FMC Corporation
Middleport, New York

Supplemental Sampling Work Plan

Tributary One North of Pearson/Stone Roads (Operable Unit 7)
and Jeddo Creek and Johnson Creek (Operable Unit 8)
Middleport, New York
Revision 1, June 8, 2018

Table of Contents

Figure Index

Table Index

Appendix Index

List of Acronyms

AOC	Administrative Order on Consent, United States Environmental Protection Agency Docket No. II RCRA-90-3008(h)-0209
Agencies	NYSDEC and USEPA
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
COC	Constituent of concern
CSM	Conceptual Site Model
DCQAP	Data Collection Quality Assurance Plan
DQO	Data Quality Objective
ECL	New York State Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMC	FMC Corporation
FSP	Field Sampling Plan
FWIA	Fish and Wildlife Impact Analysis
FWRIA	Fish and Wildlife Resource Impact Analysis
GPS	Global Positioning System
HASP	Health and Safety Plan
in bgs	inches below ground surface
MC	Matrix Code
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NPDES	National Pollutant Discharge Elimination System
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSI	Off-Site Investigation
OU	Operable Unit
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
Site	FMC Corporation Middleport Site
SOPs	Standard Operating Procedures
SPDES	State Pollutant Discharge Elimination System
Work Plan	Supplemental Sampling Work Plan
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency

1. Introduction

FMC Corporation (FMC) has prepared this Supplemental Sampling Work Plan (Work Plan) to further characterize the soil and sediment in and along Tributary One North of Pearson/Stone Roads (Operable Unit 7 or OU7) and Jeddo Creek and Johnson Creek (OU8). This characterization is needed to complete the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), and to support a Corrective Measures Study (CMS), if required, for OU7 and/or OU8. The supplemental investigation is being performed pursuant to the terms and conditions of Administrative Order on Consent, Docket No. II RCRA-90-3008(h)-0209 (AOC), effective July 2, 1991, and entered into by FMC, the New York State Department of Environmental Conservation (NYSDEC), and the United States Environmental Protection Agency (USEPA) (NYSDEC and USEPA referred to herein as "the Agencies") and its Attachment I.

FMC prepared this Work Plan in response to the Agencies' letter to FMC dated May 16, 2017, which requested that FMC complete additional sampling to further define the nature and extent of FMC-related constituents in OU7 and OU8 prior to preparing a RFI report. The draft Work Plan was prepared in accordance with the AOC and certain understandings between the Agencies and FMC reached during a July 20, 2017 teleconference and confirmed by the Agencies' email dated July 21, 2017. FMC submitted the draft Work Plan to the Agencies on November 30, 2017. As further discussed in Section 2.1 below, this Work Plan also addresses comments received (verbally and in writing) from the Agencies between March and May 2018 to the November 30, 2017 version of this Work Plan,.

1.1 Work Plan Organization

This Work Plan is organized as follows:

- Section 1 – Introduction
- Section 2 – Site Description and History
- Section 3 – Scope of Work
- Section 4 – Reporting
- Section 5 – Schedule
- Section 6 – References

2. Site Description and History

2.1 Background

FMC owns and operates a pesticide formulation facility in the Village of Middleport, Niagara County, New York (Site). The FMC Middleport facility location is shown on Figure 1 and Figure 2. The facility has manufactured or formulated pesticide products since the 1920s. Manufacturing ceased at the

Site in 1985. Studies conducted to date indicated the occurrence of FMC-related constituents in soil, sediment, surface water, and groundwater at the FMC facility and in certain off-Site areas.

Pursuant to the terms and conditions of the AOC, FMC has been implementing a RFI in multiple phases to investigate the presence of Site-related constituents at the Site and in off-Site study areas. The Agencies have divided the Site and off-Site study areas into 11 OUs. Background information concerning the OUs is provided in RFI Report Volume I – Background and Related Information (Arcadis, September 2009), which was approved by the Agencies, in consultation with the New York State Department of Health (NYSDOH), pursuant to the AOC.

OU7 includes Tributary One, north of Pearson/Stone Roads, and OU8 includes Jeddo Creek and Johnson Creek. OU7 and OU8 are downstream of OU6. OU6 includes Tributary One of Jeddo Creek, south of Pearson/Stone Roads. FMC has completed the RFI in OU6, upstream of the OU7 and OU8 study areas. The investigation results are summarized in the Agencies-approved RFI Report Volume V - Tributary One and Flood Plain South of Pearson/Stone Roads (Arcadis, June 2010). A draft Corrective Measures Study (CMS) Report (Arcadis, November 2017) for OU6 was submitted to the Agencies on November 1, 2017. The predominant constituent of concern (COC) in OU6 is arsenic in soil and sediment.

In 2006, FMC collected soil and sediment samples in OU7 and OU8 for arsenic analysis. In accordance with the Agencies-approved Sampling Work Plan – Tributary One North of Pearson Road, Jeddo Creek, and Johnson Creek (Blasland, Bouck & Lee, Inc., January 2006), FMC submitted data from that investigation to the Agencies in the spring of 2006. The Agencies approved the sample data quality by letter dated January 30, 2007. FMC sent the investigation results to the owners of the sampled properties on February 1, 2007. At the request of the NYSDEC, validated data tables were re-submitted to the NYSDEC by email on June 13, 2012 and September 7, 2016.

NYSDEC issued a letter on behalf of the Agencies to FMC on May 16, 2017 that stated the following:

> *…The Agencies reviewed the results of soil and sediment sampling conducted by FMC during and prior to 2006. A number of data gaps exist within both operable units and the data collected to date is insufficient for preparing a Remedial Facility Investigation. The Agencies have determined that additional sampling is required and request that FMC prepare and submit a Supplemental Sampling Work Plan. The Work Plan should be prepared to adequately define the nature and extent of FMC related contamination and in a manner consistent with the Remedial Investigation conducted in Operable Unit 6.*

In a letter dated May 31, 2017, FMC requested a meeting pursuant Section XI of the AOC to discuss the Agencies' May 16, 2017 letter. The meeting was held as a conference call on July 20, 2017. During the meeting, FMC requested a deadline extension for submittal of a supplemental sampling work plan for OU7 and OU8. In an email dated July 21, 2017, the Agencies extended the submittal date for the Work Plan to November 30, 2017, on which date it was formally submitted.

NYSDEC issued a letter to FMC on behalf of the Agencies on March 23, 2018, which provided written comments on the November 30, 2017 version of the Work Plan. In accordance with the AOC, FMC requested a meeting on April 5, 2018 to discuss the Agencies' comments. FMC and the

Agencies discussed the comments, including FMC's proposed responses, during a teleconference on April 25, 2018. FMC submitted its response to the Agencies' comments on May 10, 2018. Subsequent to that time, FMC and NYSDEC also discussed the sampling intervals proposed for the transects on May 24, 2018, for which NYSDEC also provided additional clarification by email to FMC on the same date. On the basis of the foregoing, FMC has revised this Work Plan in accordance with FMC's May 10, 2018 response to the Agencies' March 23, 2018 comments, and the May 24, 2018 email, as agreed amongst the parties.

2.2 Site Description

Figures 1 and 2 depict the location of OU7 and OU8. The OU7 study area begins at Stone Road to the west, and extends downstream to the convergence of Tributary One with Jeddo Creek to the north (near State Route 104). The OU8 study area begins at the downstream end of OU7, and extends downstream to approximately Marshall Road in the Town of Yates. The areas associated with OU7 and OU8 include the waterways, associated flood plains, and contributing swales.

OU7 and OU8 are immediately downstream of the Tributary One South Study Area (OU6). Figure 2 includes an aerial photograph of OU7 and OU8 and the FMC facility.

2.3 Physical Setting

Upstream of the FMC facility, and south of the Village of Middleport, Tributary One of Jeddo Creek feeds into the Middleport Reservoir, which is located south of Mountain Road in the Town of Royalton. Tributary One flows northerly through the village from the reservoir, and eventually flows into Jeddo Creek several miles northeast of Middleport, south of Ridge Road (State Route 104) and east of South County Line Road. OU6 includes the section of Tributary One between Francis Street and Stone Road.

As shown on Figure 2, OU7 includes approximately three miles of Tributary One of Jeddo Creek starting from the west side of Stone Road until it joins Jeddo Creek.

Tributary One

Figure 4 shows current land use and zoning in OU7. In the section of OU7 within Niagara County, current land use is predominantly agricultural and residential with some vacant land[1]. For the section of OU7 that runs through Orleans County, the area is zoned as agricultural and residential, with regions designated as New York State wetlands[2]. Tributary One consists of a meandering watercourse through predominantly agricultural fields. There is a narrow forested riparian zone along most of the tributary with localized areas where agricultural fields extend to the banks of the watercourse. Tributary One passes through a New York State designated wetland area in the northern portion of OU7.

1 Niagara Communities Comprehensive Plan 2030, Figure V.1 - Existing Land Use: All Land Use Categories. Clough Harbour & Associates LLP, July, 2009.

2 County of Orleans, Planning and Development Department online zoning map “Map Orleans”: https://orleansplanning.maps.arcgis.com/apps/webappviewer/index.html?id=7b0e659c4f7c4e45afbe2cab67121815 (last accessed November 23, 2017).

Historical aerial photographs from 1938 show that there were few trees within the riparian zone and the land use was dominated by agriculture. Several meanders of Tributary One appear to have migrated since 1938. There appear to be at least two meanders that have since been cutoff and become abandoned channels, multiple channels or small oxbow lakes. Two small crossings on east-west roads present in 1938 are no longer present. Currently, there are two road crossings including Stone Road and one farm crossing visible in aerial photographs.

Figure 3 illustrates the locations of numerous historical orchards that were within the drainage area of Tributary One. There are multiple swales and drainage channels draining the adjacent farmland to Tributary One. Water flow in Tributary One can vary substantially. FMC's existing State Pollutant Discharge Elimination System (SPDES) outfall discharges into Tributary One north of the Francis Street Bridge and south of the railway lines. Until 1977, FMC's discharge point to Tributary One was located beneath the Francis Street Bridge. The Middleport Sewage Treatment Plant effluent, plus storm water from village streets, private properties, and other areas are also discharged into Tributary One. North of the Erie Canal, the flow in Tributary One is supplemented with water discharged from the canal during the summer season.

Prior to 1990, the NYSDEC classified Tributary One as a Class D intermittent flow stream. A Class D stream is defined by the NYSDEC Water Quality Regulation (6 NYCRR Parts 700-705) as follows:

> *The best usage of Class D water is fishing. Due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery or stream bed conditions, the waters will not support fish propagation. These waters shall be suitable for fish survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.*

In the early 1990s, the NYSDEC reclassified Tributary One as a Class C surface water (6 NYCRR Part 847.5), which is defined by the NYSDEC Water Quality Regulation (6 NYCRR Parts 700-705) as:

> *The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary recreation, although other factors may limit the use for these purposes.*

As summarized in the draft Corrective Measures Study (CMS) Report, Tributary One and Flood Plain South of Pearson/Stone Roads Study Area – Operable Unit 6 (OU6) (Arcadis, draft November 2017), the width of Tributary One in OU6 ranges from approximately 5 to 30 feet and its average depth is between 0.5 and 1 foot. Actual water depth varies seasonally. The banks of Tributary One are highly variable, ranging from less than 1 foot in height in low lying areas, to more than 10 feet in highly modified areas within the Village of Middleport. Parts of the stream bank have riprap or other protective devices in some areas south of Sherman Street through which the tributary flows. As part of the investigation of OU7, FMC will determine similar details related to the creek and flood plain characteristics. The 100-year flood plain as mapped by the Federal Emergency Management Agency (FEMA) as of 2018 is shown on Figure 3 and Figure 4, and is only mapped in a portion of OU7 and OU8.

The bottom characteristics of Tributary One are quite variable, ranging from almost 100 percent bedrock to sediments, with a substantial fraction of fine-grained material.

Depositional areas within and adjacent to the watercourse include: point bars; cut-off channels; potential oxbows; and areas upstream of crossings where potential flow construction could cause backwater and deposition of sediment.

Jeddo Creek and Johnson Creek

The convergence of Tributary One and Jeddo Creek in the Town of Ridgeway, north of the Village of Middleport, marks the start of the OU8 study area. As shown on Figure 2, Jeddo Creek joins Johnson Creek further to the north, close to the point where Jeddo Creek crosses Mill Road.

Jeddo Creek from the confluence with Tributary One to the confluence with Johnson Creek is a highly sinuous meandering watercourse. The riparian area is generally wide and forested with areas of previously farmed land that is becoming forested. The riparian forest is narrower at the downstream end where farmland is closer to the creek. The creek flows through a campground where there are less trees and manicured lawn appears to extend to the banks of the creek.

Jeddo Creek contains long riffle sections, suggesting a steeper channel than Tributary One upstream and Johnson Creek downstream. It also contains numerous tree falls through the forested sections as well as islands, mid-channel bars and cut-off channels.

Johnson Creek from the confluence with Jeddo Creek to the crossing at Marshall Road consists of a highly sinuous meandering watercourse. The riparian area is generally forested; however, there are narrow areas of forest where farmland or residential properties are near the creek. There are numerous tree falls visible in aerial photographs and evidence of cutoff channels.

Both Jeddo Creek and Johnson Creek are classified by NYSDEC as Class C streams. The most recent FEMA maps do not include 100-year flood plain information for the portions of Jeddo and Johnson Creeks within OU8.

Locations of historical orchards near OU8 are shown on Figure 3, and property zoning descriptions as of November 2017 are shown on Figure 4. Jeddo Creek receives stormwater runoff from residential, agricultural and some commercial zoned lands south of its convergence with Tributary One. Jeddo Creek received treated groundwater from 1996 through May 2012 from the FMC Dublin Road site, and currently receives surface water from the FMC Dublin Road site and an inactive municipal landfill in the Village of Middleport.

Johnson Creek receives stormwater runoff from residential and agricultural zoned lands and current and former orchards west of its convergence with Jeddo Creek. East of its convergence with Jeddo Creek, Johnson Creek receives runoff from wetlands and agricultural and prime farm lands.

Downstream of the OU8 study area, Johnson Creek flows northward towards the Village of Lyndonville dam.

2.4 Background and Previous Investigations

FMC has collected over 700 soil and sediment samples in OU7 and OU8, collectively, to date. Table 1 summarizes the historical soil, sediment, and surface water samples previously submitted to the Agencies. The following summarizes the investigations completed in OU7 and OU8:

- **1990/1993 Off-Site Investigation (OSI)** – FMC completed the OSI program under the terms and conditions of an Order on Consent entered into by FMC and the NYSDEC (Index No. B9-0221-88-04, known herein as "OSI Order") in July 1990. Over 400 soil, surface water, and sediment samples were collected in 1990 and 1993 from off-Site study areas, including portions of Tributary One and Jeddo Creek now included in OU7 and OU8. The samples were analyzed for metals, chlorinated pesticides and herbicides, phenolic compounds, organophosphate pesticides, methyl carbonates, and semi-volatile organic compounds. FMC submitted the OSI Report (Conestoga-Rovers & Associates, 1993) to the Agencies in August 1993 and included a human health and ecological risk assessment in accordance with the provisions of the OSI Order. The ecological risk assessment included a fish and wildlife impact analysis (FWIA) performed in accordance with NYSDEC-approved work plans, NYSDEC draft guidance (Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC, June 1991)), and USEPA guidance (Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual (USEPA, March 1989)). In March 1995, FMC submitted a Draft Focused Feasibility Study Report (Conestoga-Rovers & Associates, 1995) to assess the presence of Site-related chemicals in the off-Site study areas and evaluate several remedial alternatives.
- **1995 NYSDEC Investigation** – NYSDEC collected sediment samples for arsenic analysis from within what is now referred to as OU7 and OU8, including contributing drainage swales.
- **2006** – FMC collected over 600 soil and sediment samples from over 100 boreholes installed in what is now within OU7 and OU8, including associated flood plains and contributing swales. Samples were analyzed only for arsenic based on the initial findings of OU6 RFI and the low frequency of detections of non-arsenic constituents. The 2006 investigation included the collection of several samples from tributary streams and ditches draining to Tributary One, Jeddo and Johnson Creeks in an effort to characterize potential contributing sources of arsenic to OU7 and OU8. These samples are part of the overall data set for OU7 and OU8. The locations of the 2006 sampling transects are shown on Figure 3 and Figure 4.

Upstream of OU7 and OU8, FMC collected over 2,300 soil and sediment samples to characterize the nature and extent of FMC-related constituents in OU6 as part of FMC's RFI. As stated in the RFI Volume V – Tributary One and Flood Plain South of Pearson/Stone Roads (Arcadis, June 2010), the use of arsenic data adequately defined the horizontal and vertical limits of potential FMC-related impacts in soil and sediment in OU6. The OU7 and OU8 study areas are downstream of OU6. Existing data collected from the furthest downstream reach of OU6, and in OU7 and OU8, indicate lower concentrations of arsenic in soil and sediment than observed at locations closer to the FMC facility. Based on the finding of RFI Volume V (OU6), FMC had proposed to the Agencies in November 2017 that additional investigations in OU7 and OU8 would focus on arsenic concentrations in soil and sediment; however, as requested by the Agencies in NYSDEC's

March 23, 2018 letter, 20 percent of samples collected as part of this Work Plan shall also be analyzed for lead and chlorinated pesticides, in addition to arsenic.

3. Scope of Work

In order to collect data to complete the OU7 and OU8 RFIs, FMC will complete an investigation to supplement existing data. This investigation will include soil and sediment sampling in both OU7 and OU8.

FMC will collect soil and sediment samples along 10 transects in OU7 and 20 transects in OU8. FMC will also collect soil and sediment samples to characterize potential non-FMC sources of COCs. Proposed sampling locations may be relocated, deleted or added in the field based on access permission, or field conditions encountered during site reconnaissance, with approval of the Agencies. The scope of work for this investigation is as follows:

- Obtain access to private properties for soil and sediment sampling activities.
- Complete site reconnaissance activities at each sample location (transect or other sampling location).
- Identify transect locations and soil/sediment sampling locations to the Agencies for confirmation and approval (as appropriate and/or necessary).
- Collect soil and sediment samples as described in Appendix B (Field Sampling Plan), and document observations regarding the environment at each sampling location including geomorphic conditions and sediment deposition.
- Survey sample locations.
- Analyze soil and sediment samples for arsenic.
- Analyze 20 percent of soil and sediment samples for lead and chlorinated pesticides, as requested by the Agencies.
- Prepare and submit a brief data report to the Agencies for their review.

The rationale for transect and sampling locations is described in Section 3.1. Section 3.1 also described the process for obtaining Agencies approval of sampling locations. Additional information regarding each item identified above is provided in Section 3.2, Section 3.3, and Section 4 of this Work Plan.

An updated Health and Safety Plan (HASP) for these activities is provided in Appendix A.

3.1 Sample Location Rationale and Approval Process

The proposed sampling locations are shown on Figure 3, and the rationale for each transect is summarized in Table 2. The rationale for samples to characterize potential non-FMC sources of COCs are also discussed further below.

Since FMC does not yet have access to the proposed sampling areas on private property, FMC's geomorphologist, Dr. Jeff Doucette, used aerial photographs to identify likely depositional areas

along OU7 and OU8. FMC selected the likely depositional areas to sample based on their distance from existing or proposed sampling transects, and concentrations of detected constituents in historical samples. Additional transect locations were selected after completing a detailed review of existing data to assess data gaps, and address the Agencies' request to collect samples approximately 1,000 to 1,500 feet apart.

As FMC did not have sufficient access in order to complete reconnaissance of OU7 and OU8 prior to preparing this Work Plan, the sampling locations and numbers may vary as a result of access restrictions, as well as actual field conditions as determined in the field. Figure 7 presents flow charts illustrating the rationale for transect and sample collection. Figure 7 is intended to assist field staff in adjusting transect and sample locations in the field.

Proposed transect locations will be field located to focus on areas of sediment deposition, as appropriate. If more than one deposition area occurs within an approximate 1,000 to 1,500 feet section of stream, another sampling transect may be sited in that section. If, based on access restrictions and stream characteristics, it is not possible to locate a proposed transect within one of the 1,000 to 1,500 feet sections, then the next closest appropriate transect location will be selected (i.e., a sediment deposition area within a property that FMC is allowed to access).

As requested by the Agencies, transects will extend into adjacent and contiguous mapped wetlands, if present. NYSDEC wetlands mapping (shown on Figure 3 and Figure 4) shows that only one mapped wetland occurs adjacent to the stream in OU8.

Proposed transect locations and additional non-FMC source identification sample locations will be field located based on access permission and the site reconnaissance. FMC will stake/mark proposed sampling locations for field approval by the Agencies' field representative, if present. FMC will also mark the locations on a drawing. If the Agencies' field representative is not available for field approval of sampling locations, FMC will request approval of sampling locations via email. As discussed with the Agencies during the April 25, 2018 teleconference with FMC, and as stated in the May 10, 2018 response to comments, the Agencies will respond to FMC's request within one week after receiving such a request.

The estimated number of boreholes per transect is summarized in Table 3. The approach generally assumes that 8 to 10 boreholes are installed in each transect, depending on the width of the flood plain[3] at that transect location, as shown on Figure 5. The general approach is to collect samples from:

- Two locations (sediment samples, shown as S1 and S2 on Figure 5) within the stream bed (on either side of the thalweg) in transect locations where sediment deposits of sufficient volume to sample exist on both sides of the thalweg.
- One location at the base of each stream bank (assuming that there is more than 3 feet between the base of the bank (sample E1 and W1 on Figure 5) and the sediment deposit beside of the thalweg (sample S1 and S2 on Figure 5) to justify separate samples).

[3] Where the flood plain has not been previously mapped, FMC will use field observations to delineate its approximate limits and for locating the appropriate sampling locations along each transect.

- One flood plain location on each side of the stream, above the stream bank and within approximately 25 feet from center of thalweg (shown as locations E2 and W2 on Figure 5).
- One flood plain location on either side of the stream, approximately 100 feet into the flood plain (measured as distance from thalweg, shown as locations E3 and W3 on Figure 5), provided that the flood plain extends 100 feet from the center of the thalweg.
- An additional location at the limit of the flood plain (shown as locations E4 and W4 on Figure 5), if the 100-year flood plain (or perceived flood plain where it has not been mapped) is relatively flat and appears to extend more than 200 feet past the center of the thalweg. This would include 2 sample locations, one on each side of the stream, if the flood plain extends greater than 200 feet beyond the center of the thalweg on both sides.

This results in up to 8 sample locations for a typical transect along a section of a stream that has a 100 foot wide flood plain on each side. In some cases, up to 10 locations could be sampled, if the flood plain extends beyond 200 feet on both sides of the thalweg.

The transect and borehole locations are approximate and are the preferred locations based on the information currently available, but they may be adjusted in the field in order to meet the rationale for the samples listed in Table 2. Soil and sediment sampling locations may be adjusted in the field based on property access, property owner requirements, and unforeseen conditions at the proposed sampling locations (e.g., unsafe grades, rocky surface/subsurface, lack of sediment, etc.). Sampling transects may also be adjusted, if actual geomorphic conditions are different than shown on Figure 3 and summarized in Table 2.

Potential Sampling Locations – Non-FMC Sources of COCs

Figures 3 and 4 identify additional proposed sampling locations (purple or blue ovals) for the purpose of characterizing potential non-FMC contributing sources of COCs to the waterways. These sample locations will be refined based on site reconnaissance activities and information obtained during interviews with property owners, as indicated in the sampling flow chart provided on Figure 7. These samples may include transects, grid-based samples, or other sampling approach based upon site reconnaissance. These potential sampling locations are based on historical and current site usage (including agricultural or orchard-based use) and the presence of potentially undisturbed areas next to these areas.

The sample depths, sampling procedures, and approval process for samples associated with non-FMC source characterization will be generally consistent with the soil and sediment samples collected elsewhere on site. Sample locations will be will be approved in the field by the Agencies' field representative, or if that representative is not available, locations will be mapped and submitted to the Agencies for approval prior to sample collection within a week of request, as noted above.

3.2 Access

Prior to initiating investigative activities, FMC will contact landowners for written permission to access their properties to complete the scope of work identified in this Work Plan. FMC will send a request for access letter by certified mail, overnight delivery service, or hand-delivery, as appropriate, to each landowner along OU7 and OU8. The letters will request that the landowners

provide responses by a specified date. If there are landowners who do not respond within the specified timeframe, FMC will attempt to contact them by telephone, an in-person visit to the property, or by sending another request-for-access letter. FMC will compile a list of landowners who have denied access to their property, and share this list with the Agencies.

FMC will survey property boundaries (based on property deeds) in the field to confirm samples are not collected from properties that have refused to provide access to FMC. Sampling/investigative activities will be conducted only on properties whose owners have granted written access permission.

3.3 Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP) for the OU7 and OU8 RFIs consists of the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP). The FSP is provided in Appendix B, and the QAPP is provided in Appendix C. The key components of this SAP are summarized in Sections 3.3.1 through 3.3.4, below.

Field work will be performed in accordance with the FSP in Appendix B, which presents detailed sampling procedures. FMC will clean/decontaminate equipment prior to, and following, soil and sediment sampling, as summarized in Appendix B.

FMC has the Agencies'-approved Data Collection Quality Assurance Plan (DCQAP) (Conestoga-Rovers & Associates, 1993) for groundwater monitoring, RFI, and interim corrective measures activities. FMC has prepared a QAPP for the OU7 and OU8 RFIs to update the existing DCQAP. The QAPP is provided in Appendix C of this Work Plan.

FMC will use a laboratory qualified by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) for the analysis of the samples, as summarized in Appendix C. Samples will be analyzed for arsenic, and 20 percent of samples will also be analyzed for chlorinated pesticides and lead. The samples to be analyzed for chlorinated pesticides and lead will include soil and sediment, and will include samples from all depth intervals. FMC will collect quality control (QC) samples for laboratory analysis, including field duplicates, field blanks, and matrix spike/matrix spike duplicate (MS/MSD) samples as summarized in Appendix C.

FMC will perform quality assurance (QA) activities so that the data are scientifically defensible, properly documented, of known quality, and meet the project objectives. Data validation and QA are discussed in Appendix C.

3.3.1 Utility Clearance and Site Reconnaissance

FMC will receive utility clearances for the investigation areas prior to commencing intrusive work activities. As was completed during the 2006 investigation in OU7 and OU8, FMC will interview property owners and document the following:

- Property owner name and address, and length of ownership of property
- Current land use, and historical land use (if owner can provide information), including property history, historical use of pesticides, herbicides, fungicides, or other chemicals on the property, and other information relevant to this investigation

- Property boundaries
- Observations regarding drainage or discharges, including a sketch

An example questionnaire for interviews is provided in Appendix B, Attachment B.1.

Site reconnaissance will include marking of property boundaries along the proposed sampling areas, and identification and documentation of geomorphic conditions and sediment deposition areas, since the intent is to collect samples from areas of sediment deposition. FMC will use a hand-held global positioning system (GPS) device to field locate approximate sample locations, and will mark them in the field with stakes. Figure 7 presents a transect and sample location selection rationale, intended to assist field staff in adjusting sample locations in the field. Transect and other sample locations shown on Figures 3 and 4 may be adjusted in the field based upon conditions encountered or observed at the time of sampling, including lack of sediment, the presence of gravel/rock stream substrate unsuitable for sampling, stream geomorphic conditions, safety concerns, and access. Sampling locations may be adjusted based on limitations imposed by the property owner at the time of access negotiations, or based upon information received during the interview of the property owner.

3.3.2 Soil and Sediment Sampling

Each transect location will typically consist of 8 to 10 sampling locations/boreholes, with the potential for additional samples based on site reconnaissance for non-FMC source identification purposes. FMC will also collect samples for non-FMC source identification purposes from areas outside of the transects, as shown on Figure 3 and Figure 4. The number of boreholes will depend on the width of the perceived flood plain based on field observations, access, and other considerations, as discussed in Section 3.1.

Soil samples will be collected from discrete intervals down to 24 inches below ground surface (in bgs), as shown on Figure 5. This approach targets likely depth for exposure to constituents by humans or ecological receptors. The sample intervals may be adjusted based on observed strata changes, presence of fill material, presence of native material, and observed thickness of overlying sediment as compared to underlying material.

Continuous soil samples may be collected using a direct-push method, as discussed in the FSP in Appendix B. Alternatively, FMC may use a hand auger.

Sediment samples may be collected using either a trowel (or similar equipment) or direct-push method (to be determined based on individual sampling location conditions).

If the sediment sample will be collected from below the water, an Eckman sampler (or similar) or direct-push method may be used, as described in Appendix B. Figure 5 presents an example transect and typical sampling intervals.

FMC will document soil sample intervals and stratigraphy, as summarized in Appendix B. Sample locations will be recorded using a GPS device, and then surveyed to document coordinates and elevation.

3.3.3 Habitat Assessment

FMC's sampling team will include at least one ecologist or scientist experienced in habitat assessment. In accordance with FWRIA guidance, FMC will record the flow patterns, location, habitat cover types and quality, and descriptions of the creeks and wetlands where FMC has obtained access. FMC will inspect riparian areas for evidence of impacts. Evidence will include dead or stressed vegetation, sheens, seeps, odors, and discolored soil or sediment. FMC will also assess the likelihood for direct human contact with the sediments and soil in the study area. The assessment will consist of a walkthrough to make field observations for evidence of human utilization of the study area. The observations will include, but not be limited to:

- The presence of foot paths
- Litter
- Campfires
- Fishing debris

The collected information will allow FMC to address up to and including Step II B (Contaminant-Specific Impact Assessment, Criteria-Specific Analysis) identified in the NYSDEC document "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, October 1, 1994). Should this review identify potential impacts to fish and wildlife that are FMC-related, and are not attributed to non-FMC sources of COCs, FMC will evaluate the need for additional work in a subsequent phase of investigation.

3.3.4 Sample Analysis

Soil and sediment samples will be analyzed for total arsenic. As requested by the Agencies, 20 percent of soil and sediment samples will also be analyzed for lead and chlorinated pesticides. FMC will analyze and validate samples in accordance with the QAPP in Appendix C.

4. Reporting

FMC will submit a brief data report to the Agencies following completion of data collection, validation, and analysis for OU7 and OU8. The data report will include a summary of the field activities completed, validated data tables, and figures showing sample locations in plan view and cross section. Data will be provided in an Electronic Data Deliverable (EDD) format. Cross sections will be prepared using data obtained during sampling activities, including surface elevations at sampling locations, information on stream bed characteristics, and water depth.

Upon completion of supplemental work for OU7 and OU8, and receipt of Agencies approval that there is sufficient data to complete the RFIs, FMC will prepare RFI Report - Volume VI and RFI Report - Volume VII. The RFI Reports will summarize data collected during this Work Plan and historical data for OU7 and OU8. The schedule for submission of the RFI Reports will depend on the Agencies' acceptance of the data as sufficient to prepare a RFI, as discussed in Section 5.

Following completion of the RFI Reports, FMC will prepare a FWRIA report for work completed up to and including Step II B (Contaminant-Specific Impact Assessment, Criteria-Specific Analysis) in

the NYSDEC document "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, October 1, 1994). The schedule for submission of the FWRIA report will depend on the Agencies' acceptance of the data as sufficient to prepare a RFI, as discussed above and in Section 5.

5. Schedule

Figure 6 presents the proposed schedule for the Work Plan tasks. This schedule depends on the timing required to obtain access to properties, access restrictions by the property owners, the Agencies' approval of the Work Plan and/or certain sampling locations, and seasonal/weather conditions. Commencing upon receipt of the Agencies' approval of the Work Plan, FMC will attempt to obtain access to properties within OU7 and OU8.

Sampling will commence on sites for which access has been granted following the receipt of the Agencies' approval of the field-verified sampling locations, since proposed sampling locations may be adjusted from the locations currently shown on Figure 3 and Figure 4 based on site reconnaissance and access restrictions.

FMC will update this schedule to reflect the actual timing of the Agencies' review and approval of the Work Plan, and execution of necessary access agreements, once such information is available. Further revisions to the schedule will be made following receipt of the Agencies' approval of the sampling locations and mobilization for sample collection.

6. References

Arcadis, June 2010. RFI Volume V – Tributary One and Flood Plain South of Pearson/Stone Roads.

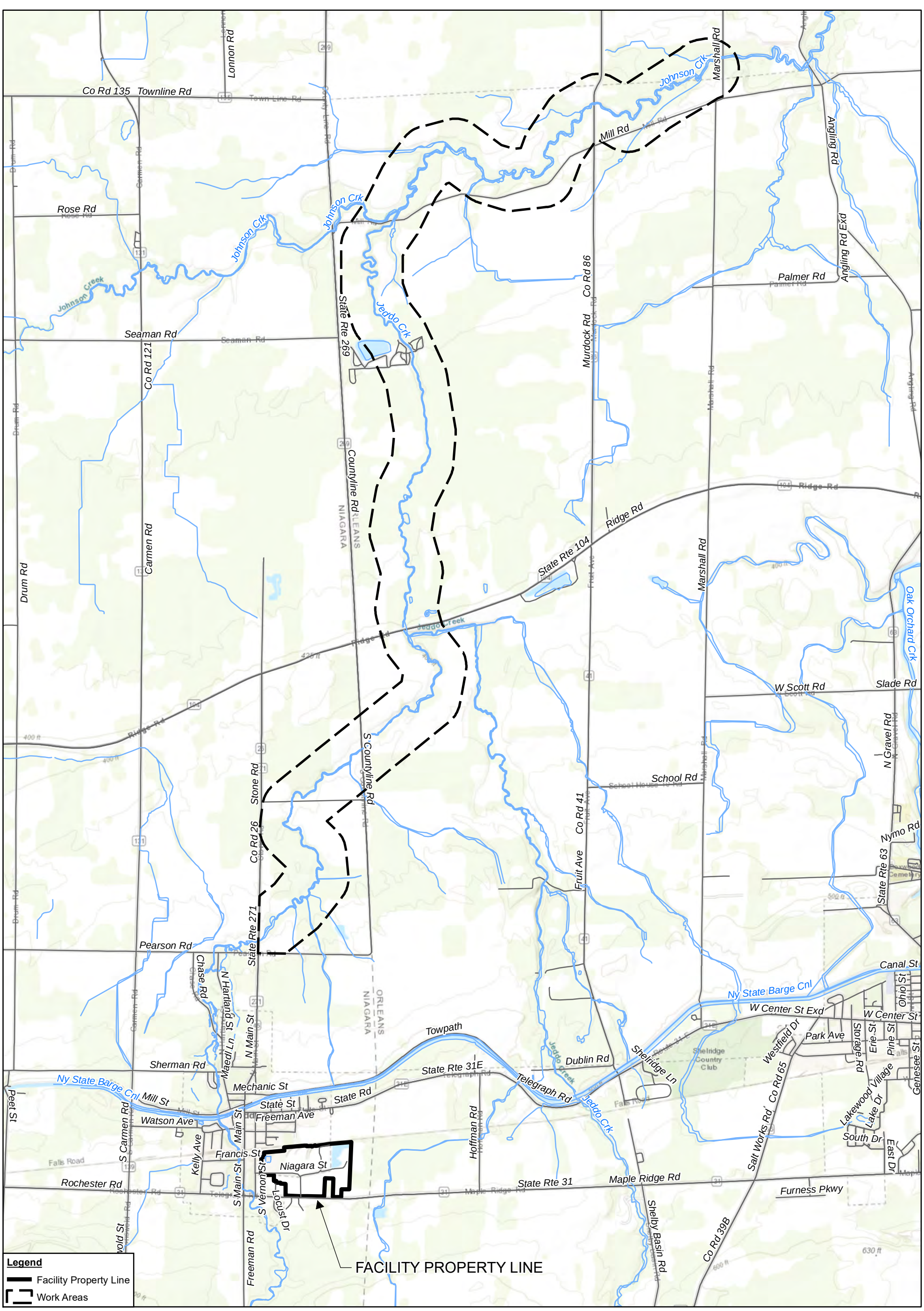
Arcadis, November 2017. Draft Corrective Measures Study (CMS) Report Tributary One and Flood Plain South of Pearson/Stone Roads Study Area – Operable Unit 6 (OU6).

Blasland Bouck & Lee, Inc., 2006. Sampling Work Plan Tributary One North of Pearson Road, Jeddo Creek, and Johnson Creek.

Conestoga-Rovers & Associates, 1993. Off-Site Investigation Report.

NYSDEC, October 1994. Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites.

Conestoga-Rovers & Associates, 1993. Data Collection Quality Assurance Plan (DCQAP).



Source: ESRI Topographic Basemap, Accessed 2018;
United States Census Bureau, 2017 TIGER/Line® Shapefiles

0 1,000 2,000 3,000
Feet

Coordinate System:
NAD 1983 StatePlane New York
West FIPS 3103 Feet

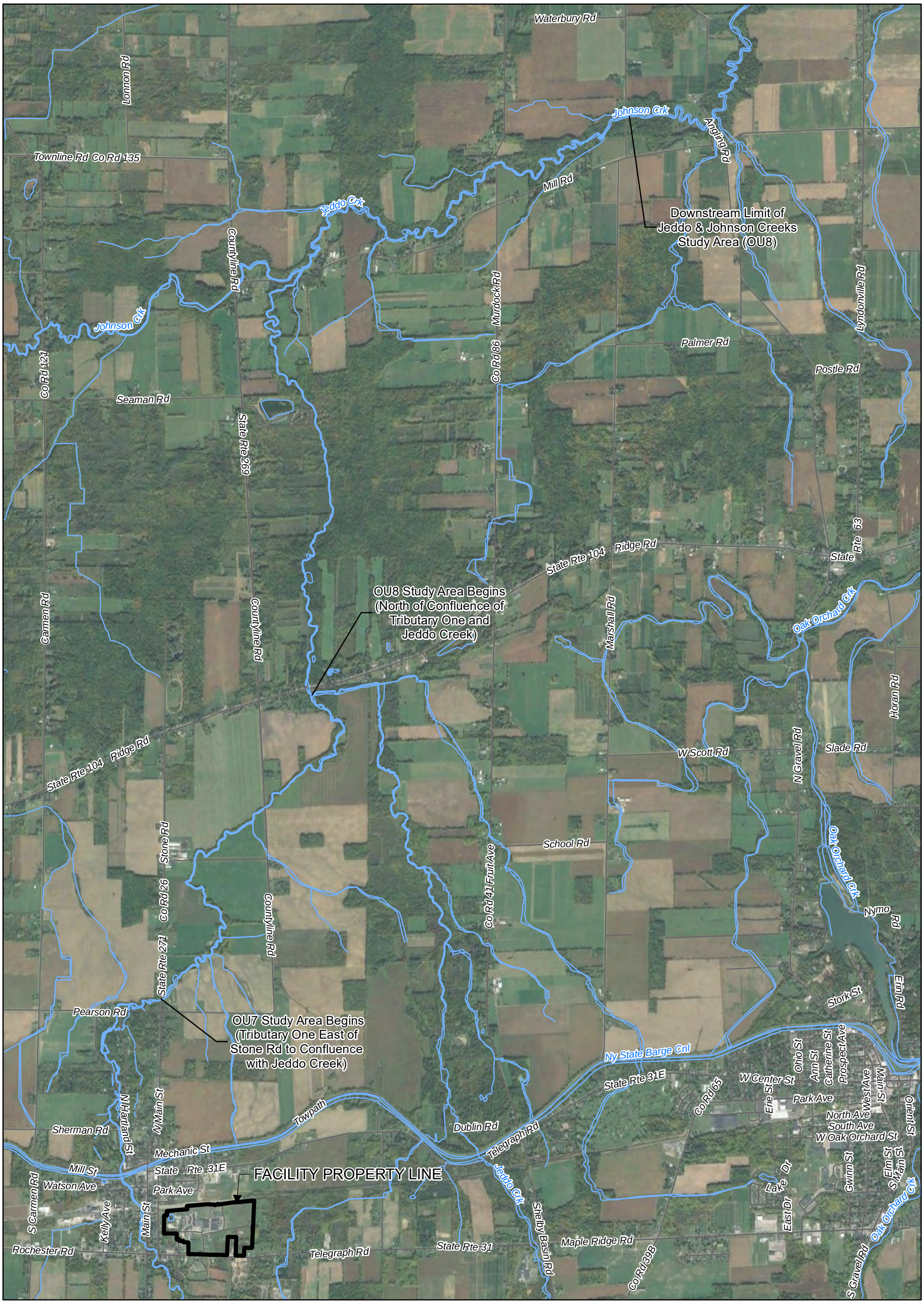
FMC CORPORATION
MIDDLEPORT, NY
SUPPLEMENTAL SAMPLING WORK PLAN
TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8)

SITE LOCATION

11149486-10
May 31, 2018

FIGURE 1

GIS File: Q:\GIS\PROJECTS\11149000s\11149486\Layouts\001\11149486-10(001)GIS-OT004.mxd



Imagery: Image ©2017 Google
United States Census Bureau, 2017 TIGER/Line® Shapefiles

0 1,000 2,000 3,000
Feet

Coordinate System:
NAD 1983 StatePlane New York West FIPS 3103 Feet

N

GHD

FMC CORPORATION
MIDDLEPORT, NY
SUPPLEMENTAL SAMPLING WORK PLAN
TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8)

11149486-10
Jun 4, 2018

AERIAL PHOTOGRAPH OF SITE AND SURROUNDING AREA

FIGURE 2

GIS File: Q:\GIS\PROJECTS\11149000s\11149486\Layouts\001\11149486-10(001)GIS-OT005.mxd

Legend

- Potential Deposition Sites (Based on aerial photographs)
- Potential OU7 Sampling Locations
- Potential OU8 Sampling Locations
- Proposed OU7 Transect Location
- Proposed OU8 Transect Location
- 2006 Proposed Sampling Transect (No Access)
- 2006 Transect
- Waterline
- State Regulated Freshwater Wetlands
- Historical Orchard Location (identified based on review of aerial photographs dated 1931, 1938, 1951, 1958, 1966, 1968, and 1971)
- 1% Annual Chance Flood Hazard (FEMA flood plain mapping not available for all of OU7 and OU8)

JN4
JN3.6
JN3
JN2.9
JN3.3
JN2.8
JN2.3
JN2.4
JN2.5
JN2.6
JN2.2
JN2
JN2.1
JN1
JNB1
JND1
JD4
JD3.9
JD3.8
JD3.5
JD3.2
JD3.1
JD3
JD2.8
JD2.5
JD2
JD1.9
JD1.5
JD1.3
JD1
JDS1
T31.1
T31
T30.3
T30
T29.7
T29.1
T29
T28.3
TSE1
T28
TSE2
T27.7
T27.2
T27
T26.5
T26
T25
TSD1
T24.2
T24
TSC1
TSB1
T23.3
T23
TSA1

Downstream Limit of Jeddo & Johnson Creeks Study Area (OU8)

OU8 Study Area Begins (North of Confluence of Tributary One and Jeddo Creek)

OU7 Study Area Begins (Tributary One East of Stone Rd to Confluence with Jeddo Creek)

Source: ESRI Topographic Basemap, Accessed 2018; Floodplain: FEMA National Flood Hazard Layer (NFHL), Accessed 2018
NYS Freshwater Wetlands: Those wetlands that are currently mapped under the state's Freshwater Wetlands Act; New York State Department of Environmental Conservation, Environmental Resource Mapper

0 1,000 2,000 3,000
Feet

Coordinate System:
NAD 1983 StatePlane New York
West FIPS 3103 Feet

FMC CORPORATION
MIDDLEPORT, NY
SUPPLEMENTAL SAMPLING WORK PLAN
TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8)

PROPOSED SAMPLING TRANSECTS AND LOCATIONS

11149486-10
Jun 4, 2018

FIGURE 3

GIS File: Q:\GIS\PROJECTS\11149000s\11149486\Layouts\001\11149486-10(001)GIS-OT002.mxd

Niagara County

Orleans County

Downstream Limit of Jeddo & Johnson Creeks Study Area (OU8)

OU8 Study Area Begins (North of Confluence of Tributary One and Jeddo Creek)

OU7 Study Area Begins (Tributary One East of Stone Rd to Confluence with Jeddo Creek)

JN4 JN3 JN2.9 JN3.6 JN3.3 JN2.8 JN2.3 JN2.4 JN2.2 JN2.6 JND1 JN2.5 JN2 JN2.1 JNB1 JN1 JD4 JD3.9 JD3.8 JD3.5 JD3.2 JD3.1 JD3 JD2.8 JD2.5 JD2 JD1.9 JD1.5 JD1.3 JDS1 JD1 T31 T31.1 T30.3 T29.7 T30 T29.1 T29 T28.3 TSE1 T28 TSE2 T27.7 T27.2 T27 T26.5 T26 T25 TSD1 T24.2 TSC1 TSB1 T23.3 T24 TSA1 T23

Johnson Creek

Jeddo Creek

Marshall Rd

Palmer Rd

Ridge Rd

Stone Rd

Erie Ave

Lyndonville Rd

Gravel Rd

Legend

- Deposition Sites
- Proposed OU7 Transect Location
- Proposed OU8 Transect Location
- Potential OU7 Sampling Locations
- Potential OU8 Sampling Locations
- 2006 Proposed Sampling Transect (No Access)
- 2006 Transect
- Waterline
- County Line
- 1% Annual Chance Flood Hazard

Orleans County Zoning

- Residential Districts
- Commercial Districts
- Agricultural District
- Prime Farmland

Niagara County Land Use

- Agriculture
- Residential
- Vacant
- State Regulated Freshwater Wetlands

Source: ESRI Topographic Basemap, Accessed 2018; NYS Freshwater Wetlands: Those wetlands that are currently mapped under the state's Freshwater Wetlands Act; New York State Department of Environmental Conservation, Environmental Resource Mapper
Zoning: Niagara Communities Comprehensive Plan 2030, Existing Land Use, Figure V.1; Map Orleans: County of Orleans, NY Planning Map, Accessed November 7, 2017

0 1,000 2,000 3,000
Feet

Coordinate System:
NAD 1983 StatePlane New York
West FIPS 3103 Feet

N

GHD

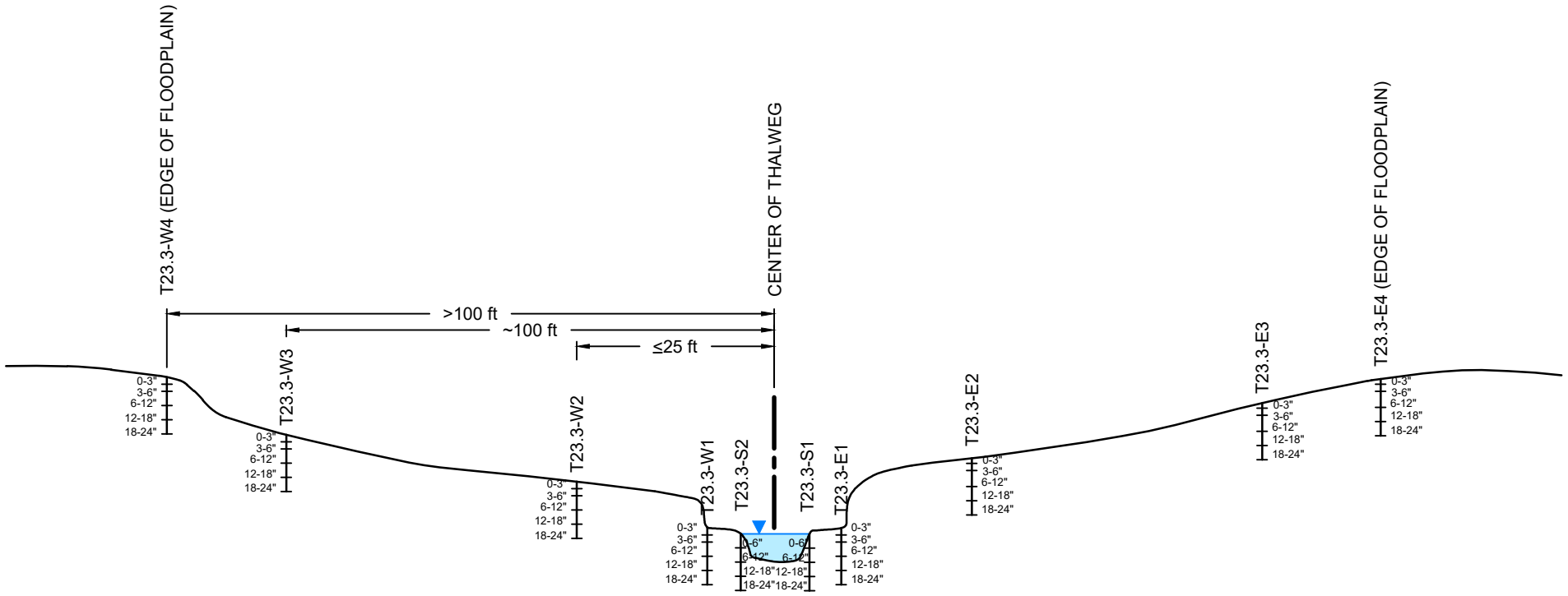
FMC CORPORATION
MIDDLEPORT, NY
SUPPLEMENTAL SAMPLING WORK PLAN
TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8)

PROPERTY ZONING AND LAND USE

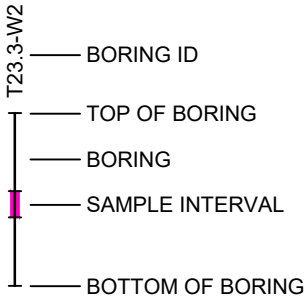
11149486-10
Jun 4, 2018

FIGURE 4

GIS File: Q:\GIS\PROJECTS\11149000s\11149486\Layouts\001\11149486-10(001)GIS-OT003.mxd



LEGEND



NOTES:

1. THIS CROSS SECTION IS TYPICAL AND SHOWN AS AN EXAMPLE. ACTUAL SAMPLE LOCATIONS AND DEPTH WILL BE ADJUSTED BASED ON ACCESS, PRESENCE OF SEDIMENT, AND OTHER FACTORS PER WORK PLAN.
2. SEDIMENT SAMPLING WILL TARGET DEPOSITION ZONES. SEDIMENT SAMPLES WILL BE COLLECTED FROM BOTH SIDES OF STREAM IF SUFFICIENT SEDIMENT EXISTS.
3. SAMPLES E1 AND W1 WILL BE COLLECTED FROM BASE OF BANK.
4. SAMPLES WILL BE COLLECTED FROM EDGE OF APPROXIMATED 100-YEAR FLOODPLAIN IF THE FLOODPLAIN EXTENDS MORE THAN 100 FEET FROM THE CENTER OF THE THALWEG

NOT TO SCALE

FMC CORPORATION
MIDDLEPORT, NEW YORK
SUPPLEMENTAL SAMPLING WORK PLAN

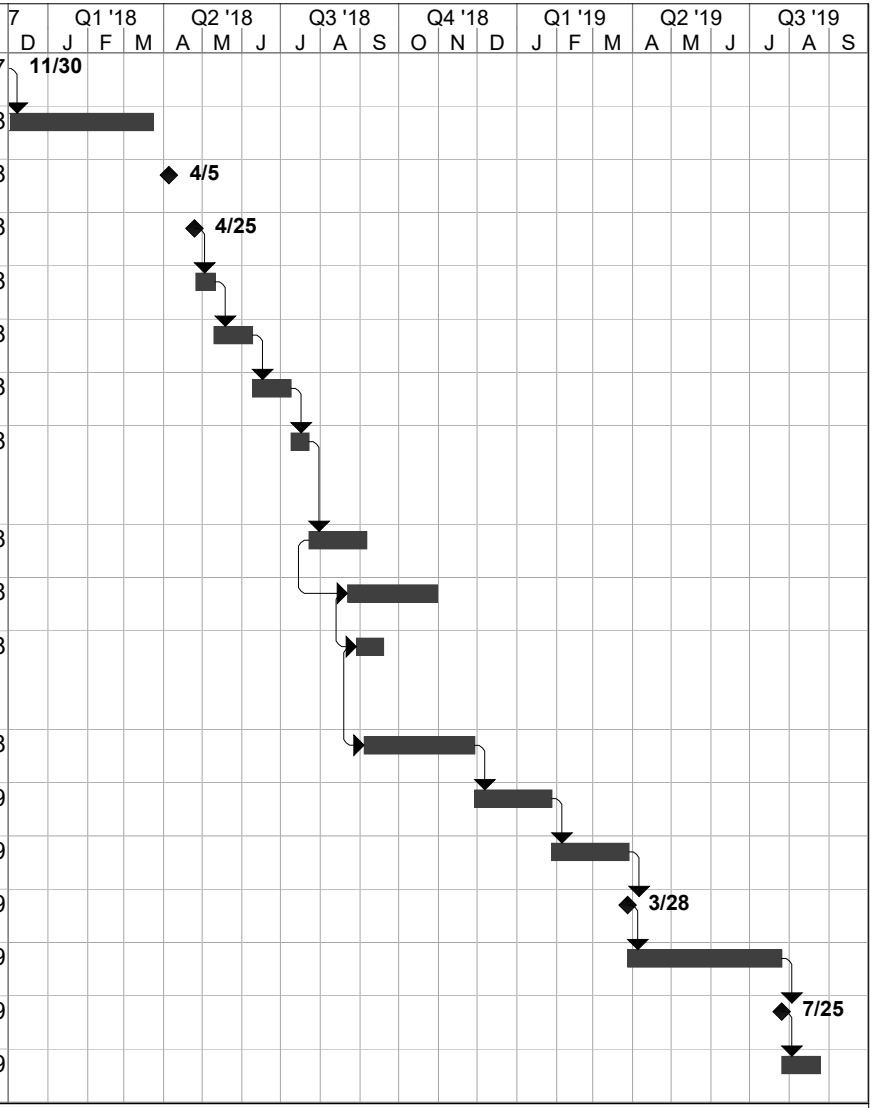
11149486-00
Jun 4, 2018

TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8) EXAMPLE TRANSECT SAMPLING PLAN

FIGURE 5

CAD File: P:\drawings\11149000s\11149486\11149486-reports\11149486-00(001)\11149486-00(001)GN\11149486-00(001)GN-WA002.dwg

ID	Task Name	Duration	Start	Finish
1	Submit Work Plan	0 days	Thu 11/30/17	Thu 11/30/17
2	Agencies' Review and Comment	114 days	Thu 11/30/17	Fri 3/23/18
3	FMC Request Meeting	1 day	Thu 4/5/18	Thu 4/5/18
4	FMC Meeting with Agencies	1 day	Wed 4/25/18	Wed 4/25/18
5	FMC Response to Comments	15 days	Thu 4/26/18	Thu 5/10/18
6	Submit Revised Work Plan and Schedule	30 days	Thu 5/10/18	Fri 6/8/18
7	Agencies' Approval of Work Plan and Schedule	30 days	Sat 6/9/18	Sun 7/8/18
8	Access Procurement Document Review and Approval by Agencies	14 days	Mon 7/9/18	Sun 7/22/18
9	Access Procurement	45 days	Mon 7/23/18	Wed 9/5/18
10	Field Activities	70 days	Wed 8/22/18	Tue 10/30/18
11	Obtain Agencies' Approval of Sample Locations (within 1 week for each location)	21 days	Wed 8/29/18	Tue 9/18/18
12	Sample Analysis and Data Validation	86 days	Tue 9/4/18	Wed 11/28/18
13	Prepare and Submit Data Package to Agencies	60 days	Thu 11/29/18	Sun 1/27/19
14	Agencies' Review of Data	60 days	Mon 1/28/19	Thu 3/28/19
15	Receive Notification of Agencies' Notice to Prepare RFI	0 days	Thu 3/28/19	Thu 3/28/19
16	Prepare Draft RFI	120 days	Thu 3/28/19	Thu 7/25/19
17	Submit Draft RFI to Agencies	0 days	Thu 7/25/19	Thu 7/25/19
18	Submit FWRIA to Agencies	30 days	Fri 7/26/19	Sat 8/24/19

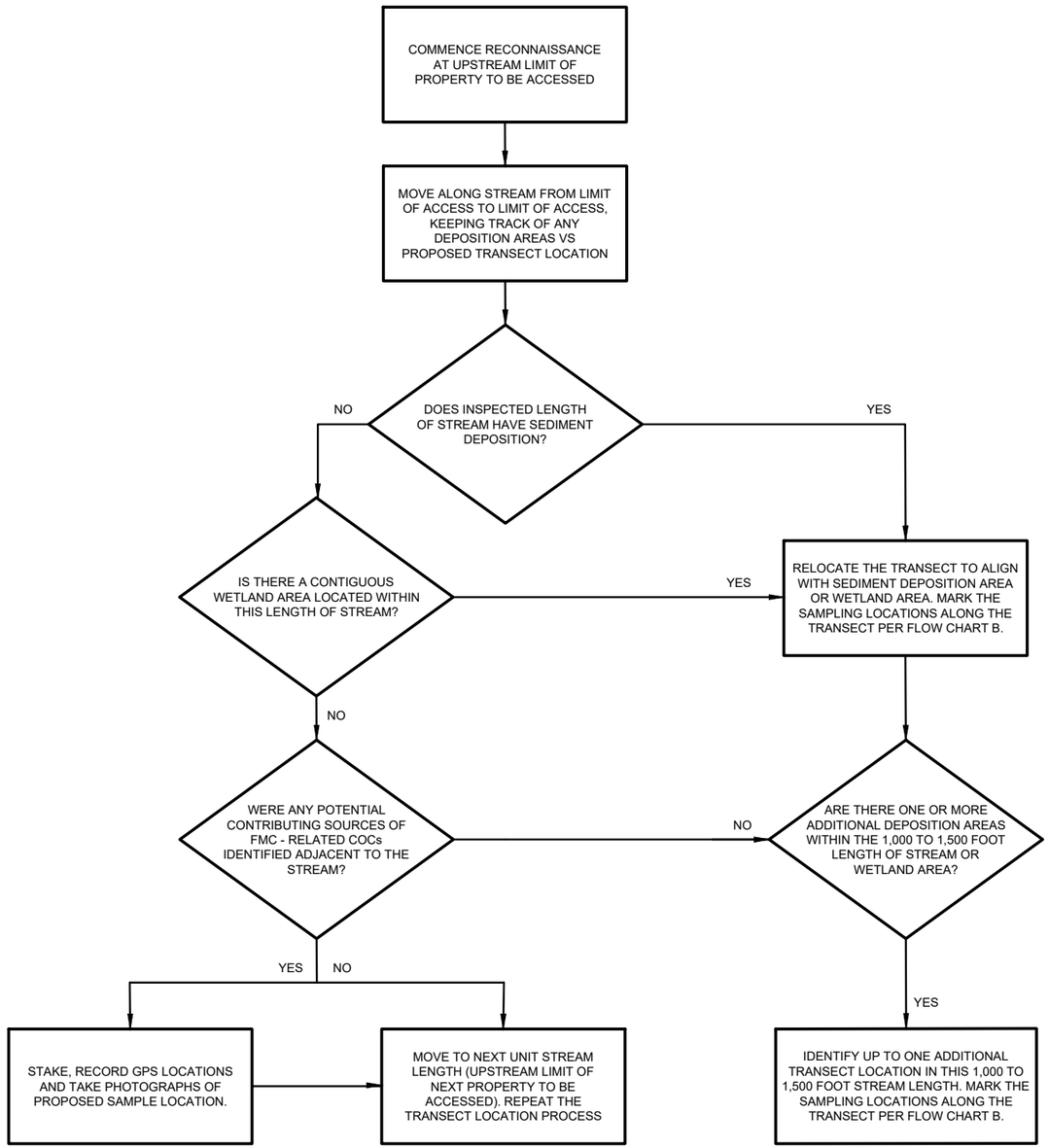


11149486-10-30(1)
Thu 6/7/18

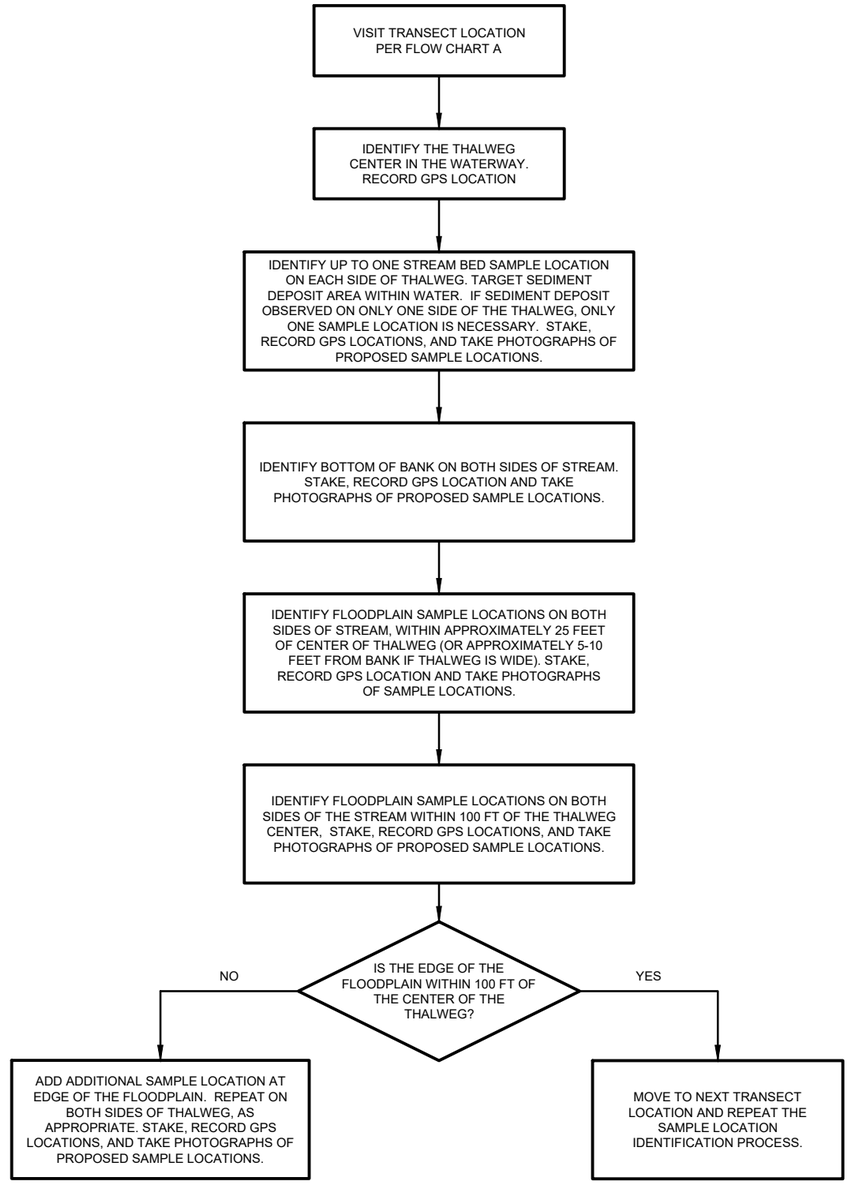
Task ▬▬▬ Milestone ◆

Figure 6 – Proposed Project Schedule
Supplemental Sampling Work Plan
Tributary One North of Pearson/Stone Roads, Jeddo Creek, and Johnson Creek – OU7 and OU8
FMC Corporation, Middleport, New York

FLOW CHART A
TRANSECT RECONNAISSANCE



FLOW CHART B
SAMPLE LOCATION SELECTION



FMC CORPORATION
MIDDLEPORT, NEW YORK
SUPPLEMENTAL SAMPLING WORK PLAN

11149486-00
Jun 4, 2018

TRIBUTARY 1 NORTH (OU7) AND JEDDO AND JOHNSON CREEKS (OU8)
TRANSECT AND SAMPLE SELECTION FLOW CHARTS

FIGURE 7

CAD File: P:\drawings\11149000s\11149486\11149486-reports\11149486-00(001)\11149486-00(001)GN\11149486-00(001)GN-WA003.DWG

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Location:	JN3-E1	JN3-E1C	JN3-E2	JN3-E3	JN3-W1	JN3-W2	JN3-W3	JND1-E1	JND1-E2	JND1-W1	JND1-W2	JN3-E1
	Sample ID:	JN3-E1(0-3)	B791718	JN3-E2(0-3)	JN3-E3(0-3)	JN3-W1(0-3)	JN3-W2(0-3)	JN3-W3(0-3)	JND1-E1(0-3)	JND1-E2(0-3)	JND1-W1(0-3)	JND1-W2(0-3)	B791723
	Sample Date:	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006
	Sample Depth:	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	3-6 in
Parameters	**Units**												
Metals													
Arsenic	mg/kg	9.5	9 *	8.8	10.9	11	3.2	2.3	3.8	2.5	4.2	3.4	12 *
Wet													
Percent solids	%	77.3	--	67.8	83.9	80.9	84.1	85.8	64.5	81.2	78	81.5	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JN3-E2 B791719 4/25/2006 3-6 in	JN3-E3 B791720 4/25/2006 3-6 in	JN3-W1 B791724 4/25/2006 3-6 in	JN3-W2 B791725 4/25/2006 3-6 in	JN3-W3 B791727 4/25/2006 3-6 in	JND1-E1 B791732 4/25/2006 3-6 in	JND1-E2 B791733 4/25/2006 3-6 in	JND1-W1 B791728 4/25/2006 3-6 in	JND1-W2 B791730 4/25/2006 3-6 in	JN3-E3 B791721 4/25/2006 3-6 in Duplicate	JN3-E1 JN3-E1(6-12) 4/25/2006 6-12 in	JN3-E2 JN3-E2(6-12) 4/25/2006 6-12 in	JN3-E3 JN3-E3(6-12) 4/25/2006 6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	7.2 *	8.7	15.1 *	3.3 *	2.6 *	9.8 *	2.5 *	3.8 *	3.6 *	8.2	18.7	2.2	5.1
Wet														
Percent solids	%	--	--	--	--	--	--	--	--	--	--	88	84.3	85.8

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN3-W1	JN3-W2	JN3-W3	JND1-E1	JND1-E2	JND1-W1	JND1-W2	JND1-W2	JN3-E1	JN3-E2	JN3-E3	JN3-W1	JN3-W2
	Sam	JN3-W1(6-12)	JN3-W2(6-12)	JN3-W3(6-12)	JND1-E1(6-12)	JND1-E2(6-12)	JND1-W1(6-12)	JND1-W2(6-12)	FD-042506-02	JN3-E1(12-18)	JN3-E2(12-18)	JN3-E3(12-18)	JN3-W1(12-18)	JN3-W2(12-18)
	Sampl	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in Duplicate	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	13.9	2.1	2.3	2.8	2.3	5.2	3.5	3.9	30.7	2.7	4.1	3.5	1.4
Wet														
Percent solids	%	86.2	87.4	86.9	79.8	84	80.6	81.8	81.7	88.3	83.7	84.6	86.8	87.6

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN3-W3	JND1-E1	JND1-E2	JND1-W1	JND1-W2	JN3-W2	JN3-E1	JN3-E2	JN3-E3	JN3-W1	JN3-W2	JN3-W3	JND1-E1
	Sam	JN3-W3(12-18)	JND1-E1(12-18)	JND1-E2(12-18)	JND1-W1(12-18)	JND1-W2(12-18)	FD-042506-01	JN3-E1(18-24)	JN3-E2(18-24)	JN3-E3(18-24)	JN3-W1(18-24)	JN3-W2(18-24)	JN3-W3(18-24)	JND1-E1(18-24)
	Sampl	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in Duplicate	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	1.8	1.3	2.9	4	4.4	1.4	34	2.9	2.5	2.7	1.8	1.9	1.3
Wet														
Percent solids	%	90.9	81.8	82.3	79.9	84.1	88	89.8	87	82.6	83.4	86.3	92	84

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JND1-E2	JND1-W1	JND1-W2	JN3-E1	JN3-E2	JN3-E3	JN3-W1	JN3-W2	JN3-W3	JND1-E1	JND1-E2	JND1-W1	JND1-W2
	Sam	JND1-E2(18-24)	JND1-W1(18-24)	JND1-W2(18-24)	JN3-E1(24-30)	JN3-E2(24-30)	JN3-E3(24-30)	JN3-W1(24-30)	JN3-W2(24-30)	JN3-W3(24-30)	JND1-E1(24-30)	JND1-E2(24-30)	JND1-W1(24-30)	JND1-W2(24-30)
	Sampl	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006	4/25/2006
	Sample	18-24 in	18-24 in	18-24 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.3	1.6	3.4	32	4	2.3	2.6	2.1	2.1	2.6	2.2	1.9	3
Wet														
Percent solids	%	81.6	82.7	81.8	92	85	81.5	81.3	86.5	90.5	79.5	82.2	83.8	83.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JD4-E1 JD4-E1(0-3) 4/26/2006 0-3 in	JD4-E2 JD4-E2(0-3) 4/26/2006 0-3 in	JD4-W1 JD4-W1(0-3) 4/26/2006 0-3 in	JD4-W2 JD4-W2(0-3) 4/26/2006 0-3 in	JD4-W3 JD4-W3(0-3) 4/26/2006 0-3 in	JN2-E1 JN2-E1(0-3) 4/26/2006 0-3 in	JN2-E2 JN2-E2(0-3) 4/26/2006 0-3 in	JN2-W1 JN2-W1(0-3) 4/26/2006 0-3 in	JN2-W2 JN2-W2(0-3) 4/26/2006 0-3 in	JN2-W3 JN2-W3(0-3) 4/26/2006 0-3 in	JD4-W2 FD-042606-02 4/26/2006 0-3 in Duplicate	JD4-E1 B791745 4/26/2006 3-6 in	JD4-E2 B791747 4/26/2006 3-6 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	7.9	5.6	12.5	6.3	12.3	6.7	3	5.8	9.8	13.9	6.6	6.4	5.7
Wet														
Percent solids	%	82.2	79	78.5	78.1	78.3	86.8	86.3	78	67.6	75.6	78	--	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JD4-W1 B791742 4/26/2006 3-6 in	JD4-W2 B791744 4/26/2006 3-6 in	JD4-W3 B791743 4/26/2006 3-6 in	JN2-E1 B791734 4/26/2006 3-6 in	JN2-E2 B791735 4/26/2006 3-6 in	JN2-W1 B791737 4/26/2006 3-6 in	JN2-W2 B791738 4/26/2006 3-6 in	JN2-W3 B791740 4/26/2006 3-6 in	JD4-E1 B791746 4/26/2006 3-6 in Duplicate	JD4-E1 JD4-E1(6-12) 4/26/2006 6-12 in	JD4-E2 JD4-E2(6-12) 4/26/2006 6-12 in	JD4-W1 JD4-W1(6-12) 4/26/2006 6-12 in	JD4-W2 JD4-W2(6-12) 4/26/2006 6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	12.4	3.7	10.5	7.5 *	3.7 *	9.1 *	14.1	14.7	6.2	4.1	5.2	14.9	3.1
Wet														
Percent solids	%	--	--	--	--	--	--	--	--	--	87.5	80.9	83.1	81.2

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD4-W3	JN2-E1	JN2-E2	JN2-W1	JN2-W2	JN2-W3	JD4-E1	JD4-E2	JD4-W1	JD4-W2	JD4-W3	JN2-E1	JN2-E2
	Sam	JD4-W3(6-12)	JN2-E1(6-12)	JN2-E2(6-12)	JN2-W1(6-12)	JN2-W2(6-12)	JN2-W3(6-12)	JD4-E1(12-18)	JD4-E2(12-18)	JD4-W1(12-18)	JD4-W2(12-18)	JD4-W3(12-18)	JN2-E1(12-18)	JN2-E2(12-18)
	Sampl	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	8.1	3.9	3	8.1	7.3	20.5	2	1.9	20.3	3.2	2.8	4.4	7.8
Wet														
Percent solids	%	84.6	94.6	93.8	82.1	83	78.3	92.3	81.1	85.4	83.9	82.2	91.4	90.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN2-W1	JN2-W2	JN2-W3	JN2-W2	JD4-E1	JD4-E2	JD4-W1	JD4-W2	JD4-W3	JN2-E1	JN2-E2	JN2-W1	JN2-W2
	Sam	JN2-W1(12-18)	JN2-W2(12-18)	JN2-W3(12-18)	FD-042606-01	JD4-E1(18-24)	JD4-E2(18-24)	JD4-W1(18-24)	JD4-W2(18-24)	JD4-W3(18-24)	JN2-E1(18-24)	JN2-E2(18-24)	JN2-W1(18-24)	JN2-W2(18-24)
	Sampl	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in Duplicate	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	6.9	2.3	16.6	3.2	1.7	1.9	56.5	4.4	2.2	3.9	10.1	2	1.8
Wet														
Percent solids	%	85.1	87.7	79.1	82	93.7	83	83.5	83	80.6	90.5	91.9	89	88.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN2-W3	JD4-E1	JD4-E2	JD4-W1	JD4-W2	JD4-W3	JN2-E1	JN2-E2	JN2-W1	JN2-W2	JN2-W3	JD1-E1	JD1-E2
	Sam	JN2-W3(18-24)	JD4-E1(24-30)	JD4-E2(24-30)	JD4-W1(24-30)	JD4-W2(24-30)	JD4-W3(24-30)	JN2-E1(24-30)	JN2-E2(24-30)	JN2-W1(24-30)	JN2-W2(24-30)	JN2-W3(24-30)	JD1-E1(0-3)	JD1-E2(0-3)
	Sampl	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/26/2006	4/27/2006	4/27/2006
	Sample	18-24 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	19.3	2.2	1.5	64.8	5.5	4.4	1.9	7.7	1.6	2.8	6.5	1.9	16.9
Wet														
Percent solids	%	80.3	91	83.1	82.1	83.6	82.4	93.3	93.2	84.4	89.2	75.7	86.1	71.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JD1-W1 JD1-W1(0-3) 4/27/2006 0-3 in	JD1-W2 JD1-W2(0-3) 4/27/2006 0-3 in	JN1-E1 JN1-E1(0-3) 4/27/2006 0-3 in	JN1-E2 JN1-E2(0-3) 4/27/2006 0-3 in	JN1-E3 JN1-E3(0-3) 4/27/2006 0-3 in	JN1-W1 JN1-W1(0-3) 4/27/2006 0-3 in	JN1-W2 JN1-W2(0-3) 4/27/2006 0-3 in	JN1-W3 JN1-W3(0-3) 4/27/2006 0-3 in	JD1-E1 B791758 4/27/2006 3-6 in	JD1-E2 B791762 4/27/2006 3-6 in	JD1-W1 B791757 4/27/2006 3-6 in	JD1-W2 B791760 4/27/2006 3-6 in	JN1-E1 B791753 4/27/2006 3-6 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.5	20.6	3.1	4	8.8	3.6	3.3	2.8	2.5	18.8	3.6	27.4	3.2
Wet														
Percent solids	%	60.4	77.3	75	66.7	61.1	72.7	44.5	76.4	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN1-E2	JN1-E3	JN1-W1	JN1-W2	JN1-W3	JD1-E1	JD1-E2	JD1-W1	JD1-W2	JN1-E1	JN1-E2	JN1-E3	JN1-W1
	Sam	B791755	B791756	B791749	B791751	B791752	JD1-E1(6-12)	JD1-E2(6-12)	JD1-W1(6-12)	JD1-W2(6-12)	JN1-E1(6-12)	JN1-E2(6-12)	JN1-E3(6-12)	JN1-W1(6-12)
	Sampl	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006
	Sample	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.2	7.9	3.7	3.8	2	2.7	21.9	1.1 B	15.4	3.2	2.4	4.8	4.8
Wet														
Percent solids	%	--	--	--	--	--	80.1	65.5	86.2	84.4	82.4	82	73.4	79.8

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN1-W2	JN1-W3	JD1-E2	JD1-E1	JD1-E2	JD1-W1	JD1-W2	JN1-E1	JN1-E2	JN1-E3	JN1-W1	JN1-W3	JN1-E2
	Sam	JN1-W2(6-14)	JN1-W3(6-12)	FD-042706-02	JD1-E1(12-18)	JD1-E2(12-18)	JD1-W1(12-18)	JD1-W2(12-18)	JN1-E1(12-18)	JN1-E2(12-18)	JN1-E3(12-18)	JN1-W1(12-18)	JN1-W3(12-18)	FD-042706-01
	Sampl	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006
	Sample	6-14 in	6-12 in	6-12 in Duplicate	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in Duplicate
Parameters	**Units**													
Metals														
Arsenic	mg/kg	6.5	1.5	21.1	6.7	4.4	0.42 B	4.9	2.3	2.6	2.2	5	2.2	2.1
Wet														
Percent solids	%	71.5	84.6	66.1	83.6	68.6	87.7	86.8	81.8	86.5	81	81.2	85	82.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD1-E1	JD1-E2	JD1-W1	JD1-W2	JN1-E1	JN1-E2	JN1-E3	JN1-W1	JN1-W3	JD1-E1	JD1-E2	JD1-W1	JD1-W2
	Sam	JD1-E1(18-24)	JD1-E2(18-24)	JD1-W1(18-24)	JD1-W2(18-24)	JN1-E1(18-24)	JN1-E2(18-24)	JN1-E3(18-24)	JN1-W1(18-24)	JN1-W3(18-24)	JD1-E1(24-30)	JD1-E2(24-30)	JD1-W1(24-30)	JD1-W2(24-30)
	Sampl	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4	2.4	1.1 U	6.1	1.5	1.9	2.8	3.3	2.3	2.8	1.6	0.96 B	5.2
Wet														
Percent solids	%	73.2	80.5	89.6	87.7	80.5	88.8	83	79.4	86.9	71.3	92.6	91.3	90.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN1-E1	JN1-E2	JN1-E3	JN1-W1	JN1-W3	JDS1-E1	JDS1-E2	JDS1-W1	JDS1-W2	T30-E1	T30-E2	T31-E1	T31-E2
	Sam	JN1-E1(24-30)	JN1-E2(24-30)	JN1-E3(24-30)	JN1-W1(24-30)	JN1-W3(24-30)	JDS1-E1(0-3)	JDS1-E2(0-3)	JDS1-W1(0-3)	JDS1-W2(0-3)	T30-E1(0-3)	T30-E2(0-3)	T31-E1(0-3)	T31-E2(0-3)
	Sampl	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/27/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006
	Sample	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	1.5	2	4.8	2	2.8	5.1	3.4	6.2	6.7	5.3	3.4	20.5	7.8 J
Wet														
Percent solids	%	81.8	85	81.4	77.3	84.4	72.3	63.8	79.9	80.9	83.2	85.1	75	74.6

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	T31-E3 T31-E3(0-3) 4/28/2006 0-3 in	T31-E4 T31-E4(0-3) 4/28/2006 0-3 in	JDS1-E1 B791766 4/28/2006 3-6 in	JDS1-E2 B791767 4/28/2006 3-6 in	JDS1-W1 B791763 4/28/2006 3-6 in	JDS1-W2 B791764 4/28/2006 3-6 in	T30-E1 B791775 4/28/2006 3-6 in	T30-E2 B791776 4/28/2006 3-6 in	T31-E1 B791770 4/28/2006 3-6 in	T31-E2 B791769 4/28/2006 3-6 in	T31-E3 B791771 4/28/2006 3-6 in	T31-E4 B791772 4/28/2006 3-6 in	JDS1-E2 B791768 4/28/2006 3-6 in Duplicate
Parameters	**Units**													
Metals														
Arsenic	mg/kg	2.3 J	1.7 J	5.2	4	8	8.1	6.5	3.5	31.4	7.6	2.3	1.5	4.1
Wet														
Percent solids	%	77.3	77.7	--	--	--	--	--	--	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JDS1-E1 JDS1-E1(6-12) 4/28/2006 6-12 in	JDS1-E2 JDS1-E2(6-12) 4/28/2006 6-12 in	JDS1-W1 JDS1-W1(6-12) 4/28/2006 6-12 in	JDS1-W2 JDS1-W2(6-12) 4/28/2006 6-12 in	T30-E1 T30-E1(6-12) 4/28/2006 6-12 in	T30-E2 T30-E2(6-12) 4/28/2006 6-12 in	T31-E1 T31-E1(6-12) 4/28/2006 6-12 in	T31-E2 T31-E2(6-12) 4/28/2006 6-12 in	T31-E3 T31-E3(6-12) 4/28/2006 6-12 in	T31-E4 T31-E4(6-12) 4/28/2006 6-12 in	JDS1-E1 JDS1-E1(12-18) 4/28/2006 12-18 in	JDS1-E2 JDS1-E2(12-18) 4/28/2006 12-18 in	JDS1-W1 JDS1-W1(12-18) 4/28/2006 12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.2	3.4	5.6	4.4	5	2.5	96.4	6.2 J	0.83 J	2.1 J	2.7	1.7	4.2
Wet														
Percent solids	%	78.3	71.6	80.7	85.1	84.1	88.6	79.8	72	86	82	79.1	76.4	74.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JDS1-W2	T30-E1	T30-E2	T31-E1	T31-E2	T31-E3	T31-E4	JDS1-E1	JDS1-E2	JDS1-W1	JDS1-W2	T30-E1	T30-E2
	Sam	JDS1-W2(12-18)	T30-E1(12-18)	T30-E2(12-18)	T31-E1(12-18)	T31-E2(12-18)	T31-E3(12-18)	T31-E4(12-18)	JDS1-E1(18-24)	JDS1-E2(18-24)	JDS1-W1(18-24)	JDS1-W2(18-24)	T30-E1(18-24)	T30-E2(18-24)
	Sampl	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	0.56 B	2.7	2.5	291	5.2 J	0.96 J	1.5 J	3.7	1.2	4.1	1.2	3.2	3.3
Wet														
Percent solids	%	90.1	86.4	88	70.5	69.5	84.7	83.2	77.7	83.7	73.4	88.2	88.7	86.1

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T31-E1	T31-E2	T31-E3	T31-E4	T30-E1	T31-E2	JDS1-E1	JDS1-E2	JDS1-W1	JDS1-W2	T30-E1	T30-E2	T31-E1
	Sam	T31-E1(18-24)	T31-E2(18-24)	T31-E3(18-24)	T31-E4(18-24)	FD-042806-01	FD-042806-02	JDS1-E1(24-30)	JDS1-E2(24-30)	JDS1-W1(24-30)	JDS1-W2(24-30)	T30-E1(24-30)	T30-E2(24-30)	T31-E1(24-30)
	Sampl	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006	4/28/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in Duplicate	18-24 in Duplicate	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	182	6.1 J	1.8 J	2.2	5.2	3.2 J	1.4	0.73 B	2.9	0.72 B	3.3	3.7	101
Wet														
Percent solids	%	61.2	65.4	86.4	84.1	69.4	88.5	79.9	86.4	74.1	90.6	78	85.8	75.1

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T31-E2	T31-E3	T31-E4	JN4-E1	JN4-E2	JN4-E3	JN4-W1	JN4-W2	JN4-W3	JNB1-E1	JNB1-E2	JNB1-W1	JNB1-W2
	Sam	T31-E2(24-30)	T31-E3(24-30)	T31-E4(24-30)	JN4-E1(0-3)	JN4-E2(0-3)	JN4-E3(0-3)	JN4-W1(0-3)	JN4-W2(0-3)	JN4-W3(0-3)	JNB1-E1(0-3)	JNB1-E2(0-3)	JNB1-W1(0-3)	JNB1-W2(0-3)
	Sampl	4/28/2006	4/28/2006	4/28/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006
	Sample	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	2.7 J	2.3 J	3.4	6.6	16.8	6.9	9.5	4.2	2.2	3.7	2.6	3.1	2.4
Wet														
Percent solids	%	82.4	88.1	84.4	89.5	73.5	73.5	83.2	69.8	79.7	75.7	81.2	83.5	87.8

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JNB1-E1	JN4-E1	JN4-E2	JN4-E3	JN4-W1	JN4-W2	JN4-W3	JNB1-E1	JNB1-E2	JNB1-W1	JNB1-W2	JN4-E1	JN4-E2
	Sam	FD-050106-02	B791777	B791778	B791779	B791781	B791783	B791784	B791788	B791789	B791785	B791786	JN4-E1(6-12)	JN4-E2(6-12)
	Sampl	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006
	Sample	0-3 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	6-12 in	6-12 in
		Duplicate												
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.9	9.3	17.2	5.2	9	4.1	2.9	3.9	2.9	4	2.6	17	8.8
Wet														
Percent solids	%	76.6	--	--	--	--	--	--	--	--	--	--	88.2	80

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN4-E3	JN4-W1	JN4-W2	JN4-W3	JNB1-E1	JNB1-E2	JNB1-W1	JNB1-W2	JN4-E1	JN4-E2	JN4-E3	JN4-W1	JN4-W2
	Sam	JN4-E3(6-12)	JN4-W1(6-12)	JN4-W2(6-12)	JN4-W3(6-12)	JNB1-E1(6-12)	JNB1-E2(6-12)	JNB1-W1(6-12)	JNB1-W2(6-12)	JN4-E1(12-18)	JN4-E2(12-18)	JN4-E3(12-18)	JN4-W1(12-18)	JN4-W2(12-18)
	Sampl	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	2.8	8.7	4	2.3	2.4	4.7	2.9	2.3	41.7	1.8	2.3	7.9	2.8
Wet														
Percent solids	%	78	83.5	75.5	86.3	78.4	86.3	85.4	85.8	86.3	86.9	84.3	85.2	82.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN4-W3	JNB1-E1	JNB1-E2	JNB1-W1	JNB1-W2	JN4-E1	JN4-E2	JN4-E3	JN4-W1	JN4-W2	JN4-W3	JNB1-E1	JNB1-E2
	Sam	JN4-W3(12-18)	JNB1-E1(12-18)	JNB1-E2(12-18)	JNB1-W1(12-18)	JNB1-W2(12-18)	JN4-E1(18-24)	JN4-E2(18-24)	JN4-E3(18-24)	JN4-W1(18-24)	JN4-W2(18-24)	JN4-W3(18-24)	JNB1-E1(18-24)	JNB1-E2(18-24)
	Sampl	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	1.4	2.2	3.1	3.1	2.4	47.7	1.5	2.5	5.4	2.4	1.3	3.1	4
Wet														
Percent solids	%	87.9	79.9	86	82	82	85.4	87.7	83.8	86.2	83.6	89.2	83.4	84.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JNB1-W1	JNB1-W2	JN4-W2	JN4-E1	JN4-E2	JN4-E3	JN4-W1	JN4-W2	JN4-W3	JNB1-E1	JNB1-E2	JNB1-W1	JNB1-W2
	Sam	JNB1-W1(18-24)	JNB1-W2(18-24)	FD-050106-01	JN4-E1(24-30)	JN4-E2(24-30)	JN4-E3(24-30)	JN4-W1(24-30)	JN4-W2(24-30)	JN4-W3(24-30)	JNB1-E1(24-30)	JNB1-E2(24-30)	JNB1-W1(24-30)	JNB1-W2(24-30)
	Sampl	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006	5/1/2006
	Sample	18-24 in	18-24 in	18-24 in Duplicate	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.5	2.6	2.7	19.6	5.1	1.7	2.3	3.8	1.7	6.3	3	2.8	2.6
Wet														
Percent solids	%	79.6	83.2	84.3	85.5	84.9	84.8	86.7	84.1	87	83.3	83.5	80.2	82.1

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD2-E1	JD2-E2	JD2-E3	JD2-W1	JD2-W2	JD2-W3	JD2-E1	JD2-E2	JD2-E3	JD2-W1	JD2-W2	JD2-W3	JD2-E1
	Sam	JD2-E1(0-3)	JD2-E2(0-3)	JD2-E3(0-3)	JD2-W1(0-3)	JD2-W2(0-3)	JD2-W3(0-3)	B791791	B791792	B791793	B791795	B791796	B791798	JD2-E1(6-12)
	Sampl	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006
	Sample	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	12.4 J	57.8	9.6	27.5 J	14.4 J	14.8 J	11.8	72.3	19.9	34.4	15.2	16.2	11 J
Wet														
Percent solids	%	75.3	70.8	75.3	82.6	79.6	79.5	--	--	--	--	--	--	78.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JD2-E2 JD2-E2(6-12) 5/2/2006 6-12 in	JD2-E3 JD2-E3(6-12) 5/2/2006 6-12 in	JD2-W1 JD2-W1(6-12) 5/2/2006 6-12 in	JD2-W2 JD2-W2(6-12) 5/2/2006 6-12 in	JD2-W3 JD2-W3(6-12) 5/2/2006 6-12 in	JD2-E1 JD2-E1(12-18) 5/2/2006 12-18 in	JD2-E2 JD2-E2(12-18) 5/2/2006 12-18 in	JD2-E3 JD2-E3(12-18) 5/2/2006 12-18 in	JD2-W1 JD2-W1(12-18) 5/2/2006 12-18 in	JD2-W2 JD2-W2(12-18) 5/2/2006 12-18 in	JD2-W3 JD2-W3(12-18) 5/2/2006 12-18 in	JD2-W1 FD-050206-01 5/2/2006 12-18 in Duplicate	JD2-E1 JD2-E1(18-24) 5/2/2006 18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	87.7	9.6	8.6 J	8.4 J	12.1 J	13.7 J	24.1	8.2	1.8 J	2.1 J	4.1 J	1.8	14.8 J
Wet														
Percent solids	%	81.5	84.4	86.5	83.1	82.3	76.9	85	84.5	82	79.8	81.5	82.1	78.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD2-E2	JD2-E3	JD2-W1	JD2-W2	JD2-W3	JD2-E1	JD2-E1	JD2-E2	JD2-E3	JD2-W1	JD2-W2	JD2-W3	TSA1-E1
	Sam	JD2-E2(18-24)	JD2-E3(18-24)	JD2-W1(18-24)	JD2-W2(18-24)	JD2-W3(18-24)	FD-050206-02	JD2-E1(24-30)	JD2-E2(24-30)	JD2-E3(24-30)	JD2-W1(24-30)	JD2-W2(24-30)	JD2-W3(24-30)	TSA1-E1(0-3)
	Sampl	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/2/2006	5/3/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in Duplicate	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	7.2	1.5	2.4 J	2.7 J	1.7 J	15.2	45.1 J	3.1	2.6	2 J	2.8 J	1.9 J	5.6
Wet														
Percent solids	%	84.4	81.2	78.3	71.6	78	78.7	72.5	87.7	77.8	75.9	83.2	84.2	70.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	TSA1-E2 TSA1-E2(0-3) 5/3/2006 0-3 in	TSA1-W1 TSA1-W1(0-3) 5/3/2006 0-3 in	TSA1-W2 TSA1-W2(0-3) 5/3/2006 0-3 in	TSB1-E1 TSB1-E1(0-3) 5/3/2006 0-3 in	TSB1-E2 TSB1-E2(0-3) 5/3/2006 0-3 in	TSB1-W1 TSB1-W1(0-3) 5/3/2006 0-3 in	TSB1-W2 TSB1-W2(0-3) 5/3/2006 0-3 in	TSC1-E1 TSC1-E1(0-3) 5/3/2006 0-3 in	TSC1-E2 TSC1-E2(0-3) 5/3/2006 0-3 in	TSC1-W1 TSC1-W1(0-3) 5/3/2006 0-3 in	TSC1-W2 TSC1-W2(0-3) 5/3/2006 0-3 in	TSA1-W2 FD-050306-02 5/3/2006 0-3 in Duplicate	TSA1-E1 B791800 5/3/2006 3-6 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	6.4	6.6	5.1	5.5	4.6	8.4	5.4	4.1	4.6	6.2	5.2	5.3	5.9
Wet														
Percent solids	%	90.2	73.3	91.1	74.9	84.4	78.2	88.7	72.2	76.2	87.8	78.3	90.7	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	TSA1-E2 B791801 5/3/2006 3-6 in	TSA1-W1 B791799 5/3/2006 3-6 in	TSA1-W2 B791806 5/3/2006 3-6 in	TSB1-E1 B791808(3-6) 5/3/2006 3-6 in	TSB1-E2 B791809 5/3/2006 3-6 in	TSB1-W1 B791803 5/3/2006 3-6 in	TSB1-W2 B791804 5/3/2006 3-6 in	TSC1-E1 B791816 5/3/2006 3-6 in	TSC1-E2 B791811 5/3/2006 3-6 in	TSC1-W1 B791815 5/3/2006 3-6 in	TSC1-W2 B791813 5/3/2006 3-6 in	TSC1-E2 B791812 5/3/2006 3-6 in Duplicate	TSA1-E1 TSA1-E1(6-12) 5/3/2006 6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	6	6.4	5.5	5.3	5.1	8.6	5.6	4.5 N*	4.6	6.5 N*	5.5 N*	4.8	4.6
Wet														
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	79.1

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	TSA1-E2	TSA1-W1	TSA1-W2	TSB1-E1	TSB1-E2	TSB1-W1	TSB1-W2	TSC1-E1	TSC1-E2	TSC1-W1	TSC1-W2	TSA1-E1	TSA1-E2
	Sam	TSA1-E2(6-12)	TSA1-W1(6-12)	TSA1-W2(6-12)	TSB1-E1(6-12)	TSB1-E2(6-12)	TSB1-W1(6-12)	TSB1-W2(6-12)	TSC1-E1(6-12)	TSC1-E2(6-12)	TSC1-W1(6-12)	TSC1-W2(6-12)	TSA1-E1(12-18)	TSA1-E2(12-18)
	Sampl	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.2	8	5.5	5.9	5.1	5	4.9	3.6	3.5	5.7	5.5	3.2	2
Wet														
Percent solids	%	82.9	78.6	84.9	75.1	82	79.9	85.7	77.9	78.5	66.5	80.1	76.6	81.8

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	TSA1-W1	TSA1-W2	TSB1-E1	TSB1-E2	TSB1-W1	TSB1-W2	TSC1-E1	TSC1-E2	TSC1-W1	TSC1-W2	TSA1-E1	TSA1-E2	TSA1-W1
	Sam	TSA1-W1(12-18)	TSA1-W2(12-18)	TSB1-E1(12-18)	TSB1-E2(12-18)	TSB1-W1(12-18)	TSB1-W2(12-18)	TSC1-E1(12-18)	TSC1-E2(12-18)	TSC1-W1(12-18)	TSC1-W2(12-18)	TSA1-E1(18-24)	TSA1-E2(18-24)	TSA1-W1(18-24)
	Sampl	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	7.3	5.4	4.1	5.8	4	5.3	1.1 B	1.1 B	2	2.9	3.1	4.8	3.8
Wet														
Percent solids	%	82.3	81.5	72.6	78.5	82.4	83.3	86.1	85.4	90	83.5	72.1	79.9	79.6

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	TSA1-W2	TSB1-E1	TSB1-E2	TSB1-W1	TSB1-W2	TSC1-E1	TSC1-E2	TSC1-W1	TSC1-W2	TSB1-W2	TSA1-E1	TSA1-E2	TSA1-W1
	Sam	TSA1-W2(18-24)	TSB1-E1(18-24)	TSB1-E2(18-24)	TSB1-W1(18-24)	TSB1-W2(18-24)	TSC1-E1(18-24)	TSC1-E2(18-24)	TSC1-W1(18-24)	TSC1-W2(18-24)	FD-050306-01	TSA1-E1(24-30)	TSA1-E2(24-30)	TSA1-W1(24-30)
	Sampl	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in Duplicate	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.5	2.8	4.8	2.6	4.7	0.61 B	1 B	1.8	4.1	4.3	3.2	3.7	2.8
Wet														
Percent solids	%	80.7	80	79.9	88.1	83.9	86.1	88.3	86.8	86	83.4	73	81.6	82.9

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	TSA1-W2	TSB1-E1	TSB1-E2	TSB1-W1	TSB1-W2	TSC1-E1	TSC1-E2	TSC1-W1	TSC1-W2	TSC1-E2	T23-W1	T23-W2	T23-W3
	Sam	TSA1-W2(24-30)	TSB1-E1(24-30)	TSB1-E2(24-30)	TSB1-W1(24-30)	TSB1-W2(24-30)	TSC1-E1(24-30)	TSC1-E2(24-30)	TSC1-W1(24-30)	TSC1-W2(24-30)	FD-050306-03	T23-W1(0-3)	T23-W2(0-3)	T23-W3(0-3)
	Sampl	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/3/2006	5/4/2006	5/4/2006	5/4/2006
	Sample	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in Duplicate	0-3 in	0-3 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.3	3.7	4	2.2	4.5	2	1.4	1.7	3	2.2	44.7	10.6	5.7
Wet														
Percent solids	%	82.7	84.8	83.1	89.2	83.5	87.9	87.9	88.1	89	88.7	68.3	87.7	92.2

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	T24-E1 T24-E1(0-3) 5/4/2006 0-3 in	T24-E2 T24-E2(0-3) 5/4/2006 0-3 in	T24-E3 T24-E3(0-3) 5/4/2006 0-3 in	T24-W1 T24-W1(0-3) 5/4/2006 0-3 in	T24-W2 T24-W2(0-3) 5/4/2006 0-3 in	T24-W3 T24-W3(0-3) 5/4/2006 0-3 in	T25-W1 T25-W1(0-3) 5/4/2006 0-3 in	T25-W2 T25-W2(0-3) 5/4/2006 0-3 in	T25-W3 T25-W3(0-3) 5/4/2006 0-3 in	T23-W1 B791818 5/4/2006 3-6 in	T23-W2 B791819 5/4/2006 3-6 in	T23-W3 B791821 5/4/2006 3-6 in	T24-E1 B791826 5/4/2006 3-6 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	98	4.6	6.3 J	113	16.2	29.2	7.2 J	5.9 J	5.7 J	67.6 N*	9.6 N*	5.8 N*	137 N*
Wet														
Percent solids	%	80.3	90.8	85.2	63.8	89.4	89.8	85.4	93.9	89.4	--	--	--	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T24-E2	T24-E3	T24-W1	T24-W2	T24-W3	T25-W1	T25-W2	T25-W3	T23-W2	T23-W1	T23-W2	T23-W3	T24-E1
	Sam	B791828	B791829	B791824	B791823	B791827	B791832	B791834	B791833	B791820	T23-W1(6-12)	T23-W2(6-12)	T23-W3(6-12)	T24-E1(6-12)
	Sampl	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006
	Sample	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in Duplicate	6-12 in	6-12 in	6-12 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.6 N*	6.6 N*	222 N*	14.2 N*	31.3 N*	8.1	6.1	6.4	9.4 N*	88.1	9.7	6.1	206
Wet														
Percent solids	%	--	--	--	--	--	--	--	--	--	66.9	81.8	86.2	78.3

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T24-E2	T24-E3	T24-W1	T24-W2	T24-W3	T25-W1	T25-W2	T25-W3	T24-E2	T23-W1	T23-W2	T23-W3	T24-E1
	Sam	T24-E2(6-12)	T24-E3(6-12)	T24-W1(6-12)	T24-W2(6-12)	T24-W3(6-12)	T25-W1(6-12)	T25-W2(6-12)	T25-W3(6-12)	FD-050406-02	T23-W1(12-18)	T23-W2(12-18)	T23-W3(12-18)	T24-E1(12-18)
	Sampl	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in Duplicate	12-18 in	12-18 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.8	4.3 J	407	14.9	17.8	6.8 J	5.4 J	6.4 J	3.7	150	3.9	4.2	35.5
Wet														
Percent solids	%	88.1	83.1	70.8	83.2	84.7	85.8	89.3	85.6	87.9	70.8	77.4	85.4	78.7

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T24-E2	T24-E3	T24-W1	T24-W2	T24-W3	T25-W1	T25-W2	T25-W3	T23-W2	T23-W1	T23-W2	T23-W3	T24-E1
	Sam	T24-E2(12-18)	T24-E3(12-18)	T24-W1(12-18)	T24-W2(12-18)	T24-W3(12-18)	T25-W1(12-18)	T25-W2(12-18)	T25-W3(12-18)	FD-050406-01	T23-W1(18-24)	T23-W2(18-24)	T23-W3(18-24)	T24-E1(18-24)
	Sampl	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in Duplicate	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.3	3.1 J	254	5.5	15.3	5.7 J	4.6 J	2.7 J	3.4	416	3.7	5.3	4
Wet														
Percent solids	%	87.7	79.9	72.9	86.3	83.4	84.6	87.4	79.6	77.1	68.5	76.9	73.1	76.3

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T24-E2	T24-E3	T24-W1	T24-W2	T24-W3	T25-W1	T25-W2	T25-W3	T23-W1	T23-W2	T23-W3	T24-E1	T24-E2
	Sam	T24-E2(18-24)	T24-E3(18-24)	T24-W1(18-24)	T24-W2(18-24)	T24-W3(18-24)	T25-W1(18-24)	T25-W2(18-24)	T25-W3(18-24)	T23-W1(24-30)	T23-W2(24-30)	T23-W3(24-30)	T24-E1(24-30)	T24-E2(24-30)
	Sampl	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.1 J	3.5 J	25.5	3.9	6.3	4.6 J	2.8 J	2.5	40.8	3.3	4.3	3	3.5 J
Wet														
Percent solids	%	88.5	83.1	76	90.1	84.1	81.4	86.9	80.1	81.3	79.5	72.9	75.4	87.9

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T24-E3	T24-W1	T24-W2	T24-W3	T25-W1	T25-W2	T25-W3	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2	T26-W1
	Sam	T24-E3(24-30)	T24-W1(24-30)	T24-W2(24-30)	T24-W3(24-30)	T25-W1(24-30)	T25-W2(24-30)	T25-W3(24-30)	T25-E1(0-3)	T25-E2(0-3)	T25-E3(0-3)	T26-E1(0-3)	T26-E2(0-3)	T26-W1(0-3)
	Sampl	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/4/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.1 J	5	5.4	3.2	4.5 J	3 J	3.9	37.5	581	18	47.6	7.9	49
Wet														
Percent solids	%	81.3	87.3	86.5	87.8	81.2	87	85.1	81.1	70.6	77.7	81.7	83.3	72.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	T26-W2	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2	T26-W1
	Sam	T26-W2(0-3)	T26-W3(0-3)	TSD1-E1(0-3)	TSD1-E2(0-3)	TSD1-W1(0-3)	TSD1-W2(0-3)	FD-050506-05	B791846	B791844	B791845	B791837	B791839	B791850
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in Duplicate	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.9	4.4	6.1	5.2	4.6	4	5.4	33.3	654	13.5	48.6	7.3	52.4
Wet														
Percent solids	%	81.3	83.1	72.2	80.5	72.9	78	84.7	--	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	T26-E1	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2	T26-W1
	Sam	B791848	B791849	B791841	B791842	B791835	B791840	B791838	T25-E1(6-12)	T25-E2(6-12)	T25-E3(6-12)	T26-E1(6-12)	T26-E2(6-12)	T26-W1(6-12)
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in Duplicate	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.6	3.8	6	5	4.1	4.3	44.7	41.9	252	5.2	19.9	4.3	144
Wet														
Percent solids	%	--	--	--	--	--	--	--	78.7	79.6	78.3	83.3	86	74.1

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	T25-E3	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2	T26-W1
	Sam	T26-W2(6-12)	T26-W3(6-12)	TSD1-E1(6-12)	TSD1-E2(6-12)	TSD1-W1(6-12)	TSD1-W2(6-12)	FD-050506-04	T25-E1(12-18)	T25-E2(12-18)	T25-E3(12-18)	T26-E1(12-18)	T26-E2(12-18)	T26-W1(12-18)
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in Duplicate	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.8	3.6	3.9	3.6	2	3.1	4.7	62.5	9.6	2.2	5.2	3.3	412
Wet														
Percent solids	%	83.1	83.2	80.7	80.8	84.5	84.9	78.2	81.3	83.3	83.2	83.2	88.1	70

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	T26-E1	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2	T26-W1
	Sam	T26-W2(12-18)	T26-W3(12-18)	TSD1-E1(12-18)	TSD1-E2(12-18)	TSD1-W1(12-18)	TSD1-W2(12-18)	FD-050506-02	T25-E1(18-24)	T25-E2(18-24)	T25-E3(18-24)	T26-E1(18-24)	T26-E2(18-24)	T26-W1(18-24)
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in Duplicate	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	6.4	3	3	4.9	2.9	1.8	5.3	161	49.8	2.2	5.3	2.5	548
Wet														
Percent solids	%	81	87.9	82.7	83.4	83.7	85.1	83.7	77.7	83.4	82.6	84	88.3	75.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	TSD1-E2	TSD1-W1	T25-E1	T25-E2	T25-E3	T26-E1	T26-E2
	Sam	T26-W2(18-24)	T26-W3(18-24)	TSD1-E1(18-24)	TSD1-E2(18-24)	TSD1-W1(18-24)	TSD1-W2(18-24)	FD-050506-03	FD-050506-01	T25-E1(24-30)	T25-E2(24-30)	T25-E3(24-30)	T26-E1(24-30)	T26-E2(24-30)
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006
	Sample	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in	18-24 in Duplicate	18-24 in Duplicate	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.5	3.8	2.9	2.5	2.3	4	2.2	2.7	201	78.2	1.8	5.4	2.5
Wet														
Percent solids	%	81	86.1	83.5	86.1	83.5	83.3	86.5	83.6	71.6	84.5	82	84	86.2

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	T26-W1	T26-W2	T26-W3	TSD1-E1	TSD1-E2	TSD1-W1	TSD1-W2	JN3-S1	JN4-S1	JNB1-S1	JND1-S1	JNB1-S1	JN3-S1
	Sam	T26-W1(24-30)	T26-W2(24-30)	T26-W3(24-30)	TSD1-E1(24-30)	TSD1-E2(24-30)	TSD1-W1(24-30)	TSD1-W2(24-30)	JN3-S1(0-3)	JN4-S1(0-3)	JNB1-S1(0-3)	JND1-S1(0-3)	FD-050806-01	JN3-S1(6-12)
	Sampl	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006
	Sample	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in Duplicate	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	184	3.3	4.3	1.8	3.6	2	2.9	12.4	12.1 J	6.6	5	6.8	8.5
Wet														
Percent solids	%	74.7	77.5	85.8	82.4	87.2	84	85.1	60.9	57.2	69	76.4	68	72.2

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN4-S1	JNB1-S1	JND1-S1	JN3-S1	JN4-S1	JNB1-S1	JND1-S1	JND1-S1	JN3-S1	JN4-S1	JND1-S1	JN4-S1	JN3-S1
	Sam	JN4-S1(6-12)	JNB1-S1(6-12)	JND1-S1(6-12)	JN3-S1(12-18)	JN4-S1(12-18)	JNB1-S1(12-18)	JND1-S1(12-18)	FD-050806-02	JN3-S1(18-24)	JN4-S1(18-24)	JND1-S1(18-24)	FD-050806-03	JN3-S1(24-30)
	Sampl	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006	5/8/2006
	Sample	6-12 in	6-12 in	6-12 in	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in Duplicate	18-24 in	18-24 in	18-24 in	18-24 in Duplicate	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	14.6 J	2.6	3.7	9	8.1 J	2.1	6.1	5.3	8.3	5.9 J	4.7	11 J	17.4
Wet														
Percent solids	%	85	77.7	75.4	73.4	86.9	84.7	77.3	75.5	70.6	84.4	70.8	86	68.9

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN4-S1	JND1-S1	JD4-S1	JN1-S1	JN2-S1	JD4-S1	JN1-S1	JN2-S1	JD4-S1	JN1-S1	JN2-S1	JD4-S1	JN1-S1
	Sam	JN4-S1(24-30)	JND1-S1(24-30)	JD4-S1(0-3)	JN1-S1(0-3)	JN2-S1(0-3)	JD4-S1(6-12)	JN1-S1(6-12)	JN2-S1(6-12)	JD4-S1(12-18)	JN1-S1(12-18)	JN2-S1(12-18)	JD4-S1(18-24)	JN1-S1(18-24)
	Sampl	5/8/2006	5/8/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/9/2006
	Sample	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	6-12 in	6-12 in	6-12 in	12-18 in	12-18 in	12-18 in	18-24 in	18-24 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.6 J	4	9.6	2.3	2.4	5.6	2.8	2.8	5.4	2	4	5.5	2.8
Wet														
Percent solids	%	84.8	71.9	87.5	78.2	66.6	73.6	82.8	80.5	72.7	82.8	74.4	71.3	80.4

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JN2-S1	JD4-S1	JN1-S1	JN2-S1	JD1-S1	JD2-S1	JDS1-S1	T25-S1	T26-S1	T31-S1	TSD1-S1	JD1-S1	JD2-S1
	Sam	JN2-S1(18-24)	JD4-S1(24-30)	JN1-S1(24-30)	JN2-S1(24-30)	JD1-S1(0-3)	JD2-S1(0-3)	JDS1-S1(0-3)	T25-S1(0-3)	T26-S1(0-3)	T31-S1(0-3)	TSD1-S1(0-3)	JD1-S1(6-12)	JD2-S1(6-12)
	Sampl	5/9/2006	5/9/2006	5/9/2006	5/9/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006
	Sample	18-24 in	24-30 in	24-30 in	24-30 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	6-12 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	5.3	5	2.8	4.6	2.6	12.3	4.2	16.3 J	51.5 J	4.8	6.6 J	3	11.7
Wet														
Percent solids	%	75.1	73.9	76.3	73.3	86.7	76.7	55	74.1	39.4	82.1	69	88.3	72.2

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo Sam Sampl Sample	JDS1-S1 JDS1-S1(6-12) 5/10/2006 6-12 in	T25-S1 T25-S1(6-8) 5/10/2006 6-8 in	T26-S1 T26-S1(6-13) 5/10/2006 6-13 in	T31-S1 T31-S1(6-12) 5/10/2006 6-12 in	TSD1-S1 TSD1-S1(6-11) 5/10/2006 6-11 in	JD1-S1 JD1-S1(12-18) 5/10/2006 12-18 in	JD2-S1 JD2-S1(12-18) 5/10/2006 12-18 in	JDS1-S1 JDS1-S1(12-18) 5/10/2006 12-18 in	JD1-S1 JD1-S1(18-24) 5/10/2006 18-24 in	JD2-S1 JD2-S1(18-24) 5/10/2006 18-24 in	JDS1-S1 JDS1-S1(18-24) 5/10/2006 18-24 in	JD2-S1 FD-051006-01 5/10/2006 18-24 in Duplicate	JD1-S1 JD1-S1(24-30) 5/10/2006 24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	4.2	12.3 J	101 J	6.6	3.4 J	1.8	13.1	3.5	1.7	32.3	1.6	37.4	1.4
Wet														
Percent solids	%	65.9	65.5	76	86.7	79.5	76.3	80.2	70.9	87.6	83.3	83.7	81.1	81.6

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD2-S1	JDS1-S1	JD1-S1	T23-S1	T24-S1	TSA1-S1	TSB1-S1	TSC1-S1	T23-S1	T24-S1	TSA1-S1	TSB1-S1	TSC1-S1
	Sam	JD2-S1(24-30)	JDS1-S1(24-30)	FD-051006-02	T23-S1(0-3)	T24-S1(0-3)	TSA1-S1(0-3)	TSB1-S1(0-3)	TSC1-S1(0-3)	T23-S1(6-12)	T24-S1(6-12)	TSA1-S1(6-12)	TSB1-S1(6-12)	TSC1-S1(6-12)
	Sampl	5/10/2006	5/10/2006	5/10/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006
	Sample	24-30 in	24-30 in	24-30 in Duplicate	0-3 in	0-3 in	0-3 in	0-3 in	0-3 in	6-12 in	6-12 in	6-12 in	6-12 in	6-12 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	21	0.84 B	2.3	34.6 J	34.6 J	9.2 J	6.7 J	4.6	61.5 J	20.2 J	3.5 J	4.6	4.2
Wet														
Percent solids	%	87.3	82.7	81.6	49.9	45.9	77.7	83.7	75.8	61.1	77.5	78.4	83.4	73.3

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1a

Historical OU7 and OU8 Soil Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	TSA1-S1	T23-S1	T24-S1	TSA1-S1	TSB1-S1	TSC1-S1	T23-S1	T24-S1	TSA1-S1	TSB1-S1	TSC1-S1	TSA1-S1	TSB1-S1
	Sam	FD-051106-01	T23-S1(12-18)	T24-S1(12-18)	TSA1-S1(12-18)	TSB1-S1(12-18)	TSC1-S1(12-18)	T23-S1(18-22)	T24-S1(18-22)	TSA1-S1(18-24)	TSB1-S1(18-24)	TSC1-S1(18-25)	TSA1-S1(24-30)	TSB1-S1(24-30)
	Sampl	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006
	Sample	6-12 in Duplicate	12-18 in	12-18 in	12-18 in	12-18 in	12-18 in	18-22 in	18-22 in	18-24 in	18-24 in	18-25 in	24-30 in	24-30 in
Parameters	**Units**													
Metals														
Arsenic	mg/kg	3.7	79.2 J	4.3 J	3.1 J	2.9	2	126 J	4.9 J	3.9 J	2.2	1.2	3.7 J	2.8
Wet														
Percent solids	%	79.4	74.7	81.3	77.7	85	83.1	77.2	76.9	76.4	87.8	85.5	79	88

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 1b

Historical OU7 and OU8 Sediment Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

Parameters	Units	Sample Location: J1 Sample ID: SD-31A Sample Date: 9/5/1990 Sample Depth: 0-6 in	J2 SD-28A 9/6/1990 0-6 in	J3 SD-29A 9/6/1990 0-6 in	J4 SD-30A 9/6/1990 0-6 in	J2 SD-53A 11/26/1990 0-6 in	J3 SD-52A 11/26/1990 0-6 in	J2 SD-53B 11/26/1990 6-12 in	J3 SD-52B 11/26/1990 6-9 in	J1 SD-57A 11/28/1990 0-6 in	J4 SD-54A 11/28/1990 0-6 in	J1 SD-157A 11/28/1990 0-6 in Duplicate	J1 SD-57B 11/28/1990 6-12 in	J4 SD-54B 11/28/1990 6-12 in	SDJ1 S-0013 4/14/1993 0-6 in
Herbicides															
2,4,5-T	mg/kg	0.0034 U	0.0027 U	0.0028 U	0.0032 U	--	--	0.0026 U	0.0024 U	--	--	--	0.0029 U	0.0028 U	--
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/kg	0.017 U	0.014 U	0.014 U	0.016 U	--	--	0.013 U	0.012 U	--	--	--	0.015 U	0.014 U	--
Dinoseb	mg/kg	0.0086 U	0.0068 U	0.0069 U	0.0079 U	--	--	0.0066 U	0.006 U	--	--	--	0.0073 U	0.007 U	--
Metals															
Aluminum	mg/kg	7760	5360	5840	12400	--	--	6780	6030	--	--	--	12400	7850	--
Arsenic	mg/kg	8.1	1.6	5.5	7.1	--	--	2	36	--	--	--	4.7	29.3	12.6 J
Cadmium	mg/kg	1.1	1.3	0.69 U	0.79 U	--	--	0.66 U	1.2 U	--	--	--	1.9	0.99	1.6
Copper	mg/kg	31.6	36.5	14.5	23.8	--	--	7.7	8.8	--	--	--	25.2	24.9	20.1
Iron	mg/kg	24400	23500	10900	22700	--	--	14700	15100	--	--	--	26000	16100	--
Lead	mg/kg	17.9	86.5	10.5	12.9	--	--	3.8	87.8	--	--	--	22.2	19.1	32.7
Manganese	mg/kg	1080	475	507	543	--	--	592	773	--	--	--	1600	1450	--
Mercury	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.13 U	0.12 U	--	--	--	0.15 U	0.14 U	0.06 U
Selenium	mg/kg	8.6 U	6.8 U	6.9 U	7.9 U	--	--	1.3 U	1.2 U	--	--	--	1.5 U	1.4 U	--
Sodium	mg/kg	862 U	680 U	691 U	789 U	--	--	661 U	1200 U	--	--	--	730 U	697 U	--
Thallium	mg/kg	0.86 U	0.68 U	1.4 U	0.79 U	--	--	2.6 U	1.2 U	--	--	--	0.73 U	0.7 U	--
Zinc	mg/kg	133	123	78.9	61	--	--	37.6	53.2	--	--	--	195	69.3	--
Pesticides															
4,4'-DDD	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
4,4'-DDE	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
4,4'-DDT	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.047 U
7-Hydroxybenzofuran	mg/kg	--	--	--	--	2.2 U	2.5 U	2.6 U	2.4 U	3.6 U	2.6 U	3.3 U	2.9 U	2.8 U	--
Aldrin	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
alpha-BHC	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
alpha-Chlordane	mg/kg	0.14 U	0.11 U	0.11 U	0.13 U	--	--	0.42 U	0.096 U	--	--	--	0.12 U	0.11 U	0.11 UJ
beta-BHC	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
Carbaryl	mg/kg	--	--	--	--	0.67 U	0.63 U	0.66 U	0.6 U	0.9 U	0.64 U	0.83 U	0.73 U	0.7 U	--
Carbofuran	mg/kg	--	--	--	--	1.3 U	1.3 U	1.3 U	1.2 U	1.8 U	1.3 U	1.7 U	1.5 U	1.4 U	--
Chlorpropham	mg/kg	--	--	--	--	--	--	0.66 U	--	0.9 U	5.1 U	0.83 U	0.73 U	0.7 U	--
Chlorpyrifos	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
delta-BHC	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
Diazinon	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
Dieldrin	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
Endosulfan I	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
Endosulfan II	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
Endosulfan sulfate	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
Endrin	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
Endrin aldehyde	mg/kg	0.028 U	0.022 U	0.022 U	0.025 U	--	--	0.085 U	0.019 U	--	--	--	0.023 U	0.022 U	0.021 UJ
Ethion	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
Ethyl parathion	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
gamma-BHC (lindane)	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
gamma-Chlordane	mg/kg	0.14 U	0.11 U	0.11 U	0.13 U	--	--	0.42 U	0.096 U	--	--	--	0.12 U	0.11 U	0.11 UJ
Heptachlor	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
Heptachlor epoxide	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.011 UJ
Malathion	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.056 U	0.05 U	--	--	--	0.061 U	0.059 U	--
Methoxychlor	mg/kg	0.14 U	0.11 U	0.11 U	0.13 U	--	--	0.42 U	0.096 U	--	--	--	0.12 U	0.11 U	0.11 UJ
Methyl parathion	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
Phorate	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
Propoxur	mg/kg	--	--	--	--	1.3 U	1.3 U	1.3 U	1.2 U	1.8 U	1.3 U	1.7 U	1.5 U	1.4 U	--
Ronnel	mg/kg	0.17 U	0.14 U	0.14 U	0.16 U	--	--	0.011 U	0.01 U	--	--	--	0.012 U	0.012 U	--
Toxaphene	mg/kg	0.28 U	0.22 U	0.22 U	0.25 U	--	--	0.85 U	0.19 U	--	--	--	0.23 U	0.22 U	0.21 UJ
SVOAsS															
2-Methylphenol	mg/kg	0.57 U	0.45 U	0.46 U	0.52 U	--	--	0.44 U	2 U	--	--	--	0.48 U	2.3 U	--
4,6-Dinitro-2-methylphenol	mg/kg	2.8 U	2.2 U	2.2 U	2.5 U	--	--	2.1 U	9.6 U	--	--	--	2.3 U	1.1 U	--
Isodrin	mg/kg	0.014 U	0.011 U	0.011 U	0.013 U	--	--	0.042 U	0.0096 U	--	--	--	0.012 U	0.011 U	0.021 UJ
Wet															
Dinocap	mg/kg	2.8 U	2.2 U	2.2 U	2.5 U	--	--	8.5 U	1.9 U	--	--	--	2.3 U	2.2 U	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	74.9
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	15600

Notes:

U - Not detected at the associated reporting limit.
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated.

Table 1b

Historical OU7 and OU8 Sediment Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	DEC-901405/901406	DEC-901407/901408	DEC-901409/901410	DEC-901411/901412	DEC-901413/901414	DEC-901415/901416	DEC-901417/901418	DEC-901419/901420	DEC-901421/901422	DEC-901423/901424	DEC-901407/901408	DEC-901405/901406	DEC-901407/901408	DEC-901409/901410	DEC-901411/901412
	Sam	901405	901407	901409	901411	901413	901415	901417	901419	901421	901423	901431	901406	901408	901410	901412
	Sampl	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995	11/30/1995
	Sample	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in	0-2 in Duplicate	2-6 in	2-6 in	2-6 in	2-6 in
Parameters	**Units**															
Herbicides																
2,4,5-T	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dinoseb	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	2.2	18.4	3.5	6.9	10.3	5.5	11.5	4	6	11.8	9.7	3.8	9.1	10.1	6.4
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides																
4,4'-DDD	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-Hydroxybenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-Chlordane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbaryl	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpropham	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpyrifos	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diazinon	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin aldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl parathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (lindane)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlordane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Malathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methoxychlor	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl parathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phorate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propoxur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ronnel	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toxaphene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOAsS																
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isodrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Wet																
Dinocap	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit.
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated.

Table 1b

Historical OU7 and OU8 Sediment Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

Parameters	Units	Sample Lo Sam Sample Sample	DEC-901413/901414 901414 11/30/1995 2-6 in	DEC-901415/901416 901416 11/30/1995 2-6 in	DEC-901417/901418 901418 11/30/1995 2-6 in	DEC-901419/901420 901420 11/30/1995 2-6 in	DEC-901421/901422 901422 11/30/1995 2-6 in	DEC-901423/901424 901424 11/30/1995 2-6 in	DEC-901417/901418 901432 11/30/1995 2-6 in Duplicate	JN3-S1 B791855 5/8/2006 3-6 in	JN4-S1 B791852 5/8/2006 3-6 in	JNB1-S1 B791854 5/8/2006 3-6 in	JND1-S1 B791856 5/8/2006 3-6 in	JD4-S1 B791859 5/9/2006 3-6 in	JN1-S1 B791861 5/9/2006 3-6 in	JN2-S1 B791858 5/9/2006 3-6 in	JD1-S1 B791866 5/10/2006 3-6 in
Herbicides																	
2,4,5-T	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dinoseb	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg		13	8.8	15.9	3.4	7.1	4.8	37.5	4.9	17.6	7.6	4.1	12.9	3.5	2.7	2.1
Cadmium	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides																	
4,4'-DDD	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-Hydroxybenzofuran	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-Chlordane	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbaryl	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbofuran	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpropham	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpyrifos	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diazinon	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin aldehyde	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethion	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl parathion	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (lindane)	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlordane	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Malathion	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methoxychlor	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl parathion	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phorate	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propoxur	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ronnel	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toxaphene	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOAsS																	
2-Methylphenol	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isodrin	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Wet																	
Dinocap	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit.
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated.

Table 1b

Historical OU7 and OU8 Sediment Data
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

	Sample Lo	JD2-S1	JDS1-S1	T25-S1	T26-S1	T31-S1	TSD1-S1	JD2-S1	T23-S1	T24-S1	TSA1-S1	TSB1-S1	TSC1-S1	TSC1-S1
	Sam	B791862	B791864	B791872	B791869	B791868	B791871	B791863	B791874	B791873	B791875	B791877	B791878	B791879
	Sampl	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/10/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006	5/11/2006
	Sample	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in Duplicate	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in	3-6 in Duplicate
Parameters	**Units**													
Herbicides														
2,4,5-T	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Dinoseb	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals														
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	23.8	3.2	35 *	211	13.1	5	26.1	46.8 *	15.8 *	4.2 *	3.7 *	4.2 *	6.2 *
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides														
4,4'-DDD	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
7-Hydroxybenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-Chlordane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbaryl	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpropham	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorpyrifos	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Diazinon	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Endrin aldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl parathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (lindane)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlordane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Malathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Methoxychlor	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl parathion	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Phorate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Propoxur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Ronnel	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Toxaphene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOAsS														
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Isodrin	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Wet														
Dinocap	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

U - Not detected at the associated reporting limit.
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated.

Table 2

Proposed Sampling Transect Locations and Rationale
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Description	Transect	Additional Rationale
7	T23.3	upstream of crossing	X	
7	T24.2	point bar; potential cut off channel	X	Downstream of T24
7	T26.5	Transect added for coverage	X	No access in 2006
7	T27.2	upstream of old crossing; see 1938 aerial	X	No access in 2006
7	T27.7	Transect added for coverage	X	No access to T28 in 2006
7	T28.3	Transect added for coverage	X	No access to T28 in 2006
7	T29.1	upstream of crossing	X	Close to T29 (no access in 2006)
7	T29.7	Transect added for coverage	X	
7	T30.3	wide area of channel	X	
7	T31.1	upstream of confluence	X	Close to T31 (290 mg/kg As from 12-18"). No access in 2006 to property west of stream (historical orchard)
8	JD1.3	upstream of crossing	X	
8	JD1.5	Transect added for coverage	X	
8	JD1.9	potential old channel; see 1938 aerial	X	
8	JD2.5	large meander/point bar	X	
8	JD2.8	Transect added for coverage	X	
8	JD3.1	Transect added for coverage	X	
8	JD3.2	upstream of crossing	X	
8	JD3.5	Transect added for coverage	X	
8	JD3.8	point bar and tree/debris jam	X	
8	JD3.9	recent oxbow/meander cut off	X	
8	JN2.1	bar deposits at confluence	X	
8	JN2.2	upstream of crossing	X	
8	JN2.3	Transect added for coverage	X	
8	JN2.4	Transect added for coverage	X	
8	JN2.5	upstream of crossing	X	
8	JN2.6	Transect added for coverage	X	
8	JN2.8	Transect added for coverage	X	
8	JN2.9	upstream of crossing	X	
8	JN3.3	Transect added for coverage	X	
8	JN3.6	Transect added for coverage	X	
		Total Transects	30	
		Sample Locations at Each Transect (Typical) - Streambed	2	
		Sample Locations at Each Transect (Typical) - Outside of Streambed	8	
		Number of Streambed Samples (Anticipated)*	4	
		Number of Samples at Sample Locations Outside of the Streambed**	5	
		Anticipated Number of Samples*	**1440**	

Notes:

* Number of samples based on sample intervals of every 6 inches, to an assumed maximum depth of 24 inches.

** Number of samples based on samples from 0-3 and 3-6 inches, and then at sample intervals of every 6 inches, to an assumed maximum depth of 24 inches. Actual number of samples at each location will depend on site conditions and actual achievable sampling depth.

*** Total number of samples excludes quality control samples also to be collected by FMC such as field blanks, duplicates, and matrix spike/matrix spike duplicates (MS/MSD) . Total number of samples will depend on access, width of perceived floodplain, achievable sampling depth, and site conditions. Six samples may be collected outside of the streambed if the flood plain does not extend more than 200 feet from the center of the thalweg.

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description
7	T23.3	T23.3-S1	within the stream bed
		T23.3-S2	within the stream bed
		T23.3-E1	east bank of stream
		T23.3-E2	above east bank of stream within 25' of thalweg center
		T23.3-E3	approx. 100' east of thalweg center
		T23.3-W1	west bank of stream
		T23.3-W2	above west bank of stream within 25' of thalweg center
		T23.3-W3	approx. 100' west of thalweg center
7	T24.2	T24.2-S1	within the stream bed
		T24.2-S2	within the stream bed
		T24.2-E1	east bank of stream
		T24.2-E2	above east bank of stream within 25' of thalweg center
		T24.2-E3	approx. 100' east of thalweg center
		T24.2-W1	west bank of stream
		T24.2-W2	above west bank of stream within 25' of thalweg center
		T24.2-W3	approx. 100' west of thalweg center
7	T26.5	T26.5-S1	within the stream bed
		T26.5-S2	within the stream bed
		T26.5-E1	east bank of stream
		T26.5-E2	above east bank of stream within 25' of thalweg center
		T26.5-E3	approx. 100' east of thalweg center
		T26.5-W1	west bank of stream
		T26.5-W2	above west bank of stream within 25' of thalweg center
		T26.5-W3	approx. 100' west of thalweg center
7	T27.2	T27.2-S1	within the stream bed
		T27.2-S2	within the stream bed
		T27.2-E1	east bank of stream
		T27.2-E2	above east bank of stream within 25' of thalweg center
		T27.2-E3	approx. 100' east of thalweg center
		T27.2-W1	west bank of stream
		T27.2-W2	above west bank of stream within 25' of thalweg center
		T27.2-W3	approx. 100' west of thalweg center
7	T27.7	T27.7-S1	within the stream bed
		T27.7-S2	within the stream bed
		T27.7-E1	east bank of stream
		T27.7-E2	above east bank of stream within 25' of thalweg center
		T27.7-E3	approx. 100' east of thalweg center
		T27.7-W1	west bank of stream
		T27.7-W2	above west bank of stream within 25' of thalweg center
		T27.7-W3	approx. 100' west of thalweg center
7	T28.3	T28.3-S1	within the stream bed
		T28.3-S2	within the stream bed
		T28.3-E1	east bank of stream
		T28.3-E2	above east bank of stream within 25' of thalweg center
		T28.3-E3	approx. 100' east of thalweg center
		T28.3-W1	west bank of stream
		T28.3-W2	above west bank of stream within 25' of thalweg center
		T28.3-W3	approx. 100' west of thalweg center

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description
7	T29.1	T29.1-S1	within the stream bed
		T29.1-S2	within the stream bed
		T29.1-E1	east bank of stream
		T29.1-E2	above east bank of stream within 25' of thalweg center
		T29.1-E3	approx. 100' east of thalweg center
		T29.1-W1	west bank of stream
		T29.1-W2	above west bank of stream within 25' of thalweg center
		T29.1-W3	approx. 100' west of thalweg center
7	T29.7	T29.7-S1	within the stream bed
		T29.7-S2	within the stream bed
		T29.7-E1	east bank of stream
		T29.7-E2	above east bank of stream within 25' of thalweg center
		T29.7-E3	approx. 100' east of thalweg center
		T29.7-W1	west bank of stream
		T29.7-W2	above west bank of stream within 25' of thalweg center
		T29.7-W3	approx. 100' west of thalweg center
7	T30.3	T30.3-S1	within the stream bed
		T30.3-S2	within the stream bed
		T30.3-E1	east bank of stream
		T30.3-E2	above east bank of stream within 25' of thalweg center
		T30.3-E3	approx. 100' east of thalweg center
		T30.3-W1	west bank of stream
		T30.3-W2	above west bank of stream within 25' of thalweg center
		T30.3-W3	approx. 100' west of thalweg center
7	T31.1	T31.1-S1	within the stream bed
		T31.1-S2	within the stream bed
		T31.1-E1	east bank of stream
		T31.1-E2	above east bank of stream within 25' of thalweg center
		T31.1-E3	approx. 100' east of thalweg center
		T31.1-W1	west bank of stream
		T31.1-W2	above west bank of stream within 25' of thalweg center
		T31.1-W3	approx. 100' west of thalweg center
8	JD1.3	JD1.3-S1	within the stream bed
		JD1.3-S2	within the stream bed
		JD1.3-E1	east bank of stream
		JD1.3-E2	above east bank of stream within 25' of thalweg center
		JD1.3-E3	approx. 100' east of thalweg center
		JD1.3-W1	west bank of stream
		JD1.3-W2	above west bank of stream within 25' of thalweg center
		JD1.3-W3	approx. 100' west of thalweg center
8	JD1.5	JD1.5-S1	within the stream bed
		JD1.5-S2	within the stream bed
		JD1.5-E1	east bank of stream
		JD1.5-E2	above east bank of stream within 25' of thalweg center
		JD1.5-E3	approx. 100' east of thalweg center
		JD1.5-W1	west bank of stream
		JD1.5-W2	above west bank of stream within 25' of thalweg center
		JD1.5-W3	approx. 100' west of thalweg center

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description
8	JD1.9	JD1.9-S1	within the stream bed
		JD1.9-S2	within the stream bed
		JD1.9-E1	east bank of stream
		JD1.9-E2	above east bank of stream within 25' of thalweg center
		JD1.9-E3	approx. 100' east of thalweg center
		JD1.9-W1	west bank of stream
		JD1.9-W2	above west bank of stream within 25' of thalweg center
		JD1.9-W3	approx. 100' west of thalweg center
8	JD2.5	JD2.5-S1	within the stream bed
		JD2.5-S2	within the stream bed
		JD2.5-E1	east bank of stream
		JD2.5-E2	above east bank of stream within 25' of thalweg center
		JD2.5-E3	approx. 100' east of thalweg center
		JD2.5-W1	west bank of stream
		JD2.5-W2	above west bank of stream within 25' of thalweg center
		JD2.5-W3	approx. 100' west of thalweg center
8	JD2.8	JD2.8-S1	within the stream bed
		JD2.8-S2	within the stream bed
		JD2.8-E1	east bank of stream
		JD2.8-E2	above east bank of stream within 25' of thalweg center
		JD2.8-E3	approx. 100' east of thalweg center
		JD2.8-W1	west bank of stream
		JD2.8-W2	above west bank of stream within 25' of thalweg center
		JD2.8-W3	approx. 100' west of thalweg center
8	JD3.1	JD3.1-S1	within the stream bed
		JD3.1-S2	within the stream bed
		JD3.1-E1	east bank of stream
		JD3.1-E2	above east bank of stream within 25' of thalweg center
		JD3.1-E3	approx. 100' east of thalweg center
		JD3.1-W1	west bank of stream
		JD3.1-W2	above west bank of stream within 25' of thalweg center
		JD3.1-W3	approx. 100' west of thalweg center
8	JD3.2	JD3.2-S1	within the stream bed
		JD3.2-S2	within the stream bed
		JD3.2-E1	east bank of stream
		JD3.2-E2	above east bank of stream within 25' of thalweg center
		JD3.2-E3	approx. 100' east of thalweg center
		JD3.2-W1	west bank of stream
		JD3.2-W2	above west bank of stream within 25' of thalweg center
		JD3.2-W3	approx. 100' west of thalweg center
8	JD3.5	JD3.5-S1	within the stream bed
		JD3.5-S2	within the stream bed
		JD3.5-E1	east bank of stream
		JD3.5-E2	above east bank of stream within 25' of thalweg center
		JD3.5-E3	approx. 100' east of thalweg center
		JD3.5-W1	west bank of stream
		JD3.5-W2	above west bank of stream within 25' of thalweg center
		JD3.5-W3	approx. 100' west of thalweg center

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description
8	JD3.8	JD3.8-S1	within the stream bed
		JD3.8-S2	within the stream bed
		JD3.8-E1	east bank of stream
		JD3.8-E2	above east bank of stream within 25' of thalweg center
		JD3.8-E3	approx. 100' east of thalweg center
		JD3.8-W1	west bank of stream
		JD3.8-W2	above west bank of stream within 25' of thalweg center
		JD3.8-W3	approx. 100' west of thalweg center
8	JD3.9	JD3.9-S1	within the stream bed
		JD3.9-S2	within the stream bed
		JD3.9-E1	east bank of stream
		JD3.9-E2	above east bank of stream within 25' of thalweg center
		JD3.9-E3	approx. 100' east of thalweg center
		JD3.9-W1	west bank of stream
		JD3.9-W2	above west bank of stream within 25' of thalweg center
		JD3.9-W3	approx. 100' west of thalweg center
8	JN2.1	JN2.1-S1	within the stream bed
		JN2.1-S2	within the stream bed
		JN2.1-E1	east bank of stream
		JN2.1-E2	above east bank of stream within 25' of thalweg center
		JN2.1-E3	approx. 100' east of thalweg center
		JN2.1-W1	west bank of stream
		JN2.1-W2	above west bank of stream within 25' of thalweg center
		JN2.1-W3	approx. 100' west of thalweg center
8	JN2.2	JN2.2-S1	within the stream bed
		JN2.2-S2	within the stream bed
		JN2.2-E1	east bank of stream
		JN2.2-E2	above east bank of stream within 25' of thalweg center
		JN2.2-E3	approx. 100' east of thalweg center
		JN2.2-W1	west bank of stream
		JN2.2-W2	above west bank of stream within 25' of thalweg center
		JN2.2-W3	approx. 100' west of thalweg center
8	JN2.3	JN2.3-S1	within the stream bed
		JN2.3-S2	within the stream bed
		JN2.3-E1	east bank of stream
		JN2.3-E2	above east bank of stream within 25' of thalweg center
		JN2.3-E3	approx. 100' east of thalweg center
		JN2.3-W1	west bank of stream
		JN2.3-W2	above west bank of stream within 25' of thalweg center
		JN2.3-W3	approx. 100' west of thalweg center
8	JN2.4	JN2.4-S1	within the stream bed
		JN2.4-S2	within the stream bed
		JN2.4-E1	east bank of stream
		JN2.4-E2	above east bank of stream within 25' of thalweg center
		JN2.4-E3	approx. 100' east of thalweg center
		JN2.4-W1	west bank of stream
		JN2.4-W2	above west bank of stream within 25' of thalweg center
		JN2.4-W3	approx. 100' west of thalweg center

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description
8	JN2.5	JN2.5-S1	within the stream bed
		JN2.5-S2	within the stream bed
		JN2.5-E1	east bank of stream
		JN2.5-E2	above east bank of stream within 25' of thalweg center
		JN2.5-E3	approx. 100' east of thalweg center
		JN2.5-W1	west bank of stream
		JN2.5-W2	above west bank of stream within 25' of thalweg center
		JN2.5-W3	approx. 100' west of thalweg center
8	JN2.6	JN2.6-S1	within the stream bed
		JN2.6-S2	within the stream bed
		JN2.6-E1	east bank of stream
		JN2.6-E2	above east bank of stream within 25' of thalweg center
		JN2.6-E3	approx. 100' east of thalweg center
		JN2.6-W1	west bank of stream
		JN2.6-W2	above west bank of stream within 25' of thalweg center
		JN2.6-W3	approx. 100' west of thalweg center
8	JN2.8	JN2.8-S1	within the stream bed
		JN2.8-S2	within the stream bed
		JN2.8-E1	east bank of stream
		JN2.8-E2	above east bank of stream within 25' of thalweg center
		JN2.8-E3	approx. 100' east of thalweg center
		JN2.8-W1	west bank of stream
		JN2.8-W2	above west bank of stream within 25' of thalweg center
		JN2.8-W3	approx. 100' west of thalweg center
8	JN2.9	JN2.9-S1	within the stream bed
		JN2.9-S2	within the stream bed
		JN2.9-E1	east bank of stream
		JN2.9-E2	above east bank of stream within 25' of thalweg center
		JN2.9-E3	approx. 100' east of thalweg center
		JN2.9-W1	west bank of stream
		JN2.9-W2	above west bank of stream within 25' of thalweg center
		JN2.9-W3	approx. 100' west of thalweg center
8	JN3.3	JN3.3-S1	within the stream bed
		JN3.3-S2	within the stream bed
		JN3.3-E1	east bank of stream
		JN3.3-E2	above east bank of stream within 25' of thalweg center
		JN3.3-E3	approx. 100' east of thalweg center
		JN3.3-W1	west bank of stream
		JN3.3-W2	above west bank of stream within 25' of thalweg center
		JN3.3-W3	approx. 100' west of thalweg center
8	JN3.6	JN3.6-S1	within the stream bed
		JN3.6-S2	within the stream bed
		JN3.6-E1	east bank of stream
		JN3.6-E2	above east bank of stream within 25' of thalweg center
		JN3.6-E3	approx. 100' east of thalweg center
		JN3.6-W1	west bank of stream
		JN3.3-W2	above west bank of stream within 25' of thalweg center
		JN3.3-W3	approx. 100' west of thalweg center

Table 3

Approximate Sample Location and Frequency
OU7 and OU8 Supplemental Sampling Work Plan
FMC Middleport, NY

OU	Transect No.	Sample Location ID[1, 2]	Description

Notes:

[1] Each sample location ID will also be followed by a number to denote a sequential sample number. For example:

Depth	Number ID	Sample Location ID Example
0-3 inches	1	T23.3W1-1
3-6 inches	2	T23.3W1-2
6-12 inches	3	T23.3W1-3
12-18 inches	4	T23.3W1-4
18-24 inches	5	T23.3W1-5

[2] Samples may not be collected from all locations or depths shown, depending on access, site conditions and perceived flood plain width at each location. As stated in the Work Plan, if the perceived 100 year flood plain extends more than 200 feet past the center of the thalweg, FMC may install another borehole in the transect (i.e., 10 sampling locations per transect).

Appendices

Appendix A
Health and Safety Plan

FMC Corporation
Middleport, New York

Health and Safety Plan

Soil and Sediment Investigation -
Tributary One North of Pearson/Stone Roads (Operable Unit 7)
and Jeddo Creek and Johnson Creek (Operable Unit 8)
Middleport, New York
November 30, 2017

Table of Contents

Table of Contents

Table of Contents

Figure Index

Table Index

Attachment Index

1. Introduction

The Health and Safety Plan (HASP) presented herein describes the health and safety procedures and emergency response guidelines for the soil and sediment investigation activities that will be performed along Tributary One east of Pearson/Stone Roads (Operable Unit [OU] 7) and Jeddo Creek and Johnson Creek (OU8) in Middleport, New York. Figure 1.1 presents the OU7 and OU8 location.

The scope of work to be completed includes the following:

i) Mobilization and demobilization of labor, materials, and equipment to and from OU7 and OU8 locations

ii) Sediment sampling

iii) Soil sampling using a direct-push method

iv) Decontamination activities

Soil and sediment sampling will be completed in a creek floodplain and in the tributary and creeks, and potentially in other locations, depending on site reconnaissance activities.

1.1 Purpose

The purpose of this site-specific HASP is to provide specific guidelines and establish procedures for the protection of personnel performing project field activities that are described in the scope of work. The information in this HASP has been developed in accordance with applicable standards and is, to the extent possible, based on information available to date. The HASP is also a living document, in that it must continually evolve as conditions at the OU7 and OU8 site locations change.

A vital element of FMC's safety and health program is the implementation of a site-specific HASP to support field activities. The HASP, as applicable to this project, requires the following measures to be implemented:

i) Communicate the contents of this HASP to project personnel.

ii) Eliminate unsafe conditions. Efforts must be initiated to identify conditions that can contribute to an incident and to remove exposure to these conditions.

iii) Utilize the STAR (Stop, Think, Act, and Review) process before beginning any activity/task/job, after an incident, and/or during any unusual circumstances. Stop the activities to think about the task, analyze the task hazards and determine methods to reduce risk, and review the results with affected personnel.

iv) Revise or develop Job Safety Analysis (JSA) forms for activities. Supervisors and affected personnel are responsible for JSA development.

v) Complete Behavioral-Based Safety (BBS) observations via the use of the Safe Task Evaluation Process (STEP).

vi) Reduce unsafe acts, as it has been determined that 88 percent of all incidents are directly caused by unsafe acts. Use the GHD BBS tools (STEPs, JSAs, STAR process, etc.) to reduce the number of unsafe acts. Personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so safety factors become an integral part of the task. Supervisory personnel shall ensure that personnel committing unsafe acts are held accountable via counselling, mentoring, and, if necessary, reprimand.

vii) Inspect frequently. Regular documented safety inspections of the work site, materials, and equipment by qualified persons ensures early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible or project activities shall be suspended. Documentation of daily inspections and corrective actions should be kept with the project files.

1.2 Stop Work Authority

All project personnel are empowered and expected to stop their work, the work of co-workers, subcontractors, client personnel, or other contractors if any person's safety or the environment is at risk. No repercussions will result from this action. Reporting of unsafe condition/acts and/or Stop Work Authority (SWA) shall be documented using the Unsafe Condition/Acts and SWA form, which is located in Attachment A (Project Safety Forms).

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of project personnel from that area and re-evaluation of the hazard and the levels of protection.

1.3 Short Service Employees

GHD Employees identified as Short Service Employees (SSE) (6 months or less) shall not be permitted to work without another non-SSE employee present.

1.4 Project Organization

All personnel conducting activities on site must conduct their activities in compliance with all applicable Safety and Health regulations to include but not limited to the Occupational Safety and Health Administration (OSHA) 29 CFR 1910, 29 CFR 1926, and GHD policies and procedures. Project personnel must also be familiar with the procedures and requirements of this HASP and the applicable procedures found within the GHD Safety and Health Policy Manual. In the event of conflicting safety procedures/requirements, personnel must implement those safety practices, which afford the highest level of safety and protection.

GHD Project Management and Safety Organization

Project Manager (PM)/Project Coordinator (PC) GHD – (Denise Quigley)

The Project Manager (PM) will provide support to the project with respect to all operations on this project and is ultimately responsible for site safety and health.

The GHD Project Coordinator (PC) shall be responsible for the overall implementation of the HASP, and for ensuring that all health and safety responsibilities are carried out in conjunction with this

project. This shall include, but is not limited to; review and approval of the HASP and consultation with the Client regarding appropriate changes to the HASP.

GHD site Supervisor/Safety & Health Officer – GHD– (Christine Miller or alternate)

Health and safety is a line management responsibility, and as such, the site Supervisor/ Safety and Health Officer (SS/SHO) will implement the overall onsite direction and enforcement of the health and safety for this project. The SS/SHO will be designated as the **"competent person"** as per OSHA regulations. The SS/SHO will report to the PM and PC for this project.

The SS/SHO is the person who, under the supervision of the PM, shall be responsible for the communication of the site requirements to project personnel and subcontractors, and is responsible for carrying out the health and safety responsibilities by making sure that:

i) The SS/SHO is onsite or available by phone at all times during the project work activities.

ii) All necessary clean up and maintenance of safety equipment is conducted by project personnel.

iii) Emergency services are contacted as necessary.

iv) The Hazard Communication (HAZCOM) program is maintained on site.

v) Forms attached to the HASP are completed correctly, submitted on a timely basis and then properly filed.

vi) A pre-entry briefing is conducted, which will serve to familiarize project personnel with the procedures, requirements, and provisions of this HASP.

vii) All necessary records are maintained in the project files (i.e., air monitoring results, calibration log sheets, incident reports, daily safety meeting forms, daily safety logbook entries, training files, etc.).

viii) Daily safety meetings are held and documented.

ix) Safe work practices for project personnel are enforced.

x) Safety of any visitors who enter the site is ensured.

xi) Communication is maintained with the Client Representative.

xii) Orders the immediate shutdown of project activities in the case of a medical emergency, unsafe condition, or unsafe practice.

xiii) Designate work areas and define minimum PPE requirements.

xiv) Provide the safety equipment, personal protective equipment (PPE) and other items necessary for GHD project personnel.

xv) Enforce the use of required PPE, any additional safety equipment that is determined to be required and other items necessary for GHD personnel or subcontractor safety.

xvi) Conduct regular inspections of all work areas including tools and equipment.

xvii) Report safety and health concerns to GHD management as necessary.

Other duties include overall implementation of the HASP and ensuring all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP, and communication of project requirements to Subcontractor personnel.

The SS/SHO has the responsibility for enforcing safe work practices and watches for any ill effects on project personnel, especially those symptoms caused by heat/cold stress or chemical exposure. The SS/SHO also will oversee the safety of any visitors who enter the site.

Emergency Coordinator (EC)

The SS/SHO will act as the EC. The EC shall be able to implement the emergency procedures and is responsible for the following in the event of an emergency:

i) The EC shall immediately respond to all imminent or actual emergency situations. The EC shall identify the problem, assess the health or environmental hazards, notify all personnel and emergency response agencies, and take all reasonable measures to stabilize the situation.

ii) The EC must take all reasonable measures necessary to ensure that fire, explosion, emission or discharge does not occur, reoccur, or spread. These measures may include stopping operations, collecting and containing released materials, and/or removing or isolating containers.

iii) The EC shall develop an Emergency Response Evacuation Route and communicate it to all project personnel.

iv) The EC shall also be responsible for follow-up activities after the incident such as cleanup of the affected area, maintenance and decontamination of the emergency equipment, and submission of any reports.

Regional Safety & Health Manager GHD – (Craig Gebhardt)

The Regional Safety & Health Manager (RSHM) is a GHD employee who is trained as a health and safety professional, works full-time for GHD in a health and safety role, and who serves in a consulting role to the PM, PC and SS/SHO regarding potential health and safety issues.

Employee Safety Responsibility

GHD employees are responsible for their own safety, as well as the safety of those around them. GHD employees shall use any equipment provided in a safe and responsible manner, as directed by their supervisor. GHD personnel will follow the policies set forth in this HASP and the GHD Safety and Health Program.

Employees are directed to take the following actions when appropriate:

i) Suspend any operations, which may cause an imminent health hazard to employees, subcontractors, or others.

ii) Correct job site hazards when possible to do so, without endangering life or health.

iii) Report safety and health concerns to the GHD PM, PC and SS/SHO.

Subcontractors and Other Consultants

Subcontractors and other consultants will be responsible for providing both a site Supervisor ("competent person") and a Safety and Health Officer to direct their activities and to meet all applicable OSHA Regulations. This may be the same individual, if so qualified. These individuals will be responsible for ensuring that all contract specifications are met, including those related to site health and safety. The names of these individuals will be presented in the subcontractor site-specific HASP.

Subcontractors to GHD and other consultants shall prepare and implement their own site-specific HASP for their contract work and provide all applicable Health and Safety SOPs for use by their project personnel. The subcontractor's and other consultants' HASP shall meet the minimum requirements of this HASP. GHD will review the subcontractor HASP prior to the subcontractor mobilizing to the site. Subcontractors and other consultants will be responsible for the health and safety of their personnel, which includes following all applicable OSHA Construction Standards as referenced in 29 CFR 1926 and the subcontractors' site-specific HASP. Subcontractors and other consultants will be required to attend an initial site briefing and subsequent safety meetings.

Authorized Visitors

Authorized Visitors shall be provided with all known information with respect to the project operations and hazards, as applicable to the purpose of their visit.

2. Site Characterization and Potentially Hazardous Compounds

2.1 Site History/Background

The FMC Middleport facility operates under a 1991 Administrative Order on Consent, Docket No. II RCRA 90 3008(h) 0209 (AOC), effective July 2, 1991, and entered into by FMC, the New York State Department of Environmental Conservation (NYSDEC), and the United States Environmental Protection Agency (USEPA) (NYSDEC and USEPA referred to herein as "the Agencies"). In accordance with the AOC, FMC completed a RCRA Facility Investigation (RFI) to investigate and remediate releases of hazardous waste and hazardous constituents associated with the generation of hazardous waste and operation of an interim status hazardous waste storage facility on site. FMC continues to collect data to supplement the RFI per the Agencies' request.

The RFI divided the site into 11 OUs. Since submitting a revised RFI Report in 1999, FMC has completed numerous investigations to define the nature and extent of contamination at its site and certain off-site areas. Such off-site characterization activities have included investigation in OU6, which includes Tributary One of Jeddo Creek, south of Pearson Road; OU7, which includes Tributary One, north of Pearson Road, and OU8, which includes Jeddo Creek and Johnson Creek.

In 2006, FMC collected soil and sediment samples in OU7 and OU8 for arsenic analysis. In accordance with the Agencies-approved Sampling Work Plan – Tributary One North of Pearson Road, Jeddo Creek, and Johnson Creek (Blasland, Bouck & Lee, Inc., January 2006), FMC

submitted data from that investigation to the Agencies. In 2017, NYSDEC requested additional sampling to define the nature and extent of FMC related contamination in OU7 and OU8.

Table 2.1 presents a listing of the chemical compounds that have been identified as potentially associated with the FMC historic operations or detected in samples collected from the site. This table also identifies the maximum detected concentrations of these chemicals in the soil and sediment (mg/kg or µg/kg). The exposure routes and regulatory Time Weighted Average (TWA) exposure levels for these chemicals are presented in Table 2.2. These levels are set to protect the health of workers.

2.2 Scope of Work

The objective of this project is to obtain additional soil and sediment samples along OU7 and OU8 for arsenic analysis.

This HASP covers the specific site activities that will be conducted by GHD personnel and their subcontractors. These activities are as follows:

- Mobilization of personnel, materials, and equipment to and from the OU7 and OU8 site locations.
- Site reconnaissance activities.
- Soil and sediment sampling in Tributary One, north of Pearson Road, and Jeddo Creek and Johnson Creek.
- Decontamination of personnel and equipment.

If site operations are altered or if additional tasks are assigned, an addendum to this HASP shall be developed to address the specific hazards associated with these changes.

3. Basis for Design

Regulations set forth by OSHA in Title 29, CFR, Part 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Section 1926.65 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), and 1910 Subpart Z (Toxic and Hazardous Substances). Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of the U.S. EPA and the National Institute for Occupational Safety and Health (NIOSH) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and site personnel and the protection of the environment will take precedence over cost and scheduling considerations for all project work.

4. Personnel Training

4.1 General

Project personnel who may potentially come into contact with the COCs must have completed hazardous waste operations-related training, as required by the OSHA Standard 29 CFR 1926.65. GHD field employees must also receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. The SS/SHO must have completed an additional 8 hours of training for supervisors.

Additional safety training may be required based on the scheduled scope of work. This safety training is to be conducted and documented before any tasks that require additional training are initiated. It is the responsibility of the SS/SHO to ensure that personnel have the necessary training and skills prior to activity assignment. Job safety training requirements for each task are included in Attachment B – Job Safety Analysis (JSA) Forms.

4.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour training course:

i) General safety procedures

ii) Physical hazards (fall protection, noise, heat stress, cold stress)

iii) Names and job descriptions of key personnel responsible for site health and safety

iv) Safety, health, and other hazards typically present at hazardous waste sites

v) Use, application, and limitations of PPE

vi) Work practices by which employees can minimize risks from hazards

vii) Safe use of engineering controls and equipment on site

viii) Medical surveillance requirements

ix) Recognition of symptoms and signs, which might indicate overexposure to hazards

x) Worker right-to-know (Hazard Communication OSHA 1926.59/1910.1200)

xi) Routes of exposure to constituents of concern

xii) Engineering controls and safe work practices

xiii) Components of a site HASP

xiv) Decontamination practices for personnel and equipment

xv) Confined space entry procedures

xvi) General emergency response procedures

4.3 Daily Safety Meetings

Daily safety meetings (tailgate safety talks) will be held to cover the work to be accomplished each day, the hazards anticipated for each task, the protective clothing and procedures required to minimize project hazards and emergency procedures. These meetings will be presented by the SS/SHO prior to beginning the day's fieldwork. The daily safety meeting must also be held prior to new tasks being initiated, and repeated if new hazards are encountered. Attachment A provides the forms (Large Group or Small Group) that shall be used for documenting the daily safety meetings.

4.4 First Aid and CPR

At least one individual current in First Aid/CPR will be available at the site during work activities. Refresher training in First Aid and CPR are required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens. Blood-borne pathogen training is included as part of the First Aid/CPR training course delivered by the American Red Cross.

5. Personal Protective Equipment (PPE)

PPE is required to safeguard project personnel from various hazards. Varying levels of protection may be required depending on the level of constituents of concern and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. Subcontractor site-specific HASPs will adequately address PPE concerns for each specific task activity based on their proposed scope of work.

5.1 Levels of Protection

Protection levels are determined based upon chemicals and physical hazards present in the work area. The specific protection levels to be employed at the site for each work task are presented in the JSA forms located in Attachment B.

5.1.1 Level D Protection

The minimum level of protection that will be required for all project personnel will be Level D. Level D will only be used in clean areas. The following equipment will be used:

i) Work clothing as prescribed by the weather

ii) Safety toe work boots meeting American National Standard Institute (ANSI) Z41

iii) Safety glasses or goggles, meeting ANSI Z87

iv) Leather work gloves

v) A high visibility safety vest (Class 2) when working near vehicular traffic or moving equipment

vi) Hard hat, meeting ANSI Z89

vii) Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a Noise Reduction Rating (NRR) of at least 20 dBA must be used)

5.1.2 Modified Level D Protection

Modified Level D will be used when airborne constituents of concern are not present at levels of concern, but project activities present an increased potential for skin contact with hazardous materials. It is not anticipated that Modified Level D will be required when sampling soil or sediment in creeks/rivers. Modified Level D consists of:

i) Tyvek® coveralls or polyethylene coated Tyvek® suit (based on the degree of hazard)

ii) Safety toe work boots meeting American National Standard Institute (ANSI) Z41

iii) Vinyl or latex boots, neoprene, or polyvinyl chloride (PVC) overboots

iv) Safety glasses or goggles

v) Hard hat

vi) Face shield in addition to safety glasses or goggles when projectiles and/or splashing liquids pose a hazard

vii) Disposable nitrile inner gloves (NDEX 8005, as manufactured by Best)

viii) Nitrile over gloves, as manufactured by Best, or equivalent

ix) Hearing protection (if necessary)

x) A high visibility safety vest (Class 2) when working near vehicular traffic or moving equipment

5.1.3 Level C Protection (not expected to be worn)

The following equipment will be used for Level C protection:

i) Full-face air purifying respirator (APR) with organic vapor/acid gas cartridges in combination with particulate filters (P-100) which are NIOSH approved (MSA GME P-100 cartridges or equivalent)

ii) Polyethylene coated Tyvek® or Saranex® hooded suit (if liquids/splash hazards are present) or Tyvek® coveralls, ankles, and cuffs taped to boots and gloves

iii) Nitrile over glove, as manufactured by Best or equivalent

iv) Inner nitrile disposable gloves (NDEX 8005, as manufactured by Best)

v) Safety toe work boots, ANSI approved

vi) Chemical resistant neoprene or rubber boots with steel toes or latex/PVC booties over safety toe shoes

vii) Hard hat, ANSI approved

viii) Hearing protection (if necessary)

ix) A high visibility safety vest (Class 2) when working near vehicular traffic or moving equipment

5.1.4 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, project conditions, ambient air quality, and the judgement of the SS/SHO and the RSHM. The PPE used will be chosen to be effective against the compound(s) present on the site.

5.2 Respiratory Protection (not expected to be worn)

Respiratory protection is an integral part of employee health and safety at sites with potential airborne contamination. It is not anticipated airborne constituents will be a concern at the site. Should the project team encounter an unexpected condition, such as an unknown waste or material, they will use stop work authority, and contact the RSHM for additional assistance before deciding to wear respirators.

5.3 Using PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level C or Modified Level D PPE is used.

5.3.1 Donning Procedures

These procedures are mandatory only if Level C or Modified Level D PPE is used on the project:

i) Remove bulky outerwear. Remove street clothes and store in clean location.

ii) Put on work clothes or coveralls.

iii) Put on the required chemical protective coveralls or rain gear.

iv) Put on the required chemical protective boots or boot covers.

v) Tape the legs of the coveralls to the boots with duct tape.

vi) Put on the required chemical protective gloves.

vii) Tape the wrists of the protective coveralls to the gloves.

viii) Don the required respirator and perform appropriate fit check.

ix) Put hood or head covering over-head and respirator straps and tape hood to face-piece.

x) Check and secure all seams.

xi) Don remaining PPE, such as hard hat.

When these procedures are instituted, one person (bottle watch/decontamination attendant) must remain outside the work area to ensure that each person entering has the proper protective equipment.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level C or Modified Level D PPE is required for this project. Whenever a person leaves a Level C or Modified Level D work area, the following decontamination sequence will be followed:

i) Upon entering the Contamination Reduction Zone (CRZ), rinse contaminated materials from the boots or remove contaminated boot covers.

ii) Clean reusable protective equipment.

iii) Remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container, which is labeled.

iv) Wash hands, face, and neck or shower (if necessary).

v) Clean and disinfect respirator for next use.

vi) Proceed to the clean area and dress in clean clothing.

All disposable equipment, garments, and PPE must be placed in covered containers and labeled for disposal. See Section 9.0 for detailed information on decontamination procedures.

5.4 Selection Matrix

The level of personal protection selected will be based upon the potential for workers to be exposed to particulates and an assessment by the SS/SHO of the potential for skin contact with contaminated materials. The PPE selection matrix is provided in each JSA Form located in Attachment B. This matrix is based upon information that was available at the time this plan was written and may be revised by the SS/SHO.

5.5 Duration of Work Tasks

The duration of activities involving the usage of PPE will be established by the SS/SHO based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 7.3) and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of APR cartridges, etc.).

All rest breaks will be taken in a clean area (e.g., Support Zone [SZ]) after full decontamination and PPE removal. Rest breaks will be observed, based upon the heat stress monitoring guidelines presented in Section 7.3.

5.6 Limitations of Protective Clothing

PPE ensembles have been selected to provide protection against constituents of concern at anticipated concentrations. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by concentrations of constituents of concern, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific constituent of concern; chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all project personnel using PPE:

i) When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift.

ii) Inspect all clothing, gloves, and boots both prior to and during use for:

   a. Imperfect seams
   b. Non-uniform coatings
   c. Tears
   d. Poorly functioning closures

iii) Inspect reusable garments, boots, and gloves both prior to and during use for:

   a. Visible signs of chemical permeation
   b. Swelling
   c. Discoloration
   d. Stiffness
   e. Brittleness
   f. Cracks
   g. Any sign of puncture
   h. Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of constituents of concern will not be reused.

Project personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i) Familiarize themselves with this HASP.

ii) Use the "buddy system" when working in a contaminated operation.

iii) Use the safety equipment in accordance with training received, labeling instructions, and common sense.

iv) Maintain safety equipment in good condition and proper working order.

v) Refrain from activities that would create additional hazards (i.e., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces).

vi) Smoking, eating, and drinking will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the SS/SHO.

vii) Soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the site.

6. Site Control

The purpose of site control is to minimize potential contamination of workers and protect the public from hazards found on site. Site control is especially important in emergency situations.

6.1 Site Orientation and Hazard Briefing

No person will be allowed in the general work area during site operations without first attending the site indoctrination training session put on by the SS/SHO. This training session will also include a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Attachment A provides a Training Acknowledgment Form for documentation purposes. In addition to this meeting, daily safety meetings will be held each day before work begins. All individuals on site, including visitors, must document their attendance to this briefing as well as the daily safety meetings on the forms included in this HASP. Attachment A presents the Daily Safety Meeting Log.

6.2 Certification Documents

The SS/SHO will be responsible for verifying compliance of training and medical surveillance certifications of all project personnel prior to them being allowed to work at the site. This will include a review of the 40-hour the hazardous waste operations and emergency response training, 8-hour update, and current medical clearance. Subcontractor personnel must provide a copy of their training, respirator fit test, and medical documentation to the GHD SS/SHO prior to the start of fieldwork. Additional safety training certification may be necessary based on the scheduled task activity.

6.3 Entry Requirements

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed to enter the site unless he or she is wearing the minimum PPE as described in Section 5.0. Personnel entering the work areas must wear the required PPE specified for those locations.

6.4 Emergency Entry and Exit

Individuals who must enter the site on an emergency basis will be briefed on the potential hazards present by the SS/SHO. All activities will cease in the event of an on site emergency and any sources of emissions will be controlled, if possible.

Individuals exiting the site because of an emergency will gather in a safe area as determined and communicated by the SS/SHO to all project personnel for a head count. The SS/SHO is responsible for ensuring that all individuals who entered the work area have exited in the event of an emergency. See Section 11.0 of this HASP for additional information.

6.5 General Practices

Additional general safety practices to be implemented are as follows:

i) At least one copy of this HASP must be at the project site, in a location readily available to all personnel, and reviewed by all project personnel prior to starting work.

ii) All project personnel must use the buddy system (working in pairs or teams).

iii) Food, beverages, cosmetics and/or tobacco products must not be present, consumed or used in the work areas.

iv) Emergency equipment such as eyewash, fire extinguishers, etc., must be removed from storage areas and staged in readily accessible locations.

v) Contaminated waste, debris, and clothing must be properly contained and legible and understandable precautionary labels must be affixed to the containers.

vi) Removing contaminated soil from protective clothing or equipment with compressed air, shaking, or any other means that disperses constituents of concern into the air is prohibited.

vii) Containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport.

viii) Visitors at the site must be instructed to stay outside the work areas during the extent of their stay. Visitors must be cautioned to avoid skin contact with contaminated surfaces, or surfaces suspected to be contaminated.

6.6 Buddy System

All project personnel must use the buddy system when working in pairs or teams. Visual contact must be maintained between project personnel at all times, and each individual must observe their coworker(s) for signs of chemical exposure, heat, or cold stress. Indications of adverse effects include, but are not limited to:

i) Changes in complexion and skin coloration

ii) Changes in coordination

iii) Excessive salivation and pupillary response

iv) Changes in speech pattern

Project personnel must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Workers must inform their partners or fellow team members of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

i) Headaches

ii) Dizziness

iii) Nausea

iv) Blurred vision

v) Cramps

vi) Irritation of eyes, skin, or respiratory tract

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member. Downrange field teams in conjunction with the “buddy” system will use the following hand signals. These signals are very important when working with heavy equipment. The entire field team shall know them before operations commence.

Signal	Meaning
Hand Gripping Throat	Out of Air; Can't Breathe
Grip Partner's Wrist	Leave Area Immediately
Hands on Top of Head	Need Assistance
Thumbs Up	Ok, I'm All Right, I Understand
Thumbs Down	No, Negative

7. Activity Hazard/Risk Analysis and General Safety Practices

This section identifies and evaluates the potential chemical, physical, and biological hazards, which may be encountered while conducting site activities. Specific activity JSA forms (see Attachment B) have been developed to address the hazards associated with scheduled/known project activities, which are outlined in Section 1.0 of this HASP.

NOTE: If a non-routine task or previously unidentified task becomes necessary then a JSA that addresses the new task must be developed and implemented before initiating the new activity.

In addition to the chemical hazards presented in Section 2.0 of this HASP, physical and biological hazards including: potential heat and cold stress; biological hazards including snakes, poison ivy, poison oak, mosquitoes, bees, wasps; uneven terrain and slippery surfaces; and the use of decontamination equipment, exist at the site. It will be the responsibility of the SS/SHO and project personnel to identify the physical and/or biological hazards posed by the various project activities and implement preventative measures and corrective actions.

7.1 Working Over or Near Water

The procedures outlined in this section are to be implemented by all GHD and subcontractor personnel when there is the potential for slipping or falling into water that is greater than 3 feet in depth. Additionally, these procedures are to be adhered to when water is flowing and has the potential to carry personnel away:

- When working at ground level, a 5-foot "no entry zone" can be established between the work area and the water hazard. The no entry zone is to be clearly defined and/or demarcated. Personnel will not be permitted to enter into this area unless the other provisions of this section are in place.

- Standard guardrails are required on any walking/working surface over or near water.
- Where guardrails are not practical due to impairment of work being performed, other types of safeguarding, such as safety harnesses, lifelines, and lanyards may be used (see GHD's Fall Protection SOP).
- If providing fall protection is not feasible due to the scope of work or location, personnel will be required to wear U.S. Coast Guard-approved life jackets or buoyant work vests. Prior to each use and after each use, the buoyant work vests and life preservers must be inspected for defects that would affect strength and/or buoyancy. Any damaged or defective buoyant work vest or life preserver cannot be used.
- Call in or make prearranged contacts after each activity posing a drowning hazard is completed.
- If work on wet or slippery surfaces above water is necessary, non-slip tape or other methods are to be used to increase traction.
- Ring buoys with a minimum 90 feet of line must be readily available for emergency operations. The distance between buoys cannot exceed 200 feet.

Due to the anticipated scope of work, a lifesaving skiff may be necessary. However, the SS in conjunction with the RSHM will evaluate current site conditions to determine if a skiff is required.

7.2 Chemical Exposure

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A constituent of concern can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact. The chemical constituents of concern at the site from a health and safety perspective are outlined in Table 2.1.

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a constituent of concern. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a constituent of concern over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given constituent of concern, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become evident for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Abrasions, cuts, heat, and moisture enhance skin absorption. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely; however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

7.2.1 Chemical Hazard Controls

Airborne exposure or contact with the site chemicals shall be controlled by:

i) Use of the proper personnel protective equipment (PPE) and good housekeeping procedures may control skin contact with chemicals. The proper PPE (e.g., polycoated Tyvek®, gloves) as described in Section 5.0 of this HASP shall be worn for all activities where contact with potentially harmful media or materials is anticipated.

ii) Dust control measures, such as wetting the immediate area, shall be employed when visible dust is generated in active work areas.

iii) Contact the RSHM for additional information regarding a particular product's or activity's exposure hazards.

iv) Using respiratory protection as appropriate, in areas known to have concentrations above the specified action level for each chemical.

7.2.2 Hazard Communication

Personnel required to handle or use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication standard. The training shall include instruction on the safe usage, and handling procedures of hazardous materials, how to read and access Safety Data Sheets (SDSs), and the proper labeling requirements.

The SDSs for those chemicals in use at the site will be available to project personnel. The SS/SHO will be responsible for maintaining the SDSs for chemical-containing materials that have been brought to the site by GHD personnel.

7.3 Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision problems, allergic reactions, and other skin concerns. Two types of UV rays are emitted from the sun: UVA and UVB rays.

UVB rays cause sunburn, skin cancer, and premature aging of the skin. UVB rays stimulate tanning but are also linked to other problems such as impaired vision, skin rashes, and some allergic and other reactions to certain drugs. Extra care should be taken if activities are to be conducted on or near water. Sunlight reflected off the surface of the water is intensified resulting in accelerated effects. The following steps should be taken to protect against overexposure to sunlight:

i) Always use sunscreen. Apply a broad-spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when you towel off or sweat.

ii) Cover up. Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays.

iii) Wear a hat. A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck – areas particularly prone to overexposure to the sun.

iv) Wear sunglasses that block 99 to 100 percent of UV radiation. Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses.

v) Seek shade. Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.

vi) Limit time in the midday sun. The sun's rays are strongest between 10 a.m. and 4 p.m. Whenever possible, limit exposure to the sun during these hours.

7.4 Heat Stress

Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat Rashes: Are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Cramps: Are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3 percent NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Exhaustion: Occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat Stroke: Is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions: Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature is described below.

Adjusted Temperature(1)	Work-Rest Regimen Normal Work Ensemble(2)	Work-Rest Regimen Impermeable Ensemble
90°C (32.°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8°C to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F (30.8° to 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

Notes:

(1) Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F=ta °F + (13 x percent sunshine). Measure air temperature (ta) with a standard thermometer, with the bulk shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

(2) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

In order to determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the

heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

i) Project personnel will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.

ii) On-site drinking water will be kept cool (50 to 60°F).

iii) A work regimen that will provide adequate rest periods for cooling down will be established, as required.

iv) All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.

v) Cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat.

vi) Project personnel shall be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.

vii) A shaded rest area must be provided. All breaks should take place in the shaded rest area.

viii) Project personnel will not be assigned to other tasks during breaks.

ix) Project personnel shall remove impermeable garments during rest periods. This includes Tyvek® garments.

x) All project personnel will be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

7.5 Cold Stress

Fatal exposures to cold have been reported in individuals failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind-chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the bodies core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased

clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the project personnel on site, and cold exposures should be immediately terminated for any individual when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

7.5.1 Predisposing Factors for Cold Stress

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the SS/SHO to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

i) **Dehydration**: The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.

ii) **Fatigue During Physical Activity**: Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.

iii) **Age**: Some older and very young individuals may have an impaired ability to sense cold.

iv) **Alcohol Consumption**: Alcohol dilates the blood vessels near the skin surface resulting in excessive body heat loss.

v) **Sedative Drugs**: Sedatives may interfere with the transmission of impulses to the brain, thereby interfering with the body's physiological defense against cold. Some prescription drugs may react the same way.

vi) **Poor Circulation**: Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.

vii) **Heavy Work Load**: Heavy workloads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.

viii) **The Use of PPE**: PPE usage, which traps sweat inside the PPE, may increase an individual's susceptibility to cold stress.

ix) **Lack of Acclimatization**: Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.

x) **History of Cold Injury**: Previous injury from cold exposures may result in increased cold sensitivity.

7.5.2 Prevention of Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education. Additional information on each measurer is as follows:

i) **Acclimatization:** Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.

ii) **Fluid and Electrolyte Replenishment**: Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.

iii) **Eating a Well Balanced Diet**: Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day.

iv) **Warm Clothing**: It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

Recommended cold weather procedures include:

i) Inner layers (t-shirts, shorts, and socks) should be of a thin, thermal insulating material.

ii) Wool or thermal trousers. Denim is not a good protective fabric.

iii) Felt-lined, rubber-bottomed, leather-upper boots with a removable felt insole is preferred. Change socks when wet.

iv) Wool shirts/sweaters should be worn over inner layer.

v) A wool cap is good head protection. Use a liner under a hard hat.

vi) Mittens are better insulators than gloves.

vii) Face masks or scarves are good protection against wind.

viii) Tyvek®/polycoated Tyvek® provides good wind protection.

ix) Wear loose fitting clothing, especially footwear.

x) Carry extra clothing in your vehicle.

xi) Shelters with heaters should be provided for rest periods for project personnel. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.

xii) At temperatures of 30°F (-1°C) or lower, cover metal tool handles with thermal insulating material if possible.

xiii) If possible, schedule work during the warmest part of the day. Rotate personnel and adjust the work/rest schedule to enable individuals to recover from the effects of cold stress.

xiv) It may not be practically feasible to implement all the above prevention measures. Follow the guidelines given below when the ambient air temperature is below 0°F (-18°C):

- i) Dress warmly.
- ii) Replenish fluids and electrolytes at regular intervals.
- iii) Provide shelter from the cold.
- iv) Adjust work/rest schedules.

7.5.3 First Aid Guidelines for Cold Stress

The following describes symptoms of different stages in cold stress and the related first aid treatment guidelines.

Frostbite

Stages

Incipient (frost nip)	May be painless. Tips of ears, nose, cheeks, fingers, toes, chin affected. Skin blanched white.
Superficial	Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.
Deep	Tissue beneath skin is solid, waxy, and white with purplish tinge. Entire tissue depth is affected.

First Aid

Incipient	Warm by applying firm pressure - blow warm breath on spot or submerge in warm water (102°F to 110°F) (39°C to 43°C). Do not rub the area.
Superficial	Provide dry coverage, steady warmth; submerge in warm water.
Deep	Hospital care is needed. Do not thaw frostbitten part if needed to walk on. Do not thaw if there is danger of re-freezing. Apply dry clothing over frostbite. Submerge in water; do not rub.

General Hypothermia

Stages

i) Shivering

ii) Indifference

iii) Decreased consciousness

iv) Unconsciousness

v) Death

Symptoms

i) Muscle tension

ii) Uncontrollable shivering

iii) Glassy stare

iv) Decreased muscle function

v) Speech distortion

vi) Blue, puffy skin

vii) Slow pulse

viii) Shallow breathing

ix) Coordination loss

x) Stumbling

xi) Forgetfulness

xii) Freezing extremities

xiii) Dilated pupils

xiv) Fatigue

Emergency Response

i) Keep the individual dry; replace wet clothing.

ii) Apply external heat to both sides of patient using available heat sources, including other bodies.

iii) Give warm liquids - not coffee or alcohol - after shivering stops and if conscious.

iv) Handle gently.

v) Transport the patient to the medical facility as soon as possible.

vi) If more than 30 minutes from a medical facility, warm the individual with other bodies.

7.6 Slip/Trip/Fall Injuries

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

i) Spot check the work area to identify hazards.

ii) Establish and utilize a pathway which is most free of slip and trip hazards.

iii) Beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain.

iv) Carry only loads which you can see over.

v) Keep work areas clean and free of clutter, especially in storage rooms and walkways.

vi) Communicate hazards to project personnel.

vii) Secure all loose clothing, ties, and remove jewelry while around machinery.

viii) Report and/or remove hazards.

ix) Keep a safe buffer zone between workers using equipment and tools.

7.7 Manual Lifting

When lifting objects, use the following proper lifting techniques:

i) Feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift.

ii) Do not lift more than 50 pounds without the assistance of another individual.

iii) Use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause a hernia.

iv) Grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you're going to lift - using the full palm. Fingers have very little power - use the strength of your entire hand.

v) The load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered.

vi) The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist your back while lifting or moving objects.

7.8 Adverse Weather Conditions

The SS/SHO shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, tornado warnings, and strong winds (approximately 40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of the site. Strong winds can generate visible dust levels resulting in hazardous conditions during the handling of impacted material and drilling reagents. In addition, no work will be permitted during any type of electrical storm or during wind events that have wind speeds exceeding 25 mph.

7.9 Biological Hazards

Project personnel conduct numerous project activities that may encounter biological hazards, including bloodborne pathogens, insects, spiders, scorpions, rodents, snakes, and large predators. This section identifies precautions to be taken if these hazards are encountered.

7.10 Vegetation Overgrowth

Overgrown weeds, bushes, trees, grass, and other vegetation are fire and safety hazards. A number of hidden hazards may not be immediately recognized due to the overgrowth of vegetation in areas where field activities may occur, including discarded junk, litter, and debris. Construction materials such as boards, nails, concrete, and other debris may be hidden beneath tall grass, weeds, and bushes. Other hazards may include steep slopes, potholes, trenches, soft spots, dips, etc., all dangerously concealed from the view of the individual walking or operating motorized equipment in the area. Additionally, biological hazards such as snakes, ticks, chiggers, and mosquitoes may be present, as they breed in overgrowth conditions.

Here are some simple actions you can take:

i) Assess the work area and determine if the area requires vegetation clearance. Consider that overgrowth extending above the lowest level of motorized equipment (i.e., bumper or fender) or 6 inches above your ankle has hidden hazards that you will not be able to readily identify.

ii) Determine if the area is safe to walk or whether you need motorized equipment. Consider the limitations of the equipment.

iii) Identify slip, trip, and fall hazards and remove from the general work area. Remember to give adequate clearance so that the items being removed do not pose future hazards.

iv) Adequately protect yourself against the hazards by wearing boots that protect the ankles, wearing long pants, and using insecticides.

v) Consider the limitations of manual or mechanical equipment for the clearance of overgrowth, particularly the safety hazards when using sling blades, machetes, weed eaters, bush hogs, or other brush removing equipment.

Before taking any action, determine whether there any ecological issues that would affect or prevent the removal of overgrowth in protected areas such as wetlands, wildlife habitats, or sanctuaries for endangered and/or protected species.

7.11 Poisonous Plants

Common poison ivy grows as a small plant, a vine, and a shrub. Poison ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison sumac grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause mild to severe allergic reaction, referred to as "contact dermatitis." These plants are found in Pennsylvania.

Dermatitis, in Rhus-sensitive persons, may result from contact with the milky sap found in the roots, stems, leaves, and fruit, and may be carried by contacted animals, equipment, or apparel.

The best form of prevention is to avoid contact. Wearing long sleeves, gloves, and disposable clothing, such as Tyvek, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

7.12 Insects

Ticks

Ticks are blood feeding external parasites of mammals, birds, and reptiles throughout the world. Some human diseases of current interest in the United States caused by tick-borne pathogens include Lyme disease, ehrlichiosis, babesiosis, Rocky Mountain spotted fever, tularemia, and tick-borne relapsing fever. Lyme disease is caused by a bacterial parasite called spirochete and is spread by infected ticks that live in and near wooded areas, tall grass, and brush. The ticks that cause the disease in the Northeast and Midwest are often no bigger than a poppy seed or a comma in newsprint. The peak months for human infection are June through October. Many other tick-borne diseases, such as Rocky Mountain spotted fever, can be carried by a variety of ticks. The prevention and treatment of these diseases are similar to those of Lyme disease.

Prevention

Preventative measures include wearing light-colored clothing, keeping clothing buttoned, tucking pant legs in socks, and keeping shirttails tucked in. Periodic checks for ticks should be made during the day, and especially at night. Hair should also be checked by parting it and combing through it to make sure that no ticks have attached to the scalp. Also, check clothing when it is first removed, before ticks have a chance to crawl off. A shower or bath should be taken as soon as possible after leaving the site for the day.

The most common repellent recommended for ticks is N,N-dimethyl-m-toluamide, or DEET. It is important to follow the manufacturer's instructions found on the container with all insecticides, especially those containing DEET.

In general, DEET insect repellent should only be applied to clothing, not directly on the skin. Do not apply to sunburns, cuts, or abrasions. Use soap and water to remove DEET once indoors. However, the DEET user is required to read the insect repellant label and/or MSDS for safe use requirements. If ticks are not responding to DEET or other safety methods, then the PM and RSHM are to be notified and additional safety controls may be utilized.

Removal

The best way to remove a tick is removal by tweezers. If tweezers are not available, cover your fingers (tissue paper) while grasping the tick. It is important to grasp the tick as close as possible to the site of attachment and use a firm steady pull to remove it. When removing the tick, be certain to remove all the mouthparts from your skin so as not to cause irritation or infection. Wash hands immediately after with soap and water, and apply antiseptic to the area where tick was removed. Get medical attention if necessary.

Symptoms of Lyme Disease

The first symptoms of Lyme disease usually appear from 2 days to a few weeks after an infected tick bites a person. Symptoms usually consist of a ring-like red rash on the skin where the tick attached, and is often bulls eye-like with red on the outside and clear in the center. The rash may be warm, itchy, tender, and/or "doughy" and appears in only 60 to 80 percent of infected persons. An infected person also has flu-like symptoms of fever, fatigue, chills, headaches, a stiff neck, and

muscle aches and pains (especially knees). Rashes may be found some distance away from original rash. Symptoms often disappear after a few weeks.

Bees, Wasps, and Yellow Jackets

Stinging insects are members of the order Hymenoptera of the class Insecta. There are two major subgroups: aphids (honeybees and bumblebees) and vespids (wasps, yellow jackets, and hornets). Aphids are docile and usually do not sting unless provoked. The stinger of the honeybee has multiple barbs, which usually detach after a sting. Vespids have few barbs and can inflict multiple stings.

Types of stinging insects that might be encountered on this project site may include:

- Carpenter bees
- Bumblebees
- Mud dauber wasps
- Yellow jackets
- Cicada killer wasps
- Giant hornets
- Honeybees
- Paper wasps

Symptoms

If you are stung, three types of reactions are possible: a normal, a toxic, or an allergic reaction.

- **Normal Reaction**: Only lasts a few hours and consists of pain, redness, swelling, itching, and warmth near the sting area.
- **Toxic Reaction**: Will last for several days, results from multiple stings, and may cause cramps, headaches, fever, and drowsiness.
- **Allergic Reaction:** Can cause hives, itching, swelling, tightness in the chest area, and a possibility of breathing difficulties, dizziness, unconsciousness, and cardiac arrest.

The stingers of many Hymenoptera may remain in the skin and should be removed as quickly as possible without concern for the method of removal. An ice cube placed over the sting will reduce pain; aspirin may also be useful. Persons with known hypersensitivity to such stings should carry a kit containing epinephrine in a prefilled syringe. Antihistamines may help decrease hives and angioedema. Persons who have severe symptoms of anaphylaxis, have positive venom skin test results, and are at risk for subsequent stings should receive immunotherapy regardless of age or time since anaphylaxis.

Precautions

The following precautions can help you avoid stings. Try to wear light colored clothing and shy away from dark or floral prints. Avoid wearing perfumes, hairsprays, colognes, and scented deodorants while working outside. If eating outside, keep all food and drinks covered; sweet foods and strong scents attract stinging insects as well. Never swat or swing at the insect; it is best to wait for it to leave, softly blow it away, or gently brush it aside. Seek medical attention when the reaction to a sting includes swelling, itching, dizziness, or shortness of breath.

If physical control measures are not effective, use a pesticide that will have a minimal impact on both you and the environment.

Fire Ants

Fire ants are reddish-brown in color and range from 1/8 inch to 3/8 inch in length. When a fire ant stings an individual, the individual is rarely only stung once. Most fire ant stings result in a raised welt with a white pustule. If stung by a fire ant, continue to observe the welt and try to prevent secondary infection by keeping the welt intact. However, some individuals may have an allergic reaction to a fire ant sting and require immediate medical attention. Pesticides and even hot water can be used to kill fire ant colonies. Fire ants are normally seen in the southern states.

Mosquitoes

Mosquitoes are common pests that can be found in any state and any work environment where warm, humid conditions exist. Mosquitoes can pass along diseases such as West Nile virus and malaria. Several different methods can be used to control adult mosquito populations: repellants such as DEET, mosquito traps, foggers, and vegetation and water management. Mosquitoes are found from the tropics to the Arctic Circle and from lowlands to the peaks of high mountains.

7.13 Poisonous Spiders

Black Widow

Black Widow spiders are not usually deadly (especially to adults) and only the female is venomous. The female spider is shiny black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about 1.5 inches long, while the adult male's is approximately half that. The spider's span ranges from 1 to 3 inches. The adult males are harmless, have longer legs, and usually have yellow and red bands and spots over their back, while the young black widows are colored orange and white. The bite of a black widow is often not painful and may go unnoticed. However, the poison injected by the spider's bite can cause severe reactions in certain individuals.

Symptoms

Symptoms include abdominal pain, profuse sweating, swelling of the eyelids, pains to muscles or the soles of the feet, salivation and dry-mouth (alternating), and paralysis of the diaphragm. If a person is bitten, they should seek immediate medical attention. Clean the area of the bite with soap and water. Apply a cool compress to the bite location. Keep effected limb elevated to about heart level. Ask a doctor if Tylenol or aspirin can be taken to relieve minor symptoms. Additional information can be obtained from the Poison Center (1-800-222-1222). Black widows are found throughout the tropics, U.S., and Canada.

Brown Recluse

Brown recluse spiders are usually light brown in color, but in some instances they may be darker. Brown recluse spiders are highly venomous spiders, native to the United States, and found coast to coast. The brown recluse can vary in size, but some can obtain bodies of 5/8 inches in length with a leg span of 1 1/2 inches in diameter. They can be identified by their three pairs of eyes along the head area and their fiddle shaped markings on the back. Most brown recluse bites are defensive rather than offensive. They generally only bite when they feel threatened.

Symptoms

If bitten by a brown recluse, an individual may experience open, ulcerated sores, which when left untreated may become infected and cause tissue necrosis. If an individual believes a spider has bitten them, they need to seek medical attention as soon as possible. In order to minimize the occurrence of brown recluse bites, individuals should shake their clothing and shoes thoroughly, eliminate the presence of cluttered areas, and spray the building perimeters with pesticides. Brown recluse are found throughout the U.S., Mexico, and Canada.

7.14 Threatening Dogs

If you are approached by a frightened or menacing dog, coyote, or other similar animal.

i) Do not attempt to run and don't turn your back.

ii) Stay quiet, and remember to breathe.

iii) Be still, with arms at sides or folded over chest with hands in fists.

iv) Slowly walk away sideways.

v) Don't stare a dog in the eyes, as this will be interpreted as a threat.

vi) Avoid eye contact.

vii) If you have a jacket, you could wrap it around your arm and should he snap, take the bite harmlessly. If an injury results from interactions with the dog, follow the emergency response/contingency procedures outlined in Section 11.

7.15 Rodents

Rodentia: rats, mice, beavers, squirrels, guinea pigs, capybaras, coypu.

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of rats; the most common are the black and brown rat.

The Brown Rat has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, shops, and supermarkets; they also frequent any space with an easy meal and potential nesting sites.

The Black Rat can be identified by its tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The House Mouse has the amazing ability to adapt and now can frequently be found in human dwellings. In buildings, mice will live anywhere and they are very difficult to keep out. Mice are also totally omnivorous; in other words, they will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

There are six major problems caused by rats and mice:

i) They eat food and contaminate it with urine and excrement.

ii) They gnaw into materials such as paper, books, wood, or upholstery, which they use as nest material. They also gnaw plastic, cinder blocks, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard.

iii) Rats occasionally bite people and may kill small animals.

iv) They, or the parasites they carry (such as fleas, mites, and worms), spread many diseases such as salmonella, trichinosis, rat bite fever, hantavirus, Weil's disease, and the bubonic plague.

v) Rats can damage ornamental plants by burrowing among the roots or feeding on new growth or twigs. They also eat some garden vegetables, such as corn and squash.

vi) Rats and mice are socially unacceptable. These rodents have been a problem for centuries, chiefly because they have an incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

7.16 Snakes

Snakes may be found in any region of the country. While many snakes encountered are not venomous, a few are, so all snakes should be given a wide berth. Of the 7,000 venomous snakebites reported each year, only about 15 prove to be fatal, so your chances of survival are extremely high. The usual snake encounter is one in which they see you before you see them, and they slither away from you quickly, startling you. If you see a snake, back away from it slowly and do not touch it. If you or someone you know are bitten, try to see and remember the color and shape of the snake, which can help with treatment of the snakebite.

Venomous snakes include the coral snake and pit vipers, such as the cottonmouth (water moccasin), copperhead, and rattlesnake. The venom of pit vipers is primarily *hematoxic* because it acts upon the victim's blood system. This venom breaks down blood cells and blood vessels and affects heart action. Bite victims experience severe burning pain, localized swelling and discoloration for the first 3 to 30 minutes, followed by nausea, vomiting, occasional diarrhea, and usually shock.

Preventing Snakebites

The best ways to prevent snakebites are to watch where you step, put your hands, or sit down. Poisonous snakes live on or near the ground and often like rocks, woodpiles, and other spots that offer both a place to sun and a place to hide. Most bites occur in and around the ankle. About 99 percent of all bites occur below the knee, except when someone accidentally picks up or falls on the snake.

Watching where you step and wearing boots in tall grass can prevent most snakebites. Snake chaps can also help protect against snakebites.

Signals that indicate a poisonous snakebite include:

i) One or two distinct puncture wounds, which may or may not bleed - the exception is the coral snake, whose teeth leave a semicircular mark.

ii) Severe pain and burning at the wound site immediately after or within 4 hours of the incident.

iii) Swelling and discoloration at the wound site immediately after or within 4 hours of the incident.

Emergency First Aid for Poisonous Snakebite

Although it is important to obtain medical aid immediately, emergency first aid can slow the spread of poison from the bite. Remain calm and avoid unnecessary movement, especially if someone is with you. The rate of venom distribution throughout your body will be slower if you are still and quiet. *Do not* use home remedies, and *do not* drink alcoholic beverages.

To care for a bite from a pit viper, such as a rattlesnake, copperhead, or cottonmouth, follow these steps:

i) Call 9-1-1 or the local emergency number.

ii) Wash the wound.

iii) Keep the injured area still and lower than the heart; if possible, carry a person who must be taken to a medical facility or have him or her walk slowly.

iv) Do not apply ice.

v) Do not cut the wound.

vi) Do not apply suction.

vii) Do not apply a tourniquet.

viii) Do not use electric shock, such as from a car battery.

Care for a bite from an elapid snake, such as a coral snake, is the same as for a pit viper, except that after washing the wound you should apply an elastic roller bandage by following these steps (see Section 10 for more information on using an elastic bandage):

i) Check for feeling, warmth, and color of the limb beyond where you will be placing the bandage by noting changes in skin color and temperature.

ii) Place the end of the bandage against the skin and use overlapping turns.

iii) Gently stretch the bandage as you continue wrapping. The wrap should cover a long body section, such as an arm or a calf, beginning at the point farthest from the heart. For a joint like a knee or ankle, use figure-eight turns to support the joint.

iv) Always check the area above and below the injury site for feeling, warmth, and color, especially fingers and toes, after you have applied an elastic roller bandage. By checking before and after bandaging, you will be able to tell if any tingling or numbness is from the bandaging or the injury.

v) Check the snugness of the bandaging—a finger should easily, but not loosely, pass under the bandage.

vi) Keep the injured area still and lower than the heart. If possible, carry a person who must be taken to a medical facility or have him or her walk slowly.

vii) Do not apply ice.

viii) Do not cut the wound.

ix) Do not apply suction.

x) Do not apply a tourniquet.

xi) Do not use electric shock, such as from a car battery.

7.17 Bloodborne Pathogens

Hepatitis and other communicable diseases are largely transmitted through exposure to bodily fluids containing the hepatitis virus, which could be found on refuse encountered in subsurface investigations. This includes activities occurring at landfills, sewage treatment facilities, sewers, topical spreading of treated waste and medical wastes (e.g., contaminated needles and syringes). Individuals performing tasks for these types of project should consult with their physicians and be properly vaccinated. The primary method of transmission depends on the prevalence of the disease in a given area.

Hepatitis A is a liver disease caused by the hepatitis A virus. Hepatitis A can affect anyone and can occur in situations ranging from isolated cases of disease to widespread epidemics.

Hepatitis B is a serious disease caused by a virus that attacks the liver. The virus, which is called hepatitis B virus (HBV), can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death.

Hepatitis C is a liver disease caused by the hepatitis C virus (HCV), which is found in the blood of persons who have the disease. HCV is spread by contact with the blood of an infected person.

Hepatitis D is a liver disease caused by the hepatitis D virus (HDV), a defective virus that needs the hepatitis B virus to exist. HDV is found in the blood of persons infected with the virus.

Hepatitis E is a liver disease caused by the hepatitis E virus (HEV) and is transmitted in much the same way as hepatitis A virus. Hepatitis E, however, does not often occur in North America.

Prevention

Preventative measures include wearing appropriate PPE: leather work gloves, a long sleeved shirt, and safety footwear. Several vaccines have been developed for the prevention of hepatitis B and C virus infection. Vaccines rely on the use of one of the viral proteins (hepatitis B surface antigen or HBsAg). The vaccine was originally prepared from plasma obtained from patients who had long-standing hepatitis B virus infection. However, currently these are more often made using recombinant technology, though plasma-derived vaccines continue to be used; the two types of vaccines are equally effective and safe.

8. Air Monitoring Program

The project manager and RSHM have determined that air monitoring is not required on this project.

9. Decontamination Procedures

In general, everything that enters the EZ at this site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any State and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) and the equipment will be inspected by the SS/SHO before it is moved into the clean zone. An existing decontamination facility complete with water supply is located at the site, which includes a decontamination pad for collection of wash water. Any material that is generated by decontamination procedures will be collected and stored in a designated area in the EZ until disposal arrangements are made. All decontamination water should be carefully handled and all sediments will be collected for proper disposal.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for heavy equipment and for any reusable PPE is Alconox/Liquinox soap. The SDS for Liquinox and any other chemical containing products brought to the site will be maintained on site by the SS/SHO.

9.1 Equipment Decontamination Procedures

All equipment that comes in contact with waste material must be decontaminated within the CRZ using high-pressure water cleaner upon exit from the EZ. Decontamination procedures will include knocking soil/mud from machines; water brush scrubbing using a solution of water and Liquinox; and a final water rinse. Personnel shall wear Level C or Modified Level D protection, as determined by the SS/SHO, when decontaminating equipment. Runoff and sediments will be collected and stored until proper on-site disposal arrangements have been made. Following decontamination and prior to exit from the EZ, the SS/SHO shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

9.2 Personnel Decontamination Procedures

Personnel decontamination will be completed in accordance with the GHD Safety and Health Program for personnel decontamination. Wash water and sediments will be collected and stored with any runoff water collected for subsequent treatment/disposal. PPE, trash, etc. will be stored until disposal arrangements are completed. It will be kept separate from trash generated in clean areas of the site. All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work. Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure. Personnel decontamination will take place prior to exiting the contaminated work area.

Modified Level D decontamination procedures are as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.

Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.

Step 3 - Remove protective clothing; dispose of in disposable container.

Step 4 - Remove inner gloves, dispose of in disposable container.

Step 5 - Wash and rinse hands with soap and water.

Level C/B decontamination procedures to be utilized as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.

Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.

Step 3 - Remove protective clothing; dispose of in disposable container.

Step 4 - Remove respirator, sanitize prior to reuse.

Step 5 - Remove inner gloves; dispose of in disposable container.

Step 6 - Wash and rinse hands with soap and water.

10. Medical Surveillance

In accordance with the requirements detailed in 29 CFR 1926.65 and 29 CFR 1910.134, all project personnel who will come in contact with potentially contaminated materials will have received medical surveillance by a licensed physician or physician's group.

Their respective employers will maintain medical records for all project personnel. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work as per the employer’s medical surveillance program which is to be in accordance with 29 CFR 1926.65.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employer will provide certifications to their on-site SS/SHO that their personnel involved in project activities will have all necessary medical examinations prior to commencing work, which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any project activity or when accidental exposure to elevated concentrations of constituents of concern occur.

11. Emergency Response and Contingency Procedures

It is essential that project personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful constituents of concern, or sudden changes in the weather. The following sections outline the general procedures for emergencies.

Emergency information should be posted as appropriate. Radios may be provided for contact purposes. In general, GHD will evacuate to a safe pre-determined meeting area (rally point) during emergencies.

11.1 Accident, Injury and Illness Reporting

Any work-related incident, accident, injury, illness, exposure, property loss or Near Loss must be reported to your supervisor, the PM and SS/SHO, the client representative and ***within 1 hour*** through the GHD Incident Reporting System.

Motor vehicle accidents must also be reported through this system. GHD's Incident Reporting Form, located in Attachment A, must also be filled out and provided to the SS/SHO. The report must be filed for the following circumstances:

i) Accident, injury, illness, or exposure of an employee.

ii) Injury of a subcontractor.

iii) Damage, loss, or theft of property.

iv) Any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.

Occupational accidents resulting in employee injury or illness will be investigated by the PM, PC and SS/SHO. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All employees have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member or management, or you may submit your concern in writing, either signed or anonymously.

11.2 Emergency Contacts

Fire Department 911

Police Department 911

Ambulance		911
Hospital:	Medina Memorial Hospital 200 Ohio Street Medina, New York 14103	585-798-2000

Directions to the Hospital - The Hospital Route Map and Directions are presented in Attachment A.

The SS/SHO will use the nearest telephone on site or may be in the possession of a mobile telephone to communicate with outside emergency and medical facilities.

11.3 Additional Emergency Numbers

National Response Center (NRC)	800-424-8802
Poison Information	800-764-7661
Agency for Toxic Substances and Disease Registry	404-488-4100 (24 Hours)
U.S. EPA Emergency Response	800-424-8802
GHD Project Manager (Denise Quigley)	Office – 519-884-0510
	Cell – 519-497-5944
GHD SS/SHO (Christine Miller)	Cell – 484-368-7178
GHD Regional Safety and Health Manager (Craig Gebhardt)	716-297-6150
GHD Incident Reporting Hotline (24 Hour)	866-529-4886

11.4 Emergency and First Aid Equipment

Emergency safety equipment will be available for use by project personnel and will be located and maintained on site. The safety equipment will include, but is not limited to, the following:

i) Field eye wash/flush bottles

ii) Approved first-aid kit

iii) Portable air horn

11.5 Project Personnel Responsibilities During Emergencies

Emergency Coordinator (EC)

As the administrator of the HASP, the EC has primary responsibility for managing all incidents. The EC will follow the guidelines that are presented below:

i) Take appropriate measures to protect personnel including: withdrawal from the work area, total evacuation and securing of the site or upgrading or downgrading the level of protective clothing and respiratory protection.

ii) Take appropriate measures to protect the public and the environment including isolating and securing the site, and ending or controlling the emergency to the extent possible.

iii) Ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated.

iv) Ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained.

v) Determine the cause of the incident and make recommendations to prevent the reoccurrence.

vi) Ensure that all required reports have been prepared.

11.6 Medical Emergencies

Any person who becomes ill or injured must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the SS/SHO.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on site to which they may have been exposed.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

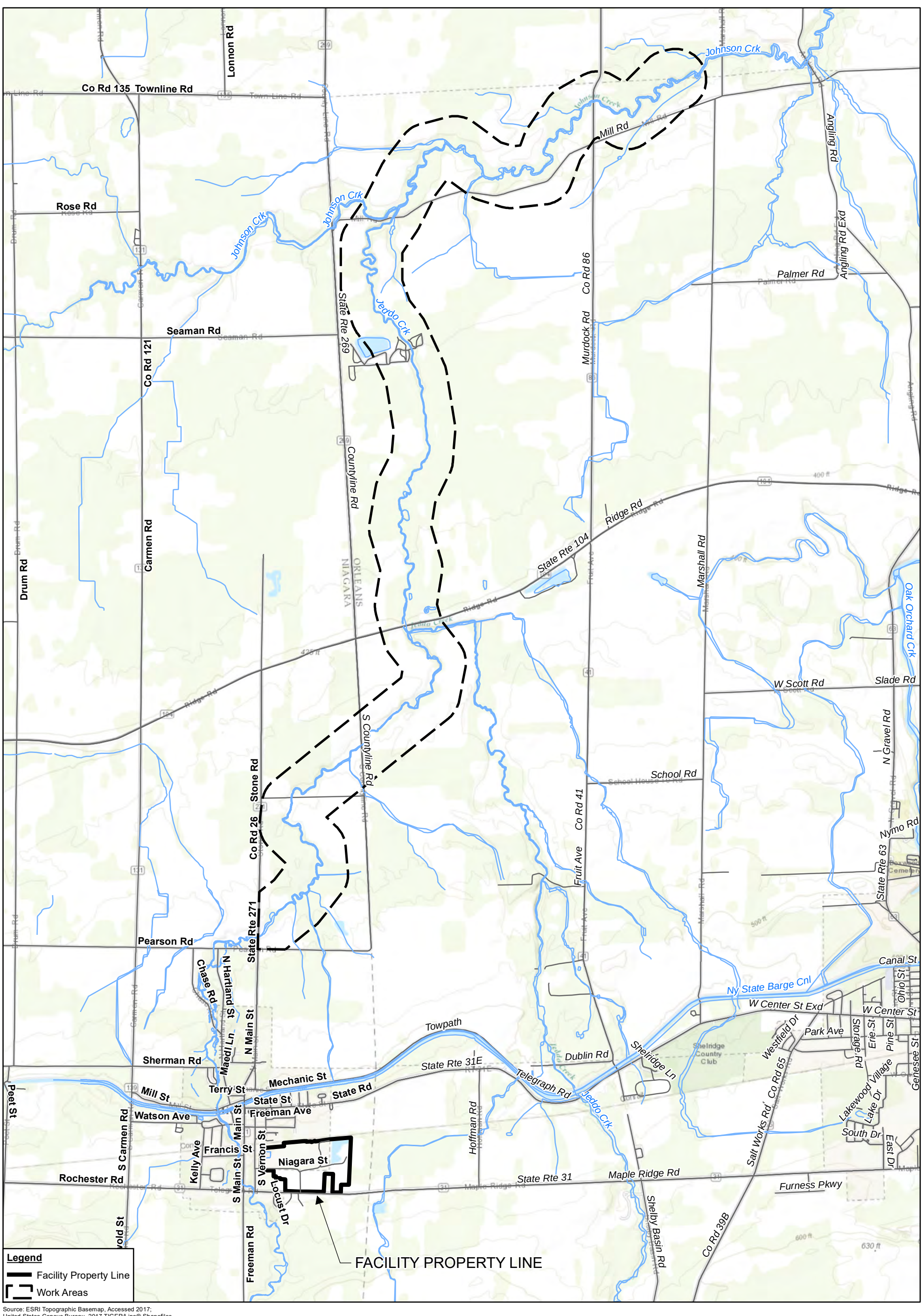
12. Recordkeeping

The SS/SHO shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i) Records of daily project safety inspections.

ii) Records of training acknowledgment forms, daily safety meeting forms and any other safety forms that are presented in Attachment A.

iii) Emergency report sheets describing any incidents or accidents.



Source: ESRI Topographic Basemap, Accessed 2017;
United States Census Bureau, 2017 TIGER/Line® Shapefiles

0 1,000 2,000 3,000
Feet

Coordinate System:
NAD 1983 StatePlane New York
West FIPS 3103 Feet

FMC CORPORATION
MIDDLEPORT, NY
HEALTH AND SAFETY PLAN

11149486-10
Nov 27, 2017

SITE LOCATION

FIGURE 1

GIS File: Q:\GIS\PROJECTS\11149000s\11149486\Layouts\002\11149486-10(002)GIS-OT001.mxd

Table 2.1

Maximum Detected Concentration of the Constituents of Concern OU7 and OU8 Soil and Sediment FMC Middleport, New York

Compounds	Maximum Detected Concentrations in OU7 and OU8 Soil or Sediment (mg/kg)
Metals	
Aluminum	12400
Arsenic	654
Cadmium	1.9
Copper	36.5
Iron	26000
Lead	87.8
Manganese	1600
Zinc	195

Table 2.2

Exposure Routes and Exposure Levels for The Chemical Constituents of Concern OU7 and OU8 Soil and Sediment FMC Middleport, New York

Chemical Compound	Ionization Potential	Exposure Routes	Acceptable Exposure Levels in Air
Metals			
Aluminum	NA	Inhalation, Ingestion Skin Absorption	1 mg/m^3 (1) 5 mg/m^3 (2)
Arsenic	NA	Inhalation, Ingestion, Human Carcinogen	0.01 mg/m^3 (1) (2) 10 mg/m^3 (3)
Cadmium	NA	Inhalation, Ingestion, Suspected Human Carcinogen	0.01 mg/m3 (1) 0.005 mg/m3 (2) 9 mg/m3 (3)
Copper	NA	Inhalation, Ingestion	1 mg/m3 (1) (2) 100 mg/m3 (3)
Iron	NA	Inhalation, Ingestion	5 mg/m3 (1) 10 mg/m3 (2) 2500 mg/m3 (3)
Lead	NA	Inhalation, Ingestion, Animal Carcinogen	0.05 mg/m^3 (1) (2) 100 mg/m^3 (3)
Manganese	NA	Inhalation, Ingestion	0.2 mg/m3 (1) 500 mg/m3 (3)
Zinc	NA	Inhalation, Ingestion	2 mg/m^3 (1) 5 mg/m^3 (2) 500 mg/m^3 (3)

Notes:

(1) 2017 Values, American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).
(2) Federal Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL).
(3) Immediately Dangerous to Life and Health (IDLH).
ppm Parts Per Million.
mg/m^3 Milligrams per Cubic Meter.
NA Not Applicable.
NE Not Established.
NI No Information

Attachments

Attachment A
Forms

EMERGENCY CONTACT SHEET

OU7 and OU8 SAMPLING

Middleport, New York

<table>
<tr><td colspan="3">EMERGENCY INFORMATION</td></tr>
<tr><td>Contact</td><td>Phone Number</td><td>Hospital Directions</td></tr>
<tr><td>Local Police</td><td>911</td><td rowspan="3">Directions:
- Head east on State Street (NY-31E) in Middleport
- Turn left onto Ohio Street in Medina</td></tr>
<tr><td>Fire Department</td><td>911</td></tr>
<tr><td>Ambulance</td><td>911</td></tr>
<tr><td>Local Hospital: Medina Memorial Hospital

Address: 200 Ohio Street
Medina, NY 14103</td><td>(585) 798-2000</td><td>Driving Time: 9 minutes
Driving Distance: 4.5 miles
(Attach Map)</td></tr>
<tr><td>National Poison Center</td><td>800-222-1222</td><td rowspan="6">GHD – Incident Reporting Hotline

Please call (866) 529-4886 and provide:
• Name and location of caller
• Description of incident
• Name of any injured persons
• Description of injuries
• Phone number for return call</td></tr>
<tr><td>Project Manager
Denise Quigley
Work:
Cell:</td><td>

(519) 884-0510
(519) 497-5944</td></tr>
<tr><td>Site Supervisor
Christine Miller
Work:
Cell:</td><td>

(610) 321-1800
(484) 368-7178</td></tr>
<tr><td>CRA Regional S&H Manager
Craig Gebhardt
Work:
Cell:</td><td>

(716) 297-6150
(719) 609-0169</td></tr>
<tr><td>Site Contact
Nick Schapman (FMC Corporation)
Cell/Work:</td><td>

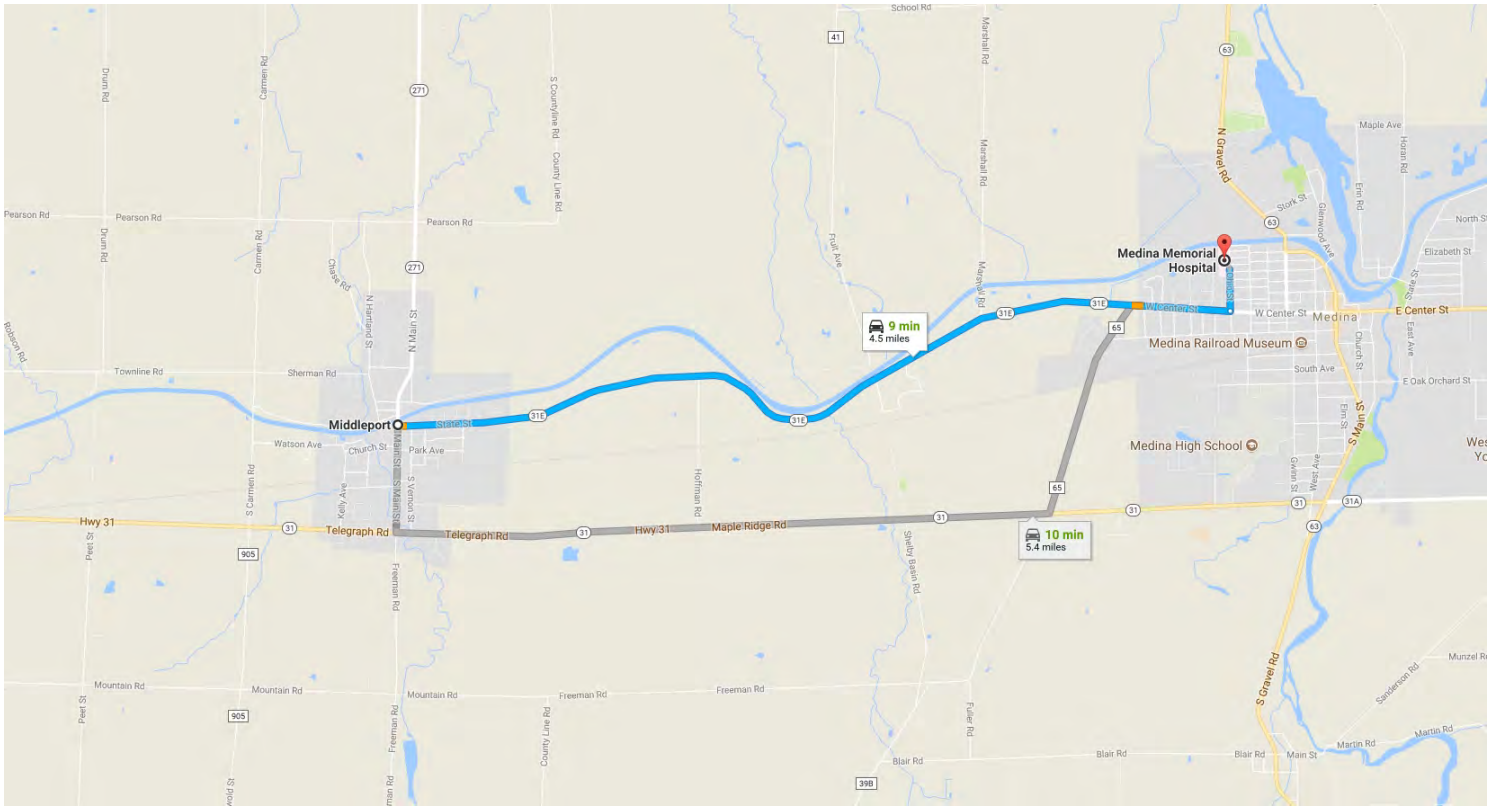
(513) 218-4222</td></tr>
<tr><td>Person to verify hospital route
Christine Miller</td><td>Signature</td></tr>
</table>

* Hospital Route must be field validated before site work commences.

Google Maps

Middleport, NY 14105, USA to Medina Memorial Hospital

Drive 4.5 miles, 9 min



Map data ©2017 Google 500 m

Middleport

New York 14105, USA

1. Head south on Main St toward State St — 30 ft
2. Turn left onto NY-31E E/State St
   Continue to follow NY-31E E — 4.3 mi
3. Turn left onto Ohio St — 0.2 mi

Medina Memorial Hospital

200 Ohio St, Medina, NY 14103, USA

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Unsafe Act / Unsafe Condition / Stop Work Authority (SWA) Report

Reported by:		Employee's office:	
RSHM:		Date:	Time:
Employee's supervisor:		Employee's principal:	
Project related:	☐ No ☐ Yes	If yes, name of client:	
Client contact (if applicable):		Project no (if applicable):	

Re: (check all that apply) ☐ **Unsafe act** ☐ **Unsafe condition** ☐ **Stop work authority (SWA)**

Location: (check one) ☐ Driving ☐ Field ☐ Office

Date reported to supervisor/PM:		Date corrected:	
Time reported to supervisor/PM:		Time corrected:	

Describe the unsafe act, unsafe condition or SWA situation

List corrective action(s) implemented

Did the corrective action(s) mitigate the unsafe act/unsafe condition?

For SMART administrators use only:

Category:

- ☐ **PPE** Personal Protective Equipment
- ☐ **BP** Body Positioning
- ☐ **WE** Work Environment
- ☐ **OP** Operating Procedures
- ☐ **TE** Tools and Equipment
- ☐ **CU** Computer Usage
- ☐ **PD** Pre-Driving
- ☐ **OPP** Operating Procedures – Parking

Chevron category:

- ☐ **A** Person or People
- ☐ **B** Equipment
- ☐ **C** Environmental
- ☐ **D** Procedures/ Processes/
  - ☐ JSA-review/revise
- ☐ **E** Visitors

Causative factor:

- ☐ **1** Insufficient training for task
- ☐ **2** Hurrying to complete the task
- ☐ **3** Easier if proper process not followed
- ☐ **4** Took shortcuts without prior incident
- ☐ **5** Incomplete or no procedures
- ☐ **6** Procedures not known or enforced
- ☐ **7** Improper PPE
- ☐ **8** Improper tools
- ☐ **9** Improper workplace layout
- ☐ **10** Exposure to conditions

Energy source:

- ☐ **G** Gravity
- ☐ **M** Motion
- ☐ **ME** Mechanical
- ☐ **E** Electrical
- ☐ **P** Pressure
- ☐ **T** Temperature
- ☐ **B** Biological
- ☐ **C** Chemical
- ☐ **R** Radiation
- ☐ **S** Sound

Are additional actions required? ☐ No ☐ Yes If yes, what?

Field Safe Task Evaluation Process (F-STEP)

Report status: (insert date)					
	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Observer's name:	Date:	Time:
Client:	Project name :	
Observer's office:	Site location:	
Observer's supervisor:	Project no. (if applicable):	
Subcontractor: ☐ Yes ☐ No	Subcontractor company name:	

Feedback conducted by:	Date:
Observee's supervisor:	Time:

Check task being observed (if not listed here, go to columns at right)		If checking this column, write in the specific task	
☐ Air knifing	☐ Mob/demob	☐ Agricultural services	
☐ Clearing	☐ Project oversight	☐ Construction	
☐ Demolition	☐ Soil sampling	☐ Landfill	
☐ Drilling	☐ Stack testing	☐ Office operations	
☐ Electrical work	☐ Surveys & audits	☐ O&M	
☐ Excavation	☐ Traffic control	☐ Pipeline	
☐ General site cleaning	☐ UST removal	☐ Refinery	
☐ Heavy equipment operations	☐ Water sampling	☐ Treatment plants	
☐ IH sampling	☐ Well management	☐ Other	
☐ Manual lifting			

Background information (Give a brief description of task being performed and your surroundings)

Observer's positive comments

1.

2.

3.

Feedback session conclusion:
If no questionable Items: brief recap of positive actions/comments
If questionable Items: brief recap of positive actions/comments and why did the questionable item(s) occur?

Personal protective equipment	Meets work standards	???	N/A	Evaluation comments
1. Hearing protection (e.g., ear plugs)			☐	
2. Head protection (e.g., hard hat)			☐	
3. Eye protection (e.g., safety glasses/goggles)			☐	
4. Hand protection (e.g., gloves)			☐	
5. Foot protection (e.g., steel-toe boots)			☐	
6. Respiratory protection			☐	
7. Fall protection (e.g., lanyard/harness)			☐	
8. High visibility clothing (e.g., work vest)			☐	
9. First aid kit/fire extinguisher			☐	
10. Other (be specific)			☐	
Body position	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
11. Proper body positioning when exerting force (lifting/pushing/pulling)			☐	
12. Pinch points/moving equipment - hands/body placement			☐	
13. 3-points of contact			☐	
14. Other (be specific)			☐	
Work environment	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
15. Work/walk surface clear (free and clear pathway)			☐	
16. Housekeeping/equipment storage			☐	
17. Controlled work zone (e.g., warning devices, barricades, cones, flags)			☐	
18. Emergency stop/safety switches			☐	
19. Materials labeled correctly			☐	
20. Storage/disposal of waste			☐	
21. Other (be specific)			☐	
Operating procedures	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
22. Star performed/job planning			☐	
23. Stop work authority process – understood and considered			☐	
24. JSA/JLA/risk assessment reviewed and followed			☐	
25. Daily site inspection			☐	
26. High risk task specific (hot work, confined space, LOTO, excavation/ trenching)			☐	
27. Inspect work zone for hazards			☐	
28. Coordinate/communicate with site rep and/or others on site			☐	
29. Spotters used appropriately			☐	
30. Underground/overhead utilities identified			☐	
31. Other (be specific)			☐	
Tools/equipment	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
32. Hand/power tool - selection, condition, and use			☐	
33. Field/test equipment - selection, condition, and use			☐	
34. Heavy equipment - selection, condition, and use			☐	
35. Other (be specific)			☐	
Observation total occurrences			☐	
% observations to meet work standards			☐	
Item specific to work task	**Meets works standards**	**???**	**N/A**	**Evaluation comments**
Insert task/JSA/SOP Step			☐	
Insert task/JSA/SOP Step			☐	
Insert task/JSA/SOP Step			☐	

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	**CF**	**Corrective actions (Must match Causative Factor)**	**Responsible party**	**Date due**	**Date completed**	**Verified by/ Validated by**	**Date**	**Details**
						Verified by: **Validated by:**		
						Verified by: **Validated by :**		
						Verified by: **Validated by:**		
						Verified by: **Validated by:**		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

Driving Safe Task Evaluation Process (D-STEP)

Report status:					
(insert date)	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Observer's name:	Date:	Time:
Client:	Project name:	
Observer's office:	Site location:	
Observer's supervisor:	Project no. (if applicable):	
Subcontractor: ☐ Yes ☐ No	Subcontractor company name:	

Feedback conducted by:	Date:
Observee's supervisor:	Time:

Driving conditions			
☐ Freeway/interstate	☐ Wet	☐ Day	☐ Raining
☐ Surfaced street	☐ Dry	☐ Night	☐ Windy
☐ Dirt road	☐ Snow/ice		☐ Snowing
	☐ Mud		☐ Fog

Driving conditions			
☐ Car	☐ Truck	☐ Van	☐ Pulling trailer
☐ Company owned	☐ Rental	☐ Personal	

Background information (Give a brief description of where you are driving from and to and your surroundings)

Observer's positive comments

1.

2.

3.

Feedback session conclusion:
If no questionable Items: brief recap of positive actions/comments
If questionable Items: brief recap of positive actions/comments and why did the questionable item(s) occur?

Pre-driving	Meets work standards	???	N/A	Evaluation comments
1. JMP/JSA/Risk Assessment developed and/or reviewed			☐	
2. STAR performed/job planning			☐	
3. Stop Work Authority – understood and considered			☐	
4. Registration/insurance/last maintenance report			☐	
5. Tire inflation and tread			☐	
6. Wipers and washer fluid/clean windows/mirrors			☐	
7. Horn/lights operation/instrument panel			☐	
8. Body damage/overall vehicle appearance			☐	
9. Under-vehicle check for leaks/obstructions			☐	
10. Secure loose items			☐	
11. Check fluid levels			☐	
12. Fire extinguisher/triangles/first aid kit/jack/spare			☐	
13. Verifies area is clear before moving vehicle			☐	
Body positioning	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
14. Adjust seat			☐	
15. Adjust head rest			☐	
16. Adjust mirrors to minimize blind spots			☐	
17. Seat belts (driver/passengers)			☐	
18. Locks doors			☐	
Operating procedures	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
19. Yields right-of-way and allows other vehicles to merge, change lanes, turn			☐	
20. Respects pedestrians, cyclists, other drivers			☐	
21. Is courteous/tolerant of others' poor driving			☐	
22. Two hands on wheel at 9 and 3 or 10 and 2			☐	
23. Skill in handling distractions			☐	
24. Adjusts to traffic conditions (speed / traffic)			☐	
25. Uses turn signals (for turns and lane changes)			☐	
26. Following distance is appropriate (4-second rule)			☐	
27. Avoids sudden acceleration and deceleration			☐	
28. Before backing up, looks behind vehicle/checks for traffic, pedestrians, parked vehicles, uses spotter			☐	
29. Scans the road ahead (15-second eye lead or 2-3 blocks-1/4 mile) and anticipates actions of others to avoid sudden swerves, stops, lane changes			☐	
30. Checks mirrors every 5-8 seconds			☐	
31. Checks for hazards on the road (e.g., animals, debris, road conditions)			☐	
32. Reads and obeys traffic signals			☐	
33. Makes complete stops at signals, at a safe distance			☐	
34. Scans intersection left and right/anticipates intent of other vehicles before reaching "point of no return"			☐	
35. Covers brakes safely and adjusts speed			☐	
36. Does not use cell phone during operation of vehicle			☐	
37. Other (be specific)			☐	
Operating procedures - Parking	**Meets work standards**	**???**	**N/A**	**Evaluation comments**
38. Looks for pull through parking before backing in			☐	
39. Uses signals, leaves adequate space before pulling back into lane			☐	
40. Obeys signs and uses signals in parking lot			☐	
41. Maintains proper speed inside the lot			☐	
42. Ensures vehicle is legally/properly parked			☐	
43. Sets parking brake and secures vehicle			☐	
44. Other (be specific)			☐	
Observation total occurrences			☐	
% Observations to meet work standards			☐	
Item specific to work task				
Insert Task/JSA/SOP Step			☐	
Insert Task/JSA/SOP Step			☐	

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	**CF**	**Corrective actions (Must match Causative Factor)**	**Responsible party**	**Date due**	**Date completed**	**Verified by/ Validated by**	**Date**	**Details**
						Verified by: **Validated by:**		
						Verified by: **Validated by:**		
						Verified by: **Validated by:**		
						Verified by: **Validated by:**		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

Near Miss Reporting Form

Note: A Significant Near Miss must be called into the Incident Reporting Hotline: 1-866-529-4886

Instructions:
1) Employee completes the Near Miss Report and submits to Supervisor.
2) Supervisor reviews and makes other comments.
3) Employee discusses Near Miss with Project Manager.
4) Submit to applicable SMART Reporting submission address

Report status:					
(insert date)	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Section 1

A. Employee Identification ☐ GHD Employee ☐ Temporary Employee ☐ Subcontractor			
Employee No.	Last Name	First Name	Employee's Company - if Subcontractor
Date of Hire	Position/Title	Supervisor	Home Office Location - if GHD Employee

B. General Information

Where did the Near Miss occur? ☐ Office ☐ Project Site ☐ Other _____ ☐ Canada ☐ United States ☐ UK	Type of Near Miss (Check all that apply) ☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage ☐ Environmental
Address of Near Miss (City, State/Province/County, Postal/Zip Code)	Specific Location of Near Miss (e.g., where on site)

Date and Hour of Near Miss		Date and Hour Reported to GHD		Time Employee Began Work
Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	a.m. p.m.
Witnesses? ☐ Yes ☐ No	Witness Name and Telephone Number			

C. Project Information (Project Related Near Miss Only): Project Related: ( ) Yes ( ) No

Project #	Project Name	GHD Project Manager	Client	Client Contact
Was the Client Advised of the Near Miss? ☐ Yes ☐ No ☐ N/A	Name:	Date and Time Month Day Year Time		

Section 2

A Details of the Near Miss
1. What job/task was being performed when the Near Miss occurred? (Example: collecting groundwater samples).
2. Provide a detailed description of the employee's specific activities at the time of the Near Miss. Include details of equipment/materials being used, including the size and weights of objects being handled, and weather conditions at time of the Near Loss. If necessary, attach additional pages to the report.

Section 2 (continued)

B. Near Miss Investigation	
Conduct a 5-Why Root Cause Analysis Investigation. In addition, if there was the potential for a significant injury or loss, report the Near Miss to the Incident Hot Line (this will determine if a Tap Root Cause Analysis is necessary).	
HASP prepared? ☐ Yes ☐ No ☐ N/A Submit a PDF of HASP to Investigation Team. If yes, was the HASP on site? ☐ Yes ☐ No	Did the safety plan identify and provide safety procedures for the specific tasks being performed when the Near Miss occurred? ☐ Yes ☐ No If no, why not? (Explain) _____ Did the employee utilize the STAR process before initiating the task? ☐ Yes ☐ No If no, why not? (Explain) _____

5-Why Root Cause:	Additional information: Attach photos, witness statement(s), affected employee statement, as applicable, to the end of this document.
1. Why did "above" happen?	
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
5. Why did "4" happen?	See Section 3 Below: Corrective Actions/ Verification and Validation
6. Why did "5" happen?	

C. Accountability		
Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

D. Stewardship		
Will a Near Miss Summary be Prepared? ☐ Yes ☐ No If yes, by:		
Quality Review By:	Date:	Findings:

Section 3 (continued)

Corrective Action					Validation & Verification		
CF	**Corrective Actions (Must match Causative Factor)**	**Responsible Party**	**Due Date**	**Date Completed**	**Verified By/ Validated By**	**Date**	**Details**
					Verified By		
					Validated By		
					Verified By		
					Validated By		
					Verified By		
					Validated By		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

Incident Reporting Form

Note: Incidents must be called into the Incident Reporting Hotline: 1-866-529-4886

Instructions: *1) For Personal Injuries, Occupational Illnesses, and Property Damage, complete Sections 1 and 2*
2) For Motor Vehicle Accidents, complete Sections 1, 2, and 4.
3) ***Initial report must be submitted within 24 hours.***

Report status:					
(insert date)	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Section 1

A. Employee Identification ☐ GHD Employee ☐ Temporary Employee ☐ Subcontractor				
Employee No.	Last Name	First Name	Middle Name/Initial	☐ Male ☐ Female
Area Code ( ) Telephone Number	Employee Home Address (Street, City, State/Province/County, Postal/Zip Code)			
Date of Hire Month Day Year	Position/Title	Supervisor	Employee's Company/Home Office Location	

B. General Information			
Where did the Incident occur and which country? ☐ Office ☐ Project Site ☐ Other _____ ☐ Canada ☐ United States	Type of incident (Check all that apply) ☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage Only		
Address of Incident (City, State/Providence/County, Postal/Zip Code)	Specific Location of incident (e.g., where on site)		
Date and Hour of Incident Month Day Year a.m. p.m.	Date and Hour Reported to Employer Month Day Year a.m. p.m.	Date and Hour Last Worked Month Day Year a.m. p.m.	Time Employee Began Work a.m. p.m.
Normal Work Hours From: To:	Witnesses? ☐ Yes ☐ No	Witness Name and Telephone Number	

C. Project Information (Project Related Incident Only) Project Related? ☐ Yes ☐ No				
Project #	Project Name	Project Manager	Site Telephone Number ( )	Project Manager Cell Number ( )
Client Name	Was the Client Advised of the Incident? ☐ Yes ☐ No	Name of Person Contacted	Date and Time Contacted	

Section 2

A. Details of the Incident
1. What job/task was being performed when the incident occurred? (Example: collecting groundwater samples).
2. Provide a detailed description of the employee's specific activities at the time of the incident. Include details of equipment/materials being used, including the size and weight of objects being handled, and weather conditions at time of the incident. If necessary, attach additional pages to the report.
3. For injuries, identify the specific part of body injured, and specify left or right side. For illnesses, identify and describe the affected area/body part.
4. Identify the object or substance that directly injured the employee and how. Include size, weight, and shape of object, quantity of substance, etc.
5. Identify property damaged and how it was damaged (include owner of property, nature and source of damage, and model and serial number, if appropriate).

B. Health Care/Medical Treatment	
Employee received health care? ☐ Yes ☐ No	Identify the type of health care provided and where it was performed. **(Check all that apply).** ☐ First Aid ☐ Medical treatment other than first aid (sutures, etc.) ☐ Hospitalized ☐ Clinic ☐ Hospital emergency room ☐ On location by self or GHD employee ☐ On site by EMT
Name of Health Care Provider, Physician Name, Phone Number, Address (Street, City, Province/State/County, and Postal/Zip Code)	

Section 2 (continued)

C. Incident Investigation
☐ **5 Why Root Cause Analysis Investigation [Non-OSHA Recordable, <$5,000/£3,000 damage]**
☐ **Tap Root Cause Analysis [OSHA Recordable, and/or >$5,000/£3,000 damages]**

HASP prepared? ☐ Yes ☐ No ☐ N/A Submit a PDF of HASP and relevant JSA(s)/Risk Assessment to Investigation Team. If yes, was the HASP on site? ☐ Yes ☐ No	Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured? ☐ Yes ☐ No If no, why not? (Explain) _____ Did the employee utilize the STAR process before initiating the task? ☐ Yes ☐ No If no, why not? (Explain) _____ Was the employee drug & alcohol tested post incident? ☐ Yes ☐ No

5-Why Root Cause: Incident Statement	Additional information: Attach photos, witness statement(s), affected employee statement, accident diagrams, as applicable, to the end of this document.
1. Why did "above" happen?	
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
	See *Corrective Actions/Verification and Validation* Section (Page 4)
5. Why did "4" happen?	
6. Why did "5" happen?	

D. Accountability

Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

E. Stewardship

Will an Incident Summary be Prepared? ☐ Yes ☐ No By:	Disciplinary Action Taken? ☐ Yes ☐ No	
Quality Review By:	Date:	Findings:

Section 3

A. Agency Reporting and Recording Information (To be completed by an HSE Team Member)			
CANADA			
Provincial Regulatory Agency Reporting Required? ☐ Yes ☐ Not required	Employee Injury Information (Injury met the following criteria): ☐ First Aid ☐ Medical Treatment ☐ Critical Injury ☐ Modified Duty ☐ Lost Time Injury If medical treatment, what?		
Joint Safety and Health Committee Notified? ☐ Yes ☐ No	Total days of modified duty If exceeds 7 days, report to WSIB	Total days of lost time (if any)	Date employee returned to work Month Day Year
UNITED STATES			
OSHA Recordable Injury? ☐ Yes ☐ No OSHA Recordable.pdf	Employee Injury Information (Injury met the following OSHA 300 Log criteria) ☐ First Aid ☐ Medical Treatment ☐ Restricted Duty ☐Lost Time Injury If medical treatment, what?		
Total days of restricted duty:	Total days of lost time (if any)		Date employee returned to work Month Day Year

Section 4

A. Vehicle GHD Employee was Operating ☐ Personal ☐ GHD-Owned ☐ Rental - Rental Company:

License Plate No.	State/Province/County	Police Department City	State/Province/County
Vehicle Year/Make/Model	Odometer Reading at Time of Accident	Police Report Number	Weather Conditions

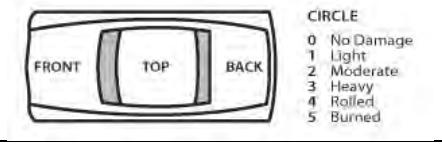
Name of Person Operating Vehicle

Address

City State/Province/County Postal/Zip Code

Telephone: Area Code ( )

"X" IN AREA OF VEHICLE DAMAGE



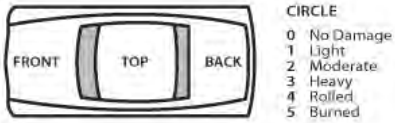
Description of Vehicle Damage:

B. Other Vehicles Involved

Name of Owner	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ( )
Operator's Name (if different from above)	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ( )

Year/Make/Model	Description of Property Damage:
Insurance Co. Name & Telephone	
License Plate No./State/Province	

"x" IN AREA OF VEHICLE DAMAGE



C. Injured Persons

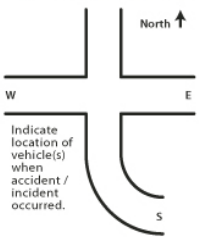
Name	Address Street, City, State/Prov./County/Postal/Zip Code	Phone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/ Passenger, GHD Employee, Other, or Pedestrian
1.				
2.				
3.				

D. Witnesses

Name	Address Street, City, State/Prov./County/Postal/Zip Code	Area Code and Telephone Number
1.		( )
2.		( )

E. Description of Accident

PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM



Was Ticket Issued? Reason:

☐ Other Operator

☐ GHD Operator

Report Date Month Day Year	Report Prepared by: (please print)	Report Prepared by: (signature)

Note: If Additional Space is Required to Complete this Report, Use Separate Sheet of Paper and Attach.

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective actions (Must match Causative Factor)	Responsible party	Date due	Date completed	Verified by/ Validated by	Date	Details
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

HASP Acknowledgment Sheet

Project Name:_____ Project Number: _____

This is to certify that I have received a pre-entry briefing regarding this HASP, and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or termination.

Print Name	Signature	Date

Tailgate Safety Meeting Form
Large Group Format - Single Day

Date:		Time:		Project No.:	
Presenter:		Project Name:			

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Method of Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Site personnel in attendance:

Print Name:	Signature:	Company:

Tailgate Safety Meeting Form
Small Group Format - Multiple Days

Date:		Time:		Project No.:	
Presenter:		Project Name:			

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Method of Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Print Name	Signature	Company

Date:		Time:		Project No.:	
Presenter:		Project Name:			

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Emergency Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Print Name	Signature	Company

Health and Safety Plan Amendment Form

This document is to be completed for ANY changes that occur within the Site Health and Safety Plan (HASP). This document is to be sent to the Regional Safety & Health Manager (RSHM) for review, verification and sign off of the HASP.

Amendment #	
Site Name/Project ID	
Date	
Client Contact (same/change)	
Reason for Amendment (SOW change, JSA addition, Chemical, etc.)	
Alternate or Additional Safeguard Procedures	
Required changes in PPE	
Additional Comments:	

Project Manager Notified	☐
RSHM Notified	☐
Client PM Notified (if necessary)	☐

Site HSE Officer (sign above)	Date

The Project Manager is ultimately responsible for the accuracy of the information on this amendment and ensuring any changes to the original HASP is discussed with all affected site personnel prior to commencing work

This original form must be placed in the project file and a copy needs to be attached to the Site Health and Safety Plan (HASP).

Safety Inspection Checklist – Mobile Equipment Safety

			Week Ending:		Job No.:		Equipment:

(This form is to be completed daily by the operator. Deficiencies should be addressed immediately.)

Superintendent: _____

	Date:	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Comments
Equipment Hours:	***Start:***								
	Stop:								
Fluid Levels:									
Oil									
Hydraulic									
Transmission									
Radiator									
Grease Fittings									
Fuel									
Safety Checks:									
Fire Extinguisher									
Seat and Safety Belts									
Warning Devices (backup alarms, lights, etc.)									
Housekeeping									
Brakes									
Mirrors									
Windshield and Wipers									
Steering									
Horn									
Lights									
Tires									
Guards									
Instruments									
Exhaust System									
Accessories:									
Boom or Mast									
Controls									
Level Indicators									
Tracks									
Other									
Sign-Off:									
Operator's Initials									
Supervisor's Initials									

Additional Comments: (Please write any additional comments here. Use the back of this form if necessary.)

√ = OK NR = Needs Repair NA = Not Applicable

Form initiated by: _____ Date initiated: _____

Initiator's role/responsibility: _____ Project number: _____

Affected location(s): _____

Client's management of change documentation attached, if required or applicable: ☐ Yes ☐ N/A

Type of change:

- ☐ Field operations/SOPs
- ☐ Equipment
- ☐ Safety
- ☐ Project management/resources

Duration of change:

- ☐ Permanent
- ☐ Temporary (specify how long change will be in place): _____
- ☐ Emergency

Describe the change:

Describe the procedure/task(s) required to complete the change:

Who needs to know about the change and how will you communicate this to them?

Is additional training for GHD people required as a result of this change? ☐ Yes ☐ No

If yes, please describe training needs and those who require it:

Coordination with Business School Learning Centre underway: ☐ Yes ☐ No

Identify any associated risks/hazards/impacts as a result of this change:

This completed form is a quality record

Does the change need to be approved by a client? ☐ Yes ☐ No

If Yes, state client's name: _____

Client role/responsibility: _____

Date authorized by client: _____
(mm/dd/yyyy)

Change approved by project manager: _____
(please print)

_____ _____
(signature) (approval date – mm/dd/yyyy)

Summary:

Item	Completion date	Confirmed by
1. Task(s) to execute change have been completed		
2. Those who need to know have been notified		
3. Additional training has been completed		
4. Risk(s) have been mitigated		
5. Change has been approved by all required parties		

Notes:

Scope: GHD may use the Management of Change Form (QSF-006) to identify and record project additions, revisions, changes, or updates regarding field operations, field SOPs, equipment, safety, resources, or project management.

Detail: The level of detail to a documented project change is ultimately determined by the project manager and/or any client expectations.

File location: Correspondence folder of the project file.

Attachment B
Job Hazard Analysis Forms

Job **Safety Analysis (JSA)**

Decontamination of Sampling Equipment and Personnel (PPE Level D)

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Decontamination of sampling equipment and personnel (PPE Level D)				
Key equipment:	Alconox/Liquinox, brushes; Nitrile gloves to be worn when decontaminating reusable equipment				
Task-specific training:	Decontamination/Site Control; Quality Control/Sampling Plan				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Decontamination of sampling equipment (soil/sediment sampling, mixing equipment, etc.)	• Contaminant exposure • Pinch points • Slip/trip/hit/fall hazards • Lifting hazards • Back injury • Manual material handling	• Set up decon station to capture any spills to avoid cross-contamination and manage wastes • Wear appropriate PPE • Scrub equipment clean then rinse and verify it is clean and free of contamination • Avoid putting hands in or near pinch points • Maintain good housekeeping and be aware of surroundings • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical means, such as a dolly, cart, or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Refer to the HASP for additional lifting techniques		
2	Decontamination of personnel	• Contaminant exposure • Slip/trip/hit/fall hazards	• Refer to the HASP for specific procedures but in general start with most contaminated article and remove until inner gloves are the last item left • Dispose of used PPE in accordance with site requirements • Wash hands and face before eating, drinking, or using tobacco products • Take care when removing PPE (boots, gloves, etc.); sit down to remove/change boots as necessary		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Management of waste derived from decontamination activities	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling	• Containerize decon waste (e.g., water, used PPE) as required • Properly dispose of decon fluids (e.g., sediments) • Refer to step 1 and the HASP for additional lifting information		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Sediment Sampling

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project Number:	11149486	**Created By**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project Address:	Middleport, New York				
Specific Task	Sediment sampling				
Key equipment:	Sediment sampler or trowel, mixing bowl				
Task-specific training:	N/A				

Hard Hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (Top Impact)	☒ Chemical Protective (i.e. Nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full Face Mask	☒ Class II	☐ Coveralls
☐ Type II (Side Impact)	☐ Level 1 Light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half Face Mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 Light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-Static	☐ High viz clothing
☐ Class G	☐ Level 3 Medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 Heavy duty			☐ N95	☒ PFD * If working in water	☐ Long sleeve shirts
Foot Protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.Cat 2	☐ P95		☐ Polyethyene tyvek
☒ Rubber boots (industrial grade) * if working in water		☐ Required	☐ Haz Cat 4	☐ R95		☐Other *
☒ Hip waders * if working in water; dependant on water depth				☐ Organic vapor		

	*see key equipment			☐ Specialty/other*		

Project Development Team		**Modified by**	**Reviewed by**	**Date**
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Review refusal of unsafe work right	• Project team not aware of SWA	• Project team discusses importance of and documentation procedures during pre-job safety meeting. • Use right to refuse work and stop any work that is unsafe		
2	Inspection and setup of sampling equipment	• Lost time from improperly functioning equipment • Pinch points on sediment samplers • Falling into water hazard (for in-creek sampling) • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly and is properly calibrated; complete Quality Control documents • Severe pinch points exist on many sediment samplers, exercise caution when handling sediment samplers. Wear gloves if possible • Ensure all PPE is worn including PFD for each person • Ensure proper footing for retrieval of samples		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Sample collection	• Lifting hazards • Back injury • Manual material handling • Pinch points • Cuts • Punctures • Sample misidentification • Lost or damaged samples after leaving site	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one handed carrying if possible; maintain awareness of footing • Sampler will be heavier when raised; take breaks to rest arms/shoulders • Avoid placing hands/fingers in pinch point locations • Use proper tools when opening container packaging (sample jars) • Do not use fixed open blade knives when opening boxes or containers • Ensure the sample id label matches sample location ID on site plan		
4	Retrieve sampler when sample collected	• Cuts due to sharp edges of sample sleeve (where trowel is not used); Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Cuts from sharp objects retrieved by Sampler	• Wear nitrile gloves • Maintain awareness of sharp edges from objects that may be in sampler • See above Section 3 SWP pertaining to lifting, back injury and material handling • Inspect sample to ensure no sharp objects are present		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Sample selection	• Bottle breakage • Contaminant exposure • Lost time due to incorrect sample selection • Pinch points	• Wear nitrile gloves when handling sample containers • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)		
6	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear nitrile gloves when handling sample containers. Handle glass jars with care • Pack glass containers in bubble wrap • Check COC against sample labels and SSOW for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • See above • See above • See above • Ensure equipment and supplies are loaded correctly and do not shift during transport • Adhere to lab protocols for sample retention, storage and transport		
7	Investigation derived waste (IDW) management (extra sample material)	• Contaminant exposure • Heavy lifting • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear nitrile gloves when handling IDW • Use proper lifting techniques to transport/dispose of IDW into containers and use buddy system if needed • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Initial Site Recon and Walkthrough

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:	Middleport, New York				
Specific task	Site walkthrough to assess and inventory hazards posed by site work activities				
Key equipment:	Basic PPE, site inspection checklist or notebook, JSA forms, pens; Insect repellant, flashlight. Coveralls may be necessary based on type of brush/plants/insects in work area(s) being inspected. Protective gloves if overgrown vegetation or rundown buildings.				
Task-specific training:	SMART Safety training (STAR), JSA development, Poison Plant Identification				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☒ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	Signature			

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe		
2	Check weather	• Unexpected storm, fog; rain; snow; lightening, thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightning/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)		
3	Don necessary GHD PPE	• Contact with recyclable material or equipment	• Wear all required PPE (hard hat, vest, boots, and glasses) at all times while in the facility		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Unload equipment from vehicle	• Lifting hazards • Back injury • Manual material handling • Cuts • Pinch points • Hand/foot injury • Forgotten equipment • Damaged equipment	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Wear leather/cotton gloves and avoid placing hands/fingers in pinch point locations • Wear steel-toed boots • Verify requested equipment against warehouse form • Load equipment in an organized manner to prevent shifting during transport or use cargo netting		
5	Complete site inspection and walkover of the property and work areas – Note any hazards that will impact site personnel and/or their operations	• Slip/trip/fall hazards • Insects/reptiles • Poison plants	• Wear PPE as directed by GHD requirements or dependent upon your evaluation of conditions • Watch where you step on pavement (potholes, dips, or obstructions) and in vegetated/wooded areas (dips, holes, branches, vines, etc.) • Do not take photographs while walking • Do not talk on cell phone while walking • If in vegetated or wooded areas, watch for beehives, wear insect repellent (if area and season dictate) as needed, be mindful of gopher holes/tunnels, small animal dens, snakes, stray dogs/cats, transient/homeless individuals, poison ivy/oak/sumac, etc.		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Demobilization	• Collision • Injury or death to vehicle occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting the site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Soil and Sediment Sampling from a Barge/Boat

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project Number:	11149486	**Created By**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project Address:					
Specific Task	Soil and Sediment sampling from boat or barge				
Key equipment:	Vehicle, valid driver's license				
Task-specific training:	Safe Boating Coarse, Pleasure Craft Operator card				

Hard Hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☒ Type I (Top Impact)	☒ Chemical Protective (i.e. Nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full Face Mask	☐ Class II	☐ Coveralls
☐ Type II (Side Impact)	☐ Level 1 Light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half Face Mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 Light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-Static	☐ High viz clothing
☐ Class G	☐ Level 3 Medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 Heavy duty			☐ N95	☒ PFD	☐ Long sleeve shirts
Foot Protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.Cat 2	☐ P95		☐ Polyethyene tyvek
☒ Rubber boots (industrial grade)		☐ Required	☐ Haz Cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project Development Team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Review refusal of unsafe work right	• Project team not aware of SWA	• Project team discusses importance of and documentation procedures during pre-job safety meeting. • Use right to refuse work and stop any work that is unsafe		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
2	Mob equipment to boat launch	• Overloading boat capacity • Inclement weather • Potential to encounter a bull that may be running loose in a farmer's field • Lifting hazards • Manual material handling • Back injury • Pinch points • Moving or flying projectiles inside vehicle while transporting equipment • Slip/trip/fall hazards • Fuel spill • Biological Hazards	• Review boat capacity and complete weight survey including personnel and gear • Monitor weather forecasts • Distribute the load evenly on the boat • Make sure grip is adequate; wear leather/cotton gloves • Heightened awareness of wasps, ants, bees, spiders, and poison plants • Stretch affected muscles (triceps, back, neck, and shoulder) prior to/during/after activity • Avoid repetitive motions and overhead lifts; use proper lifting techniques • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds then assistance (mechanical or a buddy lift) will be required • Use a two-person lift or mechanical assistance for handling objects in excess of 50 pounds • Ensure all equipment is properly secured during transport • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Refuel in appropriate location, no sparks or static buildup • Practice STAR • Maintain neutral posture; refer to the HASP for additional lifting information • Take breaks; stay hydrated; be able to recognize the signs of heat stress in yourself and others; wear sunscreen as may be necessary		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Launch boat	• Lifting hazards • Manual material handling • Back injury • Pinch points • Moving or flying projectiles inside vehicle while transporting equipment • Slip/trip/fall hazards • Fuel spill • Drowning	• Practice STAR • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Review JSA for proper fuelling • Wear the PPE that is identified in this JSA along with a PFD • Bring boating safety kit		
4	Navigate boat to the sampling site	• Causing unnecessary wake • Running aground • Disturbing others • Drowning	• Practice STAR • Wear the PPE that is identified in this JSA along with a PFD • Bring boating safety kit • Remain seated • Keep an eye out for changing weather		
5	Inspection and setup of sampling equipment on boat or barge	• Lost time from improperly functioning equipment • Pinch points on soil and sediment samplers • Falling into water hazard • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly and is properly calibrated; complete Quality Control documents • Severe pinch points exist on many soil and sediment samplers, exercise caution when handling samplers. Wear gloves if possible • Ensure all PPE is worn including PFD for each person • Ensure boat/barge is sufficiently stable for retrieval of samples		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Perform sampling activities	• Cuts due to sharp edges of sample sleeve; Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Cuts from sharp objects retrieved by Sampler • Tipping boat • Wet equipment • Drowning	• Wear nitrile gloves • Maintain awareness of sharp edges from objects that may be in sampler • See above Section 2 pertaining to lifting, back injury and material handling • Inspect sample to ensure no sharp objects are present • Remain seated when operating; If the boat tips over, remain with the boat • Keep equipment dry by storing in waterproof storage containers during transport • Be aware of surroundings, verify water depth in shallow waters • Wear the PPE that is identified in this JSA along with a PFD		
7	Sample selection	• Bottle breakage • Contaminant exposure • Pinch points	• Wear nitrile gloves when handling sample containers • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)		
8	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear nitrile gloves when handling sample containers. Handle glass jars with care • Pack glass containers in bubble wrap • Check COC against sample labels and SSOW for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • See above Section 2 • See above Section 2 • See above Section 2 • Ensure equipment and supplies are loaded correctly and do not shift during transport • Adhere to lab protocols for sample retention, storage and transport		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
9	Investigation derived waste (IDW) management (extra sample material)	• Contaminant exposure • Heavy lifting • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear nitrile gloves when handling IDW • Use proper lifting techniques to transport/dispose of IDW into drums and use buddy system if needed • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Soil Sampling

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Soil sampling				
Key equipment:	PPE - Tyvek if Level C initiated; gloves dependent on the task and chemical contamination present or suspected present				
Task-specific training:	GHD Field Method Training on Soil Sampling Procedures				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95	☒ PFD * If working in water	☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☒ Rubber boots (industrial grade) *if working in water		☐ Required	☐ Haz cat 4	☐ R95		☒Other *
☒ Hip waders * if working in water; dependant on water depth				☐ Organic vapor		

	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe		
2	Inspect and calibrate sampling and monitoring equipment	• Lost time from improperly functioning equipment • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly • Complete Quality Control documents		
3	Prepare to collect soil samples	• Lifting hazards • Back injury • Manual material handling • Pinch points • Cuts • Punctures • Sample misidentification	• Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • No bending or twisting while under load • Refer to the HASP for additional lifting information • Avoid placing hands/fingers in pinch point locations • Use proper tools when opening container packaging • Do not use fixed open blade knives when opening boxes or containers		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
			• Ensure the sample id label matches sample location with site plan/GHD site supervisor/subcontractor		
4	Opening the sample sleeve (if applicable)	• Cuts due to sharp edges of sample sleeve • Contaminant exposure	• Use sleeve cutter for opening the sample sleeves • Keep hands clear of the sleeve when cutting • Wear nitrile gloves • Maintain awareness of sharp edges of sample sleeve		
5	Sample collection	• Contaminant exposure • Cuts from container breakage • Sample misidentification	• Wear nitrile gloves and replace between soil samples • Inspect glass bottles for breaks/cracks • Do not attempt to use any suspect containers • Close glass sample containers carefully to avoid breakage • Check sample labels for accuracy prior to placing in cooler		
6	Sample selection	• Bottle breakage • Contaminant exposure • Pinch points • Lost time due to incorrect sample selection	• Wear nitrile gloves when handling sample containers • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear nitrile gloves when handling sample containers • Pack glass containers in bubble wrap • Check COC against sample labels and SSOW for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • Use proper lifting techniques as discussed in step 3 • If possible use a dolly or cart if cooler is heavy or has to be moved over a long distance • Ensure equipment and supplies are loaded correctly and do not shift during transport		
8	Investigation derived waste (IDW) management	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear nitrile gloves when handling IDW • Use proper lifting techniques as discussed in step 3 • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Wading Through a Creek

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Wading through a creek				
Key equipment:	Waterproof waders, life jacket, bug spray; first aid kit				
Task-specific training:	Reference HASP for additional site/client safety training requirements				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95	☒ PFD	☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☐ Industrial grade safety boot	☐ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒ Other *
☒ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Check weather	• Unexpected storm • Fog; rain; snow; lightening/thunder • Heat/cold stress	• Check local and destination weather forecast • Discuss weather issues and precautions to take while driving to the destination • If weather conditions (e.g., fog, rain, snow) impair the ability/vision reschedule site visit • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection		
2	Prepare to enter creek	• Boat traffic • Proper PPE • Prepare to carry equipment in creek • Creek current • Creek Depth • Creek water temperature • Slip/trip/fall hazards	• Maintain awareness creek traffic • Make sure PPE is properly secured. This includes water proof waders and life jacket • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Refer to the HASP for additional lifting information • Maintain resistance to creek current. If		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
			current is too swift do not enter the creek. • If creek water is greater than three feet deep, do not enter the creek. Utilize a boat for field activities and follow proper boat protocol. • Test creek water temperature to not induce hypothermia. If creek water is extremely cold, do not enter the creek. • Practice STAR		
3	Creek Wading	• Slips/trips/hit/fall hazards • Heat stress • Cold stress • Biological hazards • Wildlife encounters • Potential adverse weather conditions	• Use buddy system while walking through the creek • Spot check to identify underwater hazards, establish pathways which is most free of slip and trip hazards, beware of trip hazards, communicate hazards to on-site personnel • Heightened awareness of wasps, ants, bees, snakes, turtles, alligators and use bug spray as necessary • Monitor for heat stress, establish work/rest regimes, wear heat stress PPE, and have liquids available • Monitor for cold stress, wear warm clothing, have access to fluids and high energy food and schedule a work and rest regime • Be aware of any rapidly changing environmental conditions and respond accordingly		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Driving

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Travel to/from site with company/rental/personal vehicles without trailers or equipment				
Key equipment:	Vehicle, valid driver's license, 360-degree topper; seatbelt				
Task-specific training:	Defensive Driving				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☐ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Discuss route, concerns, and alternate routes with passenger and drivers of other vehicles • Use SWA to stop any work that is unsafe • Ensure proper vehicle selected for travel (use a truck if going to construction site or area with rough conditions that would damage a small vehicle?)		
2	Check weather	• Unexpected storm • Fog; rain; snow; lightning/thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightning/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Complete GHD Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a properly inflated spare tire and associated tools to install • Assure windshield and window glass is clean and free from obstructions • Assure all fluids are topped off (e.g., windshield wiper fluid) and scheduled routine maintenance has occurred (e.g., oil changes). • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • If the vehicle contains a first aid kit, fire extinguisher, and road hazard kit, verify that all items with expiration dates are current and that fire extinguisher has had documented monthly check • Do not use vehicle if any safety device is found not functioning		
4	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted		
5	Fasten seat belt(s) and ensure passengers' seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched		
6	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle prior to starting the vehicle		
7	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
8	Driving – Use defensive driving techniques and stay alert	• Arriving late • Collision • Blind spots of other vehicles • Injury or death to occupants or other parties	• Acknowledge and comply with all traffic regulations, laws, and ordinances • Do not use two-way communicating devices or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Recognize other vehicle's blind spots and minimize time spent within these zones • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance (add an extra second for each hazardous condition, triple following distance in poor weather conditions) • Signal well in advance before changing lanes or turning • Utilize all driving defensive techniques		
9	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone		
10	Park vehicle – assign a spotter if necessary (when in doubt use a spotter)	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360-degree topper on the hood of the vehicle • Use caution and mirrors/spotter when backing vehicle • Set parking brake		
11	Demobilization – conduct a vehicle walk-around inspection paying particular attention to path(s) of travel	• Collision • Injury or death to occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
12	Report maintenance or mechanical problems upon returning vehicle	• Conditions worsen leading to mechanical failure resulting in collision and injury	• Report vehicle problems immediately to company representative or rental car agency • Schedule and/or perform repairs as soon as possible		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Mobilization/Demobilization

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Mobilization/Demobilization				
Key equipment:	Vehicle and work task equipment				
Task-specific training:					

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe		
2	Check weather	• Unexpected storm • Fog, rain, snow; lightening/thunder • Heat/cold stress	• Check local weather forecast • If adverse weather conditions are likely, prepare a contingency plan for lodging, etc. with project manager • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Load equipment into vehicle	• Lifting hazards • Manual material handling • Back injury • Cuts • Pinch points • Hand/foot injury • Forgotten or damaged equipment • Materials or equipment leaving the vehicle bed during travel create hazards for other drivers	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Maintain neutral back posture - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and make sure to shift with the feet rather than twisting at the back • Maintain neutral wrist posture when lifting, carrying, pushing or pulling. The wrist is the strongest and most stable when it is straight. • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • Wear safety-toed boots • Verify requested equipment against warehouse form • Load equipment in an organized manner to prevent shifting during transport or use cargo netting • Secure materials or equipment with cargo netting. Ensure netting does not loosen during travel by securing the straps with plastic wire ties or equivalent measures.		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Complete GHD Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a spare tire • Assure windshield and window glass is clean and free from obstructions • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit • Check immediate vehicle perimeter and initial path of travel for obstructions		
5	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted		
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched		
7	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle		
8	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit		
9	Mobilize to site	• Arriving late • Collision • Injury or death to occupants or other parties	• Do not use cell phones or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance • Utilize all driving defensive techniques		

Job steps[1]	Task activity	Potential hazard(s)[2]. Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
10	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone		
11	Park vehicle	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360-degree topper on the hood of the vehicle • Use caution and mirrors/spotter when backing vehicle • Set parking brake		
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Check immediate vehicle perimeter and initial path of travel for obstructions • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Hazard guide

NA-HSE-G-229 Water – Working In, Over or Around

Note: Wherever there is a difference between the standard represented by this Guide and that of the relevant jurisdiction or client - the more stringent standard applies.

1. Definition

For the purposes of this hazard guide, working in, over and around water applies to any activities undertaken by GHD staff in the vicinity of water including ground water, aquifers, rivers, dams and estuaries.

2. Minimum requirements

GHD will implement measures to control and/or minimize the risks associated with staff working in, over or around water. To manage these risks, GHD will:

- Assess water related hazards when developing JSEAs/JSAs and identify site-specific hazards when undertaking Pre-Work Assessments.
- Identify and comply with jurisdictional requirements including requirements for use of water vessels to undertake activities.
- Ensure appropriate emergency equipment is readily available including personal floatation devices, life rings and spill kits to prevent spills into waterways and contamination.
- Ensure staff have adequate information and training such as first aid, water rescue and emergency response including fuel and chemical management.

3. Hazardous activities

The following work sites and activities may be hazardous:

- Coastal or water-adjacent sites including sites with dams, aquatic parks or other man-made water bodies.
- Inspections of flooded areas.
- Water, sewerage or industrial plants with trade wastewater or other water treatment processes.
- Lagoons, storm ponds.
- Geotechnical investigations.
- Aquatic ecological surveys.
- Diving and marine investigations.
- Inspections of bridges, wharves, jetties and piers.

4. Risk management

A **HASP** must be developed by the project team, and reviewed and approved by the Project Manager for all site activities. Identification and control of the hazards associated with working in, over or around water should form part of the plan. The HASP is to be approved by the HSE team prior to being used for site activities.

Risk management activities will be undertaken using the principles identified in the *NA-CAN-MAN-HSE-02 Canadian HSE Management System Manual/NA-US-MAN-02 U.S.HSE Management System Manual* and other associated SOPs.

Risk management documentation will be kept on hand while on site and full records maintained in the project file.

This risk management process will take into consideration at least the following:

- Changing environments, including water depth, swells, surges, currents, tides and weather conditions including wind and flooding of waterways.
- Where possible, avoiding stagnant water, swamps and tall reeds, which when disturbed may release high concentrations of hydrogen sulphide which can result in serious respiratory difficulties such as asphyxiation and neurological dysfunction.
- Hazards associated with driving across waterways in 4WD Vehicles. Refer to the *NA-G-HSE-227 Driving Vehicles* and *NA-G-HSE-208 Four Wheel Drive Vehicles* Hazard Guides.

5. Risk controls

The most effective control is to ***eliminate*** work activities in the immediate vicinity of water. Where this is not practicable, risks are to be controlled to as low as is reasonably practicable (ALARP), observing the hierarchy of controls (use multiple controls where necessary).

- ***Substitution*** – such as conducting the work on land such as using a camera instead of physically inspecting via water.
- ***Engineering/Isolation*** – such as installing an under bridge gantry or inspection platform or using additional machinery or equipment to undertake activity; e.g., fall arrest systems or elevated work platforms or isolating sensitive areas around the work zone.
- ***Administrative*** – such as planning work around water and completion of Pre-Work Assessments.
- ***Personal Protective Equipment*** – such as personal floatation devices, sunscreen, hats.

Other risk controls that should be considered are:

Personal Floatation Devices (PFDs)

PFDs should be worn in the following conditions, where practical:

- When entering running water, dams, creeks or ponds.
- When operating in unfamiliar waters.
- When undertaking activities in the water or on water vessels.
- During bad weather or restricted visibility.

All PFDs must be designed and used in accordance with the levels specified in relevant jurisdictional standards.

Working in water

When working in water, consideration is to be given to:

- Having an observer in place when working in the water.

- Water temperatures and the duration that work is to be undertaken within water. Refer to *NA-G-HSE-230 Extreme Temperatures* Hazard Guide.
- Biological hazards that may be present and any required vaccinations and health monitoring. Refer to *NA-G-HSE-202 Biologicals* Hazard Guide.

Jurisdictional regulations/requirements are to be followed when staff are engaging in diving activities.

Working on water - use of water vessels

When working on water, using a vessel, the following is to be considered:

- Identify the most appropriate vessel for the task. It should be of sufficient size and stability to accommodate staff, tools, and material required to complete the work task.
- Jurisdictional legal requirements for use of the vessel and the equipment the vessel needs to be equipped with must also be identified and complied with.
- The equipment needed for water vessels may include life jackets, life buoys, sufficient fuel, oars, flares and communication equipment such as UHF radio, mobile or satellite phone.
- Assess the vessel and its equipment to ensure sea-worthiness before accessing the vessel; this must be judged in conjunction with daily weather forecasts and water conditions.
- Use manual handling principles when transporting water vessels. Refer to N*A-G-HSE-214 Manual Handling* Hazard Guide.
- Tie off or have one team member firmly hold the vessel in position while other team members access the vessel. Care must also be taken when transferring between vessels.
- Staff that are required to operate a motorized boat are to have the appropriate jurisdictionally required training and licensing.
- In the event GHD engages a boat driver, their licenses must be viewed prior to boarding the vessel.
- Staff must keep limbs inside of the vessel while moving.
- Staff prone to sea sickness or unable to swim must inform the Project Manager so that suitable control measures are in place prior to undertaking activity.

Working over water – from height

The following is to be considered when working above water:

- The potential for falls such as working from elevated platforms.
- Falling objects, particularly if people are working below.
- Having suitable PPE such as fall arrest systems, life rings, and self-inflating floatation devices.

Refer to *NA-G-HSE-211 Work at Heights* Hazard Guide.

Working around water

When working around, consider the following:

- Ensure plant, machinery, equipment and people stay at a safe distance from the edge of waterways, particularly rivers and dams, to prevent injury or soil erosion resulting from the collapse of embankments.
- Visually inspect embankments to assess slip and trip hazards and test the ground to avoid being trapped in soft marine sediment.

Chemical management

Measures that should be taken to control the access of chemicals to waterways include:

- Erect barriers to contain potential spills such as bunds, diversion drains or sumps.
- Provide spill control equipment, including containment booms or dispersants that are specific to waterways.
- Segregate all materials used to contain or handle chemicals and fuels.
- Use cleaning fluids that are suitable for watercourses.
- Washing down vehicles in contained or sealed areas to protect underground water from fuel and oil contamination.

Refer to *NA-G-HSE-203 Chemicals and Radiation* Hazard Guide.

Water quality protection

The following is to be undertaken to protect water quality:

- Ensure a suitable spill kit is available if using plant or machinery that has the potential to pollute waterways.
- Monitor stormwater quality to ensure the water is clear of sedimentation and other pollutants.
- Have a Stormwater Pollution Prevention Plan (SWPPP) if required.
- Protect waterways from insect repellent as these can often be highly toxic to aquatic organisms.

Soil disturbance

It is important to protect existing soil integrity and minimize damage to existing embankments, drainage, erosion and sediment controls, both natural and constructed. The following is to be considered:

- Stabilize exposed soil as soon as practical.
- Establish temporary controls such as drainage structures, berms and sediment barriers.
- Consider permanent drainage and erosion control measures as part of site works, including re-vegetation.
- Redirect run-off from disturbed areas, including stockpile sites, into sedimentation control facilities.
- Redirect run-off from outside working areas, around disturbed areas to prevent overloading erosion control structures.
- Consider changes in weather conditions and the possibility of breaching soil containment barriers.

Refer to *NA-G-HSE-222 Soil Erosion, Sedimentation and Dust Control* Hazard Guide.

Fauna/flora/biological communities

The following is to be considered in relation to fauna, flora and biological communities:

- Identify dangerous fauna that may be encountered in or near fresh and marine waterways such as reptiles, bears, herding animals, crocodiles, alligators, stingrays and jellyfish and take appropriate precautions. This may include considering the use of spotters to monitor and provide warning if dangerous fauna is sighted.
- Have appropriate preventative PPE and first aid facilities available.
- Take precautions to avoid contact with pathogens and carrier organisms such as mosquitos to reduce the risk of diseases associated with water including, malaria, dengue fever, West Nile and Zika virus.
- Ensure suitable decontamination procedures are in place to prevent the spread of waterborne pests and diseases.
- Avoid disturbing or damaging threatened or sensitive biological communities.
- Identify and obtain approvals and licenses for water extraction or vegetation clearing as required by the local jurisdiction.

Refer to *NA-G-HSE-202 Biological Hazards* and *NA-G-HSE-210 Fauna and Flora* Hazard Guide.

6. Incident reporting

If an incident occurs call the Hotline at 1-866-529-4886 immediately.

Job **Safety Analysis (JSA)**

Land Surveying

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project number:	11149486	**Created by**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:	Middleport, New York				
Specific task	Land surveying				
Key equipment:	Off-road vehicle; flag or paddle				
Task-specific training:	Motor Vehicle Safety; Task-specific Training; Personal Protective Equipment; Utility/ATV Training (as necessary)				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☒ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Mob equipment to surveying area with GHD vehicle: • Plan route of travel before leaving • Review weather conditions and plan accordingly • Fasten seatbelt and obey all traffic rules	• Lifting hazards • Manual material handling • Back injury • Pinch points • Moving or flying projectiles inside vehicle while transporting equipment • Slip/trip/fall hazards • Biological hazards	• Reduce travel distance when there is a need to carry/lift materials. • Make sure grip is adequate; wear leather/cotton gloves. • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required. • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position. • Avoid one-handed carrying if possible; maintain awareness of footing. • Review JSA and HASP – Revise JSA as necessary “Dirty JSA”. • Practice STAR. • Properly secure all equipment inside the vehicle. • Use defensive driving techniques. • Do not drive while fatigued. • Park in a safe area; be aware of surroundings. • Inspect work area and note hazards (mitigate if necessary).		
2	Note traffic flow (on-site and off-site vehicles and heavy equipment)	• Struck by oncoming traffic • Slip/trip/fall hazards • Biological hazards • Threatening dogs	• Stage the GHD vehicle to aid in the protection of the survey crew if they need to set up a Temporary Traffic Control Zone (TTCZ). • Review JSA and HASP; document accordingly. • Practice STAR.		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	General use of hand tools and surveying equipment (setup, staking, measuring, locating – these tasks could involve working on slopes or other uneven/rough terrain	• Struck by oncoming traffic • Slip/trip/fall hazards • Heavy lifting • Biological hazards • Threatening dogs • Potential injuries from misuse of tools or use of tools in disrepair	• Wear ANSI Class II reflective safety vest, safety-toed boots, leather work gloves, and hard hat. • If it's not safe then use SWA and review work. • Use buddy system and team lifting; do not lift more than 40 pounds by yourself; avoid excessive body twisting motions. • Do not use old or faded PPE. • Inspect tools – use the proper tool for the task. • Repair/replace tools as necessary. • Store tools and equipment properly after use. • Practice STAR – review work area for safer means to work.		
4	Conduct survey activities – this work will involve: • traversing uneven or rough terrain – inspect/review work area and path of travel for hazards • minor clearing activities during "line clearing" – review weed/brush cutting JSA; use and store machete properly	• Struck by oncoming traffic • Slip/trip/fall hazards • Biological hazards • Pinch points • Cuts/abrasions/slivers • Threatening dogs • Equipment damage	• Surveyor will enter roadway after clearance from flagman. • Surveyor will maintain contact with flagman during survey. • Make sure that proper PPE is being worn. • Review JSA and HASP. • Practice STAR; if it's not safe then use SWA to review work. • Inspect work area and note hazards (use RCA to mitigate as necessary). • Avoid climbing over fences and over rough/uneven terrain as much as possible. • Avoid log/brush/rock piles. • Use insect repellant as directed and if necessary review PPE for stinging/biting insects (mosquito nets, face hoods, etc.). • Wisk machete in front of you away from body parts; keep in sheath when not in use. • Choose a safe path of travel; work smart. • Protect equipment during use and store properly after use.		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Exit roadway and/or heavy equipment traffic pattern	• Struck by oncoming traffic • Slip/trip/fall • Biological hazards • Threatening dogs	• Surveyor should exit roadway first, followed by flagman nearest oncoming traffic (spotter). • Review JSA and HASP. • Practice STAR.		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Clearing Operations

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date issued/revised:	November 2017	**Client:**	FMC Corporation		
Project Number:	11149486	**Created By**	Neil Lonsdale	**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project Address:	Middleport, New York				
Specific Task	Construction management of heavy equipment clearing vegetation				
Key equipment:	Heavy equipment (bull dozer, excavator, skid steer, etc), mobile equipment safety checklist, blow horn for communication				
Task-specific training:	Heavy Equipment Oversight				

Hard Hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☒ Type I (Top Impact)	☐ Chemical Protective (i.e. Nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full Face Mask	☒ Class II	☐ Coveralls
☐ Type II (Side Impact)	☒ Level 1 Light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half Face Mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 Light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-Static	☒ High viz clothing
☐ Class G	☐ Level 3 Medium duty	☐ Other*		**Cartridges**	☐ FRC	☒ Long pants
	☐ Level 4 Heavy duty			☐ N95		☒ Long sleeve shirts
Foot Protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.Cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz Cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project Development Team		Modified by	Reviewed by	Date
Name	**Signature**			
Neil Lonsdale				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Tailgate safety meeting; perform STAR; mobile equipment inspection of heavy equipment, review communication procedure using blow horn	• Miscommunication • Insufficient information for all personnel to work safely • Slip/trips/falls • Situational risks • Short service employees	• Discuss work steps, SWA, perform STAR process, and the proper course of action along with evacuation routes • Discuss the scope prior to start of work • Ensure proper documentation is in place • Verify all personnel training is sufficient for task		
2	Establish approved travel route/site preparation; inspect the ground and work surface	• Obstructions: low hanging areas, overhead utilities • Traffic • Underground utilities • Ground instability	• Plan movement of heavy equipment and any supporting equipment • Check the site to ensure no overhead; if any overhead obstructions exist, re-route path of travel to avoid contact • Ensure all site personnel are aware of the work processes/hazards		
3	Begin clearing operations	• Heavy equipment line of fire • Falling trees, limbs or vines • Poor communication • Heat/cold stress • Dehydration Biological hazards such as snakes, stinging inects, etc.	• Maintain communication with operator • Maintain 50 ft buffer between equipment and personnel • Maintain appropriate buffer between falling trees and personnel • Take frequent rest and water breaks • Review communication protocal with blow hornWear proper PPE to protect against stinging insects • Leave any area where stinging biologicals are identified		
4	Clean up/Shutdown	• Removing heavy equipment from site • Damage to on-site utilities (overhead and underground)	• Check with Site Supervisor to make sure that equipment is properly stowed and any equipment damaged during loading/unloading is taken out of service • Ensure each piece of heavy equipment has a clear path of travel while exiting the work site		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object;

Caught - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a **Stop Work Authority (SWA)** if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

SSE(s) on job: _____ **Assigned mentor:** _____

Presenter signature: _____ Date/time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

GHD emergency contact (Name and verified phone number): _____

Supervisor signature documenting daily debrief has been completed: _____

www.ghd.com

Appendix B
Field Sampling Plan

FMC Corporation
Middleport, New York

Supplemental Sampling Work Plan

Appendix B
Field Sampling Plan

Tributary One North of Pearson/Stone Roads (Operable Unit 7)
and Jeddo Creek and Johnson Creek (Operable Unit 8)
Middleport, New York
Revision 1, June 8, 2018

Table of Contents

Attachment Index

List of Acronyms

AOC	Administrative Order on Consent, United States Environmental Protection Agency Docket No. II RCRA-90-3008 (h) -0209
Agencies	NYSDEC and USEPA
ASTM	American Society of Testing Materials
bgs	Below Ground Surface
CMS	Corrective Measures Study
DCQAP	Data Collection Quality Assurance Plan
FMC	FMC Corporation
FMC OU	FMC Operable Unit
FSP	Field Sampling Plan
GPS	Global Positioning System
in bgs	inches below ground surface
MC	Matrix Code
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PVC	polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
Site	FMC Corporation Middleport Site
Work Plan	Supplemental Sampling Work Plan
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency

1. Introduction

This Field Sampling Plan (FSP) was prepared for a soil and sediment investigation in FMC Corporation (FMC) Operable Unit 7 (OU7) and Operable Unit 8 (OU8) in Middleport, New York. OU7 consists of Tributary One and its flood plain north of Pearson Road and east of Stone Road to its confluence with Jeddo Creek. OU8 consists of Jeddo Creek and its flood plain downstream of its confluence with Tributary One, and Johnson Creek and its flood plain downstream of its confluence with Jeddo Creek to approximately Marshall Road in Yates. FMC will use the data resulting from this and previous investigations to complete a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), and to support a Corrective Measures Study (CMS), if one is needed. The supplemental investigation is being performed pursuant to the terms and conditions of Administrative Order on Consent (AOC), Docket No. II RCRA-90-3008 (h) -0209, effective July 2, 1991, entered into by FMC, the New York State Department of Environmental Conservation (NYSDEC), and the United States Environmental Protection Agency (USEPA) (NYSDEC and USEPA referred to herein as "the Agencies") and its Attachment I.

This FSP is Appendix B of the Supplemental Sampling Work Plan (GHD, 2017) (Work Plan) for OU7 and OU8. The purpose of this FSP is to detail the sampling and data gathering activities to be completed and to outline the procedures to be used during those field activities. The field activities to be completed include the following:

- Sediment sampling from discrete intervals between 0 and 24 inches below ground surface (in bgs) for samples collected within the streambed
- Soil sampling from discrete intervals between 0 and 24 in bgs for samples collected outside of the streambed

FMC has the Agencies'-approved Data Collection Quality Assurance Plan (DCQAP) (Conestoga-Rovers & Associates, 1993) for groundwater monitoring, RFI, and interim corrective measures activities. FMC has prepared an updated Quality Assurance Project Plan (QAPP) for the OU7 and OU8 RFI to update the existing DCQAP. The QAPP is provided in Appendix C of the Work Plan. The QAPP and this FSP form the Sampling and Analysis Plan (SAP) for the OU7 and OU8 RFI. The QAPP and FSP are consistent with applicable requirements specified in Attachment I to the AOC.

This FSP addresses comments received (verbally and in writing) from the Agencies between March and May 2018 to the November 30, 2017 version of this FSP.

This FSP is organized as follows:

- Section 1: Introduction
- Section 2: Sampling Procedures
- Section 3: Sample Custody and Document Control

1.1 Project Objective

The objective of this program is to characterize the nature and extent of FMC-related contamination in OU7 and OU8, and use the analytical data obtained as part of this investigation to complete a RFI. The investigation will include both sediment in the stream bed (0-6, 6-12, 12-18, and 18-24 in bgs) and soil samples (0-3, 3-6, 6-12, 12-18, and 18-24 in bgs) within the flood plain. Samples will be analyzed for total arsenic. As requested by the Agencies in NYSDEC's March 23, 2018 letter, 20 percent of samples shall also be analyzed for lead and chlorinated pesticides in addition to arsenic.

2. Sampling Procedures

2.1 General

FMC will use a hand-held Global Positioning System (GPS) (or other appropriate equipment) to locate and document the final location of sample locations.

As required, additional information regarding the sampling locations will be collected for future reference (property ownership, historical land use, notable features, photo log, soil/sediment features, etc.). This information will be documented on field logs. Photos will be taken for each of the sample locations and a photo log compiling all of these photographs will be prepared by FMC.

2.2 Sediment Sampling

FMC will collect sediment samples as described in the figures and tables provided in the approved Work Plan. FMC will advance a probe or rod at each sediment sampling location to determine the approximate depth to refusal. The sample will be collected from the upper (available) layer of sediments (0-6 in bgs) plus the 6-12, 12-18, and 18-24 in bgs intervals, where sufficient sediment exists. Sediment samples will be collected from downstream locations first, unless the sampling locations are sufficiently spaced apart to eliminate impacting downstream samples by disturbing sediment.

FMC will collect sediment samples using one of the following sampling procedures. Sediment sampling will target sediment deposition zones, not the main thalweg of the stream, though sampling through water may be required in some cases to reach deposition zones. The sampling methodology selected will depend on the conditions at each of the sampling locations:

Shovel Method

1. Don a new pair of disposable gloves.
2. Collect sediment samples from the specified interval by way of a pre-cleaned/decontaminated stainless steel trowel or similar device (e.g., spoon, shovel, or scoop) or disposable plastic spoon. The samples will be collected by wading into the creek and, while facing upstream (into the current), scooping the sample from along the bottom in an upstream direction.

3. Place sediment and thoroughly mix sample in a pre-cleaned stainless steel bowl or a new disposable paper bowl prior to placement in the sample container to obtain a homogeneous sample.
4. After collection, place the sample on ice or cooler packs in a laboratory-supplied cooler.
5. Decontaminate non-disposable equipment as follows:
    a. Wash equipment with clean potable water and laboratory detergent, using a brush as necessary to remove particulates.
    b. Rinse with tap water.
    c. Rinse with deionized water.
    d. Allow to air dry.
    e. Containerize decontamination fluid for discharge to FMC's wastewater treatment plant, or disposal off-Site.

In lieu of a scoop, field personnel may also use an Eckman or Van Veen sampler, as described below.

van Veen Sampler (or equivalent) From A Boat

This procedure will be used in the unlikely event that sediment samples must be collected using a boat. The grab sampler will be deployed and retrieved by two field personnel while the vessel operator controls the winch. The general procedure for collecting sediment samples is as follows:

1. Maneuver the sampling vessel to the proposed location (using GPS, if applicable). Measure and record the water depth using a lead line or calibrated fathometer.
2. Don a new pair of disposable gloves.
3. Cock open the sampler and slide the locking pin into place.
4. Signal the winch operator to lift the sampler, taking care that the locking pin stays in place.
5. Guide the sampler overboard until it is clear of the vessel and remove the locking pin.
6. Lower the sampler through the water column to the bottom at approximately 1 ft./s.
7. Record the GPS coordinates when the sampler contacts the bottom; the GPS receiver should be as close as possible to the winch line.
8. Signal the winch operator to begin retrieving the sampler and raise it at approximately 1 ft./s.
9. Guide the sampler aboard the vessel and place it on the work table on deck; use care to avoid jostling that might disturb the integrity of the sample.
10. Proceed with logging and labeling sample and equipment decontamination as stated for soil sampling.

Direct-Push Method

If the conditions at the sample location are conducive (e.g., water level is low enough to allow use of a direct-push sampler), FMC will employ the direct-push method described in the following section for soil sampling.

2.3 Soil Sampling

FMC will collect soil samples from locations as specified in the Work Plan. Unless otherwise stated, soil samples will be collected from the 0-3 and 3-6 inch intervals, and then at sample intervals of every 6-inches to approximately 24 in bgs. Soil samples may be collected using a direct-push method, which refers to the sampler being 'pushed' into the soil material without the use of rotation to remove the soil. This method relies on the drill unit static weight combined with rapid hammer percussion (or a manual slam bar) for advancement of the tool string. Continuous soil samples are collected in tube samplers (various lengths), affixed with a cutting shoe and internal liner (PVC, Teflon, or acetate are available). The direct-push sampler can be advanced by the field team or can be advanced using a track- or truck-mounted unit (Geoprobe® or similar).

If cohesive soil conditions are encountered, or the use of direct-push equipment is determined to not be feasible in the field, FMC may use a hand auger or other more portable digging equipment (e.g., shovel or mechanical equipment with shovel attachment) to collect samples.

At each new sampling location, the following sampling procedure will be observed:

1. Don a new pair of disposable gloves.
2. Push the tool string to depth using direct-push equipment (manual slide hammer/slam bar, mechanical powered equipment, or similar equipment). If using a track-mounted or truck-mounted rig, the direct push drill rig will advance the borehole using methods consistent with ASTM Standard D6724-04.
3. If using a hand-push coring device in standing water, push or drive the sampler through the water column to the desired depth. When sampling hard or coarse sediments, a slight rotation of the tube while it is pushed will create a greater penetration and reduce compaction. Cap the tube with a Teflon plug or a sheet of Teflon. The tube is then slowly withdrawn, keeping the sample in the tube. The tube must be capped prior to pulling the bottom part of the core above the water surface.
4. If using a hand-push coring device, push or drive the sampler to the desired depth. If using a track- or truck-mounted rig, soil samples will be collected using Geoprobe® MacroCore® sampling techniques or similar. Once driven to depth, retrieve the sampler.
5. Place the sampler in an appropriate holder, and cut open the sleeve to expose the collected soil.
6. Record the soil sample length and document the stratigraphy and significant features (e.g., odor, discoloration, type of material found) on an overburden stratigraphy log. Soil and sediment will be classified using the Unified Soil Classification System (USCS) in accordance with ASTM Method D2488.

7. Collect the sample from the sleeve using a stainless steel spoon/scoop or disposable plastic spoon and place in a pre-cleaned stainless steel bowl or a new disposable paper bowl. Thoroughly mix sample in the bowl prior to placement in the sample container to obtain a homogeneous sample. Record the depth of the sample interval on the field log.
8. After placing the sample into a laboratory-supplied jar, label the jar, and place the sample on ice or cooler packs in a laboratory-supplied cooler.
9. Decontaminate non-disposable equipment as follows:
    a. Wash equipment with clean potable water and laboratory detergent, using a brush as necessary to remove particulates.
    b. Rinse with tap water.
    c. Rinse with deionized water.
    d. Allow to air dry.
    f. Containerize decontamination fluid for discharge to FMC's wastewater treatment plant, or disposal off-Site.

2.4 Quality Control Sampling

As summarized in Section 3.4 of the QAPP, FMC will collect the following types of field quality control (QC) samples for laboratory chemical analysis:

- Field duplicate samples: 1 per 20 or fewer samples submitted to laboratory
- Field/equipment blanks (field blanks): 1 daily when non-dedicated equipment used
- Matrix spike/matrix spike duplicate (MS/MSD) samples : 1 per 20 or fewer samples submitted to laboratory

Each type of field QC sample for laboratory chemical analysis is discussed in Section 3.4 of the QAPP.

2.5 Data Verification/Validation and Usability

FMC will perform quality assurance (QA) activities so that the data are scientifically defensible, properly documented, of known quality, and meet the project objectives. FMC has provided a detailed discussion regarding this procedure in the QAPP provided in Appendix C of the Work Plan.

3. Sample Custody and Document Control

The procedures for sample handling, labeling, shipping, and chain of custody documentation are provided in Section 3.2 of the QAPP (Appendix C of the Work Plan). These details are also provided below for ease of use of this FSP by field staff.

3.1 Sample Labeling

The sample numbering system for the project has been designed to uniquely identify each sample from each sampling program and event. Each sample container will be labeled with a unique sample number that will facilitate tracking and cross referencing of sample information and will be recorded in the field logbook. This numbering system consists of the sample matrix code, project reference number, sample collection date, sampler's initials, and sequential number beginning with 001 and continuing throughout the sampling program and event. The unique sample number will be recorded with the sample location in the field logbook at the time of sample collection. The field logbook will form part of the permanent field record. The sample numbering system to be used is described as follows (labels will be pre-printed with key information, with unique information entered on the sample labels by the field sampler):

Example: MC-11149486-MMDDYY-XX-NNN

Where:

MC (Matrix Code)	Designates types of sample (S for soil)
11149486	Project reference number
MMDDYY	Designates date of collection presented as month, day, and year
XX	Sampler initials
NNN-E1-01	Sample number for event starting with transect number (T23.3- or JD1.3- or JN2.1-), location (S- for in-stream, E1 for offset to east, W1 for offset to west, etc.), and sequential sample number at that borehole (01 to 04 assuming up to 4 depth intervals)

Samples designated for MS/MSD analysis will be identified as such in the remarks column of the chain of custody form.

3.2 Field Chain of Custody Procedures

Chain of custody is the sequence of possession of an item. An item (such as a sample or final evidence file) is considered to be in custody if the item is in actual possession of a person, the item is in the view of the person after being in his/her actual possession, or the item was in a person's physical possession but was placed in a secure area by that person. Field, laboratory, and final evidence files custody procedures are described in the subsections that follow.

3.2.1 Field Procedures

Logbooks and/or project standard field forms will be used to record field data collection activities. Entries will be described in as much detail so that a particular situation could be reconstructed solely from these entries. Field logbooks are bound field survey books or notebooks with consecutively numbered pages. Logbooks will be assigned by project and will be stored at FMC's or FMC's contractor office when not in use. Each logbook will be identified by a project-specific document number.

The title page of each logbook will contain the following information:

- Project name
- Project number
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each day's logbook entry, the date, start time, weather, names of sampling team members present, and the signature of the person making the entry will be entered. The names of individuals visiting OU7 or OU8 or field sampling team and the purpose of their visit will also be recorded in the field logbook.

Sample collection information will be recorded in a logbook and/or on a project standard field form. Project standard field forms are specifically prepared for each project sampling location. These forms are used to record field information obtained and samples collected for each location. Entries will be made in ink, signed, and dated with no erasures. If an incorrect entry is made, the incorrect information will be crossed out with a single strike mark and initialed. The correct information will be entered adjacent to the original entry.

Whenever a sample is collected, an identification and a detailed description (if necessary) of the location will be recorded in the logbook and/or on a project standard field form. Photographs shall be taken at sample locations (and any other relevant locations) and will be noted in the logbook. Following the completion of the field activities, FMC will create a photo log.

Samples will be collected according to the sampling procedures documented in the Work Plan. The equipment used to collect samples, time of sample collection, sample description, volume and number of containers, preservatives added (if applicable) will be recorded in the field logbook and/or on a project standard field form. A deviation from the Work Plan or other project-appropriate planning document sampling procedures will be documented in the field logbook and/or on a project standard field form. Each sample will be uniquely identified using the sample identification system provided in Section 3.1.

3.2.2 Transfer of Custody and Shipment Procedures

The sample packaging and shipping procedures summarized below for the samples to arrive at the laboratory with the chain of custody intact:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred to another person or the laboratory. As few people as possible will handle the samples.
2. Sample containers will be identified by using sample labels that include the sampler's initials, sample name, date and time of collection, and analyses to be performed. Sample labels will be completed for each sample using waterproof ink, and will be placed on the sample container.
3. Samples will be accompanied by a properly completed chain of custody form. The sample identification numbers and required analyses will be listed on the chain of custody form.

When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign and record the date and time on the form. The chain of custody form documents sample custody transfers from the sampler to another person, to the laboratory, or to/from a secure storage area.

4. Samples will be properly packaged for shipment using bubble wrap or foam sleeves and dispatched to the laboratory for analysis with a separate signed chain of custody form enclosed in and secured to the inside top of each shipping cooler. Shipping coolers will be secured with custody seals for shipment to the laboratory. The custody seal is then covered with clear plastic tape to prevent accidental damage to the custody seal.
5. If samples are split with a government agency or other entity, it is the responsibility of that entity to prepare its own chain of custody form for the samples. Information regarding the identity of the entity and the sample(s) that are being split will be recorded in the field logbook.
6. Sample shipments will be accompanied by the chain of custody form identifying its contents. The chain of custody form is a four-part carbonless-copy form. The form is completed by the sampling team which, after signing and relinquishing custody to the shipper, retains the bottom (goldenrod) copy. The shipper, if different than the sampling team members, retains the pink copy after relinquishing custody to the laboratory. The yellow copy is retained by the laboratory, and the fully executed white copy is returned as part of the data deliverables package.
7. If the samples are sent by common carrier, a bill of lading (i.e., FedEx air bill) will be used and copies will be retained as permanent documentation. Commercial carriers are not required to sign the chain of custody form provided the form is sealed inside the sample cooler with the custody tape intact.

3.3 Final Evidence Files Custody Procedures

The final evidence file for the project will be maintained by FMC and will consist of the following:

1. Project plans
2. Project logbooks
3. Field data records
4. Sample identification documents
5. Chain of custody records
6. Correspondence
7. References, literature
8. Final data packages
9. Miscellaneous - photos, maps, drawings, etc.
10. Reports

The final evidence file materials will be the responsibility of the evidentiary file custodian with respect to maintenance and document removal.

SUPPLEMENTAL SAMPLING WORK PLAN
TRIBUTARY ONE NORTH OF PEARSON/STONE ROADS (OPERABLE UNIT 7)
AND JEDDO CREEK AND JOHNSON CREEK (OPERABLE UNIT 8)
FMC CORPORATION, MIDDLEPORT, NEW YORK

Date of Sampling/Inspection: _____

Sampler/Inspector(s): _____

Completed By: _____

Photo Log Attached?: Yes _____ No _____

1. Contact Information

Property Address: _____

Owner Name: _____

Owner Address: _____

_____

Owner Phone: _____

Best Time to Contact: _____

Resident Name: _____

Resident Phone: _____

Best Time to Contact: _____

Is the owner or resident a current or former employee of FMC?

Yes _____ No _____

Property Address: _____

2. Property Description

Describe Current Property Type (e.g., Wooded, Overgrown, Agricultural/Cropland, Commercial, Industrial, Orchard, Residential, School).

Property Type	Years

Approximate Size of Property: _____

Year of Construction of Any Structure: _____

Describe Structure: _____

_____

Describe any past known soil grading or placement of fill or topsoil on the property:

_____

_____

_____

_____

_____

_____

3. Land Use History Per Owner/Residential

Was property ever owned or used by FMC? Yes _____ No _____

Describe historical usages:

_____

_____

_____

_____

Was property ever used for orchards or agricultural purposes?

Yes _____ No _____

If yes, when and how?:

_____

_____

_____

_____

Was pesticides or fertilizers applied on your yard? Yes _____ No _____

If yes, identify product and frequency of applications:

_____

_____

_____

_____

_____

4. Environmental Setting

Describe outside property (i.e., paved areas, exposed soil, vegetative cover, low areas, etc):

_____

_____

_____

_____

Describe location and size of vegetable gardens and child's play areas:

_____

_____

_____

_____

_____

Property Address: _____

Unified Soil Classification of Surface Soil:

Surface Soil Colour: _____

Surface Soil Texture: _____

Surface Soil Type: _____

Describe any surface water on or near property:

_____

_____

_____

_____

Describe surface topography, drainage, and ditches on property:

_____

_____

_____

_____

Describe the location and type of any fruit trees currently or historically present on the property:

_____

_____

_____

_____

Describe roads, railroad tracks, or other unusual features on or next to property:

_____

_____

_____

_____

5. Soil Sample Information

Sample ID	*Sample Date/Time*	*Sample Interval*	*Sample Location*	*Observations*

Property Address: _____

6. Sketch of Property, Features, Play Area, Gardens & Sample Locations

Appendix C
Quality Assurance Project Plan

FMC Corporation
Middleport, New York

Supplemental Sampling Work Plan

Appendix C
Quality Assurance Project Plan

Tributary One North of Pearson/Stone Roads (Operable Unit 7)
and Jeddo Creek and Johnson Creek (Operable Unit 8)
Middleport, New York
Revision 1 June 8 2018

Table of Contents

Table of Contents

Table of Contents

Figure Index

Table Index

Quality Assurance Project Plan
Signature Page

Site Name:	FMC Corporation		
Location address:	Middleport, New York		
Ref. No.	11149486	GHD Office:	Niagara Falls, New York
Anticipated Start Date:	August 2018	Anticipated Project Duration:	10 weeks
Prepared By:	Sheri Finn	Date:	
Project Manager:	Denise Quigley	Date:	
Quality Assurance Officer:	Sheri Finn	Date:	

This signature page must be completed and be available on Site for review. This page does not, however, replace the QSF-016 requirements.

Acronyms and Short Forms

ANSI/ASQC	American National Standards Institute/American Society for Quality Control
ASP	Analytical Services Protocol
CFR	Code of Federal Regulations
Consultant	Consultant retained by FMC to complete work on FMC's behalf
DER-10	DER-10 Technical Guidance for Site Investigation and Remediation", December 2010
DQOs	Data Quality Objectives
EDDs	Electronic Data Deliverables
ELAP	NYSDOH Environmental Laboratory Accreditation Program
LCS/LCSD	Laboratory Control Sample/Laboratory Control Spike Duplicate
LIMS	Laboratory Information Management System
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity
%R	Percent Recovery
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative Percent Difference
Site	FMC Corporation, Middleport, New York
SOPs	Standard Operating Procedures
SW-846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates 1 through V, 2014
USEPA	United States Environmental Protection Agency

1. Introduction

This Quality Assurance Project Plan (QAPP) is a planning document that provides a "blueprint" for obtaining the type and quantity of data needed to support environmental decision making during an investigation. This QAPP was developed to support the Supplemental Sampling Work Plan, Tributary One North of Pearson/Stone Roads (Operable Unit 7 or OU7) and Jeddo Creek and Johnson Creek (OU8) (Work Plan). The supplemental investigation will obtain data needed to complete the RCRA Facility Investigation (RFI) and to support a corrective measures study, if required for OU7 and OU8. The QAPP integrates the technical and quality aspects of a project and documents the quality assurance (QA), quality control (QC), and technical activities and procedures associated with planning, implementing, and assessing environmental data collection operations.

FMC has an Agency-approved Data Collection Quality Assurance Plan (DCQAP) (Conestoga-Rovers & Associates, 1993) for groundwater monitoring, RFI, and interim corrective measures activities. FMC has prepared this QAPP for the OU7 and OU8 RFI to update the existing DCQAP. This QAPP was prepared pursuant to the terms and conditions of Administrative Order on Consent, Docket No. II RCRA-90-3008(h)-0209 (AOC), effective July 2, 1991, entered into by FMC, the New York State Department of Environmental Conservation (NYSDEC), and the United States Environmental Protection Agency (USEPA) (NYSDEC and USEPA referred to herein as "the Agencies"), and supersedes previous data collection quality assurance plans prepared pursuant to the AOC for OU7 and OU8.

This QAPP is consistent with NYSDEC - Division of Remediation (DER) "DER-10 Technical Guidance for Site Investigation and Remediation", December 2010, (DER-10) guidelines, and USEPA QAPP guidance documents "EPA Requirements for Quality Assurance Project Plans", EPA QA/R-5, reissue May 2006, and "EPA Guidance for Quality Assurance Project Plans", EPA QA/G-5, reissue December 2002.

These guidance documents specify that there are four basic groups of elements that must be included in a QAPP. These four groups and associated elements follow:

- Group A - Project Management. The elements in this group include all aspects of project management, project objectives, and project history.
- Group B – Data Generation and Acquisition. The elements in this group include descriptions of the design and implementation of all measurement systems that will be used during the project.
- Group C – Assessment/Oversight. The elements in this group encompass the procedures used to ensure proper implementation of the QAPP.
- Group D – Data Validation and Usability. The elements in this group cover the QA activities that occur after the data collection phase of the project is completed.

The elements associated with the project management, data generation and acquisition, assessment/oversight, and data validation and usability for the supplemental investigation are presented in this QAPP.

2. Project Organization

The responsibilities of management, QA personnel, field personnel, and laboratory personnel are provided in the following subsections. Additionally, special training/certification requirements for the project are identified and an organization chart that identifies the lines of communication among the participants in the investigation activities is presented herein.

2.1 Management Responsibilities

FMC's Consultant has technical responsibility for the data collection activities in OU7 and OU8. The Consultant's Project Manager is ultimately responsible for achieving the project objectives. Consultant's Project Manager has selected a project team consisting of Consultant's technical personnel (engineering, geology/hydrogeology, chemistry, and data management), QA personnel, and the analytical laboratory. Consultant Project Manager's specific responsibilities are summarized by the following.

Project Manager - Consultant

- Technical representation on behalf of the client
- Advising on corrective actions
- Overview of field activities
- Providing Consultant resources on an as-required basis
- Preparing and reviewing reports
- Coordinating Consultant's technical group

The analytical laboratories used for this project will be New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH ELAP) accredited laboratories. The laboratory Project Manager is responsible for achieving the laboratory project objectives. The laboratory Project Manager responsibilities are summarized by the following.

Project Manager - Laboratory

- Providing laboratory resources on an as-required basis
- Review of final analytical reports
- Approve final reports prior to submission to Consultant

2.2 Quality Assurance Responsibilities

Project team members with QA responsibilities include Consultant's QA Officer, Consultant's Field QA Officer, and the laboratory QA Officer. These individuals and their specific responsibilities are summarized by the following.

Quality Assurance Officer - Consultant

- Review laboratory quality assurance/quality control (QA/QC)
- Coordinate and review data validation and assessment
- Advise on laboratory corrective action procedures
- Prepare and review QA reports
- QA/QC representation of project activities

Remedial Investigation Coordinator - Consultant

- Overview and review field QA/QC
- Management of field activities and field QA/QC
- Field data assessment
- Internal field technical system audits
- Technical representation of field activities
- Preparation of standard operating procedures (SOPs) for field activities
- Implement and document field corrective actions, if necessary

Quality Assurance Officer - Laboratory

- Coordinate and overview of laboratory systems audits
- Overview of QA/QC documentation
- Conduct detailed data review
- Implement and document laboratory corrective actions, if required
- Technical representation of laboratory QA procedures
- Oversee preparation of laboratory SOPs

2.3 Field Responsibilities

Consultant will conduct field sampling and obtain field measurements related to sampling during the investigation. The specific procedures for field sample collection and field measurements will adhere to the Consultant SOPs for field work and as described in the applicable work plan. Consultant's field team leader will be responsible for documenting field-related non-conformances and implementing and documenting subsequent corrective actions. The field team leader or field team members can identify and report non-conformances.

2.4 Laboratory Responsibilities

2.4.1 Laboratory

The laboratory is expected to perform the analyses for the investigation. Specific information concerning the sampling and analysis requirements for the investigation are provided in Section 2.7 of this QAPP.

The specific responsibilities of laboratory personnel involved in the project are summarized by the following:

Project Manager - Laboratory

- Coordinate laboratory analyses
- Supervise in-house chain of custody
- Sub-contract sample analyses as needed
- Schedule sample analyses
- Oversee data review
- Oversee preparation of analytical reports

Sample Custodian - Laboratory

- Receive and inspect incoming sample containers
- Record the condition of incoming sample containers
- Sign appropriate documents
- Verify correctness of chain of custody documentation
- Notify project manager of non-conformances identified during sample receipt and inspection
- Assign a unique identification number to each sample, and enter the client identification number and sample identification numbers into the sample receiving log
- Initiate transfer of the samples to appropriate laboratory sections
- Control and monitor access/storage of samples and extracts

2.5 Project Organization

The organization and lines of communication among the project participants are identified in the preceding subsections.

2.6 Problem Definition/Background Information

The problem definition and background information is detailed in the work plan.

This QAPP focuses on specific QA/QC activities designed to achieve the objectives of a supplemental investigation at the site.

This QAPP is a dynamic document, and it will be updated with specific addenda, if necessary, to reflect new phases of work as they are implemented. Necessary modifications will be made by Consultant's QA Officer and will be reviewed by Consultant's Project Manager. This QAPP will be reviewed on an annual basis by Consultant's QA Officer to confirm it accurately reflects the work being conducted at the Site. It is anticipated that this QAPP will be utilized throughout the investigative process for OU7 and OU8.

2.7 Project/Task Description

An overview of the sampling and analysis program is provided in Table C1.1. Target analytes and targeted reporting limits are presented in Table C2.1.

2.7.1 Project Schedule

The program schedules will be presented in applicable work plans and will be dependent on critical items such as regulatory reviews and approvals and weather. These items may impact the ultimate implementation and completion of scheduled activities. Forthcoming work plans will provide schedules for future sampling and analysis programs.

2.8 Quality Objectives and Criteria for Measurement Data

The quality objectives and measurement performance criteria for data obtained for the investigation are presented in the following subsections.

2.8.1 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements derived from the outputs of each step of the DQO process. The DQO process is a series of planning steps based on the scientific method that is designed to confirm that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application.

There are seven steps in the DQO process that include:

- Stating the problem
- Identifying the goal of the study
- Identifying information inputs
- Defining the boundaries of the study
- Developing the analytical approach
- Specifying performance or acceptance criteria
- Developing the plan for obtaining data

The resulting statements and DQOs are summarized in the following:

1	Problem	Determine the impact of Site-related releases.
2	Goal	Determine if constituents of concern are detected in samples.
3	Inputs	Data from the sampling locations detailed in the work plan.
4	Boundaries	Site boundaries as provided by historical documentation.
5	Analytical Approach	If Site-related constituents exceed criteria, additional activities may be necessary to address the findings.
6	Acceptance Criteria	Ability to detect constituents at laboratory method detection limits (MDLs) and quantitate constituents at laboratory targeted reporting limits (refer to QAPP Section 5.0 and Table C2.1).
7	Plan	Scheduled the sampling event with subsequent data analysis and reporting.

2.8.2 Measurement Performance Criteria

The measurement performance criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are provided in the following subsections.

2.8.2.1 Field Precision Criteria

Precision of the field sample collection procedures will be assessed by the analysis of field duplicate samples. Field duplicate samples will be collected at a frequency of one per 20 or fewer investigative samples or at a minimum frequency of one per sampling event. The samples will be labeled such that the field duplicate sample is "blind" to the laboratory. A relative percent difference (RPD) of 100 percent for soil and sediment samples will be used for analytes detected in both the investigative and field duplicate samples at concentrations greater than or equal to five times their quantitation limits.

2.8.2.2 Laboratory Precision Criteria

Laboratory precision will be assessed through the calculation of RPDs for laboratory duplicate sample analyses. These will be matrix spike/matrix spike duplicate (MS/MSD) and/or duplicate laboratory control samples (LCS/LCSD) samples. The equation to be used to determine precision is presented in Section 5.3.1 of this QAPP. Laboratory precision acceptance criteria will be generated by the laboratory and included in the laboratory reports.

2.8.2.3 Field Accuracy Criteria

The criteria for accuracy of the field sample collection procedures will be such that samples are not affected by sources external to the sample, e.g., inadequate equipment decontamination procedures or sample contamination by ambient conditions or sample cross-contamination. Field sampling accuracy will be assessed using the data from equipment blank samples.

Field equipment blank samples will be collected at a frequency of one per 10 or fewer sampling equipment decontamination procedures with a minimum frequency of one per sampling event during which equipment decontamination occurs. Field equipment blank samples (also referred to herein as equipment blank samples) will be collected by routing laboratory-provided deionized water

through decontaminated sampling equipment for the same parameters being analyzed for the investigation collection activities. The samples will be labeled such that the field blank sample is "blind" to the laboratory. Equipment blank samples will be analyzed to check for procedural contamination or ambient conditions that may cause sample contamination.

Equipment blank samples should not contain target analytes. The equipment sample data will be evaluated using the procedures specified in Section 5.3.2 of this QAPP. Sample handling procedures, sample preservation requirements, and holding time periods will be adhered to in order to maintain the required level of accuracy.

2.8.2.4 Laboratory Accuracy Criteria

Laboratory accuracy will be assessed by determining percent recoveries from LCS analyses. An LCS will be analyzed at a frequency of one per laboratory batch of 20 or fewer samples of the same matrix. Accuracy relative to the sample matrix will be assessed by determining percent recoveries from the analysis of MS samples. The equation to be used to determine accuracy for this project is presented in Section 5.3.2 of this QAPP. Laboratory accuracy acceptance criteria will be generated by the laboratory and included in the laboratory reports.

2.8.2.5 Field Representativeness Criteria

Representativeness is dependent upon the proper design of the sampling program. The representativeness criteria for field sampling will provide that the correct locations are sampled and that the proper sampling procedures are followed. The sampling program was designed to provide data representative of conditions at the Site. During development of the sampling program, consideration was given to existing analytical data and physical setting.

2.8.2.6 Laboratory Representativeness Criteria

The representativeness criteria for laboratory data will provide that the proper analytical procedures are used for sample preparation, sample analysis, and that sample holding times are met. Additionally, the accuracy and precision of the laboratory data affect representativeness. The laboratory representativeness criteria will include achieving the accuracy and precision criteria for the sample analyses.

2.8.2.7 Field Comparability Criteria

The criteria for field comparability will document that the proper sampling procedures are followed.

2.8.2.8 Laboratory Comparability Criteria

The criteria for laboratory data comparability will be to provide that the analytical methods used for the investigation are comparable to the methods used for previous sampling events, as applicable. The methods identified in Section 3.3.2 of this QAPP are the same or comparable to the methods used to generate previous data.

2.8.2.9 Field Completeness Criteria

No field analyses are currently scheduled for this investigation.

2.8.2.10 Laboratory Completeness Criteria

The criteria for laboratory completeness will be 90 percent or more of the laboratory data are determined to be usable for the intended purpose. The procedure for determining laboratory data usability is provided in Section 3.9.2 of this QAPP. The equation for calculating completeness is presented in Section 5.3.4 of this QAPP.

2.8.2.11 Field Sensitivity Criteria

No field analyses are currently scheduled for this investigation.

2.8.2.12 Laboratory Sensitivity Criteria

The sensitivity criteria for the laboratory analyses are the targeted reporting limits provided in Table C2.1 of this QAPP.

It should be noted that high concentration of target and non-target analytes and matrix interferences may prevent the targeted quantitation limits from being achieved for all samples. The methods selected for analyzing the samples are USEPA methods routinely used to support environmental investigations and data gathering activities.

2.9 Special Training/Certification Requirements

Field sampling team members are required to have successfully completed relevant field training protocols. They are also required to have received the 40-hour Hazardous Waste Operations and Emergency Response (known as HAZWOPER) safety training and annual 8-hour refresher courses required by 29 CFR Parts 1910 and 1926. Employee training documentation is maintained by the employer.

Laboratory personnel training records are maintained by the laboratory. The laboratory is required to be accredited by the National Environmental Laboratory Accreditation Program (NELAP) to demonstrate compliance with USEPA's requirement that the laboratory have a documented quality system that complies with ANSI/ASQC E4-94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R-2 ("EPA Requirements for Quality Management Plans", March 2001). The laboratory is accredited by NELAP for the analyses identified in this QAPP.

2.10 Documentation and Records

The documents, records, and reports generated during the investigation activities are identified in the following subsections. The Consultant Project Manager will confirm the current version of the QAPP is available prior to each sampling event.

2.10.1 Field and Laboratory Records

Documents and records generated during the project include sample collection records, QC sample records, laboratory records, and data handling records. A brief description of these documents and records are provided below. Detailed information on these records is provided in subsequent sections of this QAPP.

Sample collection records that will be used during the program's sampling activities include field logbooks and/or project standard field forms, stratigraphic logs, chain of custody records, field narratives, and shipping papers.

QC sample records that will be used during the project to document the generation of QC samples include field logbooks and/or project standard field forms recording field blank samples, and field duplicate samples. The laboratory will maintain quality records for deionized water sent for field blank samples and sample integrity information. Records of sample preservation will be maintained in field logbooks and/or on project standard field forms and by the laboratories.

Laboratory records that will be maintained for the project include sample receipt documentation, laboratory narratives, field and laboratory chain of custody documentation, sample container cleanliness certifications, reagent and standard reference material certifications, sample preparation records, sample analysis records (i.e., run logs), instrument/raw data, QC data, calibration data, corrective action reports, and final reports.

Data handling records that will be maintained include verification of computer programs used to manipulate or reduce raw data into final results and data validation reports. The laboratory will maintain documentation of data verification and reduction procedures as necessary for the analyses used during the investigation. Consultant will maintain checklists, notes, and reports generated during the external data validation process.

2.10.2 Data Reporting Format

Field data will be recorded in field logbooks and/or on project standard field forms. The details for recording field data are provided in Section 3.2.2.1 of this QAPP. Field data will be generated primarily from observations. This information will be included in project reports or submittals.

Full Category B ASP deliverables will be provided by the laboratory.

2.10.3 Data Archiving and Retrieval

Records will be maintained consistent with the laboratory's and Consultant's record retention policies.

3. Data Generation and Acquisition

The design and implementation of the measurement systems that will be used during the investigation activities, including sampling procedures, analytical procedures, and data handling and documentation, are detailed in the following subsections.

3.1 Sampling Process Design

The rationale for the sampling program is described in the Work Plan.

3.1.1 Sampling Methods

Sample collection methods are provided in the Work Plan.

3.1.2 Field Equipment and Sample Container Cleaning Procedures

Equipment cleaning/decontamination procedures are provided in the Work Plan. Sample containers will be provided by the laboratories. Containers will be pre-cleaned in accordance with the USEPA guidance document entitled "Specifications and Guidance for Contaminant-Free Sample Containers", EPA 540/R-93/051. Certificates of analysis for each lot of containers will be maintained by the laboratory or be available from the vendor upon request.

3.1.3 Field Equipment Maintenance, Testing, and Inspection Requirements

Field equipment will be inspected and tested prior to use in the field. Maintenance logs for field equipment are kept in field equipment files located at each Consultant office. Prior to use in the field, the equipment is checked again, and the performance information is recorded in the field logbook and/or on a standard field equipment form. Equipment returned from the field is inspected and tested. Required maintenance is performed and documented prior to the equipment being returned to service.

Critical spare parts for field equipment and replacement field equipment are available and can be delivered to the field when the need is identified. Alternately, field equipment vendors can provide replacement equipment if needed. The replacement equipment can be shipped for overnight delivery as necessary.

3.1.4 Inspection and Acceptance Requirements for Supplies and Sample Containers

The field supplies for the investigation consist of detergent (Alconox) for equipment cleaning, distilled water for sample collection equipment rinsing, deionized water for final sample collection equipment rinsing and for collecting equipment rinsate blank samples, and sample containers to collect the samples.

Alconox, a standard laboratory-grade detergent, and distilled water will be purchased as needed from a variety of vendors.

Deionized water and sample containers will be provided by the laboratory. The laboratory will maintain documentation of the purity/cleanliness for these materials. The laboratory QA Officer is ultimately responsible for providing acceptable materials for the project. The acceptability of these materials for use will be evaluated by reviewing lot analysis certificates (deionized water and containers). Water and containers that do not meet the laboratory's acceptability requirements will not be shipped to the field.

3.2 Sample Handling and Custody Requirements

The procedures for sample handling, labeling, shipping, and chain of custody documentation are provided in the subsections that follow.

3.2.1 Sample Handling

The procedures used to collect the samples are provided in the Work Plan. Table C3.2 identifies the requirements for the number of containers, container volume, container type, preservation, holding time periods, and shipping for the analyses. The sample identification procedure is as follows:

Example:	MC-11149486-MMDDYY-XX-NNN

Where:

MC (Matrix Code)	Designates types of sample (S for soil)
11149486	Project reference number
MMDDYY	Designates date of collection presented as month, day, and year
XX	Sampler initials
NNN-E1-01	Sample number for event starting with transect number (T23.3- or JD1.3- or JN2.1-), location (S- for in-stream, E1 for offset to east, W1 for offset to west, etc.), and sequential sample number at that borehole (01 to 05 assuming up to 5 depth intervals)

Samples will be placed in shipping coolers containing bagged, cubed ice immediately following collection. The samples will be grouped in the shipping cooler by the order in which the samples are collected, and then shipped to the laboratory via laboratory courier, hand delivery, or by an overnight courier service, generally on the day they are collected. The only exceptions to this procedure will be for samples collected after the courier service has picked up the shipment for the day and when samples are collected on a Sunday or holiday. In these instances, the samples will be shipped on the next business day.

3.2.2 Sample Custody

Chain of custody is the sequence of possession of an item. An item (such as a sample or final evidence file) is considered to be in custody if the item is in actual possession of a person, the item is in the view of the person after being in his/her actual possession, or the item was in a person's physical possession but was placed in a secure area by that person. Field, laboratory, and final evidence files custody procedures are described in the subsections that follow.

3.2.2.1 Field Custody Procedures

Logbooks and/or project standard field forms will be used to record field data collection activities. Entries will be described in sufficient detail so that a particular situation could be reconstructed from these entries. Field logbooks are bound field survey books or notebooks with consecutively numbered pages. Logbooks will be assigned by project and will be stored at Consultant's office when not in use. Each logbook will be identified by a project-specific document number.

The title page of each logbook will contain the following information:

- Project name
- Project number

- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each day's logbook entry, the date, start time, weather, names of sampling team members present, and the signature of the person making the entry. The names of individuals visiting the Site or field sampling team and the purpose of their visit will also be recorded in the field logbook.

Sample collection information will be recorded in a logbook and/or on a project standard field form. Project standard field forms are specifically prepared for each project sampling location. These forms are used to record field information obtained and samples collected for each location. Entries will be made in ink, signed, and dated with no erasures. If an incorrect entry is made, the incorrect information will be crossed out with a single strike mark. The correct information will be entered adjacent to the original entry.

Whenever a sample is collected, an identification and a detailed description (if necessary) of the location will be recorded in the logbook and/or on a project standard field form. Photographs taken at a location, if any, will be noted in the logbook.

Samples will be collected according to the sampling procedures documented in the work plan. The equipment used to collect samples, time of sample collection, sample description, volume and number of containers, preservatives added (if applicable) will be recorded in the field logbook and/or on a project standard field form. A deviation from the work plan, QAPP, or other project-appropriate planning document sampling procedures will be documented in the field logbook and/or on a project standard field form. Each sample will be uniquely identified using the sample identification system provided in Section 3.2.1.

Figure C1 illustrates an example chain of custody form. The sample packaging and shipping procedures summarized below will provide for the samples to arrive at the laboratory with the chain of custody intact:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred to another person or the laboratory. As few people as possible will handle the samples.
2. Sample containers will be identified by using sample labels that include the sampler's initials, sample name, date and time of collection, and analyses to be performed. Sample labels will be completed for each sample using waterproof ink, and will be placed on the sample container.
3. Samples will be accompanied by a properly completed chain of custody form. The sample identification numbers and required analyses will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign and record the date and time on the form. The chain of custody form documents sample custody transfers from the sampler to another person, to the laboratory, or to/from a secure storage area.
4. Samples will be properly packaged for shipment using bubble wrap or foam sleeves and dispatched to the laboratory for analysis with a separate signed chain of custody form

enclosed in and secured to the inside top of each shipping cooler. Shipping coolers will be secured with custody seals for shipment to the laboratory. The custody seal is then covered with clear plastic tape to prevent accidental damage to the custody seal.

5. If samples are split with a government agency or other entity, it is the responsibility of that entity to prepare its own chain of custody form for the samples. Information regarding the identity of the entity and the sample(s) that are being split will be recorded in the field logbook.

6. Sample shipments will be accompanied by the chain of custody form identifying its contents. The chain of custody form is a four part carbonless-copy form. The form is completed by the sampling team which, after signing and relinquishing custody to the shipper, retains the bottom (goldenrod) copy. The shipper, if different than the sampling team members, retains the pink copy after relinquishing custody to the laboratory. The yellow copy is retained by the laboratory, and the fully executed white copy is returned as part of the data deliverables package.

7. If the samples are sent by common carrier, a bill of lading (i.e., FedEx air bill) will be used and copies will be retained as permanent documentation. Commercial carriers are not required to sign the chain of custody form provided the form is sealed inside the sample cooler with the custody tape intact.

3.2.2.2 Laboratory Custody Procedures

Laboratory sample custody begins when the samples are received at the laboratory. The laboratory sample custodian will assign a unique laboratory sample identification number to each incoming sample. The field sample identification numbers, laboratory sample identification numbers, date and time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log. The laboratory's sample log-in, custody, and document control procedures will be consistent with its standard operating procedure.

Following log-in, samples will be stored within an access-controlled location and will be maintained properly preserved (as defined in Table C3.2) until completion of laboratory analyses. Unused sample aliquots and sample extracts will be maintained properly preserved for a minimum of 30 days following receipt of the final report by Consultant. The laboratory will be responsible for the disposal of unused sample aliquots, sample containers, and sample extracts in accordance with applicable local, state, and federal regulations.

The laboratory will be responsible for maintaining analytical logbooks and laboratory data.

3.2.2.3 Final Evidence Files Custody Procedures

The final evidence file for the project will be maintained by Consultant and will consist of the following:

1. Project plans
2. Project logbooks
3. Field data records

4. Sample identification documents
5. Chain of custody records
6. Correspondence
7. References, literature
8. Final data packages
9. Miscellaneous - photos, maps, drawings, etc.
10. Reports

The final evidence file materials will be the responsibility of the evidentiary file custodian with respect to maintenance and document removal.

3.3 Analytical Method Requirements

The field and laboratory analytical methods that will be used during the investigation are detailed in the following subsections.

3.3.1 Field Analytical Methods

No field analyses are currently scheduled for this investigation.

3.3.2 Laboratory Analytical Methods

The analytical methods that will be used are presented in Table C3.3. The frequency and types of QC samples to be collected are included in Table C1.1.

The turnaround time required for the analyses required for each batch of samples will be noted on the chain of custody documents submitted with the samples and will be communicated to the laboratory prior to the sampling event, as necessary.

3.4 Quality Control Requirements

The field and laboratory QC requirements for the investigation are discussed in the following subsections. Specific QC checks and acceptance criteria are provided in the referenced analytical methods.

3.4.1 Field Sampling Quality Control

Field QC samples for this project include equipment blank samples to determine the existence and magnitude of sample contamination resulting from sample containers, ambient conditions, or sampling procedures and field duplicate samples to assess the overall precision of the sampling and analysis event. The frequency of collection of these field QC samples is summarized in Table C1.1 of this QAPP. The evaluation of field QC data is provided in Section 3.9.2 of this QAPP.

3.4.2 Analytical Quality Control

The laboratory QC requirements for the analyses include analyzing method blanks, instrument performance checks, initial calibration standards, calibration verification standards, internal standards, surrogate compound spikes, and LCS. The acceptance criteria for LCS will be generated by the laboratory and included in the laboratory reports. The analysis frequency and acceptance criteria for the remaining QC checks will be consistent with the referenced methods in Table C3.3.

3.5 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The procedures used to verify that instruments and equipment are functional and properly maintained are described in the following subsections.

3.5.1 Field Instrument Maintenance

No field analyses are currently scheduled for this investigation.

3.5.2 Laboratory Instrument Maintenance

As part of its QA/QC program, the laboratory conducts routine preventive maintenance to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees will regularly perform routine scheduled maintenance and repair of (or coordinate with the instrument manufacturer for the repair of) all instruments. Maintenance that is performed will be documented in the laboratory's maintenance logbooks. Laboratory instruments are maintained in accordance with manufacturer's specifications. Table C3.1 provides examples of the frequency at which components of key analytical instruments or equipment will be serviced.

3.6 Calibration Procedures and Frequency

The procedures for maintaining the accuracy for the instruments and measuring equipment that will be used for conducting field sampling and laboratory analyses are described in the following subsections. These instruments and equipment will be calibrated prior to each use or according to a periodic schedule.

3.6.1 Field Instruments/Equipment

No field analyses are currently scheduled for this investigation.

3.6.2 Laboratory Instruments

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing these quality control activities. These records generally will be filed at the location where the work is performed and will be subject to a QA audit. The laboratory will have trained staff and in-house spare parts available for instrument repair or will maintain service contracts with vendors. Specific calibration procedures and frequencies are detailed in the referenced method.

3.7 Inspection/Acceptance Criteria for Supplies and Consumables

The procedures that will be used to provide supplies and consumables used in the field and laboratory are detailed in the following subsections.

3.7.1 Field Supplies and Consumables

Supplies and consumables for field sampling will be obtained from various vendors and include sample containers, detergent and water for equipment decontamination, and field blank water. The vendors and inspection and acceptance criteria for these field supplies were presented in Section 3.1.4 of this QAPP. Additional field supplies and consumables may include pump tubing and personal protective equipment. Pump tubing will be constructed of pre-cleaned high density polyethylene (or equivalent acceptable tubing). These materials will not introduce constituents into the samples or interfere with the analyses. Field supplies will be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.7.2 Laboratory Supplies and Consumables

The laboratory's vendors for general lab ware and reagents include VWR Scientific Products and Fisher Scientific, but may include others. Certificates of analysis will be maintained on file to document reagent/standard purity.

The referenced method provides details on identifying constituents in reagents and standards, determining deterioration of reagents and standards, and the corrective actions required if constituents or deterioration are identified. The laboratory QA Officer is ultimately responsible for the acceptability of supplies and consumables.

3.8 Data Acquisition Requirements (Non-Direct Measurements)

Data generated during the investigation are verified and validated. These data then will be submitted in the required reports to the NYSDEC. Data from other sources are not required for this investigation.

3.9 Data Management

The procedures for managing data from generation to final use and storage are detailed in subsections that follow.

3.9.1 Data Recording

Field information will be recorded in field logbooks and/or on project standard field forms. Field staff is responsible for recording field data and the Field QA Officer is responsible for identifying and correcting recording errors.

Laboratory data are recorded in a variety of formats. Data from instruments are recorded on magnetic media, strip charts, or bench sheets. The referenced methods provide the data recording requirement for each preparation and analysis method.

3.9.2 Data Validation

Validation of field data for this project will primarily consist of checking for transcription errors and reviewing information recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will be verified for correctness by the Field QA Officer or her designee. Limitations on the use of field data will be identified in the required reports to the NYSDEC.

Validation of the analytical data will be performed by Consultant's QA Officer or his designee based on the relevant and applicable evaluation criteria outlined in "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", EPA-540-R-2016-001, September 2016. The evaluation and action criteria specified in this document (referred to hereafter as the National Functional Guidelines) will be used for validating the data. Qualifiers assigned to the data will be consistent with the data qualifiers specified in the National Functional Guidelines.

The following QC data deliverables will be evaluated on 100 percent of the data:

1. Technical Holding Times
2. Calibrations
3. Method Blanks
4. Interelement Correction Factors
5. LCS Samples
6. Surrogate Spikes
7. Matrix Spikes
8. Serial Dilutions
9. Field Duplicates
10. Equipment Blank Samples

3.9.3 Data Transformation/Data Reduction

No field analyses are currently scheduled for this investigation.

3.9.4 Data Transmittal/Transfer

The laboratories will provide data in electronic format as electronic data deliverables (EDDs) that are compatible with EarthSoft's EQuIS database product, which is Consultant's database for chemistry and geographical data. EDDs are generated directly from the laboratory information management system (LIMS), thereby eliminating the possibility of manual transcription errors. Laboratory EDDs are imported into the EQuIS database, and the data are maintained in the database for manipulation and presentation.

Consultant's QA Officer is responsible for verifying the correctness of the analytical database after the laboratory data for each event have been imported. This is accomplished by comparing the data from the database to the hard copy analytical reports for a minimum of 10 percent of the sample

results. If discrepancies between the database and analytical reports are detected, a complete verification of the database will be performed or a new EDD will be submitted, imported, and verified as described previously.

3.9.5 Data Assessment

Assessment of laboratory data will be performed using the procedures detailed in the analytical method. These assessments included determining the mean, standard deviation, relative standard deviation, percent difference, RPD, and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes will include determining the percent recovery, RPD, and percent completeness. The statistical equations to determine these parameters are provided in Section 5.3 of this QAPP.

3.9.6 Data Tracking

The laboratory's LIMS will provide the means for tracking data in the laboratory. The Laboratory Director is ultimately responsible for data tracking in the laboratory.

Tracking of analytical data in Consultant's database includes recording the laboratory generating the data, the date when the EDD was received and imported, the date when qualifiers were applied to the results, the level of data review performed, and the data review guidance used to evaluate the data. Consultant's Project Manager is ultimately responsible for tracking data from entry to reporting.

3.9.7 Data Storage and Retrieval

Laboratory data will be stored in hard copy and/or electronic format for a minimum period of five years. Electronic instrument data will be maintained for this same time period. Laboratory records for this project will be maintained consistent with the storage requirements stated in Section 2.10.3 of this QAPP.

Consultant's Project Manager is responsible for project data storage and retrieval. Final evidence files, which will include a copy of the laboratory data, will be maintained in secure on-Site or off-Site storage.

3.9.8 Data Security

Laboratory data security is the responsibility of the Laboratory Director. Archived data cannot be accessed without authorization, and the name and purpose of personnel accessing archived data are recorded. The laboratory's LIMS is password protected and access rights are restricted by job function. Consultant's data security procedures include limiting project database access to database managers and analysts, in addition to general building security procedures.

4. Assessment/Oversight

The following subsections describe the procedures used for proper implementation of this QAPP and the activities for assessing the effectiveness of the implementation of the project and associated QA/QC activities.

4.1 Assessments and Response Actions

Assessments consisting of internal and external audits may be performed during the project. Internal technical system audits of both field and laboratory procedures will be conducted to verify that sampling and analysis are being performed in accordance with the procedures established in the work plan and QAPP.

An internal field technical system audit of field activities will be conducted by the Consultant Field QA Officer or their designee at the beginning of the field sampling activities to identify deficiencies in the field sampling and documentation procedures. The field technical system audit will include examining field sampling records and chain of custody documentation. In addition, sample collection, handling, and packaging in compliance with the established procedures will be reviewed during the field audit. Deficiencies identified will be documented and corrective actions will be taken to rectify the deficiencies.

Corrective action resulting from internal field technical system audits will be implemented immediately if data may be adversely affected from the use of unapproved methods or the improper use of approved methods. Consultant's Field QA Officer will identify deficiencies, if any, and recommend corrective action to Consultant's Project Manager. Implementation of corrective actions will be performed by the Consultant Field QA Officer and field team. Corrective action will be documented in the field logbook and/or the project file. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected and that the QA/QC procedures described in this QAPP and the work plan are maintained throughout the project.

An internal laboratory technical system audit will be conducted by the laboratory's QA Officer or designee. The laboratory technical system audit typically is conducted on a biannual basis and includes examining laboratory documentation regarding sample receiving, sample log-in, storage and tracking, chain of custody procedures, sample preparation and analysis, instrument operating records, data handling and management, data tracking and control, and data reduction and verification. The laboratory's QA Officer will evaluate the results of the audit and provide a report to section managers and the Laboratory Director that includes deficiencies and/or noteworthy observations.

Corrective action resulting from deficiencies identified during the internal laboratory technical system audit will be implemented immediately. The Laboratory Director or section leaders, in consultation with the laboratory supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The laboratory QA/QC Officer will implement and document the corrective action. Problems requiring corrective action and the corrective action taken will be reported to the laboratory Project Manager. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected.

External laboratory audits, if conducted, may include, but not be limited to, reviewing laboratory analytical procedures, laboratory on-Site audits, and/or submitting performance evaluation (PE) samples to the laboratory for analysis.

4.2 Reports to Management

Quality assurance information will be summarized following completion of the investigation activities. This information will consist of the results of external performance evaluations, results of periodic data quality validation and assessment, data use limitations, and significant QA problems identified and corrective actions taken.

Consultant's QA Officer will be responsible within the organizational structure for compiling this information.

5. Data Verification/Validation and Usability

The QA activities that will be performed so the data are scientifically defensible, properly documented, of known quality, and meet the project objectives are described in the following sections.

5.1 Data Review, Verification, and Validation Requirements

Field and laboratory data will be reviewed, verified, and validated. These terms are defined as follows:

- Data review is the in-house examination to determine that the data have been recorded, transmitted, and processed correctly.
- Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.
- Data validation is an analyte and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use.

The procedures and criteria used to verify and validate field and laboratory data are presented in Section 5.2. Field data and logbooks will be reviewed for adherence to the requirements of the sampling program, including the number of samples and locations, sampling, and sample handling procedures, were fulfilled.

Laboratory data review consists of raw data being reduced to results and checked by the responsible analyst. A second review of the data reduction procedure is conducted by another analyst or senior chemist. After the data are verified (see Section 5.2), a draft report is reviewed by the laboratory Project Manager. Final reports are generated, signed, and transmitted after approval of the draft by the Project Manager.

5.2 Verification and Validation Methods

Field data will be verified by reviewing field documentation and chain of custody records.

Verification of sample collection procedures consists of reviewing sample collection documentation for compliance with the requirements of the work plan and QAPP. If alternate sampling procedures were used, the acceptability of the procedure will be evaluated to determine the effect on the usability of the data. Data usability will not be affected if the procedure used is determined to be an acceptable alternative that fulfills the measurement performance criteria in Section 2.8.2 of this QAPP.

The laboratory will internally verify its data by reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), and data reduction and reporting. Deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the laboratory reports.

Verification of laboratory data conducted by Consultant will consist of reviewing the final reports to confirm that the method used to analyze the samples was consistent with the requirements of this QAPP. Sample handling records will also be reviewed to confirm that sample integrity remained intact from collection to laboratory receipt and that samples were properly preserved. Chain of custody documentation and sample condition upon laboratory receipt will be reviewed. Laboratory results, holding time periods, and QC data will be reviewed to determine compliance with the measurement performance criteria in Section 2.8.2 of this QAPP and the analytical methods.

Data validation will be conducted by Consultant consistent with the procedure identified in Section 3.9.2 of this QAPP. The results of the data validation procedure will identify data that do not meet the measurement performance criteria in Section 2.8.2 of this QAPP. Data validation will determine whether the data are acceptable, of limited usability (qualified as estimated), or rejected. Data qualified as estimated will be reviewed and a discussion of the usability of estimated data will be included in the data validation report. The results of data verification/validation will be summarized in data validation report provided to Consultant's Project Manager for use in interpreting the results and for use in project reports.

Data determined to be unusable may require corrective action to be taken. Potential types of corrective action may include resampling by the field team or reanalysis of samples by the laboratory. The corrective actions taken are dependent upon the ability to mobilize the field team and whether or not the data are critical for project DQOs to be achieved. Consultant's Project Manager will be responsible for approving the implementation of the corrective action deemed necessary during data verification/validation.

5.3 Usability/Reconciliation with Data Quality Objectives

The overall usability of the data for the investigation will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section 2.8.2 of this QAPP using basic statistical quantities, as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following subsections.

5.3.1 Precision

Precision of field sampling procedures will be evaluated by assessing the RPD data from field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate LCS analyses. The RPD between two measurements is calculated using the following simplified formula:

$$RPD = \frac{|R_1 - R_2|}{R_1 + R_2} \times 200$$

Where:

R_1 = value of first result

R_2 = value of second result

RPD data will provide the means to evaluate the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures. It should be noted that the RPD of two measurements can be very high when the concentrations approach the quantitation limit of an analysis.

5.3.2 Accuracy/Bias

The data from method blank samples, LCS, and matrix spikes will be used to determine accuracy and potential bias of the sample data.

The data from method blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method blank contamination will have been identified during the data validation process. Sample data associated with method blank contamination are evaluated during the data validation procedure to determine if analytes detected in samples associated with contaminated method blanks are "real", or are impacted by laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration in the method blank sample taking into account adjustments for sample preparation and dilution factors. In general, the sample data are qualified as non-detect "U" if both the sample and blank concentrations are less than the reporting limit. The "U" qualifier indicates that the result is a laboratory artifact based on the method blank contamination.

The data from equipment blank samples provide an indication of field conditions that may result in bias of sample data. Sample data associated with contaminated equipment blank samples will have been identified during the data validation process. The evaluation procedure and qualification of sample data associated with equipment contamination are performed in a similar manner as the evaluation procedure for method blank sample contamination.

MS sample data provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. MS samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCS. LCS are artificial samples prepared in the laboratory using a blank matrix fortified with analytes from a standard reference material that is independent of the calibration standards. LCS are prepared and analyzed in the same manner as the field samples. The percent recovery data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each analyte or analyte group.

Percent recovery is calculated using the following formula:

$$\%R = \frac{SSR - SR}{SA} X\ 100$$

Where:

SSR = Spiked Sample Result

SR = Sample Result or Background

SA = Spike Added

The percent recovery for LCS is determined by dividing the measured value by the true value and multiplying by 100.

Accuracy/bias will be determined by comparing the percent recovery data to the measurement performance criteria in Section 2.8.2 of this QAPP.

5.3.3 Sample Representativeness

Representativeness of the samples will be assessed by reviewing sample holding times, the results of field audits, if conducted, and the data from field duplicate samples. Sample representativeness will be considered acceptable if holding time periods are met, the results of field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples, and the field duplicate RPD data are acceptable.

5.3.4 Completeness

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/or analysis. Percent completeness will be calculated using the following formula:

$$\%\ Completeness = \frac{Number\ of\ Valid\ (usable)\ measurements}{Number\ of\ Measurements\ Planned} X\ 100$$

Completeness will be considered acceptable if 90 percent of the data are determined to be valid. However, valid sample data will not be rendered unusable if this completeness goal is not met. Formal corrective actions and additional sampling/analysis may be required when data quality results in a percentage less than the completeness goal. This will be addressed on a per event basis, in conjunction with FMC and Consultant.

5.3.5 Comparability

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Comparability will be determined to be acceptable if the sampling and analysis methods specified in this QAPP, and approved QAPP revisions or amendments, are used for generating the data.

Comparability of data from split samples (samples that are collected at the same time from the same location and split equally between two parties using sample containers from the same source or vendor), if collected, will be evaluated by determining the RPD of detected analytes in both samples following data validation. Analytes that are detected in only one of the two samples will be assessed by reviewing the data validation reports for both data sets and determining the cause of the discrepancy, if possible. Comparability of split sample data will be considered acceptable if the RPD for detected analytes with concentrations greater than or equal to five times their respective quantitation limits does not exceed RPD acceptance criteria for field duplicate samples.

5.3.6 Sensitivity and Quantitation Limits

Laboratory reports will include method reporting limits. These limits will be reviewed for the samples to ensure that the sensitivity of the analyses was sufficient to achieve the program requirements, per the NYSDEC criteria. Relevant QC data will be reviewed to assess compliance with the measurement performance criteria specified in Section 2.8.2 of this QAPP.

It should be noted that quantitation limits may be elevated as a result of high concentrations of target compounds, non-target compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria.

5.3.7 Data Limitations and Actions

Data use limitations will be identified in data validation reports. Data that do not meet the measurement performance criteria specified in this QAPP will be identified and the impact on the project quality objectives will be assessed and discussed in these reports and project reports. Field information will be reviewed to confirm that sampling procedures were conducted in accordance with the requirements of this QAPP. Data from samples collected using procedures inconsistent with the requirements of this QAPP will be evaluated using the procedures in Section 5.1 of this QAPP. Specific actions for laboratory data that do not meet the measurement performance criteria depend on the use of the data, and may require that additional samples are collected or the use of the data be restricted.

CHAIN OF CUSTODY RECORD

Address: _____

Phone: _____ Fax: _____

COC NO.: _____

PAGE ___ OF ___

(See Reverse Side for Instructions)

Project No/ Phase/Task Code:	Laboratory Name:	Lab Location:	SSOW ID:
Project Name:	Lab Contact:		Cooler No:
Project Location:	SAMPLE TYPE / ANALYSIS REQUESTED (See Back of COC for Definitions)		Carrier:
GHD Chemistry Contact:			Airbill No:
Sampler(s):			Total # of Containers:

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd/yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)												Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)																			
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.				1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

GHD Form: COC-10B (20110804)

figure C1

CHAIN OF CUSTODY FORM
QUALITY ASSURANCE PROJECT PLAN
FMC CORPORATION, MIDDLEPORT, NEW YORK

Table C1.1

Summary of Sampling and Analysis Program
FMC Corporation
Middleport, New York

Description	Sample Matrix	Laboratory Parameters [1]	Number of Samples	Quality Control Samples		
				Equipment Blanks [2]	Field Duplicates	MS/MSD
Soil Investigation	Surface/Subsurface Soil and Sediment	Arsenic	Varies	1/Day	1 per 20	1 per 20
Soil Investigation	Surface/Subsurface Soil and Sediment	Lead	Varies	1/Day	1 per 20	1 per 20
Soil Investigation	Surface/Subsurface Soil and Sediment	Chlorinated Pesticides	Varies	1/Day	1 per 20	1 per 20

Notes:

[1] - Refer to Table C2.1 for specific analytes and quantitation limits

[2] - No equipment blank collection is necessary if dedicated sampling equipment is used

MS/MSD - Matrix Spike/Matrix Spike Duplicates

Table C2.1

Analyte List and Quantitation Limits
FMC Corporation
Middleport, New York

	Analyte	Soil/Sediment (mg/kg)
Metals	Arsenic	1.0
	Lead	1.0
Chlorinated Pesticides	4,4'-DDD	1.67
	4,4'-DDE	1.67
	4,4'-DDT	1.67
	Aldrin	1.67
	alpha-BHC	1.67
	cis-Chlordane	1.67
	beta-BHC	1.67
	delta-BHC	1.67
	Dieldrin	1.67
	Endosulfan I	1.67
	Endosulfan II	1.67
	Endosulfan sulfate	1.67
	Endrin	1.67
	Endrin aldehyde	1.67
	Endrin ketone	1.67
	gamma-BHC (Lindane)	1.67
	trans-Chlordane	1.67
	Heptachlor	1.67
	Heptachlor epoxide	1.67
	Methoxychlor	1.67
	Toxaphene	16.7

Table C3.1

Routine Preventive Maintenance Procedures and Schedules
FMC Corporation
Middleport, New York

Inductively Coupled Plasma Spectrometer (ICP)	1. Clean torch assembly and mixing chamber when discolored or after 8 hours of running high dissolved solid samples. 2. Clean nebulizer as needed. 3. Check daily to ensure the gas supply is sufficient for the day's activity pressures are set as described in the Standard Operating Procedures (SOP).	1. Spare torch and mixing chambers 2. Spare nebulizer 3. Spare capillary tubing
Gas Chromatograph	1. Change septa weekly or as often as needed. 2. Change gas line dryers as needed. 3. Replace GC injector glass liner weekly or as often as needed. 4. Replace GC column as needed. 5. Clean/replace GC detector as needed. 6. Check daily to ensure that gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 7. Check daily to ensure the pressure on the primary regulator never runs below 100 pounds per square inch (psi).	1. Syringes 2. Septa 3. Detectors 4. Glass liner 5. GC column
Refrigerators	1. Monitor temperature twice daily.	
Ovens	1. Monitor temperature twice daily.	

Table C3.2

Container, Preservation, and Shipping Requirements
FMC Corporation
Middleport, New York

	Analysis	Sample Containers	Preservation	Maximum Holding Times	Shipping Means	Comments
Soil/Sediment	Metals	One 4-ounce glass jar with Teflon-lined lid	Cool to 0° to 6°C	6 months from collection to analysis	Courier or Federal Express (Priority 1)	Fill completely
	Chlorinated Pesticides	One 4-ounce glass jar with Teflon-lined lid	Cool to 0° to 6°C	14 days to extraction and 40 days to analysis	Courier or Federal Express (Priority 1)	Fill completely

Table C3.3

Summary of Analytical Methods
FMC Corporation
Middleport, New York

Parameter	Analysis Method	Laboratory
Metals	SW-846 6010C [1]	NYSDOH ELAP Accredited
Chlorinated Pesticides	SW-846 8081 [1]	NYSDOH ELAP Accredited

Notes:

[1] - SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IVB
NYSDOH - New York State Department of Health
ELAP - Environmental Laboratory Accreditation Program

www.ghd.com