

**REVISED FINAL
CONSTRUCTION COMPLETION REPORT
FOR
SOILS REMEDIAL ACTION
AREA OF CONCERN 1 AT OCCIDENTAL CHEMICAL CORPORATION
PROPERTY
FORMER LAKE ONTARIO ORDNANCE WORKS
NIAGARA COUNTY, NEW YORK
DEFENSE ENVIRONMENTAL RESTORATION PROGRAM FOR
FORMERLY USED DEFENSE SITES**

**Contract No.: W912QR-12-D-0011
Delivery Order: W912P417F0022**

Prepared for:



**US Army Corps
of Engineers®
*BUILDING STRONG®***

**U.S. Army Corps of Engineers
Buffalo District**

August 2020

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Revised Final
Construction Completion Report
For
Soils Remedial Action
Area of Concern 1 at Occidental Chemical Corporation Property
Former Lake Ontario Ordnance Works
Niagara County, New York
Defense Environmental Restoration Program for
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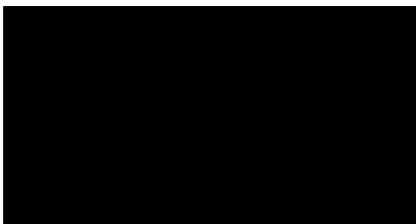
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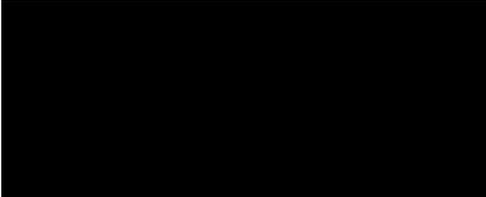
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COMPLETION OF SENIOR TECHNICAL REVIEW

This document has been produced within the framework of the ERT, Inc. quality management system. As such, a senior technical review has been conducted. This included review of all elements addressed within the document, proposed or utilized technologies and alternatives and their applications with respect to project objectives and framework of U.S. Army Corps of Engineers regulatory constraints under the current project, within which this work has been completed.



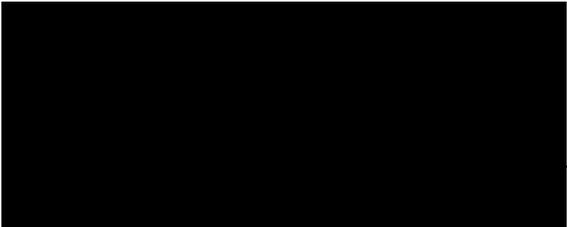
08/03/2020

Date

Senior Technical Reviewer

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

This document has been produced within the framework of ERT, Inc. total quality management system. As such, an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted. This included review of assumptions (methods, procedures, and material used in analyses), alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the project objectives. Comments and concerns resulting from review of the document have been addressed and corrected as necessary.



08/04/2020

Date

Independent Technical Reviewer

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Site Location.....	1
1.2	Site History.....	1
1.3	Environmental Setting.....	1
1.4	Nature and Extent of Contamination.....	2
2.0	PROJECT OBJECTIVES	3
3.0	CONSTRUCTION ACTIVITIES.....	5
3.1	Mobilization and Site Preparation.....	5
3.1.1	Pre-Mobilization Surveys	5
3.1.2	Vegetation Clearance and Grubbing.....	6
3.1.3	Temporary Facilities	6
3.2	Removal Activities.....	6
3.2.1	Excavation of Soil and Debris	6
3.2.2	Transport and Disposal of Material	7
3.2.3	Dewatering.....	8
3.2.4	Confirmation Sampling.....	9
3.3	Restoration Activities	13
3.3.1	Backfill.....	13
3.3.2	Hydroseeding	13
3.3.3	Access Road Restoration	13
3.4	Demobilization	13
4.0	CONCLUSION.....	15
5.0	REFERENCES	17

LIST OF TABLES

Table 1. Remediation Goals for Soil at AOC 1 at OCCP	3
Table 2. Summary of Confirmation Soil Sampling Results	11

LIST OF ATTACHMENTS

Attachment A	Figures
Attachment B	Photographic Log
Attachment C	Pre-mobilization and Post-demobilization Site Condition Survey Reports
Attachment D	Waste Characterization Analytical Reports
Attachment E	Waste Transportation and Disposal Documentation
Attachment F	Dewatering Analytical Reports
Attachment G	Confirmation Sampling Analytical Reports
Attachment H	Restoration Material Documentation
Attachment I	Field notes, Daily Reports, QC
Attachment J	Safety & Health Phase-Out Report

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
A-Zone	A-Zone Environmental Services
BOL	Bill of Lading
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
DERP	Defense Environmental Restoration Program
DU	decision unit
ERT	ERT, Inc.
Ft	foot or feet
Frank's	Frank's Vacuum Truck Service, Inc.
FUDS	Formerly Used Defense Site
ISM	Incremental Sampling Methodology
LOD	limit of detection
LOOW	Lake Ontario Ordnance Works
mg/kg	milligrams per kilogram
Modern	Modern Landfill
NAD	North American Datum
NAVD	North American Vertical Datum
NRAA	Niagara River Anglers Association
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NY	New York
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OCCP	Occidental Chemical Corporation property
Pariso	Pariso Logistics, Inc.
RA	removal action
RAO	remedial action objective
SAP	Sampling and Analysis Plan
TNT	trinitrotoluene
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
USACE	United States Army Corps of Engineers

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1.0 INTRODUCTION

A removal action (RA) was performed under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS) to address contaminated soils associated with Area of Concern (AOC) 1 at Occidental Chemical Corporation Property (OCCP) on the Former Lake Ontario Ordnance Works (LOOW). AOC 1 is situated on property currently owned by the Occidental Chemical Corporation. The RA was performed in consideration of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Sections 300.120(d) and 300.400(e). This Construction Completion Report (CCR) has been prepared to document overall work conducted during this project, ensuring successful execution and completion of the awarded Delivery Order.

1.1 Site Location

The OCCP is located off Balmer Road in the Town of Porter, Niagara County, New York (NY). The physical address of the site is 1014 – 1350 Balmer Road, Youngstown, NY 14174. It is a 304-acre parcel in the undeveloped portion of LOOW that is owned by Occidental Chemical Corporation (Attachment A, Figure 1). AOC 1 is approximately 425 feet (ft) by 325 ft. Figure 2 (Attachment A) shows the OCCP and AOC 1. Currently, the property is vacant and undeveloped; no structures are present. The area is zoned low-density residential. Property south of the OCCP is used by the Niagara River Anglers Association (NRAA) as a wilderness preserve. A north-south gravel dirt road through the OCCP is used for access to the preserve by club members. An easement for the electrical power transmission lines is located to the east of the OCCP on property owned by Waste Management, LLC and the Town of Lewiston. Undeveloped property owned by the Lewiston-Porter Central School District is located to the west of OCCP, and Balmer Road is immediately north of the OCCP (USACE, 2017).

1.2 Site History

The area was originally mixed agricultural land consisting of forest, orchard, and farms with some ponds. The former LOOW was constructed in 1942 as a trinitrotoluene (TNT) production facility by the War Department on a 7,500-acre parcel of land in northwest Niagara County, NY. Of the total parcel, 2,500 acres were used for production operations, production support, and storage. The remaining 5,000 acres were left undeveloped to serve as a buffer zone and to allow for possible expansion.

In 1945, the U.S. Congress transferred the 5,000-acre buffer zone to the General Services Administration for conveyance to private landowners (USACE, 2013). A 304-acre parcel (the OCCP) was purchased by Hooker Chemical and Plastics Corporations in 1975 from a private owner. It was later sold to the Occidental Chemical Corporation (USACE, 2013), a wholly owned subsidiary of Occidental Petroleum Corporation, which currently owns the property. Use and ownership of the OCCP for the period between 1945 and 1975 is unknown. There is no known use or storage of radioactive materials on the OCCP by the Manhattan Engineer District or the Atomic Energy Commission.

1.3 Environmental Setting

The site is relatively flat and heavily wooded. During the operation of the former LOOW, a system of drainage ditches, temporary in nature, were constructed to drain surface water runoff. They included pre-existing agricultural ditches that had been used to irrigate farmland and drainage

ditches constructed during development of the former LOOW. The drainage ditches have not been maintained and overland flow is now impeded. The Southwest Drainage Ditch is a receiving surface water body west of the OCCP. It discharges to Four Mile Creek north of Balmer Road. Four Mile Creek is a New York State (NYS) Class B water body from Lake Ontario to approximately 0.9 miles upstream, where it becomes a Class C water body. Two perennial surface water bodies (ponds) are located on OCCP but are not within AOC 1. A NYS freshwater forested/shrub wetland (LE-18) is also present.

The area is underlain by approximately 30 to 60 ft of unconsolidated glacial deposits that overlay shale bedrock of the Queenston Formation. The glacial deposits consist of fine sand, silty sand with clay, and clay-sand mixtures with occasional traces of gravel. A glaciolacustrine clay layer is present between 12 and 20 ft below ground surface. Groundwater occurs within a discontinuous upper water-bearing zone and a confined lower water-bearing zone, separated by the glaciolacustrine clay layer (USACE, 2002).

1.4 Nature and Extent of Contamination

The OCCP was first investigated during a LOOW site-wide Phase II Remedial Investigation (USACE, 2002). Subsequent investigations that encompassed portions of the OCCP occurred in 2004 and 2008 (USACE, 2004, 2008a). A risk assessment of ten potential Department of Defense -impacted areas across the former LOOW was performed; it provided an initial risk evaluation for AOC 1 (USACE, 2008b and 2008c).

In 2013, a more comprehensive investigation of the entire OCCP was completed and 39 areas of interest were prioritized and assessed. Of the 39 areas of interest, six AOCs, labeled AOC 1 through AOC 6, were selected for further investigation. Results of the investigation and an updated risk assessment for AOC 1 are documented in the *Final Remedial Investigation Report for the Occidental Chemical Corporation Property at Formerly Used Defense Site Former Lake Ordnance Works, Niagara County, New York* (USACE, 2013). The remedial investigation concluded that there was potential risk to current and potential future receptors at the site caused by elevated concentrations of lead and 2,4,6-TNT in soil. The maximum detected concentrations were 2,760 milligrams per kilogram (mg/kg) for lead and 19,000 mg/kg for 2,4,6-TNT. The contaminated area was approximately 55 ft by 100 ft and extended approximately 3 ft deep (Figure 2, Attachment A).

Remedial alternatives for soil were evaluated in the *Final Feasibility Study Exposure Unit 8 – Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works Site, Niagara County, New York* (USACE, 2015). It estimated 611 bank cubic yards as the total volume of soil/fill containing contaminants above remediation goals. The feasibility study also determined that the concentrations of contaminants in subsurface soil would not impact groundwater.

2.0 PROJECT OBJECTIVES

The RA objective, cleanup goals, and selected remedy are identified in the decision document, *Final Decision Document for the Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works Formerly Used Defense Site (FUDS) CO2NY0025, Niagara County, NY* (USACE, 2017), and are summarized below.

An RA objective for AOC 1 (Figure 2, Attachment A) was established to prevent direct contact (ingestion and/or dermal contact) with constituents of concern (COCs) in total soil that caused an unacceptable risk to an exposed potential future resident. COCs and remedial goals are identified in Table 1.

Table 1. Remediation Goals for Soil at AOC 1 at OCCP

Constituent of Concern	Remediation Goal (milligrams per kilogram)	Basis
2,4,6-TNT	18	Risk-based
Lead	400	Risk-based

The remedial alternative selected in the decision document was Alternative 4 – Excavation and Off-site Disposal. Alternative 4 included excavation and off-site disposal of all soil/fill and commingled debris from AOC 1.

Goals of the remedial action included:

1. Removal and disposal of soil/fill with concentrations of 2,4,6-TNT and lead greater than the remediation goals.
2. Removal and disposal of commingled debris.
3. Site restoration.

In accordance with the decision document, excavated soil/fill and commingled solid debris were to be placed in containers and disposed of at a permitted treatment, storage, and disposal facility. Any non-contaminated debris was to be disposed of at a Subtitle D landfill. The excavated area was to be inspected and soil/fill samples were to be collected from decision units (DUs) using incremental sampling methodology (ISM). ISM samples were to be submitted for laboratory analysis to confirm remaining soils achieved the remediation goals. Following successful remediation of the site, AOC 1 was to be restored to match the surrounding NYS freshwater forested/shrub wetland.

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3.0 CONSTRUCTION ACTIVITIES

Construction activities were completed between 06 August 2018 and 15 October 2019. Confirmation sample results indicated that initial removal activities completed in the fall of 2018 did not meet the remediation goals. Subsequently, additional removal activities were conducted in 2019; these were successful in meeting all project objectives. All RA activities were completed in accordance with the approved *Revised Final Contractor Quality Control Plan* (USACE, 2018a), *Final Site Operations Plan* (USACE, 2018b), *Revised Final Uniform Federal Policy - Quality Assurance Project Plan/Sampling and Analysis Plan* (UFP-QAPP/SAP) (USACE, 2018c), *Addendum 1 to the UFP-QAPP/SAP* (USACE, 2019), and *Accident Prevention Plan* (USACE, 2018d). The following sections describe the activities conducted to fully achieve the project objectives of this soils RA. A photographic log of construction activities is included in Attachment B of this report.

3.1 Mobilization and Site Preparation

Personnel mobilized to the site on 06 August 2018. Site preparation activities were completed prior to intrusive work. All field personnel were required to read the applicable project planning documents and become knowledgeable about their specific responsibilities in executing this RA. All required Rights-of-Entry were acquired by USACE and use of the access road was coordinated with the NRAA prior to the commencement of field activities. Site preparation activities included a pre-mobilization site condition survey, vegetation clearance and grubbing, setup/construction of temporary facilities, and installation of stormwater best management practices.

3.1.1 *Pre-Mobilization Surveys*

A pre-mobilization site condition survey was conducted on 15 August 2018. The condition survey included documentation of site conditions, land surveying, soil characterization, and utility location/clearance. The pre-mobilization site condition survey along with associated data is included in Attachment C.

Site Condition Survey

Site conditions were recorded via written and photographic documentation. The focus of this survey was the condition of areas within and immediately surrounding AOC 1 as well as the access road and surrounding vegetation. The initial site condition survey was submitted to USACE prior to mobilizing construction crews for the remedial action.

Land Survey

The pre-mobilization land survey was completed by McIntosh & McIntosh, P.C., a NYS licensed surveyor, to document pre-construction elevations of the access road and AOC 1. Horizontal datum was referenced to North American Datum (NAD) 83 NYS Plane Coordinate, West Zone and vertical datum to North American Vertical Datum (NAVD) 88. The resulting topographic maps can be found in the Pre-Mobilization Survey in Attachment C.

Soil Waste Characterization

Soils within AOC 1 were characterized for the purposes of waste disposal prior to any RA activities in 2018 (Figure 3, Attachment A) as well as before additional excavation activities in 2019 (Figure 4, Attachment A). Waste characterization samples were submitted to TestAmerica, St. Louis, Missouri for laboratory analysis in accordance with the Modern Landfill Generator Waste

Characterization Report for approval. Laboratory analysis included Resource Conservation and Recovery Act hazardous waste characteristics (ignitability, corrosivity, and reactivity) and toxicity via the toxicity characteristic leaching procedure analysis for metals, herbicides/pesticides, volatile organic compounds, semi-volatile organic compounds, and total PCBs. Analytical reports for waste characterization can be found in Attachment D.

Utility Clearance

Prior to any intrusive activities a request for utility locating and marking was placed to Dig Safely NY (1-800-962-7962). Additionally, Waste Management was consulted regarding the type, location, and depth of any underground utilities and/or pipelines to or from the adjacent facility. No utilities were identified within or adjacent to the AOC 1 area.

3.1.2 Vegetation Clearance and Grubbing

AOC 1 was a heavily wooded forested/shrub wetland and extent of the fill area was not easily identifiable. Vegetation clearance was required to delineate the horizontal extent of the fill. Once understory vegetation was cleared, and the area of excavation was delineated, tree falling and grubbing of the site was completed.

Understory vegetation clearance, tree falling, and grubbing started at the construction entrance and temporary facilities area. Additional cleared and grubbed areas included the area of contaminated soil and the debris field within the site. Care was taken to minimize the amount of vegetation requiring removal. Cleared vegetation was chipped, consolidated, and transported, via 10 tri-axle dump truck loads, to the Heinrich Services vegetative debris disposal facility. Following completion of grubbing activities, nine loads of tree stumps were transported to Lurdon Enterprises for disposal. Haul tickets from vegetation clearance activities are included in Attachment E. All vegetation clearing activities were complete on 15 August 2018.

3.1.3 Temporary Facilities

Temporary facilities were set-up/constructed following vegetation clearance as outlined in the Site Operations Plan (USACE, 2018b). Temporary facilities were regularly inspected and maintained as needed. Temporary facilities remained in-place until all remedial activities were complete.

3.2 Removal Activities

Site personnel conducted work with, and under the direction and supervision of the Construction Manager, to complete the construction activities. Individual tasks conducted as part of the overall field work are described below.

3.2.1 Excavation of Soil and Debris

Excavation of site soil and commingled debris commenced on 11 September 2018. In total, the site included approximately 1.27-acres. Excavation of soil and debris began on the western portion of the site and continued easterly towards the access road. Initial excavation efforts focused on the removal of the debris piles which were mounded up to 3 ft above the surrounding grade. The excavation continued until a gray clay layer was encountered and no debris was observed. This clay layer was used as a visual reference mark for excavation depth across the site. The excavation depth and clay layer surface varied from approximately 6 to 12 inches below grade (east to west) across the site. Soil and commingled debris were stockpiled on the eastern portion of the site. As encountered, tires were segregated and stockpiled for separate disposal. A small piece of transite pipe was discovered during excavation. A sample was collected by AMD Environmental and

submitted for analysis of asbestos. Laboratory results determined it to be non-friable (Attachment D) and the transite pipe was disposed of along with the soil as containing less than 1 percent asbestos containing material. No other debris was encountered that required segregation for disposal purposes.

Initial excavation of soil and debris was complete on 25 September 2018. In total, 3,257.70 tons of material had been removed. Confirmation samples were then collected, and results indicated COCs above the remedial goal. Additional excavation efforts were postponed until July 2019, following dewatering activities as described below in Section 3.2.3. Additional excavation efforts were completed between 29 July 2019 and 10 August 2019. Excavation began on the western edge of the site and continued toward the eastern edge of the site in order to avoid cross contamination through tracking of the equipment. All material was stockpiled on the eastern portion of the site and prepared for transport and disposal. As the excavation progressed, the remaining soil on the floor of the excavation was tested with an Expray explosives field tester to confirm no remaining explosives were present within the soil. As the loadout of material neared completion, the excavation efforts narrowed and progressed toward the construction entrance. The construction entrance and underlying soils were excavated last as the excavation, and excavator, processed out of the site. During the additional excavation activities, 5,450.32 tons of material were excavated, transported, and disposed of. In total, 8,708.02 tons of soil and commingled debris were excavated from the site.

3.2.2 Transport and Disposal of Material

Throughout the course of excavation activities, impacted soils and commingled debris that had been characterized as non-hazardous material required transport and disposal. Modern Landfill (Modern) of Model City, NY, provided transport and disposal services. All materials were sampled and analyzed in accordance with Modern's permit requirements. All transportation and disposal activities were conducted in accordance with procedures outlined in the project planning documents. Transportation and disposal of soil and commingled debris from the initial 2018 excavation effort were conducted between 26 September 2018 and 28 September 2018. Transportation and disposal of soil and commingled debris from the 2019 excavation effort were conducted between 01 August 2019 and 10 August 2019.

Stockpiled soil and debris were loaded into tri-axle dump trucks. Prior to leaving the construction entrance, trucks were inspected to ensure no loose material was present on the outside of the trucks. Following inspection, trucks proceeded to the access road where the bill of lading (BOL) was signed by the USACE representative and the transporter. Copies of the BOLs from the transport and disposal of soil and commingled debris are included in Attachment E.

All trucks hauling material from the site were required to follow the approved transportation route (Figure 5, Attachment A). As needed, bed liners were utilized when material was deemed to have too high of a moisture content and presented a potential for leaking out of the truck bed. Upon arriving at Modern, trucks were weighed at the scale house and directed to the appropriate location within the landfill to dispose of their load. Weight tickets and a certificate of disposal for all soils and commingled debris, are included in Attachment E. In addition, one 15-yard roll-off was loaded with tires that were segregated from the debris and disposed of at Modern. A copy of the tire BOL is included in Attachment E.

3.2.3 *Dewatering*

The intent was to perform the RA during late spring/early summer of 2018, when the site was most likely to be the driest. However, due to the time between the two excavation efforts, surface water had accumulated within the site. In December of 2018, 55,000 gallons of water were removed using a vacuum truck and tanker trucks. Site water was transported by Franks Vacuum Truck Service, Inc. (Frank's) to a storage facility (BOLs in Attachment E), American Recyclers Company (Tonawanda, NY). Following American Recyclers Company acceptance of the site water, the water was bulked and stored until transport to the final disposal facility, Covanta Holding Corporation (Niagara Falls, NY). The site water was ultimately accepted by Covanta and input into their energy-from-waste system.

Ahead of excavation activities in 2019, a water filtration system was mobilized allowing for the dewatering and direct discharge of excavation water into the surrounding area adjacent to the site. Dewatering activities were conducted between 23 April 2019 and 04 June 2019. Additional dewatering occurred between 23 July 2019 and 29 July 2019. The excavation was dewatered using a series of pumps, a 21,000-gallon weir tank, filtered through an on-site filtration system, and discharged downgradient of the site. Water within the excavation was initially pumped into a 21,000-gallon capacity open top weir tank to allow suspended sediments to settle. Water from the weir tank was then pumped through a BF400 bag filter unit followed by another BF400 bag filter unit, equipped with an Absolute (0.5 micron) filter bag, to further remove suspended particles. Following the removal of particulate matter, the water was then filtered through a MPC20 carbon filter unit to remove potential remaining lead and explosive constituents. Water was again filtered for sediments downstream of the carbon filter through a BF200, equipped with another Absolute (0.5 micron) filter bag before being discharged. The discharge was located downgradient of the site and a dewatering-bag (capable of sediment filtration) was attached to the end of the discharge hose. The dewatering-bag was utilized as a diffusive measure ensuring no adverse impacts to the discharge location occurred as a result of the discharged water. The discharge hose was run across the access road using a drop-trak hose protector to allow NRAA members continued use of the access road. The filtration system and discharge location were monitored by ERT personnel during times of operation.

Before commencement of dewatering operations, 21,000 gallons of excavation water were pumped through the filtration system and cycled back into the excavation. This allowed for the collection of three water samples for analysis, one every 7,000-gallons, to confirm the filtration system was functioning as designed. Discharge from the system was sampled for pH via field test, explosives via analytical method SW-846 8330B; lead via analytical method SW-846 6020B; and total suspended sediments. Dewatering operations ran continuously until the excavation was emptied of surface water. As part of the NYSDEC requirements for the discharge of treated water to the surface, representative samples were collected at a rate of one per 7,000 gallons water discharged as gauged by a flow meter on the discharge hose. Analytical results from samples collected during dewatering operations are included in Attachment F. In total, 336,000-gallons of water were removed from the site and discharged into the surrounding area.

Any water created during the cleaning of the 21,000-gallon open top weir tanks and carbon vessel was collected using a vacuum truck provided by Frank's and disposed of at a proper water treatment facility – American Recyclers Company in Tonawanda, NY. All used sediment filters were placed into two 55-gallon drums and transported to American Recyclers Company for disposal. Non-Hazardous Waste Manifest can be found in Attachment E.

3.2.4 *Confirmation Sampling*

Confirmation data was collected using ISM sampling and analysis. Two rounds of soil confirmation ISM sampling were performed, once in 2018 and again in 2019. ISM sampling was completed in 2018 and 2019 in accordance with the UFP-QAPP/SAP (USACE, 2018) and UFP-QAPP Addendum 1 (USACE, 2019), respectively.

The first round of ISM confirmation soil samples was submitted to Test America St. Louis, Missouri for laboratory analysis of 2,4,6-TNT using analytical method SW-846 8330B and lead using analytical method SW-846 6020A. Each ISM confirmation soil sample consisted of 30 increments. Results from the original ISM confirmation soil sampling indicated that COCs were present above the remedial goals (Figure 6, Attachment A). Because of this, a second removal effort was performed in 2019.

The second and final round of ISM confirmation soil samples was submitted to SGS North America, Inc. Orlando for laboratory analysis of explosives using analytical method SW-846 8330B and lead using analytical method SW-846 6020B. The 2019 ISM confirmation soil samples consisted of 50 increments to reduce the relative standard deviation to data quality objective levels. Confirmation samples were collected from the base of each DU and the sidewalls of the final excavation footprint (17 DUs) plus one additional DU for the access road alongside of AOC 1, shown in Attachment A, Figure 7. All results were less than the remedial action objectives (RAOs). A summary of results is displayed in Table 2. All laboratory analytical results can be found in Attachment G.

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Table 2. Summary of Confirmation Soil Sampling Results

Client Sample ID:			FC-DU-01	FC-DU02	FC-DU03	FC-DU04	FCDU05	FC-DU-06-R1	FC-DU-06-R2	FC-DU-06-R3	FC-DU07	FC-DU08	FCDU09
Lab Sample ID:			FA66765-4	FA66909-4	FA66909-1	FA66943-1	FA66614-2	FA66670-1	FA66670-2	FA66670-3	FA66943-3	FA66909-2	FA66614-3
Date Sampled:			8/6/2019	8/9/2019	8/9/2019	8/10/2019	7/31/2019	8/1/2019	8/1/2019	8/1/2019	8/10/2019	8/9/2019	7/31/2019
Analyte	RAO	Unit											
2,4,6-Trinitrotoluene	18	mg/kg	0.074 U	0.423	0.074 U	0.075 U	0.073 U	0.075 U	0.074 U	0.538	0.074 U	0.404	0.708
Lead	400	mg/kg	6.5	5.7	5.9	6.1	5.8	5.9	5.8	5.9	5.7	4.6	5.8

Client Sample ID:			FC-DU-10	FC-DU-11-R1	FC-DU-11-R2	FC-DU-11-R3	FC-DU12	DU13	DU-14	FC-DU-15	DU16	FC-DU-17
Lab Sample ID:			FA66670-4	FA66765-1	FA66765-2	FA66765-3	FA66943-4	FA66943-5	FA66909-3	FA66765-5	FA66943-2	FA66765-6
Date Sampled:			8/1/2019	8/6/2019	8/6/2019	8/6/2019	8/10/2019	8/10/2019	8/9/2019	8/6/2019	8/10/2019	8/6/2019
Analyte	RAO	Unit										
2,4,6-Trinitrotoluene	18	mg/kg	0.297	0.075 U	0.075 U	0.075 U	0.073 U	0.554	0.073 U	0.074 U	0.073 U	0.074 U
Lead	400	mg/kg	6	6	5.6	5.9	5.1	50	15.5	7.5	15.7	6.9

mg/kg - milligrams per kilogram

U - not detected at the limit of detection (LOD). LOD is shown.

Detected results are in bold font.

All results are less than the remedial action objectives (RAOs).

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3.3 Restoration Activities

Restoration of the site included backfilling, grading, revegetation of the site, and repair of the access road. Restoration efforts began on 05 September 2019 and were completed on 19 September 2019.

3.3.1 Backfill

Backfill material consisted of quarry screenings which were then covered with approximately 6 inches of topsoil. Both the quarry screenings and the topsoil were sampled and analyzed prior to their use to ensure that these materials were clean and of acceptable composition. Laboratory analytical reports for the backfill material as well as a letter of NYSDEC approval for the material are included in Attachment H. Weight tickets for the quarry screening and load tickets for the topsoil are also included in Attachment H.

Quarry screenings were produced by Lafarge Quarry in Lockport, NY. In total 7,036 tons of screenings placed in 12-inch lifts and compacted by tracking of the bulldozer were used to backfill the excavation. The excavation was backfilled with screenings to approximately 2 inches below grade.

Once backfill, grading, and compaction of the quarry screenings was completed, the site was covered with approximately 6-inches of topsoil sourced from a stockpile located in Lockport, NY. In total, 1,755 cubic yards of topsoil were used for the restoration effort to provide suitable soil for vegetation growth. Topsoil was graded across the site approximately 3-inches above surrounding grade to allow for positive drainage and account for potential settling. The edges of the site were tapered to match the grade of the surrounding area. The eastern edge of the site adjacent to the access road was graded in a manner that promotes drainage away from the road and towards the site.

3.3.2 Hydroseeding

Vegetation restoration was conducted using hydroseeding practices. A native NYS wetland variety seed mix consisting of Switchgrass, Deertongue, Winter Rye, and Medium Red Clover varieties, was used for vegetative cover. In addition to the grass seed, fertilizer and mulch were applied at the manufacturers recommended rates. The hydroseed mix was applied across the entirety of the disturbed area. A copy of the hydroseed mix product data sheet has been included in Attachment H.

3.3.3 Access Road Restoration

During the course of removal activities, care was taken to maintain the condition of the access road. Several times throughout the remedial activities, the road was regraded with stone to fill-in potholes/ruts, both for the integrity of the road and for the truck traffic to and from the site. At the end of major truck usage (*i.e.* soil removal and backfill import) 60 tons of crusher run were spread along the road to address several areas of minor surface thinning and numerous potholes, to ensure the access road was restored at the end of remedial activities. A copy of the material data sheet is included in Attachment H.

3.4 Demobilization

Demobilization occurred following the satisfactory completion of the RA field activities on 27 September 2019. As equipment, personnel, and facilities were no longer needed to support the field activities, they were prepared for demobilization. All equipment (and facilities as applicable)

were decontaminated prior to demobilization. A post-demobilization survey (mirroring that of the pre-mobilization survey) was completed to document the final site conditions. The Post-demobilization Survey Report is included in Attachment C of this report. All field documentation created throughout the duration of this project (Daily Reports, field notes, QC reports, etc.) can be found in Attachment I of this report. A Safety and Health Phase-Out Report was completed following site activities and is included in Attachment J of this report. The silt fence and security fence were left in place while seeds germinated and vegetation reestablished. On 14 October 2019 the silt fence and security fence were removed from the site. A final inspection was conducted on 15 October 2019.

4.0 CONCLUSION

This RA was completed in accordance with the project planning documents. All excavated material was properly containerized, transported, and disposed. In total, 8,708.02 tons of contaminated soil and comingled debris were removed. Final confirmation samples verified that the concentrations of COCs in the remaining soil were less than the RAOs and the site was restored to match the surrounding area.

The RA implemented at the Former LOOW AOC 1 at OCCP site successfully achieved the objectives identified for this project, including:

- 1) Removal and disposal of soil/fill with concentrations of 2,4,6-trinitrotoluene and lead greater than remedial goals;
- 2) Removal and disposal of comingled debris; and
- 3) Site restoration.

Based on the successful completion of the RA, the concentrations of COCs have been reduced to levels that are protective of human health and the environment. No further action is warranted for Former LOOW AOC 1 at OCCP.

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5.0 REFERENCES

- U.S. Army Corps of Engineers (USACE), 2002. *Final Report of Results for the Phase II Remedial Investigation at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York*. February.
- USACE 2004. *Small-Bermed Clearing Supplemental Investigation Summary Report*. March
- USACE 2008a. *Report of Results for the Remedial Investigations of Underground Utility Lines Formerly Used by the Department of Defense, Lake Ontario Ordnance Works (LOOW), Niagara County, NY, Volumes I-IV*. December.
- USACE 2008b. *Final Human Health Risk Assessment of Selected Exposure Units (EU1-EU6), EU8, EU9, EU10) at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York*. December.
- USACE 2008c. *Final Screening Level Ecological Risk Assessment of Selected Exposure Units Within the Former Lake Ontario Ordnance Works, Niagara County, New York*. December.
- USACE, 2013. *Final Remedial Investigation Report for the Occidental Chemical Corporation Property at Formerly Used Defense Site Former Lake Ordnance Works, Niagara County, New York*. April
- USACE 2015. *Final Feasibility Study Exposure Unit 8 – Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works, Niagara County, New York*. June.
- USACE, 2017. *Final Decision Document Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works, Niagara County, New York*. April.
- USACE, 2018a. *Revised Final Contractor Quality Control Plan for Soils Remedial Action AOC 1 at Occidental Chemical Corporation Property, Former Lake Ontario Ordnance Works, Niagara County, New York*. August.
- USACE, 2018b. *Final Site Operations Plan for Soils Remedial Action AOC 1 at Occidental Chemical Corporation Property, Former Lake Ontario Ordnance Works, Niagara County, New York*. March.
- USACE, 2018c. *Revised Final Uniform Federal Policy – Quality Assurance Project Plan Sampling and Analysis Plan for Soils Remedial Action AOC 1 at Occidental Chemical Corporation Property, Former Lake Ontario Ordnance Works, Niagara County, New York*. September.
- USACE, 2018d. *Accident Prevention Plan for Soils Remedial Action AOC 1 at Occidental Chemical Corporation Property, Former Lake Ontario Ordnance Works, Niagara County, New York*. March.
- USACE, 2019. *Addendum NO.1 to the Revised Final Uniform Federal Policy – Quality Assurance Project Plan, Sampling and Analysis Plan for Soils Remedial Action AOC 1 at Occidental Chemical Corporation Property, Former Lake Ontario Ordnance Works, Niagara County, New York*. March.

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