981975

GROUNDWATER MONITORING WELL ABANDONMENT AND INSTALLATION PLAN

USS Lead OU1 Modified Zone 1 | East Chicago, Indiana

February 2023

Prepared for:
Industrial Development Advantage
2105 West 1800 North
Farr West, Utah 84404

Prepared by:
Verdantas LLC
6397 Emerald Parkway, Suite 200
Dublin, Ohio 43016

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1.0 Introduction

Verdantas LLC (Verdantas) has prepared this Groundwater Monitoring Well Abandonment and Installation Plan (Work Plan) on behalf of Industrial Development Advantage of East Chicago, LLC (IDA) as a companion document to the October 2022 Remedial Design/Remedial Action (RD/RA) Work Plan. This document presents the procedures to be followed for decommissioning and future reinstallation of monitoring wells within Operable Unit 1 (OU-1) Modified Zone 1 of the former U.S. Smelter and Lead Refinery, Inc. (USS Lead) Superfund Site located in East Chicago, Indiana (the Site). OU1 Modified Zone 1 is defined in Section III of the Administrative Settlement Agreement for Remedial Action by Prospective Purchaser ("Settlement"). For definition purposes throughout this document the term "Site" is used consistent with the definition in the Settlement to solely refer to "Modified Zone 1" in OU1, Figure 1. The closure of multiple existing monitoring wells is necessary prior to implementing the selected remedy documented within the Record of Decision Amendment (RODA) for the site. This plan assumes that some of the monitoring wells will be re-installed following completion of planned remedial activities and subsequent development of the site.

The RD/RA will be performed in accordance with the Settlement requirements, which incorporates the Record of Decision (ROD) Amendment and the Statement of Work (SOW) signed by U.S. Department of Justice on April 7, 2022. The SOW defines specific response activities and obligations that guide the preparation of this Work Plan and the execution of the work as described herein.

Groundwater monitoring wells were installed between 2017 and 2021 during previous assessments by Amereco, Inc. and Environmental Resources Management (ERM), respectively. A total of six 2-inch internal diameter (ID) monitoring wells (ECHA-MW-01, ECHA-MW-09, ECHA-MW-35, MW-12, OU1MW-13, OU1MW-14, and OU1MW-15) are present on site that require decommissioning. ECHA-MW-01 is located in the southwest corner of the site and it will not be abandoned. This well will be preserved and protected during the remedy and development. Two additional 2-inch ID monitoring wells, OU1MW-6 and OU1MW6D, are installed in an area previously remediated by EPA in 2019 and will not be abandoned. A total of ten 1-inch ID "temporary" wells (TW-04, TW-07, TW-10, TW-15, TW-16, TW-21, TW-22, TW-23, TW-30 and TW-34) are also located within the remedial footprint and require decommissioning. The locations of the monitoring wells are shown on Figure 2.

Each of the wells to be abandoned was completed at depths ranging from approximately 11.4 to 15 feet below ground surface (bgs). The 2-inch ID monitoring wells were constructed with PVC casing and completed with a 10-foot screen, partially straddling the water table at the time of installation. The 1-inch ID temporary wells were constructed of PVC casing with a 5-foot screen. Available construction details and coordinates for the monitoring wells to be abandoned are presented in Table 1. Typical construction details for the 1-inch ID temporary monitoring wells are included along with the available well logs in Appendix A.

2.0 Monitoring Well Abandonment

In accordance with the SOW, each of the six monitoring wells ECHA-MW-09, ECHA-MW-35, MW-12, OU1MW-13, OU1MW-14, and OU1MW-15) will be abandoned in accordance with the permanent well closure requirements of Section 312 of Indiana Administrative Code (IAC) 13-10-2. Prior to abandonment, the final water level and total depth of the well as measured from the top of casing will be recorded for each of the wells to be abandoned.

The monitoring wells will be decommissioned by a driller licensed in the State of Indiana. The driller will remove the existing flush mount protective casing, terminate the well casings a minimum of two feet below the existing grade, and tremie grout the wells from the bottom of the well to the ground surface with cement-bentonite grout as set forth in 312-IAC-13-10-2. Due to the smaller diameter of the 1-inch ID temporary wells, it may be necessary to fill the screen and casing of the well to approximately five feet below ground surface with sand and then fill the rest of the casing with hydrated granular bentonite. The flush mount protective casing and well casing will both be removed as described for the 2-inch ID monitoring wells.

In accordance with 312-IAC-13-10-2, notification of the well abandonment will be submitted with a copy of all applicable well records to the Indiana Department of Natural Resources (IDNR), Division of Water within 30 days of the completion of sealing.

3.0 Monitoring Well Installation

The locations of the 2-inch ID monitoring wells to be abandoned per this Work Plan fall beneath the footprint of the proposed warehouse building. This Work Plan assumes that only the 2-inch monitoring wells will be reinstalled. Replacement monitoring well locations will need to be determined through consultation with US EPA and the PRP Group/IDA. The replacement monitoring wells will not be installed until after construction and development of the site is completed.

The replacement wells will be installed by a driller licensed in the State of Indiana and follow the provisions set forth in 312-IAC-13-8-3. Monitoring well locations will be continuously sampled to evaluate the stratigraphy and to determine groundwater levels at the Site. Groundwater is anticipated to be encountered at approximately five feet bgs. No soil samples will be submitted for laboratory analysis.

The monitoring wells will be installed using hollow stem auger drilling methods. The wells will be constructed of two-inch internal diameter Schedule 40 PVC casing and 0.010-inch slotted well screens, five or ten feet in length. At each location, a sand pack will be placed around the well screen as the augers are slowly removed from the ground. The sand pack will extend no more than two feet above the top of the well screen and the remainder of the annular space will be filled with bentonite slurry or hydrated granular bentonite. Each well will be capped with an expandable water-tight plug and completed with a concrete base and flush mount protective cover.

In accordance with 312-IAC-13-2-6, the water well driller must submit, on a departmental form or division-approved form, accurate records for each well drilled to IDNR, Division of Water within 30 days of the completion of installation. The required information to be included in each well report is outlined in 312-IAC-2-6.

3.1 Monitoring Well Development

Per 312-IAC-13-8-3, all new monitoring wells will be adequately developed to remove any sediment, drill cuttings or drilling fluids from the well and to ensure representative samples of the groundwater can be collected to determine groundwater quality. Monitoring well development will consist of removing a minimum of three, and up to ten, well volumes. Monitoring well development methods that may be used include bailing, surging or pumping. The method used will be determined using best professional judgment based on field conditions. Monitoring well development will consist of surging then removing a minimum of three and up to ten well volumes. Notes regarding measurements of pH, temperature, conductivity, and turbidity will be taken following each well volume and recorded on a monitoring well development form. If the monitoring well is entirely evacuated prior to removing the required well volumes, then an attempt will be made to redevelop the monitoring well after it recovers. If the monitoring well does not recover within a reasonable time period (four to eight hours) it will be considered developed.

4.0 Investigation Derived Waste

Soil cuttings, decontamination fluids, and purge water will be generated during the abandonment and replacement of the monitoring wells. Investigation derived wastes that are generated will be properly stored, characterized, and secured on site in labeled ODOT approved 55-gallon drums until disposed of in accordance with local state and federal regulations as part of the remedy implementation.

5.0 Certification by Project Coordinator

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

David B. Mustafaga, PG, CPG
Project Coordinator

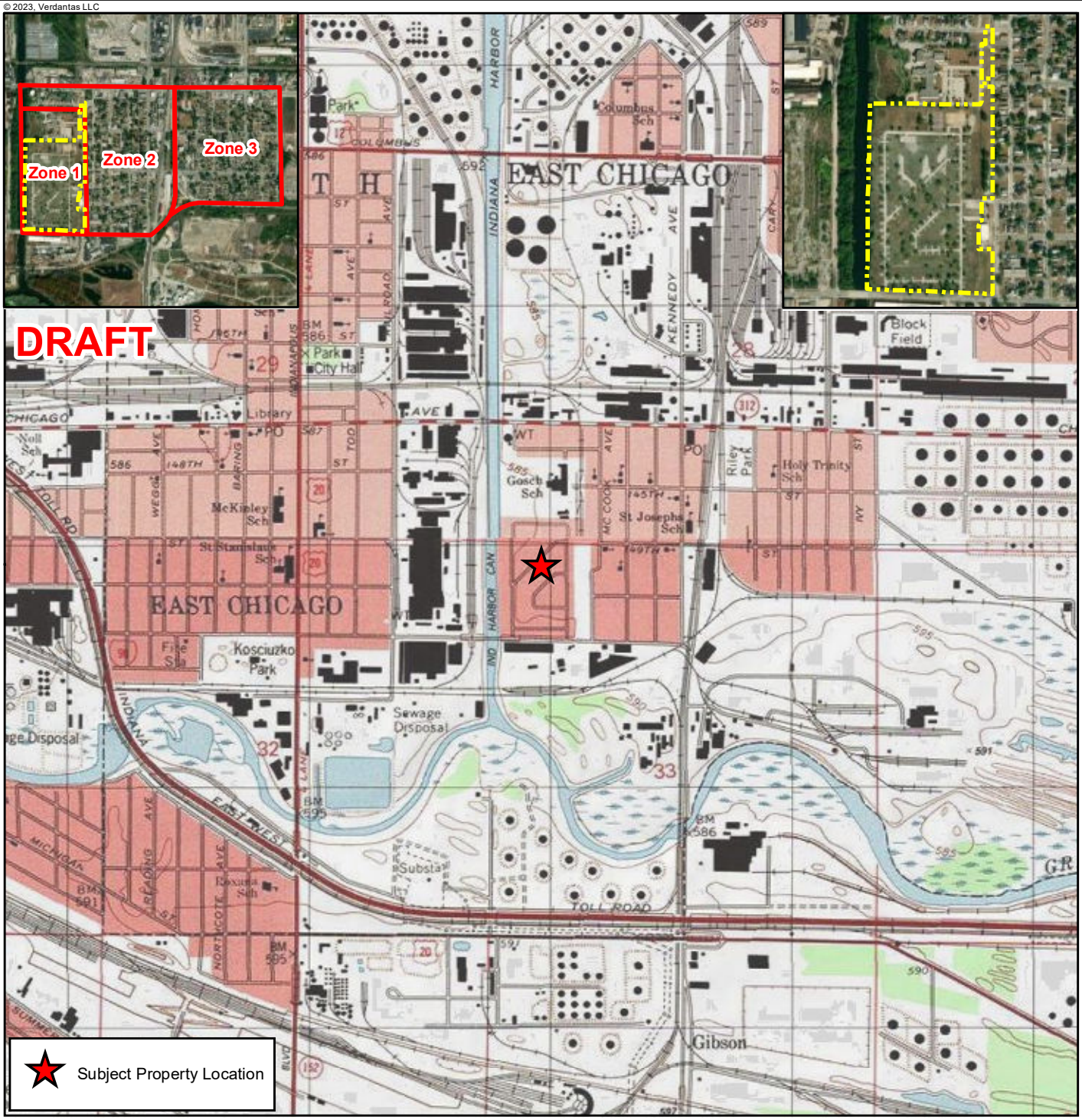
Table

Table 1
OU1 MODIFIED ZONE 1 Well Construction Information
USS Lead Superfund Site
East Chicago, Indiana

Well ID	Well Diameter (IN)	Northing	Easting	Ground Elevation (feet AMSL)	TOC Elevation (feet AMSL)[2,3]	Total Depth (feet BGS)[4]	Top of Screen (feet BGS)	Bottom of Screen (feet BGS)
MW-12	2	2322156.46	2847767.68	NA	NA	14.00	4.00	14.00
OU1MW-13[5]	2	2323127.231	2847063.497	586.87	586.60	14.00	4.00	14.00
OU1MW-14	2	2322517.928	2846904.338	586.59	586.24	14.00	4.00	14.00
OU1MW-15	2	2321703.496	2847805.189	586.73	586.25	15.00	5.00	15.00
ECHA-MW-01[1]	*2*	*2321637.384*	*2847025.336*	*587.31*	*586.83*	*11.42*	*1.42*	*11.42*
ECHA-MW-09	2	2322071.491	2847292.951	585.79	585.54	11.42	1.42	11.42
ECHA-MW-35	2	2322639.420	2847464.107	586.92	586.55	11.42	1.42	11.42
TW-04[6]	1	2321800.600	2847291.760	NA	NA	9.50	4.10	9.10
TW-07	1	2321959.840	2847178.680	NA	NA	9.50	4.10	9.10
TW-10	1	2322157.780	2847656.170	NA	NA	9.50	4.10	9.10
TW-15	1	2322208.590	2847881.950	NA	NA	9.50	4.10	9.10
TW-16	1	2321867.960	2847884.250	NA	NA	9.50	4.10	9.10
TW-21	1	2321599.030	2847820.870	NA	NA	9.50	4.10	9.10
TW-22	1	2321611.47	2847549.04	NA	NA	9.50	4.10	9.10
TW-23	1	2321623.420	2847286.840	NA	NA	9.50	4.10	9.10
TW-30	1	2322474.750	2847517.310	NA	NA	9.50	4.10	9.10
TW-34	1	2322622.060	2847538.780	NA	NA	9.50	4.10	9.10

Notes:
1. ECHA-MW01 will not be abandoned, it will be preserved and protected during the remedy and development
2. TOC - top of casing
3. AMSL - above mean sea level (NAV 88 datum)
4. BGS - below ground surface
5. Source: Table2.3-1, Well Construction Information, ERM USS Lead Superfund Site, Operable Unit 2, Revised RI Report, October 7, 2021
6. NA: MW-12 was reportedly not located by ERM during their well survey. Depth and screened interval assumed similar to other ECHA w
Total Depth- the total depth of Temporary Wells (TWs) is not documented in the Amereco report and is estimated at 9.5 feet based on a

Figures



DISCLAIMER:
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0 1,000 2,000 4,000 Feet

1:24,000

Quadrangles: Whiting and Highland, IN

Source: The topographic map was acquired through the USGS Topographic Map web service.

The aerial photo was acquired through the Esri Imagery Web Service. Aerial photography dated 2020.

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PEOPLE FOCUSED FUTURE

Monitoring Well Abandonment and Installation Plan
OU1, Modified Zone 1, USS Lead Superfund Site

Subject Property Location

East Chicago, Lake County, Indiana

Date:
February 2023

File Name:
15773_03_Fig01_SLM.mxd

Edited: 2/2/2023 By: kyusuf

Figure
1

Produced Using Esri's ArcGIS Software

DRAFT

0 100 200 400 Feet

1:2,400

VERNON AV

PRIVATE ST

MUNICIPAL DR

148TH ST

MCCOOK AV

149TH ST

149TH PL

150TH ST

150TH PL

151ST PL

151ST ST

MAGNOLIA ST

LARKSPUR ST

JONQUIL LN

ASTER ST

GLADIOLA ST

Indiana Harbor Canal

Former Goodman Park

Former WCHC Area

OU1MW6

OU1MW13

OU1MW14

OU1MW15

ECHA-MW-35

ECHA-MW-09

ECHA-MW-01

TW-34

TW-30

TW-15

TW-10

MW-12

TW-07

TW-16

TW-04

TW-23

TW-22

TW-21

Property Boundary
Parcel
2019 Remediated Soil Area
Existing Monitoring Wells
Temporary Monitoring Wells

Notes:
1) The aerial photo was acquired through the Esri Imagery Web Service. Aerial photography dated 2020.
2) Road names in gray have been vacated and removed.
3) The location of TW-04 is estimated from Amereco Phase II PDF Figures, this well is missing from digital files provided by others.

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PEOPLE FOCUSED FUTURE

February 2023

Monitoring Well Abandonment and Installation Plan
OU1, Modified Zone 1, USS Lead Superfund Site

Existing Monitoring Well Locations

East Chicago, Lake County, Indiana

Figure 2

Produced Using Esri's ArcGIS Software

File Name: 15773_03_Fig02_SitePlan.mxd

Edited: 2/2/2023 By: kyusuf

Appendix A

Appendix A Available Monitoring Well Construction Reports

50 Public Square 36th Fl
Cleveland OH 44113
P: 216.593.5200
F: 216.593.5201

PROJECT:
USS Lead
USS Lead Superfund Site
East Chicago, IN

BORING # OU1MW13

ERM PROJECT # 0432213
SHEET 1 OF 1

DRILLING CONTRACTOR	GeoServe, Inc. Woodstock, IL	ERM REPRESENTATIVE	Samuel Gaeth
DRILLING FOREMAN	Matt Palsgrove	OFFICE LOCATION	Cleveland, OH
DRILLING METHOD	Direct Push/Hollow Stem Auger	DATE: START	03/10/2021
DRILLING EQUIPMENT	7822 DT	FINISH	03/10/2021

HORIZONTAL DATUM
NORTHING 2323127.231
EASTING 2847063.497
ELEVATION 586.597 ft
VERTICAL DATUM: (NAVD 88 Datum)

WELL CONSTRUCTION

	Riser	Screen
Material:	*Schedule 40 PVC*	*Schedule 40 PVC, 0.010-slot*
Diameter (ID):	*2-inch*	*2-inch*
Coupling:	*Threaded*	*Threaded*

WELL DEVELOPMENT
Method: *Manual Surge and Purge - Bailer 0.25 hours*
Duration:
Gals. Purged: *9.5*
Depth to Water 5 feet bgs 03/10/2021

DEPTH (feet)	ELEVATION (feet ASL)	STRATA DESCRIPTION	DEPTH (feet ASL)	USCS	GRAPHIC LOG	SAMPLING DATA: RECOVERY (inches)	SAMPLING DATA: SAMPLE TYPE	SAMPLING DATA: LAB SAMPLE ID	SAMPLING DATA: LAB ANALYSIS	WELL CONSTRUCTION
0	587	Brown fine SAND, trace cobble.	0	SP						8-inch manhole to grade
2	585	Dark brown fine SAND, some silt with light orange mottling.	2	SP		60				Bentonite Seal 8in-3ft bgs
4	583	Brown fine SAND.	4	SP						
6	581			SP		22				No. 5 Sand 3-13.54ft bgs
8	579			SP						0.010-slot Schedule 40 PVC Screen 3.54-13.54ft bgs
9.5	577.5	Gray fine SAND.	9.5	SP		48				
12	575			SP						
14	573	Gray limestone GRAVEL.	14	GP		48				
14.125	572.875	Gray fine SAND.	14.125	SP						
16	571	*Bottom of Boring @ 16.00 feet bgs*	16							
569										

REMARKS:

SAMPLER TYPE
- Hand Auger
- Direct-Push Geoprobe

GRAPHIC LOG LEGEND
- Poorly-graded Sand
- Poorly-graded Gravel

LAB ANALYSIS:

ACRONYM LEGEND:
ASL = above sea level
bgs = below ground surface
eV = electronvolt
NM = not measured
PID = photoionization detector
ppm = parts per million
USCS = Unified Soil Classification System

OHIO WELL USS LEAD LOGS.GPJ MORGAN CLVD.GDT 4/8/21

ERM
50 Public Square 36th Fl
Cleveland OH 44113
P: 216.593.5200
F: 216.593.5201

PROJECT:
USS Lead
USS Lead Superfund Site
East Chicago, IN

BORING # OU1MW14

ERM PROJECT # 0432213

SHEET 1 OF 1

DRILLING CONTRACTOR	GeoServe, Inc. Woodstock, IL	ERM REPRESENTATIVE	Samuel Gaeth
DRILLING FOREMAN	Matt Palsgrove	OFFICE LOCATION	Cleveland, OH
DRILLING METHOD	Direct Push/Hollow Stem Auger	DATE: START	03/10/2021
DRILLING EQUIPMENT	7822 DT	FINISH	03/10/2021

HORIZONTAL DATUM
NORTHING 2322517.928
EASTING 2846904.338
ELEVATION 586.241 ft
VERTICAL DATUM: (NAVD 88 Datum)

WELL CONSTRUCTION

	Riser	Screen
Material:	*Schedule 40 PVC*	*Schedule 40 PVC, 0.010-slot*
Diameter (ID):	*2-inch*	*2-inch*
Coupling:	*Threaded*	*Threaded*

WELL DEVELOPMENT
Method: *Manual Surge and Purge - Bailer 0.5 hours*
Duration:
Gals. Purged: *10.15*
Depth to Water 6 feet bgs 03/10/2021

DEPTH (feet)	ELEVATION (feet ASL)	STRATA DESCRIPTION	DEPTH (feet ASL)	USCS	GRAPHIC LOG	SAMPLING DATA: RECOVERY (inches)	SAMPLING DATA: SAMPLE TYPE	SAMPLING DATA: LAB SAMPLE ID	SAMPLING DATA: LAB ANALYSIS
0	586	Brown fine SAND, some cobble.	0	SP					
2	584	Brown fine SAND with some silt.	2	SP		60			
4	582								
		Light orange to gray incrase in depth fine SAND.	5	SP		15			
6	580								
8	578								
10	576					48			
		Black ORGANIC MATTER.	11	OL					
12	574	Gray fine SAND.	11.5						
14	572			SP		48			
16	570		16						
		Bottom of Boring @ 16.00 feet bgs							
	568								

WELL CONSTRUCTION
- 8-inch manhole to grade
- Bentonite Seal 8in-3ft bgs
- No. 5 Sand 3-14.42ft bgs
- 0.010-slot Schedule 40 PVC Screen 4.42-14.42ft bgs

REMARKS:

SAMPLER TYPE
- Hand Auger
- Direct-Push Geoprobe

GRAPHIC LOG LEGEND
- Poorly-graded Sand
- Low Plasticity Organic silt or clay

LAB ANALYSIS:

ACRONYM LEGEND:
ASL = above sea level
bgs = below ground surface
eV = electronvolt
NM = not measured
PID = photoionization detector
ppm = parts per million
USCS = Unified Soil Classification System

OHIO WELL USS LEAD LOGS.GPJ MORGAN CLVD.GDT 4/8/21

50 Public Square 36th Fl
Cleveland OH 44113
P: 216.593.5200
F: 216.593.5201

PROJECT:
USS Lead
USS Lead Superfund Site
East Chicago, IN

BORING # **OU1MW15**
ERM PROJECT # 0432213
SHEET 1 OF 1

DRILLING CONTRACTOR	GeoServe, Inc. Woodstock, IL	ERM REPRESENTATIVE	Samuel Gaeth
DRILLING FOREMAN	Matt Palsgrove	OFFICE LOCATION	Cleveland, OH
DRILLING METHOD	Direct Push/Hollow Stem Auger	DATE: START	03/10/2021
DRILLING EQUIPMENT	7822 DT	FINISH	03/10/2021

HORIZONTAL DATUM
NORTHING 2321703.496
EASTING 2847805.189
ELEVATION 586.249 ft
VERTICAL DATUM: (NAVD 88 Datum)

WELL CONSTRUCTION

	Riser	Screen
Material:	*Schedule 40 PVC*	*Schedule 40 PVC, 0.010-slot*
Diameter (ID):	*2-inch*	*2-inch*
Coupling:	*Threaded*	*Threaded*

WELL DEVELOPMENT
Method: *Manual Surge and Purge - Bailer 0.3 hours*
Duration:
Gals. Purged: *10.5*
Depth to Water 3.5 feet bgs 03/10/2021

DEPTH (feet)	ELEVATION (feet ASL)	STRATA DESCRIPTION	DEPTH (feet ASL)	USCS	GRAPHIC LOG	SAMPLING DATA: RECOVERY (inches)	SAMPLING DATA: SAMPLE TYPE	SAMPLING DATA: LAB SAMPLE ID	SAMPLING DATA: LAB ANALYSIS	WELL CONSTRUCTION
0	586	Brown fine SAND and SILT, moist.	0	SP-SM						8-inch manhole to grade
2	584	Brown CLAY.	2	CL						Bentonite Seal 8in-3ft bgs
		Light brown fine SAND with some black organic matter, saturated.	2.5	SP		60				
4	582									
		Brown fine SAND with black organic matter.	5	SP		22				No. 5 Sand 3-13.36ft bgs
6	580									
8	578	Gray fine SAND.	8	SP		48				0.010-slot Schedule 40 PVC Screen 3.36-13.36ft bgs
10	576									
12	574					48				
14	572									
16	570	*Bottom of Boring @ 16.00 feet bgs*	16							
	568									

REMARKS:

SAMPLER TYPE
- Hand Auger
- Direct-Push Geoprobe

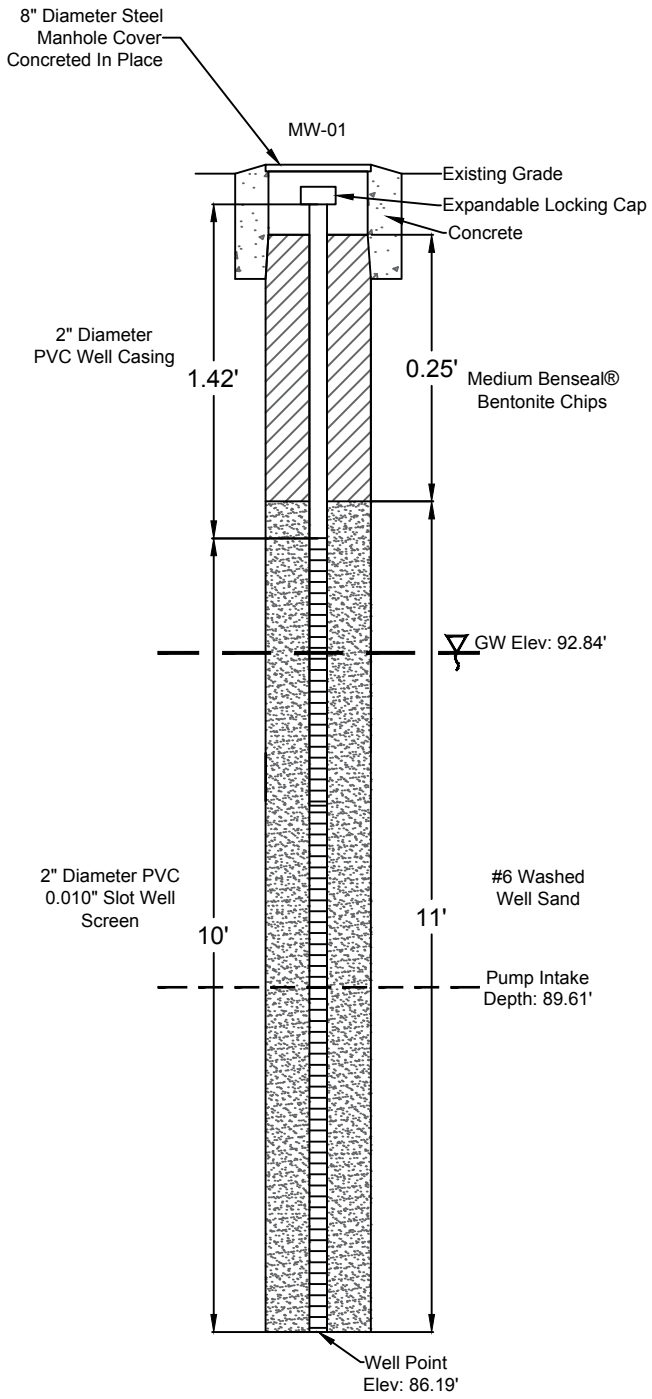
GRAPHIC LOG LEGEND
- Poorly-graded Sand with Silt
- Low Plasticity Clay
- Poorly-graded Sand

LAB ANALYSIS:

ACRONYM LEGEND:
ASL = above sea level
bgs = below ground surface
eV = electronvolt
NM = not measured
PID = photoionization detector
ppm = parts per million
USCS = Unified Soil Classification System

OHIO WELL USS LEAD LOGS.GPJ MORGAN CLVD.GDT 4/8/21

MW ID#	Water Elevation	Pump Intake	Well Depth
MW-01	92.84'	89.61'	86.19'
MW-09	93.57'	89.30'	84.52'
MW-12	94.43'	89.80'	84.98'
MW-35	94.11'	90.31'	85.21'



*Note: This Drawing Is Not To Scale. Dimensions Have Been Exaggerated For Information Purposes.

**Note: Installed with 8.25" O.D. Hollow Stem Augers

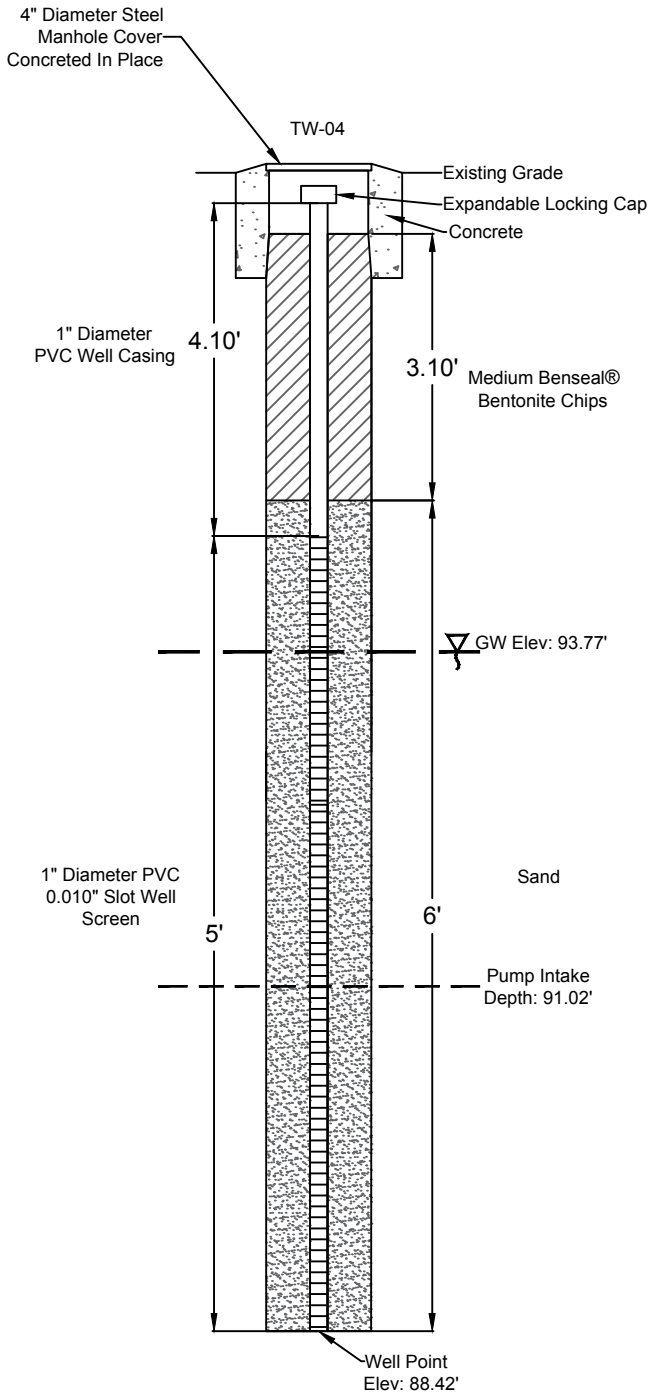
***Note: All 2" Monitoring Wells constructed similar.

MONITORING WELL CONSTRUCTION DIAGRAM
SCALE: NTS

TITLE: MW CONST. DIAGRAM			**WEST CALUMET HOUSING COMPLEX EAST CHICAGO HOUSING AUTHORITY**
PROJECT #: 16.1151.4.2	SHEET: 9A		
DRAWN BY: A. WILKER			
REVIEWED BY: Z. HEINE	1	02/15/17 PHASE II ESA	
SCALE: NTS	NO.	DATE ISSUED FOR	EAST CHICAGO INDIANA

AMERECO, INC.
CONSULTING ENGINEERS-PROJECT MANAGERS
54 MICHIGAN AVENUE
VALPARAISO, IN 46383 219-531-0531

TW ID#	Water Elevation	Pump Intake	Well Depth
TW-04	93.77'	91.02'	88.42'
TW-07	92.91'	89.64'	87.42'
TW-10	94.55'	90.65'	86.86'
TW-15	94.20'	90.28'	87.26'
TW-16	93.87'	90.27'	86.56'
TW-21	93.85'	90.20'	86.60'
TW-22	94.39'	90.74'	87.07'
TW-23	94.06'	90.69'	87.09'
TW-30	93.24'	89.91'	87.21'
TW-34	93.15'	89.32'	86.62'



*Note: This Drawing Is Not To Scale. Dimensions Have Been Exaggerated For Information Purposes.

**Note: Installed within 2.25" Diameter Soil Boring

***Note: All 1" Temporary Wells constructed similar.

TEMPORARY WELL CONSTRUCTION DIAGRAM
SCALE: NTS

TITLE: TW CONST. DIAGRAM				**WEST CALUMET HOUSING COMPLEX EAST CHICAGO HOUSING AUTHORITY**
PROJECT #: 16.1151.4.2	SHEET: 9B			
DRAWN BY: A. WILKER				
REVIEWED BY: Z. HEINE		1	02/15/17 PHASE II ESA	
SCALE: NTS		NO.	DATE ISSUED FOR	EAST CHICAGO INDIANA

AMERECO, INC.
CONSULTING ENGINEERS-PROJECT MANAGERS
54 MICHIGAN AVENUE
VALPARAISO, IN 46383 219-531-0531