Final

Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area Ravenna Army Ammunition Plant Restoration Program Portage and Trumbull Counties, Ohio

August 07, 2023

Contract No.: W912QR-12-D-0002 Delivery Order: 0003

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Mike DeWine, Governor Jon Husted, Lt. Governor Anne M. Vogel, Director

June 10, 2024

Received June 11, 2024

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak Restoration Program Manager ARNG-ILE Clean Up Camp James A Garfield JTC 1438 State Route 534 SW Newton Falls, OH 44444

Sent via email to: Kevin.m.sedlak.ctr@army.mil RE: US Army Ravenna Ammunition Plt RVAAP Remediation Response Project Records RI Remedial Response Portage County ID # 267000859258

Subject: Final Remedial Investigation Addendum for the RVAAP-70 DLA Ore Storage Site, Ore Storage Pond Sub-Area Ravenna Army Ammunition Plant Restoration Program Ohio EPA Concurrence

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the Request for concurrence for the "Final Remedial Investigation Addendum for CC RVAPP-79 DLA ore Storage Site, Ore Storage Pond Sub-Area" dated March 12, 2024¹. This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) via email on March 12, 2024. The document was prepared for the United States Army National Guard.

It is Ohio EPA's understanding that additional information will be collected outside of the original contract/scope of work. Ohio EPA will give concurrence based on Army's path moving forward. The Army will submit a second addendum to provide the additional information to Ohio EPA as requested in the letter dated October 12, 2023², associated with the DLA Ore Storage Pond. It is anticipated that this additional addendum will also include the Risk

¹ http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=2798727
 ² http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=2597194

Northeast District Office 2110 E. Aurora Road Twinsburg, Ohio 44087 U.S.A. 330 | 963 1200 epa.ohio.gov

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US Army Ravenna Ammunition Plt RVAAP June 10, 2024 Page 2 of 2

Management Decisions specified in the Final Remedial Investigation for CC RVAAP-79 DLA Ore Storage Sites dated October 16, 2020³, and will establish cleanup goals to supplement the Feasibility Study for the applicable DLA Ore Storage Sites.

This document was reviewed by personnel from Ohio EPA's DERR. Pursuant to the Director's Findings and Orders paragraph 39 (b), Ohio EPA concurs with the path forward as outlined in the March 12, 2024, letter.

If you have any questions, please contact me at (330) 963-1109, or via email at craig.kowalski@epa.ohio.gov.

Sincerely,

Craig Kowalski

Craig Kowalski Site Coordinator Division of Environmental Response and Revitalization

CK/cm

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³ http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=1482601 http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=1483188

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Parsons has completed the Draft Remedial Investigation Addendum CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in this project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions was verified. This included review of data quality objectives; technical assumptions, methods, procedures, and materials to be used; the appropriateness of data used and the level of data obtained; and the reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing United States Corps of Engineers policy.

Independent Technical Reviewer:

Dan Griffiths, C.P.G, P.G.

Technical Director

(Signature)

09 June 2021

(Date)

Parsons

Reviewer:

Edward Heyse, Ph.D., P.E.

Project Manager

Parsons

Rey Edward 08 July 2021

(Signature)

(Date)

Final

Remedial Investigation Addendum CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area Ravenna Army Ammunition Plant Restoration Program Portage and Trumbull Counties, Ohio

August 07, 2023

Contract No.: W912QR-12-D-0002 Delivery Order: 0003

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U.S. Army Corps of Engineers, Louisville District 600 Dr. Martin Luther King Jr. Place Louisville, Kentucky 40202-2267

Prepared for:

National Guard Bureau Army National Guard (ARNG- Installations and Environment) 111 South George Mason Drive Arlington, Virginia 22204-1373

DOCUMENT DISTRIBUTION

for the

Final Remedial Investigation Addendum CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area

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DERR = Division of Environmental Response and Revitalization

NEDO = Northeast District Office

OHARNG = Ohio Army National Guard

Ohio EPA=Ohio Environmental Protection Agency

RVAAP = Ravenna Army Ammunition Plant

REIMS = Ravenna Environmental Information Management System

SWDO = Southwest District Office

USACE = U.S. Army Corps of Engineers

TABLE OF CONTENTS

				Page	<u>e</u>
				ii ii	
				iv	
LIST (OF ACF	RONYM	IS AND A	ABBREVIATIONS	I
EXEC	UTIVE	SUMM	IARY		l
1.	INTRO	DUCT	'ION		l
	1.1				
	1.2			BJECTIVES	
	1.3	REPO	RT ORGA	ANIZATION1-2	2
2.					
	2.1	FACIL	LITY-WII	DE BACKGROUND	Ĺ
				Description2-1	
		2.1.2	Demogra	aphy and Land Use2-1	l
	2.2	ENVIE	RONMEN	VTAL SETTING	l
		2.2.1	Topogra	phy2-1	1
		2.2.2		and Soil2-1	
		2.2.3	• •	ology	
		2.2.4	Surface '	Water	2
	2.3	AREA	OF CON	CERN DESCRIPTION2-3	3
		2.3.1	Operatio	nal History2-3	3
		2.3.2	Previous	Investigations	1
			2.3.2.1	Previous Investigations at the Main Storage Area, Area	
				West of the Railroad, East Transportation Yard, Concrete Pad Storage Area, and Ore Storage Pond2-4	1
			2.3.2.2	Remedial Investigation Activities at the Ore Storage Pond2-5	
3.	REME	DIAL I	NVESTI	GATION ADDENDUM ACTIVITIES	1
5.	3.1			BJECTIVES	
	3.2	DATA	QUALIT	TY OBJECTIVES	l
	3.3			ATIONALE	
	3.4			ATION ACTIVITIES	
	3.5	FIELD	SAMPL	ING	2
		3.5.1	Sedimen	t Sampling	2
		3.5.2	Bioassay	/s	2
	3.6	DEVIA	ATIONS I	FROM WORK PLAN	3
	3.7				
	3.8	INVES	STIGATI(ON-DERIVED WASTE	3

TABLE OF CONTENTS

Page

4.	RESULTS AND DISCUSSION	
	4.1 HYALELLA AZTECA 10-DAY BIOASSAYS	
	4.2 CHIRONOMUS DILUTUS 10-DAY BIOASSAYS	
5.	SUMMARY AND CONCLUSIONS	
6.	RECOMMENDATIONS	6-1
7.	REFERENCES	

LIST OF TABLES

Table 3-1:	Data Quality Objectives	3-5
	Sampling Locations and Bioassays at Ore Storage Pond Sub-area	
	CC RVAAP-79 DLA Ore Storage Sites	3-7
Table 4-1:	Results of Hyalella azteca 10-Day Toxicity Testing	4-1
	Results of Chironomus dilutus 10-Day Toxicity Testing	

LIST OF FIGURES

Figure 1-1:	Location Map	1-5
	Location of CC RVAAP-79 DLA Ore Storage Sites	
-	Sub-Areas and Topography of CC RVAAP-79 DLA Ore Storage Sites	
	near Ore Storage Pond	2-9
Figure 2-2:	2013 Remedial Investigation Sediment Sampling Locations at	
	Ore Storage Pond Sub-Area	2-11
Figure 3-1:	Sediment Sampling Locations at Ore Storage Pond Sub-area	
-	CC RVAAP-79 DLA Ore Storage Sites	3-9

LIST OF APPENDICES

- Appendix A Field Activity Forms
- Appendix B Bioassay Report
- Appendix C Site Photographs
- Appendix D Ohio EPA Notification of Field Work
- Appendix E Regulatory Correspondence Letters and Comments Response Table

LIST OF ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOC	Area of Concern
ARNG	Army National Guard
bgs	below ground surface
CC	Army Environmental Compliance-Related Cleanup Program
CERCLA	Comprehensive Environmental, Response, Compensation, and Liability Act
CIACLA	Complementative Environmental, Response, Compensation, and Elability Act Camp James A. Garfield Joint Military Training Center
COCs	chemicals of concern
COPCs	chemicals of potential concern
COPECs	chemicals of potential ecological concern
DERR	1 0
	Division of Environmental Response and Revitalization
DFFO	Director's Final Findings and Orders
DLA DeD	Defense Logistics Agency
DoD	Department of Defense
DQOs	Data Quality Objectives
DU	Decision Unit
ECC	Environmental Chemical Corporation
EPCs	exposure point concentrations
ERA	Ecological Risk Assessment
ESV	Ecological Screening Value
FD	field duplicate
FS	Feasibility Study
FWCUG	Facility-Wide Cleanup Goal
FWSAP	Facility-Wide Sampling and Analysis Plan
GPS	Global Positioning System
GSA	General Services Administration
HQ	hazard quotient
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
MS/MSD	matrix spike/matrix spike duplicate
NGT	National Guard Trainee
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
REIMS	Ravenna Environmental Information Management System
RI	Remedial Investigation
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SRCs	site-related chemicals

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

- SRV Sediment Reference Value
- semivolatile organic compounds **SVOCs**
- TAL Target Analyte List
- USACE
- U.S. Army Corps of Engineers U.S. Environmental Protection Agency USEPA
- volatile organic compounds VOCs

EXECUTIVE SUMMARY

Field work for this Remedial Investigation (RI) Addendum for CC RVAAP-79 Defense Logistics Agency (DLA) Ore Storage Sites, Ore Storage Pond Sub-Area at the former Ravenna Army Ammunition Plant (RVAAP), in Portage and Trumbull counties, Ohio was conducted by Parsons, contracted by the U.S. Army Corps of Engineers (USACE)–Louisville District. Parsons was contracted by the USACE-Louisville District to complete the RI documentation under Contract No. W912QR-12-D-0002, Delivery Order No. 0003.

This RI Report Addendum was prepared in accordance with Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) guidance and regulations, the Ohio Environmental Protection Agency (Ohio EPA) Director's Final Findings and Orders (DFFO, Ohio EPA, 2004), and the National Oil and Hazardous Substances Contingency Plan (U.S. Environmental Protection Agency [USEPA], 1990). This document was prepared in accordance with the *Submission Format Guidelines for the Ravenna Army Ammunition Plant Restoration Program, Version 22* (Vista Sciences Corporation, 2020).

The former RVAAP, now Camp James A. Garfield Joint Military Training Center (CJAG), is located in northeast Ohio. CC RVAAP-79 DLA Ore Storage Sites include the following nine sub-areas:

- Main Storage Area,
- Area West of Railroad,
- East Transportation Yard,
- Concrete Pad Storage Area,
- Ore Storage Pond,
- Route 80 Tank Farm,
- Area 2 Ammunition Storage Area,
- Load Line 3 Building 803 Inert Storage and Tank Storage Area, and
- Area 8 Inert Storage, Building 841.

The RI for eight of the nine areas is complete and documented in the *Final Remedial Investigation Report for CC RVAAP-79 DLA Ore Storage Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio* (Parsons, 2020). This RI Addendum only addresses sediment at the Ore Storage Pond sub-area. No further investigation or removal action was recommended for surface water in the RI Report (Parsons, 2020).

This RI Addendum includes a review of the physical site characteristics and operational history for the Ore Storage Pond and information from previous investigations. Sediment was sampled and analyzed for inorganic chemicals related to the historical storage of strategic materials, minerals, and ores at this Area of Concern (AOC). Two bioassays were performed on composite samples consisting of portions from three of the six sediment samples:

- *Hyalella azteca* 10-day bioassay, and
- Chironomus dilutus (formerly tentans) 10-day bioassay.

The work described in this RI Addendum was conducted in accordance with the *Final Work Plan* Addendum Additional Sampling for CC RVAAP-79 DLA Ore Storage Sites Remedial Investigation, Ore Storage Pond Sub-Area, Ravenna Army Ammunition Plan Restoration Program, Portage and Trumbull Counties, Ohio (Parsons, 2021) and the Facility-Wide Sampling and Analysis Plan (FWSAP, Science Applications International Corporation [SAIC], 2011a). Bioassays were conducted on sediment samples following the USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064 (USEPA, 2000).

The results of this RI Addendum indicate that no further action is required to address ecological risk at the Ore Storage Pond sub-area within the CC RVAAP-79 DLA Ore Storage Sites.

Remedial Investigation Objectives

The following are the CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-area RI Addendum objectives:

- Conduct a field investigation to collect site-related data to determine toxicity of the sediment at the AOC.
- Determine if a Feasibility Study is required to evaluate remedial alternatives.

Area of Concern Background

The nine separate ore storage sub-areas comprising CC RVAAP-79 DLA Ore Storage Sites are all located within CJAG. The RI for eight of the nine areas is complete and documented in the *Final Remedial Investigation Report for CC RVAAP-79 DLA Ore Storage Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio* (Parsons, 2020). This RI Addendum only addresses additional sampling for the Ore Storage Pond sub-area.

Five of the sub-areas (Main Storage Area, Area West of the Railroad, East Transportation Yard, Concrete Pad Storage Area, and Ore Storage Pond) are contiguous and are located in the eastern portion of CJAG near the intersection of South Service Road and Irons Road. All five areas comprising these contiguous sub-areas cover approximately 63 acres. The portion of the sub-areas that stored ore is approximately 53 acres, the other 10 acres were added to the sub-areas as delineation decision units (DUs). The DLA stored strategic and critical materials, including chrome ore, ferrochrome ore, and metallurgical manganese ore at these subareas starting in the late 1940's. All ore was removed by 2012. The Ore Storage Pond was reportedly constructed in the mid-1950s to prevent potentially contaminated surface water runoff from nearby manganese and chrome stockpiles from entering surface water. Because the pond has not been maintained, the pond has filled in significantly since it was originally constructed and now functions as a palustrine, emergent, intermittently exposed wetland as mapped by the National Wetland Inventory (U.S. Fish and Wildlife Service, 2018). No buildings or associated infrastructure (e.g., utility lines) are believed to have been located in or near these sub-areas; however, railroad spurs were located in portions of the Main Storage Area and the Concrete Pad Storage Area. The Area West of Railroad, East Transportation Yard, and the Ore Storage Pond are located immediately adjacent to railroad spurs.

Remedial Investigation Activities

Samples used for decision making in this RI Addendum were collected by Parsons in April 2021. Composite and discrete sampling methods were employed to investigate sediment. Bioassays were performed on sediment composite samples. Samples were collected and analyzed according to the FWSAP (SAIC, 2011a) and the Final Ore Storage Pond Sub-area Work Plan Addendum (Parsons, 2021). The bioassays were conducted in accordance with USEPA toxicity and bioaccumulation guidance (USEPA, 2000).

10-Day Bioassays Toxicity Results

The results of the *Hyalella azteca* and *Chironomus dilutus* 10-day bioassays indicate that sediment from composite samples 079SD-416M-0001-SD and 079SD-417M-0001-SD do not show significant toxicity to the ecological receptors.

Recommendations

No further action is required to address ecological risk in surface water or sediment at the Ore Storage Pond sub-area at CC RVAAP-79 DLA Ore Storage Sites.

Because the additional data for the Ore Storage Pond sediments collected for this RI Addendum has concentrations of arsenic that are greater than those used to estimate risks to Human Health Receptors in the CC RVAAP-79 RI, these potential risks need to be reassessed considering the new sediment and pond data. Since the CC RVAAP-79 RI has been finalized, the Army will revise the Draft CC RVAAP-79 Feasibility Study (FS) to include a reassessment of potential human health risks for current and future receptors of the Ore Storage Pond that includes the new data collected for this RI Addendum. The revised HHRA will be incorporated into the Risk Management Portion of the CC RVAAP-79 FS.

1. INTRODUCTION

The majority of field work for the Remedial Investigation (RI) for CC RVAAP-79 Defense Logistics Agency (DLA) Ore Storage Sites (Parsons, 2020) was conducted by Environmental Chemical Corporation (ECC). Parsons was contracted by the U.S. Army Corps of Engineers (USACE)-Louisville District to complete the RI documentation under Contract No. W912QR-12-D-0002, Delivery Order No. 0003. The task order was modified (modification 08) on 29 September 2020 for additional field work required by Ohio Environmental Protection Agency (Ohio EPA) and Army National Guard (ARNG) to complete the RI at CC RVAAP-79, Ore Storage Pond sub-area. Field work for this RI Addendum was completed by Parsons. The field work was conducted in accordance with the *Final Work Plan Addendum Additional Sampling for CC RVAAP-79 DLA Ore Storage Sites Remedial Investigation, Ore Storage Pond Sub-Area, Ravenna Army Ammunition Plan Restoration Program, Portage and Trumbull Counties, Ohio (Parsons, 2021), the Facility-Wide Sampling and Analysis Plan (FWSAP, Science Applications International Corporation [SAIC], 2011a), and the USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064 (U.S. Environmental Protection Agency [USEPA], 2000).*

This RI Report Addendum was prepared in accordance with Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) guidance and regulations, Ohio EPA Director's Final Findings and Orders (DFFO, Ohio EPA, 2004), and the National Oil and Hazardous Substances Contingency Plan. The former Ravenna Army Ammunition Plant (RVAAP) is not on the USEPA National Priorities List, although it is in the USEPA Superfund Enterprise Management System database. The Ohio EPA is the environmental regulator for the RVAAP restoration program. The DFFOs form the basis for the implementation of a CERCLAbased environmental remediation program at the installation. This document was prepared in accordance with the *Submission Format Guidelines for the Ravenna Army Ammunition Plant Restoration Program, Version 22* (Vista Sciences Corporation, 2020).

The former RVAAP, now Camp James A. Garfield Joint Military Training Center (CJAG), is located in Portage and Trumbull Counties, Ohio (Figure 1-1). CC RVAAP-79 DLA Ore Storage Sites include the following nine sub-areas (Figure 1-2):

- Main Storage Area
- Area West of Railroad
- East Transportation Yard
- Concrete Pad Storage Area
- Ore Storage Pond
- Route 80 Tank Farm
- Area 2 Ammunition Storage Area
- Load Line 3 Building 803 Inert Storage and Tank Storage Area
- Area 8 Inert Storage, Building 841

The RI for eight of the nine areas is complete and documented in the *Final Remedial Investigation* Report for CC RVAAP-79 DLA Ore Storage Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio (Parsons, 2020). This RI Addendum only addresses the Ore Storage Pond sub-area.

1.1 PURPOSE

The objectives of the CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area RI Addendum are to:

- Conduct a field investigation to collect site-related data to determine toxicity of the sediment at the Area of Concern (AOC).
- Determine if a Feasibility Study is required to evaluate remedial alternatives.

1.2 SCOPE AND OBJECTIVES

This section presents objectives to complete the RI for the Ore Storage Pond sub-area. Arsenic concentrations in sediment exceeded the Ohio EPA Sediment Reference Value (SRV, Ohio EPA, 2018). Ohio Administrative Code (OAC) 3745-1 and *Ecological Risk Assessment Guidance Document* (Ohio EPA-Division of Environmental Response and Revitalization [DERR], 2018) require that further evaluation using bioassay or remediation of the sediment be performed if contaminant concentrations in sediment in lentic water bodies exceeds the Ohio EPA SRV. The following objective has been identified to complete the RI for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area:

- Characterize sediment ecotoxicity using bioassays to determine if remedial alternatives should be evaluated for sediment, or if no further action is required to address ecological risk in sediment. Two bioassays were performed on composite sediment samples:
 - o Hyalella azteca 10-day bioassay, and
 - o Chironomus dilutus (tentans) 10-day bioassay.

Bioassays followed USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064 (USEPA, 2000).

As part of the facility-wide approach to environmental investigation activities at the former RVAAP, facility-wide Data Quality Objectives (DQOs) have been developed consistent with the USEPA DQO process. The overall project DQO is to provide representative, repeatable, high quality data in order to complete a RI Report at the Ore Storage Pond sub-area at CC RVAAP-79 DLA Ore Storage Sites. DQOs specific to the Ore Storage Pond sub-area are presented in the Work Plan Addendum (Parsons, 2021) and Section 3.2.

1.3 REPORT ORGANIZATION

The RI Addendum is organized into the following sections:

- Section 1 (Introduction) Provides an overview of the purpose and scope of this RI Addendum.
- Section 2 (Background) Describes CJAG's location, operational history, demography, land use, as well as the AOC site description, operational history, and results and conclusions of previous investigations.

- Section 3 (Remedial Investigation Addendum Activities) Describes the scope of work completed and the procedures followed during this RI Addendum, including a discussion of the sampling rationale for placement of environmental media sampling locations, field activity procedures, laboratory methods, and protocols. Included in this section are the pre-mobilization activities and the field sampling methods for the sediment composite and discrete sampling. Any deviations from the work plan are outlined in this section.
- Section 4 (Results and Discussion) Discusses the results of the 10-day bioassays performed on the composite sediment samples collected from the Ore Storage Pond sub-area.
- Section 5 (Summary and Conclusions) Presents the summary and conclusions for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area based on the observations and toxicity results collected during the RI Addendum.
- Section 6 (Recommendations) Presents the recommendations for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area based on the observations and toxicity results collected during the RI Addendum.
- Section 7 (References) Lists references used to prepare this document.

The appendices to this document contain the summarized investigation data, including:

- Appendix A Field Activity Forms,
- Appendix B Bioassay Report,
- Appendix C Site Photographs,
- Appendix D Ohio EPA Notification of Field Work, and
- Appendix E Regulatory Correspondence Letters and Comments Response Table.

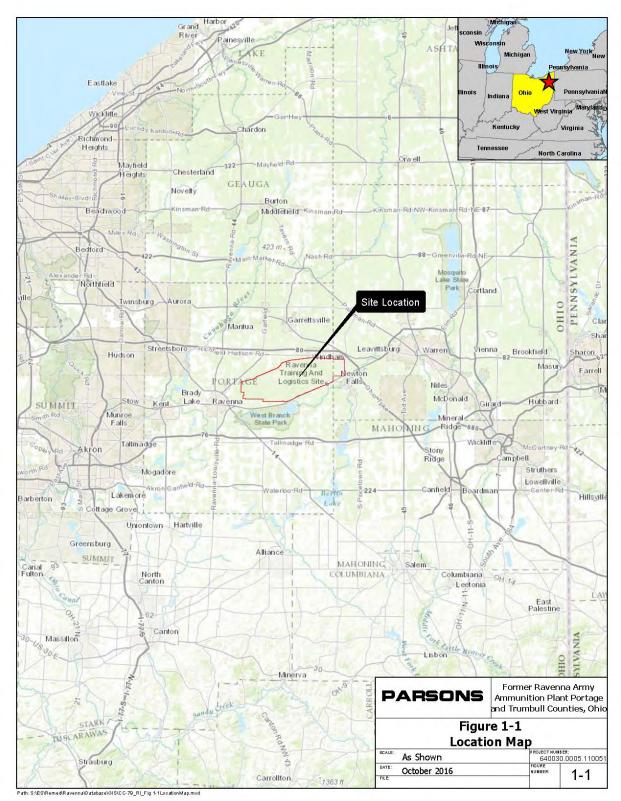


Figure 1-1: Location Map

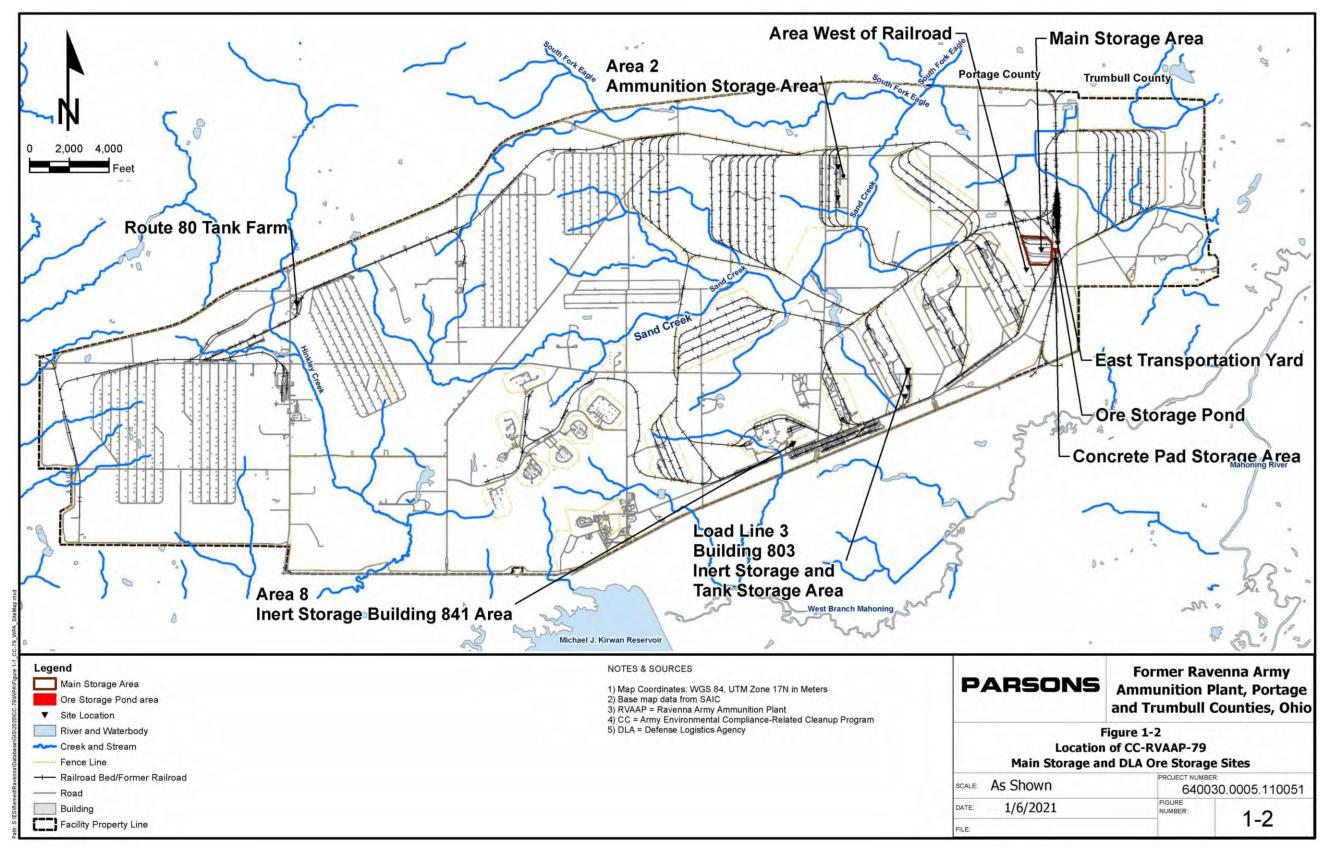


Figure 1-2: Location of CC RVAAP-79 DLA Ore Storage Sites

2. BACKGROUND

2.1 FACILITY-WIDE BACKGROUND

2.1.1 Facility Description

The facility description of the former RVAAP, now known as CJAG, is provided in Section 2.1.1 of the Final RI Report (Parsons, 2020).

2.1.2 Demography and Land Use

The 2020 Census reports that the populations of Portage and Trumbull counties are 162,466 and 197,974, respectively. Population centers closest to CJAG are Ravenna, with a population of 11,187, and Newton Falls, with a population of 4,413.

CJAG is located in a rural area and is not close to any major industrial or developed areas. Approximately 55 percent of Portage County, in which the majority of CJAG is located, consists of either woodland or farmland acreage. The closest major recreational area, the Michael J. Kirwan Reservoir (also known as West Branch Reservoir), is south of CJAG.

As of September 2013, administrative accountability for the entire 21,683-acre facility has been transferred to the United States Property and Fiscal Officer for Ohio and the property was subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site now known as CJAG. The RVAAP restoration program involves cleanup of former production/operational areas throughout CJAG related to former activities conducted as the RVAAP.

2.2 ENVIRONMENTAL SETTING

A general description of the physical features, topography, geology, hydrogeology, and environmental characteristics of CJAG is included in Section 2.2 of the Final RI Report (Parsons, 2020). The environmental setting specific to CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area is included in this Section.

2.2.1 Topography

The surface features present at CC RVAAP-79 DLA Ore Storage Sites are generally similar to the rest of CJAG, with mildly undulating topography. Figure 2-1 shows the site features and topography of the five contiguous sub-areas of the AOC, including the Main Storage Area, Area West of the Railroad, East Transportation Yard, Concrete Pad Storage Area, and Ore Storage Pond. These sub-areas are mostly devoid of large or tall vegetation and are surrounded by wooded areas. Railroad spurs formerly either traversed or were located immediately adjacent to each sub-area.

Topographical elevations of the contiguous sub-areas (including the Ore Storage Pond) are between approximately 980 feet above mean sea level (amsl) on the western side and 940 feet amsl on the eastern side (Figure 2-1). Based on area topography, the ground surface slopes to the east across these contiguous sub-areas.

2.2.2 Geology and Soil

The regional geology at CJAG consists of horizontal to gently dipping bedrock strata of Mississippian and Pennsylvanian age overlain by varying thicknesses of unconsolidated glacial deposits. Soils were observed and logged during the RI conducted at the CC RVAAP-79 DLA Ore Storage Sites (Parsons, 2020).

The soil type present at the contiguous sub-areas (including the Ore Storage Pond) consists of disturbed soils that are lacking any original depositional structures or features called Udorthents. No pertinent information regarding Udorthents is available as these soils have been disturbed to a degree that the original soil type at these locations can no longer be identified. Mahoning silt loam (2 to 6 percent slopes) is present in the area surrounding the Ore Storage Pond. Mahoning silt loam is a somewhat poorly drained soil with variable surface runoff and low permeability. The deeper soils observed and documented during the previous RI sampling events are assumed to be Hiram Till glacial deposits or fill material from site construction.

Bedrock was encountered during drilling at depths ranging from 2 to 9 feet in the contiguous sub-areas (including the Ore Storage Pond). In general, the top of bedrock was within four feet of the surface in the Area West of Railroad sub-area (west side of contiguous sub-areas) and from four to nine feet below ground surface (bgs) in the East Transportation Yard sub-area (east side of the contiguous sub-areas). The bedrock is described on boring logs as sandstone and varies in depth of weathering. This sandstone is likely the Sharon Sandstone (Conglomerate) Member of the Pottsville Formation.

2.2.3 Hydrogeology

The potentiometric surface for CJAG aquifers is mapped annually from groundwater elevation measurements in monitoring wells, most recently in the *Facility-Wide Groundwater Monitoring Program, RVAAP-66 Facility-Wide Groundwater Annual Report for 2019* (Leidos, 2020). One monitoring well, FWGmw-010, is located within the Main Storage Area. This well is completed in unconsolidated deposits and screened from 6 to 16 feet bgs. During the April 2019 groundwater monitoring event, the groundwater in this well was measured at approximately 11.40 feet bgs (Leidos, 2020). The groundwater flow direction within the unconsolidated aquifer beneath the contiguous sub-areas (including the Ore Storage Pond) is to the east.

The nearest bedrock monitoring well is FWGmw-012, located approximately 1,300 feet to the northeast of the contiguous sub-areas (including the Ore Storage Pond), and is screened in the Sharon Shale from 29.5 to 39.5 feet bgs. During the April 2019 groundwater monitoring event, the groundwater in this well was measured at approximately 0.25 feet bgs (Leidos, 2020). The Sharon Shale is not a regional aquifer. It is assumed that the regional bedrock aquifer beneath the vicinity of the contiguous sub-areas (including the Ore Storage Pond) is the Sharon Sandstone. The regional groundwater flow direction in the vicinity of the contiguous sub-areas (including the Ore Storage Pond) within the Sharon Sandstone Aquifer is towards the east- northeast.

2.2.4 Surface Water

Surface water at the contiguous sub-areas occurs intermittently as storm water runoff within ditches or conveyances and toward a wetland area within these contiguous sub-areas (i.e., the Ore Storage Pond). The Ore Storage Pond is approximately 0.36 acres in size and was constructed to control potentially contaminated surface water runoff from the adjacent manganese and chrome stockpiles from leaving the site. During the April 2021 sediment sampling event, the depth of water in the pond at sediment sampling locations ranged between 10 and 16 inches, and the thickness of the sediment ranged between 6 to 11 inches. The pond has not been maintained and therefore has been subject to continuous sedimentation and now is classified as an intermittently exposed, palustrine, emergent wetland versus a small open-water pond. The nearest wetland area downgradient of the Ore Storage Pond is approximately 2,100 to the feet east.

2.3 AREA OF CONCERN DESCRIPTION

CC RVAAP-79 DLA Ore Storage Sites include the following nine sub-areas:

- Main Storage Area
- Area West of Railroad
- East Transportation Yard
- Concrete Pad Storage Area
- Ore Storage Pond
- Route 80 Tank Farm
- Area 2 Ammunition Storage Area
- Load Line 3 Building 803 Inert Storage and Tank Storage Area
- Area 8 Inert Storage, Building 841

The nine separate ore storage sub-areas comprising CC RVAAP-79 DLA Ore Storage Sites are all located within CJAG (Figure 1-1). The RI for eight of the nine areas is complete and documented in the *Final Remedial Investigation Report for CC RVAAP-79 DLA Ore Storage Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio* (Parsons, 2020). This RI Addendum only addresses additional sampling for the Ore Storage Pond sub-area.

Five of the sub-areas are contiguous and are located in the eastern portion of CJAG near the intersection of South Service Road and Irons Road (Figure 2-1). All five areas comprising these contiguous sub-areas cover approximately 63 acres. The portion of the sub-areas that stored ore is approximately 53 acres, the other 10 acres were added to the sub-areas as delineation decision units (DUs). The DLA stored strategic and critical materials, including chrome ore, ferrochrome ore, and metallurgical manganese ore at these subareas starting in the late 1940's. All ore was removed by 2012. The Ore Storage Pond was reportedly constructed in the mid-1950s to prevent potentially contaminated surface water runoff from nearby manganese and chrome stockpiles from entering surface water. Because the pond has not been maintained, the pond has filled in significantly since it was originally constructed and now functions as a palustrine, emergent, intermittently exposed wetland as mapped by the National Wetland Inventory (U.S. Fish and Wildlife Service, 2018). No buildings or associated infrastructure (e.g., utility lines) are believed to have been located in or near these sub-areas; however, railroad spurs were located in portions of the Main Storage Area and the Concrete Pad Storage Area. The Area West of Railroad, East Transportation Yard, and the Ore Storage Pond are located immediately adjacent to railroad spurs.

2.3.1 Operational History

Based on the Final Report for the Assessment of Potential Contamination at the Defense Logistics Agency Outdoor Storage Areas, Ravenna Army Ammunition Plant, Ravenna, Ohio (SpecPro, Inc., 2003), historical operations conducted at the facility included handling and storage of strategic and critical materials, including various types of ore, for the General Services Administration (GSA). The DLA Defense National Stockpile Center leased space at the facility for the storage of the ore materials on the ground and in above-ground storage tanks since the late 1940's. The following GSA materials were stockpiled on the ground surface in the sub-areas surrounding the Ore Storage Pond: chrome ore, ferrochrome ore, and metallurgical manganese ore

(SpecPro, Inc., 2003). Ore stockpiles were being removed during the 2003 SpecPro, Inc. investigation and were completely removed from the AOC when RI investigations began in 2012.

The Historical Records Review report (SAIC, 2011b) suggested that coal storage may have occurred within the Concrete Pad Storage Area (DU05). If coal was stored within the Concrete Pad Storage Area, it was likely removed by 1979, which is the approximate date that coal piles were removed from the other coal storage areas (CC RVAAP-73 Facility-Wide Coal Storage). No ore or coal was present at the Concrete Pad Storage Area during RI sampling (Parsons, 2020).

2.3.2 **Previous Investigations**

Timeline for investigations and related documents at CC RVAAP-79 DLA Ore Storage Sites:

- 2003 Final Report for the Assessment of Potential Contamination at the DLA Outdoor Storage Areas (SpecPro, Inc., 2003)
- November 2010 Initial Assessment of CC RVAAP-79 DLA Group 2 Ammunition Storage Area (USACE, 2011)
- October 2012 Site Inspection/RI Work Plan finalized (ECC, 2012)
- October 2012 and March 2013 RI sampling performed at CC RVAAP-79 DLA Ore Storage Sites
- April 2015 Additional RI sampling performed at CC RVAAP-79 DLA Ore Storage Sites (except for the Ore Storage Pond and Area 2 Ammunition Storage Area)
- February 2019 Draft RI Report submitted to Ohio EPA
- April 2019 to February 2020 Series of comments on Draft RI from Ohio EPA requesting additional sediment sampling and bioassays for the Ore Storage Pond.
- October 2020 Final RI Report (Parsons, 2020) recommending additional sediment sampling and bioassays at the Ore Storage Pond sub-area.
- March 2021 Final Work Plan Addendum for Ore Storage Pond (Parsons, 2021)

2.3.2.1 Previous Investigations at the Main Storage Area, Area West of the Railroad, East Transportation Yard, Concrete Pad Storage Area, and Ore Storage Pond

A soil and sediment survey conducted in 1982 by The Mogul Corporation included the collection of 7 soil and 1 pond sediment sample points in the DLA ore pile area (The Mogul Corporation, 1982). The samples were analyzed for 2,4,6-trinitrotoluene, hexahydro-1,3,5-trinitro-1,3,5-triazine, and selected inorganics. Sampling for pollutants in storm water discharges was conducted on a monthly basis upstream (National Pollutant Discharge Elimination System [NPDES] Outfall #800) and downstream (NPDES Outfall #900) from the site in a surface drainage pathway adjacent to the chromium ore piles from November 1992 through February 1997. Available results from this investigation are available in the *Assessment of Potential Contamination at the DLA Outdoor Storage Areas* (SpecPro, Inc., 2003).

SpecPro, Inc. conducted an assessment of DLA outdoor storage areas, including documenting the operational history of ore storage at these contiguous sub-areas, Route 80 Tank Farm, and Load Line 3 DLA Tank Storage Area, summarizing previous investigations, and conducting sampling in 2003 (SpecPro, Inc., 2003). During the 2003 investigation, 86 discrete surface soil samples

(0-1 foot bgs) were collected from the Ore Storage Areas, as well as 14 sediment and 2 surface water samples (SpecPro, Inc., 2003). For soil characterizations purposes, most samples were analyzed for Resource Conservation and Recovery Act (RCRA) 8 metals. A portion of those samples were further characterized using the complete Target Analyte List (TAL) metals list. Detected contaminant concentrations were compared against facility-wide background values developed as part of the Phase II RI for the Winklepeck Burning Grounds (SAIC, 2001).

Three inorganics (arsenic, chromium, and lead) were detected at concentrations greater than background levels in the surface water samples collected from the Ore Storage Pond. Five inorganics were detected at concentrations greater than background levels in the sediment samples. Arsenic and chromium were detected in most sediment samples (71% and 93% of the time, respectively). In general, the occurrence of inorganics in sediment at concentrations greater than background criteria was limited to areas nearest to the chromium piles at the storage area. Inorganics were detected at concentrations greater than the background criterion in 83 out of 86 surface soil samples. Arsenic, barium, and chromium represented most contaminants detected at concentrations greater than background levels in the ore pile storage area; however, the concentrations of inorganics were spatially variable. In general, the occurrence of inorganics at concentrations greater than background criteria in surface soil was limited only to the DLA Ore Pile Storage Area and not the area surrounding the main storage location. Subsurface soil samples were not collected because target analyte Toxicity Characteristic Leaching Procedure maximum contaminant levels were not exceeded in surface soil samples (SpecPro, Inc., 2003). SpecPro, Inc. concluded that surface soil "does not appear to be significantly impacted by storage-related activities". SpecPro, Inc. further concluded that "many of the inorganics found at the DLA Storage Areas may be attributable to sources that have already been removed or are in the process of being removed." Results from this 2003 investigation are available in the Assessment of Potential Contamination at the DLA Outdoor Storage Areas (SpecPro, Inc., 2003).

2.3.2.2 Remedial Investigation Activities at the Ore Storage Pond

The following paragraphs summarize the results for the Ore Storage Pond sub-area documented in the *Final Remedial Investigation Report CC RVAAP-79 DLA Ore Storage Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio* (Parsons, 2020).

RI field work at the Ore Storage Pond was conducted in March and April 2013. Field work was conducted in accordance with *Final Site Inspection and Remedial Investigation Work Plan at Compliance Restoration Sites, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio* (ECC, 2012). DUs were designed to represent the operational areas where storage or staging activities could have caused residual contamination in surrounding media. The Ore Storage Pond was designated DU03.

Five discrete collocated sediment and surface water samples (4 primary samples and 1 field duplicate) were collected from 4 sampling locations at the Ore Storage Pond (Figure 2-2). The sediment samples were collected from 0-1 foot below the bottom of the pond. All the samples were analyzed for TAL metals, including mercury. The sediment sample from 79-OSP-DU3-SD3 and surface water sample from 79-OSP-DU3-SW1 were also analyzed for full-suite (including volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], organochlorine pesticides, polychlorinated biphenyls, and explosives/propellants).

Data generated during the CC RVAAP-79 DLA Ore Storage Sites RI for the Ore Storage Pond were screened to identify site-related chemicals (SRCs). A chemical detected at a concentration

greater than the established Background Screening Value, that is not an essential nutrient, and has not been screened out through a frequency of detection evaluation is identified as an SRC. An SRC may, or may not be, related to the former operations at the AOC. Ten inorganics, eleven SVOCs, and three VOCs were identified as SRCs in sediment at the Ore Storage Pond. Five inorganics and one VOC were identified as SRCs in surface water at the Ore Storage Pond.

Receptors and Land Use: The OHARNG-projected future land use for the AOC is Military Training Land Use. The representative receptor for these areas is the National Guard Trainee (NGT) Receptor. Additionally, the Industrial Receptor is representative for the full-time worker at CJAG. Unrestricted (Residential) Land Use is evaluated using the Resident Receptor. The Ore Storage Pond is a small (0.36 acre) former man-made pond and has no permanent inlet. There is an overflow outlet ditch from Ore Storage Pond to the ditch along the railroad to east of the pond. The Ore Storage Pond represents only a small fraction of the total habitat available at CJAG, it does not contain any unique habitats, and it may contain habitat of lower quality than the less developed portions of CJAG property (Parsons, 2020).

Nature and Extent of Contamination: The evaluation of nature and extent of contamination for the Ore Storage Pond sub-area concluded that the extent of detected chemicals in sediment and surface water is confined to the pond itself. Because the Ore Storage Pond was constructed to contain runoff from the Main Storage Area, surface water does not enter or leave the pond, except during periods of heavy precipitation.

Human Health Risk Assessment: Chemicals of potential concern (COPCs) that were carried through the risk assessment were identified by comparing the maximum detected concentration (MDC) of each SRC at each sub-area to the most stringent Resident Receptor Facility-Wide Cleanup Goal (FWCUG) (SAIC, 2010) (or USEPA Residential Receptor Regional Screening Level [RSL] if no FWCUG is established) at a target cancer risk level of 10⁻⁶ and non-carcinogenic target hazard quotient (HQ) of 0.1. Discrete samples were used to identify COPCs in sediment at the Ore Storage Pond. Grab samples were used to identify COPCs in surface water.

The COPCs in sediment (arsenic and cobalt) and surface water (arsenic) were further evaluated to identify chemicals of concern (COCs). COCs were determined by comparing the exposure point concentrations (EPCs) to FWCUGs or, where not developed, RSLs corresponding to a target cancer risk of 10⁻⁵ or target HQ of 1. The Human Health Risk Assessment performed for CC RVAAP-79 DLA Ore Storage Sites evaluated Unrestricted (Residential) Land Use (Resident Receptor), which is protective of all receptors. The RI Report (Parsons 2020) concluded that there are no COCs identified in any media in the Ore Storage Pond sub-area.

Ecological Risk Assessment: The RI Report (Parsons, 2020) included a Phase I and Phase II Ecological Risk Assessment (ERA) for all DUs including sediment and surface water at the Ore Storage Pond sub-area. The process included selection of EPCs for all SRCs, and comparison of EPCs to Ohio EPA SRVs and Ecological Screening Values (ESVs, Los Alamos National Laboratory, 2017) to identify and refine chemicals of potential ecological concern (COPECs).

There were no COPECs identified for surface water in the Level II ERA, therefore the RI Report (Parsons, 2020) concluded that no further investigation (e.g., Level III Baseline ERA) for surface water is considered necessary for the protection of ecological receptors at the Ore Storage Pond.

The MDC of arsenic in sediment (300 mg/kg) exceeded the Ohio EPA SRV (25 mg/kg) and ESV (9.79 mg/kg). The Level II ERA identified arsenic as a COPEC in sediment at the Ore Storage

Pond (Figure 2-2). Although the weight of evidence in the ERA showed arsenic was unlikely to cause any ecological impact, the arsenic concentration in sediment exceeded the Ohio EPA SRV. Therefore, in accordance with OAC 3745-1 and *Ecological Risk Assessment Guidance Document* (Ohio EPA-DERR, 2018), Ohio EPA indicated that only two options were available for Ore Storage Pond sediment: assess ecotoxicity with bioassays or remediate.

Remedial Investigation Report Recommendations: The Final RI report (Parsons, 2020), consistent with OAC 3745-1 and *Ecological Risk Assessment Guidance Document* (Ohio EPA-DERR, 2018), recommended additional assessment for sediment at the Ore Storage Pond. Specifically, the RI report recommended that six sediment samples should be collected across the pond. Two bioassays should be performed on composite samples consisting of portions from three of the six sediment samples:

- *Hyalella azteca* 10-day bioassay, and
- Chironomus dilutus (formerly tentans) 10-day bioassay.

Bioassays should follow USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064 (USEPA, 2000). Other appropriate organism(s) may be substituted for Chironomus dilutus (tentans) if needed. The decision of whether sediment should be evaluated for remedial alternatives or if no further action is required to address ecological risk based on the results of the bioassays.

In addition, the six sediment samples would be analyzed for standard sediment parameters (total organic carbon, pH, and grain size analysis) and the TAL metals. The results of these analyses would be used to support the evaluation of remedial alternatives, should evaluation be necessary. The results may also be helpful in interpreting the results of the bioassays. No further investigation or removal action was recommended for surface water.

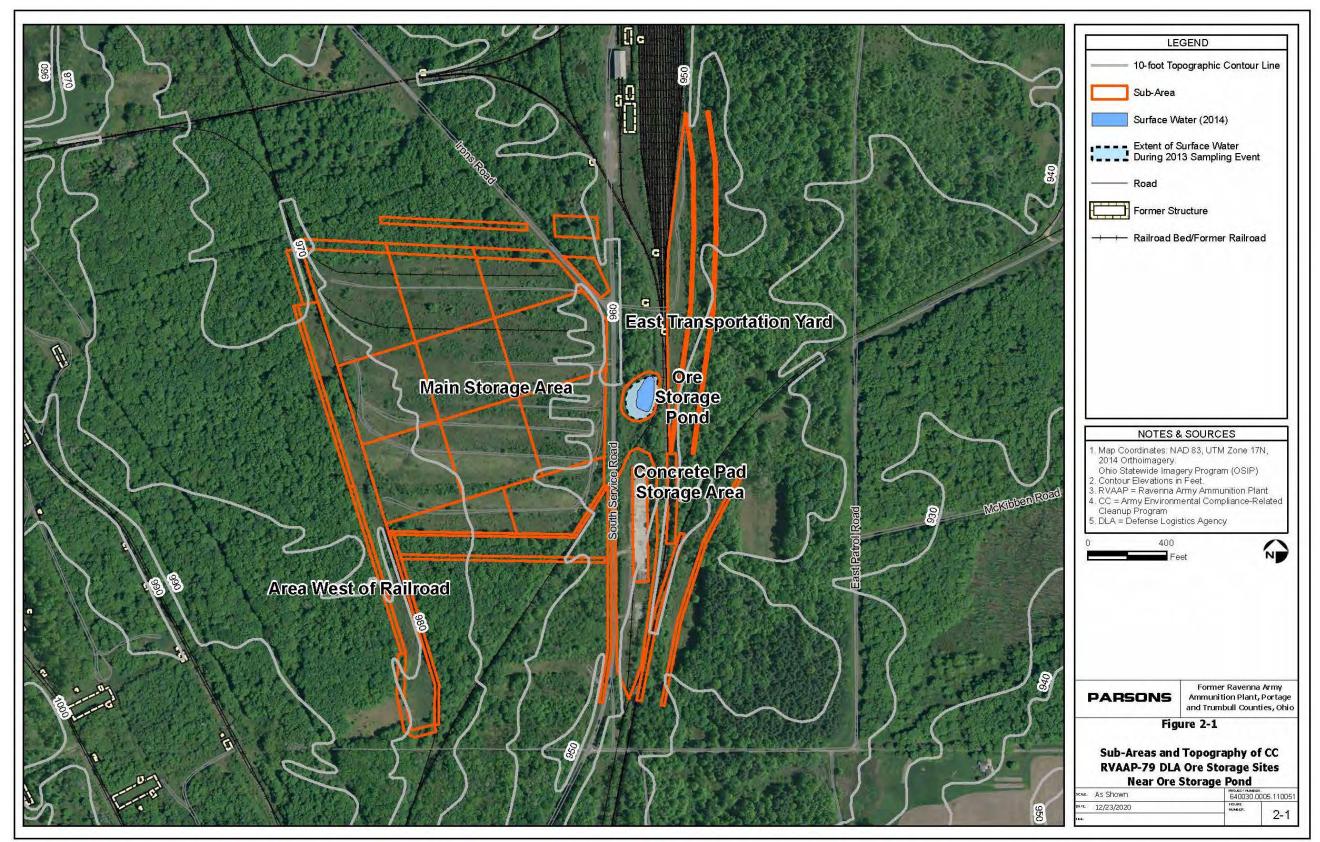
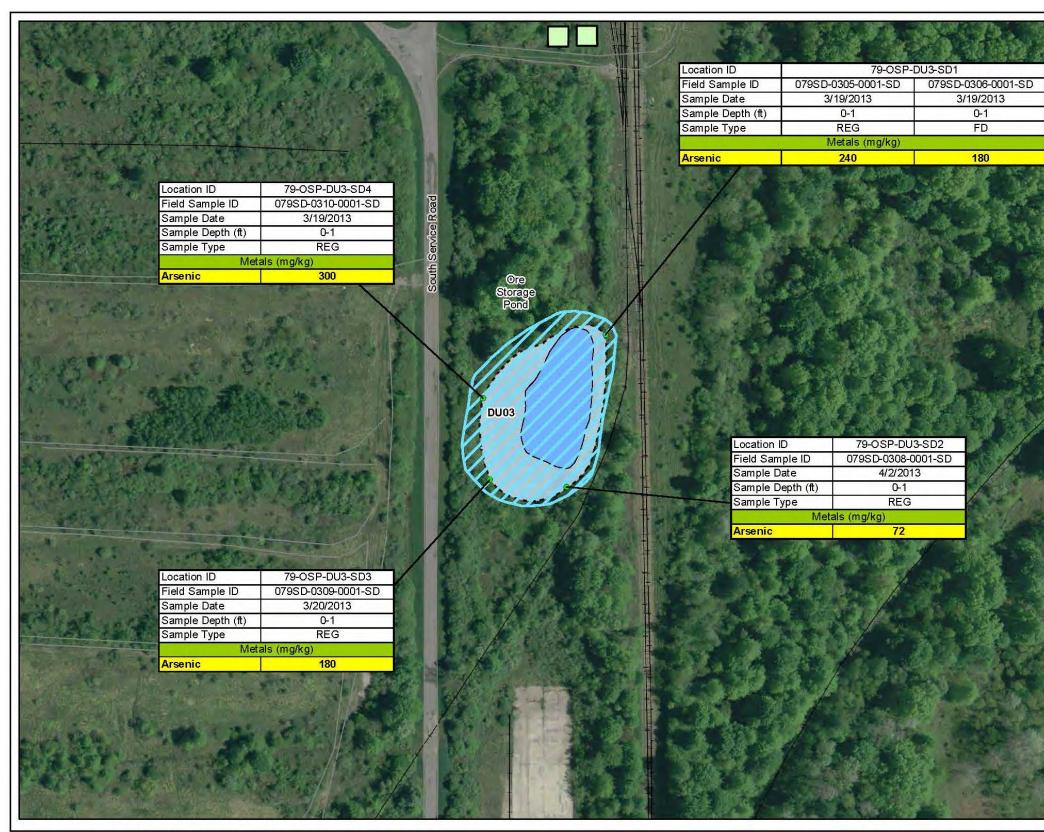
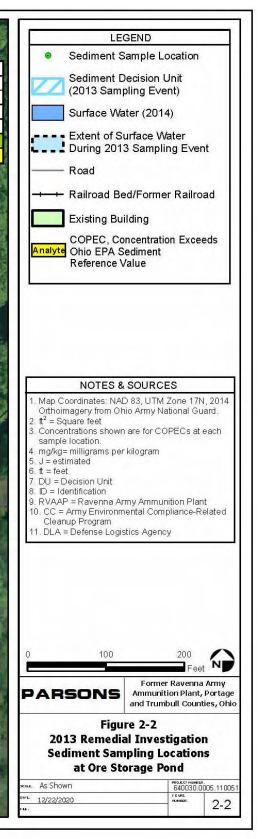


Figure 2-1: Sub-Areas and Topography of CC RVAAP-79 DLA Ore Storage Sites near Ore Storage Pond



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3. REMEDIAL INVESTIGATION ADDENDUM ACTIVITIES

This RI Addendum was conducted to characterize sediment ecotoxicity using bioassays to determine if remedial alternatives should be evaluated for sediment, or if sediment is appropriate for no further action to address ecological risk. Samples used for decision making in this RI Addendum were collected by Parsons in April 2021. Work conducted by Parsons for this RI Addendum was performed as specified in the FWSAP (SAIC, 2011a) and the Work Plan Addendum (Parsons, 2020) unless specifically noted herein (Section 3.6).

3.1 SCOPE AND OBJECTIVES

The following objective was identified to complete the RI for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area:

- Characterize sediment ecotoxicity using bioassays to determine if remedial alternatives should be evaluated for sediment, or if no further action is required to address ecological risk in. Perform two bioassays on composite sediment samples:
 - o Hyalella azteca 10-day bioassay, and
 - *Chironomus dilutus (tentans)* 10-day bioassay.

Bioassays should follow USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064 (USEPA, 2000). Other appropriate organism(s) may be substituted for Chironomus dilutus (tentans) if needed.

3.2 DATA QUALITY OBJECTIVES

The overall project DQO is to provide representative, repeatable, high quality data to address the primary project objectives (Parsons, 2020). Samples were collected and analyzed according to the FWSAP and the Work Plan Addendum. The FWSAP and Work Plan Addendum provide the organization, objectives, intended data uses, and Quality Assurance/Quality Control (QA/QC) activities to perform in order to achieve the desired DQOs for maintaining the defensibility of the data. Project DQOs were established in accordance with USEPA Region 5 guidance. Requirements for sample collection, handling, analysis criteria, target analytes, laboratory criteria, and data verification criteria for the RI Addendum are consistent with USEPA and U.S. Department of Defense (DoD) requirements. DQOs for this project include analytical precision, accuracy, representativeness, completeness, comparability, and sensitivity for the measurement data. DQOs specific to the Ore Storage Pond sub-area are presented in the Work Plan Addendum (Parsons, 2021) and Table 3-1.

3.3 SAMPLING RATIONALE

At the CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area, discrete and composite sampling methods were employed to investigate the toxicity of sediment. DUs were established in the RI Report (Parsons, 2020) to represent the operational areas where storage or staging activities could have caused residual contamination in the surrounding media (Figure 3-1). The location and size of the Ore Storage Pond DU (DU03) was based on the extent of the Ore Storage Pond. The Work Plan Addendum (Parsons, 2021) included a detailed approach for sampling at the Ore Storage Pond sub-area. Sampling conducted in April 2021 at DU03 represents the area of potential impact

from historical operations. A description of the sampling activities conducted at the Ore Storage Pond sub-area is provided in the following sections and is summarized in detail in Table 3-2.

3.4 PRE-MOBILIZATION ACTIVITIES

Parsons personnel conducted a site walk on January 9, 2020 to scout access to the pond. Parsons personnel mobilized to the pond on April 20, 2021 to collect sediment samples. This included notification of field work to Ohio EPA (Appendix D).

3.5 FIELD SAMPLING

Sediment samples were collected at CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond sub-area. Field sampling forms from April 2021 are provided in Appendix A. The bioassay laboratory report is presented in Appendix B. Photographs of RI Addendum activities from April 2021 are provided in Appendix C. Figure 3-1 depicts the location, size, and sampling locations for the sub-area. Table 3-2 presents a summary of sample identifications, sample collection methods (type), and the rationale for the sampling activities conducted at the Ore Storage Pond sub-area.

3.5.1 Sediment Sampling

Six sediment samples (plus QC including 1 field duplicate and 1 matrix spike/matrix spike duplicate) were collected from 6 sampling locations across two transects that transverse the width of the Ore Storage Pond (from West to East) using discrete sampling methods. A portion of three samples was composited in the field for a total of two composite samples (one composite sample consisting of even-numbered samples, and the other composite sample consisting of odd-numbered samples) for biological analysis (see Section 3.5.2).

Information recorded on the sample forms included station number, depth to bottom, sediment depth (i.e., sampler penetration depth), sediment depth stratum sampled, physical sediment characteristics, and date and time of sample collection (Appendix A). In addition, field measurements for temperature, pH, dissolved oxygen, etc. were collected from the water column within one meter of the sediment prior to sediment sample collection. Photographs were also taken of each sample station (Appendix C). All sediment surface using a Wildco hand-coring device. Multiple deployments of the corer were necessary to obtain adequate sediment quantity for the sample containers.

The sediment was placed in a plastic container. When sufficient sediment for all analyses had been collected, the sediment in the container was thoroughly homogenized. All sample containers were stored in insulated, ice-filled coolers while in the field prior to shipment. The hand corer was decontaminated between sampling stations by scrubbing with a brush and ambient pond water, followed by a thorough *in situ* rinsing. An equipment blank rinsate sample was collected from the hand corer.

3.5.2 Bioassays

Six sediment samples were collected using two transects across the pond and composited into two samples (three samples for each composite). Sediment was homogenized and split into laboratory containers in the field as described above. Headspace in the bioassay test sample containers was minimized. Bioassays were performed by EA Engineering Science and Technology, Inc. PBC in Hunt Valley, Maryland on each composited sample:

• *Hyalella azteca* (amphipod) 10-day bioassay and

• *Chironomus dilutus* (midge, formerly tentans) 10-day bioassay.

Bioassays followed USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates (USEPA, 2000). The tests were performed with 8 replicates per composite sediment sample. The 10-day bioassay tests evaluated survival and growth as endpoints for each test organism and a laboratory control sample was included with the tests. The bioassay samples were performed with a holding time of 14 days or less. Water overlying the test organisms was also field tested for temperature, pH, dissolved oxygen, and conductivity/salinity. The laboratory provided a final report specifying methods, materials, results, statistical determination of toxic concentrations, and unforeseen protocol deviations with an evaluation of the resulting impact. Toxicity testing operations and performance criteria are presented in Appendix B.

The survival and growth results of the organisms toxicity tests were statistically analyzed according to USEPA guidance (USEPA, 2000) to determine if any of the site sediments were significantly different (p=0.05) from the control sediment. If the data were normally distributed, then a t-Test was performed to detect statistically significant differences between test sediments and the control sediment. If the data distribution was non-normal, then a Wilcoxon Two-Sample Test was used to compare the group means. Shapiro-Wilk's Test was used to determine if the data were normally distributed, and the F-Test was used to test for homogeneity of variance.

3.6 DEVIATIONS FROM WORK PLAN

Work performed in April 2021 at the Ore Storage Pond followed the Work Plan Addendum (Parsons, 2021), except for the following deviations:

- 10-day bioassays for *Hyalella azteca* and *Chironomus dilutus* were performed on both composite sediment samples 079SD-416M-0001-SD and 079SD-417M-0001-SD.
- Sediment sampling locations were not recorded using a Trimble Global Positioning System (GPS) unit. The Trimble GPS unit was not operational at the time of sample collection. Instead, the field team used professional judgement and satellite imagery to locate the sampling stations in the pond. The samples were collected as close as possible to the originally proposed sample locations (within 4 meters as specified in the Work Plan Addendum [Parsons, 2021]).

3.7 SURVEYING

The sediment sampling locations within the pond were not surveyed.

3.8 INVESTIGATION-DERIVED WASTE

Sampling conducted at the Ore Storage Pond did not generate any investigation-derived waste.

State the Problem	Identify Goals of the Study	Identify Information Inputs	Define the Boundaries of the Study	Develop the Analytic Approach	Specify Performance or Acceptance Criteria	Develop the Detailed Plan for Obtaining Data
CC RVAAP-79 DLA Or	e Storage Sites, Ore Storage	Pond Sub-Area	I	L	1	
Concentrations of metals were detected in the sediment samples from the Ore Storage Pond that were greater than Ohio EPA SRVs. Although the Army showed there were unlikely to be unacceptable risks to ecological receptors that use the pond using standard ERA tools; the Ohio EPA per their regulations, stated that there were only two options: test the sediment by completing two bioassays or remediate the sediment.	Is the sediment toxic as measured by <i>Hyalella</i> <i>azteca</i> 10 day bioassay and /or <i>Chironomus</i> <i>dilutus</i> (<i>tentans</i>) 10 day bioassay? If bioassays indicate toxicity, report the results, and close the RI phase, then proceed to evaluation of remedial alternatives. If not toxic, report and close the RI phase with conclusion that no further action is required to address ecological risk.	Sediment toxicity is evaluated by survival and growth of in 10-day bioassays. Survival is measured by counting living (moving) organisms at the end of the 10-day test. Growth is measured by average dry weight (for <i>Hyalella azteca</i>) or ash-free dry weight (for <i>Chironomus dilutus</i>) of surviving organisms. Acceptable tests meet the following criteria in the controls: • <i>Hyalella azteca</i> Test Acceptability Criteria: 80% survival and measurable growth in the control • <i>Chironomus dilutus</i> Test Acceptability Criteria: 70% survival and a mean ash-free dry weight of 0.48 mg/organism in the control The survival and growth results from the Ore Pond sediment will be compared to those of the control or reference sediment to determine toxicity using statistical methods in accordance with <i>USEPA</i> <i>Methods for Measuring the Toxicity and</i> <i>Bioaccumulation of Sediment-associated</i> <i>Contaminants with Freshwater Invertebrates,</i> <i>Second Edition,</i> EPA 617 600/R-99/064, March 2000. If the data are normally distributed, then a t-Test will be performed to detect statistically significant (p = 0.05) differences between test sediments and the control sediment. If the data distribution is non-normal, then a Wilcoxon Two-Sample Test will be used to compare the group means. Shapiro-Wilk's Test will be used to determine if the data are normally distributed, and the F-Test will be used to test for homogeneity of variance. Should the test results indicate a high degree of statistical strength due to low variability in the data or if the data is highly variable, an indication of biological significance of >20% difference from the control, is sufficient to indicate that a sample may have a substantial impact.	Sediment from within the submerged portions of Ore Storage Pond. The pond is small (0.36 acres). Because the pond has not been maintained, the pond has filled in significantly since it was originally constructed. The size of the pond changes seasonally and with rain events.	Analytic approach is in accordance with USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 617 600/R-99/064, March 2000.	All sampling and analysis will be performed in accordance with the procedures outlined in the UFP-QAPP and the Work Plan Addendum, Additional Sampling for CC RVAAP-79 DLA Ore Storage Sites Remedial Investigation, Ore Storage Pond Sub-Area, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio.	 Collect six sediment samples across the pond. Prepare field composite samples that each contain portions from three of the six sediment samples) and perform the two bioassays: <i>Hyalella azteca</i> 10 day bioassay and <i>Chironomus dilutus (tentans)</i> 10 day bioassay Bioassays should follow USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064, March 2000. Other appropriate organism(s) may be substituted for <i>Chironomus dilutus (tentans)</i> if needed. Refer to Section 3.0 for further details.

Table 3-1: Data Quality Objectives

Location ID	Sample ID	Depth	Matrix	Sampl	е Туре	10-Day Bioassay	Notes
	079SD-410-0001-SD	0-6 inches	sediment	Discrete	N		
079SD-410	079SD-410-9001-SD	0-6 inches	sediment	Discrete	FD		Western most end of north transect.
	079SD-410-0001-SD-MS/MSD	0-6 inches	sediment	Discrete	MS/MSD		
079SD-411	079SD-411-0001-SD	0-6 inches	sediment	Discrete	Ν		Middle of north transect.
079SD-412	079SD-412-0001-SD	0-6 inches	sediment	Discrete	Ν		Eastern most end of north transect.
079SD-413	079SD-413-0001-SD	0-4 inches	sediment	Discrete	Ν		Western most end of south transect.
079SD-414	079SD-414-0001-SD	0-6 inches	sediment	Discrete	Ν		Middle of south transect.
079SD-415	079SD-415-0001-SD	0-6 inches	sediment	Discrete	Ν		Eastern most end of south transect
079SD-416M	079SD-416M-0001-SD	0-6 inches	sediment	composite	N	Hyalella azteca 10-day bioassay and Chironomus dilutus (tentans) 10-day bioassay	Composite sediment from SD-410, SD-412, and SD-414
079SD-417M	079SD-417M-0001-SD	0-6 inches	sediment	composite	N	Hyalella azteca 10-day bioassay and Chironomus dilutus (tentans) 10-day bioassay	Composite sediment from SD-411, SD-413, and SD-415

Table 3-2: Sampling Locations and Bioassays at Ore Storage Pond Sub-area CC RVAAP-79 DLA Ore Storage Sites

Notes:

FD = field duplicate MS/MSD = matrix spike/matrix spike duplicate N = normal sample SD = sediment

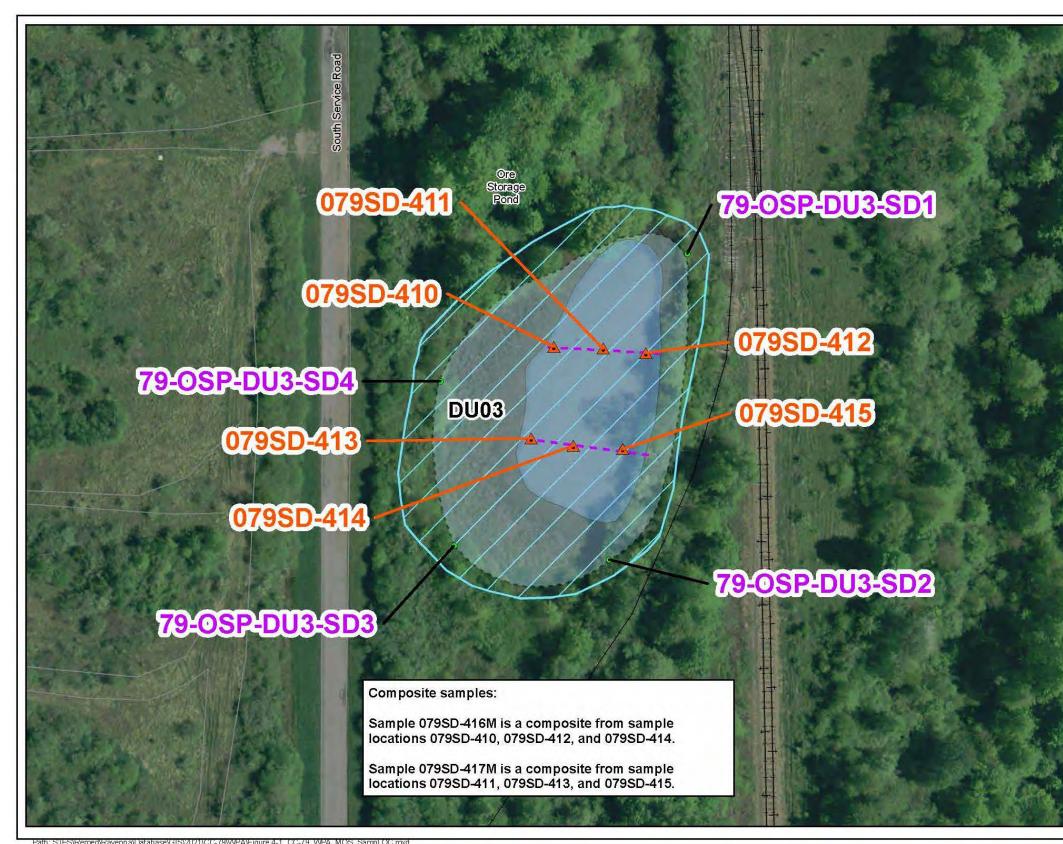
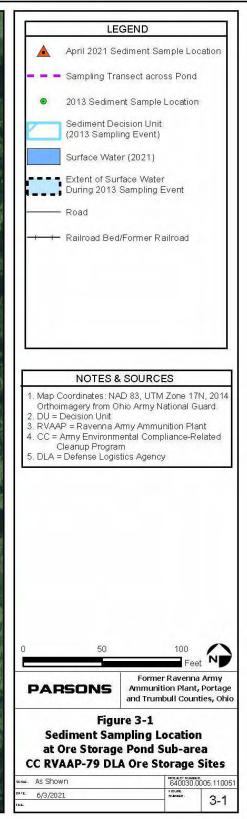


Figure 3-1: Sediment Sampling Locations at Ore Storage Pond Sub-area CC RVAAP-79 DLA Ore Storage Sites



4. RESULTS AND DISCUSSION

The Level II Screening ERA performed for the Ore Storage Pond sub-area in the RI Report (Parsons, 2020) concluded that arsenic was identified as a COPEC in the sediment for the Ore Storage Pond, and additional assessment of the sediment at the Ore Storage Pond was required to complete the characterization and ERA of this sub-area. No COPECs were identified for the surface water of the Ore Storage Pond. Field work was performed for additional sampling and bioassays as described in the Work Plan Addendum (Parsons, 2021). This section evaluates the additional samples and bioassays performed for the Ore Storage Pond sub-area. Six sediment samples were collected across the pond, and two bioassays were performed on composite samples consisting of portions from three of the six sediment samples:

- Hyalella azteca 10 day bioassay, and
- Chironomus tentans 10 day bioassay.

Bioassays followed USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064, March 2000 (USEPA, 2000).

4.1 HYALELLA AZTECA 10-DAY BIOASSAYS

Table 4-1 summarizes the results of the *Hyalella azteca* 10-day survival and growth test. Water quality measurements taken during the test are presented in Appendix B. The survival and growth of *Hyalella azteca* exposed to the site sediments were statistically compared to organisms exposed to the laboratory control. The results indicate that survival and growth of the organisms exposed to site sediments were not statistically different (p=0.05) from the laboratory control sample. The results of the *Hyalella azteca* 10-day bioassay indicate that sediment from composite samples 079SD-416M-0001-SD and 079SD-417M-0001-SD do not show toxicity.

Sample Identification	10-Day Survival (percent)	Mean Dry Weight as mg/Organism (±SD)	Conclusion
Laboratory Control	80	0.073 (±0.016)	Control meets criteria of 80%
Laboratory Control	80	$0.075(\pm 0.010)$	survival and measurable growth
			Survival and growth are not
079SD-416M-0001-SD	86	0.096 (±0.015)	statistically different (p=0.05)
			from laboratory control
			Survival and growth are not
079SD-417M-0001-SD	86	0.083 (±0.021)	statistically different (p=0.05)
			from laboratory control

 Table 4-1: Results of Hyalella azteca 10-Day Toxicity Testing

4.2 CHIRONOMUS DILUTUS 10-DAY BIOASSAYS

Table 4-2 summarizes the results of the *Chironomus dilutus* 10-day survival and growth test. Water quality measurements taken during the test are presented in Appendix B. The survival and growth of *Chironomus dilutus* exposed to the site sediments were statistically compared to organisms exposed to the laboratory control. The survival results indicated that the organisms exposed to the site sediments were statistically different (p=0.05) from the laboratory control sample for survivability. Although statistically different, the average survivability of *Chironomus dilutus* in

the two samples was 85.5 percent, compared to 100 percent survivability in the control. This is a 14.5% difference in survival rates relative to the control. Ohio EPA guidance (Ohio EPA-DERR, 2018) indicates that historically laboratory bioassays use a significant difference range of 10 - 20% as being of importance. The DQO in the Work Plan Addendum (Parsons, 2021) indicated that a difference between bioassay results in the samples and control of greater than 20 percent indicates a significant impact. Therefore, the survival rates in the samples, though statistically different from the control, were not sufficiently different to be an important or significant impact. Mean ash free dry weight indicated that growth in both of the sediment samples were not significantly different from the control. The results of the *Chironomus dilutus* 10-day bioassay indicate that sediment from composite samples 079SD-416M-0001-SD and 079SD-417M-0001-SD do not show significant toxicity.

Sample Identification	10-Day Survival (percent)	Mean Ash Free Dry Weight as mg/Organism (±SD)	Conclusion
Laboratory Control	100	0.697 (±0.152)	Control meets criteria of greater than 70% survival and a mean ash-free dry weight of at least 0.48 mg/organism
079SD-416M-0001-SD	93(a)	1.074 (±0.209)	Survival rate is statistically different (p=0.05) from laboratory control. Growth is not statistically different from the control.
079SD-417M-0001-SD	78(a)	1.221 (±0.267)	Survival rate is statistically different (p=0.05) from laboratory control. Growth is not statistically different from the control.

Table 4-2: Results of Chironomus dilutus 10-Day Toxicity Testing

Notes:

(a) Significantly different (p=0.05) from laboratory control.

5. SUMMARY AND CONCLUSIONS

This RI addendum was conducted to determine the toxicity of the Ore Storage Pond sub-area and evaluate whether additional remedial actions are warranted. Samples used for decision making in this RI Addendum were collected by Parsons in April 2021. Samples were collected and analyzed according to the FWSAP (SAIC, 2011a) and the Final Ore Storage Pond Sub-area Work Plan Addendum (Parsons, 2021). The bioassays were conducted in accordance with USEPA toxicity and bioaccumulation guidance (USEPA, 2000).

At the Ore Storage Pond sub-area, composite and discrete sampling methods were employed to investigate sediment. Six sediment samples were collected across the pond, and two bioassays were performed on composite samples consisting of portions from three of the six sediment samples:

- *Hyalella azteca* 10 day bioassay, and
- *Chironomus tentans* 10 day bioassay.

Bioassays followed USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064, March 2000.

The results of the *Hyalella azteca* and *Chironomus dilutus* 10-day bioassays indicate that sediment from composite samples 079SD-416M-0001-SD and 079SD-417M-0001-SD do not show significant toxicity to the ecological receptors.

6. **RECOMMENDATIONS**

Based on the summary and conclusions of this RI Addendum, No Further Action is recommended to address ecological risk in sediment in the Ore Storage Pond sub-area at CC RVAAP-79 DLA Ore Storage Sites.

Because the additional data for the Ore Storage Pond sediments collected for this RI Addendum has concentrations of arsenic that are greater than those used to estimate risks to Human Health Receptors in the CC RVAAP-79 RI, these potential risks need to be reassessed considering the new sediment and pond data. Since the CC RVAAP-79 RI has been finalized, the Army will revise the Draft CC RVAAP-79 FS to include a reassessment of potential human health risks for current and future receptors of the Ore Storage Pond that includes the new data collected for this RI Addendum. The revised HHRA will be incorporated into the Risk Management Portion of the CC RVAAP-79 FS.

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APPENDICES

Appendix A Field Activity Forms

APPENDIX A.1

SEDIMENT SAMPLING FORMS

Sediment Sampling Form

~		0-0002 DO: 0003	0	Sampled By:	i CAhr 4	J.P.t	C'M Kitcheld
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		escription (color	0	1. 1.	t share.	ARIA WO	tir, edge stor
						- V	
Amblent Wate	Conditions:						
Water		Electrical	Dissolved	Redox	Turbidity/	Water	Sediment
Temp. (°C)	pH (SU)	Conductivity (µS/cm)	Oxygen (mg/L)	Potential (mV)	Appearance (NTU)	Depth Above Sample (feet)	Sample Depth (feet)
12.3	7.83	0.40	11.82				0.5
Sediment Colle	ction inform	ation:					
			1				
	Nater Depth A	bove Sample (fe	et):(nc ci	
	Sediment Sam	ple Depth:	<u> </u>	Sediment Dept	h to Refusal:	0,5 ff	
	Collection Meti	hod (circle one):	Scoop E	Eckman Dredge	Hand Corer	Other.	
			-)	-	\subseteq		
;	Sample Type (Grab Com	posite			
Sediment Sam	nie informatic						
1	E 179	57-410)				
Station ID:	2011		TISD	ulal			10:110
Sample ID:()	7950-4	10-000	ate Sampled	4/20/2	.1	Time Sampled:	10:45
Duplicate Same	10 10 079ST	-410 900	-SD	(+5min);	2:45	MS/MSD collect	ad 2 Yes No
Observations (N	lunsell Soll Co	lor Chart, Textu		1			
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	21 10	TK	0 0		- + -	1 - 01 1	- Paula
Photos: _	fuolos_	10KON C	E Ser	4 ple 1	CCTOR	Land de	pt, of saying
Sample Preserv		lce.	1 0				
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Laboratory Ana			4740				
		SW6010C/SW7	4/18				
	Walkley Black	c Method					
pH by SV							
	by ASTM D 4						
Bioassay	Hyalella azteca	a 10 day					
Bloassay	Chironomous	dilutus (tentans)	10 day				
Notes:							
		mm in diameter, nolded into shape			rubbed between	fingers. Loose ma	terials (not cohesive) that
Slit - P	articles 0.004-0. ngers. Non-plas			a material posses	sing a greasy or	smooth, taic-like fe	el when rubbed between
fi Clay - P				rms a dense, gui	nmy surface that	is difficult to penet	rate with tools (hardpan).
fi Cłay - Pi C Mari - C	lay is both plast	n 0.004 mm in dia tic and cohesive. e, usually greyish	meter, which fo -white, often co	ntaining fragmen	is of mollusc she	ils.	
fi Clay - P C Mari - C Detritus - D	lay is both plast alcium carbonat aad, unconsolid	n 0.004 mm in dia tic and cohesive. e, usually greyish ated organic mate	meter, which fo -white, often co rial including a	ntaining fragmen ticks, wood, leave	ts of mollusc she is, and other part	ils. iaily decayed coars	

Nuck - Black, extremely fine, floccularit material composed of comp Sludge - Organic matter that is decidedly of human or animal origin.

1415

Sediment Sampling Form

Weather:		ames A. Gan 0-0002 DO: 0003 45° Ca	the second second		P. 20 nrth		<u>richin, K.</u> F.
Sample Loca	tion Description Water Body N	ame: Ore	Storage	Poni	atitude/Longitu	de;	
	Sample Site D						orth edge
Amblent Wat	er Conditions:						6
Water Temp. (°C)	pH (SU)	Electrical Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Turbidity/ Appearance (NTU)	Water Depth Above Sample (feet)	Sediment Sample Depth (feet)
12	7.86	0,139	13.20	32.3		10 mous	0.5
		nple Depth: <u>()</u> (circle one): (circle one):	Scoop B	Sediment Dep Eckman Dredge uposite	Hand Corer	Other:	
Sediment San	aple informati						
Station ID:	F 079	75D-911		1 1			
Sample ID:	179SD-	411-000	Bate Sampled	. U17012	1	10.000	10,30
					-1	Time Sampled:	10,00
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Duplicate Sam			Duplicate Time	e (+5min):		Time Sampled:	1
		blor Chart, Textu	Duplicate Time re, Odor, App	e (+5min): earance):		MS/MSD collecte	ed? Yes No
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Observations (Sof Photos: Sample Preser Comments:	Munsell Soil Co <u>CTSCIT</u> <u>DMOTO</u> vation: <u>About</u>	WHIC WHIC SULSC AS TOKO Ice. O COMS	Duplicate Time re, Odor, App MANY 0 407 N 07	earance): .gr5pr .somple	- mail	MS/MSD collecters $\frac{1}{1.r} \leq \frac{1}{5}$	ed? Yes No
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Observations (<u>Sof</u> Photos: Sample Preser Comments: Leboratory Ar TAL Met	Munaell Soil Co C+ Sil+ DECE DECE Valion: About 1 nalytical Methor tais/Mercury by	Nor Charl, Textu WHL GULGO BS TOKO Ice. D CORTS DOS: SW6010C/SW7	Duplicate Time re, Odor, App Mary Depr ACOF	earance): .gr5pr .somple	- mail	MS/MSD collecters $\frac{1}{1.r} \leq \frac{1}{5}$	ed? Yes No
Observations (<u>Sol</u> <u>h-4</u> Photos: Sample Preser Comments: Laboratory Ar TAL Met Y TOC b	Munaell Soil Co <u>C</u> + <u>Sit</u> + <u>D</u> + <u>D</u> + <u>D</u> + <u>D</u> + <u>D</u> + <u>Abor</u> + <u>Abor</u> + <u>Abor</u> + <u>Abor</u> + <u>B</u> + <u>Abor</u> + <u>B</u> + <u>B}+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B</u>+ <u>B}</u></u>	Nor Charl, Textu WHL GULGO BS TOKO Ice. D CORTS DOS: SW6010C/SW7	Duplicate Time re, Odor, App Mary Depr ACOF	earance): .gr5pr .somple	- mail	MS/MSD collecters $\frac{1}{1.r} \leq \frac{1}{5}$	ed? Yes No
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Observations (<u>Sol</u> Photos: Sample Preser Comments: Leboratory Ar TAL Met % TOC b PH by St Grain Sta Bioassay Notes: Sand - I Silt - F	Munaell Soil Co <u>C</u> + <u>Sil+</u> <u>J</u> Motor <u>J</u> Motor <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u> <u>About</u>	blor Charl, Textu WHY. SVISTOR CONTS Ice. O CONTS Ods: SW6010C/SW7 & Method 422-63 a 10 day dilutus (tentans) O mm in diameter, molded into shape	Duplicate Time re, Odor, Appl MAY 4 DADE CER 011 GER 011 4718 10 day possessing a g ss (non-plastic). pr. generally fin	earance): df <u>50 r</u> Somple Somple	n rubbed between	MS/MSD collecto T.r. <u>Sltg</u> al <u>Gendin</u> fingers. Loose mat	ed? Yes (No)
Observations (Soft Photos: Sample Preser Comments: Leboratory Ar TAL Met % TOC b OFAin St Bioassay Bioassay Notes: Sand - I Silt - F	Munaell Soil Co CH STIL Muraell Soil Co CH STIL Marcun Marcun valion: About 1 malytical Methodist Marcuny by Walkley Blac W2045D Ze by ASTM D y Walkley Blac W2045D Ze by ASTM D y Hyalella aztec y Chironomous Particles 0.08-2:0 often cannot be in Particles 0.04-0. fingers. Non-plan Particles less that Clay is both plas	blor Charl, Textu WHY. SVISTOR SVISTOR SV6010C/SW7 Method 422-63 a 10 day dikutus (tentans) Omm in diameter, molded into shape .06 mm in diameter, molded into shape .06 mm in diameter, molded into chee n 0.004 mm in dia tic and cohesive.	Duplicate Time re, Odor, App LAV V DAT AV OF AV OF AV OF AV ATTB 10 day possessing a g as (non-plastic), or, generally fine he. meller, which fo	e (+5min): earance): Somple Somple Somple clut clut clut starpe starpe clut clut clut clut clut clut clut clut	n rubbed between ssing a greasy or a	MS/MSD collecte T. r. <u>S It s</u> <i>Guid Collecter</i> <i>Guid Collecter</i>	ed? Yes (No Wht lepth of s
Observations (Soft Photos: Sample Preser Comments: Leboratory Ar TAL Met With by St Grain Siz Bioassay Bioassay Notes: Sand - I Silt - F Clay - F Mari - C Detritus - D Peat - F	Munaell Soil Co CH STIL Munaell Soil Co CH STIL March State (About 1) March State (About 1) Ma	blor Charl, Textu W HY. GNISCO COTS ICE. COTS DOS: SW6010C/SW7 & Method 422-63 a 10 day dilutus (tentans) Omm in diameter, molded into shape tic and not cohea tic and not cohea tic and cohesive. te, usually greyish lated organic materia	Duplicate Time re, Odor, App <u>CAV V</u> <u>O 407</u> <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407 <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407 <u>CV 0 407 <u>CV 0 407 <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407 <u>CV 0 407</u> <u>CV 0 407</u> <u>CV 0 407 <u>CV 0</u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u></u>	earance): 	nubbed between ssing a greasy or a mmy surface that the of moliuse shell es, and other partit t; parts of plants a	MS/MSD collects	ed? Yes No

SedIment Sampling Form

	ion Description		1	P 1			
		ame: DCC-5	2		atitude/Longitud	ie:;ei	
	Sample Site D	escription (color,	, odor, appear	ance):			
Amblent Wate	r Conditions:						
Water Temp. (°C)	pH (SU)	Electrical Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Turbidity/ Appearance (NTU)	Water Depth Above Sample (feet)	Sediment Sample Depth (faet)
11,78	7,82	0.139	11.3	3,5	-		0,5
	Sediment Sam Collection Met Sample.Type (C	5 50000 E	Sediment Dep ckman Dredge posite		11 m les Other	<u>)</u>
ediment Sam Station (D: Sample (D:) Duplicate Samp	Sediment Sam Collection Met Sample.Type (ple Information Collection Collection Collection Collection Collection Collection Collection Collection Collection Collection Met Collection Collection Met Collection Collection Collection Collection Cole	bove Sample (fe ple Depth: 0_{+} had (circle one): (circle one): (0) on: 3Si) - 4ii 412^{-000}	Scoop E Srab Com 2 - 5 Date Sampled: Duplicate Time	ckman Dredge posite 4 20	Hand Corer	Dther.	10:00 ed?
iediment Sam Station ID: Sample ID: Duplicate Samp Dibservations (N 	Sediment Sam Collection Met Sample Type (ple Information 29-50- ole ID Munaell Soil Co 4	bove Sample (fe ple Depth: 0 chod (circle one): (circle one): 350 - 413 412 - 000 bor Chart, Texture 155 - 000 155 -	Scoop E Scoop E Srab Comp 2 -SD Date Sampled: Duplicate Time re, Odor, Appe	ckman Dredge posite 4 20	Hand Corpr 21 	T Sampled:	VE

____pH by SW9045D

Grain Size by ASTM D 422-63

Bloassay Hyalella azteca 10 day

Bioassay Chironomous dilutus (tentans) 10 day

Notes:

- Sand Particles 0.06-2.0 mm in diameter, possessing a gritty texture when rubbed between fingers. Loose materials (not cohesive) that often cannot be molded into shapes (non-plastic).
 - Silt Particles 0.004-0.06 mm in diameter, generally fine material possessing a greasy or smooth, tak-like feel when rubbed between fingers. Non-plastic and not cohesive.
- Clay Particles less than 0.004 mm in diameter, which forms a dense, gummy surface that is difficult to penetrate with tools (hardpan). Cisy is both plastic and cohesive.
- Mard Calcium carbonate, usually greyish-white, often containing fragments of mollusc shells.
- Detritus Dead, unconsolidated organic material including sticks, wood, leaves, and other partially decayed coarse plant material.
 - Peat Panially decomposed plant materials characterized by an acidic pH; pents of plants such as Sphagnum moss sometimes visible. Muck - Black, extremely fine, flocculant material composed of completely decomposed organic material (excluding sewage).
- Sludge Organic metter that is decidedly of human or animal origin.

Sediment Sampling Form

Sample Locs	tion Descripti	on:	in the	C			
	Water Body N	Name: Use 2	storage		atitude/Longitur		
	Sample Site I	Description (color	r, odor, appear	rance): We	st side	OF Isto	next to can
ambient Wat	er Conditions						
	of Conditions		1 Blocked	1 Birden	T St. Links	- 10-1-1- T	0.0.1
Water Temp.	pH	Electrical Conductivity	Dissolved Oxygen	Redox Potential	Turbidity/ Appearance	Water Depth Above	Sediment Sample
(°C)	(SU)	(µS/cm)	(mg/L)	(mV)	(NTU)	Sample (feet)	Depth (feet)
12.67	7.7	0,137	13.29	*		10"	4 inchs
	1.1	1.					
ediment Col	lection inform	nation:					
	949 A.		10"	1			
	Water Depth /	Above Sample (fe	set):U	nchis		11 . 12	
	Sediment San	mple Depth: 2		Sediment Dep	th to Refusal:	+ inches	
	Collection Me	thod (circle one):	Scoop E	ckman Dredge	Hand Core	Other:	
		thod (circle one):	1	ckman Drødge	Hand Core	Other:	
	Collection Me Sample Type	/	1	ickman Drødge posite	Hand Core	Other:	
	Sample Type	(circle one):	1		Hand Core	Other:	
5	Sample Type	(circle one):	Grad Com		Hand Core	Other:	
station ID:	Sample Type	(circle one): (ion: 9SD-4/	Grad Com	posite		Other:	
station ID:	Sample Type	(circle one): (ion: 9SD-4/	Grad Com	posite		Other:	1140
Station ID: Sample ID:	Sample Type nple Information 19307	(circle one): (9 SD - 4/ - 4/3-000/ p	Grad Com	4/20/:	21		
Station ID: Sample ID: Suplicate Sam	Sample Type nple Information 19307	(drole one): (9 SD - 4/ 5 4/3-000/ p	Grad Com 3 SD Date Sampled: Duplicate Time	4/20/	21	Time Sampled:	
Station ID: Sample ID: Suplicate Sam Observations (Sample Information	(circle one): (9 SD - 4/ 4/3-000/ plor Chart, Textur	Grad Com J Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21	Time Sampled:	
Station ID: lample ID: Duplicate Sam Diservations (Sample Type nple Information 19807 17950- ple ID Munsell Soil Co 17913	(circle one): (9 SD - 4/ 4/3-000/ E blor Chart, Textur blo (k. Si	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21	Time Sampled:	
Station ID: Cample ID: Cample ID: Campanyations (Campanyations (Sample Information	(circle one): (9 SD - 4/ 4/3-000/ plor Chart, Textur	Grad Com 3 5 5 5 5 5 5 5 5 5 5 5 5 5	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
Station ID: Sample ID: Suplicate Sam Observations (Ca Motos:	Sample Type nple Information 19307 17950- 17950- 1950- Munsell Soil Co 179150- 17950- 1950-	(circle one): (9 SD - 4/ 9 SD - 4/ 6 (13-000/ 5 0 (14, 5) 5 0 (1	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21	Time Sampled: MS/MSD collector	
Station ID: Cample ID: Duplicate Sam Deservations (Ca Ma hotos: ample Preser	Sample Type nple Information 19307 17950- 17950- 1950- Munsell Soil Co 179150- 17950- 1950-	(circle one): (9 SD - 4/ 4/3-000/ E blor Chart, Textur blo (k. Si	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
Station ID: Sample ID: Suplicate Sam Observations ((a) hotos:	Sample Type nple Information 19307 17950- 17950- 1950- Munsell Soil Co 179150- 17950- 1950-	(circle one): (9 SD - 4/ 9 SD - 4/ 6 (13-000/ 5 0 (14, 5) 5 0 (1	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
Station ID: ample ID: bupilcate Sam baservations ((Sample Preser comments:	Sample Type nple Information 1907 1900	(circle one): ($\frac{1}{9}$ SD - 4/1 $\frac{1}{9}$	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
ample ID: applicate Sam baservations (botos: ample Preser omments: aboratory Ar	Sample Type nple Information 19307 19407	(circle one): (9SD - 4/1 4/3 - 000/1 500 ($16 - 51500$ ($16 - 511000$ (1000 (100	Grad Com Grad Com Date Sampled: Duplicate Time re, Odor, Appe TV, MIT	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
tation ID: ample ID: uplicate Sam baservations (baservations (hotos: ample Preser omments: aboratory Ar TAL Met	Sample Type nple Information 19307 1930 1930 1930 Munsell Soil Co 1930	(circle one): (9 SD - 4/ 9 SD - 4/ 6 (13-000/ 5 0 (14, 5) 5 0 (1	Grad Com Grad Com Date Sampled: Duplicate Time re, Odor, Appe TV, MIT	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
tation ID: ample ID: uplicate Sam baervations (hotos: ample Preser omments: aboratory Ar TAL Met % TOC b	Sample Type nple Information 1907 17950 17950 Munsell Soil Co 17950 Munsell Soil Co 17950 19950 Munsell Soil Co 17950 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 199500 1995000 199500 1995000 1995000 19950000 1995000 1995000 1995000	(circle one): (9 SD - 4/ 9 SD - 4/ 6 (13-000/ 5 0 (14, 5) 5 0 (1	Grad Com Grad Com Date Sampled: Duplicate Time re, Odor, Appe TV, MIT	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
tation ID: ample ID: uplicate Sam baservations (botos: ample Preser omments: aboratory Ar TAL Met % TOC b PH by Si	Sample Type nple Information 19307 19307 19307 Munsell Soil Complete Munsell Soil Com	(circle one): (9 SD - 4/ 9 SD - 4/ 6 (13-000/ 5 (13-00))) 5 (13-00)) 5	Grad Com Grad Com Date Sampled: Duplicate Time re, Odor, Appe TV, MIT	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
tation ID: ample ID: uplicate Sam baservations (baservations (hotos: ample Preser omments: aboratory Ar TAL Met % TOC b PH by ST Grain Sb	Sample Type nple Information 1907 17950- 17950- 1079	(circle one): (9 SD - 4/ 9 SD - 4/ 	Grad Com Grad Com Date Sampled: Duplicate Time re, Odor, Appe TV, MIT	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight
ample ID: ample ID: ample ID: ample Sam baservations (Mathematical ample Preser omments: ample Sam Grain St Bloassay	Sample Type nple Information 19907 1995 1995 1995 Munsell Soil Co 1995	(circle one): (9 SD - 4/ 9 SD - 4/ 	Grad Com Grad Com SD Date Sampled: Duplicate Time re, Odor, Appe 10, 11 10, 11	4/20/2	21 - -	Time Sampled: MS/MSD collector	sight

- fingers. Non-plastic and not cohesive.
- Clay Particles less than 0.004 mm in diameter, which forms a dense, gummy surface that is difficult to penetrate with tools (hardpan). Clay is both plastic and cohesive.
- Marl Calcium carbonate, usually greyish-white, often containing fragments of moliusc shells.
- Detritus Dead, unconsolidated organic material including sticks, wood, leaves, and other partially decayed coarse plant material.
 - Peet Partially decomposed plant materials characterized by an acidic pH; parts of plants such as Sphagnum moss sometimes visible. Muck - Black, extremely fine, flocculant material composed of completely decomposed organic material (excluding sewage).
- Sludge Organic matter that is decidedly of human or animal origin.

Sediment Sampling Form

A 1	1 1 1 1	D-0002 DD: 0003		Sempled by-	ricari-e	J. Pete	1 10 - 112
Weather.	and in -	is car	1				
Sample Locat				2 1			
	Water Body Na	ame: Dre St	erace +	ond L	atitude/Longitu	de:	
	Sample Site D	escription (color	odor, appear	ance): M;	d Pond		
Ambient Wate	r Conditions:						
Water	1.000	Electrical	Dissolved	Redox	Turbidity/	Water	Sediment
Temp. (°C)	pH	Conductivity (µS/cm)	Oxygen (mg/L)	Potential (mV)	Appearance (NTU)	Depth Above Sample (feet)	Sample Depth (feet)
	(SU)		13.39	(114)	(410)	1 J	
12,48	1.11	0,140	12.27				0.5
Section of the second	1.0. 20						
Sediment Coll	ection information	ation:					
			L1				
	Water Depth A	bove Sample (fe	eet):	_			
	Sediment Sam	ple Depth: D.	5	Sediment Dep	th to Refusal:	6	
			1.		0		
8	Collection Met	hod (circle one):	Scoop E	ckman Dredge	Hand Corer	Other	
	Sample Type (circle one):	Grab) Com	posite	0		
		C	_				
Sediment Sam	ple informatio	on:	.1				
Station ID:	til and	-SD-41	4				
alauvii id.	P 017	10					
0	70/7		T-SD	interla	4		11.20
Sample ID: 0	79-50-	414-000	Date Sampled;	4120/2	L1	Time Sampled:	11:25
Sample ID: 0	79-50-	414-000	Date Sampled:				~
Sample ID: 0	79-50-	414-000	Date Sampled: Duplicate Time			Time Sampled: MS/MSD collecte	~
Sample ID: <u>0</u> Duplicate Samp	79-50- 1e 10	414-000	Date Sampled: Date Sampled: Duplicate Time	(+5mln):			~
Sample ID: 0	79-50-	414 -000 	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0	79-50-	414 -000 	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0	79-50-	414 -000 	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0	79-50-	414 -000 	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0	19-50- le ID lunsell Soil Col ick, 3r	414 -000 	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	~
Sample ID: 0 Duplicate Samp Observations (N B [d Photos: 4 Sample Preserv	19-50- le ID lunsell Soil Col ick, 3r	414-000 lor Chart, Textur any SI!+	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0 Duplicate Samp Observations (N B [d Photos: 4	19-50- le ID lunsell Soil Col ick, 3r	414-000 lor Chart, Textur any SI!+	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0 Duplicate Samp Observations (N B [d Photos: 4 Sample Preserv	19-50- le ID lunsell Soil Col i.ck, 3r 240705 ation:	414-000 Tor Chart, Textus my SJ!+ TCKON	Date Sampled: Duplicate Time re. Odor. Appe	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: 0 Duplicate Samp Observations (M 8 10 Photos: 4 Semple Preserv Comments: 4 Laboratory And	19-50- le ID lunsell Soil Col i.ck, 3r Dhatos ation:	414-000 Ior Chart, Textus my SI!+ <i>Tc. Kon</i> Ice.	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (M B 1 g Photos: Sample Preserv Comments: Laboratory And TAL Meta	19-50- Ile ID Iunsell Soil Col LCL, 3r Dhatos ation: ation:	414 -000 Ior Chart, Textur my SI!+ TC.Ken Ice. de: sw6010C/SW7	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (N B [d Photos: Photos: Sample Preserv Comments: Laboratory And TAL Meta	19-50- le ID lunsell Soil Col i.ck, 3 26.255 ation: ation: Mytical Metho is/Mercury by 1 Walkiey Black	414 -000 Ior Chart, Textur my SI!+ TC.Ken Ice. de: sw6010C/SW7	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Laboratory And TAL Meta % TOC by PH by SV	199-50- le ID Iunsell Soil Col LCL, 3 Dhatos ation: ation: Is/Mercury by 1 Walkley Black 19045D	414 - 00 Ior Chart, Textur my SI!+ Tc.Kon Ice. des: SW6010C/SW7 Method	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Laboratory And TAL Meta % TOC by PH by SV	19-50- le ID lunsell Soil Col i.ck, 3 26.255 ation: ation: Mytical Metho is/Mercury by 1 Walkiey Black	414 - 00 Ior Chart, Textur my SI!+ Tc.Kon Ice. des: SW6010C/SW7 Method	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (N B [G Photos: Sample Preserv Comments: Laboratory Anu TAL Meta % TOC by PH by SV Grain Size	199-50- le ID Iunsell Soil Col LCL, 3 Dhatos ation: ation: Is/Mercury by 1 Walkley Black 19045D	414 - 000 Ior Chart, Textur My SJ !+ TE Ken Ice. ds: sweenoc/swr Method	Date Sampled: Duplicate Time re, Odor, Appe W HA	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (N B [d Photos: Sample Preserv Comments: Laboratory And TAL Meta % TOC by FH by SV Grain Size Bloassay	79-50- le ID lunsell Soil Col i.ck, 3 26.2705 ation: lytical Metho is/Mercury by i Walkley Black v9045D e by ASTM D 4 Hyalelia azteci	414 - 000 Ior Chart, Textus My 51!+ 72.Kon Ice. ds: sweentoc/swr Method 222-63 a 10 day	471B	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Comments: Laboratory And TAL Meta Stroc by Bioassay Bioassay	79-50- le ID lunsell Soil Col i.ck, 3 26.2705 ation: lytical Metho is/Mercury by i Walkley Black v9045D e by ASTM D 4 Hyalelia azteci	414 - 000 Ior Chart, Textur My SJ !+ TE Ken Ice. ds: sweenoc/swr Method	471B	(+5min):	-	MS/MSD collecte	ed? Year No
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Sample Preserv Comments: Comments: Laboratory And TAL Meta Motes: Bioassay Notes:	79-50- le ID Iunsell Soil Col i.ck, 3r 26-55 ation: Is/Mercury by 1 Walkiey Black 19045D e by ASTM D 4 Hyalelia azteca Chironomous o	UIU - 000 Ior Chart, Textus My SIII TCKON Ice. ds: SW6010C/SW74 Method 122-63 a 10 day dilutus (tentans)	10 day	(+5min): arance): clay	 hydrog rotion e	MS/MSD collecte 20 SK i A ad depts	of Sodik
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Comments: Laboratory And TAL Meta TAL Meta YTOC by Bioassay Bioassay Motes: Sand - Preserv	79-50- le ID Junsell Soil Col LCL, 3 DLatos ation: Nytical Metho Is/Mercury by 1 Walkley Black /B045D e by ASTM D 4 Hyalelia azteca Chironomous co articles 0.06-2.0	UIU - 000 Ior Chart, Textus My SIII TCKON Ice. ds: SW6010C/SW74 Method 122-63 a 10 day dilutus (tentans)	10 day	(+5min): arance): clay	 hydrog rotion e	MS/MSD collecte 20 SK i A ad depts	ed? Year No
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Laboratory And TAL Meta TAL Meta TAL Meta TAL Meta FIOC by Bioassay Bioassay Notes: Sand - Pi Silt - Pi	10-50- le ID Junsell Soil Col LCL, 3- 26-70-5 ation: Mytical Metho Is/Mercury by 1 Walkley Black /9045D e by ASTM D 4 Hyalelia azteca Chironomous o articles 0.06-2.0 flen cannot be n articles 0.004-0.1	UIU - 000 Ior Chart, Textus My SJ!+ TCKon Ice. ds: SW6010C/SW74 kethod 122-63 a 10 day dilutus (tentans) mm in diamater, nokled into shape 06 mm in diamater	10 day possessing a gr	(+5min): arance): clay de loc	hy drog trade	MS/MSD collecte <u>xn Sk i A</u> <i>Ad Olepts</i> fingers. Loose mat	of Sodik
Sample ID: Duplicate Samp Observations (M B [d Photos: Sample Preserv Comments: Laboratory And TAL Meta TAL Meta TAL Meta FIOC by Bioassay Bioassay Bioassay Notes: Sand - P fi	10-50- le ID Junsell Soil Col LCL, 3- 26, 70- 26, 70	UIU-000 Ior Chart, Textus My SJI TCKON Ice.	10 day possessing a gr (nor-plastic). possessing a gr (nor-plastic). possessing ine he.	(+5min): arance): clau_ clau clau_ clau clau_ clau_ clau clau clau clau clau clau clau clau	hy drog o trail e	MS/MSD collecte <u>2.0. S.H. ¹ A</u> <i>A.J. Oleptic</i> <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Olep</i></i></i></i></i>	ed? Yes No
Sample ID: Duplicate Samp Observations (M B [Photos: Sample Preserv Comments: Comments: Laboratory And TAL Meta TAL Meta Grain Size Bioassay Bioassay Notes: Sand - P Siz - P fi Ctay - P	10-50- le ID lunsell Soil Col LCL, 5 26,	UIU - 000 Ior Chart, Textus My SJ!+ 72.Kex Ice. Ice. SW6010C/SW74 Method 122-63 a 10 day diluture (tentans) mm in diameter, nolded into shape 06 mm in diameter, nolded into shape 06 mm in diameter, 0.004 mm in diameter	10 day possessing a gr (nor-plastic). possessing a gr (nor-plastic). possessing ine he.	(+5min): arance): clau_ clau clau_ clau clau_ clau_ clau clau clau clau clau clau clau clau	hy drog o trail e	MS/MSD collecte <u>2.0. S.H. ¹ A</u> <i>A.J. Oleptic</i> <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Oleptic <i>A.J. Olep</i></i></i></i></i>	erials (not cohesive)
Sample ID: 0 Duplicate Samp Observations (N B (g Photos: 4 Sample Preserv Comments: 4 TAL Meta % TOC by 0 PH by SV 0 Grain Siz Bioassay Bioassay Notes: 5 Sand - Pi fit Ctay - Pi	79-50- le ID Iunsell Soil Col LCL, 3 DLatos ation: Illustical Metho Is/Mercury by S Walkiey Black /9045D e by ASTM D 4 Hyalelia extecs Chironomous of articles 0.06-2.0 filen cannot be na articles 0.004-0.1 ngers. Non-plas articles less than lay is both plast	UIU-000 Ior Chart, Textus My SJI TCKON Ice.	471B 10 day possessing a gr se (non-plastic). meter, which for	(+5min): arance): clay_clay_clay_clay_clay_clay_clay_clay_	nubbed between asing a greesy or mmy surface that	MS/MSD collecte <u>xn Sk i A</u> <i>Ad depta</i> <i>ad depta</i>	ed? Yes No
Sample ID: 0 Duplicate Samp Observations (N 8 19 Photos: 4 Sample Preserv Comments: 4 Sample Preserv Comments: 4 TAL Meta % TOC by 9H by SV Grain Siz Bioassay Bioassay Notes: 5 Sand - Pr 0 Silt - Pr 0 Silt - Pr	79-50- le ID Iunsell Soil Col LCL, 3 DLatos ation: Internet Soil Col Chiron Method Is/Mercury by S Walkiey Black V9045D e by ASTM D 4 Hyalelia extecs Chironomous of articles 0.06-2.0 filen cannot be m articles 0.064-0.1 mores. Non-plass articles best than lay is both plast alclum carbonate	diluture (tentans) mm in diameter, notice Into chesito 6 mm in diameter, notice Into chesito 0.004 mm in diameter, s, usually greytsh	4718 10 day possessing a gr weter, which for white, often cor	(+5min): arance): clay de loc de loc	nubbed between rubbed between resting a greesy or mmy surface that ts of moliusc she	MS/MSD collecte <u>xn Sk i A</u> <i>Ad depta</i> <i>ad depta</i>	ed? Yes No
Sample ID: Duplicate Samp Observations (M Photos: Sample Preserv Comments: Laboratory Anu TAL Meta % TOC by PH by SV PH by SV Bioassay	79-50- le ID lunsell Soil Col i.ck, 3- Diatos: Diatos: ation: ation: ation: Marcury by S Walkiey Black y9045D e by ASTM D 4 Hyalelia extecs Chironomous of articles 0.06-2.0 ften cannot be n articles 0.06-2.0 ften cannot be stan articles 0.004-0.1 ngers. Non-plass articles than lay is both plast alcum carbonate sed, unconsolide articley decompo	UIU - 000 Ior Chart, Textus My SII Ice.	4718 10 day possessing a gr sc (non-plastic). ar, generally fina two. meter, which for white, often con anal including stil is characterized	(+5min): arance): Clau Clau Me /oc // /oc //oc /	nubbed between seling a greesy or mmy surface that ts of moliusc elea se, and other part parts of plants a	MS/MSD collecter	ed? Yes No
Sample ID: Duplicate Samp Observations (M Bild Photos: Sample Preserv Comments: Sample Preserv Comments: Laboratory And TAL Meta Motassay Bioassay Bioassay Bioassay Notes: Sand - P. Sill - P. Clay - P. Muck - Bi	79-50- le ID lunsell Soil Col i.ck, 30 20-21-05 ation: aticles: 0.06-2.0 aticles: 0.004-0.1 aticles: 0.004-0.1 aticles: aticle: ati	UIU - 000 Ior Chart, Textus My SII Ice.	4718 10 day possessing a gr (non-plastic). ar, generally fina we, meter, which for white, often cor arial including stills characterized terial composed	(+5min): arance): <u>Claus</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u>	nubbed between seling a greesy or mmy surface that ts of moliusc elea se, and other part parts of plants a	MS/MSD collecte <u>2.n. S.H. i A</u> <i>a.d. deptic</i> <i>a.d. deptic <i>a.d. deptic <i>a.d. deptic <i>a.d. deptic <i>a.d. deptic <i>a</i></i></i></i></i></i>	ed? Yes No

11

Sediment Sampling Form

Weather:	indau,	43 1	alm				
Sample Locat	tion Descripti Water Body N	Name: Dre	Storace	Hond .	atitude/Longitud	le:	
	Sample Site D	Description (color,	, odor, appear	ance): Fre	+ 5:00 1	r ord	roor stand
Amblent Wets	or Conditions						
Water	1	Electrical	Dissolved	Redox	Turbidity/	Water	Sediment
Temp.	pН	Conductivity	Oxygen	Potential	Appearance	Depth Above	Sample
(°C)	(SU)	(µS/cm)	(mg/L)	(mV)	(NTU)	Sample (feet)	Depth (feet)
12.3	1,6	0,139	13,0	22.5	~	1. 1	0.5
	In the set						
Sediment Coll	lection intom	hagon:					
	Water Depth /	Above Sample (fe	et):			0.11	
	the second se	mple Depth: 0.	-	Sediment Dep	th to Refusal:	1	
		제 가게 왜 그 같아.				-	
		thod (circle one):	2	ckman Dredge	Hand Cored	Other:	
	Sample Type	(circle one):	Srab' Com	pasite			
-	anto Informati		-				
Sediment Sam	ipie intornati	min Ju	\sim				
Station ID:		95D-41		1111			
				4/20/	21	Time Sampled:	1115
Sample ID: 0	7950-4	15-0001	SD ate Sampled:	4/20/	1.27		0
Sample ID: <u>6</u> Duplicate Samp	79 5D-4	- 0001	SD ate Sampled: puplicate Time		1.27	Time Sampled:_ MS/MSD collect	0
Sample ID: 0 Duplicate Samp Observations (N	79 SD-4	Dolor Chart, Textur	ste Sampled: puplicate Time e, Odor, Appe	arance):	-	MS/MSD collect	ted? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (M MOS	795D-4 ble ID Vunsell Soil Cr 44 Soil Soil Cr	olor Chart, Textur	ste Sampled; puplicate Time e, Odor, Appe		-	MS/MSD collect	0
Sample ID: <u>0</u> Duplicate Samp Observations (I <u>MOS</u> ETH	795D-4 ble ID Vunsell Soil Cr 44 Soil Soil Cr	olor Chart, Textur	splicate Time e, Odor, Appe	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (M MOS Er H Photos:	7950-4 ble ID Munsell Soil Cr 44 Sills The JSans Sources	olor Chart, Textur	splicate Time e, Odor, Appe	arance):	- Dire o	MS/MSD collect	ted? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (I <u>MOS</u> ETH	7950-4 ble ID Munsell Soil Cr 44 Sills The JSans Sources	olor Chart, Textur	splicate Time e, Odor, Appe	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (M MOS Er H Photos:	7950-4 ble ID Munsell Soil Cr 44 Sills The JSans Sources	olor Chart, Textur Slicht Trizen Shots	splicate Time e, Odor, Appe	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (I <u>M05</u> <u>Ei H</u> Photos: Sample Preserv Comments:	795D-4 ple ID Munsell Soll Cr Hunsell Soll Cr Hu	olor Chart, Textur 311 Srt 5 Tr Xen S Phata 100,	splicate Time e, Odor, Appe	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: <u>0</u> Duplicate Samp Observations (I <u>MOS</u> <u>Er H</u> Photos: Sample Present Comments: Leboratory An	79 SD-4 ple ID Munsell Soil Cr Hunsell Soil Cr Hunsel	olor Chart, Textur Slight Mr. 200 Ice. ods:	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (M MOS Photos: Sample Presen Comments: Leboratory An TAL Met	79 5D-4 ble ID Munsell Soil C. 44 Sili 44 Sance Sance Valion: allytical Methodals/Mercury by	olor Chart, Textur Slicht Mr. Zen Sphats Ice, SW8010C/SW74	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (M MOS Photos: Sample Presen Comments: Leboratory An TAL Met	79 SD-4 ple ID Munsell Soil Cr Hunsell Soil Cr Hunsel	olor Chart, Textur Slicht Mr. Zen Sphats Ice, SW8010C/SW74	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (M MOS Photos: Sample Presen Comments: Leboratory An TAL Met	79 5D-4 ple ID Munsell Soil Cr Hunsell Soil Cr	olor Chart, Textur Slicht Mr. Zen Sphats Ice, SW8010C/SW74	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Present Comments: Laboratory An TAL Met % TOC by DH by SV	79 5D-4 ple ID Munsell Soil Cr Hunsell Soil Cr	ods: SW6010C/SW74	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Er H Photos: Sample Preserv Comments: Laboratory An TAL Met % TOC by BH by SV Grain Siz	79 5D-4 ple ID Munsell Soil Cr 41 5111 12 50 02 Values 12 Values	olor Chart, Textur Sicht Sic	spuplicate Time e, Odor, Appe <u>29</u>	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Er H Photos: Sample Preserv Comments: Comments: Leboratory An TAL Metz % TOC by Hoy SV Grein Siz Bloassay	79 5D-4 ple ID Munsell Soil Cr 40 50 10 10 50	olor Chart, Textur Sicht Sic	spinite Sampled: huplicate Time e, Odor, Appe <u>sy in a</u> <u>in</u> S <u>TC</u> /S	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Er H Photos: Sample Preserv Comments: Comments: Leboratory An TAL Metz % TOC by Hoy SV Grein Siz Bloassay	79 5D-4 ple ID Munsell Soil Cr 40 50 10 10 50	olor Charl, Textur Slight Trites Trites Cons. SW6010C/SW74 K Method 422-63 ca 10 day	spinite Sampled: huplicate Time e, Odor, Appe <u>sy in a</u> <u>in</u> S <u>TC</u> /S	arance):	- Dire o	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Preserv Comments: Comments: Leboratory An TAL Mett % TOC by Bloassay Bloassay Bloassay Notes: Sand - F	79 5D-4 ple ID Munsell Soil Cr 40 50 7 Munsell Soil Cr 40	odos: SW8010C/SW74 k Method 422-63 ca 10 day dilutus (tentans) 0 mm in diameter, p	ID day	arance):	- Dire r	MS/MSD collect	tod? Yes (No)
Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Present Comments: Comments: Leboratory An TAL Mett % TOC by Bloassay Bloassay Notes: Sand - P	79 5D-4 ple ID Munsell Soil Cr 41 5113 12 5005 Values 13 Values 14 values 14 values 14 values 14 values 14 chironomous values 0.06-2.1 often cannot be	alor Charl, Textur SILCA Tr Zea Tr Zea SW6010C/SW74 k Method 422-63 ca 10 day dilutus (tentans) 0 mm in diameter, p molded into shape	In day	tty texture when	Drte f	MS/MSD collect	ted? Yes Ro motistical and solid
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Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Preserv Comments: Comments: Leboratory An TAL Metz Grein Siz Bloassay Bloassay Sand - P	79 5 D - 4 ble ID Munsell Soil Cr Ling Sills Munsell Soil Cr Ling Sills Munsell Soil Cr Ling Sills Marcuny Soil Antices Mercury By Walkley Blac W9045D te by ASTM D Hysiella aztec Chironomous Particles 0.06-2.1 often cannot be particles 0.004-0 ingers. Non-pla tarticles less tha	olor Chart, Textur ali Srt	Solution of the second	tity texture when	Tribled between ssing a greasy or a	MS/MSD collect	ted? Yes Ro motistical and solid
Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Present Comments: Comments: Leboratory An TAL Metr % TOC by Bloassay Bloassay Notes: Silt - P Clay - P	79 5D - 4 ble ID Munsell Soil Cr. 4 5 6 10 Munsell Soil Cr. 5 11 1 5 6 10 1 5 6	olor Chart, Textur <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signal</u> <u>signa</u>	intersection in	tty texture when material posses me a dense, gu	Tree e Sampb / Sampb / Samb / Sampb / Samb / S	MS/MSD collect	ted? Yes Ro Tao tit to tal and Colid aterials (not cohesive) to sel when rubbed between
Sample ID: Duplicate Samp Observations (I MOS Photos: Sample Present Comments: Comments: Laboratory An TAL Met % TOC by Grain Siz Bloassay Notes: Sand - P	79 5 D - 4 ple ID Munsell Soil Cr 4 5 5 1 5 1 5 6 7 5 Valion: alytical Methy als/Mercury by y Walkley Blac We045D the by ASTM D Hysiella aztec Chironomous Particles 0.06-2.1 often cannot be tarticles 0.06-2.0 by as the base tarticles 0.06-2.0 by a both plass tarticles 100-000-00 tarticles 0.000-00 tarticles	olor Chart, Textur all S-0001 p olor Chart, Textur 11 Srt 11 S	IC day possessing a gr (non-plastic). r, generally fine ve.	tty texture when material posses me a dense, gu	Trubbed between seing a greasy or a mmy surface that his of mollusc shell	MS/MSD collect	ted? Yes Ro Tao tit total add Solid aterials (not cohesive) to sel when rubbed between trate with tools (hardpa

Sediment Sampling Form

Project Na	ime: Camp Ja	ames A. Garfi	eld, OH	Site Locatio	n: CC,RVAA	P-79, Ore Sto	rage Pond	
Contract Numb	per: W912QR-12-E	D-0002 DO: 0003		Sampled By:2	Zohte :	J. Petarli,	K. F. Elos	
Weather: PC	stly so	UNAY, 4	18° Ca	1m			5 10 1	
	, ation Descriptio	en:						
-	Water Body Na	ame: <u>Ore</u>	stores	2 Pondu	atitude/Longitud	de:		
	Sample Site De	escription (color,	odor, appear	ance): (omn	osite of	0795	<u>D-4/0-0001-5</u> 1-5D	D.
Ambiant Wa	ter Conditions:	0795)-4120	001-SD, a	10 07951	0-414-000	1-SĎ	,
		Electrical	Dissolved	Bodox	Turbiditu/	Mator	Codimont	
Water Temp.	рН	Conductivity	Dissolved Oxygen	Redox Potential	Turbidity/ Appearance	Water Depth Above	Sediment Sample	
(°C)	(SU)	(µS/cm)	(mg/L)	(mV)	(NTU)	Sample (feet)	Depth (feet)	
-	-							
Sediment Co	ollection Information							
	Water Depth A	bove Sample (fe						
	Sediment Sam	ple Depth: 0.	5	Sediment Dept	th to Refusal:	5 To Il ind	hos	
	Collection Met	hod (circle one):	Scoop E	ckman Dredge	Hand Corer	Other:		
	Sample Type (circle one):	Grab Com	posite	\frown			
Cadimont Sc	mple Informatio		\subseteq					
		4						
	1795D~4		-	4100	10-01	T ime O I i	las a sa t si	i det i
-					-		10:00 AM to 11	95 A-2
						MS/MSD collect	Δ -	
Observations	(Munsell Soil Co	lor Chart, Textu	re, Odor, Appe	earance): <u>Se c</u>	e desci	iptions	101	
07951) - 410-00	101-5D, O	795D-9	12-0001	· 50, 000	10792-	414-0001-SD	
Photos:	Dhates	taka, A	E Court	ale lago	tons a	ad deat	h of sadding	at
Sample Pres			- seall	117 102CC	TELEVS (~)
Comments:		site Si	note					
o o nanon do	<u>_</u>			11				
Laboratory A	Analytical Metho	ods:						
	etals/Mercury by		471B					
% TOC	by Walkley Blac	k Method						
pH by	SW9045D							
	Size by ASTM D							
	ay Hyalella azteo	-						
Bioass	ay Chironomous	dilutus (tentans)	10 day					
Notes:	- Detinice 0.06.2 () mm in diamotor		rittu taxtura what	a wheed between	fingers Loose me	toriale (not cohosive) that	
Sanu		molded into shape				Thigers. Loose the	terials (not cohesive) that	
Silt		.06 mm in diamete stic and not cohes		e material posses	ssing a greasy or	smooth, talc-like fe	el when rubbed between	
Clay	- Particles less tha			orms a dense, gu	mmy surface that	t is difficult to penet	rate with tools (hardpan).	
	- Calcium carbona	te, usually greyish						
		•	-			tially decayed coars	-	
						such as Sphagnum anic material (exclu	moss sometimes visible. ding sewage).	
	- Organic matter th				•			

Sediment Sampling Form

	The C.	NAY 4	18° Cal	n	a for going the			elos
Weather: <u>CC</u>	7		0 001					
Sample Locat	ion Descriptio	ame: <u>Dre</u>	cherr	o Part.	attenda II. a uniteri			
	vvater body Na	ame. Ore	510100	e jour	attude/Longitud		SD-411-000	1.50
Ambient Wate	Sample Site D	escription (color, 0795)	D - 413-C		, and 07	9-415-00	01-SD	μ.
Water	-	Electrical	Dissolved	Redox	Turbidity/	Water	Sediment	1
Temp.	pH	Conductivity (µS/cm)	Oxygen (mg/L)	Potential	Appearance	Depth Above Sample (feet)	Sample	1
(°C)	(SU)	(µoran)	(mg/L)	(mV)	(NTU)	Sample (leet)	Depth (feet)	
	~				-	-		
Sediment San	ple Information	0.01						
Sample ID: 0Z Duplicate Sam Observations (95D - 95D - 4/17 ple ID Munsell Soil Co	4/7 M M-000- 5 	Duplicate Time re, Odor, Appe	(+5min):	e desci	_MS/MSD collecte	10:70 To 11:1 Har Yes 10 DF 0795D-2	iu
Sample ID:0Z Duplicate Sam Observations (079.SD Photos:	79.5D - 95D - 4/1 ple ID Munsell Soll Co - 4/3 r Os - 2/13 r Os	4/7 M M-000-5 olor Chart, Textur 00/-SD, 1 35 Take	Duplicate Time re, Odor, Appe 0795D~	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	d? Yes /	111 1001-000
Sample ID:0Z Duplicate Sam Observations (079SD Photos: Sample Preser	Photo Ph	4/7 M M-000-5 olor Chart, Textur 00/-SD, 1 35 Take	Duplicate Time re, Odor, Appe 0795D~	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:0Z Duplicate Sam Observations (079SD Photos: Sample Preser Comments:	Photo vation:	4/7 M M-000- S plor Chart, Textur 001-SD, J as Taken loe, bs: Te Se	Duplicate Time re, Odor, Appe 0795D~	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Disservations (0795D Photos: Sample Preser Comments: Laboratory Ar	$795D^{-}$ $95D^{-}$ $95D^{-}$ $95D^{-}$ 910^{-} Munsell Soll Co - 413ros - 210ros - 210ros - - - - - - - -	4/7 M M-000- 8 olor Chart, Textur 00/-SD, 1 05 Taken 100, 50 100, 50 00,	Duplicate Time re, Odor, Appe 079SD- V OF S 000000000000000000000000000000000000	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Diservations (079SD Photos: Sample Preser Comments: Laboratory Ar	Plant Compositions	4/7 M M-000- S plor Chart, Textur 001-SD, 1 35 Take 108. 25. Te Se ods: 5W6010C/SW7	Duplicate Time re, Odor, Appe 079SD- V OF S 000000000000000000000000000000000000	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Observations (079SD Photos: Sample Preser Comments: Laboratory Ar TAL Met % TOC b	ple ID Munsel/ Soll Co <i>Q L </i>	4/7 M M-000- S plor Chart, Textur 001-SD, 1 35 Take 108. 25. Te Se ods: 5W6010C/SW7	Duplicate Time re, Odor, Appe 079SD- V OF S 000000000000000000000000000000000000	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Observations (07950 Photos: Sample Preser Comments: Laboratory Ar TAL Met % TOC to pH by S	Photo For Photo For	4/7 M M-coor-S olor Chart, Textur col - SD, J S Take ice, col - SD, J S Take ice, col - SD, J S S Take ice, col - SD, J S S Take ice, col - SD, J S S S S S S S S S S S S S S S S S S S	Duplicate Time re, Odor, Appe 079SD- V OF S 000000000000000000000000000000000000	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Observations (079SP Photos: Sample Preser Comments: Laboratory Ar TAL Met TAL Met Y TOC to PH by S Grain Si	295D- 95D-4/1 ple ID Munsell Soil Co - 413 FOS vation: <u>Compose</u> vation: <u>Compose</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation: <u>vation:</u> vation:	4/7 M M-000- S olor Chart, Textur 00/-SD, ice, ice, ice, ice, isw6010C/SW7 ik Method 422-63	Duplicate Time re, Odor, Appe 079SD- V OF S 000000000000000000000000000000000000	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Deservations (07950 Photos: Sample Preser Comments: Laboratory Ar TAL Met 0 TOC 12 0 File Sample State 0 Display S	Photo allytical Methor allytical Methor allyt	4/7 M M-000- 5 plor Chart, Textur CO/ -SD , 1 is Take ice, 25, Te Se ods: SW6010C/SW7 ik Method 422-63 ca 10 day	Duplicate Time re, Odor, Appe 079SD- N OFS 2-11- 2-11- 471B	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Observations (07950 Photos: Sample Preser Comments: Laboratory Ar TAL Met % TOC to pH by S Grain St Bioassay	Photo allytical Methor allytical Methor allyt	4/7 M M-000- S olor Chart, Textur 00/-SD, ice, ice, ice, ice, isw6010C/SW7 ik Method 422-63	Duplicate Time re, Odor, Appe 079SD- N OFS 2-11- 2-11- 471B	(+5min): arance): <u>_Sec</u> 415-00	e desci 01-5D	MS/MSD collecte	ar Yes Mg	111 1001-000
Sample ID:02 Duplicate Sam Observations (079SP Photos: Sample Preser Comments: Laboratory Ar TAL Mel % TOC b Bioassay Bioassay Notes:	Photo - 4/3 - 04 Munsell Soll Co - 4/3 - 04 Munsell Soll Co - 4/3 - 04 - 4/3 - 04 - 4/3 - 04 - 4/3 - 04 - 24 -	4/7 M M-coor-S olor Chart, Textur col - SD, J as Take ice, col - SD, col - S	Duplicate Time re, Odor, Appe 079SD~ V OF S 2000 200 2000 2	(+5min): arance): Sec 415-00	e desci	MS/MSD collecte	ar Yes Mg	ill - ol.mc.st
Sample ID:02 Duplicate Sam Observations (07950 Photos: Sample Preser Comments: Laboratory Ar TAL Met With TOC to PH by S Grain Si Bioassay Notes: Sand - 1	Photo Solutions Photo	4/7 M M-coor-S olor Chart, Textur CO/-SD, as Take ice, bds: SW6010C/SW7 k Method 422-63 ca 10 day dilutus (tentans) 0 mm in diameter, molded into shape	Duplicate Time re, Odor, Appe 0795D~ 0795D~ 0795D~ 0795	(+5min): arance):_Sec 4/15-100 Comp D	n rubbed between	MS/MSD collecte	depth of se	ill - - - - - - - -
Sample ID:02 Duplicate Sam Observations (079.50 Photos: Sample Preser Comments: Laboratory Ar TAL Met % TOC to pH by S Grain Si Bioassay Notes: Sand - 1 Sit - 1	Photo Solutions Photo	4/7 M M-coor-S olor Chart, Textur CO/-SD, as Taken ice, bis taken	Duplicate Time re, Odor, Appe 0795D~ 0795D~ 0795D~ 0795C~	(+5min): arance): Sec 415-00 Comp D	n rubbed betweel	MS/MSD collecte	eriais (not cohesive) th	(1)
Sample ID:02 Duplicate Sam Observations (079SD Photos: Sample Preser Comments: Laboratory Ar TAL Met % TOC to Bioassay Bioassay Notes: Sand - Silt - Clay - 1	Planticles 0.06-2.0 offen cannot be Particles less tha Clay is both plas	4/7 M M-coor-S olor Chart, Textur CO/-SD, as Take ice, bis: SW6010C/SW7 k Method 422-63 ca 10 day dilutus (tentans) 0 mm in diameter, molded into shape .06 mm in diameter, stic and not cohes	Duplicate Time re, Odor, Appe O 79SD~ N OFS A O	(+5min): arance): Sec 415-00 Comp b Comp comp	n rubbed between ummy surface tha	MS/MSD collecte	ed? Yes (COT OT 95D-2 Copt of Se reriais (not cohesive) th el when rubbed betwee	(1)

APPENDIX A.2

FIELD NOTES

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DAILY ACTIVITY REPORT

Project No: 6	40030.0005.110051	Day: Tuesday	Date:	4-20-2021
W912QR-12-D	-0002, TO 0003		Report No:	
Project Title:	Camp James A Garfield OH – Se	diment Sampling at CC RVA	AP-79 Ore Pon	d

Work Area	Shift	Hours	Worked:	Weather: Coudy
		From:	To:	Temp 45 degrees
	DAY	08:00	3:30pm	Rain/Snow; none

Contractor Manpower	Number of Workers	Total Onsite Hours	Major Equipment	Number on Site	Total Hours
PARSONS	3				
Joe Peterlin		7.5	Hand tools		
Paul Zahrte		7.5	Canoe		
Karen Fields		7.5			
Contractors					
None					
Visitors	1				
Kevin Sedlak (8:00-9:00 AM)		1			

HEALTH AND SAFETY TASKS PERFORMED/PPE: Level D

EQUIPMENT ON SITE: Canoe, sediment sampler, water meter, Trimble GPS

QUALITY CONTROL ACTIVITIES (Including Field Calibrations, may include attachment): None

SITE WORK COMPETED Collected Ore Storage Pond Sediment samples Completed wetland delineation of Ore Storage Pond Completed Waste Inspection

PROBLEMS ENCOUNTERED/CORRECTIVE ACTION TAKEN: none

NOTES/INSTRUCTIONS GIVEN BY GOVERNMENT PERSONNEL: none

PROPOSED SCOPE OF WORK FOR TOMORROW: no work tomorrow. Waste inspection in May 2021.

Date: 4-20-2021

Joe Peterlin

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DAILY ACTIVITY REPORT

Project No:	640030.0005.110051	Day: Tuesday	Date:	4-27-2021
W912QR-12-I	D-0002, TO 0003		Report No:	
Project Title:	Camp Garfield(Ravenna) OH – repla	ce manhole and pad for 0	69MW-008	

Work Area	Shift	Hours	Worked:	Weather: Clear
		From:	To:	Temp 75 degrees
	DAY	08:30	3:00pm	Rain/Snow; none

Contractor Manpower	Number of Workers	Total Onsite Hours	Major Equipment	Number on Site	Total Hours
PARSONS	1				
Joe Peterlin		6.5			
Contractors					
None					
Visitors					
HEALTH AND SAFETY T	ASKS PERFOR	 MED/PPE: Le	evel D		
EQUIPMENT ON SITE: 7	Frimble GPS				

QUALITY CONTROL ACTIVITIES (Including Field Calibrations, may include attachment): None

SITE WORK COMPETED Recorded wetland delineation GPS coordinates.

PROBLEMS ENCOUNTERED/CORRECTIVE ACTION TAKEN: none

NOTES/INSTRUCTIONS GIVEN BY GOVERNMENT PERSONNEL: none

PROPOSED SCOPE OF WORK FOR TOMORROW: Waste inspection in May 2021.

Date: 4-27-2021

Joe Peterlin

Location 6 -. JAG Date 4-27-292/ Location C - JAG Date 422-2021 55 Project / Client Project / Client Phone Googe Farth GPS -Arrived \$:30 Am to Collect GPS Copidenetes from Wetlends 81.007233 Areq. OP2 81.007001 - Tremble GPS is Equipment 81,006993 207775 81.006802 2 0 onsite. OP 81.006607 OPE - I am varable to see data 81,006463 that opposes to be collected in the Training & Emailed data files to Koren Freds. 81.006468 20,8006 OP8 11 208 00 9 81.00646 81,006535 OPS 207811 07/0 207578 81.006523 OPIN 81,006712 207460 OPIZ 81,0067,39 207797 OPIS 81.006716 OPIY 41,207.309 81.00699 ORIS 81,007098 611. 207358 41,207413 41,207429 41.207652 81.007139 OPIG OPIZ 81,007138 81.007152 SP18 Protted Coordinates on Rite in the Rain

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APPENDIX A.3

SAFETY FORMS

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	Service Service
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	1 United
	PROJECT C JAC DAILY SAFETY INSPECTION
	N V NA Page 1 10 10 11 Page 1 of 2
	Daily safety briefing conducted
	Emergency numbers and route to hospital posted
	FWSHP and project-specific Adda-d
	FWSHP and project-specific Addenda on-site, available to employees, and complete Required exposure monitoring conducted and documented
	Monitoring instruments (PID, OVA, CGI) calibrated daily against known standard and documented First aid kit available and inspected used.
	First aid kit available and inspected weekly
	Personnel wearing PPF mound by person
	with side shields, and nitrile or similar gloves to handle potentially contaminated material) Personnel using buddy system (manual)
	system (maintain visual or verbal contact and able to
3	
	If temperature <40°F: cold stress training conducted, controls in SSHP being followed Personnal university of the stress training conducted, controls in SSHP implemented
	Personnel using appropriate biological hazard controls (See SSHP)
	Unil rig operating manual on-site
	Drill rigs inspected weekly and documented
	Personnel near drill rig or other overhead hazards wearing hardhats
	Lach of two drill rig emergency shutdown devices tested daily
	Employees excluded from under lifted loads
	Unnecessary personnel excluded from hazardous areas, specifically near heavy equipment
	- Radius of exclusion zone around drill rig at least equal to mast beints
	Personnel wearing hearing protection when within 25 ft of drill rigs, generators, or other noisy
	Containers of flammable liquids closed and labeled properly
	Fully charged fire extinguisher available 25 to 50 ft from flammables storage area and inspected
t	Personnel exiting potentially contaminated areas washing hands by for
t	Personnel using steam washer wearing faceshield, hearing protection, heavy duty waterproof gloves,
	Saranax or rainsuit

Page Lof 2

		NA	Page 2 of 2
14	r	NA	Item
		-41-	Portable electrical equipment plugged to a GFC1
		-	Electrical wiring covered by insulation or enclosure
		-	Three wire, UL approved, extension cords used
	1		Housekeeping adequate (walkways clear of loose, sharp or dangerous objects and trip bazards, wor areas clear of objects that might fall on employees)
-	0		Walking/working surfaces safe (not slippery, no unguarded holes, no trip hazards)
	1	-	Excavations deeper than 5 ft shored or sloped (if personnel will enter) and in compliance with SSH
-	1	12	Moving (rotating) machinery guarded to prevent employee contact
-		-	Fall protection provided for work at elevations greater than 4 ft
-	1	1	All containers of hazardous material labeled to indicate contents and hazards
-	-	L	MSDSs for hazardous materials on-site
-		-	All vehicles equipped with two-way radios and cellular phones
		1	15-min eyewash (accessible and full) within 100 ft of areas where corrosive sample preservatives poured
-	1	1	Potable and non-potable water labeled
-	-	-	Chainsaws have anti-kick-back protection, personnel wearing cut resistant gloves, protective chap
-			Visitor access controlled
-	-	-	Site hazards and controls consistent with SSHP
-	-	-	Site hazard controls appropriate and sufficient
A	tion	is take	in to correct or control any "N" responses
-	1	17	Te. In 200 4 10 2021
N	me		Signature Date
			Site Safety and Health Plan Page
			Site Safety and Health Plan Page .

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04/20/2021

SITE SAFETY AND HEALTH OFFICER

PR	юл	ECT:_	C-JAG- 4-27-2021 Page 1 of 2
N	Y	NA	Item
11	-	F	Daily safety briefing conducted
11	1	F	Emergency numbers and route to hospital posted
	-	-	FWSHP and project-specific Addenda on-site, available to employees, and complete
	1.1	14	Required exposure monitoring conducted and documented
1	11T	-	Monitoring instruments (PID, OVA, CGI) calibrated daily against known standard and documented
	1	-	First aid kit available and inspected weekly
)	F	Personnel wearing PPE required by SSHP for fieldwork (at least safety shoes or boots, safety glasses with side shields, and nitrile or similar gloves to handle potentially contaminated material)
		-	Personnel using buddy system (maintain visual or verbal contact and able to render aid)
		-	If temperature >70°F: heat stress training conducted, cool fluids available, pulse rates of personne wearing Tyvek® are being monitored, work/rest cycle in SSHP being followed
		~	If temperature <40°F: cold stress training conducted, controls in SSHP implemented
	1	-	Personnel using appropriate biological hazard controls (See SSHP)
		L	Drill rig operating manual on-site
			Drill rigs inspected weekly and documented
		-	Personnel near drill rig or other overhead hazards wearing hardhats
T		-	Each of two drill rig emergency shutdown devices tested daily
1	-	Y	Employees excluded from under lifted loads
1		-	Unnecessary personnel excluded from hazardous areas, specifically near heavy equipment
	71	-	Radius of exclusion zone around drill rig at least equal to mast height
		•	Personnel wearing hearing protection when within 25 ft of drill rigs, generators, or other noisy equipment
1		-	Containers of flammable liquids closed and labeled properly
		-	Fully charged fire extinguisher available 25 to 50 ft from flammables storage area and inspected monthly
1		-	Personnel exiting potentially contaminated areas washing hands before eating
		-	Personnel using steam washer wearing faceshield, hearing protection, heavy duty waterproof gloves. Saranax or rainsuit

Γ_	DAILY SAFETY INSPECTION						
PF	кол	ECT:_	Page 2 of 2				
N	Y	NA	Item				
			Portable electrical equipment plugged to a GFCI				
		-	Electrical wiring covered by insulation or enclosure				
			Three wire, UL approved, extension cords used				
			Housekeeping adequate (walkways clear of loose, sharp or dangerous objects and trip hazards, work areas clear of objects that might fall on employees)				
			Walking/working surfaces safe (not slippery, no unguarded holes, no trip hazards)				
			Excavations deeper than 5 ft shored or sloped (if personnel will enter) and in compliance with SSHP				
			Moving (rotating) machinery guarded to prevent employee contact				
	\square		Fall protection provided for work at elevations greater than 4 ft				
	Π	~	All containers of hazardous material labeled to indicate contents and hazards				
			MSDSs for hazardous materials on-site				
			All vehicles equipped with two-way radios and cellular phones				
		-	15-min eyewash (accessible and full) within 100 ft of areas where corrosive sample preservatives are poured				
		~	Potable and non-potable water labeled				
		-	Chainsaws have anti kick-back protection, personnel wearing cut resistant gloves, protective chaps				
		~	Visitor access controlled				
		$\overline{}$	Site hazards and controls consistent with SSHP				
		L	Site hazard controls appropriate and sufficient				
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C-JAG 4-27-2021
TAILGATE SAFETY MEETING LOG
PROJECT NAME: PROJECT NO:
DATE: MTW Th F Sa Su TIME: 8:30 A~
WEATHER: Cleer 70°S
PROJECT NAME: PROJECT NO: DATE: MIW TH F Sa Su TIME: 9:30 A WEATHER: Cleer 70°S WORKING CONDITIONS: Cleci and Ory
PPE: Level D.
ITEMS DISCUSSED: Tok Clier Toic Til
ITEMS DISCUSSED: Tick, Slips, Trips, Falls
THE FOLLOWING INDIVIDUALS ATTENDED THE DAILY TAILGATE SAFETY MEETING (SIGNATURES)
4-27-2021

SITE SAFETY AND HEALTH OFFICER

Appendix B Bioassay Report

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RESULTS OF TOXICITY TESTING WITH *Hyalella azteca* and *Chironomus dilutus* ON SEDIMENT SAMPLES FROM PARSONS PROJECT NUMBER 640030.110051 RAVENNA, OHIO

Prepared for:

Parsons 3606 Park 42 Drive, Box 13 Sharonville, Ohio 45241

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC 231 Schilling Circle Hunt Valley, Maryland 21031 For questions, please contact Michael Chanov ph: 410-584-7000

Results relate only to the items tested or to the samples as received by the laboratory.

This report shall not be reproduced, except in full, without written approval of EA Engineering, Science, and Technology, Inc., PBC

This report contains 18 pages plus 4 attachments.

Michael K. Chanov II Laboratory Director

EA Project Number 70019.TOX



24 May 2021

Date

EA Report Number 8561

1. INTRODUCTION

EA Engineering, Science, and Technology performed toxicity testing on sediment samples for Parsons Project Number 640030.110051, Ravenna, Ohio. The objective of the testing was to evaluate the toxicity of two site sediment samples as compared to control sediment. The testing program consisted of: 1) a 10-day survival and growth toxicity test using the freshwater midge *Chironomus dilutus* (formerly *tentans*); 2) a 10-day survival and growth toxicity test using the freshwater midge freshwater amphipod *Hyalella azteca*.

2. METHODS AND MATERIALS

2.1 SAMPLE DESCRIPTIONS

Two sediment samples were collected for the project by Parsons personnel. The samples were packed on wet ice and transported to EA's Ecotoxicology Laboratory in Hunt Valley, Maryland. Upon receipt at EA, the samples were visually inspected, compared against the chain-of-custody record, and assigned EA laboratory accession numbers. Copies of the chain-of-custody records are included in Attachment I. Table 1 summarizes the collection and receipt data for the site sediments. When not being processed for testing, the samples were stored in the dark at 4°C.

2.2 CONTROL SEDIMENT

The control sediment used in the toxicity tests was a natural sediment from Pretty Boy Reservoir, Maryland which has been routinely utilized in freshwater sediment toxicity testing.

2.3 LABORATORY WATER

Dechlorinated tap water was used as the overlying water for the sediment exposures. The source of the water was the City of Baltimore municipal water system. Upon entering the laboratory, the water passed through a high-capacity, activated-carbon filtration system to remove any possible contaminants such as chlorine and trace organic compounds. This water source has proven safe for aquatic organism toxicity testing at EA as evidenced by maintenance of the multigeneration *Hyalella azteca*, *Lumbriculus variegatus* and fathead minnow cultures with no evident loss of fecundity. Additionally, this water has been routinely utilized in freshwater sediment toxicity testing, which have met test acceptability criteria.

2.4 TEST ORGANISMS

The midges (*Chironomus dilutus*) lot were obtained from Aquatic Research Organisms (Hampton, New Hampshire). Upon receipt at EA, the organisms were gradually acclimated to laboratory water at 23°C. Second instar larvae were used in the toxicity testing.

The amphipods (*Hyalella azteca*) were obtained from Aquatic Research Organisms (Hampton, New Hampshire). Organisms were 8 days old for testing and were gradually acclimated to the testing temperature of 23°C during the holding period.

2.5 TOXICITY TEST OPERATIONS AND PERFORMANCE

Toxicity test methodologies utilized in this study followed EA's standard toxicity testing protocols (EA 2018), and comply with current NELAC standards where applicable.

2.5.1 Chironomus dilutus 10-Day Toxicity Tests

Toxicity testing was conducted in accordance with US EPA guidance (US EPA 2000), and test methodologies followed EA's standard toxicity testing protocol CT-AC-06 (EA 2018).

The test chambers used in the *C. dilutus* 10-day survival and growth toxicity test were 300-ml lipless glass beakers, each containing 100 ml of sediment and 175 ml of overlying water. The tests were performed with eight replicates per sediment. The sediments and overlying water were added to the chambers approximately 24 hours prior to introduction of the test organisms. The beakers were left undisturbed overnight to allow any suspended sediment particles in the water column to settle. The introduction of the test organisms to the test chambers marked the initiation of the toxicity tests. Ten organisms were randomly introduced into each replicate beaker for a total of 80 organisms per sediment. The test chambers were placed in a water bath to maintain temperatures at a target range of $23\pm1^{\circ}$ C, with a 16-hour light/8-hour dark photoperiod. The *C. dilutus* were fed 1.5 ml per replicate of a 4 g/L slurry of Tetramin flake food daily.

The overlying water in the exposure chambers was renewed a minimum of twice daily using a water delivery system (Zumwalt et al. 1994). Fresh overlying water was slowly added to each replicate, displacing the water already in the beaker to flow out through a notch cut into the top of the beaker. The notch was sealed with fine mesh screen to prevent loss of organisms during the renewal process.

For the midge toxicity testing, water quality parameters of temperature, pH, dissolved oxygen, and conductivity were recorded daily on the overlying water in one replicate of each sediment. Composite samples of the overlying water of each sediment were also analyzed for alkalinity, hardness, conductivity and ammonia at test initiation and termination.

At the end of the 10-day exposure period, the surviving organisms from each replicate were retrieved from the sediment. The number of surviving organisms from each replicate was recorded. The surviving *C. dilutus* from each replicate were then placed in a dried, pre-weighed ceramic crucible and placed in a drying oven at 100°C for a minimum of 24 hours. The crucibles were then removed from the oven, placed in a desiccator to cool, and weighed. The dry weight of the surviving organisms in each replicate was determined by subtracting the weight of the crucible from the weight of the crucible plus dried organisms. The mean dry weight per organism was obtained by dividing the total organism dry weight per replicate by the number of surviving organisms per replicate.

The ash-free dry weight was determined for the *C. dilutus* by placing the crucibles with ovendried organisms in a muffle furnace at 550°C for two hours, then weighing the crucibles with organisms following an appropriate cooling period. For each replicate, the weight of the crucible with furnace-dried organisms was subtracted from the weight of the crucible with oven-dried organisms, yielding a total organism ash-free dry weight. A mean ash-free dry weight per organism was obtained by dividing the total organism ash-free dry weight per replicate by the number of surviving organisms per replicate.

The survival and growth results of the *C. dilutus* toxicity tests were statistically analyzed according to US EPA guidance (US EPA 2000) to determine if any of the site sediments were significantly different (p=0.05) from the control sediment. If the data were normally distributed, then a t-Test was performed to detect statistically significant differences between test sediments and the control sediment. If the data distribution was non-normal, then a Wilcoxon Two-Sample Test was used to compare the group means. Shapiro-Wilk's Test was used to determine if the data were normally distributed, and the F-Test was used to test for homogeneity of variance.

Tables, 2 and 3 present the test results and water quality, respectively, for the *C. dilutus* toxicity testing. Copies of the original data sheets and statistical analyses from the sediment toxicity testing are included in Attachment II for *C. dilutus*.

2.5.2 Hyalella azteca 10-Day Toxicity Tests

Toxicity testing was conducted in accordance with US EPA guidance (US EPA 2000), and test methodologies followed EA's standard toxicity testing protocol HA-AC-06 (EA 2018).

The test chambers used in the *H. azteca* 10-day survival and growth toxicity test were 300-ml lipless glass beakers, each containing 100 ml of sediment and 175 ml of overlying water (lab water). The tests were performed with eight replicates per sediment. The sediments and overlying water were added to the chambers approximately 24 hours prior to introduction of the test organisms. The beakers were left undisturbed overnight to allow any suspended sediment particles in the water column to settle. The introduction of the test organisms to the test chambers marked the initiation of the toxicity tests. Ten organisms were randomly introduced into each replicate beaker for a total of 80 organisms per sediment. The test chambers were placed in a water bath to maintain temperatures at a target range of $23\pm1^{\circ}$ C, with a 16-hour light/8-hour dark photoperiod.

The *H. azteca* were fed 1.0 ml per replicate of YCT (a suspension of yeast, ground cereal leaves, and trout chow) daily. The overlying water in the exposure chambers was renewed a minimum of twice daily using a water delivery system (Zumwalt et al. 1994). Fresh overlying water was slowly added to each replicate, displacing the water already in the beaker to flow out through a notch cut into the top of the beaker. The notch was sealed with fine mesh screen to prevent loss of organisms during the renewal process.

For the amphipod toxicity testing, water quality parameters of temperature, pH, dissolved oxygen, and conductivity were recorded daily on the overlying water in one replicate of each sediment. Composite samples of the overlying water of each sediment were also analyzed for alkalinity, hardness, conductivity and ammonia at test initiation and termination.

At the end of the 10-day (*H. azteca*) exposure period, the surviving organisms from each replicate were retrieved from the sediment. The number of surviving organisms from each replicate was recorded. The surviving *H. azteca* from each replicate were then placed in a dried, pre-weighed aluminum pan, and placed in a drying oven at 100°C for 24 hours. The pans were then removed from the oven, placed in a desiccator to cool, and weighed. The dry weight of the surviving organisms in each replicate was determined by subtracting the weight of the empty pan from the weight of the pan plus dried organisms. The mean dry weight per organism was obtained by dividing the total organism dry weight per replicate by the number of surviving organisms per replicate.

The survival and growth results of the *H. azteca* toxicity tests were statistically analyzed according to US EPA guidance (2000) to determine if any of the site sediments were significantly different (p=0.05) from the control sediment. If the data were normally distributed, then a t-Test was performed to detect statistically significant differences between test sediments and the control sediment. If the data distribution was non-normal, then a Wilcoxon Two-Sample Test was used to compare the group means. Shapiro-Wilk's Test was used to determine if the data were normally distributed, and the F-Test was used to test for homogeneity of variance.

Table 4 summarizes the results of the *H. azteca* test and Table 5 provides a summary of the water quality measurements recorded during the *H. azteca* toxicity testing. Copies of the original data sheets and statistical analyses from the sediment toxicity testing are included in Attachment III for *H. azteca*.

2.6 REFERENCE TOXICANT TESTS

In conformance with EA's quality assurance/quality control program, reference toxicant tests were performed on *C. dilutus* and *H. azteca*. The *C. dilutus* were exposed to sodium dodecyl sulfate (SDS) to determine the 48-hour LC50. The *H. azteca* were exposed to the reference toxicant copper sulfate (CuSO₄) in a graded concentration series to determine the 96-hour median lethal concentration (LC50). The results of the reference toxicant tests were compared to EA's established control chart limits according to US EPA methodology (US EPA 2002). Reference toxicant test data are presented in Table 6.

2.7 ARCHIVES

Original data sheets, records, memoranda, notes, and computer printouts are archived at EA's Office in Hunt Valley, Maryland. These data will be retained for a period of 5 years unless a longer period of time is requested.

3. RESULTS AND DISCUSSION

3.1 Chironomus dilutus SEDIMENT TOXICITY TEST

Table 2 summarizes the results of the *C. dilutus* 10-day survival and growth test. Water quality measurements taken during the test are presented in Table 3. The survival and growth of *C. dilutus* exposed to the site sediments were statistically compared to organisms exposed to the laboratory control. The survival results indicated that the organisms exposed to the site sediments were statistically different (p=0.05) from the laboratory control sample. Mean ash free dry weight indicated that neither of the sediment samples were significantly different from the control.

3.2 *Hyalella azteca* SEDIMENT TOXICITY TEST

Table 4 summarizes the results of the *H. azteca* 10-day survival and growth test. Water quality measurements taken during the test are presented in Table 5. The survival and growth of *H. azteca* exposed to the site sediments were statistically compared to organisms exposed to the laboratory control. The results indicated that for survival and growth the organisms exposed to site sediments were not statistically different (p=0.05) from the laboratory control sample.

3.3 REFERENCE TOXICANT TESTS

The results of the reference toxicant tests are summarized in Table 6. All of the reference toxicant test results fell within the established laboratory control chart limits.

4. REFERENCES

- EA. 2018. EA Ecotoxicology Laboratory Quality Assurance and Standard Operating Procedures Manual. EA Manual ATS-102. Internal document prepared by EA's Ecotoxicology Laboratory, EA Engineering, Science, and Technology, Inc., PBC, Hunt Valley, Maryland.
- US EPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. Second Edition. EPA/600/R-99/064. U.S. Environmental Protection Agency, Office of Research and Development, Duluth, Minnesota.
- US EPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, DC.
- Zumwalt, D.C., F.J. Dwyer, I.E. Greer, and C.G. Ingersoll. 1994. A water-renewal system that accurately delivers small volumes of water to exposure chamber. Environmental Toxicology and Chemistry. 13:1311-1314.

TABLE 1SUMMARY OF COLLECTION AND RECEIPT INFORMATION FOR
SEDIMENT SAMPLES - PARSONS PROJECT NUMBER 640030.110051

<u>Sample</u> <u>Identification</u>	<u>EA Accession</u> <u>Number</u>	<u>Sample</u> <u>Date</u>	<u>Receipt</u> <u>Time and Date</u>	<u>Receipt</u> <u>Temperature</u> <u>(°C)</u>
079SD-417M-0001-SD	AT1-223	1315, 4/20/2021	1200, 4/21/2021	2.3
079SD-416M-0001-SD	AT1-224	1300, 4/20/2021	1200, 4/21/2021	1.4

EA Test Number:	TN-21-239
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	10-Day Survival (percent)	Mean Ash Free Dry Weight as mg/Organism (±SD)		
Laboratory Control	AT0-593	100	0.697 (±0.152)		
079SD-417M-0001-SD	AT1-223	78 ^(a)	1.221 (±0.267)		
079SD-416M-0001-SD	AT1-224	93 ^(a)	1.074 (±0.209)		

(a) Significantly different (p=0.05) from laboratory control.

EA Test Number:	TN-21-239
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	Temperature (°C)		pH (su)			ed Oxygen 1g/L)	Conductivity (µs/cm)	
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Laboratory Control	AT0-593	22.0	24.0	7.4	8.2	5.3	8.6	361	404
079SD-417M-0001-SD	AT1-223	22.0	23.9	7.3	8.1	5.0	8.0	365	389
079SD-416M-0001-SD	AT1-224	22.0	23.8	7.3	8.1	4.5	7.8	365	391

EA Test Number:	TN-21-239
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	Alkalinity (mg/L)			dness g/L)		uctivity /cm)		nonia g/L)
		Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Laboratory Control	AT0-593	44	46	96	92	387	377	< 0.1	1.6
079SD-417M-0001-SD	AT1-223	34	50	76	84	348	376	1.6	1.4
079SD-416M-0001-SD	AT1-224	42	52	84	84	372	372	1.7	1.5

EA Test Number:	TN-21-240
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	10-Day Survival (percent)	Mean Dry Weight as mg/Organism (±SD)
Laboratory Control	AT0-593	80	0.073 (±0.016)
079SD-417M-0001-SD	AT1-223	86	0.083 (±0.021)
079SD-416M-0001-SD	AT1-224	86	0.096 (±0.015)

TABLE 5 WATER QUALITY PARAMETERS MEASURED DURING Hyalella azteca 10-DAY TOXICITY TESTING

EA Test Number:	TN-21-240
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	Temperature (°C)		pH D (su)		Dissolved Oxygen (mg/L)		Conductivity (µs/cm)	
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Laboratory Control	AT0-593	22.0	23.5	7.4	8.2	6.3	8.6	361	401
079SD-417M-0001-SD	AT1-223	22.0	23.7	7.4	8.1	6.3	7.9	357	399
079SD-416M-0001-SD	AT1-224	22.0	23.8	7.4	8.1	6.5	7.6	361	391

EA Test Number:	TN-21-240
Test Initiation:	23 April 2021
Test Termination:	3 May 2021

Sample Identification	EA Accession Number	Alkalinity (mg/L)		Hardness (mg/L)		Conductivity (µs/cm)		Ammonia (mg/L)	
		Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Laboratory Control	AT0-593	44	40	96	92	387	372	< 0.1	< 0.1
079SD-417M-0001-SD	AT1-223	34	46	76	84	348	379	1.6	0.4
079SD-416M-0001-SD	AT1-224	42	48	84	84	372	366	1.7	0.6

Test Species	Reference Toxicant	EA Test Number	Test Result	Acceptable Control Chart Limits
Chironomus dilutus (midge)	Sodium dodecyl sulfate (SDS)	RT-21-062	48-Hour LC50: 59 mg/L SDS	16 – 80 mg/L SDS
<i>Hyalella azteca</i> (amphipod)	Copper sulfate (CuSO ₄)	RT-21-061	96-Hour LC50: 143 μg/L Cu	0.3 – 310 μg/L Cu

TABLE 6 RESULTS OF REFERENCE TOXICANT TESTING

ATTACHMENT I

Chain-of-Custody Record (3 pages)

	Chain-of-Custody Record
B EA Engineering, Science, and Technology	Person's Project # 640030,11005
EA Ecotoxicology Laboratory 231 Schilling Circle Hunt Valley, Maryland 21031 Telephone: 410-584-7000 Fax: 410-584-1057	Sample Shipped By: (circle) Fed. Ex. UPS Other: Tracking #:
Client: Project No.: NPDES Number: Client Purchase Order Number: City/State Collected: O H	- Fedex Arcount 1674-0246-1

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession			Colle	ection	Sample Description (including Site, Station Number, and Outfall Number) of Container		
Number (office use only)	Grab	Composite	Start Date/Time	End Date/Time			
AT1-223	-	X	04/20/21	1315	079 SD - 417M -0001-SD	21	(2,3%)
ALM - L							
						and a second	
					1000 CIO		-

Sampled By:	Date/Time	Received By:	Date/Time
JePeterlin	4-20-2021 5	1300- FedEx	
Sampler's Printed Name:	Title:	Relinquished By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory	Date/Time Unfr 4/21/21 1200
Wee Comple Chilled During Col			1 10 101

Was Sample Chilled During Collection? Yes / No

Sample Collection Parameters

Comments:

Hyalella azteca 10 day Bibassa Chironomus dilutus (Tentens) 10 Day Broassey

Visual Description: Temperature (°C):

pH:

TRC (mg/L): Other:

Chain-of-Custody Record

R EA Engineering, Science, and Technology	Persons Project # 646030, 11005
EA Ecotoxicology Laboratory 231 Schilling Circle Hunt Valley, Maryland 21031 Telephone: 410-584-7000 Fax: 410-584-1057	Sample Shipped By: (circle) Fed. Ex UPS Other:
Client: Project No.:	Fedex Accant 1674-0246-1
NPDES Number: Client Purchase Order Number:	-
City/State Collected: Kasenna, OH	

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession			Colle	ection	Sample Description	1
Number (office use only)	Grab	Composite	Start Date/Time	End Date/Time	(including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT1-224		X	04/20/21	13:00	079504116-M-0001-56 T	Z
					- 6795D-416M-0001-5D	(1.4%)
				5		

Sampled By:	Date/Time	Received By:	Date/Time
Joe Peterlin	4-20-2021 5:300 m	Feder	
Sampler's Printed Name:	Title:	Relinquished By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory	
Kelinquisned By:		Laboratory	1 Jahren 1915

Was Sample Chilled During Collection? Yes / No

Sample Collection Parameters Visual Description: Temperature (°C): pH: TRC (mg/L): Other:

Comments:

Hyalella azteca 10 day Bioassey chironomus dillitus (tentons) 10 day Bibassey

Yellow-Laboratory 12.

Pink-Client/Sampler

ATTACHMENT II

Data Sheets and Statistical Analyses from *Chironomus dilutus* Toxicity Tests (18 pages)

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project N	ımber:	70019.TOX	
Client:	Parsons		

QC Test Number: _______ TN-21-239

		TEST ORGANISM IN	
Common Name: _	Midge	Adul	ts Isolated (Time, Date):
Scientific Name: _		Neon	ates Pulled (Time, Date):
Lot Number:	CH - 097	Accli	imation: <u>274-</u>) Age: 2nd insh
Source: <u>F</u>	A ARO WM 4/13	<u>/ Cultu</u>	re Water (T/S): <u>23.1 °C</u> <u>\$</u> pp
		TEST INITIA	ATION
Date	Time	<u>Initials</u>	Activity
4/22/21	1535	81	Sediment Added to Chambers
L	1540	V	Overlying Water Added to Chambers
1/2>24	1012	m	Organisms Transferred
		TEST SET	C-UP
mple Number(s)	: <u>AT0-593, AT1-22</u>		
veryling Water N Verlying 6	lumber: <u>D</u> LSA 5/24/24	Dechlor	nt Volume Overlying Water
veryling Water N Verlying (b) <u>Treatment</u>	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying 6	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	Dechlor	nt <u>Volume Overlying Water</u> 175 ml
veryling Water N Verlying (b) <u>Treatment</u>	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N verlying (b) <u>Treatment</u> etty Boy Control	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	
veryling Water N Verlying (b) <u>Treatment</u> etty Boy Control AT1-223	lumber: <u>D</u> ISA 5/24/24 <u>V</u>	echlor Yolume Test Sedimer	



SEDIMENT TOXICITY TEST OBSERVATION DATA SHEET

Project Number:	700	19,TOX		TEST ORC	ANISM				Beginning Date: _	4/23/24	Tim	e: 1016
Client: Pars	ons			Comm	on Name:	Midge		_	Ending Date:	5/312) Tim	e: 122-4
QC Test Number:	ę	TN-21-239		Scienti	fic Name:	C. dilutus						
Test Material(s):	Sec	liment										
Accession Number	(s): <u>AT0-</u>	593, AT1-223	, AT1-224	TEST	TYPE:	Static / Fl	owthrough		Test Container: _	300ml lip	less beakers	
Overlying Water: _	I	Dechlor			Renewa	I Non-r	enewal		Test Volume:	100ml sed	iment	
Accession Number:		N/A	-1	Photop	period: 161, 8d	Light Inter	nsity: <u>50 - 100</u>	fc	Test Duration:	10 days		
		1.4		ine Cherry 11		Number	r of Surviving	Organis	sms			tas dana
Treatment	Rep	Day O Date 4/15	Day Date	Day 10 Date 5/3	Day Date	Day Date	Day Date	Day Date		Day Date	Day Date	Day Date
Pretty Boy Control	Α	10		10								
(AT0-593)	В	lo		10					1			
	C	10		10								i = -1
	D	15		10		18						
	Е	10		10						-		
	F	10		10								
	G	10		10								
	Н	10		10								
AT1-223	A	10	-	8								
	В	10		8								
	C	10		8								
	D	10		Ģ								1
	E	10		6						<u></u>		
	F	10		9								
	G	10		9							1	
	H	10		8								
Time /	Initials	1010~		122MM								

EPA Test Method: (FW) EPA 600-R-99-064/SW EPA-600-R-94-025 (CHECK ONE)

Hyalella: (100,1)

X



SEDIMENT TOXICITY TEST OBSERVATION DATA SHEET

Project Number:				TEST ORG	ANISM on Name:	Midaa			Beginning Date:	7/20/24	Time	e: 1014 e: 1884
Client: Parso					fic Name:				Ending Date.	21010		<u> 1</u>
QC Test Number: _				Scienti		C. anaus						
Test Material(s): Accession Number(s			AT1 224	TECT	TYPE:	Static) / F	lowthrough		Test Container:	300m11in	lass baskars	
			, A11-224	IEDI		1 /Non-r			Test Volume:			
Overlying Water: Accession Number:				Dhotor	eriod: 161, 8d				Test Duration:			
Accession Number;				A	errod <u>: 101, 60</u>		AV SYLAND MALE AND			10 days		
1			MOGI				r of Surviving			1 mil		-
Treatment	Rep	Day Date 4/23	Day Date	Day 10 Date 5/3	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date
AT1-224	A	10	8	8			1				L'atori non	
	В	10	<u> </u>	9		1						
	С	(0		10	l l						r	
	D	to		9								
- and the second second	Е	10		9								-
	F	10		9				10.00				
	G	10		10			1					
	H	10	1	10	l i							
			¥	1.0								
							11				1	
					-							
		ya ana ana ana ana ana ana ana ana ana a										
								11		1		
												1
			1									
Time /	Initials	1016~		1334 107								

EPA Test Method: (FW) EPA 600-R-99-064/SW EPA-600-R-94-025 (CHECK ONE)



ASH-FREE DRY WEIGHT DATA (Test Species: _____ C. dilutus

Project Number:		70019.7	<u>rox</u>	Client:	Parsons	;	QC Test Num	oer:T	<u>N-21-239</u>
Loaded pans in o Loaded pans out		51	3/81 12	175	RSB	Loaded pans in furnace:	<u>Date</u> 5/10/21 5/10/21		e <u>Initials</u> DD M DD M
						Loaded pans out furnace:			
Loaded pans wei Oven Temp (°C)	7	1 A 1	4/21 1		NI	Loaded pans weighed: Furnace Temp (°C):	511121 512	130	JA JA
Test Concentration	Rep	Pan #	A Weight of Pan (mg)	B Weight of I Oven-Dried C (mg)	Organisms	C Weight of Pan and Furnace-Dried Organisms (mg)	B-C Total Ash-Free Dry Weight (mg)	D Number of Organisms Weighed	(B-C)/D Mean Ash-Free Dry Organism Weight (mg)
Control	A	15	4786.50	4793.	74	4789.06	4.68	10	0.468
	B	42	4644.08	4654.	20	4647.27	6.93	10	0.693
	C	49	4281.35	4289.	520	42.84.52	5.00	10	0.500
	D	87	5157.07	5173	13	5164.87	8.26	ID	0,826
au <u>arra</u> n	E	88	5246.70	5260 -	93	5252.29	8.64	10	0.864
	F	103	5146.29	51606	79	5152.20	8.59	10	0,859
	G	107	4605.14	4615	88	4609.09	6.79	10	0.679
	H	109	5407.99	5419 .	76	5412.89	6.87	10	0.687
AT1-223	Α	114	4721.12	4736.	51	4726.27	10-24	8	1.280
	B	122	5764.74	578100		5770.25	10.75	8	1.344
	C	147	4783.12	479,7.	75	4788.64	9.11	8	1.139
0 - 10 - 10 - 10	D	178	5046.90	5061	60	5051.52	10.08	6	1.680
	Е	188	5267.95	5281.0	12	5273.21	8.71	6	1.452
	F	191	5227.05	5241.0	64	5232.15	8.89	9	0.988
	G	192	5348.17	5360.4		5352.19	8.36	9	0.929
	H	213	5213.33	5224.	16	5216.50	7.66	8	0.958

Dry wt. calculations checked (date, initials): 5/23/2021, JR

Ash-Free calculations checked (date, initials): 523 3021 JOR



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ASH-FREE DRY WEIGHT DATA (Test Species: _____C. dilutus

-	70019.7	<u>rox</u>	Client: <u>Parsons</u>		QC Test Num	ber: <u> </u>	N-21-239
oven:_ ghed:	5 5 5	13/21 13/21 13	275 A1 1242 NB	Loaded pans out furnace:			00 A-
	102		- @ Hygy 1111	Furnace Temp (°C):	550		
Rep	Pan #	A Weight of Pan (mg)	B Weight of Pan and Oven-Dried Organisms (mg)	C Weight of Pan and Furnace-Dried Organisms (mg)	B-C Total Ash-Free Dry Weight (mg)	D Number of Organisms Weighed	(B-C)/D Mean Ash-Free Dry Organism Weight (mg)
A	215	4761.98	4780.22	4769.04	11.18	8	1. 398
-	254	4800,19	4817.98		1		1, 194
С	282	4618.43	4637.79				1.300
D	290	5134.73	5147.90	5139.06	and a set of the set o	9	0.982
E	T.C.I.I.		4724.17	4716.69	7.48	9	0.831
-			5259.31	52.49.87	9.44	9	1.049
G	323	4981.97		4986.36	8.129	10	0.8149
H	328	5510,21	5526.42	5516.21	10.21	10	1.021
					-		
				·		Tartis	
)	oven:- ghed: : : Rep A B C D E F G	oven: 5 oven: 5 ghed: 5 105 105 105 Rep Pan # A 215 B 354 C 253 D 340 E 302 F 310 G 323	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	DateTimeInitialsoven: $5/3/2$ 1775 A1Loaded pans in furnace:oven: $5/4/21$ 1775 A1Loaded pans out furnace:ghed: $5/4/21$ 1402 458 Loaded pans weighed:ghed: $5/4/21$ 1402 458 Loaded pans weighed:: 105 $6/43/4/10$ Furnace Temp (°C):iABCWeight of PanOven-Dried OrganismsWeight of Pan andRepPan #Weight of PanOven-Dried Organisms(mg)(mg)(mg)(mg)A 245 $4760-22$ B 554 4618.43 C 785 44807.23 C 785 4618.43 D 390 5134.73 S (47.90 5139.06 E 302 $4712.3F$ H 3259.353 5259.35 G 353 4981.97 H 226 4981.97 H 226 4981.97	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Dry wt. calculations checked (date, initials): 5/23/2021, JR

Ash-Free calculations checked (date, initials): 5/23/2021 JR

OKS1 5121/4



TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

Project Number:	70019.TOX	TEST ORGANISM		Beginning Date:	4/23/21	Time: _10/6
Client: Parsons		Common Name:	Midge	Ending Date:	313.121	Time: 1237
QC Test Number:	TN-21-239	Scientific Name:	C. dilutus			

TARGET VALUES: Temp: 23±1 °C pH: 6.0-9.0 DO: >4.0 mg/L Salinity: 0 ppt Photoperiod: 161,8d Light Intensity: 50-100 fc

				Temp	peratur	•e (°C)	é.					pН					Dis	ssolved	l Oxyg	gen (m	g/L)			F	Conduc	tivity inity (j	(µS/cn ppt)	D	
Test Conc	Rep	0	ĩ	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Control (AT0-593)		23.0							8.2							8.6						1	401						
		23.0							811		1					7.9							380						
AT1-223		+							+							t							+	_					
AT1-224		23.0		-	-	-	-	-	8,1	-	-	-			-	7.6	-	-	-	-		-	351	-					-
		21.0		-	-				0,1		-			-		7.0					-	-	211			-			-
										-													1						
	-	-		-		-		-	-			-			-		-		-	-	-	-	-	-				-	-
																						-		-					-
					-											_											1		
Meter N	umber	64	-			-		-	691	-	-					6:1	-				-		601						
	Time								0907	-						0907							0902						
1	Initials	M							104							M							m						1

1 1



TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

.

Project Number:	70019.TOX	TEST ORGANISM	Beginning Date: 4/23/21	Time: _/0/6
Client: Parsons		Common Name: Midge	Ending Date: 5/3/31	Time: 17 74
QC Test Number:	TN-21-239	Scientific Name: C. dilutus		

TARGET VALUES Temp: <u>23±1</u> °C pH: <u>6.0-9.0</u> DO: <u>>4.0</u> mg/L Salinity: <u>0</u> ppt Photoperiod: <u>16 l, 8 d</u> Light Intensity: <u>50 - 100</u> fc

				Temj	peratur	e (°C)						pH					Dis	solved	l Oxyg	gen (m	g/L)			8	onduc Sal	tivity inity ((µS/cn ppt)		
Test Conc	Rep	ī	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Control (AT0-593)		22.3	23.5	393	33.0	33.3	ورول	24.0	7.5	8.0	7.3	5.10	8.0	17.3	7.8	6.0	8.4	7.5	5.3	6.0	5.0	6.5	388	393	389	404	386	379	36
AT1-223		32.5	227	23.(°, rc	23,5	33.9	239	1.5	7.9	7,2	7.8	7.8	7.5	7,6	6.3	8.0	6.7	5.0	5.0	5.0	الورلة	370	384	382	389	367	367	365
AT1-224		32.4	22.9	27.2	23,0	33.4	\$33.	23.8	7.4	7.9	7,4	ر د	7,	7.5	1,3	6.3	7,8	6.5	5.2	5.0	4,5	4.7	383	389	388	391)	367	365	367
																													-
Meter	Number	000	681	601	1891	400	600	1861	030	687	687	180	600	650	68)	UTU	687	687	687	50	680	691	620	607	601	487	600	650	681
		1005		1				1	1000	1.		and the second s			the second se	100 C			1057	1,50								1200	1.1.2
	Initials	R	R	M				690		M	1					A			M	M		UAD		A		M	A		1200



TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

1 .

Project Number:	70019.TOX	TEST ORGANISM	Beginning Date: <u>$4/23/24$</u> Time: <u>/o/c</u>
Client: Parsons		Common Name: Midge	Ending Date: $5/3/21$ Time: 1224
QC Test Number:	TN-21-239	Scientific Name: <u>C. dilutus</u>	

TARGET VALUES Temp: <u>23±1</u> °C pH: <u>6.0-9.0</u> DO: <u>>4.0</u> mg/L Salinity: <u>0</u> ppt Photoperiod: <u>16 l, 8 d</u> Light Intensity: <u>50 - 100</u> fc

				Temp	eratur	e (°C)						pН					Dis	solved	l Oxyg	en (m	g/L)			6	onduc Sal	tivity ((µS/cm opt)	1)	
Test Conc	Rep	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
Control (AT0-593)			23.D	22.0					7.5	7.4	1.5					5.9	7.0	59		-			362	364	377				
AT1-223		13.3)3 ^{,c}	22.0					7.6	1.3	1.5					G. 4	7.0	5.6					31.8	365	345				
AT1-224		73.4	93.0	22.0					7.6	7.3	7.4					6.1	6.9	5.5					36.16	365	368				
																				-									
Meter N									600	1081						Sis	(28)	680					650	687	680				
	Time Initials		1440						2250	1446 OB	0908 JA					1735		19703 JP					0735	1446					

EA

TOXICOLOGY LABORATORY BENCH SHEET -RENEWAL RECORD

Project Number: _____70019.TOX

Client: Parsons

Day	Date	Time	Initials
0	1 1	AM 0 500	p-
	4/23/21	PM 1430	R3B
1	114	AM 3900	A
_	4/24/27	PM 1315	M
2	4/23/21 4/24/27 4/25/21	AM 0905	AI
2.5	4/23/21	PM 1335	AU
3		PM 1885 AM 0855	A
	4/26/21	PM 1455	NA-
4	4/26/21 4/27/21 4/28/21 4/29/21 4/29/21 4/29/21	AM 0858	A A
	4/27/21	PM 1446	JA
5	1 ()	AM 0843	JA A1
	4128181	PM 1605	(AD
6	ni al a	AM 0830	
	4/29/21	PM 1421	JA
7	11 3	AM 095	
	438121	PM 1522	
8	11	AM 0705	m
	5/1/2	PM 1220	TP
9	-N 1	AM 0630	JR
-	512121	PM 1429	JR
10		AM	
		PM	

ATS-T33 03/01/00

TOXICOLOGY LABORATORY BENCH SHEET -TESTING LOCATION

Project Number: _____ 70019.TOX

Client: Parsons

QC Test Number: <u>TN-21-239</u>

Day	Testing Location	Date	Time	Initials
0	524	1/22/21	1016	m
1	52A 52A	4/24/21	100 5	M
2	52A 52A 52A 53A	4125/21	0932	M
3	524	4/26/27	1040	A
4	574	4127121	1057	m
5	52A 52A	4/28/21 4/29/21 4/30/21	1152	M
6	574	4/29/21	0830	A
7	52A	4130121	1323	TP
8	524	5/1/4	0705	m
9	52A	5/1/11 5/2/21	0630	JR A1
10	524	513/21	1003	AT
11				
12				
13				
14			· · · · · · · · · · · · · · · · · · ·	
15				
16				
17			1	
18				
19			<u></u>	
20			1	
21				
22				
23	т. П			
24				
25	14			
26				
27				
28				
29				
30			· · · ·	

ATS-T80 07/24/18



TOXICOLOGY LABORATORY BENCH SHEET -FEEDING RECORD

Client: Parsons

Food: <u>1.5 ml Tetramin Slurry</u>

Day	Date	Time	Initials
0	4/22/21	1500	rsa.
1	4/04/01	1335	M
2	4125124	1357	OR
3	4/26/21	1625	ÚP
4	4127/21	1500	A1
5	4/28/21	lleit	(AD
6	4129121	1500	
7	4130/21	1545	
8	5/1121	1048	P
9	512121	1589	ne
10			
11			
12			
13			
14			
15			
16			
17			
18	2000 Constantin		
19			
20			
21			
22			
23			11
24			
25			
26			64. Jul
27			
28			

ATS-T31 03/01/00



TOXICOLOGY LABORATORY BENCH SHEET

Project Number: <u>70019.TOX</u>

Client: Parsons

and a second second

QC Test Number: ______TN-21-239

Date/Time/Initials

Comments/Activity

ES

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: <u>70019.TOX</u>

Client: Parsons

QC Test Number: TN-21-239

Correction Explanations

- (a) Technician Error-Mathematical
- (b) Technician Error-Manual Data Recording
- (c) Technician Error-Head Count Observation
- (d) Technician Error-Overwrite
- (e) Technician Error-Missing Data
- (f) Technician Error-Lost Organism
- (g) Technician Error-Transcription Error
- (h) Technician Error-Other:
- (i) Meter Malfunction

	10.00	~		Midge Grov	vth and S	Survival 1	Test-10 Da	y Surviva	al	
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021		Test ID: Lab ID: Protocol:	TN-21-239			Sample ID Sample Ty Test Spec	/pe:	Parsons Sediment CT-C. dilutus	
Conc-	1	2	3	4	5	6	7	8		
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
AT1-223	0.8000	0.8000	0.8000	0.6000	0.6000	0.9000	0.9000	0.8000		
AT1-224	0.8000	0.9000	1.0000	0.9000	0.9000	0.9000	1.0000	1.0000		

	10.00		Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	1000	
*AT1-223	0.7750	0.7750	1.0874	0.8861	1,2490	12.766	8	36.00	51.00
AT1-224	0.9250	0.9250	1.2924	1.1071	1.4120	8.514	8		

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.74321	0.844	-0.699	2.0213
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				

Reviewed by: 3K

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			- 1	Nidge Grov	vth and S	Survival 1	est-10 Da	y Surviva	al	14-
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021		Test ID: Lab ID: Protocol:	TN-21-239			Sample ID Sample Ty Test Spec	/pe:	Parsons Sediment CT-C. dilutus	
Conc-	1	2	3	4	5	6	7	8		
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0	
AT1-223	0.8000	0.8000	0.8000	0.6000	0.6000	0.9000	0.9000	0.8000		
AT1-224	0.8000	0.9000	1.0000	0.9000	0.9000	0.9000	1.0000	1.0000		

	100000	1.00	Tr	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8			
AT1-223	0.7750	0.7750	1.0874	0.8861	1.2490	12.766	8			
*AT1-224	0.9250	0.9250	1.2924	1.1071	1.4120	8.514	8	48.00	51.00	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.81935	0.844	-0.2789	1,92704
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				

Reviewed by: <u>SR</u>

	1			Midge Gro	wth and S	Survival 7	fest-10 Da	y Growt	h	
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021		Test ID: Lab ID: Protocol:	TN-21-239			Sample ID Sampl e T y Test Spec	/pe:	Parsons Sediment CT-C. dilutus	
Conc-	1	2	3	4	5	6	7	8	s.d.	
Control	0.4680	0.6930	0.5000	0.8260	0.8640	0.8590	0.6790	0.6870	0.15235	
AT1-223	1.2800	1.3438	1.1387	1.6800	1.4517	0.9878	0.9289	0.9575	0.26682	
AT1-224	1.3975	1.1944	1.3000	0.9822	0.8311	1.0489	0.8190	1.0210	0.20912	

-		-		Transform	n: Untran	sformed			1-Tailed	
Солс-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.6970	1.0000	0.6970	0.4680	0.8640	21.857	8	-		
AT1-223	1.2210	1.7519	1.2210	0.9289	1.6800	21.852	8	-4.824	1.761	0.1913
AT1-224	1.0743	1.5413	1.0743	0.8190	1.3975	19.466	8			

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94807	-	0.844		0.3782	-0.1895
F-Test indicates equal variances (p = 0.16)	3.06748		8.88539			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.19133	0.27451	1.09848	0.0472	2.7E-04	1, 14

Reviewed by: <u>SR</u>

			7.221	Midge Grow	wth and S	Survival 7	est-10 Da	y Growt	1	_
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021		Test ID: Lab ID: Protocol:	TN-21-239			Sample ID Sample Ty Test Spec	vpe:	Parsons Sediment CT-C. dilutus	
Conc-	1	2	3	4	5	6	7	8	s.d.	
Control	0.4680	0.6930	0.5000	0.8260	0.8640	0.8590	0.6790	0.6870	0.15235	
AT1-223	1.2800	1.3438	1.1387	1.6800	1.4517	0.9878	0.9289	0.9575	0.26682	
AT1-224		1.1944	1.3000	0.9822	0.8311	1.0489	0.8190	1.0210	0.20912	

	1111	100 - C.	1	Transform	n: Untran	sformed			1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.6970	1.0000	0,6970	0.4680	0.8640	21.857	8			
AT1-223	1.2210	1.7519	1.2210	0.9289	1.6800	21.852	8			
AT1-224	1.0743	1.5413	1.0743	0.8190	1.3975	19.466	8	-4.124	1.761	0.1611

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94954		0.844		0.08891	-0.8967
F-Test indicates equal variances (p = 0.42)	1.88422		8.88539			1.11
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.16111	0.23115	0.56933	0.03347	0.00103	1, 14

Reviewed by: JR

ATTACHMENT III

Data Sheets and Statistical Analyses from *Hyalella azteca* Toxicity Tests (18 pages)

	-	R
-	-	

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project Number:	70019.TOX	
Client: Parsons	a como per	-
QC Test Number:	TN-21-240	

Commenter Manage	Amphinad		ISM INFORMATION Adults Isolated (Time, Date):
Common Name:	and the second second	*	
Scientific Name:			Neonates Pulled (Time, Date):
Lot Number:			Acclimation: <u>424his</u> Age: <u>8 days</u>
Source:EA	ARO STU O	à)Mu	Culture Water (T/S): 23,2 °C 6 ppt
	50 - 10 - 10	TEST	INITIATION
Date	<u>Time</u>	Initials	Activity
4122121	1535	A	Sediment Added to Chambers
L L	1340	v	Overlying Water Added to Chambers
412212		NSO	
4/23/21	1016	100	Organisms Transferred
-	1991-19 -	TES	T SET-UP
	ATT1 5112 ATT	-//i A11-//4	
and a second second			
we rylin g Water Nu	mber:		
weryling Water Nu	mber:	Dechlor	ediment Volume Overlying Water
ver ylin g Water Nu	mber:		ediment Volume Overlying Water
weryling Water Nu Sverlying GKS <u>Treatment</u>	mber: 5]こ4 こい	Dechlor	ediment <u>Volume Overlying Water</u> 175 ml
Treatment retty Boy Control (mber: 5]こ4 こい	Dechlor Volume Test Se	
weryling Water Nu Sverlying GKS <u>Treatment</u>	mber: 5]こ4 こい	Dechlor Volume Test Se	
weryling Water Nu Sverlying Gase <u>Treatment</u> retty Boy Control (mber: 5]こ4 こい	Dechlor Volume Test Se	
weryling Water Nu Verlying Gase <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
xeryling Water Nu Verlying GASS <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
xeryling Water Nu Verlying GASS <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
xeryling Water Nu Verlying GASS <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
xeryling Water Nu Verlying GASS <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
weryling Water Nu Sverlying എக்க <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
weryling Water Nu Verlying Gase <u>Treatment</u> retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	
retty Boy Control (AT1-223	mber: 5]こ4 こい	Dechlor Volume Test Se	

ATS-T28 03/01/00



Project Number: _			x	IMENT T TEST ORG	ANISM			Beg	inning Date:	1/21/21	Time	: 1016
Client: Para	sons			Commo	on Name: _	Amphipe	od	En	ding Date:	5/3/21	Tim	e: 1345
QC Test Number:		TN-21-240		Scientif	fic Name:	H. azteca	1					
Test Material(s): _	Sec	liment										
Accession Number	(s): <u>ATO</u>	-593, AT1-223	, AT1-224	TEST 7	TYPE:	(tatic)	Flowthrough	Te	st Container: _	300ml lip	less beakers	
Overlying Water:	1	Dechlor			Rene	wal DNon	-renewal	Te	st Volume:	100ml sedi	ment	
Accession Number	:	N/A		Photop	eriod: 161, 8	d Light Int	ensity: <u>50 - 10</u>	<u>0</u> fc Te	st Duration:	10 days		
						Numb	er of Survivin	g Organisms				
Treatment	Rep	Day 4 2.1 2.1 Date	Day Date	Day 10 Date 5/2	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date
Pretty Boy Control	A	10		8			1					1.0
(AT0-593)	В	10		8		1						
	C	10		8								
	D] -		8								
6010 	E	10		8			1.				1	
	F	10		8		-	U.I.		-)/:		<	
	G	10		8							1.1	
	Н	10		8								
AT1-223	A	10		10								
	В	10		8	1							
	C	10		9								
	D	10		8								
	Е	10		8					1			
	F	10		9	[]							
	G	16		9								0
	H	10		8								
Time	/ Initials	110		1345A								

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EPA Test Method: (FW) EPA 600-R-99-064/SW EPA-600-R-94-025 (CHECK ONE)

Lumbriculus (100.3)

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1.00

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QC Test Number: Test Material(s): Accession Number(s Overlying Water: Accession Number:	<u>Sec</u> 5): <u>ATO</u> 1	liment - <u>593, AT1-22</u> Dechlor	3 <u>, AT1-224</u>	TEST	<u> </u>	Static wal / Non d Light Int	r Flowthrough -renewal ensity: <u>50 - 10</u> er of Survivin	T 9 <u>0</u> fc T	est Volume:	100ml sedi	less beakers iment	
Treatment	Rep	Day 1/23 Date O	Day Date	Day 10 Date 5/3	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date
AT1-224	Α	10		8								
	В	50		8								
	С	10		9								
	D	10		9	. 6	1						
	Е	10		9					-21			
	F	10		8								
	G	1		10								
	H	10		B								
					1							
a dian									-			
				1						_		
Time /	Initials	loibess		1345AJ								

EPA Test Method: (FW) EPA 600-R-99-064/SW EPA-600-R-94-025 (CHECK ONE)

Hyaleila: (100.1) X

Chironomus (100.2)

Lumbriculus (100.3)

ATS-T12 06/15/10

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EA 🖷	ŧ				(T)			()
roject Number:	7	0019.TO	x	WEIGHT DATA	(Test Species: _	<u>H. azteca</u>	_) Date Ti	me Initials
lient: <u>Pars</u>		0019.10	<u>A</u>		Loaded tins placed in (oven:		SJ AT
C Test Number:		-21-240			Loaded tins removed f			350 NJB
in Lot: <u>Na</u>			torne an		Loaded tins weighed:			400 RJB
ven Temp (°C):	1		End:(@	0	Oven Number: <u>BLM-01</u>	G4-009646	Balance Number: TS-L	225.C / P0115825
Test Concentration	Rep	Tin #	A Weight of Tin (mg)	B Weight of Tin and Dried Organisms (mg)	B-A Total Dry Organism Weight (mg)	C Number of Organisms Weighed	(B-A)/C Mean Dry Organism Weight (mg)	(if applicable) Mean Biomass (mg/exposed org.)
Pretty Boy Res.	A	158	28.93	29.60	0.670	8	0.084	0,667
(AT0-593)	В	346	29.56	30,12	0,56	8	0,070	0,056
	C	290	29.37	29.79	0.42	8	0,053	0,042
	D	141	28.60	29.42	0.82	8	0,103	0,082
	Е	109	28.47	29,14	0,67	8	0,084	0,067
	F	189	27.79	28.34	0,55	8	0,069	0,055
	G	115	29.32	29.87	0.55	8	0,069	0,055
	Н	42	29.12	29.56	0.44	8	0,055	0.044
AT1-223	A	341	29.01	29.85	0.84	10	0,084	0.084
	В	380	30.23	31.29	1.06	8	0.133	0.106
	C	5	29.08	29.65	0,57	9	0,663	0.057
	D	43	30,40	30.31.04	0,64	8	0,080	0,064
	E	69	30,00	30.63	0.63	8	0,079	0,063
	F	294	29,00	29.65	0,65	٩	0.072	0,065
	G	324	30.68	31.34	0,66	3	0.073	0,066
	H	145	27.59	28.24	0.65	8	0.081	0,065

(OM 514/21

QC Tin 1	nt: <u>Pars</u> Test Number: Lot: <u>Novs</u> n Temp (°C):	TN 1 3 2	53	End: (0		Loaded tins placed in a Loaded tins removed f Loaded tins weighed: Oven Number: <u>BLM-0</u>	rom oven:	5/4/4 1	355 A7 (5) 355 A58 355 A58 356 A58 3 1455 A58 -225.C) PO115825
С	Test oncentration	Rep	Tin #	A Weight of Tin (mg)	B Weight of Tin and Dried Organisms (mg)	B-A Total Dry Organism Weight (mg)	C Number of Organisms Weighed	(B-A)/C Mean Dry Organism Weight (mg)	(if applicable) Mean Biomass (mg/exposed org.)
C AT	1-224	А	335	28.77	29.78	101	8	0,126	0,107
		В	304	29.37	30.10	0,73	8	0,091	0,073
		C	210	29.84	30.81	0,97	9	108	0,097
		D	76	29.36	30.11	0,75	9	0,083	0,075
		E	354	29.06	29.81	0,75	9	0,083	0,075
		F	239	29.66	30.39	0,73	8	0,091	0.073
1		G	376	29.24	30.07	0.83	10	0.083	0.083
		H	259	29.74	30.54	0,80	8	0,100	0,080
		1							

Dry wt. calculations checked (date, initials): 5/24/2021 15R

Biomass calculations checked (date, initials): 5/24/2021, R



TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

1

Project Number:	70019.TOX	TEST ORGANISM	Beginning Date:	Time: 1316
Client:Parsons		Common Name: Amphipo	Ending Date: $5/3/2-1$	Time: 1345
QC Test Number:	TN-21-240	Scientific Name: <u>H. azteca</u>		

TARGET VALUES: Temp: <u> 23 ± 1 </u> °C pH: <u>6.0-9.0</u> DO: <u>>4.0</u> mg/L Salinity: <u>0</u> ppt Photoperiod: <u>161, 8d</u> Light Intensity: <u>50-100</u> fc

			Temperature (°C)						рН						Dissolved Oxygen (mg/L)						Conductivity (µS/cm) Salinity (ppt)								
Test Conc	Rep	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Control (AT0-593)		23.0							8.2	8 th3						8.6		(L.L.					401						
							T			10													-						
AT1-223		23.0							8.1							7.9							388						
AT1-224		73.0	-	-	-	-	-	-	8.1	-	-	-		-		7.6	-				-		391						-
		12.0						-	0.1							7.10													
																						-		_				_	_
	-			-	-	-	-	-	-	-		-	-	-	-	-		-		-	-	-	-		-	-			
		-		-		1		-					-		-	-			-	-	-		-						1
																20											127		
												-																	
																												-	
Meter 1		-	171						(81	1					_	621				-		-	601						-
	Time	10907							0907		1					0707							0907					1	
	Initials	m							1-							~							M						



TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number:	70019.TOX	TEST ORGANISM	Beginning Date	: <u>4/23/21</u>	
Client: Parsons		Common Name: Amphig	ood Ending Date: _	5/3/27	Time: <u>1345</u>
QC Test Number:	TN-21-240	Scientific Name: <i>H. azte</i>	200		

TARGET VALUES Temp: <u>23±1</u> °C pH: <u>6.0-9.0</u> DO: <u>>4.0</u> mg/L Salinity: <u>0</u> ppt Photoperiod: <u>16 l, 8 d</u> Light Intensity: <u>50 - 100</u> fc

				Temp	peratur	e (°C)						pН					Dis	solved	Oxyg	en (mg	g/L)			6	onduc Sal	tivity inity (j	(µS/cm opt)		
Test Conc	Rep	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Control (AT0-593)		333	32.	33.8	23.0	23.4	33.5	23.4	7.5	3.8	7.9	5,5	7.8	٦.٦	7,5	8.0	8.0	8.0	6.3	7.4	6.7	6.4	398	398	39-	395	372	366	367
AT1-223		22 ?	23.8	99°) j ^{7,0}	33.5	533.1	23.7	7.5	7.8	7.0	, n, N	7.7	٦,	17.4	7,5	7.5	6.0	16.4	٦.3	6.5	6.6	379	388	389	399	366	362	364
AT1-224		22.3	29 E	37.	23.0	33.	33.9	23)	7.4	٦, ٦	٦.٧	۹.۴	7.4	7.7	17,4	7.0	р. ₍	6	56.5	7.2	6.7	6.6	375	387	352	371	363	362	364
						F																							
Meter	Number	620	181	657	181	620	450	681	(MO	681	687	1057	650	650	181	670	68)	681	[3]	680	650	681	670	681	681	681	680	680	68)
	Time	0000	0530	NNOT	1058	1151	1800	1006	Sel	0937	lonin	1058	1151	1800	1006	000	0932	[OHM	1058	151	1800	1006	1008	6570	1044	1058	1151	1200	1020
	Initials	129	R	M	M	M	B	lPD	R	81	121	R	B	M	UAD	K	100	M	87	A		IAD	M	37	107		A		An



TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number:	70019.TOX	TEST ORGANISM		Beginning Date	4/23/21	Time: 1018
Client: Parsons		Common Name:	Amphipod	Ending Date: _	5/3/27	Time: <u>1345</u>
QC Test Number:	TN-21-240	Scientific Name:	H. azteca			

TARGET VALUES Temp: <u> 23 ± 1 </u> °C pH: <u>6.0-9.0</u> DO: <u> ≥4.0 </u> mg/L Salinity: <u>0</u> ppt Photoperiod: <u>16l, 8d</u> Light Intensity: <u>50-100</u> fc

		Temperature (°C)					рН						Dissolved Oxygen (mg/L)								Conductivity (µS/cm) + Salinity (ppt)								
Test Conc	Rep	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
Control (AT0-593)			23.0	22.0					7.6	14	7.7					6.6	1.1	6.9					36(367	384				
AT1-223		22.9	2.0	22.0					7.6	7.4	7.6					6.5	1.1	6.3					360	366	357				
AT1-224		23.0	J.S.O	, 77'0					76	1.4	7.5					6.5	1.2	6.6					366	364	361				
														_															
																					*								
Meter N	Jumber	680	Le 81	680					640	Un	68						681	680	2				680	487	680				
	Time Initials	0712 M	41.0	0905 113				-	0732 M	1447	0909					0732	14	10905			-		0732	144	10905	>			

TOXICOLOGY LABORATORY BENCH SHEET -RENEWAL RECORD

Project Number: _____70019.TOX

Client: Parsons

QC Test Number: <u>TN-21-240</u>

Day	Date	Time	Initials
0	1 1	AM 0500	pre
	4 23/21	PM 1430	NO
1		AM 0900	A
	4/24/21	PM 1315	\$7
2		AM 0905	A
	4125121	PM 1335	DA A1
3	1.1.1.1	AM 0855	A
	[4/26/2]	PM 1455	JA A7
4		AM 0858	17
	4/27/21	PM 1446	AU
5	4/23/21 4/24/21 4/25/21 4/25/21 4/27/21 4/27/21 4/28/21 4/29/21 4/29/21	AM 0843	M
	1128121	PM 1605	Uno
6	4/20/22	AM 0830	A
	7/07/8]	PM 1421	JA
7	(1/2)/2.	AM 6951	UAD
	7[50]7	AM 6951 PM 1522	P
8	.11	AM 0705	m
	5/1/2	PM 12205	- A- - V-
9	5/2/21	AM 0630	R
	5/2/21	PM 1429	jA
10		AM	
		PM	



TOXICOLOGY LABORATORY BENCH SHEET -TESTING LOCATION

Project Number: 70019.TOX

Client: Parsons

QC Test Number: <u>TN-21-240</u>

Day	Testing Location	Date	Time	Initials
0	52A	4/23/21	1017	RSB
1	52-4	4/24/21	1008	M
2	52A	4/25/21	0932	A
3	52A	4/20/27	1044	A
4	52A	4127121	10 58	AT
5	57A 57A	4/28/21	1157	A
6	SZA	4/29/21	0830	A
7	52A	4130121	0830	P
8	SLA	SILLI	0705	m
9	52A	5/1/11	0630	JR
10	SOA	5/3/01	1003	AT
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23		1		
24		1		
25				
26		-		J
27				
28				
29				
30		2 I (4



TOXICOLOGY LABORATORY BENCH SHEET -FEEDING RECORD

Project Number: 70019.TOX
Client: Parsons
QC Test Number: TN-21-240

Food: <u>1 ml YCT per beaker daily</u>

Day	Date	Time	Initials
0	4/23/21 4/24/21 4/25/21	1500	150
1	4124121	1335	A
2	4125121	1357	ont
3	4/26/21	1625	UAD
4	4/37/81	1500	A
5	4/87/81 4/20121		UTD I
6	4/29/21	500	'PP
7	4130121	1545	TP
8	511121	1048	TP TP
9	512121	1509	AU
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			-

ATS-T31 03/01/00



TOXICOLOGY LABORATORY BENCH SHEET

Project Number: _____70019.TOX

Client: Parsons

QC Test Number: ______TN-21-240

Date/Time/Initials

Comments/Activity



TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: <u>70019.TOX</u>

Client: Parsons

QC Test Number: TN-21-240

Correction Explanations

- (a) Technician Error-Mathematical
- (b) Technician Error-Manual Data Recording
- (c) Technician Error-Head Count Observation
- (d) Technician Error-Overwrite
- (e) Technician Error-Missing Data
- (f) Technician Error-Lost Organism
- (g) Technician Error-Transcription Error
- (h) Technician Error-Other:
- (i) Meter Malfunction

ATS-T78 05/11/16

			An	nphipod Gr	owth and	Surviva	l Test-10 [Day Surv	ival
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021		Test ID: Lab ID: Protocol:	TN-21-240			Sample ID Sample Ty Test Spec	ype:	Parsons Sediment HA-H. azteca
Conc-	1	2	3	4	5	6	7	8	
Control	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	-
AT1-223	1.0000	0.8000	0.9000	0.8000	0.8000	0.9000	0.9000	0.8000	
AT1-224	0.8000	0.8000	0.9000	0.9000	0.9000	0.8000	1.0000	0.8000	

	1.000		Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.8000	1.0000	1.1071	1.1071	1.1071	0.000	8		
AT1-223	0.8625	1.0781	1.1985	1.1071	1,4120	9.283	8	84.00	51.00
AT1-224	0.8625	1.0781	1.1985	1.1071	1.4120	9.283	8		

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.80517	0.844	1.22901	3.39213
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				

er e en e	4/23/2021		and a second					Day Surv	
End Date: Sample Date: Comments:	5/3/2021		Test ID: Lab ID: Protocol:	TN-21-240)		Sample ID Sample Ty Test Spec	/pe:	Parsons Sediment HA-H. azteca
Conc-	1	2	3	4	5	6	7	8	
Control	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	
AT1-223	1.0000	0.8000	0.9000	0.8000	0.8000	0.9000	0.9000	0.8000	
AT1-224	0.8000	0.8000	0.9000	0.9000	0.9000	0.8000	1.0000	0.8000	

			Transform: Arcsin Sq			uare Root		Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.8000	1.0000	1.1071	1.1071	1.1071	0.000	8		
AT1-223	0.8625	1.0781	1.1985	1.1071	1.4120	9.283	8		
AT1-224	0.8625	1.0781	1.1985	1.1071	1.4120	9.283	8	84.00	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.80517	0.844	1.22901	3.39213
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)		Call of the local		

Reviewed by: <u>JR</u>

	10.7	Amphipod Growth and Survival Test-Growth												
Start Date: End Date: Sample Date: Comments:	4/23/2021 5/3/2021	Test ID: Lab ID: Protocol:		TN-21-240	14		Sample ID: Sample Type: Test Species:		Parsons Sediment HA-H. azteca					
Сопс-	1	2	3	4	5	6	7	8	s.d.					
Control	0.0838	0.0700	0.0525	0.1025	0.0838	0.0688	0.0688	0.0550	0.01643					
AT1-223	0.0840	0.1325	0.0633	0.0800	0.0787	0.0722	0.0733	0.0812	0.02097					
AT1-224	0.1263	0.0913	0.1078	0.0833	0.0833	0.0913	0.0830	0.1000	0.01514					

				Transform	n: Untran	sformed		1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.0731	1.0000	0.0731	0.0525	0.1025	22.474	8		1.100	1
AT1-223	0.0832	1.1374	0.0832	0.0633	0.1325	25.210	8	-1.067	1.761	0.0166
AT1-224	0.0958	1.3097	0.0958	0.0830	0.1263	15.807	8			

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.84736	1	0.844		1.5501	2.79323
F-Test indicates equal variances (p = 0.54)	1.62778		8.88539			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.01659	0.22687	0.0004	0.00035	0.30409	1, 14

Reviewed by: <u>JR</u>

			Amphipo	d Growth	and Sur	vival Test	-Growth		
4/23/2021 5/3/2021	Test ID: Lab ID: Protocol:		TN-21-240		Sample ID: Sample Type: Test Species:			Parsons Sediment HA-H. azteca	
1	2	3	4	5	6	7	8	s.d.	
0.0838	0.0700	0.0525	0.1025	0.0838	0.0688	0.0688	0.0550	0.01643	
0.0840	0.1325	0.0633	0.0800	0.0787	0.0722	0.0733	0.0812	0.02097	
0.1263	0.0913	0.1078	0.0833	0.0833	0.0913	0.0830	0.1000	0.01514	
	5/3/2021 1 0.0838 0.0840	5/3/2021 1 2 0.0838 0.0700 0.0840 0.1325	5/3/2021 Lab ID: Protocol: 1 2 3 0.0838 0.0700 0.0525 0.0840 0.1325 0.0633	4/23/2021 Test ID: TN-21-240 5/3/2021 Lab ID: Protocol: 1 2 3 4 0.0838 0.0700 0.0525 0.1025 0.0840 0.1325 0.0633 0.0800	4/23/2021 Test ID: TN-21-240 5/3/2021 Lab ID: Protocol: 1 2 3 4 5 0.0838 0.0700 0.0525 0.1025 0.0838 0.0840 0.1325 0.0633 0.0800 0.0787	4/23/2021 Test ID: TN-21-240 5/3/2021 Lab ID: Protocol: 1 2 3 4 5 6 0.0838 0.0700 0.0525 0.1025 0.0838 0.0688 0.0840 0.1325 0.0633 0.0800 0.0787 0.0722	4/23/2021 Test ID: TN-21-240 Sample IE 5/3/2021 Lab ID: Sample TY Sample TY Protocol: Test Spec Test Spec 1 2 3 4 5 6 7 0.0838 0.0700 0.0525 0.1025 0.0838 0.0688 0.0688 0.0840 0.1325 0.0633 0.0800 0.0787 0.0722 0.0733	4/23/2021 Test ID: TN-21-240 Sample ID: 5/3/2021 Lab ID: Sample Type: Protocol: Test Species: 1 2 3 4 5 6 7 8 0.0838 0.0700 0.0525 0.1025 0.0838 0.0688 0.0688 0.0550 0.0840 0.1325 0.0633 0.0800 0.0787 0.0722 0.0733 0.0812	5/3/2021 Lab ID: Protocol: Sample Type: Test Species: Sediment HA-H. azteca 1 2 3 4 5 6 7 8 s.d. 0.0838 0.0700 0.0525 0.1025 0.0838 0.0688 0.0688 0.0550 0.01643 0.0840 0.1325 0.0633 0.0800 0.0787 0.0722 0.0733 0.0812 0.02097

100.000			2	Transform	n: Untran	sformed			1-Tailed	1 N 1 N
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.0731	1.0000	0.0731	0.0525	0.1025	22.474	8		ange anderen er senter.	, CHILL CO. 412 CO. 6 CO. 6
AT1-223	0.0832	1.1374	0.0832	0.0633	0.1325	25.210	8			
AT1-224	0.0958	1.3097	0.0958	0.0830	0.1263	15.807	8	-2.867	1.761	0.0139

Auxiliary Tests	Statistic	E.	Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91282		0.844		0.78854	-0.0037
F-Test indicates equal variances (p = 0.83)	1.17841		8.88539			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.01391	0.19028	0.00205	0.00025	0.01243	1, 14

ATTACHMENT IV

Report Quality Assurance Record (2 pages)

Client: Parsons	Project Number: 70019. Tox
Author: Michael Chanor	EA Report Number: 856
F	REPORT CHECKLIST
QA/QC ITEM	REVIEWER DATE
 Samples collected, transported, and recein according to study plan requirements. 	ived Juflick stratu
2. Samples prepared and processed accord. study plan requirements.	ing to buffle spripe
 Data collected using calibrated instrument equipment. 	ts and but KCK stule
 Calculations checked: Hand calculations checked 	JufKCK 5/21/2
 Documented and verified statistical procedure used. 	Mykik stala
Data input/statistical analyses complete ar correct.	nd for M Renfor 5/24/202
Reported results and facts checked agains original sources.	st Juss MRedif 5/24/2021
Data presented in figures and tables corre and in agreement with text.	essi MRade 5/24/2021
 Results reviewed for compliance with study plan requirements. 	y MIKCE 5/21/21
	AUTHOR DATE
 Commentary reviewed and resolved. 	Jula 5/2/21
10. All study plan and quality assurance/contro	I requirements have been met and the report is
approved:	- laffel s/24/4
	PROJECT MANAGER DATE

PROJECT MANAGER

line 5 CONTROL OFFICER

IN

DATE 5/24/2021

5/24/2021

SENIOR TECHNICAL REVIEWER

DATE

ATS-Q8 01/25/02

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Appendix C Site Photographs

(April 20, 2021)

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1. Photograph of Ore Storage Pond, facing east, setting up northern transect.



2. Photograph of Ore Storage Pond, facing north from southern end of pond.



3. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-410.



 Photograph of depth of sediment at sampling location 079SD-410 located on the West end of the North Transect Page 3 of 13



5. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-411.



 Photograph of depth of sediment at sampling location 079SD-411 located from the middle of the North Transect Page 4 of 13



7. Photograph of Ore Storage Pond, facing northwest, view of the northern portion of the pond from shore near sediment sampling location 079SD-412



8. Photograph of Ore Storage Pond, facing southwest, view of the southern portion of the pond from shore near sediment sampling location 079SD-412.



9. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-412.



10. Photograph of Depth of sediment at sampling location 079SD-412 located on the East end of the North Transect



11. Photograph of hand corer used to collect sediment sample from sampling location 079SD-112.



12. Photograph of sediment sample from sampling location 079SD-412 located on the East end of the North Transect



13. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-413.



14. Photograph of Depth of sediment at sampling location 079SD-413 located on the West end of the South Transect



15. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-414.



16. Photograph of Depth of sediment at sampling location 079SD-414 located in the middle of the South Transect



17. Photograph of Ore Storage Pond, facing east, sampling at location 079SD-415.



18. Photograph of Depth of sediment at sampling location 079SD-415 located on the East end of the South Transect



19. Photograph of filling sample jars with collected sediment.



20. Photograph of wetland delineation Page 11 of 13



21. Photograph of Ore Storage Pond, soil test pit TP-1.



22. Photograph of Ore Storage Pond, soil test pit TP-2.



23. Photograph of Ore Storage Pond, soil test pit TP-3.

Appendix D Ohio EPA Notification of Field Work

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March 26, 2021

Ohio Environmental Protection Agency DERR-NEDO Attn: Mr. Ed D'Amato 2110 East Aurora Road Twinsburg, OH 44087-1924

Subject: Notification of Field Work, Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Additional Sampling for CC RVAAP-79 Defense Logistics Agency (DLA) Ore Storage Sites Remedial Investigation, Ore Storage Pond Sub-Area, Ohio EPA ID # 267-000859-258

Dear Mr. D'Amato:

In accordance with the Director's Final Findings and Orders, Section XIII, #28, for the RVAAP Restoration Program, the Army National Guard (ARNG) is providing notification of field activities at Camp James A. Garfield / former RVAAP 15 days prior to the scheduled start date. Parsons will be conducting sediment sampling at Ore Storage Pond sub-area within CC RVAAP-79 DLA Ore Storage Sites during the week of 19 April 2021 (anticipate two days of sampling, 20 through 21 April 2021).

For additional information on the field activities, please refer to the *Final Work Plan Addendum* Additional Sampling for CC RVAAP-79 DLA Ore Storage Sites Remedial Investigation, Ore Storage Pond Sub-Area, RVAAP Restoration Program, Portage and Trumbull Counties, Ohio submitted to Ohio EPA on 23 March 2021.

Please contact the undersigned at (614) 336-6000 Ex 2053 or <u>kevin.m.sedlak.ctr@mail.mil</u> if there are issues or concerns with this submission.

Sincerely, SEDLAK.KEVIN.MICH Digitally signed by SEDLAK.KEVIN.MICH Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2021.03.26 09:05:16 -04'00' Kevin Sedlak RVAAP Restoration Program Manager

cc: Bob Princic, Ohio EPA, DERR-NEDO Tom Schneider, Ohio EPA, SWDO Natalie Oryshkewych, Ohio EPA, DERR-NEDO Megan Oravec, Ohio EPA, DERR-NEDO Mark Leeper, ARNG Katie Tait, OHARNG, CJAG Steven Kvaal, USACE Louisville Kevin Mieczkowski, USACE Louisville Jennifer Tierney, Vista Sciences Edward Heyse, Parsons This Page Intentionally Left Blank.

Appendix E Regulatory Correspondence Letters and Comments Response Table This Page Intentionally Left Blank



Mike DeWine, Governor Jon Husted, Lt. Governor Anne M. Vogel, Director

June 10, 2024

Received June 11, 2024

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak Restoration Program Manager ARNG-ILE Clean Up Camp James A Garfield JTC 1438 State Route 534 SW Newton Falls, OH 44444

Sent via email to: Kevin.m.sedlak.ctr@army.mil RE: US Army Ravenna Ammunition Plt RVAAP Remediation Response Project Records RI Remedial Response Portage County ID # 267000859258

Subject: Final Remedial Investigation Addendum for the RVAAP-70 DLA Ore Storage Site, Ore Storage Pond Sub-Area Ravenna Army Ammunition Plant Restoration Program Ohio EPA Concurrence

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the Request for concurrence for the "Final Remedial Investigation Addendum for CC RVAPP-79 DLA ore Storage Site, Ore Storage Pond Sub-Area" dated March 12, 2024¹. This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) via email on March 12, 2024. The document was prepared for the United States Army National Guard.

It is Ohio EPA's understanding that additional information will be collected outside of the original contract/scope of work. Ohio EPA will give concurrence based on Army's path moving forward. The Army will submit a second addendum to provide the additional information to Ohio EPA as requested in the letter dated October 12, 2023², associated with the DLA Ore Storage Pond. It is anticipated that this additional addendum will also include the Risk

¹ http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=2798727

Northeast District Office 2110 E. Aurora Road Twinsburg, Ohio 44087 U.S.A. 330 | 963 1200 epa.ohio.gov

The State of Ohio is an Equal Opportunity Employer and Provider of ADA Services

² http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=2597194

US Army Ravenna Ammunition Plt RVAAP June 10, 2024 Page 2 of 2

Management Decisions specified in the Final Remedial Investigation for CC RVAAP-79 DLA Ore Storage Sites dated October 16, 2020³, and will establish cleanup goals to supplement the Feasibility Study for the applicable DLA Ore Storage Sites.

This document was reviewed by personnel from Ohio EPA's DERR. Pursuant to the Director's Findings and Orders paragraph 39 (b), Ohio EPA concurs with the path forward as outlined in the March 12, 2024, letter.

If you have any questions, please contact me at (330) 963-1109, or via email at craig.kowalski@epa.ohio.gov.

Sincerely,

Craig Kowalski

Craig Kowalski Site Coordinator Division of Environmental Response and Revitalization

CK/cm

ec: Katie Tait, OHARNG RTLS, CJAG Steve Kvaal, USACE Louisville Nathaniel Peters, USACE Louisville Jennifer M. Tierney, Chenega Reliable Services Angela Cobbs, Chenega Reliable Services Megan Oravec, Ohio EPA, NEDO DERR Natalie Oryshkewych, Ohio EPA, NEDO DERR Thomas Schneider, Ohio EPA, SWDO DERR Brian Tucker, Ohio EPA, CO DERR

³ http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=1482601 http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=1483188



NATIONAL GUARD BUREAU 111 SOUTH GEORGE MASON DRIVE ARLINGTON VA 22204-1373

March 12, 2024

Ohio Environmental Protection Agency DERR-NEDO Attn: Ms. Megan Oravec 2110 East Aurora Road Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Final Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Storage Sites - Ore Storage Pond Sub-Area (Work Activity No. 267000859211)

Dear Ms. Oravec:

The Army submitted the *Final Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area*, dated August 7, 2023. This addendum was updated in accordance with a letter dated August 25, 2021, that was submitted by the Army to Ohio EPA. Ohio EPA since provided a letter dated October 12, 2023, requesting additional information such as sediment concentration data, a brief discussion of the results, and a weight of evidence of all the ecological assessment components be added to the addendum.

This additional information is outside of the contractor's current scope of work for this addendum. Accordingly, the Army is proposing the following path forward:

- 1) Ohio EPA provide a concurrence letter for the *Final Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area*, dated August 7, 2023.
- 2) The Army will submit a second addendum. This second addendum will provide the additional information Ohio EPA requested in the letter dated October 12, 2023, associated with the DLA Ore Storage Pond. It is anticipated that this additional addendum will also include the Risk Management Decisions specified in the *Final Remedial Investigation for CC RVAAP-79 DLA Ore Storage Sites* dated October 16, 2020, and will establish cleanup goals to supplement the feasibility study for the applicable DLA Ore Storage Sites.

Please contact the undersigned at 330-235-2153 or <u>kevin.m.sedlak.ctr@army.mil</u> if there are issues or concerns with this proposal.

Sincerely,

Digitally signed by SEDLAK.KEVIN.MIC HAEL.1254440171 – Date: 2024.03.12 13:56:03 -04'00'

Kevin M. Sedlak RVAAP Restoration Program Manager Army National Guard Directorate

cc: Tom Schneider, Ohio EPA, SWDO Brian Tucker, Ohio EPA, CO Katie Tait, OHARNG Steve Kvaal, USACE Louisville Nathaniel Peters, USACE Louisville T. Zach Bayne, USACE Louisville Jed Thomas, Leidos Jennifer Tierney, Chenega



Mike DeWine, Governor Jon Husted, Lt. Governor Anne M. Vogel, Director

EPA.Ohio.gov

Received October 13, 2023

October 12, 2023

Designation

TRANSMITTED ELECTRONICALLY

Mr. Kevin M. Sedlak RE: **US Army Ravenna Ammunition Plt RVAAP** Army National Guard **Remediation Response** Installations & Environment- Cleanup Branch IPA Project records **Remedial Response** 1438 State Route 534 SW **Portage County** 267000859243, 267000859137, 267000859098, Newton Falls, OH 44444 Sent via email to: Kevin.m.sedlak.ctr@army.mil 267000859264 and 267000859127

Ohio EPA Comments on the "Final Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Subject: Storage Sites - Ore Storage Pond Sub-Area" dated August, 2023

Dear Mr. Sedlak:

On August, 9, 2023, the Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), received the Final Remedial Investigation Addendum for CC RVAAP-79 DLA Ore Storage Sites - Ore Storage Pond Sub-Area¹. It was prepared by the U.S. Army Corps of Engineers.

Ohio EPA has the following comment:

1. Section 4 of the results section does not include the sediment concentration results. Note that the action item below will not change the conclusion of the addendum.

Action Item: Please include the sediment concentration data, a brief discussion of the results, and a weight of evidence discussion of all the ecological assessment components.

If you have any questions concerning this letter, please contact me at (330) 963-1170 or ed.damato@epa.ohio.gov.

Sincerely,

Edward & D'Amato

Edward D'Amato, Site Coordinator Division of Environmental Response and Revitalization

Nat Peters, USACE ec: Katie Tait, OHARNG RTLS Steven Kvaal, USACE Angela Cobbs, Chenega Natalie Oryshkewych, Ohio EPA, DERR, NEDO Megan Oravec, Ohio EPA, DERR, NEDO Tom Schneider, Ohio EPA, DERR, SWDO Brian Tucker, Ohio EPA, DERR, CO

¹ http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=2514547 Northeast District Office 330 963 1200 2110 E. Aurora Road epa.ohio.gov Twinsburg, Ohio 44087 U.S.A.

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August 25, 2021

Ohio Environmental Protection Agency DERR-NEDO Attn: Edward J. D'Amato 2110 East Aurora Road Twinsburg, OH 44087-1924

Subject: Former Ravenna Army Ammunition Plant (RVAAP) Restoration Program Draft RI Addendum/ Draft Feasibility Study, CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area Portage/Trumbull Counties, Ohio EPA ID # 267-000859-211

Dear Mr. D'Amato:

The Army appreciates the recent opportunity during the August 20, 2021 Conference Call to discuss the Ohio EPA's concerns regarding the Draft Remedial Investigation (RI) Addendum for the CC RVAAP-79 DLA Ore Storage Sites, Ore Storage Pond Sub-Area. Additionally, Ohio EPA expressed concern that new sediment data from the Ore Storage Pond collected for the bioassays may impact the conclusions of the Human Health Risk Assessment for the Ore Storage Pond in the Final 2020 RI (*approved December 17, 2020*).

The Army proposes the following approach to continue to make progress on this Area of Concern (AOC) while providing a process to address the Ohio EPA's concerns that were provided for discussion on August 20, 2021. The Army plans to address all the concerns provided by the Ohio EPA, in the proposed following approach.

1.) CC RVAAP-79 RI Addendum for Ore Storage Pond

- Ohio EPA should stop review of the Draft CC RVAAP-79 RI Addendum.
- Army will revise the RI Addendum as follows:

1.) The findings will be revised to state that the "No Further Action" determination only applies for ecological receptors and that no further remedial actions are warranted to address ecological risk.

2.) A statement, where appropriate, will be added to state:

"Because the additional data for the Ore Storage Pond sediments collected for this RI Addendum, has concentrations of arsenic that are greater than those used to estimate risks to Human Health Receptors in the CC RVAAP-79 RI, these potential risks need to be reassessed considering the new sediment and pond data. Since the CC RVAAP-79 RI has been finalized, the Army will revise the Draft CC RVAAP-79 Feasibility (FS) to include a reassessment of potential human health risks for current and future receptors of the Ore Storage Pond that includes the new data collected for this RI Addendum. The revised HHRA will be incorporated into the Risk Management Portion of the CC RVAAP-79 FS."

2.) CC RVAAP-79 RI (approved December 17, 2020)

• • No change proposed.

3.) CC RVAAP-79 FS (draft and under review by the Ohio EPA)

- Ohio EPA should stop review of this Draft document.
- Army will revise the FS to include a revised Baseline Human Health Risk Assessment for the Ore Storage Pond using all available data (previously and newly collected for CC RVAAP-79 RI Addendum).
- Army will revise the FS to address the applicable Ohio EPA's comments provided on August 20, 2021.
- Army will redevelop Alternatives.
- Army will resubmit revised Draft FS.

If this approach is acceptable, please provide a notification of agreement and the Army will proceed as proposed. Please contact the undersigned at <u>kevin.m.sedlak.ctr@mail.mil</u> or (614) 336-6000 ext 2053 if there are concerns or if you would like to discuss the proposed approach.

Sincerely, SEDLAK.KEVIN. Digitally signed by SEDLAK.KEVIN.MICHAEL.12 MICHAEL.12544 54440171 40171 Date: 2021.08.25 13:16:29 -04'00' Kevin Sedlak RVAAP Restoration Program Manager Army National Guard Directorate

cc: Tom Schneider, Ohio EPA, SWDO Bob Princic, Ohio EPA, DERR-NEDO Megan Oravec, Ohio EPA, DERR-NEDO Mark Leeper, ARNG Katie Tait, OHARNG, Camp James A. Garfield Steve Kvaal, USACE Louisville Angela Schmidt, USACE Louisville Chenega Tri-Services, LLC Patrick Ryan, Leidos