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SAMPLING AND ANALYSIS PLAN REPORT
SEDIMENT CHARACTERIZATION STUDY TO SUPPORT EPISODIC MAINTENANCE DREDGING AT COAST GUARD STATION VALLEJO
VALLEJO, CALIFORNIA

Submitted to:
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MAY 23, 2024

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Task Order 70Z08822FESDV0023

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Dredged Material Management Office
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ACRONYMS AND ABBREVIATIONS

%	percent
±	plus or minus
°C	degrees Celsius
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
ASTM	ASTM International
Basin Plan	*Water Quality Control Plan for the San Francisco Bay Region*
BCDC	San Francisco Bay Conservation and Development Commission
BHC	benzene hexachloride
Brice	Brice Engineering
C	core
CCC	Criterion Continuous Concentration
CETIS	Comprehensive Environmental Toxicity Information System
CFR	Code of Federal Regulations
cm	centimeter(s)
CMC	Criterion Maximum Concentration
COC	chain-of-custody
COPC	contaminant of potential concern
CTR	California Toxics Rule
CRM	Certified Reference Material
Cullinan Ranch	San Pablo Bay National Wildlife Refuge
CWA	Clean Water Act
cy	cubic yard
dd/ddd.ddddddd	degrees decimal minutes
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DGPS	Global Positioning System
DMMO	Dredged Material Management Office
DoD-ELAP	U.S. Department of Defense ELAP
EC_{50}	median effects concentration
EcoAnalysts	EcoAnalysts, Inc.
EFH	Essential Fish Habitat
ELAP	Environmental Laboratory Accreditation Program
e-mail	electronic mail
ERL	Effects Range-Low
ERM	Effects Range-Median
ft^2	square feet
g	gram(s)
GC	gas chromatography
Green Book	*Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual*
HASP	Health and Safety Plan
HDPE	high-density polyethylene
IAA	integrated alternative analysis
ID	sample identifier
ITM	Inland Testing Manual

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LC_{50}	median lethal concentration
Leviathan	Leviathan Environmental
Leviathan	vessel name
LPC	limiting permissible concentration
m^2	square meter(s)
MB	method blank
MET	Modified Elutriate Test
mg/kg	milligram per kilogram
mg/L	milligram(s) per liter
mL	milliliter
MLLW	mean lower low water
mm	millimeter
Montezuma Wetlands	Montezuma Wetlands Restoration Project
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
NAD83	North American Datum, State Plane Zone 1
NCl	nitrogen chloride
NH_3	ammonia
nm	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NUAD	no unconfined aquatic disposal (not suitable for unconfined aquatic disposal)
OD	overdredge
OPR	ongoing precision and recovery
OSHA	Occupational Safety and Health Administration
oz	ounce(s)
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pg/g	picograms per gram
pH	potential of hydrogen
Physis	Physis Environmental Testing Laboratory
PPE	personal protective equipment
ppt	parts per thousand
pptr	parts per trillion
Project	USCG Maintenance Dredging Project at Station Vallejo
QA	quality assurance
QAP	Quality Assurance Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RWQCB	Regional Water Quality Control Board
SAP Report	Sampling and Analysis Plan Report
SET	Standard Elutriate Test
SF	San Francisco
SF-09	Carquinez Strait In-Bay disposal site
SF-DODs	San Francisco Deep Ocean Disposal site
SFEI	San Francisco Estuary Institute
SIM	Selective Ion Monitoring

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SM	Standard Method
SOP	Standard Operating Procedure
SP	solid phase
SPP	suspended particulate-phase
STFATE	Short-Term Fate
STLC	soluble threshold limit concentration
Study	sediment characterization study
SUAD	suitability for unconfined aquatic disposal
SV	Station Vallejo
SW	Site water
SWI	sediment water interface
TCDD	2,3,7,8-tetrachlorodiobenzo-p-dioxin
TCLP	toxicity characteristic leaching procedure
TEQ	toxic equivalent
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TSS	total suspended solids
TTLC	total threshold limit concentration
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
WQC	water quality certification
WSP	WSP USA Environment & Infrastructure
Z-layer	0.5-foot (6-inch) layer of sediment below the 2-foot overdredge allowance that represents the resultant surface post-dredging

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1.0 INTRODUCTION

This Sampling and Analysis Plan Report (SAP Report) provides the results of a sediment characterization study (Study) proposed to support episodic maintenance dredging needed at United States Coast Guard (USCG) Station Vallejo (SV) in Vallejo, California (Figure 1-1). This SAP Report outlines the federally approved procedures that were used to assess the disposal suitability of the proposed dredged materials and the corresponding results of the sediment investigation.

This SAP Report was prepared by WSP USA Environment & Infrastructure (WSP) under contract to the USCG in accordance with the *Evaluation of Dredged Materials Proposed for Discharge in Waters of the United States, USEPA-823-B-98-004* (Inland Testing Manual [ITM]) (U.S. Environmental Protection Agency [USEPA]/U.S. Army Corps of Engineers [USACE], 1998), as supplemented by *Public Notice 01-01: Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region* (USACE/USEPA, 2001) and *San Francisco District Public Notice 99-4 Proposed Guidance for Sampling and Analysis Plans (Quality Assurance Project Plans) for Dredging Projects Within the USACE San Francisco District* (USACE/USEPA, 1999). This document includes the following elements:

- Introduction
- Site History
- Methods
  - Dredge Design
  - Sampling Design
  - Physical and Chemical Testing
  - Biological Testing
- Study Results
- Conclusion and Recommendations; and
- Quality Assurance (QA) and Quality Control (QC) Procedures and Review

The Study approach was presented to the Dredged Material Management Office (DMMO) on 6 December 2023. The SAP was approved by the DMMO via electronic mail (e-mail) on 8 December 2023 and through File Number 2008-00049: USCG Station Vallejo, Maintenance Dredging, Episode 2; Sampling and Analysis Plan; DMMO Serial Number 23-081 on 11 December 2023. Appendix A contains all agency comments and correspondence for this Project.

1.1 Project Summary

The USCG Maintenance Dredging Project at SV (Project, Figure 1-2) is required to support berthing and transit of USCG vessels at USCG SV. The ability to conduct these mission-related activities will imminently be impeded by sediment accumulated since the most recent dredging event in 2021; therefore, the USCG plans to dredge SV during the 2024 in-water work window or sooner, if approved by the agencies.

The maintenance dredging design depth for the Project is -10 feet mean lower low water (MLLW) plus a 2-foot overdredge (OD) allowance (to -12 feet MLLW). To support the upcoming episode of maintenance dredging at this site, a bathymetric survey of the permitted area for long-term maintenance dredging was performed by Brice Engineering (Brice) on behalf of the USCG on 6 October 2023. The survey showed that a total of approximately 14,264 cubic yards (cy) of sediment (approximately 600 cy per month) had accumulated within the berthing area since the most recent dredging event occurred approximately 2 years prior (final post-dredge survey

performed on 9-13 November 2021). For the Study, this sedimentation rate was used to calculate the total volume proposed to be dredged and disposed for this episode to be conducted in mid-2024. Table 3-1 of this SAP Report contains the actual proposed dredging locations, design depths, and estimated volumes for the Project.

Dredging for the Project will likely consist of dredging the basin from a barge-mounted clamshell/excavator dredge, placing the dredged material onto scows for transport using tugboats, and disposing of the dredged material at an agency-approved placement location. It is expected that the dredging and disposal event may take up to 15 working-days to complete.

Disposal of dredged material in San Francisco Bay is primarily regulated under Section 404 of the Clean Water Act (CWA). The USACE and USEPA each administer specific aspects of Section 404, which established a permit program and technical guidelines to regulate discharges of dredged or fill material. The evaluation of a Section 404 permit application involves determining whether the proposed Project complies with 40 Code of Federal Regulations (CFR) 230 (*Guidelines for Specification of Disposal Sites for Dredge or Fill Material*) and USACE permit regulations (33 CFR 320–330).

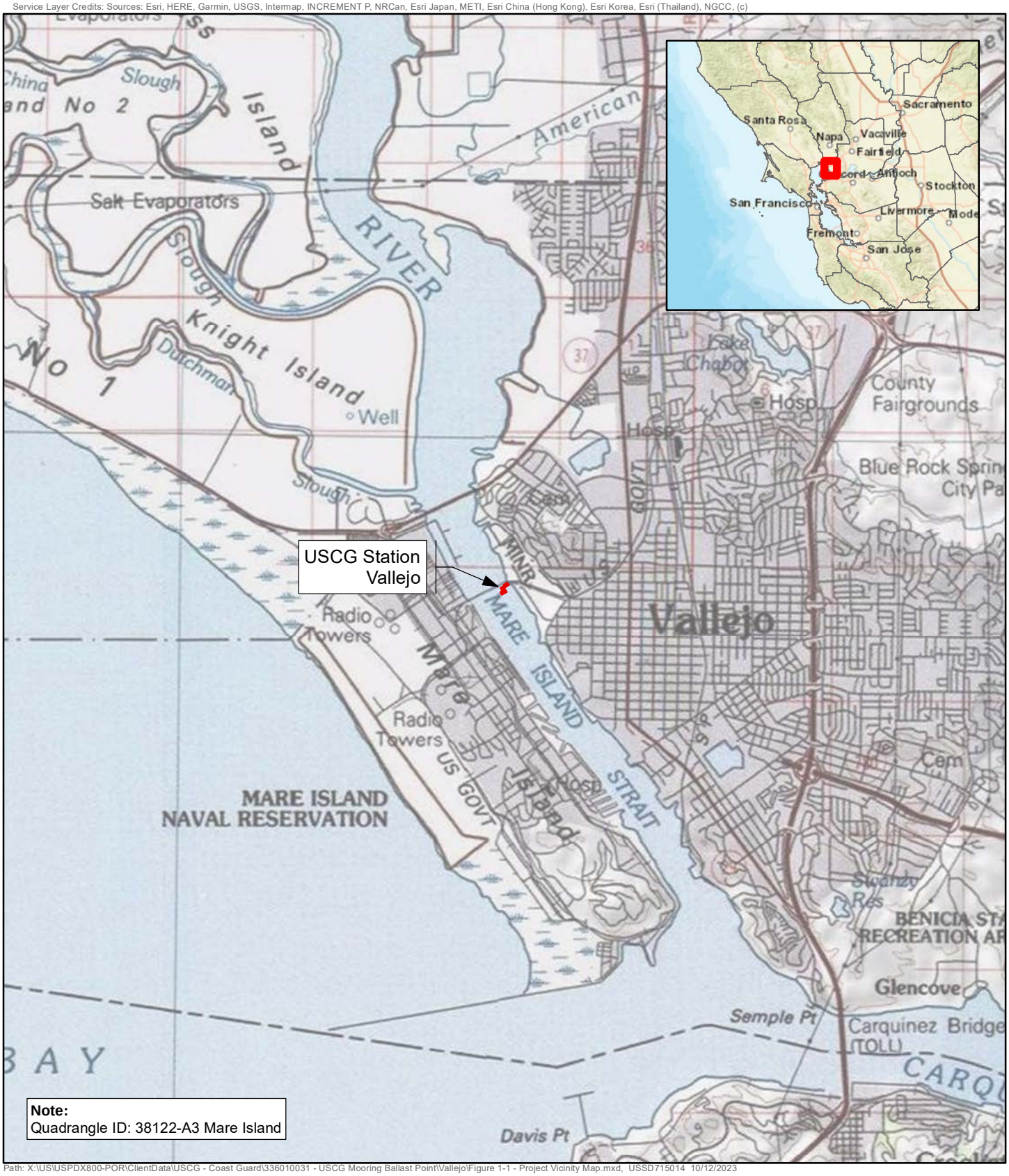
Permitting and Regulatory Information
The USCG will perform this dredging episode in accordance with existing permits (Appendix A). These include USCG multi-year dredging permit SPN-2008-00049N and San Francisco Bay Conservation and Development Commission (BCDC) Consistency Determination Number C2007-005.07. Although the last SV dredging event was performed under California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) WDID# 2 CW439590, this water quality certification (WQC) was only approved for a single dredging episode; therefore, a new WQC will be necessary for the proposed event.

Agency approval for this event requires coordination with the DMMO. Approval for the event will be based on the results of this Study designed to provide recent physical and chemical characteristics of the proposed dredged materials. Placement suitability will be determined by the Study results in comparison to three potential placement sites the 1) Cullinan Ranch Restoration Project in the San Pablo Bay National Wildlife Refuge (Cullinan Ranch), 2) Montezuma Wetlands Restoration Project (Montezuma Wetlands) and 3) the Carquinez Strait In-Bay disposal site (SF-09) in accordance with the *Integrated Alternatives Analysis for Disposal of Dredged Materials for Coast Guard Projects within San Francisco Bay Region* (IAA; USCG 2021). While Montezuma Wetlands was not included as a proposed placement location in the Project SAP, this location was added for consideration through the agency consultation process. Figure 1-3 shows the proposed placement sites. If none of these placement options are considered compatible, the option to dispose the USCG dredged materials at an appropriately permitted upland landfill may be pursued (as needed), based on the Study results.

1.1.1 Purpose and Objectives

The Project purpose is to regain adequate berthing and transit depths for the USCG vessels at USCG SV, which are critical to the USCG's mission. The Project will be supported by this Study, which has the objective to evaluate the proposed dredged materials for placement suitability in accordance with approved agency testing guidelines.

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)



Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 1-1 - Project Vicinity Map.mxd, USSD715014 10/12/2023

1 inch = 1 miles

0 0.5 1 Miles

FIGURE 1-1

Project Vicinity Map
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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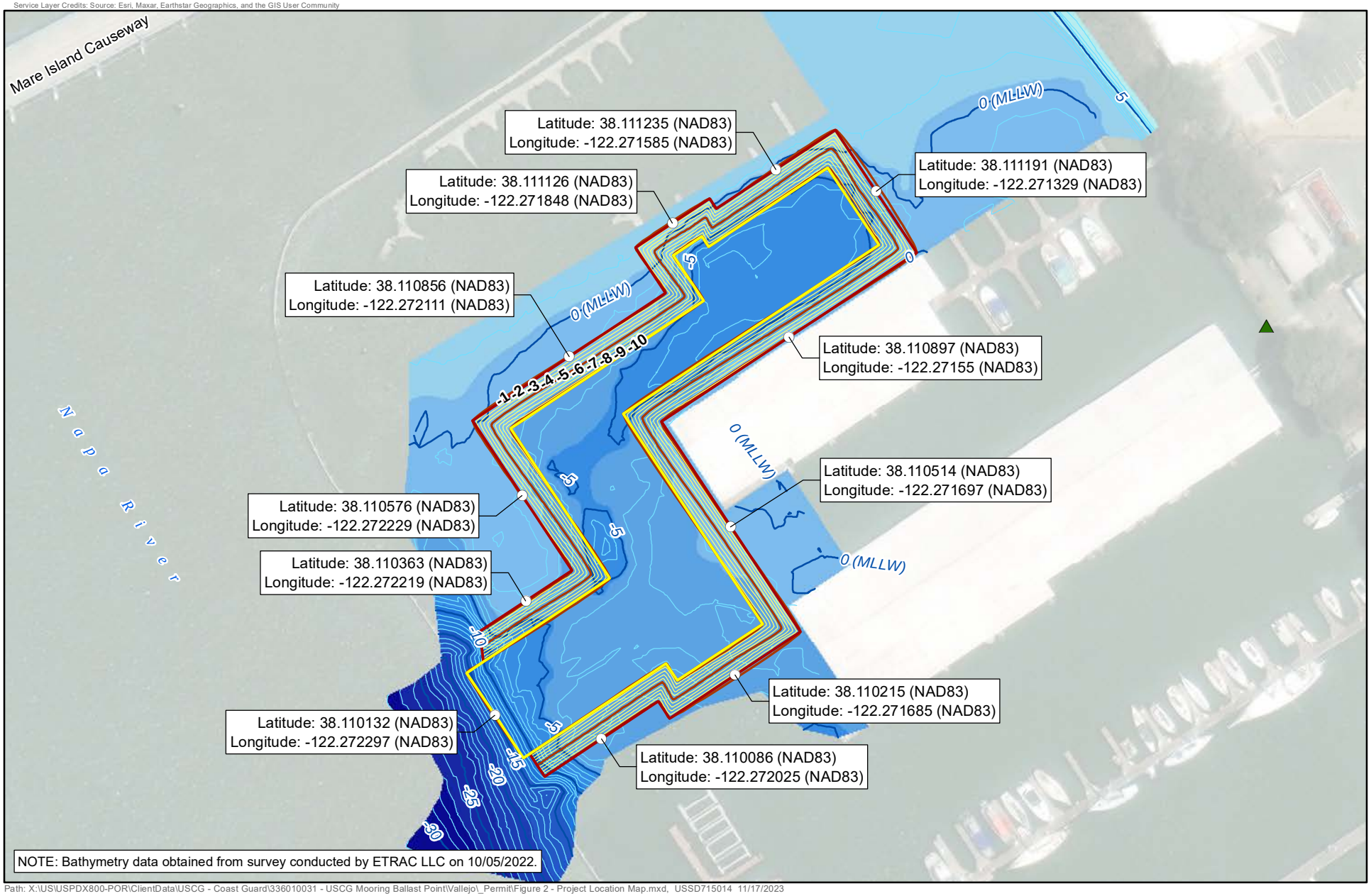
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo_Permit\Figure 2 - Project Location Map.mxd, USSD715014 11/17/2023

1 inch = 100 feet

0 50 100 Feet

Existing Outfall Location

Permitted Dredging Area for Long-Term Maintenance (1.5 acres)

Toe of Slope

Existing Bathymetry:

Bathymetry Contour (1ft. interval, MLLW datum)

Bathymetry Contour (5ft. interval, MLLW datum)

Proposed Bathymetry:

Bathymetry Contour (1ft. interval, MLLW datum)

Bathymetry Contour (5ft. interval, MLLW datum)

FIGURE 1-2

Project Location Map
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 1-3 - Proposed Disposal Locations.mxd, USSD715014 2/13/2024

1 inch = 4 miles

0 2 4 Miles

Cullinan Ranch

SF-09 Disposal Site (approximate)

Target SF-09 Reference Collection Area

San Pablo Bay National Wildlife Refuge

FIGURE 1-3

Proposed Disposal Locations
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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1.1.2 Proposed Dredging Volumes and Depths

For Study planning, the proposed Project dredging volume estimated for this event was approximately 23,151 cy.[1] This total volume included approximately 18,557 cy of sediment to be removed to the design depth of -10 feet MLLW and approximately 4,594 cy of sediment in the 2-foot OD allowance (to -12 feet MLLW). The dredging event is currently scheduled for August 2024 but may need to be performed sooner based on anticipated berthing and access needs. Dredging will likely be accomplished using a shallow draft barge-mounted clamshell dredge with scow barges for disposal, depending on the water depth at the time of work.

1.1.3 Proposed and Alternative Placement Options

The USCG prefers to dispose of the material at the most appropriate site based on chemical composition, environmental impact, and cost. However, they are committed to dispose of at least 80 percent of the 2021-2025 maintenance dredging materials from the Station Golden Gate, Station Vallejo, Base Alameda, and Yerba Buena Island (Coast Guard Cutter Aspen Mooring and Approach and Station San Francisco) project sites at an approved and available upland/beneficial reuse site or San Francisco Deep Ocean Disposal site (SF-DODs), and up to 20 percent at the available in-Bay sites in accordance with their IAA (USCG 2021). The IAA, which includes projected dredging volumes from 2021 to 2025 was included as Appendix B in the SAP and is available upon request.

For the Study, samples of the proposed dredged materials were collected at SV with the intent to be tested according to protocols for an unconfined aquatic disposal determination for potential placement at Cullinan Ranch or SF-09; however preliminary results showed that Montezuma Wetlands should also be considered (Figure 1-3). If it is determined by this Study that none of these locations is appropriate for the proposed dredged materials, samples will be evaluated for upland disposal at an appropriately permitted landfill.

Beneficial reuse at Cullinan Ranch is the USCG's preferred disposal option. Based on correspondence between Steve Carrol of Ducks Unlimited, Inc. and the USCG on 29 August 2023, Cullinan Ranch "is still open for beneficial reuse and has plenty of capacity." Cullinan Ranch is located approximately 1.74 nautical miles (nm) from the Project site (Figure 1-3).

Cullinan Ranch has specific Waste Discharge Requirements that outline criteria for placement (RWQCB Order Number R2-2010-0108). Acceptance of dredged materials at this site are further described under Specification B.1 of the *Regional Board Staff Report Summary Report – Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines* (RWQCB 2000) and within the DMMO guidance document, *Guidelines for Implementing the ITM in the San Francisco Bay Region* (USACE Public Notice 01-01) with the exception that the water column bioassay simulating in-bay unconfined aquatic disposal shall be replaced with the modified effluent elutriate test, as described in Attachment B of the ITM, for both water column toxicity and chemistry (DMMO suite of metals only).

In case the preferred disposal site is not available at the time of dredging, or the sediment is not compatible for placement, the USCG also evaluated the proposed dredged materials for

[1] This volume includes an approximate sedimentation rate of 600 cy per month, or the approximate volume of sediments that were accumulated between November 2021 and October 2023 plus a 10 percent contingency volume to accommodate the potential for heavy rainfall in 2023-2024.

placement at SF-09. The SF-09 in-Bay disposal site is in the Carquinez Strait approximately 3.9 nm from the Project site (Figure 1-3). The Carquinez Strait SF-09 in-Bay placement site is a 1,000-foot by 2,000-foot rectangle, approximately 10-55 feet deep, 0.9 miles west of the entrance to Mare Island Strait in eastern San Pablo Bay.

Once preliminary results were received, a third disposal option, the Montezuma Wetlands in Collinsville, California was added for placement consideration. Montezuma Wetlands are located approximately 23 nm from the Project site.

Selection of the disposal location for the Project will be based on the results of this Study, which compares results to available screening criteria for unconfined aquatic disposal. This Study involves a tiered approach to sampling and analysis that will streamline the disposal determination and consultation process with the DMMO, as outlined in this SAP Report.

1.1.4 Project Timeline and Correspondence with Agencies Regarding SAP Report Approval

The Project SAP was initially presented to the DMMO agencies on 06 December 2023. After the presentation and review, the DMMO agencies recommended minor revisions to the SAP which was then approved on 08 December 2023. Sediment and site water sample collection for the Project took place from 11-14 December 2023 and 21 December 2023. Samples were analyzed between 14 December 2023 and 15 February 2024.

On 06 March 2024, the Draft SAP Report was submitted to the DMMO agencies for consideration at the 20 March 2024 DMMO regular meeting. Following the meeting, the DMMO agencies provided comments and recommendations to the USCG. The Draft SAP Report was revised and resubmitted to the DMMO agencies on 12 April 2024. On 13 May 2024, the USCG received the SUAD determination, in which the DMMO recommended disposal of the proposed dredged materials at an in-Bay disposal site, such as Carquinez Strait (SF-09) or for beneficial reuse at Cullinan Ranch or Montezuma Wetlands. Appendix F contains the SUAD determination from the DMMO agencies.

1.2 Site Description

The USCG SV is located approximately 32 miles northeast of San Francisco in the City of Vallejo, Solano County, California (center point 38.110641 North, -122.271883 West, Figure 1-1). The Project footprint is located within the Vallejo Municipal Marina, on the eastern side of the Napa River/Mare Island Strait, adjacent to Mare Island/Ernest D. Wichels Memorial Causeway. USCG SV is approximately 3 miles upstream from the mouth of the Napa River at Carquinez Strait. Shoaling within the Station boat basin occurs when suspended sediment from the Napa River moves into the sheltered areas, where it slows and settles (BB&E 2021).

USCG SV is a multi-mission small boat station for emergency response, search and rescue operations, and maritime law enforcement. The area of responsibility covers San Pablo Bay north of the Richmond Bridge, Petaluma River, Napa River, and Suisun Bay to the Antioch Bridge and up to Suisun City. Facility buildings line the shore of the Vallejo Marina, along with restaurants, a marine mechanic shop, and associated parking lots. Two outfalls discharge into the vicinity of the proposed dredging area (Figure 1-2). These outfalls collect stormwater from various areas of SV and surrounding sites and discharge into the Marina.

The approved maintenance depth at SV is -10 feet MLLW plus a 2-foot OD allowance (to -12 feet MLLW) and the permitted dredging area for long term maintenance is approximately 59,560 square feet (ft^2; 1.37 acres). The most recent dredging event at SV was performed from 9 to 13 November 2021.

1.3 Scope of Work

This SAP Report details the results of the sediment collection and testing program to support the 2024 episodic maintenance dredging event. The primary disposal option to be evaluated for the Project is beneficial reuse at Cullinan Ranch, Montezuma Wetlands, or SF-09 in the Carquinez Strait (Figure 1-3). If none of these options are deemed appropriate for the Project dredged materials, additional analytical testing will be performed to determine whether the sediment can be disposed of at an appropriately permitted upland landfill. Program elements included the following:

- Preparation of a Project-specific SAP for agency review and approval,
- Adoption of a Health and Safety Plan (HASP), including all requirements in Occupational Safety and Health Administration (OSHA) 29 CFR 1910,
- Field mobilization and collection of six sediment core samples to the maintenance dredging design depth, plus a 2-foot OD allowance and a 0.5-foot (6-inch) Z-layer in accordance with the procedures outlined in the SAP,
- Compositing the six individual samples for chemical, physical, and toxicological analyses,
- Collection of site water for elutriate testing,
- Collection of a reference sediment sample at the SF-09 reference site,
- Submission of samples to accredited laboratories for physical, chemical, and toxicological analyses,
- QA/QC review of data,
- Analysis of sediment chemistry and toxicity results,
- Preparation of this detailed SAP Report for submission to the DMMO, and
- Convening of a sediment disposal suitability meeting with the DMMO to present a detailed discussion of the test results.

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2.0 SITE HISTORY

Sediment testing results for material collected for regular updates of the permit and for unconfined disposal have consistently indicated that the material is clean and suitable for unconfined aquatic disposal, near-shore placement, and/or beach replenishment. Sediment testing results for the 2013, 2018, and 2021 dredging events are included in Appendix A, and a sampling map is shown on Figure 2-1.

Appendix A also contains historical permits for the Project that would be reapplied for to support the current dredging effort.[2] The recent dredging history, including USACE permit numbers, volumes, design depths, contaminants of concern, and placement locations for this site, is presented in Table 2-1.

Table 2-1. Dredging Site History

Dredging Year	Permit Number	Total Volume Dredged (cy)[1]	Dredging Depth (feet MLLW)	COPC	Placement Site (Ocean, Upland, Beach, etc.)
2021	2008-00049N	10,313	-12	None	Beneficial reuse at Cullinan Ranch Wetlands Restoration Site
2018	2008-00049N	15,600	-12	None	Beneficial reuse at Cullinan Ranch Wetlands Restoration Site, SF-09
2013	2008-00049N	8,850	-12	None	SF-09

Notes:
COPC = contaminant of potential concern; cy = cubic yard(s); MLLW = mean lower low water; USCG = United States Coast Guard
[1] Volumes are approximate.

During the 2021 event, approximately 10,313 cy of sediment was dredged within the authorized footprint and transported to the Cullinan Ranch Restoration Project for beneficial reuse. Prior to this event, maintenance dredging was conducted at USCG SV in the fall of 2018 and removed approximately 15,600 cy. For the 2018 event, approximately 1,800 cy was disposed in-Bay at SF-09 in Carquinez Strait and approximately 13,800 cy of material was used beneficially at the Cullinan Ranch restoration site. In 2013, approximately 8,850 cy were dredged from the footprint and placed at SF-09.

2.1 Summary of Prior Sediment Characterization Results

The primary findings for sediments evaluated in 2020 for the 2021 dredging event are outlined as follows:

1. Sediments were characterized as fine-grained depositional material.
2. In general, the sediments exhibited low concentrations of chemical constituents.
3. Sediment chemistry levels were generally below the Effects Range-Low (ERL) guideline values and the San Francisco Bay ambient concentrations.
4. Sediment chemistry levels were all below the Cullinan Ranch disposal site criteria.

[2] Due to file size, copies of these historical permits can be provided upon request.

5. Mercury values exceeded the bioaccumulation trigger (Site sample result = 0.347 milligram per kilogram (mg/kg); bioaccumulation trigger = 0.332 mg/kg) criteria value. However, the values were below the Total Maximum Daily Load (TMDL) limit for San Francisco Bay ambient sediment concentrations (0.47 mg/kg) and were also below the Cullinan Ranch disposal site criteria guideline values (BB&E 2021).
6. Based on the absence of any significant adverse biological effects and contaminant concentrations that were below the dredge material acceptance criteria for placement at Cullinan Ranch and SF-09, sediments proposed for dredging from the USCG SV were not expected to elicit significantly adverse ecological impacts within Cullinan Ranch or SF-09.

The primary findings for sediments evaluated for the 2018 dredging event are outlined as follows:

1. Sediments were characterized as fine-grained depositional material.
2. In general, the sediments exhibited low or non-detect concentrations of chemical constituents.
3. Sediment chemistry levels were generally above SF-09 reference site conditions.
4. Sediment chemistry levels were generally below the ER-L guideline values and the San Francisco Bay ambient concentrations.
5. Sediment chemistry levels were generally below the Cullinan Ranch use as cover guideline values except for metals, which were slightly elevated above guideline values.
6. Modified Elutriate Test (MET) metals concentrations were below the environmental screening levels.
7. Sediment chemistry levels were all below the available trigger levels for bioaccumulation.
8. The toxicity analyses exhibited no acute sediment, standard elutriate, or MET elutriate toxicity for any of the tested organisms (Arcadis 2018).
9. Based on the absence of any significant adverse biological effects and contaminant concentrations that were below the dredged material acceptance criteria for placement at Cullinan Ranch and SF-09, sediment proposed for dredging from the USCG SV were not expected to elicit significantly adverse ecological impacts within Cullinan Ranch or SF-09.

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Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 2-1 – Historical Sampling Locations.mxd, USSD715014 11/13/2023

- Sediment Core (USCG STA Vallejo, 2020)
- Sediment Core (USCG STA Vallejo & City of Vallejo, 2018)
- Sediment Core (Vallejo Marina, 2012)
- Sediment Core (USCG STA Vallejo, 2008)
- Existing Outfall Location
- Bathymetry Contour (1ft. interval, MLLW datum)
- Bathymetry Contour (5ft. interval, MLLW datum)
- Permitted Dredging Area for Long-Term Maintenance (1.5 acres)
- Toe of Slope

1 inch = 100 feet

0 50 100 Feet

FIGURE 2-1

Historical Sampling Locations
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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3.0 METHODS

This section provides details on the proposed maintenance dredging volumes and target sample collection depths, discusses the procedures used to access the collection sites, and describes the methods and materials used to collect, composite, handle, and archive sediment samples for the proposed Study. The Study implemented Tier II chemical and physical testing to allow the USCG and agencies to verify that the proposed dredged materials are suitable to be used at an available approved beneficial reuse site (e.g., Cullinan Ranch or Montezuma Wetlands) or for open water disposal at SF-09.

3.1 Dredging Design

Dredging design plans by Brice are included in Appendix A. The approximate area proposed for long-term maintenance dredging over the 10-year permit cycle is approximately 59,560 ft^2 (1.37 acres). The proposed dredging location, design depth, and estimated dredging volumes are summarized in Table 3-1. Note that these dredging volumes are based on a 6 October 2023 survey and should be considered approximate as the actual sediment volumes at the time of dredging may be slightly higher or lower than those presented. For the Study, one composite was prepared of the proposed dredged materials for testing (Figure 3-1). The dredging design includes a 3:1 slope, as shown in the cross-sections on Figure 3-2.

Table 3-1. Station Vallejo
Proposed Dredging Locations, Design Depths, and Volumes

Maintenance Dredging Location	Composite Area	Approximate Permitted Dredging Area (acres)	Design Depth (feet MLLW)	Estimated Dredge Volume to Design Depth (cy)	Estimated 2-foot OD Volume (cy)	Estimated Total Volume Per Composite Area (cy)[1]
USCG Station Vallejo	Total	1.37	−10.0	18,557	4,594	23,151

Notes:
cy = cubic yard(s); MLLW = mean lower low water; OD = overdredge; USCG = United States Coast Guard
1. Includes the total volume with the 2-foot overdredge allowance.
2. The proposed dredging volume used to design the Study is estimated and was determined using a 6 October 2023 bathymetric survey. The dredged material to the design depth includes an estimated sedimentation rate of 600 cy per month to estimate accumulation that may occur between the 2023 bathymetric survey and the proposed dredging event. A 10 percent contingency is also included to accommodate the potential for heavier than average rainfall in 2023-2024.

3.2 Sampling Design

Sediment sampling for the Study was designed to ensure that representative samples were collected for the proposed dredge sites. A reference sample was collected at SF-09 (38.06296291, -112.26707036) on 11 December 2023 (Figure 3-2) and six locations within the proposed dredging area at SV were sampled using a vibracore on 12 and 13 December 2023 (Figure 3-1, Table 3-2). In addition to sediments, site water used to prepare elutriate samples were also collected on 13 and 21 December 2023.

Sediment collection followed the guidance in *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual* (USEPA, 2001). Sediment cores collected from each of the six proposed sampling sites were collected from the sediment water interface (SWI) to the design depth plus a 2-foot OD allowance. Samples were

collected using a vibracore sampler in accordance with the methods described in Section 3.2.7.1 at the sampling locations shown on Figure 3-1 and listed in Table 3-2.

Any accumulated sediment that is deposited within the proposed dredging footprint between the time of sampling and dredging activity will be assumed to have the same chemical composition unless a significant event occurs.

3.2.1 Sampling and Testing Objectives

The objective of the Study was to determine the placement location for the proposed Project dredged materials and to consider any impacts dredging or disposal operations may have on sediments and water quality of the SV local ecosystem and the final placement site. Sample collection was documented using vibracore logs and photography. Vibracore logs are in Appendix B, and photographs of cores are in Appendix C.

3.2.2 Sample Identification

Samples were identified by the sampling location (SV or SF-09 Reference), the year in which the sample was collected (2023, "-23-"), the sample type, and the type of sample (e.g., core = C; site water = SW). For QA/QC, a duplicate sample (SV-23-DUP) was also collected for chemical analyses. In addition, any Z-layer samples collected were labeled with the same sample identifier and appended with a "Z."

3.2.3 Core Sample Locations and Depth

Table 3-2 is an overview of positioning, sample collection times, mudline elevations, Project depths, target penetration depths, actual penetration depths, analysis lengths, and general notes for each core. The actual penetration depth is the actual penetration of the vibracore into the sediment, which was attempted to the target core length. The target core length is calculated by subtracting the mudline elevation measured in the field from the design depth plus the 2-ft OD allowance. Samples of the dredged material were collected to the design depth of -10 feet MLLW plus a 2-foot OD allowance to -12 feet MLLW.

As required by the Essential Fish Habitat (EFH) agreement (USACE and USEPA 2011, USACE and USEPA 2012), an undisturbed 6-inch "Z-layer" immediately below the OD at each sample location was also collected by penetrating the vibracore an additional 1-foot beyond the OD. This 6-inch Z-layer sediment was archived for future testing that will only be required if deemed necessary by the DMMO based on a review of the results of the chemical and physical tests presented in this SAP Report. Any sediment collected below the Z-layer was discarded. Z-layers were recovered for four of the six samples. No Z-layer was recovered for samples SV-23-C3 and SV-23-C5. All samples were stored at 4 degrees Celsius (°C) prior to test initiation.

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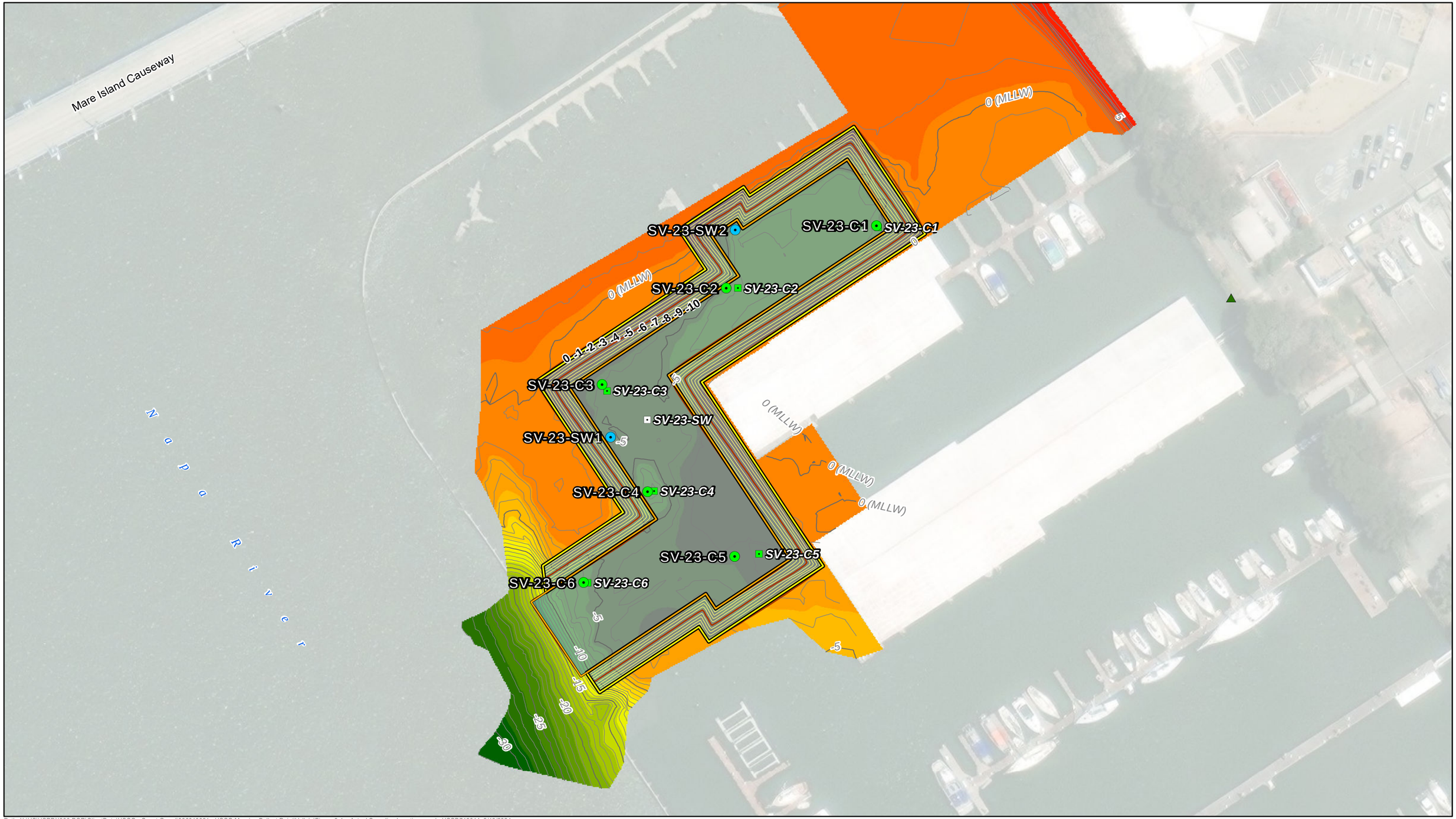

Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 3-1 – Actual Sampling Locations.mxd, USSD715014 2/13/2024

wsp

- Existing Outfall Location
- Permitted Dredging Area for Long-Term Maintenance (1.5 acres)
- Toe of Slope

Proposed Bathymetry:

- Bathymetry Contour (1ft. interval, MLLW datum)
- Bathymetry Contour (5ft. interval, MLLW datum)
- Proposed Dredging Footprint

Existing Bathymetry:

- Bathymetry Contour (1ft. interval, MLLW datum)
- Bathymetry Contour (5ft. interval, MLLW datum)

- Actual Sediment Sample Location
- Actual Site Water Sample Location
- Proposed Sediment Sample Location
- Proposed Site Water Sample Location

1 inch = 75 feet
0 37.5 75 Feet

FIGURE 3-1

Actual Sampling Locations
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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Table 3-2. Vibracore Collection Log

Sample Identifier	Core Attempts Required	Latitude (dd.dddddd)	Longitude (ddd.dddddd)	Date	Time	Project Depth (Plus 2 foot OD Plus 1 foot for Z-Layer Recovery)	Mudline Elevation (feet MLLW)	Target Penetration (feet)	Actual Penetration (feet)	Recovered Core Length (feet)	Additional Notes
SV-23-C1	1	38.111087	-122.271366	12/12/2023	8:45	-13.0	-5.3	7.7	9.9	9.7	Lost material in catcher, small amount around 0.2 feet.
SV-23-C2	1	38.110942	-122.271804	12/12/2023	13:15	-13.0	-5.7	7.3	8.0	7.3	Soft plug.
SV-23-C3	1	38.110722	-122.272163	12/12/2023	14:10	-13.0	-4.0	9.0	9.0	8.0	Small soft plug. No Z-layer. Sediment is too soft. Fell out.
SV-23-C3	2	38.110719	-122.272165	12/12/2023	14:30	-13.0	-4.2	8.8	9.8	8.0	Combined with Attempt #1. Collected for Z-layer recovery. Result was the same.
SV-23-C4	1	38.110472	-122.272031	12/13/2023	10:25	-13.0	-6.9	6.1	8.6	7.4	No comments recorded.
SV-23-C5	1	38.110329	-122.271719	12/12/2023	10:25	-13.0	-2.4	10.6	10.5	7.3	No plug. Lost bottom of core on retrieval. Core rejected, not 75% recovery. RCRA archive only.
SV-23-C5	2	38.110362	-122.271720	12/12/2023	11:00	-13.0	-2.7	10.3	11.0	7.2	Small plug. Not 75% recovery. No sample.
SV-23-C5	3	38.110324	-122.271777	12/12/2023	11:40	-13.0	-2.8	10.2	11.0	8.5	No plug. 78% recovery. No Z-layer.
SV-23-C6	1	38.110263	-122.272217	12/13/2023	8:50	-13.0	-5.1	7.9	8.9	7.5	No comments recorded.

Notes: dd/ddd.ddddddd = degrees decimal minutes; OD = overdredge; MLLW = mean lower low water; % = percent; RCRA = Resource Conservation and Recovery Act (landfill)

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Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 3-3 - SF-09 Reference Sediment Collection Site.mxd, USSD715014 2/13/2024

1 inch = 1,000 feet

0 500 1,000 Feet

SF-09 Reference Collection Location

SF-09 Disposal Site (approximate)

Target SF-09 Reference Collection Area

FIGURE 3-2

SF-09 Reference Sediment Collection Site
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

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3.2.4 Reference and Control Sediment Sample Collection

Reference sediment was collected in the southeastern half of the designated SF-09 reference site (approximate collection location latitude 38.062963, longitude -112.267070) that has been used for numerous dredged material bioassays (Figure 3-2).

Negative control sediments were used for solid phase (SP) toxicity exposures. The negative control ("home") sediments were collected at the same location and at the same time as the test organisms. Negative control sediment exposures were used to determine the health of the test organisms during the laboratory exposure period. For the tests to be considered valid, organism performance met the specific control criteria of greater than 90 percent mean survival in the SP tests. Survival at these levels attests to the suitability of the organisms for testing purposes. Negative control sediments were collected by the test organism supplier and sent to the EcoAnalysts, Inc. (EcoAnalysts) toxicity testing laboratory in Port Gamble, Washington, along with each batch of test organisms. All control sediments were stored at 4°C prior to test initiation.

3.2.5 Composite Areas

Sediments collected for the Study area were tested as one composite sample comprising six core samples (Figure 3-1). To adequately characterize sediment quality and collect enough material to run all proposed analyses, multiple core samples were collected at several of the proposed sampling locations (Table 3-2). Sediments composited from each location were approximately proportional to the dredging volume represented by each location. Sediment from the core samples was composited for chemical and physical testing (Tier II) and toxicity evaluations (Tier III). A field duplicate of the composite sediments (SV-23-DUP) was analyzed for the same suite of analyses as the proposed dredge footprint composite (SV-23-Composite) and the reference sample composite (SF-09 Reference).

The SF-09 reference sample was collected concurrently to the dredging area core samples using a pipe dredge. The SF-09 reference sample was tested for the same suite of analyses as the sediment composite area samples (Figure 3-2).

3.2.6 Sampling Platform, Navigation, and Vertical Control

To navigate to the target sampling locations, a differential Global Positioning System (DGPS) with real-time monitoring of the most recent shape files was used. Once the vessel, *Leviathan,* was positioned over a sampling location, the boat captain deployed a three-point anchor or double-tied to nearby docks to maintain position. Once the vessel was secured, WSP scientists recorded its position in the field log, measured the water depth with a weighted fiberglass tape, and then corrected the water depth to MLLW using National Oceanic and Atmospheric Administration (NOAA) tide tables and bathymetric data.

The target navigational accuracy was plus or minus (±) 3 meters. Many of the Project samples were collected within 3 meters of the proposed location; however, the WSP Field Manager minorly adjusted the SV-23-C5 sampling location (20.67 feet) because of poor recovery at the proposed collection location, shallow mudline depths, and difficulty setting anchors in the soft sediments.

3.2.7 Sampling Collection, Processing, and Shipping

Several types of equipment were used to collect sediments for the Study. All samples were processed by qualified WSP scientists on the marine sampling vessel and transferred to the appropriate testing laboratories under the stringent sample tracking protocol outlined in this section.

3.2.7.1 Sampling Equipment

Sediments were collected using a vibracore within the dredge footprint and a pipe dredge was used for SF-09 reference sediment collection. Water samples were collected using a Niskin grab sampler. Various equipment types and collection strategies are described in this section.

Project Area Sampling Equipment

Vibracore: Sediments were collected using a vibracore sampler. The vibracore uses a 4-inch-diameter aluminum tube connected to a stainless-steel cutter. The aluminum-encased vibrating unit uses 220-volt, 3-phase, 30-ampere electricity to drive two counter-rotating concentric vibrators. Prior to deployment, the aluminum core barrel was lined with a noncontaminating polyethylene liner to prevent cross contamination between each core attempt. Once the vessel was positioned above a sampling location, *Leviathan* personnel deployed the vibracore using a hydraulic winch and vibrated the equipment until penetration to the target depth was achieved. Core penetration depth was calculated with a tape measure attached to the vibracore head. After the vibracore was turned off, the sediment core was returned to the boat's deck for processing. Once onboard, core samples were processed immediately after careful extraction of each attempt onto a decontaminated polyvinyl chloride tray. Once on the tray, the protective sleeve was cut open for sample processing. Processing included photography of each core as well as inspections for unique strata (color, odors, grain size, etc.) and then subsampling for chemistry.

Vibracore penetration accuracy was plus/minus (±) 0.5 feet, and the target penetration to the Project design depth was corrected for the tidal elevation at each coring location. NOAA charts or recent bathymetric data was used to assess water depth, which was verified using the *Leviathan*'s fathometer. The penetration depth was determined using a measuring tape attached to the vibracore head. The distance from where the tape was attached to the vibracore head was added to the length from that point to the core cutter at the bottom of the vibracore barrel. Following the collection of each core, the actual length of the sediment in the tube was determined to assess the amount of recovery and potential sediment compaction that occurred during collection.

None of the cores collected for the Study were refused by encountering native materials. The only locations where Z-layer samples were not collected were SV-23-C3 and SV-23-C5 (Table 3-2).

Site Water: Site water used for water column testing was collected from the dredging area using a Niskin water sampler positioned approximately 1-meter below the surface on 13 December 2023 (SV-23-SW-1). Site water collected in the field was placed into cubitainers and transported to EcoAnalysts for elutriate preparation.[3] Once the samples were received by the laboratory, it became apparent that additional site water would be required because of the fine sediment grain size. Therefore, a second site water sample was collected on 21 December 2023 (SV-23-SW-2)

[3] The lab prepared the elutriate by mixing the composited sediments with site water to form the 100 percent supernatant. The 100 percent supernatant was then be diluted with clean sea water to prepare test concentrations for SPP exposures.

and sent to EcoAnalysts. Once the elutriate was prepared, it was used for suspended particulate-phase (SPP) exposure tests (described in Section 3.5) and modified elutriate test (MET) toxicity and chemical testing. For SPP exposure and MET tests, approximately 40 liters (L) of site water and 25 L of sediment per composite (one test, one reference, 50 L total) were collected to yield an expected elutriate sample volume of approximately 500-1000 milliliters (mL). Independent site water samples collected on the 13 and 21 December were also analyzed. For each of these samples, approximately 2.5 L of water was collected.

SF-09 Reference Collection Equipment

The SF-09 reference sediment was collected in the southeastern half of the placement site by Leviathan and WSP scientists using a pipe dredge. The pipe dredge is a large stainless-steel bucket attached to a sturdy stainless-steel chain tied to a heavy towline. A hydraulic winch is used to raise and lower the pipe dredge using the towline threaded over the A-frame of the *Leviathan.* For the Study, the pipe dredge was positioned at its starting location by Leviathan personnel and then pulled along the sediment surface by the vessel for approximately 50-ft. The sediment collected in the pipe-dredge represents the top 6 to 18 inches of sediment at the proposed placement site. Sufficient volume was retained at the SF-09 reference site on the first attempt.

3.2.8 Separating Layers and Sample Preparation

Individual sediment samples were collected in several sampling containers, including (1) 5-gallon high-density polyethylene (HDPE) plastic bags for toxicity; (2) a food-grade plastic quart-size bag for physical analysis; and (3) 4-ounce and 8-ounce glass jars for analytical chemistry. All sediments were processed on the survey vessel and separated according to testing type and subsampled according to the testing matrix in Table 3-2b of the Project SAP.

Individual core samples collected from SV were split into material from the SWI to the OD depth of -12 feet MLLW, and the Z-layer sample (from -12 feet MLLW to -12.5 feet MLLW). These samples were archived and will only be analyzed if requested. The purpose of analyzing the Z-layer would be to determine the quality of the resultant sediment surface post dredging.

3.2.8.1 Equipment Decontamination

Once sediment was retrieved and processed for sampling, any remnant sediment on the sampling equipment was removed with site water and scrubbed with a clean brush and Alconox-water solution. The equipment was then rinsed again with site water prior to moving to the next sampling location. Additionally, all sampling tools, including the core barrel, pipe dredge, stainless-steel mixing vessels and scoops, core extraction trays, and other reusable items that contact the sample were similarly decontaminated prior to use at each collection location.

3.2.8.2 Field and Core Photo Data Documentation

Once on deck, each core was extracted from the vibracore barrel, laid on a tray, and then logged and photographed. The Field Manager maintained a complete record of field activities, including the following information:

- Date and time of collection
- Sample identifier (ID)

- Sampling location (latitude and longitude to within 3-meter accuracy)
- Water depth (±0.1 foot)
- Mudline elevation
- Tidal stage and currents
- Climatic conditions
- Sampling method and any problems encountered (e.g., debris)
- Sampler penetration
- Sample length
- Sampling depth below mudline
- Description of the material type obtained in the samples
- Description of any vertical stratification in each core
- Description of sediment subsampling methods
- Photograph of each core

3.2.8.3 Sample Archiving

WSP retained archived samples from each of the six individual core and Z-layer samples, the area composite sample, and the SF-09 reference sample. Archives are being kept in a freezer at the WSP San Diego office at −20°C for future testing if requested by the USCG or DMMO. Archived samples will be retained at WSP for up to one year following the date of sample collection.

3.2.8.4 Transport and Chain-of-Custody Procedures

Proper recordkeeping and chain-of-custody (COC) procedures were implemented to allow samples to be traced from collection to their final disposition. After collection of sediment, documentation was required to adequately identify and catalog information regarding sampling location and characteristics. Field log entries were completed when the observations were made.

Completion of all COC documentation was the responsibility of the WSP Field Manager. The COC forms were completed and signed before the end of each sampling day and before the samples were removed from the vessel or passed from the control of the Field Manager. All COC forms were again signed at each additional point of transfer of samples following departure from the field.

Sample container information was recorded on the COC form, including the sampling organization, point of contact, sample ID, collection date and time, type of sample, and Project name. The form served as a sample analysis request form. Samples were sent overnight via FedEx to the laboratories along with a COC form specifying the sample identification and the analyses to be conducted (by referencing a list of specific analyses or the statement of work for the laboratory). These forms were prepared in duplicate; the WSP Field Manager retained one copy, and the other copy always accompanied the samples. All sediment samples were packed and transported by WSP scientists as soon as possible following field collection in coolers with ice and maintained at a temperature of 4°C or cooler.

3.3 Tier II Physical and Chemical Testing

Physis Environmental Testing Laboratory (Physis) in Anaheim, California conducted all physical and analytical chemical analyses on sediment, MET samples, and site water, according to approved methods for the constituents listed in Table 3-3 that follow the ITM (USEPA/USACE 1998), the Cullinan Ranch dredged material reuse for wetland surface materials as outlined in the RWQCB Draft Staff Report *Beneficial Reuse of Dredged Material: Sediment Screening and Testing Guidelines* (RWQCB 2000), and the DMMO Public Notice 01-01 (USACE 2001). Evaluation of Tier II results included comparison of Study sediments to all appropriate benchmarks for unconfined aquatic disposal in Section 4.0.

Physical (grain size) analysis was performed on the composite area sample (SV-23-Composite), the duplicate sample (SV-23-DUP), and the SF-09 reference sediments. The analyses were performed at Physis using a laser technique (ASTM International [ASTM] D4464, 2015). Percent gravel, sand, silt, and clay were be reported to 0.1 percent, along with the corresponding millimeter and phi sizes, and a cumulative grain size distribution diagram was prepared. Chemical analyses were also performed for the composite area sample (SV-23-Composite), duplicate sample (SV-23-DUP), and the SF-09 reference sediments. Bulk sediment chemical analysis results were reported on a dry-weight basis.

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Table 3-3. Chemical Analyses of Sediment, Elutriate, and Site Water Samples for Unconfined Aquatic Disposal

Analyte	Analysis Method	Sediment Target Reporting Limit[a, b]	Analysis Method	Site Water and Elutriate Target Reporting Limit[a, b]
Grain Size	ASTM D1234; SM 2560 D, Plumb 1981	0.1 %	N/A	N/A
Total Solids	SM 2540 B[c]	0.1 %	N/A	N/A
TSS	N/A	N/A	SM 2540 D[d]	0.5 mg/L
TOC	9060A; 5310B[c]	0.1 %	EPA 200.8[c]	N/A
Arsenic	6010/6020[d]	2.0 mg/kg	EPA 200.8[c]	0.015 µg/L
Cadmium	6010/6020[d]	0.3 mg/kg	EPA 200.8[c]	0.005 µg/L
Chromium	6010/6020[d]	5.0 mg/kg	EPA 200.8[c]	0.025 µg/L
Copper	6010/6020[d]	5.0 mg/kg	EPA 200.8[c]	0.01 µg/L
Lead	6010/6020[d]	5.0 mg/kg	EPA 200.8[c]	0.005 µg/L
Mercury	245.7[d], 7471A[d]	0.02 mg/kg	EPA 245.7	0.02 µg/L
Nickel	6010/6020[d]	5.0 mg/kg	EPA 200.8[c]	0.005 µg/L
Selenium	6010/6020[d]	0.1 mg/kg	EPA 200.8[c]	0.015 mg/L
Silver	6010/6020[d]	0.2 mg/kg	EPA 200.8[c]	0.02 µg/L
Zinc	6010/6020[d]	1.0 mg/kg	EPA 200.8[c]	0.005 µg/L
PAHs	8270E/8270C SIM [d, e]	20 µg/kg	N/A	N/A
Pesticides [f]	8270E/8270C SIM/8081A/8270E-NCl[d]	2.0 µg/kg [i]	N/A	N/A
PCB Aroclors [g,j]	8270E/8270C SIM/8082 [d]	20 µg/kg	N/A	N/A
Organotins	Krone, et al [h]	10 µg/kg	N/A	N/A
Dioxins and Furans	USEPA 1613	1.0 – 10.0 pg/g	N/A	N/A

Notes:

µg/kg = microgram(s) per kilogram (parts per billion); µg/L = micrograms per liter ASTM = ASTM International; GC = gas chromatography; mg/kg = milligram(s) per kilogram (parts per million); mg/L = milligram(s) per liter; N/A = not applicable; NCl = nitrogen chloride; NH_3 = ammonia; NOAA = National Oceanic and Atmospheric Administration; pg/g = picograms per gram (parts per trillion [pptr]); PAH = polycyclic aromatic hydrocarbons; PCB = polychlorinated biphenyl; SIM = Selective Ion Monitoring; SM = Standard Method; TOC = total organic carbon; TSS = total suspended solids; USEPA = United States Environmental Protection Agency

a. Sediment minimum detection limits are on a dry-weight basis.
b. Reporting limits are provided by Physis Laboratories, Inc.
c. American Public Health Association et al. 1995. *Standard Methods for the Examination of Water and Wastewater*, 19th Edition.
d. USEPA, 1986–1996 SW-846. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition.
e. Includes low molecular weight PAHs: naphthalene, acenapthylene, acenapthene, anthracene, fluorene, phenanthrene, 1-methylnaphthalene, 1-methylphenanthrene, 2,3,5-trimethylnaphthalene, 2-methylnaphthalene, biphenyl, naphthalene and high molecular weight PAHs: fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d) pyrene, dibenz(a,h)anthracene, 2,6-dimethylnaphthalene, dibenzothiophene, benzo(g,h,i)perylene, perylene, and pyrene. Total PAHs will also be calculated.
f. Includes aldrin, α- benzene hexachloride (BHC), β-BHC, Δ=BHC, ¥-BHC (lindane), chlordane, dieldrin, trans-nonachlor, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, alpha chlordane, gamma chlordane, cis-nonachlor, oxychlordane, 2,4- and 4,4-dichlorodiphenyldichloroethane (DDD), 2,4- and 4,4-dichlorodiphenyldichloroethylene (DDE), and 2,4- 4,4-dichlorodiphenyltrichloroethane (DDT), and total DDTs.
g. Polychlorinated biphenyls (PCB) Aroclors: Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, and total Aroclors.
h. Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi, 1989. A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Liver from Puget Sound. *Marine Environmental Research* 27: 1–18. Includes monobutyltin, dibutyltin, tributyltin, tetrabutyltin, and total butyltins.
i. Except toxaphene and chlordane, which are 20 and 1,000 micrograms per kilogram (parts per billion), respectively.
j. If bioaccumulation is necessary because of elevated levels of PCBs, the agencies expect to require PCB congener analysis rather than Aroclor analysis. PCB congeners reported will likely be: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132/153, 138/158, 149, 151, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

3.3.1 Tier II Data Quality Assurance/Quality Control

The chemical and physical testing methods met the objectives of the testing protocols to ensure that any adverse impacts on the water column were identified. Analytical QA/QC for bulk sediment chemistry results was evaluated according to *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations (Chemical Evaluations)* USEPA 832-B-95-001 (USEPA, 1995). QA/QC was maintained during the analytical portion of this Study by using duplicate sample analyses,[4] reagent blanks, and spiked samples, as specified in the USEPA methods for individual chemicals.

Replicate analyses for each type of determination was performed on each type of sample matrix. Precision was expressed as the difference in results of replicate analyses ("analysis" includes all steps of preparation and determination) divided by the average of those values and expressed as a percentage. Thus, a relative percent difference of 0 percent means that replicate results were identical. Instrument calibration and verification were performed using USEPA or National Bureau of Standards traceable reference materials. All QA/QC information can be found in Section 4.4 of this report and in the analytical reports included as Appendix D.

3.4 Tier III Toxicity Tests

EcoAnalysts conducted all toxicity testing for proposed dredge sediments following USEPA- and USACE-approved methods as outlined in the Project SAP. Sediment toxicity exposures were initiated prior to the ITM maximum holding time of eight weeks (USEPA/USACE 1998).

The toxicity analyses included the following:

1. 48-hour SPP toxicity test on bivalve larvae (*Mytilus galloprovincialis*),
2. 96-hour static water column SPP toxicity tests with mysid shrimp (*Americamysis bahia*), and
3. 10-day SP toxicity tests using one species of amphipod (*Leptocheirus plumulosus*) and a marine worm (*Neanthes arenaceodentata*, Table 3-4a).[5]

Toxicity evaluations were conducted for SPP tests using an aqueous elutriate prepared from the composite area sample (SV-23-Composite) and Project-area site water. The SP test was conducted for the SV-23-Composite and the SF-09 reference site sediment. All tests included one or more negative control samples for determining test acceptability criteria as defined by the individual test methods. The SP organisms used for this Study met the criteria in *Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual* (Green Book; USEPA 1991) requirement that at least two of the benthic species tested be from filter-feeding, deposit-feeding, or burrowing species. *L. plumulosus* is a burrowing filter feeder; *N. arenaceodentata* is a burrowing deposit feeder.

The amphipod *L. plumulosus* was chosen for SP exposures because it is more tolerant to low-salinity environments. Seawater salinity was 20 and 19 parts per thousand (ppt) for the SV-23-SW-1 and SV-23-SW-2 samples, respectively. Because this salinity was below the acceptable

[4] Duplicates are generally produced/reported only when an MS/MSD is not done as standard procedure (usually for inorganic analyses only).
[5] If performed, bioaccumulation exposures will be performed for 28-days using an ITM and DMMO approved bivalve species available at the time of testing (preferably *Macoma nausata)* and marine worms.

range for the water column test organisms, adjustments to salinity were made for the SPP tests by adding artificial salts to the elutriate to bring it within the recommended range of the test organisms (25-30 ppt). Clean seawater (zero percent elutriate) and a "salt control" using a similar amount of artificial salts were used as controls in the SPP tests. The USEPA-approved test species for the sediment characterization Study are listed in Table 3-4.

Table 3-4. Toxicity Test Species

Test Organism	Taxon	Method	End Points
Suspended Particulate Phase (SPP)			
Bivalve Larvae	*Mytilus galloprovincialis*	ASTM, 1998 E 724 98	48-hour survival and normal development
Mysid Shrimp	*Americamysis bahia*	USACE/USEPA 1998	4-day survival
Solid Phase (SP)			
Polychaetes	*Neanthes arenaceodentata*	ASTM, 2007 E 1611-00	10-day survival
Amphipods[1]	*Leptocheirus plumulosus*	ASTM, 2008 E 1367-03; USEPA 1994	10-day survival

Notes:
ASTM = ASTM International; SP = solid phase; SPP = suspended particulate phase; USACE = United States Army Corps of Engineers; USEPA = United States Environmental Protection Agency
1. *Leptocheirus plumulosus* was used for SP toxicity tests because of low salinity measured in site water samples.

3.4.1 Ammonia Reduction

Bulk porewater ammonia was measured by EcoAnalysts in SP test samples before performing exposure testing. Bulk ammonia concentration was between 9.57 and 28.5 milligrams per liter (mg/L) total ammonia in the SF-09 reference and SV-23-Composite, respectively. These measurements were below the amphipod ammonia trigger level of 60 mg/L (USEPA 1994), but above the recommended 15 mg/L threshold set by USACE/USEPA (2001). Because an initial reduction of ammonia in porewater was assumed by application of overlying seawater for SP test initiation, porewater reduction was not performed.

Ammonia was also considered to be at a level of concern (> 20 percent) of that measured in bulk porewater for SPP tests using the standard elutriate test (SET) method for placement at SF-09. While ammonia-related effects were considered not likely to occur in mysid SPP exposures, there was a concern for larval exposures. Because of this, an ammonia-reduced 100 percent treatment was employed in the larval test to confirm potential toxicity. This treatment was made with sediment that had been purged with seawater to reduce ammonia levels but was otherwise the same as the non-reduced 100 percent treatment.

3.4.2 Toxicity Data Analysis

In Section 4.0, bioassay results for Project sediments are evaluated to determine potential adverse impact of dredging and disposal activities on the water column (SPP exposures) and sediment column (SP exposures). Statistical analyses used to evaluate all bioassays followed the guidelines in the ITM. In cases where the average survival in the test treatments equals or exceeds that of the reference for SP tests or control for SPP tests, no statistical analyses were necessary. If SP organism survival in test sediments was lower than the reference sediment survival, a student's t-test was used to determine whether the difference in survival was statistically significant (p less than or equal [≤] 0.05). Dunnett's multiple comparison test was used for SPP data to assess significant reductions in survival or normality (bivalve larvae) in elutriate test concentrations, compared with control survival or normality. Results were analyzed using the

Comprehensive Environmental Toxicity Information System (CETIS) program (Tidepool Scientific Software, 2000–2016).

3.5 Modified Elutriate Test

To evaluate the effect of dredging and placement within the Cullinan Ranch restoration site, the composite samples underwent a modified elutriate test (MET), which is used to predict the release of contaminants into the water column of effluent resulting from placement within a confined disposal facility (RWQCB 2010)[6]. For the MET, test solutions were prepared with site water (SV-23-SW-1 and SV-23-SW-2) mixed with the composited sediment, and analyzed for each of the following chemical and biological analyses:

1. 96-hour acute static survival water column toxicity testing with the mysid *Americamysis bahia*; and
2. Metals analysis (total [mercury and selenium] and dissolved [arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc]).

The MET and SPP toxicity tests for placement at Cullinan Ranch and SF-09, respectively, were performed immediately following sample collection to ensure site water holding times were met. Poor survival in the 50 and 100 percent elutriate concentrations for the SET SPP exposure test for SF-09 reference sediment led the lab to conduct ammonia reduction procedures for the 100 percent elutriate as described in Section 3.4.1[7]. This technique is further described in the toxicity report included as Appendix E.

3.6 Deviations from the Final Study Sampling and Analysis Plan

There were several deviations to the Project SAP during the Study. These deviations primarily comprised the following:

- Per USEPA recommendation, a third disposal option, Montezuma Wetlands, was evaluated for this SAP Report that was not included in the SAP (WSP 2023).

- Several of the proposed sampling locations were adjusted slightly in the field because 75 percent recovery was not met on the first attempts. With the exception of SV-23-C5, which was moved approximately 6-meters away due to difficulty anchoring in the soft sediment and shallow mudline elevations, the samples collected in 2023 were within 3-meters or less of the proposed sampling locations. All six samples were considered representative of the material proposed to be dredged; therefore, these minor deviations are not considered significant.

- A second site water sample was collected within the Project footprint on 21 December 2023 to support elutriate preparation and chemical analyses due to insufficient volume collected with the first site water sample on 13 December 2023. Both site water samples

[6] On 20 March 2024, at the DMMO meeting where this SAP Report was presented, USACE clarified that toxicity testing and therefore elutriate testing was not necessary for evaluating placement of the proposed dredged materials at Cullinan Ranch as this location does not discharge.
[7] While toxicity was observed in the elutriate tests, the agencies of the DMMO meeting on 20 March 2024 concurred that toxicity testing using a MET was not required for sediments proposed to be placed at Cullinan Ranch.

were included in elutriate prep and analyzed individually for proposed chemical parameters.

- *Leptocheirus plumulosus* was used for SP exposure tests because of its tolerance for low salinity environments.
- A full dilution series was tested for the MET test with *Americamysis bahia* instead of just the 100 percent elutriate per recommendation by USEPA.

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4.0 RESULTS

The following sections present the results of the physical and chemical analyses as well as the toxicity tests conducted in accordance with the SAP (WSP 2023). Table 4-1 summarizes the results of the physical analyses (grain size) for the composite samples. Table 4-2a and b summarize results of the chemical analyses for the composite samples and includes various screening criteria taken into consideration for suitability for unconfined aquatic disposal (SUAD) determination. Seawater and elutriate chemical results are included in Table 4-3. The results of the suspended particulate-phase (SPP) and solid-phase (SP) toxicity tests, including the Standard Elutriate Test (SET) and Modified Elutriate Test (MET) tests, are shown in Table 4-4a, 4-4b, 4-4c, 4-4d (SPP) and 4-6a, 4-6b, and 4-6c (SP).

Tests performed for this Study were evaluated to determine the potential of chemical contaminants in the sediment to cause adverse effects during dredging or disposal. Analytical laboratory results for physical and chemical analyses are included in the Physis reports in Appendix D, and toxicity test results are provided in the report prepared by EcoAnalysts in Appendix E.

4.1 Physical Analysis

Physical characteristics of the sediments are summarized in Table 4-1 and Appendix D. Overall, the composite samples comprised mostly fines, predominantly silt (SV-23-Composite = 67.4 percent silt; SV-23-DUP = 69.4 percent silt; SF-09 Reference = 65.4 percent silt) and clay (SV-23-Composite = 23.6 percent clay; SV-23-DUP = 20.9 percent clay; SF-09 Reference = 21.5 percent clay) (Table 4-1). Gravel was not present in any of the composite samples, and sand comprised a lower percent overall of each of the composite samples (SV-23-Composite = 8.99 percent sand; SV-23-DUP = 9.71 percent sand; SF-09 Reference = 13.1 percent sand). The high (approximately 90 percent) fines content of the composite sediments (the sum of the silt and clay fractions) made the chemical constituents of the sediments appropriately comparable to guideline values put forth in the San Francisco Bay ambient dataset (San Francisco Estuary Institute [SFEI] 2016), which assumes sample sediments are less than 100 percent fines.

Table 4-1. Physical Testing Results – Grain Size

Sample	%Solids	Silt (%)	Clay (%)	Sand (%)	Gravel (%)	Mean (mm)	Mean (phi)
SF-09 Reference	45.6	65.4	21.5	13.1	0.0	0.009	6.78
SV-23-Composite	41.8	67.4	23.6	8.99	0.0	0.008	6.97
SV-23-DUP	41.6	69.4	20.9	9.71	0.0	0.009	6.84

Notes: % = Percent; mm = millimeters

4.2 Chemical Analysis

The results of the chemical analyses of the bulk sediment are presented in Table 4-2a and 4-2b for the SV-23-Composite and SF-09 reference sample. Where applicable, the results are compared to the following guideline values:

- Effects range-low (ERL) and effects range-median (ERM) screening values (Long et al. 1995),

- Tributyltin screening values (USEPA 1996) developed for bulk sediment,
- SF Bay ambient guideline values for sediments with less than 100 percent fines (SFEI 2016),
- Montezuma Wetlands Restoration Project disposal site criteria values for dredge material use as cover[8] or fill (RWQCB 2012),
- Cullinan Ranch disposal site criteria values for dredged material use as cover (RWQCB 2010), and
- The most recent bioaccumulation trigger levels developed from the Regional Monitoring Program (SFEI 2018).
- Elutriate and site water chemistry results were also compared to available environmental screening levels (RWQCB 2016) and California Toxics Rule (CTR) criteria listed in 40 CFR §131.38.

4.2.1 Sediment Chemistry Results

Sediment chemistry results are included in Table 4-2a and 4-2b (dioxins and furans, only). Bulk sediment chemistry was evaluated for the SV-23-Composite, SV-23-DUP, and SF-09 reference samples. SV samples were collected to the design depth of -10.0-ft MLLW plus a 2.0-ft OD allowance and an overpenetration depth of 1.0-ft to obtain an adequate 0.5-ft Z-layer sample (to -12.5-ft MLLW).

Total solids concentrations for SV-23-Composite, SV-23-DUP, and SF-09 reference samples were 41.8 percent, 41.6 percent, and 45.6 percent, respectively. Total organic carbon (TOC) concentrations were 1.65 percent,1.63 percent, and 1.38 percent.

Concentrations of polycyclic aromatic hydrocarbons (PAHs) were not detected above levels of concern in any of the sediments tested. Total PAHs for SV-23-Composite, SV-23-DUP, and SF-09 reference site samples were 437.7 micrograms per kilogram (µg/kg), 472.9 µg/kg, and 422.5 µg/kg, respectively. None of the individual or total PAHs for the samples were detected above the screening guidelines included in Table 4-2a.

Chlorinated pesticides, polychlorinated biphenyl congeners (PCBs), and organotins (dibutyltin, monobutyltin, tetrabutyltin, and tributyltin) were non-detect in all sediments.

Several polychlorinated dioxins and furans were detected in each of the sediment samples (Table 4-2b). The dioxin and furan congeners present in the sediment were evaluated based on the detected concentrations of 2,3,7,8-tetrachlorodiobenzo-p-dioxin (TCDD) and by calculating 2,3,7,8-TCDD toxic equivalents (TEQs) using the World Health Organization 2005 toxicity equivalency factors (Van den Berg et al. 2006) for the other 2,3,7,8 congeners. The TCDD TEQs for the SV-23-Composite, SV-23-DUP, and SF-09 reference samples were as follows: 1.19 picograms per gram (pg/g), 1.25 pg/g, and 1.50 pg/g, respectively. The TCDD TEQ for the SF-09 reference sediments exceeded the TCDD TEQs of the test sediments, but all samples were below the SF Bay ambient level (2.90 pg/g).Metals were detected in all sample sediments analyzed (Table 4-2a). The results of the concentrations of the individual metals in each sample are listed

[8] Montezuma Wetlands, LLC Criteria for Dredged Material Disposal as Cover are identical to those for disposal at Cullinan Ranch.

below in the following order, unless otherwise specified: SV-23-Composite, SV-23-DUP, SF-09 reference.

- Total arsenic concentrations in the samples were 17.1 mg/kg, 17.4 mg/kg, and 14.7 mg/kg. All the sediments exceeded the ERL (8.20 mg/kg) for arsenic but did not exceed the ERM (70.0 mg/kg). All samples also exceeded the SF Bay ambient level (13.9 mg/kg), and SV-23-Composite and SV-23-DUP samples exceeded Cullinan Ranch disposal site criterion (15.3 mg/kg). However, concentrations of total arsenic in all samples did not exceed the Montezuma disposal site criterion for dredged material used as fill (70.0 mg/kg).
- Total cadmium concentrations in the samples were 0.308 mg/kg, 0.184 mg/kg, and 0.285 mg/kg. While the SV-23-Composite exceeded the SF-09 reference concentration, all sediments were below all screening criteria/guideline values.
- Hexavalent chromium[9] concentrations were 116 mg/kg, 104 mg/kg, and 95.9 mg/kg. Although not a direct comparison due to analyte differences, all samples exceeded the total chromium ERL (81.0 mg/kg) but remined below the ERM (370 mg/kg). SV-23-Composite exceeded both the SF Bay ambient level (112 mg/kg) and Cullinan Ranch disposal site criterion (also 112 mg/kg) but was below the Montezuma disposal site criterion for dredged material use as fill (370 mg/kg). Additionally, concentrations of total chromium in the SV-23-DUP sample did not exceed the SF Bay ambient level, Cullinan Ranch disposal site criterion, or Montezuma disposal site criterion.
- Total copper concentrations were 61.4 mg/kg, 58.0 mg/kg, and 59.4 mg/kg. All sediments exceeded both the ERL (34.0 mg/kg) and the SF Bay ambient level for copper (53.9 mg/kg). However, none of the samples exceeded the ERM (270 mg/kg), nor did they exceed the Cullinan Ranch disposal criterion (68.1 mg/kg) or Montezuma disposal site criterion for copper (270 mg/kg).
- Total lead concentrations were 23.9 mg/kg, 23.0 mg/kg, and 22.6 mg/kg. All samples were below all screening criteria/guideline values.
- Total mercury concentrations were 0.276 mg/kg, 0.264 mg/kg, and 0.223 mg/kg. All samples exceeded the ERL for total mercury (0.15 mg/kg). However, concentrations of mercury were below all other screening criteria/guidelines values, including the trigger level for bioaccumulation testing (0.330 mg/kg).
- Total nickel concentrations were 102 mg/kg, 97.0 mg/kg, and 96.9 mg/kg. All samples exceeded both the ERL (20.9 mg/kg) and ERM (51.6 mg/kg), and SV-23-Composite also exceeded the SF Bay ambient level (98.3 mg/kg). SV-23-DUP did not exceed the SF Bay ambient level. All samples were below all other screening criteria/guideline values.
- Total selenium concentrations were 0.523 mg/kg, 0.431 mg/kg, and 0.411 mg/kg. All samples exceeded the SF Bay ambient level (0.359 mg/kg) but were below all other screening criteria/guideline values.
- Total silver concentrations were 0.905 mg/kg, 0.677 mg/kg, and 0.616 mg/kg. All samples exceeded both the SF Bay ambient level (0.315 mg/kg) and the Cullinan Ranch disposal criterion (0.580 mg/kg). Concentrations in all samples were below the ERL (1.0 mg/kg),

[9] Hexavalent chromium.

ERM (3.70 mg/kg), and Montezuma disposal site criterion for dredged material use as fill (3.70 mg/kg).

- Total zinc concentrations were 128 mg/kg, 122 mg/kg, and 122 mg/kg. All composite sediments were below all screening criteria/guideline values.

4.2.2 Site Water and Elutriate Chemistry Results

Site water and elutriate chemistry results are included in Table 4-3. Site water collected during the vibracore sampling field activities and an elutriate water sample created during the MET test were analyzed for total and dissolved metals, per the SAP (WSP 2023). The two site water samples and elutriate samples are SV-23-SW-1, SV-23-SW-2, and SV-23-Elutriate, respectively. Concentrations of total or dissolved metals were not detected above levels of concern in either water sample. The results were compared to Criterion Continuous Concentration (CCC) and Criterion Maximum Concentration (CMC) screening levels for both freshwater and saltwater, and concentrations of total and dissolved metals in all samples were below these guideline values (CFR Title 40 § 131.38). Results for both samples were also below Montezuma disposal site screening criteria (Table 4-3).

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Table 4-2a. Station Vallejo Composite Sediment Chemistry Results (Dry Weight)

Methods	Compound Name	Type	Units	ERL	ERM	San Francisco Bay Ambient Levels[a]	Cullinan Ranch Disposal Site Criteria[d]	Montezuma Disposal Site Criteria for Dredged Material Use as Fill[i]	Trigger Levels for Bioaccumulation Testing[e]	SF-09 Reference	SV-23-Composite	SV-23-DUP	Times Above Reference
SM 2540 B	Percent Solids	General Chemistry	%	.	.	.	.	.	.	45.6	41.8	41.6	0.92
SM 2560 D	Gravel 2.0 < 4.0 mm	Grain size	%	.	.	.	.	.	.	0.00	0.00	0.00	NA
SM 2560 D	Sand 0.0625 to < 2.0 mm	Grain size	%	.	.	.	.	.	.	13.1	8.99	9.71	0.69
SM 2560 D	Silt 0.0039 to < 0.0625 mm	Grain size	%	.	.	.	.	.	.	65.4	67.4	69.4	1.03
SM 2560 D	Clay < 0.0039 mm	Grain size	%	.	.	.	.	.	.	21.5	23.6	20.9	1.10
EPA 9060A	Total Organic Carbon	General Chemistry	%	.	.	.	.	.	.	1.38	1.65	1.63	1.20
Metals													
EPA 6020	Arsenic	Metals	mg/kg	8.2	70	*13.9*	*15.3**	*70.0***	.	*14.7*	*17.1**	*17.4**	1.16
EPA 6020	Cadmium	Metals	mg/kg	1.2	9.6	*0.329*	*0.330**	*9.60***	.	0.285	0.308	0.184	1.08
EPA 6020	Chromium	Metals	mg/kg	81	370	*112*[b]	*112**	*370***	.	95.9	*116**	104	1.21
EPA 6020	Copper	Metals	mg/kg	34	270	*53.9*	*68.1**	*270***	.	*59.4*	*61.4*	*58.0*	1.03
EPA 6020	Lead	Metals	mg/kg	46.7	218	*25.1*	*43.2**	*218***	.	22.6	23.9	23.0	1.06
EPA 245.7	Mercury	Metals	mg/kg	0.15	0.71	*0.332*[c]	*0.430**	*1.30***	*0.330*	0.223	0.276	0.264	1.24
EPA 6020	Nickel	Metals	mg/kg	20.9	51.6	*98.3*	*112**	*200***	.	96.9	*102*	97.0	1.05
EPA 6020	Selenium	Metals	mg/kg	.	.	*0.359*	*0.640**	*1.40***	.	*0.411*	*0.523*	*0.431*	1.27
EPA 6020	Silver	Metals	mg/kg	1.0	3.7	*0.315*	*0.580**	*3.70***	.	*0.616**	*0.905**	*0.677**	1.47
EPA 6020	Zinc	Metals	mg/kg	150	410	*136*	*158**	*410***	.	122	128	122	1.05
Polycyclic Aromatic Hydrocarbons[c]													
EPA 8270 E	1-Methylnaphthalene	LMW PAH	µg/kg	.	.	*13.8*	.	.	.	ND<0.084	ND<0.084	ND<0.084	NA
EPA 8270 E	1-Methylphenanthrene	LMW PAH	µg/kg	.	.	*37.8*	.	.	.	ND<0.076	ND<0.076	ND<0.076	NA
EPA 8270 E	2,3,5-Trimethylnaphthalene	LMW PAH	µg/kg	.	.	*7.31*	.	.	.	ND<0.059	ND<0.059	ND<0.059	NA
EPA 8270 E	2-Methylnaphthalene	LMW PAH	µg/kg	70.0	670	*20.8*	.	.	.	0.750	ND<0.106	4.36	NA
EPA 8270 E	2,6-Dimethylnaphthalene	LMW PAH	µg/kg	.	.	*12.9*	.	.	.	ND<0.065	0.893	ND<0.065	NA
EPA 8270 E	Acenaphthene	LMW PAH	µg/kg	16.0	500	*13.6*	.	.	.	8.66	8.07	ND<0.078	0.93
EPA 8270 E	Acenaphthylene	LMW PAH	µg/kg	44.0	640	*34.0*	.	.	.	ND<0.058	0.504	4.36	NA
EPA 8270 E	Anthracene	LMW PAH	µg/kg	85.3	1100	*80.5*	.	.	.	4.80	5.86	6.27	1.22
EPA 8270 E	Benzo (a) Anthracene	HMW PAH	µg/kg	261	1600	*212*	.	.	.	25.0	18.1	23.3	0.72
EPA 8270 E	Benzo (a) Pyrene	HMW PAH	µg/kg	430	1600	*395*	.	.	.	52.0	43.4	34.9	0.83
EPA 8270 E	Benzo (b) Fluoranthene	HMW PAH	µg/kg	.	.	*225*	.	.	.	34.6	29.4	33.9	0.85
EPA 8270 E	Benzo (e) Pyrene	HMW PAH	µg/kg	.	.	*244*	.	.	.	37.3	40.3	25.9	1.08
EPA 8270 E	Benzo (g,h,i) Perylene	HMW PAH	µg/kg	.	.	*408*	.	.	.	17.4	39.3	70.1	2.26
EPA 8270 E	Benzo (k) Fluoranthene	HMW PAH	µg/kg	.	.	*229*	.	.	.	30.0	22.5	33.9	0.75
EPA 8270 E	Biphenyl	LMW PAH	µg/kg	63.4	260	*11.8*	.	.	.	2.23	2.36	ND<0.092	1.06
EPA 8270 E	Chrysene	HMW PAH	µg/kg	384	2800	*243*	.	.	.	39.8	38.2	37.2	0.96
EPA 8270 E	Dibenz (a,h) Anthracene	HMW PAH	µg/kg	63.4	260	*47.8*	.	.	.	ND<0.106	ND<0.106	ND<0.106	NA
EPA 8270 E	Dibenzthiophene	LMW PAH	µg/kg	.	.	*16.3*	.	.	.	ND<0.200	ND<0.200	ND<0.200	NA

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Table 4-2a. Station Vallejo Composite Sediment Chemistry Results (Dry Weight) (Continued)

Methods	Compound Name	Type	Units	ERL	ERM	San Francisco Bay Ambient Levels[a]	Cullinan Ranch Disposal Site Criteria[d]	Montezuma Disposal Site Criteria for Dredged Material Use as Fill[i]	Trigger Levels for Bioaccumulation Testing[e]	SF-09 Reference	SV-23-Composite	SV-23-DUP	Times Above Reference
EPA 8270 E	Fluoranthene	HMW PAH	µg/kg	600	5100	*562*	.	.	.	71.1	57.2	64.0	0.80
EPA 8270 E	Fluorene	LMW PAH	µg/kg	19.0	540	*27.2*	.	.	.	1.99	1.54	7.30	0.77
EPA 8270 E	Indeno (1,2,3-c,d) Pyrene	HMW PAH	µg/kg	.	.	*336*	.	.	.	12.6	42.5	37.6	3.37
EPA 8270 E	Naphthalene	LMW PAH	µg/kg	160	2100	*56.2*	.	.	.	7.90	5.00	11.4	0.63
EPA 8270 E	Perylene	HMW PAH	µg/kg	.	.	*213*	.	.	.	59.5	50.9	30.0	0.86
EPA 8270 E	Phenanthrene	LMW PAH	µg/kg	240	1500	*173*	.	.	.	22.3	27.0	31.7	1.21
EPA 8270 E	Pyrene	HMW PAH	µg/kg	665	2600	*783*	.	.	.	94.3	99.1	77.0	1.05
	Total Detectable PAHs	PAH	µg/kg	4022	44792	*4520*	*3390**	*44792***	*4500*	422.5	437.7	472.9	1.04
Chlorinated Pesticides													
EPA 8270 E	2,4'-DDD	Chlorinated Pesticides	µg/kg	.	.	*0.510*	.	.	.	ND<0.267	ND<0.267	ND<0.267	NA
EPA 8270 E	2,4'-DDE[f]	Chlorinated Pesticides	µg/kg	.	.	*0.110*	.	.	.	ND<0.200	ND<0.200	ND<0.200	NA
EPA 8270 E	2,4'-DDT[f]	Chlorinated Pesticides	µg/kg	.	.	*0.040*	.	.	.	ND<0.194	ND<0.194	ND<0.194	NA
EPA 8270 E	4,4'-DDD	Chlorinated Pesticides	µg/kg	2.0	20	*1.98*	.	.	.	ND<0.198	ND<0.198	ND<0.198	NA
EPA 8270 E	4,4'-DDE	Chlorinated Pesticides	µg/kg	2.2	27	*1.98*	.	.	.	ND<0.193	ND<0.193	ND<0.193	NA
EPA 8270 E	4,4'-DDT	Chlorinated Pesticides	µg/kg	1.0	7.0	*0.270*	.	.	.	ND<0.128	ND<0.128	ND<0.128	NA
	Total Detectable DDTs[g]	Chlorinated Pesticides	µg/kg	1.58	46.1	*4.68*	*7.00**	*100***	*50.0*	0.00	0.00	0.00	NA
EPA 8270 E	Aldrin[f]	Chlorinated Pesticides	µg/kg	.	.	*0.03*	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	BHC-Alpha	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	BHC-Beta	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	BHC-Delta	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	BHC-Gamma	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Dieldrin[h]	Chlorinated Pesticides	µg/kg	0.02	8.0	*0.160*	*0.720**	*4.30***	*1.90*	ND<0.100	ND<0.100	ND<0.100	NA
EPA 8270 E	Endosulfan-I	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Endosulfan-II	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Endosulfan Sulfate	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Endrin[f]	Chlorinated Pesticides	µg/kg	.	.	*0.010*	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Endrin Aldehyde	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Heptachlor	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E	Heptachlor Epoxide	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
EPA 8270 E-NCI	Toxaphene	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<10.0	ND<10.0	ND<10.0	NA
EPA 8270 E	Alpha Chlordane	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.187	ND<0.187	ND<0.187	NA
EPA 8270 E	Gamma Chlordane	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.179	ND<0.179	ND<0.179	NA
EPA 8270 E	Cis-nonachlor	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.192	ND<0.192	ND<0.192	NA
EPA 8270 E	Trans-nonachlor	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.186	ND<0.186	ND<0.186	NA

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Table 4-2a. Station Vallejo Composite Sediment Chemistry Results (Dry Weight) (Continued)

Methods	Compound Name	Type	Units	ERL	ERM	San Francisco Bay Ambient Levels[a]	Cullinan Ranch Disposal Site Criteria[d]	Montezuma Disposal Site Criteria for Dredged Material Use as Fill[i]	Trigger Levels for Bioaccumulation Testing[e]	SF-09 Reference	SV-23-Composite	SV-23-DUP	Times Above Reference
EPA 8270 E	Oxychlordane	Chlorinated Pesticides	µg/kg	.	.	.	.	.	.	ND<0.250	ND<0.250	ND<0.250	NA
	Total Chlordanes (calculated)[g]	Chlorinated Pesticides	µg/kg	0.5	6.0	*0.340*	*2.30**	*4.80***	*37.0*	0.0	0.0	0.0	NA
Polychlorinated Biphenyl Congeners[c]													
EPA 8270 E	PCB018	PCB Congeners	µg/kg	.	.	*0.070*	.	.	.	ND<0.029	ND<0.029	ND<0.029	NA
EPA 8270 E	PCB028	PCB Congeners	µg/kg	.	.	*0.280*	.	.	.	ND<0.023	ND<0.023	ND<0.023	NA
EPA 8270 E	PCB037	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.060	ND<0.060	ND<0.060	NA
EPA 8270 E	PCB044	PCB Congeners	µg/kg	.	.	*0.330*	.	.	.	ND<0.028	ND<0.028	ND<0.028	NA
EPA 8270 E	PCB049	PCB Congeners	µg/kg	.	.	*0.250*	.	.	.	ND<0.036	ND<0.036	ND<0.036	NA
EPA 8270 E	PCB052	PCB Congeners	µg/kg	.	.	*0.390*	.	.	.	ND<0.012	ND<0.012	ND<0.012	NA
EPA 8270 E	PCB066	PCB Congeners	µg/kg	.	.	*0.470*	.	.	.	ND<0.027	ND<0.027	ND<0.027	NA
EPA 8270 E	PCB070	PCB Congeners	µg/kg	.	.	*0.580*	.	.	.	ND<0.023	ND<0.023	ND<0.023	NA
EPA 8270 E	PCB074	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.021	ND<0.021	ND<0.021	NA
EPA 8270 E	PCB077	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.018	ND<0.018	ND<0.018	NA
EPA 8270 E	PCB081	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.084	ND<0.084	ND<0.084	NA
EPA 8270 E	PCB087	PCB Congeners	µg/kg	.	.	*0.460*	.	.	.	ND<0.081	ND<0.081	ND<0.081	NA
EPA 8270 E	PCB099	PCB Congeners	µg/kg	.	.	*0.650*	.	.	.	ND<0.028	ND<0.028	ND<0.028	NA
EPA 8270 E	PCB101	PCB Congeners	µg/kg	.	.	*1.11*	.	.	.	ND<0.027	ND<0.027	ND<0.027	NA
EPA 8270 E	PCB105	PCB Congeners	µg/kg	.	.	*0.360*	.	.	.	ND<0.047	ND<0.047	ND<0.047	NA
EPA 8270 E	PCB110	PCB Congeners	µg/kg	.	.	*1.04*	.	.	.	ND<0.074	ND<0.074	ND<0.074	NA
EPA 8270 E	PCB114	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.072	ND<0.072	ND<0.072	NA
EPA 8270 E	PCB118	PCB Congeners	µg/kg	.	.	*0.98*	.	.	.	ND<0.069	ND<0.069	ND<0.069	NA
EPA 8270 E	PCB119	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.071	ND<0.071	ND<0.071	NA
EPA 8270 E	PCB123	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.018	ND<0.018	ND<0.018	NA
EPA 8270 E	PCB126	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.086	ND<0.086	ND<0.086	NA
EPA 8270 E	PCB128	PCB Congeners	µg/kg	.	.	*0.280*	.	.	.	ND<0.081	ND<0.081	ND<0.081	NA
EPA 8270 E	PCB132/168	PCB Congeners	µg/kg	.	.	*0.370*	.	.	.	ND<0.094	ND<0.094	ND<0.094	NA
EPA 8270 E	PCB138	PCB Congeners	µg/kg	.	.	*1.84*	.	.	.	ND<0.057	ND<0.057	ND<0.057	NA
EPA 8270 E	PCB149	PCB Congeners	µg/kg	.	.	*1.26*	.	.	.	ND<0.092	ND<0.092	ND<0.092	NA
EPA 8270 E	PCB151	PCB Congeners	µg/kg	.	.	*0.560*	.	.	.	ND<0.073	ND<0.073	ND<0.073	NA
EPA 8270 E	PCB153	PCB Congeners	µg/kg	.	.	*1.82*[c]	.	.	.	ND<0.065	ND<0.065	ND<0.065	NA
EPA 8270 E	PCB156	PCB Congeners	µg/kg	.	.	*0.160*	.	.	.	ND<0.089	ND<0.089	ND<0.089	NA
EPA 8270 E	PCB157	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.103	ND<0.103	ND<0.103	NA
EPA 8270 E	PCB158	PCB Congeners	µg/kg	.	.	*0.150*[c]	.	.	.	ND<0.074	ND<0.074	ND<0.074	NA
EPA 8270 E	PCB167	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.049	ND<0.049	ND<0.049	NA

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Table 4-2a. Station Vallejo Composite Sediment Chemistry Results (Dry Weight) (Continued)

Methods	Compound Name	Type	Units	ERL	ERM	San Francisco Bay Ambient Levels[a]	Cullinan Ranch Disposal Site Criteria[d]	Montezuma Disposal Site Criteria for Dredged Material Use as Fill[i]	Trigger Levels for Bioaccumulation Testing[e]	SF-09 Reference	SV-23-Composite	SV-23-DUP	Times Above Reference
EPA 8270 E	PCB169	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.116	ND<0.116	ND<0.116	NA
EPA 8270 E	PCB170	PCB Congeners	µg/kg	.	.	*0.460*	.	.	.	ND<0.118	ND<0.118	ND<0.118	NA
EPA 8270 E	PCB177	PCB Congeners	µg/kg	.	.	*0.360*	.	.	.	ND<0.085	ND<0.085	ND<0.085	NA
EPA 8270 E	PCB180	PCB Congeners	µg/kg	.	.	*1.020*	.	.	.	ND<0.154	ND<0.154	ND<0.154	NA
EPA 8270 E	PCB183	PCB Congeners	µg/kg	.	.	*0.360*	.	.	.	ND<0.056	ND<0.056	ND<0.056	NA
EPA 8270 E	PCB187	PCB Congeners	µg/kg	.	.	*0.850*	.	.	.	ND<0.168	ND<0.168	ND<0.168	NA
EPA 8270 E	PCB189	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.109	ND<0.109	ND<0.109	NA
EPA 8270 E	PCB194	PCB Congeners	µg/kg	.	.	*0.330*	.	.	.	ND<0.164	ND<0.164	ND<0.164	NA
EPA 8270 E	PCB201[f]	PCB Congeners	µg/kg	.	.	*0.060*	.	.	.	ND<0.104	ND<0.104	ND<0.104	NA
EPA 8270 E	PCB206	PCB Congeners	µg/kg	.	.	.	.	.	.	ND<0.155	ND<0.155	ND<0.155	NA
	Total PCB Congeners[g]	PCB Congeners	µg/kg	22.7	180	*18.2*	*22.7**	*180***	*18.0*	0.00	0.00	0.00	NA
Organotins													
Organotins By Krone et al.	Dibutyltin	Organotins	µg/kg	.	.	.	.	.	.	ND<1.00	ND<1.00	ND<1.00	NA
Organotins By Krone et al.	Monobutyltin	Organotins	µg/kg	.	.	.	.	.	.	ND<1.00	ND<1.00	ND<1.00	NA
Organotins By Krone et al.	Tetrabutyltin	Organotins	µg/kg	.	.	.	.	.	.	ND<1.00	ND<1.00	ND<1.00	NA
Organotins By Krone et al.	Tributyltin	Organotins	µg/kg	.	.	.	.	.	.	ND<1.00	ND<1.00	ND<1.00	NA
	Total Organotins[g]	Organotins	µg/kg	.	.	.	.	.	.	0.00	0.00	0.00	NA

Notes All values reported in Dry Weight.
Analytes are reported to the method detection limit provided by Physis. Non-detect results are reported as ND<MDL.
Totals for PAHs, DDTs, Organotins, and PCBs were hand calculated. Where a result is ND<MDL, they are reported as 0 for the sum.
Chlordane is calculated as the sum of: Chlordane-alpha, Chlordane-gamma, cis-Nonachlor, trans-Nonachlor, Oxychlordane
a - Values from *Updated ambient concentrations of toxic chemicals in San Francisco Bay sediments* (2015).
b - The San Francisco Bay Regional Monitoring Program (RMP) stopped monitoring Chromium in 2002. Value is for Chromium IV from 1998 ambient levels.
c - The San Francisco Bay RMP updated Ambient Thresholds for Mercury, PAHs, and PCBs only in 2016.
d - RWQCB. 2010. Waste Discharge Requirement and Water Quality Certification Order No. R2-2010-0108 for: U.S. Fish and Wildlife Service Cullinan Ranch Restoration Project.
e - SFEI. 2018. Dredged Material Testing Thresholds for San Francisco Bay Area Sediments . Available at: http://www.sfei.org/content/dmmo-ambient-sediment-conditions. San Francisco Estuary Institute, Regional Monitoring Program.
f - Result is non-detect; however, method detection limit is higher than San Francisco Bay Ambient Level.
g - Total concentration of analyte is reported as ND < the average of MDLs reported for the results included in the sum.
h - Result is non-detect; however, method detection limit is higher than Effects Range-Low.
i - Lowest of either 1) the RWQCB 2010 Waste Discharge Requirement and Water Quality Certification Order No. R2-2010-0108 for: U.S. Fish and Wildlife Service Cullinan Ranch Restoration Project. October 14 or 2) RWQCB 2012. Updated Waste Discharge Requirements, Water Quality Certification, and Rescission of Order No. 00-061 for: Montezuma Wetlands LLC, Montezuma Wetlands Restoration Project, Solano County. October 10.

NA = not applicable
mg - milligram
kg - kilogram
µg - microgram
% = percent

ND - Non Detect < MDL
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyl
NT = Not Tested

SFB = San Francisco Bay
ERL = Effects range-low
ERM = Effects range-median
USCG = United States Coast Guard

BOLD = value detected is above ERL
BOLD = value detected is above ERM
BOLD Italics = above SFB Ambient Level
* = above Cullinan Ranch Disposal Site Criteria

** = above Montezuma Disposal Site Criteria for Dredged Material Use as Fill

Table 4-2b. Station Vallejo Composite Sediment Chemistry Results for Dioxins and Furans (Dry Weight)

Analyte (USEPA 1613 B)	Unit (dry weight)	TEF (2005 WHO)	SF Bay Ambient Level[a]	SV-23-Composite						SV-23-DUP						SF-09 Reference					
				RDL	EDL	Result	Q	TEQ (DL)	# of Isomers	RDL	EDL	Result	Q	TEQ (DL)	# of Isomers	RDL	EDL	Result	Q	TEQ (DL)	# of Isomers
2,3,7,8-Tetra CDD *	pg/g	1.00	·	0.997	0.186	<0.186		0.186	0	0.997	0.263	<0.263		0.263	0	0.999	0.268	<0.268		0.268	0
1,2,3,7,8-Penta CDD *	pg/g	1.00	·	4.99	0.294	0.362		0.362	1	4.98	0.448	<0.448		0.448	0	4.99	0.454	<0.454	(1)	0.454	0
1,2,3,4,7,8-Hexa CDD *	pg/g	0.100	·	4.99	0.292	<0.292		0.0292	0	4.98	0.237	<0.237		0.0237	0	4.99	0.320	0.390		0.0390	1
1,2,3,6,7,8-Hexa CDD *	pg/g	0.100	·	4.99	0.245	0.864		0.0864	1	4.98	0.194	0.638		0.0638	1	4.99	0.272	1.13		0.113	1
1,2,3,7,8,9-Hexa CDD *	pg/g	0.100	·	4.99	0.793	<0.793	(1)	0.0793	0	4.98	0.199	0.749		0.0749	1	4.99	0.274	0.959		0.0959	1
1,2,3,4,6,7,8-Hepta CDD *	pg/g	0.0100	·	4.99	0.273	8.50		0.0850	1	4.98	0.329	4.30		0.0430	1	4.99	0.379	8.59		0.0859	1
Octa CDD *	pg/g	0.000300	·	9.97	0.536	61.6		0.0185	1	9.97	0.600	42.2		0.0127	1	9.99	0.497	75.7		0.0227	1
Total Tetra CDD *	pg/g	N/A	·	0.997	0.186	0.219		N/A	1	0.997	0.263	0.756		N/A	1	0.999	0.268	2.38		N/A	2
Total Penta CDD *	pg/g	N/A	·	4.99	0.294	0.737		N/A	2	4.98	0.987	<0.987	(1)	N/A	0	4.99	1.27	<1.27		N/A	0
Total Hexa CDD *	pg/g	N/A	·	4.99	0.260	8.98		N/A	3	4.98	0.209	8.51		N/A	6	4.99	0.287	11.9		N/A	6
Total Hepta CDD *	pg/g	N/A	·	4.99	0.273	24.9		N/A	2	4.98	0.329	15.6		N/A	2	4.99	0.379	26.3		N/A	2
2,3,7,8-Tetra CDF **	pg/g	0.100	·	0.997	0.136	0.686		0.0686	1	0.997	0.540	<0.540	(2)	0.0540	0	0.999	0.256	0.721		0.0721	1
1,2,3,7,8-Penta CDF **	pg/g	0.0300	·	4.99	0.236	0.324		0.00972	1	4.98	0.270	0.337		0.0101	1	4.99	0.308	0.370		0.0111	1
2,3,4,7,8-Penta CDF **	pg/g	0.300	·	4.99	0.213	0.457		0.137	1	4.98	0.245	0.441		0.132	1	4.99	0.276	0.547		0.164	1
1,2,3,4,7,8-Hexa CDF **	pg/g	0.100	·	4.99	0.194	0.471		0.0471	1	4.98	0.341	<0.341		0.0341	0	4.99	0.324	0.443		0.0443	1
1,2,3,6,7,8-Hexa CDF **	pg/g	0.100	·	4.99	0.188	<0.188	(1)	0.0188	0	4.98	0.230	<0.230		0.0230	0	4.99	0.304	<0.304		0.0304	0
2,3,4,6,7,8-Hexa CDF **	pg/g	0.100	·	4.99	0.254	<0.254		0.0254	0	4.98	0.266	<0.266		0.0266	0	4.99	0.337	<0.337		0.0337	0
1,2,3,7,8,9-Hexa CDF **	pg/g	0.100	·	4.99	0.230	<0.230		0.0230	0	4.98	0.303	<0.303		0.0303	0	4.99	0.399	<0.399		0.0399	0
1,2,3,4,6,7,8-Hepta CDF **	pg/g	0.0100	·	4.99	1.15	<1.15	(1)	0.0115	0	4.98	0.850	<0.850	(1)	0.00850	0	4.99	0.432	1.62		0.0162	1
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.0100	·	4.99	0.326	<0.326		0.00326	0	4.98	0.283	<0.283		0.00283	0	4.99	0.461	<0.461		0.00461	0
Octa CDF **	pg/g	0.000300	·	9.97	0.386	5.26		0.00158	1	9.97	0.430	3.72		0.00112	1	9.99	0.370	5.70		0.00171	1
Total Tetra CDF **	pg/g	N/A	·	0.997	0.136	2.63		N/A	5	0.997	0.219	1.26		N/A	3	0.999	0.256	1.55		N/A	3
Total Penta CDF **	pg/g	N/A	·	4.99	0.224	5.31		N/A	4	4.98	0.257	2.79		N/A	4	4.99	0.291	5.50		N/A	4
Total Hexa CDF **	pg/g	N/A	·	4.99	0.199	3.28		N/A	3	4.98	0.261	1.63		N/A	2	4.99	0.337	3.48		N/A	3
Total Hepta CDF **	pg/g	N/A	·	4.99	2.49	<2.49		N/A	0	4.98	1.64	<1.64		N/A	0	4.99	0.446	1.62		N/A	1
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	2.90	N/A	N/A	N/A	N/A	1.19	N/A	N/A	N/A	N/A	N/A	1.25	N/A	N/A	N/A	N/A	N/A	1.50	N/A

Notes: BT = Bioaccumulation Trigger; Q = Qualifier; EDL = Estimated Detection Limit; N/A = Not Applicable; RDL = Reportable Detection Limit; pg/g = picograms per gram; TEF = Toxic Equivalency Factor TEQ = Toxic Equivalency Quotient;
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. Toxic Equivalents (TEQs), the measured concentration of the chemical is multiplied by a toxic equivalency factor (TEF)., or relative toxicity of a dioxin-like compound compared to the most toxic dioxin compound, 2,3,7,8-tetrachlorodiobenzo-p-dioxin.
"Toxic Equivalents (TEQs) based on WHO 1998 Toxic Equivalency Factors (TEFs).
Value is consistent with the published Puget Sound limit for unconfined aquatic disposal and is ½ the established limit for placement at the Hamilton Wetlands Restoration Project site."
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(2) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
a. Yee, D. and Trowbridge, P. 2016. Updated ambient concentrations of toxic chemicals in San Francisco Bay area sediments. San Francisco Estuary Institute (SFEI), Richmond, California. February 26.
b. Lowest of either 1) the RWQCB 2010 Waste Discharge Requirement and Water Quality Certification Order No. R2-2010-0108 for: U.S. Fish and Wildlife Service Cullinan Ranch Restoration Project. October 14 or 2) RWQCB 2012. Updated Waste Discharge Requirements, Water Quality Certification, and Rescission of Order No. 00-061 for: Montezuma Wetlands LLC, Montezuma Wetlands Restoration Project, Solano County. October 10.
c. RWQCB. 2010. Waste Discharge Requirement and Water Quality Certification Order No. R2-2010-0108 for: U.S. Fish and Wildlife Service Cullinan Ranch Restoration Project. October 14.

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Table 4-3. Station Vallejo Seawater and Elutriate Analytical Chemistry Results

Analytical Method	Compound Name	Type	Units (wet weight)	Saltwater CCC (chronic)	Saltwater CMC (acute)	Freshwater CCC (chronic)	Freshwater CMC (acute)	Montezuma Screening Criteria[e]	SV-23-SW-1		SV-23-SW-2		SV-23-ELUTRIATE	
SM 2540 D	Total Suspended Solids	General Chemistry	mg/L	·	·	·	·	·	15.1		5.82		11.3	
Total Metals														
EPA 1640	Arsenic[c]	Metals	µg/L	36.0	69.0	150	340	--	1.35		1.31		--	
EPA 1640	Cadmium[c]	Metals	µg/L	7.90	33.0	2.2	4.30	--	0.087		0.124		--	
EPA 1640	Chromium[a]	Metals	µg/L	50.0	1100	11.0	16.0	--	1.78		0.867		--	
EPA 1640	Copper[b]	Metals	µg/L	6.00	9.40	--	--	--	3.22		4.27		--	
EPA 1640	Lead[c]	Metals	µg/L	5.60	140	2.50	65.0	--	0.636		0.519		--	
EPA 245.7	Mercury[c]	Metals	µg/L	0.940	1.80	0.770	1.40	*2.10*	0.0211		0.0203		0.0101	J
EPA 1640	Nickel[b]	Metals	µg/L	11.9	62.4	52.0	470	--	4.05		3.59		--	
EPA 1640	Selenium[c]	Metals	µg/L	71.0	290	--	--	*20.0*	0.063		0.076		0.061	
EPA 1640	Silver[c]	Metals	µg/L	·	1.90	--	3.40	--	0.187		0.226		--	
EPA 1640	Zinc[c]	Metals	µg/L	81.0	90.0	120	120	--	8.54		5.44		--	
Total Dissolved Metals[d]														
EPA 1640	Arsenic	Dissolved Metals	µg/L	36.0	69.0	150	340	*69.0*	1.21		1.04		4.95	
EPA 1640	Cadmium	Dissolved Metals	µg/L	7.85	32.8	2.00	4.06	*3.90*	0.072		0.055		ND < 0.003	
EPA 1640	Chromium[a]	Dissolved Metals	µg/L	49.7	1092	10.6	15.7	*16.0*	0.09		0.057		0.043	
EPA 1640	Copper	Dissolved Metals	µg/L	4.98	7.80	--	--	*9.40*	2.04		2.64		0.341	
EPA 1640	Lead	Dissolved Metals	µg/L	5.33	133	1.98	51.4	*65.0*	ND < 0.003		ND < 0.003		ND < 0.003	
EPA 1640	Nickel	Dissolved Metals	µg/L	11.8	61.8	51.8	469	*74*	2.57		2.28		3.07	
EPA 1640	Selenium	Dissolved Metals	µg/L	70.9	289	--	--	--	ND < 0.005		ND < 0.005		--	
EPA 1640	Silver	Dissolved Metals	µg/L	·	1.62	--	2.89	*1.90*	0.538		0.292		0.248	
EPA 1640	Zinc	Dissolved Metals	µg/L	76.6	85.1	118	117	*90*	6.29		3.27		0.402	

Notes: All results reported in wet weight
-- = Not reported
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
Analytes are reported to the method detection limit provided by Physis.
CCC = Criterion Continuous Concentration
CMC = Criterion Maximum Concentration
CCC and CMC values provided by U.S. Environmental Protection Agency.
a: CCC and CMC values correspond to chromium VI (hexavalent chromium)
b: California Regional Water Quality Control Board, San Francisco Bay Region (Region 2) (RWQCB). 2012. Water Quality Control Plan (Basin Plan). 2012.
c: CFR Title 40 § 131.38. 2024. Establishment of numeric criteria for priority toxic pollutants for the State of California. Accessed on 06 February 2024. Available at: https://www.ecfr.gov/current/title-40/section-131.38.
d: Conversion factors from: 3: CFR Title 40 § 131.38 Table 2 to paragraph (b)(2). 2024. Establishment of numeric criteria for priority toxic pollutants for the State of California. Accessed on 13 February 2024. Available at: https://www.ecfr.gov/current/title-40/section-131.38.
e: Updated Waste Discharge Requirement and Water Quality Criteria, Water Quality Certification, and Recession of Order no. 00-61 for: Montezuma Wetlands LLC, Montezuma Wetlands Restoration Project, Solano County. October 1.
mg – milligram; L – liter; µg – microgram; ND - Non Detect < MDL; MDL - Method Detection Limit

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4.3 Tier III Data Analysis and Interpretation

Statistical analyses used to evaluate all bioassays followed the guidelines in the ITM (USEPA/USACE 1998).

Suspended Particulate Phase Tests: Per USACE Public Notice 01-01 (2001), both median lethal concentration (LC_{50}) and median effects concentration (EC_{50}) values were calculated and reported for SPP tests. Abnormal larvae and calculated mortalities were added (i.e., it is assumed that abnormal larvae will not survive) to evaluate whether control survival is acceptable (greater than [>]70 percent) and when calculating LC_{50} concentrations. The abnormality counts were used for calculating EC_{50} values. The LC_{50} was determined using the Comprehensive Environmental Toxicity Information System (CETIS) program.

In comparison to the SF-09 Reference: In cases where the average survival in the test treatments equaled or exceeded that of the reference (for SP exposures) or control (for SPP tests), no statistical analyses were necessary. If SP organism survival in test sediments was lower than reference survival, a student's t-test was used to determine whether the difference in survival is statistically significant ($p \leq 0.05$). Dunnett's multiple comparison test was used for SPP data to assess significant reductions in survival or normality (bivalve larvae) in elutriate test concentrations, compared with control survival or normality. Results were analyzed using the CETIS program (Tidepool Scientific Software, 2000–2016).

4.3.1 Suspended Particulate-Phase Results

Individual replicate results for each of the SPP tests conducted for this Study are presented in Tables 4-4a, 4-4b, and 4-4c. The results of the SPP tests for the Study are summarized in Table 4-4d. Two SPP test dilution series, one using a standard elutriate test (SET) and a second with a modified elutriate test (MET) were evaluated for this Project to ensure that the best placement location would be identified. To determine placement suitability at SF-09, the SET series was performed for two species per the ITM and modified by Corps Public Notice 01-01. To determine placement suitability at Cullinan Ranch[10], a MET series was performed for one species per requirements in Order No. R2-2010-0108 for the Cullinan Ranch Restoration Project; however, this test was determined to be unnecessary by the DMMO because there is no discharge at this proposed placement site.

4.3.2 Modified Elutriate Test (Comparison to Cullinan Ranch) Results

The only species evaluated for the MET test was *A. bahia*. Mean survival for *A. bahia* was significantly reduced in the 100 percent elutriate (84.0 percent) compared to the lab control (100 percent), but the LC_{50}/EC_{50} values were greater than 100 percent (Table 4-4c).

4.3.3 Standard Elutriate Test (Comparison to SF-09) Results

The SPP benthic tests with the mysid shrimp (*A. bahia*) and bivalve embryos (*M. galloprovincialis*) were initiated on 26 December 2023. Laboratory control samples of filtered seawater were also evaluated. The *A. bahia* and *M. galloprovincialis* tests were validated by 96.0 percent survival and

[10] On 20 March 2024, at the DMMO meeting where this SAP Report was presented, USACE clarified that toxicity testing and therefore elutriate testing was not necessary for evaluating placement of the proposed dredged materials at Cullinan Ranch.

97.1 percent mean combined survival/normal development in the mysid shrimp and bivalve larvae control samples, respectively (Table 4-4).

The mean percentage of survival for *A. bahia* in the 100 percent elutriate concentrations for the SV-23-Composite sample was 88.0. However, for *M. galloprovincialis*, the mean normal development in the 100 percent elutriate concentration was 0.00 percent (Table 4-4).

No statistically significant effects relative to a laboratory control were observed in the undiluted (100 percent) elutriate for the mysid shrimp (*A. bahia*); however, for mussels (*M. galloprovincialis*), the results were significantly reduced when compared to the control. Because ammonia was a potential confounding factor in the mussel embryo test, an ammonia-reduced sample was also evaluated. While mean combined survival/normal development improved, results for the ammonia-reduced SV-23-Composite sample were still significantly reduced compared to the control (88.8 percent compared to 97.1 percent). The results of the SPP acute exposure tests indicated that LC_{50}/EC_{50} values were greater than 100 percent for mysids, and they were 59.37 percent for mussel embryos. These results indicate that the SPP tests for *A. bahia* met acceptability criteria and the limiting permissible concentration (LPC) for placement at SF-09, and the SPP tests for *M. galloprovincialis* did not.

Because significantly reduced survival was observed for *M. galloprovincialis*, the Short-Term Fate (STFATE) model was run for dredged material placement at SF-09. Parameters for the STFATE model are included in Table 4-5.

4.3.4 Prediction of Water Column Toxicity During Disposal at SF-09

The ITM guidelines (USACE/USEPA 1998) stipulate that water column concentrations must not exceed 1 percent of the LC_{50} outside the mixing zone. Implementation guidelines for the ITM in the San Francisco Bay region further require that the most conservative endpoint, either the lowest LC_{50} or EC_{50} from bioassay testing, be used to evaluate these criteria. For this Study, that value was 59.1 (proportion normal EC_{50} end point summary), resulting in a toxicity threshold of 0.591.

EcoAnalysts modeled results for the SF-09 site using a release zone method per USACE and USEPA 1977. The release zone method assumes that a typical barge is used for the work measuring 25 meters by 3.7 meters and that the volume of SF-09 (597,809 cubic meters) is the receiving water dilution volume. Parameters used for the model and results are shown in Table 4-5.

Based on the results of this model, the predicted concentration in the water column after disposal was 0.0059 percent, which is less than the toxicity threshold of 0.594. This indicates that disposal of the sediment from USCG Station Vallejo would not pose a toxicity risk to existing water column organisms at the SF-09 dredged material disposal site.

Table 4-4a. Test Results for the 48-hour Water-Column Test with *Mytilus galloprovincialis*

Treatment	Concentration	Replicate	Number Initiated*	Number Normal	Number Abnormal	Total	Percentage Normal	Mean Percentage Normal	SD	Percentage Normal Survival	Mean Percentage Normal Survival[1]	SD	Normal Survival Statistically Less Than Control?	Normal Survival LC_{50} (%)	Total Ammonia (mg/L) - Day 0	Total Ammonia (mg/L) - Day 2	Unionized Ammonia (mg/L) - Day 0	Unionized Ammonia (mg/L) - Day 2
Control	0%	1	222	235	10	245	95.9	95.3	0.9	100.0	97.1	4.1			0.303	0.00	0.004	0.00
		2	222	226	10	236	95.8			100.0								
		3	222	229	15	244	93.9			100.0								
		4	222	207	10	217	95.4			93.3								
		5	222	204	9	213	95.8			92.0								
Salt Control	0%	1	222	215	11	226	95.1	94.3	2.5	96.9	97.2	3.1	No		0.116	0.00	0.002	0.00
		2	222	205	12	217	94.5			92.4								
		3	222	244	9	253	96.4			100.0								
		4	222	232	11	243	95.5			100.0								
		5	222	214	24	238	89.9			96.5								
SV-23-SW	0%	1	222	227	3	230	98.7	97.3	0.8	100.0	99.5	1.2	No		0.095	0.00	0.002	0.00
		2	222	222	8	230	96.5			100.0								
		3	222	237	7	244	97.1			100.0								
		4	222	216	6	222	97.3			97.4								
		5	222	222	7	229	96.9			100.0								
SV-23-Composite[2]	1%	1	222	226	4	230	98.3	95.3	2.1	100.0	97.3	2.6	No	59.37	0.403	0.00	0.008	0.00
		2	222	213	13	226	94.2			96.0								
		3	222	213	10	223	95.5			96.0								
		4	222	235	19	254	92.5			100.0								
		5	222	209	9	218	95.9			94.2								
	10%	1	222	226	11	237	95.4	95.4	2	100.0	91.5	8.7	No		1.70	0.692	0.033	0.015
		2	222	191	7	198	96.5			86.1								
		3	222	215	7	222	96.8			96.9								
		4	222	212	9	221	95.9			95.6								
		5	222	175	14	189	92.6			78.9								
	50%	1	222	149	68	217	68.7	62.9	4.7	67.2	64.6	3.3	Yes		*5.26*	*4.67*	*0.126*	*0.163*
		2	222	150	81	231	64.9			67.6								
		3	222	137	101	238	57.6			61.8								
		4	222	146	80	226	64.6			65.8								
		5	222	134	95	229	58.5			60.4								
	100%	1	222	0	227	227	0.0	0.0	0.0	0.0	0.0	0.0	Yes		*10.8*	*9.84*	*0.323*	*0.532*
		2	222	0	209	209	0.0			0.0								
		3	222	0	217	217	0.0			0.0								
		4	222	0	192	192	0.0			0.0								
		5	222	0	207	207	0.0			0.0								
SV-23-Composite[2] (Ammonia Reduced)	100%	1	222	177	32	209	84.7	90.2	3.4	79.8	88.8	5.4	Yes		*4.20*	*3.96*	*0.157*	*0.138*
		2	222	200	17	217	92.2			90.2								
		3	222	200	24	224	89.3			90.2								
		4	222	209	15	224	93.3			94.2								
		5	222	199	18	217	91.7			89.7								

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Table 4-4a. Test Results for the 48-hour Water-Column Test with *Mytilus galloprovincialis (Continued)*

Notes:
BOLD = Test result is statistically less than the control
Italics = Measurement is above NOEC (NOEC derived from concurrent reference-toxicant test)
* Number Initiated is a mean of 5 replicates from the initial stocking density taken at Time 0.
1 Normal Survival (combined proportion normal) is calculated as the number normal ÷ the number initiated
2 The laboratory report from EcoAnalysts referred to this sample as SV-23-A-Composite. The sample has been renamed here to reflect the composite sample being evaluated in this test to remain consistent with the naming convention used in the rest of the physical, chemical, and toxicity results of this Study.

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Table 4-4b. Test Results for the 96-Hour Water-Column Test with *Americamysis bahia* (SET)

Treatment	Concentration	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Survival	Mean Percentage Survival	SD	Mean Percentage Mortality	SD	Survival Statistically Less Than Control?	LC_{50} (%)
Control	0%	1	10	10	0	100	96	8.9	4	8.9		
		2	10	8	2	80						
		3	10	10	0	100						
		4	10	10	0	100						
		5	10	10	0	100						
Salt Control	0%	1	10	8	2	80	92	8.4	8	8.4	No	
		2	10	9	1	90						
		3	10	10	0	100						
		4	10	10	0	100						
		5	10	9	1	90						
SV-23-SW	0%	1	10	10	0	100	100	0.0	0	0.0	No	
		2	10	10	0	100						
		3	10	10	0	100						
		4	10	10	0	100						
		5	10	10	0	100						
SV-23-Composite[1]	1%	1	10	10	0	100	94	5.2	6	5.2	No	>100
		2	10	9	1	90						
		3	10	10	0	100						
		4	12	11	1	92						
		5	10	9	1	90						
	10%	1	10	10	0	100	98	4.5	2	4.5	No	
		2	10	10	0	100						
		3	10	9	1	90						
		4	10	10	0	100						
		5	10	10	0	100						
	50%	1	10	10	0	100	94	8.9	6	8.9	No	
		2	10	10	0	100						
		3	10	10	0	100						
		4	10	8	2	80						
		5	10	9	1	90						
	100%	1	10	10	0	100	88	13.0	12	13.0	No	
		2	10	9	1	90						
		3	10	10	0	100						
		4	10	7	3	70						
		5	10	8	2	80						

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Table 4-4b. Test Results for the 96-Hour Water-Column Test with *Americamysis bahia* (SET) *(Continued)*

Notes:
[1] The laboratory report from EcoAnalysts referred to this sample as SV-23-A-Composite. The sample has been renamed here to reflect the composite sample being evaluated in this test to remain consistent with the naming convention used in the rest of the physical, chemical, and toxicity results of this Study.

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Table 4-4c. Test Results for the 96-Hour Water-Column Test with *Americamysis bahia* (MET)

Treatment	Concentration	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Survival	Mean Percentage Survival	SD	Mean Percentage Mortality	SD	Survival Statistically Less Than Control?	LC_{50} (%)
Control	0%	1	10	10	0	100	100	0.0	0	0.0		
		2	10	10	0	100						
		3	10	10	0	100						
		4	10	10	0	100						
		5	10	10	0	100						
Salt Control	0%	1	10	10	0	100	96	5.5	4	5.5	No	
		2	10	10	0	100						
		3	10	9	1	90						
		4	10	9	1	90						
		5	10	10	0	100						
SV-23-SW	0%	1	10	10	0	100	96	5.5	4	5.5	No	
		2	10	10	0	100						
		3	10	9	1	90						
		4	10	9	1	90						
		5	10	10	0	100						
SV-23-Composite[1]	1%	1	10	10	0	100	96	5.5	4	5.5	No	>100
		2	10	9	1	90						
		3	10	10	0	100						
		4	10	9	1	90						
		5	10	10	0	100						
	10%	1	10	10	0	100	98	4.5	2	4.5	No	
		2	10	10	0	100						
		3	10	9	1	90						
		4	10	10	0	100						
		5	10	10	0	100						
	50%	1	10	9	1	90	94	5.5	6	5.5	No	
		2	10	10	0	100						
		3	10	10	0	100						
		4	10	9	1	90						
		5	10	9	1	90						
	100%	1	10	7	3	70	84	8.9	16	8.9	Yes	
		2	10	9	1	90						
		3	10	8	2	80						
		4	10	9	1	90						
		5	10	9	1	90						

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Table 4-4c. Test Results for the 96-Hour Water-Column Test with *Americamysis bahia* (MET) *(Continued)*

Notes:
BOLD = Test result is statistically less than the control
[1] The laboratory report form EcoAnalysts referred to this sample as SV-23-A-Composite. The sample has been renamed here to reflect the composite sample being evaluated in this test to remain consistent with the naming convention used in the rest of the physical, chemical, and toxicity results of this Study.

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Table 4-4d. Summary of Toxicity Test Results – Suspended Particulate-Phase

Location	Elutriate Concentration (%)	Mysid MET[2] (*Americamysis bahia*) Mean Survival (%)	Mysid SET (*Americamysis bahia*) Mean Survival (%)	Mussel SET (*Mytilus galloprovincialis*) Mean Combined Survival/Normal Development (%)
Laboratory Control	—	100	96.0	97.1
Salt Control	—	96.0	92.0	97.2
SV-23-SW	—	96.0	100	99.5
SV-23-Composite	1	96.0	94.0	97.3
	10	98.0	98.0	91.5
	50	94.0	94.0	64.6
	100	84.0	88.0	0.00
LC_{50}/EC_{50} (% elutriate)[1]	—	>100	>100	59.37
SV-23-A-Composite (Ammonia Reduced)	100	—	—	88.8

Notes:

BOLD = Test result is statistically less than the control

— = not applicable; > = greater than; % = percent; EC_{50} = median effect concentration; LC_{50} = median lethal concentration; SV = Station Vallejo; 23 = year of sample collection (2023); SET = standard elutriate test; SW = site water; % = percent

1. An LC_{50}/EC_{50} of >100 percent indicates that there was greater than 50 percent survival/normal larvae in the 100 percent elutriate concentration.
2. Modified Elutriate Test (MET). Test solutions were prepared with site water (SV-23-SW) mixed with the composited sediment and then analyzed for the 96-hour acute static survival water column toxicity testing with the Mysid (*Americamysis bahia*).

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Table 4-5. STFATE Mixing Model Results for Determining Potential Toxicity for Placement of Dredged Material at SF-09

Site:	USCG Station Vallejo
Sample ID:	SV-23-Composite
Species:	*M. galloprovincialis*
Disposal Site:	SF-09
Mixing Zone Volume Calculation	
Depth of disposal site (m)	15
Pi (constant)	3.14159
Width of vessel (m)	3.7
Length of vessel (m)	25
Speed of vessel (m/s)	1
Time of discharge (s)	30
Depth of vessel (m)	2.5
Mixing Zone Volume (m^3)	650,391
Volume of Liquid Phase	
Bulk density (g/cc)	1.29
Particle density (g/cc)	2.65
Density of liquid phase (constant)	1.001
Vol of disposal vessel (m^3)	231
Liquid phase volume (m^3)	189
Volume of suspended phase	
Silt (%)	67.4
Clay (%)	23.6
Volume of Suspended Phase (m^3)	38
Projected Water Column Concentration (SP)	0.0059
Calculation of Water Column Concentration Guideline (percent SP)	
Lowest LC_{50} or EC_{50} from bioassay	59.1
LC_{50} or EC_{50} × 0.01	0.591

Notes: ID = identifier; m = meters; m/s = meters per second; s = second; m3 = cubic meters; g/cc = grams per cubic centimeter; % = percent; SP = suspended phase; EC50 = median effect concentration; LC50 = median lethal concentration

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4.3.5 Solid-Phase Results

The 10-day SP benthic test with *N. arenaceodentata* and *L. plumulosus* were initiated on 29 December 2023. Individual replicate results for each of the SP tests conducted for this Study are presented in Tables 4-6a and 4-6b. The results of both SP tests for the Study are summarized in Table 4-6c. The tests were validated by 100 and 98 percent survival in the control samples, respectively. Mean survival in the SF-09 reference sample was and 98.0 percent for *N. arenaceodentata and* 92.0 percent for *L. plumulosus.* Survival in the SV-23-Composite was 98.0 percent for *N. arenaceodentata* and 96.0 percent for *L. plumulosus*. Based on the SP test results, the sediments met the LPC for placement at SF-09.

Table 4-6a. Test Results for the 10-Day Solid-Phase Test with *Neanthes arenaceodentata*

Treatment	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Survival	Mean Percentage Survival	SD	Mean Percentage Mortality	SD
Control	1	10	10	0	100	100	0.0	0	0.0
	2	11	11	0	100				
	3	10	10	0	100				
	4	10	10	0	100				
	5	10	10	0	100				
SF-09 Reference[1]	1	10	10	0	100	98	4.5	2	4.5
	2	10	10	0	100				
	3	10	10	0	100				
	4	10	9	1	90				
	5	10	10	0	100				
SV-23-Composite[2]	1	10	10	0	100	98	4.5	2	4.5
	2	10	9	1	90				
	3	10	10	0	100				
	4	10	10	0	100				
	5	10	10	0	100				

Notes:
[1] The laboratory report from EcoAnalysts referred to this sample as SF-09 Ref. The sample has been renamed here to remain consistent with the naming convention used in the rest of the physical, chemical, and toxicity results of this Study for this sample.
[2] The laboratory report from EcoAnalysts referred to this sample as SV-23-A-Composite. The same has been renamed here to remain consistent with the sample naming convention in the rest of the physical, chemical, and toxicity results of this Study for this sample.

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Table 4-6b. Test Results for the 10-Day Solid-Phase Test with *Leptocheirus plumulosus*

Treatment	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Survival	Mean Percentage Survival	SD	Mean Percentage Mortality	SD
Control	1	20	20	0	100	98	2.7	2	2.7
	2	20	19	1	95				
	3	20	19	1	95				
	4	20	20	0	100				
	5	20	20	0	100				
SF-09 Reference[1]	1	20	20	0	100	92	5.7	8	5.7
	2	20	18	2	90				
	3	20	19	1	95				
	4	20	17	3	85				
	5	20	18	2	90				
SV-23-Composite[2]	1	20	19	1	95	96	4.2	4	4.2
	2	20	18	2	90				
	3	20	20	0	100				
	4	20	20	0	100				
	5	20	19	1	95				

Notes:
[1] The laboratory report from EcoAnalysts referred to this sample as SF-09 Ref. The sample has been renamed here to remain consistent with the naming convention used in the rest of the physical, chemical, and toxicity results of this Study for this sample.
[2] The laboratory report from EcoAnalysts referred to this sample as SV-23-A-Composite. The same has been renamed here to remain consistent with the sample naming convention in the rest of the physical, chemical, and toxicity results of this Study for this sample.

Table 4-6c. Summary of Toxicity Test Results – Solid-Phase

Location	Amphipod *(Leptocheirus plumulosus)* Mean Survival (%)	Worm *(Neanthes arenaceodentata)* Mean Survival (%)
Laboratory Control (Native Sediment)	98.0	100.0
SF-09	92.0	98.0
SV-23-Composite	96.0	98.0

Notes: % = percent; SF-09 = Carquinez Strait In-Bay Disposal Site; SV = Station Vallejo; 23 = year of collection (2023)

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4.4 Quality Assurance Quality Control Review

All sample results were reviewed for conformance with the Project-specific SAP (WSP 2023). The SAP includes data quality acceptability limits applicable to sediments. The laboratory (Physis) holds a valid certification by the California Department of Public Health's Environmental Laboratory Accreditation Program (ELAP) and is accredited by the U.S. Department of Defense ELAP (DoD-ELAP). The laboratory utilized all prescribed analytical methods per the signed COC for testing, ensuring data comparability. Method sensitivity criteria (SAP Table 3-3b) were met for target reporting limits.

Sediments

Physis deliverable 2208006-003 in Appendix D contains QA/QC information for sediments. Hardcopy and EDD deliverables were reported and qualified (flagged) based on both the laboratory performance-based criteria limits and the Project-specific criteria limits, including surrogates and Matrix Spike (MS)/Matrix Spike Duplicate (MSD) recoveries and duplicate precision listed in the SAP. All requested analyses and analytes were reported, and all sample holding times were met. Minimum laboratory quality control requirements were met (SAP Table 3-3d) with the exception of select compounds as noted below. Project QC control acceptable limits (SAP, Table 3-3c) were established in addition to laboratory performance limits to identify conditions that could warrant further corrective action(s). A summary of each of the QC indicators and exceedances of any Measurement Quality Objectives for accuracy and precision (MQOs, reference SAP Table 3-3d) is provided below.

1. Method Blanks (Sediments): All the Project method blanks were within acceptable limits, with the exception of one surrogate.
2. Surrogates/Internal standards/LCSs (Sediments): The LCS/LCSD recoveries for all analytes met acceptable control limits as listed in the SAP, with the following exceptions:
    - *Accuracy* for eight pesticides, one PCB congener, and eight PAHs exceeded SAP and/or laboratory derived performance limits.
    - *Precision* for six surrogates, 18 pesticides, one organotin, one PCB congener, and eleven PAHs exceeded SAP and/or laboratory derived performance limits.
3. MS/MSDs/Certified Reference Materials (CRMs)/replicates (Sediments): For all samples, MS/MSDs/CRMs/replicates were within acceptable recovery limits for accuracy, with the following exceptions:
    - *Accuracy* for four pesticides, one PCB congener, three PAHs, and one metal (mercury) exceeded SAP and/or laboratory derived performance limits.
    - *Precision* for three metals, three dioxins and furans, and one particulate size distribution analyte exceed SAP and/or laboratory derived performance limits.

Based on the above-noted performance limit exceedances, there were no significant patterns of method blank contamination, surrogate, LCS/LCSD, or MS/MSD recoveries. Of the LCS/LCSD accuracy exceedances noted above, the corresponding internal laboratory QA/QC samples (method blank, surrogates, and Certified Reference Materials [CRMs]) were within laboratory derived control limits, with minor exception. In one instance, a pesticide (4,4'-DDD) LCS and CRM did not meet minimum laboratory control requirements. However, the corresponding LCSD and method blank were within laboratory derived control limits, therefore the batch results were accepted without further qualification. In addition, seven of the eight PAHs were below accuracy limits for the LCSD sample, indicative of potential low bias in this sample. However, all PAH surrogates were within control limits, and there was no consistent bias in the CRM results. The samples were reported as qualified.

Of the MS/MSD/CRM recovery or RPD exceedances noted above, the corresponding internal laboratory QA/QC samples (method blank, surrogates, LCS/LCSD, and CRMs) were within laboratory derived control limits. Therefore, the MS/MSD and analytical replicate precision exceedances can be attributed to sample heterogeneity, and these exceedances are not indicative of systemic bias. Samples that exceeded accuracy or precision criteria attributed to sample heterogeneity are flagged in the laboratory reports. These exceedances were limited in nature relative to the full analytic data set and deemed to not adversely affect overall data quality. Based on this review, using the SAP and laboratory-derived reporting criteria, all results are considered usable as reported.

Water and Elutriate

Physis deliverables 2208006-004 and 2208006-005 in Appendix D contain QA/QC information for water and elutriate samples. Hardcopy and EDD deliverables were reported and qualified (flagged) based on both the laboratory performance-based criteria limits and the Project-specific criteria limits, including surrogate and MS/MSD recoveries and duplicate precision listed in the SAP. All requested analyses and analytes were reported, and all sample holding times were met. Minimum laboratory quality control requirements were met (SAP Table 3-3c) with the exception of select compounds as noted below. Project QC control acceptable limits (SAP, Table 3-3d) were established in addition to laboratory performance limits to identify conditions that could warrant further corrective action(s). A summary of each of the QC indicators and exceedances of any Measurement Quality Objectives for accuracy and precision (MQOs, reference SAP Table 3-3e) is provided below.

1. Method Blanks (Water and elutriate samples): All the Project method blanks were within acceptable limits.
2. Surrogates/Internal standards/LCSs (Water and elutriate samples): The LCS/LCSD recoveries for all analytes met acceptable control limits for both accuracy and precision as listed in the SAP.
3. MS/MSDs (Water and elutriate samples): For all samples, MS/MSDs were within acceptable recovery limits for both accuracy and precision.
4. Replicates (Water and elutriate samples): For all samples, laboratory batch replicates were within acceptable control limits for accuracy. For precision, three metals (total cadmium, dissolved chromium, and dissolved silver) exceeded SAP and/or laboratory derived performance limits.

Based on the above-noted performance limit exceedances, there were no significant patterns of method blank contamination, surrogate, LCS/LCSD, or MS/MSD recoveries. For the analytical replicate precision exceedances in the laboratory batch replicate for total cadmium and dissolved silver, the Project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply. For the analytical replicate precision exceedance for dissolved chromium, it was noted that the analyte concentration in the Project sample was lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply.

Overall, the exceedances noted above were limited in nature relative to the full analytic data set and were deemed to not adversely affect overall data quality. Based on this review, using the SAP and laboratory-derived reporting criteria, all results are considered usable as qualified.

Toxicity

A summary of QA/QC for the toxicity tests are described in the EcoAnalysts report included in Appendix E. The quality assurance objectives for toxicity testing conducted by the testing laboratory are detailed in the OTM (USEPA/USACE 1991) and the laboratory's quality assurance plans (QAPs). These objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Water and Sediment Sampling and Handling
- Source and Condition of Test Organisms
- Condition of Equipment
- Test Conditions
- Instrument Calibration
- Use of Reference Toxicants
- Record Keeping
- Data Evaluation

Each toxicity test species was evaluated in reference toxicant tests during the test period to establish the sensitivity of the test organisms (Lee 1980). The reference toxicant LC50 or EC50 should fall within two standard deviations of the historical laboratory mean. Water quality measurements were monitored to ensure that they fell within prescribed limits. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

The methods employed in every phase of the toxicity testing program are detailed in the EcoAnalysts Standard Operating Procedures (SOP). All EcoAnalysts staff members receive regular, documented training in all SOPs and test methods. Finally, all data collected and produced as a result of these analyses were recorded on approved data sheets. If an aspect of a test deviated from protocol, the test was evaluated to determine whether it was valid according to the regulatory agencies responsible for approval of the proposed permitting action.

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5.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, the USCG is proposing to conduct maintenance dredging at Station Vallejo during the 2024 in-water work window or sooner. A comprehensive sediment evaluation was conducted to determine the suitable location(s) for disposal of the dredged material. Three primary disposal locations were evaluated: 1) Cullinan Ranch, 2) Montezuma Wetlands, and 3) SF-09. The sediment assessment was conducted according to the ITM, and the agency-approved SAP (WSP 2023). For testing purposes, the Project site was evaluated as one composite area.

5.1 Conclusions

The results of the Study indicate that the proposed Project dredged materials are likely suitable for unconfined aquatic disposal at Cullinan Ranch, SF-09 or for use as fill at the Montezuma Wetlands. These conclusions are based on the results of grain size, analytical chemistry analysis of sediments, elutriates, and site water as well as toxicity evaluations and models which were performed in accordance with the ITM (USACE/USEPA 1998). Conclusions for the Study are summarized in Section 5.1.1 and 5.1.2.

5.1.1 Physical and Chemical Analysis

Sediments from Station Vallejo and SF-09 appear to be similar in physical and chemical properties as evidenced by the following results:

- The sediment grain size distribution contained for the SV-23-Composite was between 90.3 to 91.0 percent fines and while the SF-09 sample contained 86.9 percent fines (Table 4 -1).
- All analytes met criteria for placement at Montezuma Wetlands (Table 4-2a).
- Most analytes, except metals, met criteria for placement at Cullinan Ranch (Table 4-2a).
- None of the analytes exceeded bioaccumulation triggers (Table 4-2a).
- Results for metals for both SF-09 and the Station Vallejo samples both exceeded SF Bay Ambient Criteria for arsenic, copper, selenium, and silver. The SV-23-Composite also exceeded SF Bay ambient levels for chromium and nickel; however, the SV-23-DUP did not (Table 4-2a).
- Organochlorine pesticides, PCB congeners, and organotins were non-detect above their method detection limits (Table 4-2a).
- PAH concentrations were detected at levels below all available screening values (Table 4-2a).
- Metal concentrations detected in the SV-23-Composite sample were at levels between approximately 1.03 times (copper) and 1.47 times (silver) above the SF-09 Reference sediments, and exceedances in available criteria were generally for the same analytes in both the SV-23-Composite and the SF-09 (Table 4-2a). These analytes included arsenic, copper, selenium, and silver.
- Total toxic equivalency (TEQ) was measured at 1.19 pg/g, 1.25 pg/g and 1.50 pg/g in the SV-23-Composite, SV-23-DUP, and SF-09 samples, respectively. These values are below the below the SF Bay ambient level (2.90 pg/g) and the results indicate that the TEQ for the proposed dredged materials are less than currently present at SF-09 (Table 4-2b).
- Elutriate and site water samples were below CCC and CMC as well as Montezuma Wetlands acceptance criteria.

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5.1.2 Toxicity Evaluations

Sediments from Station Vallejo and SF-09 were used in SPP and SP exposures to determine compatibility for placement at SF-09, Cullinan Ranch[11], and Montezuma Wetlands. Sample elutriates were prepared using the SET and MET methods, respectively, for SPP exposures. In addition, SP exposures were performed to determine compatibility for placement at SF-09.

- MET
    - Significant toxicity was observed in the 100 percent MET elutriate for *Americamysis bahia*.
    - Sediments are not likely suitable for placement at Cullinan Ranch.
- SET
    - No significant toxicity observed in the 100 percent SET elutriate for *Americamysis bahia.*
    - Significant toxicity was observed in the 50 and 100 percent elutriates for *Mytilus galloprovincialis*.
    - Modeling these results using STFATE showed that the sediment would be non-toxic to existing water column organisms.
    - Sediments likely suitable for placement at SF-09.
- SP
    - No significant toxicity was observed in the SP exposures.
    - Sediments likely suitable for placement at SF-09.

5.2 Disposal Suitability Recommendation

In summary, the results of this Study indicated that the proposed Project dredged materials are likely suitable for placement at SF-09, Cullinan Ranch, or the Montezuma Wetlands.

On 20 March 2024, the DMMO agencies concurred that Cullinan Ranch should also be considered as a viable placement option for the proposed dredged material of the Project, due to its proximity to the Site and option for beneficial reuse. The USCG and WSP had initially concluded from the results of the Study that the proposed dredged material was not suitable for placement at Cullinan Ranch due to concentrations of certain analytes in the elutriate sample (silver and nickel) that exceeded site-specific criteria for dredged material as cover at Cullinan Ranch. During the 20 March 2024 meeting, the RWQCB clarified that because Cullinan Ranch does not create discharge during dredged material placement, toxicity testing and therefore elutriate testing is not required and the proposed dredged material may still be suitable for placement at Cullinan Ranch.

[11] On 20 March 2024, at the DMMO meeting where this SAP Report was presented, USACE clarified that toxicity testing and therefore elutriate testing was not necessary for evaluating placement of the proposed dredged materials at Cullinan Ranch.

6.0 AGENCY SUITABILITY DETERMINATION

The Draft SAP Report was presented to the agencies for review at the DMMO meeting on 20 March 2024. Following the presentation, the agencies requested additional results for PAH analysis on project sediments. Following the receipt of the requested information, the DMMO agencies provided the following suitability determination for the project dredged materials in a letter dated 10 May 2024:

> *At the meeting on March 20, 2024, the DMMO completed its review of the sediment test results presented in the document prepared by WSP USA Environment & Infrastructure Inc. entitled "Sampling and Analysis Plan Report Sediment Characterization Study to Support Maintenance Dredging at Coast Guard Station Vallejo," dated March 2024 and revised April 2024. The test results are for the approximately 23,151 cubic yards of sediment proposed to be dredged to a design depth of -10 feet mean lower low water, plus an overdepth allowance of 2 feet, from an approximately 1.5-acre dredge footprint at the US Coast Guard Station Vallejo, located in the Vallejo Marina, in the City of Vallejo, Solano County, California.*
>
> *The members of the DMMO are recommending to their respective agency's management that the sediment proposed for dredging from the Vallejo Marina, as characterized in the above document, is suitable for unconfined aquatic disposal at an in-Bay disposal site, such as the Carquinez Strait Disposal Site (SF-9), and for beneficial reuse at the Cullinan Ranch Restoration Project and the Montezuma Wetlands Restoration Project.*

Agency correspondence regarding the SUAD determination is included in Appendix F.

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7.0 REFERENCES

American Public Health Association, American Water Works Association, and Water Environment Federation. 1995. *Standard Methods for the Examination of Water and Wastewater*. 19th Edition. Edited by A.D. Eaton, L.S. Clesceri, and A.E. Greenberg. Washington, DC.

Arcadis Design & Consultancy. 2018. *United States Coast Guard Civil Engineering Unit Oakland Sediment Sampling and Analysis Plan Report USACE Per No. PN 2008-00049N Dredge Episode No. 3 BCDC Permit No. C2007.005.04*. August.

ASTM International. 1998. *Standard Guide for Conducting Static Acute Toxicity Tests Starting With Embryos of Four Species of Saltwater Bivalve Molluscs*. ASTM Designation E 724-98.

ASTM International. 1999. *Standard Guide for Conducting 10-Day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods*. ASTM Designation E 1367–99.

ASTM International. 2000. *Standard Guide for Conducting Sediment Toxicity Tests with Marine and Estuarine Polychaetous Annelids*. ASTM Designation E 1611–00.

ASTM International. 2007. *Standard Guide for Conducting Sediment Toxicity Tests With Polychaetous Annelids.* ASTM Designation E 1611-00.

ASTM International. 2008. *Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Invertebrates.* ASTM Designation E 1367-03.

ASTM International. D4464. 2015. *Standard Method for Particle Size Distribution of Catalytic Material by Laser Light Scattering*. ASTM Designation D4464-15.

BB&E Consulting Engineers & Professionals. 2021. *Sediment Sampling and Analysis Report for Maintenance Dredging at United States Coast Guard Station Vallejo California*. January.

Buchman, M.F. 2008. *NOAA Screening Quick Reference Tables*. NOAA OR&R Report 08-1. Seattle Washington: Office of Response and Restoration Division, National Oceanic and Atmospheric Administration. 34 pages.

California Regional Water Quality Control Board, San Francisco Bay Region (Region 2) (RWQCB). 2000. *Staff Report Summary Report –Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines*. March.

California Regional Water Quality Control Board, San Francisco Bay Region (Region 2) (RWQCB). 2010. *Waste Discharge Requirement and Water Quality Certification Order No. R2-2010-0108 for: U.S. Fish and Wildlife Service Cullinan Ranch Restoration Project.* October 14.

California Regional Water Quality Control Board, San Francisco Bay Region (Region 2) (RWQCB). 2012. *Water Quality Control Plan (Basin Plan).* 2012.

California Regional Water Quality Control Board, San Francisco Bay Region (Region 2) (RWQCB). 2016. Environmental Screening Levels Lookup Tables, Revision 3. February. Accessed October 2023. Available at: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml.

CFR Title 29, Part 1910 *(Occupational Safety and Health Standards).* Occupational Safety and Health Administration, Department of Labor. United States Government Accounting Office. E-file current through January 16, 2009.

CFR Title 40 § 131.38. 2023*. Establishment of numeric criteria for priority toxic pollutants for the State of California.* Accessed on 17 October 2023. Available at: https://www.ecfr.gov/current/title-40/section-131.38.

Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi. 1989. *A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Liver from Puget Sound*. *Marine Environmental Research* 27: 1–18.

Lin, D. and J.A. Davis. 2018. *Support for Sediment Bioaccumulation Evaluation: Toxicity Reference Values for San Francisco Bay.* San Francisco Estuary Institute, Richmond, CA. SFEI Contribution #916.

National Oceanic and Atmospheric Administration (NOAA). 1993. *Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects, 1984–1992, Volume IV, Comprehensive Descriptions of Trace Organic Analytical Methods*. July 1993.

Plumb, R.H. 1981. *Procedures for Handling and Chemical Analysis of Sediment and Water Samples*. USEPA/USACE Technical Committee on Criteria for Dredged and Fill Material. AD-A103 788/6. May.

Regional Water Quality Control Board (RWQCB). 2012. *Updated Waste Discharge Requirements, Water Quality Certification, and Rescission of Order No. 00-061 for: Montezuma Wetlands LLC, Montezuma Wetlands Restoration Project, Solano County*. October 1.

Schroeder, P.R., and M.R. Palermo. 1990. *Automated Dredging and Disposal Alternatives Management System User's Guide.* Vicksburg, Mississippi: United States Army Engineer Waterways Experiment Base. Technical Note EEDP-06-12.

Tidepool Scientific Software. 2000–2016. *Comprehensive Environmental Toxicity Information System (CETIS)*. Database. Version 1.8.0.8B.

United States Army Corps of Engineers (USACE) and United States Environmental Protection Agency (USEPA). 1999. *San Francisco District Public Notice 99-4 Proposed Guidance for Sampling and Analysis Plans (Quality Assurance Project Plans) for Dredging Projects within the USACE San Francisco District*. 1 July 1999.

USEPA/USACE (1977). *Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters*. July 1977.

USACE/USEPA. 2001. *Public Notice 01-01: Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region.*

FINAL

USEPA. 1986–1996. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*. SW-846. Third Edition. December 1986, as amended by Updates I (July 1992), II (September 1994), IIA (August 1993), IIB (January 1995), and III (December 1996).

USEPA. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual*. Washington D.C.: USEPA Office of Water (4504F). EPA 503/8-91/001.

USEPA. 1994. *Methods for Assessing the Toxicity of Sediment-associated Contaminants to Estuarine and Marine Amphipods*. Washington DC: USEPA Office of Research and Development. USEPA 600/R-94/025.

USEPA. 1995. *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations (Chemical Evaluations).* USEPA 832-B-95-001.

USEPA. 1996. *Recommendations for Screening Values for Tributyltin in Sediments at Superfund Sites in Puget Sound Washington*. U.S. Environmental Protection Agency.

USEPA. 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review.* U.S. Environmental Protection Agency.

USEPA. 2001. *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual*. USEPA-823-B-01-002. October.

USEPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.* Office of Water. USEPA 821/R-02/012. October.

USEPA. 2004. *Contract Laboratory Program National Functional Guidelines for Inorganics Data Review.* U.S. Environmental Protection Agency.

USEPA/USACE. 1998. *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S: Inland Testing Manual.* EPA 823-B-98-004. February 1998.

Van den Berg, M., L.S. Birnbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, H.

Hakansson, A. Hanberg, L. Haws, M. Rose, S. Safe, D. Schrenk, C. Tohyama, A. Tritscher, J. Tuomisto, M. Tysklind, N. Walker, and R.E. Peterson. 2006. The 2005 World Health Organization reevaluation of human and mammalian toxic equivalency factors for dioxins and dioxin-like compounds. Toxicological Sciences 93(2):223-241.

WSP USA Environment & Infrastructure Solutions, Inc. (WSP). 2023. *Final Sampling and Analysis Plan Sediment Characterization Study to Support Episodic Maintenance Dredging at Coast Guard* Station *Vallejo, Vallejo, California.* 20 December 2023.

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APPENDIX A

AGENCY CORRESPONDENCE AND DESIGN PLANS

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APPENDIX B

VIBRACORE LOGS

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APPENDIX C

VIBRACORE PHOTOLOGS

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APPENDIX D

ANALYTICAL CHEMISTRY REPORTS

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APPENDIX E

TOXICITY TESTING REPORT

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APPENDIX F

AGENCY SUITABILITY DETERMINATION

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APPENDIX A

AGENCY CORRESPONDENCE AND DESIGN PLANS

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Gobbi, Kimbrie

From: Vargas, Jessica M CIV USARMY CESPN (USA) <Jessica.M.Vargas@usace.army.mil>
Sent: Friday, December 8, 2023 10:41 AM
To: Gobbi, Kimbrie
Cc: Hale, Erin E CIV USCG CEU OAKLAND (USA); Popovich, Kaylee; France, Melissa M CIV USARMY CESPN (USA); Saldana, Brianna C CIV (USA); Graham-Davis, Jazzy@Waterboards; Louie, Selina@Waterboards; Brenda Goeden - BCDC (brenda.goeden@bcdc.ca.gov); Soumoy, Pascale@BCDC; Lopez, Jaime@BCDC; bouhedda.fadwa@epa.gov; Siu, Jennifer
Subject: RE: 2023 USCG Station Vallejo Draft SAP - Revised Figure and Proposed Sampling Location Table for DMMO Approval

Hi Kimbrie,

The DMMO has reviewed the revised SAP Table 3-2a and Figure 3-1 for the USCG Station Vallejo maintenance dredging project and agrees with the proposed changes to the sampling plan described in your email and with the compositing and sampling scheme demonstrated in the revised table and figure.

We will follow up with an official SAP approval letter for your records but feel free to use this email as sufficient approval to start your sampling project.

Please let me know if you have any questions.

v/r,

Jessica Vargas
Chief, Dredged Material Management Office
Corps of Engineers, San Francisco District,
Operations and Readiness Division

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Jessica.M.Vargas@usace.army.mil
Phone: 415-254-3328
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From: Gobbi, Kimbrie <kimbrie.gobbi@wsp.com>
Sent: Wednesday, December 6, 2023 3:17 PM
To: Vargas, Jessica M CIV USARMY CESPN (USA) <Jessica.M.Vargas@usace.army.mil>
Cc: Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>; Popovich, Kaylee <kaylee.popovich@wsp.com>
Subject: [Non-DoD Source] 2023 USCG Station Vallejo Draft SAP - Revised Figure and Proposed Sampling Location Table for DMMO Approval

Dear Jessica,

The Draft Sampling and Analysis Plan (SAP) to support 2023 sampling for 2024 Episodic maintenance dredging at United States Coast Guard (USCG) Station Vallejo was presented to the San Francisco Dredged Material Management Office (DMMO) at their regular meeting on December 6, 2023. Agency feedback included the following suggestions for the proposed sampling program:

- Consider performing only confirmatory chemistry testing and no bioassays for the 2023 event.
- Consider a freshwater amphipod for potential bioassay testing depending on the salinity of the site water at the time of sampling for the 2023 event.
- Consider testing only one composite area comprised of six core samples.

In response to these suggestions, the USCG proposes to:

- Collect sediment for bioassay and hold until chemistry testing is complete.
- Test salinity of the site water to ensure that the appropriate amphipod species is chosen for exposure testing if bioassays are performed.
- Collect and analyze one sediment composite comprised of six sediment core samples.

To support these changes to the proposed sampling plan, a revised Table 3-2a and Figure 3-1 are provided for agency review and approval. In the figure, a red (shallow) to green (deep) gradation is used to show depth.

The USCG appreciates the continued opportunity to coordinate with the DMMO on this and future dredging events and requests your review and approval of the attached information at your earliest convenience.

Best regards,

Kimbrie Gobbi
Marine Scientist
(she/her)

M+ 1 443-852-4637

I speak for the trees! Please consider the environment before printing this email!

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DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102-3404

December 11, 2023

Operations and Readiness Division

SUBJECT: File Number 2008-00049: USCG Station Vallejo, Maintenance Dredging, Episode 2; Sampling and Analysis Plan; DMMO Serial Number: 23-081

Erin Hale
U.S. Coast Guard CEU
1301 Clay Street, Suite 700N
Oakland, California 94612-5203

Dear Ms. Hale:

The Dredged Material Management Office (DMMO) is an interagency group comprised of representatives from the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the San Francisco Bay Conservation and Development Commission, the San Francisco Bay Regional Water Quality Control Board, the California State Lands Commission, and state and federal wildlife agencies. At the meeting on December 6, 2023, the DMMO completed its review of the sampling and analysis plan (SAP) presented in the document prepared by WSP USA Environment & Infrastructure Inc. entitled, "Sampling and Analysis Plan Sediment Characterization Study to Support Maintenance Dredging at Coast Guard Station Vallejo, Vallejo, California" dated November 2023 and revised Table 3-2a and Figure 3-1 sent by email. The SAP is for the approximately 23,151 cubic yards of sediment proposed to be dredged to a design depth of -10 feet mean lower low water (MLLW), plus 2 feet of overdredge, from an approximately 1.37-acre dredge area at the at U.S. Coast Guard Station Vallejo, located in the Vallejo Marina, in the City of Vallejo, Solano County, California. The sediment is being tested for placement at an in-Bay disposal site and beneficial re-use.

Please note that the DMMO expects all laboratory data be reported using the DMMO Sediment Testing Data Templates. <u>The data template package should be uploaded prior to the DMMO meeting where the project's SAR is on the Agenda.</u> The DMMO will review the Template QA/QC Report as part of the SAR review. The templates, user manuals, and information on who to contact if you need assistance can be found on the Meeting Area page of the DMMO database website: https://www.dmmosfbay.org/. Please note that failure to upload the sediment characterization data in the requested format may result in delays to your project.

The DMMO has approved the adequacy of the sampling plan as characterized in the above document and revised proposal detailed in an email dated December 6, 2023.

In response to the National Marine Fisheries Service's LTMS Programmatic Essential Fish Habitat consultation reporting requirements, the DMMO is keeping track of the actual dredged acreage, to assess the environmental impacts of maintenance dredging more accurately, compared to the permitted dredge acreage. Please include the approximate acreage of the proposed dredge footprints for this episode in the report of test results report

If you have any questions regarding this matter, please contact Melissa France at (415) 503-6768 or e-mail at Melissa.M.France@usace.army.mil. If you wish to write, please address all correspondence to Melissa France, Operations and Readiness Division and **refer to the file number at the head of this letter and include the dredge episode number.**

Sincerely,

Digitally signed by
Jessica Vargas
Date: 2023.12.11
15:37:31 -08'00'

Jessica M. Vargas
Chief, Dredged Material Management Office
Operations and Readiness Division

Copies Furnished (Electronically):

US EPA, San Francisco, CA, Attn: Jennifer Siu
US NMFS, Santa Rosa, CA, Attn: Sara Azat
CA BCDC, San Francisco, CA, Attn: Brenda Goeden
CA RWQCB, Oakland, CA, Attn: Selina Louie
CA SLC, Sacramento, CA, Attn: Marlene Schroeder
CA DFW, Santa Rosa, CA, Attn: Arn Aarreberg

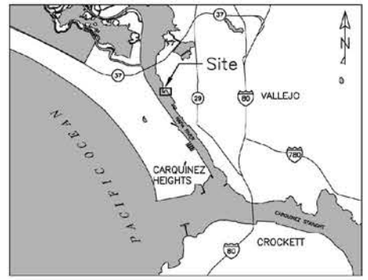
NOTES:

1. BATHYMETRIC DATA IS FROM A SURVEY CONDUCTED BY ETRAC, LLC ON OCTOBER 5, 2022 AND REPRESENTS THE SEA FLOOR CONDITIONS PRESENT ON THAT DATE. THE HYDROGRAPHIC SURVEY WAS CONDUCTED IN ACCORDANCE WITH THE METHODS AND ACCURACIES OUTLINED IN THE CORPS OF ENGINEERS' HYDROGRAPHIC SURVEYING MANUAL (EM 1110-2-1003, NOVEMBER 30, 2013). SOUNDINGS WERE MEASURED USING AN R2SONIC 2020 MULTIBEAM ECHOSOUNDER. POSITION AND MOTION WERE MEASURED USING AN APPLANIX POS M/V INERTIALLY-AIDED GNSS NAVIGATION SYSTEM. SOUND VELOCITY THROUGH THE WATER COLUMN WAS MEASURED USING AN AML BASE X PROFILER.
2. HORIZONTAL DATUM IS NAD83(2011) EPOCH 2010.0000].
3. HORIZONTAL COORDINATE SYSTEM IS CALIFORNIA STATE PLANE COORDINATE SYSTEM, ZONE 2.
4. AERIAL IMAGERY WAS ACQUIRED BY BRICE ENGINEERING, LLC ON OCTOBER 5, 2023 USING A DJI PHANTOM 4 PRO V2 UAV.
5. SOUNDINGS ARE IN FEET BELOW MEAN LOWER LOW WATER (MLLW), REFERENCED TO TIDE STATION "MARE ISLAND" TIDAL EPOCH 2006-2012, NOAA TIDE STATION ID: 9415218. A MEAN OF TWO ONLINE POSITION USER SERVICE (OPUS) SOLUTIONS WAS MADE ON CONTROL POINT "GROTTO" LOCATED SOUTHEAST OF THE PROJECT. THE PUBLISHED OFFSET OF -0.110M (-0.36FT) BETWEEN NAVD88 AND MLLW FOR MARE ISLAND WAS APPLIED TO "GROTTO" TO DETERMINE A MLLW ELEVATION FROM WHICH ALL SURVEY DATA WAS COLLECTED. COORDINATES FOR "GROTTO":

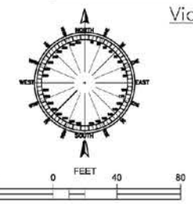
   NORTHING: 1,797,122.95' SFT
   EASTING: 6,486,862.30' SFT
   ELEVATION: 8.93' MLLW.

6. PLANIMETRIC FEATURES AND UPLAND TOPOGRAPHY SURVEYED USING CONVENTIONAL LAND SURVEY PRACTICES AND RTK GPS.
7. MAJOR CONTOURS ARE GENERATED AT 5' INTERVALS, RELATIVE TO MLLW.
8. UNDERLINED SPOT ELEVATIONS (5.) INDICATE ELEVATION ABOVE MLLW.
9. DREDGE DEPTH IS 10 FEET BELOW MLLW.
10. DREDGE VOLUME WAS CALCULATED USING AUTOCAD CIVIL 3D 2020 COMPOSITE VOLUME METHOD AND INCLUDES 2:1 SIDESLOPE:

	BASE	1FT OVER	2FT OVER
NORTH	4,803 CYD	6,100 CYD	7,429 CYD
SOUTH	4,867 CYD	5,831 CYD	6,835 CYD
TOTAL	9,670 CYD	11,931 CYD	14,264 CYD



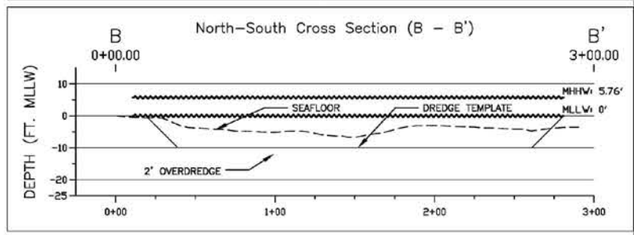
Vicinity Map

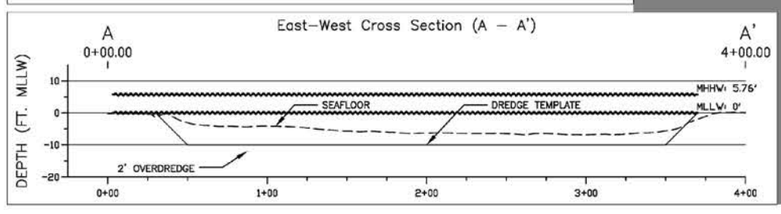


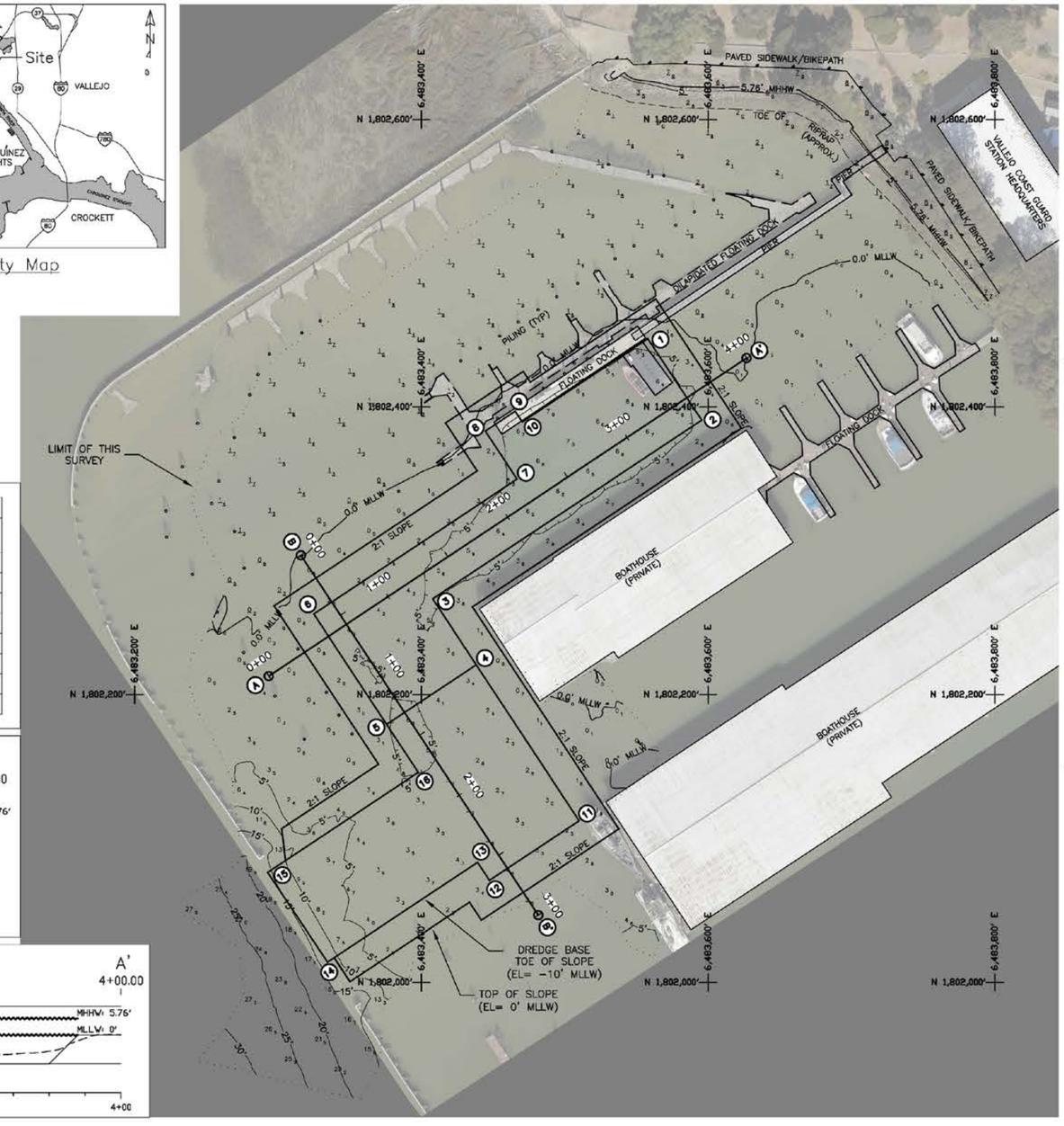
SCALE: 1" = 40'
IF SHEET IS SMALLER THAN 22" X 34", DRAWING IS REDUCED, USE GRAPHIC SCALE.

DREDGE LIMITS NORTH			
POINT #	NORTHING	EASTING	DREDGE ELEVATION
1	1,802,447.51	6,483,557.86	-10'
2	1,802,390.80	6,483,595.48	-10'
3	1,802,256.61	6,483,407.87	-10'
4	1,802,220.75	6,483,438.23	-10'
5	1,802,179.35	6,483,375.69	-10'
6	1,802,256.07	6,483,324.91	-10'
7	1,802,349.86	6,483,456.60	-10'
8	1,802,383.21	6,483,444.52	-10'
9	1,802,397.01	6,483,465.37	-10'
10	1,802,389.55	6,483,470.30	-10'

DREDGE LIMITS SOUTH			
POINT #	NORTHING	EASTING	DREDGE ELEVATION
4	1,802,220.75	6,483,438.23	-10'
5	1,802,179.35	6,483,375.69	-10'
11	1,802,112.35	6,483,509.99	-10'
12	1,802,070.95	6,483,447.45	-10'
13	1,802,083.45	6,483,439.17	-10'
14	1,802,014.17	6,483,334.50	-10'
15	1,802,076.45	6,483,292.71	-10'
16	1,802,146.00	6,483,397.77	-10'







CONSULTANTS

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.
9177 SKY PARK COURT
SAN DIEGO, CA 92123

BRICE ENGINEERING, LLC
3700 CENTERPOINT DR STE 8223
ANCHORAGE, AK 99503

U. S. COAST GUARD
CIVIL ENGINEERING UNIT
OAKLAND

USCG, CEU OAKLAND
1301 CLAY ST, SUITE 700N
OAKLAND, CALIFORNIA 94612

ISSUE		
MARK	DATE	DESCRIPTION

A/E PROJECT NO:
CAD FILE NAME: 2023_USCG_STA_VALLEJO_V2.dwg
DESIGNED BY: JA
DRAWN BY: JA
EDITED BY: JA
CHECKED BY: JA

SCALE: 1"=40' PLOT SCALE: 1:1
SHEET TITLE: CONDITION SURVEY

HYDROGRAPHIC SURVEY
STATION VALLEJO
VALLEJO, CA
STATION VALLEJO
CIVIL
CONDITION SURVEY

PREPARED BY: REVIEWED BY: REVIEWED BY:
PROJECT MGR DIVISION CHIEF
APPROVED BY:
TECHNICAL DIRECTOR DATE

PROJECT NUMBER: 18786997
DRAWING NUMBER:
DISCIPLINE/SHT NO: V-101
SHEET 1 OF 1

Path: X:\US\USPDX800-POR\ClientData\USCG - Coast Guard\336010031 - USCG Mooring Ballast Point\Vallejo\Figure 3-2 - Proposed Dredging Area and Representative Cross Sections.mxd, USSD715014 11/14/2023

FIGURE 3-2

Proposed Dredging Area and Representative Cross Sections
United States Coast Guard Station Vallejo
Maintenance Dredging
Vallejo, California

Gobbi, Kimbrie

From: France, Melissa M CIV USARMY CESPN (USA) <Melissa.M.France@usace.army.mil>
Sent: Tuesday, February 13, 2024 1:38 PM
To: Hale, Erin E CIV USCG CEU OAKLAND (USA)
Cc: Siu, Jennifer; Sara Azat - NOAA Federal; Louie, Selina@Waterboards; Graham-Davis, Jazzy@Waterboards; Kim Squires; Gobbi, Kimbrie; Hollenbeck, Kiera J LT USCG CEU OAKLAND (USA); Larsson, Ingrid; Goeden, Brenda@BCDC; Vargas, Jessica M CIV USARMY CESPN (USA)
Subject: RE: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049
Signed By: melissa.m.france@usace.army.mil

Hi Erin,

Sorry I'm late to the party. I had to gather my thoughts on the matter and consult with Jessica. The Corps can process this under RGP 5 for emergencies. Upon receipt of a notification, the Corps will immediately notify the appropriate offices of the EPA, the U.S. Fish and Wildlife Service (I added Kim Squires to the thread), NMFS, the California Department of Fish and Wildlife (CDFW), the Regional Water Quality Control Boards (RWQCB), and BCDC, etc.

Here's what we are going to need:

1. A project description: how much material, proposed disposal location, and the area to be dredged.
2. Any preliminary test results. I know the SAP has been recently approved so if you have any test results, please provide that information
3. A brief, but clear, description of the imminent threat to life or property and the proposed project's purpose and need;

Any projects authorized under this RGP must be initiated within seven 7 days of receiving authorization to proceed. Will you be able to mobilize within the 7 days? When do you plan on starting? What effects will the upcoming increment weather have on the proposed area?

Here is the link for the RGP 5 for a complete list of what is needed.
https://www.spn.usace.army.mil/Missions/Regulatory/Permitting/Emergency/

Please don't hesitate to contact me if you have any questions.

v/r,

Melissa France
Senior Project Manager
US Army Corps of Engineers, San Francisco District,
Operations and Readiness Division, Dredged Material Management Office
Phone: (415) 503-6768
Email: Melissa.M.France@usace.army.mil

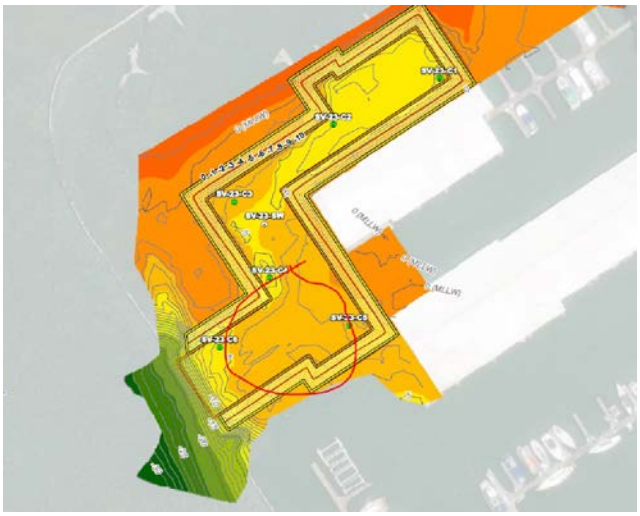
Website:
http://www.spn.usace.army.mil/Missions/Dredging-Work-Permits

From: Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>
Sent: Monday, February 12, 2024 4:33 PM
To: Goeden, Brenda@BCDC <brenda.goeden@bcdc.ca.gov>; France, Melissa M CIV USARMY CESPN (USA) <Melissa.M.France@usace.army.mil>

Cc: Siu, Jennifer <Siu.Jennifer@epa.gov>; Sarah Azat (Sara.Azat@noaa.gov) <sara.azat@noaa.gov>; Louie, Selina@Waterboards <Selina.Louie@waterboards.ca.gov>; Graham-Davis, Jazzy@Waterboards <Jazzy.Graham-Davis@Waterboards.ca.gov>
Subject: RE: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

The area circled is my guess on where they are getting stuck (The deeper the orange the shallower the water).

It doesn't appear to be a small mound we can knock about.



From: Goeden, Brenda@BCDC <brenda.goeden@bcdc.ca.gov>
Sent: Monday, February 12, 2024 4:27 PM
To: France, Melissa M CIV USARMY CESPN (USA) <Melissa.M.France@usace.army.mil>
Cc: Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>; Siu, Jennifer <Siu.Jennifer@epa.gov>; Sarah Azat (Sara.Azat@noaa.gov) <sara.azat@noaa.gov>; Louie, Selina@Waterboards <Selina.Louie@waterboards.ca.gov>; Graham-Davis, Jazzy@Waterboards <Jazzy.Graham-Davis@Waterboards.ca.gov>
Subject: [Non-DoD Source] FW: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

HI Melissa,

I see that Jessica is in training all week – you'll need to jump into this conversation – start at the bottom…

Best,

Brenda

From: Goeden, Brenda@BCDC
Sent: Monday, February 12, 2024 4:23 PM
To: Siu, Jennifer <Siu.Jennifer@epa.gov>; Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>; Vargas, Jessica M CIV USARMY CESPN (US) <Jessica.M.Vargas@usace.army.mil>; Louie, Selina@Waterboards <Selina.Louie@waterboards.ca.gov>; Olah, Ryan <ryan_olah@fws.gov>; brian.meux@noaa.gov; Melissa.M.France@usace.army.mil; Sarah Azat (Sara.Azat@noaa.gov) <sara.azat@noaa.gov>
Cc: Hollenbeck, Kiera J LT USCG CEU OAKLAND (USA) <Kiera.J.Hollenbeck@uscg.mil>; Gobbi, Kimbrie <kimbrie.gobbi@wsp.com>; Larsson, Ingrid <ingrid.larsson@wsp.com>
Subject: RE: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

HI All,

Sorry for the resend, but looks like Jessica's email was wrong.

Brenda

From: Goeden, Brenda@BCDC
Sent: Monday, February 12, 2024 4:22 PM
To: Siu, Jennifer <Siu.Jennifer@epa.gov>; Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>; jessica.m.varges@usace.mil; Louie, Selina@Waterboards <Selina.Louie@waterboards.ca.gov>; Olah, Ryan <ryan_olah@fws.gov>; brian.meux@noaa.gov; Melissa.M.France@usace.army.mil; Sarah Azat (Sara.Azat@noaa.gov) <sara.azat@noaa.gov>
Cc: Hollenbeck, Kiera J LT USCG CEU OAKLAND (USA) <Kiera.J.Hollenbeck@uscg.mil>; Gobbi, Kimbrie <kimbrie.gobbi@wsp.com>; Larsson, Ingrid <ingrid.larsson@wsp.com>
Subject: RE: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

HI Jenn and Team,

Jumping in here for a minute. I believe the USCG will find that a knockdown really won't work because they are within the Vallejo Municipal Marina and it has not been dredged for several years. As understand it the entire marina is impacted by sediment and has a number of boats sitting on the mud at lower tides. I am afraid the only likely place that they'd be able to knockdown into is the fairway or entrance channel which is probably not a good solution.

Erin and Team, please correct me if I am mistaken.

Best,

Brenda

From: Siu, Jennifer <Siu.Jennifer@epa.gov>
Sent: Monday, February 12, 2024 3:07 PM
To: Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>; jessica.m.varges@usace.mil; Louie, Selina@Waterboards <Selina.Louie@waterboards.ca.gov>; Olah, Ryan <ryan_olah@fws.gov>; brian.meux@noaa.gov; Melissa.M.France@usace.army.mil; Goeden, Brenda@BCDC <brenda.goeden@bcdc.ca.gov>
Cc: Hollenbeck, Kiera J LT USCG CEU OAKLAND (USA) <Kiera.J.Hollenbeck@uscg.mil>; Gobbi, Kimbrie <kimbrie.gobbi@wsp.com>; Larsson, Ingrid <ingrid.larsson@wsp.com>
Subject: RE: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

Erin, would a knockdown effort as opposed to 'dredge and remove' do anything?

Jennifer D. Siu (she/her)
Wetlands Section, WTR 2-2
Water Division
USEPA, Region 9
(415) 972-3983
Siu.Jennifer@epa.gov

If you will stay close to the simplicity of nature, to the small things hardly noticeable, those things can become great and immeasureable - Rilke

From: Hale, Erin E CIV USCG CEU OAKLAND (USA) <Erin.E.Hale@uscg.mil>
Sent: Monday, February 12, 2024 2:53 PM
To: Siu, Jennifer <Siu.Jennifer@epa.gov>; jessica.m.varges@usace.mil; Selina.Louie@waterboards.ca.gov; Olah, Ryan <ryan_olah@fws.gov>; brian.meux@noaa.gov; Melissa.M.France@usace.army.mil; Brenda Goeden - BCDC (brenda.goeden@bcdc.ca.gov) <brenda.goeden@bcdc.ca.gov>

Cc: Hollenbeck, Kiera J LT USCG CEU OAKLAND (USA) <Kiera.J.Hollenbeck@uscg.mil>; Gobbi, Kimbrie <kimbrie.gobbi@wsp.com>; Larsson, Ingrid <ingrid.larsson@wsp.com>
Subject: U.S. Coast Guard Sta Vallejo - Emergency Request - USACE File 2008-00049

Good morning all, we have a bit of an emergency situation.

We are getting very shallow at Sta Vallejo. We originally had been working on our dredge packages for this upcoming work window, but as of today our search and rescue operations and spill response operations are impacted and vessels cannot leave the station (or can only briefly leave at high tide and hope they can get back in for hotel services).

We are generally able to avoid these situations and I cannot remember the last time we had to do an emergency dredge at any station. With the extra snow melt last year - and king tides - we are seeing a lot more sediment infill. Although we have been able to avoid emergencies like this previously, we do always have a Plan B! Plan B includes use of another facility within the area of response while we wait for the IWWW to open. However, with the recent storms we had damages to our docks at some other stations and no longer have a plan B. Further, the vessels at those stations need to be relocated and Sta Vallejo is their designated back up plan.

Long story – short need. What will it take for approval for an out of season / emergency dredge to get Sta. Vallejo operational ASAP (or as soon as our contracting can get a bid package out)? I am eyeing RPG 5 - Repair and Protection Activities in Emergency Situations: An "emergency situation" is present where there is a clear, sudden, unexpected, and imminent threat to life or property demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property or essential public services (i.e., a situation that could potentially result in an unacceptable hazard to life or a significant loss of property if corrective action requiring a permit is not undertaken immediately.

Facility Dredge Permit Status:

USACE: 2008-00049N – Valid through 2031
BCDC CZMA: C2007.005.07 – Valid through July 1, 2031
ESA/EFH – Authorized through the USACE Long-Term Management Strategy programmatic(s) for work within the IWWW. Will we need an exception?
401 WQ Cert – Currently in review. Last project was a single event authorization.
Suitability Determination – pending final labs and report. Have most of the lab analysis back but not all.

Disposal – Preliminary results indicate SF-9 is likely appropriate or worst-case Montezuma disposal.

Thank you in advance for your assistance as we navigate this critical request,

Erin

Erin Hale
Environmental Protection Specialist
US Coast Guard
Civil Engineering Unit Oakland
1301 Clay Street, Suite 700N
Oakland, CA 94612
571-607-0945

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APPENDIX B

VIBRACORE LOGS

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Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C1
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.111087
Date:	12/12/2023	**Longitude:**	-122.271366
Time:	0845	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	9.7	**Project Depth to Overdredge (ft MLLW):**	-5.3
Tide (ft):	4.4	**Target Penetration (ft):**	7.7
Mudline Elevation (ft MLLW):	-5.3	**Actual Penetration (ft):**	9.9
Sample Type:		**Recovered Core Length (ft):**	9.7

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Very soft, wet, homogeneous, low plasticity. sticky
0.5						
1.0						LF-23-SV-1 = 0 to 3.6'
						LF-23-SV-3 = 0 to 2'
1.5						LF-23-SV-4 = 2' to 4'
2.0						
2.5						
3.0						
3.5			Dark olive gray	5Y 3/2	Strong	Black fibers at 3.6', strong odor
4.0						LF-23-SV-2 = 3.6 to 6.7'
						LF-23-SV-5 = 3.6' to 5.0'
4.5						
5.0						LF-23-SV-6 = 5.0 to 6.7'
5.5						
6.0						
6.5						
7.0						Z-layer sample A 6.7' to 7.2' Coloring mottled 6.6' to end
7.5						Discard overpenetration 7.2' to 9.7'
8.0						End of target penetration
8.5						
9.0						
9.5						
10.0						Bottom of boring at 9.7'

Additional Notes: Lost material in catcher, (small amount ~0.2').

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C2
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.110942
Date:	12/12/2023	**Longitude:**	-122.271804
Time:	1315	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	11.8	**Project Depth to Overdredge (ft MLLW):**	-5.7
Tide (ft):	6.1	**Target Penetration (ft):**	7.3
Mudline Elevation (ft MLLW):	-5.7	**Actual Penetration (ft):**	8.0
Sample Type:		**Recovered Core Length (ft):**	7.3

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, non-plastic
0.5						
1.0						LF-23-SV-13 = 0' to 1'
1.5						LF-23-SV-14 = 1' to 2'
2.0						LF-23-SV-15 = 2' to 3'
2.5						
3.0			Dark olive gray	5Y 3/2		Colors mottled befow 3.0' Clay % increases with depth
3.5						LF-23-SV-16 = 3' to 4'
4.0						LF-23-SV-17 = 4' to 5'
4.5						
5.0						LF-23-SV-18 = 5' to 6'
5.5						
6.0						
6.5						Z-layer at 6.3' to 6.8' SV-23-C2-Z
7.0						Overpenetration; discard
7.5						Bottom of boring at 7.3'
8.0						
8.5						
9.0						
9.5						
10.0						

Additional Notes: Soft plug.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C3
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.110722
Date:	12/12/2023	**Longitude:**	-122.272163
Time:	1410	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	9.0	**Project Depth to Overdredge (ft MLLW):**	-4.0
Tide (ft):	5.0	**Target Penetration (ft):**	9.0
Mudline Elevation (ft MLLW):	-4.0	**Actual Penetration (ft):**	9.0
Sample Type:		**Recovered Core Length (ft):**	8.0

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, non-plastic, sticky
0.5						LF-23-SV-19 = 0' to 3'
1.0						
1.5						
2.0						
2.5						
3.0						LF-23-SV-20 = 3' to 6'
3.5						
4.0			Dark olive gray	5Y 3/2		
4.5						
5.0						
5.5						Clay content increases with depth
6.0						LF-23-SV-21 = 6' to 8'
6.5						
7.0						
7.5						
8.0						Bottom of boring at 8.0' No Z-layer
8.5						
9.0						
9.5						
10.0						

Additional Notes: Small soft plug. No Z-layer. Sediment is too soft. Fell out.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C3
Project No.	336010031	**Attempt Number:**	2
Logged and Sampled By:	KG/KP	**Latitude:**	38.110719
Date:	12/12/2023	**Longitude:**	-122.272165
Time:	1430	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	8.7	**Project Depth to Overdredge (ft MLLW):**	-4.2
Tide (ft):	4.5	**Target Penetration (ft):**	8.8
Mudline Elevation (ft MLLW):	-4.2	**Actual Penetration (ft):**	9.8
Sample Type:		**Recovered Core Length (ft):**	8.0

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, non-plastic
0.5						LF-23-SV-22 = 0' to 3'
1.0						
1.5						
2.0						
2.5						
3.0						LF-23-SV-23 = 3' to 6'
3.5			Dark olive gray	5Y 3/2		
4.0						Clay % increases with depth
4.5						
5.0						
5.5						
6.0						LF-23-SV-24 = 6' to 8'
6.5						
7.0						
7.5						
8.0						Bottom of boring at 8.0' No Z-layer
8.5						
9.0						
9.5						
10.0						

Additional Notes: Combined with attempt 1. Collected for Z-layer recovery; however the result was the same.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C4
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.110472
Date:	12/13/2023	**Longitude:**	-122.272031
Time:	1025	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	12.5	**Project Depth to Overdredge (ft MLLW):**	-6.9
Tide (ft):	5.6	**Target Penetration (ft):**	6.1
Mudline Elevation (ft MLLW):	-6.9	**Actual Penetration (ft):**	8.6
Sample Type:		**Recovered Core Length (ft):**	7.4

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, non-plastic
0.5			Dark olive gray	5Y 3/2		
1.0						
1.5						Mottled coloration
2.0						Clay increases with depth
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
						Z-layer 5.1' to 5.6' SV-23-Z-C4
5.5						
						Overpenetration, discard
6.0						
6.5						
7.0						
7.5						Bottom of boring at 7.4'
8.0						
8.5						
9.0						
9.5						
10.0						

Additional Notes:

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C5
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.110329
Date:	12/12/2023	**Longitude:**	-122.271719
Time:	1025	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	8.7	**Project Depth to Overdredge (ft MLLW):**	-2.4
Tide (ft):	6.3	**Target Penetration (ft):**	10.6
Mudline Elevation (ft MLLW):	-2.4	**Actual Penetration (ft):**	10.5
Sample Type:		**Recovered Core Length (ft):**	7.3

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, homogeneous, low plasticity
0.5						LF-23-SV-07 = 0' to 2'
1.0			Dark olive gray	5Y 3/2		Coloring is mottled below 1.0'
1.5						
2.0						LF-23-SV-10 = 2' to 4'
2.5						
3.0						
3.5						Clay content increases with depth
4.0						LF-23-SV-12 = 4' to 6'
4.5						
5.0						
5.5						
6.0						
6.5						
7.0						
7.5						Bottom of boring at 7.3'
8.0						
8.5						
9.0						
9.5						
10.0						

Additional Notes: No plug. Lost bottom of core on retrieval. Core rejected, not 75% recovery. RCRA archive only.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C5
Project No.	336010031	**Attempt Number:**	2
Logged and Sampled By:	KG/KP	**Latitude:**	38.110362
Date:	12/12/2023	**Longitude:**	-122.271720
Time:	1100	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	9.3	**Project Depth to Overdredge (ft MLLW):**	-2.7
Tide (ft):	6.6	**Target Penetration (ft):**	10.3
Mudline Elevation (ft MLLW):	-2.07	**Actual Penetration (ft):**	11
Sample Type:		**Recovered Core Length (ft):**	7.2

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Very soft, wet, homogeneous, non-plastic, sticky
0.5						LF-23-SV-11 = whole core A
1.0						
1.5						
2.0						
2.5						
3.0						Clay content increases with depth
3.5			Dark olive gray	5Y 3/2		Black fibers at 3.6'
4.0						
4.5						
5.0						
5.5						
6.0						
6.5						
7.0						Black fibers at 6.7'
7.5						Bottom of boring at 7.2'
8.0						
8.5						
9.0						
9.5						
10.0						

Additional Notes: Small plug. Not 75% recovery. No sample.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C5
Project No.	336010031	**Attempt Number:**	3
Logged and Sampled By:	KG/KP	**Latitude:**	38.110324
Date:	12/12/2023	**Longitude:**	-122.271777
Time:	1140	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	9.5	**Project Depth to Overdredge (ft MLLW):**	-2.8
Tide (ft):	6.2	**Target Penetration (ft):**	10.2
Mudline Elevation (ft MLLW):	-2.8	**Actual Penetration (ft):**	11
Sample Type:		**Recovered Core Length (ft):**	8.5

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, low plasticity
0.5						LF-23-SV-08 = 0' to 4'
1.0						
			Dark olive gray	5Y 3/2		
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						LF-23-SV-09 = 4' to 8.5'
4.5						Clay content increases with depth
5.0						
5.5						
6.0						
6.5						
7.0						
7.5						
8.0						
8.5						Bottom of boring at 8.5' No Z-layer
9.0						
9.5						
10.0						

Additional Notes: No plug. 78% recovery. No Z-layer.

Project:	USCG Station Vallejo Sediment Characterization	**Log of Station ID:**	SV-23-C6
Project No.	336010031	**Attempt Number:**	1
Logged and Sampled By:	KG/KP	**Latitude:**	38.110263
Date:	12/13/2023	**Longitude:**	-122.272217
Time:	0850	**Project Depth (ft MLLW):**	-10, -13 to OD + Z layer
Water Depth (ft):	9.0	**Project Depth to Overdredge (ft MLLW):**	-5.1
Tide (ft):	3.9	**Target Penetration (ft):**	7.9
Mudline Elevation (ft MLLW):	-5.1	**Actual Penetration (ft):**	8.9
Sample Type:		**Recovered Core Length (ft):**	7.5

Depth in Feet	Lithology	Sediment Description	Color	Munsell Color Notation	Odor	Remarks
0.0		Clayey silt	Olive gray	5Y 4/2	None	Soft, wet, very homogeneous, non-plastic
0.5						
1.0						
1.5						
2.0						
2.5			Dark olive gray	5Y 3/2		Mottled coloration
3.0						
3.5						
4.0						Clay content increases with depth
4.5						
5.0						
5.5						
6.0						
6.5						
7.0						Z-layer at 6.9' to 7.4' SV-23-06-Z
7.5						Overpenetration, discard Bottom of boring at 7.5'
8.0						
8.5						
9.0						
9.5						
10.0						

Additional Notes:

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APPENDIX C

VIBRACORE PHOTOLOGS

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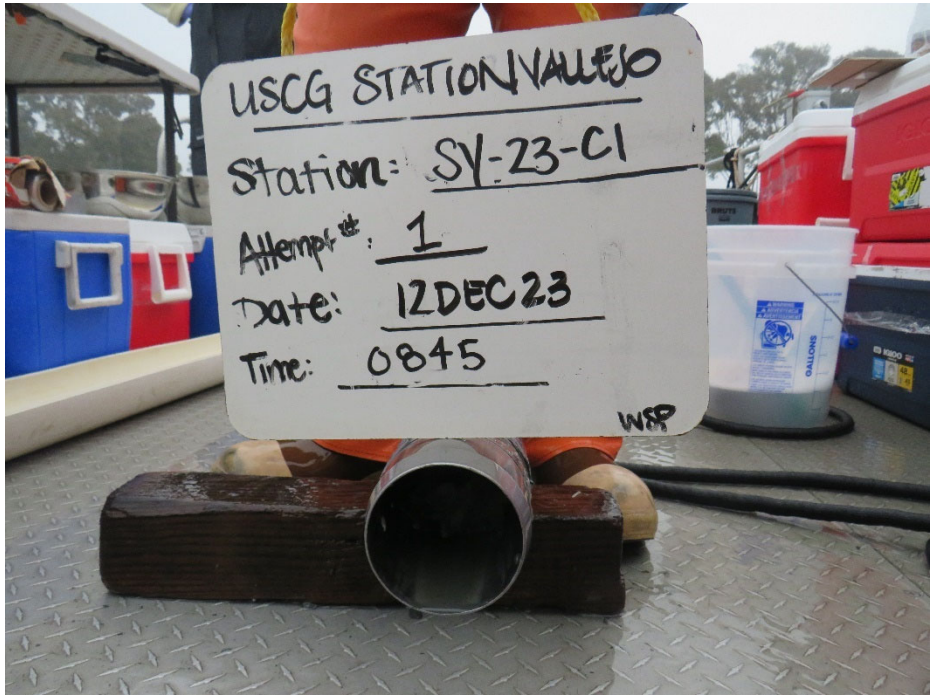
Location: USCG Station Vallejo
Sample ID: SF-09 Reference
Attempt #: 1
Sample Type: Pipe Dredge Composite Sample
Sample Date and Time: 12/11/23 1315

Location: USCG Station Vallejo
Sample ID: SF-09 Reference
Attempt #: 1
Sample Type: Pipe Dredge Composite Sample - Closeup
Sample Date and Time: 12/11/23 1315



Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: Plug
Sample Date and Time: 12/12/23 0845

Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: Plug Closeup
Sample Date and Time: 12/12/23 0845

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: 0 to 2 feet
Sample Date and Time: 12/12/23 0845

Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: 2 to 4 feet
Sample Date and Time: 12/12/23 0845

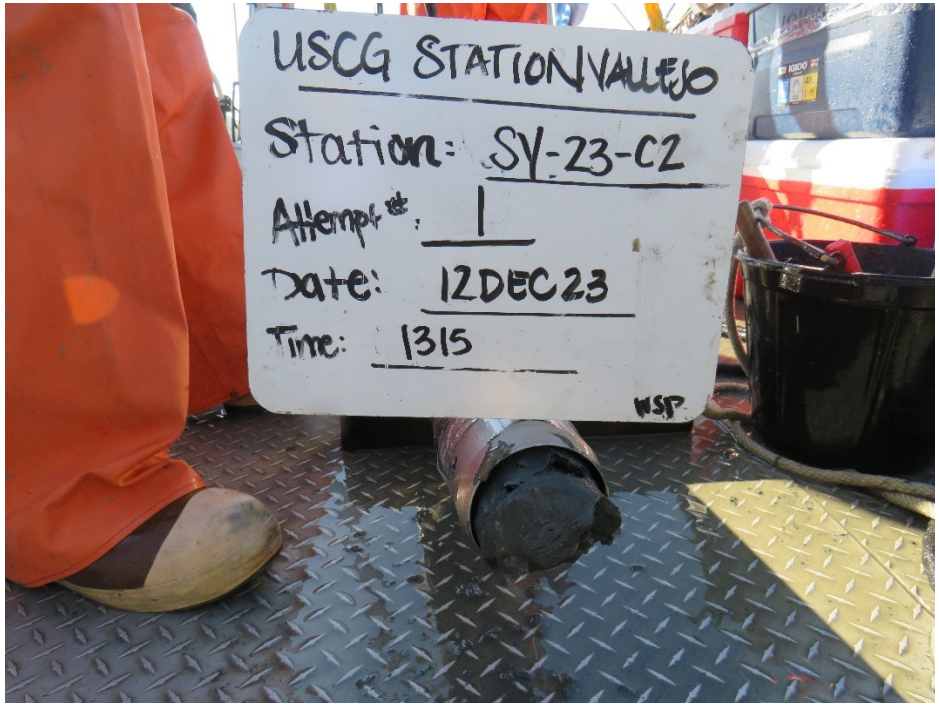
Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: 4 to 6 feet
Sample Date and Time: 12/12/23 0845

Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: 6 to 8 feet
Sample Date and Time: 12/12/23 0845

Location: USCG Station Vallejo
Sample ID: SV-23-C1
Attempt #: 1
Core Length: 8 to 9.7 feet
Sample Date and Time: 12/12/23 0845

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

Project No: 336010031.03.005

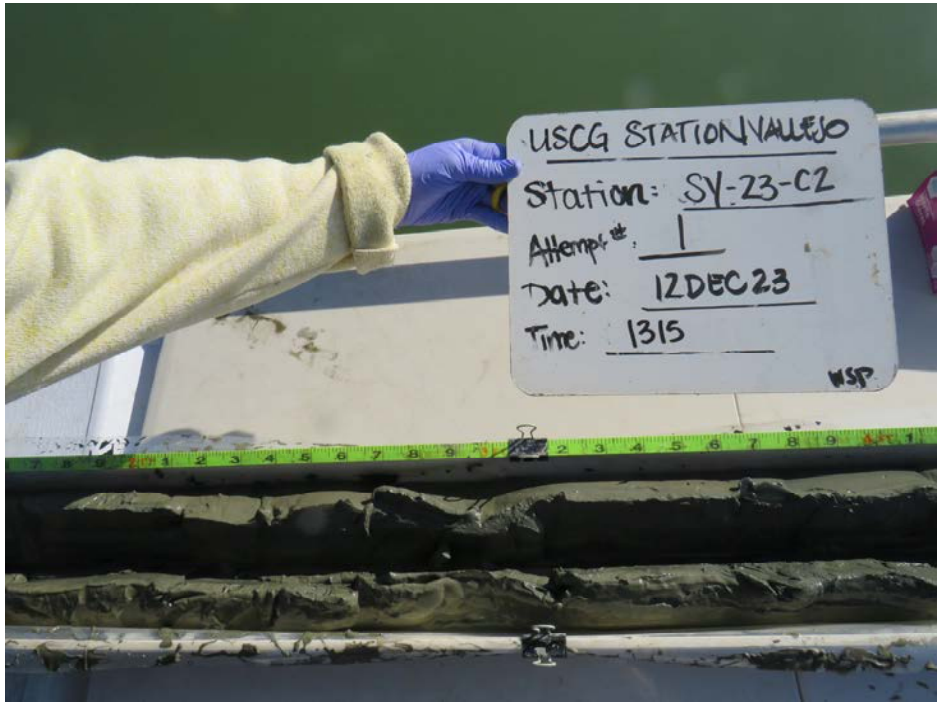


Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: Plug
Sample Date and Time: 12/12/23 1315

Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: Plug Closeup
Sample Date and Time: 12/12/23 1315

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

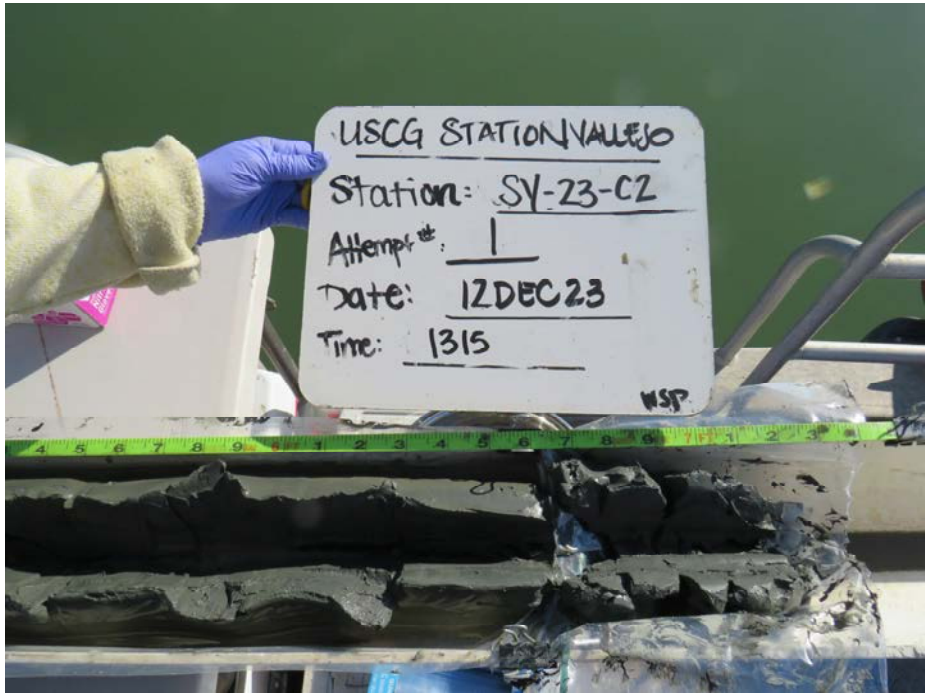
Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: 0 to 2 feet
Sample Date and Time: 12/12/23 1315



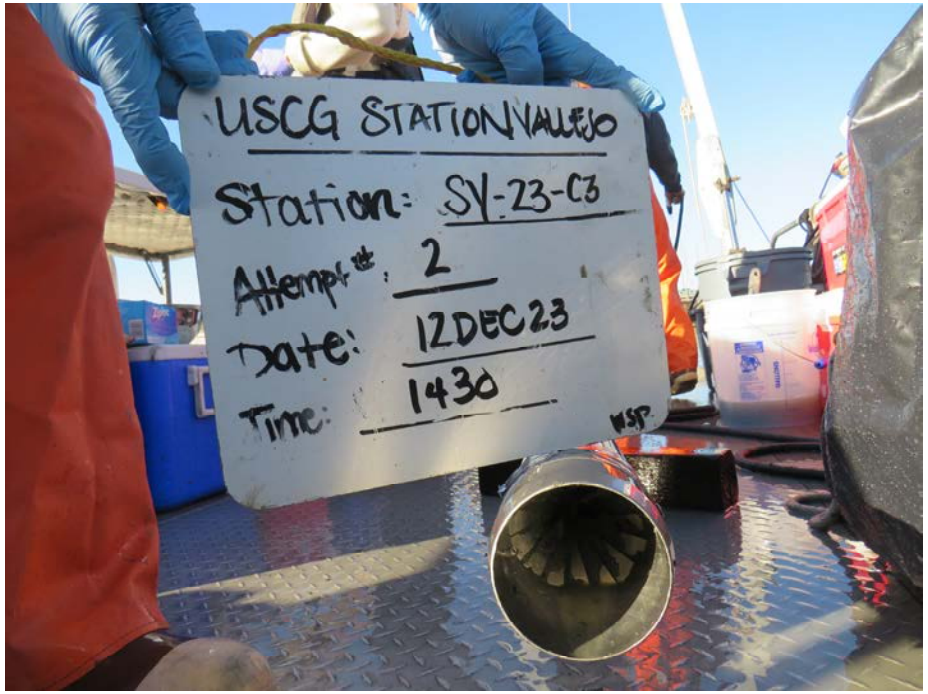
Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: 2 to 4 feet
Sample Date and Time: 12/12/23 1315

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: 4 to 6 feet
Sample Date and Time: 12/12/23 1315



Location: USCG Station Vallejo
Sample ID: SV-23-C2
Attempt #: 1
Core Length: 6 to 7.3 feet
Sample Date and Time: 12/12/23 1315



Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: Plug
Sample Date and Time: 12/12/23 1430

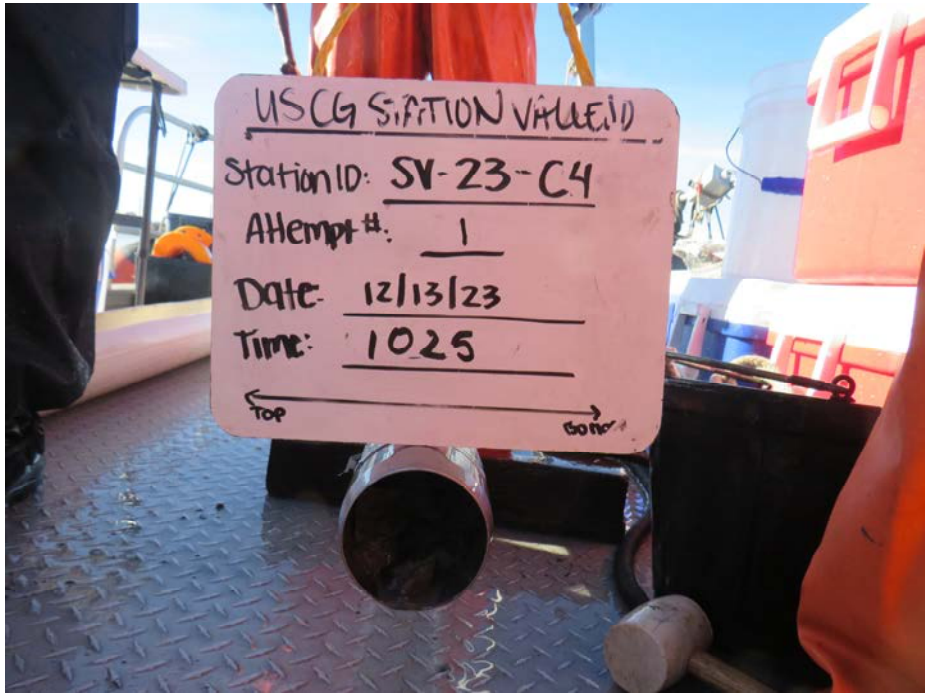
Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: Plug Closeup
Sample Date and Time: 12/12/23 1430

Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: 0 to 2 feet
Sample Date and Time: 12/12/23 1430

Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: 2 to 4 feet
Sample Date and Time: 12/12/23 1430

Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: 4 to 6 feet
Sample Date and Time: 12/12/23 1430

Location: USCG Station Vallejo
Sample ID: SV-23-C3
Attempt #: 2
Core Length: 6 to 8 feet
Sample Date and Time: 12/12/23 1430



Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: Plug
Sample Date and Time: 12/13/2023 1025

Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: Plug Closeup
Sample Date and Time: 12/13/2023 1025

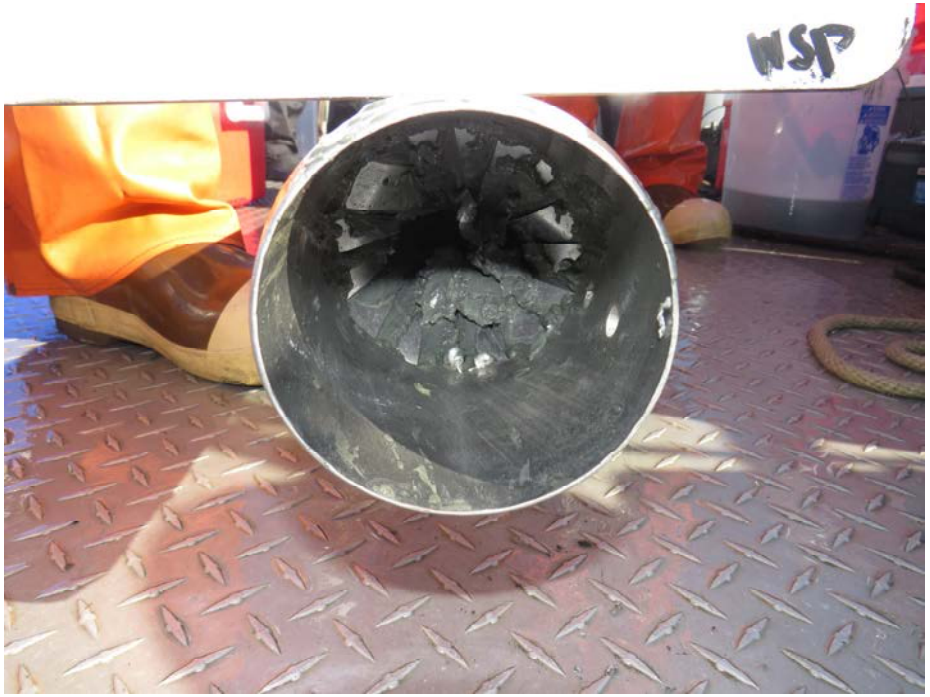
Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: 0 to 2 feet
Sample Date and Time: 12/13/2023 1025

Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: 2 to 4 feet
Sample Date and Time: 12/13/2023 1025

Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: 4 to 6 feet
Sample Date and Time: 12/13/2023 1025

Location: USCG Station Vallejo
Sample ID: SV-23-C4
Attempt #: 1
Core Length: 6 to 7.4 feet
Sample Date and Time: 12/13/2023 1025

Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: Plug
Sample Date and Time: 12/12/2023 1140



Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: Plug Closeup
Sample Date and Time: 12/12/2023 1140

Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: 0 to 2 feet
Sample Date and Time: 12/12/2023 1140

Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: 2 to 4 feet
Sample Date and Time: 12/12/2023 1140

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

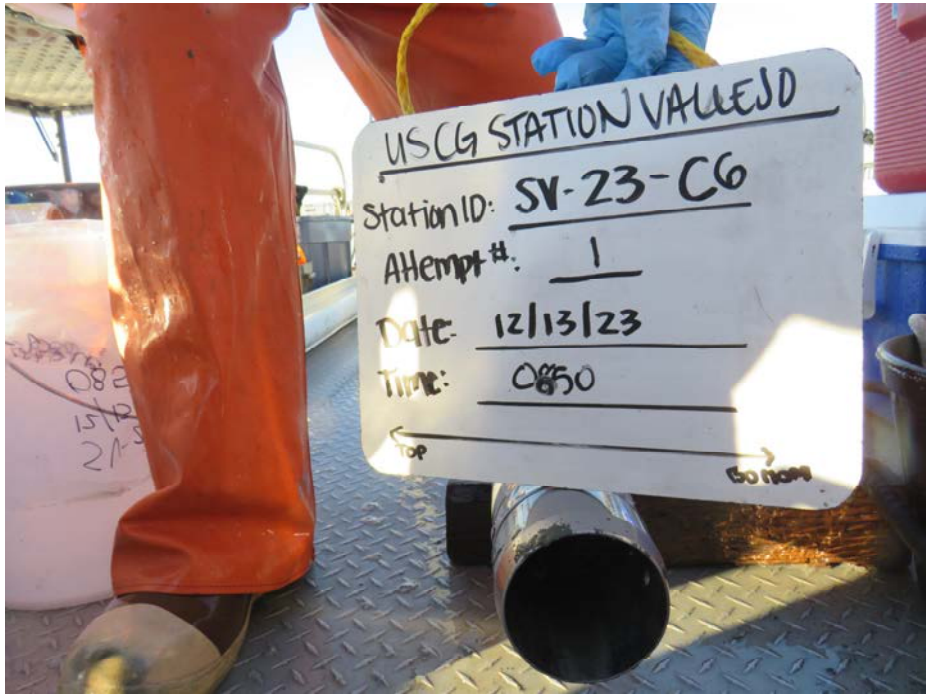
Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: 4 to 6 feet
Sample Date and Time: 12/12/2023 1140

Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: 6 to 8 feet
Sample Date and Time: 12/12/2023 1140

Location: USCG Station Vallejo
Sample ID: SV-23-C5
Attempt #: 3
Core Length: 8 to 8.5 feet
Sample Date and Time: 12/12/2023 1140

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

Project No: 336010031.03.005



Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: Plug
Sample Date and Time: 12/13/2023 0850

Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: Plug Closeup
Sample Date and Time: 12/13/2023 0850

Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: 0 to 2 feet
Sample Date and Time: 12/13/2023 0850

Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: 2 to 4 feet
Sample Date and Time: 12/13/2023 0850

Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: 4 to 6 feet
Sample Date and Time: 12/13/2023 0850

Location: USCG Station Vallejo
Sample ID: SV-23-C6
Attempt #: 1
Core Length: 6 to 7.5 feet
Sample Date and Time: 12/13/2023 0850

USCG Station Vallejo 2024 Maintenance Dredging
Vallejo, California
December, 2023

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APPENDIX D

ANALYTICAL CHEMISTRY REPORTS

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

April 05, 2024

Kimbrie Gobbi
WSP USA
9177 Sky Park Ct
San Diego, CA 92123-

Project Name: USCG SV Sediment Characterization Study PO# F01400148
Physis Project ID: 2208006-003

Dear Kimbrie,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 12/14/2023. A total of 3 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Particle Size Distribution by SM 2560 D
Elements
Trace Metals by EPA 6020
Trace Mercury by EPA 245.7
Organics
Toxaphene w/ OCPs by EPA 8270E-NCI
Total Organic Carbon by EPA 9060
Polynuclear Aromatic Hydrocarbons by EPA 8270E
Percent Solids by SM 2540 B
Organotins by Krone et al., 1989
Organochlorine Pesticides & PCB Congeners by EPA 8270E
Subcontract
Dibenzo-Dioxins/Furans by EPA 1613B/8290

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,
Rachel Hansen
Rachel Hansen
714 602-5320
Extension 203

rachelhansen@physislabs.com

1904 E. Wright Circle Anaheim, CA 92806 (714) 602-5320 fax (714) 602-5321 www.physislabs.com CA ELAP #2769

PROJECT SAMPLE LIST

WSP USA

PHYSIS Project ID: 2208006-00

USCG SV Sediment Characterization Study PO# F01400148

Total Samples: 3

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
113486	SV-23-Composite	S	12/12/2023	8:45	Sediment	Not Specified
113487	SV-23-DUP	S	12/12/2023	8:45	Sediment	Not Specified
113488	SF-09 Reference	S	12/11/2023	13:15	Sediment	Not Specified

1904 E. Wright Circle Anaheim, CA 92806 (714) 602-5320 fax (714) 602-5321 www.physislabs.com CA ELAP #2769

ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

1904 E. Wright Circle Anaheim, CA 92806 (714) 602-5320 fax (714) 602-5321 www.physislabs.com CA ELAP #2769

QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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CASE NARRATIVE

QUALIFIER NOTES

In addition to the use of analyte specific Physis Qualifier Codes where applicable, the following were also noted.

CERTIFIED REFERENCE MATERIAL

1. PCB congeners 156 and 206 were outside specified acceptance limits in the CRM as a result of possible matrix interference combined with the low concentration of these analytes in the CRM SRM 1944.

2. Chlorinated Pesticides 2,4'-DDD, 2,4'-DDE, 4,4'-DDD, 4,4'-DDT, PCB congeners 018, 052, 066, 087, PAH compounds 1-Methylnaphthalene, 1-Methylphenanthrene, and Acenaphthene were outside specified acceptance limits in the CRM as a result of possible interference in the CRM SRM 1944 matrix.

ANALYTICAL REPORT

PHYSIS
TERRA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(PCB030)	EPA 8270E	% Recovery	90	1			Total		O-43100	09-Jan-24	15-Jan-24
(PCB112)	EPA 8270E	% Recovery	96	1			Total		O-43100	09-Jan-24	15-Jan-24
(PCB198)	EPA 8270E	% Recovery	85	1			Total		O-43100	09-Jan-24	15-Jan-24
(TCMX)	EPA 8270E	% Recovery	68	1			Total		O-43100	09-Jan-24	15-Jan-24
2,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.267	0.5	Total		O-43100	09-Jan-24	15-Jan-24
2,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	15-Jan-24
2,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.194	0.5	Total		O-43100	09-Jan-24	15-Jan-24
4,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.198	0.5	Total		O-43100	09-Jan-24	15-Jan-24
4,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.193	0.5	Total		O-43100	09-Jan-24	15-Jan-24
4,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.128	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Aldrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
BHC-alpha	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
BHC-beta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
BHC-delta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
BHC-gamma	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Chlordane-alpha	EPA 8270E	ng/dry g	ND	1	0.187	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Chlordane-gamma	EPA 8270E	ng/dry g	ND	1	0.179	0.5	Total		O-43100	09-Jan-24	15-Jan-24
cis-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.192	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Dieldrin	EPA 8270E	ng/dry g	ND	1	0.1	0.2	Total		O-43100	09-Jan-24	15-Jan-24
Endosulfan Sulfate	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Endosulfan-I	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Endosulfan-II	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Endrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Endrin Aldehyde	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Endrin Ketone	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Heptachlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Heptachlor Epoxide	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Methoxychlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Oxychlordane	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Toxaphene	EPA 8270E-NCI	ng/dry g	ND	1	10	20	Total		O-43100	09-Jan-24	17-Jan-24
trans-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.186	0.5	Total		O-43100	09-Jan-24	15-Jan-24

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113487-R1 SV-23-DUP S			**Matrix: Sediment**				**Sampled:**			**Received:**	
(PCB030)	EPA 8270E	% Recovery	88	1			Total		O-43100	09-Jan-24	14-Jan-24
(PCB112)	EPA 8270E	% Recovery	105	1			Total		O-43100	09-Jan-24	14-Jan-24
(PCB198)	EPA 8270E	% Recovery	90	1			Total		O-43100	09-Jan-24	14-Jan-24
(TCMX)	EPA 8270E	% Recovery	112	1			Total		O-43100	09-Jan-24	14-Jan-24
2,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.267	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.194	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.198	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.193	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.128	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Aldrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-alpha	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-beta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-delta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-gamma	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chlordane-alpha	EPA 8270E	ng/dry g	ND	1	0.187	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chlordane-gamma	EPA 8270E	ng/dry g	ND	1	0.179	0.5	Total		O-43100	09-Jan-24	14-Jan-24
cis-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.192	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dieldrin	EPA 8270E	ng/dry g	ND	1	0.1	0.2	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan Sulfate	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan-I	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan-II	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endrin Aldehyde	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Endrin Ketone	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Heptachlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Heptachlor Epoxide	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Methoxychlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Oxychlordane	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Toxaphene	EPA 8270E-NCI	ng/dry g	ND	1	10	20	Total		O-43100	09-Jan-24	16-Jan-24
trans-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.186	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(PCB030)	EPA 8270E	% Recovery	116	1			Total		O-43100	09-Jan-24	14-Jan-24
(PCB112)	EPA 8270E	% Recovery	110	1			Total		O-43100	09-Jan-24	14-Jan-24
(PCB198)	EPA 8270E	% Recovery	105	1			Total		O-43100	09-Jan-24	14-Jan-24
(TCMX)	EPA 8270E	% Recovery	155	1			Total	M	O-43100	09-Jan-24	14-Jan-24
2,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.267	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.194	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDD	EPA 8270E	ng/dry g	ND	1	0.198	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDE	EPA 8270E	ng/dry g	ND	1	0.193	0.5	Total		O-43100	09-Jan-24	14-Jan-24
4,4'-DDT	EPA 8270E	ng/dry g	ND	1	0.128	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Aldrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-alpha	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-beta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-delta	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
BHC-gamma	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chlordane-alpha	EPA 8270E	ng/dry g	ND	1	0.187	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chlordane-gamma	EPA 8270E	ng/dry g	ND	1	0.179	0.5	Total		O-43100	09-Jan-24	14-Jan-24
cis-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.192	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dieldrin	EPA 8270E	ng/dry g	ND	1	0.1	0.2	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan Sulfate	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan-I	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endosulfan-II	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endrin	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Endrin Aldehyde	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Chlorinated Pesticides

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Endrin Ketone	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Heptachlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Heptachlor Epoxide	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Methoxychlor	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Oxychlordane	EPA 8270E	ng/dry g	ND	1	0.25	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Toxaphene	EPA 8270E-NCI	ng/dry g	ND	1	10	20	Total		O-43100	09-Jan-24	17-Jan-24
trans-Nonachlor	EPA 8270E	ng/dry g	ND	1	0.186	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Percent Solids	SM 2540 B	%	41.8	1	0.1	0.1	NA		C-78020	03-Jan-24	04-Jan-24
Total Organic Carbon	EPA 9060	% dry weight	1.65	1	0.01	0.01	NA		O-36109	12-Feb-24	15-Feb-24
Sample ID: 113487-R1	**SV-23-DUP S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Percent Solids	SM 2540 B	%	41.6	1	0.1	0.1	NA		C-78020	03-Jan-24	04-Jan-24
Total Organic Carbon	EPA 9060	% dry weight	1.63	1	0.01	0.01	NA		O-36109	12-Feb-24	15-Feb-24
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Percent Solids	SM 2540 B	%	45.6	1	0.1	0.1	NA		C-78020	03-Jan-24	04-Jan-24
Total Organic Carbon	EPA 9060	% dry weight	1.38	1	0.01	0.01	NA		O-36109	12-Feb-24	15-Feb-24

Elements

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Arsenic (As)	EPA 6020	µg/dry g	17.1	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Cadmium (Cd)	EPA 6020	µg/dry g	0.308	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Chromium (Cr)	EPA 6020	µg/dry g	116	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Copper (Cu)	EPA 6020	µg/dry g	61.4	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Lead (Pb)	EPA 6020	µg/dry g	23.9	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Mercury (Hg)	EPA 245.7	µg/dry g	0.276	1	0.00001	0.00002	NA		E-32019	04-Jan-24	11-Jan-24
Nickel (Ni)	EPA 6020	µg/dry g	102	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Selenium (Se)	EPA 6020	µg/dry g	0.523	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Silver (Ag)	EPA 6020	µg/dry g	0.905	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Zinc (Zn)	EPA 6020	µg/dry g	128	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Sample ID: 113487-R1	**SV-23-DUP S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Arsenic (As)	EPA 6020	µg/dry g	17.4	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Cadmium (Cd)	EPA 6020	µg/dry g	0.184	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Chromium (Cr)	EPA 6020	µg/dry g	104	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Copper (Cu)	EPA 6020	µg/dry g	58	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Lead (Pb)	EPA 6020	µg/dry g	23	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Mercury (Hg)	EPA 245.7	µg/dry g	0.264	1	0.00001	0.00002	NA		E-32019	04-Jan-24	11-Jan-24
Nickel (Ni)	EPA 6020	µg/dry g	97	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Selenium (Se)	EPA 6020	µg/dry g	0.431	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Silver (Ag)	EPA 6020	µg/dry g	0.677	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Zinc (Zn)	EPA 6020	µg/dry g	122	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24

Elements

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Arsenic (As)	EPA 6020	µg/dry g	14.7	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Cadmium (Cd)	EPA 6020	µg/dry g	0.285	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Chromium (Cr)	EPA 6020	µg/dry g	95.9	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Copper (Cu)	EPA 6020	µg/dry g	59.4	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Lead (Pb)	EPA 6020	µg/dry g	22.6	1	0.0025	0.005	NA		E-29072	02-Jan-24	04-Jan-24
Mercury (Hg)	EPA 245.7	µg/dry g	0.223	1	0.00001	0.00002	NA		E-32019	04-Jan-24	11-Jan-24
Nickel (Ni)	EPA 6020	µg/dry g	96.9	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Selenium (Se)	EPA 6020	µg/dry g	0.411	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24
Silver (Ag)	EPA 6020	µg/dry g	0.616	1	0.01	0.02	NA		E-29072	02-Jan-24	04-Jan-24
Zinc (Zn)	EPA 6020	µg/dry g	122	1	0.025	0.05	NA		E-29072	02-Jan-24	04-Jan-24

Organotins

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(Tripentyltin)	Krone et al., 1989	% Recovery	84	1			Total		O-43100	09-Jan-24	19-Jan-24
Dibutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Monobutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tetrabutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tributyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Sample ID: 113487-R1	**SV-23-DUP S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(Tripentyltin)	Krone et al., 1989	% Recovery	89	1			Total		O-43100	09-Jan-24	19-Jan-24
Dibutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Monobutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tetrabutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tributyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(Tripentyltin)	Krone et al., 1989	% Recovery	54	1			Total		O-43100	09-Jan-24	19-Jan-24
Dibutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Monobutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tetrabutyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24
Tributyltin	Krone et al., 1989	ng/dry g	ND	1	1	3	Total		O-43100	09-Jan-24	19-Jan-24

Particle Size Distribution

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Clay <0.0039 mm	SM 2560 D	%	23.6	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Granule 2.0 <4.0 mm	SM 2560 D	%	ND	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Kurtosis	SM 2560 D		0.878	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (mm)	SM 2560 D		0.00796	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (phi)	SM 2560 D		6.97	1			NA		C-73028	12-Jan-24	26-Jan-24
Sand 0.0625 to <2.0 mm	SM 2560 D	%	8.99	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Silt 0.0039 to <0.0625 mm	SM 2560 D	%	67.4	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Skewness	SM 2560 D		-0.045	1			NA		C-73028	12-Jan-24	26-Jan-24
Sorting	SM 2560 D		1.88	1			NA		C-73028	12-Jan-24	26-Jan-24
Sample ID: 113487-R1	**SV-23-DUP S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Clay <0.0039 mm	SM 2560 D	%	20.9	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Granule 2.0 <4.0 mm	SM 2560 D	%	ND	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Kurtosis	SM 2560 D		0.878	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (mm)	SM 2560 D		0.00873	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (phi)	SM 2560 D		6.84	1			NA		C-73028	12-Jan-24	26-Jan-24
Sand 0.0625 to <2.0 mm	SM 2560 D	%	9.71	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Silt 0.0039 to <0.0625 mm	SM 2560 D	%	69.4	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Skewness	SM 2560 D		-0.00846	1			NA		C-73028	12-Jan-24	26-Jan-24
Sorting	SM 2560 D		1.85	1			NA		C-73028	12-Jan-24	26-Jan-24

Particle Size Distribution

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
Clay <0.0039 mm	SM 2560 D	%	21.5	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Granule 2.0 <4.0 mm	SM 2560 D	%	ND	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Kurtosis	SM 2560 D		0.854	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (mm)	SM 2560 D		0.00908	1			NA		C-73028	12-Jan-24	26-Jan-24
Mean (phi)	SM 2560 D		6.78	1			NA		C-73028	12-Jan-24	26-Jan-24
Sand 0.0625 to <2.0 mm	SM 2560 D	%	13.1	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Silt 0.0039 to <0.0625 mm	SM 2560 D	%	65.4	1	0.05	0.05	NA		C-73028	12-Jan-24	26-Jan-24
Skewness	SM 2560 D		-0.000264	1			NA		C-73028	12-Jan-24	26-Jan-24
Sorting	SM 2560 D		1.94	1			NA		C-73028	12-Jan-24	26-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
PCB 018	EPA 8270E	ng/dry g	ND	1	0.029	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 028	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 037	EPA 8270E	ng/dry g	ND	1	0.06	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 044	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 049	EPA 8270E	ng/dry g	ND	1	0.036	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 052	EPA 8270E	ng/dry g	ND	1	0.012	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 066	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 070	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 074	EPA 8270E	ng/dry g	ND	1	0.021	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 077	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 081	EPA 8270E	ng/dry g	ND	1	0.084	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 087	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 099	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 101	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 105	EPA 8270E	ng/dry g	ND	1	0.047	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 110	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 114	EPA 8270E	ng/dry g	ND	1	0.072	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 118	EPA 8270E	ng/dry g	ND	1	0.069	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 119	EPA 8270E	ng/dry g	ND	1	0.071	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 123	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 126	EPA 8270E	ng/dry g	ND	1	0.086	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 128	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 132/168	EPA 8270E	ng/dry g	ND	1	0.094	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 138	EPA 8270E	ng/dry g	ND	1	0.057	0.2	Total		O-43100	09-Jan-24	15-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
PCB 149	EPA 8270E	ng/dry g	ND	1	0.092	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 151	EPA 8270E	ng/dry g	ND	1	0.073	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 153	EPA 8270E	ng/dry g	ND	1	0.065	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 156	EPA 8270E	ng/dry g	ND	1	0.089	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 157	EPA 8270E	ng/dry g	ND	1	0.103	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 158	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 167	EPA 8270E	ng/dry g	ND	1	0.049	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 169	EPA 8270E	ng/dry g	ND	1	0.116	0.2	Total		O-43100	09-Jan-24	15-Jan-24
PCB 170	EPA 8270E	ng/dry g	ND	1	0.118	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 177	EPA 8270E	ng/dry g	ND	1	0.085	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 180	EPA 8270E	ng/dry g	ND	1	0.154	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 183	EPA 8270E	ng/dry g	ND	1	0.056	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 187	EPA 8270E	ng/dry g	ND	1	0.168	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 189	EPA 8270E	ng/dry g	ND	1	0.109	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 194	EPA 8270E	ng/dry g	ND	1	0.164	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 201	EPA 8270E	ng/dry g	ND	1	0.104	0.25	Total		O-43100	09-Jan-24	15-Jan-24
PCB 206	EPA 8270E	ng/dry g	ND	1	0.155	0.25	Total		O-43100	09-Jan-24	15-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113487-R1	**SV-23-DUP S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
PCB 018	EPA 8270E	ng/dry g	ND	1	0.029	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 028	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 037	EPA 8270E	ng/dry g	ND	1	0.06	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 044	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 049	EPA 8270E	ng/dry g	ND	1	0.036	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 052	EPA 8270E	ng/dry g	ND	1	0.012	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 066	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 070	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 074	EPA 8270E	ng/dry g	ND	1	0.021	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 077	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 081	EPA 8270E	ng/dry g	ND	1	0.084	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 087	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 099	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 101	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 105	EPA 8270E	ng/dry g	ND	1	0.047	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 110	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 114	EPA 8270E	ng/dry g	ND	1	0.072	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 118	EPA 8270E	ng/dry g	ND	1	0.069	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 119	EPA 8270E	ng/dry g	ND	1	0.071	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 123	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 126	EPA 8270E	ng/dry g	ND	1	0.086	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 128	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 132/168	EPA 8270E	ng/dry g	ND	1	0.094	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 138	EPA 8270E	ng/dry g	ND	1	0.057	0.2	Total		O-43100	09-Jan-24	14-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
PCB 149	EPA 8270E	ng/dry g	ND	1	0.092	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 151	EPA 8270E	ng/dry g	ND	1	0.073	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 153	EPA 8270E	ng/dry g	ND	1	0.065	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 156	EPA 8270E	ng/dry g	ND	1	0.089	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 157	EPA 8270E	ng/dry g	ND	1	0.103	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 158	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 167	EPA 8270E	ng/dry g	ND	1	0.049	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 169	EPA 8270E	ng/dry g	ND	1	0.116	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 170	EPA 8270E	ng/dry g	ND	1	0.118	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 177	EPA 8270E	ng/dry g	ND	1	0.085	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 180	EPA 8270E	ng/dry g	ND	1	0.154	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 183	EPA 8270E	ng/dry g	ND	1	0.056	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 187	EPA 8270E	ng/dry g	ND	1	0.168	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 189	EPA 8270E	ng/dry g	ND	1	0.109	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 194	EPA 8270E	ng/dry g	ND	1	0.164	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 201	EPA 8270E	ng/dry g	ND	1	0.104	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 206	EPA 8270E	ng/dry g	ND	1	0.155	0.25	Total		O-43100	09-Jan-24	14-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
PCB 018	EPA 8270E	ng/dry g	ND	1	0.029	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 028	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 037	EPA 8270E	ng/dry g	ND	1	0.06	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 044	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 049	EPA 8270E	ng/dry g	ND	1	0.036	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 052	EPA 8270E	ng/dry g	ND	1	0.012	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 066	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 070	EPA 8270E	ng/dry g	ND	1	0.023	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 074	EPA 8270E	ng/dry g	ND	1	0.021	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 077	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 081	EPA 8270E	ng/dry g	ND	1	0.084	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 087	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 099	EPA 8270E	ng/dry g	ND	1	0.028	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 101	EPA 8270E	ng/dry g	ND	1	0.027	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 105	EPA 8270E	ng/dry g	ND	1	0.047	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 110	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 114	EPA 8270E	ng/dry g	ND	1	0.072	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 118	EPA 8270E	ng/dry g	ND	1	0.069	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 119	EPA 8270E	ng/dry g	ND	1	0.071	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 123	EPA 8270E	ng/dry g	ND	1	0.018	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 126	EPA 8270E	ng/dry g	ND	1	0.086	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 128	EPA 8270E	ng/dry g	ND	1	0.081	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 132/168	EPA 8270E	ng/dry g	ND	1	0.094	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 138	EPA 8270E	ng/dry g	ND	1	0.057	0.2	Total		O-43100	09-Jan-24	14-Jan-24

PCB Congeners

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
PCB 149	EPA 8270E	ng/dry g	ND	1	0.092	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 151	EPA 8270E	ng/dry g	ND	1	0.073	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 153	EPA 8270E	ng/dry g	ND	1	0.065	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 156	EPA 8270E	ng/dry g	ND	1	0.089	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 157	EPA 8270E	ng/dry g	ND	1	0.103	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 158	EPA 8270E	ng/dry g	ND	1	0.074	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 167	EPA 8270E	ng/dry g	ND	1	0.049	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 169	EPA 8270E	ng/dry g	ND	1	0.116	0.2	Total		O-43100	09-Jan-24	14-Jan-24
PCB 170	EPA 8270E	ng/dry g	ND	1	0.118	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 177	EPA 8270E	ng/dry g	ND	1	0.085	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 180	EPA 8270E	ng/dry g	ND	1	0.154	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 183	EPA 8270E	ng/dry g	ND	1	0.056	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 187	EPA 8270E	ng/dry g	ND	1	0.168	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 189	EPA 8270E	ng/dry g	ND	1	0.109	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 194	EPA 8270E	ng/dry g	ND	1	0.164	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 201	EPA 8270E	ng/dry g	ND	1	0.104	0.25	Total		O-43100	09-Jan-24	14-Jan-24
PCB 206	EPA 8270E	ng/dry g	ND	1	0.155	0.25	Total		O-43100	09-Jan-24	14-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113486-R1	**SV-23-Composite S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(d10-Acenaphthene)	EPA 8270E	% Recovery	46	1			Total		O-43100	09-Jan-24	15-Jan-24
(d10-Phenanthrene)	EPA 8270E	% Recovery	81	1			Total		O-43100	09-Jan-24	15-Jan-24
(d12-Chrysene)	EPA 8270E	% Recovery	69	1			Total		O-43100	09-Jan-24	15-Jan-24
(d12-Perylene)	EPA 8270E	% Recovery	122	1			Total		O-43100	09-Jan-24	15-Jan-24
(d8-Naphthalene)	EPA 8270E	% Recovery	36	1			Total		O-43100	09-Jan-24	15-Jan-24
1-Methylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.084	0.5	Total		O-43100	09-Jan-24	15-Jan-24
1-Methylphenanthrene	EPA 8270E	ng/dry g	ND	1	0.076	0.5	Total		O-43100	09-Jan-24	15-Jan-24
2,3,5-Trimethylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.059	0.5	Total		O-43100	09-Jan-24	15-Jan-24
2,6-Dimethylnaphthalene	EPA 8270E	ng/dry g	0.893	1	0.065	0.5	Total		O-43100	09-Jan-24	15-Jan-24
2-Methylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.106	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Acenaphthene	EPA 8270E	ng/dry g	8.07	1	0.078	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Acenaphthylene	EPA 8270E	ng/dry g	0.504	1	0.058	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Anthracene	EPA 8270E	ng/dry g	5.86	1	0.046	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benz[a]anthracene	EPA 8270E	ng/dry g	18.1	1	0.107	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benzo[a]pyrene	EPA 8270E	ng/dry g	43.4	1	0.106	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benzo[b]fluoranthene	EPA 8270E	ng/dry g	29.4	1	0.063	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benzo[e]pyrene	EPA 8270E	ng/dry g	40.3	1	0.098	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benzo[g,h,i]perylene	EPA 8270E	ng/dry g	39.3	1	0.093	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Benzo[k]fluoranthene	EPA 8270E	ng/dry g	22.5	1	0.111	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Biphenyl	EPA 8270E	ng/dry g	2.36	1	0.092	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Chrysene	EPA 8270E	ng/dry g	38.2	1	0.067	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Dibenz[a,h]anthracene	EPA 8270E	ng/dry g	ND	1	0.106	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Dibenzothiophene	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Fluoranthene	EPA 8270E	ng/dry g	57.2	1	0.035	0.5	Total		O-43100	09-Jan-24	15-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Fluorene	EPA 8270E	ng/dry g	1.54	1	0.068	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Indeno[1,2,3-cd]pyrene	EPA 8270E	ng/dry g	42.5	1	0.087	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Naphthalene	EPA 8270E	ng/dry g	5	1	0.187	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Perylene	EPA 8270E	ng/dry g	50.9	1	0.114	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Phenanthrene	EPA 8270E	ng/dry g	27	1	0.074	0.5	Total		O-43100	09-Jan-24	15-Jan-24
Pyrene	EPA 8270E	ng/dry g	99.1	1	0.048	0.5	Total		O-43100	09-Jan-24	15-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113487-R1 SV-23-DUP S			**Matrix: Sediment**				**Sampled:**			**Received:**	
(d10-Acenaphthene)	EPA 8270E	% Recovery	96	1			Total		O-43100	09-Jan-24	14-Jan-24
(d10-Phenanthrene)	EPA 8270E	% Recovery	90	1			Total		O-43100	09-Jan-24	14-Jan-24
(d12-Chrysene)	EPA 8270E	% Recovery	72	1			Total		O-43100	09-Jan-24	14-Jan-24
(d12-Perylene)	EPA 8270E	% Recovery	79	1			Total		O-43100	09-Jan-24	14-Jan-24
(d8-Naphthalene)	EPA 8270E	% Recovery	53	1			Total		O-43100	09-Jan-24	14-Jan-24
1-Methylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.084	0.5	Total		O-43100	09-Jan-24	14-Jan-24
1-Methylphenanthrene	EPA 8270E	ng/dry g	ND	1	0.076	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,3,5-Trimethylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.059	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,6-Dimethylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.065	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2-Methylnaphthalene	EPA 8270E	ng/dry g	4.36	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Acenaphthene	EPA 8270E	ng/dry g	ND	1	0.078	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Acenaphthylene	EPA 8270E	ng/dry g	4.36	1	0.058	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Anthracene	EPA 8270E	ng/dry g	6.27	1	0.046	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benz[a]anthracene	EPA 8270E	ng/dry g	23.3	1	0.107	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[a]pyrene	EPA 8270E	ng/dry g	34.9	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[b]fluoranthene	EPA 8270E	ng/dry g	33.9	1	0.063	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[e]pyrene	EPA 8270E	ng/dry g	25.9	1	0.098	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[g,h,i]perylene	EPA 8270E	ng/dry g	70.1	1	0.093	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[k]fluoranthene	EPA 8270E	ng/dry g	33.9	1	0.111	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Biphenyl	EPA 8270E	ng/dry g	ND	1	0.092	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chrysene	EPA 8270E	ng/dry g	37.2	1	0.067	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dibenz[a,h]anthracene	EPA 8270E	ng/dry g	ND	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dibenzothiophene	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Fluoranthene	EPA 8270E	ng/dry g	64	1	0.035	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Fluorene	EPA 8270E	ng/dry g	7.3	1	0.068	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Indeno[1,2,3-cd]pyrene	EPA 8270E	ng/dry g	37.6	1	0.087	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Naphthalene	EPA 8270E	ng/dry g	11.4	1	0.187	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Perylene	EPA 8270E	ng/dry g	30	1	0.114	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Phenanthrene	EPA 8270E	ng/dry g	31.7	1	0.074	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Pyrene	EPA 8270E	ng/dry g	77	1	0.048	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113488-R1	**SF-09 Reference S**		**Matrix: Sediment**				**Sampled:**			**Received:**	
(d10-Acenaphthene)	EPA 8270E	% Recovery	77	1			Total		O-43100	09-Jan-24	14-Jan-24
(d10-Phenanthrene)	EPA 8270E	% Recovery	96	1			Total		O-43100	09-Jan-24	14-Jan-24
(d12-Chrysene)	EPA 8270E	% Recovery	76	1			Total		O-43100	09-Jan-24	14-Jan-24
(d12-Perylene)	EPA 8270E	% Recovery	84	1			Total		O-43100	09-Jan-24	14-Jan-24
(d8-Naphthalene)	EPA 8270E	% Recovery	61	1			Total		O-43100	09-Jan-24	14-Jan-24
1-Methylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.084	0.5	Total		O-43100	09-Jan-24	14-Jan-24
1-Methylphenanthrene	EPA 8270E	ng/dry g	ND	1	0.076	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,3,5-Trimethylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.059	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2,6-Dimethylnaphthalene	EPA 8270E	ng/dry g	ND	1	0.065	0.5	Total		O-43100	09-Jan-24	14-Jan-24
2-Methylnaphthalene	EPA 8270E	ng/dry g	0.75	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Acenaphthene	EPA 8270E	ng/dry g	8.66	1	0.078	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Acenaphthylene	EPA 8270E	ng/dry g	ND	1	0.058	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Anthracene	EPA 8270E	ng/dry g	4.8	1	0.046	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benz[a]anthracene	EPA 8270E	ng/dry g	25	1	0.107	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[a]pyrene	EPA 8270E	ng/dry g	52	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[b]fluoranthene	EPA 8270E	ng/dry g	34.6	1	0.063	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[e]pyrene	EPA 8270E	ng/dry g	37.3	1	0.098	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[g,h,i]perylene	EPA 8270E	ng/dry g	17.4	1	0.093	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Benzo[k]fluoranthene	EPA 8270E	ng/dry g	30	1	0.111	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Biphenyl	EPA 8270E	ng/dry g	2.23	1	0.092	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Chrysene	EPA 8270E	ng/dry g	39.8	1	0.067	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dibenz[a,h]anthracene	EPA 8270E	ng/dry g	ND	1	0.106	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Dibenzothiophene	EPA 8270E	ng/dry g	ND	1	0.2	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Fluoranthene	EPA 8270E	ng/dry g	71.1	1	0.035	0.5	Total		O-43100	09-Jan-24	14-Jan-24

Polynuclear Aromatic Hydrocarbons

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Fluorene	EPA 8270E	ng/dry g	1.99	1	0.068	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Indeno[1,2,3-cd]pyrene	EPA 8270E	ng/dry g	12.6	1	0.087	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Naphthalene	EPA 8270E	ng/dry g	7.9	1	0.187	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Perylene	EPA 8270E	ng/dry g	59.5	1	0.114	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Phenanthrene	EPA 8270E	ng/dry g	22.3	1	0.074	0.5	Total		O-43100	09-Jan-24	14-Jan-24
Pyrene	EPA 8270E	ng/dry g	94.3	1	0.048	0.5	Total		O-43100	09-Jan-24	14-Jan-24

QUALITY CONTROL REPORT

PHYSIS
TERRA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-003
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO# F014001

Chlorinated Pesticides — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24			Analyzed: 14-Jan-24		
(PCB030)	NA	128	1			% Recovery	100	128	52 - 124%	FAIL			R
(PCB112)	NA	133	1			% Recovery	100	133	49 - 133%	PASS			
(PCB198)	NA	78	1			% Recovery	100	78	60 - 129%	PASS			
(TCMX)	NA	117	1			% Recovery	100	117	6 - 124%	PASS			
2,4'-DDD	Total	ND	1	0.267	0.5	ng/dry g							
2,4'-DDE	Total	ND	1	0.2	0.5	ng/dry g							
2,4'-DDT	Total	ND	1	0.194	0.5	ng/dry g							
4,4'-DDD	Total	ND	1	0.198	0.5	ng/dry g							
4,4'-DDE	Total	ND	1	0.193	0.5	ng/dry g							
4,4'-DDT	Total	ND	1	0.128	0.5	ng/dry g							
Aldrin	Total	ND	1	0.25	0.5	ng/dry g							
BHC-alpha	Total	ND	1	0.25	0.5	ng/dry g							
BHC-beta	Total	ND	1	0.25	0.5	ng/dry g							
BHC-delta	Total	ND	1	0.25	0.5	ng/dry g							
BHC-gamma	Total	ND	1	0.25	0.5	ng/dry g							
Chlordane-alpha	Total	ND	1	0.187	0.5	ng/dry g							
Chlordane-gamma	Total	ND	1	0.179	0.5	ng/dry g							
cis-Nonachlor	Total	ND	1	0.192	0.5	ng/dry g							
Dieldrin	Total	ND	1	0.1	0.2	ng/dry g							
Endosulfan Sulfate	Total	ND	1	0.25	0.5	ng/dry g							
Endosulfan-I	Total	ND	1	0.25	0.5	ng/dry g							
Endosulfan-II	Total	ND	1	0.25	0.5	ng/dry g							
Endrin	Total	ND	1	0.25	0.5	ng/dry g							

Chlorinated Pesticides

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Endrin Aldehyde	Total	ND	1	0.25	0.5	ng/dry g							
Endrin Ketone	Total	ND	1	0.25	0.5	ng/dry g							
Heptachlor	Total	ND	1	0.25	0.5	ng/dry g							
Heptachlor Epoxide	Total	ND	1	0.25	0.5	ng/dry g							
Methoxychlor	Total	ND	1	0.25	0.5	ng/dry g							
Oxychlordane	Total	ND	1	0.25	0.5	ng/dry g							
trans-Nonachlor	Total	ND	1	0.186	0.5	ng/dry g							
		Method: EPA 8270E-NCI				Batch ID: O-43100			Prepared: 09-Jan-24			Analyzed: 16-Jan-24	
Toxaphene	Total	ND	1	10	20	ng/dry g							

Chlorinated Pesticides — QUALITY CONTROL REPORT

Sample ID: 113482-BS1 **QAQC Procedural Blank** **Matrix: BlankMatrix** **Sampled:** **Received:**

Method: EPA 8270E Batch ID: O-43100 Prepared: 09-Jan-24 Analyzed: 14-Jan-24

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
(PCB030)	NA	77	1			% Recovery	100	0	77	52 - 124%	PASS		
(PCB112)	NA	120	1			% Recovery	100	0	120	49 - 133%	PASS		
(PCB198)	NA	98	1			% Recovery	100	0	98	60 - 129%	PASS		
(TCMX)	NA	81	1			% Recovery	100	0	81	6 - 124%	PASS		
2,4'-DDD	Total	650	1	0.267	0.5	ng/dry g	500	0	130	61 - 134%	PASS		
2,4'-DDE	Total	555	1	0.2	0.5	ng/dry g	500	0	111	66 - 140%	PASS		
2,4'-DDT	Total	687	1	0.194	0.5	ng/dry g	500	0	137	61 - 138%	PASS		
4,4'-DDD	Total	814	1	0.198	0.5	ng/dry g	500	0	163	59 - 140%	FAIL		R
4,4'-DDE	Total	340	1	0.193	0.5	ng/dry g	500	0	68	67 - 117%	PASS		
4,4'-DDT	Total	596	1	0.128	0.5	ng/dry g	500	0	119	56 - 173%	PASS		
Aldrin	Total	380	1	0.25	0.5	ng/dry g	500	0	76	66 - 120%	PASS		
BHC-alpha	Total	641	1	0.25	0.5	ng/dry g	500	0	128	55 - 113%	FAIL		R
BHC-beta	Total	526	1	0.25	0.5	ng/dry g	500	0	105	59 - 123%	PASS		
BHC-delta	Total	556	1	0.25	0.5	ng/dry g	500	0	111	59 - 116%	PASS		
BHC-gamma	Total	807	1	0.25	0.5	ng/dry g	1000	0	81	61 - 112%	PASS		
Chlordane-alpha	Total	487	1	0.187	0.5	ng/dry g	500	0	97	63 - 111%	PASS		
Chlordane-gamma	Total	455	1	0.179	0.5	ng/dry g	500	0	91	68 - 117%	PASS		
cis-Nonachlor	Total	494	1	0.192	0.5	ng/dry g	500	0	99	63 - 110%	PASS		
Dieldrin	Total	603	1	0.1	0.2	ng/dry g	500	0	121	59 - 121%	PASS		
Endosulfan Sulfate	Total	585	1	0.25	0.5	ng/dry g	500	0	117	48 - 135%	PASS		
Endosulfan-I	Total	455	1	0.25	0.5	ng/dry g	500	0	91	0 - 127%	PASS		
Endosulfan-II	Total	0	1	0.25	0.5	ng/dry g	500	0	0	0 - 121%	PASS		
Endrin	Total	340	1	0.25	0.5	ng/dry g	500	0	68	43 - 155%	PASS		

Chlorinated Pesticides

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Endrin Aldehyde	Total	0	1	0.25	0.5	ng/dry g	500	0	0	0 - 135%	PASS			
Endrin Ketone	Total	408	1	0.25	0.5	ng/dry g	500	0	82	43 - 152%	PASS			
Heptachlor	Total	1100	1	0.25	0.5	ng/dry g	1000	0	110	41 - 146%	PASS			
Heptachlor Epoxide	Total	574	1	0.25	0.5	ng/dry g	500	0	115	58 - 126%	PASS			
Methoxychlor	Total	1860	1	0.25	0.5	ng/dry g	1000	0	186	47 - 210%	PASS			
Oxychlordane	Total	1770	1	0.25	0.5	ng/dry g	1500	0	118	60 - 118%	PASS			
trans-Nonachlor	Total	419	1	0.186	0.5	ng/dry g	500	0	84	64 - 111%	PASS			
	Method:	EPA 8270E-NCI				Batch ID:	O-43100		Prepared:	09-Jan-24			Analyzed:	16-Jan-24
Toxaphene	Total	5280	1	10	20	ng/dry g	5000	0	106	70 - 128%	PASS			

PHYSIS ENVIRONMENTAL LABORATORIES, INC.
TERRA FAUNA FLORA AQUA AURA
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-003
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO# F014001

Chlorinated Pesticides — QUALITY CONTROL REPORT

Sample ID: 113482-BS2 **QAQC Procedural Blank** **Matrix: BlankMatrix** **Sampled:** **Received:**

Method: EPA 8270E Batch ID: O-43100 Prepared: 09-Jan-24 Analyzed: 14-Jan-24

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
(PCB030)	NA	72	1			% Recovery	100	0	72	52 - 124%	PASS	7	30	PASS	
(PCB112)	NA	75	1			% Recovery	100	0	75	49 - 133%	PASS	46	30	FAIL	R
(PCB198)	NA	67	1			% Recovery	100	0	67	60 - 129%	PASS	38	30	FAIL	R
(TCMX)	NA	79	1			% Recovery	100	0	79	6 - 124%	PASS	2	30	PASS	
2,4'-DDD	Total	474	1	0.267	0.5	ng/dry g	500	0	95	61 - 134%	PASS	31	30	FAIL	R
2,4'-DDE	Total	378	1	0.2	0.5	ng/dry g	500	0	76	66 - 140%	PASS	37	30	FAIL	R
2,4'-DDT	Total	539	1	0.194	0.5	ng/dry g	500	0	108	61 - 138%	PASS	24	30	PASS	
4,4'-DDD	Total	528	1	0.198	0.5	ng/dry g	500	0	106	59 - 140%	PASS	42	30	FAIL	R
4,4'-DDE	Total	251	1	0.193	0.5	ng/dry g	500	0	50	67 - 117%	FAIL	31	30	FAIL	R
4,4'-DDT	Total	505	1	0.128	0.5	ng/dry g	500	0	101	56 - 173%	PASS	16	30	PASS	
Aldrin	Total	289	1	0.25	0.5	ng/dry g	500	0	58	66 - 120%	FAIL	27	30	PASS	R
BHC-alpha	Total	490	1	0.25	0.5	ng/dry g	500	0	98	55 - 113%	PASS	27	30	PASS	
BHC-beta	Total	393	1	0.25	0.5	ng/dry g	500	0	79	59 - 123%	PASS	28	30	PASS	
BHC-delta	Total	483	1	0.25	0.5	ng/dry g	500	0	97	59 - 116%	PASS	13	30	PASS	
BHC-gamma	Total	658	1	0.25	0.5	ng/dry g	1000	0	66	61 - 112%	PASS	20	30	PASS	
Chlordane-alpha	Total	351	1	0.187	0.5	ng/dry g	500	0	70	63 - 111%	PASS	32	30	FAIL	R
Chlordane-gamma	Total	317	1	0.179	0.5	ng/dry g	500	0	63	68 - 117%	FAIL	36	30	FAIL	R
cis-Nonachlor	Total	317	1	0.192	0.5	ng/dry g	500	0	63	63 - 110%	PASS	44	30	FAIL	R
Dieldrin	Total	334	1	0.1	0.2	ng/dry g	500	0	67	59 - 121%	PASS	57	30	FAIL	R
Endosulfan Sulfate	Total	240	1	0.25	0.5	ng/dry g	500	0	48	48 - 135%	PASS	84	30	FAIL	R
Endosulfan-I	Total	204	1	0.25	0.5	ng/dry g	500	0	41	0 - 127%	PASS	76	30	FAIL	R
Endosulfan-II	Total	0	1	0.25	0.5	ng/dry g	500	0	0	0 - 121%	PASS	0	30	PASS	
Endrin	Total	485	1	0.25	0.5	ng/dry g	500	0	97	43 - 155%	PASS	35	30	FAIL	R

Chlorinated Pesticides

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
Endrin Aldehyde	Total	0	1	0.25	0.5	ng/dry g	500	0	0	0 - 135%	PASS	0	30	PASS	
Endrin Ketone	Total	149	1	0.25	0.5	ng/dry g	500	0	30	43 - 152%	FAIL	93	30	FAIL	R
Heptachlor	Total	596	1	0.25	0.5	ng/dry g	1000	0	60	41 - 146%	PASS	59	30	FAIL	R
Heptachlor Epoxide	Total	211	1	0.25	0.5	ng/dry g	500	0	42	58 - 126%	FAIL	93	30	FAIL	R
Methoxychlor	Total	1060	1	0.25	0.5	ng/dry g	1000	0	106	47 - 210%	PASS	55	30	FAIL	R
Oxychlordane	Total	1170	1	0.25	0.5	ng/dry g	1500	0	78	60 - 118%	PASS	41	30	FAIL	R
trans-Nonachlor	Total	338	1	0.186	0.5	ng/dry g	500	0	68	64 - 111%	PASS	21	30	PASS	
	Method: EPA 8270E-NCI					Batch ID: O-43100			Prepared: 09-Jan-24				Analyzed: 16-Jan-24		
Toxaphene	Total	3410	1	10	20	ng/dry g	5000	0	68	70 - 128%	FAIL	44	30	FAIL	R

Chlorinated Pesticides

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113484-CRM1	**QAQC CRM - SRM 1944**					**Matrix: Sediment**		**Sampled:**				**Received:**	
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 14-Jan-24	
(PCB030)	NA	140	1			% Recovery	100	140		33 - 149%	PASS		
(PCB030)	Total	140	1			% Recovery	100	140		33 - 149%	PASS		
(PCB112)	NA	87	1			% Recovery	100	87		49 - 120%	PASS		
(PCB112)	Total	87	1			% Recovery	100	87		49 - 120%	PASS		
(PCB198)	NA	82	1			% Recovery	100	82		35 - 123%	PASS		
(PCB198)	Total	82	1			% Recovery	100	82		35 - 123%	PASS		
(TCMX)	NA	95	1			% Recovery	100	95		37 - 138%	PASS		
(TCMX)	Total	95	1			% Recovery	100	95		37 - 138%	PASS		
2,4'-DDD	Total	160	1	0.267	0.5	ng/dry g	38	421		44 - 157%	FAIL		2
2,4'-DDE	Total	132	1	0.2	0.5	ng/dry g	19	695		54 - 157%	FAIL		2
4,4'-DDD	Total	254	1	0.198	0.5	ng/dry g	108	235		41 - 153%	FAIL		2
4,4'-DDE	Total	108	1	0.193	0.5	ng/dry g	86	126		57 - 152%	PASS		
4,4'-DDT	Total	755	1	0.128	0.5	ng/dry g	170	444		23 - 144%	FAIL		2
Chlordane-alpha	Total	21.3	1	0.187	0.5	ng/dry g	16.5	129		61 - 161%	PASS		
Chlordane-gamma	Total	28.3	1	0.179	0.5	ng/dry g	19	149		69 - 163%	PASS		
cis-Nonachlor	Total	3.84	1	0.192	0.5	ng/dry g	3.7	104		59 - 175%	PASS		
trans-Nonachlor	Total	8.33	1	0.186	0.5	ng/dry g	8.2	102		72 - 170%	PASS		

Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 6020					Batch ID: E-29072		Prepared: 02-Jan-24			Analyzed: 04-Jan-24		
Arsenic (As)	NA	ND	1	0.025	0.05	µg/dry g							
Cadmium (Cd)	NA	ND	1	0.0025	0.005	µg/dry g							
Chromium (Cr)	NA	ND	1	0.0025	0.005	µg/dry g							
Copper (Cu)	NA	ND	1	0.0025	0.005	µg/dry g							
Lead (Pb)	NA	ND	1	0.0025	0.005	µg/dry g							
Nickel (Ni)	NA	ND	1	0.01	0.02	µg/dry g							
Selenium (Se)	NA	ND	1	0.025	0.05	µg/dry g							
Silver (Ag)	NA	ND	1	0.01	0.02	µg/dry g							
Zinc (Zn)	NA	ND	1	0.025	0.05	µg/dry g							
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24			Analyzed: 11-Jan-24		
Mercury (Hg)	NA	ND	1	0.00001	0.00002	µg/dry g							
Sample ID: 113482-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 6020					Batch ID: E-29072		Prepared: 02-Jan-24			Analyzed: 04-Jan-24		
Arsenic (As)	NA	2.02	1	0.025	0.05	µg/dry g	2	0	101	85 - 115%	PASS		
Cadmium (Cd)	NA	2.01	1	0.0025	0.005	µg/dry g	2	0	100	86 - 122%	PASS		
Chromium (Cr)	NA	1.91	1	0.0025	0.005	µg/dry g	2	0	95	83 - 113%	PASS		
Copper (Cu)	NA	1.95	1	0.0025	0.005	µg/dry g	2	0	98	83 - 114%	PASS		
Lead (Pb)	NA	2.04	1	0.0025	0.005	µg/dry g	2	0	102	85 - 118%	PASS		
Nickel (Ni)	NA	1.94	1	0.01	0.02	µg/dry g	2	0	97	83 - 113%	PASS		
Selenium (Se)	NA	2.08	1	0.025	0.05	µg/dry g	2	0	104	72 - 118%	PASS		
Silver (Ag)	NA	0.186	1	0.01	0.02	µg/dry g	0.2	0	93	79 - 118%	PASS		
Zinc (Zn)	NA	1.9	1	0.025	0.05	µg/dry g	2	0	95	86 - 116%	PASS		
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24			Analyzed: 11-Jan-24		
Mercury (Hg)	NA	0.000946	1	0.00001	0.00002	µg/dry g	0.001	0	95	82 - 118%	PASS		

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-BS2	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**		
	Method: EPA 6020					Batch ID: E-29072		Prepared: 02-Jan-24				Analyzed: 04-Jan-24		
Arsenic (As)	NA	2.05	1	0.025	0.05	µg/dry g	2	0	102	85 - 115%	PASS	1	30	PASS
Cadmium (Cd)	NA	1.99	1	0.0025	0.005	µg/dry g	2	0	100	86 - 122%	PASS	0	30	PASS
Chromium (Cr)	NA	1.9	1	0.0025	0.005	µg/dry g	2	0	95	83 - 113%	PASS	1	30	PASS
Copper (Cu)	NA	1.94	1	0.0025	0.005	µg/dry g	2	0	97	83 - 114%	PASS	1	30	PASS
Lead (Pb)	NA	2.04	1	0.0025	0.005	µg/dry g	2	0	102	85 - 118%	PASS	0	30	PASS
Nickel (Ni)	NA	1.93	1	0.01	0.02	µg/dry g	2	0	96	83 - 113%	PASS	1	30	PASS
Selenium (Se)	NA	2.12	1	0.025	0.05	µg/dry g	2	0	106	72 - 118%	PASS	2	30	PASS
Silver (Ag)	NA	0.203	1	0.01	0.02	µg/dry g	0.2	0	101	79 - 118%	PASS	9	30	PASS
Zinc (Zn)	NA	1.91	1	0.025	0.05	µg/dry g	2	0	95	86 - 116%	PASS	1	30	PASS
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24				Analyzed: 11-Jan-24		
Mercury (Hg)	NA	0.000978	1	0.00001	0.00002	µg/dry g	0.001	0	98	82 - 118%	PASS	3	30	PASS
Sample ID: 113483-CRM1	**QAQC CRM - ERA D111-540**					**Matrix: Sediment**		**Sampled:**				**Received:**		
	Method: EPA 6020					Batch ID: E-29072		Prepared: 02-Jan-24				Analyzed: 04-Jan-24		
Arsenic (As)	NA	187	1	0.025	0.05	µg/dry g	183		102	80 - 120%	PASS			
Cadmium (Cd)	NA	93.5	1	0.0025	0.005	µg/dry g	91		103	80 - 120%	PASS			
Chromium (Cr)	NA	108	1	0.0025	0.005	µg/dry g	122		89	80 - 120%	PASS			
Copper (Cu)	NA	152	1	0.0025	0.005	µg/dry g	151		101	80 - 120%	PASS			
Lead (Pb)	NA	148	1	0.0025	0.005	µg/dry g	140		106	80 - 120%	PASS			
Nickel (Ni)	NA	72.6	1	0.01	0.02	µg/dry g	71		102	80 - 120%	PASS			
Selenium (Se)	NA	180	1	0.025	0.05	µg/dry g	186		97	80 - 120%	PASS			
Silver (Ag)	NA	48.7	1	0.01	0.02	µg/dry g	41		119	80 - 120%	PASS			
Zinc (Zn)	NA	238	1	0.025	0.05	µg/dry g	245		97	80 - 120%	PASS			
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24				Analyzed: 11-Jan-24		
Mercury (Hg)	NA	18.3	1	0.00001	0.00002	µg/dry g	15.3		120	80 - 120%	PASS			

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
Sample ID: 113486-MS1	**SV-23-Composite S**					**Matrix: Sediment**		**Sampled:**				**Received:**			
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24				Analyzed: 11-Jan-24			
Mercury (Hg)	NA	0.722	1	0.00001	0.00002	µg/dry g	0.509	0.276	88	76 - 135%	PASS				
Sample ID: 113486-MS2	**SV-23-Composite S**					**Matrix: Sediment**		**Sampled:**				**Received:**			
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24				Analyzed: 11-Jan-24			
Mercury (Hg)	NA	0.496	1	0.00001	0.00002	µg/dry g	0.362	0.276	61	76 - 135%	FAIL	36	30	FAIL	M
Sample ID: 113486-R2	**SV-23-Composite S**					**Matrix: Sediment**		**Sampled:**				**Received:**			
	Method: EPA 6020					Batch ID: E-29072		Prepared: 02-Jan-24				Analyzed: 04-Jan-24			
Arsenic (As)	NA	14.8	1	0.025	0.05	µg/dry g						14	30	PASS	
Cadmium (Cd)	NA	0.301	1	0.0025	0.005	µg/dry g						2	30	PASS	
Chromium (Cr)	NA	91.9	1	0.0025	0.005	µg/dry g						23	30	PASS	
Copper (Cu)	NA	53.4	1	0.0025	0.005	µg/dry g						14	30	PASS	
Lead (Pb)	NA	21.6	1	0.0025	0.005	µg/dry g						10	30	PASS	
Nickel (Ni)	NA	86.8	1	0.01	0.02	µg/dry g						16	30	PASS	
Selenium (Se)	NA	0.308	1	0.025	0.05	µg/dry g						52	30	FAIL	NH
Silver (Ag)	NA	0.648	1	0.01	0.02	µg/dry g						33	30	FAIL	NH
Zinc (Zn)	NA	113	1	0.025	0.05	µg/dry g						12	30	PASS	
	Method: EPA 245.7					Batch ID: E-32019		Prepared: 04-Jan-24				Analyzed: 11-Jan-24			
Mercury (Hg)	NA	0.225	1	0.00001	0.00002	µg/dry g						20	30	PASS	

Organotins

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**			
	Method: Krone et al., 1989					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 18-Jan-24			
(Tripentyltin)	NA	51	1			% Recovery	100		51	50 - 150%	PASS				
Dibutyltin	Total	ND	1	1	3	ng/dry g									
Monobutyltin	Total	ND	1	1	3	ng/dry g									
Tetrabutyltin	Total	ND	1	1	3	ng/dry g									
Tributyltin	Total	ND	1	1	3	ng/dry g									
Sample ID: 113482-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**			
	Method: Krone et al., 1989					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 19-Jan-24			
(Tripentyltin)	NA	91	1			% Recovery	100	0	91	50 - 150%	PASS				
Dibutyltin	Total	564	1	1	3	ng/dry g	500	0	113	50 - 150%	PASS				
Monobutyltin	Total	479	1	1	3	ng/dry g	500	0	96	10 - 110%	PASS				
Tetrabutyltin	Total	567	1	1	3	ng/dry g	500	0	113	50 - 150%	PASS				
Tributyltin	Total	564	1	1	3	ng/dry g	500	0	113	50 - 150%	PASS				
Sample ID: 113482-BS2	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**			
	Method: Krone et al., 1989					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 19-Jan-24			
(Tripentyltin)	NA	103	1			% Recovery	100	0	103	50 - 150%	PASS	12	30	PASS	
Dibutyltin	Total	571	1	1	3	ng/dry g	500	0	114	50 - 150%	PASS	1	30	PASS	
Monobutyltin	Total	200	1	1	3	ng/dry g	500	0	40	10 - 110%	PASS	82	30	FAIL	R
Tetrabutyltin	Total	551	1	1	3	ng/dry g	500	0	110	50 - 150%	PASS	3	30	PASS	
Tributyltin	Total	545	1	1	3	ng/dry g	500	0	109	50 - 150%	PASS	4	30	PASS	

Particle Size Distribution

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
		Method: SM 2560 D				Batch ID: C-73028		Prepared: 12-Jan-24			Analyzed: 26-Jan-24		
Clay <0.0039 mm	NA	ND	1	0.05	0.05	%							
Granule 2.0 <4.0 mm	NA	ND	1	0.05	0.05	%							
Sand 0.0625 to <2.0 mm	NA	ND	1	0.05	0.05	%							
Silt 0.0039 to <0.0625 mm	NA	ND	1	0.05	0.05	%							
Sample ID: 113485-LCM1	**QAQC LCM - Physis PSD**					**Matrix: Sediment**		**Sampled:**			**Received:**		
		Method: SM 2560 D				Batch ID: C-73028		Prepared: 12-Jan-24			Analyzed: 26-Jan-24		
Clay <0.0039 mm	NA	10.4	1	0.05	0.05	%	9.1		114	70 - 130%	PASS		
Granule 2.0 <4.0 mm	NA	0	1	0.05	0.05	%							
Sand 0.0625 to <2.0 mm	NA	62.8	1	0.05	0.05	%	58.6		107	80 - 120%	PASS		
Silt 0.0039 to <0.0625 mm	NA	27.2	1	0.05	0.05	%	32.3		84	69 - 131%	PASS		
Sample ID: 113486-R2	**SV-23-Composite S**					**Matrix: Sediment**		**Sampled:**			**Received:**		
		Method: SM 2560 D				Batch ID: C-73028		Prepared: 12-Jan-24			Analyzed: 26-Jan-24		
Clay <0.0039 mm	NA	22.6	1	0.05	0.05	%					4	30	PASS
Granule 2.0 <4.0 mm	NA	ND	1	0.05	0.05	%					0	30	PASS
Kurtosis	NA	0.881	1								0	30	PASS
Mean (mm)	NA	0.00822	1								3	30	PASS
Mean (phi)	NA	6.93	1								1	30	PASS
Sand 0.0625 to <2.0 mm	NA	9.07	1	0.05	0.05	%					1	30	PASS
Silt 0.0039 to <0.0625 mm	NA	68.3	1	0.05	0.05	%					1	30	PASS
Skewness	NA	-0.0162	1								94	30	FAIL NH
Sorting	NA	1.86	1								1	30	PASS

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24			Analyzed: 14-Jan-24		
PCB 018	NA	ND	1	0.029	0.2	ng/dry g							
PCB 028	NA	ND	1	0.023	0.2	ng/dry g							
PCB 037	NA	ND	1	0.06	0.2	ng/dry g							
PCB 044	NA	ND	1	0.028	0.2	ng/dry g							
PCB 049	NA	ND	1	0.036	0.2	ng/dry g							
PCB 052	NA	ND	1	0.012	0.2	ng/dry g							
PCB 066	NA	ND	1	0.027	0.2	ng/dry g							
PCB 070	NA	ND	1	0.023	0.2	ng/dry g							
PCB 074	NA	ND	1	0.021	0.2	ng/dry g							
PCB 077	NA	ND	1	0.018	0.2	ng/dry g							
PCB 081	NA	ND	1	0.084	0.2	ng/dry g							
PCB 087	NA	ND	1	0.081	0.2	ng/dry g							
PCB 099	NA	ND	1	0.028	0.2	ng/dry g							
PCB 101	NA	ND	1	0.027	0.2	ng/dry g							
PCB 105	NA	ND	1	0.047	0.2	ng/dry g							
PCB 110	NA	ND	1	0.074	0.2	ng/dry g							
PCB 114	NA	ND	1	0.072	0.2	ng/dry g							
PCB 118	NA	ND	1	0.069	0.2	ng/dry g							
PCB 119	NA	ND	1	0.071	0.2	ng/dry g							
PCB 123	NA	ND	1	0.018	0.2	ng/dry g							
PCB 126	NA	ND	1	0.086	0.2	ng/dry g							
PCB 128	NA	ND	1	0.081	0.2	ng/dry g							
PCB 132/168	NA	ND	1	0.094	0.2	ng/dry g							

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
PCB 138	NA	ND	1	0.057	0.2	ng/dry g							
PCB 149	NA	ND	1	0.092	0.2	ng/dry g							
PCB 151	NA	ND	1	0.073	0.2	ng/dry g							
PCB 153	NA	ND	1	0.065	0.2	ng/dry g							
PCB 156	NA	ND	1	0.089	0.2	ng/dry g							
PCB 157	NA	ND	1	0.103	0.2	ng/dry g							
PCB 158	NA	ND	1	0.074	0.2	ng/dry g							
PCB 167	NA	ND	1	0.049	0.2	ng/dry g							
PCB 169	NA	ND	1	0.116	0.2	ng/dry g							
PCB 170	NA	ND	1	0.118	0.25	ng/dry g							
PCB 177	NA	ND	1	0.085	0.25	ng/dry g							
PCB 180	NA	ND	1	0.154	0.25	ng/dry g							
PCB 183	NA	ND	1	0.056	0.25	ng/dry g							
PCB 187	NA	ND	1	0.168	0.25	ng/dry g							
PCB 189	NA	ND	1	0.109	0.25	ng/dry g							
PCB 194	NA	ND	1	0.164	0.25	ng/dry g							
PCB 201	NA	ND	1	0.104	0.25	ng/dry g							
PCB 206	NA	ND	1	0.155	0.25	ng/dry g							

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**	
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 14-Jan-24	
PCB 018	NA	114	1	0.029	0.2	ng/dry g	100	0	114	68 - 119%	PASS		
PCB 028	NA	53.1	1	0.023	0.2	ng/dry g	50	0	106	67 - 123%	PASS		
PCB 037	NA	82.1	1	0.06	0.2	ng/dry g	100	0	82	77 - 116%	PASS		
PCB 044	NA	26.5	1	0.028	0.2	ng/dry g	25	0	106	76 - 114%	PASS		
PCB 049	NA	76.2	1	0.036	0.2	ng/dry g	100	0	76	72 - 122%	PASS		
PCB 052	NA	74.5	1	0.012	0.2	ng/dry g	100	0	75	74 - 119%	PASS		
PCB 066	NA	47.7	1	0.027	0.2	ng/dry g	50	0	95	75 - 117%	PASS		
PCB 070	NA	38.1	1	0.023	0.2	ng/dry g	50	0	76	76 - 117%	PASS		
PCB 074	NA	80.1	1	0.021	0.2	ng/dry g	100	0	80	74 - 121%	PASS		
PCB 077	NA	18.6	1	0.018	0.2	ng/dry g	25	0	74	73 - 121%	PASS		
PCB 081	NA	50.9	1	0.084	0.2	ng/dry g	50	0	102	73 - 125%	PASS		
PCB 087	NA	28.4	1	0.081	0.2	ng/dry g	25	0	114	76 - 119%	PASS		
PCB 099	NA	44.5	1	0.028	0.2	ng/dry g	50	0	89	77 - 118%	PASS		
PCB 101	NA	58.7	1	0.027	0.2	ng/dry g	50	0	117	76 - 119%	PASS		
PCB 105	NA	38.3	1	0.047	0.2	ng/dry g	50	0	77	71 - 121%	PASS		
PCB 110	NA	36	1	0.074	0.2	ng/dry g	50	0	72	71 - 120%	PASS		
PCB 114	NA	40.8	1	0.072	0.2	ng/dry g	50	0	82	71 - 120%	PASS		
PCB 118	NA	52.3	1	0.069	0.2	ng/dry g	50	0	105	75 - 117%	PASS		
PCB 119	NA	48.9	1	0.071	0.2	ng/dry g	50	0	98	74 - 121%	PASS		
PCB 123	NA	28.5	1	0.018	0.2	ng/dry g	25	0	114	75 - 119%	PASS		
PCB 126	NA	23.5	1	0.086	0.2	ng/dry g	25	0	94	67 - 139%	PASS		
PCB 128	NA	21.7	1	0.081	0.2	ng/dry g	25	0	87	71 - 128%	PASS		
PCB 132/168	NA	52.6	1	0.094	0.2	ng/dry g	50	0	105	74 - 116%	PASS		

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
PCB 138	NA	28.6	1	0.057	0.2	ng/dry g	25	0	114	74 - 123%	PASS			
PCB 149	NA	26	1	0.092	0.2	ng/dry g	25	0	104	70 - 117%	PASS			
PCB 151	NA	19.8	1	0.073	0.2	ng/dry g	25	0	79	75 - 124%	PASS			
PCB 153	NA	38.6	1	0.065	0.2	ng/dry g	50	0	77	76 - 122%	PASS			
PCB 156	NA	48.6	1	0.089	0.2	ng/dry g	50	0	97	68 - 139%	PASS			
PCB 157	NA	40	1	0.103	0.2	ng/dry g	50	0	80	73 - 124%	PASS			
PCB 158	NA	38	1	0.074	0.2	ng/dry g	50	0	76	70 - 130%	PASS			
PCB 167	NA	29.9	1	0.049	0.2	ng/dry g	25	0	120	67 - 136%	PASS			
PCB 169	NA	26.1	1	0.116	0.2	ng/dry g	25	0	104	60 - 153%	PASS			
PCB 170	NA	29.5	1	0.118	0.25	ng/dry g	25	0	118	66 - 135%	PASS			
PCB 177	NA	48.1	1	0.085	0.25	ng/dry g	50	0	96	73 - 128%	PASS			
PCB 180	NA	23.8	1	0.154	0.25	ng/dry g	25	0	95	72 - 132%	PASS			
PCB 183	NA	50.6	1	0.056	0.25	ng/dry g	50	0	101	79 - 119%	PASS			
PCB 187	NA	19.8	1	0.168	0.25	ng/dry g	25	0	79	77 - 121%	PASS			
PCB 189	NA	19	1	0.109	0.25	ng/dry g	25	0	76	54 - 154%	PASS			
PCB 194	NA	16.4	1	0.164	0.25	ng/dry g	25	0	66	57 - 147%	PASS			
PCB 201	NA	18	1	0.104	0.25	ng/dry g	25	0	72	71 - 119%	PASS			
PCB 206	NA	15.5	1	0.155	0.25	ng/dry g	25	0	62	56 - 145%	PASS			

PCB Congeners

QUALITY CONTROL REPORT

Sample ID: 113482-BS2 **QAQC Procedural Blank** **Matrix: BlankMatrix** **Sampled:** **Received:**

Method: EPA 8270E Batch ID: O-43100 Prepared: 09-Jan-24 Analyzed: 14-Jan-24

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
PCB 018	NA	85.5	1	0.029	0.2	ng/dry g	100	0	86	68 - 119%	PASS	28	30	PASS	
PCB 028	NA	39.7	1	0.023	0.2	ng/dry g	50	0	79	67 - 123%	PASS	29	30	PASS	
PCB 037	NA	94	1	0.06	0.2	ng/dry g	100	0	94	77 - 116%	PASS	14	30	PASS	
PCB 044	NA	21.9	1	0.028	0.2	ng/dry g	25	0	88	76 - 114%	PASS	19	30	PASS	
PCB 049	NA	71	1	0.036	0.2	ng/dry g	100	0	71	72 - 122%	FAIL	7	30	PASS	R
PCB 052	NA	81.1	1	0.012	0.2	ng/dry g	100	0	81	74 - 119%	PASS	9	30	PASS	
PCB 066	NA	49.4	1	0.027	0.2	ng/dry g	50	0	99	75 - 117%	PASS	4	30	PASS	
PCB 070	NA	37.9	1	0.023	0.2	ng/dry g	50	0	76	76 - 117%	PASS	0	30	PASS	
PCB 074	NA	80	1	0.021	0.2	ng/dry g	100	0	80	74 - 121%	PASS	0	30	PASS	
PCB 077	NA	18.6	1	0.018	0.2	ng/dry g	25	0	74	73 - 121%	PASS	0	30	PASS	
PCB 081	NA	39.1	1	0.084	0.2	ng/dry g	50	0	78	73 - 125%	PASS	27	30	PASS	
PCB 087	NA	23.7	1	0.081	0.2	ng/dry g	25	0	95	76 - 119%	PASS	18	30	PASS	
PCB 099	NA	53.8	1	0.028	0.2	ng/dry g	50	0	108	77 - 118%	PASS	19	30	PASS	
PCB 101	NA	49.8	1	0.027	0.2	ng/dry g	50	0	100	76 - 119%	PASS	16	30	PASS	
PCB 105	NA	40.9	1	0.047	0.2	ng/dry g	50	0	82	71 - 121%	PASS	6	30	PASS	
PCB 110	NA	44.7	1	0.074	0.2	ng/dry g	50	0	89	71 - 120%	PASS	21	30	PASS	
PCB 114	NA	36.8	1	0.072	0.2	ng/dry g	50	0	74	71 - 120%	PASS	10	30	PASS	
PCB 118	NA	55.2	1	0.069	0.2	ng/dry g	50	0	110	75 - 117%	PASS	5	30	PASS	
PCB 119	NA	51	1	0.071	0.2	ng/dry g	50	0	102	74 - 121%	PASS	4	30	PASS	
PCB 123	NA	23.4	1	0.018	0.2	ng/dry g	25	0	94	75 - 119%	PASS	19	30	PASS	
PCB 126	NA	28	1	0.086	0.2	ng/dry g	25	0	112	67 - 139%	PASS	17	30	PASS	
PCB 128	NA	19.2	1	0.081	0.2	ng/dry g	25	0	77	71 - 128%	PASS	12	30	PASS	
PCB 132/168	NA	39.2	1	0.094	0.2	ng/dry g	50	0	78	74 - 116%	PASS	30	30	PASS	

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
PCB 138	NA	23.1	1	0.057	0.2	ng/dry g	25	0	92	74 - 123%	PASS	21	30	PASS	
PCB 149	NA	23.5	1	0.092	0.2	ng/dry g	25	0	94	70 - 117%	PASS	10	30	PASS	
PCB 151	NA	19.5	1	0.073	0.2	ng/dry g	25	0	78	75 - 124%	PASS	1	30	PASS	
PCB 153	NA	38.6	1	0.065	0.2	ng/dry g	50	0	77	76 - 122%	PASS	0	30	PASS	
PCB 156	NA	45.3	1	0.089	0.2	ng/dry g	50	0	91	68 - 139%	PASS	6	30	PASS	
PCB 157	NA	37.6	1	0.103	0.2	ng/dry g	50	0	75	73 - 124%	PASS	6	30	PASS	
PCB 158	NA	36.9	1	0.074	0.2	ng/dry g	50	0	74	70 - 130%	PASS	3	30	PASS	
PCB 167	NA	26.4	1	0.049	0.2	ng/dry g	25	0	106	67 - 136%	PASS	12	30	PASS	
PCB 169	NA	27.6	1	0.116	0.2	ng/dry g	25	0	110	60 - 153%	PASS	6	30	PASS	
PCB 170	NA	19.1	1	0.118	0.25	ng/dry g	25	0	76	66 - 135%	PASS	43	30	FAIL	R
PCB 177	NA	46.7	1	0.085	0.25	ng/dry g	50	0	93	73 - 128%	PASS	3	30	PASS	
PCB 180	NA	32.2	1	0.154	0.25	ng/dry g	25	0	129	72 - 132%	PASS	30	30	PASS	
PCB 183	NA	40	1	0.056	0.25	ng/dry g	50	0	80	79 - 119%	PASS	23	30	PASS	
PCB 187	NA	24.1	1	0.168	0.25	ng/dry g	25	0	96	77 - 121%	PASS	19	30	PASS	
PCB 189	NA	19.7	1	0.109	0.25	ng/dry g	25	0	79	54 - 154%	PASS	4	30	PASS	
PCB 194	NA	19.9	1	0.164	0.25	ng/dry g	25	0	80	57 - 147%	PASS	19	30	PASS	
PCB 201	NA	17.7	1	0.104	0.25	ng/dry g	25	0	71	71 - 119%	PASS	1	30	PASS	
PCB 206	NA	15	1	0.155	0.25	ng/dry g	25	0	60	56 - 145%	PASS	3	30	PASS	

PCB Congeners

QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113484-CRM1	**QAQC CRM - SRM 1944**					**Matrix: Sediment**		**Sampled:**			**Received:**		
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24			Analyzed: 14-Jan-24		
PCB 018	NA	108	1	0.029	0.2	ng/dry g	51	212	50 - 143%	FAIL			2
PCB 028	NA	116	1	0.023	0.2	ng/dry g	80.8	144	44 - 145%	PASS			
PCB 044	NA	61.7	1	0.028	0.2	ng/dry g	60.2	102	43 - 110%	PASS			
PCB 049	NA	45.5	1	0.036	0.2	ng/dry g	53	86	41 - 145%	PASS			
PCB 052	NA	161	1	0.012	0.2	ng/dry g	79.4	203	45 - 110%	FAIL			2
PCB 066	NA	108	1	0.027	0.2	ng/dry g	71.9	150	32 - 110%	FAIL			2
PCB 087	NA	39.7	1	0.081	0.2	ng/dry g	29.9	133	41 - 110%	FAIL			2
PCB 099	NA	27.6	1	0.028	0.2	ng/dry g	37.5	74	33 - 110%	PASS			
PCB 101	NA	79.1	1	0.027	0.2	ng/dry g	73.4	108	41 - 110%	PASS			
PCB 105	NA	23.8	1	0.047	0.2	ng/dry g	24.5	97	12 - 111%	PASS			
PCB 110	NA	62.1	1	0.074	0.2	ng/dry g	63.5	98	41 - 110%	PASS			
PCB 118	NA	55.5	1	0.069	0.2	ng/dry g	58	96	34 - 110%	PASS			
PCB 138	NA	73.5	1	0.057	0.2	ng/dry g	62.1	118	34 - 142%	PASS			
PCB 149	NA	45	1	0.092	0.2	ng/dry g	49.7	91	44 - 128%	PASS			
PCB 151	NA	12	1	0.073	0.2	ng/dry g	16.9	71	37 - 122%	PASS			
PCB 153	NA	61.5	1	0.065	0.2	ng/dry g	74	83	39 - 110%	PASS			
PCB 156	NA	27.6	1	0.089	0.2	ng/dry g	6.5	425	35 - 120%	FAIL			1
PCB 170	NA	13.1	1	0.118	0.25	ng/dry g	22.6	58	34 - 148%	PASS			
PCB 180	NA	37	1	0.154	0.25	ng/dry g	44.3	84	44 - 132%	PASS			
PCB 183	NA	8.77	1	0.056	0.25	ng/dry g	12.2	72	53 - 131%	PASS			
PCB 187	NA	14.5	1	0.168	0.25	ng/dry g	25.1	58	56 - 131%	PASS			
PCB 194	NA	12	1	0.164	0.25	ng/dry g	11.2	107	34 - 166%	PASS			
PCB 206	NA	2.81	1	0.155	0.25	ng/dry g	9.2	31	50 - 159%	FAIL			1

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**	
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 14-Jan-24	
(d10-Acenaphthene)	NA	113	1			% Recovery	100	113		27 - 133%	PASS		
(d10-Phenanthrene)	NA	92	1			% Recovery	100	92		43 - 129%	PASS		
(d12-Chrysene)	NA	60	1			% Recovery	100	60		52 - 144%	PASS		
(d12-Perylene)	NA	89	1			% Recovery	100	89		36 - 161%	PASS		
(d8-Naphthalene)	NA	79	1			% Recovery	100	79		25 - 125%	PASS		
1-Methylnaphthalene	Total	ND	1	0.084	0.5	ng/dry g							
1-Methylphenanthrene	Total	ND	1	0.076	0.5	ng/dry g							
2,3,5-Trimethylnaphthalene	Total	ND	1	0.059	0.5	ng/dry g							
2,6-Dimethylnaphthalene	Total	ND	1	0.065	0.5	ng/dry g							
2-Methylnaphthalene	Total	ND	1	0.106	0.5	ng/dry g							
Acenaphthene	Total	ND	1	0.078	0.5	ng/dry g							
Acenaphthylene	Total	ND	1	0.058	0.5	ng/dry g							
Anthracene	Total	ND	1	0.046	0.5	ng/dry g							
Benz[a]anthracene	Total	ND	1	0.107	0.5	ng/dry g							
Benzo[a]pyrene	Total	ND	1	0.106	0.5	ng/dry g							
Benzo[b]fluoranthene	Total	ND	1	0.063	0.5	ng/dry g							
Benzo[e]pyrene	Total	ND	1	0.098	0.5	ng/dry g							
Benzo[g,h,i]perylene	Total	ND	1	0.093	0.5	ng/dry g							
Benzo[k]fluoranthene	Total	ND	1	0.111	0.5	ng/dry g							
Biphenyl	Total	ND	1	0.092	0.5	ng/dry g							
Chrysene	Total	ND	1	0.067	0.5	ng/dry g							
Dibenz[a,h]anthracene	Total	ND	1	0.106	0.5	ng/dry g							
Dibenzothiophene	Total	ND	1	0.2	0.5	ng/dry g							

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Fluoranthene	Total	ND	1	0.035	0.5	ng/dry g							
Fluorene	Total	ND	1	0.068	0.5	ng/dry g							
Indeno[1,2,3-cd]pyrene	Total	ND	1	0.087	0.5	ng/dry g							
Naphthalene	Total	ND	1	0.187	0.5	ng/dry g							
Perylene	Total	ND	1	0.114	0.5	ng/dry g							
Phenanthrene	Total	ND	1	0.074	0.5	ng/dry g							
Pyrene	Total	ND	1	0.048	0.5	ng/dry g							

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113482-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24			Analyzed: 14-Jan-24		
(d10-Acenaphthene)	NA	87	1			% Recovery	100	0	87	27 - 133%	PASS		
(d10-Phenanthrene)	NA	84	1			% Recovery	100	0	84	43 - 129%	PASS		
(d12-Chrysene)	NA	80	1			% Recovery	100	0	80	52 - 144%	PASS		
(d12-Perylene)	NA	94	1			% Recovery	100	0	94	36 - 161%	PASS		
(d8-Naphthalene)	NA	64	1			% Recovery	100	0	64	25 - 125%	PASS		
1-Methylnaphthalene	Total	329	1	0.084	0.5	ng/dry g	500	0	66	31 - 128%	PASS		
1-Methylphenanthrene	Total	430	1	0.076	0.5	ng/dry g	500	0	86	78 - 129%	PASS		
2,3,5-Trimethylnaphthalene	Total	691	1	0.059	0.5	ng/dry g	500	0	138	55 - 122%	FAIL		R
2,6-Dimethylnaphthalene	Total	358	1	0.065	0.5	ng/dry g	500	0	72	48 - 120%	PASS		
2-Methylnaphthalene	Total	378	1	0.106	0.5	ng/dry g	500	0	76	42 - 116%	PASS		
Acenaphthene	Total	457	1	0.078	0.5	ng/dry g	500	0	91	50 - 120%	PASS		
Acenaphthylene	Total	457	1	0.058	0.5	ng/dry g	500	0	91	51 - 114%	PASS		
Anthracene	Total	381	1	0.046	0.5	ng/dry g	500	0	76	70 - 113%	PASS		
Benz[a]anthracene	Total	381	1	0.107	0.5	ng/dry g	500	0	76	54 - 152%	PASS		
Benzo[a]pyrene	Total	375	1	0.106	0.5	ng/dry g	500	0	75	36 - 149%	PASS		
Benzo[b]fluoranthene	Total	452	1	0.063	0.5	ng/dry g	500	0	90	38 - 161%	PASS		
Benzo[e]pyrene	Total	441	1	0.098	0.5	ng/dry g	500	0	88	44 - 148%	PASS		
Benzo[g,h,i]perylene	Total	503	1	0.093	0.5	ng/dry g	500	0	101	55 - 143%	PASS		
Benzo[k]fluoranthene	Total	455	1	0.111	0.5	ng/dry g	500	0	91	44 - 148%	PASS		
Biphenyl	Total	366	1	0.092	0.5	ng/dry g	500	0	73	45 - 119%	PASS		
Chrysene	Total	370	1	0.067	0.5	ng/dry g	500	0	74	57 - 137%	PASS		
Dibenz[a,h]anthracene	Total	499	1	0.106	0.5	ng/dry g	500	0	100	56 - 148%	PASS		
Dibenzothiophene	Total	393	1	0.2	0.5	ng/dry g	500	0	79	46 - 126%	PASS		

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Fluoranthene	Total	392	1	0.035	0.5	ng/dry g	500	0	78	77 - 131%	PASS			
Fluorene	Total	504	1	0.068	0.5	ng/dry g	500	0	101	57 - 127%	PASS			
Indeno[1,2,3-cd]pyrene	Total	434	1	0.087	0.5	ng/dry g	500	0	87	52 - 150%	PASS			
Naphthalene	Total	290	1	0.187	0.5	ng/dry g	500	0	58	33 - 112%	PASS			
Perylene	Total	449	1	0.114	0.5	ng/dry g	500	0	90	40 - 141%	PASS			
Phenanthrene	Total	429	1	0.074	0.5	ng/dry g	500	0	86	71 - 121%	PASS			
Pyrene	Total	453	1	0.048	0.5	ng/dry g	500	0	91	77 - 132%	PASS			

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
Sample ID: 113482-BS2	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**			
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24				Analyzed: 14-Jan-24			
(d10-Acenaphthene)	NA	61	1			% Recovery	100	0	61	27 - 133%	PASS	35	30	FAIL	R
(d10-Phenanthrene)	NA	56	1			% Recovery	100	0	56	43 - 129%	PASS	40	30	FAIL	R
(d12-Chrysene)	NA	55	1			% Recovery	100	0	55	52 - 144%	PASS	37	30	FAIL	R
(d12-Perylene)	NA	93	1			% Recovery	100	0	93	36 - 161%	PASS	1	30	PASS	
(d8-Naphthalene)	NA	38	1			% Recovery	100	0	38	25 - 125%	PASS	51	30	FAIL	R
1-Methylnaphthalene	Total	224	1	0.084	0.5	ng/dry g	500	0	45	31 - 128%	PASS	38	30	FAIL	R
1-Methylphenanthrene	Total	353	1	0.076	0.5	ng/dry g	500	0	71	78 - 129%	FAIL	19	30	PASS	R
2,3,5-Trimethylnaphthalene	Total	273	1	0.059	0.5	ng/dry g	500	0	55	55 - 122%	PASS	86	30	FAIL	R
2,6-Dimethylnaphthalene	Total	302	1	0.065	0.5	ng/dry g	500	0	60	48 - 120%	PASS	18	30	PASS	
2-Methylnaphthalene	Total	275	1	0.106	0.5	ng/dry g	500	0	55	42 - 116%	PASS	32	30	FAIL	R
Acenaphthene	Total	326	1	0.078	0.5	ng/dry g	500	0	65	50 - 120%	PASS	33	30	FAIL	R
Acenaphthylene	Total	312	1	0.058	0.5	ng/dry g	500	0	62	51 - 114%	PASS	38	30	FAIL	R
Anthracene	Total	295	1	0.046	0.5	ng/dry g	500	0	59	70 - 113%	FAIL	25	30	PASS	R
Benz[a]anthracene	Total	258	1	0.107	0.5	ng/dry g	500	0	52	54 - 152%	FAIL	38	30	FAIL	R
Benzo[a]pyrene	Total	364	1	0.106	0.5	ng/dry g	500	0	73	36 - 149%	PASS	3	30	PASS	
Benzo[b]fluoranthene	Total	383	1	0.063	0.5	ng/dry g	500	0	77	38 - 161%	PASS	16	30	PASS	
Benzo[e]pyrene	Total	436	1	0.098	0.5	ng/dry g	500	0	87	44 - 148%	PASS	1	30	PASS	
Benzo[g,h,i]perylene	Total	242	1	0.093	0.5	ng/dry g	500	0	48	55 - 143%	FAIL	71	30	FAIL	R
Benzo[k]fluoranthene	Total	369	1	0.111	0.5	ng/dry g	500	0	74	44 - 148%	PASS	21	30	PASS	
Biphenyl	Total	296	1	0.092	0.5	ng/dry g	500	0	59	45 - 119%	PASS	21	30	PASS	
Chrysene	Total	336	1	0.067	0.5	ng/dry g	500	0	67	57 - 137%	PASS	10	30	PASS	
Dibenz[a,h]anthracene	Total	364	1	0.106	0.5	ng/dry g	500	0	73	56 - 148%	PASS	31	30	FAIL	R
Dibenzothiophene	Total	250	1	0.2	0.5	ng/dry g	500	0	50	46 - 126%	PASS	45	30	FAIL	R

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODEc
Fluoranthene	Total	278	1	0.035	0.5	ng/dry g	500	0	56	77 - 131%	FAIL	33	30	FAIL	R
Fluorene	Total	518	1	0.068	0.5	ng/dry g	500	0	104	57 - 127%	PASS	3	30	PASS	
Indeno[1,2,3-cd]pyrene	Total	440	1	0.087	0.5	ng/dry g	500	0	88	52 - 150%	PASS	1	30	PASS	
Naphthalene	Total	186	1	0.187	0.5	ng/dry g	500	0	37	33 - 112%	PASS	44	30	FAIL	R
Perylene	Total	398	1	0.114	0.5	ng/dry g	500	0	80	40 - 141%	PASS	12	30	PASS	
Phenanthrene	Total	287	1	0.074	0.5	ng/dry g	500	0	57	71 - 121%	FAIL	41	30	FAIL	R
Pyrene	Total	340	1	0.048	0.5	ng/dry g	500	0	68	77 - 132%	FAIL	29	30	PASS	R

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113484-CRM1	**QAQC CRM - SRM 1944**					**Matrix: Sediment**		**Sampled:**			**Received:**		
	Method: EPA 8270E					Batch ID: O-43100		Prepared: 09-Jan-24			Analyzed: 14-Jan-24		
(d10-Acenaphthene)	Total	48	1			% Recovery	100		48	44 - 144%	PASS		
(d10-Phenanthrene)	Total	102	1			% Recovery	100		102	60 - 134%	PASS		
(d12-Chrysene)	Total	81	1			% Recovery	100		81	27 - 158%	PASS		
(d12-Perylene)	Total	84	1			% Recovery	100		84	17 - 160%	PASS		
(d8-Naphthalene)	Total	25	1			% Recovery	100		25	19 - 130%	PASS		
1-Methylnaphthalene	Total	96.4	1	0.084	0.5	ng/dry g	470		21	25 - 128%	FAIL		2
1-Methylphenanthrene	Total	2770	1	0.076	0.5	ng/dry g	1700		163	37 - 110%	FAIL		2
2-Methylnaphthalene	Total	214	1	0.106	0.5	ng/dry g	740		29	28 - 123%	PASS		
Acenaphthene	Total	62.5	1	0.078	0.5	ng/dry g	390		16	22 - 110%	FAIL		2
Anthracene	Total	1170	1	0.046	0.5	ng/dry g	1130		104	47 - 133%	PASS		
Benz[a]anthracene	Total	3630	1	0.107	0.5	ng/dry g	4720		77	31 - 145%	PASS		
Benzo[a]pyrene	Total	2580	1	0.106	0.5	ng/dry g	4300		60	22 - 127%	PASS		
Benzo[b]fluoranthene	Total	2820	1	0.063	0.5	ng/dry g	3870		73	36 - 160%	PASS		
Benzo[e]pyrene	Total	2490	1	0.098	0.5	ng/dry g	3280		76	38 - 147%	PASS		
Benzo[g,h,i]perylene	Total	2430	1	0.093	0.5	ng/dry g	2840		86	41 - 144%	PASS		
Benzo[k]fluoranthene	Total	3580	1	0.111	0.5	ng/dry g	4390		82	32 - 159%	PASS		
Biphenyl	Total	67.1	1	0.092	0.5	ng/dry g	250		27	27 - 112%	PASS		
Chrysene	Total	3970	1	0.067	0.5	ng/dry g	5900		67	44 - 162%	PASS		
Dibenz[a,h]anthracene	Total	751	1	0.106	0.5	ng/dry g	924		81	22 - 135%	PASS		
Dibenzothiophene	Total	817	1	0.2	0.5	ng/dry g	500		163	78 - 170%	PASS		
Fluoranthene	Total	8010	1	0.035	0.5	ng/dry g	8920		90	31 - 141%	PASS		
Fluorene	Total	158	1	0.068	0.5	ng/dry g	480		33	24 - 110%	PASS		
Indeno[1,2,3-cd]pyrene	Total	3090	1	0.087	0.5	ng/dry g	2780		111	60 - 164%	PASS		

Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Naphthalene	Total	351	1	0.187	0.5	ng/dry g	1280		27	19 - 126%	PASS			
Perylene	Total	525	1	0.114	0.5	ng/dry g	1170		45	26 - 114%	PASS			
Phenanthrene	Total	4960	1	0.074	0.5	ng/dry g	5270		94	51 - 121%	PASS			
Pyrene	Total	9270	1	0.048	0.5	ng/dry g	9700		96	31 - 126%	PASS			

PHYSIS ENVIRONMENTAL LABORATORIES, INC.
TERRA FAUNA FLORA AQUA AURA
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-003
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO# F014001

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Percent Solids		**Method: SM 2540 B**			**Fraction: NA**					**Prepared: 03-Jan-24**		**Analyzed: 04-Jan-24**		
113482-B1	QAQC Procedural Blank	C-78020	ND	1	0.1	0.1	%							
Total Organic Carbon		**Method: EPA 9060**			**Fraction: NA**					**Prepared: 12-Feb-24**		**Analyzed: 15-Feb-24**		
113482-B1	QAQC Procedural Blank	O-36109	ND	1	0.01	0.01	% dry weight							
113484-CRM 1	QAQC CRM - SRM 1944	O-36109	3.55	1	0.01	0.01	% dry weight	4.4		81	80 - 120%			PASS
113486-R2	SV-23-Composite	O-36109	1.6	1	0.01	0.01	% dry weight					3	30	PASS

SUBCONTRACT REPORT

PHYSIS
TERRA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Your Project #: 2208006-003
Your C.O.C. #: n/a

Attention: Misty Mercier

Physis Environmental Laboratories Inc.
1904 East Wright Circle
Anaheim, CA
USA 92806

Report Date: 2024/01/15
Report #: R7989829
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BN858
Received: 2023/12/20, 12:30

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dioxins/Furans in Soil (1613B) (1)	3	2024/01/06	2024/01/09	BRL SOP-00410	EPA 1613B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
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Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 2208006-003
Your C.O.C. #: n/a

Attention: Misty Mercier

Physis Environmental Laboratories Inc.
1904 East Wright Circle
Anaheim, CA
USA 92806

Report Date: 2024/01/15
Report #: R7989829
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BN858
Received: 2023/12/20, 12:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Lori Dufour, Project Manager
Email: Lori.Dufour@bureauveritas.com
Phone# (905) 817-5700
==========
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH615							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-COMPOSITE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.186	0.186	0.997	0.227	1.00	0.186	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	0.362	0.294	4.99	0.258	1.00	0.362	1	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	<0.292	0.292	4.99	0.204	0.100	0.0292	0	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	0.864	0.245	4.99	0.173	0.100	0.0864	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	<0.793 (1)	0.793	4.99	0.179	0.100	0.0793	0	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	8.50	0.273	4.99	0.743	0.0100	0.0850	1	9151412
Octa CDD *	pg/g	61.6	0.536	9.97	0.800	0.000300	0.0185	1	9151412
Total Tetra CDD *	pg/g	0.219	0.186	0.997	0.400	N/A	N/A	1	9151412
Total Penta CDD *	pg/g	0.737	0.294	4.99	0.400	N/A	N/A	2	9151412
Total Hexa CDD *	pg/g	8.98	0.260	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDD *	pg/g	24.9	0.273	4.99	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	0.686	0.136	0.997	0.181	0.100	0.0686	1	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.324	0.236	4.99	0.242	0.0300	0.00972	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.457	0.213	4.99	0.211	0.300	0.137	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	0.471	0.194	4.99	0.228	0.100	0.0471	1	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.188 (1)	0.188	4.99	0.203	0.100	0.0188	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.254	0.254	4.99	0.177	0.100	0.0254	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.230	0.230	4.99	0.185	0.100	0.0230	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	<1.15 (1)	1.15	4.99	0.185	0.0100	0.0115	0	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.326	0.326	4.99	0.194	0.0100	0.00326	0	9151412
Octa CDF **	pg/g	5.26	0.386	9.97	0.919	0.000300	0.00158	1	9151412
Total Tetra CDF **	pg/g	2.63	0.136	0.997	0.400	N/A	N/A	5	9151412
Total Penta CDF **	pg/g	5.31	0.224	4.99	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	3.28	0.199	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDF **	pg/g	<2.49	2.49	4.99	0.400	N/A	N/A	0	9151412
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.19	N/A	N/A

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH615							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-COMPOSITE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	73	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	44	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	97	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	52	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	102	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	64	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	78	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	76	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	73	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH616							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.263	0.263	0.997	0.227	1.00	0.263	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	<0.448	0.448	4.98	0.258	1.00	0.448	0	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	<0.237	0.237	4.98	0.204	0.100	0.0237	0	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	0.638	0.194	4.98	0.173	0.100	0.0638	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	0.749	0.199	4.98	0.179	0.100	0.0749	1	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	4.30	0.329	4.98	0.743	0.0100	0.0430	1	9151412
Octa CDD *	pg/g	42.2	0.600	9.97	0.800	0.000300	0.0127	1	9151412
Total Tetra CDD *	pg/g	0.756	0.263	0.997	0.400	N/A	N/A	1	9151412
Total Penta CDD *	pg/g	<0.987 (1)	0.987	4.98	0.400	N/A	N/A	0	9151412
Total Hexa CDD *	pg/g	8.51	0.209	4.98	0.400	N/A	N/A	6	9151412
Total Hepta CDD *	pg/g	15.6	0.329	4.98	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	<0.540 (2)	0.540	0.997	0.181	0.100	0.0540	0	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.337	0.270	4.98	0.242	0.0300	0.0101	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.441	0.245	4.98	0.211	0.300	0.132	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	<0.341	0.341	4.98	0.228	0.100	0.0341	0	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.230	0.230	4.98	0.203	0.100	0.0230	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.266	0.266	4.98	0.177	0.100	0.0266	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.303	0.303	4.98	0.185	0.100	0.0303	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	<0.850 (1)	0.850	4.98	0.185	0.0100	0.00850	0	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.283	0.283	4.98	0.194	0.0100	0.00283	0	9151412
Octa CDF **	pg/g	3.72	0.430	9.97	0.919	0.000300	0.00112	1	9151412
Total Tetra CDF **	pg/g	1.26	0.219	0.997	0.400	N/A	N/A	3	9151412
Total Penta CDF **	pg/g	2.79	0.257	4.98	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	1.63	0.261	4.98	0.400	N/A	N/A	2	9151412
Total Hepta CDF **	pg/g	<1.64	1.64	4.98	0.400	N/A	N/A	0	9151412

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH616							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				**TOXIC EQUIVALENCY**		# of	
	UNITS	**SV-23-DUP**	**EDL**	**RDL**	**MDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.25	N/A	N/A
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	63	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	65	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	39	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	50	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	104	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	81	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	59	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	69	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	71	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	63	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	60	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable
* CDD = Chloro Dibenzo-p-Dioxin
** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH617							
Sampling Date		2023/12/11 13:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SF-09 REFERENCE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.268	0.268	0.999	0.227	1.00	0.268	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	<0.454 (1)	0.454	4.99	0.258	1.00	0.454	0	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	0.390	0.320	4.99	0.204	0.100	0.0390	1	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	1.13	0.272	4.99	0.173	0.100	0.113	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	0.959	0.274	4.99	0.179	0.100	0.0959	1	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	8.59	0.379	4.99	0.743	0.0100	0.0859	1	9151412
Octa CDD *	pg/g	75.7	0.497	9.99	0.800	0.000300	0.0227	1	9151412
Total Tetra CDD *	pg/g	2.38	0.268	0.999	0.400	N/A	N/A	2	9151412
Total Penta CDD *	pg/g	<1.27	1.27	4.99	0.400	N/A	N/A	0	9151412
Total Hexa CDD *	pg/g	11.9	0.287	4.99	0.400	N/A	N/A	6	9151412
Total Hepta CDD *	pg/g	26.3	0.379	4.99	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	0.721	0.256	0.999	0.181	0.100	0.0721	1	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.370	0.308	4.99	0.242	0.0300	0.0111	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.547	0.276	4.99	0.211	0.300	0.164	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	0.443	0.324	4.99	0.228	0.100	0.0443	1	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.304	0.304	4.99	0.203	0.100	0.0304	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.337	0.337	4.99	0.177	0.100	0.0337	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.399	0.399	4.99	0.185	0.100	0.0399	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	1.62	0.432	4.99	0.185	0.0100	0.0162	1	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.461	0.461	4.99	0.194	0.0100	0.00461	0	9151412
Octa CDF **	pg/g	5.70	0.370	9.99	0.919	0.000300	0.00171	1	9151412
Total Tetra CDF **	pg/g	1.55	0.256	0.999	0.400	N/A	N/A	3	9151412
Total Penta CDF **	pg/g	5.50	0.291	4.99	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	3.48	0.337	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDF **	pg/g	1.62	0.446	4.99	0.400	N/A	N/A	1	9151412
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.50	N/A	N/A

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH617							
Sampling Date		2023/12/11 13:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SF-09 REFERENCE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	36	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	57	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	32	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	85	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	33	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	62	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	64	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	67	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	65	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	61	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	54	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3BN858
Report Date: 2024/01/15

Physis Environmental Laboratories Inc.
Client Project #: 2208006-003

TEST SUMMARY

Bureau Veritas ID: XYH615
Sample ID: SV-23-COMPOSITE
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

Bureau Veritas ID: XYH616
Sample ID: SV-23-DUP
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

Bureau Veritas ID: XYH617
Sample ID: SF-09 REFERENCE
Matrix: Soil

Collected: 2023/12/11
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.7°C

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
9151412	YQI	Matrix Spike	37CL4 2378 Tetra CDD	2024/01/09		81	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		83	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		84	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		101	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		96	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		78	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		93	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		93	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		76	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		77	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		86	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		93	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		81	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		76	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		82	%	24 - 169
			C13-OCDD	2024/01/09		59	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09		121	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/09		120	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/09		113	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/09		119	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2024/01/09		112	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09		149 (1)	%	70 - 140
			Octa CDD	2024/01/09		169 (1)	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/09		115	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/09		121	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/09		119	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/09		117	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/09		118	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/09		120	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/09		118	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09		128 (1)	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09		118	%	78 - 138
			Octa CDF	2024/01/09		122	%	63 - 170
9151412	YQI	Spiked Blank	37CL4 2378 Tetra CDD	2024/01/11		58	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/11		53	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/11		49	%	28 - 143
			C13-123478 HexaCDD	2024/01/11		74	%	32 - 141
			C13-123478 HexaCDF	2024/01/11		68	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/11		46	%	26 - 138
			C13-123678 HexaCDD	2024/01/11		81	%	28 - 130
			C13-123678 HexaCDF	2024/01/11		70	%	26 - 123
			C13-12378 PentaCDD	2024/01/11		56	%	25 - 181
			C13-12378 PentaCDF	2024/01/11		56	%	24 - 185
			C13-123789 HexaCDF	2024/01/11		60	%	29 - 147
			C13-234678 HexaCDF	2024/01/11		65	%	28 - 136
			C13-23478 PentaCDF	2024/01/11		56	%	21 - 178
			C13-2378 TetraCDD	2024/01/11		58	%	25 - 164
			C13-2378 TetraCDF	2024/01/11		54	%	24 - 169
			C13-OCDD	2024/01/11		39	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/11		121	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/11		118	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/11		109	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/11		112	%	76 - 134

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8,9-Hexa CDD	2024/01/11		103	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/11		116	%	70 - 140
			Octa CDD	2024/01/11		117	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/11		116	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/11		115	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/11		115	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/11		112	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/11		114	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/11		113	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/11		114	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/11		120	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/11		113	%	78 - 138
			Octa CDF	2024/01/11		110	%	63 - 170
9151412	YQI	Spiked Blank DUP	37CL4 2378 Tetra CDD	2024/01/09		67	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		83	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		89	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		95	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		91	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		84	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		98	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		86	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		66	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		68	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		83	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		90	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		74	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		65	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		69	%	24 - 169
			C13-OCDD	2024/01/09		58	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09		119	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/09		121	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/09		113	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/09		116	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2024/01/09		108	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09		123	%	70 - 140
			Octa CDD	2024/01/09		122	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/09		126	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/09		118	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/09		112	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/09		120	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/09		123	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/09		116	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/09		121	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09		122	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09		126	%	78 - 138
			Octa CDF	2024/01/09		128	%	63 - 170
9151412	YQI	RPD	2,3,7,8-Tetra CDD	2024/01/09	1.7		%	25
			1,2,3,7,8-Penta CDD	2024/01/09	2.5		%	25
			1,2,3,4,7,8-Hexa CDD	2024/01/09	3.6		%	25
			1,2,3,6,7,8-Hexa CDD	2024/01/09	3.5		%	25
			1,2,3,7,8,9-Hexa CDD	2024/01/09	4.7		%	25
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09	5.9		%	25
			Octa CDD	2024/01/09	4.2		%	25

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			2,3,7,8-Tetra CDF	2024/01/09	8.3		%	25
			1,2,3,7,8-Penta CDF	2024/01/09	2.6		%	25
			2,3,4,7,8-Penta CDF	2024/01/09	2.6		%	25
			1,2,3,4,7,8-Hexa CDF	2024/01/09	6.9		%	25
			1,2,3,6,7,8-Hexa CDF	2024/01/09	7.6		%	25
			2,3,4,6,7,8-Hexa CDF	2024/01/09	2.6		%	25
			1,2,3,7,8,9-Hexa CDF	2024/01/09	6.0		%	25
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09	1.7		%	25
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09	11		%	25
			Octa CDF	2024/01/09	15		%	25
9151412	YQI	Method Blank	37CL4 2378 Tetra CDD	2024/01/09		57	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		80	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		66	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		83	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		85	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		62	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		83	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		76	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		48	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		54	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		76	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		79	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		58	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		58	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		67	%	24 - 169
			C13-OCDD	2024/01/09		57	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09	<0.277, EDL=0.277		pg/g	
			1,2,3,7,8-Penta CDD	2024/01/09	<0.469, EDL=0.469		pg/g	
			1,2,3,4,7,8-Hexa CDD	2024/01/09	<0.217, EDL=0.217		pg/g	
			1,2,3,6,7,8-Hexa CDD	2024/01/09	<0.191, EDL=0.191		pg/g	
			1,2,3,7,8,9-Hexa CDD	2024/01/09	<0.189, EDL=0.189		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09	<0.524, EDL=0.524		pg/g	
			Octa CDD	2024/01/09	4.34, EDL=0.306		pg/g	
			Total Tetra CDD	2024/01/09	<0.277, EDL=0.277		pg/g	
			Total Penta CDD	2024/01/09	<0.469, EDL=0.469		pg/g	
			Total Hexa CDD	2024/01/09	<0.198, EDL=0.198		pg/g	
			Total Hepta CDD	2024/01/09	<0.518, EDL=0.518		pg/g	
			2,3,7,8-Tetra CDF	2024/01/09	<0.163, EDL=0.163		pg/g	
			1,2,3,7,8-Penta CDF	2024/01/09	<0.364, EDL=0.364		pg/g	
			2,3,4,7,8-Penta CDF	2024/01/09	<0.320, EDL=0.320		pg/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,7,8-Hexa CDF	2024/01/09	<0.226, EDL=0.226		pg/g	
			1,2,3,6,7,8-Hexa CDF	2024/01/09	<0.227, EDL=0.227		pg/g	
			2,3,4,6,7,8-Hexa CDF	2024/01/09	<0.234, EDL=0.234		pg/g	
			1,2,3,7,8,9-Hexa CDF	2024/01/09	<0.272, EDL=0.272		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09	<0.282, EDL=0.282		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09	<0.331, EDL=0.331		pg/g	
			Octa CDF	2024/01/09	0.827, EDL=0.274		pg/g	
			Total Tetra CDF	2024/01/09	<0.163, EDL=0.163		pg/g	
			Total Penta CDF	2024/01/09	<0.341, EDL=0.341		pg/g	
			Total Hexa CDF	2024/01/09	<0.239, EDL=0.239		pg/g	
			Total Hepta CDF	2024/01/09	<0.304, EDL=0.304		pg/g	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

(1) Recovery of the matrix spike was above the upper control limit. Laboratory spiked water (or soil) resulted in satisfactory recovery of the compound of interest. When considered together, these QC data suggest that matrix interferences may be biasing the data high. For results that were not detected (ND), this potential bias has no impact.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Ravneet Kaur, Analyst II

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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COMPANY NAME: WSP USA Environment & Infrastructure, Inc.	EMAIL: kimbrie.gobbi@wsp.com; kaylee.popovich@wsp.com	PROJECT NAME / NUMBER: USCG SV Sediment Characterization Study	COC PAGE: 1 of 2
PROJECT MANAGER: Kimbrie Gobbi	FAX:	PO #: F01400148 / PHYSIS SOS #:	TYPE OF ICE USED: ☑ WET ☐ BLUE ☐ DRY
COMPANY ADDRESS: 9177 Sky Park Ct, San Diego, CA 92123	PHONE: 443.852.4637 (KG) office; 805.550.8752 (KP) cell	SAMPLED BY: KP/KG	SHIPPED VIA: ☑ FEDEX ☐ UPS ☐ USPS ☐ Client ☐ Physis ☐ other

TURNAROUND TIME: ☑ STANDARD (15-20 business days) ☐ RUSH business days

REPORT FORMAT: ☑ PHYSIS PDF/EDD ☐ SWAMP EDD ☐ other

SPECIAL INSTRUCTIONS

Please report only requested analytes.
Please report to the MDL with flags.
Misty Mercier is PM.
Please report totals for PAHs and PCBs. Please report results in dry weight.

PHYSIS MATRIX CODES

SW = seawater FW = freshwater RW = rainwater
WW = wastewater DW = drinking water
S = sediment T = tissue E = extract O = other (specify)

REQUESTED ANALYSES

PLEASE SEE PHYSIS SOS

	SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE date	SAMPLE time	physis matrix code	# of bottles	Grain size (ASTM D1234; SM 2540D, Plumb 1981)	Total Solids (SM 2540B)	Total Organic Carbon (EPA 9060A; 5310B)	Metals (EPA 6020, [245.7/7471A for Hg])	PAHs (8270E/8270C SIM)	Pesticides (8270E/8270C SIM/8081A/8270E-NCI)	PCB Aroclors (8270E/8270C SIM/8082)	Organotins (Krone, et al)	Dioxins & Furans (EPA 1613B; 8290)
1	SV-23-Composite	S	12/12/23	0845		3	X	X	X	X	X	X	X	X	X
2	SV-23-DUP	S	12/12/23	0845		3	X	X	X	X	X	X	X	X	X
3	SF-09 Reference	S	12/11/23	1315		3	X	X	X	X	X	X	X	X	X
4															
5															
6															
7															
8															
9															
10															

RELINQUISHED BY print	signature	company	date & time	RECEIVED BY print	signature	company	date & time
Kimbrie Gobbi	KPG	WSP	12/13/23 1700	Maunga NOM	[signature]	PHYSIS	12/14/23 1000

Analyte[i]	Analysis Method	Sediment Target Reporting Limit[a, b]
Grain Size	ASTM D1234; SM 2560 D, Plumb 1981	0.10%
Total Solids	SM 2540 B[c]	0.10%
TOC	9060A; 5310B[c]	0.10%
Arsenic	6010/6020[d]	2.0 mg/kg
Cadmium	6010/6020[d]	0.3 mg/kg
Chromium	6010/6020[d]	5.0 mg/kg
Copper	6010/6020[d]	5.0 mg/kg
Lead	6010/6020[d]	5.0 mg/kg
Mercury	245.7[d], 7471A[d]	0.02 mg/kg
Nickel	6010/6020[d]	5.0 mg/kg
Selenium	6010/6020[d]	0.1 mg/kg
Silver	6010/6020[d]	0.2 mg/kg
Zinc	6010/6020[d]	1.0 mg/kg
PAHs	8270E/8270C SIM [d]	20 µg/kg
Pesticides [f]	8270E/8270C SIM/8081A/8270E-NCI[d]	2.0 µg/kg [j]
PCB Aroclors [g]	8270E/8270C SIM/8082 [d]	20 µg/kg
Organotins	Krone, et al [h]	10 µg/kg
Dioxins and Furans	USEPA 1613	1.0 – 10.0 pg/g

Notes:

µg/kg = microgram(s) per kilogram (parts per billion); µg/L = micrograms per liter ASTM = ASTM International; GC = gas chromatography; mg/kg = milligram(s) per kilogram (parts per million); mg/L = milligram(s) per liter; N/A = not applicable; NCI = nitrogen chloride; NH_3 = ammonia; NOAA = National Oceanic and Atmospheric Administration; pg/g = picograms per gram (parts per trillion [pptr]); PAH = polycyclic aromatic hydrocarbons; PCB = polychlorinated biphenyl; SIM = Selective Ion Monitoring; SM = Standard Method; TOC = total organic carbon; TSS = total suspended solids; USEPA = United States Environmental Protection Agency

a. Sediment minimum detection limits are on a dry-weight basis; tissue minimum levels are on a wet weight basis.

b. Reporting limits are provided by Physis Laboratories, Inc.

c. American Public Health Association et al. 1995. *Standard Methods for the Examination of Water and Wastewater*, 19th Edition.

d. USEPA, 1986–1996 SW-846. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition.

e. Includes low molecular weight PAHs: naphthalene, acenapthylene, acenapthene, anthracene, fluorene, phenanthrene and high molecular weight PAHs: fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d) pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene, and pyrene. Total PAHs will also be calculated.

f. Includes aldrin, α- benzene hexachloride (BHC), β-BHC, Δ=BHC, ¥-BHC (lindane), chlordane, dieldrin, trans-nonachlor, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, alpha chlordane, gamma chlordane, cis-nonachlor, oxychlordane, 2,4- and 4,4-dichlorodiphenyldichloroethane (DDD), 2,4- and 4,4-dichlorodiphenyldichloroethylene (DDE), and 2,4- 4,4-dichlorodiphenyltrichloroethane (DDT), and total DDTs.

g. Polychlorinated biphenyls (PCB) Aroclors: Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, and total Aroclors.

h. Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi, 1989. A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Liver from Puget Sound. *Marine Environmental Research* 27: 1–18. Includes monobutyltin, dibutyltin, tributyltin, tetrabutyltin, and total butyltins.

i. National Oceanic and Atmospheric Administration. 1993. Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects, 1984–1992, Volume IV, *Comprehensive Descriptions of Trace Organic Analytical Methods*, July.

j. Except toxaphene and chlordane, which are 1,000 micrograms per kilogram (parts per billion).

k. If bioaccumulation is necessary because of elevated levels of PCBs, the agencies expect to require PCB congener analysis rather than Aroclor analysis. PCB congeners reported will likely be: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132/153, 138/158, 149, 151, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

l. Toxicity characteristic leaching procedure (TCLP), total threshold limit concentration (TTLC), and soluble threshold limit concentration (STLC) analyses will be run if chemistry levels exceed Resource Conservation and Recovery Act (RCRA) guideline trigger levels.

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Project Iteration ID: 2208006-003
Client Name: WSP USA
Project Name: USCG SV Sediment Characterization Study PO# F01400148
COC Page Number: 3 of 3
Bottle Label Color: NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: MN
2. Date Received: 12/14/23
3. Time Received: 1000
4. Client Name: WSP
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     - i. Start Time:_____
     - ii. End Time:_____
     - iii. Total Mileage: _____
     - iv. Number of Pickups:_____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): 3.1 Used I/R Thermometer # ____

Inspection Info

1. Initials Inspected By: AL

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... Yes / No
2. All sample containers arrived intact..... Yes / No
3. All samples listed on COC(s) are present..... Yes / No
4. Information on containers consistent with information on COC(s)..... Yes / No
5. Correct containers and volume for all analyses indicated..... Yes / No
6. All samples received within method holding time..... Yes / No
7. Correct preservation used for all analyses indicated..... Yes / No
8. Name of sampler included on COC(s)..... Yes / No RGH

Notes:

Your Project #: 2208006-003
Your C.O.C. #: n/a

Attention: Misty Mercier

Physis Environmental Laboratories Inc.
1904 East Wright Circle
Anaheim, CA
USA 92806

Report Date: 2024/01/15
Report #: R7989829
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BN858
Received: 2023/12/20, 12:30

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dioxins/Furans in Soil (1613B) (1)	3	2024/01/06	2024/01/09	BRL SOP-00410	EPA 1613B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 2208006-003
Your C.O.C. #: n/a

Attention: Misty Mercier

Physis Environmental Laboratories Inc.
1904 East Wright Circle
Anaheim, CA
USA 92806

Report Date: 2024/01/15
Report #: R7989829
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BN858
Received: 2023/12/20, 12:30

Encryption Key

Stephanie Pollen
Account Manager, Ultra Trace Analysis
15 Jan 2024 17:00:53

Please direct all questions regarding this Certificate of Analysis to:
Lori Dufour, Project Manager
Email: Lori.Dufour@bureauveritas.com
Phone# (905) 817-5700
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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3BN858
Report Date: 2024/01/15

Physis Environmental Laboratories Inc.
Client Project #: 2208006-003

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH615							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-COMPOSITE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.186	0.186	0.997	0.227	1.00	0.186	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	0.362	0.294	4.99	0.258	1.00	0.362	1	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	<0.292	0.292	4.99	0.204	0.100	0.0292	0	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	0.864	0.245	4.99	0.173	0.100	0.0864	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	<0.793 (1)	0.793	4.99	0.179	0.100	0.0793	0	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	8.50	0.273	4.99	0.743	0.0100	0.0850	1	9151412
Octa CDD *	pg/g	61.6	0.536	9.97	0.800	0.000300	0.0185	1	9151412
Total Tetra CDD *	pg/g	0.219	0.186	0.997	0.400	N/A	N/A	1	9151412
Total Penta CDD *	pg/g	0.737	0.294	4.99	0.400	N/A	N/A	2	9151412
Total Hexa CDD *	pg/g	8.98	0.260	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDD *	pg/g	24.9	0.273	4.99	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	0.686	0.136	0.997	0.181	0.100	0.0686	1	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.324	0.236	4.99	0.242	0.0300	0.00972	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.457	0.213	4.99	0.211	0.300	0.137	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	0.471	0.194	4.99	0.228	0.100	0.0471	1	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.188 (1)	0.188	4.99	0.203	0.100	0.0188	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.254	0.254	4.99	0.177	0.100	0.0254	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.230	0.230	4.99	0.185	0.100	0.0230	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	<1.15 (1)	1.15	4.99	0.185	0.0100	0.0115	0	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.326	0.326	4.99	0.194	0.0100	0.00326	0	9151412
Octa CDF **	pg/g	5.26	0.386	9.97	0.919	0.000300	0.00158	1	9151412
Total Tetra CDF **	pg/g	2.63	0.136	0.997	0.400	N/A	N/A	5	9151412
Total Penta CDF **	pg/g	5.31	0.224	4.99	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	3.28	0.199	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDF **	pg/g	<2.49	2.49	4.99	0.400	N/A	N/A	0	9151412
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.19	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH615							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-COMPOSITE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	73	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	44	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	97	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	52	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	102	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	64	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	78	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	76	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	73	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH616							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SV-23-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.263	0.263	0.997	0.227	1.00	0.263	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	<0.448	0.448	4.98	0.258	1.00	0.448	0	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	<0.237	0.237	4.98	0.204	0.100	0.0237	0	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	0.638	0.194	4.98	0.173	0.100	0.0638	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	0.749	0.199	4.98	0.179	0.100	0.0749	1	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	4.30	0.329	4.98	0.743	0.0100	0.0430	1	9151412
Octa CDD *	pg/g	42.2	0.600	9.97	0.800	0.000300	0.0127	1	9151412
Total Tetra CDD *	pg/g	0.756	0.263	0.997	0.400	N/A	N/A	1	9151412
Total Penta CDD *	pg/g	<0.987 (1)	0.987	4.98	0.400	N/A	N/A	0	9151412
Total Hexa CDD *	pg/g	8.51	0.209	4.98	0.400	N/A	N/A	6	9151412
Total Hepta CDD *	pg/g	15.6	0.329	4.98	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	<0.540 (2)	0.540	0.997	0.181	0.100	0.0540	0	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.337	0.270	4.98	0.242	0.0300	0.0101	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.441	0.245	4.98	0.211	0.300	0.132	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	<0.341	0.341	4.98	0.228	0.100	0.0341	0	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.230	0.230	4.98	0.203	0.100	0.0230	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.266	0.266	4.98	0.177	0.100	0.0266	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.303	0.303	4.98	0.185	0.100	0.0303	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	<0.850 (1)	0.850	4.98	0.185	0.0100	0.00850	0	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.283	0.283	4.98	0.194	0.0100	0.00283	0	9151412
Octa CDF **	pg/g	3.72	0.430	9.97	0.919	0.000300	0.00112	1	9151412
Total Tetra CDF **	pg/g	1.26	0.219	0.997	0.400	N/A	N/A	3	9151412
Total Penta CDF **	pg/g	2.79	0.257	4.98	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	1.63	0.261	4.98	0.400	N/A	N/A	2	9151412
Total Hepta CDF **	pg/g	<1.64	1.64	4.98	0.400	N/A	N/A	0	9151412

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

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DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH616							
Sampling Date		2023/12/12 08:45							
COC Number		n/a				**TOXIC EQUIVALENCY**		# of	
	UNITS	**SV-23-DUP**	**EDL**	**RDL**	**MDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.25	N/A	N/A
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	63	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	65	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	39	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	50	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	104	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	81	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	59	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	69	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	71	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	63	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	60	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable
* CDD = Chloro Dibenzo-p-Dioxin
** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH617							
Sampling Date		2023/12/11 13:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SF-09 REFERENCE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Dioxins & Furans									
2,3,7,8-Tetra CDD *	pg/g	<0.268	0.268	0.999	0.227	1.00	0.268	0	9151412
1,2,3,7,8-Penta CDD *	pg/g	<0.454 (1)	0.454	4.99	0.258	1.00	0.454	0	9151412
1,2,3,4,7,8-Hexa CDD *	pg/g	0.390	0.320	4.99	0.204	0.100	0.0390	1	9151412
1,2,3,6,7,8-Hexa CDD *	pg/g	1.13	0.272	4.99	0.173	0.100	0.113	1	9151412
1,2,3,7,8,9-Hexa CDD *	pg/g	0.959	0.274	4.99	0.179	0.100	0.0959	1	9151412
1,2,3,4,6,7,8-Hepta CDD *	pg/g	8.59	0.379	4.99	0.743	0.0100	0.0859	1	9151412
Octa CDD *	pg/g	75.7	0.497	9.99	0.800	0.000300	0.0227	1	9151412
Total Tetra CDD *	pg/g	2.38	0.268	0.999	0.400	N/A	N/A	2	9151412
Total Penta CDD *	pg/g	<1.27	1.27	4.99	0.400	N/A	N/A	0	9151412
Total Hexa CDD *	pg/g	11.9	0.287	4.99	0.400	N/A	N/A	6	9151412
Total Hepta CDD *	pg/g	26.3	0.379	4.99	0.400	N/A	N/A	2	9151412
2,3,7,8-Tetra CDF **	pg/g	0.721	0.256	0.999	0.181	0.100	0.0721	1	9151412
1,2,3,7,8-Penta CDF **	pg/g	0.370	0.308	4.99	0.242	0.0300	0.0111	1	9151412
2,3,4,7,8-Penta CDF **	pg/g	0.547	0.276	4.99	0.211	0.300	0.164	1	9151412
1,2,3,4,7,8-Hexa CDF **	pg/g	0.443	0.324	4.99	0.228	0.100	0.0443	1	9151412
1,2,3,6,7,8-Hexa CDF **	pg/g	<0.304	0.304	4.99	0.203	0.100	0.0304	0	9151412
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.337	0.337	4.99	0.177	0.100	0.0337	0	9151412
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.399	0.399	4.99	0.185	0.100	0.0399	0	9151412
1,2,3,4,6,7,8-Hepta CDF **	pg/g	1.62	0.432	4.99	0.185	0.0100	0.0162	1	9151412
1,2,3,4,7,8,9-Hepta CDF **	pg/g	<0.461	0.461	4.99	0.194	0.0100	0.00461	0	9151412
Octa CDF **	pg/g	5.70	0.370	9.99	0.919	0.000300	0.00171	1	9151412
Total Tetra CDF **	pg/g	1.55	0.256	0.999	0.400	N/A	N/A	3	9151412
Total Penta CDF **	pg/g	5.50	0.291	4.99	0.400	N/A	N/A	4	9151412
Total Hexa CDF **	pg/g	3.48	0.337	4.99	0.400	N/A	N/A	3	9151412
Total Hepta CDF **	pg/g	1.62	0.446	4.99	0.400	N/A	N/A	1	9151412
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	1.50	N/A	N/A

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		XYH617							
Sampling Date		2023/12/11 13:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	SF-09 REFERENCE	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	36	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDD *	%	57	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234678 HeptaCDF **	%	32	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDD *	%	85	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123478 HexaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-1234789 HeptaCDF **	%	33	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123678 HexaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDD *	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-12378 PentaCDF **	%	62	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-123789 HexaCDF **	%	64	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-234678 HexaCDF **	%	67	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-23478 PentaCDF **	%	65	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDD *	%	61	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-2378 TetraCDF **	%	53	N/A	N/A	N/A	N/A	N/A	N/A	9151412
C13-OCDD *	%	54	N/A	N/A	N/A	N/A	N/A	N/A	9151412

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: XYH615
Sample ID: SV-23-COMPOSITE
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

Bureau Veritas ID: XYH616
Sample ID: SV-23-DUP
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

Bureau Veritas ID: XYH617
Sample ID: SF-09 REFERENCE
Matrix: Soil

Collected: 2023/12/11
Shipped:
Received: 2023/12/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	9151412	2024/01/06	2024/01/09	Yan Qin

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
9151412	YQI	Matrix Spike	37CL4 2378 Tetra CDD	2024/01/09		81	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		83	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		84	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		101	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		96	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		78	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		93	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		93	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		76	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		77	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		86	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		93	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		81	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		76	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		82	%	24 - 169
			C13-OCDD	2024/01/09		59	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09		121	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/09		120	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/09		113	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/09		119	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2024/01/09		112	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09		149 (1)	%	70 - 140
			Octa CDD	2024/01/09		169 (1)	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/09		115	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/09		121	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/09		119	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/09		117	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/09		118	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/09		120	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/09		118	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09		128 (1)	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09		118	%	78 - 138
			Octa CDF	2024/01/09		122	%	63 - 170
9151412	YQI	Spiked Blank	37CL4 2378 Tetra CDD	2024/01/11		58	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/11		53	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/11		49	%	28 - 143
			C13-123478 HexaCDD	2024/01/11		74	%	32 - 141
			C13-123478 HexaCDF	2024/01/11		68	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/11		46	%	26 - 138
			C13-123678 HexaCDD	2024/01/11		81	%	28 - 130
			C13-123678 HexaCDF	2024/01/11		70	%	26 - 123
			C13-12378 PentaCDD	2024/01/11		56	%	25 - 181
			C13-12378 PentaCDF	2024/01/11		56	%	24 - 185
			C13-123789 HexaCDF	2024/01/11		60	%	29 - 147
			C13-234678 HexaCDF	2024/01/11		65	%	28 - 136
			C13-23478 PentaCDF	2024/01/11		56	%	21 - 178
			C13-2378 TetraCDD	2024/01/11		58	%	25 - 164
			C13-2378 TetraCDF	2024/01/11		54	%	24 - 169
			C13-OCDD	2024/01/11		39	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/11		121	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/11		118	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/11		109	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/11		112	%	76 - 134

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8,9-Hexa CDD	2024/01/11		103	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/11		116	%	70 - 140
			Octa CDD	2024/01/11		117	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/11		116	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/11		115	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/11		115	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/11		112	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/11		114	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/11		113	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/11		114	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/11		120	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/11		113	%	78 - 138
			Octa CDF	2024/01/11		110	%	63 - 170
9151412	YQI	Spiked Blank DUP	37CL4 2378 Tetra CDD	2024/01/09		67	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		83	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		89	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		95	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		91	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		84	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		98	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		86	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		66	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		68	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		83	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		90	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		74	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		65	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		69	%	24 - 169
			C13-OCDD	2024/01/09		58	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09		119	%	67 - 158
			1,2,3,7,8-Penta CDD	2024/01/09		121	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2024/01/09		113	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2024/01/09		116	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2024/01/09		108	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09		123	%	70 - 140
			Octa CDD	2024/01/09		122	%	78 - 144
			2,3,7,8-Tetra CDF	2024/01/09		126	%	75 - 158
			1,2,3,7,8-Penta CDF	2024/01/09		118	%	80 - 134
			2,3,4,7,8-Penta CDF	2024/01/09		112	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2024/01/09		120	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2024/01/09		123	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2024/01/09		116	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2024/01/09		121	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09		122	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09		126	%	78 - 138
			Octa CDF	2024/01/09		128	%	63 - 170
9151412	YQI	RPD	2,3,7,8-Tetra CDD	2024/01/09	1.7		%	25
			1,2,3,7,8-Penta CDD	2024/01/09	2.5		%	25
			1,2,3,4,7,8-Hexa CDD	2024/01/09	3.6		%	25
			1,2,3,6,7,8-Hexa CDD	2024/01/09	3.5		%	25
			1,2,3,7,8,9-Hexa CDD	2024/01/09	4.7		%	25
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09	5.9		%	25
			Octa CDD	2024/01/09	4.2		%	25

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			2,3,7,8-Tetra CDF	2024/01/09	8.3		%	25
			1,2,3,7,8-Penta CDF	2024/01/09	2.6		%	25
			2,3,4,7,8-Penta CDF	2024/01/09	2.6		%	25
			1,2,3,4,7,8-Hexa CDF	2024/01/09	6.9		%	25
			1,2,3,6,7,8-Hexa CDF	2024/01/09	7.6		%	25
			2,3,4,6,7,8-Hexa CDF	2024/01/09	2.6		%	25
			1,2,3,7,8,9-Hexa CDF	2024/01/09	6.0		%	25
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09	1.7		%	25
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09	11		%	25
			Octa CDF	2024/01/09	15		%	25
9151412	YQI	Method Blank	37CL4 2378 Tetra CDD	2024/01/09		57	%	35 - 197
			C13-1234678 HeptaCDD	2024/01/09		80	%	23 - 140
			C13-1234678 HeptaCDF	2024/01/09		66	%	28 - 143
			C13-123478 HexaCDD	2024/01/09		83	%	32 - 141
			C13-123478 HexaCDF	2024/01/09		85	%	26 - 152
			C13-1234789 HeptaCDF	2024/01/09		62	%	26 - 138
			C13-123678 HexaCDD	2024/01/09		83	%	28 - 130
			C13-123678 HexaCDF	2024/01/09		76	%	26 - 123
			C13-12378 PentaCDD	2024/01/09		48	%	25 - 181
			C13-12378 PentaCDF	2024/01/09		54	%	24 - 185
			C13-123789 HexaCDF	2024/01/09		76	%	29 - 147
			C13-234678 HexaCDF	2024/01/09		79	%	28 - 136
			C13-23478 PentaCDF	2024/01/09		58	%	21 - 178
			C13-2378 TetraCDD	2024/01/09		58	%	25 - 164
			C13-2378 TetraCDF	2024/01/09		67	%	24 - 169
			C13-OCDD	2024/01/09		57	%	17 - 157
			2,3,7,8-Tetra CDD	2024/01/09	<0.277, EDL=0.277		pg/g	
			1,2,3,7,8-Penta CDD	2024/01/09	<0.469, EDL=0.469		pg/g	
			1,2,3,4,7,8-Hexa CDD	2024/01/09	<0.217, EDL=0.217		pg/g	
			1,2,3,6,7,8-Hexa CDD	2024/01/09	<0.191, EDL=0.191		pg/g	
			1,2,3,7,8,9-Hexa CDD	2024/01/09	<0.189, EDL=0.189		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2024/01/09	<0.524, EDL=0.524		pg/g	
			Octa CDD	2024/01/09	4.34, EDL=0.306		pg/g	
			Total Tetra CDD	2024/01/09	<0.277, EDL=0.277		pg/g	
			Total Penta CDD	2024/01/09	<0.469, EDL=0.469		pg/g	
			Total Hexa CDD	2024/01/09	<0.198, EDL=0.198		pg/g	
			Total Hepta CDD	2024/01/09	<0.518, EDL=0.518		pg/g	
			2,3,7,8-Tetra CDF	2024/01/09	<0.163, EDL=0.163		pg/g	
			1,2,3,7,8-Penta CDF	2024/01/09	<0.364, EDL=0.364		pg/g	
			2,3,4,7,8-Penta CDF	2024/01/09	<0.320, EDL=0.320		pg/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,7,8-Hexa CDF	2024/01/09	<0.226, EDL=0.226		pg/g	
			1,2,3,6,7,8-Hexa CDF	2024/01/09	<0.227, EDL=0.227		pg/g	
			2,3,4,6,7,8-Hexa CDF	2024/01/09	<0.234, EDL=0.234		pg/g	
			1,2,3,7,8,9-Hexa CDF	2024/01/09	<0.272, EDL=0.272		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2024/01/09	<0.282, EDL=0.282		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2024/01/09	<0.331, EDL=0.331		pg/g	
			Octa CDF	2024/01/09	0.827, EDL=0.274		pg/g	
			Total Tetra CDF	2024/01/09	<0.163, EDL=0.163		pg/g	
			Total Penta CDF	2024/01/09	<0.341, EDL=0.341		pg/g	
			Total Hexa CDF	2024/01/09	<0.239, EDL=0.239		pg/g	
			Total Hepta CDF	2024/01/09	<0.304, EDL=0.304		pg/g	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

(1) Recovery of the matrix spike was above the upper control limit. Laboratory spiked water (or soil) resulted in satisfactory recovery of the compound of interest. When considered together, these QC data suggest that matrix interferences may be biasing the data high. For results that were not detected (ND), this potential bias has no impact.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Ravneet Kaur, Analyst II

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Chain of Custody

Physis Project ID: 2208006-003

International Solid Sample
Heat Treat Required
High Risk material
Controlled Storage and Disposal

Environmental Laboratories, Inc.
Mercier
E. Wrigth Cir.
aheim, CA 92806
14-605-5320 (office), 714-335-5918 (cell)
c@physislabs.com

To: Bureau Veritas Laboratories
Stephanie Pollen
299 Cayuga Rd.
c/o FedEx Depot
Cheektowaga, NY 14225
Stephanie.Pollen@bvlabs.com

Physis SOS Number:	2208006	PO Number:	Sampled by:
Turnaround Time	☑ Standard ☐ RUSH: _____ Business Days	Type of ice used:	☐ BLUE ☑ WET ☐ DRY
Report Format	☑ PDF/EDD ☐ SWAMP EDD ☐ CEDEN EDD ☐ Other EDD: _____	Shipped via:	☑ FEDEX ☐ UPS ☐ USPS ☐ Client ☐ Physis ☐ Other: _____

Sample ID	Sample Description	Requested Analyses/Method	Sample Date	Sample Time	Matrix	# of Bottles
SV-23-Composite	S	Dibenzo-Dioxins/Furans (EPA 1613B/8290)	12/12/2023	8:45:00 AM	Sediment	1
SV-23-DUP	S	Dibenzo-Dioxins/Furans (EPA 1613B/8290)	12/12/2023	8:45:00 AM	Sediment	1
SF-09 Reference	S	Dibenzo-Dioxins/Furans (EPA 1613B/8290)	12/11/2023	1:15:00 PM	Sediment	1

Notes/Comments:

Report Down to the MDL

20-Dec-23 12:30
Lori Dufour
C3BN858
RUK ENV-1729

Relinquished:	Print: Richard Hanken	Date: 12/18/23	Received By:	Print: [illegible]	Date: 2023/12/20
Org: Physis	Sign: [illegible]	Time: 1300	Org:	Sign: [illegible]	Time: 12:30
Relinquished:	Print:	Date:	Received By:	Print:	Date:
Org:	Sign:	Time:	Org:	Sign:	Time:

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

February 06, 2024

Kimbrie Gobbi
WSP USA
9177 Sky Park Ct
San Diego, CA 92123-

Project Name: USCG SV Sediment Characterization Study PO # F01400148
Physis Project ID: 2208006-004

Dear Kimbrie,

Enclosed are the analytical results for the sample submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 12/19/2023. A total of 1 sample was received for analysis in accordance with the attached chain of custody (COC). Per the COC, the sample was analyzed for:

Conventionals
Total Suspended Solids by SM 2540 D
Elements
Total Mercury by EPA 245.7
Total & Dissolved Trace Metals by EPA 1640

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,
misty mercier
Misty Mercier
714 602-5320
Extension 202
mistymercier@physislabs.com

PROJECT SAMPLE LIST

WSP USA

PHYSIS Project ID: 2208006-00

USCG SV Sediment Characterization Study PO # F01400148

Total Samples: 1

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
113533	SV-23-SW	SW	12/13/2023	12:00	Samplewater	Not Specified

1904 E. Wright Circle Anaheim, CA 92806 (714) 602-5320 fax (714) 602-5321 www.physislabs.com CA ELAP #2769

ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

PHYSIS
TERRA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F01400

Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113533-R1	**SV-23-SW SW**		**Matrix: Samplewater**				**Sampled:**	**13-Dec-23 12:00**		**Received:**	**19-Dec-23**
Total Suspended Solids	SM 2540 D	mg/L	15.1	1	0.5	0.5	NA		C-79012	19-Dec-23	19-Dec-23

PHYSIS
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PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F0140

Elements

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113533-R1	**SV-23-SW SW**		**Matrix: Samplewater**				**Sampled:**	**13-Dec-23 12:00**		**Received:**	**19-Dec-23**
Arsenic (As)	EPA 1640	µg/L	1.35	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Arsenic (As)	EPA 1640	µg/L	1.21	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	0.087	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	0.072	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	1.78	1	0.0125	0.025	Total		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	0.09	1	0.0125	0.025	Dissolved		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	3.22	1	0.005	0.01	Total		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	2.04	1	0.005	0.01	Dissolved		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	0.636	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	ND	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Mercury (Hg)	EPA 245.7	µg/L	0.0211	1	0.01	0.02	Total		E-32028	31-Dec-23	01-Jan-24
Nickel (Ni)	EPA 1640	µg/L	4.05	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Nickel (Ni)	EPA 1640	µg/L	2.57	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	0.063	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	ND	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.187	1	0.01	0.02	Total		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.538	1	0.01	0.02	Dissolved		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	8.54	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	6.29	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24

QUALITY CONTROL REPORT

PHYSIS
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Innovative Solutions for Nature

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F01400

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Total Suspended Solids		**Method: SM 2540 D**			**Fraction: NA**					**Prepared: 19-Dec-23**			**Analyzed: 19-Dec-23**		
113531-B1	QAQC Procedural Blank	C-79012	ND	1	0.5	0.5	mg/L								
113531-BS1	QAQC Procedural Blank	C-79012	99.2	1	0.5	0.5	mg/L	100	0	99	80 - 120%	PASS			
113531-BS2	QAQC Procedural Blank	C-79012	96.6	1	0.5	0.5	mg/L	100	0	97	80 - 120%	PASS	2	30	PASS

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PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F0140

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113531-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24			Analyzed: 30-Jan-24		
Arsenic (As)	Dissolved	ND	1	0.005	0.015	µg/L							
Arsenic (As)	Total	ND	1	0.005	0.015	µg/L							
Cadmium (Cd)	Dissolved	ND	1	0.0025	0.005	µg/L							
Cadmium (Cd)	Total	ND	1	0.0025	0.005	µg/L							
Chromium (Cr)	Dissolved	ND	1	0.0125	0.025	µg/L							
Chromium (Cr)	Total	ND	1	0.0125	0.025	µg/L							
Copper (Cu)	Dissolved	ND	1	0.005	0.01	µg/L							
Copper (Cu)	Total	ND	1	0.005	0.01	µg/L							
Lead (Pb)	Dissolved	ND	1	0.0025	0.005	µg/L							
Lead (Pb)	Total	ND	1	0.0025	0.005	µg/L							
Nickel (Ni)	Dissolved	ND	1	0.0025	0.005	µg/L							
Nickel (Ni)	Total	ND	1	0.0025	0.005	µg/L							
Selenium (Se)	Dissolved	ND	1	0.005	0.015	µg/L							
Selenium (Se)	Total	ND	1	0.005	0.015	µg/L							
Silver (Ag)	Dissolved	ND	1	0.01	0.02	µg/L							
Silver (Ag)	Total	ND	1	0.01	0.02	µg/L							
Zinc (Zn)	Dissolved	ND	1	0.0025	0.005	µg/L							
Zinc (Zn)	Total	ND	1	0.0025	0.005	µg/L							
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23			Analyzed: 01-Jan-24		
Mercury (Hg)	Total	ND	1	0.01	0.02	µg/L							
Sample ID: 113531-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23			Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.07	1	0.01	0.02	µg/L	2	0	103	84 - 120%	PASS		

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Innovative Solutions for Nature

PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F0140

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113531-BS2	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23				Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.05	1	0.01	0.02	µg/L	2	0	102	84 - 120%	PASS	2	30	PASS
Sample ID: 113532-LCM1	**QAQC LCM - Physis Seawater**					**Matrix: Seawater**		**Sampled:**				**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24				Analyzed: 30-Jan-24		
Arsenic (As)	Total	2.73	1	0.005	0.015	µg/L								
Cadmium (Cd)	Total	0.144	1	0.0025	0.005	µg/L								
Chromium (Cr)	Total	0.27	1	0.0125	0.025	µg/L								
Copper (Cu)	Total	0.241	1	0.005	0.01	µg/L								
Lead (Pb)	Total	0.023	1	0.0025	0.005	µg/L								
Nickel (Ni)	Total	0.479	1	0.0025	0.005	µg/L								
Selenium (Se)	Total	0.058	1	0.005	0.015	µg/L								
Silver (Ag)	Total	0.059	1	0.01	0.02	µg/L								
Zinc (Zn)	Total	0.489	1	0.0025	0.005	µg/L								
Sample ID: 113532-LCS1	**QAQC LCM - Physis Seawater**					**Matrix: Seawater**		**Sampled:**				**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24				Analyzed: 31-Jan-24		
Arsenic (As)	Total	13.6	1	0.005	0.015	µg/L	20	2.73	54	54 - 136%	PASS			
Cadmium (Cd)	Total	16.2	1	0.0025	0.005	µg/L	20	0.144	80	74 - 110%	PASS			
Chromium (Cr)	Total	18.3	1	0.0125	0.025	µg/L	20	0.27	90	87 - 117%	PASS			
Copper (Cu)	Total	15.9	1	0.005	0.01	µg/L	20	0.241	78	77 - 110%	PASS			
Lead (Pb)	Total	15.9	1	0.0025	0.005	µg/L	20	0.023	79	77 - 110%	PASS			
Nickel (Ni)	Total	19.4	1	0.0025	0.005	µg/L	20	0.479	95	75 - 110%	PASS			
Selenium (Se)	Total	22	1	0.005	0.015	µg/L	20	0.058	110	76 - 119%	PASS			
Silver (Ag)	Total	6.45	1	0.01	0.02	µg/L	10	0.059	64	61 - 113%	PASS			
Zinc (Zn)	Total	15.3	1	0.0025	0.005	µg/L	20	0.489	74	72 - 116%	PASS			

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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F0140

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113532-LCS2	**QAQC LCM - Physis Seawater**					**Matrix: Seawater**		**Sampled:**				**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24				Analyzed: 31-Jan-24		
Arsenic (As)	Total	17.1	1	0.005	0.015	µg/L	20	2.73	72	54 - 136%	PASS	29	30	PASS
Cadmium (Cd)	Total	18.7	1	0.0025	0.005	µg/L	20	0.144	93	74 - 110%	PASS	15	30	PASS
Chromium (Cr)	Total	18.9	1	0.0125	0.025	µg/L	20	0.27	93	87 - 117%	PASS	3	30	PASS
Copper (Cu)	Total	17	1	0.005	0.01	µg/L	20	0.241	84	77 - 110%	PASS	7	30	PASS
Lead (Pb)	Total	16.5	1	0.0025	0.005	µg/L	20	0.023	82	77 - 110%	PASS	4	30	PASS
Nickel (Ni)	Total	17.1	1	0.0025	0.005	µg/L	20	0.479	83	75 - 110%	PASS	13	30	PASS
Selenium (Se)	Total	18.7	1	0.005	0.015	µg/L	20	0.058	93	76 - 119%	PASS	17	30	PASS
Silver (Ag)	Total	7.15	1	0.01	0.02	µg/L	10	0.059	71	61 - 113%	PASS	10	30	PASS
Zinc (Zn)	Total	15.4	1	0.0025	0.005	µg/L	20	0.489	75	72 - 116%	PASS	1	30	PASS
Sample ID: 113533-MS1	**SV-23-SW SW**					**Matrix: Samplewater**		**Sampled: 13-Dec-23 12:00**				**Received: 19-Dec-23**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23				Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.33	1	0.01	0.02	µg/L	2	0.0211	115	76 - 127%	PASS			
Sample ID: 113533-MS2	**SV-23-SW SW**					**Matrix: Samplewater**		**Sampled: 13-Dec-23 12:00**				**Received: 19-Dec-23**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23				Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.18	1	0.01	0.02	µg/L	2	0.0211	108	76 - 127%	PASS	6	30	PASS

PHYSIS
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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-004
Client: WSP USA
Project: USCG SV Sediment Characterization Study PO # F0140

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS		QA CODEc
Sample ID: 113533-R2	**SV-23-SW SW**					**Matrix: Samplewater**		**Sampled: 13-Dec-23 12:00**			**Received: 19-Dec-23**			
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24			Analyzed: 31-Jan-24			
Arsenic (As)	Dissolved	0.94	1	0.005	0.015	µg/L					25	30	PASS	
Arsenic (As)	Total	1.58	1	0.005	0.015	µg/L					16	30	PASS	
Cadmium (Cd)	Dissolved	0.055	1	0.0025	0.005	µg/L					27	30	PASS	
Cadmium (Cd)	Total	0.123	1	0.0025	0.005	µg/L					34	30	FAIL	NH
Chromium (Cr)	Dissolved	0.175	1	0.0125	0.025	µg/L					64	30	FAIL	SL
Chromium (Cr)	Total	1.94	1	0.0125	0.025	µg/L					9	30	PASS	
Copper (Cu)	Dissolved	1.63	1	0.005	0.01	µg/L					22	30	PASS	
Copper (Cu)	Total	3.63	1	0.005	0.01	µg/L					12	30	PASS	
Lead (Pb)	Dissolved	ND	1	0.0025	0.005	µg/L					0	30	PASS	
Lead (Pb)	Total	0.712	1	0.0025	0.005	µg/L					11	30	PASS	
Nickel (Ni)	Dissolved	2.17	1	0.0025	0.005	µg/L					17	30	PASS	
Nickel (Ni)	Total	4.5	1	0.0025	0.005	µg/L					11	30	PASS	
Selenium (Se)	Dissolved	ND	1	0.005	0.015	µg/L					0	30	PASS	
Selenium (Se)	Total	0.048	1	0.005	0.015	µg/L					27	30	PASS	
Silver (Ag)	Dissolved	0.369	1	0.01	0.02	µg/L					37	30	FAIL	NH
Silver (Ag)	Total	0.214	1	0.01	0.02	µg/L					13	30	PASS	
Zinc (Zn)	Dissolved	4.98	1	0.0025	0.005	µg/L					23	30	PASS	
Zinc (Zn)	Total	8.46	1	0.0025	0.005	µg/L					1	30	PASS	
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Dec-23			Analyzed: 01-Jan-24			
Mercury (Hg)	Total	0.0191	1	0.01	0.02	µg/L					10	30	PASS	J

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CHAIN of CUSTODY

COMPANY NAME: WSP USA Environment & Infrastructure	EMAIL: kimbrie.gobbi@wsp.com; kaylee.popovich@wsp.com	PROJECT NAME / NUMBER: USCG SV Sediment Characterization Study	COC PAGE: 1 of 1
PROJECT MANAGER: Kimbrie Gobbi	FAX:	PO #: F01400148 / PHYSIS SOS #:	TYPE OF ICE USED: ☑ WET ☐ BLUE ☐ DRY
COMPANY ADDRESS: 9177 Sky Park Ct, San Diego, CA 92123	PHONE: 443.852.4637 (KG) office; 805.550.8752 (KP) cell	SAMPLED BY: KP/KG	SHIPPED VIA: ☑ FEDEX ☐ UPS ☐ USPS ☐ Client ☐ Physis ☐ other

TURNAROUND TIME: ☑ STANDARD (15-20 business days) ☐ RUSH business days

REPORT FORMAT: ☑ PHYSIS PDF/EDD ☐ SWAMP EDD ☐ other

SPECIAL INSTRUCTIONS

Please report only requested analytes.
Please report to the MDL with flags.
Misty Mercier is PM.

PHYSIS MATRIX CODES

SW = seawater FW = freshwater RW = rainwater
WW = wastewater DW = drinking water
S = sediment T = tissue E = extract O = other (specify)

REQUESTED ANALYSES

PLEASE SEE PHYSIS SOS

	SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE date	SAMPLE time	physis matrix code	# of bottles	Total Suspended Solids (SM 2540D)	Total and Dissolved Metals (EPA 1640)	Total Mercury (EPA 245.7)
1	SV-23-SW	SW	12/13/23	1200		3	X	X	X
3									
4									
5									
6									
7									
8									
9									
10									

RELINQUISHED BY print	signature	company	date & time	RECEIVED BY print	signature	company	date & time
Michelle Knowlen	M. Kl	EcoAnalysts	12/18/23 1400	Sierra Whitacre	Sierra Whitacre	Physis	12/19/23 0930

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Project Iteration ID:	2208006-004
Client Name:	WSP USA
Project Name:	USCG SV Sediment Characterization Study PO # F01400148
COC Page Number:	2 of 2
Bottle Label Color:	NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: VW
2. Date Received: ~~0930~~ 12/19/23
3. Time Received: 0930
4. Client Name: WSP USA
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     - i. Start Time:_____
     - ii. End Time:_____
     - iii. Total Mileage: _____
     - iv. Number of Pickups:_____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): 1.1°C Used I/R Thermometer # 1-2

Inspection Info

1. Initials Inspected by: RGH

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... Yes / No
2. All sample containers arrived intact..... Yes / No
3. All samples listed on COC(s) are present..... Yes / No
4. Information on containers consistent with information on COC(s)..... Yes / No
5. Correct containers and volume for all analyses indicated..... Yes / No
6. All samples received within method holding time..... Yes / No
7. Correct preservation used for all analyses indicated..... Yes / No
8. Name of sampler included on COC(s)..... Yes / No

Notes:

February 02, 2024

Kimbrie Gobbi
WSP USA
9177 Sky Park Ct
San Diego, CA 92123-

Project Name: USCG SV Sediment Characterization Study F01400148
Physis Project ID: 2208006-005

Dear Kimbrie,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 12/27/2023. A total of 2 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Total Suspended Solids by SM 2540 D
Elements
Total Mercury by EPA 245.7
Total & Dissolved Trace Metals by EPA 1640

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,
misty mercier

Misty Mercier
714 602-5320
Extension 202
mistymercier@physislabs.com

PROJECT SAMPLE LIST

WSP USA

PHYSIS Project ID: 2208006-00

USCG SV Sediment Characterization Study F01400148

Total Samples: 2

PHYSIS ID	Sample ID	Description	Date	Time	Matrix	Sample Type
113858	SV-23-SW	SW	12/21/2023	10:30	Samplewater	Not Specified
113859	SV-23-ELUTRIATE	SW	12/26/2023	9:50	Samplewater	Not Specified

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

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Conventionals

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113858-R1	**SV-23-SW SW**		**Matrix: Samplewater**				**Sampled:**	**21-Dec-23 10:30**		**Received:**	**27-Dec-23**
Total Suspended Solids	SM 2540 D	mg/L	5.82	1	0.5	0.5	NA		C-79020	28-Dec-23	28-Dec-23
Sample ID: 113859-R1	**SV-23-ELUTRIATE SW**		**Matrix: Samplewater**				**Sampled:**	**26-Dec-23 9:50**		**Received:**	**27-Dec-23**
Total Suspended Solids	SM 2540 D	mg/L	11.3	1	0.5	0.5	NA		C-79020	28-Dec-23	28-Dec-23

Elements

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113858-R1 SV-23-SW SW			**Matrix: Samplewater**				**Sampled: 21-Dec-23 10:30**			**Received: 27-Dec-23**	
Arsenic (As)	EPA 1640	µg/L	1.31	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Arsenic (As)	EPA 1640	µg/L	1.04	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	0.124	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	0.055	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	0.867	1	0.0125	0.025	Total		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	0.057	1	0.0125	0.025	Dissolved		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	4.27	1	0.005	0.01	Total		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	2.64	1	0.005	0.01	Dissolved		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	0.519	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	ND	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Mercury (Hg)	EPA 245.7	µg/L	0.0203	1	0.01	0.02	Total		E-32028	31-Jan-24	01-Jan-24
Nickel (Ni)	EPA 1640	µg/L	3.59	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Nickel (Ni)	EPA 1640	µg/L	2.28	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	0.076	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	ND	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.226	1	0.01	0.02	Total		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.292	1	0.01	0.02	Dissolved		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	5.44	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	3.27	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24

Elements

ANALYTE	Method	Units	RESULT	DF	MDL	RL	Fraction	QA CODE	Batch ID	Date Processed	Date Analyzed
Sample ID: 113859-R1	**SV-23-ELUTRIATE SW**		**Matrix: Samplewater**				**Sampled:**	**26-Dec-23**	**9:50**	**Received:**	**27-Dec-23**
Arsenic (As)	EPA 1640	µg/L	5.81	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Arsenic (As)	EPA 1640	µg/L	4.95	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	0.026	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Cadmium (Cd)	EPA 1640	µg/L	ND	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	0.519	1	0.0125	0.025	Total		E-31111	29-Jan-24	31-Jan-24
Chromium (Cr)	EPA 1640	µg/L	0.043	1	0.0125	0.025	Dissolved		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	1.04	1	0.005	0.01	Total		E-31111	29-Jan-24	31-Jan-24
Copper (Cu)	EPA 1640	µg/L	0.341	1	0.005	0.01	Dissolved		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	0.257	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Lead (Pb)	EPA 1640	µg/L	ND	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Mercury (Hg)	EPA 245.7	µg/L	0.0101	1	0.01	0.02	Total	J	E-32028	31-Jan-24	01-Jan-24
Nickel (Ni)	EPA 1640	µg/L	3.67	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Nickel (Ni)	EPA 1640	µg/L	3.07	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	0.061	1	0.005	0.015	Total		E-31111	29-Jan-24	31-Jan-24
Selenium (Se)	EPA 1640	µg/L	ND	1	0.005	0.015	Dissolved		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.099	1	0.01	0.02	Total		E-31111	29-Jan-24	31-Jan-24
Silver (Ag)	EPA 1640	µg/L	0.248	1	0.01	0.02	Dissolved		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	1.9	1	0.0025	0.005	Total		E-31111	29-Jan-24	31-Jan-24
Zinc (Zn)	EPA 1640	µg/L	0.402	1	0.0025	0.005	Dissolved		E-31111	29-Jan-24	31-Jan-24

QUALITY CONTROL REPORT

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PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-005
Client: WSP USA
Project: USCG SV Sediment Characterization Study F01400148

Conventionals

QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Total Suspended Solids		**Method: SM 2540 D**			**Fraction: NA**					**Prepared: 28-Dec-23**			**Analyzed: 28-Dec-23**		
113856-B1	QAQC Procedural Blank	C-79020	ND	1	0.5	0.5	mg/L								
113856-BS1	QAQC Procedural Blank	C-79020	96.4	1	0.5	0.5	mg/L	100	0	96	80 - 120%	PASS			
113856-BS2	QAQC Procedural Blank	C-79020	98.6	1	0.5	0.5	mg/L	100	0	99	80 - 120%	PASS	3	30	PASS

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PHYSIS Project ID: 2208006-005
Client: WSP USA
Project: USCG SV Sediment Characterization Study F01400148

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113856-B1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24			Analyzed: 30-Jan-24		
Arsenic (As)	Dissolved	ND	1	0.005	0.015	µg/L							
Arsenic (As)	Total	ND	1	0.005	0.015	µg/L							
Cadmium (Cd)	Dissolved	ND	1	0.0025	0.005	µg/L							
Cadmium (Cd)	Total	ND	1	0.0025	0.005	µg/L							
Chromium (Cr)	Dissolved	ND	1	0.0125	0.025	µg/L							
Chromium (Cr)	Total	ND	1	0.0125	0.025	µg/L							
Copper (Cu)	Dissolved	ND	1	0.005	0.01	µg/L							
Copper (Cu)	Total	ND	1	0.005	0.01	µg/L							
Lead (Pb)	Dissolved	ND	1	0.0025	0.005	µg/L							
Lead (Pb)	Total	ND	1	0.0025	0.005	µg/L							
Nickel (Ni)	Dissolved	ND	1	0.0025	0.005	µg/L							
Nickel (Ni)	Total	ND	1	0.0025	0.005	µg/L							
Selenium (Se)	Dissolved	ND	1	0.005	0.015	µg/L							
Selenium (Se)	Total	ND	1	0.005	0.015	µg/L							
Silver (Ag)	Dissolved	ND	1	0.01	0.02	µg/L							
Silver (Ag)	Total	ND	1	0.01	0.02	µg/L							
Zinc (Zn)	Dissolved	ND	1	0.0025	0.005	µg/L							
Zinc (Zn)	Total	ND	1	0.0025	0.005	µg/L							
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Jan-24			Analyzed: 01-Jan-24		
Mercury (Hg)	Total	ND	1	0.01	0.02	µg/L							
Sample ID: 113856-BS1	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**			**Received:**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Jan-24			Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.07	1	0.01	0.02	µg/L	2	0	103	84 - 120%	PASS		

PHYSIS
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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

PHYSIS Project ID: 2208006-005
Client: WSP USA
Project: USCG SV Sediment Characterization Study F01400148

Elements — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Sample ID: 113856-BS2	**QAQC Procedural Blank**					**Matrix: BlankMatrix**		**Sampled:**				**Received:**		
	Method: EPA 245.7					Batch ID: E-32028		Prepared: 31-Jan-24				Analyzed: 01-Jan-24		
Mercury (Hg)	Total	2.05	1	0.01	0.02	µg/L	2	0	102	84 - 120%	PASS	2	30	PASS
Sample ID: 113857-LCM1	**QAQC LCM - Physis Seawater**					**Matrix: Seawater**		**Sampled:**				**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24				Analyzed: 30-Jan-24		
Arsenic (As)	Total	2.73	1	0.005	0.015	µg/L								
Cadmium (Cd)	Total	0.144	1	0.0025	0.005	µg/L								
Chromium (Cr)	Total	0.27	1	0.0125	0.025	µg/L								
Copper (Cu)	Total	0.241	1	0.005	0.01	µg/L								
Lead (Pb)	Total	0.023	1	0.0025	0.005	µg/L								
Nickel (Ni)	Total	0.479	1	0.0025	0.005	µg/L								
Selenium (Se)	Total	0.058	1	0.005	0.015	µg/L								
Silver (Ag)	Total	0.059	1	0.01	0.02	µg/L								
Zinc (Zn)	Total	0.489	1	0.0025	0.005	µg/L								
Sample ID: 113857-LCS1	**QAQC LCM - Physis Seawater**					**Matrix: Seawater**		**Sampled:**				**Received:**		
	Method: EPA 1640					Batch ID: E-31111		Prepared: 29-Jan-24				Analyzed: 31-Jan-24		
Arsenic (As)	Total	13.6	1	0.005	0.015	µg/L	20	2.73	54	54 - 136%	PASS			
Cadmium (Cd)	Total	16.2	1	0.0025	0.005	µg/L	20	0.144	80	74 - 110%	PASS			
Chromium (Cr)	Total	18.3	1	0.0125	0.025	µg/L	20	0.27	90	87 - 117%	PASS			
Copper (Cu)	Total	15.9	1	0.005	0.01	µg/L	20	0.241	78	77 - 110%	PASS			
Lead (Pb)	Total	15.9	1	0.0025	0.005	µg/L	20	0.023	79	77 - 110%	PASS			
Nickel (Ni)	Total	19.4	1	0.0025	0.005	µg/L	20	0.479	95	75 - 110%	PASS			
Selenium (Se)	Total	22	1	0.005	0.015	µg/L	20	0.058	110	76 - 119%	PASS			
Silver (Ag)	Total	6.45	1	0.01	0.02	µg/L	10	0.059	64	61 - 113%	PASS			
Zinc (Zn)	Total	15.3	1	0.0025	0.005	µg/L	20	0.489	74	72 - 116%	PASS			

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PHYSIS Project ID: 2208006-005
Client: WSP USA
Project: USCG SV Sediment Characterization Study F01400148

Elements — QUALITY CONTROL REPORT

Sample ID: 113857-LCS2 QAQC LCM - Physis Seawater Matrix: Seawater Sampled: Received:

Method: EPA 1640 Batch ID: E-31111 Prepared: 29-Jan-24 Analyzed: 31-Jan-24

ANALYTE	FRACTION	RESULT	DF	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODEc
Arsenic (As)	Total	17.1	1	0.005	0.015	µg/L	20	2.73	72	54 - 136%	PASS	29	30	PASS
Cadmium (Cd)	Total	18.7	1	0.0025	0.005	µg/L	20	0.144	93	74 - 110%	PASS	15	30	PASS
Chromium (Cr)	Total	18.9	1	0.0125	0.025	µg/L	20	0.27	93	87 - 117%	PASS	3	30	PASS
Copper (Cu)	Total	17	1	0.005	0.01	µg/L	20	0.241	84	77 - 110%	PASS	7	30	PASS
Lead (Pb)	Total	16.5	1	0.0025	0.005	µg/L	20	0.023	82	77 - 110%	PASS	4	30	PASS
Nickel (Ni)	Total	17.1	1	0.0025	0.005	µg/L	20	0.479	83	75 - 110%	PASS	13	30	PASS
Selenium (Se)	Total	18.7	1	0.005	0.015	µg/L	20	0.058	93	76 - 119%	PASS	17	30	PASS
Silver (Ag)	Total	7.15	1	0.01	0.02	µg/L	10	0.059	71	61 - 113%	PASS	10	30	PASS
Zinc (Zn)	Total	15.4	1	0.0025	0.005	µg/L	20	0.489	75	72 - 116%	PASS	1	30	PASS

CHAIN OF CUSTODY

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COMPANY NAME: WSP USA Environment & Infrastructure	EMAIL: kimbrie.gobbi@wsp.com; kaylee.popovich@wsp.com	PROJECT NAME / NUMBER: USCG SV Sediment Characterization Study	COC PAGE: 1 of 2
PROJECT MANAGER: Kimbrie Gobbi	FAX:	PO#: F01400148 / PHYSIS SOS #:	TYPE OF ICE USED: ☑ WET ☐ BLUE ☐ DRY
COMPANY ADDRESS: 9177 Sky Park Ct, San Diego, CA 92123	PHONE: 443.852.4637 (KG) office; 805.550.8752 (KP) cell	SAMPLED BY: KP/KG	SHIPPED VIA: ☑ FEDEX ☐ UPS ☐ USPS ☐ Client ☐ Physis ☐ other

TURNAROUND TIME: ☑ STANDARD (15-20 business days) ☐ RUSH business days

REPORT FORMAT: ☑ PHYSIS PDF/EDD ☐ SWAMP EDD ☐ other

SPECIAL INSTRUCTIONS

Please report only requested analytes.
Please report to the MDL with flags.
Misty Mercier is PM.

PHYSIS MATRIX CODES

SW = seawater FW = freshwater RW = rainwater
WW = wastewater DW = drinking water
S = sediment T = tissue E = extract O = other (specify)

REQUESTED ANALYSES

PLEASE SEE PHYSIS SOS

	SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE date	SAMPLE time	physis matrix code	# of bottles	Total Suspended Solids (SM 2540D)	Total and Dissolved Metals (EPA 1640)	Total Mercury (EPA 245.7)
1	SV-23-SW	SW	12/21/23	1030		3	X	X	X
2	SV-23-ELUTRIATE	SW	12/26/23	950		3	X	X	X
3									
4									
5									
6									
7									
8									
9									
10									

RELINQUISHED BY print	signature	company	date & time	RECEIVED BY print	signature	company	date & time
Michelle Knowlen	[signature]	EcoAnalysts	12/26/2023	Angie Torr	[signature]	Physis	12/27/23 0950

Analyte[l]	Analysis Method	Site Water and Elutriate Target Reporting Limit[a, b]
TSS	SM 2540 D[d]	0.5 mg/L
Arsenic	EPA 1640[c]	0.015 µg/L
Cadmium	EPA 1640[c]	0.005 µg/L
Chromium	EPA 1640[c]	0.025 µg/L
Copper	EPA 1640[c]	0.01 µg/L
Lead	EPA 1640[c]	0.005 µg/L
Mercury	EPA 245.7	0.02 µg/L
Nickel	EPA 1640[c]	0.005 µg/L
Selenium	EPA 1640[c]	0.015 mg/L
Silver	EPA 1640[c]	0.02 µg/L
Zinc	EPA 1640[c]	0.005 µg/L

Notes:

µg/kg = microgram(s) per kilogram (parts per billion); µg/L = micrograms per liter ASTM = ASTM International; GC = gas chromatography; mg/kg = milligram(s) per kilogram (parts per million); mg/L = milligram(s) per liter; N/A = not applicable; NCl = nitrogen chloride; NH_3 = ammonia; NOAA = National Oceanic and Atmospheric Administration; pg/g = picograms per gram (parts per trillion [pptr]); PAH = polycyclic aromatic hydrocarbons; PCB = polychlorinated biphenyl; SIM = Selective Ion Monitoring; SM = Standard Method; TOC = total organic carbon; TSS = total suspended solids; USEPA = United States Environmental Protection Agency

a. Sediment minimum detection limits are on a dry-weight basis; tissue minimum levels are on a wet weight basis.

b. Reporting limits are provided by Physis Laboratories, Inc.

c. American Public Health Association et al. 1995. *Standard Methods for the Examination of Water and Wastewater*, 19th Edition.

d. USEPA, 1986–1996 SW-846. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition.

e. Includes low molecular weight PAHs: naphthalene, acenapthylene, acenapthene, anthracene, fluorene, phenanthrene and high molecular weight PAHs: fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d) pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene, and pyrene. Total PAHs will also be calculated.

f. Includes aldrin, α- benzene hexachloride (BHC), β-BHC, Δ=BHC, ¥-BHC (lindane), chlordane, dieldrin, trans-nonachlor, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, alpha chlordane, gamma chlordane, cis-nonachlor, oxychlordane, 2,4- and 4,4-dichlorodiphenyldichloroethane (DDD), 2,4- and 4,4-dichlorodiphenyldichloroethylene (DDE), and 2,4- 4,4-dichlorodiphenyltrichloroethane (DDT), and total DDTs.

g. Polychlorinated biphenyls (PCB) Aroclors: Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, and total Aroclors.

h. Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi, 1989. A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Liver from Puget Sound. *Marine Environmental Research* 27: 1–18. Includes monobutyltin, dibutyltin, tributyltin, tetrabutyltin, and total butyltins.

i. National Oceanic and Atmospheric Administration. 1993. Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects, 1984–1992, Volume IV, *Comprehensive Descriptions of Trace Organic Analytical Methods,* July.

j. Except toxaphene and chlordane, which are 1,000 micrograms per kilogram (parts per billion).

k. If bioaccumulation is necessary because of elevated levels of PCBs, the agencies expect to require PCB congener analysis rather than Aroclor analysis. PCB congeners reported will likely be: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132/153, 138/158, 149, 151, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

l. Toxicity characteristic leaching procedure (TCLP), total threshold limit concentration (TTLC), and soluble threshold limit concentration (STLC) analyses will be run if chemistry levels exceed Resource Conservation and Recovery Act (RCRA) guideline trigger levels.

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Project Iteration ID: 2208006-005
Client Name: WSP USA
Project Name: USCG SV Sediment Characterization Study F01400148
COC Page Number: 2 of 2
Bottle Label Color: NA

Sample Receipt Summary

Receiving Info

1. Initials Received By: AT
2. Date Received: 12/27/23
3. Time Received: 0956
4. Client Name: WSP
5. Courier Information: (Please circle)
   - Client
   - UPS
   - Area Fast
   - DRS
   - FedEx
   - GSO/GLS
   - Ontrac
   - PAMS
   - PHYSIS Driver:
     - i. Start Time:_____
     - ii. End Time:_____
     - iii. Total Mileage: _____
     - iv. Number of Pickups:_____
6. Container Information: (Please put the # of containers or circle none)
   - 1 Cooler
   - __ Styrofoam Cooler
   - ____ Boxes
   - None
   - ___ Carboy(s)
   - __Carboy Trash Can(s)
   - ____ Carboy Cap(s)
   - Other _____
7. What type of ice was used: (Please circle any that apply)
   - Wet Ice
   - Blue Ice
   - Dry Ice
   - Water
   - None
8. Randomly Selected Samples Temperature (°C): -1.0 Used I/R Thermometer # 1-2

Inspection Info

1. Initials Inspected By: RGH

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out..... Yes / No
2. All sample containers arrived intact..... Yes / No
3. All samples listed on COC(s) are present..... Yes / No
4. Information on containers consistent with information on COC(s)..... Yes / No
5. Correct containers and volume for all analyses indicated..... Yes / No
6. All samples received within method holding time..... Yes / No
7. Correct preservation used for all analyses indicated..... Yes / No
8. Name of sampler included on COC(s)..... Yes / No

Notes:

APPENDIX E

TOXICITY TESTING REPORT

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TOXICITY TESTING RESULTS

UNITED STATES COAST GUARD STATION VALLEJO
DREDGED MATERIAL EVALUATION
VALLEJO, CALIFORNIA

Prepared for:
WSP USA Environment & Infrastructure
San Diego, CA

On behalf of:
U.S. Coast Guard
CEU Oakland
1301 Clay Street, Suite 700N
Oakland CA 94612

Prepared by:
EcoAnalysts, Inc.
4770 NE View Dr.
PO Box 216
Port Gamble, Washington 98364

EcoAnalysts Report ID: PG1617.01Vallejo

Submittal Date: January 25, 2024

Accredited in accordance with
NELAP, ORELAP ID 4165

All testing reported herein was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and EcoAnalysts is not responsible for use of less than the complete report. The test results summarized in this report apply only to the sample(s) evaluated. This document is uncontrolled when printed or accessed from electronic distribution.

PREPARED AND APPROVED BY:

_____

Michelle Knowlen

Senior Project Manager – Toxicology & Ecology

QA:

Mary Ann Rempel-Hester

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ACRONYMS AND ABBREVIATIONS

cm:	Centimeter
°C:	Degrees Celsius
EC_{50}:	Effective Concentration that results in a 50% reduction in a sub-lethal endpoint
ITM:	Inland Testing Manual (USEPA/USACE 1998)
LC_{50}:	Lethal Concentration that results in a 50% reduction in survival
L:	Liter
LOEC:	Lowest Observed Effect Concentration
LPC:	Limiting Permissible Concentration
MET:	Modified Elutriate Test
µm:	micrometer
mg/L:	milligrams per liter
mm:	millimeter
NELAP:	National Environmental Laboratory Accreditation Program
NOEC:	No Observed Effect Concentration
OTM:	Ocean Testing Manual (USEPA/USACE 1991); also referenced as the “Green Book”
OV:	Overlying
ppt:	Parts Ter Thousand
PW:	Porewater
SD:	Standard Deviation
SET:	Standard Elutriate Test
SOP:	Standard Operation Procedure
UIA:	Un-ionized Ammonia
USACE:	United States Army Corps of Engineers
USCG:	United States Coast Guard
USEPA/EPA:	United States Environmental Protection Agency
WA:	Washington State

1. INTRODUCTION

EcoAnalysts, Inc. conducted toxicity testing with sediment samples provided by WSP USA Environment & Infrastructure as part of the United States Coast Guard (USCG) evaluation of material proposed for maintenance dredging at USCG Station Vallejo in Vallejo, California. The objective of this program was to characterize the potential dredged material from within the proposed project area to determine its suitability for unconfined aquatic disposal. Dredged material from this project is proposed for ocean disposal at the United States Environmental Protection Agency (USEPA) approved in-bay SF-09 disposal site in Carquinez Strait or the beneficial reuse location Cullinan Ranch, which sits 1.74 nautical miles from the project site (and is the preferred disposal option). The results of the toxicity testing are contained in this report.

2. METHODS

The material considered for ocean disposal was tested using criteria outlined in the project specific Sampling and Analysis Plan (USCG 2023) and in accordance with the Ocean Testing Manual (OTM; USEPA/USACE 1991), the Inland Testing Manual (ITM; USEPA/USACE 1998), and the Guidelines for Implementing the ITM in the San Francisco Bay Region (USACE/USEPA 2001). Testing of a reference sediment was performed concurrently for all whole sediment toxicity tests for comparison purposes. All testing was conducted at the EcoAnalysts (Port Gamble, WA) laboratory and followed the quality control objectives as prescribed by the guidance noted above and the National Environmental Laboratory Accreditation Program (NELAP; Oregon Laboratory Accreditation Program Certificate Number 4165-002).

2.1 Sample Collection

Individual core samples were collected on December 12-13, 2023 by WSP USA Environment & Infrastructure personnel. Samples were received via FedEx at EcoAnalysts on December 14, 2023. The reference sediment (SF-09 Reference) was collected on December 11, 2023 and was received on December 14, 2023. The core samples were combined by EcoAnalysts personnel on December 21, 2023 to form one composite sample for bioassay testing: SV-23-A-Composite (Table 2-1). Samples were stored in a walk-in cold room at 4 ± 2 °C in the dark. All tests were conducted within the eight-week (56 days) holding time calculated from the time of sampling.

Table 2-1: Test Sample Collection and Compositing Schedule

Test Sample	Sub-Station Samples	Internal Lab ID Number	Collection Date	Received Date	Compositing Date
SV-23-A-Composite	SV-23-C1, SV-23-C2, SV-23-C3, SV-23-C4, SV-23-C5, SV-23-C6	P231221.01	12/12/23 & 12/13/23	12/14/23	12/21/23
SF-09 Reference		P231214.11	12/11/23	12/14/23	
SV-23-SW[1]		P231214.04	12/13/23	12/14/23	
SV-23-SW[1]		P231222.01	12/21/23	12/22/23	

[1]Site water collected 12/13/23 used for MET analyses, site water collected 12/21/23 used for SET analyses

2.2 Composite Sample Grain Size and Amphipod Species Selection

Sediment grain size is one of the characteristics used in selecting the appropriate amphipod test species to use for the program (*Ampelisca abdita* or *Eohaustorius estuarius*). Wet-sieve grain size analysis was performed by EcoAnalysts on the sample composite and homogenized reference sample (Table 2-2). The species *Ampelisca abdita* is often recommended when sediments are composed of greater than 60% fines whereas the species *Eohaustorius estuarius* prefers medium to fine sand sediments and is often recommended when sediments are composed of less than 60% fines (PSEP 1995). Both the reference sample and the project sample were above the 60% fines threshold, however, due to the low salinity in the porewater of the composite sample (see section 2.4), *A. abdita* was not recommended. The amphipod *Leptocheirus plumulosus* (a species tolerant to a full range of grain sizes and salinity ranging from 2 to 32 ppt) was selected and approved as a replacement of *A. abdita* for this program.

Table 2-2: Test Sample Grain Size

Test Sample	Grain Size (% Fines)[1]
SF-09 Reference	64
SV-23-A-Composite	86

[1] Wet-sieve method

2.3 Bioassay Testing

Samples were evaluated in accordance with procedures outlined in the OTM (USEPA/USACE 1991) and the more recent procedures described in the ITM (USEPA/USACE 1998) to establish suitability for unconfined aquatic disposal or beneficial reuse. They were also analyzed in accordance with the San Francisco Bay regional guidance (USACE/USEPA 2001). This included bioassay analysis of one composite sample and one reference sample. Appropriate laboratory control samples were run concurrently with each of the selected test species and site water collected from the project site was employed in the suspended-particulate phase tests. Bioassay testing consisted of two solid phase bioassays and three suspended-particulate bioassays (one with bivalve larvae and two with mysid shrimp). A Modified Elutriate Test (MET) with mysid was employed for one of the suspended-particulate phase tests to determine suitability at the beneficial reuse site. The bioassays conducted in support of this project are summarized in Table 2-3.

Table 2-3. Biological Testing Performed for Dredged Material Evaluation

Test Type	Type of Organism	Taxon	Project Sediments	Reference Sediment[1]	Project Site Water[1]	Control Sediment/ Seawater
Solid Phase	Amphipod	*Leptocheirus plumulosus*	X	X		X
	Polychaete	*Neanthes arenaceodentata*	X	X		X
Suspended-Particulate Phase	Mysid shrimp	*Americamysis bahia*	X[2,3]		X	X
	Bivalve larvae	*Mytilus galloprovincialis*	X[2]		X	X

[1] Shaded areas indicate tests that are not applicable to the selected treatments
[2] Sediment elutriates of project material
[3] Mysid SPP conducted as a standard elutriate test (SET) and a modified elutriate test (MET)

2.4 Bulk Sample Porewater Ammonia Measurements

While elevated ammonia and low salinity in the porewater are transient qualities in dredged material, they can influence organism survival and development in laboratory tests. If concentrations of ammonia or conditions of low salinity were found in the test composites, these would be considered non-persistent effects under OTM (USEPA/USACE 1991) guidance for this material. Prior to testing, bulk sediment porewater ammonia concentrations and salinity are usually measured to determine whether any method modifications or supplemental testing would be required (Table 2-4). Bulk sediments are homogenized test composites that have not been further processed for bioassay testing.

Measurements of total ammonia were made with an Orion 5-Star Multimeter equipped with an ammonia ion selective electrode. Analytical procedures followed those described in Standard Method 4500-NH3 D (APHA 2017) and included a three-point calibration (1, 10, and 100 mg/L). Conversion of measured total ammonia values to unionized ammonia were made following calculations derived from published guidance (USEPA 1989 and Hampson 1977).

Table 2-4: Bulk Sediment Porewater Measurements

Sample	Matrix: Bulk Porewater			
	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)[1]	Salinity (ppt)	pH
SF-09 Reference	9.57	0.106	21	7.3
SV-23-A-Composite	28.5	0.500	17	7.5

[1] UIA calculated with the projected test temperature for *Leptocheirus* at 25°C

The threshold values to address potential ammonia related effects for the amphipod test using *Leptocheirus plumulosus* is 60 mg/L total ammonia (0.8 mg/L unionized ammonia), however the San Francisco regional guidance (USACE/USEPA 2001) has a recommended threshold of 15 mg/L for all amphipod species (Table 2-5). *Neanthes arenaceodentata* is less sensitive to ammonia than *L. plumulosus*. Bulk ammonia concentration in the sediment composite and reference was between 9.57 and 28.5 mg/L total ammonia, respectively. These measurements were below the amphipod ammonia trigger levels by USEPA 1994, but ammonia within the composite sample was above the recommended threshold set by USACE/USEPA 2001. The bulk porewater ammonia values represent the worst-case scenario of ammonia concentrations that the organisms will be exposed to during the benthic test. Because the test method involves the layering of 175 mL of sediment with 775 mL of overlying seawater, there will be an initial reduction in the porewater ammonia concentrations through the act of dilution. While this dilution can vary widely depending upon the nature of the sediment and is not strictly proportional to the volume of sediment and water added to the test chamber, it was expected to reduce the ammonia levels within the composite below the recommended threshold set by the USEPA for San Fransisco Bay. Therefore, ammonia reduction procedures were not warranted based on this assessment.

Table 2-5. Threshold Ammonia Concentrations for Amphipods

Parameter	*Leptocheirus plumulosus*
Total Ammonia (USEPA 1994)	<60 mg/L (pH 7.7)
Unionized Ammonia (USEPA 1994)	<0.8 mg/L (pH 7.7)
Total Ammonia Threshold Recommended by USEPA (USACE/USEPA 2001)	<15 mg/L
Total Ammonia (Internal lab - NOEC)	68.1 mg/L (running mean: 4-day exposure)
Unionized Ammonia (Internal lab – NOEC)	1.274 mg/L (running mean: 4-day exposure)

When creating SET elutriate for the water-column tests, the sample sediment is mixed with site water at a ratio of 1:4. This generally results in total ammonia concentrations of less than 20% of what was measured in the bulk porewater. Ammonia reduction is not addressed for the water-column tests but is observed and noted. Ammonia-related effects were not anticipated to occur in the mysid suspended-particulate phase test but were for the larval development test (Table 2-6). An additional ammonia-reduced 100% treatment was therefore employed in the larval test to confirm potential toxicity. This treatment was made with sediment that had been purged with seawater to reduce ammonia levels but was otherwise the same as the non-reduced 100% treatment.

Table 2-6: Threshold Ammonia Concentrations for Water-Column Test Organisms

Parameter	*Americamysis bahia*	*Mytilus* sp.
Total Ammonia (Internal lab - NOEC)	23.3 mg/L (running mean)	4.06 mg/L (running mean)

2.5 Salinity Adjustments

Similar to the salinity observed in the composite sample porewater, the project site water salinity was also below the acceptable range of the water column test organisms (Table 2-7). Adjustments to salinity were therefore made for the suspended-particulate phase tests. Once elutriates were created, salinity was increased in the elutriate and the site water by adding artificial salts (Crystal Sea Marine Mix) to bring it within the recommended range of the test organisms (25-30 ppt). To account for the added salts, a “salt control” treatment containing a similar amount of artificial salts was tested alongside each water column bioassay.

Table 2-7: Site Water Check-In Parameters

Sample	Matrix: Project Site Water		
	Total Ammonia (mg/L)	Salinity (ppt)	pH
SV-23-SW (collected 12/13/23)	0.116	20	7.7
SV-23-SW (collected 12/21/23)	0.00	19	7.7

2.6 Negative Control Samples

Both solid-phase test species employed for this program are laboratory cultured organisms without "home" sediment available. As such, amphipod sediment from Seabrook, New Hampshire was provided by Aquatic Research Organisms for use as the control treatment in the amphipod test. This sediment was press-sieved through a 0.5 mm screen to remove all native fauna and conditioned under flow-through water exchanges prior to testing. A coarse sand from Yaquina Bay, Oregon was provided by Northwest Amphipod for use as the control sediment treatment for the Neanthes growth test. Both control sediments have been routinely tested in conjunction with these species at this laboratory and results from historical testing have demonstrated acceptable organism health and sediment quality.

2.7 Seawater for Bioassay Testing

Seawater used in this study, including the flow-through studies, came from the northern Hood Canal at Port Gamble, Washington. This seawater source has been used successfully on similar bioassay testing programs by the contracting team. Extensive testing on a variety of test species has shown that there is no significant potential for toxicity or bioaccumulation from this water supply. Acceptable survival of organisms in control sediment has been achieved consistently in previous dredged material testing conducted by the laboratory. Chemical analyses of this water source resulted in no significant contaminants of concern or bioaccumulation potential. Seawater was passed through a sand filter prior to use in the laboratory. For non-flow-through tests, the water was also filtered to 0.45 µm.

2.8 Solid-Phase Bioassays

Solid phase tests were performed to estimate the potential impact of ocean disposal of dredged material on benthic organisms that attempt to re-colonize the area. Sediment was tested in 10-day tests using two species: the amphipod *Leptocheirus plumulosus* and the polychaete *Neanthes arenaceodentata*.

The amphipods *L. plumulosus* were supplied by Aquatic Research Organisms in Hampton, New Hampshire and were acclimated to and held at 25 ± 2°C prior to testing. Polychaete worms (*N. arenaceodentata*) were supplied by Aquatic Toxicology Support, LLC in Bremerton, Washington. Juvenile polychaetes were held in seawater at 20 ± 1°C.

Solid phase tests were conducted as 10-day static exposures with five replicates for the test treatments, the reference, and control sediment. Two centimeters of sediment (approximately 175 mL) were placed into each 1-L glass chamber with 775 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were placed into randomly assigned positions and allowed to equilibrate to test conditions overnight.

Immediately prior to test initiation, water quality measurements were taken in all replicate chambers for each test treatment and included dissolved oxygen, temperature, salinity, and pH. To initiate the test, test organisms were randomly allocated to each of the test chambers. Initial stocking densities were 10 organisms per test chamber for the polychaete test and 20 organisms per test chamber for the amphipod test.

During the test, water quality was monitored daily in a single water quality surrogate chamber per treatment. No food was provided during the 10-day exposures. Ammonia was measured in both porewater and overlying water at initiation and termination. As per recommendation, sulfides were additionally measured in the porewater and overlying water for the solid-phase tests at initiation and

termination (USACE/USEPA 2001). These measurements were made from a surrogate chamber for each test treatment. Sediment porewater was extracted via centrifugation.

At test termination, the sediments were carefully sieved to remove the test organisms and survival assessed using methods described in the OTM (USEPA/USACE 1991).

2.9 Suspended-Particulate Phase Testing: Standard Elutriate Test (SET)

Suspended-particulate phase bioassays employing the SET method were performed to estimate the potential impact of dredged material disposal to organisms that live in the water column. The tests were performed on elutriate samples prepared using a 4:1 dilution by volume of site water to sediment. Sediment from the project composite was combined with site water and vigorously agitated for 30 minutes. Following one hour of settling, the supernatant was gently decanted. Due to the high turbidity of the elutriate, the supernatant was centrifuged after settling for an hour to further clarify the elutriate in preparation of the bioassay initiations. Salinity was then adjusted to bring it within range of the test organisms. This supernatant represents the 100% test concentration. Subsequent test dilutions were created by mixing laboratory seawater with the 100% supernatant for the water-column tests. Two species were tested: *Americamysis* (formerly *Mysidopsis*) *bahia* (mysid shrimp) and *Mytilus galloprovincialis* (mussel) larvae.

Mysid shrimp (*A. bahia*) were supplied by Aquatic BioSystems, Inc. in Fort Collins, Colorado. They were held at 20 ± 1°C and fed *Artemia* nauplii ad libitum prior to testing. Adult mussels (*M. galloprovincialis*) were supplied by Taylor Shellfish in Shelton, Washington. Mussels were held in seawater at natural flow-through temperature (13 ± 2°C) prior to spawning for collection of gametes.

The elutriate tests with both species were performed with dilutions of 100%, 50%, 10%, and 1% elutriate mixtures as well as a clean seawater control, salt control, and (salinity-adjusted) site water treatment. Both tests were performed under static conditions (non-renewal). Ten animals were used per replicate with five replicates per elutriate concentration in the mysid test. This test was run for 96 hours. Biological observations of *A. bahia* were conducted daily. To terminate the *A. bahia* test, organisms from each chamber were removed and live/dead organisms enumerated. Survival was then compared between the control and test treatments.

To obtain gametes for testing in the bivalve development test, adult mussels to be spawned were placed in clean seawater at 16°C (culture temperature) for approximately 30 – 60 minutes in the presence of dense marine algal suspension. The mussels were then transferred to containers with culture water adjusted to 20 -23°C for the purpose of inducing the release of gametes. The animals were held at the shocking temperature and were monitored for spawning individuals. Spawning females and males were removed from the water bath and placed in individual containers with seawater. These individuals were allowed to spawn until sufficient gametes were available to initiate the test. After the spawning period, eggs were transferred to fresh seawater and filtered through a 0.5 mm Nitex® mesh screen to remove large debris, feces, and excess gonadal matter. A composite was made of the sperm and diluted with fresh seawater. The fertilization process was initiated by adding sperm to the isolated egg containers. Egg-sperm solutions were periodically homogenized with a perforated plunger during the fertilization process and sub-samples observed under the microscope for egg and sperm viability. Approximately one to one and a half hours after fertilization, embryo solutions were checked for fertilization rate. Only those embryo stocks with >90% fertilization were used to initiate the tests. Embryo solutions were rinsed free of excess sperm and then combined to create one embryo stock solution. Density of the embryo stock solution was determined by counting the number of embryos in a subsample of homogenized stock solution. This was used to determine the volume of embryo stock solution to deliver

approximately 270 embryos (or between 15-30 embryos per mL) to each test chamber within 4 hours of fertilization.

Five replicates per treatment were employed for the bivalve development test. The test was terminated between 48 – 96 hours, or when the bivalve larvae reached the D-hinge prodissoconch stage in the control. At the termination of the study, survival and normal development were compared between the control and test groups to determine if significant mortality or abnormal development occurred.

Daily water quality monitoring of test chambers (or surrogate chambers for the bivalve test) was carried out for pH, dissolved oxygen, salinity, and temperature. Ammonia was analyzed at the start and end of the tests in all concentrations.

2.10 Suspended-Particulate Phase Testing: Modified Elutriate Test (MET)

A suspended-particulate phase bioassay employing the MET method was also performed to evaluate the effect of dredging and placement within the Cullinan Ranch restoration beneficial reuse site. Elutriate was composed of composited sediment and site water mixed on a dry weight basis to achieve a desired slurry concentration of 150 g/L. To calculate how much sediment and water to combine to achieve this concentration, a 25 mL subsample of the sediment was dried in an oven and weighed. The following formula was then used:

$$V_{sediment} = 18\ \frac{C_{slurry}}{C_{sediment}}$$

$$V_{water} = 18 - V_{sediment}$$

Where

$V_{sediment}$ = volume of sediment (in L)
18 = volume of slurry for glass carboy (in L)
C_{slurry} = desired concentration of slurry (in grams per L, dry-weight basis)
$C_{sediment}$ = pre-determined concentration of sediment (in grams per L, dry-weight basis)
V_{water} = volume of site water (in L)

Sediment from the project composite was then combined with site water in a glass carboy and vigorously mixed for 5 minutes. Following one hour of aeration, the mixture was allowed to settle for 24-hrs before the supernatant was gently siphoned into a secondary container. Subsamples of the elutriate were then bottled and shipped to Physis in Anaheim, CA for chemical analysis. Salinity was then adjusted to bring the elutriate within range of the test organisms. This supernatant represents the 100% test concentration. Subsequent test dilutions were created by mixing laboratory seawater with the 100% supernatant for the water-column tests. One species was tested: *Americamysis* (formerly *Mysidopsis*) *bahia* (mysid shrimp).

Mysid shrimp (*A. bahia*) were supplied by Aquatic BioSystems, Inc. in Fort Collins, Colorado. They were held at 20 ± 1°C and fed *Artemia* nauplii ad libitum prior to testing. The elutriate test was performed with dilutions of 100%, 50%, 10%, and 1% elutriate mixtures as well as a clean seawater control, salt control, and (salinity-adjusted) site water treatment. The test was performed under static conditions (non-renewal). Ten animals were used per replicate with five replicates per elutriate concentration. This test was run for 96 hours to determine survival. Biological observations of *A. bahia* were conducted daily. To terminate the *A. bahia* test, organisms from each chamber were removed and live/dead organisms enumerated. Survival was then compared between the control and test treatments.

Daily water quality monitoring of test chambers (or surrogate chambers for the bivalve test) was carried out for pH, dissolved oxygen, salinity, and temperature. Ammonia was analyzed at the start and end of the tests in all concentrations.

2.11 Data Management and Analysis

All water quality and endpoint data were entered either by hand on bench sheets or directly into Excel spreadsheets. Water quality parameters were summarized by calculating the mean, minimum, and maximum values for each test treatment. Endpoint data were calculated for each replicate and the mean value and standard deviation were determined for each test treatment.

All hand-entered data were reviewed for data entry errors, which were corrected prior to summary calculations. A minimum of 10% of all calculations and data sorting were reviewed for errors. Review counts were conducted on any apparent outliers.

Statistical comparisons, determinations of statistical significance, and/or elutriate dose response estimations were performed using the Comprehensive Environmental Toxicity Information System Software (CETIS™; version 2.1.4.6). Hypothesis testing and point estimation were performed following standard USEPA flow chart methods.

2.12 Quality Assurance/Quality Control

The quality assurance objectives for toxicity testing conducted by the testing laboratory are detailed in the OTM (USEPA/USACE 1991) and the laboratory's quality assurance plans (QAPs). These objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Water and Sediment Sampling and Handling
- Source and Condition of Test Organisms
- Condition of Equipment
- Test Conditions
- Instrument Calibration
- Use of Reference Toxicants
- Record Keeping
- Data Evaluation

Each toxicity test species was evaluated in reference toxicant tests during the test period to establish the sensitivity of the test organisms (Lee 1980). The reference toxicant LC_{50} or EC_{50} should fall within two standard deviations of the historical laboratory mean. Water quality measurements were monitored to ensure that they fell within prescribed limits. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

The methods employed in every phase of the toxicity testing program are detailed in the EcoAnalysts Standard Operating Procedures (SOP). All EcoAnalysts staff members receive regular, documented training in all SOPs and test methods. Finally, all data collected and produced as a result of these analyses were recorded on approved data sheets. If an aspect of a test deviated from protocol, the test was evaluated to determine whether it was valid according to the regulatory agencies responsible for approval of the proposed permitting action.

3. RESULTS

The results of the sediment testing, including summaries of test results and water quality observations, are presented in this section. Supporting laboratory documents (bench sheets), statistical comparisons, and reference-toxicant test results are provided in Appendix A. Chain of custody forms and all pre-test documents are provided in Appendix B.

3.1 Solid-Phase Test Results

The results of the solid-phase toxicity tests are presented in this section. The tests were performed with the amphipod species *Leptocheirus plumulosus* as well as the polychaete worm *Neanthes arenaceodentata.*

3.1.1 Results of Solid-Phase Test with *Leptocheirus plumulosus*

The solid-phase test with *L. plumulosus* was initiated on December 29, 2023. The test was validated by 98% survival in the control, meeting the acceptability criterion of ≥ 90% survival. Mean survival for all samples is summarized in Table 3-1. Summaries of water quality measurements, ammonia concentrations, and test conditions are presented in Table 3-2 through Table 3-5.

Mean survival in the reference sample was 92%. Mean survival in SV-23-A-Composite was 96% and was not found to be significantly lower than the reference treatment. Significant biological effects (>20% mortality compared to the reference or control) did not occur in the composite sample, which did not exceed the lowest permissible concentration (LPC) requirements for benthic toxicity as defined in the OTM (USEPA/USACE 1991).

All water quality measurements of temperature, dissolved oxygen, salinity, and pH were within the recommended limits during the test (Table 3-2).

Ammonia concentrations observed in the *L. plumulosus* test are summarized in Table 3-3. All measured ammonia values were below the NOEC value derived from the concurrent ammonia reference-toxicant test. They were also below the USEPA recommended threshold for action (USACE/USEPA 2001). This indicates that ammonia concentrations within the sediment samples should not have been a contributor to any adverse biological effects observed in the test treatments. Sulfides were monitored on Day 0 and Day 10 in the solid-phase tests per USEPA 2001 guidance recommendations and were found to be low overall (Table 3-4). Sulfides should thus not have been a contributor to adverse survival effects.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The reference-toxicant test control met the test acceptability criterion and the LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested.

Table 3-1. Survival Summary for the 10-Day Solid-Phase Test with *Leptocheirus plumulosus*

Sample ID	Mean Survival (%)	Standard Deviation	Significant Biological Effect? R – T > 20%?	Significantly Less Than Reference?	Exceeds LPC?
Control	98	2.7			
SF-09 Reference	92	5.7			
SV-23-A-Composite	96	4.2	No (-4%)	No	No

R = Mean survival of reference SF-09 Reference T = Mean survival of project sediment treatment

Table 3-2. Water Quality Summary for the Solid Phase Test with *Leptocheirus plumulosus*

Sample ID	Dissolved Oxygen (mg/L) > 4.2			Temperature (°C) 25 ± 2			Salinity (ppt) 28 ± 2			pH (units) 8 ± 1		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.1	6.8	7.4	24.4	23.0	25.7	29	28	29	8.0	7.7	8.2
SF-09 Reference	7.0	6.8	7.2	24.3	23.0	25.6	29	28	29	8.0	7.7	8.1
SV-23-A-Composite	6.8	6.2	7.1	24.3	23.0	25.6	28	28	29	7.8	7.6	8.0

Table 3-3. Ammonia Summary for the Solid-Phase Test with *Leptocheirus plumulosus*

Sample ID	Total Ammonia (mg/L) NOEC = 70.9 mg/L USEPA 2001 Threshold = 15 mg/L				Unionized Ammonia (mg/L) NOEC = 1.115 mg/L			
	Day 0		Day 10		Day 0		Day 10	
	OV	PW	OV	PW	OV	PW	OV	PW
Control	0.293	3.39	0.00	0.816	0.008	0.055	0.000	0.009
SF-09 Reference	1.74	5.10	0.00	0.280	0.044	0.033	0.000	0.005
SV-23-A-Composite	2.15	9.85	0.00	2.02	0.044	0.127	0.000	0.029

NOEC derived from concurrent reference-toxicant test OV = Overlying water, PW = Porewater

Table 3-4: Sulfide Summary for the Solid-Phase Test with *Leptocheirus plumulosus*

Sample ID	Total Sulfides (mg/L)				Hydrogen Sulfide (mg/L) Trigger Value = 0.099 mg/L[1]			
	Day 0		Day 10		Day 0		Day 10	
	OV	PW	OV	PW	OV	PW	OV	PW
Control	0.003	ND	0.005	0.015	0.0003	ND	0.0002	0.0028
SF-09 Reference	ND	ND	ND	ND	ND	ND	ND	ND
SV-23-A-Composite	0.003	ND	0.012	ND	0.0003	ND	0.0005	ND

[1] Inouye et al. 2015 ND = analyte not detected

Table 3-5. Test Condition Summary for the Solid-Phase Test with *Leptocheirus plumulosus*

Test Conditions: *Leptocheirus plumulosus*		
Date Sampled	December 12-13, 2023 (test sample) December 11, 2023 (reference)	
Date Received	December 14, 2023	
Sample Storage Conditions	4°C, dark	
Test Dates	December 29, 2023 – January 8, 2024	
Days of Holding Recommended: ≤8 weeks (56 days)	18 days	
Source of Control Sediment	Seabrook, NH	
Test Species	*Leptocheirus plumulosus*	
Supplier	Aquatic Research Organisms, Hampton NH	
Date Acquired	December 27, 2023	
Acclimation / Holding Time	2 days	
Age Class	Sub-adult, 2 – 4 mm	
Test Procedures	ITM & USACE/USEPA 2001	
Test Location	EcoAnalysts, Port Gamble, WA	
Test Type / Duration	10-Day/ Static	
Control Water	0.45 µm-filtered, North Hood Canal seawater	
Test Lighting	Continuous	
Test Chamber	1000-mL Glass Chamber	
Replicates / Treatment	5 + 2 surrogates	
Organisms / Replicate	20	
Exposure Volume	175 mL sediment (2 cm) / 775 mL of overlying seawater	
Feeding	None	
Water Renewal	None	
Test Dissolved Oxygen	Recommended: > 4.2 mg/L	Actual: 6.2 – 7.4
Test Temperature	Recommended: 25 ± 2°C	Actual: 23.0 – 25.7
Test Salinity	Recommended: 28 ± 2 ppt	Actual: 28 – 29
Test pH	Recommended: 8 ± 1	Actual: 7.6 – 8.2
Control Performance Standard	≥ 90% survival	Actual: 98%
Reference Toxicant	Total Ammonia	Unionized Ammonia
Reference Toxicant LC_{50} (mg/L)	143.1	1.721
Mean; Acceptable Range (mg/L)	137.8; 69.1 – 275	1.851; 0.984 – 3.48
NOEC	70.9	1.115
Deviations from Test Protocol	None	

3.1.2 Results of the Solid-Phase Test with *Neanthes arenaceodentata*

The solid-phase test with *N. arenaceodentata* was initiated on December 29, 2023. The test was validated by 100% survival in the control sample, meeting the acceptability criterion of ≥90%. Mean survival for all samples is summarized in Table 3-6. Summaries of water quality measurements, ammonia concentrations, and test conditions are presented in Table 3-7 through Table 3-10.

Mean survival in the reference sample and composite was 98%. Mean survival in the composite was not found to be significantly lower than the reference treatment, nor were significant biological effects (>10% mortality compared to the reference) observed. Thus, SV-23-A-Composite met the LPC requirements for benthic toxicity as defined in the OTM (USEPA/USACE 1991).

All water quality parameters were within the recommended ranges during the test with the exception of salinity in the control treatment on Day 5 and 7, when it measured 31 ppt instead of 26-30 ppt (Table 3-7). This deviation was still within the tolerance of the test organisms and no effect to survival was observed. One chamber (Control Rep 2) was stocked with 11 organisms instead of 10.

Ammonia concentrations observed in the *N. arenaceodentata* test are summarized in Table 3-8. All values were below the NOEC values derived from the concurrent ammonia reference-toxicant tests. They were also below the USEPA recommended threshold for action of 15 mg/L total ammonia (USACE/USEPA 2001). This indicates that ammonia concentrations within the sediment samples should not have been a contributor to any adverse biological effects observed in the test treatments. Sulfides were monitored on Day 0 and Day 10 in the solid-phase tests per USEPA 2001 guidance recommendations and were found to be low overall. Sulfides should thus not have been a contributor to adverse survival effects (Table 3-9).

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The reference-toxicant test control met the test acceptability criterion and the LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested.

A summary of the test conditions is presented in Table 3-9.

Table 3-6. Survival Summary for the 10-Day Solid-Phase Test with *Neanthes arenaceodentata*

Sample ID	Mean Survival (%)	Standard Deviation	Significant Biological Effect? R – T > 10%?	Significantly Less Than Reference?	Exceeds LPC?
Control	100	0.0			
SF-09 Reference	98	4.5			
SV-23-A-Composite	98	4.5	No	No	No

R = Mean survival of reference SF-09 Reference
T = Mean survival of project sediment treatment

Table 3-7. Water Quality Summary for the Solid-Phase Test with *Neanthes arenaceodentata*

Sample ID	Dissolved Oxygen (mg/L) >4.6			Temperature (°C) 20 ± 1			Salinity (ppt) 28 ± 2			pH (units) 8 ± 1		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.5	7.3	7.7	19.2	19.0	19.6	30	28	**31**	8.0	8.0	8.1
SF-09 Reference	7.5	7.2	7.6	19.3	19.0	19.8	29	28	29	7.8	7.7	8.0
SV-23-A-Composite	7.5	7.4	7.7	19.2	19.0	19.6	29	28	30	8.0	7.9	8.1

BOLD = Measurement outside of recommended range

Table 3-8. Ammonia Summary for the Solid-Phase Test with *Neanthes arenaceodentata*

Sample ID	Total Ammonia (mg/L) NOEC = 138 mg/L				Unionized Ammonia (mg/L) NOEC = 1.407 mg/L			
	Day 0		Day 10		Day 0		Day 10	
	OV	PW	OV	PW	OV	PW	OV	PW
Control	0.339	1.30	0.00	0.306	0.012	0.015	0.000	0.002
SF-09 Reference	1.61	3.77	0.00	4.19	0.046	0.022	0.000	0.012
SV-23-A-Composite	4.55	8.61	0.00	11.5	0.127	0.097	0.000	0.052

NOEC derived from concurrent reference-toxicant test

OV = Overlying water, PW = Porewater

Table 3-9. Sulfide Summary for the Solid-Phase Test with *Neanthes arenaceodentata*

Sample ID	Total Sulfides (mg/L)				Hydrogen Sulfide (mg/L) Trigger Value = 3.4 mg/L[1]			
	Day 0		Day 10		Day 0		Day 10	
	OV	PW	OV	PW	OV	PW	OV	PW
Control	0.002	ND	0.008	0.005	0.0001	ND	0.0004	0.0011
SF-09 Reference	0.004	ND	0.002	0.024	0.0003	ND	0.0001	0.0100
SV-23-A-Composite	0.003	ND	ND	0.006	0.0002	ND	ND	0.0019

[1] Inouye et al. 2015

ND = analyte not detected

Table 3-10. Test Condition Summary for the Solid-Phase Test with *Neanthes arenaceodentata*

Test Conditions: *Neanthes arenaceodentata*		
Date Sampled	December 12-13, 2023 (test sample) December 11, 2023 (reference)	
Date Received	December 14, 2023	
Sample Storage Conditions	4°C, dark	
Test Dates	December 29, 2023 – January 8, 2024	
Days of Holding Recommended: ≤8 weeks (56 days)	18 days	
Source of Control Sediment	Yaquina Bay, OR	
Test Species	*Neanthes arenaceodentata*	
Supplier	Aquatic Toxicology Support	
Date Acquired	December 29, 2023	
Acclimation / Holding Time	0 days	
Age Class	25 days old	
Test Procedures	ITM & USACE/USEPA 2001	
Test Location	EcoAnalysts, Port Gamble, WA	
Test Type / Duration	10-Day/ Static	
Control Water	0.45 µm-filtered, North Hood Canal seawater	
Test Lighting	12 hour light / 12 hour dark	
Test Chamber	1000-mL Glass Chamber	
Replicates / Treatment	5 + 2 surrogates	
Organisms / Replicate	10	
Exposure Volume	175 mL sediment (2 cm depth) / 775 mL of overlying seawater	
Feeding	None	
Water Renewal	None	
Test Dissolved Oxygen	Recommended: > 4.6 mg/L	Actual: 7.2 – 7.7 mg/L
Test Temperature	Recommended: 20 ± 1°C	Actual: 19.0 – 19.8°C
Test Salinity	Recommended: 28 ± 2 ppt	Actual: 28 – 31 ppt
Test pH	Recommended: 7 – 9	Actual: 7.7 – 8.1
Control Performance Standard	≥90% survival	Actual: 100%
Reference Toxicant	Total Ammonia	Unionized Ammonia
Reference Toxicant LC_{50} (mg/L)	179 mg/L	1.634
Mean; Acceptable Range (mg/L)	156.5; 104 – 234 mg/L	2.185; 1.33 – 3.58 mg/L
NOEC	138	1.407
Deviations from Test Protocol	Salinity in Control on Day 5 & 7, Control Rep 2 initiated with 11 animals	

3.2 Suspended-Particulate Phase (Elutriate) Test Results

The results of the suspended-particulate phase toxicity tests are presented in this section. The tests were performed with mysid shrimp (*Americamysis bahia*) and mussel larvae (*Mytilus galloprovincialis*).

3.2.1 Results of the Suspended-Particulate Phase SET with *Americamysis bahia*

The suspended-particulate phase SET with *A. bahia* was initiated on December 26, 2023. The test was validated by 96% survival in the seawater control, meeting the acceptability criterion of ≥90%. Mean survival in the salt control was 92% and was not significantly lower than the seawater control, indicating that the addition of salts to the elutriate and site water did not impact survival. Mean survival in the site water treatment was similarly not significantly lower than the control, indicating that the site water in the elutriate composition did not contribute to any survival effects. Mean survival for all samples is summarized in Table 3-11.

Mean percentage survival in the 100% elutriate concentration for SV-23-A-Composite was 88%. The estimated LC_{50} value was >100%. Statistical comparison of the treatments to the control survival resulted in no significant differences.

Water quality parameters were within the target limits throughout the duration of the 96-hour test, with the exception of salinity in the 100% elutriate on Day 3 when it peaked at 31 ppt (Table 3-12). While above the recommended range of 28 ± 2 ppt, it was still within the tolerance of the test organisms and dropped back down to 30 ppt the following day. SV-23-A-Composite 1% Replicate 4 was initiated with 12 animals. The start count was adjusted for statistical analysis.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The reference-toxicant test control met the test acceptability criterion and the LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested.

All measured ammonia values observed in the *A. bahia* test were below the NOEC values derived from the concurrent ammonia reference-toxicant test. This indicates that ammonia concentrations within the elutriate should not have been a contributor to any adverse biological effects observed in the test treatments (Table 3-13).

A summary of test conditions is present in Table 3-13.

Table 3-11. Survival Summary for the Suspended-Particulate Phase SET with *Americamysis bahia*

Sample ID	Concentration (%)	Mean Survival (%)	Standard Deviation	Statistically Less Than Control?	LC_{50} Value
Control		96	8.9		
Salt Control		92	8.4	No	
SV-23-SW		100	0.0	No	
SV-23-A-Composite	1	94	5.2	No	>100
	10	98	4.5	No	
	50	94	8.9	No	
	100	88	13.0	No	

Table 3-12. Water Quality Summary for the Suspended-Particulate Phase SET with *Americamysis bahia*

Sample ID	Concentration (%)	Dissolved Oxygen (mg/L) ≥3.0 mg/L			Temperature (°C) 20 ± 1			Salinity (ppt) 28 ± 2			pH (units) 8 ± 1		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control		5.9	4.6	7.4	20.0	19.2	21.3	29	29	30	7.8	7.4	8.1
Salt Control		6.2	5.3	7.8	19.9	19.0	21.2	28	28	29	7.8	7.6	8.1
SV-23-SW		5.9	4.1	8.1	20.1	19.5	21.0	29	28	29	7.8	7.5	8.1
SV-23-A-Composite	1	5.9	5.1	7.8	20.1	19.5	21.3	29	29	30	7.8	7.6	8.1
	10	5.8	4.7	7.7	20.1	19.4	21.2	29	29	30	7.8	7.7	8.1
	50	6.0	5.2	7.8	20.0	19.2	21.2	30	30	30	8.0	7.9	8.0
	100	6.1	5.4	7.8	19.9	19.0	21.1	30	30	**31**	8.1	8.0	8.2

Bold = Measurement outside of recommended range

Table 3-13. Ammonia Summary for the Suspended-Particulate Phase SET with *Americamysis bahia*

Sample ID	Concentration (%)	Total Ammonia (mg/L) NOEC =27.7 mg/L		Unionized Ammonia (mg/L) NOEC = 0.813 mg/L	
		Day 0	Day 4	Day 0	Day 4
Control		0.00	1.33	0.000	0.012
Salt Control		0.0079	0.875	0.000	0.013
SV-23-SW		1.30	1.39	0.059	0.016
SV-23-A-Composite	1	0.972	1.18	0.044	0.017
	10	1.47	2.36	0.065	0.044
	50	4.65	7.17	0.163	0.257
	100	8.50	12.0	0.294	0.668

NOEC derived from concurrent reference-toxicant test

Table 3-14. Test Condition Summary for the Suspended-Particulate Phase SET with *Americamysis bahia*

Test Conditions: *Americamysis bahia*		
Date Sampled	December 12-13, 2023 (test sample) December 21, 2023 (site water)	
Date Received	December 14, 2023 (test sample) December 22, 2023 (site water)	
Sample Storage Conditions	4°C, dark	
Test Dates	December 26 – 30, 2023	
Days of Holding Recommended: ≤8 weeks (56 days)	14 days	
Test Species	*Americamysis bahia*	
Supplier	Aquatic BioSystems	
Date Acquired	December 22, 2023	
Acclimation / Holding Time	4 days	
Age at Test Initiation	5 days old	
Test Procedures	ITM & USACE/USEPA 2001	
Test Location	EcoAnalysts, Port Gamble, WA	
Test Type / Duration	96-Hour/ static	
Control Water	0.45 µm-filtered, North Hood Canal seawater	
Organisms / Replicate	10	
Exposure Volume	250 mL	
Feeding	0.1 mL of Artemia nauplii, twice daily	
Test Solution Renewal	None	
Test Dissolved Oxygen	Recommended: > 3.0 mg/L	Actual: 4.1 – 8.1 mg/L
Test Temperature	Recommended: 20 ± 1°C	Actual: 19.0 – 21.3°C
Test Salinity	Recommended: 28 ± 2 ppt	Actual: 28 – 31 ppt
Test pH	Recommended: 8 ± 1	Actual: 7.4 – 8.2
Control Performance Standard	≥90% survival	Actual: 96%
Reference Toxicant	Total Ammonia	Unionized Ammonia
Reference Toxicant LC_{50} (mg/L)	43.27	1.106
Mean; Acceptable Range (mg/L)	40.33; 23.4 – 69.4	0.962; 0.511 – 1.81
NOEC (mg/L)	27.7	0.813
Deviations from Test Protocol	Salinity in 100% treatment Day 3, 1% Rep 4 stocked with 12 animals	

3.2.2 Results of the Suspended-Particulate Phase SET with *Mytilus galloprovincialis*

The suspended-particulate phase SET with *M. galloprovincialis* was initiated on December 26, 2023. The test met the acceptability criteria for proportion normal and normal survival (summarized in Table 3-15). Mean normal survival in the salt control was not significantly lower than the seawater control, indicating that the addition of salts to the elutriate and site water did not impact survival. Mean normal survival in the site water treatment was similarly not significantly lower than the control, indicating that the site water in the elutriate composition did not contribute to any survival effects.

Mean percent normal survival in the 100% elutriate concentration for the composite sample was 0.0% (Table 3-16). The estimated proportion normal EC_{50} value for the composite sample was > 59.1%, and the estimated combined mortality/normality LC_{50} value was 59.4% (Table 3-17), indicating a larval effect was present in the composite. Statistical comparison of normal survival in the 100% elutriate concentration to that of the control resulted in a significant difference.

Measurements of water quality parameters were within the recommended limits during the test with the exception of salinity in the 100% elutriate concentration, which measured 30 ppt instead of 28 ± 1 ppt (Table 3-18). The sample elutriate salinity increased during the salting process prior to testing, however the addition of salts did not cause an effect to normal development and survival and the salinity of the 100% treatment was still within the tolerance range of the test species. The embryo stocking density achieved in this test was 22.2 embryos/mL of test solution, which was within the recommended density of 15 – 30 embryos/mL.

Ammonia concentrations observed in the *M. galloprovincialis* elutriate test are summarized in Table 3-19. Total and unionized ammonia measurements in the 50% and 100% treatments in the composite samples were above the NOEC values derived from the concurrent ammonia reference-toxicant test. This indicates that ammonia concentrations within the overlying water were likely a contributor to the adverse biological effects observed in the test treatments. An ammonia-reduced 100% treatment was performed side-by-side and performed better than the un-reduced treatment; however, normal survival was still significantly less than the control in the ammonia-reduced. Ammonia levels in the ammonia-reduced were slightly above the NOEC obtained from the concurrent ammonia reference toxicant test, indicating that while ammonia levels were lower in the 100% ammonia-reduced treatment than that of the un-reduced, an effect from ammonia may have still been present.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The reference-toxicant test control met the test acceptability criterion and the EC_{50} value was within control chart limits of ± 2 standard deviations from the laboratory historical mean. This indicates that the test organisms used in this study were of similar sensitivity to those previously tested. A summary of test conditions is present in Table 3-20.

Table 3-15. *Mytilus galloprovincialis* Control Acceptability Results

Test Date	Mean Normal Survival (%)[1] >70%	Meets Acceptability Criteria?
December 26 – 28, 2023	97.0	Yes

[1] Calculated as the number of normally developed embryos ÷ number of embryos stocked (stocking density); combined mortality/normality endpoint.

Table 3-16. Combined Mortality/Normality (LC_{50}) Endpoint Summary for *Mytilus galloprovincialis*

Sample ID	Concentration (%)	Mean Normal Survival (%)[1]	Standard Deviation	Statistically Less Than Control?	LC_{50}
Control		97.0	4.1		
Salt Control		97.1	3.2	No	
SV-23-SW		99.5	1.2	No	
SV-23-A-Composite	1	97.2	2.7	No	59.4%
	10	91.4	8.8	No	
	50	64.5	3.3	Yes	
	100	0.0	0.0	Yes	
SV-23-A-Composite Ammonia Reduced	100	88.7	5.4	Yes	

[1] Calculated as the number of normally developed embryos ÷ number of embryos stocked (stocking density).

Table 3-17: Proportion Normal (EC_{50}) Endpoint Summary for *Mytilus galloprovincialis*

Sample ID	Concentration (%)	Mean Normal (%)[1]	Standard Deviation	Statistically Less Than Control?	EC_{50}
Control		95.3	0.85		
Salt Control		94.3	2.6	No	
SV-23-SW		97.3	0.82	No	
SV-23-A-Composite	1	95.3	2.1	No	59.1%
	10	95.4	1.7	No	
	50	62.9	4.7	Yes	
	100	0.0	0.0	Yes	
SV-23-A-Composite Ammonia Reduced	100	90.2	3.4	Yes	

[1] Calculated as the number of normally developed embryos ÷ total number (normal + abnormal)

Table 3-18. Water Quality Summary for the Suspended-Particulate Phase SET with *Mytilus galloprovincialis*

Sample ID	Concen-tration (%)	Dissolved Oxygen (mg/L) ≥3.3 mg/L			Temperature (°C) 16 ± 1			Salinity (ppt) 28 ± 1			pH (units) 8 ± 1		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control		8.1	8.0	8.2	16.7	16.0	17.0	28	28	28	7.6	7.4	7.7
Salt Control		8.1	8.0	8.2	16.6	16.0	17.0	28	28	28	7.7	7.6	7.8
SV-23-SW		8.1	8.0	8.2	16.5	16.0	17.0	28	28	28	7.9	7.8	7.9
SV-23-A-Composite	1	8.1	8.0	8.2	16.7	16.0	17.0	28	28	29	7.8	7.8	7.9
	10	8.1	8.0	8.3	16.7	16.0	17.1	29	28	29	7.8	7.8	7.9
	50	8.1	8.0	8.2	16.6	16.0	17.0	29	29	29	8.0	7.9	8.1
	100	8.0	7.9	8.1	16.6	16.0	17.0	**30**	**30**	**30**	8.1	8.0	8.3
SV-23-A-Composite Ammonia Reduced	100	8.0	7.8	8.1	16.4	16.0	17.0	29	28	29	8.1	8.1	8.1

Table 3-19. Ammonia Summary for the Suspended-Particulate Phase SET with *Mytilus galloprovincialis*

Sample ID	Concentration (%)	Total Ammonia (mg/L) NOEC = 3.92 mg/L		Unionized Ammonia (mg/L) NOEC = 0.06 mg/L	
		Day 0	Day 2	Day 0	Day 2
Control		0.303	0.00	0.004	0.000
Salt Control		0.116	0.00	0.002	0.000
SV-23-SW		0.0950	0.00	0.002	0.000
SV-23-A-Composite	1	0.403	0.00	0.008	0.000
	10	1.70	0.692	0.033	0.015
	50	**5.26**	**4.67**	**0.126**	**0.163**
	100	**10.8**	**9.84**	**0.323**	**0.532**
SV-23-A-Composite Ammonia Reduced	100	**4.20**	**3.96**	**0.157**	**0.138**

NOEC derived from concurrent reference-toxicant test
Bold = Measurement above NOEC

Table 3-20. Test Condition Summary for the Suspended-Particulate Phase SET with *Mytilus galloprovincialis*

Test Conditions: *Mytilus galloprovincialis*		
Date Sampled	December 12-13, 2023 (test sample), December 21, 2023 (site water)	
Date Received	December 14, 2023 (test sample), December 22, 2023 (site water)	
Sample Storage Conditions	4°C, dark	
Test Dates	December 26 – 28, 2023	
Days of Holding Recommended: ≤8 weeks (56 days)	14 days	
Test Species	*Mytilus galloprovincialis*	
Supplier	Taylor Shellfish	
Date Acquired	December 15, 2023	
Acclimation / Holding Time	11 days	
Age Class	~3h larvae	
Test Procedures	ITM, USACE/USEPA 2001	
Test Location	EcoAnalysts, Port Gamble, WA	
Test Type / Duration	48 – 96 ± 2 Hour/ Static	Actual: 48 Hours
Control Water	0.45 µm-filtered, North Hood Canal seawater	
Test Lighting	16 hour light / 8 hour dark	
Test Chamber	30-mL Glass Vial	
Replicates / Treatment	5	
Concentration / Treatment	1, 10, 50, and 100% elutriate	
Organisms / Replicate Recommended: 15 –30 embryos per mL	22.2 embryos per mL	
Exposure Volume	10 mL	
Test Solution Renewal	None	
Test Dissolved Oxygen	Recommended: > 3.3 mg/L	Actual: 7.8 – 8.3 mg/L
Test Temperature	Recommended: 16 ± 1°C	Actual: 16.0 – 17.1 °C
Test Salinity	Recommended: 28 ± 1 ppt	Actual: 28 – 30 ppt
Test pH	Recommended: 8 ± 1	Actual: 7.4 – 8.3
Control Performance Standard	≥ 70% combined survival/normality	97.0%
Reference Toxicant	Total Ammonia	Unionized Ammonia
Reference Toxicant EC50 (mg/L)	6.393	0.100
Mean; Acceptable Range (mg/L)	6.917; 3.8 – 12.6	0.136; 0.070 – 0.264
NOEC (mg/L)	3.92	0.06
Deviations from Test Protocol	Salinity in 100%	

3.2.3 Results of the Suspended-Particulate Phase MET with *Americamysis bahia*

The suspended-particulate phase MET with *A. bahia* was initiated on December 26, 2023. The test was validated by 100% survival in the seawater control, meeting the acceptability criterion of ≥90%. Mean survival in the salt control was 96% and was not significantly lower than the seawater control, indicating that the addition of salts to the elutriate and site water did not impact survival. Mean survival in the site water treatment was similarly not significantly lower than the control, indicating that the site water in the elutriate composition did not contribute to any survival effects. Mean survival for all samples is summarized in Table 3-21.

Mean percentage survival in the 100% elutriate concentration for SV-23-A-Composite was 84%. The estimated LC_{50} value was >100%. Statistical comparison of the treatments to the control survival resulted in a significant difference in the 100% treatment.

Water quality parameters were within the target limits throughout the duration of the 96-hour test (Table 3-22).

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The reference-toxicant test control met the test acceptability criterion and the LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested.

All measured ammonia values observed in the *A. bahia* test were below the NOEC values derived from the concurrent ammonia reference-toxicant test. This indicates that ammonia concentrations within the elutriate should not have been a contributor to any adverse biological effects observed in the test treatments (Table 3-23).

A summary of test conditions is present in Table 3-24.

Table 3-21. Survival Summary for the Suspended-Particulate Phase MET with *Americamysis bahia*

Sample ID	Concentration (%)	Mean Survival (%)	Standard Deviation	Statistically Less Than Control?	LC_{50} Value
Control		100	0.0		
Salt Control		96	5.5	No	
SV-23-SW		96	5.5	No	
SV-23-A-Composite	1	96	5.5	No	>100
	10	98	4.5	No	
	50	94	5.5	No	
	100	84	8.9	Yes	

Table 3-22. Water Quality Summary for the Suspended-Particulate Phase MET with *Americamysis bahia*

Sample ID	Concentration (%)	Dissolved Oxygen (mg/L) ≥ 3.0 mg/L			Temperature (°C) 20 ± 1			Salinity (ppt) 28 ± 2			pH (units) 8 ± 1		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control		5.9	4.8	7.7	19.8	18.6	21.2	29	29	30	7.5	7.3	8.0
Salt Control		6.3	5.4	7.8	19.7	18.8	21.2	28	28	29	7.7	7.4	8.1
SV-23-SW		6.2	5.0	8.1	19.8	18.8	21.1	28	28	28	7.8	7.6	8.0
SV-23-A-Composite	1	6.1	5.1	7.8	19.9	19.0	21.4	29	29	30	7.8	7.6	8.1
	10	6.0	4.6	7.7	19.8	19.1	21.0	29	29	30	7.8	7.6	8.1
	50	5.9	4.9	7.8	19.6	18.7	20.8	29	29	29	7.9	7.7	8.1
	100	5.8	3.9	7.8	19.7	19.0	20.9	29	28	29	8.1	7.9	8.2

Table 3-23. Ammonia Summary for the Suspended-Particulate Phase MET with *Americamysis bahia*

Sample ID	Concentration (%)	Total Ammonia (mg/L) NOEC =27.7 mg/L		Unionized Ammonia (mg/L) NOEC = 0.813 mg/L	
		Day 0	Day 4	Day 0	Day 4
Control		0.371	1.58	0.013	0.014
Salt Control		1.02	1.30	0.044	0.019
SV-23-SW		0.740	1.25	0.027	0.022
SV-23-A-Composite	1	0.890	1.34	0.040	0.019
	10	2.87	1.96	0.127	0.028
	50	4.39	4.80	0.194	0.134
	100	6.07	9.07	0.336	0.395

NOEC derived from concurrent reference-toxicant test

Table 3-24. Test Condition Summary for the Suspended-Particulate Phase MET with *Americamysis bahia*

Test Conditions: *Americamysis bahia*		
Date Sampled	December 12-13, 2023 (test sample) December 13, 2023 (site water)	
Date Received	December 14, 2023 (test sample and site water)	
Sample Storage Conditions	4°C, dark	
Test Dates	December 26 – 30, 2023	
Days of Holding Recommended: ≤8 weeks (56 days)	14 days	
Test Species	*Americamysis bahia*	
Supplier	Aquatic BioSystems	
Date Acquired	December 22, 2023	
Acclimation / Holding Time	4 days	
Age at Test Initiation	5 days old	
Test Procedures	ITM & USCAE/USEPA 2001	
Test Location	EcoAnalysts, Port Gamble, WA	
Test Type / Duration	96-Hour/ static	
Control Water	0.45 µm-filtered, North Hood Canal seawater	
Organisms / Replicate	10	
Exposure Volume	250 mL	
Feeding	0.1 mL of Artemia nauplii, twice daily	
Test Solution Renewal	None	
Test Dissolved Oxygen	Recommended: > 3.0 mg/L	Actual: 3.9 – 8.1 mg/L
Test Temperature	Recommended: 20 ± 1°C	Actual: 18.6 – 21.4°C
Test Salinity	Recommended: 28 ± 2 ppt	Actual: 28 – 30 ppt
Test pH	Recommended: 8 ± 1	Actual: 7.3 – 8.2
Control Performance Standard	≥ 90% survival	Actual: 100%
Reference Toxicant	Total Ammonia	Unionized Ammonia
Reference Toxicant LC_{50} (mg/L)	43.27	1.106
Mean; Acceptable Range (mg/L)	40.33; 23.4 – 69.4	0.962; 0.511 – 1.81
NOEC (mg/L)	27.7	0.813
Deviations from Test Protocol	None	

4. SUMMARY

The results of the solid-phase and suspended-particulate phase for USCG Station Vallejo are summarized below.

The survival of each species in the test sediments was evaluated statistically against survival in the reference sediment according to guidelines provided by the OTM (USEPA/USACE 1991). Potential dredged material does not meet the LPC for benthic toxicity when organism survival is statistically less than in the reference sediment and survival is less that the that of the reference sediment by at least 20 percent for amphipod tests, or by at least 10 percent for *N. arenaceodentata*.

The LPC for benthic toxicity was met for *L. plumulosus* and *N. arenaceodentata* in the composite sample (Table 4-1). Sample SV-23-A-Composite meets LPC criteria.

Table 4-1. Solid-Phase Test Results Summary

Sample ID	Survival (%)	
	Leptocheirus plumulosus	***Neanthes arenaceodentata***
SF-09 Reference	92	98
SV-23-A-Composite	96	98

Suspended-particulate phase test results for USCG Station Vallejo are summarized in Table 4-2 (for SET) and Table 4-3 (for MET). Survival in the 100% elutriate of the composite sample for the SET *A. bahia* was not statistically significantly less than the control and the LC_{50} value was greater than 100%. Larval *M. galloprovincialis* normal survivorship (combined mortality/normality) and proportion normal results in the 100% elutriate for the composite sample were significantly less than the control treatment and the LC_{50} and EC_{50} values indicate a biological effect is present (59.4% and 59.1%, respectively). Ammonia concentrations in the treatment and an ammonia-reduced treatment indicate that ammonia may be driving the toxicity observed in the sample. Survival in the 100% treatment of the MET with *A. bahia* was significantly less than that of the control. A full dilution series was performed on the MET, allowing an LC_{50} to be calculated. Despite the survival effect in comparison to the control, the LC_{50} was still >100% in the MET analysis.

Table 4-2. Suspended-Particulate Phase SET Results Summary

Sample ID	Endpoint LC/EC_{50} Result	*Americamysis bahia*	*Mytilus galloprovincialis*
SV-23-A-Composite	Significantly Below control?	No	Yes
	LC_{50}	>100%	59.4%
	EC_{50}	NA	59.1%

Table 4-3: Suspended-Particulate Phase MET Results Summary

Sample ID	Endpoint LC_{50} Result	*Americamysis bahia*
SV-23-A-Composite	Survival Significantly Less than Control?	Yes
	LC_{50}	>100%

5. REFERENCES

APHA. 2017. American Public Health Association, American Water Works Association, and Water Environment Federation (APHA). Standard Methods for the Examination of Water and Wastewater, 23th Edition. Ammonia-Selective Electrode Method, Method 4500-NH_3 D.

CETIS. 2022. CETIS™ Comprehensive Environmental Toxicity Information System User's Guide. Tidepool Scientific Software. McKinleyville, CA.

Hampson 1977. B. L. Hampson, Relationship between total ammonia and free ammonia in terrestrial and ocean waters, ICES Journal of Marine Science, Volume 37, Issue 2, February 1977, Pages 117–122.

Inouye,L., E. Hoffman, D. Fox. 2015. DMMP Clarification Paper: Modifications to Ammonia and Sulfide Triggers for Purging and Reference Toxicant Testing for Marine Bioassays. Final Paper August 14, 2015. Prepared by Laura Inouye (Ecology), Erika Hoffman (EPA) and David Fox (Corps) for the DMMP agencies.

Lee, D.R. 1980. Reference toxicants in quality control of aquatic bioassays: Aquatic invertebrate bioassays. In Buikema AL Jr, Cairns J Jr, eds, Proceedings, 2nd Annual Symposium on Aquatic Toxicology. STP 715. American Society for Testing and Materials, Philadelphia, PA, pp 188–199.

USCG. 2023. Sampling and Analysis Plan for a Sediment Characterization Study to Support Episodic Maintenance Dredging at Coast Guard Station Vallejo in Vallejo, California. United States Coast Guard, CEU Oakland, Oakland, California. November 2023.

PSEP. 1995. Puget Sound Protocols and Guidelines. Puget Sound Estuary Program. Puget Sound Water Quality Action Team, Olympia, Washington.

USACE/USEPA. 2001. Public Notice 01-01: Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region.

USEPA. 1989. U.S. Environmental Protection Agency. "Ambient Water Quality Criteria for Ammonia (Saltwater)" EPA 440/5-88/004, Washington, D.C. Environmental Protection Agency Office of Water Regulations and Standards, Criteria and Standards Division.

USEPA. 1994. Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods. EPA/600/R-94/025. Environmental Protection Agency Office of Research and Development. June 1994.

USEPA/USACE. 1991. Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual (Green Book, Ocean Testing Manual, OTM). EPA-503/8-91-001. February 1991.

USEPA/USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S: - Testing Manual (Inland Testing Manual, ITM) EPA 823-B-98-004. February 1998.

APPENDIX A. TEST DATA, STATISTICAL ANALYSES, AND REFERENCE TOXICANT TEST RESULTS

1. *LEPTOCHEIRUS PLUMULOSUS* 10-DAY SOLID-PHASE TEST

1.1 *LEPTOCHEIRUS PLUMULOSUS* TEST DATA
1.2 *LEPTOCHEIRUS PLUMULOSUS* TEST STATISTICAL RESULTS
1.3 *LEPTOCHEIRUS PLUMULOSUS* REFERENCE TOXICANT TEST RESULTS

2. *NEANTHES ARENACEODENTATA* 10-DAY SOLID-PHASE TEST

2.1 *NEANTHES ARENACEODENTATA* TEST DATA
2.2 *NEANTHES ARENACEODENTATA* STATISTICAL RESULTS
2.3 *NEANTHES ARENACEODENTATA* REFERENCE TOXICANT TEST RESULTS

3. *AMERICAMYSIS BAHIA* SET SPP WATER-COLUMN TEST

3.1 *AMERICAMYSIS BAHIA* SET TEST DATA
3.2 *AMERICAMYSIS BAHIA* SET STATISTICAL RESULTS
3.3 *AMERICAMYSIS BAHIA* REFERENCE TOXICANT TEST RESULTS

4. *MYTILUS GALLOPROVINCIALIS* SET SPP WATER-COLUMN TEST

4.1 *MYTILUS GALLOPROVINCIALIS* SET TEST DATA
4.2 *MYTILUS GALLOPROVINCIALIS* SET STATISTICAL RESULTS
4.3 *MYTILUS GALLOPROVINCIALIS* REFERENCE TOXICANT TEST RESULTS

5. *AMERICAMYSIS BAHIA* MET SPP WATER-COLUMN TEST

5.1 *AMERICAMYSIS BAHIA* MET TEST DATA
5.2 *AMERICAMYSIS BAHIA* MET STATISTICAL RESULTS
5.3 *AMERICAMYSIS BAHIA* REFERENCE TOXICANT TEST RESULTS

APPENDIX B. CHAIN-OF-CUSTODY FORMS, LOGS, AND PRE-TEST DOCUMENTS

APPENDIX A. TEST DATA, STATISTICAL ANALYSES, AND REFERENCE TOXICANT TEST RESULTS

1. *Leptocheirus plumulosus* 10-day Solid-Phase Test

1.1 *Leptocheirus plumulosus* Test Data

Version T.6

GENERAL

Client	WSP
Project	USCG Station Vallejo
Project Number	PG1617
Project Manager	M. Knowlen
Date Oldest Sample Collected	12/11/2023
Sample Holding Time	18
Test Start Date	12/29/2023
Test Species	*Leptocheirus plumulosus*
Organism Supplier	ARO
Organism Acquired	12/27/2023
Organism Acclimation	2
Organism Age	2-4 mm
Test Type/Duration	10d Static, non-renewal
Test Protocol	ITM
Regional Protocol	San Francisco USEPA
Laboratory Location	Port Gamble
Test Location	Bath 2
Sample Treatment	Control pres-sieved 0.5mm & purged
Control Sediment Source	Seabrook NH
Water Batch	FSW122823.01
Test Lighting	Continuous
Test Chamber	1 L mason jars
Replicates Per Treatment	5
Organisms per Replicate	20
Exposure Volume	2 cm sediment/ 775 mL water
Feeding Information	None
Test Dissolved Oxygen	> 4.2
Test Temperature	25 ± 2
Test Salinity	28 ± 2
Test pH	8 ± 1
Water Renewal Info	None

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	**Max**
DO:	4.2	
Temp:	22.5	27.4
Sal:	26	30
pH:	7	9

TEST START TIME/INITIALS:	**1445 MK**
TEST END TIME:	**1000 MK**

	CLIENT SAMPLE ID	LAB ID
1	**Control**	**P231222.02**
2	**SF-09 Reference**	**P231214.11**
3	**SV-23-A-Composite**	**P231221.01**
4	.	.
5	.	.
6	.	.
7	.	.
8	.	.
9	.	.
10	.	.
11	.	.
12	.	.
13	.	.
14	.	.
15	.	.
16	.	.
17	.	.
18	.	.
19	.	.
20	.	.

EcoAnalysts, Inc.

10 DAY SP WQ DATA SHEET

CLIENT	PROJECT	SPECIES	LOCATION	PROTOCOL
WSP	USCG Station Vallejo	*Leptocheirus plumulosus*	Port Gamble / Bath 2	ITM , San Francisco USEPA
PROJECT NUMBER	**TEST TYPE/DURATION**	**WATER DESCRIPTION**	**TEST START DATE**	**TEST END DATE**
PG1617	10d Static, non-renewal	FSW122823.01	December 29, 2023	January 8, 2024

WATER QUALITY DATA

SAMPLE ID	DAY	REP	JAR #	TECHNICIAN	Date	Meter	DO (mg/L) > 4.2	TEMP (°C) 23 - 27	SALINITY (ppt) 26 - 30	pH 7 - 9	Notes
Control	0	Surr	14	MK	12/29/23	7	7.4	24.1	29	7.7	
Control	1	Surr	14	TT	12/30/23	8	6.9	24.7	28	7.9	
Control	2	Surr	14	LG	12/31/23	8	7.1	23.6	28	7.9	
Control	3	Surr	14	TT	01/01/24	7	7.3	23.0	28	8.0	
Control	4	Surr	14	TW	01/02/24	8	7.0	24.3	28	7.9	
Control	5	Surr	14	SR	01/03/24	8	6.8	24.3	29	8.0	
Control	6	Surr	14	SR	01/04/24	7	7.1	23.6	28	8.1	
Control	7	Surr	14	NL	01/05/24	8	7.0	25.7	29	8.1	
Control	8	Surr	14	SR	01/06/24	7	6.8	24.5	29	8.2	
Control	9	Surr	14	NL	01/07/24	7	6.9	24.6	29	8.2	
Control	10	Surr	14	MK	01/08/24	7	7.3	25.5	29	8.1	
SF-09 Reference	0	Surr	1	MK	12/29/23	7	7.1	23.9	29	7.7	
SF-09 Reference	1	Surr	1	TT	12/30/23	8	6.9	24.6	29	7.9	
SF-09 Reference	2	Surr	1	LG	12/31/23	8	7.1	23.5	28	7.9	
SF-09 Reference	3	Surr	1	TT	01/01/24	7	7.2	23.0	29	7.9	
SF-09 Reference	4	Surr	1	TW	01/02/24	8	6.9	24.2	29	7.9	
SF-09 Reference	5	Surr	1	SR	01/03/24	8	6.9	24.1	29	8.0	
SF-09 Reference	6	Surr	1	SR	01/04/24	7	7.1	23.5	29	8.1	
SF-09 Reference	7	Surr	1	NL	01/05/24	8	7.2	25.6	29	8.0	
SF-09 Reference	8	Surr	1	SR	01/06/24	7	6.8	24.8	29	8.1	
SF-09 Reference	9	Surr	1	NL	01/07/24	7	6.9	24.7	29	8.1	
SF-09 Reference	10	Surr	1	MK	01/08/24	7	6.9	25.6	29	8.1	

10 DAY SP WQ DATA SHEET

CLIENT	PROJECT	SPECIES	LOCATION	PROTOCOL
WSP	USCG Station Vallejo	*Leptocheirus plumulosus*	Port Gamble / Bath 2	ITM , San Francisco USEPA
PROJECT NUMBER	**TEST TYPE/DURATION**	**WATER DESCRIPTION**	**TEST START DATE**	**TEST END DATE**
PG1617	10d Static, non-renewal	FSW122823.01	December 29, 2023	January 8, 2024

WATER QUALITY DATA

SAMPLE ID	DAY	REP	JAR #	TECHNICIAN	Date	Meter	DO (mg/L) > 4.2	TEMP (°C) 23 - 27	SALINITY (ppt) 26 - 30	pH 7 - 9	Notes
SV-23-A-Composite	0	Surr	11	MK	12/29/23	7	7.1	24.0	29	7.6	
SV-23-A-Composite	1	Surr	11	TT	12/30/23	8	6.5	24.7	28	7.8	
SV-23-A-Composite	2	Surr	11	LG	12/31/23	8	7.0	23.5	28	7.8	
SV-23-A-Composite	3	Surr	11	TT	01/01/24	7	7.1	23.0	28	7.8	
SV-23-A-Composite	4	Surr	11	TW	01/02/24	8	6.6	24.2	28	7.7	
SV-23-A-Composite	5	Surr	11	SR	01/03/24	8	6.2	24.1	28	7.6	
SV-23-A-Composite	6	Surr	11	SR	01/04/24	7	6.8	23.6	28	7.9	
SV-23-A-Composite	7	Surr	11	NL	01/05/24	8	6.8	25.5	28	7.9	
SV-23-A-Composite	8	Surr	11	SR	01/06/24	7	6.7	24.7	28	7.9	
SV-23-A-Composite	9	Surr	11	NL	01/07/24	7	6.7	24.5	28	8.0	
SV-23-A-Composite	10	Surr	11	MK	01/08/24	7	6.8	25.6	28	8.0	

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10-DAY SP TEST OBSERVATION DATA SHEET

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 2	ITM	*Leptocheirus plumulosus*

Observation Key
#FOS = Num Floating on Water Surface
#E = Num Emerged from Sediment
#M = Number of Mortalities or Molts
L = Anoxic Surface
G = Growth
D = No Air Flow (Measure DO)
N = Normal
TC = Too Cloudy to Observe

ENDPOINT DATA & OBSERVATIONS

CLIENT ID	REP	Jar #	Initial #	Day	1	2	3	4	5	6	7	8	9	10	Comments
				Technician	TT	LG	TT	TW	SR	SR	NL	SR	NL	MK	
				Date	12/30/23	12/31/23	01/01/24	01/02/24	01/03/24	01/04/24	01/05/24	01/06/24	01/07/24	01/08/24	
Control	1	7	20		N	N	6M	N	N	N	N	N	N	N	
Control	2	18	20		N	N	N	N	N	N	N	N	N	N	
Control	3	9	20		N	N	1M	N	N	N	N	N	N	N	
Control	4	12	20		N	N	N	N	N	N	N	N	N	N	
Control	5	8	20		2M	N	N	N	N	N	N	N	N	N	
SF-09 Reference	1	6	20		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	2	10	20		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	3	17	20		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	4	15	20		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	5	16	20		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	1	3	20		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	2	4	20		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	3	13	20		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	4	5	20		1FOS	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	5	2	20		N	N	N	N	N	N	N	N	N	N	

EcoAnalysts, Inc.

10 Day SP Survival Summary

CLIENT	PROJECT	PROJECT NUMBER
WSP	USCG Station Vallejo	PG1617
PROJECT MANAGER	**SPECIES**	
M. Knowlen	*Leptocheirus plumulosus*	

Sample ID	Rep	Jar #	# Initiated	Date Recovered:		1/8/2024		Comments
				# Alive	# Dead	Initials	# Missing or Dead	
Control	1	7	20	20	0	MK	0	
Control	2	18	20	19	0	MK	1	
Control	3	9	20	19	0	MK	1	
Control	4	12	20	20	0	MK	0	
Control	5	8	20	20	0	MK	0	
SF-09 Reference	1	6	20	20	0	MK	0	
SF-09 Reference	2	10	20	18	0	MK	2	
SF-09 Reference	3	17	20	19	0	MK	1	
SF-09 Reference	4	15	20	17	0	MK	3	
SF-09 Reference	5	16	20	18	0	MK	2	
SV-23-A-Composite	1	3	20	19	0	MK	1	
SV-23-A-Composite	2	4	20	18	0	MK	2	
SV-23-A-Composite	3	13	20	20	0	MK	0	
SV-23-A-Composite	4	5	20	20	0	MK	0	
SV-23-A-Composite	5	2	20	19	0	MK	1	

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Leptocheirus plumulosus*

Sample ID	Rep	# Initiated	# Alive	% Survival	Survival Statistics: Mean Survival (%)	Survival Statistics: SD	% Mortality	Mortality Statistics: Mean Mortality (%)	Mortality Statistics: SD
Control	1	20	20	100			0		
Control	2	20	19	95			5		
Control	3	20	19	95			5		
Control	4	20	20	100			0		
Control	5	20	20	100	98.0	2.7	0	2.0	2.7
SF-09 Reference	1	20	20	100			0		
SF-09 Reference	2	20	18	90			10		
SF-09 Reference	3	20	19	95			5		
SF-09 Reference	4	20	17	85			15		
SF-09 Reference	5	20	18	90	92.0	5.7	10	8.0	5.7
SV-23-A-Composite	1	20	19	95			5		
SV-23-A-Composite	2	20	18	90			10		
SV-23-A-Composite	3	20	20	100			0		
SV-23-A-Composite	4	20	20	100			0		
SV-23-A-Composite	5	20	19	95	96.0	4.2	5	4.0	4.2

10 Day SP Test Day 0 Overlying Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Leptocheirus plumulosus*

Calibration Standards Temperature: 19.3 **Date:** 12/29/2023 **Tech:** DM **Ammonia Meter:** 10 **Sulfide Meter** SPEC 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa^s*	*Unionized NH_3 (mg/L)*	*H_2S pK_a **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	
Control	0	Overlying	0.293	19.8	T17	3	10	1	3	29	7.7	24.1	297.25	9.26	0.008	6.53	0.263	
SF-09 Reference	0	Overlying	1.74	19.6	T17	ND	10	1	ND	29	7.7	23.9	297.05	9.26	0.044	6.53	ND	
SV-23-A-Composite	0	Overlying	2.15	19.6	T17	3	10	1	3	29	7.6	24.0	297.15	9.26	0.044	6.53	0.324	

10 Day SP Test Day 0 Porewater Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Leptocheirus plumulosus*

Calibration Standards Temperature: 19.3 **Date:** 12/29/2023 **Tech:** DM **Ammonia Meter:** 10 **Sulfide Meter:** SPEC 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Porewater salinity (ppt)*	*Porewater pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa^s*	*Unionized NH_3 (mg/L)*	*H_2S pK_a **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Record	Record	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	
Control	0	Porewater	3.39	20.3	T17/8	ND	10	1	ND	26	7.5	24.1	297.25	9.26	0.055	6.54	ND	
SF-09 Reference	0	Porewater	5.10	20.0	T17/8	ND	10	1	ND	28	7.1	23.9	297.05	9.26	0.033	6.54	ND	
SV-23-A-Composite	0	Porewater	9.85	19.9	T17/8	ND	10	1	ND	27	7.4	24.0	297.15	9.26	0.127	6.54	ND	

10 Day SP Test Day 10 Overlying Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Leptocheirus plumulosus*

Calibration Standards Temperature: 18.8 **Date:** 1/8/2024 **Tech:** LG **Ammonia Meter:** 10 **Sulfide Meter:** Spec 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pK_a **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	
Control	10	Overlying	0.00	19.4	T17	5	10	1	5	29	8.1	25.5	298.65	9.26	0.000	6.51	0.176	
SF-09 Reference	10	Overlying	0.00	19.4	T17	ND	10	1	ND	29	8.1	25.6	298.75	9.26	0.000	6.51	ND	
SV-23-A-Composite	10	Overlying	0.00	19.4	T17	12	10	1	12	28	8.0	25.6	298.75	9.26	0.000	6.51	0.527	

10 Day SP Test Day 10 Porewater Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Leptocheirus plumulosus*

Calibration Standards Temperature: 19.3 **Date:** 1/8/2024 **Tech:** MS/ TW **Ammonia Meter: 10** **Sulfide Meter:** Spec 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Porewater salinity (ppt)*	*Porewater pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pK_a**	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Record	Record	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	
Control	10	Porewater	0.816	19.2	M7/T17	15	10	1	15	29	7.3	25.5	298.65	9.26	0.009	6.51	2.805	
SF-09 Reference	10	Porewater	0.280	19.5	M7/T17	ND	10	1	ND	29	7.5	25.6	298.75	9.26	0.005	6.51	ND	
SV-23-A-Composite	10	Porewater	2.02	19.3	M7/T17	ND	10	1	ND	29	7.4	25.6	298.75	9.26	0.029	6.51	ND	

1.2 *Leptocheirus plumulosus* Test Statistical Results

CETIS Analytical Report

Report Date: 11 Jan-24 10:50 (p 1 of 6)
Test Code/ID: PG1617 Lp / 20-1983-4303

Leptocheirus 10-d Survival and Reburial Sediment Test

EcoAnalysts

Analysis ID:	20-9284-7332	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	E3FD11310575800DE7D33935048CA8E6	**Editor ID:**	009-542-444-2

Batch ID:	07-6263-6400	**Test Type:**	Survival (10d)	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 14:45	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-24 10:00	**Species:**	Leptocheirus plumulosus	**Brine:**	Not Applicable
Test Length:	9d 19h	**Taxon:**	Malacostraca	**Source:**	Aquatic Research Organis **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control	07-8855-9706	22 Dec-23	22 Dec-23	7d 15h	WSP	USCG Station Vallejo 20
SF-09 Reference	17-3314-9739	11 Dec-23 13:15	14 Dec-23 13:07	18d 2h (0.4 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control	Sediment Sample	WSP USCG Vallejo	P231222.02	
SF-09 Reference	Sediment Sample	WSP USCG Vallejo	P231214.11	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	SF-09 Reference failed 10d proportion survived endpoint	4.83%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Control Sed		Reference Sed*	8	2.094	1.86	0.1051	CDF	0.0348	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0350004	0.0350004	1	4.383	0.0696	Non-Significant Effect
Error	0.0638813	0.0079852	8			
Total	0.0988818		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	1.558	11.26	0.2473	Equal Variances
	Mod Levene Equality of Variance Test	0.5083	13.75	0.5026	Equal Variances
	Variance Ratio F Test	3.134	23.15	0.2944	Equal Variances
Distribution	Anderson-Darling A2 Test	0.5552	3.878	0.1556	Normal Distribution
	D'Agostino Skewness Test	0.7506	2.576	0.4529	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2075	0.3025	0.2776	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9169	0.7411	0.3320	Normal Distribution

10d Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	0.9800	0.9460	1.0000	1.0000	0.9500	1.0000	0.0123	2.79%	0.00%
SF-09 Reference	RS	5	0.9200	0.8492	0.9908	0.9000	0.8500	1.0000	0.0255	6.20%	6.12%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	1.4130	1.3360	1.4910	1.4590	1.3450	1.4590	0.0278	4.40%	0.00%
SF-09 Reference	RS	5	1.2950	1.1580	1.4320	1.2490	1.1730	1.4590	0.0492	8.50%	8.37%

10d Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.0000	0.9500	0.9500	1.0000	1.0000
SF-09 Reference	RS	1.0000	0.9000	0.9500	0.8500	0.9000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.4590	1.3450	1.3450	1.4590	1.4590
SF-09 Reference	RS	1.4590	1.2490	1.3450	1.1730	1.2490

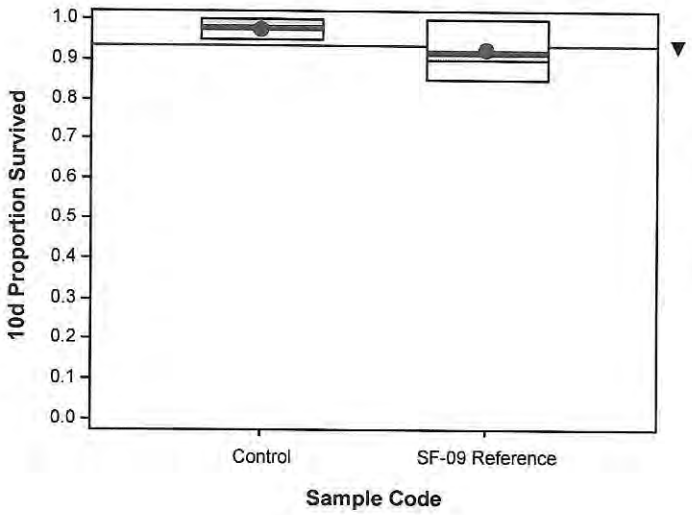
Leptocheirus 10-d Survival and Reburial Sediment Test — **EcoAnalysts**

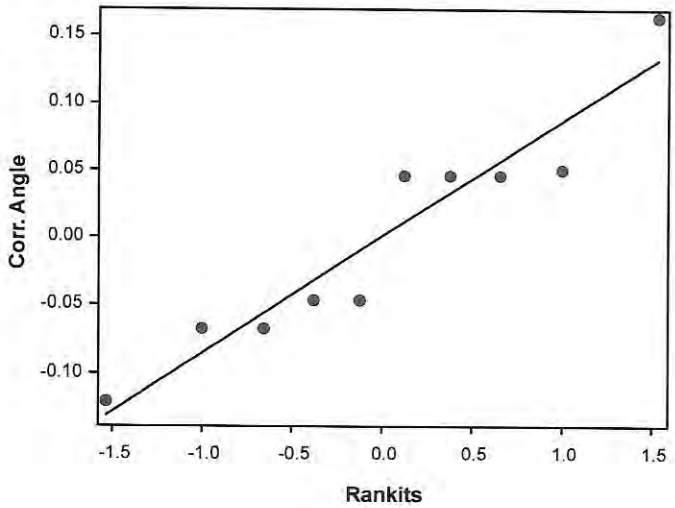
Analysis ID:	20-9284-7332	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	E3FD11310575800DE7D33935048CA8E6	**Editor ID:**	009-542-444-2

10d Proportion Survived Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	20/20	19/20	19/20	20/20	20/20
SF-09 Reference	RS	20/20	18/20	19/20	17/20	18/20

Graphics





Leptocheirus 10-d Survival and Reburial Sediment Test — EcoAnalysts

Analysis ID:	18-5068-7316	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:47	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	6530140DB323EBDDF4B606EF5F665E2B	**Editor ID:**	009-542-444-2

Batch ID:	07-6263-6400	**Test Type:**	Survival (10d)	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 14:45	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-24 10:00	**Species:**	Leptocheirus plumulosus	**Brine:**	Not Applicable
Test Length:	9d 19h	**Taxon:**	Malacostraca	**Source:**	Aquatic Research Organis **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
SF-09 Reference	17-3314-9739	11 Dec-23 13:15	14 Dec-23 13:07	18d 2h (0.4 °C)	WSP	USCG Station Vallejo 20
SV-23-A-Composi	16-7254-0307	12 Dec-23 08:45	14 Dec-23 13:07	17d 6h (0 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
SF-09 Reference	Sediment Sample	WSP USCG Vallejo	P231214.11	
SV-23-A-Composi	Sediment Sample	WSP USCG Vallejo	P231221.01	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	SV-23-A-Composi passed 10d proportion survived endpoi	7.27%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		SV-23-A-Composi	8	-1.207	1.86	0.1176	CDF	0.8691	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0145847	0.0145847	1	1.458	0.2617	Non-Significant Effect
Error	0.080027	0.0100034	8			
Total	0.0946117		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0.2599	11.26	0.6240	Equal Variances
	Mod Levene Equality of Variance Test	0.0822	13.75	0.7840	Equal Variances
	Variance Ratio F Test	1.533	23.15	0.6892	Equal Variances
Distribution	Anderson-Darling A2 Test	0.3797	3.878	0.4087	Normal Distribution
	D'Agostino Skewness Test	0.4911	2.576	0.6234	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2092	0.3025	0.2651	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9339	0.7411	0.4872	Normal Distribution

10d Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
SF-09 Reference	RS	5	0.9200	0.8492	0.9908	0.9000	0.8500	1.0000	0.0255	6.20%	0.00%
SV-23-A-Composi		5	0.9600	0.9081	1.0000	0.9500	0.9000	1.0000	0.0187	4.36%	-4.35%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
SF-09 Reference	RS	5	1.2950	1.1580	1.4320	1.2490	1.1730	1.4590	0.0492	8.50%	0.00%
SV-23-A-Composi		5	1.3710	1.2610	1.4820	1.3450	1.2490	1.4590	0.0398	6.48%	-5.90%

10d Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	1.0000	0.9000	0.9500	0.8500	0.9000
SV-23-A-Composi		0.9500	0.9000	1.0000	1.0000	0.9500

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	1.4590	1.2490	1.3450	1.1730	1.2490
SV-23-A-Composi		1.3450	1.2490	1.4590	1.4590	1.3450

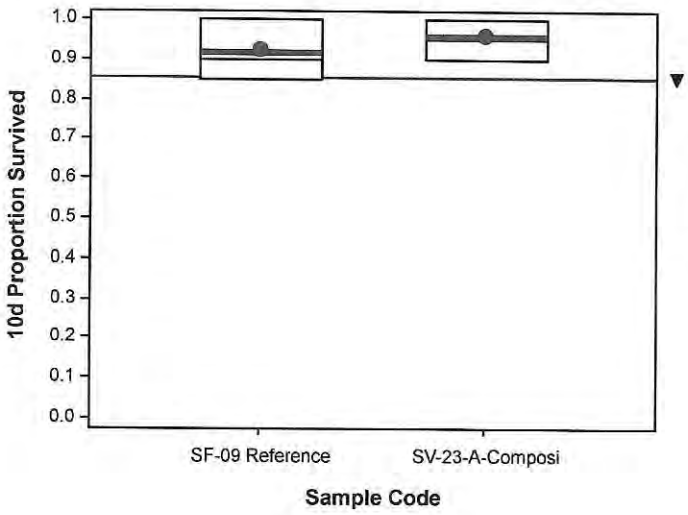
Leptocheirus 10-d Survival and Reburial Sediment Test — **EcoAnalysts**

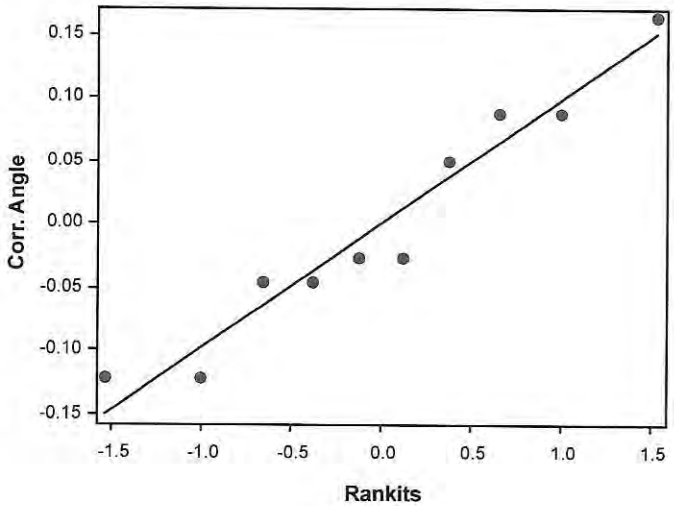
Analysis ID:	18-5068-7316	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:47	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	6530140DB323EBDDF4B606EF5F665E2B	**Editor ID:**	009-542-444-2

10d Proportion Survived Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	20/20	18/20	19/20	17/20	18/20
SV-23-A-Composi		19/20	18/20	20/20	20/20	19/20

Graphics





Leptocheirus 10-d Survival and Reburial Sediment Test — EcoAnalysts

Analysis ID:	04-7624-5639	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:49	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	81817D75F9CB854E71CA8CEFE02E9386	**Editor ID:**	009-542-444-2

Batch ID:	07-6263-6400	**Test Type:**	Survival (10d)	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 14:45	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-24 10:00	**Species:**	Leptocheirus plumulosus	**Brine:**	Not Applicable
Test Length:	9d 19h	**Taxon:**	Malacostraca	**Source:**	Aquatic Research Organis **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control	07-8855-9706	22 Dec-23	22 Dec-23	7d 15h	WSP	USCG Station Vallejo 20
SV-23-A-Composi	16-7254-0307	12 Dec-23 08:45	14 Dec-23 13:07	17d 6h (0 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control	Sediment Sample	WSP USCG Vallejo	P231222.02	
SV-23-A-Composi	Sediment Sample	WSP USCG Vallejo	P231221.01	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	SV-23-A-Composi passed 10d proportion survived endpoi	4.09%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Control Sed		SV-23-A-Composi	8	0.8648	1.86	0.09019	CDF	0.2062	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004398	0.004398	1	0.7478	0.4124	Non-Significant Effect
Error	0.0470499	0.0058812	8			
Total	0.0514479		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0.6072	11.26	0.4583	Equal Variances
	Mod Levene Equality of Variance Test	0.3189	13.75	0.5927	Equal Variances
	Variance Ratio F Test	2.045	23.15	0.5055	Equal Variances
Distribution	Anderson-Darling A2 Test	0.4702	3.878	0.2509	Normal Distribution
	D'Agostino Skewness Test	0.4906	2.576	0.6237	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2349	0.3025	0.1254	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9144	0.7411	0.3126	Normal Distribution

10d Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	0.9800	0.9460	1.0000	1.0000	0.9500	1.0000	0.0123	2.79%	0.00%
SV-23-A-Composi		5	0.9600	0.9081	1.0000	0.9500	0.9000	1.0000	0.0187	4.36%	2.04%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	1.4130	1.3360	1.4910	1.4590	1.3450	1.4590	0.0278	4.40%	0.00%
SV-23-A-Composi		5	1.3710	1.2610	1.4820	1.3450	1.2490	1.4590	0.0398	6.48%	2.97%

10d Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.0000	0.9500	0.9500	1.0000	1.0000
SV-23-A-Composi		0.9500	0.9000	1.0000	1.0000	0.9500

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.4590	1.3450	1.3450	1.4590	1.4590
SV-23-A-Composi		1.3450	1.2490	1.4590	1.4590	1.3450

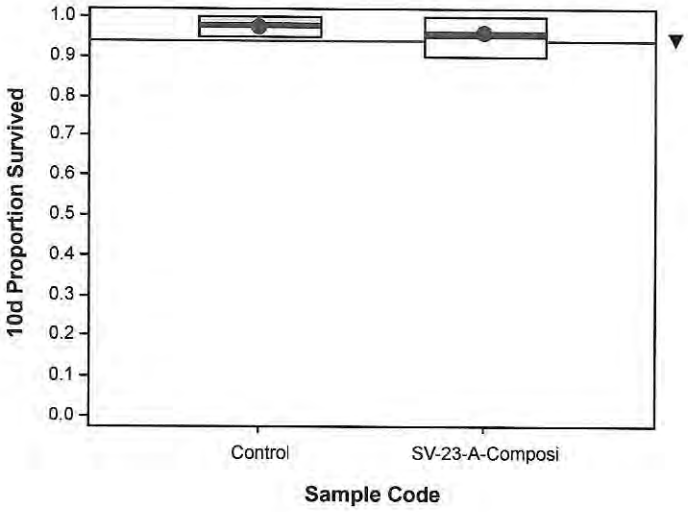
Leptocheirus 10-d Survival and Reburial Sediment Test — **EcoAnalysts**

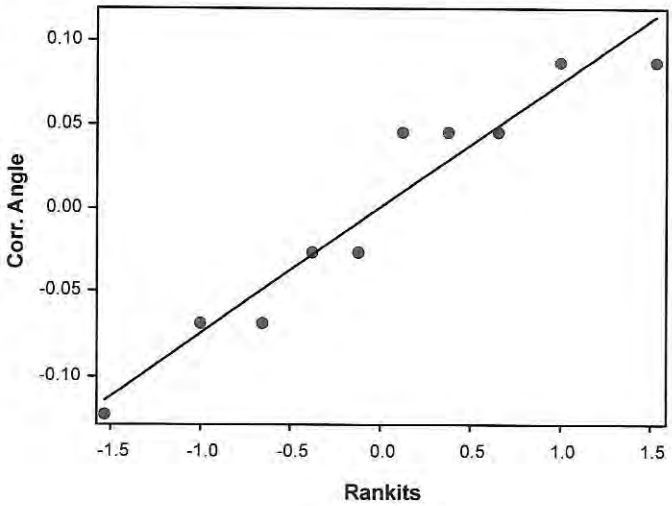
Analysis ID:	04-7624-5639	**Endpoint:**	10d Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 10:49	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 10:44	**MD5 Hash:**	81817D75F9CB854E71CA8CEFE02E9386	**Editor ID:**	009-542-444-2

10d Proportion Survived Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	20/20	19/20	19/20	20/20	20/20
SV-23-A-Composi		19/20	18/20	20/20	20/20	19/20

Graphics





CETIS Test Data Worksheet

Report Date: 11 Jan-24 10:45 (p 1 of 1)
Test Code/ID: PG1617 Lp / 20-1983-4303

Leptocheirus 10-d Survival and Reburial Sediment Test — **EcoAnalysts**

Start Date: 29 Dec-23 14:45
End Date: 08 Jan-24 10:00
Sample Date: 12 Dec-23 08:45

Species: Leptocheirus plumulosus
Protocol: EPA-823-B-98-004 (1998)
Material: Sediment Sample

Sample Code: SV-23-A-Composi
Sample Source: WSP USCG Vallejo
Sample Station: P231221.01

Sample	Rep	Pos	# Exposed	1d Survival	2d Survival	3d Survival	4d Survival	5d Survival	6d Survival	7d Survival	8d Survival	9d Survival	10d Survival	Notes
Control	1	15	20										20	
Control	2	7	20										19	
Control	3	13	20										19	
Control	4	14	20										20	
Control	5	8	20										20	
SF-09 Reference	1	6	20										20	
SF-09 Reference	2	10	20										18	
SF-09 Reference	3	5	20										19	
SF-09 Reference	4	2	20										17	
SF-09 Reference	5	4	20										18	
SV-23-A-Composi	1	1	20										19	
SV-23-A-Composi	2	12	20										18	
SV-23-A-Composi	3	9	20										20	
SV-23-A-Composi	4	11	20										20	
SV-23-A-Composi	5	3	20										19	

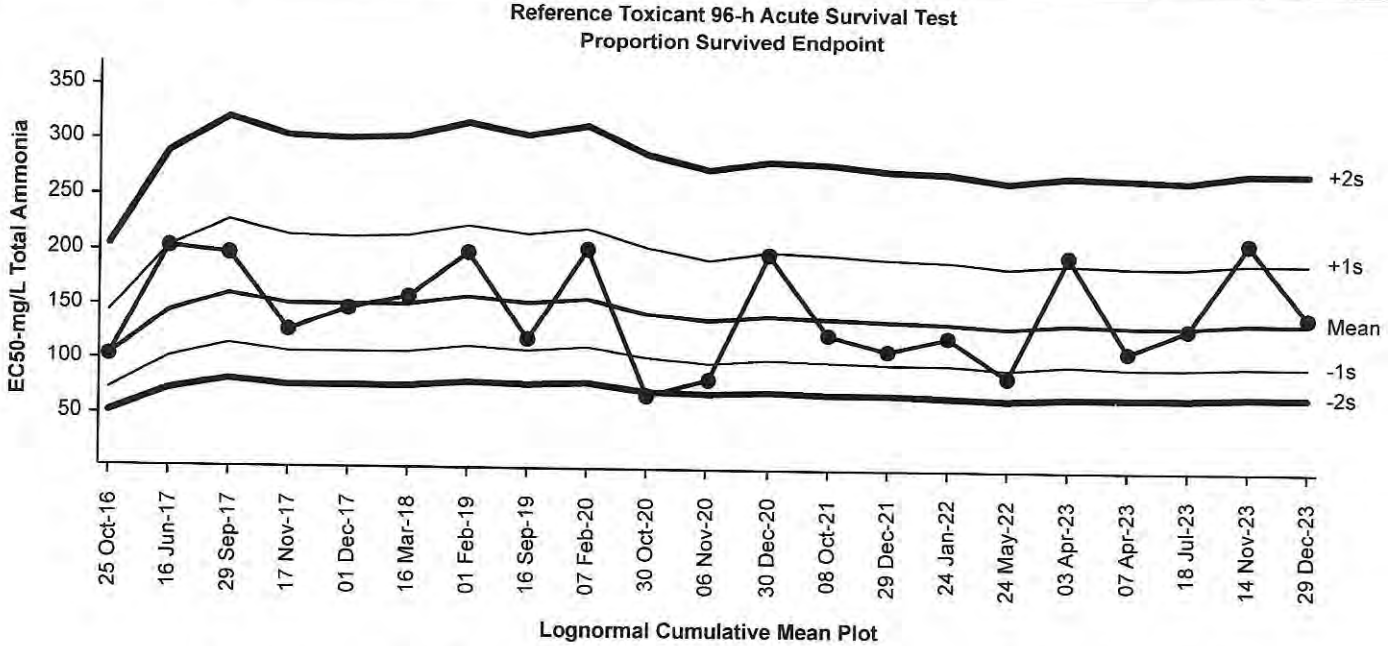
1.3 *Leptocheirus plumulosus* Reference Toxicant Test Results

CETIS QC Plot

Report Date: 03 Jan-24 08:34 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival
Protocol: All Protocols
Organism: Leptocheirus plumulosus
Endpoint: Proportion Survived
Material: Total Ammonia
Source: Reference Toxicant-REF



Mean:	137.8	**Count:**	20	**-1s Warning Limit:**	97.6	**-2s Action Limit:**	69.1
Sigma:	NA	**CV:**	35.60%	**+1s Warning Limit:**	195	**+2s Action Limit:**	275

Quality Control Data

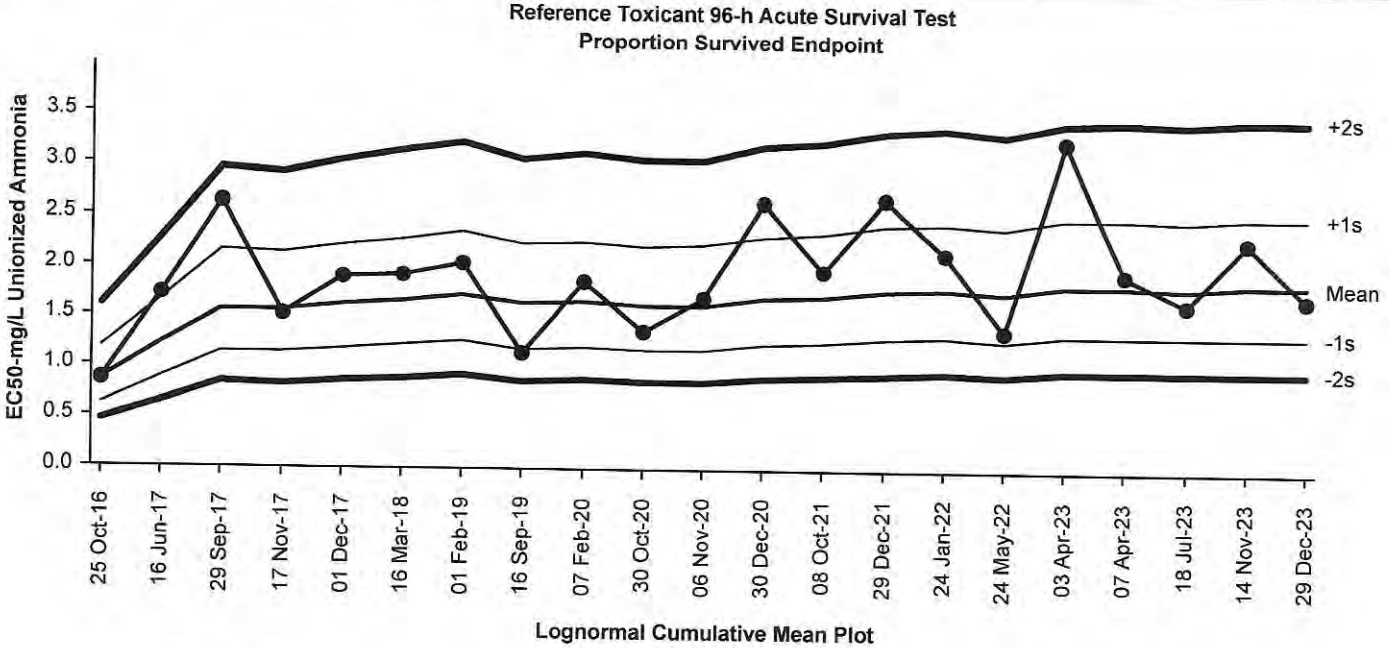
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Oct	25	15:45	102.4	-35.41	-0.8601			02-8318-6911	18-4112-2235	ENVIRON
2	2017	Jun	16	16:03	202.6	64.77	1.116	(+)		00-5023-5254	20-2544-5405	EcoAnalysts
3		Sep	29	15:30	198.3	60.48	1.054	(+)		13-4014-1574	11-7220-7663	EcoAnalysts
4		Nov	17	14:30	128	-9.809	-0.2139			07-0278-0985	00-0990-3170	EcoAnalysts
5		Dec	1	14:50	147.7	9.865	0.2003			19-2167-0970	16-4579-0932	EcoAnalysts
6	2018	Mar	16	11:30	158.9	21.02	0.4113			16-0683-6878	15-3126-9652	EcoAnalysts
7	2019	Feb	1	15:00	199.1	61.22	1.065	(+)		11-7650-5353	13-6648-4674	EcoAnalysts
8		Sep	16	14:55	119.4	-18.38	-0.4147			01-2726-0700	18-9209-4901	EcoAnalysts
9	2020	Feb	7	10:05	202.5	64.68	1.115	(+)		14-5346-3979	08-7217-8019	EcoAnalysts
10		Oct	30	12:34	67.7	-70.12	-2.059	(-)	(-)	12-3711-9056	12-0163-9710	EcoAnalysts
11		Nov	6	14:40	83.07	-54.76	-1.467	(-)		05-0024-0198	13-0531-3306	EcoAnalysts
12		Dec	30	13:57	199.2	61.35	1.067	(+)		07-4405-4986	14-9310-0859	EcoAnalysts
13	2021	Oct	8	15:05	126.2	-11.58	-0.2542			05-2805-7708	16-7978-5454	EcoAnalysts
14		Dec	29	11:15	111	-26.87	-0.6282			11-3222-7586	21-1281-0215	EcoAnalysts
15	2022	Jan	24	14:43	123.6	-14.26	-0.3165			18-9421-3118	21-3760-6180	EcoAnalysts
16		May	24	14:10	86.26	-51.57	-1.358	(-)		11-1057-6078	17-3088-1574	EcoAnalysts
17	2023	Apr	3	14:20	199.3	61.48	1.068	(+)		10-5257-3473	09-4253-7394	EcoAnalysts
18			7	15:30	109.6	-28.21	-0.6635			05-0807-6495	08-7219-7140	EcoAnalysts
19		Jul	18	16:25	132.4	-5.429	-0.1164			17-4715-4605	05-3932-4133	EcoAnalysts
20		Nov	14	17:32	212.5	74.64	1.254	(+)		05-8480-6710	14-9046-9684	EcoAnalysts
21		Dec	29	15:15	143.1	5.282	0.1089			02-4705-2515	15-3583-4249	EcoAnalysts

CETIS QC Plot

Report Date: 03 Jan-24 08:34 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival
Protocol: All Protocols
Organism: Leptocheirus plumulosus
Endpoint: Proportion Survived
Material: Unionized Ammonia
Source: Reference Toxicant-REF



Mean:	1.851	**Count:**	20	**-1s Warning Limit:**	1.35	**-2s Action Limit:**	0.984
Sigma:	NA	**CV:**	32.40%	**+1s Warning Limit:**	2.54	**+2s Action Limit:**	3.48

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Oct	25	15:45	0.8546	-0.9965	-2.447	(-)	(-)	18-6848-6631	04-2373-3096	ENVIRON
2	2017	Jun	16	16:03	1.719	-0.1326	-0.2353			04-5648-3020	10-2353-8275	EcoAnalysts
3		Sep	29	15:30	2.637	0.7858	1.12	(+)		15-5089-4345	09-9312-2868	EcoAnalysts
4		Nov	17	14:30	1.521	-0.3298	-0.6212			06-2404-4690	01-3191-2615	EcoAnalysts
5		Dec	1	14:50	1.901	0.05022	0.08474			17-7762-6557	08-1207-1028	EcoAnalysts
6	2018	Mar	16	11:30	1.928	0.07696	0.129			16-8201-9532	13-0649-3547	EcoAnalysts
7	2019	Feb	1	15:00	2.043	0.1914	0.3115			06-8535-3473	18-7290-7964	EcoAnalysts
8		Sep	16	14:55	1.137	-0.7144	-1.544	(-)		16-9894-1469	05-8231-7455	EcoAnalysts
9	2020	Feb	7	10:05	1.862	0.01119	0.01907			00-9189-5120	21-1174-9453	EcoAnalysts
10		Oct	30	12:34	1.356	-0.4956	-0.9864			12-7273-4562	14-5594-4554	EcoAnalysts
11		Nov	6	14:40	1.711	-0.1403	-0.2495			17-6773-6511	17-4952-2497	EcoAnalysts
12		Dec	30	13:57	2.662	0.8107	1.15	(+)		15-8553-9948	10-2101-2609	EcoAnalysts
13	2021	Oct	8	15:05	1.981	0.1303	0.2154			11-2335-3025	08-6847-6642	EcoAnalysts
14		Dec	29	11:15	2.7	0.8488	1.195	(+)		01-0096-3103	14-9096-9780	EcoAnalysts
15	2022	Jan	24	14:43	2.169	0.3177	0.5014			15-1693-6295	03-6730-4653	EcoAnalysts
16		May	24	14:10	1.374	-0.477	-0.9432			10-9772-9806	16-2905-2175	EcoAnalysts
17	2023	Apr	3	14:20	3.263	1.411	1.794	(+)		21-1068-5837	03-2605-1035	EcoAnalysts
18			7	15:30	1.965	0.1136	0.1886			12-6741-3316	11-2641-3584	EcoAnalysts
19		Jul	18	16:25	1.653	-0.198	-0.3581			14-3631-9557	16-0003-2792	EcoAnalysts
20		Nov	14	17:32	2.294	0.4424	0.6783			17-1053-8060	10-4206-1984	EcoAnalysts
21		Dec	29	15:15	1.721	-0.1303	-0.231			08-9563-0637	02-6773-0508	EcoAnalysts

CETIS Summary Report

Report Date: 03 Jan-24 08:33 (p 1 of 1)
Test Code/ID: P220819.112 / 02-4705-2515

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Batch ID:	01-2369-8044	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 15:15	**Protocol:**	PSEP (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	02 Jan-24 13:20	**Species:**	Leptocheirus plumulosus	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Malacostraca	**Source:**	Aquatic Research Organis **Age:**

Sample ID:	09-8178-8270	**Code:**	P220819.112	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.112
Sample Age:	497d 15h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
05-2921-1386	Proportion Survived	Fisher Exact Test		70.9	130	96.01	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
15-3583-4249	Proportion Survived	Linear Interpolation (ICPIN)		EC15	76.97	52.04	100.1	1
				EC20	84.05	64.9	116.7	
				EC25	91.78	69.99	148.4	
				EC40	119.4	82.92	190.5	
				EC50	143.1	91.33	215.4	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
22.8		3	0.9000	0.6516	1.1480	0.8000	1.0000	0.0577	0.1000	11.11%	6.90%
42.4		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-3.45%
70.9		3	0.8667	0.7232	1.0100	0.8000	0.9000	0.0333	0.0577	6.66%	10.34%
130		3	0.5333	0.1539	0.9128	0.4000	0.7000	0.0882	0.1528	28.64%	44.83%
339		3	0.0333	-0.1101	0.1768	0.0000	0.1000	0.0333	0.0577	173.21%	96.55%

Proportion Survived Detail

MD5: 5B12B490639C0B5C2A9951AE4FA0F2B6

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
22.8		1.0000	0.9000	0.8000
42.4		1.0000	1.0000	1.0000
70.9		0.9000	0.9000	0.8000
130		0.4000	0.7000	0.5000
339		0.0000	0.0000	0.1000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
22.8		10/10	9/10	8/10
42.4		10/10	10/10	10/10
70.9		9/10	9/10	8/10
130		4/10	7/10	5/10
339		0/10	0/10	1/10

CETIS Test Data Worksheet

Report Date: 03 Jan-24 08:33 (p 1 of 1)
Test Code/ID: P220819.112 / 02-4705-2515

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Start Date:	29 Dec-23 15:15	**Species:**	Leptocheirus plumulosus	**Sample Code:**	P220819.112
End Date:	02 Jan-24 13:20	**Protocol:**	PSEP (1995)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.112

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	5	10	9	
0	D	2	10	10	10	
0	D	3	3	10	10	
22.8		1	17	10	10	
22.8		2	6	10	9	
22.8		3	13	10	8	
42.4		1	15	10	10	
42.4		2	12	10	10	
42.4		3	16	10	10	
70.9		1	9	10	9	
70.9		2	2	10	9	
70.9		3	18	10	8	
130		1	1	10	4	
130		2	11	10	7	
130		3	14	10	5	
339		1	8	10	0	
339		2	7	10	0	
339		3	4	10	1	

CETIS Summary Report

Report Date: 03 Jan-24 08:34 (p 1 of 1)
Test Code/ID: P220819.112 UIA / 08-9563-0637

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID:	01-2369-8044	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 15:15	**Protocol:**	PSEP (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	02 Jan-24 13:20	**Species:**	Leptocheirus plumulosus	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Malacostraca	**Source:**	Aquatic Research Organis **Age:**

Sample ID:	14-5765-3653	**Code:**	P220819.112 UIA	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.112 UIA
Sample Age:	497d 15h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	PMSD	S
04-0782-6559	Proportion Survived	Fisher Exact Test	1.115	1.63	1.348	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	S
02-6773-0508	Proportion Survived	Linear Interpolation (ICPIN)	EC15	1.178	0.8278	1.339	1
			EC20	1.248	1.044	1.492	
			EC25	1.32	1.115	1.637	
			EC40	1.551	1.24	1.939	
			EC50	1.721	1.315	2.05	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
0.361		3	0.9000	0.6516	1.1480	0.8000	1.0000	0.0577	0.1000	11.11%	6.90%
0.677		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-3.45%
1.115		3	0.8667	0.7232	1.0100	0.8000	0.9000	0.0333	0.0577	6.66%	10.34%
1.63		3	0.5333	0.1539	0.9128	0.4000	0.7000	0.0882	0.1528	28.64%	44.83%
2.694		3	0.0333	-0.1101	0.1768	0.0000	0.1000	0.0333	0.0577	173.21%	96.55%

Proportion Survived Detail

MD5: ED025FE551C2A67D8696263A02E43382

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
0.361		1.0000	0.9000	0.8000
0.677		1.0000	1.0000	1.0000
1.115		0.9000	0.9000	0.8000
1.63		0.4000	0.7000	0.5000
2.694		0.0000	0.0000	0.1000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
0.361		10/10	9/10	8/10
0.677		10/10	10/10	10/10
1.115		9/10	9/10	8/10
1.63		4/10	7/10	5/10
2.694		0/10	0/10	1/10

CETIS Test Data Worksheet

Report Date: 03 Jan-24 08:33 (p 1 of 1)
Test Code/ID: P220819.112 UIA / 08-9563-0637

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Start Date:	29 Dec-23 15:15	**Species:**	Leptocheirus plumulosus	**Sample Code:**	P220819.112 UIA
End Date:	02 Jan-24 13:20	**Protocol:**	PSEP (1995)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Sample Station:**	P220819.112 UIA

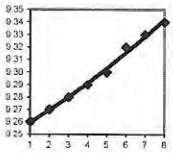
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	5	10	9	
0	D	2	17	10	10	
0	D	3	4	10	10	
0.361		1	10	10	10	
0.361		2	15	10	9	
0.361		3	1	10	8	
0.677		1	7	10	10	
0.677		2	11	10	10	
0.677		3	16	10	10	
1.115		1	14	10	9	
1.115		2	6	10	9	
1.115		3	13	10	8	
1.63		1	3	10	4	
1.63		2	12	10	7	
1.63		3	8	10	5	
2.694		1	18	10	0	
2.694		2	9	10	0	
2.694		3	2	10	1	

Un-ionized Ammonia Calculator

CLIENT:	Internal	Date of Test:	December 29, 2023
PROJECT:	Internal	Test Type:	*Leptocheirus RT*
COMMENTS:	P220819.112		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Ionic strength	pKa^s
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



$y = 0.0003x^2 + 0.0091x + 9.2502$

...

	Sample	Mod	*NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	*temp (K)*	*pKa^s*		NH_3U (mg/L)
	Target / Sample Name		Actual	Actual	Actual	Actual	Calculated	Calculated		**Calculated**
	Example 3.5		2.000	10.0	7.5	5.0	278.15	9.2520		**0.008**
1										
2	18		22.8	29	7.5	23.7	296.85	9.2557		**0.361**
3	36		42.4	29	7.5	23.8	296.95	9.2557		**0.677**
4	72		70.9	29	7.5	23.6	296.75	9.2557		**1.115**
5	144		130	29	7.4	23.6	296.75	9.2557		**1.630**
6	288		339	29	7.2	23.6	296.75	9.2557		**2.694**
7										
8										
9										
10										
11										
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ECO ANALYSTS

Ammonia Reference Toxicant Test Water Quality Data Sheet

CLIENT	PROJECT		Laboratory	PROTOCOL
Various	Various	*Leptocheirus plumulosus*	Port Gamble .	Various

TEST ID	LOT #:	TEST START DATE	TIME / INITIALS	4-DAY END DATE	TIME
P220829.112	22G3156086	29Dec23	1515 MK	02Jan24	1320

CHAMBER SIZE/TYPE	EXPOSURE VOLUME
Glass pint jar	250 mL

WATER QUALITY DATA

TEST CONDITIONS					DO (mg/L) ≥ 6.3		TEMP(C) 25 ± 2		SAL (ppt) 28 ± 2		pH 7.8 ± 0.5		TECHNICIAN	AMMONIA					
SAMPLE ID	CONCENTRATION value	CONCENTRATION units	DAY	REP	D.O. meter	D.O. mg/L	TEMP. meter	TEMP. °C	SALINITY meter	SALINITY ppt	pH meter	pH unit	WQ TECH/ DATE	AMMONIA METER	AMMONIA mg/L	Tech			
Ref.Tox.-ammonia	0	mg/L	0	Stock	7	7.8	7	23.5	7	29	7	7.4	MK 12/29	10	0.0	MK			
			4	1	8	6.9	8	23.2	8	29	8	7.9	~~CS 1/2~~ ① CS 1/2						
Ref.Tox.-ammonia	18	mg/L	0	Stock	7	7.8	7	23.7	7	29	7	7.5	MK 12/29	10	22.8	MK			
			4	1	8	7.0	8	23.4	8	29	8	7.8	CS 1/2						
Ref.Tox.-ammonia	36	mg/L	0	Stock	7	7.8	7	23.8	7	29	7	7.5	MK 12/29	10	42.4	MK			
			4	1	8	7.2	8	23.5	8	30	8	7.8	CS 1/2						
Ref.Tox.-ammonia	72	mg/L	0	Stock	7	7.7	7	23.6	7	29	7	7.5	MK 12/29	10	70.9	MK			
			4	1	8	7.0	8	22.7	8	30	8	7.8	CS 1/2						
Ref.Tox.-ammonia	144	mg/L	0	Stock	7	7.7	7	23.6	7	29	7	7.4	MK 12/29	10	130	MK			
			4	1	8	6.9	8	23.4	8	29	8	7.7	CS 1/2						
Ref.Tox.-ammonia	288	mg/L	0	Stock	7	7.6	7	23.6	7	29	7	7.2	MK 12/29	10	339	MK			
			4	1	8	7.0	8	23.4	8	30	8	7.6	CS 1/2						

① -1E CS 1/2/24

Ammonia Reference Toxicant Test Water Quality Data Sheet

EcoAnalysts

P22 0819.112

CLIENT	PROJECT	SPECIES		
Variavs	Variavs	Leptocheirus plumulosus		
		PROJECT MANAGER	LABORATORY	PROTOCOL
		M. Knowlen	Port Gamble .	Various

SURVIVAL & BEHAVIOR DATA

OBSERVATION KEY
N = Normal
LOE = Loss of equilibium
Q = Quinscent
DC = Discoloration
NB = No body
F = Floating on surface

INITIAL # OF ORGANISMS: 10

SAMPLE ID	CONC. value	CONC. units	REP	INITIAL NUMBER	DAY 1 #ALIVE	DAY 1 #DEAD	DAY 1 OBS	DAY 2 #ALIVE	DAY 2 #DEAD	DAY 2 OBS	DAY 3 #ALIVE	DAY 3 #DEAD	DAY 3 OBS	DAY 4 #ALIVE	DAY 4 #DEAD	DAY 4 OBS
					DATE 12/30/23			DATE 12/31/23			DATE 1/1/24			DATE 1/2/24		
					TECHNICIAN TT			TECHNICIAN LG			TECHNICIAN TT			TECHNICIAN TW		
Ref.Tox.- Ammonia	0	mg/L	1	10	10	0	N	10	0	N	10	0	N	9	0	1NB
			2	10	10	0	N	10	0	N	10	0	N	10	0	N
			3	10	10	0	N	10	0	N	10	0	N	10	0	N
Ref.Tox.- Ammonia	18	mg/L	1	10	10	0	N	10	0	N	9(1) 10	0(1) 0	N	10	0	N
			2	10	10	0	N	9	1NB	N	9	0	N	9	0	N
			3	10	10	0	N	9	1NB	N	9	0	N	8	0	1NB
Ref.Tox.- Ammonia	36	mg/L	1	10	10	0	N	10	0	N	10	0	N	10	0	N
			2	10	10	0	N	10	0	N	10	0	N	10	0	N
			3	10	10	0	N	10	0	N	10	0	N	10	0	N
Ref.Tox.- Ammonia	72	mg/L	1	10	9	1	N	9	0	N	9	0	N	9	0	N
			2	10	10	0	N	10	0	N	10	0	N	9	1	N
			3	10	10	0	N	10	0	N	10	0	N	8	0	2NB 1F
Ref.Tox.- Ammonia	144	mg/L	1	10	10	0	N	10	0	Q	9	1	Q	4	5	Q
			2	10	10	0	N	10	0	Q	10	0	Q	7	3	Q
			3	10	9	1	N	9	0	Q	8(2)	2(2)	Q	5	3	1F Q
Ref.Tox.- Ammonia	288	mg/L	1	10	9	1	Q	4	5	Q	0	4	—			
			2	10	8	2	Q	1	7	Q	0	1	—			
			3	10	9	1	Q	4	5	Q	1	3	Q	(3) ~~4~~	~~0~~	~~Q~~

(1) IE - TT 1/1/24
(2) Confirmed org. count w/ DM - TT 1/1/24
(3) S.M. TT 1/1/24

Reference Toxicant ID: P220829.112
Date Prepared: 12/29/23
Technician Initials: SIR

Lepto NH_3 RT

Assumptions in Model
Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: 12/27/2023
Measurement: 9600

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	**Desired Concentration**	**Volume**		
mg/L	mg/L	mL	mL stock to increase	
				SALT WATER
319	**288**	750		**33.750**
130	**144**	750		**16.875**
70.9	**72**	750		**8.438**
42.4	**36**	750		**4.219**
22.8	**18**	750		**2.109**
	0	750		**0.000**

2. *Neanthes arenaceodentata* 10-day Solid-Phase Test

2.1 *Neanthes arenaceodentata* Test Data

Version T.6

GENERAL

Client	WSP
Project	USCG Station Vallejo
Project Number	PG1617
Project Manager	M. Knowlen
Date Oldest Sample Collected	12/11/2023
Sample Holding Time	18
Test Start Date	12/29/2023
Test Species	*Neanthes arenaceodentata*
Organism Supplier	ATS
Organism Acquired	12/29/2023
Organism Acclimation	0
Organism Age	25d post-emergence
Test Type/Duration	10d Static, non-renewal
Test Protocol	ITM
Regional Protocol	San Francisco USEPA
Laboratory Location	Port Gamble
Test Location	Bath 9
Sample Treatment	none
Control Sediment Source	Yaquina Bay, OR
Water Batch	FSW122823.01
Test Lighting	12hr light / 12hr dark
Test Chamber	1 L mason jars
Replicates Per Treatment	5
Organisms per Replicate	10
Exposure Volume	2 cm sediment/ 775 mL water
Feeding Information	None
Test Dissolved Oxygen	> 4.6
Test Temperature	20 ± 1
Test Salinity	28 ± 2
Test pH	8 ± 1
Water Renewal Info	None

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	**Max**
DO:	4.6	
Temp:	18.5	21.4
Sal:	26	30
pH:	7	9

TEST START TIME/INITIALS:	**1110 MK**
TEST END TIME:	**13:40 MS**

	CLIENT SAMPLE ID	LAB ID
1	**Control**	**P231025.04**
2	**SF-09 Reference**	**P231214.11**
3	**SV-23-A-Composite**	**P231221.01**
4	.	.
5	.	.
6	.	.
7	.	.
8	.	.
9	.	.
10	.	.
11	.	.
12	.	.
13	.	.
14	.	.
15	.	.
16	.	.
17	.	.
18	.	.
19	.	.
20	.	.

10 DAY SP WQ DATA SHEET

CLIENT	PROJECT	SPECIES	LOCATION	PROTOCOL
WSP	USCG Station Vallejo	*Neanthes arenaceodentata*	Port Gamble / Bath 9	ITM , San Francisco USEPA
PROJECT NUMBER	**TEST TYPE/DURATION**	**WATER DESCRIPTION**	**TEST START DATE**	**TEST END DATE**
PG1617	10d Static, non-renewal	FSW122823.01	December 29, 2023	January 8, 2024

WATER QUALITY DATA

SAMPLE ID	DAY	REP	JAR #	TECHNICIAN	Date	Meter	DO (mg/L) > 4.6	TEMP (°C) 19 - 21	SALINITY (ppt) 26 - 30	pH 7 - 9	Notes
Control	0	Surr	14	MK	12/29/23	7	7.6	19.3	30	8.0	
Control	1	Surr	14	SR	12/30/23	7	7.6	19.3	30	8.0	
Control	2	Surr	14	TT	12/31/23	7	7.6	19.1	30	8.0	
Control	3	Surr	14	TT	01/01/24	7	7.7	19.0	30	8.1	
Control	4	Surr	14	TW	01/02/24	8	7.6	19.3	30	8.0	
Control	5	Surr	14	SR	01/03/24	8	7.4	19.5	31	8.0	
Control	6	Surr	14	SR	01/04/24	7	7.5	19.1	28	8.0	
Control	7	Surr	14	NL	01/05/24	8	7.3	19.6	31	8.0	Salinity out of range. Management notified. No action taken.-NL 1/6/24
Control	8	Surr	14	SR	01/06/24	7	7.5	19.2	30	8.0	
Control	9	Surr	14	NL	01/07/24	7	7.6	19.0	30	8.0	
Control	10	Surr	14	TW	01/08/24	7	7.6	19.0	30	8.0	
SF-09 Reference	0	Surr	1	MK	12/29/23	7	7.6	19.5	29	7.9	
SF-09 Reference	1	Surr	1	SR	12/30/23	7	7.5	19.2	29	7.8	
SF-09 Reference	2	Surr	1	TT	12/31/23	7	7.3	19.1	29	7.7	
SF-09 Reference	3	Surr	1	TT	01/01/24	7	7.5	19.0	28	7.8	
SF-09 Reference	4	Surr	1	TW	01/02/24	8	7.4	19.5	29	7.8	
SF-09 Reference	5	Surr	1	SR	01/03/24	8	7.2	19.6	29	7.7	
SF-09 Reference	6	Surr	1	SR	01/04/24	7	7.4	19.1	29	7.8	
SF-09 Reference	7	Surr	1	NL	01/05/24	8	7.6	19.8	29	7.9	
SF-09 Reference	8	Surr	1	SR	01/06/24	7	7.4	19.3	29	7.9	
SF-09 Reference	9	Surr	1	NL	01/07/24	7	7.5	19.2	29	8.0	
SF-09 Reference	10	Surr	1	TW	01/08/24	7	7.6	19.1	29	8.0	

10 DAY SP WQ DATA SHEET

CLIENT	PROJECT	SPECIES	LOCATION	PROTOCOL
WSP	USCG Station Vallejo	*Neanthes arenaceodentata*	Port Gamble / Bath 9	ITM , San Francisco USEPA
PROJECT NUMBER	**TEST TYPE/DURATION**	**WATER DESCRIPTION**	**TEST START DATE**	**TEST END DATE**
PG1617	10d Static, non-renewal	FSW122823.01	December 29, 2023	January 8, 2024

WATER QUALITY DATA

SAMPLE ID	DAY	REP	JAR #	TECHNICIAN	Date	Meter	DO (mg/L) > 4.6	TEMP (°C) 19 - 21	SALINITY (ppt) 26 - 30	pH 7 - 9	Notes
SV-23-A-Composite	0	Surr	11	MK	12/29/23	7	7.5	19.1	29	7.9	
SV-23-A-Composite	1	Surr	11	SR	12/30/23	7	7.4	19.2	29	8.0	
SV-23-A-Composite	2	Surr	11	TT	12/31/23	7	7.5	19.1	29	8.0	
SV-23-A-Composite	3	Surr	11	TT	01/01/24	7	7.7	19.0	28	8.1	
SV-23-A-Composite	4	Surr	11	TW	01/02/24	8	7.5	19.4	28	8.0	
SV-23-A-Composite	5	Surr	11	SR	01/03/24	8	7.4	19.5	29	8.0	
SV-23-A-Composite	6	Surr	11	SR	01/04/24	7	7.7	19.1	30	8.0	
SV-23-A-Composite	7	Surr	11	NL	01/05/24	8	7.4	19.6	29	7.9	
SV-23-A-Composite	8	Surr	11	SR	01/06/24	7	7.5	19.2	28	7.9	
SV-23-A-Composite	9	Surr	11	NL	01/07/24	7	7.5	19.1	28	8.0	
SV-23-A-Composite	10	Surr	11	TW	01/08/24	7	7.5	19.0	28	8.0	

10-DAY SP TEST OBSERVATION DATA SHEET

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 9	ITM	*Neanthes arenaceodentata*

Observation Key
#FOS = Num Floating on Water Surface
#E = Num Emerged from Sediment
#M = Number of Mortalities or Molts
L = Anoxic Surface
G = Growth
D = No Air Flow (Measure DO)
N = Normal
TC = Too Cloudy to Observe

ENDPOINT DATA & OBSERVATIONS

				Technician	SR	TT	TT	TW	SR	SR	NL	SR	NL	MK	
				Date	12/30/23	12/31/23	01/01/24	01/02/24	01/03/24	01/04/24	01/05/24	01/06/24	01/07/24	01/08/24	
CLIENT ID	REP	Jar #	Initial #	Day	1	2	3	4	5	6	7	8	9	10	Comments
Control	1	7	10		N	N	N	N	N	N	N	N	N	N	
Control	2	18	11		N	N	N	N	N	N	N	N	N	N	
Control	3	9	10		N	N	N	N	N	N	N	N	N	N	
Control	4	12	10		N	N	G	N	N	N	N	N	N	N	
Control	5	8	10		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	1	6	10		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	2	10	10		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	3	17	10		N	N	N	N	N	N	N	N	N	N	
SF-09 Reference	4	15	10		N	N	G	N	N	N	N	N	N	N	
SF-09 Reference	5	16	10		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	1	3	10		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	2	4	10		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	3	13	10		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	4	5	10		N	N	N	N	N	N	N	N	N	N	
SV-23-A-Composite	5	2	10		N	N	N	N	N	N	N	N	N	N	

EcoAnalysts, Inc.

10 Day SP Survival Summary

CLIENT	PROJECT	PROJECT NUMBER
WSP	USCG Station Vallejo	PG1617
PROJECT MANAGER	**SPECIES**	
M. Knowlen	*Neanthes arenaceodentata*	

Sample ID	Rep	Jar #	# Initiated	Date Recove 1/8/2024 # Alive	# Dead	Initials	# Missing or Dead	Comments
Control	1	7	10	10	0	MS	0	
Control	2	18	11	11	0	MS	0	
Control	3	9	10	10	0	MS	0	
Control	4	12	10	10	0	MS	0	
Control	5	8	10	10	0	MS	0	
SF-09 Reference	1	6	10	10	0	MS	0	
SF-09 Reference	2	10	10	10	0	MS	0	
SF-09 Reference	3	17	10	10	0	MS	0	
SF-09 Reference	4	15	10	9	0	MS	1	
SF-09 Reference	5	16	10	10	0	MS	0	
SV-23-A-Composite	1	3	10	10	0	MS	0	
SV-23-A-Composite	2	4	10	9	0	MS	1	
SV-23-A-Composite	3	13	10	10	0	MS	0	
SV-23-A-Composite	4	5	10	10	0	MS	0	
SV-23-A-Composite	5	2	10	10	0	MS	0	

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Neanthes arenaceodentata*

Sample ID	Rep	# Initiated	# Alive	% Survival	Survival Statistics: Mean Survival (%)	Survival Statistics: SD	% Mortality	Mortality Statistics: Mean Mortality (%)	Mortality Statistics: SD
Control	1	10	10	100			0		
Control	2	11	11	100			0		
Control	3	10	10	100			0		
Control	4	10	10	100			0		
Control	5	10	10	100	100.0	0.0	0	0.0	0.0
SF-09 Reference	1	10	10	100			0		
SF-09 Reference	2	10	10	100			0		
SF-09 Reference	3	10	10	100			0		
SF-09 Reference	4	10	9	90			10		
SF-09 Reference	5	10	10	100	98.0	4.5	0	2.0	4.5
SV-23-A-Composite	1	10	10	100			0		
SV-23-A-Composite	2	10	9	90			10		
SV-23-A-Composite	3	10	10	100			0		
SV-23-A-Composite	4	10	10	100			0		
SV-23-A-Composite	5	10	10	100	98.0	4.5	0	2.0	4.5

10 Day SP Test Day 0 Overlying Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Neanthes arenaceodentata*

Calibration Standards Temperature: 19.3 **Date:** 12/29/2023 **Tech:** DM **Ammonia Meter:** 10 **Sulfide Mete** SPEC 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pK$_a$ **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	Notes
Control	0	Overlying	0.339	19.5	T17	2	10	1	2	30	8.0	19.3	292.45	9.26	0.012	6.60	0.107	
SF-09 Reference	0	Overlying	1.61	19.3	T17	4	10	1	4	29	7.9	19.5	292.65	9.26	0.046	6.60	0.266	
SV-23-A-Composite	0	Overlying	4.55	19.3	T17	3	10	1	3	29	7.9	19.1	292.25	9.26	0.127	6.61	0.202	

10 Day SP Test Day 0 Porewater Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Neanthes arenaceodentata*

Calibration Standards Temperature:	19.3	Date:	12/29/2023	Tech:	DM	Ammonia Meter:	10	Sulfide Mete	SPEC 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Porewater salinity (ppt)*	*Porewater pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pKa ***	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Record	Record	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	Notes
Control	0	Porewater	1.30	18.9	T17/8	ND	10	1	ND	30	7.5	19.3	292.45	9.26	0.015	6.60	ND	
SF-09 Reference	0	Porewater	3.77	18.4	T17/8	ND	10	1	ND	29	7.2	19.5	292.65	9.26	0.022	6.60	ND	
SV-23-A-Composite	0	Porewater	8.61	18.6	T17/8	ND	10	1	ND	27	7.5	19.1	292.25	9.26	0.097	6.61	ND	

10 Day SP Test Day 10 Overlying Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Neanthes arenaceodentata*

Calibration Standards Temperature: 18.8 **Date:** 1/8/2024 **Tech:** LG **Ammonia Meter:** 10 **Sulfide Meter:** Spec 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pK_a **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	
Control	10	Overlying	0.00	18.0	T17	8	10	1	8	30	8.0	19.0	292.15	9.26	0.000	6.61	0.434	
SF-09 Reference	10	Overlying	0.00	18.1	T17	2	10	1	2	29	8.0	19.1	292.25	9.26	0.000	6.61	0.108	
SV-23-A-Composite	10	Overlying	0.00	18.0	T17	ND	10	1	ND	28	8.0	19.0	292.15	9.26	0.000	6.61	ND	

10 Day SP Test Day 10 Porewater Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Neanthes arenaceodentata*

Calibration Standards Temperature: 19.3 **Date:** 1/8/2024 **Tech:** CS/MS **Ammonia Meter: 10** **Sulfide Meter:** SPEC 1

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Porewater salinity (ppt)*	*Porewater pH*	*Test temp (C)*	*Temp (K)*	*NH_3 pKa[5]*	*Unionized NH_3 (mg/L)*	*H_2S pK_a **	*Undissociated Sulfide (µg/L as H_2S)*	Notes
Sourced	Sourced		Record	Record	Record	Record	Record	Record	Calculated	Record	Record	Sourced	Calculated	Calculated	Calculated	Calculated	Calculated	Notes
Control	10	Porewater	0.306	18.7	M7/T17	5	10	1	5	32	7.3	19.0	292.15	9.26	0.002	6.61	1.109	
SF-09 Reference	10	Porewater	4.19	19.2	M7/T17	24	10	1	24	30	6.9	19.1	292.25	9.26	0.012	6.61	10.037	
SV-23-A-Composite	10	Porewater	11.5	18.5	M7/T17	6	10	1	6	29	7.1	19.0	292.15	9.26	0.052	6.61	1.883	

2.2 *Neanthes arenaceodentata* Statistical Results

CETIS Analytical Report

Report Date:	11 Jan-24 11:47 (p 1 of 4)
Test Code/ID:	PG1617 N.a. / 18-6883-9835

Neanthes 10-d Survival and Growth Sediment Test — **EcoAnalysts**

Analysis ID:	05-7462-0058	**Endpoint:**	Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 11:45	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 11:44	**MD5 Hash:**	92A7B7DAC09F04D66EDBE184647BEE54	**Editor ID:**	009-542-444-2

Batch ID:	07-7995-7451	**Test Type:**	Survival-Growth	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 11:10	**Protocol:**	ASTM E1611-00 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-24 13:40	**Species:**	Neanthes arenaceodentata	**Brine:**	Not Applicable
Test Length:	10d 2h	**Taxon:**	Polychaeta	**Source:**	Aquatic Toxicology Support **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control	11-4079-4562	25 Oct-23	25 Oct-23	65d 11h	WSP	USCG Station Vallejo 20
SF-09 Reference	17-3314-9739	11 Dec-23 13:15	14 Dec-23 13:07	17d 22h (0.4 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control	Sediment Sample	WSP USCG Vallejo	P231025.04	
SF-09 Reference	Sediment Sample	WSP USCG Vallejo	P231214.11	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	SF-09 Reference passed proportion survived endpoint	4.68%

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Control Sed		Reference Sed	8	25	---	1	Exact	0.5000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0029042	0.0029042	1	1.091	0.3267	Non-Significant Effect
Error	0.0212918	0.0026615	8			
Total	0.0241961		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	6.463	11.26	0.0346	Equal Variances
	Mod Levene Equality of Variance Test	0.9088	13.75	0.3772	Equal Variances
	Variance Ratio F Test	478.8	23.15	2.6E-05	Unequal Variances
Distribution	Anderson-Darling A2 Test	1.697	3.878	<1.0E-05	Non-Normal Distribution
	D'Agostino Skewness Test	3.327	2.576	0.0009	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.3878	0.3025	0.0001	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6374	0.7411	0.0002	Non-Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
SF-09 Reference	RS	5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	2.00%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	CS	5	1.4140	1.4090	1.4180	1.4120	1.4120	1.4190	0.0015	0.24%	0.00%
SF-09 Reference	RS	5	1.3790	1.2890	1.4700	1.4120	1.2490	1.4120	0.0326	5.28%	2.41%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.0000	1.0000	1.0000	1.0000	1.0000
SF-09 Reference	RS	1.0000	1.0000	1.0000	0.9000	1.0000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	1.4120	1.4190	1.4120	1.4120	1.4120
SF-09 Reference	RS	1.4120	1.4120	1.4120	1.2490	1.4120

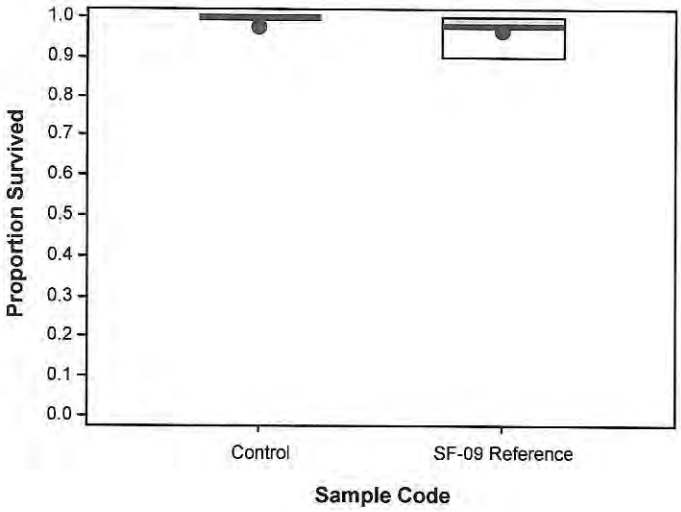
Neanthes 10-d Survival and Growth Sediment Test — **EcoAnalysts**

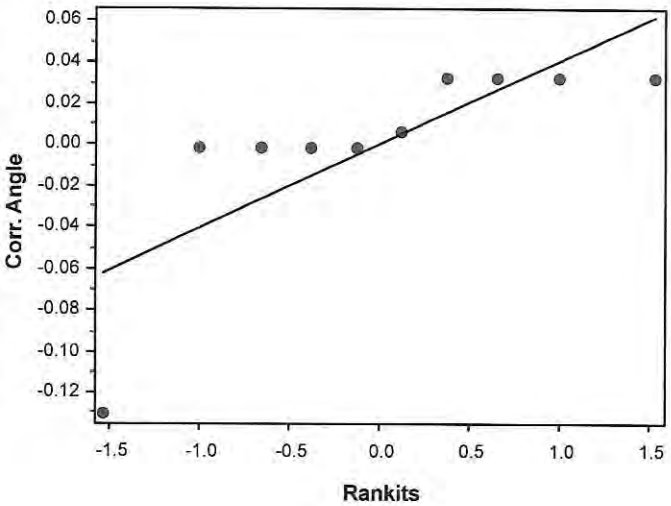
Analysis ID:	05-7462-0058	**Endpoint:**	Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 11:45	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 11:44	**MD5 Hash:**	92A7B7DAC09F04D66EDBE184647BEE54	**Editor ID:**	009-542-444-2

Proportion Survived Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	CS	10/10	11/11	10/10	10/10	10/10
SF-09 Reference	RS	10/10	10/10	10/10	9/10	10/10

Graphics





Neanthes 10-d Survival and Growth Sediment Test — **EcoAnalysts**

Analysis ID:	05-1574-5897	**Endpoint:**	Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 11:45	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 11:44	**MD5 Hash:**	14E226B5E3EFA5758511AA00C7F5A304	**Editor ID:**	009-542-444-2

Batch ID:	07-7995-7451	**Test Type:**	Survival-Growth	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 11:10	**Protocol:**	ASTM E1611-00 (2000)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-24 13:40	**Species:**	Neanthes arenaceodentata	**Brine:**	Not Applicable
Test Length:	10d 2h	**Taxon:**	Polychaeta	**Source:**	Aquatic Toxicology Support **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
SF-09 Reference	17-3314-9739	11 Dec-23 13:15	14 Dec-23 13:07	17d 22h (0.4 °C)	WSP	USCG Station Vallejo 20
SV-23-A-Composi	16-7254-0307	12 Dec-23 08:45	14 Dec-23 13:07	17d 2h (0 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
SF-09 Reference	Sediment Sample	WSP USCG Vallejo	P231214.11	
SV-23-A-Composi	Sediment Sample	WSP USCG Vallejo	P231221.01	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	SV-23-A-Composi passed proportion survived endpoint	5.60%

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed		SV-23-A-Composi	8	27.5	---	2	Exact	0.7778	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.0424949	0.0053119	8			
Total	0.0424949		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0	11.26	1.0000	Equal Variances
	Mod Levene Equality of Variance Test	0	13.75	1.0000	Equal Variances
	Variance Ratio F Test	1	23.15	1.0000	Equal Variances
Distribution	Anderson-Darling A2 Test	2.912	3.878	<1.0E-05	Non-Normal Distribution
	D'Agostino Skewness Test	2.495	2.576	0.0126	Normal Distribution
	Kolmogorov-Smirnov D Test	0.4824	0.3025	<1.0E-05	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.5093	0.7411	<1.0E-05	Non-Normal Distribution

Proportion Survived Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
SF-09 Reference	RS	5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	0.00%
SV-23-A-Composi		5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	0.00%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
SF-09 Reference	RS	5	1.3790	1.2890	1.4700	1.4120	1.2490	1.4120	0.0326	5.28%	0.00%
SV-23-A-Composi		5	1.3790	1.2890	1.4700	1.4120	1.2490	1.4120	0.0326	5.28%	0.00%

Proportion Survived Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	1.0000	1.0000	1.0000	0.9000	1.0000
SV-23-A-Composi		1.0000	0.9000	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	1.4120	1.4120	1.4120	1.2490	1.4120
SV-23-A-Composi		1.4120	1.2490	1.4120	1.4120	1.4120

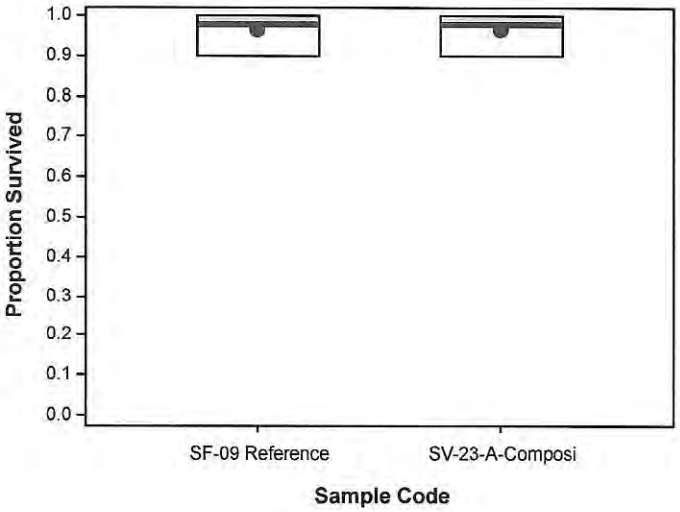
Neanthes 10-d Survival and Growth Sediment Test — **EcoAnalysts**

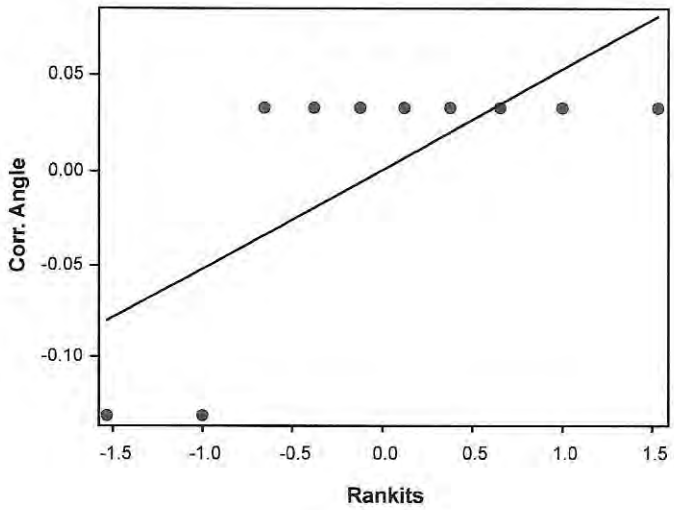
Analysis ID:	05-1574-5897	**Endpoint:**	Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	11 Jan-24 11:45	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	11 Jan-24 11:44	**MD5 Hash:**	14E226B5E3EFA5758511AA00C7F5A304	**Editor ID:**	009-542-444-2

Proportion Survived Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
SF-09 Reference	RS	10/10	10/10	10/10	9/10	10/10
SV-23-A-Composi		10/10	9/10	10/10	10/10	10/10

Graphics





CETIS Test Data Worksheet

Report Date: 11 Jan-24 11:46 (p 1 of 1)
Test Code/ID: PG1617 N.a. / 18-6883-9835

Neanthes 10-d Survival and Growth Sediment Test — **EcoAnalysts**

Start Date:	29 Dec-23 11:10	**Species:**	Neanthes arenaceodentata	**Sample Code:**	Control
End Date:	08 Jan-24 13:40	**Protocol:**	ASTM E1611-00 (2000)	**Sample Source:**	WSP USCG Vallejo
Sample Date:	25 Oct-23	**Material:**	Sediment Sample	**Sample Station:**	P231025.04

Sample	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm	Notes
Control	1	11	10	10		0			
Control	2	13	11	11		0			
Control	3	2	10	10		0			
Control	4	5	10	10		0			
Control	5	6	10	10		0			
SF-09 Reference	1	12	10	10		0			
SF-09 Reference	2	3	10	10		0			
SF-09 Reference	3	4	10	10		0			
SF-09 Reference	4	10	10	9		0			
SF-09 Reference	5	14	10	10		0			
SV-23-A-Composi	1	15	10	10		0			
SV-23-A-Composi	2	1	10	9		0			
SV-23-A-Composi	3	7	10	10		0			
SV-23-A-Composi	4	8	10	10		0			
SV-23-A-Composi	5	9	10	10		0			

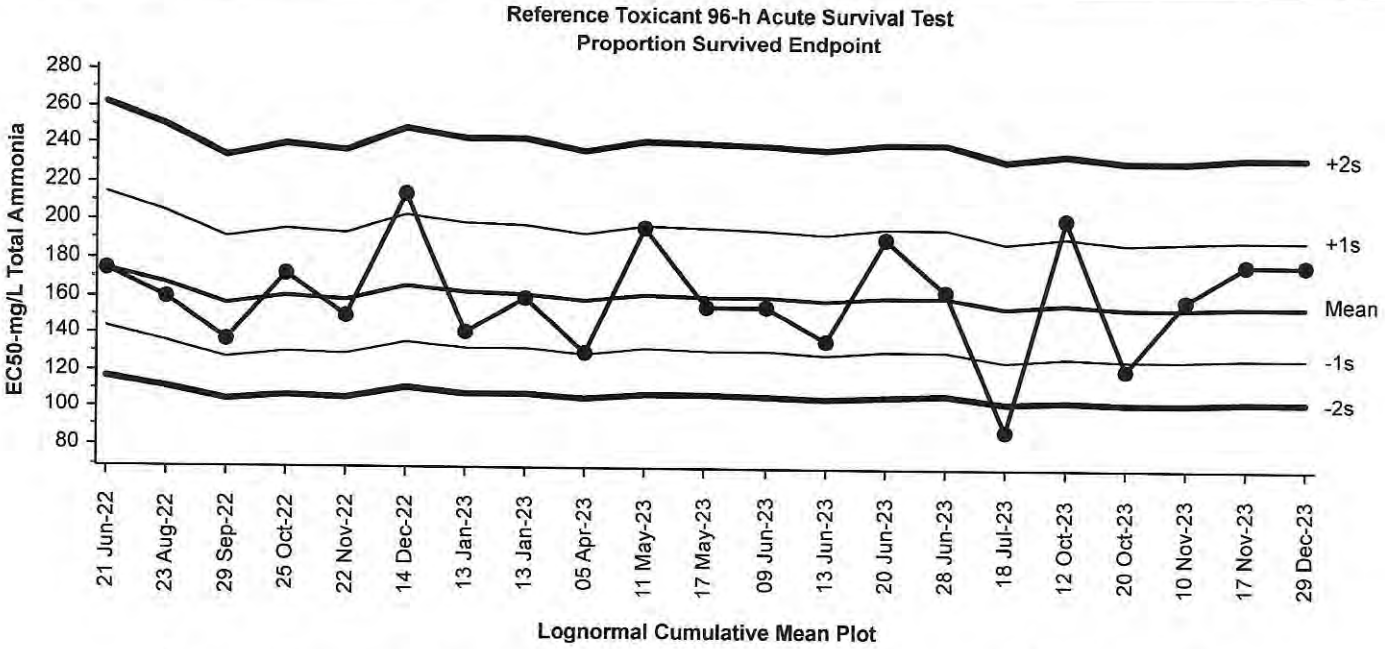
2.3 *Neanthes arenaceodentata* Reference Toxicant Test Results

CETIS QC Plot

Report Date: 03 Jan-24 09:18 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival | **Organism:** Neanthes arenaceodentata | **Material:** Total Ammonia
Protocol: All Protocols | **Endpoint:** Proportion Survived | **Source:** Reference Toxicant-REF



Mean:	156.5	**Count:**	20	**-1s Warning Limit:**	128	**-2s Action Limit:**	104
Sigma:	NA	**CV:**	20.40%	**+1s Warning Limit:**	192	**+2s Action Limit:**	234

Quality Control Data

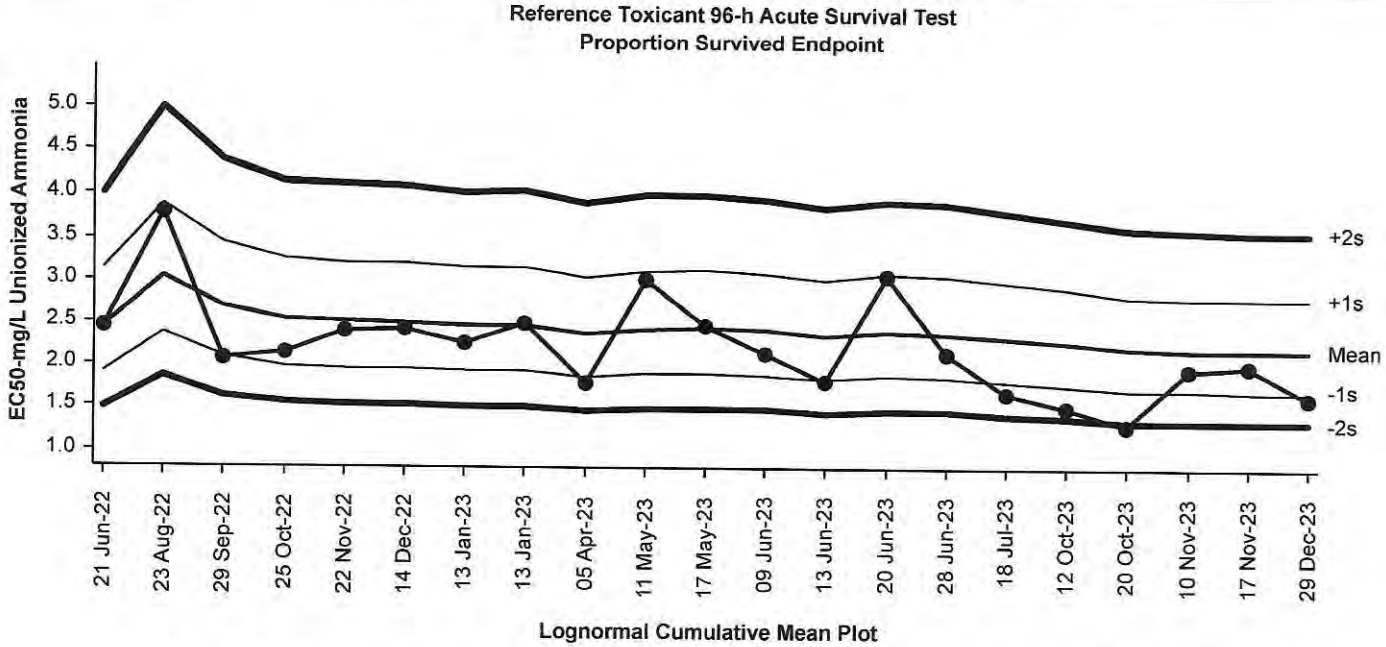
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2022	Jun	21	15:45	174.9	18.46	0.5519			10-2538-6283	14-3666-1506	EcoAnalysts
2		Aug	23	14:08	159.1	2.619	0.08215			17-0235-4010	05-7032-3472	EcoAnalysts
3		Sep	29	15:28	137.1	-19.35	-0.6535			03-3712-7673	03-3541-8621	EcoAnalysts
4		Oct	25	13:00	172.8	16.34	0.4918			16-3471-2888	14-4985-7148	EcoAnalysts
5		Nov	22	18:45	149.4	-7.044	-0.228			09-5667-8954	07-0185-4884	EcoAnalysts
6		Dec	14	15:25	214.8	58.36	1.569	(+)		18-3309-9140	14-3636-0481	EcoAnalysts
7	2023	Jan	13	13:15	141.2	-15.31	-0.5097			11-5034-4123	16-2148-2454	EcoAnalysts
8			13	16:33	159.7	3.175	0.09943			17-7595-8780	05-3063-2004	EcoAnalysts
9		Apr	5	14:55	130.4	-26.14	-0.9046			11-7289-8211	18-7983-9604	EcoAnalysts
10		May	11	15:18	196.6	40.14	1.13	(+)		01-5896-6597	13-5560-2707	EcoAnalysts
11			17	15:25	155.1	-1.411	-0.04483			09-5506-2214	14-8576-5468	EcoAnalysts
12		Jun	9	14:29	154.7	-1.772	-0.05637			08-6757-2520	10-6239-7760	EcoAnalysts
13			13	16:20	136.9	-19.58	-0.6619			06-2404-0035	15-0297-5446	EcoAnalysts
14			20	14:52	191.2	34.75	0.9928			09-7904-9020	16-4468-8585	EcoAnalysts
15			28	16:12	163.3	6.849	0.2121			03-5533-4944	08-2966-7703	EcoAnalysts
16		Jul	18	15:20	88.19	-68.3	-2.839	(-)	(-)	19-7419-9402	17-2524-5962	EcoAnalysts
17		Oct	12	16:05	202.3	45.85	1.272	(+)		07-1619-7733	01-6686-9432	EcoAnalysts
18			20	18:02	121.8	-34.71	-1.242	(-)		07-4882-1570	15-9008-8350	EcoAnalysts
19		Nov	10	14:20	159.4	2.896	0.09077			01-0179-6296	18-4017-2625	EcoAnalysts
20			17	15:07	178.7	22.19	0.6564			11-5731-8682	10-5534-0687	EcoAnalysts
21		Dec	29	15:45	179	22.47	0.6643			02-7325-0956	05-4125-3457	EcoAnalysts

CETIS QC Plot

Report Date: 03 Jan-24 09:23 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival | **Organism:** Neanthes arenaceodentata | **Material:** Unionized Ammonia
Protocol: All Protocols | **Endpoint:** Proportion Survived | **Source:** Reference Toxicant-REF



Mean:	2.185	**Count:**	20	**-1s Warning Limit:**	1.71	**-2s Action Limit:**	1.33
Sigma:	NA	**CV:**	25.10%	**+1s Warning Limit:**	2.8	**+2s Action Limit:**	3.58

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2022	Jun	21	15:45	2.443	0.2572	0.4506			19-7550-0810	15-1612-6650	EcoAnalysts
2		Aug	23	14:08	3.798	1.613	2.239	(+)	(+)	07-0648-9473	01-5439-6552	EcoAnalysts
3		Sep	29	15:28	2.077	-0.1082	-0.2056			01-5105-1781	06-0424-1990	EcoAnalysts
4		Oct	25	13:00	2.154	-0.03122	-0.05827			14-7727-6578	02-8812-8427	EcoAnalysts
5		Nov	22	18:45	2.416	0.2309	0.4069			07-9444-9163	00-9445-7280	EcoAnalysts
6		Dec	14	15:25	2.43	0.2451	0.4305			09-0689-0078	04-1997-4862	EcoAnalysts
7	2023	Jan	13	13:15	2.265	0.0793	0.1444			13-5395-4986	19-0621-5617	EcoAnalysts
8			13	16:33	2.497	0.3115	0.5397			14-7632-0871	11-6659-5325	EcoAnalysts
9		Apr	5	14:55	1.792	-0.3931	-0.8031			09-4366-1463	19-4497-2018	EcoAnalysts
10		May	11	15:18	3.026	0.8402	1.318	(+)		07-4046-9049	21-4632-4439	EcoAnalysts
11			17	15:25	2.482	0.2963	0.515			00-3123-8899	04-4158-4695	EcoAnalysts
12		Jun	9	14:29	2.138	-0.04727	-0.08857			16-0705-6297	17-2787-6989	EcoAnalysts
13			13	16:20	1.812	-0.3736	-0.7593			07-5502-3371	06-6740-0686	EcoAnalysts
14			20	14:52	3.054	0.8688	1.356	(+)		21-2358-3332	05-9838-0785	EcoAnalysts
15			28	16:12	2.137	-0.0483	-0.09051			10-4989-2309	10-2329-9104	EcoAnalysts
16		Jul	18	15:20	1.682	-0.5034	-1.06	(-)		20-9539-0839	09-3687-1059	EcoAnalysts
17		Oct	12	16:05	1.516	-0.6694	-1.481	(-)		13-7294-3731	05-4183-4224	EcoAnalysts
18			20	18:02	1.303	-0.8827	-2.096	(-)	(-)	11-9412-9369	06-3804-6342	EcoAnalysts
19		Nov	10	14:20	1.968	-0.2172	-0.4239			07-5659-6192	18-7840-0756	EcoAnalysts
20			17	15:07	2.012	-0.1738	-0.3357			19-3413-7204	02-1029-7804	EcoAnalysts
21		Dec	29	15:45	1.634	-0.5511	-1.177	(-)		18-4092-8116	06-6195-2586	EcoAnalysts

CETIS Summary Report

Report Date:	24 Jan-24 16:08 (p 1 of 1)
Test Code/ID:	P220819.113 / 02-7325-0956

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Batch ID:	20-1591-0174	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 15:45	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	02 Jan-24 14:11	**Species:**	Neanthes arenaceodentata	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Polychaeta	**Source:**	Aquatic Toxicology Support **Age:**

Sample ID:	10-7690-6438	**Code:**	P220819.113	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.113
Sample Age:	497d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
05-8949-2383	Proportion Survived	Fisher Exact Test		138	232	178.9	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
05-4125-3457	Proportion Survived	Linear Interpolation (ICPIN)		EC15	149.2	149.2	149.2	1
				EC20	153.1	153.1	153.1	
				EC25	157.2	157.2	157.2	
				EC40	169.9	169.9	169.9	
				EC50	179	179	179	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
60.5		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
138		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
232		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
321		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
479		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail — MD5: 3850E5F5A6D28FC9430497E7BC0453A9

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
60.5		1.0000	1.0000	1.0000
138		1.0000	1.0000	1.0000
232		0.0000	0.0000	0.0000
321		0.0000	0.0000	0.0000
479		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
60.5		10/10	10/10	10/10
138		10/10	10/10	10/10
232		0/10	0/10	0/10
321		0/10	0/10	0/10
479		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 24 Jan-24 16:11 (p 1 of 1)
Test Code/ID: P220819.113UIA / 18-4092-8116

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Start Date: 29 Dec-23 15:45
End Date: 02 Jan-24 14:11
Sample Date: 19 Aug-22

Species: Neanthes arenaceodentata
Protocol: EPA-823-B-98-004 (1998)
Material: Unionized Ammonia

Sample Code: P220819.113UIA
Sample Source: Reference Toxicant
Sample Station: P220819.113UIA

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	6	10	10	
0	D	2	5	10	10	
0	D	3	2	10	10	
0.758		1	1	10	10	
0.758		2	16	10	10	
0.758		3	13	10	10	
1.407		1	8	10	10	
1.407		2	7	10	10	
1.407		3	14	10	10	
1.883		1	9	10	0	
1.883		2	15	10	0	
1.883		3	11	10	0	
2.104		1	18	10	0	
2.104		2	3	10	0	
2.104		3	12	10	0	
2.496		1	17	10	0	
2.496		2	10	10	0	
2.496		3	4	10	0	

CETIS Summary Report

Report Date: 24 Jan-24 16:09 (p 1 of 1)
Test Code/ID: P220819.113UIA / 18-4092-8116

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID:	20-1591-0174	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	29 Dec-23 15:45	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	02 Jan-24 14:11	**Species:**	Neanthes arenaceodentata	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Polychaeta	**Source:**	Aquatic Toxicology Support **Age:**

Sample ID:	20-3997-8583	**Code:**	P220819.113UIA	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.113UIA
Sample Age:	497d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
14-4279-5142	Proportion Survived	Fisher Exact Test		1.407	1.883	1.628	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
06-6195-2586	Proportion Survived	Linear Interpolation (ICPIN)		EC15	1.473	1.473	1.473	1
				EC20	1.495	1.495	1.495	
				EC25	1.518	1.518	1.518	
				EC40	1.587	1.587	1.587	
				EC50	1.634	1.634	1.634	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
0.758		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.407		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.883		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
2.104		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
2.496		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail

MD5: E890052C125868AEE548484A7CE276F2

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
0.758		1.0000	1.0000	1.0000
1.407		1.0000	1.0000	1.0000
1.883		0.0000	0.0000	0.0000
2.104		0.0000	0.0000	0.0000
2.496		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
0.758		10/10	10/10	10/10
1.407		10/10	10/10	10/10
1.883		0/10	0/10	0/10
2.104		0/10	0/10	0/10
2.496		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 24 Jan-24 16:11 (p 1 of 1)
Test Code/ID: P220819.113 / 02-7325-0956

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Start Date:	29 Dec-23 15:45	**Species:**	Neanthes arenaceodentata	**Sample Code:**	P220819.113
End Date:	02 Jan-24 14:11	**Protocol:**	EPA-823-B-98-004 (1998)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.113

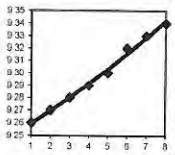
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	13	10	10	
0	D	2	2	10	10	
0	D	3	14	10	10	
60.5		1	4	10	10	
60.5		2	3	10	10	
60.5		3	16	10	10	
138		1	11	10	10	
138		2	8	10	10	
138		3	6	10	10	
232		1	9	10	0	
232		2	5	10	0	
232		3	15	10	0	
321		1	1	10	0	
321		2	12	10	0	
321		3	18	10	0	
479		1	17	10	0	
479		2	10	10	0	
479		3	7	10	0	

Un-ionized Ammonia Calculator

CLIENT:	WSP	Date of Test:	December 29, 2023
PROJECT:	Vallejo	Test Type:	*Neanthes SP RT*
COMMENTS:	P220819.113		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Ionic strength	pKa^s
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



$y = 0.0003x^2 + 0.0091x + 9.2502$

...

	Sample	Mod	*NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	*temp (K)*	*pKa^s*		NH_3U (mg/L)
	Target / Sample Name		Actual	Actual	Actual	Actual	Calculated	Calculated		Calculated
	Example 3.5		2.000	10.0	7.5	5.0	278.15	9.2520		0.008
1										
2	50		60.5	29	7.5	20.5	293.65	9.2557		0.758
3	100		138	29	7.4	20.8	293.95	9.2557		1.407
4	200		232	29	7.3	20.8	293.95	9.2557		1.883
5	300		321	29	7.2	21.0	294.15	9.2557		2.104
6	400		479	30	7.1	21.0	294.15	9.2559		2.496
7										
8										
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Ammonia Reference Toxicant Test Survival Data Sheet

CLIENT	PROJECT	SPECIES	LABORATORY	PROTOCOL
WSP	Vallejo Station	*Neanthes arenaceodentata*	Port Gamble .	OTM/ITM

TEST ID	LOT #:	TEST START DATE	TIME	4-DAY END DATE	TIME
P220819.113	22G3156086	29Dec23	1545 MK	02Jan24	1411

CHAMBER SIZE/TYPE	EXPOSURE VOLUME
Glass pint jar	250 mL

WATER QUALITY DATA

TEST CONDITIONS					DO (mg/L) > 4.6		TEMP(C) 20 ± 1		SAL (ppt) 28 ± 2		pH 7 - 9		TECHNICIAN	AMMONIA			SULFIDES		
CLIENT/ENVIRON ID	CONCENTRATION value	CONCENTRATION units	DAY	REP	D.O. meter	D.O. mg/L	TEMP. meter	TEMP. °C	SALINITY meter	SALINITY ppt	pH meter	pH unit	WQ TECH/ DATE	AMMONIA METER	AMMONIA mg/L	Tech	SULFIDES meter	SULFIDES mg/L	Tech
Ref.Tox.-ammonia	0	mg/L	0	Stock	7	7.8	7	20.6	7	29	7	7.5	MK 12/29	11	0.0	MK			
			4	1	8	7.6	8	19.1	8	29	8	7.9	TW 1/2						
Ref.Tox.-ammonia	50	mg/L	0	Stock	7	7.7	7	20.5	7	29	7	7.5	MK 12/29	11	60.5	MK			
			4	1	8	7.6	8	19.1	8	29	8	7.9	TW 1/2						
Ref.Tox.-ammonia	100	mg/L	0	Stock	7	7.9	7	20.8	7	29	7	7.4	MK 12/29	11	138	MK			
			4	1	8	7.6	8	19.2	8	29	8	7.8	TW 1/2						
Ref.Tox.-ammonia	200	mg/L	0	Stock	7	7.8	7	20.8	7	29	7	7.3	MK 12/29	11	232	MK			
			4	1	8	6.5	8	19.0	8	29	8	7.7	TW 1/2						
Ref.Tox.-ammonia	300	mg/L	0	Stock	7	7.8	7	21.0	7	29	7	7.2	MK 12/29	11	321	MK			
			4	1	—	—	—	—	—	—	—	—	—						
Ref.Tox.-ammonia	400	mg/L	0	Stock	7	7.9	7	21.0	7	30	7	7.1	MK 12/29	11	479	MK			
			4	1	—	—	—	—	—	—	—	—	—						

Ammonia Reference Toxicant Test Survival Data Sheet

P 220819.113

CLIENT	PROJECT	TEST ID	SPECIES		
WSP	Vallejo Station	P220819.113	*Neanthes arenaceodentata*		
			PROJECT MANAGER	LABORATORY	PROTOCOL
			M. Knowlen	Port Gamble .	OTM/ITM

SURVIVAL & BEHAVIOR DATA

OBSERVATION KEY
N = Normal
LOE = Loss of equilibium
Q = Quiescent
DC = Discoloration
NB = No body
F = Floating on surface

INITIAL # OF ORGANISMS: 20

CLIENT/ENVIRON ID	CONC. value	CONC. units	REP	INITIAL NUMBER	DAY 1 #ALIVE	DAY 1 #DEAD	DAY 1 OBS	DAY 2 #ALIVE	DAY 2 #DEAD	DAY 2 OBS	DAY 3 #ALIVE	DAY 3 #DEAD	DAY 3 OBS	DAY 4 #ALIVE	DAY 4 #DEAD	DAY 4 OBS
					DATE 12/30/23			DATE 12/31/23			DATE 1/1/24			DATE 1/2/24		
					TECHNICIAN SR			TECHNICIAN UG			TECHNICIAN TT			TECHNICIAN TW		
Ref.Tox.- Ammonia	0	mg/L	1	20	20	0	N	10	0	N	10	0	N	10	0	N
			2	20	20	0	N	10	0	N	10	0	N	10	0	N
			3	20	20	0	N	10	0	N	10	0	N	10	0	N
Ref.Tox.- Ammonia	50	mg/L	1	20	20	0	N	10	0	N	10	0	N	10	0	N
			2	20	20	0	N	10	0	IF	10	0	N	10	0	N
			3	20	20	0	N	10	0	N	10	0	N	10	0	N
Ref.Tox.- Ammonia	100	mg/L	1	20	20	0	LOE	10	0	LOE	10	0	LOE	10	0	LOE
			2	20	20	0	LOE	10	0	LOE	10	0	LOE	10	0	LOE
			3	20	20	0	LOE	10	0	LOE	10	0	LOE, Q	10	0	LOE
Ref.Tox.- Ammonia	200	mg/L	1	20	20	0	LOE	10	0	Q	10	0	Q	0	10	DC
			2	20	20	0	LOE	10	0	Q	10	0	Q	0	10	DC
			3	20	20	0	LOE	10	0	Q	10	0	Q	0	10	DC
Ref.Tox.- Ammonia	300	mg/L	1	20	20	0	Q	7	3	Q	0	7	DC	—	—	—
			2	20	20	0	Q	0	10	—	—	—	—	—	—	—
			3	20	20	0	Q	6	4	—	0	6	DC	—	—	—
Ref.Tox.- Ammonia	400	mg/L	1	20	0	20	DC	—	—	—	—	—	—	—	—	—
			2	20	0	20	DC	—	—	—	—	—	—	—	—	—
			3	20	0	20	DC	—	—	—	—	—	—	—	—	—

Ammonia Reference Toxicant
Spiking Worksheet

Reference Toxicant ID: P220819.113
Date Prepared: 12/29/23
Technician Initials: SR

Neanthes NH_3 RT

Assumptions in Model
Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: 12/27/2023
Measurement: 9600

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	**Desired Concentration**	**Volume**		
mg/L	mg/L	mL	mL stock to increase	
			FRESH WATER (mL)	SALT WATER (mL)
60.5	**50**	750		5.86
138	**100**	750		11.72
232	**200**	750		23.44
321	**300**	750		35.16
479	**400**	750		46.88

3. *Americamysis bahia* SET SPP Water-Column Test

3.1 *Americamysis bahia* SET Test Data

Version T.1

GENERAL

Client	WSP
Project	USCG Station Vallejo
Project Number	PG1617
Project Manager	M. Knowlen
Date Sample Collected (Oldest Sample)	12/12/2023
Sample Holding Time	14
Test Start Date	12/26/23
Test End Date	12/30/23
Test Species	*Americamysis bahia*
Organism Supplier	ABS
Date Organism Acquired	12/22/2023
Organism Acclimation Time (Days)	4
Organism Batch	ABS122223.01
Test Type	SPP
Test Protocol	OTM/ITM
Regional Protocol	San Francisco Bay
Laboratory Location	Port Gamble
Test Location	Bath 1
Sample Treatment	Increased salinity
Water Batch	FSW122323.01
Test Lighting	16L:8D
Test Chamber	12 oz. plastic
Replicates Per Treatment	5
Organisms per Replicate	10
Exposure Volume	250 mL
Feeding Information	0.1 mL nauplii twice daily
Test Dissolved Oxygen	> 3
Test Temperature	20 ± 1
Test Salinity	28 ± 2
Test pH	8 ± 1
Water Renewal Info	None

Food Batch #
41730.00

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	**Max**
DO:	3.0	
Temp:	18.5	21.4
Sal:	26	30
pH:	7	9

TEST START TIME:	16:25
TEST END TIME:	1453

	CLIENT SAMPLE ID (Concentration %)	LAB ID
Control	Control	.
2	Salt Control	CSMM122623.02
3	SV-23-SW	P231222.01
4	SV-23-A-Composite 1%	P231221.01
5	SV-23-A-Composite 10%	P231221.01
6	SV-23-A-Composite 50%	P231221.01
7	SV-23-A-Composite 100%	P231221.01
8	.	.
9	.	.
10	.	.
11	.	.
12	.	.
13	.	.
14	.	.
15	.	.
16	.	.
17	.	.
18	.	.
19	.	.
20	.	.

EcoAnalysts, Inc.

SPP ELUTRIATE PREPARATION WORKSHEET

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER
WSP	USCG Station Vallejo	PG1617	M. Knowlen

DILUENT SOURCE: (sitewater/labwater):

sitewater

PROJECT SITEWATER CLIENT ID:	LABORATORY WATER LAB ID:
SV-23-SW	

STANDARD ELUTRIATE IS PREPARED AT 1 PART SEDIMENT TO 4 PARTS WATER

ELUTRIATE RATIO SELECTED:	1:4
TOTAL VOLUME OF ELUTRIATE PREPARATION VESSEL:	8 L
VOLUME OF SEDIMENT PER SAMPLE:	1.125 L
VOLUME OF DILUENT:	4.5 L
TOTAL NUMBER OF PREPARTION VESSELS PER SAMPLE:	1

# Cont's	Sample ID	Date Spin Start	Time Spin Start	Time Settle Start	Time of Elutriate Collection	Initial Volume Recovered (units)	Centrifuged (Y/N)	Settled Overnight (Y/N)	Secondary Volume Recovered (units)	Total Volume (units)	Comments
1	SV-23-A-Composite	12/26/23	845	915	1015	0 L	Y	N	3L	3 L	Shared w/ larval test. After 1 hr settling, elutriate still too turbid. Centrifuged to recover. MK 12/26/23

SPP Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION			PROTOCOL		
WSP	USCG Station Vallejo	*Americamysis bahia*	Port Gamble / Bath 1			OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**PROJECT NUMBER**	**TEST START DATE**	**TIME**	**INITIALS**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	SPP	PG1617	December 26, 2023	16:25	MK	December 30, 2023	1453	SR

WATER QUALITY DATA

							DO (mg/L)	TEMP (°C)	SALINITY (ppt)	pH	Feeding 0.1 mL nauplii twice daily		
SAMPLE ID (Concentration %)	DAY	REP	JAR #	TECHNICIAN	Date	Meter	> 3	19 - 21	26 - 30	7 - 9	AM	PM	Notes
Control	0	Stock		JL	12/26/23	7	7.4	19.4	29	8.1		CS	
Control	1	1	1	SR	12/27/23	7	6.6	20.7	29	8.0	LG	MS	
Control	2	2	7	TW	12/28/23	8	5.7	21.3	29	7.8	TW	JL	
Control	3	3	15	SR	12/29/23	7	4.6	19.2	30	7.7	MK	NL	
Control	4	4	33	TT	12/30/23	8	5.3	19.6	29	7.4	SR		
Salt Control	0	Stock		JL	12/26/23	7	7.8	19.0	28	8.1		CS	
Salt Control	1	1	10	SR	12/27/23	7	6.7	20.5	28	8.0	LG	MS	
Salt Control	2	2	8	TW	12/28/23	8	5.8	21.2	28	7.8	TW	JL	
Salt Control	3	3	14	SR	12/29/23	7	5.3	19.3	29	7.7	MK	NL	
Salt Control	4	4	6	TT	12/30/23	8	5.6	19.5	28	7.6	SR		
SV-23-SW	0	Stock		JL	12/26/23	7	8.1	19.6	28	8.1		CS	
SV-23-SW	1	1	29	SR	12/27/23	7	6.3	20.7	28	7.9	LG	MS	
SV-23-SW	2	2	5	TW	12/28/23	8	5.5	21.0	29	7.8	TW	JL	
SV-23-SW	3	3	34	SR	12/29/23	7	5.6	19.5	29	7.7	MK	NL	
SV-23-SW	4	4	28	TT	12/30/23	8	4.1	19.7	29	7.5	SR		
SV-23-A-Composite 1%	0	Stock		JL	12/26/23	7	7.8	19.5	29	8.1		CS	
SV-23-A-Composite 1%	1	1	21	SR	12/27/23	7	6.1	20.7	29	7.9	LG	MS	
SV-23-A-Composite 1%	2	2	31	TW	12/28/23	8	5.1	21.3	29	7.6	TW	JL	
SV-23-A-Composite 1%	3	3	27	SR	12/29/23	7	5.3	19.6	30	7.6	MK	NL	
SV-23-A-Composite 1%	4	4	12	TT	12/30/23	8	5.3	19.5	29	7.6	SR		
SV-23-A-Composite 10%	0	Stock		JL	12/26/23	7	7.7	19.4	29	8.1		CS	
SV-23-A-Composite 10%	1	1	30	SR	12/27/23	7	5.9	20.7	29	7.9	LG	MS	
SV-23-A-Composite 10%	2	2	20	TW	12/28/23	8	4.9	21.2	29	7.8	TW	JL	
SV-23-A-Composite 10%	3	3	11	SR	12/29/23	7	5.6	19.5	30	7.7	MK	NL	
SV-23-A-Composite 10%	4	4	24	TT	12/30/23	8	4.7	19.6	30	7.7	SR		

SPP Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION			PROTOCOL		
WSP	USCG Station Vallejo	*Americamysis bahia*	Port Gamble / Bath 1			OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**PROJECT NUMBER**	**TEST START DATE**	**TIME**	**INITIALS**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	SPP	PG1617	December 26, 2023	16:25	MK	December 30, 2023	1453	SR

WATER QUALITY DATA

							DO (mg/L)	TEMP (°C)	SALINITY (ppt)	pH	Feeding 0.1 mL nauplii twice daily		
SAMPLE ID (Concentration %)	**DAY**	**REP**	**JAR #**	**TECHNICIAN**	**Date**	**Meter**	> 3	19 - 21	26 - 30	7 - 9	AM	PM	**Notes**
SV-23-A-Composite 50%	0	Stock		JL	12/26/23	7	7.8	19.2	30	8.0		CS	
SV-23-A-Composite 50%	1	1	22	SR	12/27/23	7	6.1	20.7	30	8.0	LG	MS	
SV-23-A-Composite 50%	2	2	35	TW	12/28/23	8	5.5	21.2	30	8.0	TW	JL	
SV-23-A-Composite 50%	3	3	25	SR	12/29/23	7	5.2	19.3	30	7.9	MK	NL	
SV-23-A-Composite 50%	4	4	13	TT	12/30/23	8	5.3	19.5	30	8.0	SR		
SV-23-A-Composite 100%	0	Stock		JL	12/26/23	7	7.8	19.0	30	8.0		CS	
SV-23-A-Composite 100%	1	1	19	SR	12/27/23	7	6.3	20.5	30	8.1	LG	MS	
SV-23-A-Composite 100%	2	2	16	TW	12/28/23	8	5.4	21.1	30	8.2	TW	JL	
SV-23-A-Composite 100%	3	3	32	SR	12/29/23	7	5.5	19.5	31	8.2	MK	NL	
SV-23-A-Composite 100%	4	4	18	TT	12/30/23	8	5.7	19.5	30	8.2	SR		

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SPP Test Observation and Endpoint Data Sheet

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 1	OTM/ITM / San Francisco Bay	*Americamysis bahia*

Observation Key
N = Normal
Q = Quiescent
#LOS=Loss of equilibrium
#NB = Num no body
TC = Too cloudy for observations
TCLO = Too cloudy to count, but live organisms observed

ENDPOINT DATA & OBSERVATIONS

			Day	1			2			3			4			
			Tech	SR			TW			SR			SR			
			Date	12/27/23			12/28/23			12/29/23			12/30/23			
CLIENT ID (Concentration %)	**REP**	**Initial #**		**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Comments**
Control	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	2	10		10	0	N	9	0	1NB,N	8	1NB	N	8	0	N	
Control	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	1	10		8	2NB	N	8	0	N	8	0	N	8	0	N	
Salt Control	2	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
Salt Control	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	5	10		10	0	N	9	1	N	9	0	N	9	0	N	
SV-23-SW	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 1%	1	10		9	1	N	10	0	1FB,N	10	0	N	10	0	N	
SV-23-A-Composite 1%	2	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	
SV-23-A-Composite 1%	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 1%	4	12		10	0	N	12	0	2FB,N	12	0	N	11	1NB	N	
SV-23-A-Composite 1%	5	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	
SV-23-A-Composite 10%	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	3	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	
SV-23-A-Composite 10%	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	5	10		10	0	N	10	0	N	10	0	N	10	0	N	

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SPP Test Observation and Endpoint Data Sheet

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 1	OTM/ITM / San Francisco Bay	*Americamysis bahia*

Observation Key
N = Normal
Q = Quiescent
#LOS=Loss of equilibrium
#NB = Num no body
TC = Too cloudy for observations
TCLO = Too cloudy to count, but live organisms observed

ENDPOINT DATA & OBSERVATIONS

			Day	1			2			3			4			
			Tech	SR			TW			SR			SR			
			Date	12/27/23			12/28/23			12/29/23			12/30/23			
CLIENT ID (Concentration %)	**REP**	**Initial #**		**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Comments**
SV-23-A-Composite 50%	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 50%	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 50%	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 50%	4	10		10	0	N	10	0	N	8	1, 1NB	N	8	0	N	
SV-23-A-Composite 50%	5	10		10	0	N	10	0	N	10	0	N	9	1NB	N	
SV-23-A-Composite 100%	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 100%	2	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	
SV-23-A-Composite 100%	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 100%	4	10		10	0	N	10	0	N	7	3NB	N	7	0	N	
SV-23-A-Composite 100%	5	10		10	0	N	9	0	1NB,N	9	0	N	8	1	N	

EcoAnalysts, Inc.

SPP Test Stats

CLIENT	PROJECT	SPECIES
WSP	USCG Station Vallejo	*Americamysis bahia*

Sample ID (Concentration %)	Rep	# Initiated	# Alive	# Missing or Dead	% Survival	Survival Statistics: Mean Survival (%)	Survival Statistics: SD	% Mortality	Mortality Statistics: Mean Mortality (%)	Mortality Statistics: SD
Control	1	10	10	0	100			0		
Control	2	10	8	2	80			20		
Control	3	10	10	0	100			0		
Control	4	10	10	0	100			0		
Control	5	10	10	0	100	96.0	8.9	0	4.0	8.9
Salt Control	1	10	8	2	80			20		
Salt Control	2	10	9	1	90			10		
Salt Control	3	10	10	0	100			0		
Salt Control	4	10	10	0	100			0		
Salt Control	5	10	9	1	90	92.0	8.4	10	8.0	8.4
SV-23-SW	1	10	10	0	100			0		
SV-23-SW	2	10	10	0	100			0		
SV-23-SW	3	10	10	0	100			0		
SV-23-SW	4	10	10	0	100			0		
SV-23-SW	5	10	10	0	100	100.0	0.0	0	0.0	0.0
SV-23-A-Composite 1%	1	10	10	0	100			0		
SV-23-A-Composite 1%	2	10	9	1	90			10		
SV-23-A-Composite 1%	3	10	10	0	100			0		
SV-23-A-Composite 1%	4	12	11	1	91.7			8.3		
SV-23-A-Composite 1%	5	10	9	1	90	94.3	5.2	10	5.7	5.2
SV-23-A-Composite 10%	1	10	10	0	100			0		
SV-23-A-Composite 10%	2	10	10	0	100			0		
SV-23-A-Composite 10%	3	10	9	1	90			10		
SV-23-A-Composite 10%	4	10	10	0	100			0		
SV-23-A-Composite 10%	5	10	10	0	100	98.0	4.5	0	2.0	4.5
SV-23-A-Composite 50%	1	10	10	0	100			0		
SV-23-A-Composite 50%	2	10	10	0	100			0		
SV-23-A-Composite 50%	3	10	10	0	100			0		
SV-23-A-Composite 50%	4	10	8	2	80			20		
SV-23-A-Composite 50%	5	10	9	1	90	94.0	8.9	10	6.0	8.9
SV-23-A-Composite 100%	1	10	10	0	100			0		
SV-23-A-Composite 100%	2	10	9	1	90			10		
SV-23-A-Composite 100%	3	10	10	0	100			0		
SV-23-A-Composite 100%	4	10	7	3	70			30		
SV-23-A-Composite 100%	5	10	8	2	80	88.0	13.0	20	12.0	13.0

SPP Test Day 0 Ammonia

CLIENT		PROJECT				SPECIES
WSP		USCG Station Vallejo				*Americamysis bahia*
Calibration Standards Temperature:	20.6	**Date:**	12/26/2023	**Tech:**	MK	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	**Day**	**Overlying/ Porewater**	***Total NH_3 (mg/L)***	***NH_3 sample temp***	***Meter***	***Test salinity (ppt)***	***Test pH***	***Test temp (C)***	***Temp (K)***	***pKa[5]***	***Unionized NH_3 (mg/L)***	
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Notes
Control	0	Overlying	0.00	20.0	T17	29	8.1	19.4				
Salt Control	0	Overlying	0.0079	19.8	T17	28	8.1	19.0	292.15	9.2555	0.000	
SV-23-SW	0	Overlying	1.30	20.4	T17	28	8.1	19.6	292.75	9.2555	0.059	
SV-23-A-Composite 1%	0	Overlying	0.972	19.6	T17	29	8.1	19.5	292.65	9.2557	0.044	
SV-23-A-Composite 10%	0	Overlying	1.47	19.6	T17	29	8.1	19.4	292.55	9.2557	0.065	
SV-23-A-Composite 50%	0	Overlying	4.65	19.6	T17	30	8.0	19.2	292.35	9.2559	0.163	
SV-23-A-Composite 100%	0	Overlying	8.50	19.6	T17	30	8.0	19.0	292.15	9.2559	0.294	

SPP Test Day 4 Ammonia

CLIENT	PROJECT		SPECIES
WSP	USCG Station Vallejo		*Americamysis bahia*
Calibration Standards Temperature: 19.1	**Date:** 12/30/2023	**Tech:** SR	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*Meter*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*pKa^s*	*Unionized NH_3 (mg/L)*	
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Notes
Control	4	Overlying	1.33	19.6	T17	29	7.4	19.6	292.75	9.2557	0.012	
Salt Control	4	Overlying	0.875	19.8	T17	28	7.6	19.5	292.65	9.2555	0.013	
SV-23-SW	4	Overlying	1.39	19.6	T17	29	7.5	19.7	292.85	9.2557	0.016	
SV-23-A-Composite 1%	4	Overlying	1.18	19.6	T17	29	7.6	19.5	292.65	9.2557	0.017	
SV-23-A-Composite 10%	4	Overlying	2.36	19.6	T17	30	7.7	19.6	292.75	9.2559	0.044	
SV-23-A-Composite 50%	4	Overlying	7.17	19.6	T17	30	8.0	19.5	292.65	9.2559	0.257	
SV-23-A-Composite 100	4	Overlying	12.0	19.5	T17	30	8.2	19.5	292.65	9.2559	0.668	

3.2 *Americamysis bahia* SET Statistical Results

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	19-5391-6847	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	6DD3B7FEE15E67A30132B04EB87075DF	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix		
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO	**Age:**	5d

Sample ID:	03-4082-1464	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	100	>100	---	1	0.1185	12.34%

Dunnett Multiple Comparison Test

Control vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water	1	8	0.3769	2.305	0.1897	CDF	0.6571	Non-Significant Effect
	10	8	-0.3448	2.305	0.1897	CDF	0.8926	Non-Significant Effect
	50	8	0.396	2.305	0.1897	CDF	0.6490	Non-Significant Effect
	100	8	1.419	2.305	0.1897	CDF	0.2240	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0592173	0.0148043	4	0.874	0.4968	Non-Significant Effect
Error	0.338772	0.0169386	20			
Total	0.39799		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.985	13.28	0.4081	Equal Variances
	Levene Equality of Variance Test	1.736	4.431	0.1816	Equal Variances
	Mod Levene Equality of Variance Test	0.9798	4.893	0.4478	Equal Variances
Distribution	Anderson-Darling A2 Test	1.01	3.878	0.0118	Normal Distribution
	D'Agostino Kurtosis Test	0.0191	2.576	0.9848	Normal Distribution
	D'Agostino Skewness Test	1.612	2.576	0.1069	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	2.6	9.21	0.2726	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2081	0.2018	0.0067	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.9104	0.8877	0.0310	Normal Distribution

96h Proportion Survived Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
1		5	0.9433	0.8785	1.0000	0.9167	0.9000	1.0000	0.0233	5.53%	1.74%
10		5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	-2.08%
50		5	0.9400	0.8289	1.0000	1.0000	0.8000	1.0000	0.0400	9.52%	2.08%
100		5	0.8800	0.7181	1.0000	0.9000	0.7000	1.0000	0.0583	14.82%	8.33%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.3510	1.1820	1.5200	1.4120	1.1070	1.4120	0.0610	10.09%	0.00%
1		5	1.3200	1.2150	1.4250	1.2780	1.2490	1.4120	0.0379	6.42%	2.30%
10		5	1.3790	1.2890	1.4700	1.4120	1.2490	1.4120	0.0326	5.28%	-2.10%
50		5	1.3180	1.1480	1.4890	1.4120	1.1070	1.4120	0.0615	10.44%	2.41%
100		5	1.2340	1.0030	1.4650	1.2490	0.9912	1.4120	0.0833	15.09%	8.64%

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	19-5391-6847	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	6DD3B7FEE15E67A30132B04EB87075DF	**Editor ID:**	009-542-444-2

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	0.8000	1.0000	1.0000	1.0000
1		1.0000	0.9000	1.0000	0.9167	0.9000
10		1.0000	1.0000	0.9000	1.0000	1.0000
50		1.0000	1.0000	1.0000	0.8000	0.9000
100		1.0000	0.9000	1.0000	0.7000	0.8000

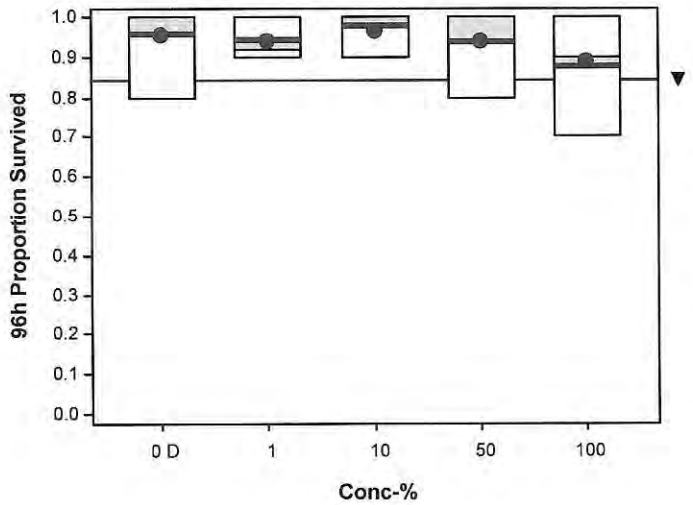
Angular (Corrected) Transformed Detail

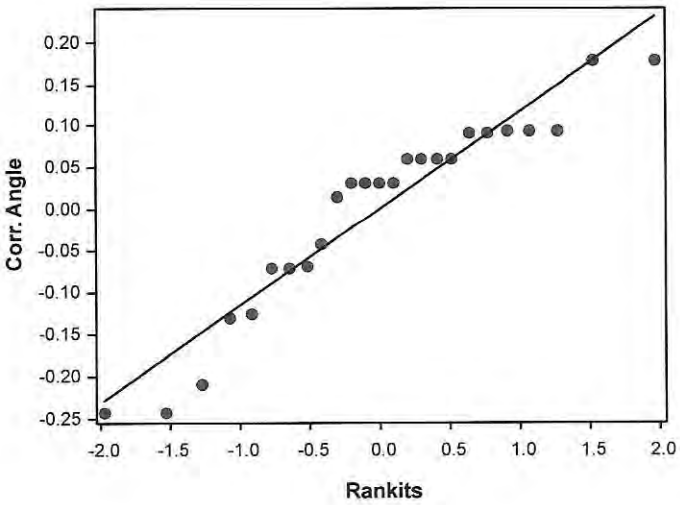
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.4120	1.1070	1.4120	1.4120	1.4120
1		1.4120	1.2490	1.4120	1.2780	1.2490
10		1.4120	1.4120	1.2490	1.4120	1.4120
50		1.4120	1.4120	1.4120	1.1070	1.2490
100		1.4120	1.2490	1.4120	0.9912	1.1070

96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	8/10	10/10	10/10	10/10
1		10/10	9/10	10/10	11/12	9/10
10		10/10	10/10	9/10	10/10	10/10
50		10/10	10/10	10/10	8/10	9/10
100		10/10	9/10	10/10	7/10	8/10

Graphics





Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	02-0496-6823	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	EDE87747FD6020F54F697D0FFC892CF8	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix		
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO	**Age:**	5d

Sample ID:	03-4082-1464	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	0	>0	---	---	0.08688	9.05%

Steel Many-One Rank Sum Test

Control I	vs	Control II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Dilution Water		Site Water	8	30	18	1	CDF	0.8427	Non-Significant Effect
		Salt Control	8	23.5	18	2	CDF	0.3152	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0398067	0.0199033	2	1.696	0.2246	Non-Significant Effect
Error	0.140834	0.0117362	12			
Total	0.180641		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
	Levene Equality of Variance Test	4.659	6.927	0.0318	Equal Variances
	Mod Levene Equality of Variance Test	1.438	8.022	0.2871	Equal Variances
Distribution	Anderson-Darling A2 Test	1.027	3.878	0.0107	Normal Distribution
	D'Agostino Skewness Test	2.114	2.576	0.0345	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2333	0.2542	0.0273	Normal Distribution
	Shapiro-Wilk W Normality Test	0.8589	0.8328	0.0233	Normal Distribution

96h Proportion Survived Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
0	SC	5	0.9200	0.8161	1.0000	0.9000	0.8000	1.0000	0.0374	9.09%	4.17%
0	SW	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-4.17%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.3510	1.1820	1.5200	1.4120	1.1070	1.4120	0.0610	10.09%	0.00%
0	SC	5	1.2860	1.1260	1.4460	1.2490	1.1070	1.4120	0.0577	10.03%	4.83%
0	SW	5	1.4120	1.4120	1.4120	1.4120	1.4120	1.4120	0.0000	0.00%	-4.51%

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	0.8000	1.0000	1.0000	1.0000
0	SC	0.8000	0.9000	1.0000	1.0000	0.9000
0	SW	1.0000	1.0000	1.0000	1.0000	1.0000

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	02-0496-6823	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	EDE87747FD6020F54F697D0FFC892CF8	**Editor ID:**	009-542-444-2

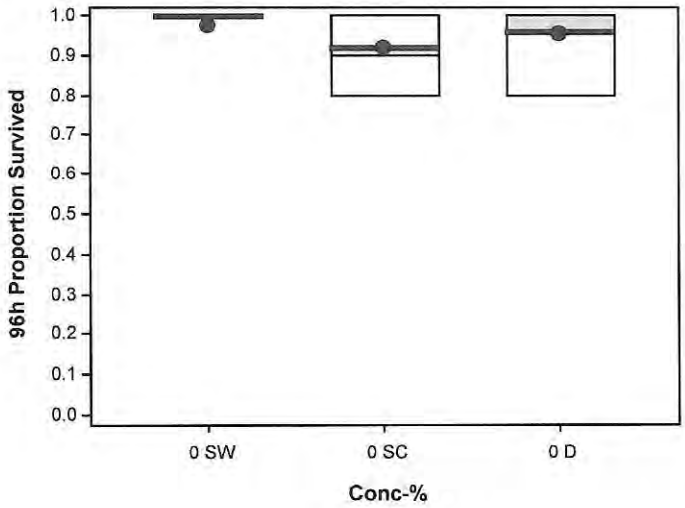
Angular (Corrected) Transformed Detail

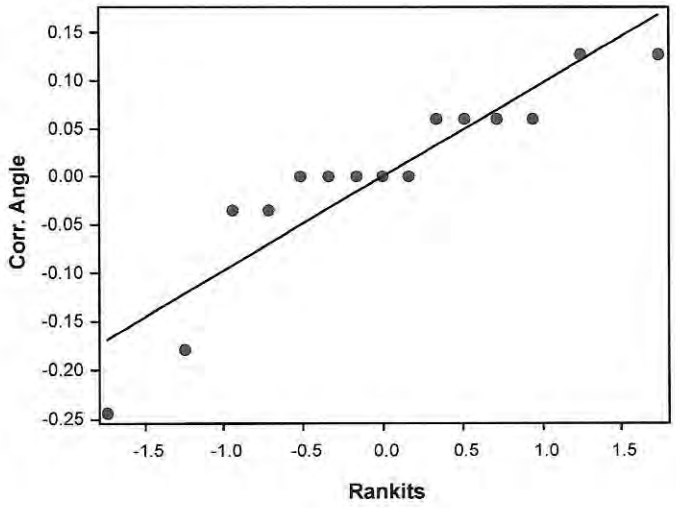
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.4120	1.1070	1.4120	1.4120	1.4120
0	SC	1.1070	1.2490	1.4120	1.4120	1.2490
0	SW	1.4120	1.4120	1.4120	1.4120	1.4120

96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	8/10	10/10	10/10	10/10
0	SC	8/10	9/10	10/10	10/10	9/10
0	SW	10/10	10/10	10/10	10/10	10/10

Graphics





Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	16-1127-1218	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	6DD3B7FEE15E67A30132B04EB87075DF	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix		
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO	**Age:**	5d

Sample ID:	03-4082-1464	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	463277	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
EC15	>100	---	---	<1	---	---
EC20	>100	---	---	<1	---	---
EC25	>100	---	---	<1	---	---
EC40	>100	---	---	<1	---	---
EC50	>100	---	---	<1	---	---

96h Proportion Survived Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Median**	**Min**	**Max**	**CV%**	**%Effect**	**ΣA/ΣB**	**Mean**	**%Effect**
0	D	5	0.9600	1.0000	0.8000	1.0000	9.32%	0.00%	48/50	0.9608	0.00%
1		5	0.9433	0.9167	0.9000	1.0000	5.53%	1.74%	49/52	0.9608	0.00%
10		5	0.9800	1.0000	0.9000	1.0000	4.56%	-2.08%	49/50	0.9608	0.00%
50		5	0.9400	1.0000	0.8000	1.0000	9.52%	2.08%	47/50	0.9400	2.16%
100		5	0.8800	0.9000	0.7000	1.0000	14.82%	8.33%	44/50	0.8800	8.41%

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	0.8000	1.0000	1.0000	1.0000
1		1.0000	0.9000	1.0000	0.9167	0.9000
10		1.0000	1.0000	0.9000	1.0000	1.0000
50		1.0000	1.0000	1.0000	0.8000	0.9000
100		1.0000	0.9000	1.0000	0.7000	0.8000

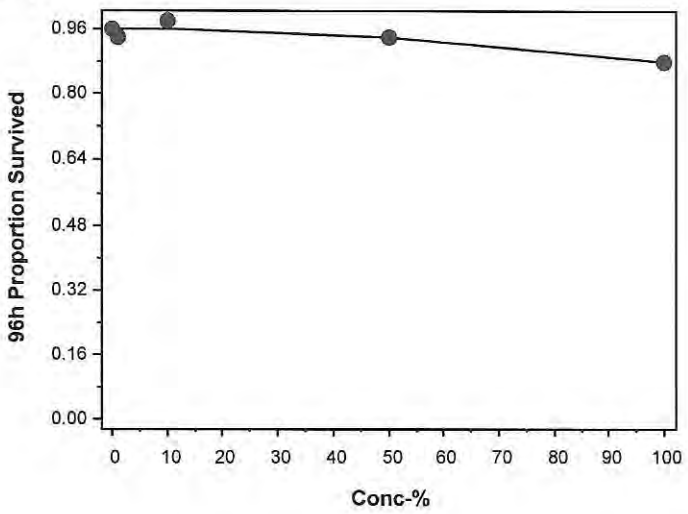
96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	8/10	10/10	10/10	10/10
1		10/10	9/10	10/10	11/12	9/10
10		10/10	10/10	9/10	10/10	10/10
50		10/10	10/10	10/10	8/10	9/10
100		10/10	9/10	10/10	7/10	8/10

Mysidopsis 96-h Acute Survival Test **EcoAnalysts**

Analysis ID:	16-1127-1218	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 11:00	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	03 Jan-24 10:59	**MD5 Hash:**	6DD3B7FEE15E67A30132B04EB87075DF	**Editor ID:**	009-542-444-2

Graphics



CETIS Test Data Worksheet

Report Date: 03 Jan-24 11:00 (p 1 of 1)
Test Code/ID: P231221.01 SET / 05-2151-5792

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Start Date:	26 Dec-23 16:00	**Species:**	Americamysis bahia	**Sample Code:**	P231221.01
End Date:	30 Dec-23 14:53	**Protocol:**	EPA-823-B-98-004 (1998)	**Sample Source:**	WSP USCG Vallejo
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Sample Station:**	SV-23-A-Composite

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	12	10				10	
0	D	2	20	10				8	
0	D	3	26	10				10	
0	D	4	24	10				10	
0	D	5	6	10				10	
0	SC	1	14	10				8	
0	SC	2	25	10				9	
0	SC	3	15	10				10	
0	SC	4	17	10				10	
0	SC	5	23	10				9	
0	SW	1	30	10				10	
0	SW	2	4	10				10	
0	SW	3	32	10				10	
0	SW	4	29	10				10	
0	SW	5	7	10				10	
1		1	9	10				10	
1		2	19	10				9	
1		3	33	10				10	
1		4	8	12				11	
1		5	18	10				9	
10		1	10	10				10	
10		2	5	10				10	
10		3	35	10				9	
10		4	22	10				10	
10		5	27	10				10	
50		1	34	10				10	
50		2	11	10				10	
50		3	13	10				10	
50		4	2	10				8	
50		5	31	10				9	
100		1	3	10				10	
100		2	28	10				9	
100		3	16	10				10	
100		4	1	10				7	
100		5	21	10				8	

3.3 *Americamysis bahia* Reference Toxicant Test Results

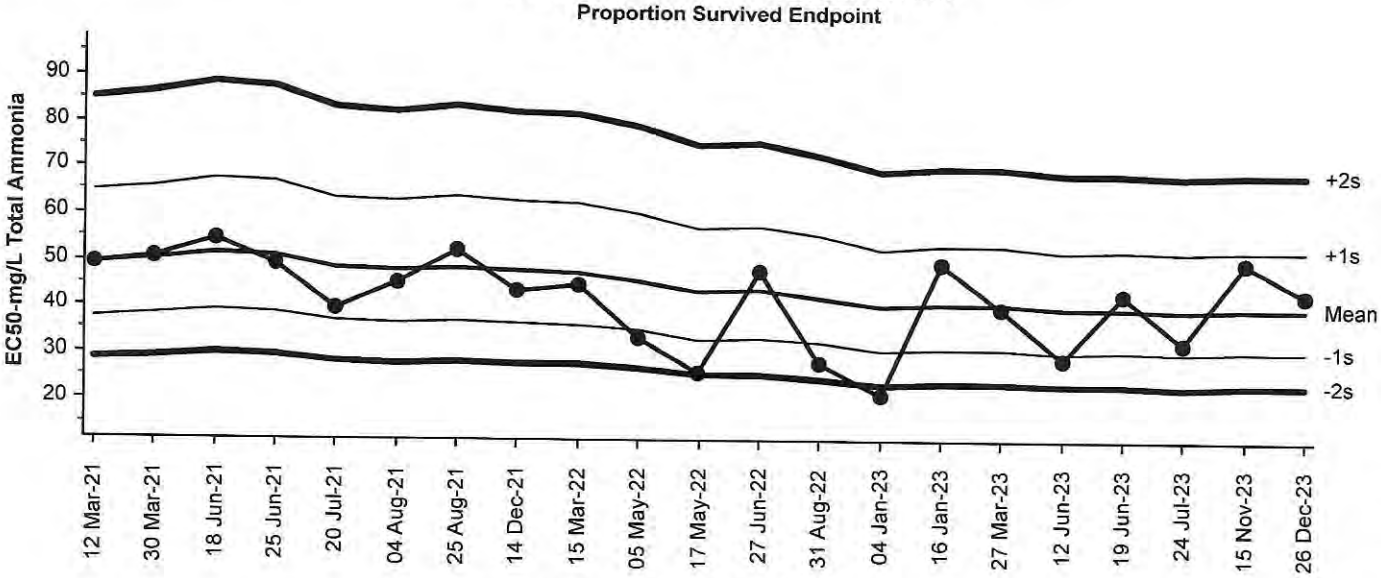
CETIS QC Plot

Report Date: 04 Jan-24 14:19 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival | **Organism:** Americamysis bahia | **Material:** Total Ammonia
Protocol: All Protocols | **Endpoint:** Proportion Survived | **Source:** Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test
Proportion Survived Endpoint



Lognormal Cumulative Mean Plot

Mean:	40.33	**Count:**	20	**-1s Warning Limit:**	30.7	**-2s Action Limit:**	23.4
Sigma:	NA	**CV:**	27.70%	**+1s Warning Limit:**	52.9	**+2s Action Limit:**	69.4

Quality Control Data

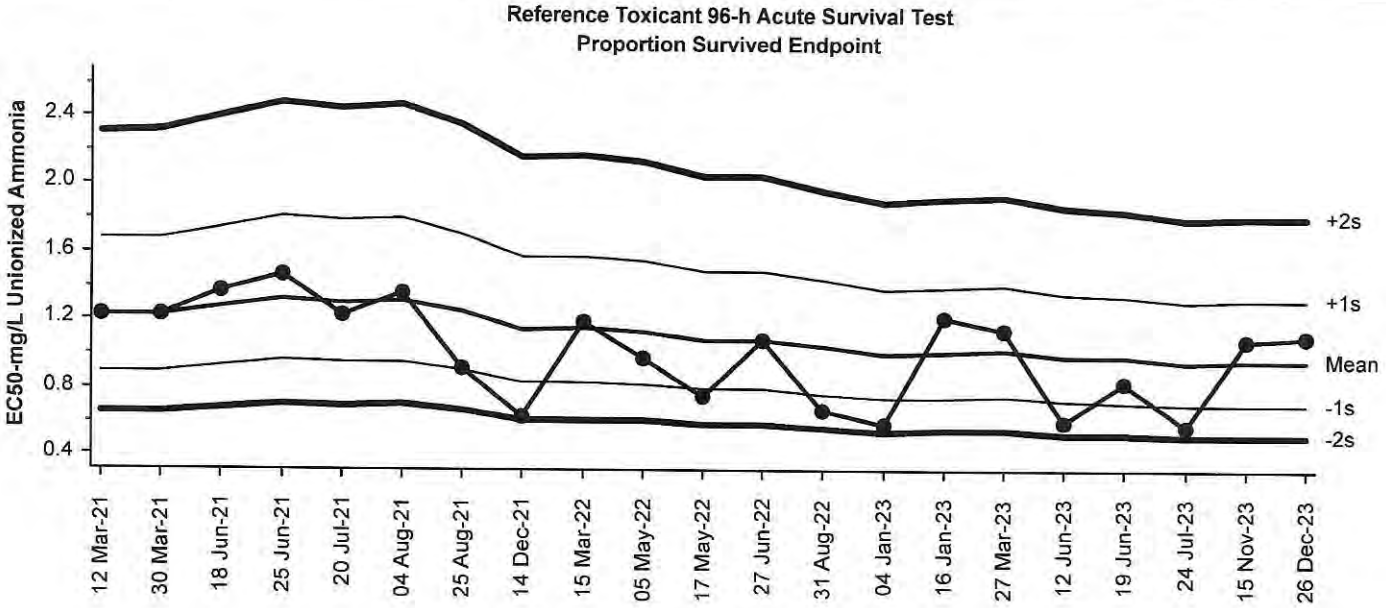
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2021	Mar	12	16:14	49.37	9.042	0.7446			18-5434-9515	18-6079-9086	EcoAnalysts
2			30	13:55	50.83	10.5	0.8518			17-3756-7744	04-0053-5233	EcoAnalysts
3		Jun	18	16:30	54.64	14.31	1.118	(+)		01-8844-2510	20-0148-5495	EcoAnalysts
4			25	14:10	49.31	8.98	0.7399			18-5484-8878	12-4713-5568	EcoAnalysts
5		Jul	20	14:00	39.61	-0.7117	-0.06554			13-1683-1120	17-0510-9818	EcoAnalysts
6		Aug	4	15:31	45.6	5.278	0.4527			18-5136-2569	14-9688-8086	EcoAnalysts
7			25	12:30	52.66	12.34	0.9823			17-5720-9959	08-5446-9120	EcoAnalysts
8		Dec	14	15:08	43.78	3.452	0.3023			12-2936-9872	13-6771-0841	EcoAnalysts
9	2022	Mar	15	14:58	45.09	4.768	0.4113			14-6373-5875	14-0865-4834	EcoAnalysts
10		May	5	14:59	33.55	-6.773	-0.6767			20-5665-2087	14-9264-7880	EcoAnalysts
11			17	15:00	25.96	-14.37	-1.621	(-)		09-5954-8213	20-8845-5762	EcoAnalysts
12		Jun	27	15:16	48.24	7.912	0.6594			04-2763-8518	05-6292-1544	EcoAnalysts
13		Aug	31	15:38	28.01	-12.31	-1.341	(-)		09-7289-9321	20-5773-2495	EcoAnalysts
14	2023	Jan	4	16:54	21.02	-19.31	-2.398	(-)	(-)	10-8405-7934	14-3917-7655	EcoAnalysts
15			16	15:20	49.73	9.406	0.7716			00-5023-4163	02-3920-9354	EcoAnalysts
16		Mar	27	16:15	40.05	-0.2772	-0.02539			19-9864-9381	05-2366-4559	EcoAnalysts
17		Jun	12	18:15	28.97	-11.36	-1.218	(-)		21-2321-1661	20-4768-3034	EcoAnalysts
18			19	16:45	43.42	3.097	0.2723			06-8112-6501	18-4426-3725	EcoAnalysts
19		Jul	24	16:30	32.5	-7.826	-0.7941			02-6642-7447	19-0861-9788	EcoAnalysts
20		Nov	15	17:58	50.11	9.779	0.7991			00-4605-6933	10-9410-9569	EcoAnalysts
21		Dec	26	16:30	43.27	2.947	0.2596			13-1008-6828	00-5880-8573	EcoAnalysts

CETIS QC Plot

Report Date: 04 Jan-24 14:19 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival
Protocol: All Protocols
Organism: Americamysis bahia
Endpoint: Proportion Survived
Material: Unionized Ammonia
Source: Reference Toxicant-REF



Lognormal Cumulative Mean Plot

Mean:	0.9618	**Count:**	20	**-1s Warning Limit:**	0.701	**-2s Action Limit:**	0.511
Sigma:	NA	**CV:**	32.40%	**+1s Warning Limit:**	1.32	**+2s Action Limit:**	1.81

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2021	Mar	12	16:14	1.222	0.26	0.7575			17-1664-8225	19-6080-5490	EcoAnalysts
2			30	13:55	1.23	0.2684	0.7793			06-7126-5819	07-8529-2108	EcoAnalysts
3		Jun	18	16:30	1.369	0.4074	1.118	(+)		19-2327-7644	12-0910-6238	EcoAnalysts
4			25	14:10	1.47	0.508	1.342	(+)		00-5444-4904	17-0668-6758	EcoAnalysts
5		Jul	20	14:00	1.231	0.2694	0.7816			21-3428-6324	03-0006-1373	EcoAnalysts
6		Aug	4	15:31	1.359	0.3975	1.095	(+)		19-6085-9640	19-2418-9451	EcoAnalysts
7			25	12:30	0.9194	-0.04237	-0.1426			14-8657-8854	05-3476-6843	EcoAnalysts
8		Dec	14	15:08	0.634	-0.3277	-1.319	(-)		14-0164-7935	04-7880-7084	EcoAnalysts
9	2022	Mar	15	14:58	1.188	0.2259	0.6678			05-3148-4351	02-2351-6255	EcoAnalysts
10		May	5	13:16	0.9754	0.01359	0.04441			04-9702-9945	01-1046-8829	EcoAnalysts
11			17	15:00	0.7469	-0.2148	-0.8002			16-5921-0010	03-4622-9967	EcoAnalysts
12		Jun	27	15:16	1.077	0.1157	0.3596			12-2407-7415	00-4815-6881	EcoAnalysts
13		Aug	31	15:38	0.6634	-0.2984	-1.176	(-)		17-7267-3915	03-6558-5310	EcoAnalysts
14	2023	Jan	4	16:54	0.5854	-0.3764	-1.572	(-)		10-6548-5923	16-8818-4872	EcoAnalysts
15			16	15:20	1.214	0.2522	0.7371			05-4678-2256	12-6429-6050	EcoAnalysts
16		Mar	27	16:15	1.148	0.1861	0.56			20-9684-0076	11-7055-4789	EcoAnalysts
17		Jun	12	18:15	0.5993	-0.3625	-1.497	(-)		06-0472-2561	09-2691-9150	EcoAnalysts
18			19	16:45	0.8284	-0.1334	-0.4726			05-1147-3109	17-9769-0664	EcoAnalysts
19		Jul	24	16:30	0.5742	-0.3876	-1.633	(-)		12-8316-1267	13-1741-4110	EcoAnalysts
20		Nov	15	17:58	1.081	0.1189	0.3691			12-4902-1440	05-5971-1725	EcoAnalysts
21		Dec	26	16:30	1.106	0.1444	0.4429			09-2094-8244	10-4460-8525	EcoAnalysts

CETIS Summary Report

Report Date: 04 Jan-24 14:15 (p 1 of 1)
Test Code/ID: P220819.106 / 13-1008-6828

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Batch ID:	02-7337-9794	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 16:13	**Species:**	Americamysis bahia	**Brine:**	Not Applicable
Test Length:	96h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	18-4224-6568	**Code:**	P220819.106	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.106
Sample Age:	494d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
12-1508-3963	Proportion Survived	Fisher Exact Test		27.7	54.4	38.82	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
00-5880-8573	Proportion Survived	Linear Interpolation (ICPIN)		EC15	31.69	27.78	32.64	1
				EC20	33.13	29.03	34.46	
				EC25	34.65	30.32	36.38	
				EC40	39.6	34.56	42.78	
				EC50	43.27	37.41	47.64	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
14.3		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
27.7		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
54.4		3	0.2333	-0.0535	0.5202	0.1000	0.3000	0.0667	0.1155	49.49%	75.86%
76.2		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
109		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail MD5: 339A8E6E1FCBB361118F88CA03EA29A0

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
14.3		0.9000	1.0000	1.0000
27.7		0.9000	1.0000	1.0000
54.4		0.3000	0.1000	0.3000
76.2		0.0000	0.0000	0.0000
109		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
14.3		9/10	10/10	10/10
27.7		9/10	10/10	10/10
54.4		3/10	1/10	3/10
76.2		0/10	0/10	0/10
109		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 04 Jan-24 14:14 (p 1 of 1)
Test Code/ID: P220819.106 / 13-1008-6828

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Start Date:	26 Dec-23 16:30	**Species:**	Americamysis bahia	**Sample Code:**	P220819.106
End Date:	30 Dec-23 16:13	**Protocol:**	EPA/821/R-02-012 (2002)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.106

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	4	10	9	
0	D	2	7	10	10	
0	D	3	10	10	10	
14.3		1	14	10	9	
14.3		2	11	10	10	
14.3		3	2	10	10	
27.7		1	18	10	9	
27.7		2	9	10	10	
27.7		3	5	10	10	
54.4		1	8	10	3	
54.4		2	17	10	1	
54.4		3	15	10	3	
76.2		1	16	10	0	
76.2		2	6	10	0	
76.2		3	3	10	0	
109		1	12	10	0	
109		2	13	10	0	
109		3	1	10	0	

CETIS Summary Report

Report Date:	04 Jan-24 14:18 (p 1 of 1)
Test Code/ID:	P220819.106UIA / 09-2094-8244

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Batch ID:	02-7337-9794	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 16:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Dec-23 16:13	**Species:**	Americamysis bahia	**Brine:**	Not Applicable		
Test Length:	96h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO	**Age:**	5d

Sample ID:	04-0502-0244	**Code:**	P220819.106UIA	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.106UIA
Sample Age:	494d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
04-6003-2288	Proportion Survived	Fisher Exact Test		0.813	1.276	1.019	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
10-4460-8525	Proportion Survived	Linear Interpolation (ICPIN)		EC15	0.8964	0.8166	0.9143	1
				EC20	0.925	0.8434	0.9493	
				EC25	0.9541	0.8748	0.985	
				EC40	1.044	0.9644	1.096	
				EC50	1.106	1.006	1.173	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
0.42		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
0.813		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
1.276		3	0.2333	-0.0535	0.5202	0.1000	0.3000	0.0667	0.1155	49.49%	75.86%
1.8		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
2.055		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail — MD5: 9031B1DAA50732BFF0E40ACF617DF0A3

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
0.42		0.9000	1.0000	1.0000
0.813		0.9000	1.0000	1.0000
1.276		0.3000	0.1000	0.3000
1.8		0.0000	0.0000	0.0000
2.055		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
0.42		9/10	10/10	10/10
0.813		9/10	10/10	10/10
1.276		3/10	1/10	3/10
1.8		0/10	0/10	0/10
2.055		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 04 Jan-24 14:18 (p 1 of 1)
Test Code/ID: P220819.106UIA / 09-2094-8244

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Start Date:	26 Dec-23 16:30	**Species:**	Americamysis bahia	**Sample Code:**	P220819.106UIA
End Date:	30 Dec-23 16:13	**Protocol:**	EPA/821/R-02-012 (2002)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.106UIA

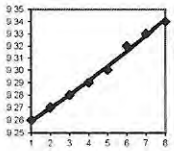
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	3	10	9	
0	D	2	8	10	10	
0	D	3	5	10	10	
0.42		1	2	10	9	
0.42		2	13	10	10	
0.42		3	4	10	10	
0.813		1	6	10	9	
0.813		2	7	10	10	
0.813		3	12	10	10	
1.276		1	1	10	3	
1.276		2	11	10	1	
1.276		3	9	10	3	
1.8		1	15	10	0	
1.8		2	17	10	0	
1.8		3	18	10	0	
2.055		1	10	10	0	
2.055		2	16	10	0	
2.055		3	14	10	0	

Un-ionized Ammonia Calculator

CLIENT:	WSP	Date of Test:	December 26, 2023
PROJECT:	Vallejo	Test Type:	*Mysid RT*
COMMENTS:	P220819.106		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Ionic strength	pKa^s
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



$y = 0.0003x^2 + 0.0091x + 9.2502$

...

	Sample	Mod	*NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	*temp (K)*	*pKa^s*		NH_3U (mg/L)
	Target / Sample Name		Actual	Actual	Actual	Actual	Calculated	Calculated		**Calculated**
	Example 3.5		2.000	10.0	7.5	5.0	278.15	9.2520		**0.008**
1										
2	10		14.3	29	7.9	19.8	292.95	9.2557		**0.420**
3	20		27.7	29	7.9	19.8	292.95	9.2557		**0.813**
4	40		54.4	29	7.8	19.8	292.95	9.2557		**1.276**
5	60		76.2	29	7.8	19.9	293.05	9.2557		**1.800**
6	80		109	30	7.7	19.9	293.05	9.2559		**2.055**
7										
8										
9										
10										
11										
12										
13										
14										
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ECO ANALYSTS

96-Hour Mysid Ammonia Reference Toxicant Test

Toxicant:	Ammonium Chloride
Ref Tox ID:	P220819.106
Lot #:	22E3156086
Protocol:	TOX099
Replicates:	3

Date Test Started:	12/26/2023
Date Test Ended:	12/30/2023
Matrix:	Liquid
Species:	*Americamysis bahia*
No. of Org. per Chamber:	10

	Conc.	Meter #:	DO (mg/L) (≥3.1)	Meter #:	Temp (°C) (20±1°C)	Meter #:	Salinity (ppt) (28±2ppt)	Meter #:	pH (7 - 9)
Day 0 (Stock)	Control	B	7.5	B	19.9	B	29	B	7.9
Date: 12/26/23	10		7.6		19.8		29		7.9
Time: 1240	20		7.6		19.8		29		7.9
Technician: JL	40		7.7		19.8		29		7.8
	60		7.7		19.9		29		7.8
PM Feed: CS	80		7.7		19.9		30		7.7

		Day 1	Day 2	Day 3	Day 4
Temperature (OLD)		20.7	20.3	19.6	
Temperature (NEW)			—		
Feed: 0.1mL *Artemia* (Time/Init.)	AM	UG	TW	MK 0900	SR
	PM	MS	JL	NL 1905	

Day 4	Control	8	4.6	8	19.8	8	29	8	7.4
Date: 12/30/23	10		5.1		19.7		30		7.5
Time: 1259	20		4.9		19.9		29		7.6
Replicate No.: 3	40		5.8		19.8		30		7.7
Technician: TT	60		—		—		—		—
	80		—		—		—		—

Dilution Preparation (Mysid NH_3 RT Spiking Worksheet)

Test Solution NH_3 Concentration				Volume of Stock to Reach Desired Concentration	
Measured		Desired	Volume		
mg/L		mg/L	mL	mL stock to increase	
Day 0	Day 2				SALT WATER
0.60		**0**	750		**0.000**
14.3		**10**	750		**1.200**
27.7		**20**	750		**2.400**
54.4		**40**	750		**4.801**
76.2		**60**	750		**7.201**
109		**80**	750		**9.602**

Start Time:	1630 JL, MK
End Time:	1613 SR
Test Acceptability:	≥90% survival in control

Test Location:	Bath 3	
Dilution Water Batch:	FSW122323.01	
Supplier:	Aquatic BioSystems	
Organism Batch:	ABS122223	Age: 5d
Chamber Size/Type:	12 oz. Cup	
Exposure Volume:	250 mL	

ECO ANALYSTS, INC.

96-Hour Mysid Ammonia Reference Toxicant Test

Toxicant:	Ammonium Chloride
Ref Tox ID:	P22OB19.106
Species:	*Americamysis bahia*

Date Test Started:	12/26/2023
Date Test Ended:	12/30/2023

Concentration	Rep	Day 1 Date: 12/27/23 Time: 2450		Day 2 Date: 12/28/23 Time: 1015		Day 3 Date: 12/29/23 Time: 1240		Day 4 Date: 12/30/23 Time: 1623	
		# Alive	# Dead	# Alive	# Dead	# Alive	# Dead	# Alive	# Dead
Control	1	10	0	10	0	9	INB	~~10~~ 9 ②	0
	2	10	0	10	0	10	0	10	0
	3	10	0	10	0	10	0	10	0
10	1	10	0	9	INB	9	0	9	0
	2	10	0	10	0	10	0	10	0
	3	10	0	10	0	10	0	10	0
20	1	10	0	10	0	10	0	9	1
	2	10	0	10	0	10	0	10	0
	3	10	0	11 ①	0	10	0	10	0
40	1	9	1	6	2, INB	6	0	3	3
	2	10	0	7	3	7	0	1	6
	3	10	0	7	3	6	1	3	3, INB
60	1	6	3, INB	0	6	—	—	—	—
	2	8	2	0	8	—	—	—	—
	3	6	4	1	5	0	1	—	—
80	1	5	5	0	5	—	—	—	—
	2	0	10	—	—	—	—	—	—
	3	3	7	0	3	—	—	—	—
INITIALS:		SR		TW		MK		SR	

① typo? mk 12/29.

② IE - SR 12/30/23

4. *Mytilus galloprovincialis* SET SPP Water-Column Test

4.1 *Mytilus galloprovincialis* SET Test Data

Version T.2

GENERAL

Client	WSP
Project	USCG Station Vallejo
Project Number	PG1617
Project Manager	M. Knowlen
Date Sample Collected (Oldest Sample)	12/12/2023
Sample Holding Time	14
Test Start Date	12/26/23
Test End Date	12/28/23
Test Species	*Mytilus galloprovincialis*
Organism Supplier	Taylor Shellfish
Date Organism Acquired	12/15/2023
Organism Acclimation Time (Days)	11
Organism Batch	TS121523.01
Test Type	Larval Development SPP
Test Protocol	OTM/ITM
Regional Protocol	San Francisco Bay
Laboratory Location	Port Gamble
Test Location	Incubator 1
Sample Treatment	Increased salinity
Water Batch	FSW122623.01
Test Lighting	16L:8D
Test Chamber	26 mL shell vials
Replicates Per Treatment	5
Exposure Volume	10 mL
Test Dissolved Oxygen	> 3.3
Test Temperature	16 ± 1
Test Salinity	28 ± 1
Test pH	8 ± 1

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	**Max**
DO:	3.3	
Temp:	14.5	17.4
Sal:	27	29
pH:	7	9

TEST START TIME:	17:00
TEST END TIME:	17:20

	CLIENT SAMPLE ID	LAB ID
Control	Control	.
2	Salt Control	CSMM122623.02
3	SV-23-SW	P231222.01
4	SV-23-A-Composite 1%	P231221.01
5	SV-23-A-Composite 10%	P231221.01
6	SV-23-A-Composite 50%	P231221.01
7	SV-23-A-Composite 100%	P231221.01
8	SV-23-A-Composite AR 100%	P231221.01
9	.	.
10	.	.
11	.	.
12	.	.
13	.	.
14	.	.
15	.	.
16	.	.
17	.	.

EcoAnalysts, Inc.

SPP ELUTRIATE PREPARATION WORKSHEET

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER
WSP	USCG Station Vallejo	PG1617	M. Knowlen

DILUENT SOURCE: (sitewater/labwater):

sitewater

PROJECT SITEWATER CLIENT ID:	LABORATORY WATER LAB ID:
SV-23-SW	

STANDARD ELUTRIATE IS PREPARED AT 1 PART SEDIMENT TO 4 PARTS WATER

ELUTRIATE RATIO SELECTED:	1:4	**AR = 1:4**
TOTAL VOLUME OF ELUTRIATE PREPARATION VESSEL:	8 L	AR = 500 mL
VOLUME OF SEDIMENT PER SAMPLE:	1.125 L	AR= 100 mL
VOLUME OF DILUENT:	4.5 L	AR = 400 mL
TOTAL NUMBER OF PREPARTION VESSELS PER SAMPLE:	1	AR = 1

# Cont's	Sample ID	Date Spin Start	Time Spin Start	Time Settle Start	Time of Elutriate Collection	Initial Volume Recovered (units)	Centrifuged (Y/N)	Settled Overnight (Y/N)	Secondary Volume Recovered (units)	Total Volumne (units)	Comments
1	SV-23-A-Composite	12/26/23	845	915	1015	0 L	Y	N	3 L	3 L	Shared w/ mysid test. After 1 hr settling, elutriate still too turbid. Centrifuged to recover. MK 12/26/23
1	SV-23-A-Composite AR	12/26/23	1010	1040	1140	100 mL	Y	N	200 mL	300 mL	Ammonia-reduced treatment for larval. Poor settling; centrifuged to recover more volume.

SPP Larval Test

CLIENT	PROJECT	PROJECT NUMBER	PROJECT MANAGER	LABORATORY	PROTOCOL
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble , Incubator 1	OTM/ITM , San Francisco B

TEST ORGANISM SPAWNING DATA

SPECIES			**TEST START DATE**	**SEDIMENT TREATMENT**	
Mytilus galloprovincialis			26-Dec-23	Increased salinity	
SUPPLIER			**ORGANISM BATCH**	**TEST CHAMBERS**	
Taylor Shellfish			TS121523.01	26 mL shell vials	
SPAWNING METHOD		**INITIAL SPAWNING TIME**	**FINAL SPAWNING TIME**	**EXPOSURE VOLUME**	
Heat Shock		1255	1400	10 mL	
MALES	**FEMALES**	**SPERM VIABILITY**	**EGG CONDITION**	**TIME OF INITIATION**	**INITIALS**
4	7	Good	Good	17:00	JL MK
BEGIN FERTILIZATION	**END FERTILIZATION**		**CONDITION OF EMBRYOS**	**ROSE BENGAL LOT #**	**FORMALIN LOT #**
1405	17:00		Good	5135	230724-07

EMBRYO DENSITY CALCULATIONS

# of embryos in 1 mL of 100X diluted embryo stock

Count 1	Count 2	Mean
312	274	293

 # embryos in original stock = # of embryos in diluted stock x 100

29300

Percentage of embryo stock needed = 2700 embryos per 1 mL/# embryos in original stock

0.09

mL of egg stock to add to FSW to achieve total volume = percentage of embro stock needed * 40 mL (or desired volume of embryo stock)

3.69 **Add this volume to beaker and dilute to 40 mL (or desired volume of embryo stock) with FSW = final embryo stock**

Add 0.1 mL of final embryo stock to test chambers

SPP Larval Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION		PROTOCOL		
WSP	USCG Station Vallejo	*Mytilus galloprovincialis*	Port Gamble / Incubator 1		OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**Project Number**	**TEST START DATE**	**TIME**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	Larval Development SPP	PG1617	December 26, 2023	17:00	December 28, 2023	17:20	TW

WATER QUALITY DATA

SAMPLE ID (CONCENTRATION %)	DAY	REP	TECHNICIAN	Date	Meter	DO (mg/L) > 3.3	TEMP (°C) 15 - 17	SALINITY (ppt) 27 - 29	pH 7 - 9	Notes
Control	0	Surr	MK	12/26/23	9	8.2	17.0	28	7.6	
Control	1	Surr	SR	12/27/23	7	8.0	17.0	28	7.4	
Control	2	Surr	TW	12/28/23	7	8.1	16.0	28	7.7	
Control	3	Surr								
Control	4	Surr								
Salt Control	0	Surr	MK	12/26/23	9	8.1	17.0	28	7.8	
Salt Control	1	Surr	SR	12/27/23	7	8.0	16.7	28	7.6	
Salt Control	2	Surr	TW	12/28/23	7	8.2	16.0	28	7.8	
Salt Control	3	Surr								
Salt Control	4	Surr								
SV-23-SW	0	Surr	MK	12/26/23	9	8.0	17.0	28	7.9	
SV-23-SW	1	Surr	SR	12/27/23	7	8.0	16.4	28	7.8	
SV-23-SW	2	Surr	TW	12/28/23	7	8.2	16.0	28	7.9	
SV-23-SW	3	Surr								
SV-23-SW	4	Surr								
SV-23-A-Composite 1%	0	Surr	MK	12/26/23	9	8.2	17.0	28	7.8	
SV-23-A-Composite 1%	1	Surr	SR	12/27/23	7	8.0	17.0	28	7.8	
SV-23-A-Composite 1%	2	Surr	TW	12/28/23	7	8.2	16.0	29	7.9	
SV-23-A-Composite 1%	3	Surr								
SV-23-A-Composite 1%	4	Surr								
SV-23-A-Composite 10%	0	Surr	MK	12/26/23	9	8.3	17.0	28	7.8	
SV-23-A-Composite 10%	1	Surr	SR	12/27/23	7	8.0	17.1	29	7.8	
SV-23-A-Composite 10%	2	Surr	TW	12/28/23	7	8.1	16.0	29	7.9	
SV-23-A-Composite 10%	3	Surr								
SV-23-A-Composite 10%	4	Surr								

SPP Larval Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION		PROTOCOL		
WSP	USCG Station Vallejo	*Mytilus galloprovincialis*	Port Gamble / Incubator 1		OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**Project Number**	**TEST START DATE**	**TIME**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	Larval Development SPP	PG1617	December 26, 2023	17:00	December 28, 2023	17:20	TW

WATER QUALITY DATA

SAMPLE ID (CONCENTRATION %)	DAY	REP	TECHNICIAN	Date	Meter	DO (mg/L) > 3.3	TEMP (°C) 15 - 17	SALINITY (ppt) 27 - 29	pH 7 - 9	Notes
SV-23-A-Composite 50%	**0**	Surr	MK	12/26/23	9	8.2	17.0	29	7.9	
SV-23-A-Composite 50%	**1**	Surr	SR	12/27/23	7	8.0	16.9	29	7.9	
SV-23-A-Composite 50%	**2**	Surr	TW	12/28/23	7	8.0	16.0	29	8.1	
SV-23-A-Composite 50%	**3**	Surr								
SV-23-A-Composite 50%	**4**	Surr								
SV-23-A-Composite 100%	**0**	Surr	MK	12/26/23	9	8.1	17.0	30	8.0	Sample salinity increased slightly after salting. Within range of test organism. MK 12/26
SV-23-A-Composite 100%	**1**	Surr	SR	12/27/23	7	7.9	16.9	30	8.1	
SV-23-A-Composite 100%	**2**	Surr	TW	12/28/23	7	8.0	16.0	30	8.3	
SV-23-A-Composite 100%	**3**	Surr								
SV-23-A-Composite 100%	**4**	Surr								
SV-23-A-Composite AR 100%	**0**	Surr	MK	12/26/23	9	7.8	17.0	28	8.1	
SV-23-A-Composite AR 100%	**1**	Surr	SR	12/27/23	7	8.1	16.2	29	8.1	
SV-23-A-Composite AR 100%	**2**	Surr	TW	12/28/23	7	8.1	16.0	29	8.1	
SV-23-A-Composite AR 100%	**3**	Surr								
SV-23-A-Composite AR 100%	**4**	Surr								

SPP Larval Test Summary

CLIENT	PROJECT	PROJECT NUMBER
WSP	USCG Station Vallejo	PG1617
PROJECT MANAGER	**TEST TYPE**	**SPECIES**
M. Knowlen	Larval Development SPP	*Mytilus galloprovincialis*

LARVAL ENDPOINT DATA

Sample ID (Concentration %)	Rep	# Normal	# Abnormal	Total	Date	Tech	Comments / QA Counts
Stocking Density	1			187	01/03/24	MK	
Stocking Density	2			222	01/03/24	MK	
Stocking Density	3			227	01/03/24	MK	
Stocking Density	4			232	01/03/24	MK	
Stocking Density	5			241	01/03/24	MK	
Control	1	235	10	245	01/02/24	MK	
Control	2	226	10	236	01/02/24	MK	
Control	3	229	15	244	01/02/24	MK	
Control	4	207	10	217	01/02/24	MK	
Control	5	204	9	213	01/02/24	MK	
Salt Control	1	215	11	226	01/02/24	MK	
Salt Control	2	205	12	217	01/02/24	MK	
Salt Control	3	244	9	253	01/02/24	MK	
Salt Control	4	232	11	243	01/02/24	MK	
Salt Control	5	214	24	238	01/02/24	MK	
SV-23-SW	1	227	3	230	01/03/24	MK	
SV-23-SW	2	222	8	230	01/03/24	MK	
SV-23-SW	3	237	7	244	01/03/24	MK	
SV-23-SW	4	216	6	222	01/03/24	MK	
SV-23-SW	5	222	7	229	01/02/24	MK	
SV-23-A-Composite 1%	1	226	4	230	01/03/24	MK	
SV-23-A-Composite 1%	2	213	13	226	01/03/24	MK	
SV-23-A-Composite 1%	3	213	10	223	01/03/24	MK	
SV-23-A-Composite 1%	4	235	19	254	01/03/24	MK	
SV-23-A-Composite 1%	5	209	9	218	01/02/24	MK	
SV-23-A-Composite 10%	1	226	11	237	01/03/24	MK	
SV-23-A-Composite 10%	2	191	7	198	01/03/24	MK	
SV-23-A-Composite 10%	3	215	7	222	01/02/24	MK	
SV-23-A-Composite 10%	4	212	9	221	01/02/24	MK	
SV-23-A-Composite 10%	5	175	14	189	01/02/24	MK	
SV-23-A-Composite 50%	1	149	68	217	01/03/24	MK	
SV-23-A-Composite 50%	2	150	81	231	01/03/24	MK	
SV-23-A-Composite 50%	3	137	101	238	01/02/24	MK	
SV-23-A-Composite 50%	4	146	80	226	01/02/24	MK	
SV-23-A-Composite 50%	5	134	95	229	01/02/24	MK	

SPP Larval Test Summary

CLIENT	PROJECT	PROJECT NUMBER
WSP	USCG Station Vallejo	PG1617
PROJECT MANAGER	**TEST TYPE**	**SPECIES**
M. Knowlen	Larval Development SPP	*Mytilus galloprovincialis*

LARVAL ENDPOINT DATA

Sample ID (Concentration %)	Rep	# Normal	# Abnormal	Total	Date	Tech	Comments / QA Counts
SV-23-A-Composite 100%	1	0	227	227	01/03/24	MK	
SV-23-A-Composite 100%	2	0	209	209	01/03/24	MK	
SV-23-A-Composite 100%	3	0	217	217	01/03/24	MK	
SV-23-A-Composite 100%	4	0	192	192	01/03/24	MK	
SV-23-A-Composite 100%	5	0	207	207	01/02/24	MK	
SV-23-A-Composite AR 100%	1	177	32	209	01/02/24	MK	
SV-23-A-Composite AR 100%	2	200	17	217	01/02/24	MK	
SV-23-A-Composite AR 100%	3	200	24	224	01/02/24	MK	
SV-23-A-Composite AR 100%	4	209	15	224	01/02/24	MK	
SV-23-A-Composite AR 100%	5	199	18	217	01/02/24	MK	

SPP Larval Test Summary

CLIENT	PROJECT	PROJECT NUMBER	LOCATION
WSP	USCG Station Vallejo	PG1617	Port Gamble / Incubator 1
PROJECT MANAGER	**TEST TYPE**	**SPECIES**	**PROTOCOL**
M. Knowlen	Larval Development SPP	*Mytilus galloprovincialis*	OTM/ITM , San Francisco Bay

LARVAL ENDPOINT STATS

Sample ID (Concentration %)	Rep	# Normal	# Abnormal	Total	% Survival	Mean % Survival	SD	% Normal	Mean % Normal	SD	% Combined Endpoint	Mean % Combined Endpoint	SD
Stocking Density	1			187									
Stocking Density	2			222									
Stocking Density	3			227									
Stocking Density	4			232		Average Stocking Density	SD Stocking Density						
Stocking Density	5			241		221.8	20.7						
Control	1	235	10	245	1.00			0.96			1.00		
Control	2	226	10	236	1.00			0.96			1.00		
Control	3	229	15	244	1.00			0.94			1.00		
Control	4	207	10	217	0.98			0.95			0.93		
Control	5	204	9	213	0.96	0.99	0.02	0.96	0.95	0.01	0.92	0.97	0.04
Salt Control	1	215	11	226	1.00			0.95			0.97		
Salt Control	2	205	12	217	0.98			0.94			0.92		
Salt Control	3	244	9	253	1.00			0.96			1.00		
Salt Control	4	232	11	243	1.00			0.95			1.00		
Salt Control	5	214	24	238	1.00	1.00	0.01	0.90	0.94	0.03	0.96	0.97	0.03
SV-23-SW	1	227	3	230	1.00			0.99			1.00		
SV-23-SW	2	222	8	230	1.00			0.97			1.00		
SV-23-SW	3	237	7	244	1.00			0.97			1.00		
SV-23-SW	4	216	6	222	1.00			0.97			0.97		
SV-23-SW	5	222	7	229	1.00	1.00	0.00	0.97	0.97	0.01	1.00	0.99	0.01
SV-23-A-Composite 1%	1	226	4	230	1.00			0.98			1.00		
SV-23-A-Composite 1%	2	213	13	226	1.00			0.94			0.96		
SV-23-A-Composite 1%	3	213	10	223	1.00			0.96			0.96		
SV-23-A-Composite 1%	4	235	19	254	1.00			0.93			1.00		
SV-23-A-Composite 1%	5	209	9	218	0.98	1.00	0.01	0.96	0.95	0.02	0.94	0.97	0.03
SV-23-A-Composite 10%	1	226	11	237	1.00			0.95			1.00		
SV-23-A-Composite 10%	2	191	7	198	0.89			0.96			0.86		
SV-23-A-Composite 10%	3	215	7	222	1.00			0.97			0.97		
SV-23-A-Composite 10%	4	212	9	221	1.00			0.96			0.96		
SV-23-A-Composite 10%	5	175	14	189	0.85	0.95	0.07	0.93	0.95	0.02	0.79	0.92	0.09
SV-23-A-Composite 50%	1	149	68	217	0.98			0.69			0.67		
SV-23-A-Composite 50%	2	150	81	231	1.00			0.65			0.68		
SV-23-A-Composite 50%	3	137	101	238	1.00			0.58			0.62		
SV-23-A-Composite 50%	4	146	80	226	1.00			0.65			0.66		
SV-23-A-Composite 50%	5	134	95	229	1.00	1.00	0.01	0.59	0.63	0.05	0.60	0.65	0.03
SV-23-A-Composite 100%	1	0	227	227	1.00			0.00			0.00		
SV-23-A-Composite 100%	2	0	209	209	0.94			0.00			0.00		
SV-23-A-Composite 100%	3	0	217	217	0.98			0.00			0.00		
SV-23-A-Composite 100%	4	0	192	192	0.87			0.00			0.00		
SV-23-A-Composite 100%	5	0	207	207	0.93	0.94	0.05	0.00	0.00	0.00	0.00	0.00	0.00
SV-23-A-Composite AR 100%	1	177	32	209	0.94			0.85			0.80		
SV-23-A-Composite AR 100%	2	200	17	217	0.98			0.92			0.90		
SV-23-A-Composite AR 100%	3	200	24	224	1.00			0.89			0.90		
SV-23-A-Composite AR 100%	4	209	15	224	1.00			0.93			0.94		
SV-23-A-Composite AR 100%	5	199	18	217	0.98	0.98	0.02	0.92	0.90	0.03	0.90	0.89	0.05

SPP Larval Test Day 0 Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Mytilus galloprovincialis*
Calibration Standards Temperature: 20.6	**Date:** 12/26/2023	**Tech:** MK	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*Meter*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*pKa^s*	*Unionized NH_3 (mg/L)*	
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Notes
Control	0	Overlying	0.303	19.8	T17	28	7.6	17.0	290.15	9.2555	0.004	
Salt Control	0	Overlying	0.116	19.7	T17	28	7.8	17.0	290.15	9.2555	0.002	
SV-23-SW	0	Overlying	0.0950	19.7	T17	28	7.9	17.0	290.15	9.2555	0.002	
SV-23-A-Composite 1%	0	Overlying	0.403	19.6	T17	28	7.8	17.0	290.15	9.2555	0.008	
SV-23-A-Composite 10%	0	Overlying	1.70	19.9	T17	28	7.8	17.0	290.15	9.2555	0.033	
SV-23-A-Composite 50%	0	Overlying	5.26	19.6	T17	29	7.9	17.0	290.15	9.2557	0.126	
SV-23-A-Composite 100%	0	Overlying	10.8	20.0	T17	30	8.0	17.0	290.15	9.2559	0.323	
SV-23-A-Composite AR 100%	0	Overlying	4.20	20.0	T17	28	8.1	17.0	290.15	9.2555	0.157	

SPP Larval Test Day 2 Ammonia

CLIENT	PROJECT	PROJECT NUMBER	SPECIES
WSP	USCG Station Vallejo	PG1617	*Mytilus galloprovincialis*
Calibration Standards Temperature: 20.2	**Date:** 12/28/2023	**Tech:** TW	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*Meter*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*pKa^s*	*Unionized NH_3 (mg/L)*	Notes
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	
Control	2	Overlying	0.00	20.0	10	28	7.7	16.0	289.15	9.2555		
Salt Control	2	Overlying	0.00	20.0	10	28	7.8	16.0	289.15	9.2555		
SV-23-SW	2	Overlying	0.00	19.7	10	28	7.9	16.0	289.15	9.2555		
SV-23-A-Composite	2	Overlying	0.00	20.0	10	29	7.9	16.0	289.15	9.2557		
SV-23-A-Composite	2	Overlying	0.692	20.0	10	29	7.9	16.0	289.15	9.2557	0.015	
SV-23-A-Composite	2	Overlying	4.67	19.9	10	29	8.1	16.0	289.15	9.2557	0.163	
SV-23-A-Composite	2	Overlying	9.84	20.0	10	30	8.3	16.0	289.15	9.2559	0.532	
SV-23-A-Composite	2	Overlying	3.96	19.9	10	29	8.1	16.0	289.15	9.2557	0.138	

4.2 *Mytilus galloprovincialis* SET Statistical Results

CETIS Summary Report

Report Date:	16 Jan-24 11:33 (p 1 of 1)
Test Code/ID:	P231221.01 M.sp / 12-7348-5594

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	TU	S
08-4278-4559	Combined Proportion Norma	Dunnett Multiple Comparison Test	✓	10	50	22.36	6.1%	10	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
08-4278-4559	Combined Proportion Norma	PMSD	0.06096	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.9703	0.9194	1.0210	0.9189	1.0000	0.0183	0.0410	4.22%	0.00%
0	SC	5	0.9712	0.9319	1.0100	0.9234	1.0000	0.0141	0.0316	3.26%	-0.09%
0	SW	5	0.9946	0.9796	1.0100	0.9730	1.0000	0.0054	0.0121	1.22%	-2.51%
1		5	0.9721	0.9391	1.0050	0.9414	1.0000	0.0119	0.0265	2.73%	-0.19%
10		5	0.9144	0.8056	1.0230	0.7883	1.0000	0.0392	0.0876	9.58%	5.76%
50		5	0.6450	0.6044	0.6856	0.6036	0.6757	0.0146	0.0327	5.07%	33.52%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Combined Proportion Normal Detail — MD5: 2F04A84DC5A6234FD0F4C489F4E51C02

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
0	SC	0.9685	0.9234	1.0000	1.0000	0.9640
0	SW	1.0000	1.0000	1.0000	0.9730	1.0000
1		1.0000	0.9595	0.9595	1.0000	0.9414
10		1.0000	0.8604	0.9685	0.9550	0.7883
50		0.6712	0.6757	0.6171	0.6577	0.6036
100		0.0000	0.0000	0.0000	0.0000	0.0000

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
0	SC	215/222	205/222	244/244	232/232	214/222
0	SW	227/227	222/222	237/237	216/222	222/222
1		226/226	213/222	213/222	235/235	209/222
10		226/226	191/222	215/222	212/222	175/222
50		149/222	150/222	137/222	146/222	134/222
100		0/222	0/222	0/222	0/222	0/222

CETIS Summary Report

Report Date: 24 Jan-24 15:38 (p 1 of 1)
Test Code/ID: P231221.01 M.sp / 12-7348-5594

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	TU	S
04-5333-6888	Proportion Normal	Dunnett Multiple Comparison Test	✓	10	50	22.36	2.91%	10	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
04-4639-6342	Proportion Normal	Linear Interpolation (ICPIN)		EC15	20.56	17.81	23.01	4.9	1
				EC20	25.98	22.04	30.21	3.8	
				EC25	32.77	27.18	39.81	3.1	
			✓	EC40	53.17	50.16	55.89	1.9	
			✓	EC50	59.1	56.3	61.61	1.7	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
04-4639-6342	Proportion Normal	Control Resp	0.9534	0.9	<<	Yes	Passes Criteria
04-5333-6888	Proportion Normal	Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.9534	0.9428	0.9640	0.9385	0.9592	0.0038	0.0085	0.90%	0.00%
0	SC	5	0.9429	0.9113	0.9745	0.8992	0.9644	0.0114	0.0255	2.70%	1.10%
0	SW	5	0.9732	0.9630	0.9834	0.9652	0.9870	0.0037	0.0082	0.85%	-2.07%
1		5	0.9528	0.9265	0.9792	0.9252	0.9826	0.0095	0.0212	2.22%	0.06%
10		5	0.9544	0.9334	0.9753	0.9259	0.9685	0.0075	0.0169	1.77%	-0.10%
50		5	0.6286	0.5703	0.6868	0.5756	0.6866	0.0210	0.0469	7.46%	34.07%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Normal Detail — MD5: 8F8EF4384FAB5E43E86851505F4B57D7

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
0	SC	0.9513	0.9447	0.9644	0.9547	0.8992
0	SW	0.9870	0.9652	0.9713	0.9730	0.9694
1		0.9826	0.9425	0.9552	0.9252	0.9587
10		0.9536	0.9646	0.9685	0.9593	0.9259
50		0.6866	0.6494	0.5756	0.6460	0.5852
100		0.0000	0.0000	0.0000	0.0000	0.0000

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
0	SC	215/226	205/217	244/253	232/243	214/238
0	SW	227/230	222/230	237/244	216/222	222/229
1		226/230	213/226	213/223	235/254	209/218
10		226/237	191/198	215/222	212/221	175/189
50		149/217	150/231	137/238	146/226	134/229
100		0/227	0/209	0/217	0/192	0/207

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	08-4278-4559	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:48	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	3A5034C203CE0303C0B39F7FDDC7457A	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	10	50	22.36	10	0.05915	6.10%

Dunnett Multiple Comparison Test

Control vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water	1	8	0.1681	2.227	0.1726	CDF	0.6861	Non-Significant Effect
	10	8	1.642	2.227	0.1726	CDF	0.1366	Non-Significant Effect
	50*	8	6.553	2.227	0.1726	CDF	1.0E-05	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
PMSD	0.06096	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.846241	0.28208	3	18.79	1.7E-05	Significant Effect
Error	0.240258	0.0150161	16			
Total	1.0865		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	7.392	11.34	0.0604	Equal Variances
	Levene Equality of Variance Test	5.422	5.292	0.0091	Unequal Variances
	Mod Levene Equality of Variance Test	1.284	5.953	0.3244	Equal Variances
Distribution	Anderson-Darling A2 Test	0.3332	3.878	0.5193	Normal Distribution
	D'Agostino Kurtosis Test	0.3288	2.576	0.7423	Normal Distribution
	D'Agostino Skewness Test	0.2844	2.576	0.7761	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.189	9.21	0.9098	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1128	0.2235	0.7864	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9713	0.866	0.7817	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9703	0.9194	1.0000	1.0000	0.9189	1.0000	0.0183	4.22%	0.00%
1		5	0.9721	0.9391	1.0000	0.9595	0.9414	1.0000	0.0119	2.73%	-0.19%
10		5	0.9144	0.8056	1.0000	0.9550	0.7883	1.0000	0.0392	9.58%	5.76%
50		5	0.6450	0.6044	0.6856	0.6577	0.6036	0.6757	0.0146	5.07%	33.52%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	08-4278-4559	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:48	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	3A5034C203CE0303C0B39F7FDDC7457A	**Editor ID:**	009-542-444-2

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.4410	1.2750	1.6060	1.5380	1.2820	1.5380	0.0596	9.26%	0.00%
1		5	1.4280	1.3010	1.5540	1.3680	1.3260	1.5380	0.0456	7.15%	0.90%
10		5	1.3130	1.0960	1.5310	1.3570	1.0930	1.5380	0.0784	13.34%	8.83%
50		5	0.9328	0.8905	0.9752	0.9458	0.8898	0.9649	0.0153	3.65%	35.25%
100		5	0.0336	0.0336	0.0336	0.0336	0.0336	0.0336	0.0000	0.00%	97.67%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
1		1.0000	0.9595	0.9595	1.0000	0.9414
10		1.0000	0.8604	0.9685	0.9550	0.7883
50		0.6712	0.6757	0.6171	0.6577	0.6036
100		0.0000	0.0000	0.0000	0.0000	0.0000

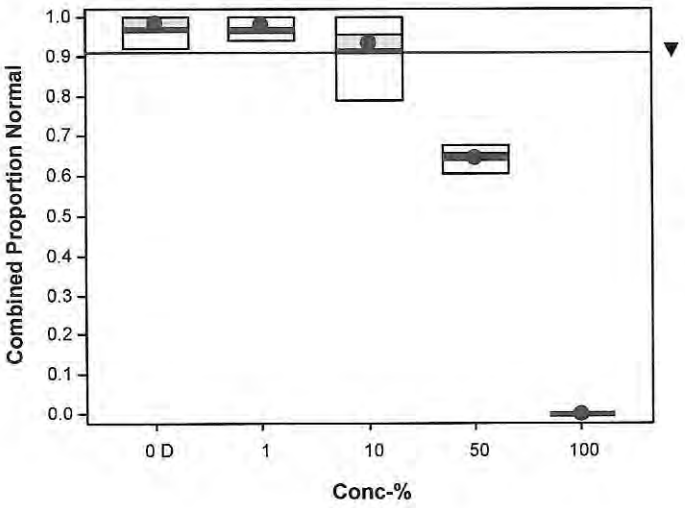
Angular (Corrected) Transformed Detail

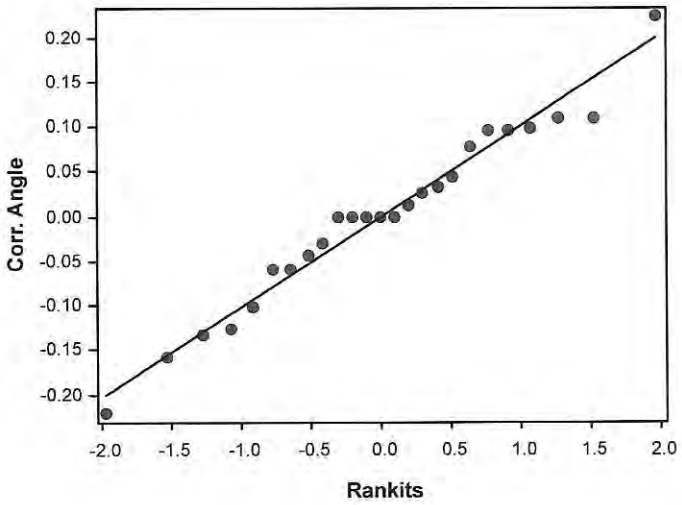
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.5380	1.5380	1.5380	1.3080	1.2820
1		1.5380	1.3680	1.3680	1.5380	1.3260
10		1.5380	1.1880	1.3920	1.3570	1.0930
50		0.9601	0.9649	0.9036	0.9458	0.8898
100		0.0336	0.0336	0.0336	0.0336	0.0336

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
1		226/226	213/222	213/222	235/235	209/222
10		226/226	191/222	215/222	212/222	175/222
50		149/222	150/222	137/222	146/222	134/222
100		0/222	0/222	0/222	0/222	0/222

Graphics





Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	16-8264-7175	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	70098DC09AFFC675C8508167223DF8C7	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	0	>0	---	---	0.04138	4.26%

Dunnett Multiple Comparison Test

Control I	vs	Control II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		Site Water	8	-1.064	2.108	0.1398	CDF	0.9380	Non-Significant Effect
		Salt Control	8	0.1933	2.108	0.1398	CDF	0.5882	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
PMSD	0.04265	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.020147	0.0100735	2	0.9162	0.4263	Non-Significant Effect
Error	0.131939	0.0109949	12			
Total	0.152086		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	2.178	9.21	0.3365	Equal Variances
	Levene Equality of Variance Test	5.291	6.927	0.0225	Equal Variances
	Mod Levene Equality of Variance Test	0.921	8.022	0.4326	Equal Variances
Distribution	Anderson-Darling A2 Test	0.7557	3.878	0.0490	Normal Distribution
	D'Agostino Skewness Test	0.7698	2.576	0.4414	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2057	0.2542	0.0876	Normal Distribution
	Shapiro-Wilk W Normality Test	0.883	0.8328	0.0526	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9703	0.9194	1.0000	1.0000	0.9189	1.0000	0.0183	4.22%	0.00%
0	SC	5	0.9712	0.9319	1.0000	0.9685	0.9234	1.0000	0.0141	3.26%	-0.09%
0	SW	5	0.9946	0.9796	1.0000	1.0000	0.9730	1.0000	0.0054	1.22%	-2.51%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.4410	1.2750	1.6060	1.5380	1.2820	1.5380	0.0596	9.26%	0.00%
0	SC	5	1.4280	1.2930	1.5620	1.3920	1.2900	1.5390	0.0484	7.58%	0.89%
0	SW	5	1.5110	1.4380	1.5840	1.5370	1.4060	1.5380	0.0264	3.90%	-4.90%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
0	SC	0.9685	0.9234	1.0000	1.0000	0.9640
0	SW	1.0000	1.0000	1.0000	0.9730	1.0000

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	16-8264-7175	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	70098DC09AFFC675C8508167223DF8C7	**Editor ID:**	009-542-444-2

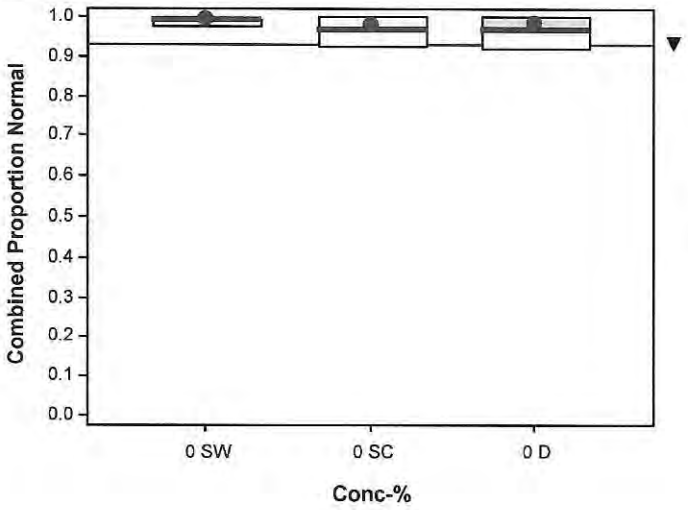
Angular (Corrected) Transformed Detail

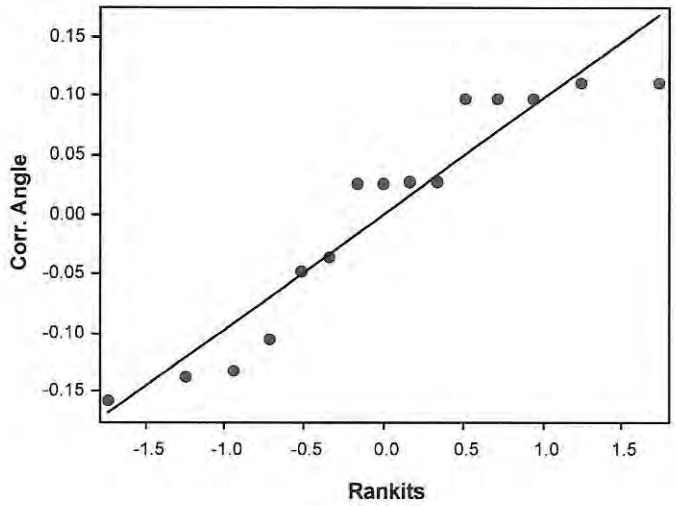
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.5380	1.5380	1.5380	1.3080	1.2820
0	SC	1.3920	1.2900	1.5390	1.5380	1.3800
0	SW	1.5380	1.5370	1.5380	1.4060	1.5370

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
0	SC	215/222	205/222	244/244	232/232	214/222
0	SW	227/227	222/222	237/237	216/222	222/222

Graphics





Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	04-5333-6888	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	D26BE3FE5CFE4DC72B4D0B99C1A2AE8	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	10	50	22.36	10	0.02775	2.91%

Dunnett Multiple Comparison Test

Control vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water	1	8	-0.1145	2.227	0.05923	CDF	0.7891	Non-Significant Effect
	10	8	-0.1583	2.227	0.05923	CDF	0.8031	Non-Significant Effect
	50*	8	16.47	2.227	0.05923	CDF	<1.0E-05	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.727222	0.242407	3	137.1	<1.0E-05	Significant Effect
Error	0.0282866	0.0017679	16			
Total	0.755509		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.507	11.34	0.3199	Equal Variances
	Levene Equality of Variance Test	1.227	5.292	0.3324	Equal Variances
	Mod Levene Equality of Variance Test	1.121	5.953	0.3792	Equal Variances
Distribution	Anderson-Darling A2 Test	0.5847	3.878	0.1315	Normal Distribution
	D'Agostino Kurtosis Test	0.1577	2.576	0.8747	Normal Distribution
	D'Agostino Skewness Test	0.05767	2.576	0.9540	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.02818	9.21	0.9860	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1554	0.2235	0.2335	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9456	0.866	0.3046	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9534	0.9428	0.9640	0.9576	0.9385	0.9592	0.0038	0.90%	0.00%
1		5	0.9528	0.9265	0.9792	0.9552	0.9252	0.9826	0.0095	2.22%	0.06%
10		5	0.9544	0.9334	0.9753	0.9593	0.9259	0.9685	0.0075	1.77%	-0.10%
50		5	0.6286	0.5703	0.6868	0.6460	0.5756	0.6866	0.0210	7.46%	34.07%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	04-5333-6888	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	D26BE3FE5CFE4DC72B4D0B99C1A2AE8	**Editor ID:**	009-542-444-2

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.3540	1.3300	1.3780	1.3630	1.3200	1.3670	0.0087	1.43%	0.00%
1		5	1.3570	1.2900	1.4240	1.3570	1.2940	1.4390	0.0240	3.96%	-0.22%
10		5	1.3580	1.3110	1.4050	1.3680	1.2950	1.3920	0.0170	2.80%	-0.31%
50		5	0.9159	0.8556	0.9763	0.9336	0.8613	0.9767	0.0217	5.31%	32.35%
100		5	0.0345	0.0332	0.0359	0.0346	0.0332	0.0361	0.0005	3.11%	97.45%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
1		0.9826	0.9425	0.9552	0.9252	0.9587
10		0.9536	0.9646	0.9685	0.9593	0.9259
50		0.6866	0.6494	0.5756	0.6460	0.5852
100		0.0000	0.0000	0.0000	0.0000	0.0000

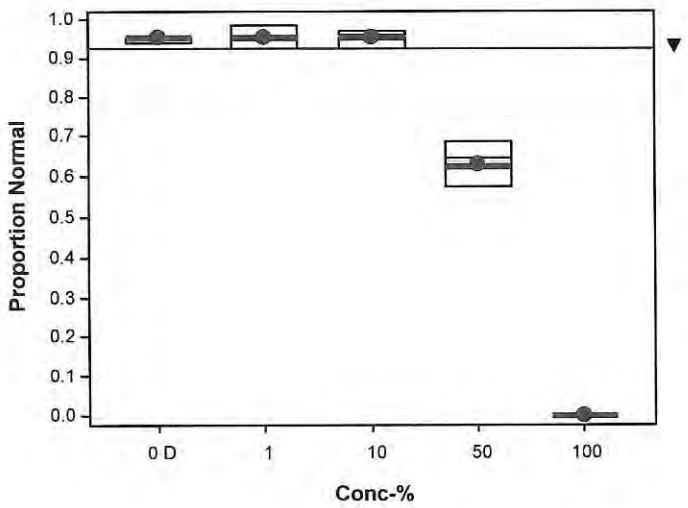
Angular (Corrected) Transformed Detail

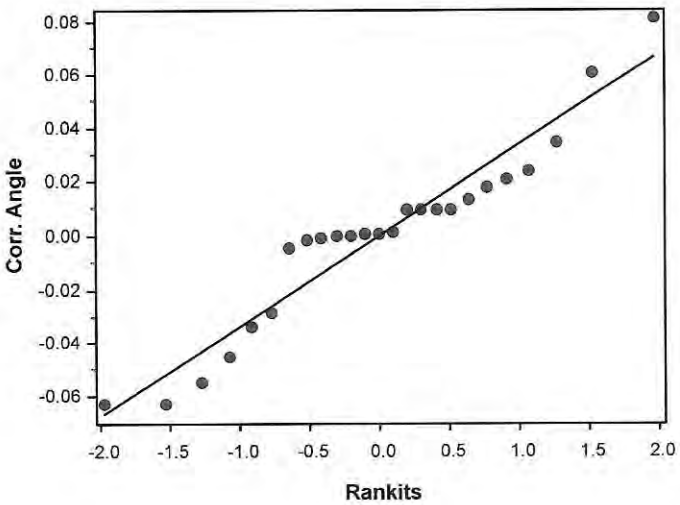
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.3670	1.3630	1.3200	1.3540	1.3640
1		1.4390	1.3290	1.3570	1.2940	1.3660
10		1.3540	1.3820	1.3920	1.3680	1.2950
50		0.9767	0.9371	0.8613	0.9336	0.8710
100		0.0332	0.0346	0.0340	0.0361	0.0348

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
1		226/230	213/226	213/223	235/254	209/218
10		226/237	191/198	215/222	212/221	175/189
50		149/217	150/231	137/238	146/226	134/229
100		0/227	0/209	0/217	0/192	0/207

Graphics





Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	05-5648-5732	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	33DC88F2E81FC28915E87A8299FCF8AF	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	0	>0	---	---	0.02158	2.26%

Dunnett Multiple Comparison Test

Control I	vs	Control II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		Site Water	8	-2.424	2.108	0.04723	CDF	0.9967	Non-Significant Effect
		Salt Control	8	0.9143	2.108	0.04723	CDF	0.2963	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9732	0.9	<<	Yes	Passes Criteria
Control Resp	0.9429	0.9	<<	Yes	Passes Criteria
Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0149398	0.0074699	2	5.952	0.0160	Significant Effect
Error	0.0150592	0.0012549	12			
Total	0.029999		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.37	9.21	0.1854	Equal Variances
	Levene Equality of Variance Test	1.081	6.927	0.3701	Equal Variances
	Mod Levene Equality of Variance Test	0.7264	8.022	0.5100	Equal Variances
Distribution	Anderson-Darling A2 Test	0.5476	3.878	0.1625	Normal Distribution
	D'Agostino Skewness Test	1.793	2.576	0.0730	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1447	0.2542	0.5825	Normal Distribution
	Shapiro-Wilk W Normality Test	0.916	0.8328	0.1672	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9534	0.9428	0.9640	0.9576	0.9385	0.9592	0.0038	0.90%	0.00%
0	SC	5	0.9429	0.9113	0.9745	0.9513	0.8992	0.9644	0.0114	2.70%	1.10%
0	SW	5	0.9732	0.9630	0.9834	0.9713	0.9652	0.9870	0.0037	0.85%	-2.07%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.3540	1.3300	1.3780	1.3630	1.3200	1.3670	0.0087	1.43%	0.00%
0	SC	5	1.3330	1.2700	1.3970	1.3480	1.2480	1.3810	0.0228	3.82%	1.51%
0	SW	5	1.4080	1.3730	1.4430	1.4010	1.3830	1.4560	0.0126	2.00%	-4.01%

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	05-5648-5732	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	33DC88F2E81FC28915E87A8299FCF8AF	**Editor ID:**	009-542-444-2

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
0	SC	0.9513	0.9447	0.9644	0.9547	0.8992
0	SW	0.9870	0.9652	0.9713	0.9730	0.9694

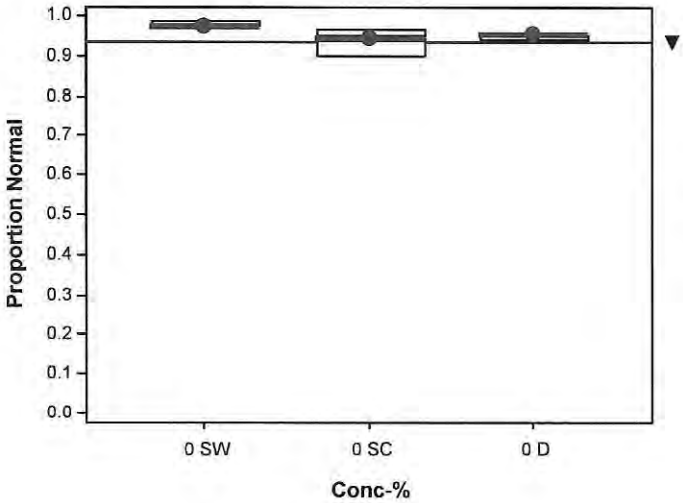
Angular (Corrected) Transformed Detail

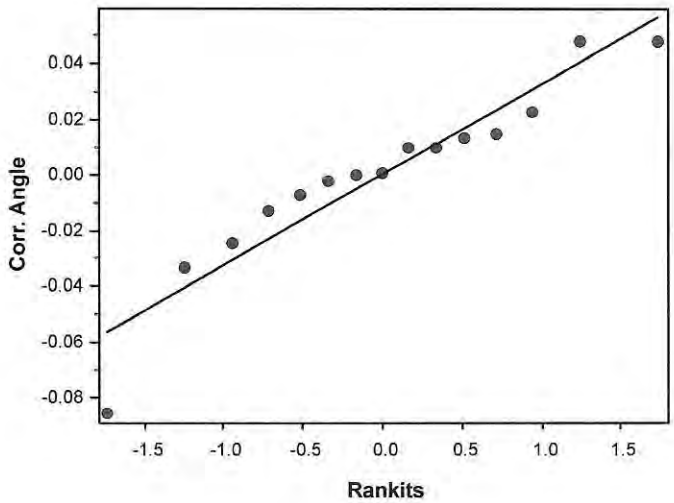
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.3670	1.3630	1.3200	1.3540	1.3640
0	SC	1.3480	1.3330	1.3810	1.3560	1.2480
0	SW	1.4560	1.3830	1.4010	1.4060	1.3950

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
0	SC	215/226	205/217	244/253	232/243	214/238
0	SW	227/230	222/230	237/244	216/222	222/229

Graphics





Bivalve Larval Survival and Development Test — EcoAnalysts

Analysis ID:	11-9717-9929	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	3A5034C203CE0303C0B39F7FDDC7457A	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2079066	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
EC15	17.23	9.061	22.82	5.8	4.4	11
EC20	23.03	14.34	29.21	4.3	3.4	7
EC25	30.68	21.43	37.59	3.3	2.7	4.7
EC40	53.46	50.86	55.09	1.9	1.8	2
EC50	59.37	56.96	60.87	1.7	1.6	1.8

Combined Proportion Normal Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Median**	**Min**	**Max**	**CV%**	**%Effect**	**ΣA/ΣB**	**Mean**	**%Effect**
0	D	5	0.9703	1.0000	0.9189	1.0000	4.22%	0.00%	1101/1134	0.9717	0.00%
1		5	0.9721	0.9595	0.9414	1.0000	2.73%	-0.19%	1096/1127	0.9717	0.00%
10		5	0.9144	0.9550	0.7883	1.0000	9.58%	5.76%	1019/1114	0.9147	5.87%
50		5	0.6450	0.6577	0.6036	0.6757	5.07%	33.52%	716/1110	0.6450	33.62%
100		5	0.0000	0.0000	0.0000	0.0000	---	100.00%	0/1110	0.0000	100.00%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
1		1.0000	0.9595	0.9595	1.0000	0.9414
10		1.0000	0.8604	0.9685	0.9550	0.7883
50		0.6712	0.6757	0.6171	0.6577	0.6036
100		0.0000	0.0000	0.0000	0.0000	0.0000

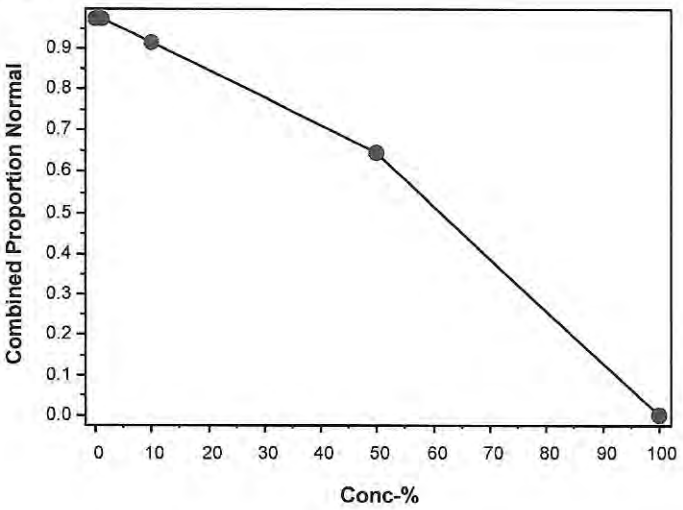
Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
1		226/226	213/222	213/222	235/235	209/222
10		226/226	191/222	215/222	212/222	175/222
50		149/222	150/222	137/222	146/222	134/222
100		0/222	0/222	0/222	0/222	0/222

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	11-9717-9929	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	3A5034C203CE0303C0B39F7FDDC7457A	**Editor ID:**	009-542-444-2

Graphics



Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	04-4639-6342	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	D26BE3FE5CFE4DC72B4D0B99C1A2AE8	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-2383-0723	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1051755	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
EC15	20.56	17.81	23.01	4.9	4.3	5.6
EC20	25.98	22.04	30.21	3.8	3.3	4.5
EC25	32.77	27.18	39.81	3.1	2.5	3.7
EC40	53.17	50.16	55.89	1.9	1.8	2
EC50	59.1	56.3	61.61	1.7	1.6	1.8

Proportion Normal Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Median**	**Min**	**Max**	**CV%**	**%Effect**	**ΣA/ΣB**	**Mean**	**%Effect**
0	D	5	0.9534	0.9576	0.9385	0.9592	0.90%	0.00%	1101/1155	0.9535	0.00%
1		5	0.9528	0.9552	0.9252	0.9826	2.22%	0.06%	1096/1151	0.9535	0.00%
10		5	0.9544	0.9593	0.9259	0.9685	1.77%	-0.10%	1019/1067	0.9535	0.00%
50		5	0.6286	0.6460	0.5756	0.6866	7.46%	34.07%	716/1141	0.6275	34.19%
100		5	0.0000	0.0000	0.0000	0.0000	---	100.00%	0/1052	0.0000	100.00%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
1		0.9826	0.9425	0.9552	0.9252	0.9587
10		0.9536	0.9646	0.9685	0.9593	0.9259
50		0.6866	0.6494	0.5756	0.6460	0.5852
100		0.0000	0.0000	0.0000	0.0000	0.0000

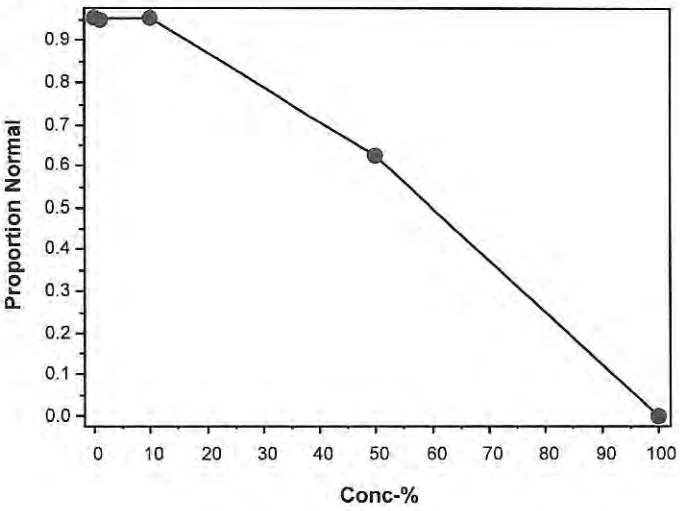
Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
1		226/230	213/226	213/223	235/254	209/218
10		226/237	191/198	215/222	212/221	175/189
50		149/217	150/231	137/238	146/226	134/229
100		0/227	0/209	0/217	0/192	0/207

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	04-4639-6342	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:49	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	04 Jan-24 11:47	**MD5 Hash:**	D26BE3FE5CFE4DC72B4D0B99C1A2AE8	**Editor ID:**	009-542-444-2

Graphics



CETIS Test Data Worksheet

Report Date: 04 Jan-24 11:50 (p 1 of 1)
Test Code/ID: P231221.01 M.sp / 12-7348-5594

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Start Date: 26 Dec-23 17:00 **Species:** Mytilus galloprovincialis **Sample Code:** P231221.01
End Date: 28 Dec-23 17:20 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** WSP USCG Vallejo
Sample Date: 12 Dec-23 08:45 **Material:** Sediment Elutriate **Sample Station:** SV-23-A-Composite

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	26	222	245	245	235	
0	D	2	14	222	236	236	226	
0	D	3	27	222	244	244	229	
0	D	4	29	222	217	217	207	
0	D	5	35	222	213	213	204	
0	SC	1	12	222	226	226	215	
0	SC	2	30	222	217	217	205	
0	SC	3	9	222	253	253	244	
0	SC	4	18	222	243	243	232	
0	SC	5	7	222	238	238	214	
0	SW	1	5	222	230	230	227	
0	SW	2	11	222	230	230	222	
0	SW	3	20	222	244	244	237	
0	SW	4	10	222	222	222	216	
0	SW	5	6	222	229	229	222	
1		1	21	222	230	230	226	
1		2	33	222	226	226	213	
1		3	2	222	223	223	213	
1		4	15	222	254	254	235	
1		5	34	222	218	218	209	
10		1	24	222	237	237	226	
10		2	17	222	198	198	191	
10		3	1	222	222	222	215	
10		4	8	222	221	221	212	
10		5	19	222	189	189	175	
50		1	13	222	217	217	149	
50		2	23	222	231	231	150	
50		3	25	222	238	238	137	
50		4	3	222	226	226	146	
50		5	4	222	229	229	134	
100		1	32	222	227	227	0	
100		2	31	222	209	209	0	
100		3	28	222	217	217	0	
100		4	16	222	192	192	0	
100		5	22	222	207	207	0	

CETIS Summary Report

Report Date:	24 Jan-24 15:39 (p 1 of 1)
Test Code/ID:	P231221.01 M.sp / 01-2188-7109

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	17-4936-5498	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite Ammonia Reduce
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
10-0514-6590	Proportion Normal	Equal Variance t Two-Sample Test	0.0029	100% failed proportion normal	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
10-0514-6590	Proportion Normal	Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.9534	0.9428	0.9640	0.9385	0.9592	0.0038	0.0085	0.90%	0.00%
0	SC	5	0.9429	0.9113	0.9745	0.8992	0.9644	0.0114	0.0255	2.70%	1.10%
0	SW	5	0.9732	0.9630	0.9834	0.9652	0.9870	0.0037	0.0082	0.85%	-2.07%
100		5	0.9023	0.8598	0.9448	0.8469	0.9330	0.0153	0.0343	3.80%	5.36%

Proportion Normal Detail — MD5: 1F4339F377D89B355894FE60023C4538

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
0	SC	0.9513	0.9447	0.9644	0.9547	0.8992
0	SW	0.9870	0.9652	0.9713	0.9730	0.9694
100		0.8469	0.9217	0.8929	0.9330	0.9171

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
0	SC	215/226	205/217	244/253	232/243	214/238
0	SW	227/230	222/230	237/244	216/222	222/229
100		177/209	200/217	200/224	209/224	199/217

CETIS Summary Report

Report Date: 16 Jan-24 11:32 (p 1 of 1)
Test Code/ID: P231221.01 M.sp / 01-2188-7109

Bivalve Larval Survival and Development Test — EcoAnalysts

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish **Age:**

Sample ID:	17-4936-5498	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite Ammonia Reduce
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
13-4600-2140	Combined Proportion Norma	Equal Variance t Two-Sample Test	0.0092	100% failed combined proportion normal	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
13-4600-2140	Combined Proportion Norma	PMSD	0.03737	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.9703	0.9194	1.0210	0.9189	1.0000	0.0183	0.0410	4.22%	0.00%
0	SC	5	0.9712	0.9319	1.0100	0.9234	1.0000	0.0141	0.0316	3.26%	-0.09%
0	SW	5	0.9946	0.9796	1.0100	0.9730	1.0000	0.0054	0.0121	1.22%	-2.51%
100		5	0.8874	0.8209	0.9539	0.7973	0.9414	0.0240	0.0536	6.04%	8.54%

Combined Proportion Normal Detail MD5: F222BEB886743247DA0EE08E7FAE99E7

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
0	SC	0.9685	0.9234	1.0000	1.0000	0.9640
0	SW	1.0000	1.0000	1.0000	0.9730	1.0000
100		0.7973	0.9009	0.9009	0.9414	0.8964

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
0	SC	215/222	205/222	244/244	232/232	214/222
0	SW	227/227	222/222	237/237	216/222	222/222
100		177/222	200/222	200/222	209/222	199/222

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	13-4600-2140	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	04 Jan-24 11:55	**MD5 Hash:**	70E2C9249AE19BAF7AB8CD3D5AFFB50	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	17-4936-5498	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite Ammonia Reduce
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% failed combined proportion normal endpoint	3.74%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		100*	8	2.952	1.86	0.1297	CDF	0.0092	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
PMSD	0.03737	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.105884	0.105884	1	8.712	0.0184	Significant Effect
Error	0.0972353	0.0121544	8			
Total	0.203119		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	5.297	11.26	0.0504	Equal Variances
	Mod Levene Equality of Variance Test	0.6723	13.75	0.4436	Equal Variances
	Variance Ratio F Test	2.723	23.15	0.3554	Equal Variances
Distribution	Anderson-Darling A2 Test	0.8996	3.878	0.0217	Normal Distribution
	D'Agostino Skewness Test	0.9351	2.576	0.3498	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2315	0.3025	0.1395	Normal Distribution
	Shapiro-Wilk W Normality Test	0.8159	0.7411	0.0226	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9703	0.9194	1.0000	1.0000	0.9189	1.0000	0.0183	4.22%	0.00%
100		5	0.8874	0.8209	0.9539	0.9009	0.7973	0.9414	0.0240	6.04%	8.54%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.4410	1.2750	1.6060	1.5380	1.2820	1.5380	0.0596	9.26%	0.00%
100		5	1.2350	1.1350	1.3350	1.2510	1.1040	1.3260	0.0361	6.54%	14.29%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	0.9324	0.9189
100		0.7973	0.9009	0.9009	0.9414	0.8964

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	13-4600-2140	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	04 Jan-24 11:55	**MD5 Hash:**	70E2C9249AE19BAF7AB8CD3D5AFFB50	**Editor ID:**	009-542-444-2

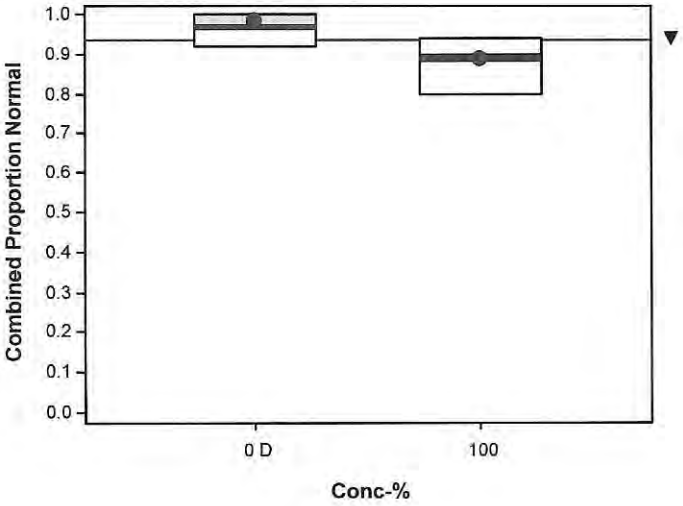
Angular (Corrected) Transformed Detail

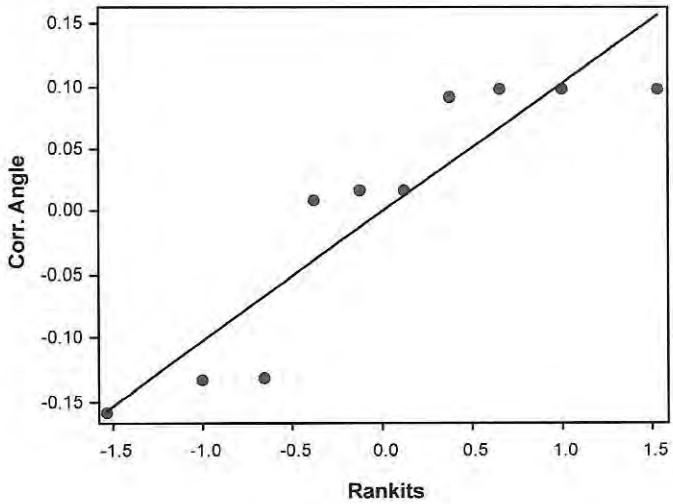
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.5380	1.5380	1.5380	1.3080	1.2820
100		1.1040	1.2510	1.2510	1.3260	1.2430

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/235	226/226	229/229	207/222	204/222
100		177/222	200/222	200/222	209/222	199/222

Graphics





Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	10-0514-6590	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	04 Jan-24 11:55	**MD5 Hash:**	96B3BC086AA9551DEDF789640B5105AF	**Editor ID:**	009-542-444-2

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	17-4936-5498	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite Ammonia Reduce
Sample Age:	14d 8h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% failed proportion normal endpoint	2.34%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		100*	8	3.724	1.86	0.04877	CDF	0.0029	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.9534	0.9	<<	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0238528	0.0238528	1	13.87	0.0058	Significant Effect
Error	0.0137573	0.0017197	8			
Total	0.0376101		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	4.424	11.26	0.0686	Equal Variances
	Mod Levene Equality of Variance Test	1.936	13.75	0.2135	Equal Variances
	Variance Ratio F Test	8.151	23.15	0.0664	Equal Variances
Distribution	Anderson-Darling A2 Test	0.4897	3.878	0.2253	Normal Distribution
	D'Agostino Skewness Test	1.757	2.576	0.0789	Normal Distribution
	Kolmogorov-Smirnov D Test	0.206	0.3025	0.2886	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9146	0.7411	0.3144	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9534	0.9428	0.9640	0.9576	0.9385	0.9592	0.0038	0.90%	0.00%
100		5	0.9023	0.8598	0.9448	0.9171	0.8469	0.9330	0.0153	3.80%	5.36%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.3540	1.3300	1.3780	1.3630	1.3200	1.3670	0.0087	1.43%	0.00%
100		5	1.2560	1.1870	1.3250	1.2790	1.1690	1.3090	0.0248	4.41%	7.21%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9592	0.9576	0.9385	0.9539	0.9577
100		0.8469	0.9217	0.8929	0.9330	0.9171

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Analysis ID:	10-0514-6590	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv2.1.4
Analyzed:	04 Jan-24 11:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	04 Jan-24 11:55	**MD5 Hash:**	96B3BC086AA9551DEDF789640B5105AF	**Editor ID:**	009-542-444-2

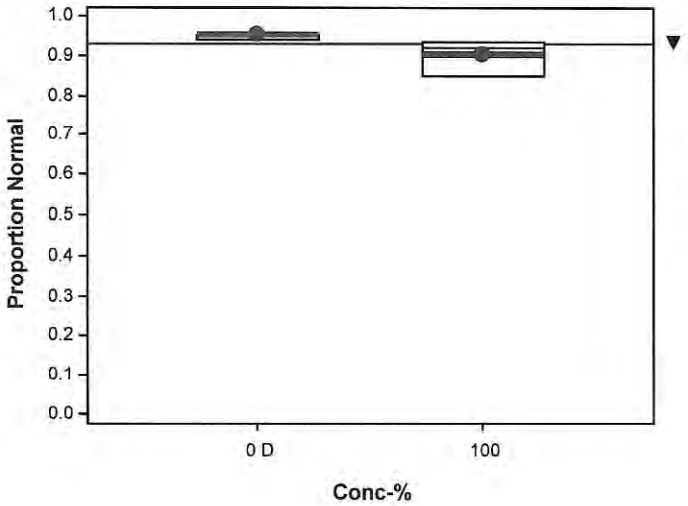
Angular (Corrected) Transformed Detail

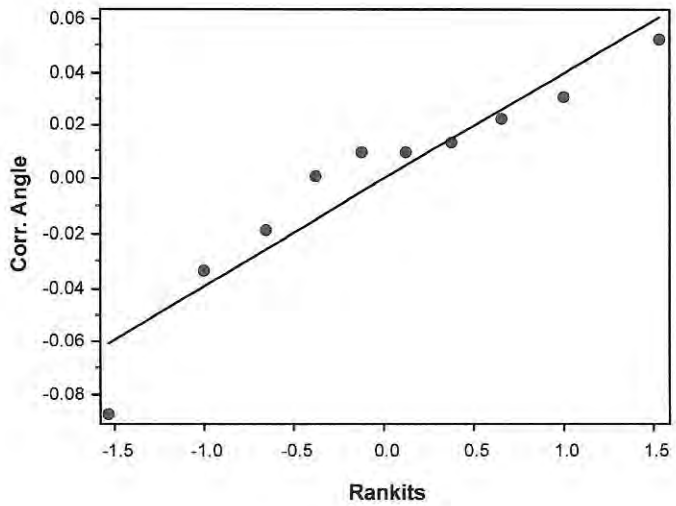
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.3670	1.3630	1.3200	1.3540	1.3640
100		1.1690	1.2870	1.2370	1.3090	1.2790

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	235/245	226/236	229/244	207/217	204/213
100		177/209	200/217	200/224	209/224	199/217

Graphics





CETIS Test Data Worksheet

Report Date: 04 Jan-24 11:56 (p 1 of 1)
Test Code/ID: P231221.01 M.sp / 01-2188-7109

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Start Date:	26 Dec-23 17:00	**Species:**	Mytilus galloprovincialis	**Sample Code:**	P231221.01
End Date:	28 Dec-23 17:20	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	WSP USCG Vallejo
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Sample Station:**	SV-23-A-Composite Ammonia Redu

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	10	222	245	245	235	
0	D	2	18	222	236	236	226	
0	D	3	7	222	244	244	229	
0	D	4	11	222	217	217	207	
0	D	5	2	222	213	213	204	
0	SC	1	19	222	226	226	215	
0	SC	2	4	222	217	217	205	
0	SC	3	13	222	253	253	244	
0	SC	4	5	222	243	243	232	
0	SC	5	6	222	238	238	214	
0	SW	1	3	222	230	230	227	
0	SW	2	16	222	230	230	222	
0	SW	3	17	222	244	244	237	
0	SW	4	8	222	222	222	216	
0	SW	5	15	222	229	229	222	
100		1	9	222	209	209	177	
100		2	14	222	217	217	200	
100		3	1	222	224	224	200	
100		4	12	222	224	224	209	
100		5	20	222	217	217	199	

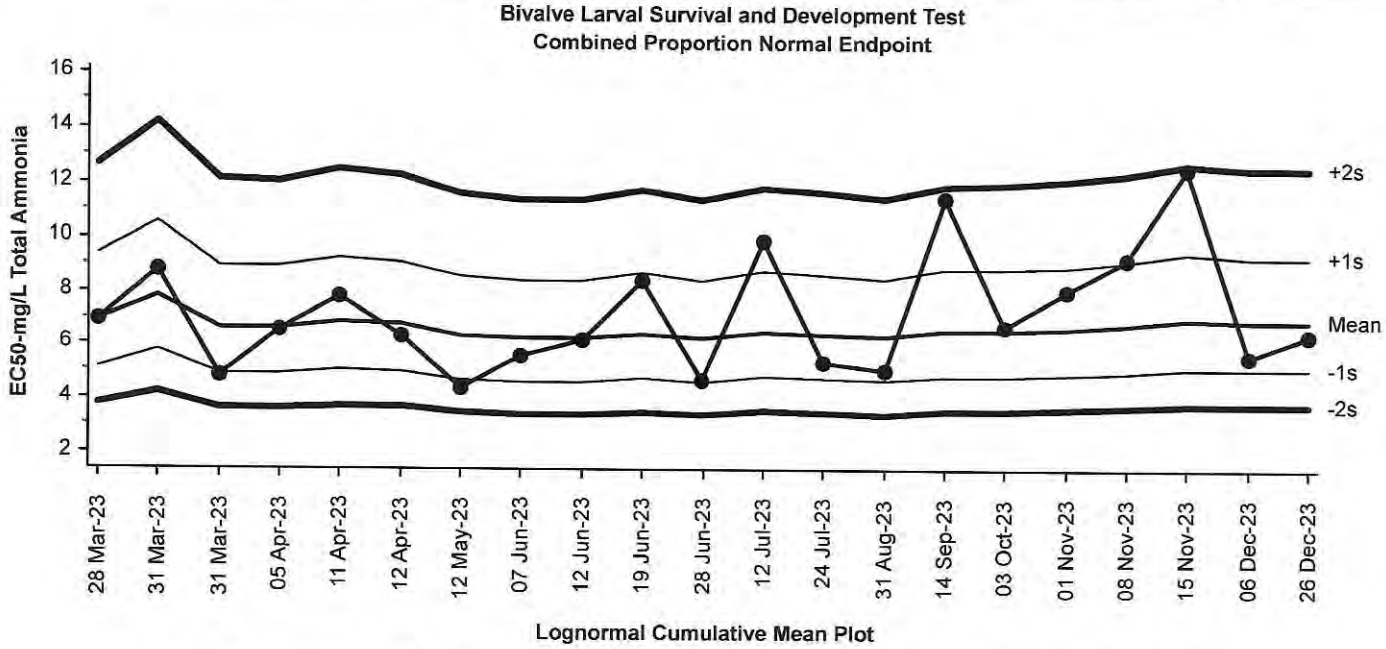
4.3 *Mytilus galloprovincialis* Reference Toxicant Test Results

CETIS QC Plot

Report Date: 09 Jan-24 15:53 (1 of 1)

Bivalve Larval Survival and Development Test — **All Matching Labs**

Test Type: Development-Survival **Organism:** Mytilus galloprovincialis **Material:** Total Ammonia
Protocol: All Protocols **Endpoint:** Combined Proportion Normal **Source:** Reference Toxicant-REF



Mean:	6.917	**Count:**	20	**-1s Warning Limit:**	5.12	**-2s Action Limit:**	3.8
Sigma:	NA	**CV:**	30.60%	**+1s Warning Limit:**	9.33	**+2s Action Limit:**	12.6

Quality Control Data

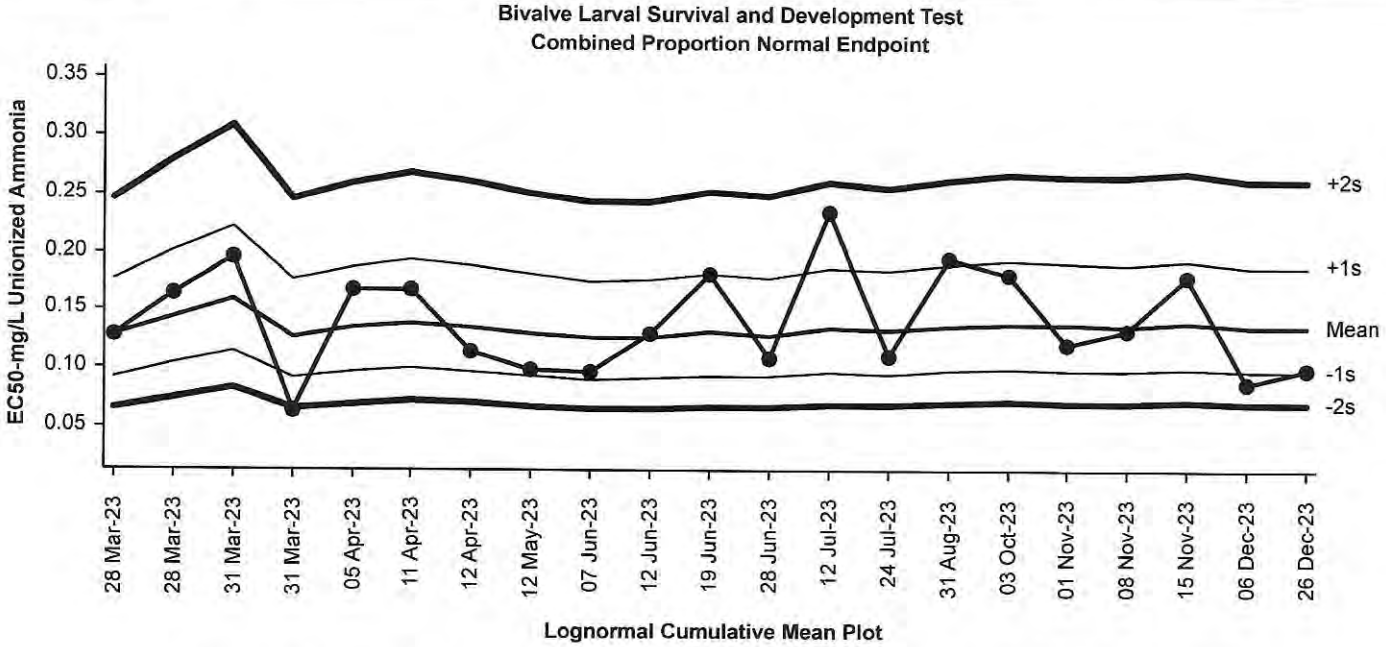
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2023	Mar	28	15:47	6.941	0.02348	0.01131			01-6969-0938	06-4639-7696	EcoAnalysts
2			31	16:52	8.774	1.857	0.7937			21-2826-5425	10-8042-3972	EcoAnalysts
3			31	16:54	4.818	-2.099	-1.207	(-)		13-8989-7877	05-5295-3514	EcoAnalysts
4		Apr	5	15:18	6.581	-0.3361	-0.1662			05-6481-1975	07-2069-0121	EcoAnalysts
5			11	16:37	7.809	0.8921	0.4049			14-1713-1401	15-2064-5147	EcoAnalysts
6			12	15:13	6.298	-0.6187	-0.3127			21-2394-6995	12-4981-2785	EcoAnalysts
7		May	12	15:35	4.42	-2.497	-1.495	(-)		02-3839-1595	05-0285-3181	EcoAnalysts
8		Jun	7	16:24	5.621	-1.296	-0.6924			16-8311-5218	04-7873-2197	EcoAnalysts
9			12	18:29	6.154	-0.7631	-0.3902			19-7480-8941	04-9719-6422	EcoAnalysts
10			19	16:20	8.423	1.506	0.6573			16-3224-4662	15-6769-3694	EcoAnalysts
11			28	15:18	4.725	-2.192	-1.272	(-)		10-1014-4768	17-1187-2841	EcoAnalysts
12		Jul	12	12:57	9.89	2.973	1.193	(+)		02-0009-8192	04-6529-8407	EcoAnalysts
13			24	17:06	5.374	-1.543	-0.8425			05-3985-4386	13-9086-0827	EcoAnalysts
14		Aug	31	16:54	5.053	-1.864	-1.048	(-)		16-1472-3265	15-9433-1311	EcoAnalysts
15		Sep	14	13:50	11.43	4.512	1.676	(+)		10-9810-7803	01-3503-3195	EcoAnalysts
16		Oct	3	17:04	6.706	-0.2106	-0.1032			15-2407-3570	09-1135-7427	EcoAnalysts
17		Nov	1	17:40	8.055	1.138	0.5082			08-2875-4322	08-8063-5388	EcoAnalysts
18			8	15:55	9.251	2.334	0.9705			13-4824-7359	00-4887-4658	EcoAnalysts
19			15	14:38	12.55	5.635	1.989	(+)		04-7650-2671	01-5035-4681	EcoAnalysts
20		Dec	6	17:35	5.604	-1.313	-0.7025			07-4908-4729	09-1248-2427	EcoAnalysts
21			26	17:01	6.393	-0.5245	-0.2632			09-3076-3716	10-6984-5454	EcoAnalysts

CETIS QC Plot

Report Date: 09 Jan-24 16:06 (1 of 1)

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Test Type: Development-Survival | **Organism:** Mytilus galloprovincialis | **Material:** Unionized Ammonia
Protocol: All Protocols | **Endpoint:** Combined Proportion Normal | **Source:** Reference Toxicant-REF



Mean:	0.1363	**Count:**	20	**-1s Warning Limit:**	0.098	**-2s Action Limit:**	0.0704
Sigma:	NA	**CV:**	33.90%	**+1s Warning Limit:**	0.19	**+2s Action Limit:**	0.264

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2023	Mar	28	15:46	0.1275	-0.00881	-0.2025			08-8126-4059	10-2993-2407
2			28	15:47	0.1637	0.02739	0.5547			03-3638-8838	12-4289-2851
3			31	16:52	0.1949	0.05861	1.084	(+)		14-3337-1963	13-8011-4764
4			31	16:54	0.06349	-0.07279	-2.314	(-)	(-)	01-2022-2925	11-3364-1842
5		Apr	5	15:18	0.1685	0.03225	0.6435			01-0596-2964	10-8703-5300
6			11	16:37	0.1673	0.03106	0.6219			13-1124-3474	18-0348-0749
7			12	15:13	0.1148	-0.02149	-0.5199			18-5662-1396	07-7214-9910
8		May	12	15:35	0.09858	-0.0377	-0.9811			08-2245-0872	03-4589-6060
9		Jun	7	16:24	0.0976	-0.03868	-1.011	(-)		18-8939-1974	09-3314-9652
10			12	18:29	0.1293	-0.00696	-0.1588			09-8773-2984	16-9381-4730
11			19	16:20	0.182	0.04567	0.8755			21-4361-0458	04-8703-0787
12			28	15:18	0.1088	-0.02744	-0.681			16-9844-0501	06-2488-5585
13		Jul	12	12:57	0.2364	0.1001	1.668	(+)		13-3479-3905	05-2583-6446
14			24	17:06	0.1104	-0.02589	-0.6384			08-8951-5421	04-1308-9826
15		Aug	31	16:54	0.1956	0.05931	1.094	(+)		07-4158-0358	11-0996-2376
16		Oct	3	17:04	0.182	0.0457	0.8761			19-5530-4547	06-1309-3566
17		Nov	1	17:40	0.1213	-0.01494	-0.3517			06-2464-1457	05-4038-7195
18			8	15:55	0.1338	-0.00253	-0.05666			13-8700-3666	02-0586-1811
19			15	14:38	0.1802	0.04387	0.8454			19-3724-7711	00-4487-8422
20		Dec	6	17:35	0.08732	-0.04897	-1.349	(-)		11-7639-2844	02-1522-3004
21			26	17:01	0.09993	-0.03636	-0.9401			07-1075-7212	13-4227-6824

CETIS Summary Report

Report Date:	09 Jan-24 16:04 (p 1 of 1)
Test Code/ID:	P220819.107 / 09-3076-3716

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	
Sample ID:	14-6877-8612	**Code:**	P220819.107	**Project:**	Reference Toxicant		
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Source:**	Reference Toxicant		
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.107		
Sample Age:	494d 17h	**Client:**	Internal Lab				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
07-0707-8938	Combined Proportion Norma	Dunnett Multiple Comparison Test		3.92	7.42	5.393	12.6%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
00-6627-3829	Combined Proportion Norma	Linear Interpolation (ICPIN)		EC15	4.258	1.84	5.028	1
				EC20	4.52	2.329	5.308	
				EC25	4.795	2.873	5.666	
				EC40	5.707	4.56	6.648	
				EC50	6.393	5.394	7.696	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
07-0707-8938	Combined Proportion Norma	PMSD	0.1265	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.17		3	0.9733	0.8583	1.0880	0.9198	1.0000	0.0267	0.0463	4.76%	2.67%
3.92		3	0.9151	0.5498	1.2800	0.7453	1.0000	0.0849	0.1471	16.07%	8.49%
7.42		3	0.3664	0.1436	0.5891	0.2783	0.4575	0.0518	0.0897	24.47%	63.36%
14.7		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
20.5		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Combined Proportion Normal Detail — MD5: 8594D5800BC98D69218758746A7E1D0E

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
2.17		1.0000	0.9198	1.0000
3.92		1.0000	1.0000	0.7453
7.42		0.3632	0.4575	0.2783
14.7		0.0000	0.0000	0.0000
20.5		0.0000	0.0000	0.0000

Combined Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	223/223	221/221	228/228
2.17		223/223	195/212	216/216
3.92		231/231	217/217	158/212
7.42		77/212	97/212	59/212
14.7		0/212	0/212	0/212
20.5		0/212	0/212	0/212

CETIS Test Data Worksheet

Report Date: 09 Jan-24 15:52 (p 1 of 1)
Test Code/ID: P220819.107 / 09-3076-3716

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Start Date:	26 Dec-23 17:01	**Species:**	Mytilus galloprovincialis	**Sample Code:**	P220819.107
End Date:	28 Dec-23 17:20	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.107

Conc-mg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	3	212	230	230	223	
0	D	2	4	212	227	227	221	
0	D	3	15	212	237	237	228	
2.17		1	7	212	233	233	223	
2.17		2	17	212	209	209	195	
2.17		3	6	212	237	237	216	
3.92		1	1	212	246	246	231	
3.92		2	2	212	230	230	217	
3.92		3	13	212	169	169	158	
7.42		1	12	212	240	240	77	
7.42		2	18	212	232	232	97	
7.42		3	14	212	190	190	59	
14.7		1	11	212	160	160	0	
14.7		2	9	212	225	225	0	
14.7		3	5	212	201	201	0	
20.5		1	10	212	238	238	0	
20.5		2	8	212	209	209	0	
20.5		3	16	212	262	262	0	

CETIS Summary Report

Report Date: 09 Jan-24 15:58 (p 1 of 2)
Test Code/ID: P220819.107UIA / 07-1075-7212

Bivalve Larval Survival and Development Test — EcoAnalysts

Batch ID:	11-2885-0894	**Test Type:**	Development-Survival	**Analyst:**	Michelle Knowlen		
Start Date:	26 Dec-23 17:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	28 Dec-23 17:20	**Species:**	Mytilus galloprovincialis	**Brine:**	Crystal Sea Marine Mix		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	15-7742-5879	**Code:**	P220819.107UIA	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.107UIA
Sample Age:	494d 17h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
01-9633-1691	Proportion Normal	Dunnett Multiple Comparison Test		0.06	0.113	0.08234	3.41%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
13-4227-6824	Combined Proportion Norma	Linear Interpolation (ICPIN)		EC15	0.06641	0.0268	0.07965	1
				EC20	0.07113	0.03405	0.08427	
				EC25	0.07588	0.04135	0.08891	
				EC40	0.09024	0.07307	0.103	
				EC50	0.09993	0.08574	0.1169	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
01-9633-1691	Proportion Normal	Control Resp	0.9684	0.9	<<	Yes	Passes Criteria

Combined Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
0.033		3	0.9733	0.8583	1.0880	0.9198	1.0000	0.0267	0.0463	4.76%	2.67%
0.06		3	0.9151	0.5498	1.2800	0.7453	1.0000	0.0849	0.1471	16.07%	8.49%
0.113		3	0.3664	0.1436	0.5891	0.2783	0.4575	0.0518	0.0897	24.47%	63.36%
0.224		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
0.313		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9684	0.9538	0.9829	0.9620	0.9736	0.0034	0.0059	0.61%	0.00%
0.033		3	0.9338	0.8771	0.9906	0.9114	0.9571	0.0132	0.0229	2.45%	3.57%
0.06		3	0.9391	0.9285	0.9498	0.9349	0.9435	0.0025	0.0043	0.46%	3.02%
0.113		3	0.3498	0.2024	0.4973	0.3105	0.4181	0.0343	0.0594	16.97%	63.88%
0.224		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
0.313		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Combined Proportion Normal Detail — MD5: DDCDF43C97ACAD9B641EF66E263F9493

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
0.033		1.0000	0.9198	1.0000
0.06		1.0000	1.0000	0.7453
0.113		0.3632	0.4575	0.2783
0.224		0.0000	0.0000	0.0000
0.313		0.0000	0.0000	0.0000

Proportion Normal Detail — MD5: B605C369B62B38CD119D7F60B247B3AB

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9696	0.9736	0.9620
0.033		0.9571	0.9330	0.9114
0.06		0.9390	0.9435	0.9349
0.113		0.3208	0.4181	0.3105
0.224		0.0000	0.0000	0.0000
0.313		0.0000	0.0000	0.0000

Combined Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	223/223	221/221	228/228
0.033		223/223	195/212	216/216
0.06		231/231	217/217	158/212
0.113		77/212	97/212	59/212
0.224		0/212	0/212	0/212
0.313		0/212	0/212	0/212

Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	223/230	221/227	228/237
0.033		223/233	195/209	216/237
0.06		231/246	217/230	158/169
0.113		77/240	97/232	59/190
0.224		0/160	0/225	0/201
0.313		0/238	0/209	0/262

CETIS Test Data Worksheet

Report Date: 09 Jan-24 15:57 (p 1 of 1)
Test Code/ID: P220819.107UIA / 07-1075-7212

Bivalve Larval Survival and Development Test — **EcoAnalysts**

Start Date:	26 Dec-23 17:01	**Species:**	Mytilus galloprovincialis	**Sample Code:**	P220819.107UIA
End Date:	28 Dec-23 17:20	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Sample Station:**	P220819.107UIA

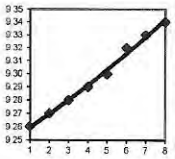
Conc-mg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	10	212	230	230	223	
0	D	2	16	212	227	227	221	
0	D	3	13	212	237	237	228	
0.033		1	17	212	233	233	223	
0.033		2	2	212	209	209	195	
0.033		3	15	212	237	237	216	
0.06		1	1	212	246	246	231	
0.06		2	9	212	230	230	217	
0.06		3	3	212	169	169	158	
0.113		1	14	212	240	240	77	
0.113		2	5	212	232	232	97	
0.113		3	7	212	190	190	59	
0.224		1	18	212	160	160	0	
0.224		2	11	212	225	225	0	
0.224		3	4	212	201	201	0	
0.313		1	8	212	238	238	0	
0.313		2	12	212	209	209	0	
0.313		3	6	212	262	262	0	

Un-ionized Ammonia Calculator

CLIENT:	Internal	Date of Test:	December 26, 2023
PROJECT:	Internal	Test Type:	*Mytilus*
COMMENTS:	P220819.107		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Ionic strength	pKa[s]
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



$y = 0.0003x^2 + 0.0091x + 9.2502$

...

	Sample	Mod	*NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	*temp (K)*	*pKa[s]*		NH_3U (mg/L)
	Target / Sample Name		Actual	Actual	Actual	Actual	Calculated	Calculated		**Calculated**
	Example 3.5		2.000	10.0	7.5	5.0	278.15	9.2520		**0.008**
1										
2	1.5		2.17	28	7.7	17.0	290.15	9.2555		**0.033**
3	3		3.92	28	7.7	17.0	290.15	9.2555		**0.060**
4	6		7.42	28	7.7	17.0	290.15	9.2555		**0.113**
5	12		14.7	28	7.7	17.0	290.15	9.2555		**0.224**
6	18		20.5	28	7.7	17.0	290.15	9.2555		**0.313**
7										
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QA ✓
Mane

48 Hour Bivalve Development Reference Toxicant Test

Test ID: P220819.107	Replicates: 3	Study Director: M. Knowlen	Location: Inc. 1
Dilution Water Batch: FSW122623.01	Organism Batch: TS121523.01	Associated Test(s): WSP	Organism: M.sp.
Chamber Size/Type: 30 ml shell vial	Exposure Volume: 10 ml		
Toxicant: Ammonium Chloride:	Lot #: 22E3156086	Date Prepared: 12/26/23	Initials: JL
Target Concentrations: **See spiking worksheet**		Quantity of Stock: Target: See spiking worksheet	Quantity of Diluent: Target: 200 mL
See spiking worksheet		Actual: See spiking worksheet	Actual: 200.0g

SPAWNING DATA

Initial Spawning Time: 1255	Final Spawning Time: 1400	Fertilization Time: 1405	No. of Females: 7	No. of Males: 4
Embryo Density (count/mL):	1. 312	2. 274	3. —	Mean: 293
Stocking Volume Calculation: 2700/29300 = 0.092 × 100mL = 9.22mL eggstock : 90.78 mL FSW; Deliver 100 mL				

0 Hours Date: 12/26/23 WQ Time: 1455 Start Time: 1701 Initials: MK JL

STOCK

	Control	1.5	3	6	12	18
D.O. (%) (≥3.3 mg/L)	8.3	8.4	8.5	8.5	8.5	8.5
Temperature (16 ± 1°C) ①	17.0	17.0	17.0	17.0	17.0	17.0
Salinity (28 ± 1 ppt)	28	28	28	28	28	28
pH (7.5-9)	7.7	7.7	7.7	7.7	7.7	7.7

Day 1	Temperature (16 ± 1°C)	25.4

Final Day Date: 12/28/23 WQ Time: 1610 End Time: 1720 Initials: TW

Formalin Lot #: 230724-07 Rose Bengal Lot #: 5135

STOCK

	Control	1.5	3	6	12	18
D.O. (%) (≥3.3 mg/L)	8.2	8.2	8.2	8.2	8.2	8.2
Temperature (16 ± 1°C)	15.9 ①	15.9 ①	15.9 ①	15.9 ①	15.9 ①	15.9 ①
Salinity (28 ± 1 ppt)	28	28	28	28	28	28
pH (7.5-9)	7.7	7.7	7.8	7.8	7.8	7.9

① temp blank used next to vials. MK 12/26, TW 12/28

48 Hour Bivalve Development Reference Toxicant Test

P220819.107

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	223	7	1/5/24	DM
	2	221	6	1/5/24	DM
	3	220	9	1/5/24	DM
1.5	1	223	10	1/5/24	DM
	2	195	14	1/5/24	DM
	3	216	21	1/5/24	DM
3	1	231	15	1/5/24	DM
	2	217	13	1/5/24	DM
	3	159	11	1/5/24	DM
6	1	77	113	1/5/24	DM
	2	② ~~139~~ 97	② ~~87~~ 135	1/5/24	DM
	3	59	131	1/5/24	DM
12	1	0	160	1/5/24	DM
	2	0	225 ①	1/5/24	DM
	3	0	201	1/5/24	DM
18	1	0	238	1/5/24	DM
	2	0	209	1/5/24	DM
	3	0	202	1/5/24	DM

Stocking Density

Rep	Count	Init.
1	187	MK
2	222	MK
3	227	MK
Mean:	212	

QA Count Checks:			
#1 conc/rep Ø rep2 # normal 221 # abnormal 7	#2 conc/rep 3 rep2 # normal 223 # abnormal 17	#3 conc/rep _____ # normal ___ # abnormal ___	#4 conc/rep _____ # normal ___ # abnormal ___
Tech. Init. NL	Tech. Init. NL	Tech. Init. _____	Tech. Init. _____
Calc. 221/227 = 97% 221/228 = 97% Δ = 0%	223/~~17~~ 240 = 93% 217/~~13~~ 230 = 94% Δ = 1%		

QA Check Acceptability: ☑ <5% difference in means of QA & orig. counts

① IE-DM-1/5/24 ② Numbers were swapped: confirmed w/ tech. MK 1/9/24.

Ammonia Reference Toxicant
Spiking Worksheet

Reference Toxicant ID: P220819.107
Date Prepared: 12/26/23
Technician Initials: JL

Biv / Echino NH_3 RT

Assumptions in Model
Stock ammonia concentration is 9,000 mg/L = 9 mg/mL

Date: 12/26/2023
Measurement: 9373.333333

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	Desired Concentration	Volume		
mg/L	mg/L	mL	mL stock to increase	
			[redacted]	SALT WATER
2.17	1.5	200		0.048
3.92	3	200		0.096
7.42	6	200		0.192
14.7	12	200		0.384
20.5	18	200		0.576

5. *Americamysis bahia* MET SPP Water-Column Test

5.1 *Americamysis bahia* MET Test Data

Version T.1

GENERAL

Client	WSP
Project	USCG Station Vallejo
Project Number	PG1617
Project Manager	M. Knowlen
Date Sample Collected (Oldest Sample)	12/12/2023
Sample Holding Time	14
Test Start Date	12/26/23
Test End Date	12/30/23
Test Species	*Americamysis bahia*
Organism Supplier	ABS
Date Organism Acquired	12/22/2023
Organism Acclimation Time (Days)	4
Organism Batch	ABS122223.01
Test Type	SPP
Test Protocol	OTM/ITM
Regional Protocol	San Francisco Bay
Laboratory Location	Port Gamble
Test Location	Bath 1
Sample Treatment	Increased salinity
Water Batch	FSW122323.01
Test Lighting	16L:8D
Test Chamber	12 oz. plastic
Replicates Per Treatment	5
Organisms per Replicate	10
Exposure Volume	250 mL
Feeding Information	0.1 mL nauplii twice daily
Test Dissolved Oxygen	> 3
Test Temperature	20 ± 1
Test Salinity	28 ± 2
Test pH	8 ± 1
Water Renewal Info	None

Food Batch #
41730.00

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	**Max**
DO:	3.0	
Temp:	18.5	21.4
Sal:	26	30
pH:	7	9

TEST START TIME:	1600
TEST END TIME:	1453

	CLIENT SAMPLE ID (Concentration %)	LAB ID
Control	Control	.
2	Salt Control	CSMM122623.01
3	SV-23-SW	P231214.04
4	SV-23-A-Composite 1%	P231221.01
5	SV-23-A-Composite 10%	P231221.01
6	SV-23-A-Composite 50%	P231221.01
7	SV-23-A-Composite 100%	P231221.01
8	.	.
9	.	.
10	.	.
11	.	.
12	.	.
13	.	.
14	.	.
15	.	.
16	.	.
17	.	.
18	.	.
19	.	.
20	.	.

EcoAnalysts, Inc.

SPP ELUTRIATE PREPARATION WORKSHEET

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER
WSP	USCG Station Vallejo	PG1617	M. Knowlen

DILUENT SOURCE: (sitewater/labwater):

sitewater

PROJECT SITEWATER CLIENT ID:	LABORATORY WATER LAB ID:
SV-23-SW	

STANDARD ELUTRIATE IS PREPARED AT 1 PART SEDIMENT TO 4 PARTS WATER

ELUTRIATE RATIO SELECTED:	MET (150g/L target slurry: 524g/L dry weight of comp)
TOTAL VOLUME OF ELUTRIATE PREPARATION VESSEL:	20 L Glass carboy (filled to 15 L)
VOLUME OF SEDIMENT PER SAMPLE:	4.3 L
VOLUME OF DILUENT:	10.7 L
TOTAL NUMBER OF PREPARTION VESSELS PER SAMPLE:	1

# Cont's	Sample ID	Date Spin Start	Time Spin Start	Time Settle Start	Time of Elutriate Collection	Initial Volume Recovered (units)	Centrifuged (Y/N)	Settled Overnight (Y/N)	Secondary Volume Recovered (units)	Total Volume (units)	Comments
1	SV-23-A Composite	12/25/23	0915-0920 mix; 0925-1025 aerate	1025 (12/25/23)	950 (12/26/23)	5.2 L	N	Y (24 hr settle)	--	5.2 L	Elutriate shared w/ chem

SPP Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION			PROTOCOL		
WSP	USCG Station Vallejo	*Americamysis bahia*	Port Gamble / Bath 1			OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**PROJECT NUMBER**	**TEST START DATE**	**TIME**	**INITIALS**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	SPP	PG1617	December 26, 2023	1600	JL MK	December 30, 2023	1453	SR

WATER QUALITY DATA

							DO (mg/L)	TEMP (°C)	SALINITY (ppt)	pH	Feeding 0.1 mL nauplii twice daily		
SAMPLE ID (Concentration %)	DAY	REP	JAR #	TECHNICIAN	Date	Meter	> 3	19 - 21	26 - 30	7 - 9	AM	PM	Notes
Control	0	Stock		JL	12/26/23	7	7.7	19.4	29	8.0		CS	
Control	1	1	1	SR	12/27/23	7	6.7	20.3	29	7.4	LG	MS	
Control	2	2	7	TW	12/28/23	8	4.8	21.2	29	7.5	TW	JL	
Control	3	3	15	SR	12/29/23	7	5.3	18.6	30	7.3	MK	NL	
Control	4	4	33	TT	12/30/23	8	5.1	19.3	29	7.4	SR		
Salt Control	0	Stock		JL	12/26/23	7	7.8	19.0	28	8.1		CS	
Salt Control	1	1	10	SR	12/27/23	7	6.9	20.3	28	7.7	LG	MS	
Salt Control	2	2	8	TW	12/28/23	8	5.5	21.2	28	7.6	TW	JL	
Salt Control	3	3	14	SR	12/29/23	7	5.8	18.8	29	7.4	MK	NL	
Salt Control	4	4	6	TT	12/30/23	8	5.4	19.3	28	7.6	SR		
SV-23-SW	0	Stock		JL	12/26/23	7	8.1	19.6	28	8.0		CS	
SV-23-SW	1	1	29	SR	12/27/23	7	6.6	20.3	28	7.8	LG	MS	
SV-23-SW	2	2	5	TW	12/28/23	8	5.7	21.1	28	7.8	TW	JL	
SV-23-SW	3	3	34	SR	12/29/23	7	5.7	18.8	28	7.6	MK	NL	
SV-23-SW	4	4	28	TT	12/30/23	8	5.0	19.2	28	7.7	SR		
SV-23-A-Composite 1%	0	Stock		JL	12/26/23	7	7.8	19.4	29	8.1		CS	
SV-23-A-Composite 1%	1	1	21	SR	12/27/23	7	6.5	20.3	29	7.9	LG	MS	
SV-23-A-Composite 1%	2	2	31	TW	12/28/23	8	5.1	21.4	29	7.7	TW	JL	
SV-23-A-Composite 1%	3	3	27	SR	12/29/23	7	5.8	19.0	30	7.6	MK	NL	
SV-23-A-Composite 1%	4	4	12	TT	12/30/23	8	5.4	19.2	29	7.6	SR		
SV-23-A-Composite 10%	0	Stock		JL	12/26/23	7	7.7	19.3	29	8.1		CS	
SV-23-A-Composite 10%	1	1	30	SR	12/27/23	7	6.5	20.3	29	7.9	LG	MS	
SV-23-A-Composite 10%	2	2	20	TW	12/28/23	8	5.4	21.0	29	7.7	TW	JL	
SV-23-A-Composite 10%	3	3	11	SR	12/29/23	7	5.8	19.2	30	7.6	MK	NL	
SV-23-A-Composite 10%	4	4	24	TT	12/30/23	8	4.6	19.1	29	7.6	SR		

EcoAnalysts, Inc.

SPP Test WQ Data Sheet

CLIENT	PROJECT	SPECIES	LOCATION			PROTOCOL		
WSP	USCG Station Vallejo	*Americamysis bahia*	Port Gamble / Bath 1			OTM/ITM , San Francisco Bay		
PROJECT MANAGER	**TEST TYPE**	**PROJECT NUMBER**	**TEST START DATE**	**TIME**	**INITIALS**	**TEST END DATE**	**TIME**	**INITIALS**
M. Knowlen	SPP	PG1617	December 26, 2023	1600	JL MK	December 30, 2023	1453	SR

WATER QUALITY DATA

							DO (mg/L)	TEMP (°C)	SALINITY (ppt)	pH	Feeding 0.1 mL nauplii twice daily		
SAMPLE ID (Concentration %)	**DAY**	**REP**	**JAR #**	**TECHNICIAN**	**Date**	**Meter**	> 3	19 - 21	26 - 30	7 - 9	AM	PM	**Notes**
SV-23-A-Composite 50%	0	Stock		JL	12/26/23	7	7.8	19.3	29	8.1		CS	
SV-23-A-Composite 50%	1	1	22	SR	12/27/23	7	5.7	20.3	29	8.0	LG	MS	
SV-23-A-Composite 50%	2	2	35	TW	12/28/23	8	5.6	20.8	29	8.0	TW	JL	
SV-23-A-Composite 50%	3	3	25	SR	12/29/23	7	4.9	18.7	29	7.7	MK	NL	
SV-23-A-Composite 50%	4	4	13	TT	12/30/23	8	5.3	19.1	29	7.9	SR		
SV-23-A-Composite 100%	0	Stock		JL	12/26/23	7	7.8	19.4	28	8.2		CS	
SV-23-A-Composite 100%	1	1	19	SR	12/27/23	7	6.1	20.2	28	8.1	LG	MS	
SV-23-A-Composite 100%	2	2	16	TW	12/28/23	8	5.7	20.9	29	8.1	TW	JL	
SV-23-A-Composite 100%	3	3	32	SR	12/29/23	7	3.9	19.0	29	7.9	MK	NL	
SV-23-A-Composite 100%	4	4	18	TT	12/30/23	8	5.3	19.1	29	8.1	SR		

EcoAnalysts, Inc.

SPP Test Observation and Endpoint Data Sheet

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 1	OTM/ITM / San Francisco Bay	*Americamysis bahia*

Observation Key
N = Normal
Q = Quiescent
#LOS=Loss of equilibrium
#NB = Num no body
TC = Too cloudy for observations
TCLO = Too cloudy to count, but live organisms observed

ENDPOINT DATA & OBSERVATIONS

			Day	1			2			3			4			
			Tech	SR			TW			SR			SR			
			Date	12/27/23			12/28/23			12/29/23			12/30/23			
CLIENT ID (Concentration %)	**REP**	**Initial #**		**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Comments**
Control	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
Control	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
Salt Control	3	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	
Salt Control	4	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
Salt Control	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-SW	3	10		9	1	N	9	0	N	9	0	N	9	0	N	
SV-23-SW	4	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-SW	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 1%	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 1%	2	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-A-Composite 1%	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 1%	4	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-A-Composite 1%	5	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	1	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	3	10		10	0	N	9	0	1NB,N	9	0	N	9	0	1FB, N	
SV-23-A-Composite 10%	4	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 10%	5	10		10	0	N	10	0	N	10	0	N	10	0	N	

EcoAnalysts, Inc.

SPP Test Observation and Endpoint Data Sheet

CLIENT	PROJECT	PROJECT NO.	PROJECT MANAGER	LOCATION	PROTOCOL	SPECIES
WSP	USCG Station Vallejo	PG1617	M. Knowlen	Port Gamble / Bath 1	OTM/ITM / San Francisco Bay	*Americamysis bahia*

Observation Key
N = Normal
Q = Quiescent
#LOS=Loss of equilibrium
#NB = Num no body
TC = Too cloudy for observations
TCLO = Too cloudy to count, but live organisms observed

ENDPOINT DATA & OBSERVATIONS

			Day	1			2			3			4			
			Tech	SR			TW			SR			SR			
			Date	12/27/23			12/28/23			12/29/23			12/30/23			
CLIENT ID (Concentration %)	**REP**	**Initial #**		**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Alive**	**Dead**	**Obs**	**Comments**
SV-23-A-Composite 50%	1	10		10	0	N	10	0	N	10	0	N	9	1NB	N	
SV-23-A-Composite 50%	2	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 50%	3	10		10	0	N	10	0	N	10	0	N	10	0	N	
SV-23-A-Composite 50%	4	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-A-Composite 50%	5	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-A-Composite 100%	1	10		10	0	N	8	0	2NB,N	7	1	N	7	0	N	
SV-23-A-Composite 100%	2	10		10	0	N	10	0	N	9	1NB	N	9	0	N	
SV-23-A-Composite 100%	3	10		10	0	N	10	0	N	9	1NB	N	8	1	N	
SV-23-A-Composite 100%	4	10		9	1	N	9	0	N	9	0	N	9	0	N	
SV-23-A-Composite 100%	5	10		10	0	N	9	0	1NB,N	9	0	N	9	0	N	

EcoAnalysts, Inc.

SPP Test Stats

CLIENT	PROJECT	SPECIES
WSP	USCG Station Vallejo	*Americamysis bahia*

Sample ID (Concentration %)	Rep	# Initiated	# Alive	# Missing or Dead	% Survival	Survival Statistics: Mean Survival (%)	Survival Statistics: SD	% Mortality	Mortality Statistics: Mean Mortality (%)	Mortality Statistics: SD
Control	1	10	10	0	100			0		
Control	2	10	10	0	100			0		
Control	3	10	10	0	100			0		
Control	4	10	10	0	100			0		
Control	5	10	10	0	100	100.0	0.0	0	0.0	0.0
Salt Control	1	10	10	0	100			0		
Salt Control	2	10	10	0	100			0		
Salt Control	3	10	9	1	90			10		
Salt Control	4	10	9	1	90			10		
Salt Control	5	10	10	0	100	96.0	5.5	0	4.0	5.5
SV-23-SW	1	10	10	0	100			0		
SV-23-SW	2	10	10	0	100			0		
SV-23-SW	3	10	9	1	90			10		
SV-23-SW	4	10	9	1	90			10		
SV-23-SW	5	10	10	0	100	96.0	5.5	0	4.0	5.5
SV-23-A-Composite 1%	1	10	10	0	100			0		
SV-23-A-Composite 1%	2	10	9	1	90			10		
SV-23-A-Composite 1%	3	10	10	0	100			0		
SV-23-A-Composite 1%	4	10	9	1	90			10		
SV-23-A-Composite 1%	5	10	10	0	100	96.0	5.5	0	4.0	5.5
SV-23-A-Composite 10%	1	10	10	0	100			0		
SV-23-A-Composite 10%	2	10	10	0	100			0		
SV-23-A-Composite 10%	3	10	9	1	90			10		
SV-23-A-Composite 10%	4	10	10	0	100			0		
SV-23-A-Composite 10%	5	10	10	0	100	98.0	4.5	0	2.0	4.5
SV-23-A-Composite 50%	1	10	9	1	90			10		
SV-23-A-Composite 50%	2	10	10	0	100			0		
SV-23-A-Composite 50%	3	10	10	0	100			0		
SV-23-A-Composite 50%	4	10	9	1	90			10		
SV-23-A-Composite 50%	5	10	9	1	90	94.0	5.5	10	6.0	5.5
SV-23-A-Composite 100%	1	10	7	3	70			30		
SV-23-A-Composite 100%	2	10	9	1	90			10		
SV-23-A-Composite 100%	3	10	8	2	80			20		
SV-23-A-Composite 100%	4	10	9	1	90			10		
SV-23-A-Composite 100%	5	10	9	1	90	84.0	8.9	10	16.0	8.9

SPP Test Day 0 Ammonia

CLIENT		PROJECT				SPECIES
WSP		USCG Station Vallejo				*Americamysis bahia*
Calibration Standards Temperature:	20.6	Date:	12/26/2023	Tech:	MK	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*Meter*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*pKa[5]*	*Unionized NH_3 (mg/L)*	
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Notes
Control	0	Overlying	0.371	20.0	T17	29	8.0	19.4	292.55	9.2557	0.013	
Salt Control	0	Overlying	1.02	19.6	T17	28	8.1	19.0	292.15	9.2555	0.044	
SV-23-SW	0	Overlying	0.740	19.8	T17	28	8.0	19.6	292.75	9.2555	0.027	
SV-23-A-Composite 1%	0	Overlying	0.890	19.8	T17	29	8.1	19.4	292.55	9.2557	0.040	
SV-23-A-Composite 10%	0	Overlying	2.87	20.9	T17	29	8.1	19.3	292.45	9.2557	0.127	
SV-23-A-Composite 50%	0	Overlying	4.39	20.0	T17	29	8.1	19.3	292.45	9.2557	0.194	
SV-23-A-Composite 100%	0	Overlying	6.07	20.0	T17	28	8.2	19.4	292.55	9.2555	0.336	

SPP Test Day 4 Ammonia

CLIENT	PROJECT		SPECIES
WSP	USCG Station Vallejo		*Americamysis bahia*
Calibration Standards Temperature: 19.1	**Date:** 12/30/2023	**Tech:** SR	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample (Concentration %)	Day	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*Meter*	*Test salinity (ppt)*	*Test pH*	*Test temp (C)*	*Temp (K)*	*pKa^s*	*Unionized NH_3 (mg/L)*	
Sourced	Sourced		Record	Record	Record	Sourced	Sourced	Sourced	Calculated	Calculated	Calculated	Notes
Control	4	Overlying	1.58	20.1	T17	29	7.4	19.3	292.45	9.2557	0.014	
Salt Control	4	Overlying	1.30	20.0	T17	28	7.6	19.3	292.45	9.2555	0.019	
SV-23-SW	4	Overlying	1.25	19.8	T17	28	7.7	19.2	292.35	9.2555	0.022	
SV-23-A-Composite 1%	4	Overlying	1.34	19.6	T17	29	7.6	19.2	292.35	9.2557	0.019	
SV-23-A-Composite 10%	4	Overlying	1.96	19.6	T17	29	7.6	19.1	292.25	9.2557	0.028	
SV-23-A-Composite 50%	4	Overlying	4.80	19.6	T17	29	7.9	19.1	292.25	9.2557	0.134	
SV-23-A-Composite 100	4	Overlying	9.07	19.3	T17	29	8.1	19.1	292.25	9.2557	0.395	

5.2 *Americamysis bahia* MET Statistical Results

CETIS Analytical Report

Report Date: 03 Jan-24 10:51 (p 1 of 4)
Test Code/ID: P231221.01 MET / 19-6168-5027

Mysidopsis 96-h Acute Survival Test

EcoAnalysts

Analysis ID:	08-0519-8740	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:49	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	45BDE83B8412A1E7942C94363C93AB2A	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	12-4190-1791	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	50	100	70.71	2	0.07668	7.67%

Steel Many-One Rank Sum Test

Control vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Dilution Water	1	8	22.5	17	1	CDF	0.3541	Non-Significant Effect
	10	8	25	17	1	CDF	0.5912	Non-Significant Effect
	50	8	20	17	1	CDF	0.1653	Non-Significant Effect
	100*	8	15	17	0	CDF	0.0158	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.17716	0.04429	4	6.342	0.0018	Significant Effect
Error	0.139666	0.0069833	20			
Total	0.316826		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
	Levene Equality of Variance Test	7.448	4.431	0.0008	Unequal Variances
	Mod Levene Equality of Variance Test	0.8128	4.893	0.5364	Equal Variances
Distribution	Anderson-Darling A2 Test	0.7661	3.878	0.0461	Normal Distribution
	D'Agostino Kurtosis Test	0.312	2.576	0.7550	Normal Distribution
	D'Agostino Skewness Test	1.44	2.576	0.1499	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	2.171	9.21	0.3377	Normal Distribution
	Kolmogorov-Smirnov D Test	0.18	0.2018	0.0358	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9255	0.8877	0.0683	Normal Distribution

96h Proportion Survived Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
1		5	0.9600	0.8920	1.0000	1.0000	0.9000	1.0000	0.0245	5.71%	4.00%
10		5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	2.00%
50		5	0.9400	0.8720	1.0000	0.9000	0.9000	1.0000	0.0245	5.83%	6.00%
100		5	0.8400	0.7289	0.9511	0.9000	0.7000	0.9000	0.0400	10.65%	16.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.4120	1.4120	1.4120	1.4120	1.4120	1.4120	0.0000	0.00%	0.00%
1		5	1.3470	1.2360	1.4580	1.4120	1.2490	1.4120	0.0399	6.63%	4.62%
10		5	1.3790	1.2890	1.4700	1.4120	1.2490	1.4120	0.0326	5.28%	2.31%
50		5	1.3140	1.2030	1.4250	1.2490	1.2490	1.4120	0.0399	6.79%	6.93%
100		5	1.1690	1.0240	1.3140	1.2490	0.9912	1.2490	0.0523	10.00%	17.20%

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	08-0519-8740	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:49	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	45BDE83B8412A1E7942C94363C93AB2A	**Editor ID:**	009-542-444-2

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
1		1.0000	0.9000	1.0000	0.9000	1.0000
10		1.0000	1.0000	0.9000	1.0000	1.0000
50		0.9000	1.0000	1.0000	0.9000	0.9000
100		0.7000	0.9000	0.8000	0.9000	0.9000

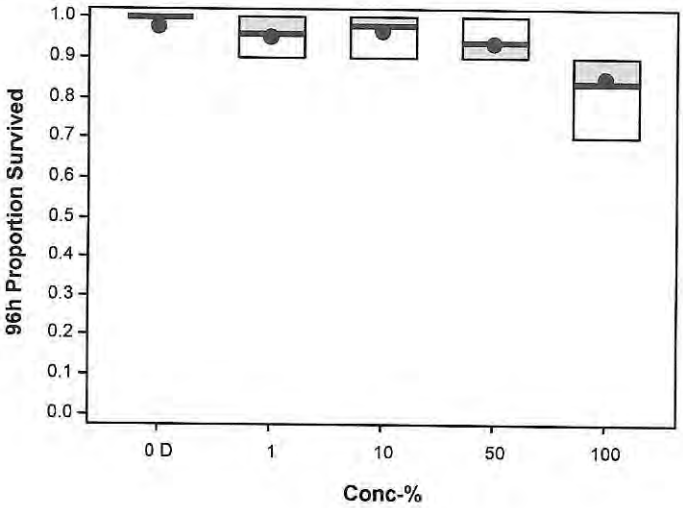
Angular (Corrected) Transformed Detail

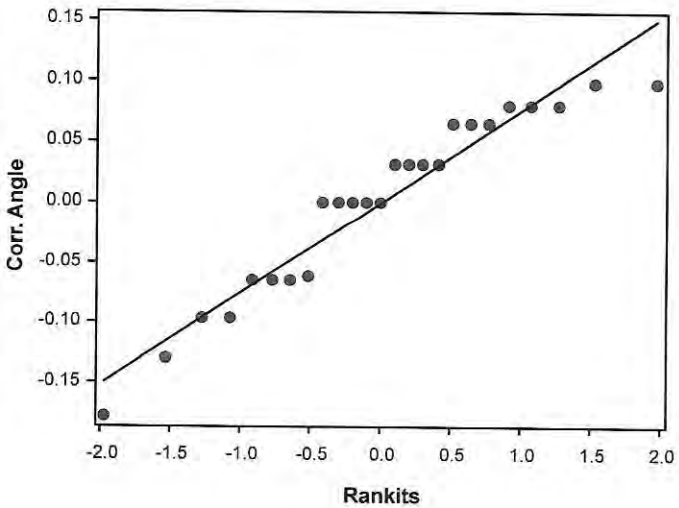
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.4120	1.4120	1.4120	1.4120	1.4120
1		1.4120	1.2490	1.4120	1.2490	1.4120
10		1.4120	1.4120	1.2490	1.4120	1.4120
50		1.2490	1.4120	1.4120	1.2490	1.2490
100		0.9912	1.2490	1.1070	1.2490	1.2490

96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	10/10
1		10/10	9/10	10/10	9/10	10/10
10		10/10	10/10	9/10	10/10	10/10
50		9/10	10/10	10/10	9/10	9/10
100		7/10	9/10	8/10	9/10	9/10

Graphics





Mysidopsis 96-h Acute Survival Test

EcoAnalysts

Analysis ID:	06-9249-0834	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:50	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	A8B03EB7E41FFE26589AED8615695BC0	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	12-4190-1791	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	0	>0	---	---	0.06409	6.41%

Steel Many-One Rank Sum Test

Control I	vs	Control II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Dilution Water		Site Water	8	22.5	18	1	CDF	0.2396	Non-Significant Effect
		Salt Control	8	22.5	18	1	CDF	0.2396	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.014165	0.0070825	2	1.333	0.3000	Non-Significant Effect
Error	0.0637424	0.0053119	12			
Total	0.0779074		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
	Levene Equality of Variance Test	48	6.927	<1.0E-05	Unequal Variances
	Mod Levene Equality of Variance Test	1.5	8.022	0.2740	Equal Variances
Distribution	Anderson-Darling A2 Test	1.495	3.878	0.0002	Non-Normal Distribution
	D'Agostino Skewness Test	0.9979	2.576	0.3183	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2333	0.2542	0.0273	Normal Distribution
	Shapiro-Wilk W Normality Test	0.7845	0.8328	0.0023	Non-Normal Distribution

96h Proportion Survived Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
0	SC	5	0.9600	0.8920	1.0000	1.0000	0.9000	1.0000	0.0245	5.71%	4.00%
0	SW	5	0.9600	0.8920	1.0000	1.0000	0.9000	1.0000	0.0245	5.71%	4.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.4120	1.4120	1.4120	1.4120	1.4120	1.4120	0.0000	0.00%	0.00%
0	SC	5	1.3470	1.2360	1.4580	1.4120	1.2490	1.4120	0.0399	6.63%	4.62%
0	SW	5	1.3470	1.2360	1.4580	1.4120	1.2490	1.4120	0.0399	6.63%	4.62%

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
0	SC	1.0000	1.0000	0.9000	0.9000	1.0000
0	SW	1.0000	1.0000	0.9000	0.9000	1.0000

Mysidopsis 96-h Acute Survival Test — EcoAnalysts

Analysis ID:	06-9249-0834	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:50	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	A8B03EB7E41FFE26589AED8615695BC0	**Editor ID:**	009-542-444-2

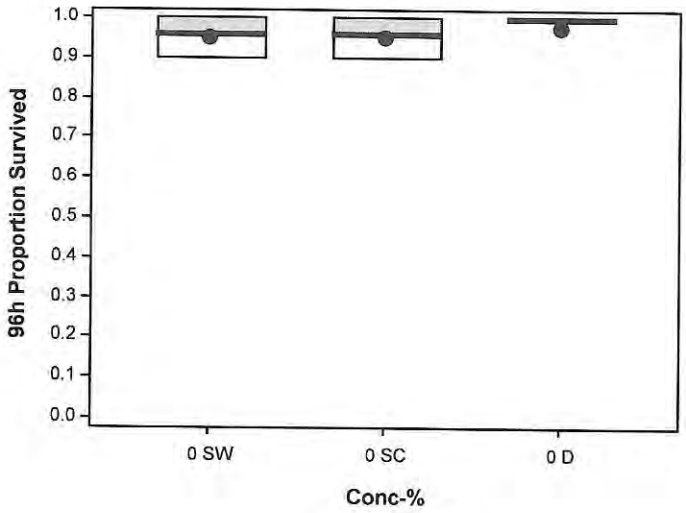
Angular (Corrected) Transformed Detail

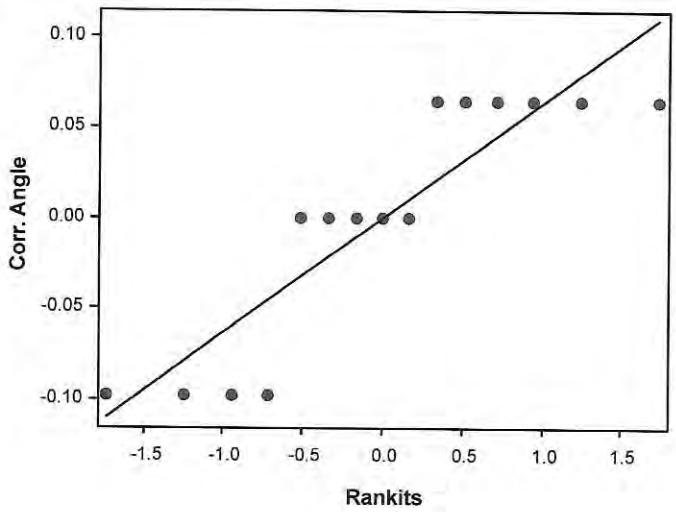
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.4120	1.4120	1.4120	1.4120	1.4120
0	SC	1.4120	1.4120	1.2490	1.2490	1.4120
0	SW	1.4120	1.4120	1.2490	1.2490	1.4120

96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	10/10
0	SC	10/10	10/10	9/10	9/10	10/10
0	SW	10/10	10/10	9/10	9/10	10/10

Graphics





CETIS Analytical Report

Report Date: 03 Jan-24 10:51 (p 1 of 2)
Test Code/ID: P231221.01 MET / 19-6168-5027

Mysidopsis 96-h Acute Survival Test — EcoAnalysts

Analysis ID:	13-9391-2550	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	45BDE83B8412A1E7942C94363C93AB2A	**Editor ID:**	009-542-444-2

Batch ID:	05-6299-5759	**Test Type:**	Survival (96h)	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:00	**Protocol:**	EPA-823-B-98-004 (1998)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 14:53	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Test Length:	95h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	12-4190-1791	**Code:**	P231221.01	**Project:**	USCG Station Vallejo 2024
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Source:**	WSP USCG Vallejo
Receipt Date:	14 Dec-23 13:07	**CAS (PC):**		**Station:**	SV-23-A-Composite
Sample Age:	14d 7h (0.1 °C)	**Client:**	WSP		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2128345	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
EC15	93.33	59.49	---	1.1	---	1.7
EC20	>100	---	---	<1	---	---
EC25	>100	---	---	<1	---	---
EC40	>100	---	---	<1	---	---
EC50	>100	---	---	<1	---	---

96h Proportion Survived Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	Code	Count	Mean	Median	Min	Max	CV%	%Effect	ΣA/ΣB	Mean	%Effect
0	D	5	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	50/50	1.0000	0.00%
1		5	0.9600	1.0000	0.9000	1.0000	5.71%	4.00%	48/50	0.9700	3.00%
10		5	0.9800	1.0000	0.9000	1.0000	4.56%	2.00%	49/50	0.9700	3.00%
50		5	0.9400	0.9000	0.9000	1.0000	5.83%	6.00%	47/50	0.9400	6.00%
100		5	0.8400	0.9000	0.7000	0.9000	10.65%	16.00%	42/50	0.8400	16.00%

96h Proportion Survived Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
1		1.0000	0.9000	1.0000	0.9000	1.0000
10		1.0000	1.0000	0.9000	1.0000	1.0000
50		0.9000	1.0000	1.0000	0.9000	0.9000
100		0.7000	0.9000	0.8000	0.9000	0.9000

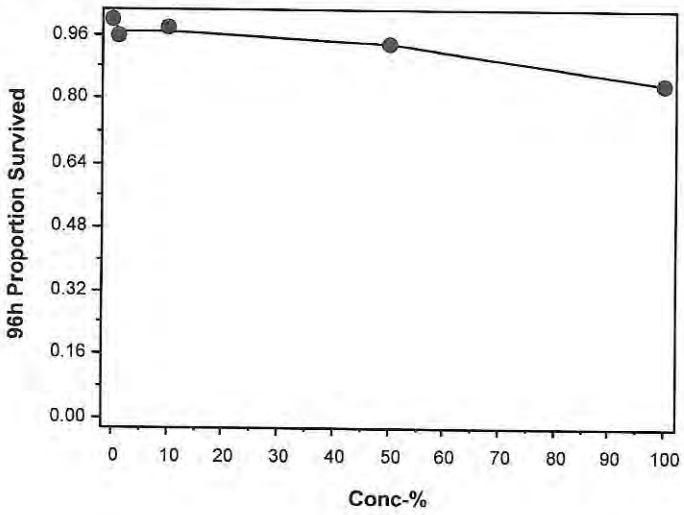
96h Proportion Survived Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	10/10
1		10/10	9/10	10/10	9/10	10/10
10		10/10	10/10	9/10	10/10	10/10
50		9/10	10/10	10/10	9/10	9/10
100		7/10	9/10	8/10	9/10	9/10

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Analysis ID:	13-9391-2550	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv2.1.4
Analyzed:	03 Jan-24 10:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Edit Date:	03 Jan-24 10:48	**MD5 Hash:**	45BDE83B8412A1E7942C94363C93AB2A	**Editor ID:**	009-542-444-2

Graphics



CETIS Test Data Worksheet

Report Date: 03 Jan-24 10:51 (p 1 of 1)
Test Code/ID: P231221.01 MET / 19-6168-5027

Mysidopsis 96-h Acute Survival Test — **EcoAnalysts**

Start Date:	26 Dec-23 16:00	**Species:**	Americamysis bahia	**Sample Code:**	P231221.01
End Date:	30 Dec-23 14:53	**Protocol:**	EPA-823-B-98-004 (1998)	**Sample Source:**	WSP USCG Vallejo
Sample Date:	12 Dec-23 08:45	**Material:**	Sediment Elutriate	**Sample Station:**	SV-23-A-Composite

Conc-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	28	10				10	
0	D	2	20	10				10	
0	D	3	10	10				10	
0	D	4	22	10				10	
0	D	5	11	10				10	
0	SC	1	29	10				10	
0	SC	2	24	10				10	
0	SC	3	25	10				9	
0	SC	4	21	10				9	
0	SC	5	27	10				10	
0	SW	1	18	10				10	
0	SW	2	12	10				10	
0	SW	3	31	10				9	
0	SW	4	32	10				9	
0	SW	5	23	10				10	
1		1	7	10				10	
1		2	15	10				9	
1		3	19	10				10	
1		4	14	10				9	
1		5	2	10				10	
10		1	16	10				10	
10		2	34	10				10	
10		3	1	10				9	
10		4	3	10				10	
10		5	33	10				10	
50		1	5	10				9	
50		2	6	10				10	
50		3	26	10				10	
50		4	30	10				9	
50		5	13	10				9	
100		1	17	10				7	
100		2	35	10				9	
100		3	9	10				8	
100		4	8	10				9	
100		5	4	10				9	

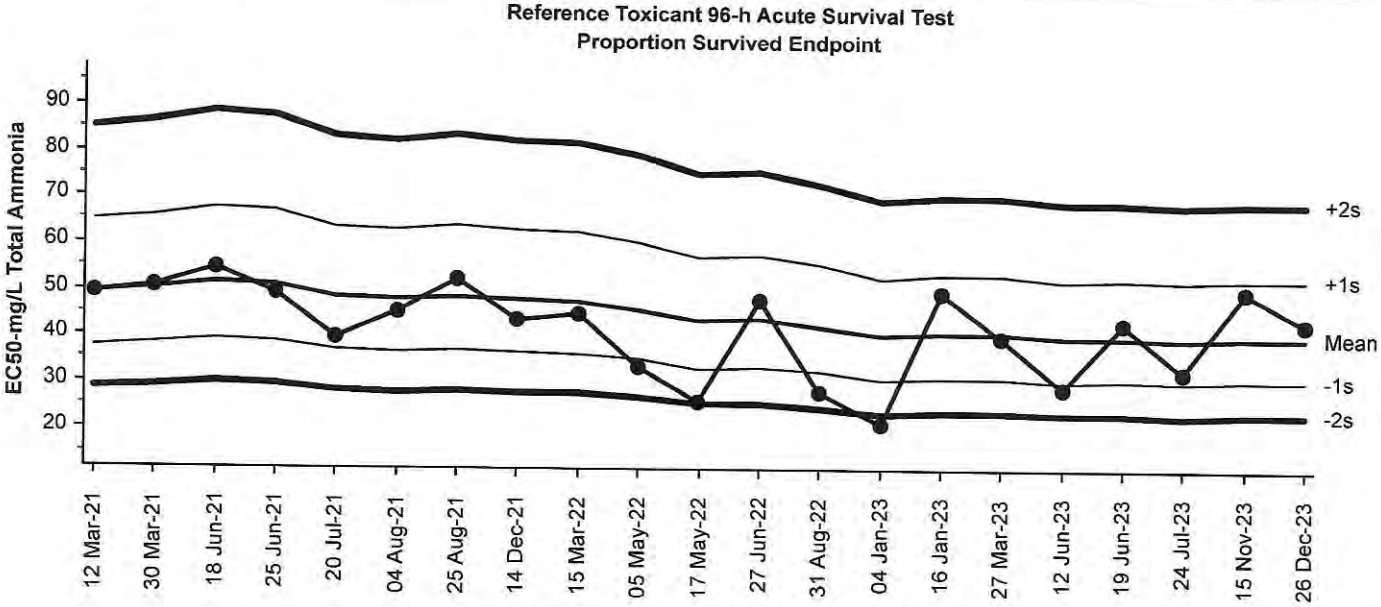
5.3 *Americamysis bahia* Reference Toxicant Test Results

CETIS QC Plot

Report Date: 04 Jan-24 14:19 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival | **Organism:** Americamysis bahia | **Material:** Total Ammonia
Protocol: All Protocols | **Endpoint:** Proportion Survived | **Source:** Reference Toxicant-REF



Lognormal Cumulative Mean Plot

Mean:	40.33	**Count:**	20	**-1s Warning Limit:**	30.7	**-2s Action Limit:**	23.4
Sigma:	NA	**CV:**	27.70%	**+1s Warning Limit:**	52.9	**+2s Action Limit:**	69.4

Quality Control Data

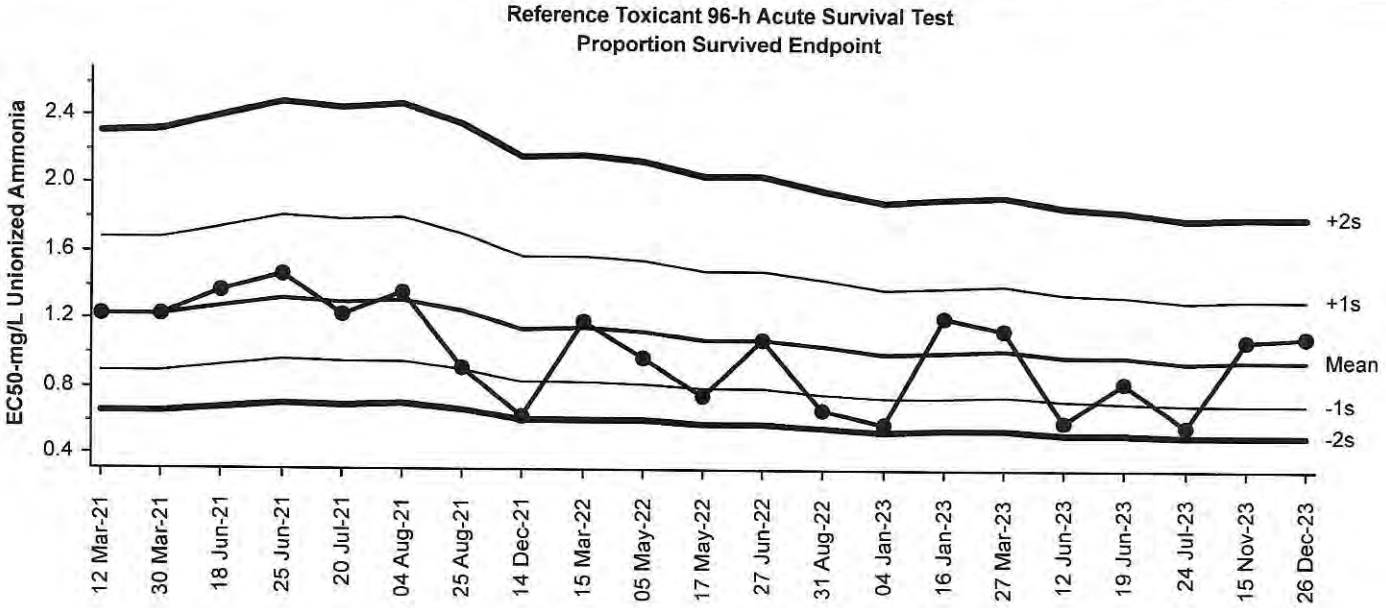
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2021	Mar	12	16:14	49.37	9.042	0.7446			18-5434-9515	18-6079-9086	EcoAnalysts
2			30	13:55	50.83	10.5	0.8518			17-3756-7744	04-0053-5233	EcoAnalysts
3		Jun	18	16:30	54.64	14.31	1.118	(+)		01-8844-2510	20-0148-5495	EcoAnalysts
4			25	14:10	49.31	8.98	0.7399			18-5484-8878	12-4713-5568	EcoAnalysts
5		Jul	20	14:00	39.61	-0.7117	-0.06554			13-1683-1120	17-0510-9818	EcoAnalysts
6		Aug	4	15:31	45.6	5.278	0.4527			18-5136-2569	14-9688-8086	EcoAnalysts
7			25	12:30	52.66	12.34	0.9823			17-5720-9959	08-5446-9120	EcoAnalysts
8		Dec	14	15:08	43.78	3.452	0.3023			12-2936-9872	13-6771-0841	EcoAnalysts
9	2022	Mar	15	14:58	45.09	4.768	0.4113			14-6373-5875	14-0865-4834	EcoAnalysts
10		May	5	14:59	33.55	-6.773	-0.6767			20-5665-2087	14-9264-7880	EcoAnalysts
11			17	15:00	25.96	-14.37	-1.621	(-)		09-5954-8213	20-8845-5762	EcoAnalysts
12		Jun	27	15:16	48.24	7.912	0.6594			04-2763-8518	05-6292-1544	EcoAnalysts
13		Aug	31	15:38	28.01	-12.31	-1.341	(-)		09-7289-9321	20-5773-2495	EcoAnalysts
14	2023	Jan	4	16:54	21.02	-19.31	-2.398	(-)	(-)	10-8405-7934	14-3917-7655	EcoAnalysts
15			16	15:20	49.73	9.406	0.7716			00-5023-4163	02-3920-9354	EcoAnalysts
16		Mar	27	16:15	40.05	-0.2772	-0.02539			19-9864-9381	05-2366-4559	EcoAnalysts
17		Jun	12	18:15	28.97	-11.36	-1.218	(-)		21-2321-1661	20-4768-3034	EcoAnalysts
18			19	16:45	43.42	3.097	0.2723			06-8112-6501	18-4426-3725	EcoAnalysts
19		Jul	24	16:30	32.5	-7.826	-0.7941			02-6642-7447	19-0861-9788	EcoAnalysts
20		Nov	15	17:58	50.11	9.779	0.7991			00-4605-6933	10-9410-9569	EcoAnalysts
21		Dec	26	16:30	43.27	2.947	0.2596			13-1008-6828	00-5880-8573	EcoAnalysts

CETIS QC Plot

Report Date: 04 Jan-24 14:19 (1 of 1)

Reference Toxicant 96-h Acute Survival Test — **All Matching Labs**

Test Type: Survival
Protocol: All Protocols
Organism: Americamysis bahia
Endpoint: Proportion Survived
Material: Unionized Ammonia
Source: Reference Toxicant-REF



Lognormal Cumulative Mean Plot

Mean:	0.9618	**Count:**	20	**-1s Warning Limit:**	0.701	**-2s Action Limit:**	0.511
Sigma:	NA	**CV:**	32.40%	**+1s Warning Limit:**	1.32	**+2s Action Limit:**	1.81

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2021	Mar	12	16:14	1.222	0.26	0.7575			17-1664-8225	19-6080-5490	EcoAnalysts
2			30	13:55	1.23	0.2684	0.7793			06-7126-5819	07-8529-2108	EcoAnalysts
3		Jun	18	16:30	1.369	0.4074	1.118	(+)		19-2327-7644	12-0910-6238	EcoAnalysts
4			25	14:10	1.47	0.508	1.342	(+)		00-5444-4904	17-0668-6758	EcoAnalysts
5		Jul	20	14:00	1.231	0.2694	0.7816			21-3428-6324	03-0006-1373	EcoAnalysts
6		Aug	4	15:31	1.359	0.3975	1.095	(+)		19-6085-9640	19-2418-9451	EcoAnalysts
7			25	12:30	0.9194	-0.04237	-0.1426			14-8657-8854	05-3476-6843	EcoAnalysts
8		Dec	14	15:08	0.634	-0.3277	-1.319	(-)		14-0164-7935	04-7880-7084	EcoAnalysts
9	2022	Mar	15	14:58	1.188	0.2259	0.6678			05-3148-4351	02-2351-6255	EcoAnalysts
10		May	5	13:16	0.9754	0.01359	0.04441			04-9702-9945	01-1046-8829	EcoAnalysts
11			17	15:00	0.7469	-0.2148	-0.8002			16-5921-0010	03-4622-9967	EcoAnalysts
12		Jun	27	15:16	1.077	0.1157	0.3596			12-2407-7415	00-4815-6881	EcoAnalysts
13		Aug	31	15:38	0.6634	-0.2984	-1.176	(-)		17-7267-3915	03-6558-5310	EcoAnalysts
14	2023	Jan	4	16:54	0.5854	-0.3764	-1.572	(-)		10-6548-5923	16-8818-4872	EcoAnalysts
15			16	15:20	1.214	0.2522	0.7371			05-4678-2256	12-6429-6050	EcoAnalysts
16		Mar	27	16:15	1.148	0.1861	0.56			20-9684-0076	11-7055-4789	EcoAnalysts
17		Jun	12	18:15	0.5993	-0.3625	-1.497	(-)		06-0472-2561	09-2691-9150	EcoAnalysts
18			19	16:45	0.8284	-0.1334	-0.4726			05-1147-3109	17-9769-0664	EcoAnalysts
19		Jul	24	16:30	0.5742	-0.3876	-1.633	(-)		12-8316-1267	13-1741-4110	EcoAnalysts
20		Nov	15	17:58	1.081	0.1189	0.3691			12-4902-1440	05-5971-1725	EcoAnalysts
21		Dec	26	16:30	1.106	0.1444	0.4429			09-2094-8244	10-4460-8525	EcoAnalysts

CETIS Summary Report

Report Date: 04 Jan-24 14:15 (p 1 of 1)
Test Code/ID: P220819.106 / 13-1008-6828

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Batch ID:	02-7337-9794	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 16:13	**Species:**	Americamysis bahia	**Brine:**	Not Applicable
Test Length:	96h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	18-4224-6568	**Code:**	P220819.106	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.106
Sample Age:	494d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
12-1508-3963	Proportion Survived	Fisher Exact Test		27.7	54.4	38.82	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
00-5880-8573	Proportion Survived	Linear Interpolation (ICPIN)		EC15	31.69	27.78	32.64	1
				EC20	33.13	29.03	34.46	
				EC25	34.65	30.32	36.38	
				EC40	39.6	34.56	42.78	
				EC50	43.27	37.41	47.64	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
14.3		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
27.7		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
54.4		3	0.2333	-0.0535	0.5202	0.1000	0.3000	0.0667	0.1155	49.49%	75.86%
76.2		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
109		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail — MD5: 339A8E6E1FCBB361118F88CA03EA29A0

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
14.3		0.9000	1.0000	1.0000
27.7		0.9000	1.0000	1.0000
54.4		0.3000	0.1000	0.3000
76.2		0.0000	0.0000	0.0000
109		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
14.3		9/10	10/10	10/10
27.7		9/10	10/10	10/10
54.4		3/10	1/10	3/10
76.2		0/10	0/10	0/10
109		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 04 Jan-24 14:14 (p 1 of 1)
Test Code/ID: P220819.106 / 13-1008-6828

Reference Toxicant 96-h Acute Survival Test — EcoAnalysts

Start Date:	26 Dec-23 16:30	**Species:**	Americamysis bahia	**Sample Code:**	P220819.106
End Date:	30 Dec-23 16:13	**Protocol:**	EPA/821/R-02-012 (2002)	**Sample Source:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Total Ammonia	**Sample Station:**	P220819.106

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	4	10	9	
0	D	2	7	10	10	
0	D	3	10	10	10	
14.3		1	14	10	9	
14.3		2	11	10	10	
14.3		3	2	10	10	
27.7		1	18	10	9	
27.7		2	9	10	10	
27.7		3	5	10	10	
54.4		1	8	10	3	
54.4		2	17	10	1	
54.4		3	15	10	3	
76.2		1	16	10	0	
76.2		2	6	10	0	
76.2		3	3	10	0	
109		1	12	10	0	
109		2	13	10	0	
109		3	1	10	0	

CETIS Summary Report

Report Date: 04 Jan-24 14:18 (p 1 of 1)
Test Code/ID: P220819.106UIA / 09-2094-8244

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Batch ID:	02-7337-9794	**Test Type:**	Survival	**Analyst:**	Michelle Knowlen
Start Date:	26 Dec-23 16:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Dec-23 16:13	**Species:**	Americamysis bahia	**Brine:**	Not Applicable
Test Length:	96h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 5d

Sample ID:	04-0502-0244	**Code:**	P220819.106UIA	**Project:**	Reference Toxicant
Sample Date:	19 Aug-22	**Material:**	Unionized Ammonia	**Source:**	Reference Toxicant
Receipt Date:	19 Aug-22	**CAS (PC):**		**Station:**	P220819.106UIA
Sample Age:	494d 16h	**Client:**	Internal Lab		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
04-6003-2288	Proportion Survived	Fisher Exact Test		0.813	1.276	1.019	---	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	S
10-4460-8525	Proportion Survived	Linear Interpolation (ICPIN)		EC15	0.8964	0.8166	0.9143	1
				EC20	0.925	0.8434	0.9493	
				EC25	0.9541	0.8748	0.985	
				EC40	1.044	0.9644	1.096	
				EC50	1.106	1.006	1.173	

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
0.42		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
0.813		3	0.9667	0.8232	1.1100	0.9000	1.0000	0.0333	0.0577	5.97%	0.00%
1.276		3	0.2333	-0.0535	0.5202	0.1000	0.3000	0.0667	0.1155	49.49%	75.86%
1.8		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%
2.055		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	---	100.00%

Proportion Survived Detail — MD5: 9031B1DAA50732BFF0E40ACF617DF0A3

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9000	1.0000	1.0000
0.42		0.9000	1.0000	1.0000
0.813		0.9000	1.0000	1.0000
1.276		0.3000	0.1000	0.3000
1.8		0.0000	0.0000	0.0000
2.055		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	9/10	10/10	10/10
0.42		9/10	10/10	10/10
0.813		9/10	10/10	10/10
1.276		3/10	1/10	3/10
1.8		0/10	0/10	0/10
2.055		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 04 Jan-24 14:18 (p 1 of 1)
Test Code/ID: P220819.106UIA / 09-2094-8244

Reference Toxicant 96-h Acute Survival Test — **EcoAnalysts**

Start Date: 26 Dec-23 16:30
End Date: 30 Dec-23 16:13
Sample Date: 19 Aug-22

Species: Americamysis bahia
Protocol: EPA/821/R-02-012 (2002)
Material: Total Ammonia

Sample Code: P220819.106UIA
Sample Source: Reference Toxicant
Sample Station: P220819.106UIA

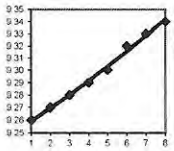
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	3	10	9	
0	D	2	8	10	10	
0	D	3	5	10	10	
0.42		1	2	10	9	
0.42		2	13	10	10	
0.42		3	4	10	10	
0.813		1	6	10	9	
0.813		2	7	10	10	
0.813		3	12	10	10	
1.276		1	1	10	3	
1.276		2	11	10	1	
1.276		3	9	10	3	
1.8		1	15	10	0	
1.8		2	17	10	0	
1.8		3	18	10	0	
2.055		1	10	10	0	
2.055		2	16	10	0	
2.055		3	14	10	0	

Un-ionized Ammonia Calculator

CLIENT:	WSP	Date of Test:	December 26, 2023
PROJECT:	Vallejo	Test Type:	*Mysid RT*
COMMENTS:	P220819.106		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Ionic strength	pKa^s
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



$y = 0.0003x^2 + 0.0091x + 9.2502$

...

	Sample	Mod	*NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	*temp (K)*	*pKa^s*		NH_3U (mg/L)
	Target / Sample Name		Actual	Actual	Actual	Actual	Calculated	Calculated		**Calculated**
	Example 3.5		2.000	10.0	7.5	5.0	278.15	9.2520		**0.008**
1										
2	10		14.3	29	7.9	19.8	292.95	9.2557		**0.420**
3	20		27.7	29	7.9	19.8	292.95	9.2557		**0.813**
4	40		54.4	29	7.8	19.8	292.95	9.2557		**1.276**
5	60		76.2	29	7.8	19.9	293.05	9.2557		**1.800**
6	80		109	30	7.7	19.9	293.05	9.2559		**2.055**
7										
8										
9										
10										
11										
12										
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14										
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45										

ECO ANALYSTS

96-Hour Mysid Ammonia Reference Toxicant Test

Toxicant:	Ammonium Chloride
Ref Tox ID:	P220819.106
Lot #:	22E3156086
Protocol:	TOX099
Replicates:	3

Date Test Started:	12/26/2023
Date Test Ended:	12/30/2023
Matrix:	Liquid
Species:	*Americamysis bahia*
No. of Org. per Chamber:	10

	Conc.	Meter #:	DO (mg/L) (≥3.1)	Meter #:	Temp (°C) (20±1°C)	Meter #:	Salinity (ppt) (28±2ppt)	Meter #:	pH (7 - 9)
Day 0 (Stock)	Control	B	7.5	B	19.9	B	29	B	7.9
Date: 12/26/23	10		7.6		19.8		29		7.9
Time: 1240	20		7.6		19.8		29		7.9
Technician: JL	40		7.7		19.8		29		7.8
	60		7.7		19.9		29		7.8
PM Feed: CS	80		7.7		19.9		30		7.7

		Day 1	Day 2	Day 3	Day 4
Temperature (OLD)		20.7	20.3	19.6	
Temperature (NEW)			—		
Feed: 0.1mL *Artemia* (Time/Init.)	AM	UG	TW	MK 0900	SR
	PM	MS	JL	NL 1905	

Day 4	Control	B	4.6	B	19.8	B	29	B	7.4
Date: 12/30/23	10		5.1		19.7		30		7.5
Time: 1259	20		4.9		19.9		29		7.6
Replicate No.: 3	40		5.8		19.8		30		7.7
Technician: TT	60		—		—		—		—
	80		—		—		—		—

Dilution Preparation (Mysid NH_3 RT Spiking Worksheet)

Test Solution NH_3 Concentration				Volume of Stock to Reach Desired Concentration	
Measured		Desired	Volume		
mg/L		mg/L	mL	mL stock to increase	
Day 0	Day 2				SALT WATER
0.60		**0**	750		**0.000**
14.3		**10**	750		**1.200**
27.7		**20**	750		**2.400**
54.4		**40**	750		**4.801**
76.2		**60**	750		**7.201**
109		**80**	750		**9.602**

Start Time:	1630 JL, MK
End Time:	1613 SR
Test Acceptability:	≥90% survival in control

Test Location:	Bath 3
Dilution Water Batch:	FSW122323.01
Supplier:	Aquatic BioSystems
Organism Batch:	ABS122223 Age: 5d
Chamber Size/Type:	12 oz. Cup
Exposure Volume:	250 mL

ECO ANALYSTS, INC.

96-Hour Mysid Ammonia Reference Toxicant Test

Toxicant:	Ammonium Chloride
Ref Tox ID:	P22OB19.1010
Species:	*Americamysis bahia*

Date Test Started:	12/26/2023
Date Test Ended:	12/30/2023

Concentration	Rep	Day 1 Date: 12/27/23 Time: 2450		Day 2 Date: 12/28/23 Time: 1015		Day 3 Date: 12/29/23 Time: 1240		Day 4 Date: 12/30/23 Time: 1623	
		# Alive	# Dead	# Alive	# Dead	# Alive	# Dead	# Alive	# Dead
Control	1	10	0	10	0	9	INB	~~10~~ 9 ②	0
	2	10	0	10	0	10	0	10	0
	3	10	0	10	0	10	0	10	0
10	1	10	0	9	INB	9	0	9	0
	2	10	0	10	0	10	0	10	0
	3	10	0	10	0	10	0	10	0
20	1	10	0	10	0	10	0	9	1
	2	10	0	10	0	10	0	10	0
	3	10	0	11 ①	0	10	0	10	0
40	1	9	1	6	2, INB	6	0	3	3
	2	10	0	7	3	7	0	1	6
	3	10	0	7	3	6	1	3	3, INB
60	1	6	3, INB	0	6	—	—	—	—
	2	8	2	0	8	—	—	—	—
	3	6	4	1	5	0	1	—	—
80	1	5	5	0	5	—	—	—	—
	2	0	10	—	—	—	—	—	—
	3	3	7	0	3	—	—	—	—
INITIALS:		SR		TW		MK		SR	

① typo? mk 12/29.

② IE - SR 12/30/23

APPENDIX B. CHAIN-OF-CUSTODY FORMS, LOGS, AND PRE-TEST DOCUMENTS

CHAIN OF CUSTODY

EcoAnalysts
LIFE IN WATER

EcoAnalysts, Inc.
4770 NE View Dr., Port Gamble, WA. 98364
Tel: (360) 297-6040

Destination: ECOANALYTS, INC	Sample Originator (Organization): WSP USA Environment & Infrastructure	Report Results To: WSP USA	Phone: 443-852-4637 (Kimbrie)
Destination Contact: MICHELLE KNOWLEN	PERSON WHO COLLECTED SAMPLE: KG/KP	Contact Name: Kimbrie Gobbi, Kaylee Popovich	Fax:
Date: 12/13/2023	Address: 9177 Sky Park Court San Diego 92123	Lab Address: EcoAnalysts, Inc. 4729 NE View Drive, PO Box 216 | Port Gamble, WA 98364 Laboratory: 4770 NE View Drive | Port Gamble, WA 98364 O: (360) 297-6040 ext. 6056 | C: (360) 286-9517	Email: kimbrie.gobbi@wsp.com, kaylee.popovich@wsp.com
Turn-Around-Time: Standard			
Project Name: USCG SV Sediment Characterization Study WSP Project Number: 336010031.03	Phone: 443-852-4637	Invoicing To: WSP USA	
	Fax:	Comments or Special Instructions:	
Contract/PO: F014000152	E-mail: kimbrie.gobbi@wsp.com, kaylee.popovich@wsp.com		

No.	Sample ID	Matrix	Volume & Type of Container	Date & Time	HOLD FOR TOXICITY TESTING	CREATE "SV-23-COMPOSITE" FOR ANALYSIS	PREPARE MET	SAMPLE TIME			Preservation	Sample Temp Upon Receipt	LAB ID
1	SV-23-C1	Sediment	polyethylene bag (n = 1)	12/12/2023	X	X	X	0845			On Ice	0.0°C	P231214.05
2	SV-23-C2	Sediment	polyethylene bag (n = 1)	12/12/2023	X	X	X	1315			On Ice	0.0°C	P231214.06
3	SV-23-C3	Sediment	polyethylene bag (n = 1)	12/12/2023	X	X	X	1410			On Ice	0.0°C	P231214.07
4	SV-23-C4	Sediment	polyethylene bag (n = 1)	12/13/2023	X	X	X	1025			On Ice	0.0°C	P231214.08
5	SV-23-C5	Sediment	polyethylene bag (n = 1)	12/12/2023	X	X	X	1025			On Ice	0.1°C	P231214.09
6	SV-23-C6	Sediment	polyethylene bag (n = 1)	12/13/2023	X	X	X	0850			On Ice	0.0°C	P231214.10
7	SF-09 Reference	Sediment	polyethylene bag (n = 3) ~~2~~	12/11/2023	X			1315			On Ice	①	P231214.11a-b
8	SV-23-SW	Seawater	20L cubitainer (n = 2) ~~1~~ 1 KA	12/13/2023	X	X	X	1200			On Ice	1.0°C	P231214.04
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Relinquished by:	Received by:	Relinquished by:	Received by:
Print Name: Kimbrie Gobbi	Print Name: KIMBRIE GOBBI	Print Name: KIMBRIE GOBBI	Print Name: Marisa Seibert
Signature:	Signature: KG	Signature:	Signature:
Affiliation: WSP USA	Affiliation:	Affiliation: WSP USA	Affiliation: EcoAnalysts
Date/Time: 12/____/23	Date/Time:	Date/Time: 12/13/23 1700	Date/Time: 12/14/23 1307

Matrix Codes
FW = Fresh Water
SB = Salt & Brackish Water
SS = Soil & Sediment

① Bag 1 of 2: temp. = 0.4°C, P231214.11a
Bag 2 of 2: temp. = 0.0°C, P231214.11b JMS 12/14

Version 1.0, Effective 7/1/

PAGE ___of ___

PROJECT SITE WATER
SAMPLE RECEIPT FORM

Client:	Client ID:	Lab ID:
WSP USA Environment & Infrastructure	SV-23-SW	P231214.04
Project: USCG SV Sediment Characterization Study WSP Project #: 33601 0031.03		

Date/Time Received:	12/14/23 1307
Airbill #:	master #: 787985750421
Shipper Tracking Information Kept for Records: (Y/N/NA)	N
Collection Date/Time:	12/13/23 1200
Condition of Shipping Container:	Good
Type and Capacity of Sample Container:	20L Cubi
Total Sample Volume (L):	20L
Condition of Sampling Container:	Good
Sample Container Appropriate: (Y/N)	Y
Custody Seals Intact: (Y/N/NA)	NA
Frozen Wet or Blue Ice Present During Shipment/Transport: (Y/N)	Y
Sampler's Name Present on COC Form: (Y/N)	Y KG/KP
Odor:	NONE
Color:	Clear

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

Lab ID	Meter #	Dissolved Oxygen (mg/L)	Meter #	Temp. (°C) **(0-6°C) ***	Meter #	Cond. (µS/cm) or Sal. (ppt)	Meter #	pH	Total NH3 (mg/L)	Tech
P231214.04	8	9.1	T21	1.0	8	20	8	7.7	0.116	MS

*Ideal temperatures should be 0 – 6 degrees C (Not frozen). Client will be notified for temps >6°C.

If there are sample receipt problems, complete the following:

Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

CHAIN OF CUSTODY

EcoAnalysts
LIFE IN WATER

EcoAnalysts, Ir
4770 NE View Dr., Gamble, WA. 983
Tel: (360) 297-60

Destination: ECOANALYTS, INC	Sample Originator (Organization): WSP USA Environment & Infrastructure	Report Results To: WSP USA	Phone: 443-852-4637 (Kimbrie)
Destination Contact: MICHELLE KNOWLEN	PERSON WHO COLLECTED SAMPLE: STEPHEN LAMOTHE	Contact Name: Kimbrie Gobbi, Kaylee Popovich	Fax:
Date: 12/___/2023	Address: 9177 Sky Park Court San Diego 92123	Lab Address: EcoAnalysts, Inc. 4729 NE View Drive, PO Box 216 | Port Gamble, WA 98364 Laboratory: 4770 NE View Drive | Port Gamble, WA 98364 O: (360) 297-6040 ext. 6056 | C: (360) 266-9517	Email: kimbrie.gobbi@wsp.com, kaylee.popovich@wsp.com
Turn-Around-Time: Standard			
Project Name: USCG SV Sediment Characterization Study WSP Project Number: 336010031.03	Phone: 443-852-4637	Analyses:	Invoicing To: WSP USA
	Fax:		Comments or Special Instructions:
Contract/PO: F014000152	E-mail: kimbrie.gobbi@wsp.com; kaylee.popovich@wsp.com		

No.	Sample ID	Matrix	Volume & Type of Container	Date & Time	USE FOR SPP TOXICITY TESTING						Preservation	Sample Temp Upon Receipt	LAB ID
1	SV-23-SW	Seawater	20L cubitainer (n = 1)	12/21/2023: 1030	X						On Ice	0.8°C	P231222.01
2													
3													
4													
5													
6													
7													
8													
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10													
11													
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14													
15													
16													
17													
18													
19													
20													

Relinquished by:	Received by:	Relinquished by:	Received by:	Matrix Codes
Print Name: STEPHEN LAMOTHE STEPHEN LAMOTHE	Print Name: Nicole Lundgren	Print Name:	Print Name:	FW = Fresh Water
Signature:	Signature:	Signature:	Signature:	SB = Salt & Brackish Water
Affiliation: WSP USA (subcontractor)	Affiliation: ECOA.	Affiliation:	Affiliation:	SS = Soil & Sediment
Date/Time: 12/21/23 1200	Date/Time: 12/22/23 1213	Date/Time:	Date/Time:	

PROJECT SITE WATER SAMPLE RECEIPT FORM

Client:	Client ID:	Lab ID:
WSP USA Environment & Infrastructure	SV-23-SW	P231222.01
Project: USCG SV Sediment Characterization Study		
Date/Time Received:		12/22/23 1213
Airbill #:		7884 0767 7630
Shipper Tracking Information Kept for Records: (Y/N/NA)		NA
Collection Date/Time:		12/21/23 1030
Condition of Shipping Container:		Good
Type and Capacity of Sample Container:		20L cubi
Total Sample Volume (L):		20L
Condition of Sampling Container:		Good
Sample Container Appropriate: (Y/N)		Y
Custody Seals Intact: (Y/N/NA)		N
Frozen Wet or Blue Ice Present During Shipment/Transport: (Y/N)		Ice-water mix
Sampler's Name Present on COC Form: (Y/N)		Stephen Lamothe
Odor:		None
Color:		pale yellow

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

Lab ID	Meter #	Dissolved Oxygen (mg/L)	Meter #	Temp. (°C) (0-6°C) *	Meter #	Cond. (µS/cm) or Sal. (ppt)	Meter #	pH	Total NH3 (mg/L)	Tech
P231222.01	9	8.2	T14 9 ①	0.8	9	19	9	7.7	0.00	NL

*Ideal temperatures should be 0 – 6 degrees C (Not frozen). Client will be notified for temps >6°C.

If there are sample receipt problems, complete the following:	
Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:
①IE-NL 12/22/23	

Wet-Sieve Procedure for Determining Percent Fines (<63 µm) of Sediment

DATE: 12/21/23	CLIENT: WSP	PROJECT: Vallejo

Procedure:

1. **Collect 50 mL of sediment to be analyzed**
2. **Transfer sediment to a #230 (63 µm) testing sieve**
3. **Rinse sieve thoroughly with a stream of water until water flowing through the sieve is clear**
4. **Transfer all retained material to a 100mL graduated cylinder using a small funnel and DI squirt bottle**
5. **Allow sediment to settle. Record the volume of sediment retained below.**

SAMPLE ID:	A) INITIAL VOLUME OF SEDIMENT (mL)	B) VOLUME OF SEDIMENT RETAINED (mL)	A - B =	Multiplier	Estimated Percent Fines
Example	50	22	28	x2 =	56
P231221.01 comp	50	①~~8~~7	43	x2 =	86
				x2 =	
				x2 =	
				x2 =	
				x2 =	
				x2 =	
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				x2 =	
				x2 =	
				x2 =	

①IE-NL 12/21/23

Wet-Sieve Procedure for Determining Percent Fines (<63 µm) of Sediment

DATE: 1/12/24	CLIENT: WSP	PROJECT: USCG Permitting: Station Vallejo

Procedure:

1. **Collect 50 mL of sediment to be analyzed**
2. **Transfer sediment to a #230 (63 µm) testing sieve**
3. **Rinse sieve thoroughly with a stream of water until water flowing through the sieve is clear**
4. **Transfer all retained material to a 100mL graduated cylinder using a small funnel and DI squirt bottle**
5. **Allow sediment to settle. Record the volume of sediment retained below.**

SAMPLE ID:	A) INITIAL VOLUME OF SEDIMENT (mL)	B) VOLUME OF SEDIMENT RETAINED (mL)	A - B =	Multiplier	Estimated Percent Fines
Example	50	22	28	x2 =	56
SE-09 Reference	50	18	32	x2 =	64
				x2 =	
				x2 =	
				x2 =	
				x2 =	
				x2 =	
				x2 =	
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				x2 =	
				x2 =	

EcoAnalysts, Inc.

Compositing Record

Client	~~WSP VSGC Perm~~ WSP	**Project Number**	PG-1893
Project	VSGC Permitting: Station Vallejo		
Composite Method (Hand, Auger, Drum)	Drum		

Date /Time	Tech (s)	Composite Name (CLIENT ID/SAP ID)	Composite Lab ID (EcoAnalysts Lab#)	Samples Included in Composite		Type (buckets/bags/jars)	Approx. volume	Estimated Final Volume/# Pieces
				Client ID	Lab ID			
11/4/21 13:48	All	Composite Example	P211104.01 A and B	Core 1	P211030.01a	bag	5L	31L/2 buckets
				Core 1	P211030.01b	bag	5L	
				Core 2	P211030.02	jar	1L	
				Core 3	P211030.03	bucket	20L	
12/22/23 1330	SR	SV-23-Composite Area A	P231221.01	SV-23-C1	P231214.05	bag	3.7L	24.8L/2 bags
				SV-23-C2	P231214.06	bag	3.1L	
				SV-23-C3	P231214.07	bag	4.5L	
				SV-23-C4	P231214.08	bag	3.3L	
				SV-23-C5	P231214.09	bag	6.3L	
				SV-23-C6	P231214.10	bag	3.9L	

Notes:
① IE-SR 12/22/23

Updated 8/4/23 V.1

CLIENT	PROJECT	SPECIES
WSP	Vellejo	*Various*
Calibration Standards Temperature: 21.5	Date: 12/21/2023 Tech: NL	

NH_3 sample temperature should be within +/- 1°C of standard temp at time and date of analysis

Sample	Material	Overlying/ Porewater	*Total NH_3 (mg/L)*	*NH_3 sample temp*	*WQ/Temp Meter*	*Measured Total Dissolved Sulfide (µg/L as S)*	*Sulfide Sample Volume (ml)*	*Sulfide Multiplier*	*Calculated Total Dissolved Sulfide (µg/L as S)*	*Porewater salinity (ppt)*	*Porewater pH*	*Projected test temp (C)*	*Temp (K)*	*NH_3 pKa[1]*	*Unionized NH_3 (mg/L)*	*H_2S pKa**	*Undissociated Sulfide (µg/L as H_2S)*	*Undissociated Sulfide (mg/L as H_2S)*	Notes
Record			Record	Record	Record	Record	Record	Record	Calculated	Record	Record	Record	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	
SV-23-Composite Area A	Bulk	PW	28.5	21.0	M8/T17					17	7.5	25.0	298.15	9.25	0.500				
SE-09 Reference	Bulk	PW	9.57	19.3	M8/T17					21	7.3	25.0	298.15	9.25	0.106				Cal. Temp : 19.5 1/12/24 MS

MET prep calculations

Dry Weight Subsampling

Volume of Sed:	25 mL
Wet Weight of Sed:	31.7 g
Dry Weight of Sed (after 24 hr oven time):	13.1 g
Dry Weight of Sed per 1 mL:	0.524 g/mL
Dry Weight of Sed per 1 L:	524 g/L

Elutriate Prep

Vessel Size:	20 L glass carboy
C_{slurry} (desired slurry conc.):	150 g/L
X (target vol slurry for vessel):	15 L
C_{sed} (determined sed conc. in dry weight):	524 g/L
V_{sed} (vol of sed to add to vessel):	4.3 L
V_{H20} (vol of site water to add to vessel):	10.7 L

Formula

$$V_{sed} = X \frac{C_{slurry}}{C_{sed}}$$

$$V_{H20} = X - V_{sed}$$

ORGANISM RECEIPT LOG

Date: 12/27/23	**Time:** 1110	**Batch No.** AR012272301
Organism: Leptocheirus plumulosus		
Source / Supplier: Aquatic Research Organisms		
No. Ordered: —	**No. Received:** 990+	**Source Batch:** Collection date, hatch date, etc.): 12/2023
Condition of Organisms: Good	**Approximate Size or Age:** (Days from hatch, life stage, size class, etc.): 2-4 mm long	
Shipper: FedEx	**B of L (Tracking No.)** 7144 4906 1514	
Condition of Container: GOOD	**Received By:** DM	

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	7.0	16.0	26 ppt	6.9	—	—	DM

**if >10% contact lab manager*

Notes:

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species Leptocheirus plumulosus

Source: Lab reared X Hatchery reared ____ Field collected ____

Hatch date 12/2023 Receipt date ____

Lot number 12 26 23 LP Strain ARO

Brood origination Chesapeak Bay, VA

II. Water Quality

Temperature 24 °C Salinity ~28 ppt D.O. SAT ppm

pH ~8.0 su Hardness — ppm Alkalinity — ppm

III. Culture Conditions

Freshwater ____ Saltwater X Other ____

Recirculating ____ Flow through ____ Static renewal X

DIET: Flake food X Phytoplankton ____ Trout chow X

Artemia ____ Rotifers ____ YCT ____ Other "GORP"

Prophylactic treatments: ____

Comments: 2-4 mm long

IV. Shipping Information

Client: Eco Analyst PG # of Organisms 990+

Carrier: fedex Date shipped 12/26/23

Biologist: ____

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

ORGANISM RECEIPT LOG

Date:	Time:	Batch No.
12/29/23	1050	ATS122923.01

Organism: Neanthes arenaceodentata

Source / Supplier: ATS

No. Ordered:	No. Received:	Source Batch: Collection date, hatch date, etc.):
395	435	emerged 12/4/23

Condition of Organisms:	Approximate Size or Age: (Days from hatch, life stage, size class, etc.):
good	25 day post emergence

Shipper:	B of L (Tracking No.)
courier	—

Condition of Container:	Received By:
good	MK

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units) ppt	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	19.7 ①	18.5 ①	30 ①	7.3 ①	—	—	MK

*if >10% contact lab manager

Notes:

① composite from 4 containers

Aquatic Toxicology Support
1849 Charleston Beach Road West
Bremerton, Washington 98312
(360) 813-1202

Order Summary

Species: *Neanthes arenaceodentata**	Emerge Date: 4 Dec '23
Number Ordered: 395	Number Shipped: 395 + 10%
Date Shipped: 29 Dec '23	Salinity (ppt): 30
pH: 7.8	Temperature (°C) 19.9

*Smith 1964. CSU Long Beach strain. Feed upon arrival.

ORGANISM RECEIPT LOG

Date:	Time:	Batch No.
12/22/23	1215	ABS122223.01

Organism: AMERICAMYSIS bahia

Source / Supplier: AQUATIC BIOSYSTEMS

No. Ordered:	No. Received:	Source Batch: Collection date, hatch date, etc.):
1,020	1,120	(1) ~~12/20/22~~ 12/21/23

Condition of Organisms:	Approximate Size or Age: (Days from hatch, life stage, size class, etc.):
Good	~~21 day~~ (1) 1 day

Shipper:	B of L (Tracking No.)
Fedex	137496029588

Condition of Container:	Received By:
Good	Tiffany Tate

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	10.86	(2) ~~15.2~~ 16.0	29.1	7.3	—	—	TT

**if >10% contact lab manager*

Notes: (1) 16. MK 1/3/24 (2) MK. TT 12/22

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 12/21/2023

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: <1 day

LIFE STAGE: Juvenile

HATCH DATE: 12/21/2023

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25°C	24-26 °C
SALINITY/CONDUCTIVITY:	25 ppt**	21-30 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	145 mg/l	140-170 mg/l
pH:	8.13	7.60-8.20

Comments: ** Acclimated to 28 ppt on 12/21/23

Facility Supervisor

ORGANISM RECEIPT LOG

Date: 12/15/23	**Time:** 1529	**Batch No.** TS12523.01
Organism: M.sp		
Source / Supplier: Taylor Shellfish		
No. Ordered: 12lbs	**No. Received:** 12lbs	**Source Batch:** Collection date, hatch date, etc.): 12/15/23
Condition of Organisms: Good	**Approximate Size or Age:** (Days from hatch, life stage, size class, etc.): Mixed Adults	
Shipper: Courier	**B of L (Tracking No.)** NA	
Condition of Container: Good	**Received By:** NL	

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	received		dry	-			NL
		10.4					

**if >10% contact lab manager*

Notes:

TAYLOR SHELLFISH FARMS

SE 130 LYNCH RD, SHELTON WA 98584
PHONE #: (360) 426-6178
WASHINGTON STATE CERT #: WA 6SP

Harvest Hour: 11 am
Harvest Minute: 20
Refer Date
Refer Hour
Refer Minute

HARVEST DATE: 12/15/23
HARVEST AREA: Totten Inlet
HARVEST ITEM: Thunderbird Gallo
FARM CODE: Gallagher
Dozens
Pounds
Dept ID: M127.
QUANTITY: 17
All Shellstock containers in this lot have the harvest

MAINTENANCE LOG FOR CULTURES

ORGANISM: Leptos
LOCATION: Inc 2 → moved to Bath 2 on 12/29

Batch Number: AR012723.01	Date Received: 12/27/23	Initial # of Organisms:	10% mortality =

Date	Feed AM	Feed PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal ppt	pH	H_2O Change	Organisms appear healthy (Y/N)	# Mort (per tub)	[1]Cumulative # Mort*	Init.	Comments
12/28	–	✓	1	2.9 ①	23.5	26	7.0	Y	Y	–	–	NL	DO-air lines added,
12/29	✓	–	1	6.9	22.	27	7.7	Y	Y	–	–	MK	moved to better bath + Airstones
22/30	–	✓	2	6.2	23.3	28	7.5	Y	Y	–	–	SR	
12/31	–	✓	1	6.8	23.1	28	7.5	N	Y	–	–	LG	
1/1/24	–		1	6.8	23	28	7.7	Y	Y	–	–	TT	
1/2/24	–	✓	1	② 0.1	23.	28	6.8	N	Y	–	–	MS	

FT = Flow-through
*For all containers and all days for a given batch; if **>10% notify lab manager**
[1] Cumulative # Mort is the running total of the **current day's total mortality + previous cumulative culture mortality** since acquired in lab

② Increased airflow to culture. MS 1/2/24

8/8/23
① Remeasured DO after airstones added & water change: 7.8 mg/L - DM - 12/28/23

MAINTENANCE LOG FOR CULTURES

ORGANISM: Mysids
LOCATION: Inc 2 → Bothl on 12/24/23

Batch Number: ABSA222301	Date Received: 12/22/23	Initial # of Organisms:	10% mortality =

Date	Feed AM	Feed PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal	pH	H_2O Change	Organisms appear healthy (Y/N)	# Mort (per tub)	[1]Cumulative # Mort*	Init.	Comments
12/24	✓	✓	A	7.5	20.6	30	7.8	Y	Y	—	—	NL	Mysids came in @ 16°C
12/24	✓	✓	B	7.7	21.1	30	7.8	Y	Y	—	—	NL	mysids were put in
12/25	✓	✓	A	7.4	20.2	29	8.0	Y	Y	0	—	SR	Inc 2 for 12/22-24.
12/25	✓	✓	B	7.3	20.5	29	8.0	Y	Y	0	0	SR	WQ was not taken
12/26	✓	✓	A	7.4	20.0	29	7.8	N	Y	0	—	UL	on 12/23 but the
12/26	✓	✓	B	7.2	20.3	29	7.9	N	Y	0	—	UL	temp of the culture
													was 19.1°C - NL 12/24

FT = Flow-through
*For all containers and all days for a given batch; if >10% notify lab manager
[1] Cumulative # Mort is the running total of the current day's total mortality + previous cumulative culture mortality since acquired in lab

MAINTENANCE LOG FOR CULTURES

ORGANISM: M. sp.
LOCATION: Bath 10

Batch Number: TS121523.01	Date Received: 12/15/23	Initial # of Organisms: —	10% mortality = —

Date	Feed AM	Feed PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal ppt	pH	H_2O Change	Organisms appear healthy (Y/N)	# Mort (per tub)	[1]Cumulative # Mort*	Init.	Comments
12/24	X	✓	B	7.2	11.1	31	7.5	FT	Y	0	—	TW	
12/25	—	—	B	7.4	11.4	30	7.6	FT	Y	0	0	SR	
12/26		✓	B	7.3	11.3	30	7.6	FT	Y	0	—	JL	
12/28	—	✓	B	7.9	12.3	30	7.7	FT	Y	0	—	CS	
12/31	—	✓	B	—	—	—	—	—	—	—	—	LG	
~~01/04~~ ①	~~—~~	~~✓~~	~~—~~	8.1	9.5								Too cold for salt
~~01/04~~ ①	~~—~~	~~✓~~											
01/04	—	✓	B	8.1	10.3	29	7.7	FT	Y	0	0	CS	
1/7	—	✓	B	8.8	10.3	29	7.8	FT	Y	0	0	TW	
1/10	—	✓	B	8.3	10.6	30	7.6	FT	Y	0	0	CS	
1/14	—	✓	B	8.9	9.5	31	7.8	FT	Y	0	0	LG	
1/16	✓	—	B	8.6	9.7	30	7.8	FT	Y	0	0	CS	
1/18	✓	—	B	7.6	10.2	30	7.8	FT	Y	0	0	CS	
1/21	—	✓	B	9.8	9.5	30	7.8	FT	Y	0	0	LG	

FT = Flow-through
*For all containers and all days for a given batch; if **>10% notify lab manager**
[1] Cumulative # Mort is the running total of the **current day's total mortality + previous cumulative culture mortality** since acquired in lab

① 16-CS 1/4/24

MAINTENANCE LOG FOR FLOW-THROUGH CULTURE TUBS

LOCATION: Bath 10

Organism (A): M.sp	Batch Number: TS110623.01	Date Received: 11/6	Initial # of Organisms:	10% Mort =
Organism (B): M.sp	Batch Number: TS110623.01	Date Received: 11/6	Initial # of Organisms:	10% Mort =
Organism (C): M.sp	Batch Number: TS121523.01A	Date Received: 12/15	Initial # of Organisms:	10% Mort =
Organism (D): M.sp	Batch Number: TS121523.01B	Date Received: 12/15	Initial # of Organisms:	10% Mort =
Organism (E):	Batch Number:	Date Received:	Initial # of Organisms:	10% Mort =

Date	Feed AM	Feed PM	Organism (A, B, C, D, or E)	D.O.	Temp (°C)	Cond/ Sal	pH	H_2O Change	Organisms appear healthy (Y/N)	# Mort	Cumulative # Mort*	Init.	Comments
12/17	✓	–	D	7.7	11.9	31	7.7	FT	Y	0	–	NL	
12/17	✓	–	A	7.7	12.1	31	7.8	FT	Y	0	–	NL	
12/12	✓	–	B	8.2	12.1	31	7.8	FT	Y	0	–	NL	
12/19		✓	A	7.1	15.4	31	7.5	FT	Y	0	–	CS	
12/19		✓	B	6.9	15.7	31	7.7	FT	Y	0	–	CS	
12/19		✓	C	6.9	15.1	31	7.5	FT	Y	0	–	CS	
12/19		✓	D	6.8	15.1	31	7.5	FT	Y	0	1	CS	
12/20	–	–	C	7.1	15.7	31	7.4	FT	Y	0	–	NL	
12/20	–	–	D	7.1	15.5	31	7.4	FT	Y	0	1	NL	
12/21	–	✓	A	7.7	11.3	31	7.6	FT	Y	0	–	CS	
12/21	–	✓	C	7.4	12.4	31	7.4	FT	Y	0	–	CS	
12/21	–	✓	D	7.2	11.6	31	7.5	FT	Y	0	1 + 2	CS	
~~12/23~~ ①			A	~~7.7~~ ①	~~11.3~~	~~31~~	~~7~~						
12/23			A	7.7	10.4	30	7.7	FT	Y	0	–	TT	
12/23			B	7.7	10.5	30	7.6	FT	Y	0	–	TT	

FT = Flow-through

**For all days of a given batch; if >10% notify lab manager*

① 1E-CS 12/21, TT 12/23

MAINTENANCE LOG FOR FLOW-THROUGH CULTURE TUBS

LOCATION: Bath 10

Organism (A): M. Sp.	Batch Number: TS110623.01	Date Received: 11.6.23	Initial # of Organisms:	10% Mort =
Organism (B): M. Sp.	Batch Number: TS110623.01	Date Received: 11.6.23	Initial # of Organisms:	10% Mort =
Organism (C): M. Sp	Batch Number: TS121523.01A	Date Received: 12/15	Initial # of Organisms: 12/bs	10% Mort =
Organism (D): M. Sp	Batch Number: TS121523.01B	Date Received: 12/15	Initial # of Organisms:	10% Mort =
Organism (E):	Batch Number:	Date Received:	Initial # of Organisms:	10% Mort =

Date	Feed AM	Feed PM	Organism (A, B, C, D, or E)	D.O.	Temp (°C)	Cond/ Sal	pH	H_2O Change	Organisms appear healthy (Y/N)	# Mort	Cumulative # Mort*	Init.	Comments
11.23.23		X	A	7.3	16.4	30	7.6	FT	Y	—	—	MARM	
↓		X	B	7.6	16.6	30	7.7	FT	Y	—	—	MARM	
11/26	X	—	A	7.3	15.7	32	7.7	FT	Y	—	—	TW	
11/26	X	—	B	7.7	15.6	32	7.7	FT	Y	—	—	TW	
12/3	—	✓	A	—	—	—	—	FT	Y	—	—	NL/LG	fed
12/3	—	✓	B	—	—	—	—	FT	Y	—	—	NL/LG	fed
12/6/23	—	—	A	6.7	15.3	30	7.5	FT	Y	0+①	0	DM	
12/6/23	—	—	B	7.5	15.4	30	7.6	FT	Y	1	1	DM	
12/10	—	✓	A	7.9	15.4	30	7.8	FT	Y	0	—	LG	
12/10	—	✓	B	7.9	15.4	30	7.9	FT	Y	0	1	LG	
12/22	—	✓	A	7.6	26.0	32	7.6	FT	Y	0	—	SR	
12/22	—	✓	B	7.9	26.0	32	7.8	FT	Y	0	1	SR	
12/24/23	—	✓	A	7.8	25.9	32	7.7	FT	Y	0	—	SR	
12/24/23	—	✓	B	7.8	25.7	32	7.7	FT	Y	0	1	SR	
12/17	✓	—	C	7.7	11.9	31	7.8	FT	Y	0	—	NL	↑ 3°C

FT = Flow-through

For all days of a given batch; if >10% notify lab manager

① WC-DM-12/6/23

Summary of Toxicity Test Results – Suspended-Particulate-Phase				
Location	**Elutriate Concentration (%)**	**Mysid MET[2] (*Americamysis bahia*) Mean Survival (%)**	**Mysid SET[3] (*Americamysis bahia*) Mean Survival (%)**	**Mussel (*Mytilus galloprovincialis*) Mean Combined Survival/Normal Development (%)**
Laboratory Control	—	100	96.0	97.1
Salt Control	—	96.0	92.0	97.2
SV-23-SW	—	96.0	100	99.5
SV-23-Composite	1	96.0	94.0	97.3
	10	98.0	98.0	91.5
	50	94.0	94.0	**64.6**
	100	**84.0**	88.0	**0.00**
LC_{50}/EC_{50} (% elutriate)[1]	—	>100	>100	59.37
SV-23-A-Composite (Ammonia Reduced)	100	—	—	**88.8**

Notes:

BOLD = Test result is statistically less than control.

1. An LC_{50}/EC_{50} of >100 percent indicates that there was greater than 50 percent survival/normal larvae in the 100 percent elutriate concentration. — = not applicable; > = greater than; % = percent; EC_{50} = median effect concentration; LC_{50} = median lethal concentration. SV = Station Vallejo; 23 = year of sample collection (2023)

2. Modified Elutraite Test. Test solutions were prepared with site water (SV-23-SW) mixed with the composited sediment and then analyzed for the 96-hour acute static survival water column toxicity testing with the Mysid *Americamysis bahia*.

3. Standard Elutriate Test.

SW = Site Water sample

Summary of Toxicity Test Results – Solid Phase		
Location	**Amphipod** ***(Leptocheirus plumulosus)***	**Worm** ***(Neanthes arenaceodentata)***
	Mean Survival (%)	**Mean Survival (%)**
Laboratory Control (Native Sediment)	98.0	100.0
SF-09	92.0	98.0
SV-23-Composite	96.0	98.0

Notes:

% = percent**;** SF-09 = Carquinez Strait In-Bay Disposal Site; SV = Station Vallejo; 23 = year of collection (2023)

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APPENDIX F

AGENCY SUITABILITY DETERMINATION

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DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102-3404

May 10, 2024

Operations and Readiness Division

SUBJECT: File Number 2008-00049: USCG Station Vallejo, Maintenance Dredging; Episode 2; Test Results; DMMO Serial Number: 24-022

Erin Hale
U.S. Coast Guard CEU
1301 Clay Street, Suite 700N
Oakland, California 94612-5203

Dear Ms. Hale:

The Dredged Material Management Office (DMMO) is an interagency group comprised of representatives from the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the San Francisco Bay Conservation and Development Commission, the San Francisco Bay Regional Water Quality Control Board, the California State Lands Commission, and state and federal wildlife agencies. At the meeting on March 20, 2024, the DMMO completed its review of the sediment test results presented in the document prepared by WSP USA Environment & Infrastructure Inc. entitled "Sampling and Analysis Plan Report Sediment Characterization Study to Support Maintenance Dredging at Coast Guard Station Vallejo," dated March 2024 and revised April 2024. The test results are for the approximately 23,151 cubic yards of sediment proposed to be dredged to a design depth of -10 feet mean lower low water, plus an overdepth allowance of 2 feet, from an approximately 1.5-acre dredge footprint at the US Coast Guard Station Vallejo, located in the Vallejo Marina, in the City of Vallejo, Solano County, California.

The members of the DMMO are recommending to their respective agency's management that the sediment proposed for dredging from the Vallejo Marina, as characterized in the above document, is suitable for unconfined aquatic disposal at an in-Bay disposal site, such as the Carquinez Strait Disposal Site (SF-9), and for beneficial reuse at the Cullinan Ranch Restoration Project and the Montezuma Wetlands Restoration Project.

To assist the National Marine Fisheries Service in more accurately assessing the environmental impacts of maintenance dredging, the DMMO is keeping track of the actual acreage that is dredged, to compare that to the amount that is permitted to be dredged. Please include the approximate acreage of the proposed dredge footprint in the dredge operation plan.

Also, please be advised that this letter does not constitute an authorization to proceed with your dredge project. You must first obtain appropriate Federal, State and local authorizations and provide all appropriate notifications.

If you have any questions regarding this matter, please contact Melissa France at (415) 503-6768 or e-mail at Melissa.M.France@usace.army.mil. If you wish to write, please address all correspondence to Melissa France, Operations and Readiness Division and **refer to the file number at the head of this letter and include the dredge episode number.**

Sincerely,

Digitally signed by VARGAS.JESSICA.MARIE.1288359675
Date: 2024.05.10 11:05:35 -07'00'

Jessica M. Vargas
Chief, Dredged Material Management Office
Operations and Readiness Division

Copies Furnished (Electronically):

US EPA, San Francisco, CA, Attn: Jennifer Siu
US NMFS, Santa Rosa, CA, Attn: Sara Azat
CA BCDC, San Francisco, CA, Attn: Brenda Goeden
CA RWQCB, Oakland, CA, Attn: Selina Louie
CA SLC, Sacramento, CA, Attn: Marlene Schroeder
CA DFW, Santa Rosa, CA, Attn: Arn Aarreberg