April 1, 2025

Mr. Mark Domaracki, P.G.
New York State Department of Environmental Conservation
Division of Environmental Remediation – Remedial Bureau C
Bureau A, Section B 12th Floor
625 Broadway
Albany, NY 12233-7014

Subject: Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Hercules/Dyno Nobel Site
Port Ewen, New York
Registry No. 356001

Dear Mr. Domaracki:

As requested, EHS Support LLC ("EHS Support") is providing the attached *Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report* (the "September 2024 Preliminary Bioavailability Report") on behalf of Hercules LLC and Dyno Nobel Inc. (the "Parties") for the ongoing investigation that is being conducted in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved *Plantasie Creek Ecological Impact Assessment Work Plan* dated September 2022. The data presented in this Report document the findings of the November 2023 instream sampling conducted within the Plantasie Creek study area. Should you have any questions or require additional information, please feel free to contact me at 850-251-0582 or Gary Long at 215-498-0548.

Sincerely,

Kristin A. VanLandingham, P.E.
Project Manager

cc: Edward Meeks, Hercules LLC
Ian McCary, Hercules LLC
Tina Maniatis, Dyno Nobel Inc.
Gary Long, EHS Support LLC

I, Kristin A. VanLandingham, P.E., certify that I am currently a NYS-registered professional engineer and that this *Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report* dated March 2025 for the Hercules, Inc. site located in Port Ewen, New York was prepared in accordance with all applicable statutes and regulations, and in conformance with the DER *Technical Guidance for Site Investigation and Remediation* (DER-10).

Kristin A. VanLandingham, P.E.
NYS License No. 089610

04/01/2025
Date

Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report

Hercules LLC Site #356001
Port Ewen, New York

Prepared for:

Hercules LLC
Dyno Nobel Inc.

Prepared by:

EHS Support

April 2025

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Acronyms

°C	degrees Celsius
µm	micrometer
µmol/g_{OC}	micromoles per gram organic carbon
AVS	acid-volatile sulfide
AWQS	Ambient Water Quality Standards
BAZ	biologically active zone
CBR	critical body residue
DUSR	Data Usability Summary Report
DFWMR	Division of Fish, Wildlife, and Marine Resources
DSB	dietary screening benchmark
ECSM	Ecological Conceptual Site Model
EqP	equilibrium partitioning
f_{oc}	fraction organic carbon
FWRIA	Fish and Wildlife Resources Impact Analysis
LOEC	lowest observed effect concentration
MeHg	methylmercury
mg/kg	milligrams per kilogram
NOEC	no observed effect concentration
NYSDEC	New York State Department of Environmental Conservation
ORP	oxidation reduction potential
SE	sequential extraction
SEM	simultaneously extracted metals
SGV	sediment guidance value
SPC	specific conductance
SWMU	Solid Waste Management Unit
TDS	total dissolved solids
THg	total mercury
TL	total length
TOC	total organic carbon
TRV	toxicity reference value
ww	wet weight

1 Introduction

This *Plantasie Creek Interim Phase 1 Preliminary Bioavailability Assessment Report* ("September 2024 Preliminary Bioavailability Assessment Report") was developed on behalf of Hercules LLC ("Hercules"), a wholly owned subsidiary of Ashland, Inc. ("Ashland") and Dyno Nobel, Inc. ("Dyno Nobel"), to present the preliminary findings from Phase 1 instream sediment, surface water, pore water, and fish tissue sampling in Plantasie Creek downstream of the Dyno Nobel Port Ewen Site ("Site"), which was conducted in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved *Plantasie Creek Ecological Impact Assessment Work Plan* ("September 2022 Work Plan") (EHS Support, 2022). Plantasie Creek is being investigated as part of a NYSDEC Fish and Wildlife Resources Impact Analysis (FWRIA) that is being conducted to support remedial investigations of the Site in accordance with Administrative Order on Consent Index # CO 3-20180508-85 effective August 3, 2018. The Site is located at 161 Ulster Avenue, approximately 1 mile south of the Village of Port Ewen in Ulster County, New York (**Figure 1**), and is listed on the New York State Inactive Hazardous Waste Site Index as Site No. 356001.

1.1 Past Investigations

Ecological investigations have been on-going at the Site since 2007 as part of a NYSDEC FWRIA. The scope of FWRIA investigations includes the characterization and delineation of target metals, specifically copper, mercury, selenium, and zinc, that may have migrated from the Site and deposited in bed sediments within Plantasie Creek downstream of the Solid Waste Management Unit (SWMU) 1/22 Wetland Complex (**Figure 2**). Sediment sampling and substrate survey results from multiple phases of investigation within Plantasie Creek provide the basis for the characterization and delineation of target metal concentrations in sediment to NYSDEC Class C Freshwater Sediment Guidance Values (SGVs) (EHS Support, 2020). The results of the phased sediment delineation sampling were reported to NYSDEC in the *Plantasie Creek Phase 1 and 2 Sediment Sampling Report* ("Sediment Sampling Report") (EHS Support, 2020). The findings of these investigations were used to support an ecological conceptual site model (ECSM) regarding the potential transport and deposition of target metals in fine-grained sediments within Plantasie Creek downstream of SWMU 1/22 (EHS Support, 2020). Key findings reported in the 2020 Sediment Sampling Report were:

- Concentrations of target metals in sediment decreased with increasing distance downstream of the Site.
- The greatest concentrations of target metals within the extent of sediment delineation sampling were observed in samples collected within the reach from the downstream Site boundary to Salem Street, approximately one mile downstream of the Site (**Figure 2**).

Sediment investigations conducted within Plantasie Creek have adequately characterized and delineated the extent of target metals based on concentrations exceeding NYSDEC Class C SGVs (EHS Support, 2020). However, the potential ecological impacts of target metal concentrations exceeding NYSDEC Class C SGVs have not been evaluated based on Site-specific exposure conditions, consistent with the procedures provided by NYSDEC from the Division of Fish, Wildlife, and Marine Resources (DFWMR) *Screening and Assessment of Contaminated Sediment* (NYSDEC DFWMR, 2014). The Sediment Sampling Report (EHS Support, 2020) recommended further investigations to assess potential ecological and human health exposure to target metals in sediments. Two primary considerations in the assessment of target metal exposure in sediment include:

- **Metal bioavailability and toxicity**: Delineation sampling results presented in the Sediment Sampling Report (EHS Support, 2020) represent total recoverable metals concentrations in sediments. However, metal concentrations in labile sediment fractions and pore water better represent metal bioavailability and toxicity. Therefore, a phased assessment approach was recommended to evaluate the bioavailability and toxicity of metals in sediments based on Site-specific exposure conditions.
- **Mobility of target metals into food webs**: Mercury, particularly in the form of methylmercury (MeHg), has the potential to bioaccumulate or biomagnify in aquatic and terrestrial food webs. It was recommended that the evaluation of potential exposure to target metals in sediment include an assessment of potential mobility of metals from sediment into associated food webs.

1.2 On-going Investigations

The September 2022 Work Plan was developed to characterize potential human health and ecological exposure to target metals, including copper, mercury, selenium, and zinc, in Plantasie Creek downstream of the Site (EHS Support, 2022). Specific objectives of the September 2022 Work Plan were to:

- Assess the bioavailability of target metals, specifically copper, mercury, selenium, and zinc, at representative stations within the extent of downstream sediment delineation sampling from the Site to Salem Street, where sediments exceeding NYSDEC Class C freshwater SGVs have been delineated (EHS Support, 2020).
- Evaluate the potential for adverse ecological effects associated with direct contact and dietary exposure to target metals for aquatic and semi-aquatic receptors associated with Plantasie Creek.
- Provide data to support potential risk-based remedial decision making for sediments in Plantasie Creek downstream of the Site.

In addition to the FWRIA Part 2: Ecological Impact Assessment objectives, data collected as part of the September 2022 Work Plan will be used to evaluate potential human health exposure to target metals in sediments within Plantasie Creek through dermal contact or incidental ingestion pathways, if deemed necessary, through decision making processes described in the September 2022 Work Plan.

The September 2022 Work Plan was developed as a phased investigation to maximize the efficiency of the investigation in providing focused data to support risk assessment and potential remedial decision-making:

- **Phase 1 – Preliminary Bioavailability Assessment**: The purpose of the Preliminary Bioavailability Assessment is to provide a preliminary assessment of the bioavailability of target metals, specifically copper, mercury, selenium, and zinc, at representative stations where NYSDEC Class C sediments were identified during the phased delineation sampling based on total recoverable metals concentrations (EHS Support, 2020).
- **Phase 2 – Comprehensive Ecological Impact Assessment**: The purpose of the Comprehensive Ecological Impact Assessment is to collect data to support multiple lines-of-evidence to evaluate direct contact and bioaccumulative exposure pathways to aquatic and semi-aquatic ecological receptors in accordance with DER-10 and FWRIA guidance (NYSDEC, 1994).

This September 2024 Preliminary Bioavailability Assessment Report was prepared to present the findings from Phase 1 sampling conducted in accordance with the NYSDEC-approved September 2022

Work Plan. Based on the September 2022 Work Plan, a sampling program was implemented in November 2023 to collect fish tissue, surface water, sediment, and pore water samples from Plantasie Creek to satisfy the Phase 1 investigation objectives. Analytical data from these sampling events were reviewed and compared to the criteria detailed in **Section 2.1** and in accordance with the approach outlined in the September 2022 Work Plan. A meeting was held on April 4, 2024 between NYSDEC, Hercules, Dyno Nobel, and EHS Support to present the findings of the November 2023 instream sampling event, discuss identified data gaps, and propose next steps to address identified data gaps for the Plantasie Creek instream investigation. However, it is important to note that a subset of these data may no longer be representative of current conditions instream within a portion of the study area following the disturbance of Plantasie Creek and its banks in early May 2024.[1]

Further analyses of the November 2023 instream sampling data, as well as additional instream data that may be collected as part of supplemental sampling events to re-characterize the nature and extent of target metals within the disturbed area of Plantasie Creek, will be presented in a comprehensive instream report that will be submitted to NYSDEC following completion of the instream investigation. The following sections summarize the sample design, data analysis approach, results, and an updated conceptual site model based on the November 2023 instream sampling data.

[1] Approximately 0.7 miles of Plantasie Creek and its floodplain from upstream of Mountain View Avenue to Salem Street were disturbed as part of stormwater management activities conducted by a contractor hired by the Town of Esopus. The disturbance created by these activities may affect the representativeness of current conditions at a subset of sampling points (PBA-02 and PBA-03). An assessment of the impact of the disturbance on November 2023 sampling results is ongoing with NYSDEC; supplemental sampling may be warranted to characterize the nature and extent of target metals concentrations within the limits of disturbance of the stormwater management activities.

2 Instream Sampling and Analysis

This section provides a summary of the Plantasie Creek instream investigation, including sampling design and methods, results from the November 2023 sampling event, and an updated instream conceptual model based on sampling results received to date.

2.1 Sampling Design and Methods

In accordance with the September 2022 Work Plan, instream sampling was conducted during November 2023 to preliminarily assess the bioavailability of target metals in Plantasie Creek downstream of the Site. This section provides details regarding the sampling design and methods used to sample each medium. A summary of the analytical methods and sample handling requirements for each sample medium is presented in **Table 1**.

2.1.1 Fish Tissue Sampling

Fish tissue composite samples were collected in November 2023 from two sampling reaches in Plantasie Creek and one reach in the Twaalfskill Brook, an NYSDEC-approved background area (**Figure 2**). Fish tissue samples were collected using a Smith-Root LR-20B backpack-mounted electrofishing unit. Unit output was continuously monitored to maximize sampling efficiency while minimizing harmful effects to fish and other aquatic organisms. Target fish species were netted as soon as they were affected by the electrical field and placed in temporary holding wells until sufficient target species were collected for that sampling reach.

A summary of captured and observed fish species from the November 2023 sampling event is provided in **Table 2**. Fish tissue samples were collected from PBA-02, PBA-04, and the background reach in Twaalfskill Brook. One golden shiner (Notemigonus crysoleucas), 18 tesselated darters (Etheostoma olmstedi), and 22 blacknose dace were collected from PBA-02, PBA-04, and the background reach, respectively. Fish tissue samples were unable to be collected from two reaches (PBA-01 and PBA-03) in the Plantasie Creek study area due to lack of target fish species encountered in the reaches during the sampling event. The lack of availability of target fish species also affected the number of fish included in composite samples, and an individual fish sample was evaluated at PBA-02 due to the collection of a single golden shiner. Consequently, some composite samples also included fish outside of the target length variance (smallest fish total length [TL] >75 percent of largest fish TL).

Adult forage fish tissue whole-body composite and individual samples were processed to be consistent with NYSDEC guidance (NYSDEC DFWMR, 2003). Fish selected for tissue analysis were placed in a clean plastic bag and labeled with the appropriate collection information. Samples were placed in a freezer and frozen at -12 degrees Celsius (°C) to -18°C. Samples were shipped frozen to the designated laboratory. Fish tissue samples were analyzed for target metals (i.e., copper, total mercury [THg], methlymercury [MeHg], selenium, and zinc) consistent with analytical methods and sample handling requirements outlined in **Table 1**.

2.1.2 Surface Water Sampling

Surface water samples were collected during November 2023 from four co-located sampling locations in the Plantasie Creek assessment reach and one location in the Twaalfskill Brook background area (**Figure**

2). Samples were collected near-bottom (within approximately 6 inches of the sediment-surface water interface) via direct grab. Care was exercised not to disturb bottom sediments when collecting surface water samples. Sample locations were approached from down-current, then collected from up-current of the physical location of the sampler. If a sample location was visibly turbid, the area was allowed to settle, and the sample was taken once the location was not visibly turbid. Unfiltered samples were collected via direct grab using laboratory-supplied, dedicated bottleware. Filtered samples were collected via direct grab using dedicated, laboratory-supplied transfer containers, transferred to 0.45-micrometer (µm) vacuum tower filters for filtering, then transferred to their laboratory-supplied dedicated bottleware. Surface water samples were immediately placed on ice and stored at 4°C for shipment to the analytical laboratory. Water quality parameters, including specific conductance (SPC), oxidation-reduction potential (ORP), pH, temperature, dissolved oxygen, and turbidity were collected during each sample grab using a YSI ProDSS water quality meter.

Unflitered samples were analyzed for target metals (copper, THg, MeHg, selenium, and zinc) and ancillary parameters to support the calculation of water quality criteria and data interpretation. Ancillary parameters include pH, total hardness, total organic carbon (TOC), alkalinity, major ions/anions, total dissolved solids (TDS), and total suspended solids. Filtered samples were analyzed for the target metals and dissolved organic carbon. Surface water samples were analyzed consistent with analytical methods and sample handling requirements outlined in **Table 1**.

2.1.3 Bulk Sediment Sampling

Sediment samples were collected during November 2023 from four co-located sampling locations in the Plantasie Creek assessment reach and one location in the Twaalfskill Brook background area (**Figure 2**). Consistent with data collected at the direction of DFWMR during the FWRIA and previous downstream sediment investigation sampling, the target depth interval for surficial sediment samples was 0-to-12-inches. Sediment samples from the 0-to-12-inch sediment interval represent a highly conservative estimate of the biologically active zone (BAZ) where the predominant abundance and mass of biological activity is expected to occur within the benthic habitat of Plantasie Creek (EHS Support, 2022).

Bulk sediment samples were collected via direct push using a dedicated plastic core liner. Two cores were taken from each sampling location, one for acid-volatile sulfide (AVS) and simultaneously extracted metals (SEM) analysis, and another for the remaining analyses. Each core was immediately capped upon collection and transferred to the on-site processing area. Sediment from cores used for non-AVS-SEM analyses was transferred to decontaminated stainless steel trays for homogenization to consistent color and texture, then placed in the appropriate laboratory-supplied containers. Cores sampled for AVS-SEM analysis were split lengthwise along opposite sides of the core and immediately placed in a glove bag with a nitrogen atmosphere for processing and to minimize oxidation of the sample in the core liner. Non-homogenized sediment aliquots from the AVS-SEM dedicated core liners were then transferred to laboratory-supplied airtight glass containers and were filled such that no headspace remained. The glass containers were immediately capped upon filling within the nitrogen atmosphere. All sediment samples were immediately placed on ice and stored at 4°C until receipt by the analytical laboratory.

Based on conditions encountered in the field, only one location (PBA-03-SD) was able to be sampled at the target depth interval of 0-12 inches; depths of samples at other stations were less than the target depth interval due to refusal or poor recovery.

Sampling locations were sampled at the following depth intervals:

- PBA-BKG-SD: 0-8 inches
- PBA-01-SD: 0-8 inches
- PBA-02-SD: 0-10 inches
- PBA-03-SD: 0-12 inches
- PBA-04-SD: 0-8 inches

All intervals sampled were deeper than the 0-10 or 0-15-centimeter (0-3.9 to 0-5.9-inch) depth interval recommended in USEPA guidance, including *Determination of the Biologically Relevant Sampling Depth for Terrestrial and Aquatic Ecological Risk Assessments* (USEPA, 2015) and *Methods for the Collection, Storage, and Manipulation of Sediments for Chemical and Toxicological Analyses* (USEPA, 2001). Therefore, sediment samples collected during November 2023 are expected to accurately represent exposure conditions in the BAZ.

Bulk sediment samples from stations within the Plantasie Creek assessment reach were analyzed for AVS-SEM, target metals (i.e., copper, THg, MeHg, selenium, and zinc), TOC, and sediment grain size distribution by sieve analysis. An aliquot of the bulk sediment from a subset of Plantasie Creek stations (i.e., PBA-01-SD; PBA-02-SD; and PBA-03-SD) was also submitted for sequential extraction (SE) determination of the distribution of target metals into solid phases.

Bulk sediment samples from the Twaalfskill Brook background area were analyzed for AVS-SEM, target metals, target analyte list metals, TOC, target compound list (TCL) volatile organic compounds, TCL semi-volatile organic compounds, and TCL pesticides. Bulk sediment samples were analyzed to be consistent with analytical methods and sample handling requirements outlined in **Table 2**.

2.1.4 Pore Water Sampling

Pore water samples were collected during November 2023 from four co-located sampling locations in the Plantasie Creek assessment reach and one location in the Twaalfskill Brook background area (**Figure 2**). Samples were collected via syringes attached to a Henry Probe sampler, which is a small-bore piezometer screened at an interval within the target sampling interval. Unfiltered samples were transferred from the syringes directly to laboratory-supplied bottleware, while filtered samples were transferred to 0.45-µm vacuum tower filters for filtering; then, the filtrate was transferred to dedicated bottleware. Pore water samples were immediately placed on ice and stored at 4°C until receipt by the analytical laboratory.

Consistent with data collected at the direction of DFWMR during the FWRIA and previous sediment sampling conducted as part of the downstream sediment investigation in Plantasie Creek, pore water samples for chemical analyses were collected from the 0-12-inch sediment interval. As noted for sediment samples, this sampling interval is deeper than the depth interval recommended in USEPA (2015) and USEPA (2001); therefore, pore water data represent a highly conservative estimate of exposure in the BAZ of Plantasie Creek. Pore water samplers were advanced to at least 6 inches, or as deep as possible, prior to refusal. An aliquot of pore water from each station was analyzed in the field for water quality parameters (i.e., SPC, TDS, ORP, pH, and temperature) using a Myron Ultrameter II. These parameters were also analyzed for the ambient surface water during pore water sampling using a YSI ProDSS water quality meter to assess the potential for surface water dilution of pore water samples.

A review of water quality parameters, namely SPC, collected for pore water and ambient surface water during November 2023 pore water sampling indicated limited potential for surface water intrusion and dilution of the pore water collected from stations within the Plantasie Creek assessment reach, including PBA-01-PW; PBA-02-PW; PBA-03-PW; and PBA-04-PW. SPC values in pore water were greater than surface water SPC values at evaluated stations during pore water collection, indicating limited potential for surface water intrusion (Zimmerman et al., 2005). SPC values in pore water collected from the Twaalfskill Brook background station (PBA-BKG-PW) were similar to or slightly lower than those in surface water, indicating that there may be surface water intrusion to pore water. Based on the substrate composition observed in Twaalfskill Brook (i.e., large cobles and gravel), the larger pore space is likely to create an increased potential for intrusion of surface water to pore water than the clay and silt dominated substrates encountered in the Plantasie Creek assessment reach.

Unfiltered pore water samples were only analyzed for pH. Filtered pore water samples were analyzed for target metals (i.e., copper, THg, MeHg, selenium, and zinc), hardness, calcium, magnesium, sodium, potassium, and pH. Pore water samples were analyzed to be consistent with analytical methods and sample handling requirements outlined in **Table 1**.

2.2 Analytical Data Validation

Consistent with the September 2022 Work Plan, data quality was evaluated using validation procedures that assess the accuracy, precision, representativeness, completeness, comparability (method compliance) and sensitivity of the analytical data to determine if it is adequate for its intended use. Data Usability Summary Reports (DUSRs) documenting the results of data validation conducted on Phase 1 analytical data are provided in **Appendix C**.

2.3 Sampling Results

Instream sampling results from the November 2023 sampling event were evaluated in accordance with the September 2022 Work Plan (EHS Support, 2022) and NYSDEC DER-10 guidance (NYSDEC, 2010). A summary of analytical data, laboratory analytical reports, and data validation reports from the November 2023 sampling event are provided in **Appendix A**, **Appendix B**, and **Appendix C** respectively. As described in the September 2022 Work Plan, the decision to proceed with the Phase 2 Comprehensive Ecological Impact Assessment will be based on weight-of-evidence evaluation for key bioavailability indicators from the Phase 1 Bioavailability Assessment. Decision criteria that indicate highly bioavailable and likely toxic metal concentrations are presented in **Table 7**. This section provides explanations of results from the November 2023 instream sampling event in the context of screening values and decision criteria outlined in the September 2022 Work Plan, which are summarized in **Table 3** through **Table 7**.

2.3.1 Fish Tissue Results

As presented in **Table 2**, composite fish tissue samples were submitted for analysis from PBA-04-TI (18 individual tessellated darter) and PBA-BKG-TI (22 individual blacknose dace), while only a single individual sample was submitted from PBA-02-TI (1 individual golden shiner). Fish tissue samples submitted for analysis consisted of forage fish, which was consistent with the objectives presented in the September 2022 Work Plan; however, differing species and sample sizes across stations creates

uncertainty in longitudinal comparisons within Plantasie Creek or comparisons to the Twaalfskill Brook background site.

Whole body concentrations from fish tissue samples collected during November 2023 were evaluated relative to critical body residues (CBRs) and dietary screening benchmarks (DSBs) for wildlife to assess the potential for adverse effects to the growth, reproduction, or survival of fish and piscivorous wildlife, respectively. Two levels of chronic endpoints representing no observed effect concentration (NOEC) and lowest observed effect concentration (LOEC) endpoints were identified as CBRs and DSBs to evaluate the potential for adverse effects to invertebrates and fish potentially exposed within Plantasie Creek (**Table 3**):

- CBRs for the protection of fish:
  - NOEC CBR (CBR_{NOEC}): Represents a chronic NOEC CBR for mortality, growth, and reproduction endpoints identified in literature studies.
  - LOEC CBR (CBR_{LOEC}): Represents a LOEC CBR for mortality, growth, and reproduction endpoints identified in literature studies.
- DSBs for the protection of piscivorous wildlife:
  - NOEC DSB (DSB_{NOEC}): Represents a chronic NOEC DSB for mortality, growth, and reproduction endpoints for belted kingfisher derived, based on the no observed adverse effects level (NOAEL) toxicity reference values (TRVs) identified in literature studies.
  - LOEC DSB (DSB_{LOEC}): Represents a chronic LOEC DSB for mortality, growth, and reproduction endpoints for belted kingfisher derived, based on the lowest observed adverse effects level TRVs identified in literature studies.

A summary of fish tissue sampling results compared to the criteria outlined above are presented in **Figure 3**. Concentrations of target metals in whole body fish samples were below respective CBR_{LOEC}, CBR_{NOEC}, and DSB_{LOEC} values at PBA-04-TI and PBR-BKG-TI, indicating that concentrations of target metals in tissue are protective of the evaluated forage fish species and piscivorous wildlife within these reaches. Concentrations of mercury, MeHg, and selenium in fish tissue exceeded respective DSB_{NOEC} criteria at Plantasie Creek stations PBA-02-TI and PBA-04-TI and at the Twaalfskill Brook background station (PBA-BKG-TI). At PBA-02-TI, mercury in fish tissue (0.16 miligrams per kilogram [mg/kg] wet weight [ww]) exceeded the mercury DSB_{LOEC} and copper in fish tissue (5.6 mg/kg ww) exceeded the copper CBR_{LOEC}. It is important to note that the exceedances at PBA-02-TI were evaluated from tissue collected from a single golden shiner captured within the sampling reach. The results of the evaluations indicate that forage fish captured at PBA-04-TI do not exceed LOEC fish tissue decision criteria (CBR_{LOEC} and DSB_{LOEC}). A golden shiner collected at PBA-02-TI exceeded LOEC fish tissue decision criteria for copper (CBR_{LOEC}) and mercury (DSB_{LOEC}; **Table 9**).

It should be noted that results from the November 2023 fish tissue sampling do not fully satisfy the sampling and analytical requirements defined in the September 2022 Work Plan. Several target fish species were either not encountered or captured and, therefore, sampled irregularly across stations. has resulted in a limited capacity to effectively evaluate the potential bioavailability and toxicity of target metals in forage fish based on Phase 1 data. The limited catch of target fish species across stations was likely due to sampling late in the year (November) when target species were not present. Further fish tissue sampling is warranted as part of the Phase 2 Comprehensive Ecological Impact Assessment to fully evaluate the bioaccumulation of target metals and associated risks to fish based on CBRs and piscivorous wildlife based on DSBs.

2.3.2 Surface Water Results

Filtered and unfiltered surface water chemistry results were compared to acute and chronic NYSDEC Ambient Water Quality Standards (AWQS) derived for the protection of aquatic life, as specified in 6 CRR-NY 703.5 (**Table 4**). Surface water sampling results are presented in **Figure 4**. Surface water concentrations of target metals in both filtered and unfiltered surface water samples collected during the November 2023 sampling event within the Plantaise Creek assessment reach and the Twaalfskill Brook background assessment reach were below respective acute and chronic NYSDEC AWQS at all sampling stations, indicating that target metals concentrations in surface water within this reach are protective of aquatic life. The results of these evaluations indicate that surface water within the Plantasie Creek assessment reach do not exceed the relevant surface water decision criteria which are intended to identify areas where highly bioavailable and likely toxic metal concentrations may exist (**Table 9**).

2.3.3 Bulk Sediment Results

Total recoverable target metals concentrations were compared to NYSDEC SGVs to identify the sediment class (Class A or Class C) for each sampling station (NYSDEC DFWMR, 2014).

- **Class A:** Metals concentrations below the Class A SGV threshold; concentrations associated with this class are considered to present little or no potential risk to aquatic life.
- **Class C:** Metals concentrations exceeding the Class C SGV thresholds; concentrations exceeding Class C thresholds have a higher potential to be toxic to aquatic life.

NYSDEC SGVs are presented in **Table 5** and sediment sampling results are presented in **Figure 5**. All target metals concentrations were below their respective NYSDEC SGVs at PBA-03-SD; PBA-04-SD; and PBA-BKG-SD. Exceedances of relevant criteria were limited to sampling locations closest to the Site (PBA-01-SD and PBA-02-SD) in the depositional reach upstream of Salem Street, consistent with the ECSM presented in the September 2022 Work Plan. Target metals concentrations at the following sampling locations exceeded their respective NYSDEC SGVs:

- **Class A:** PBA-01-SD (zinc) and PBA-02-SD (zinc)
- **Class C:** PBA-01-SD (copper and mercury) and PBA-02-SD (copper, mercury, and selenium)

AVS, SEM, and TOC results were also used to evaluate the bioavailability and toxicity of divalent metals mixtures in sediment based on equilibrium partitioning (EqP) theory (USEPA, 2005 and 2007). The EqP approach presented in USEPA guidance (2005) and adopted in NYSDEC guidance (NYSDEC DFWMR, 2014) establishes the following benchmarks for protection of benthic organisms based on the organic carbon-normalized difference in the molar concentrations of summed SEM and AVS ($\sum$SEM-AVS/f_{OC}):

- < 130 micromoles per gram organic carbon (µmol/g_{OC}): Toxicity is not likely.
- 130-3000 µmol/g_{OC}: Toxicity is uncertain.
- 3,000 µmol/g_{OC}: Toxicity is likely.

SEM-AVS/f_{OC} at PBA-02-SD (143.8 µmol/g_{OC}) was found to be within the USEPA suggested range where toxicity of sediments to benthic organisms is uncertain (130-3,000 µmol/g_{OC}). SEM-AVS/f_{OC} results from all other sediment samples were at least two orders of magnitude lower than the decision criteria of 3,000 µmol/g_{OC}, indicating limited bioavailability of target metals in sediment (**Figure 5** and **Table 9**).

The SE fractionation of target metals was also evaluated within the Plantasie Creek assessment reach. Generally, bioavailable metals are associated with the F-1 and F-2 fractions, with decreasing bioavailability in fractions F-3 through F-5. Typically, the distribution of highly bioavailable target metals in sediment can be apportioned to the following solid phase fractions (e.g., Tessier et al., 1979):

- Exchangeable fraction (F-1) targets metals that are weakly adsorbed to sediment and susceptible to desorption by changes in pore water chemistry (i.e., ionic composition).
- Carbonate-associated fraction (F-2) targets metals bound to carbonates in sediment, which are dissolved by changes in pH and release adsorbed metals.
- Metals targeted in F-3 to F-5 are not typically associated with high bioavailability.

Evaluation of the bioavailable SE fractions (F-1 and F-2) are presented in **Table 8** and evaluated against the decision criteria outlined in the September 2022 Work Plan (**Table 9**). No sampling station evaluated for SE exceeded the decision criteria of 50 percent of copper in the combined F-1 and F-2 fractions, indicating limited potential for copper bioavailability within the Plantasie Creek assessment reach. Non-detected results for THg in the F-1 and F-2 fractions were rejected during data validation due to percent recoveries less than 40 percent in laboratory control samples and laboratory control sample duplicates (**Appendix C)**. Low analyte recoveries have been documented when attempting to sequentially extract simple binary mixtures of bentonite, MnO2 and humic acid spiked with metals; low analyte recoveries were attributed to post-extraction re-adsorption of analytes on residual solids or incomplete dissolution of the target phase (Bacon and Davidson, 2008). Therefore, the low THg recovery may be a function of the spiking procedure and not an indication of the ability to detect THg in the F-1 and F-2 fractions.

2.3.4 Pore Water Results

Filtered and unfiltered pore water chemistry results were compared to acute and chronic NYSDEC AWQS derived for the protection of aquatic life, as specified in 6 CRR-NY 703.5 (**Table 6**). Pore water sampling results are presented in **Figure 6**. Pore water concentrations of target metals in filtered and unfiltered pore water samples collected during the November 2023 sampling event within the Plantasie Creek assessment reach were below their respective acute and chronic NYSDEC AWQS at all sampling stations, indicating that target metals concentrations in pore water within this reach are protective of aquatic life. The results of these evaluations indicate that pore water within the Plantasie Creek assessment reach do not exceed the relevant pore water decision criteria, which are intended to identify areas where highly bioavailable and likely toxic metal concentrations may exist (**Table 9**).

2.4 Interim Investigation Summary

This September 2024 Preliminary Bioavailability Assessment Report presents the results and preliminary analyses of Plantasie Creek fish tissue, surface water, sediment, and pore water data collected in November 2023 consistent with the September 2022 Work Plan. Decision criteria that indicate highly bioavailable and likely toxic target metal concentrations were evaluated; the key findings of the preliminary bioavailability assessment are presented in **Table 9** and include the following:

- Target metal concentrations in a limited fish tissue dataset did not exceed decision criteria (CBR_{LOEC} and DSB_{LOEC}) at PBA-04-TI. The mercury DSB_{LOEC} and copper CBR_{loec} decision criteria were exceeded at PBA-02-TI but DSB_{LOEC} and CBR_{LOEC} decision criteria values were not exceeded for MeHg, selenium, or zinc at this location.
- Target metal concentrations in filtered surface water samples did not exceed decision criteria (NYSDEC Acute AWQS) at any surface water sampling stations.

- SEM-AVS/f_{OC} did not exceed decision criteria (3,000 µmol/g_{OC}) at any sediment sampling stations.
- Target metal concentrations in filtered pore water samples did not exceed decision criteria (NYSDEC Acute AWQS) at any pore water sampling stations.
- Less than 50 percent of copper in bulk sediment is associated with bioavailable SE factions (F-1 and F-2) at stations where SE was evaluated.

Additionally, the spatial distribution of target metal concentrations in sediments in exceedance of the NYSDEC Class A and C SGVs are limited to PBA-01 and PBA-02, remaining within the depositional reach between the Site boundary and Salem Street. Class A SGVs were not exceeded for any target metal at PBA-03 and PBA-04.

As previously stated, a subset of the sediment data presented in this report may no longer be representative of current conditions on Plantasie Creek within the portion of the study area from upstream of Mountain View Avenue to Salem Street due to the disturbance of Plantasie Creek and its banks by stormwater management activities conducted by the Town of Esopus in early May 2024. The assessment of the impact of the disturbance on November 2023 sampling results is ongoing with NYSDEC, and supplemental sampling may be warranted to recharacterize the nature and extent of target metals concentrations within the limits of disturbance. The results of any supplemental sampling and analyses of the complete instream dataset collected in November 2023, and any supplemental sampling results, will be presented in a comprehensive instream report that will be submitted to NYSDEC following the completion of the instream investigation.

3 Plantasie Creek Instream Conceptual Model Summary

An ECSM presented in the *Fish and Wildlife Impact Analysis Step IIC Investigation Report* (URS, 2011) describes the potential migration of target metals from historical Site operations to downstream areas of Plantasie Creek. This ECSM was summarized and further refined in Section 2.2 of the September 2022 Work Plan based on phased sediment sampling and substrate surveys conducted within Plantasie Creek from the Site downstream to the Rondout Creek floodplain (EHS Support, 2020). This section presents further refinement of the ECSM based on the findings of November 2023 sampling event, as summarized in **Section 2.2**. However, it is important to reiterate that a subset of the analytical data used in the ECSM summary may no longer be representative of current conditions within Plantasie Creek due to the disturbance of Plantasie Creek and its banks in early May 2024. Further updates to the ECSM to reflect post-disturbance conditions will be provided based on supplemental sampling that may be warranted to recharacterize the nature and extent of target metals concentrations within the limits of disturbance.

Substrate mapping survey findings indicate that the distribution of fine-grained depositional sediment within the extent of the delineation sampling is consistent with stream gradient. As described in the ECSM presented in the September 2022 Work Plan, the primary depositional reach runs in a low-gradient (0.2 percent) reach from the Site Boundary to Salem Street, and is characterized by fine-grained sediment deposition over a native clay layer. Downstream of Salem Street, there is an abrupt increase in stream gradient (3.9 percent) and the streambed is characterized primarily by bedrock with boulder, cobble, gravel, and fine-medium sand substrates within the higher gradient, higher energy reach. As stated in the ECSM presented in the September 2022 Work Plan, the distribution of target metals in Plantasie Creek sediment is consistent with the distribution of fine-grained depositional sediments. Results from the phased delineation sampling indicated that the greatest potential in-stream exposure to target metals in Plantasie Creek sediments downstream of the Site is within the low gradient reach from the Site boundary to Salem Street (EHS Support, 2020).

As presented in **Section 2.2**, key findings from data collected in November 2023 support the conceptual fate and transport mechanisms for target metals in Plantasie Creek as presented in the ECSM. Target metal concentrations in Plantasie Creek sediments were consistent with the trends expected based on depositional patterns described in the ECSM presented in the September 2022 Work Plan. As described in **Section 2.2**, target metal concentrations in Plantasie Creek sediments generally decreased with increasing downstream distance from the Site, and concentrations of target metals downstream of Salem Street did not exceed NYSDEC Class A or Class C SGVs.

Results from the November 2023 Phase 1 Preliminary Bioavailability Assessment indicate limited bioavailability of target metal constituents in Plantasie Creek sediments downstream of the Site. Filtered metals results for surface water and pore water do not exceed their respective NYSDEC AWQS in any sample collected during November 2023, indicating limited concentrations of dissolved metals in aqueous exposure media. Additionally, analyses of sediment target metal bioavailability based on EqP indicate that target metal toxicity in sediment is unlikely. SE analyses indicate that less than half of total recoverable copper concentrations are in bioavailable fractions (F1 or F2). Although limited, evaluations of fish tissue with respect to CBR_{LOEC} and DSB_{LOEC} decision criteria indicate low bioavailability and toxicity to fish and piscivorous wildlife within portions of the assessment reach. Collectively, these preliminary lines of evidence collected during the Phase 1 bioavailability assessment do not indicate high bioavailability or toxicity of target metals in sediments within the Plantasie Creek assessment reach.

Further data collection and evaluation is warranted through supplemental sampling or completion of the Phase 2 Comprehensive Ecological Impact Assessment to support conclusions regarding potential risks to ecological receptors associated with exposure to target metals, specifically copper and mercury.

4 References

Bacon, J.R. and C.M. Davidson. 2008. Is there a future for sequential chemical extraction? Analyst. 133: 25-46.

EHS Support. 2020. Plantasie Creek Phase 1 and 2 Sediment Sampling, Port Ewen, Ulster County, NY. April.

EHS Support. 2022. Plantasie Creek Ecological Impact Assessment Work Plan, Port Ewen, Ulster County, NY. September.

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

NYSDEC DFWMR. 2003. Procedures for the Collection and Preparation of Aquatic Biota for Contaminant Analysis. January.

NYSDEC. 2010. DER-10/Technical Guidance for Site Investigation and Remediation, Deputy Commissioner, Office of Remediation and Materials Management. May.

NYSDEC DFWMR. 2014. Screening and Assessment of Contaminated Sediment.

URS Corporation. 2011. Fish and Wildlife Impact Analysis Step IIC Investigation Report, Dyno Nobel Site. Port Ewen, New York. July 13.

USEPA. 2001. Methods for the Collection, Storage, and Manipulation of Sediments for Chemical and Toxicological Analyses.

USEPA. 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc). Office of Research and Development. USEPA-600-R-02 011.

USEPA. 2007. Framework for Metals Risk Assessment. USEPA 120/R-07/001. March.

USEPA. 2015. Determination of the Biologically Relevant Sampling Depth for Terrestrial and Aquatic Ecological Risk Assessments. National Center for Environmental Assessment, Ecological Risk Assessment Support Center, Cincinnati, OH. EPA/600/R-15/176.

Zimmerman, M.J., Massey, A.M., and Campo, K.W., 2005, Pushpoint sampling for defining spatial and temporal variations in contaminant concentrations in sediment pore water near the ground-water/surface-water interface: U.S. Geological Survey Scientific Investigations Report 2005-5036, 70 p.

Tables

Table 1
Summary of Analytical Methods and Sample Handling Requirements
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Analytical Group	Analytical and Preparation Method	Required Sample Mass	Sample Containers	Preservation Requirements	Maximum Holding Time
Solid Media (Bulk Sediment) - Plantasie Creek Stations					
TAL Metals Copper Selenium Zinc	USEPA Method 6020A	100 g	Glass or plastic	Cool to 4°C	180 days to analysis
Total Mercury	USEPA Method 7471B	100 g	Glass or plastic	Cool to 4°C	28 days to analysis
Methylmercury	USEPA Method 1630	100 g	Glass	Cool to 4°C	28 days to analysis
AVS-SEM	USEPA-821-R-91-100	113 g (4 oz.)	Glass with Teflon septa cap	Cool to 4°C	14 days
Total Organic Carbon	Lloyd Kahn	100 g	Amber glass, Teflon cap	Cool to 4°C	14 days
Grain Size Distribution	ASTM D422	500 g	Glass or plastic	None	No hold
Solid Media (Bulk Sediment) - Background Stations					
TAL Metals	USEPA Method 6020A	100 g	Glass or plastic	Cool to 4°C	180 days to analysis
Total Mercury	USEPA Method 7471B	100 g	Glass or plastic	Cool to 4°C	28 days to analysis
AVS-SEM	USEPA-821-R-91-100	113 g (4 oz.)	Glass with Teflon septa cap	Cool to 4°C	14 days
TCL VOCs	USEPA Method 8260C	100 g	Amber Glass with Teflon cap	Cool to 4°C	40 days for analysis
TCL SVOCs	USEPA Method 8270D	100 g	Amber Glass with Teflon cap	Cool to 4°C	14 days to extraction 40 days from extraction to analysis
TCL Pesticides	USEPA Method 8081B	100 g	Amber Glass with Teflon cap	Cool to 4°C	14 days to extraction 40 days from extraction to analysis
TOC	Lloyd Kahn	100 g	Amber glass, Teflon cap	Cool to 4°C	14 days
Grain Size Distribution	ASTM D422	500 g	Glass or plastic	None	No hold
Solid Media (Biological Tissue) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	USEPA Method 6020A	100 g	Glass or plastic	Cool to 4°C	180 days to analysis
Total Mercury	USEPA Method 1631	100 g	Glass or plastic	Cool to 4°C	1 year
Methylmercury	USEPA Method 1630	100 g	Glass	Cool to 4°C	28 days to analysis
Aqueous Media (Surface Water) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	USEPA Method 6020B	250 mL	Plastic	HNO_3, pH<2, 4°C	180 days
Total Mercury	USEPA Method 1631	250 mL	Fluoropolymer or Glass bottles with fluoropolymer cap	Cool to 4°C	90 days from extraction to analysis
Methylmercury	USEPA Method 1630	250 mL	Plastic or Glass	H_2SO_4, pH<2, 4°C	180 days to analysis
TOC	USEPA Method 5310C	40-mL vial	Amber glass	H_3PO_4, pH<2, 4°C	28 days
DOC	USEPA Method 5310C	40 mL	Glass with Teflon septum	4°C (no headspace)	28 days
Alkalinity	SM 2320B	150 mL	Plastic or glass	Cool to 4°C	14 days
Hardness	SM 2320C	100 mL	Plastic or glass	Cool to 4°C	180 days
TSS	SM 2540D	1,000 mL	Plastic or glass	Cool to 4°C	7 days
pH	USEPA Method 9040C	50 mL	Plastic or glass	Cool to 4°C	as soon as possible

Table 1
Summary of Analytical Methods and Sample Handling Requirements
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Analytical Group	Analytical and Preparation Method	Required Sample Mass	Sample Containers	Preservation Requirements	Maximum Holding Time
Aqueous Media (Pore Water) - Plantasie Creek and Background Stations					
TAL Metals Copper Selenium Zinc	USEPA Method 6020B	250 mL	Plastic	HNO_3, pH<2, 4°C	180 days
Total Mercury	USEPA Method 1631	250 mL	Fluoropolymer or Glass bottles with fluoropolymer cap	Cool to 4°C	90 days from extraction to analysis
Methylmercury	USEPA Method 1630	250 mL	Plastic or Glass	H_2SO_4, pH<2, 4°C	180 days to analysis
Hardness	SM 2320C	100 mL	Plastic or glass	Cool to 4°C	180 days
pH	USEPA Method 9040C	50 mL	Plastic or glass	Cool to 4°C	as soon as possible

Notes:

*holding times and volume requirements may vary by laboratory.

°C = degrees Celsius

ASTM = American Society for Testing and Materials

AVS-SEM = acid volatile sulfide/simultaneously extracted metals

DOC = dissolved organic carbon

g = gram

H_2SO_4 = sulfuric acid

H_3PO_4 = phosphoric acid

HNO_3 = nitric acid

mL = milliliter

oz = ounce

SM = Standard method

SVOC = semi-volatile organic compound

TAL = target analyte list

TCL = target compound list

TOC = total organic carbon

TSS = total suspended solids

USEPA = United States Environmental Protection Agency

VOC = volatile organic compound

Table 2
Summary of Fish Species Information
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Reach	Date Collected	Species	Scientific Name	Guild	Status	Individual Count	Estimated Size Range (cm)
4	**11/1/2023**	**Tesselated Darter**	***Etheostoma olmstedi***	**Insectivore**	**Captured**	**18**	**6.5 - 11**
4	11/1/2023	Bluegill Sunfish	*Lepomis macrochirus*	Insectivore/Piscivore	Observed	n/a	n/a
4	11/1/2023	Pumpkinseed Sunfish	*Lepomis gibbosus*	Insectivore/Piscivore	Observed	n/a	n/a
4	11/1/2023	Smallmouth Bass	*Micropterus dolomieu*	Piscivore	Observed	n/a	n/a
4	11/1/2023	Largemouth Bass	*Micropterus salmoides*	Piscivore	Observed	n/a	n/a
4	11/1/2023	American Eel	*Anguilla rostrata*	Omnivore	Observed	n/a	n/a
2	**11/1/2023**	**Golden Shiner**	***Notemigonus crysoleucas***	**Insectivore/Omnivore**	**Captured**	**1**	**13**
2	11/1/2023	American Eel	*Anguilla rostrata*	Omnivore	Observed	n/a	n/a
BKG	**11/3/2023**	**Blacknose Dace**	***Rhinichthys atratulus***	**Insectivore**	**Captured**	**22**	**5.5 - 8.7**
BKG	11/3/2023	American Eel	*Anguilla rostrata*	Omnivore	Observed	n/a	n/a

Notes:
Bold results indicate species actually captured and submitted for analysis
cm = centimeter
n/a = not applicable

Table 3
Fish Tissue Analytical Criteria
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Endpoint	DSB (mg/kg ww)					CBR (mg/kg ww)									
	Copper	Mercury	Methylmercury	Selenium	Zinc	Copper		Mercury		Methylmercury	Selenium		Zinc		
NOEC	16	0.045	--	0.7	95	3.9	a	0.2	b	--	1.6	d	287	e	
LOEC	28.9	0.14	--	1.4	164	4.5	a	0.77	c	--	3.2	d	403	e	

Notes:
CBR = critical body residue
DSB = dietary screening benchmark
LOEC = lowest observed effect concentration
mg/kg = milligram per kilogram
NOEC = no observed effect concentration
ww = wet weight

Sources:
a = Mount et al. (1994)
b = 5.5 percent injury from Dillon et al. (2010), consistent with Beckvar et al. (2005) tissue threshold effect level (t-TEL)

c = 20 percent injury from Dillon et al. (2010), consistent with tissue threshold for reproduction identified in Fuchsman et al. (2016)
d = Tashjian, D. H., Teh, S. J., Sogomonyan, A., & Hung, S. S. 2006. Bioaccumulation and chronic toxicity of dietary l-selenomethionine in juvenile white sturgeon (Acipenser transmontanus). Aquatic Toxicology, 79(4), 401–409.
e = Pierson (1981)

Table 4
Surface Water Analytical Criteria
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

	NYSDEC AWQS (µg/l)			
Endpoint	**Copper**	**Mercury**	**Selenium**	**Zinc**
Acute	14.8	1.4	4.6	127.7
Chronic	9.8	0.77	--	90.1

Notes:

µg/l = micrograms per liter

AWQS = acute water quality standard

NYSDEC = New York State Department of Environmental Conservation

Source:

6 CRR-NY 703.5. Techincal support in: NYSDEC. 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Table 5
Sediment Analytical Criteria
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Sediment Class	NYSDEC SGV (mg/kg & µmol/g_{OC})								(SEM-AVS)/f_{OC}	
	Copper		Mercury		Selenium		Zinc			
Class A	32	a	0.2	a	5	b	120	a	130	c
Class C	150	a	1	a	5	b	460	a	3000	c

Notes:

µmol/g_{OC} = micromol per gram organic carbon

AVS = acid-volatile sulfides

f_{OC} = fraction organic carbon

mg/kg = milligram per kilogram

NYSDEC = New York State Department of Environmental Conservation SEM = simultaneously extracted metals

SGV = sediment guidance value

Sources:

a = NYSDEC. 2014. Division of Fish, Wildlife, and Marine Resources (DFWMR) Screening and Assessment of Contaminated Sediment.

b = Nagpal, N.K., Pommen, L.W., and L.G. Swain. 1995. Approved and working criteria for water quality guidelines for British Columbia. 28 pp.

c = USEPA. 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc). Office of Research and Development. USEPA-600-R-02 011.

Table 6
Pore Water Analytical Criteria
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Endpoint	NYSDEC AWQS (µg/L)			
	Copper[1]	Mercury	Selenium	Zinc[1]
Acute	32.3	1.4	4.6	257.3
Chronic	19.8	0.77	--	181.9

Notes:

[1] Copper and zinc are hardness dependent values calculated based on site specific hardness.

µg/L = micrograms per liter

AWQS = acute water quality standard

NYSDEC = New York State Department of Environmental Conservation

Source:

6 CRR-NY 703.5. Techincal support in: NYSDEC. 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

EHS Support

Table 7
Decision Criteria
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Analyte	SW/PW	Sediment		Fish Tissue	
	NYSDEC Acute AWQS	(SEM-AVS)/f_{OC}	Bioavailable SE	DSB_{LOEC}	CBR_{LOEC}
Unit	µg/L	µmol/g_{OC}	%	mg/kg ww	mg/kg ww
Copper	14.8	3,000	<50 (F1+F2)	8.1	4.5
Mercury	1.4	3,000	<50 (F1+F2)	0.14	0.77
Selenium	4.6	3,000	--	1.4	4.5
Zinc	127.7	3,000	--	1.5	403

Notes:

µg/L = micrograms per liter

µmol/g_{OC} = micromol per gram organic carbon

% = percent

AWQS = acute water quality standard

AVS = acid-volatie sulfides

CBR = critical body residue

DSB = dietary screening benchmark

F1+F2 = exchangeable and carbonate-associated fractions

f_{OC} = fraction organic carbon

LOEC = lowest observed effect conecntration

mg/kg = milligram per kilogram

NYSDEC = New York State Department of Environmental Conservation

SE = sequential extraction

SEM = simultaneously extracted metals

ww = wet weight

Table 8
Results of Sequential Extraction of Target Metals in Fractions F-1 and F-2
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Bulk Sediment		
Station ID	SE Fraction 1 + 2 (% of total)	
	Copper	Mercury
PBA-BKG	NA	NA
PBA-01	0.13	0.01 R
PBA-02	0.20	0.02 R
PBA-03	0.05	0.01 R
PBA-04	NA	NA

Notes:

Green-shaded cells indicate results are below decision criteria

NA = not assessed at this station

R = The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

SE = sequential extraction

Table 9
Summary of Decision Criteria Evaluation
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Station ID	Fish Tissue								Surface Water			
	CBR_{LOEC}				DSB_{LOEC}				NYSDEC Acute AWQS			
	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Selenium	Zinc	Copper	Mercury	Selenium	Zinc
PBA-BKG	--	--	--	--	--	--	--	--	--	--	--	--
PBA-01	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
PBA-02	X	--	--	--	--	X	--	--	--	--	--	--
PBA-03	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
PBA-04	--	--	--	--	--	--	--	--	--	--	--	--

Table 9
Summary of Decision Criteria Evaluation
Plantasie Creek Interim Phase 1 Ecological Impact Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Sediment						Pore Water			
(SEM-AVS)/f_{OC}				Bioavailable SE		NYSDEC Acute AWQS			
Copper	Mercury	Selenium	Zinc	Copper	Mercury	Copper	Mercury	Selenium	Zinc
--	--	--	--	NA	NA	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	NA	NA	--	--	--	--

Notes:

-- = no exceedance of relevant decision criteria

AVS = acid-volatile sulfides

CBR = critical body residue

DSB = dietary screening benchmark

f_{OC} = fraction organic carbon

LOEC = lowest observed effect conecntration

NA = not assessed at this station

NS = sufficient sample not available

NYSDEC = New York State Department of Environmental Conservation

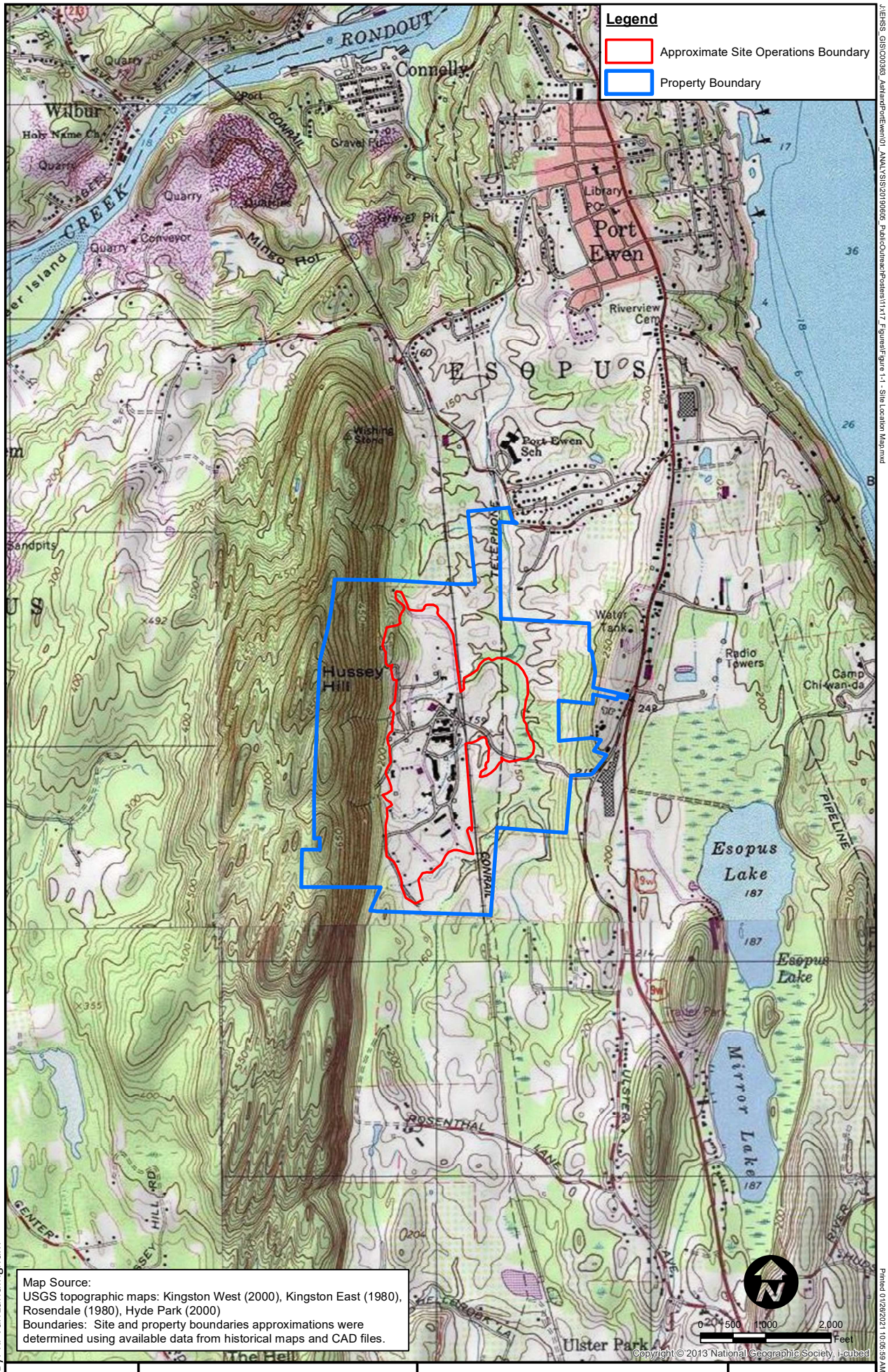
SE = sequential extraction

SEM = simultaneously extracted metals

SGV = sediment guidance value

X = exceedance of relevant decision criteria

Figures



Map Source:
USGS topographic maps: Kingston West (2000), Kingston East (1980), Rosendale (1980), Hyde Park (2000)
Boundaries: Site and property boundaries approximations were determined using available data from historical maps and CAD files.

Reviewed By: K. VanLandingham

EHS Support	Downstream Sediment Investigation Dyno Nobel Port Ewen Site Port Ewen, New York	SITE LOCATION MAP	FIGURE 1

J:\EHS_GIS\200383_AshlandPortEwen\01_ANALYSIS\20190605_PublicOutreach\Posters\11x17_Figures\Figure 1-1 - Site Location Map.mxd

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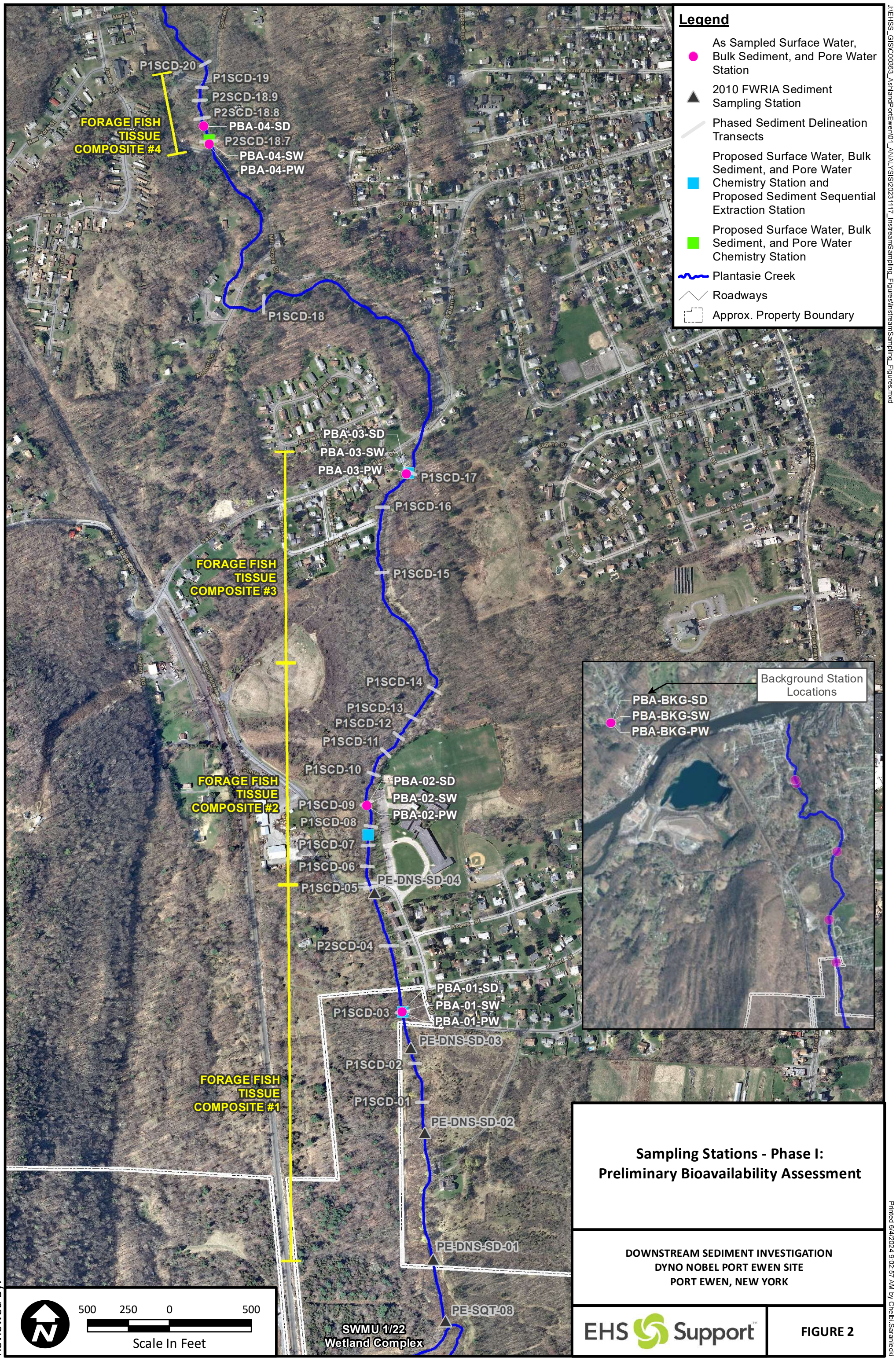
Legend
As Sampled Surface Water, Bulk Sediment, and Pore Water Station
2010 FWRIA Sediment Sampling Station
Phased Sediment Delineation Transects
Proposed Surface Water, Bulk Sediment, and Pore Water Chemistry Station and Proposed Sediment Sequential Extraction Station
Proposed Surface Water, Bulk Sediment, and Pore Water Chemistry Station
Plantasie Creek
Roadways
Approx. Property Boundary
P1SCD-20
P1SCD-19
P2SCD-18.9
P2SCD-18.8
PBA-04-SD
P2SCD-18.7
PBA-04-SW
PBA-04-PW
FORAGE FISH TISSUE COMPOSITE #4
P1SCD-18
PBA-03-SD
PBA-03-SW
PBA-03-PW
P1SCD-17
P1SCD-16
P1SCD-15
FORAGE FISH TISSUE COMPOSITE #3
P1SCD-14
P1SCD-13
P1SCD-12
P1SCD-11
P1SCD-10
PBA-02-SD
PBA-02-SW
PBA-02-PW
P1SCD-09
P1SCD-08
P1SCD-07
P1SCD-06
PE-DNS-SD-04
P1SCD-05
FORAGE FISH TISSUE COMPOSITE #2
P2SCD-04
PBA-01-SD
PBA-01-SW
PBA-01-PW
P1SCD-03
PE-DNS-SD-03
P1SCD-02
P1SCD-01
PE-DNS-SD-02
FORAGE FISH TISSUE COMPOSITE #1
PE-DNS-SD-01
PE-SQT-08
SWMU 1/22 Wetland Complex
Background Station Locations
PBA-BKG-SD
PBA-BKG-SW
PBA-BKG-PW
500 250 0 500
Scale In Feet
Reviewed By:
Sampling Stations - Phase I:
Preliminary Bioavailability Assessment
DOWNSTREAM SEDIMENT INVESTIGATION
DYNO NOBEL PORT EWEN SITE
PORT EWEN, NEW YORK
EHS Support
FIGURE 2
J:\EHSS_GIS\C00363_AshlandPortEwen\01_ANALYSIS\20231117_InstreamSampling_Figures\InstreamSampling_Figures.mxd
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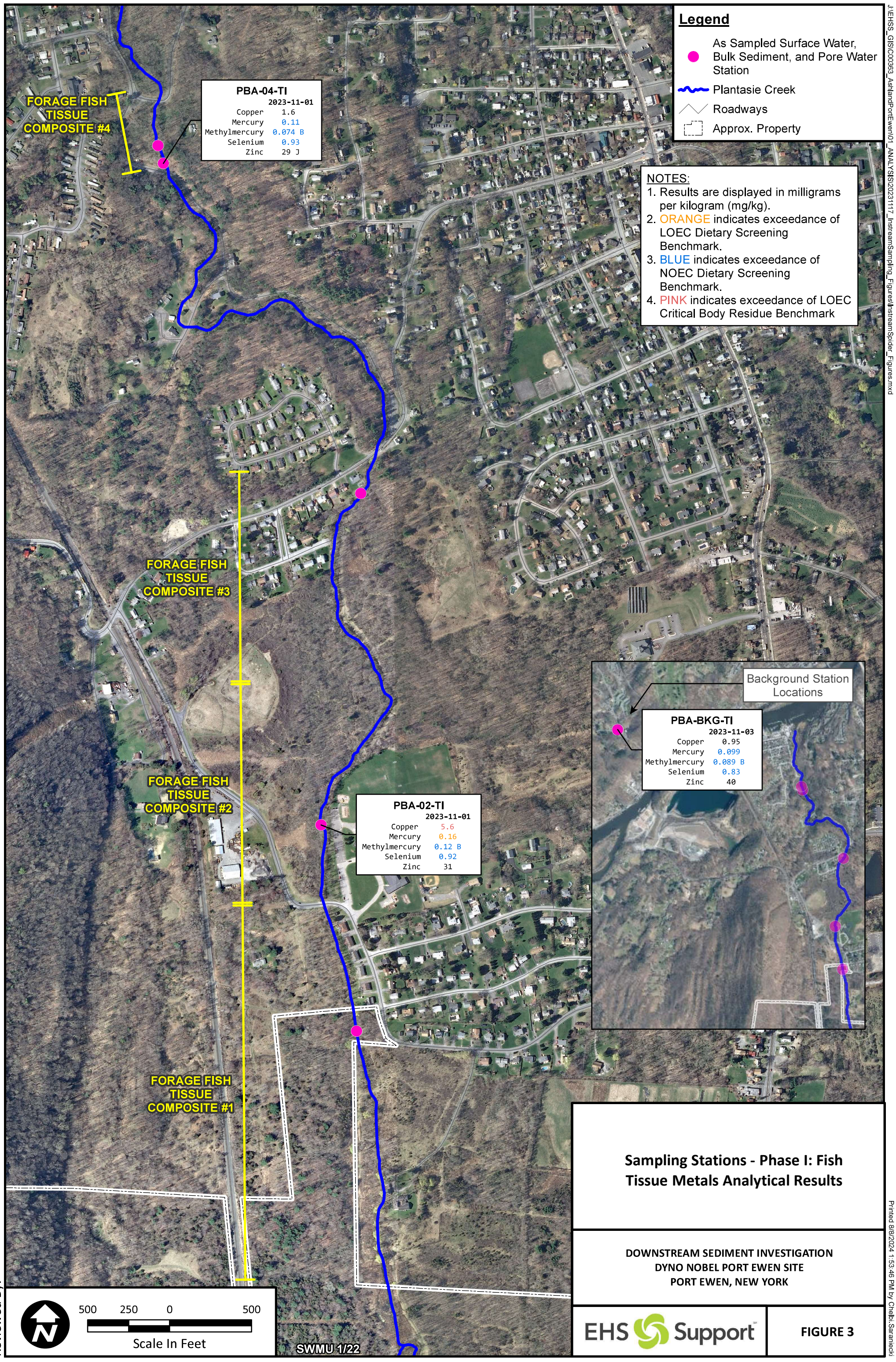
Legend
As Sampled Surface Water, Bulk Sediment, and Pore Water Station
Plantasie Creek
Roadways
Approx. Property
NOTES:
1. Results are displayed in milligrams per kilogram (mg/kg).
2. ORANGE indicates exceedance of LOEC Dietary Screening Benchmark.
3. BLUE indicates exceedance of NOEC Dietary Screening Benchmark.
4. PINK indicates exceedance of LOEC Critical Body Residue Benchmark
PBA-04-TI
2023-11-01
Copper 1.6
Mercury 0.11
Methylmercury 0.074 B
Selenium 0.93
Zinc 29 J
PBA-02-TI
2023-11-01
Copper 5.6
Mercury 0.16
Methylmercury 0.12 B
Selenium 0.92
Zinc 31
PBA-BKG-TI
2023-11-03
Copper 0.95
Mercury 0.099
Methylmercury 0.089 B
Selenium 0.83
Zinc 40
Background Station Locations
FORAGE FISH TISSUE COMPOSITE #4
FORAGE FISH TISSUE COMPOSITE #3
FORAGE FISH TISSUE COMPOSITE #2
FORAGE FISH TISSUE COMPOSITE #1
SWMU 1/22
500 250 0 500
Scale In Feet
Sampling Stations - Phase I: Fish Tissue Metals Analytical Results
DOWNSTREAM SEDIMENT INVESTIGATION
DYNO NOBEL PORT EWEN SITE
PORT EWEN, NEW YORK
EHS Support
FIGURE 3
Reviewed By:
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Legend

- As Sampled Surface Water, Bulk Sediment, and Pore Water Station
- Plantasie Creek
- Roadways
- Approx. Property Boundary

PBA-04-SW

	2023-10-31	2023-10-31(F)
Copper	7.1	5.9
Mercury	0.012	0.0055
Methylmercury	0.00017 B	0.00015 B
Selenium	0.55 J	0.59 J
Zinc	4 U	4 U

PBA-03-SW

	2023-10-31	2023-10-31(F)
Copper	6.8	5.8
Mercury	0.011	0.0027
Methylmercury	0.0002 B	0.00015 B
Selenium	0.62 J	0.62 J
Zinc	4 U	4 U

PBA-02-SW

	2023-10-31	2023-10-31(F)
Copper	6.8	5.6
Mercury	0.011	0.0043
Methylmercury	4.6e-005 JB	0.00016 BF2
Selenium	0.61 J	0.69 J
Zinc	4 U	4 U

PBA-01-SW

	2023-10-31	2023-10-31(F)
Copper	6.6	5.6
Mercury	0.011	0.0052
Methylmercury	0.0002 B	0.00017 B
Selenium	0.83 J	0.75 J
Zinc	4 U	4 U

Background Station Locations

PBA-BKG-SW

	2023-10-31	2023-10-31(F)
Copper	1.7	1.2
Mercury	0.0026	0.00072
Methylmercury	7.7e-005 BF2	6.3e-005 B
Selenium	0.41 J	0.47 J
Zinc	4.5 J	4 U

NOTES:

1. Results are displayed in micrograms per liter (µg/l).
2. (F) indicates filtered sample.
3. GRAY indicates non-detect values (shown as the method detection limit).
4. ORANGE indicates exceedance of Acute Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.
5. BLUE indicates exceedance of Chronic Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

500 250 0 500

Scale In Feet

SWMU 1/22

Sampling Results - Phase I: Surface Water Metals Analytical Results

DOWNSTREAM SEDIMENT INVESTIGATION
DYNO NOBEL PORT EWEN SITE
PORT EWEN, NEW YORK

EHS Support

FIGURE 4

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Legend

- As Sampled Surface Water, Bulk Sediment, and Pore Water Station
- Plantasie Creek
- Roadways
- Approx. Property Boundary

PBA-04-SD

	2023-11-02 (0-08)
(SEM-AVS)/fOC	-4.99922
Copper	14
Mercury	0.029 U
Methylmercury	0.0002
Selenium	0.27 J
Zinc	45

PBA-03-SD

	2023-11-02 (0-12)
(SEM-AVS)/fOC	2.59177
Copper	32
Mercury	0.088
Methylmercury	0.00039
Selenium	1.1
Zinc	84

PBA-02-SD

	2023-11-02 (0-10)
(SEM-AVS)/fOC	143.853
Copper	1000 F2
Mercury	6.2
Methylmercury	0.0067
Selenium	8.6
Zinc	340 F1

PBA-01-SD

	2023-11-03 (0-08)
(SEM-AVS)/fOC	-164.536
Copper	240
Mercury	1.4
Methylmercury	0.0025
Selenium	2.6
Zinc	210

Background Station Locations

PBA-BKG-SD

	2023-11-02 (0-08)
(SEM-AVS)/fOC	34.1188
Copper	20 F2
Mercury	0.12
Selenium	0.28 JF2
Zinc	97 F1F2

NOTES:

1. Results are displayed in milligrams per kilogram (mg/kg), with the exception of SEM-AVS/fOC which is displayed in micromoles per gram - organic carbon (umol/g-OC).
2. Depths ("0-10") are displayed in inches.
3. GRAY indicates non-detect values (shown as the method detection limit).
4. BLUE indicates exceedance of Class A Freshwater Sediment Guidance values.
5. ORANGE indicates exceedance of Class C Freshwater Sediment Guidance values.

500 250 0 500

Scale In Feet

SWMU 1/22

Sampling Results - Phase I: Sediment Metals Analytical Results

DOWNSTREAM SEDIMENT INVESTIGATION
DYNO NOBEL PORT EWEN SITE
PORT EWEN, NEW YORK

EHS Support

FIGURE 5

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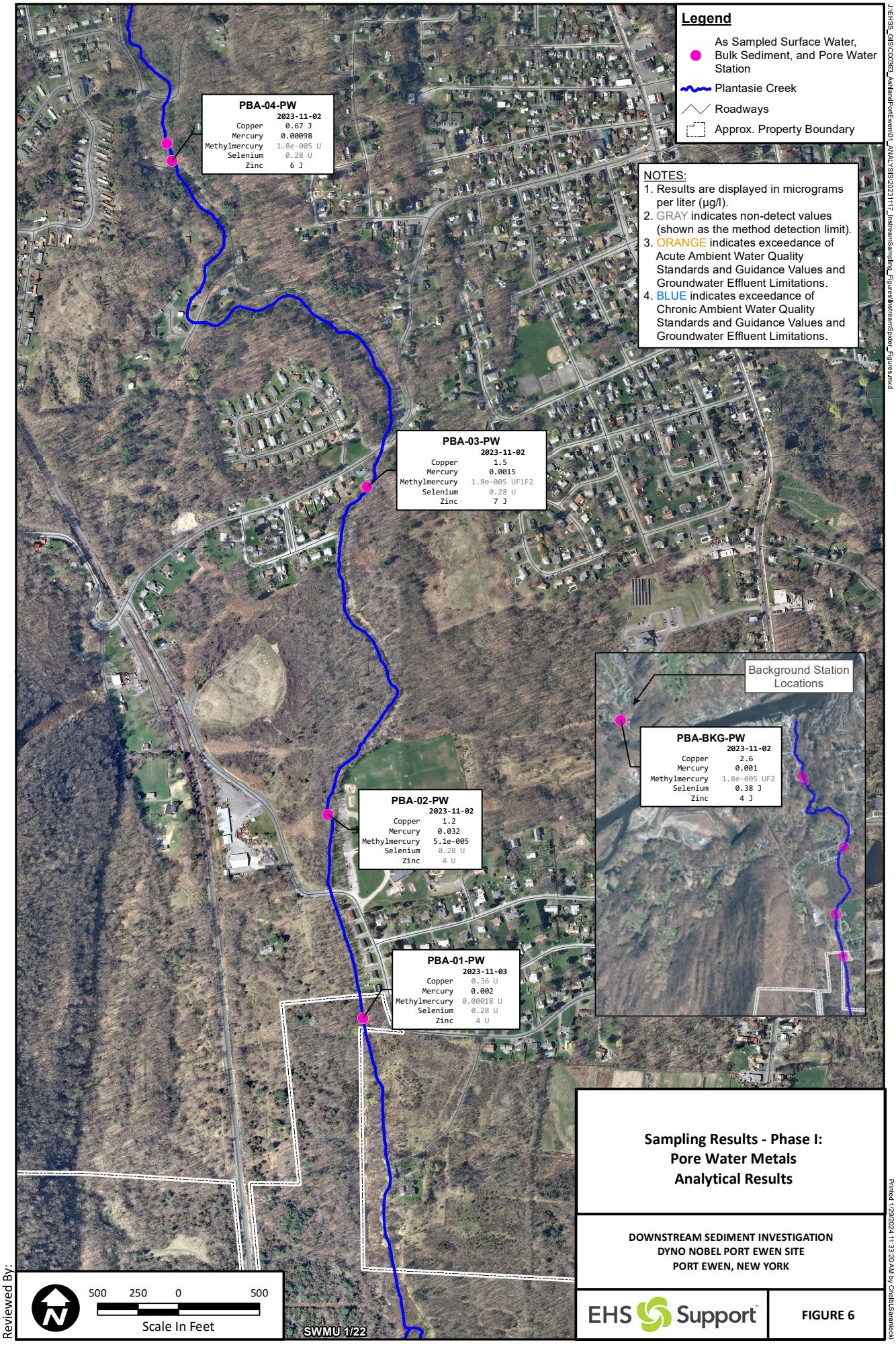

Sampling Results - Phase I:
Pore Water Metals
Analytical Results

DOWNSTREAM SEDIMENT INVESTIGATION
DYNO NOBEL PORT EWEN SITE
PORT EWEN, NEW YORK

EHS Support

FIGURE 6

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Appendix A Summary of Plantasie Creek Instream Analytical Data

Appendix A
November 2023 Fish Tissue Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

									Sample ID	PBA-02-TI		PBA-04-TI		PBA-BKG-TI	
									Sample Date	11/01/2023		11/01/2023		11/03/2023	
									Sample Type (N: Normal; FD: Field Duplicate)	N		N		N	
Chemical	**CAS No.**	**DSB NOEC**		**DSB LOEC**		**CBR NOEC**		**CBR LOEC**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
METALS															
Copper	7440-50-8	7		8.1		3.9	a	4.5 a	mg/kg	5.6		1.6		0.95	
Mercury	7439-97-6	**0.042**		0.14		0.2	b	0.77 c	mg/kg	**0.16**	**J**	**0.11**	**J**	**0.099**	**J**
Methylmercury	22967-92-6	**0.04**		0.14		0.2	b	0.77 c	mg/kg	**0.12**	**J**	**0.074**	**J**	**0.089**	**J**
Selenium	7782-49-2	**0.69**		1.4		2.94	d	4.5 d	mg/kg	**0.92**		**0.93**		**0.83**	
Zinc	7440-66-6	114		150		287	e	403 e	mg/kg	31		29	J	40	

Notes:
Results that exceeds Site-Specific Dietary Screening Benchmark: NOEC, Forage Fish are bolded.
Results that exceeds Site-Specific Dietary Screening Benchmark: LOEC, Forage Fish are underlined.
Results that exceeds Site-Specific Critical Body Residue Benchmark: NOEC, Forage Fish are in red font.
Results that exceeds Site-Specific Critical Body Residue Benchmark: LOEC, Forage Fish are highlighted yellow.

B = Compound was found in the blank and sample
CAS = Chemical Abstracts Service
CBR = critical body residue
DSB = dietary screening benchmark
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
LOEC = lowest observed effect concentration
N = normal
NOEC = no observed effect concentration
mg/kg = milligram per kilogram
ww = wet weight

Appendix A
November 2023 Surface Water Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-01-SW		PBA-01-SW-Z		PBA-02-SW		PBA-02-SW-Z		PBA-03-SW		DUP-SW		PBA-03-SW-Z		DUP-SW-Z		PBA-04-SW		PBA-04-SW-Z		PBA-BKG-SW		BKG-DUP-SW		PBA-BKG-SW-Z		PBA-BKG-DUP-01-SW-Z	
					Sample Date	10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023		10/31/2023	
					Sample Type (N: Normal; FD: Field Duplicate)	N		N		N		N		N		FD		N		FD		N		N		N		FD		N		FD	
Chemical	CAS No.	AWQS Chronic	AWQS Acute	Fraction	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit	Result	Unit
GENERAL CHEMISTRY																															
Alkalinity, Bicarbonate (As CaCO3)	ALKB	--	--	T	µg/L	100000				100000				110000		110000						110000				180000		190000					
Alkalinity, Carbonate (As CaCO3)	ALKC	--	--	T	µg/L	< 5000	U			< 5000	U			< 5000	U	< 5000	U					< 5000	U			< 5000	U	< 5000	U				
Alkalinity, Hydroxide (As CaCO3)	ALKH	--	--	T	µg/L	< 5000	U			< 5000	U			< 5000	U	< 5000	U					< 5000	U			< 5000	U	< 5000	U				
Alkalinity, Phenolphthalein	ALKP	--	--	T	µg/L	< 5000	U			< 5000	U			< 5000	U	< 5000	U					< 5000	U			< 5000	U	< 5000	U				
Alkalinity, Total (As CaCO3)	ALK	--	--	T	µg/L	100000				100000				110000		110000						110000				180000		190000					
Bromide	24959-67-9	--	--	T	µg/L	81	J			140	J			160	J	160	J					110				360		370					
Chloride (As Cl)	16887-00-6	--	--	T	µg/L	19000				13000				17000		17000						18000				74000		72000					
Dissolved Organic Carbon	DOC	--	--	D	µg/L			8800				9200						8800		9100				9000						4900		4900	
Fluoride	16984-48-8	--	--	T	µg/L	64	J			67	J			66	J	66	J					67	J			110		130					
Hardness (As CaCO3)	HARD	--	--	T	µg/L	99000	J			120000	J			130000	J	130000	J					110000	J			170000	J	170000	J				
pH	PH	--	--	T	SU	7.7	J			7.6	J			7.6	J	7.6	J					7.9	J			8.2	J	8.1	J				
Sulfate (As SO4)	14808-79-8	--	--	T	µg/L	7600				8600				9700		9700						9600				28000		28000					
Total Dissolved Solids (Residue, Filterable)	TDS	--	--	T	µg/L	150000				150000				170000		170000						170000				340000		330000					
Total Organic Carbon	TOC	--	--	T	µg/L	8600				8800				8800		8800						8600				4800		4700					
Total Suspended Solids	TSS	--	--	T	µg/L	1000				< 1000	U			1900		1900						2300				21000		20000					
METALS (TOTAL)																															
Calcium	7440-70-2	--	--	T	µg/L	32000				34000				35000		34000						35000				63000		61000					
Copper	7440-50-8	--	--	T	µg/L	6.6				6.8				6.8		7.2						7.1				1.7		1.6					
Magnesium	7439-95-4	--	--	T	µg/L	4700				4700				4900		4800						4900				7300		6700					
Mercury	7439-97-6	--	--	T	µg/L	0.011	J			0.011	J			0.011	J	0.012	J					0.012	J			0.0026	J	0.0033	J				
Methylmercury	22967-92-6	--	--	T	µg/L	0.0002	J			< 5e-005	UJ			0.0002	J	0.00018	J					0.00017	J			< 7.7e-005	UJ	< 5e-005	UJ				
Potassium	7440-09-7	--	--	T	µg/L	1700				1700				1800		1800						1900				2900		2700					
Selenium	7782-49-2	--	--	T	µg/L	0.83	J			0.61	J			0.62	J	0.69	J					0.55	J			0.41	J	0.37	J				
Sodium	7440-23-5	--	--	T	µg/L	9800				10000				13000		13000						14000				50000		48000					
Zinc	7440-66-6	--	--	T	µg/L	< 4	U			< 4	U			< 4	U	< 4	U					< 4	U			4.5	J	4.2	J				
METALS (DISSOLVED)																															
Copper	7440-50-8	9.8	14.8	D	µg/L			5.6				5.6						5.8		5.6				5.9						1.2		1.3	
Mercury	7439-97-6	0.77	1.4	D	µg/L			0.0052	J			0.0043	J					0.0027	J	0.0042	J			0.0055	J					0.00072	J	0.00068	J
Methylmercury	22967-92-6	--	--	D	µg/L			0.00017	J			0.00016	J					0.00015	J	0.00015	J			0.00015	J					< 6.3e-005	U	< 6.5e-005	U
Selenium	7782-49-2	--	4.6	D	µg/L			0.75	J			0.69	J					0.62	J	0.63	J			0.59	J					0.47	J	0.41	J
Zinc	7440-66-6	90.1	127.7	D	µg/L			< 4	U			< 4	U					< 4	U	< 4	U			< 4	U					< 4	U	< 4	U

Appendix A
November 2023 Surface Water Data
Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Notes:
Results that exceeds Site-Specific Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations: Acute, Surface Water are bold and underlined.
Results that exceeds Site-Specific Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations: Chronic, Surface Water are highlighted yellow.

µg/l = microgram per liter
AWQS = acute water quality standard
CAS = Chemical Abstracts Service
D = dissolved
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NYSDEC = New York State Department of Environmental Conservation
T = total
U = analyte was analyzed for but not detected

Source:
6 CRR-NY 703.5. Techincal support in: NYSDEC. 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Appendix A
November 2023 Sediment Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
					Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-10in		0-12in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual	Result	Qual
AVS/SEM													
9034 AVS/SEM	Acid Volatile Sulfides	18496-25-8-AVS	--	--	µmol/g	8.6		3.3		< 0.29	UJ	< 0.23	UJ
CALC	(SEM-AVS)/f_{OC} (µmol/g_{oc})	SEM-AVS-OC	--	--	µmol/g	-164.5360606				143.8525641		2.591772727	
Lloyd Kahn	Total Organic Carbon	TOC	--	--	mg/kg	33000	J	20000		39000	J	22000	
6010D AVS/SEM	Copper	7440-50-8	--	--	µmol/g	2.4	J	1	J	3.8	J	0.087	J
6010D AVS/SEM	Zinc	7440-66-6	--	--	µmol/g	0.77	J	0.52		2.1		0.2	
7470A AVS/SEM	Mercury	7439-97-6	--	--	µmol/g	0.00031	J	0.000047	UJ	0.00025	J	< 3.6e-005	UJ
SEM	SEM/AVS Ratio	SEM/AVS	--	--	None	0.37		0.46		0		0	
GEOPHYSICAL													
D422	Coarse Sand	COARSESAND	--	--	%	4.5				0.7		1.5	
D422	Fine Sand	FINESAND	--	--	%	12.4				7		17.3	
D422	Fines	FINES	--	--	%	77.5				88		67	
D422	Gravel	GRAVEL	--	--	%	1.1				0		0.9	
D422	Medium Sand	GSMSAND	--	--	%	4.5				4.3		13.3	
D422	Percent Passing 0.375 Inch (3/8 Inch Sieve)	SIEVE0.375IN	--	--	% Passing	100				100		100	
D422	Percent Passing 0.75 Inch (3/4 Inch Sieve)	SIEVE0.75IN	--	--	% Passing	100				100		100	
D422	Percent Passing 1 Inch (1 Inch Sieve)	SIEVE1.0IN	--	--	% Passing	100				100		100	
D422	Percent Passing 1.5 Inch (1.5 Inch Sieve)	SIEVE1.5IN	--	--	% Passing	100				100		100	
D422	Percent Passing 2 Inch (2 Inch Sieve)	SIEVE2.0IN	--	--	% Passing	100				100		100	
D422	Sand	308075-07-2	--	--	%	21.4				12		32.1	
D422	Sieve No. 10, Percent Passing	SIEVE10	--	--	% Passing	94.4				99.3		97.6	
D422	Sieve No. 200, Percent Passing	SIEVE200	--	--	% Passing	77.5				88		67	
D422	Sieve No. 4, Percent Passing	SIEVE4	--	--	% Passing	98.9				100		99.1	
D422	Sieve No. 40, Percent Passing	SIEVE40	--	--	% Passing	89.9				95		84.3	
D422	Sieve No. 80, Percent Passing	SIEVE80	--	--	% Passing	83.8				91.4		70.9	
D422	Sieve, No. 100, Percent Passing	SIEVE100	--	--	% Passing	81.9				90.3		69.8	
D422	Sieve, No. 20, Percent Passing	SIEVE20	--	--	% Passing	93.2				98.4		94	
D422	Sieve, No. 60, Percent Passing	SIEVE60	--	--	% Passing	86.3				92.6		73.9	
D422	Sieve-US Std. 3-inch (75 mm)	SIEVE3INCH	--	--	% Passing	100				100		100	
METALS													
1630	Methylmercury	22967-92-6	--	--	mg/kg	0.0025	J	0.0055	J	0.0067		0.00039	
6020B	Aluminum	7429-90-5	--	--	mg/kg								
6020B	Antimony	7440-36-0	--	--	mg/kg								
6020B	Arsenic	7440-38-2	--	--	mg/kg								
6020B	Barium	7440-39-3	--	--	mg/kg								
6020B	Beryllium	7440-41-7	--	--	mg/kg								
6020B	Cadmium	7440-43-9	--	--	mg/kg								
6020B	Calcium	7440-70-2	--	--	mg/kg								
6020B	Chromium, total	7440-47-3	--	--	mg/kg								
6020B	Cobalt	7440-48-4	--	--	mg/kg								

Appendix A
November 2023 Sediment Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

						Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
						Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
						Sample Depth	0-8in		0-8in		0-10in		0-12in	
						Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit		Result	Qual	Result	Qual	Result	Qual	Result	Qual
6020B	Copper	7440-50-8	**32**	150	mg/kg		**240**	J	**390**		**1000**		32	
6020B	Iron	7439-89-6	--	--	mg/kg									
6020B	Lead	7439-92-1	--	--	mg/kg									
6020B	Magnesium	7439-95-4	--	--	mg/kg									
6020B	Manganese	7439-96-5	--	--	mg/kg									
6020B	Nickel	7440-02-0	--	--	mg/kg									
6020B	Potassium	7440-09-7	--	--	mg/kg									
6020B	Selenium	7782-49-2	**5**	5	mg/kg		2.6	J	2.1		**8.6**		1.1	
6020B	Silver	7440-22-4	--	--	mg/kg									
6020B	Sodium	7440-23-5	--	--	mg/kg									
6020B	Thallium	7440-28-0	--	--	mg/kg									
6020B	Vanadium	7440-62-2	--	--	mg/kg									
6020B	Zinc	7440-66-6	**120**	460	mg/kg		**210**	J	**130**		**340**		84	
7471B	Mercury	7439-97-6	**0.2**	1	mg/kg		**1.4**	J	**3.1**		**6.2**		0.088	
SEQUENTIAL EXTRACTION														
6010B SEP Step 1	Copper	7440-50-8	--	--	mg/kg		< 0.76	U			< 0.62	U	< 0.46	U
6010B SEP Step 1	Selenium	7782-49-2	--	--	mg/kg		< 1.6	U			< 1.3	U	< 0.98	U
6010B SEP Step 1	Zinc	7440-66-6	--	--	mg/kg		3	J			4.5	J	< 1.4	U
6010B SEP Step 2	Copper	7440-50-8	--	--	mg/kg		1.1	J			5.2	J	< 0.69	U
6010B SEP Step 2	Selenium	7782-49-2	--	--	mg/kg		< 1.2	U			< 0.99	U	< 0.73	U
6010B SEP Step 2	Zinc	7440-66-6	--	--	mg/kg		21				24		< 0.86	U
6010B SEP Step 3	Copper	7440-50-8	--	--	mg/kg		70				100		5.3	
6010B SEP Step 3	Selenium	7782-49-2	--	--	mg/kg		< 0.4	U			0.41	J	< 0.24	U
6010B SEP Step 3	Zinc	7440-66-6	--	--	mg/kg		23				30		< 1.4	U
6010B SEP Step 4	Copper	7440-50-8	--	--	mg/kg		320				270		4	
6010B SEP Step 4	Selenium	7782-49-2	--	--	mg/kg		< 1.1	R			0.94	J	< 0.68	R
6010B SEP Step 4	Zinc	7440-66-6	--	--	mg/kg		91				150		33	
6010B SEP Step 5	Copper	7440-50-8	--	--	mg/kg		160	J			21	J	370	J
6010B SEP Step 5	Selenium	7782-49-2	--	--	mg/kg		< 6.2	U			5.5	J	5.5	J
6010B SEP Step 5	Zinc	7440-66-6	--	--	mg/kg		11	J			12	J	17	J
6010B SEP Step 6	Copper	7440-50-8	--	--	mg/kg		67				150		4	
6010B SEP Step 6	Selenium	7782-49-2	--	--	mg/kg		< 0.4	U			< 0.33	U	< 0.24	U
6010B SEP Step 6	Zinc	7440-66-6	--	--	mg/kg		24	J			30	J	24	J
6010B SEP Step 7	Copper	7440-50-8	--	--	mg/kg		13				23		2.9	
6010B SEP Step 7	Selenium	7782-49-2	--	--	mg/kg		< 0.4	U			< 0.66	U	< 0.49	U
6010B SEP Step 7	Zinc	7440-66-6	--	--	mg/kg		35				38		29	
6010B SEP Sum 1-7	Copper	7440-50-8	--	--	mg/kg		630	J			570	J	390	J
6010B SEP Sum 1-7	Selenium	7782-49-2	--	--	mg/kg		< 0.17	UJ			6.8	J	5.5	J
6010B SEP Sum 1-7	Zinc	7440-66-6	--	--	mg/kg		210	J			290	J	100	J
6010B SEP Total	Copper	7440-50-8	--	--	mg/kg		530	J			910	J	18	J

Appendix A
November 2023 Sediment Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
					Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-10in		0-12in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual	Result	Qual
6010B SEP Total	Selenium	7782-49-2	--	--	mg/kg	3.6	J			8.6	J	1.1	J
6010B SEP Total	Zinc	7440-66-6	--	--	mg/kg	160	J			240	J	91	J
7470A SEP Step 1	Mercury	7439-97-6	--	--	mg/kg	< 0.014	R			< 0.011	R	< 0.0085	R
7470A SEP Step 2	Mercury	7439-97-6	--	--	mg/kg	< 0.014	R			< 0.011	R	< 0.0082	R
7470A SEP Step 3	Mercury	7439-97-6	--	--	mg/kg	< 0.0095	U			0.0085	J	< 0.0058	U
7470A SEP Step 4	Mercury	7439-97-6	--	--	mg/kg	3.8				1.9		0.012	J
7470A SEP Step 5	Mercury	7439-97-6	--	--	mg/kg	2.8	J			0.77	J	3.3	J
7470A SEP Step 6	Mercury	7439-97-6	--	--	mg/kg	0.036				0.034		< 0.0068	U
7470A SEP Step 7	Mercury	7439-97-6	--	--	mg/kg	< 0.095	U			< 0.077	U	< 0.058	U
7470A SEP Sum 1-7	Mercury	7439-97-6	--	--	mg/kg	6.7	J			2.7	J	3.3	J
7470A SEP Total	Mercury	7439-97-6	--	--	mg/kg	5.8	J			6.2	J	< 0.058	UJ
PESTICIDES													
8081B	Aldrin	309-00-2	--	--	mg/kg								
8081B	alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	--	--	mg/kg								
8081B	Alpha Endosulfan	959-98-8	--	--	mg/kg								
8081B	beta BHC (Beta Hexachlorocyclohexane)	319-85-7	--	--	mg/kg								
8081B	Beta Endosulfan	33213-65-9	--	--	mg/kg								
8081B	cis-Chlordane	5103-71-9	--	--	mg/kg								
8081B	delta BHC (Delta Hexachlorocyclohexane)	319-86-8	--	--	mg/kg								
8081B	Dieldrin	60-57-1	--	--	mg/kg								
8081B	Endosulfan sulfate	1031-07-8	--	--	mg/kg								
8081B	Endrin	72-20-8	--	--	mg/kg								
8081B	Endrin Aldehyde	7421-93-4	--	--	mg/kg								
8081B	Endrin Ketone	53494-70-5	--	--	mg/kg								
8081B	gamma BHC (Lindane)	58-89-9	--	--	mg/kg								
8081B	Heptachlor	76-44-8	--	--	mg/kg								
8081B	Heptachlor Epoxide	1024-57-3	--	--	mg/kg								
8081B	Methoxychlor	72-43-5	--	--	mg/kg								
8081B	P,P'-DDD	72-54-8	--	--	mg/kg								
8081B	P,P'-DDE	72-55-9	--	--	mg/kg								
8081B	P,P'-DDT	50-29-3	--	--	mg/kg								
8081B	Toxaphene	8001-35-2	--	--	mg/kg								
8081B	trans-Chlordane	5103-74-2	--	--	mg/kg								
SVOC													
8270E	2,4,5-Trichlorophenol	95-95-4	--	--	mg/kg								
8270E	2,4,6-Trichlorophenol	88-06-2	--	--	mg/kg								
8270E	2,4-Dichlorophenol	120-83-2	--	--	mg/kg								
8270E	2,4-Dimethylphenol	105-67-9	--	--	mg/kg								
8270E	2,4-Dinitrophenol	51-28-5	--	--	mg/kg								
8270E	2,4-Dinitrotoluene	121-14-2	--	--	mg/kg								

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Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
					Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-10in		0-12in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual	Result	Qual
8270E	2,6-Dinitrotoluene	606-20-2	--	--	mg/kg								
8270E	2-Chloronaphthalene	91-58-7	--	--	mg/kg								
8270E	2-Chlorophenol	95-57-8	--	--	mg/kg								
8270E	2-Methylnaphthalene	91-57-6	--	--	mg/kg								
8270E	2-Methylphenol (O-Cresol)	95-48-7	--	--	mg/kg								
8270E	2-Nitroaniline	88-74-4	--	--	mg/kg								
8270E	2-Nitrophenol	88-75-5	--	--	mg/kg								
8270E	3,3'-Dichlorobenzidine	91-94-1	--	--	mg/kg								
8270E	3-Nitroaniline	99-09-2	--	--	mg/kg								
8270E	4,6-Dinitro-2-Methylphenol	534-52-1	--	--	mg/kg								
8270E	4-Bromodiphenyl ether (PBDE-003)	101-55-3	--	--	mg/kg								
8270E	4-Chloro-3-Methylphenol	59-50-7	--	--	mg/kg								
8270E	4-Chloroaniline	106-47-8	--	--	mg/kg								
8270E	4-Chlorophenyl Phenyl Ether	7005-72-3	--	--	mg/kg								
8270E	4-Methylphenol (P-Cresol)	106-44-5	--	--	mg/kg								
8270E	4-Nitroaniline	100-01-6	--	--	mg/kg								
8270E	4-Nitrophenol	100-02-7	--	--	mg/kg								
8270E	Acenaphthene	83-32-9	--	--	mg/kg								
8270E	Acenaphthylene	208-96-8	--	--	mg/kg								
8270E	Acetophenone	98-86-2	--	--	mg/kg								
8270E	Anthracene	120-12-7	--	--	mg/kg								
8270E	Atrazine	1912-24-9	--	--	mg/kg								
8270E	Benzaldehyde	100-52-7	--	--	mg/kg								
8270E	Benzo[a]anthracene	56-55-3	--	--	mg/kg								
8270E	Benzo[a]pyrene	50-32-8	--	--	mg/kg								
8270E	Benzo[b]fluoranthene	205-99-2	--	--	mg/kg								
8270E	Benzo[g,h,i]perylene	191-24-2	--	--	mg/kg								
8270E	Benzo[k]fluoranthene	207-08-9	--	--	mg/kg								
8270E	Benzyl Butyl Phthalate	85-68-7	--	--	mg/kg								
8270E	Biphenyl (Diphenyl)	92-52-4	--	--	mg/kg								
8270E	Bis(2-Chloroethoxy) Methane	111-91-1	--	--	mg/kg								
8270E	Bis(2-Chloroethyl) Ether	111-44-4	--	--	mg/kg								
8270E	Bis(2-Chloroisopropyl) Ether	108-60-1	--	--	mg/kg								
8270E	Bis(2-ethylhexyl) phthalate	117-81-7	--	--	mg/kg								
8270E	Caprolactam	105-60-2	--	--	mg/kg								
8270E	Carbazole	86-74-8	--	--	mg/kg								
8270E	Chrysene	218-01-9	--	--	mg/kg								
8270E	Dibenz[a,h]anthracene	53-70-3	--	--	mg/kg								
8270E	Dibenzofuran	132-64-9	--	--	mg/kg								
8270E	Diethyl Phthalate	84-66-2	--	--	mg/kg								

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					Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
					Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-10in		0-12in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual	Result	Qual
8270E	Dimethyl phthalate	131-11-3	--	--	mg/kg								
8270E	Di-N-Butyl Phthalate	84-74-2	--	--	mg/kg								
8270E	Di-n-octyl phthalate	117-84-0	--	--	mg/kg								
8270E	Fluoranthene	206-44-0	--	--	mg/kg								
8270E	Fluorene	86-73-7	--	--	mg/kg								
8270E	Hexachlorobenzene	118-74-1	--	--	mg/kg								
8270E	Hexachlorobutadiene	87-68-3	--	--	mg/kg								
8270E	Hexachlorocyclopentadiene	77-47-4	--	--	mg/kg								
8270E	Hexachloroethane	67-72-1	--	--	mg/kg								
8270E	Indeno(1,2,3-C,D)Pyrene	193-39-5	--	--	mg/kg								
8270E	Isophorone	78-59-1	--	--	mg/kg								
8270E	Naphthalene	91-20-3	--	--	mg/kg								
8270E	Nitrobenzene	98-95-3	--	--	mg/kg								
8270E	N-Nitrosodi-N-Propylamine	621-64-7	--	--	mg/kg								
8270E	N-Nitrosodiphenylamine	86-30-6	--	--	mg/kg								
8270E	Pentachlorophenol	87-86-5	--	--	mg/kg								
8270E	Phenanthrene	85-01-8	--	--	mg/kg								
8270E	Phenol	108-95-2	--	--	mg/kg								
8270E	Pyrene	129-00-0	--	--	mg/kg								
VOC													
8260D	1,1,1-Trichloroethane	71-55-6	--	--	mg/kg								
8260D	1,1,2,2-Tetrachloroethane	79-34-5	--	--	mg/kg								
8260D	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	--	--	mg/kg								
8260D	1,1,2-Trichloroethane	79-00-5	--	--	mg/kg								
8260D	1,1-Dichloroethane	75-34-3	--	--	mg/kg								
8260D	1,1-Dichloroethene	75-35-4	--	--	mg/kg								
8260D	1,2,4-Trichlorobenzene	120-82-1	--	--	mg/kg								
8260D	1,2-Dibromo-3-Chloropropane	96-12-8	--	--	mg/kg								
8260D	1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	--	--	mg/kg								
8260D	1,2-Dichlorobenzene	95-50-1	--	--	mg/kg								
8260D	1,2-Dichloroethane	107-06-2	--	--	mg/kg								
8260D	1,2-Dichloropropane	78-87-5	--	--	mg/kg								
8260D	1,3-Dichlorobenzene	541-73-1	--	--	mg/kg								
8260D	1,4-Dichlorobenzene	106-46-7	--	--	mg/kg								
8260D	2-Hexanone	591-78-6	--	--	mg/kg								
8260D	Acetone	67-64-1	--	--	mg/kg								
8260D	Benzene	71-43-2	--	--	mg/kg								
8260D	Bromodichloromethane	75-27-4	--	--	mg/kg								

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Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-01-SD-0-8		DUP-SD		PBA-02-SD-0-10		PBA-03-SD-0-12	
					Sample Date	11/03/2023		11/03/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-10in		0-12in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		N	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual	Result	Qual
8260D	Bromoform	75-25-2	--	--	mg/kg								
8260D	Bromomethane	74-83-9	--	--	mg/kg								
8260D	Carbon Disulfide	75-15-0	--	--	mg/kg								
8260D	Carbon Tetrachloride	56-23-5	--	--	mg/kg								
8260D	Chlorobenzene	108-90-7	--	--	mg/kg								
8260D	Chloroethane	75-00-3	--	--	mg/kg								
8260D	Chloroform	67-66-3	--	--	mg/kg								
8260D	Chloromethane	74-87-3	--	--	mg/kg								
8260D	cis-1,2-Dichloroethene	156-59-2	--	--	mg/kg								
8260D	cis-1,3-Dichloropropene	10061-01-5	--	--	mg/kg								
8260D	Cyclohexane	110-82-7	--	--	mg/kg								
8260D	Dibromochloromethane	124-48-1	--	--	mg/kg								
8260D	Dichlorodifluoromethane	75-71-8	--	--	mg/kg								
8260D	Ethylbenzene	100-41-4	--	--	mg/kg								
8260D	Isopropylbenzene (Cumene)	98-82-8	--	--	mg/kg								
8260D	Methyl Acetate	79-20-9	--	--	mg/kg								
8260D	Methyl Ethyl Ketone	78-93-3	--	--	mg/kg								
8260D	Methyl Isobutyl Ketone	108-10-1	--	--	mg/kg								
8260D	Methylcyclohexane	108-87-2	--	--	mg/kg								
8260D	Methylene Chloride	75-09-2	--	--	mg/kg								
8260D	Styrene	100-42-5	--	--	mg/kg								
8260D	Tert-Butyl Methyl Ether	1634-04-4	--	--	mg/kg								
8260D	Tetrachloroethylene	127-18-4	--	--	mg/kg								
8260D	Toluene	108-88-3	--	--	mg/kg								
8260D	trans-1,2-Dichloroethene	156-60-5	--	--	mg/kg								
8260D	trans-1,3-Dichloropropene	10061-02-6	--	--	mg/kg								
8260D	Trichloroethylene	79-01-6	--	--	mg/kg								
8260D	Trichlorofluoromethane	75-69-4	--	--	mg/kg								
8260D	Vinyl Chloride	75-01-4	--	--	mg/kg								
8260D	Xylenes	1330-20-7	--	--	mg/kg								

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Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

						Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
						Sample Date	11/02/2023		11/02/2023		11/02/2023	
						Sample Depth	0-8in		0-8in		0-8in	
						Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual
AVS/SEM											
9034 AVS/SEM	Acid Volatile Sulfides	18496-25-8-AVS	--	--	µmol/g	< 0.23	UJ	0.56	J	0.24	J
CALC	(SEM-AVS)/f_{OC} (µmol/g_{oc})	SEM-AVS-OC	--	--	µmol/g	-4.999217391		34.11876471			
Lloyd Kahn	Total Organic Carbon	TOC	--	--	mg/kg	23000		17000	J	9700	
6010D AVS/SEM	Copper	7440-50-8	--	--	µmol/g	0.024	J	0.16		0.12	
6010D AVS/SEM	Zinc	7440-66-6	--	--	µmol/g	0.091		0.98	J	0.87	J
7470A AVS/SEM	Mercury	7439-97-6	--	--	µmol/g	< 1.8e-005	UJ	< 1.9e-005	U	< 4.1e-005	U
SEM	SEM/AVS Ratio	SEM/AVS	--	--	None	0		2		4.1	
GEOPHYSICAL											
D422	Coarse Sand	COARSESAND	--	--	%	0.3		1			
D422	Fine Sand	FINESAND	--	--	%	38.1		60.5			
D422	Fines	FINES	--	--	%	60		26.2			
D422	Gravel	GRAVEL	--	--	%	0		2.1			
D422	Medium Sand	GSMSAND	--	--	%	1.6		10.2			
D422	Percent Passing 0.375 Inch (3/8 Inch Sieve)	SIEVE0.375IN	--	--	% Passing	100		100			
D422	Percent Passing 0.75 Inch (3/4 Inch Sieve)	SIEVE0.75IN	--	--	% Passing	100		100			
D422	Percent Passing 1 Inch (1 Inch Sieve)	SIEVE1.0IN	--	--	% Passing	100		100			
D422	Percent Passing 1.5 Inch (1.5 Inch Sieve)	SIEVE1.5IN	--	--	% Passing	100		100			
D422	Percent Passing 2 Inch (2 Inch Sieve)	SIEVE2.0IN	--	--	% Passing	100		100			
D422	Sand	308075-07-2	--	--	%	40		71.7			
D422	Sieve No. 10, Percent Passing	SIEVE10	--	--	% Passing	99.7		96.9			
D422	Sieve No. 200, Percent Passing	SIEVE200	--	--	% Passing	60		26.2			
D422	Sieve No. 4, Percent Passing	SIEVE4	--	--	% Passing	100		97.9			
D422	Sieve No. 40, Percent Passing	SIEVE40	--	--	% Passing	98.1		86.7			
D422	Sieve No. 80, Percent Passing	SIEVE80	--	--	% Passing	84.7		49.3			
D422	Sieve, No. 100, Percent Passing	SIEVE100	--	--	% Passing	78.3		41.8			
D422	Sieve, No. 20, Percent Passing	SIEVE20	--	--	% Passing	99.4		95.1			
D422	Sieve, No. 60, Percent Passing	SIEVE60	--	--	% Passing	92.7		64.2			
D422	Sieve-US Std. 3-inch (75 mm)	SIEVE3INCH	--	--	% Passing	100		100			
METALS											
1630	Methylmercury	22967-92-6	--	--	mg/kg	0.0002					
6020B	Aluminum	7429-90-5	--	--	mg/kg			7400		6500	
6020B	Antimony	7440-36-0	--	--	mg/kg			0.26	J	0.27	J
6020B	Arsenic	7440-38-2	--	--	mg/kg			6.6	J	6.9	J
6020B	Barium	7440-39-3	--	--	mg/kg			55	J	54	J
6020B	Beryllium	7440-41-7	--	--	mg/kg			0.36	J	0.29	J
6020B	Cadmium	7440-43-9	--	--	mg/kg			0.25	J	0.23	J
6020B	Calcium	7440-70-2	--	--	mg/kg			6700		6700	
6020B	Chromium, total	7440-47-3	--	--	mg/kg			11	J	10	J
6020B	Cobalt	7440-48-4	--	--	mg/kg			5.5	J	5.4	J

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Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

						Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
						Sample Date	11/02/2023		11/02/2023		11/02/2023	
						Sample Depth	0-8in		0-8in		0-8in	
						Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit		Result	Qual	Result	Qual	Result	Qual
6020B	Copper	7440-50-8	**32**	150	mg/kg		14		20	J	14	J
6020B	Iron	7439-89-6	--	--	mg/kg				18000		18000	
6020B	Lead	7439-92-1	--	--	mg/kg				35		38	
6020B	Magnesium	7439-95-4	--	--	mg/kg				2500	J	2300	J
6020B	Manganese	7439-96-5	--	--	mg/kg				230	J	250	J
6020B	Nickel	7440-02-0	--	--	mg/kg				25	J	14	J
6020B	Potassium	7440-09-7	--	--	mg/kg				1300	J	1000	J
6020B	Selenium	7782-49-2	**5**	5	mg/kg		0.27	J	0.28	J	0.27	J
6020B	Silver	7440-22-4	--	--	mg/kg				0.22	J	0.08	J
6020B	Sodium	7440-23-5	--	--	mg/kg				54	J	49	J
6020B	Thallium	7440-28-0	--	--	mg/kg				0.1	J	0.072	J
6020B	Vanadium	7440-62-2	--	--	mg/kg				13	J	12	J
6020B	Zinc	7440-66-6	**120**	460	mg/kg		45		97	J	110	J
7471B	Mercury	7439-97-6	**0.2**	1	mg/kg		0.029	U	0.12		0.089	
SEQUENTIAL EXTRACTION												
6010B SEP Step 1	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 1	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 1	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 2	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 2	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 2	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 3	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 3	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 3	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 4	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 4	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 4	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 5	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 5	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 5	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 6	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 6	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 6	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Step 7	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Step 7	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Step 7	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Sum 1-7	Copper	7440-50-8	--	--	mg/kg							
6010B SEP Sum 1-7	Selenium	7782-49-2	--	--	mg/kg							
6010B SEP Sum 1-7	Zinc	7440-66-6	--	--	mg/kg							
6010B SEP Total	Copper	7440-50-8	--	--	mg/kg							

Appendix A
November 2023 Sediment Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
					Sample Date	11/02/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-8in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual
6010B SEP Total	Selenium	7782-49-2	--	--	mg/kg						
6010B SEP Total	Zinc	7440-66-6	--	--	mg/kg						
7470A SEP Step 1	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 2	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 3	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 4	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 5	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 6	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Step 7	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Sum 1-7	Mercury	7439-97-6	--	--	mg/kg						
7470A SEP Total	Mercury	7439-97-6	--	--	mg/kg						
PESTICIDES											
8081B	Aldrin	309-00-2	--	--	mg/kg			< 0.0002	R	< 0.00018	U
8081B	alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	--	--	mg/kg			< 0.00016	UJ	< 0.00015	U
8081B	Alpha Endosulfan	959-98-8	--	--	mg/kg			< 0.00017	R	< 0.00016	U
8081B	beta BHC (Beta Hexachlorocyclohexane)	319-85-7	--	--	mg/kg			< 0.00017	R	< 0.00016	U
8081B	Beta Endosulfan	33213-65-9	--	--	mg/kg			< 0.00014	R	< 0.00013	U
8081B	cis-Chlordane	5103-71-9	--	--	mg/kg			< 0.00016	R	< 0.00015	U
8081B	delta BHC (Delta Hexachlorocyclohexane)	319-86-8	--	--	mg/kg			< 0.0002	R	< 0.00019	U
8081B	Dieldrin	60-57-1	--	--	mg/kg			< 0.00016	R	< 0.00015	U
8081B	Endosulfan sulfate	1031-07-8	--	--	mg/kg			< 0.00029	R	< 0.00027	U
8081B	Endrin	72-20-8	--	--	mg/kg			< 0.00012	R	< 0.00011	U
8081B	Endrin Aldehyde	7421-93-4	--	--	mg/kg			< 0.00023	R	< 0.00021	U
8081B	Endrin Ketone	53494-70-5	--	--	mg/kg			< 8.7e-005	UJ	< 8.1e-005	U
8081B	gamma BHC (Lindane)	58-89-9	--	--	mg/kg			< 0.00016	R	< 0.00015	U
8081B	Heptachlor	76-44-8	--	--	mg/kg			< 0.0002	UJ	< 0.00018	U
8081B	Heptachlor Epoxide	1024-57-3	--	--	mg/kg			< 0.00016	R	< 0.00015	U
8081B	Methoxychlor	72-43-5	--	--	mg/kg			< 0.00025	R	< 0.00023	U
8081B	P,P'-DDD	72-54-8	--	--	mg/kg			< 0.00013	R	0.00039	J
8081B	P,P'-DDE	72-55-9	--	--	mg/kg			< 0.00013	R	< 0.00012	U
8081B	P,P'-DDT	50-29-3	--	--	mg/kg			< 0.00045	R	< 0.00042	U
8081B	Toxaphene	8001-35-2	--	--	mg/kg			< 0.017	U	< 0.016	U
8081B	trans-Chlordane	5103-74-2	--	--	mg/kg			< 0.00015	R	< 0.00014	U
SVOC											
8270E	2,4,5-Trichlorophenol	95-95-4	--	--	mg/kg			< 0.086	U	< 0.081	U
8270E	2,4,6-Trichlorophenol	88-06-2	--	--	mg/kg			< 0.082	U	< 0.078	U
8270E	2,4-Dichlorophenol	120-83-2	--	--	mg/kg			< 0.019	U	< 0.018	U
8270E	2,4-Dimethylphenol	105-67-9	--	--	mg/kg			< 0.083	U	< 0.079	U
8270E	2,4-Dinitrophenol	51-28-5	--	--	mg/kg			< 1.5	U	< 1.5	U
8270E	2,4-Dinitrotoluene	121-14-2	--	--	mg/kg			< 0.15	U	< 0.14	U

Appendix A
November 2023 Sediment Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
					Sample Date	11/02/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-8in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual
8270E	2,6-Dinitrotoluene	606-20-2	--	--	mg/kg			< 0.096	U	< 0.091	U
8270E	2-Chloronaphthalene	91-58-7	--	--	mg/kg			< 0.011	U	< 0.011	U
8270E	2-Chlorophenol	95-57-8	--	--	mg/kg			< 0.091	U	< 0.086	U
8270E	2-Methylnaphthalene	91-57-6	--	--	mg/kg			< 0.012	U	< 0.011	U
8270E	2-Methylphenol (O-Cresol)	95-48-7	--	--	mg/kg			< 0.071	U	< 0.067	U
8270E	2-Nitroaniline	88-74-4	--	--	mg/kg			< 0.11	U	< 0.11	U
8270E	2-Nitrophenol	88-75-5	--	--	mg/kg			< 0.091	U	< 0.087	U
8270E	3,3'-Dichlorobenzidine	91-94-1	--	--	mg/kg			< 0.23	R	< 0.22	U
8270E	3-Nitroaniline	99-09-2	--	--	mg/kg			< 0.063	U	< 0.06	U
8270E	4,6-Dinitro-2-Methylphenol	534-52-1	--	--	mg/kg			< 0.43	R	< 0.41	U
8270E	4-Bromodiphenyl ether (PBDE-003)	101-55-3	--	--	mg/kg			< 0.11	U	< 0.1	U
8270E	4-Chloro-3-Methylphenol	59-50-7	--	--	mg/kg			< 0.087	U	< 0.083	U
8270E	4-Chloroaniline	106-47-8	--	--	mg/kg			< 0.065	U	< 0.062	U
8270E	4-Chlorophenyl Phenyl Ether	7005-72-3	--	--	mg/kg			< 0.083	U	< 0.078	U
8270E	4-Methylphenol (P-Cresol)	106-44-5	--	--	mg/kg			< 0.073	U	< 0.069	U
8270E	4-Nitroaniline	100-01-6	--	--	mg/kg			< 0.092	U	< 0.087	U
8270E	4-Nitrophenol	100-02-7	--	--	mg/kg			< 0.17	U	< 0.17	U
8270E	Acenaphthene	83-32-9	--	--	mg/kg			< 0.014	U	< 0.014	U
8270E	Acenaphthylene	208-96-8	--	--	mg/kg			< 0.011	U	< 0.01	U
8270E	Acetophenone	98-86-2	--	--	mg/kg			< 0.088	U	< 0.083	U
8270E	Anthracene	120-12-7	--	--	mg/kg			< 0.013	U	0.034	J
8270E	Atrazine	1912-24-9	--	--	mg/kg			< 0.11	R	< 0.1	U
8270E	Benzaldehyde	100-52-7	--	--	mg/kg			< 0.031	R	< 0.029	U
8270E	Benzo[a]anthracene	56-55-3	--	--	mg/kg			0.05	J	0.13	J
8270E	Benzo[a]pyrene	50-32-8	--	--	mg/kg			0.058	J	0.13	J
8270E	Benzo[b]fluoranthene	205-99-2	--	--	mg/kg			0.069	J	0.19	J
8270E	Benzo[g,h,i]perylene	191-24-2	--	--	mg/kg			0.046	J	0.12	J
8270E	Benzo[k]fluoranthene	207-08-9	--	--	mg/kg			0.031	J	0.068	
8270E	Benzyl Butyl Phthalate	85-68-7	--	--	mg/kg			< 0.17	U	< 0.16	U
8270E	Biphenyl (Diphenyl)	92-52-4	--	--	mg/kg			< 0.09	U	< 0.086	U
8270E	Bis(2-Chloroethoxy) Methane	111-91-1	--	--	mg/kg			< 0.091	U	< 0.086	U
8270E	Bis(2-Chloroethyl) Ether	111-44-4	--	--	mg/kg			< 0.009	U	< 0.0085	U
8270E	Bis(2-Chloroisopropyl) Ether	108-60-1	--	--	mg/kg			< 0.018	U	< 0.018	U
8270E	Bis(2-ethylhexyl) phthalate	117-81-7	--	--	mg/kg			< 0.27	U	< 0.25	U
8270E	Caprolactam	105-60-2	--	--	mg/kg			< 0.16	U	< 0.15	U
8270E	Carbazole	86-74-8	--	--	mg/kg			< 0.012	U	0.021	J
8270E	Chrysene	218-01-9	--	--	mg/kg			0.066	J	0.17	J
8270E	Dibenz[a,h]anthracene	53-70-3	--	--	mg/kg			< 0.032	U	0.035	J
8270E	Dibenzofuran	132-64-9	--	--	mg/kg			< 0.091	U	< 0.086	U
8270E	Diethyl Phthalate	84-66-2	--	--	mg/kg			< 0.087	U	< 0.083	U

Appendix A
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Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

					Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
					Sample Date	11/02/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-8in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual
8270E	Dimethyl phthalate	131-11-3	--	--	mg/kg			< 0.098	U	< 0.093	U
8270E	Di-N-Butyl Phthalate	84-74-2	--	--	mg/kg			< 0.11	U	< 0.1	U
8270E	Di-n-octyl phthalate	117-84-0	--	--	mg/kg			< 0.14	U	< 0.14	U
8270E	Fluoranthene	206-44-0	--	--	mg/kg			0.1	J	0.32	J
8270E	Fluorene	86-73-7	--	--	mg/kg			< 0.0098	U	< 0.0092	U
8270E	Hexachlorobenzene	118-74-1	--	--	mg/kg			< 0.018	U	< 0.017	U
8270E	Hexachlorobutadiene	87-68-3	--	--	mg/kg			< 0.015	U	< 0.014	U
8270E	Hexachlorocyclopentadiene	77-47-4	--	--	mg/kg			< 0.025	R	< 0.024	U
8270E	Hexachloroethane	67-72-1	--	--	mg/kg			< 0.088	U	< 0.083	U
8270E	Indeno(1,2,3-C,D)Pyrene	193-39-5	--	--	mg/kg			0.032	J	0.096	
8270E	Isophorone	78-59-1	--	--	mg/kg			< 0.093	U	< 0.088	U
8270E	Naphthalene	91-20-3	--	--	mg/kg			< 0.0097	U	< 0.0092	U
8270E	Nitrobenzene	98-95-3	--	--	mg/kg			< 0.091	U	< 0.086	U
8270E	N-Nitrosodi-N-Propylamine	621-64-7	--	--	mg/kg			< 0.017	U	< 0.016	U
8270E	N-Nitrosodiphenylamine	86-30-6	--	--	mg/kg			< 0.083	U	< 0.078	U
8270E	Pentachlorophenol	87-86-5	--	--	mg/kg			< 0.4	U	< 0.38	U
8270E	Phenanthrene	85-01-8	--	--	mg/kg			0.045	J	0.16	J
8270E	Phenol	108-95-2	--	--	mg/kg			< 0.075	U	< 0.071	U
8270E	Pyrene	129-00-0	--	--	mg/kg			0.091	J	0.26	J
VOC											
8260D	1,1,1-Trichloroethane	71-55-6	--	--	mg/kg			< 0.0023	U	< 0.0022	U
8260D	1,1,2,2-Tetrachloroethane	79-34-5	--	--	mg/kg			< 0.0021	U	< 0.002	U
8260D	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	--	--	mg/kg			< 0.0027	U	< 0.0027	UJ
8260D	1,1,2-Trichloroethane	79-00-5	--	--	mg/kg			< 0.0013	U	< 0.0013	U
8260D	1,1-Dichloroethane	75-34-3	--	--	mg/kg			< 0.0022	U	< 0.0022	U
8260D	1,1-Dichloroethene	75-35-4	--	--	mg/kg			< 0.0031	U	< 0.003	U
8260D	1,2,4-Trichlorobenzene	120-82-1	--	--	mg/kg			< 0.0035	U	< 0.0034	U
8260D	1,2-Dibromo-3-Chloropropane	96-12-8	--	--	mg/kg			< 0.0044	UJ	< 0.0043	UJ
8260D	1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	--	--	mg/kg			< 0.0019	U	< 0.0018	U
8260D	1,2-Dichlorobenzene	95-50-1	--	--	mg/kg			< 0.0023	U	< 0.0023	U
8260D	1,2-Dichloroethane	107-06-2	--	--	mg/kg			< 0.002	U	< 0.0019	U
8260D	1,2-Dichloropropane	78-87-5	--	--	mg/kg			< 0.0018	U	< 0.0018	U
8260D	1,3-Dichlorobenzene	541-73-1	--	--	mg/kg			< 0.0042	U	< 0.0041	U
8260D	1,4-Dichlorobenzene	106-46-7	--	--	mg/kg			< 0.002	U	< 0.002	U
8260D	2-Hexanone	591-78-6	--	--	mg/kg			< 0.0021	U	< 0.0021	UJ
8260D	Acetone	67-64-1	--	--	mg/kg			0.02	J	< 0.0052	U
8260D	Benzene	71-43-2	--	--	mg/kg			< 0.0019	U	< 0.0019	U
8260D	Bromodichloromethane	75-27-4	--	--	mg/kg			< 0.0032	U	< 0.0031	U

Appendix A
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Port Ewen, NY

					Sample ID	PBA-04-SD-0-8		PBA-BKG-SD-0-8		PBA-BKG-DUP-SD-0-8	
					Sample Date	11/02/2023		11/02/2023		11/02/2023	
					Sample Depth	0-8in		0-8in		0-8in	
					Sample Type (N: Normal; FD: Field Duplicate)	N		N		FD	
	Chemical	CAS No.	Site-Specific Freshwater SGV: Class A	Site-Specific Freshwater SGV: Class C	Unit	Result	Qual	Result	Qual	Result	Qual
8260D	Bromoform	75-25-2	--	--	mg/kg			< 0.0034	U	< 0.0034	U
8260D	Bromomethane	74-83-9	--	--	mg/kg			< 0.0031	U	< 0.0031	U
8260D	Carbon Disulfide	75-15-0	--	--	mg/kg			< 0.0054	U	< 0.0054	U
8260D	Carbon Tetrachloride	56-23-5	--	--	mg/kg			< 0.0028	U	< 0.0027	U
8260D	Chlorobenzene	108-90-7	--	--	mg/kg			< 0.0018	U	< 0.0017	U
8260D	Chloroethane	75-00-3	--	--	mg/kg			< 0.004	UJ	< 0.0039	UJ
8260D	Chloroform	67-66-3	--	--	mg/kg			< 0.0046	U	< 0.0045	U
8260D	Chloromethane	74-87-3	--	--	mg/kg			< 0.0027	U	< 0.0027	U
8260D	cis-1,2-Dichloroethene	156-59-2	--	--	mg/kg			< 0.0021	U	< 0.002	U
8260D	cis-1,3-Dichloropropene	10061-01-5	--	--	mg/kg			< 0.003	U	< 0.003	U
8260D	Cyclohexane	110-82-7	--	--	mg/kg			< 0.0032	U	< 0.0032	UJ
8260D	Dibromochloromethane	124-48-1	--	--	mg/kg			< 0.0034	U	< 0.0033	U
8260D	Dichlorodifluoromethane	75-71-8	--	--	mg/kg			< 0.0034	UJ	< 0.0033	UJ
8260D	Ethylbenzene	100-41-4	--	--	mg/kg			< 0.0025	U	< 0.0025	U
8260D	Isopropylbenzene (Cumene)	98-82-8	--	--	mg/kg			< 0.0035	U	< 0.0035	U
8260D	Methyl Acetate	79-20-9	--	--	mg/kg			< 0.01	U	< 0.0099	U
8260D	Methyl Ethyl Ketone	78-93-3	--	--	mg/kg			< 0.0035	U	< 0.0034	UJ
8260D	Methyl Isobutyl Ketone	108-10-1	--	--	mg/kg			< 0.0025	U	< 0.0025	U
8260D	Methylcyclohexane	108-87-2	--	--	mg/kg			< 0.0033	U	< 0.0032	U
8260D	Methylene Chloride	75-09-2	--	--	mg/kg			< 0.0061	U	< 0.0061	U
8260D	Styrene	100-42-5	--	--	mg/kg			< 0.002	U	< 0.002	U
8260D	Tert-Butyl Methyl Ether	1634-04-4	--	--	mg/kg			< 0.002	U	< 0.002	U
8260D	Tetrachloroethylene	127-18-4	--	--	mg/kg			< 0.0027	U	< 0.0027	U
8260D	Toluene	108-88-3	--	--	mg/kg			< 0.002	U	< 0.0019	U
8260D	trans-1,2-Dichloroethene	156-60-5	--	--	mg/kg			< 0.0024	U	< 0.0024	U
8260D	trans-1,3-Dichloropropene	10061-02-6	--	--	mg/kg			< 0.0031	U	< 0.003	U
8260D	Trichloroethylene	79-01-6	--	--	mg/kg			< 0.0021	U	< 0.0021	U
8260D	Trichlorofluoromethane	75-69-4	--	--	mg/kg			< 0.0056	U	< 0.0056	U
8260D	Vinyl Chloride	75-01-4	--	--	mg/kg			< 0.0049	U	< 0.0048	U
8260D	Xylenes	1330-20-7	--	--	mg/kg			< 0.0098	U	< 0.0097	U

Appendix A
November 2023 Sediment Data
Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

Notes:
Results that exceeds Site-Specific Freshwater Sediment Guidance values: Class A are bold and underlined.
Results that exceeds Site-Specific Freshwater Sediment Guidance values: Class C are shaded yellow.

% = percent
µmol/g_{OC} = micromol per gram organic carbon
AVS = acid-volatile sulfides
CAS = Chemical Abstracts Service
f_{OC} = fraction organic carbon
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/kg = milligram per kilogram
mm = millimeter
NYSDEC = New York State Department of Environmental Conservation
R = The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
SEM = simultaneously extracted metals
SGV = sediment guidance value
U = analyte was analyzed for but not detected

Sources:
NYSDEC. 2014. Division of Fish, Wildlife, and Marine Resources (DFWMR) Screening and Assessment of Contaminated Sediment.
Nagpal, N.K., Pommen, L.W., and L.G. Swain. 1995. Approved and working criteria for water qualityguidelines for British Columbia.
ISBN 0-7726-3774-1. Water Quality Branch. Ministry of Environment. Lands and Parks. Victoria, British Columbia. 28 pp.
USEPA. 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) forthe Protection of Benthic
Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc). Office of Research and Development. USEPA-600-R-02 011.

Appendix A
November 2023 Pore Water Data
Revised Plantasie Creek Phase 1 Preliminary Bioavailability Assessment Report
Dyno Nobel Port Ewen Site
Port Ewen, NY

						Sample ID	PBA-01-PW		DUP-PW		PBA-01-PW-Z		DUP-PW-Z		PBA-02-PW		PBA-02-PW-Z		PBA-03-PW		PBA-03-PW-Z		PBA-04-PW		PBA-04-PW-Z		PBA-BKG-PW-Z		BKG-DUP-PW-Z	
						Sample Date	11/03/2023		11/03/2023		11/03/2023		11/03/2023		11/02/2023		11/02/2023		11/02/2023		11/02/2023		11/02/2023		11/02/2023		11/02/2023		11/02/2023	
						Sample Type (N: Normal; FD: Field Duplicate)	N		FD		N		FD		N		N		N		N		N		N		N		FD	
Chemical	CAS No.	AWQS Chronic	AWQS Acute	Fraction	Unit		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
GENERAL CHEMISTRY																														
Hardness (As CaCO3)	HARD	--	--	T	µg/L						270000		300000				270000				150000				280000		190000	J	380000	J
pH	PH	--	--	T	SU		7.5	J	7.7	J					8	J			8.6	J			8.3	J			8.5	J	8.3	J
METALS (DISSOLVED)																														
Calcium	7440-70-2	--	--	D	µg/L																						62000		66000	
Copper	7440-50-8	19.8	32.3	D	µg/L						< 0.36	U	< 0.36	U			1.2				1.5				0.67	J	2.6	J	< 1.3	UJ
Magnesium	7439-95-4	--	--	D	µg/L																						6800		7300	
Mercury	7439-97-6	0.77	1.4	D	µg/L						0.002		0.0023				0.032				0.0015				0.00098		0.001		0.001	
Methylmercury	22967-92-6	--	--	D	µg/L						< 0.00018	UJ	2.80E-05	J			< 1.8e-005	J			< 1.8e-005	UJ			< 1.8e-005	UJ	< 1.8e-005	UJ	< 1.8e-005	UJ
Potassium	7440-09-7	--	--	D	µg/L																						2300		2400	
Selenium	7782-49-2	--	4.6	D	µg/L						< 0.28	U	< 0.28	U			< 0.28	U			< 0.28	U			< 0.28	U	0.38	J	0.36	J
Sodium	7440-23-5	--	--	D	µg/L																						52000		57000	
Zinc	7440-66-6	181.9	257.3	D	µg/L						< 4	U	< 4	U			< 4	U			7	J			6	J	4	J	< 4	U

Notes:
Results that exceeds Site-Specific Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations: Acute, Pore Water are bold and underlined.
Results that exceeds Site-Specific Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations: Chronic, Pore Water are shaded yellow.

µg/L = microgram per liter
AWQS = ambient water quality standard
CAS = Chemical Abstracts Service
D = dissolved
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NYSDEC = New York State Department of Environmental Conservation
SU = standard unit
T = total
U = analyte was analyzed for but not detected

Source:
6 CRR-NY 703.5. Techincal support in: NYSDEC. 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Appendix B Laboratory Analytical Reports

Available upon request.

Appendix C Data Usability Summary Reports

EHS Support Validation Report Number: 733

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164734-1
Analyses: SVOC, Metals, General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Pittsburgh, Pennsylvania and Cleveland, Ohio

EHS Support℠

Report Date:

August 20, 2024

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Appendix

1 Sample and Analytical Protocol Summary

Water samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 6020B for metals
  - 9056A for anions
  - 9040C for pH
- USEPA Methods
  - 1630 for methylmercury
  - 1631E for low-level mercury
- Standard Methods (SM)
  - Alkalinity: SM2320B
  - Total dissolved solids (TDS): SM2540C
  - Total suspended solids (TSS): SM2540D
  - Total organic carbon: SM5310C
  - Dissolved organic carbon: SM5310C
  - Hardness: SM2340C

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses		
					SVOC	Metals	Gen Chem
180-164734-1	180-164734-1	PBA-BKG-SW	Water	10/31/2023	X	X	X
180-164734-1	180-164734-2	BKG-DUP-SW	Water	10/31/2023	X	X	X
180-164734-1	180-164734-3	PBA-BKG-SW-Z	Water	10/31/2023	X	X	X
180-164734-1	180-164734-4	PBA-BKG-DUP-01-SW-Z	Water	10/31 /2023	X	X	X
180-164734-1	180-164734-5	EQB-SW-20231031	Water	10/31/2023	X	X	X

Notes:
Samples whose names end with "-Z" are filtered aliquots.
Gen chem = general chemistry
SDG = sample delivery group
SVOC = semi-volatile organic compound

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

Notes in the laboratory report present a discrepancy between the field duplicate sample name on the bottle (BKG-DUP) and that on the chain of custody (BKG-DUP-SW). The sample was logged per the chain of custody. Aside from the sample name discrepancy, the chain of custody was properly completed; the gap between the relinquishing date/time and the receiving date/time is assumed to correspond to sample shipment.

No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, no QC excursions encountered led to the rejection of data. Results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Semi-Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements—Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Methylmercury by Method 1630	Water	Amber glass vials, hydrochloric acid to pH less than 2	180 days from collection to analysis

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- Correlation coefficients were acceptable.
- The continuing calibration verification percent difference results were within limits.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Sample results associated with blank contamination are presented in **Table 4**.

Table 4 Observed Blank Contamination and Associated Actions—Semi-Volatile Organic Compounds

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Methylmercury	0.0251 J ng/L (MB 240-594096/1-A) **and** 0.025 J ng/L (EQB-SW-20231031)	Greater than or equal to the method detection limit but less than or equal to the reporting limit.	180-164734-2	Greater than or equal to the method detection limit but less than or equal to reporting limit.	Report U at the reporting limit
			180-164734-1 180-164734-3 180-164734-4	Greater than reporting limit but less than 5× the blank result.	Report U at the detected concentration

Notes:
[1] See **Table 2** for qualifier definitions.
EQB = equipment blank
MB = method blank
ng/L = nanogram per liter

Please note that blank samples are not qualified due to contamination seen in other blanks.

3.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

3.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or ‘clean’ sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. The reported recovery was within control limits.

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 5**.

Table 5 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances—Semi-Volatile Organic Compounds

Lab Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164734-1	Methylmercury (Method 1630)	Acceptable	Acceptable	Greater than upper acceptance limit

Samples to be analyzed using Method 1630 have been prepared using batch digestion; therefore, the batch qualifications are applied. Because of the noncompliant matrix spike result, qualifiers shown in **Table 6** were applied to the methylmercury results for the two unfiltered field samples in this SDG.

Table 6 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions—Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

3.7 Target Compound Identification

Acceptable—no issues were encountered. Retention times for the analyte and surrogate were within limits. No reported results were greater than the calibrated range of the instrument.

3.8 Field Duplicates

Acceptance criteria (**Table 7**) were met. Two parent sample-field duplicate sample pairs were included in this SDG.

Table 7 Acceptable Parent Sample-Field Duplicate Relationships—Semi-Volatile Organic Compounds

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

3.9 Additional Notes

Total and dissolved sample aliquots were analyzed. All results have been qualified as non-detect due to blank contamination.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

4 Metals Analysis

4.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 8**.

Table 8 Preservation and Holding Time Requirements—Metals

Method	Matrix	Preservation	Holding Time
Metals (except mercury) by Method 6020	Water	Nitric acid to pH less than 2	180 days from collection to analysis
Low-level mercury by Method 1631E	Water	No preservation needed at time of collection.	28 days from collection to preservation* 90 days from preservation to analysis

Notes:
*Preservation time is up to 28 days for samples that will not need to be transferred from their original containers.

4.2 Inductively Coupled Plasma-Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: The laboratory's "…tune check point-of-failure is 0.9 amu at 10 percent peak height.… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DOD [Department of Defense] source documents."
Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[1] full width at 10% peak height."[2]
- "Resolution < 0.9 amu full width at 10% peak height."[3]

[1] u = unified atomic mass unit
[2] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf
[3] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.4, Appendix B, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Calibration results outside control limits are presented in **Table 9**. Other acceptance criteria were me. Contract-required quantitation limit check standards were analyzed; recoveries were acceptable.

Table 9 Observed Calibration Nonconformances—Metals

Calibration	Analyte	Quality Control Nonconformance	Associated Lab Sample IDs
CCV 240-595473/76 CCV 240-595473/102	Mercury (1631)	CCV recovery is less than lower acceptance limit	180-164734-1 180-164734-2 180-164734-3 180-164734-4 180-164734-5

Note:
CCV = continuing calibration verification

Sample results associated with non-compliant calibration values are qualified as shown in **Table 10**.

Table 10 Initial and Continuing Calibration Nonconformance Actions—Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
ICV and/or CCV %D is greater than the upper limit; positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit; negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
CCV = continuing calibration verification
ICV = initial calibration verification

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples.

Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were me. No detections were reported from the laboratory method blanks, instrument blanks, or equipment blank associated with reported results in this data set.

4.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

4.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is, as the name implies, a separate QC sample that is created just as the laboratory control sample is created. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and from the laboratory control sample duplicate are evaluated to access accuracy and bias. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Acceptance criteria were met. Laboratory control sample and laboratory control sample duplicate recoveries, as well as the relative percent difference between laboratory control sample and laboratory control sample duplicate results, were within acceptance limits. A laboratory control sample/laboratory control sample duplicate pair was analyzed with one Method 6020 batch. Single laboratory control samples were analyzed with other batches.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on samples 180-164734-1 and 180-164734-3. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

4.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 11**) were met. A laboratory duplicate of sample 180-164734-3 was analyzed by Method 6020. The relationship between copper results was outside laboratory limits but all relationships met the criteria applied during validation and are considered acceptable.

Table 11 Acceptable Parent Sample–Laboratory Duplicate Relationships—Metals

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and its lab duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or its lab duplicate concentrations(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

4.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed

acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Acceptance criteria were met. Serial dilution analyses were performed on sample 180-164734-1 for total metals and sample 180-164734-3 for dissolved metals. Several of the results could not be evaluated because the analytes were not present in the parent sample at sufficient concentrations.

4.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

4.11 Field Duplicates

Acceptance criteria (**Table 12**) were met. Two parent sample-field duplicate sample pairs were included in this SDG.

Table 12 Acceptable Parent Sample–Field Duplicate Relationships—Metals

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

4.12 Additional Notes

Total and dissolved metals were reported. Relationships between total and dissolved sample results were acceptable.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

5 General Chemistry Analysis

5.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 13**.

Table 13 Preservation and Holding Time Requirements—General Chemistry

Method	Matrix	Preservation	Holding Time
Alkalinity and temperature by Method 2320B	Water	Less than or equal to 6°C	14 days
Hardness by Method SM2340C	Water	HNO_3 to pH less than 2	180 days
Total dissolved solids by Method SM2540C	Water	Less than or equal to 6°C	7 days
Total suspended solids by Method SM2540D	Water	Less than or equal to 6°C	7 days
Total organic carbon by Method SM5310C	Water	Less than or equal to 6°C; pH less than 2	28 days
Dissolved organic carbon by Method SM5310	Water	Less than or equal to 6°C; pH less than 2	28 days
pH by Method 9040	Water	Less than or equal to 6°C	15 minutes
Bromide, chloride, fluoride, and sulfate by Method 9056A	Water	Less than or equal to 6°C	28 days

Notes:
°C = degrees Celsius
HNO_3 = nitric acid

Reported results associated with analyses performed outside of the specified holding times are listed in **Table 14**. Temperature results from Method 2320 have been marked as not reportable. All other holding time criteria were met.

Table 14 Observed Preservation and/or Holding Time Nonconformances—General Chemistry

Lab Sample IDs	Analysis	Holding Time	Observed Holding Time
180-164734-1 180-164734-2 180-164734-5	pH by Method 9040	15 minutes	25 days

The samples listed in **Table 14** have been qualified as shown in **Table 15**.

Table 15 Preservation and Holding Time Nonconformance Actions—General Chemistry

Quality Control Excursion	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R

Note:
[1] See **Table 2** for qualifier definitions.

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- Calibration curves exhibited acceptable correlation coefficients or coefficients of determination.
- Continuing calibration verification results were within limits.
- Low level calibration standards were analyzed in Method 9056 with acceptable results.

Reported bromide results were associated with retention times outside the reported retention time window. Email communication with laboratory staff yielded the following explanation: “Matrix can shift result[s] outside of the retention time window. When this happens, we us[e] the technical judgment of the analyst to determine if the peak is correctly identified. Results are correct.” Retention times did not lead to qualification of any sample results.

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or ‘clean’ sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported in laboratory method blanks. Calibrations blank results were non-detect for all reported analytes other than temperature. One equipment blank was analyzed; results for all analytes other than temperature and pH were non-detect.

5.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

5.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 16**.

Table 16 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances—General Chemistry

Lab Sample ID	Analyte	Recoveries		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164734-1	Hardness	Acceptable	132 percent	Greater than the upper acceptance limit

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Because of the noncompliant matrix spike results, qualifiers (**Table 17**) were applied to hardness results in the two field samples in this SDG.

Table 17 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions—General Chemistry

Recovery	Sample Result	Qualification[1]
Matrix spike percent recovery is less than 75 percent but greater than or equal to 30 percent	Non-detect	UJ
	Detect	J
Matrix spike percent recovery is less than 30 percent.	Non-detect	R
	Detect	J
Matrix spike percent recovery is greater than 125 percent.	Non-detect	No Action
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 18**) were met. Laboratory duplicate analysis was performed on sample 180-164734-1 for hardness, TDS, TSS, pH, and alkalinity.

Table 18 Acceptable Parent Sample–Laboratory Duplicate Relationships—General Chemistry

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

5.7 Field Duplicates

Acceptance criteria (**Table 19**) were met. Two parent sample–field duplicate sample pairs were included in this SDG.

Table 19 Acceptable Parent Sample–Field Duplicate Relationships—General Chemistry

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

5.8 Additional Notes

Total organic carbon was analyzed using unfiltered sample aliquots and dissolved organic carbon was analyzed using filtered aliquots. Relationships between total and dissolved results were acceptable.

Hardness results for three samples were reported from dilutions. A note in the narrative states that "Samples PBA-BKG-SW (180-164734-1), BKG-DUP-SW (180-164734-2) and EQB-SW-20231031 (180-164734-5) required dilution prior to analysis for Hardness."

Amy Coats

Validation performed by: Amy Coats
EHS Support LLC

6 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.077	UJ	0.077	BF2	180-164734-1	180-164734-1
PBA-BKG-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	2.6	J	0.14		180-164734-1	180-164734-1
PBA-BKG-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	170	J	15	F2F1	180-164734-1	180-164734-1
PBA-BKG-SW	10/31/2023	Water	T	9040C	pH	s.u.	8.2	J	0.1	HF	180-164734-1	180-164734-1
BKG-DUP-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.05	UJ	0.050	JB	180-164734-2	180-164734-1
BKG-DUP-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	3.3	J	0.14		180-164734-2	180-164734-1
BKG-DUP-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	170	J	15		180-164734-2	180-164734-1
BKG-DUP-SW	10/31/2023	Water	T	9040C	pH	s.u.	8.1	J	0.1	HF	180-164734-2	180-164734-1
PBA-BKG-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.063	U	0.063	B	180-164734-3	180-164734-1
PBA-BKG-SW-Z	10/31/2023	Water	D	1631E	Mercury	ng/L	0.72	J	0.14		180-164734-3	180-164734-1
PBA-BKG-DUP-01-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.065	U	0.065	B	180-164734-4	180-164734-1
PBA-BKG-DUP-01-SW-Z	10/31/2023	Water	D	1631E	Mercury	ng/L	0.68	J	0.14		180-164734-4	180-164734-1
EQB-SW-20231031	10/31/2023	Water	T	1631E	Mercury	ng/L	0.14	UJ	0.14	U	180-164734-5	180-164734-1
EQB-SW-20231031	10/31/2023	Water	T	9040C	pH	s.u.	5.6	J	0.1	HF	180-164734-5	180-164734-1

Notes:
B = Compound was found in the blank and sample.
$CaCO_3$ = calcium carbonate
D = dissolved
F1 = Matrix spike and/or matrix spike duplicate recovery exceeds control limits
F2 = Matrix spike/matrix spike duplicate relative percent difference exceeds control limits
HF = Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
J (lab qualifier) = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/L = milligram per liter
N = not applicable
ng/L = nanogram per liter
SDG = sample delivery group
s.u. = standard unit
T = total
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

EHS Support Validation Report Number: 734

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164738-1
Analyses: SVOC, Metals, General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Pittsburgh, Pennsylvania, and Cleveland, Ohio

EHS Support℠

Report Date:

August 20, 2024

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Appendix

1 Sample and Analytical Protocol Summary

Water samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 6020B for metals
  - 9056A for anions
  - 9040C for pH
- USEPA Methods
  - 1630 for methylmercury
  - 1631E for low-level mercury
- Standard Methods (SM)
  - Alkalinity: SM2320B
  - Total dissolved solids (TDS): SM2540C
  - Total suspended solids (TSS): SM2540D
  - Total organic carbon: SM5310C
  - Dissolved organic carbon: SM5310C
  - Hardness: SM2340C

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses		
					SVOC	Metals	Gen Chem
180-164738-1	180-164738-1	PBA-01-SW	Water	10/31/2023	X	X	X
180-164738-1	180-164738-2	PBA-02-SW	Water	10/31/2023	X	X	X
180-164738-1	180-164738-3	PBA-03-SW	Water	10/31/2023	X	X	X
180-164738-1	180-164738-4	PBA-04-SW	Water	10/31/2023	X	X	X
180-164738-1	180-164738-5	DUP-SW	Water	10/31/2023	X	X	X
180-164738-1	180-164738-6	PBA-01-SW-Z	Water	10/31/2023	X	X	X
180-164738-1	180-164738-7	PBA-02-SW-Z	Water	10/31/2023	X	X	X
180-164738-1	180-164738-8	PBA-03-SW-Z	Water	10/31/2023	X	X	X
180-164738-1	180-164738-9	PBA-04-SW-Z	Water	10/31/2023	X	X	X
180-164738-1	180-164738-10	DUP-SW-Z	Water	10/31/2023	X	X	X

Notes:
Samples whose names end with "-Z" are filtered aliquots.
Gen chem = general chemistry
SDG = sample delivery group
SVOC = semi-volatile organic compound

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

Notes in the laboratory report present discrepancies between the chain of custody and the bottles received; QC aliquots were submitted but not listed on the chain of custody. Otherwise, the chain of custody was properly completed; the gap between the relinquishing date/time and the receiving date/time is assumed to correspond to sample shipment.

Sample receipt checklists at Pittsburgh and at Lancaster include negative answers to the following question and statement: “Did all bottles arrive in good condition (Unbroken)?” and “There is sufficient vol. for all requested analyses.” However, there are no notes in the narrative about issues with sample condition. No requested analyses were found to be missing. Samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, no QC excursions encountered led to the rejection of data. Results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Semi-Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements – Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Methylmercury by Method 1630	Water	Amber glass vials, hydrochloric acid to pH less than 2	180 days from collection to analysis

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values and/or the regression coefficient values were acceptable.
- Correlation coefficients were acceptable.
- The continuing calibration verification percent difference results were within limits.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Sample results associated with blank contamination are presented in **Table 4**.

Table 4 Observed Blank Contamination and Associated Actions – Semi-Volatile Organic Compounds

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Methylmercury	0.0251 J ng/L (MB 240-594096/1-A)	Greater than or equal to the method detection limit but less than or equal to the reporting limit.	180-164738-2	Greater than or equal to the method detection limit but less than or equal to the reporting limit.	Report U at the reporting limit
			180-164738-1 180-164738-3 180-164738-4 180-164738-5 180-164738-6 180-164738-7 180-164738-8 180-164738-9 180-164738-10	Greater than reporting limit and greater than 5× the blank result.	No qualification needed

Notes:
[1] See **Table 2** for qualifier definitions.
MB = method blank
ng/L = nanogram per liter

3.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

3.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. The reported recoveries were within control limits.

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 5**.

Table 5 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Semi-Volatile Organic Compounds

Lab Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164738-7	Dissolved methylmercury	Acceptable	Acceptable	Greater than upper acceptance limit

Samples analyzed by Method 1630 were prepared using batch digestion; therefore, batch qualifications are applied. Because of the noncompliant matrix spike result, qualifiers shown in **Table 6** were applied to methylmercury results for all dissolved field samples in this SDG. The matrix spike/matrix spike duplicate analysis performed for total methylmercury using sample 180-164738-2 exhibited acceptable results.

Table 6 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[(1)]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J

Quality Control Nonconformance	Sample Result	Sample Result Qualification[(1)]
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Notes:
[(1)] See **Table 2** for qualifier definitions.

3.7 Target Compound Identification

Acceptable—no issues were encountered. Retention times for the analyte and surrogate were within limits. No reported results were greater than the calibrated range of the instrument.

3.8 Field Duplicates

Acceptance criteria (**Table 7**) were met. Two parent sample–field duplicate sample pairs were included in this SDG.

Table 7 Acceptable Parent Sample–Field Duplicate Relationships – Semi-Volatile Organic Compounds

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

3.9 Additional Notes

Total and dissolved methylmercury concentrations were reported. Relationships between total and dissolved results were acceptable except for that listed in **Table 8**.

Table 8 Observed Total vs. Dissolved Nonconformances – Metals

Sample IDs	Analyte	Total Fraction Concentration	Dissolved Fraction Concentration	Percent Difference
PBA-02-SW/PBA-02-SW-Z	Methylmercury	0.050 U	0.16	22.5 percent

Notes:
The sample aliquot ending in "-Z" was filtered.
The validated result for sample PBA-02-SW is non-detect at the reporting limit. The numerical value of the reporting limit was used to calculate the percent difference.

For analyses in which samples undergo batch digestion, batch qualifications are applied. Because of the noncompliant total vs. dissolved result relationship, qualifiers shown in **Table 9** were applied to methylmercury results for all field samples in this SDG.

Table 9 Total vs. Dissolved Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
• Dissolved and/or total sample concentrations are greater than the reporting limit **and**	Non-detect	UJ
• Dissolved sample concentration is greater than the total sample concentration **and** • Calculated %D is greater than 10 percent.	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference

4 Metals Analysis

4.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 10**.

Table 10 Preservation and Holding Time Requirements – Metals

Method	Matrix	Preservation	Holding Time
Metals (except mercury) by Method 6020	Water	Nitric acid to pH less than 2	180 days from collection to analysis
Low-level mercury by Method 1631E	Water	No preservation needed at time of collection.	28 days from collection to preservation* 90 days from preservation to analysis

Note:
*Preservation time is up to 28 days for samples that will not need to be transferred from their original containers.

4.2 Inductively Coupled Plasma–Mass Spectrometry Tune

Inductively coupled plasma–mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: The laboratory's "…tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DOD [Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[1] full width at 10% peak height."[2]
- "Resolution < 0.9 amu full width at 10% peak height."[3]

[1] u = unified atomic mass unit

[2] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf

[3] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual for Environmental Laboratories, Version 5.4, Appendix B, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Calibration results outside control limits are presented in **Table 11**. Other acceptance criteria were met. Contract-required quantitation limit check standards were analyzed—recoveries were acceptable.

Table 11 Observed Calibration Nonconformances – Metals

Calibration	Analyte	Quality Control Nonconformance	Associated Samples
CCV 240-595473/76 CCV 240-595473/102	Mercury (Method 1631)	CCV recovery is less than lower acceptance limit	180-164738-6 180-164738-7 180-164738-8 180-164738-10

Note:
CCV = continuing calibration verification

Sample results associated with non-compliant calibration values are qualified as shown in **Table 12**.

Table 12 Initial and Continuing Calibration Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
ICV and/or CCV %D is greater than the upper limit, positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit, negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
CCV = continuing calibration verification
ICV = initial calibration verification

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples.

Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported from the laboratory method blanks or instrument blanks in this data set.

4.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

4.6 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Laboratory control sample recoveries were within acceptance limits.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from

matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on samples 180-164738-2 and 180-164738-7.

4.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 13**) were met. Laboratory duplicates of samples 180-164738-2 and 180-164738-7 were analyzed by Method 6020.

Table 13 Acceptable Parent Sample–Laboratory Duplicate Relationships – Metals

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and its lab duplicate concentrations are greater than or equal to 5× the reporting limit.	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or its lab duplicate concentrations(s) is/are less than 5× the reporting limit.	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

4.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Acceptance criteria were met. Serial dilution analyses were performed on sample 180-164738-2 for total metals and 180-164738-7 for dissolved metals. Serial dilution results are evaluated for analytes that were detected in the original sample at sufficient concentrations.

4.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be

independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

4.11 Field Duplicates

Two parent sample–field duplicate sample pairs were submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 14**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 14 Observed Field Duplicate Nonconformances – Metals

Samples	Analyte	Parent Sample Result	Duplicate Sample Result	Relationship
PBA-03-SW-Z/DUP-SW-Z	Mercury (Method 1631)	2.7 ng/L	4.2 ng/L	43.5 percent

Note:
ng/L = nanograms per liter

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied (**Table 15**). Because of the noncompliant parent sample-field duplicate relationship, qualifiers were applied to Method 1631 mercury results for all field samples in this SDG, with the exception of samples PBA-03-SW and DUP-SW. This parent/duplicate pair exhibited an acceptable relationship between parent and duplicate results.

Table 15 Field Duplicate Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[(1)]
Sample and its field duplicate concentrations are greater than or equal to 5× the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/ sediment)	Detect	J
Sample and/or its field duplicate concentrations(s) is/are less than 5x the reporting limit, and • Absolute difference is greater than 2× the reporting limit (aqueous) **or** • Absolute difference is greater than 3× the reporting limit (soil/ sediment)	Non-detect	UJ
	Detect	J

Note:
[(1)] See **Table 2** for qualifier definitions.

4.12 Additional Notes

Total and dissolved metals were reported. Relationships between total and dissolved sample results were acceptable.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

5 General Chemistry Analysis

5.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 16**.

Table 16 Preservation and Holding Time Requirements – General Chemistry

Method	Matrix	Preservation	Holding Time
Alkalinity by Method 2320B	Water	Less than or equal to 6°C	14 days
Hardness by Method SM2340C	Water	HNO_3 to pH less than 2	180 days
Total dissolved solids by Method SM2540C	Water	Less than or equal to 6°C	7 days
Total suspended solids by Method SM2540D	Water	Less than or equal to 6°C	7 days
Total organic carbon by Method SM5310C	Water	Less than or equal to 6°C; pH less than 2	28 days
Dissolved organic carbon by Method SM5310	Water	Less than or equal to 6°C; pH less than 2	28 days
pH by Method 9040	Water	Less than or equal to 6°C	15 minutes
Bromide, chloride, fluoride, and sulfate by Method 9056A	Water	Less than or equal to 6°C	28 days

Notes:
°C = degrees Celsius
HNO_3 = nitric acid

Analyses performed outside of the specified holding times are listed in **Table 17**. Temperature results from Method 2320 have been marked as not reportable. All other holding time criteria were met.

Table 17 Observed Preservation and/or Holding Time Nonconformances – General Chemistry

Samples	Analysis	Holding Time	Observed Holding Time
180-164738-1 180-164738-2 180-164738-3 180-164738-4 180-164738-5	pH by Method 9040	15 minutes	25 days

The samples listed in **Table 17** have been qualified as shown in **Table 18**.

Table 18 Preservation and Holding Time Nonconformance Actions – General Chemistry

Quality Control Excursion	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R

Note:
[1] See **Table 2** for qualifier definitions.

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Calibration curves exhibited acceptable correlation coefficients or coefficients of determination. Results for continuing calibration verification (CCV) samples were within control limits. The result for one low-level CCV was outside limits and is shown in **Table 19**.

Reported bromide results were associated with retention times outside the reported retention time window. Email communication with laboratory staff yielded the following explanation: “Matrix can shift result[s] outside of the retention time window. When this happens, we us[e] the technical judgment of the analyst to determine if the peak is correctly identified. Results are correct.” Retention times did not lead to qualification of any sample results.

Table 19 Observed Calibration Nonconformances – General Chemistry

Calibration	Analyte	Quality Control Nonconformance	Associated Samples
CCVL 180-451086/5	Bromide	CCVL %D = -30.6 percent	All samples in this SDG

Notes:
CCV = continuing calibration verification
SDG = sample delivery group

The non-compliant bromide CCV result was for a low-level CCV. No associated sample results were significantly greater than the associated reporting limit. Sample results associated with non-compliant calibration values are qualified as shown in **Table 20**.

Table 20 Initial and Continuing Calibration Nonconformance Actions – General Chemistry

Quality Control Nonconformance	Sample Result	Qualification[1]
ICV and/or CCV %D is greater than the upper limit, positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit, negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
CCV = continuing calibration verification
ICV = initial calibration verification

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Laboratory method blanks were non-detect aside from the positive value reported for temperature. Calibrations blank results were non-detect for all reported analytes other than temperature.

5.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

5.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike/matrix spike pairs were analyzed for anions (Method 9056) and for dissolved organic carbon. A matrix sike was analyzed for hardness. The matrix spike recovery that was outside control limits is presented in **Table 21**.

Table 21 Observed Matrix Spike Nonconformances – General Chemistry

Lab Sample ID	Analyte	Recovery
180-164738-2	Hardness	74 percent

For analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Because of the noncompliant matrix spike result, qualifiers (**Table 22**) were applied to hardness results in all unfiltered field samples in this SDG.

Table 22 Matrix Spike Nonconformance Actions – General Chemistry

Recovery	Sample Result	Qualification[1]
Matrix spike percent recovery is less than 75 percent but greater than or equal to 30 percent	Non-detect	UJ
	Detect	J
Matrix spike percent recovery is less than 30 percent.	Non-detect	R
	Detect	J
Matrix spike percent recovery is greater than 125 percent.	Non-detect	No Action
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 23**) were met. Laboratory duplicate analysis was performed on sample 180-164738-2 for hardness, total dissolved solids, total suspended solids, pH, and alkalinity.

Table 23 Acceptable Parent Sample–Laboratory Duplicate Relationships – General Chemistry

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

5.7 Field Duplicates

Acceptance criteria (**Table 24**) were met. Two parent sample-field duplicate sample pairs were included in this SDG.

Table 24 Acceptable Parent Sample–Field Duplicate Relationships – General Chemistry

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

5.8 Additional Notes

Total organic carbon was analyzed using unfiltered sample aliquots and dissolved organic carbon was analyzed using filtered aliquots. Relationships between total and dissolved results were acceptable.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Amy Coats

Validation performed by: Amy Coats
EHS Support LLC

6 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-01-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.2	J	0.018	B	180-164738-1	180-164738-1
PBA-01-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	11	J	0.14		180-164738-1	180-164738-1
PBA-01-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	99	J	6.0		180-164738-1	180-164738-1
PBA-01-SW	10/31/2023	Water	T	9040C	pH	s.u.	7.7	J	0.1	HF	180-164738-1	180-164738-1
DUP-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.15	J	0.018	B	180-164738-10	180-164738-1
DUP-SW-Z	10/31/2023	Water	T	1631E	Mercury	ng/L	4.2	J	0.14		180-164738-10	180-164738-1
PBA-02-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.05	UJ	0.050	JB	180-164738-2	180-164738-1
PBA-02-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	11	J	0.14		180-164738-2	180-164738-1
PBA-02-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	120	J	6.0	F1	180-164738-2	180-164738-1
PBA-02-SW	10/31/2023	Water	T	9040C	pH	s.u.	7.6	J	0.1	HF	180-164738-2	180-164738-1
PBA-02-SW	10/31/2023	Water	T	9056A	Bromide	mg/L	0.14	J	0.053		180-164738-2	180-164738-1
PBA-03-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.2	J	0.018	B	180-164738-3	180-164738-1
PBA-03-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	11	J	0.14		180-164738-3	180-164738-1
PBA-03-SW	10/31/2023	Water	T	9040C	pH	s.u.	7.6	J	0.1	HF	180-164738-3	180-164738-1
PBA-03-SW	10/31/2023	Water	T	9056A	Bromide	mg/L	0.11	J	0.053		180-164738-3	180-164738-1
PBA-04-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.17	J	0.018	B	180-164738-4	180-164738-1
PBA-04-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	12	J	0.14		180-164738-4	180-164738-1
PBA-04-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	110	J	30		180-164738-4	180-164738-1
PBA-04-SW	10/31/2023	Water	T	9040C	pH	s.u.	7.9	J	0.1	HF	180-164738-4	180-164738-1
PBA-04-SW	10/31/2023	Water	T	9056A	Bromide	mg/L	0.11	J	0.053		180-164738-4	180-164738-1
DUP-SW	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.18	J	0.018	B	180-164738-5	180-164738-1
DUP-SW	10/31/2023	Water	T	1631E	Mercury	ng/L	12	J	0.70		180-164738-5	180-164738-1
DUP-SW	10/31/2023	Water	T	2340C	Hardness (as $CaCO_3$)	mg/L	130	J	30		180-164738-5	180-164738-1
DUP-SW	10/31/2023	Water	T	9040C	pH	s.u.	7.6	J	0.1	HF	180-164738-5	180-164738-1
DUP-SW	10/31/2023	Water	T	9056A	Bromide	mg/L	0.16	J	0.053		180-164738-5	180-164738-1
PBA-01-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.17	J	0.018	B	180-164738-6	180-164738-1
PBA-01-SW-Z	10/31/2023	Water	T	1631E	Mercury	ng/L	5.2	J	0.14		180-164738-6	180-164738-1
PBA-02-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.16	J	0.018	BF2	180-164738-7	180-164738-1
PBA-02-SW-Z	10/31/2023	Water	T	1631E	Mercury	ng/L	4.3	J	0.14		180-164738-7	180-164738-1
PBA-03-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.15	J	0.018	B	180-164738-8	180-164738-1
PBA-03-SW-Z	10/31/2023	Water	T	1631E	Mercury	ng/L	2.7	J	0.14		180-164738-8	180-164738-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-04-SW-Z	10/31/2023	Water	N	1630	Methylmercury	ng/L	0.15	J	0.018	B	180-164738-9	180-164738-1
PBA-04-SW-Z	10/31/2023	Water	T	1631E	Mercury	ng/L	5.5	J	0.14		180-164738-9	180-164738-1

Notes:
B = Compound was found in the blank and sample.
$CaCO_3$ = calcium carbonate
F1 = matrix spike and/or matrix spike duplicate recovery exceeds control limits
F2 = matrix spike/matrix spike duplicate relative percent difference exceeds control limits
HF = Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
J (lab qualifier) = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/L = milligram per liter
N = not applicable
ng/L = nanogram per liter
SDG = sample delivery group
s.u. = standard unit
T = total
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

EHS Support Validation Report Number: 735

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164842-1
Analyses: VOC, SVOC, Pesticides, Metals, General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Pittsburgh, Pennsylvania and Cleveland, Ohio

EHS Support

Report Date:

August 20, 2024

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Appendix

1 Sample and Analytical Protocol Summary

Water samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 8260D for volatile organic compounds (VOCs)
  - 8270D for semi-volatile organic compounds
  - 8081B for pesticides
  - 6020B for metals
  - 7470A for mercury
  - 9060A for total organic carbon
  - 9040C for pH
- USEPA Methods
  - 1630 for methylmercury
  - 1631E for low-level mercury
- Standard Methods (SM)
  - SM2340C for hardness

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses				
					VOC	SVOC	Pest	Metals	Gen Chem
180-164842-1	180-164842-1	PBA-BKG-PW-Z	Water	11/2/2023				X	X
180-164842-1	180-164842-2	BKG-DUP-PW-Z	Water	11/2/2023				X	X
180-164842-1	180-164842-3	EQB-PW-20231102	Water	11/2/2023				X	X
180-164842-1	180-164842-4	EQB-SED-20231102	Water	11/2/2023	X	X	X	X	X

Notes:
Samples whose names end with "-Z" are filtered aliquots.
Gen chem = general chemistry
Pest = pesticides
SDG = sample delivery group
SVOC = semi-volatile organic compounds
VOC = volatile organic compound

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The chain of custody was properly completed; the gap between the relinquishing date/time and the receiving date/time is assumed to correspond to sample shipment.

According to notes in the laboratory report, samples in this SDG were received in two coolers, one of which was delayed in shipping and therefore received at an elevated temperature.

2.3 Assessment Summary and Data Usability

In this SDG, several results were rejected due to holding time and/or preservation exceedances. Additional information is provided in **Sections 3.1**, **4.1**, and **5.1**. Remaining results are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements – Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Method 8260	Soil	Frozen, or cooled to less than or equal to 6°C and preserved with $NaHSO_4$ or MeOH.	14 days
	Water	Less than or equal to 6°C; HCl to pH less than 2; no headspace	14 days
		Less than or equal to 6°C; no headspace	7 days

Notes:
°C = degrees Celsius
HCl = hydrochloric acid
MeOH = methanol
$NaHSO_4$ = sodium bisulfate

Holding time criteria were met. Samples associated with preservation nonconformances are presented in **Table 4**.

Table 4 Observed Preservation and/or Holding Time Nonconformances – Volatile Organic Compounds

Sample	Analysis	Preservation Nonconformance
180-164842-4	Method 8260	Receipt temperature 13.0°C

The samples in **Table 4** have been qualified as shown in **Table 5**:

Table 5 Preservation and Holding Time Nonconformance Actions – Volatile Organic Compounds

Quality Control Nonconformance	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed is less than or equal to 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R
Preservation temperature exceeded, observed temperature is greater than 6°C but less than or equal to 10°C. Holding time criteria met, no headspace in vials.	J	UJ

Quality Control Nonconformance	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Preservation temperature exceeded, observed temperature is greater than 10°C.	J	R

Notes:
[1] See **Table 2** for qualifier definitions.
°C = degree Celsius

3.2 Mass Spectrometer Tuning

Method 8260 uses gas chromatography and mass spectrometry. Gas chromatograph-mass spectrometer methods require mass spectrometers to meet specific tuning criteria, thereby demonstrating sufficient mass accuracy and mass resolution to be used for quantitative analysis of target, surrogate, and internal standard compounds. Gas chromatography–mass spectrometry tuning checks are performed to ensure acceptable system performance.

Tuning check criteria were met and all analyses were performed within a 12-hour tune clock.

3.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Sample results associated with continuing calibration results that did not meet criteria are listed in **Table 6**. Initial calibration results were acceptable.

Table 6 Observed Calibration Nonconformances – Volatile Organic Compounds

Calibration	Compound	Quality Control Nonconformance	Associated Samples
CCVIS 180-451414/2	Acetone	CCV %D +40.5	180-164842-4
	MTBE	CCV %D +23.4	
	MIBK	CCV%D -29.6	
	Bromoform	CCV%D +46.0	
	1,2-Dibromo-3-Chloropropane	CCV %D +63.8	
	cis-1,3-Dichloropropene	CCV %D +23.2	
	Methyl acetate	CCV %D +49.5	

Calibration	Compound	Quality Control Nonconformance	Associated Samples
	trans-1,3-Dichloropropene	CCV %D +26.9	

Notes:
%D = percent difference
CCV = continuing calibration verification
MIBK = methyl isobutyl ketone
MTBE = methyl tert-butyl ether

Sample results associated with non-compliant calibration values are qualified as shown in **Table 7**.

Table 7 Initial and Continuing Calibration Nonconformance Actions – Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Qualification[1]
RRF is less than the limit.	Non-detect	R
	Detect	J
Initial calibration %RSD or correlation coefficient is outside the acceptance limits (i.e., %RSD is greater than the maximum or the coefficient is less than 0.99).	Non-detect	UJ
	Detect	J
Initial calibration %RSD is greater than 90 percent.	Non-detect	R
	Detect	J
ICV and/or CCV %D is greater than the upper limit, positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit, negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J
ICV and/or CCV %D is greater than 90 percent (increase or decrease in sensitivity)	Non-detect	R
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
%RSD = percent relative standard deviation
CCV = continuing calibration verification
ICV = initial calibration verification
RRF = relative response factor

3.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when

associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Trip blanks identify contamination introduced at any point during the "trip," which begins with the empty containers and their transportation to the site and includes field activity, shipment to the laboratory, and analysis.
- Field blanks identify contamination introduced from bottleware and ambient conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Methylene chloride was detected in an equipment blank; however, no field samples in this SDG were analyzed by Method 8260. Therefore, this blank contamination did not lead to qualification of field sample results.

3.5 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly purging efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationships between the amounts of surrogate added and the amounts of surrogate reported for each sample were within control limits.

3.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is a separately prepared QC sample that is meant to be identical to the laboratory control sample. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and laboratory control sample duplicate are evaluated to access accuracy. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Acceptance criteria were met. Recoveries, as well as the relative percent difference between the laboratory control sample and laboratory control sample duplicate results, were within control limits.

3.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample, thus it is a spiked sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from the matrix spike and matrix spike duplicate are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Not applicable—no matrix spike analysis performed on a sample in this data set was reported.

3.8 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, mass spectrometry analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses - such as injection and ionization variability - should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards. This ‘builds in’ a correction factor for analyte losses.

Acceptance criteria were met. Internal standard peak areas and retention times were within acceptance limits.

3.9 Target Compound Identification

Acceptable; no issues were encountered.

3.10 Field Duplicates

Not applicable—the parent sample–field duplicate sample pair in this SDG was not designated for VOC analysis.

3.11 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

4 Semi-Volatile Organic Compound Analysis

4.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 8**.

Table 8 Preservation and Holding Time Requirements – Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Method 8270	Water	Less than or equal to 6°C	7 days from collection to extraction, 40 days from extraction to analysis
Methylmercury by Method 1630	Water	Amber glass vials, hydrochloric acid to pH less than 2	180 days from collection to analysis

Note:
°C = degrees Celsius

Holding time criteria were met. Samples associated with preservation nonconformances are presented in **Table 9**.

Table 9 Observed Preservation and/or Holding Time Nonconformances – Semi-Volatile Organic Compounds

Sample	Analysis	Preservation Nonconformance
180-164842-4	Method 8270	Receipt temperature 13.0°C
180-164842-3	Methylmercury by Method 1630	Receipt temperature 13.0°C
180-164842-4	Methylmercury by Method 1630	Receipt temperature 13.0°C

Note:
°C = degrees Celsius

The samples listed in **Table 9** have been qualified as shown in **Table 10**.

Table 10 Preservation and Holding Time Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Qualification[(1)]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than or equal to 2× holding time.	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time.	J	R
Preservation temperature was exceeded, observed temperature is greater than 6°C but less than or equal to 10°C. Holding time criteria were met.	J	UJ

Quality Control Nonconformance	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Preservation temperature was exceeded; observed temperature is greater than 10°C.	J	R

Notes:
[1] See **Table 2** for qualifier definitions.
°C = degree Celsius

4.2 Mass Spectrometer Tuning

Method 8270 uses gas chromatography and mass spectrometry. Gas chromatograph/mass spectrometer methods require mass spectrometers to meet specific tuning criteria, thereby demonstrating sufficient mass accuracy and mass resolution to be used for quantitative analysis of target, surrogate, and internal standard compounds. Gas chromatography-mass spectrometry tuning checks are performed to ensure acceptable system performance.

Tuning check criteria were met and all analyses were performed within a 12-hour tune clock.

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Sample results associated with continuing calibrations that did not meet criteria are listed in **Table 11**. Initial calibration criteria were met. Correlation coefficients for methylmercury analysis were acceptable.

Table 11 Observed Calibration Nonconformances – Semi-Volatile Organic Compounds

Calibration	Compound	Quality Control Nonconformance	Associated Samples
CCVIS 180-451884/3	4-Nitroaniline	CCV%D +20.4	180-164842-4

Notes:
%D = percent difference
CCV = continuing calibration verification

Sample results associated with non-compliant calibration values are qualified as shown in **Table 12.**

Table 12 Initial and Continuing Calibration Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Qualification[1]
RRF is less than the limit.	Non-detect	R
	Detect	J
Initial calibration %RSD or correlation coefficient is outside the acceptance limits (i.e., %RSD is greater than the maximum or the coefficient is less than 0.99).	Non-detect	UJ
	Detect	J
Initial calibration %RSD is greater than 90 percent.	Non-detect	R
	Detect	J
ICV and/or CCV %D is greater than the upper limit, positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit, negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J
ICV and/or CCV %D is greater than 90%; recovery is greater than the upper acceptance limit or less than the lower acceptance limit.	Non-detect	R
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
%RSD = percent relative standard deviation
CCV = continuing calibration verification
ICV = initial calibration verification
RRF = relative response factor

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Sample results associated with blank contamination are presented in **Table 13**. Several compounds were detected in the Method 8270 analysis of equipment blank EQB-SED-20231102; however, no field samples were analyzed by Method 8270. Therefore, the Method 8270 blank contamination did not lead to qualification of field sample results.

Table 13 Observed Blank Contamination and Associated Actions – Semi-Volatile Organic Compounds

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Methylmercury	0.021 J ng/L (EQB-SED-20231102)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164842-1 180-164842-2	Non-detect	No qualification needed

Notes:
[1] See **Table 2** for qualifier definitions.
MB = method blank
EQB = equipment blank
ng/L = nanograms per liter

4.5 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

4.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is a separately prepared QC sample that is meant to be identical to the laboratory control sample. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and laboratory control sample duplicate are evaluated to access accuracy. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

A single laboratory control sample was analyzed for methylmercury. A laboratory control sample/laboratory control sample duplicate pair was analyzed by Method 8270. Sample results associated with laboratory control sample recoveries or relative percent difference values outside control limits are listed in **Table 14**.

Table 14 Observed Laboratory Control Sample/Laboratory Control Sample Duplicate Nonconformances – Semi-Volatile Organic Compounds

LCS/LCSD Sample ID	Compound	LCS and/or LCSD Recovery	RPD	Associated Samples
180-451491/2-A 180-451491/3-A	3 & 4-Methylphenol	Acceptable	Greater than the upper acceptance limits	180-164842-4

Notes:
LCS = laboratory control sample
LCSD = laboratory control sample duplicate
RPD = relative percent difference

Sample results associated with noncompliant laboratory control sample recoveries or relative percent difference values are qualified in accordance with **Table 15**.

Table 15 Laboratory Control Sample/Laboratory Control Sample Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Laboratory control sample/laboratory control sample duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 16**.

Table 16 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Semi-Volatile Organic Compounds

Lab Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164842-1	Methylmercury (Method 1630)	Acceptable	Acceptable	Greater than upper acceptance limit

Samples analyzed using Method 1630 were prepared using batch digestion. Therefore, batch qualifications are applied. Because of the noncompliant matrix spike result, qualifiers shown in **Table 17** were applied to the methylmercury results for the two filtered field samples in this SDG.

Table 17 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

4.8 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, mass spectrometry analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses - such as injection and ionization variability - should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards. This 'builds in' a correction factor for analyte losses.

Acceptance criteria were met. Internal standard peak areas and retention times were within acceptance limits.

4.9 Target Compound Identification

Acceptable—no issues were encountered. Retention times for methylmercury were within limits. No reported results were greater than the calibrated range of the instrument.

4.10 Field Duplicates

Acceptance criteria were met. The parent and duplicate samples in this SDG were analyzed for methylmercury. Results for parent and duplicate were non-detect. The parent sample-field duplicate sample pair in this SDG was not designated for Method 8270 analysis.

4.11 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

5 Pesticides

5.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 18**.

Table 18 Preservation and Holding Time Requirements – Pesticides

Method	Matrix	Preservation	Holding Time
Method 8081	Water	Less than or equal to 6°C	7 days from collection to extraction, 40 days from extraction to analysis
	Solids	Less than or equal to 6°C	14 days from collection to extraction, 40 days from extraction to analysis

Note:
°C = degrees Celsius

Samples associated with preservation and/or holding time nonconformances are presented in **Table 19**.

Table 19 Observed Preservation and/or Holding Time Nonconformances – Pesticides

Sample	Analysis	Nonconformance
180-164842-4	Method 8081	Receipt temperature 13.0°C
		Sample extracted 12 days after collection

Note:
°C = degrees Celsius

The samples listed in **Table 19** have been qualified as shown in **Table 20**.

Table 20 Preservation and Holding Time Nonconformance Actions – Pesticides

Quality Control Nonconformance	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than or equal to 2× holding time.	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time.	J	R
Preservation temperature was exceeded, observed temperature is greater than 6°C. Holding time criteria were met.	J	UJ
Preservation temperature was exceeded, observed temperature is greater than 6°C. Technical holding time exceeded.	J	R

Notes:
[1] See **Table 2** for qualifier definitions.
°C = degree Celsius

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

The laboratory report narrative includes the following notes, "Compound eluted outside the retention time window on the front column for the following samples: (CCV 180-452496/27), (CCV 180-452496/28), (CCV 180-452496/29) and (CCV 180-452496/30). This retention time shift was taken into account when reviewing the samples for target compounds." This did not lead to qualification of reported results.

Sample results associated with continuing calibrations that did not meet criteria are listed in **Table 21**. Other calibration criteria were met; the initial calibration relative standard deviation values, and the correlation coefficients, were acceptable.

Table 21 Observed Calibration Nonconformances – Pesticides

Calibration (Column MR-1)	Compound	Quality Control Nonconformance	Associated Samples
ICV 180-449502/33	2,4'-DDD	ICV%D +100.4	180-164842-4
	cis-Nonachlor	ICV%D +26.0	
ICV 180-449502/35	2,4'-DDE	ICV%D -24.1	
CCV 180-452496/27	Toxaphene	CCV%D -38.2	
CCVIS 180-452496/31	4,4'-DDE	CCV%D +35.8	
	Dieldrin	CCV%D +58.9	
	Endrin	CCV%D +63.5	
	4,4'-DDD	CCV%D +42.3	
	Endosulfan II	CCV%D +55.1	
	4,4'-DDT	CCV%D +46.6	
	Endrin aldehyde	CCV%D +46.0	
	Methoxychlor	CCV%D +42.2	
	Endosulfan sulfate	CCV%D +41.1	
	Endrin ketone	CCV%D +29.4	

Notes:
CCV = continuing calibration verification
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
ICV = initial calibration verification

Sample results associated with non-compliant calibration values are qualified in accordance with **Table 22**.

Table 22 Initial and Continuing Calibration Nonconformance Actions – Pesticides

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
%RSD is greater than: • 20 percent for single component target analytes except alpha BHC (alpha hexachlorocyclohexane) and delta-BHC (delta hexachlorocyclohexane) • 25 percent for alpha BHC (alpha hexachlorocyclohexane) and delta-BHC (delta hexachlorocyclohexane) • 30 percent for toxaphene peaks • 20 percent for surrogates	Non-detect	UJ
	Detect	J
%D is greater than 20 percent (increase in sensitivity).	Non-detect	No Action
	Detect	J
%D is greater than 20 percent (decrease in sensitivity).	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
RSD = relative standard deviation

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Results for the laboratory method blank and the equipment blank were non-detect.

5.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to

predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationships between the amounts of surrogate added and the amounts of surrogate reported for each sample were within control limits.

5.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is a separately prepared QC sample that is meant to be identical to the laboratory control sample. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and laboratory control sample duplicate are evaluated to access accuracy. The relative percent difference between the laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Sample results associated with laboratory control sample recoveries or relative percent difference values outside control limits are listed in **Table 23**.

Table 23 Observed Laboratory Control Sample/Laboratory Control Sample Duplicate Nonconformances – Pesticides

LCS/LCSD Sample ID	Analyte	LCS and/or LCSD Recovery	RPD	Associated Samples
180-451812/2-A 180-451812/3-A	Dieldrin	Greater than the upper acceptance limit	Acceptable	180-164842-4
	Endrin	Greater than the upper acceptance limit	Acceptable	

Notes:
LCS = laboratory control sample
LCSD = laboratory control sample duplicate
RPD = relative percent difference

Sample results associated with noncompliant laboratory control sample recoveries or relative percent difference values are qualified in accordance with **Table 24**.

Table 24 Laboratory Control Sample Nonconformance Actions – Pesticides

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit	Non-detect	No Action
	Detect	J

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is less than the lower acceptance limit but greater than 10 percent	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent	Non-detect	R
	Detect	J
Laboratory control sample/laboratory control sample duplicate relative percent difference is greater than the upper acceptance limit	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.

5.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Not applicable—no matrix spike analysis was performed on a sample in this data set.

5.7 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, some analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standard peak heights and retention times were within acceptance limits.

5.8 Laboratory Duplicate Analysis

Not applicable—no laboratory duplicate analysis performed on a sample in this data set was reported.

5.9 Target Compound Identification

No pesticides were detected in samples in this SDG. The percent difference between results for three compounds in laboratory control sample and laboratory control sample duplicate 180-451812/2-A and 180-451812/3-A were greater than 25. This does not lead to sample result qualification and is included for information purposes only.

5.10 Field Duplicates

Not applicable—the parent sample-field duplicate sample pair in this SDG was not designated for pesticide analysis.

5.11 Additional Notes

Not applicable—no additional notes to report.

6 Metals Analysis

6.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 25**.

Table 25 Preservation and Holding Time Requirements – Metals

Method	Matrix	Preservation	Holding Time
Metals (except mercury) by Method 6020	Water	Nitric acid to pH less than 2	180 days from collection to analysis
Mercury by Method 7470	Water	Nitric acid to pH less than 2	28 days from collection to analysis
Low-level mercury by Method 1631E	Water	No preservation needed at time of collection.	28 days from collection to preservation* 90 days from preservation to analysis

Note:
*Preservation time is up to 28 days for samples that will not need to be transferred from their original containers.

6.2 Inductively Coupled Plasma-Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: The laboratory's "…tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DoD [Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u1 full width at 10% peak height."2
- "Resolution < 0.9 amu full width at 10% peak height."3

[1] u = unified atomic mass unit

[2] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf

[3] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.4, Appendix B, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

6.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits for all reported metals.
- Contract required detection limit check standards were analyzed; recoveries were acceptable.

6.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Sample results associated with blank contamination are presented in **Table 26**.

Table 26 Observed Blank Contamination and Associated Actions – Metals

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Copper	0.4 J µg/L (EQB-SED-20231102)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164842-3	Non-detect	No qualification needed
			180-164842-2	Greater than reporting limit but less than 5× the blank result	Report U at the detected concentration
			180-164842-1	Greater than reporting limit and greater than 5× the blank result	No qualification needed

Notes:
[1] See **Table 2** for qualifier definitions.
µg/L = microgram per liter
EQB = equipment blank

6.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

6.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is, as the name implies, a separate QC sample that is created just as the laboratory control sample is created. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and from the laboratory control sample duplicate are evaluated to access accuracy and bias. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Acceptance criteria were met. Laboratory control sample and laboratory control sample duplicate recoveries, as well as the relative percent difference between laboratory control sample and laboratory control sample duplicate results, were within acceptance limits. A laboratory control sample/laboratory control sample duplicate pair was analyzed for Method 7470A. Single laboratory control samples were analyzed with Methods 6020 and 1631. Recoveries of linear range check standards were also within control limits.

6.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from

matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analyses were performed on sample 180-164842-1. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

6.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Not applicable—no laboratory duplicate analysis was reported in this data set.

6.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Serial dilution analysis was performed on sample 180-164842-1; a result was reported for sodium. The percent difference was within control limits. No results for other metals were reported.

6.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

6.11 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 27**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 27 Observed Field Duplicate Nonconformances – Metals

Samples	Analyte	Parent Sample Result (µg/L)	Duplicate Sample Result (µg/L)	Relationship
PBA-BKG-PW-Z/ BKG-DUP-PW-Z	Copper	2.6	1.3 U(1)	NC

Notes:
(1) See **Table 2** for qualifier definitions.
µg/L = micrograms per liter
NC = Not compliant—this refers to cases in which the sample and/or duplicate concentration is less than 5x the reporting limit and the difference between the two is outside the acceptance limits.

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied (**Table 28**). Because of the noncompliant parent sample-field duplicate relationships, qualifiers were applied to the two results for dissolved copper in field samples in this SDG.

Table 28 Field Duplicate Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate concentrations are greater than or equal to 5x the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/ sediment)	Detect	J
Sample and/or its field duplicate concentrations(s) is/are less than 5x the reporting limit, and • Absolute difference is greater than 2x the reporting limit (aqueous) **or** • Absolute difference is greater than 3x the reporting limit (soil/ sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

6.12 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

7 General Chemistry Analysis

7.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 29**.

Table 29 Preservation and Holding Time Requirements – General Chemistry

Method	Matrix	Preservation	Holding Time
Hardness by Method SM2340C	Water	Nitric acid to pH less than 2	180 days
Total organic carbon by Method 9060	Water	Less than or equal to 6°C; phosphoric acid to pH less than 2	28 days
pH by Method 9040	Water	Less than or equal to 6°C	15 minutes

Note:
°C = degrees Celsius

Reported results associated with analyses performed outside of the specified holding times are listed in **Table 30**.

Table 30 Observed Preservation and/or Holding Time Nonconformances – General Chemistry

Samples	Analysis	Holding Time	Observed Holding Time
180-164842-1 180-164842-2 180-164842-3 180-164842-4	pH	15 minutes	27 days

The samples listed in **Table 30** have been qualified as shown in **Table 31**.

Table 31 Preservation and Holding Time Nonconformance Actions – General Chemistry

Quality Control Excursion	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R

Note:
[1] See **Table 2** for qualifier definitions.

7.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- Calibration curves exhibited acceptable correlation coefficients or coefficients of determination.
- Continuing calibration verification results were within limits.

7.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported in laboratory method blanks or calibrations blanks. Equipment blank results were non-detect for all analytes other than pH.

7.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

7.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on sample 180-164842-1 for hardness. Matrix spike recoveries, as well as the relative percent difference between matrix spike and matrix spike duplicate, were acceptable.

7.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 32**) were met. Laboratory duplicate analysis was performed on sample 180-164842-1 for hardness.

Table 32 Acceptable Parent Sample-Laboratory Duplicate Relationships – General Chemistry

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

7.7 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 33**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 33 Observed Field Duplicate Nonconformances – General Chemistry

Samples	Analyte	Parent Sample Result (µg/L)	Duplicate Sample Result (µg/L)	Relationship
PBA-BKG-PW-Z/ BKG-DUP-PW-Z	Hardness (As $CaCO_3$)	190	380	66.7 percent

Notes:
µg/L = micrograms per liter
$CaCO_3$ = calcium carbonate

For analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied (**Table 34**). Because of the noncompliant parent sample-field duplicate relationships, qualifiers were applied to the two hardness results for dissolved field samples in this SDG.

Table 34 Field Duplicate Nonconformance Actions – General Chemistry

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate concentrations are greater than or equal to 5x the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J
Sample and/or its field duplicate concentrations(s) is/are less than 5x the reporting limit, and • Absolute difference is greater than 2x the reporting limit (aqueous) **or** • Absolute difference is greater than 3x the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

7.8 Additional Notes

Hardness results for field samples were reported from dilutions.

Validation performed by: Amy Coats
EHS Support LLC

8 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-PW-Z	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.018	UJ	0.018	UF2	180-164842-1	180-164842-1
PBA-BKG-PW-Z	11/2/2023	Water	T	2340C	Hardness (As CaCO3)	mg/L	190	J	15		180-164842-1	180-164842-1
PBA-BKG-PW-Z	11/2/2023	Water	D	6020B	Copper	µg/L	2.6	J	0.36		180-164842-1	180-164842-1
PBA-BKG-PW-Z	11/2/2023	Water	T	9040C	pH	SU	8.5	J	0.1	HF	180-164842-1	180-164842-1
BKG-DUP-PW-Z	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.018	UJ	0.018	U	180-164842-2	180-164842-1
BKG-DUP-PW-Z	11/2/2023	Water	T	2340C	Hardness (As CaCO3)	mg/L	380	J	30		180-164842-2	180-164842-1
BKG-DUP-PW-Z	11/2/2023	Water	D	6020B	Copper	µg/L	1.3	UJ	1.3		180-164842-2	180-164842-1
BKG-DUP-PW-Z	11/2/2023	Water	T	9040C	pH	SU	8.3	J	0.1	HF	180-164842-2	180-164842-1
EQB-PW-20231102	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.018	R	0.018	U	180-164842-3	180-164842-1
EQB-PW-20231102	11/2/2023	Water	T	9040C	pH	SU	5.6	J	0.1	HF	180-164842-3	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Aldrin	µg/L	0.00034	R	0.00034	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	alpha BHC (Alpha Hexachlorocyclohexane)	µg/L	0.00022	R	0.00022	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Alpha Endosulfan	µg/L	0.00065	R	0.00065	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	beta BHC (Beta Hexachlorocyclohexane)	µg/L	0.00035	R	0.00035	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Beta Endosulfan	µg/L	0.0003	R	0.00030	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	cis-Chlordane	µg/L	0.00035	R	0.00035	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	delta BHC (Delta Hexachlorocyclohexane)	µg/L	0.00061	R	0.00061	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Dieldrin	µg/L	0.00026	R	0.00026	U*+H	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Endosulfan sulfate	µg/L	0.0006	R	0.00060	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Endrin	µg/L	0.00022	R	0.00022	U*+H	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Endrin Aldehyde	µg/L	0.00049	R	0.00049	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Endrin Ketone	µg/L	0.00037	R	0.00037	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	gamma BHC (Lindane)	µg/L	0.00028	R	0.00028	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Heptachlor	µg/L	0.00043	R	0.00043	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Heptachlor epoxide - isomer b	µg/L	0.00032	R	0.00032	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Methoxychlor	µg/L	0.00073	R	0.00073	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	P,P'-DDD	µg/L	0.0005	R	0.00050	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	P,P'-DDE	µg/L	0.00028	R	0.00028	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	P,P'-DDT	µg/L	0.00065	R	0.00065	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	Toxaphene	µg/L	0.046	R	0.046	UH	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8081B	trans-Chlordane	µg/L	0.00039	R	0.00039	UH	180-164842-4	180-164842-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1,1-Trichloroethane	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1,2,2-Tetrachloroethane	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	4.3	R	4.3	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1,2-Trichloroethane	µg/L	2.3	R	2.3	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1-Dichloroethane	µg/L	3.1	R	3.1	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,1-Dichloroethene	µg/L	2.8	R	2.8	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2,4-Trichlorobenzene	µg/L	3.9	R	3.9	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2-Dibromo-3-Chloropropane	µg/L	4.4	R	4.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2-Dibromoethane (Ethylene Dibromide)	µg/L	2.5	R	2.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2-Dichlorobenzene	µg/L	1.8	R	1.8	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2-Dichloroethane	µg/L	2.9	R	2.9	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,2-Dichloropropane	µg/L	3.3	R	3.3	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,3-Dichlorobenzene	µg/L	2.5	R	2.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	1,4-Dichlorobenzene	µg/L	2.7	R	2.7	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	2-Hexanone	µg/L	16	R	16	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Acetone	µg/L	17	R	17	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Benzene	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Bromodichloromethane	µg/L	3.2	R	3.2	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Bromoform	µg/L	4.9	R	4.9	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Bromomethane	µg/L	4.4	R	4.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Carbon Disulfide	µg/L	4.4	R	4.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Carbon Tetrachloride	µg/L	4.4	R	4.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Chlorobenzene	µg/L	2.5	R	2.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Chloroethane	µg/L	4.5	R	4.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Chloroform	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Chloromethane	µg/L	4.5	R	4.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	cis-1,2-Dichloroethene	µg/L	3.5	R	3.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	cis-1,3-Dichloropropene	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Cyclohexane	µg/L	3.2	R	3.2	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Dibromochloromethane	µg/L	4.2	R	4.2	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Dichlorodifluoromethane	µg/L	4.2	R	4.2	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Ethylbenzene	µg/L	2.5	R	2.5	U	180-164842-4	180-164842-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
EQB-SED-20231102	11/2/2023	Water	N	8260D	Isopropylbenzene (Cumene)	µg/L	1.7	R	1.7	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Methyl Acetate	µg/L	8.4	R	8.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Methyl Ethyl Ketone	µg/L	13	R	13	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Methyl Isobutyl Ketone	µg/L	15	R	15	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Methylcyclohexane	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Methylene Chloride	µg/L	5.4	J	4.4		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Styrene	µg/L	2.4	R	2.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Tert-Butyl Methyl Ether	µg/L	3	R	3.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Tetrachloroethylene	µg/L	2.3	R	2.3	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Toluene	µg/L	2.3	R	2.3	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	trans-1,2-Dichloroethene	µg/L	3.4	R	3.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	trans-1,3-Dichloropropene	µg/L	2.9	R	2.9	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Trichloroethylene	µg/L	3.4	R	3.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Trichlorofluoromethane	µg/L	4.4	R	4.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Vinyl Chloride	µg/L	2	R	2.0	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8260D	Xylenes	µg/L	4.5	R	4.5	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4,5-Trichlorophenol	µg/L	0.24	R	0.24	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4,6-Trichlorophenol	µg/L	0.21	R	0.21	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4-Dichlorophenol	µg/L	0.048	R	0.048	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4-Dimethylphenol	µg/L	0.16	R	0.16	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4-Dinitrophenol	µg/L	1.4	R	1.4	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,4-Dinitrotoluene	µg/L	0.33	R	0.33	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2,6-Dinitrotoluene	µg/L	0.16	R	0.16	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Chloronaphthalene	µg/L	0.056	R	0.056	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Chlorophenol	µg/L	0.12	R	0.12	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Methylnaphthalene	µg/L	0.058	R	0.058	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Methylphenol (O-Cresol)	µg/L	0.28	R	0.28	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Nitroaniline	µg/L	0.52	R	0.52	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	2-Nitrophenol	µg/L	0.18	R	0.18	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	3,3'-Dichlorobenzidine	µg/L	0.55	R	0.55	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	3-Nitroaniline	µg/L	0.41	R	0.41	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4,6-Dinitro-2-Methylphenol	µg/L	1.4	R	1.4	U	180-164842-4	180-164842-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Bromodiphenyl ether (PBDE-003)	µg/L	0.3	R	0.30	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Chloro-3-Methylphenol	µg/L	0.26	R	0.26	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Chloroaniline	µg/L	0.35	R	0.35	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Chlorophenyl Phenyl Ether	µg/L	0.21	R	0.21	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Methylphenol (P-Cresol)	µg/L	0.35	R	0.35	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Nitroaniline	µg/L	0.34	R	0.34	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	4-Nitrophenol	µg/L	0.89	R	0.89	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Acenaphthylene	µg/L	0.061	R	0.061	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Acetophenone	µg/L	0.15	R	0.15	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Anthracene	µg/L	0.21	J	0.046		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Atrazine	µg/L	0.6	R	0.60	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Benzaldehyde	µg/L	0.51	R	0.51	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Benzo[a]anthracene	µg/L	0.63	J	0.071		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Benzo[b]fluoranthene	µg/L	0.39	J	0.092		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Benzo[k]fluoranthene	µg/L	0.25	J	0.083		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Benzyl Butyl Phthalate	µg/L	0.44	R	0.44	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Biphenyl (Diphenyl)	µg/L	0.13	R	0.13	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Bis(2-Chloroethoxy) Methane	µg/L	0.14	R	0.14	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Bis(2-Chloroethyl) Ether	µg/L	0.038	R	0.038	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Bis(2-Chloroisopropyl) Ether	µg/L	0.055	R	0.055	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Bis(2-ethylhexyl) phthalate	µg/L	5.9	R	5.9	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Caprolactam	µg/L	0.44	R	0.44	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Chrysene	µg/L	0.81	J	0.076		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Dibenz[a,h]anthracene	µg/L	0.068	R	0.068	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Dibenzofuran	µg/L	0.18	R	0.18	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Diethyl Phthalate	µg/L	0.53	R	0.53	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Dimethyl phthalate	µg/L	0.19	R	0.19	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Di-N-Butyl Phthalate	µg/L	0.7	R	0.70	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Di-n-octyl phthalate	µg/L	0.65	R	0.65	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Fluoranthene	µg/L	2	J	0.057		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Hexachlorobenzene	µg/L	0.053	R	0.053	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Hexachlorobutadiene	µg/L	0.065	R	0.065	U	180-164842-4	180-164842-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
EQB-SED-20231102	11/2/2023	Water	N	8270D	Hexachlorocyclopentadiene	µg/L	0.47	R	0.47	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Hexachloroethane	µg/L	0.13	R	0.13	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Isophorone	µg/L	0.18	R	0.18	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Naphthalene	µg/L	0.056	R	0.056	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Nitrobenzene	µg/L	0.47	R	0.47	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	N-Nitrosodi-N-Propylamine	µg/L	0.067	R	0.067	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	N-Nitrosodiphenylamine	µg/L	0.11	R	0.11	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Pentachlorophenol	µg/L	0.8	R	0.80	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Phenanthrene	µg/L	0.88	J	0.052		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Phenol	µg/L	0.46	R	0.46	U	180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	N	8270D	Pyrene	µg/L	1.3	J	0.051		180-164842-4	180-164842-1
EQB-SED-20231102	11/2/2023	Water	T	9040C	pH	SU	5.6	J	0.1	HF	180-164842-4	180-164842-1

Notes:
*+ = laboratory control sample and/or laboratory control sample duplicate is outside acceptance limits; high biased.
µg/L = micrograms per liter
F2 = matrix spike/matrix spike duplicate relative percent difference exceeds control limits
H = Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements.
HF = Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/L = milligram per liter
N = not applicable
ng/L = nanogram per liter
R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
SDG = sample delivery group
SU = standard unit
T = Total
U (lab qualifier) = Indicates the analyte was analyzed for but not detected.
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

EHS Support Validation Report Number: 736

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164859-1
Analyses: SVOC, Metals, General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Pittsburgh, Pennsylvania, and Cleveland, Ohio

EHS Support

Report Date:

September 25, 2024

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Appendix

1 Sample and Analytical Protocol Summary

Water samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 6020B for metals
  - 9040C for pH
- USEPA Methods
  - 1630 for methylmercury
  - 1631E for low-level mercury
- Standard Method (SM)
  - Hardness: SM2340C

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses		
					SVOC	Metals	Gen Chem
180-164859-1	180-164859-1	PBA-01-PW-Z	Water	11/3/2023	X	X	X
180-164859-1	180-164859-2	PBA-02-PW-Z	Water	11/2/2023	X	X	X
180-164859-1	180-164859-3	PBA-03-PW-Z	Water	11/2/2023	X	X	X
180-164859-1	180-164859-4	PBA-04-PW-Z	Water	11/2/2023	X	X	X
180-164859-1	180-164859-5	DUP-PW-Z	Water	11/3/2023	X	X	X
180-164859-1	180-164859-6	EQB-PW-20231103	Water	11/3/2023	X	X	X
180-164859-1	180-164859-7	PBA-01-PW	Water	11/3/2023			X
180-164859-1	180-164859-8	PBA-02-PW	Water	11/2/2023			X
180-164859-1	180-164859-9	PBA-03-PW	Water	11/2/2023			X
180-164859-1	180-164859-10	PBA-04-PW	Water	11/2/2023			X
180-164859-1	180-164859-11	DUP-PW	Water	11/3/2023			X

Notes:
Samples whose names end with "-Z" are filtered aliquots.
Gen chem = general chemistry
SDG = sample delivery group
SVOC = semi-volatile organic compound

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The Login Sample Receipt Checklist includes a value of “False” for the checklist item “There are no discrepancies between the containers received and the COC.” However, no additional notes about discrepancies were found. The chain of custody was completed correctly, except that samples PBA-04-PW and DUP-PW (180-164859-10 and 180-164859-11) are included in the lab report but not included on the copy of the chain of custody included in the lab report. The gap between the relinquishing date/time and the receiving date/time is assumed to correspond to sample shipment.

No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, no QC excursions encountered led to the rejection of data. Results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A.**

3 Semi-Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements – Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Methylmercury by Method 1630	Water	Amber glass vials, hydrochloric acid to pH less than 2	180 days from collection to analysis

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- Correlation coefficients were acceptable.
- The continuing calibration verification percent difference results were within limits.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported from the laboratory method blanks, calibration blanks, or equipment blank associated with reported results in this data set.

3.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

3.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. The reported recovery was within control limits.

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 4**.

Table 4 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Semi-Volatile Organic Compounds

Lab Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164859-3	Methylmercury (Method 1630)	Less than the lower acceptance limit but greater than 10 percent.	Acceptable	Greater than upper acceptance limit

Samples to be analyzed using Method 1630 have been prepared using batch digestion. Therefore, the batch qualifications are applied. Because of the noncompliant matrix spike result, qualifiers shown in **Table 5** were applied to the methylmercury results for all filtered field samples in this SDG, except for 180-164859-1. The matrix spike/matrix spike duplicate analysis performed on this sample exhibited acceptable recoveries and acceptable relative percent difference between the matrix spike and matrix spike duplicate results.

Table 5 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
(1) See **Table 2** for qualifier definitions.

3.7 Target Compound Identification

Acceptable; no issues were encountered. Retention times for the analyte and surrogate were within limits. No reported results were greater than the calibrated range of the instrument.

3.8 Field Duplicates

Acceptance criteria (**Table 6**) were met. One parent sample-field duplicate sample pair was included in this SDG and designated for methylmercury analysis.

Table 6 Acceptable Parent Sample-Field Duplicate Relationships – Semi-Volatile Organic Compounds

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) or • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) or • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

3.9 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

4 Metals Analysis

4.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 7**.

Table 7 Preservation and Holding Time Requirements – Metals

Method	Matrix	Preservation	Holding Time
Metals (except mercury) by Method 6020	Water	Nitric acid to pH less than 2	180 days from collection to analysis
Low-level mercury by Method 1631E	Water	No preservation needed at time of collection.	28 days from collection to preservation* 90 days from preservation to analysis

Note:
*Preservation time is up to 28 days for samples that will not need to be transferred from their original containers.

4.2 Inductively Coupled Plasma-Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: The laboratory's "…tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DOD [Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[1] full width at 10% peak height."[2]
- "Resolution < 0.9 amu full width at 10% peak height."[3]

[1] u = unified atomic mass unit

[2] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf

[3] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual for Environmental Laboratories, Version 5.4, Appendix B, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits.
- Contract-required detection limit check standards were analyzed; recoveries were acceptable.

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported from the laboratory method blanks, instrument blanks, or equipment blank associated with reported results in this data set.

4.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

4.6 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Laboratory control sample recoveries were within acceptance limits. Recoveries of linear range check standards were also within control limits.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on sample 180-164859-3 for Methods 1631 and 6020.

4.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Not applicable—no laboratory duplicate analysis was reported.

4.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Not applicable—no serial dilution analysis was reported.

4.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

4.11 Field Duplicates

Acceptance criteria (**Table 8**) were met. One parent sample-field duplicate sample pair was included in this SDG and designated for metals analysis.

Table 8 Acceptable Parent Sample-Field Duplicate Relationships – Metals

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

4.12 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

5 General Chemistry Analysis

5.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 9**.

Table 9 Preservation and Holding Time Requirements – General Chemistry

Method	Matrix	Preservation	Holding Time
Hardness by Method SM2340C	Water	HNO_3 to pH less than 2	180 days
pH by Method 9040C	Water	Less than or equal to 6°C	15 minutes

Notes:
°C = degree Celsius
HNO_3 = nitric acid
SM = Standard Method

Reported results associated with analyses performed outside of the specified holding times are listed in **Table 10**.

Table 10 Observed Preservation and/or Holding Time Nonconformances – General Chemistry

Samples	Analysis	Holding Time	Observed Holding Time
180-164859-6 180-164859-7 180-164859-8 180-164859-9 180-164859-10 180-164859-11	pH by Method 9040	15 minutes	28-30 days

The samples listed in **Table 10** have been qualified as shown in **Table 11**.

Table 11 Preservation and Holding Time Nonconformance Actions – General Chemistry

Quality Control Excursion	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R

Note:
[1] See **Table 2** for qualifier definitions.

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met; continuing calibration verification results were within limits.

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections of hardness were reported in the laboratory method blank, instrument blanks, or the equipment blank.

5.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

5.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to

the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on sample 180-164859-3 for hardness.

5.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 12**) were met. Laboratory duplicate analysis was performed on sample 180-164859-9 for pH and hardness.

Table 12 Acceptable Parent Sample-Laboratory Duplicate Relationships – General Chemistry

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

5.7 Field Duplicates

Acceptance criteria (**Table 13**) were met; two parent sample-field duplicate sample pair were included in this SDG.

Table 13 Acceptable Parent Sample-Field Duplicate Relationships – General Chemistry

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

5.8 Additional Notes

Hardness results for all field samples in this SDG were reported from dilutions.

Validation performed by: Amy Coats
EHS Support LLC

6 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-01-PW-Z	11/3/2023	Water	N	1630	Methylmercury	ng/L	0.18	UJ	0.18	U	180-164859-1	180-164859-1
PBA-04-PW	11/2/2023	Water	T	9040C	pH	s.u.	8.3	J	0.1	HF	180-164859-10	180-164859-1
DUP-PW	11/3/2023	Water	T	9040C	pH	s.u.	7.7	J	0.1	HF	180-164859-11	180-164859-1
PBA-02-PW-Z	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.051	J	0.018		180-164859-2	180-164859-1
PBA-03-PW-Z	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.018	UJ	0.018	UF1F2	180-164859-3	180-164859-1
PBA-04-PW-Z	11/2/2023	Water	N	1630	Methylmercury	ng/L	0.018	UJ	0.018	U	180-164859-4	180-164859-1
EQB-PW-20231103	11/3/2023	Water	T	9040C	pH	s.u.	5.6	J	0.1	HF	180-164859-6	180-164859-1
PBA-01-PW	11/3/2023	Water	T	9040C	pH	s.u.	7.5	J	0.1	HF	180-164859-7	180-164859-1
PBA-02-PW	11/2/2023	Water	T	9040C	pH	s.u.	8	J	0.1	HF	180-164859-8	180-164859-1
PBA-03-PW	11/2/2023	Water	T	9040C	pH	s.u.	8.6	J	0.1	HF	180-164859-9	180-164859-1

Notes:
F1 = Matrix spike and/or matrix spike duplicate recovery exceeds control limits.
F2 = Matrix spike/matrix spike duplicate relative percent difference exceeds control limits.
HF = Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N = Not applicable
ng/L = nanogram per liter
SDG = sample delivery group
s.u. = standard unit
T = Total
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

EHS Support Validation Report Number: 744

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG):
180-164778-1
Analyses: VOC, SVOC, Pesticides, Metals, General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Pittsburgh, Pennsylvania

EHS Support

Report Date:

November 10, 2024

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Appendix

1 Sample and Analytical Protocol Summary

Sediment samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 8260D for volatile organic compounds
  - 8270E for semi-volatile organic compounds
  - 8081B for pesticides
  - 6010D for acid volatile sulfide/simultaneous extracted metals (AVS/SEM)
  - 6020B for metals
  - 7470A for AVS/SEM mercury
  - 7471B for mercury
  - 9034 for AVS/SEM acid-volatile sulfide
- The Lloyd Kahn Method for total organic carbon

Additional analyses were performed by the laboratory; samples were analyzed at Eurofins in Burlington, Vermont for grain size by ASTM[1] Method D422. No results of grain size analyses were validated. Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses				
					VOC	SVOC	Pest	Metals	Gen Chem
180-164778-1	180-164778-1	PBA-BKG-SD-0-8	Sediment	11/2/2023	X	X	X	X	X
180-164778-1	180-164778-2	TB-20231102	Sediment	11/2/2023	X				
180-164778-1	180-164778-3	PBA-BKG-DUP-SD-0-8	Sediment	11/2/2023	X	X	X	X	X

Notes:
Gen chem = general chemistry
Pest = pesticides
SDG = sample delivery group
SVOC = semi-volatile organic compound
VOC = volatile organic compound

[1] ASTM International, formerly known as American Society for Testing and Materials.

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The chain of custody was properly completed; the gap between relinquishing date/time and receiving date/time is assumed to be associated with sample shipment. It is assumed that custody was maintained. No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, specified results of Method 8270E and 8081B analyses were rejected. Remaining results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A.**

3 Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for VOCs are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements – Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Method 8260	Soil	Frozen, or cooled to less than or equal to 6°C and preserved with $NaHSO_4$ or MeOH.	14 days
	Water	Less than or equal to 6°C; HCl to pH less than 2; no headspace.	14 days
		Less than or equal to 6°C; no headspace.	7 days

Notes:
°C = degrees Celsius
HCl = hydrochloric acid
MeOH = methanol
$NaHSO_4$ = sodium bisulfate

3.2 Mass Spectrometer Tuning

Method 8260 uses gas chromatography and mass spectrometry. Gas chromatograph-mass spectrometer methods require mass spectrometers to meet specific tuning criteria, thereby demonstrating sufficient mass accuracy and mass resolution to be used for quantitative analysis of target, surrogate, and internal standard compounds. Gas chromatography-mass spectrometry tuning checks are performed to ensure acceptable system performance.

Tuning check criteria were met and all analyses were performed within a 12-hour tune clock.

3.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Sample results associated with continuing calibration results that did not meet criteria are listed in **Table 4**. Initial calibration results were acceptable. Notes in the laboratory report narrative state that relative response factors (RRFs) for methyl acetate failed to meet laboratory criteria. These RRF values meet the criterion provided in the National Functional Guidelines and are therefore considered acceptable.

Table 4 Observed Calibration Nonconformances – Volatile Organic Compounds

Calibration	Compound	Quality Control Nonconformance	Associated Samples
CCVIS 180-451162/2 Batch 180-451162	1,2-Dibromo-3-Chloropropane*	CCV%D -28.5	180-164778-3
	Chloroethane*	CCV%D -28.6	
	Dichlorodifluoromethane*	CCV%D -35.3	
	Trichlorofluoromethane	CCV%D +69.7	
CCVIS 180-451053/3 Batch 180-451053	Dichlorodifluoromethane*	CCV%D -20.8	180-164778-1 180-164778-2
	2-Butanone*	CCV%D -22.6	
	2-Hexanone*	CCV%D -20.9	
	1,2-Dibromo-3-Chloropropane*	CCV%D -36.5	
	Chloroethane	CCV %D +47.9	
	Trichlorofluoromethane	CCV %D +76.9	
	Toluene	CCV%D +20.7	
	Isopropylbenzene	CCV%D +23.1	

Notes:
*The laboratory report narrative includes a note saying "A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable."
%D = percent difference
CCV = continuing calibration verification

Sample results associated with non-compliant calibration values are qualified as shown in **Table 5**.

Table 5 Initial and Continuing Calibration Nonconformance Actions – Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Qualification[1]
RRF is less than the limit.	Non-detect	R
	Detect	J
Initial calibration %RSD or correlation coefficient is outside the acceptance limits (i.e., %RSD is greater than the maximum or the coefficient is less than 0.99).	Non-detect	UJ
	Detect	J
Initial calibration %RSD is greater than 90 percent.	Non-detect	R
	Detect	J
ICV and/or CCV %D is greater than the upper limit, positive; recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
ICV and/or CCV %D is greater than the upper limit, negative; recovery is less than lower acceptance limit	Non-detect	UJ
	Detect	J

Quality Control Nonconformance	Sample Result	Qualification[1]
ICV and/or CCV %D is greater than 90% (increase or decrease in sensitivity)	Non-detect	R
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%D = percent difference
%RSD = percent relative standard deviation
CCV = continuing calibration verification
ICV = initial calibration verification
RRF = relative response factor

3.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Trip blanks identify contamination introduced at any point during the "trip," which begins with the empty containers and their transportation to the site and includes field activity, shipment to the laboratory, and analysis.
- Field blanks identify contamination introduced from bottleware and ambient conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Results for the trip blank and laboratory method blanks were non-detect.

3.5 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly purging efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationships between the amounts of surrogate added and the amounts of surrogate reported for each sample were within control limits.

3.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is a separately prepared QC sample that is meant to be identical to the laboratory control sample. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and laboratory control sample duplicate are evaluated to access accuracy. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Sample results associated with laboratory control sample recoveries and/or relative percent difference values outside control limits are listed in **Table 6**. Samples in this SDG were analyzed in two batches. One batch included a laboratory control sample/laboratory control sample duplicate pair. The other included a single laboratory control sample. Limits provided in the National Functional Guidelines for percent recovery and relative percent difference values in matrix/matrix spike duplicate analyses are applied to laboratory control sample/laboratory control sample duplicate results. Compounds for which no such limits are provided in the National Functional Guidelines are evaluated using laboratory limits.

Table 6 Observed Laboratory Control Sample/Laboratory Control Sample Duplicate Nonconformances – Volatile Organic Compounds

LCS/LCSD Sample ID	Compound	LCS and/or LCSD Recovery	RPD	Associated Samples
LCS: 180-451053/4	Chloroethane*	Less than the lower acceptance limit but greater than 10 percent.	Not applicable; LCS only	180-164778-1 180-164778-2
	Trichlorofluoromethane	Greater than the upper acceptance limit.		

Notes:
* The laboratory report narrative includes a note stating that "A low-level LCS (LLCS), spiked at the reporting limit (RL), was prepared with this batch. The affected target analytes recovered within acceptance limits; therefore, the LLCS demonstrates the analytical system had sufficient sensitivity to detect the compounds had they been present."
LCS = laboratory control sample
LCSD = laboratory control sample duplicate
RPD = relative percent difference

Sample results associated with noncompliant laboratory control sample recoveries or relative percent difference values are qualified in accordance with **Table 7**.

Table 7 Laboratory Control Sample Nonconformance Actions – Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification [a]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J

Quality Control Nonconformance	Sample Result	Sample Result Qualification [a]
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Laboratory control sample/laboratory control sample duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[a] See **Table 2** for qualifier definitions.

3.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample, thus it is a spiked sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from the matrix spike and matrix spike duplicate are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike/matrix spike duplicate analyses were performed on sample 180-164778-1. Limits provided in the National Functional Guidelines for percent recovery and relative percent difference values are applied. Compounds for which no such limits are provided in the National Functional Guidelines are evaluated using laboratory limits. Matrix spike analyses exhibiting recoveries and/or relative percent difference values outside control limits are presented in **Table 8**.

Table 8 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Volatile Organic Compounds

Sample ID	Compound	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164778-1	1,1,2-Trichloro-1,2,2-trifluoroethane	Less than the lower acceptance limit but greater than 10 percent	Less than the lower acceptance limit but greater than 10 percent	Acceptable
	Cyclohexane	Less than the lower acceptance limit but greater than 10 percent	Acceptable	Acceptable

As a consequence of these excursions, the listed results have been qualified per **Table 9**.

Table 9 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

3.8 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, mass spectrometry analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses - such as injection and ionization variability - should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards. This 'builds in' a correction factor for analyte losses.

Acceptance criteria were met. Internal standard peak areas and retention times were within acceptance limits. The recovery of one internal standard in method blank MB 180-451162/7 was greater than the upper acceptance limit. This did not lead to any results being qualified and is included for informational purposes only.

3.9 Target Compound Identification

Acceptable; no issues were encountered.

3.10 Field Duplicates

Acceptance criteria (**Table 10**) were met. One parent sample-field duplicate sample pair was included in this SDG.

Table 10 Acceptable Parent Sample-Field Duplicate Relationships – Volatile Organic Compounds

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

3.11 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Soil/sediment samples with at least 30 percent solids do not require qualification of organic results based on the percent solids values. Samples in this data set met this criterion and did not need sample result qualification.

4 Semi-Volatile Organic Compound Analysis

4.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 11**.

Table 11 Preservation and Holding Time Requirements – Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Method 8270	Water	Less than or equal to 6°C	7 days from collection to extraction, 40 days from extraction to analysis
	Soil/ sediment	Less than or equal to 6°C	14 days from collection to extraction, 40 days from extraction to analysis

Note:
°C = degrees Celsius

4.2 Mass Spectrometer Tuning

Method 8270 uses gas chromatography and mass spectrometry. Gas chromatograph/mass spectrometer methods require mass spectrometers to meet specific tuning criteria, thereby demonstrating sufficient mass accuracy and mass resolution to be used for quantitative analysis of target, surrogate, and internal standard compounds. Gas chromatography-mass spectrometry tuning checks are performed to ensure acceptable system performance.

Tuning check criteria were met and all analyses were performed within a 12-hour tune clock.

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- The continuing calibration verification percent difference results were within limits.
- Minimum relative response factor criteria were met.

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Results for the laboratory method blank were non-detect.

4.5 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

4.6 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Reported recoveries were within control limits.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 12**.

Table 12 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Semi-Volatile Organic Compounds

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164778-1	3,3'-Dichlorobenzidine	Less than 10 percent	Acceptable	NA
	4,6-Dinitro-2-Methylphenol	Acceptable	Less than 10 percent	NA
	Atrazine	Less than 10 percent	Less than 10 percent	NA
	Benzaldehyde	Less than 10 percent	Less than 10 percent	NA
	Benzo[a]anthracene	Acceptable	Greater than the upper acceptance limit	Acceptable
	Benzo[b]fluoranthene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable
	Benzo[g,h,i]perylene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable
	Chrysene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable
	Fluoranthene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable
	Hexachlorocyclo-pentadiene	Less than 10 percent	Less than 10 percent	NA
	Indeno(1,2,3-C,D) pyrene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
	Phenanthrene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable
	Pyrene	Greater than the upper acceptance limit	Greater than the upper acceptance limit	Acceptable

Notes:
NA = Not applicable—when a recovery is significantly low, that recovery determines the relevant result qualification. In these cases, the relative percent difference is of no consequence.

As a consequence of these excursions, the listed results have been qualified per **Table 13**.

Table 13 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

4.8 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, mass spectrometry analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses - such as injection and ionization variability - should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is

known). In other words, target analytes are quantitated using the internal standards. This 'builds in' a correction factor for analyte losses.

Acceptance criteria were met. Internal standard peak areas and retention times for samples in this SDG were within acceptance limits.

4.9 Target Compound Identification

Acceptable—no issues were encountered. No reported results were greater than the calibrated range of the instrument.

4.10 Field Duplicates

One parent sample-field duplicate pair was submitted in this SDG. Cases in which the relationship between parent and duplicate results was outside the acceptance limits are presented in **Table 14**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 14 Observed Field Duplicate Nonconformances – Semi-Volatile Organic Compounds

Samples	Compound	Parent Sample Result (µg/kg)	Duplicate Sample Result (µg/kg)	Relationship
PBA-BKG-SD-0-8/ PBA-BKG-DUP-SD-0-8	Benzo[a]anthracene	50	130	NC
	Benzo[a]pyrene	58	130	NC
	Benzo[b]fluoranthene	69	190	93.4 percent
	Benzo[g,h,i]perylene	46	120	NC
	Chrysene	66	170	NC
	Fluoranthene	100	320	104.8 percent
	Phenanthrene	45	160	NC
	Pyrene	91	260	96.3

Notes:
µg/kg = microgram per kilogram
NC = Not compliant—this refers to cases in which the sample and/or duplicate concentration is less than 5× the reporting limit and the difference between the two is outside the acceptance limits.

As a consequence of these QC excursions, parent and duplicate sample results for the listed compounds have been qualified as estimated (J), in accordance with **Table 15**.

Table 15 Field Duplicate Nonconformance Actions – Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate is greater than or equal to 5× the reporting limit and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J
Sample and/or its field duplicate is less than 5× the reporting limit and • Absolute difference is greater than 2× the reporting limit (aqueous) **or** • Absolute difference is greater than 3× the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

4.11 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Results for the two field samples in this SDG were reported from dilutions. A note in the narrative states that “The following samples were diluted due to the nature of the sample matrix. The sample extracts were too viscous to be analyzed at any less of a dilution…”

Soil/sediment samples with at least 30 percent solids do not require qualification of organic results based on the percent solids values. Samples in this data set met this criterion and did not need sample result qualification.

5 Pesticides

5.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 16**.

Table 16 Preservation and Holding Time Requirements – Pesticides

Method	Matrix	Preservation	Holding Time
Method 8081	Water	Less than or equal to 6°C	7 days from collection to extraction, 40 days from extraction to analysis
	Soil/sediment	Less than or equal to 6°C	14 days from collection to extraction, 40 days from extraction to analysis

Note:
°C = degrees Celsius

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met for reported analytes:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- The continuing calibration verification percent difference results were within limits.

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Results for the laboratory method blank were non-detect.

5.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationships between the amounts of surrogate added and the amounts of surrogate reported for each sample were within control limits.

5.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The LCS undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Reported recoveries were within control limits.

5.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike analyses exhibiting recoveries and/or relative percent difference values outside control limits are presented in **Table 17**.

Table 17 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – Pesticides

Sample ID	Compound	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164778-1	Aldrin	Recovery is less than 10 percent	Acceptable	NA
	alpha BHC (Alpha Hexachlorocyclohexane)	Less than the lower acceptance limit but greater than 10 percent	Acceptable	Greater than the upper acceptance limit
	Alpha Endosulfan	Recovery is less than 10 percent	Acceptable	NA
	beta BHC (Beta Hexachlorocyclohexane)	Recovery is less than 10 percent	Greater than the upper acceptance limit	NA
	Beta Endosulfan	Recovery is less than 10 percent	Acceptable	NA
	cis-Chlordane	Acceptable	Recovery is less than 10 percent	NA
	delta BHC (Delta Hexachlorocyclohexane)	Recovery is less than 10 percent	Greater than the upper acceptance limit	NA
	Dieldrin	Recovery is less than 10 percent	Acceptable	NA
	Endosulfan sulfate	Recovery is less than 10 percent	Recovery is less than 10 percent	NA
	Endrin	Recovery is less than 10 percent	Acceptable	NA
	Endrin Aldehyde	Recovery is less than 10 percent	Acceptable	NA
	Endrin Ketone	Acceptable	Less than the lower acceptance limit but greater than 10 percent	Greater than the upper acceptance limit
	gamma BHC (Lindane)	Recovery is less than 10 percent	Acceptable	NA
	Heptachlor	Acceptable	Greater than the upper acceptance limit	Greater than the upper acceptance limit
	Heptachlor epoxide - isomer b	Recovery is less than 10 percent	Acceptable	NA
	Methoxychlor	Recovery is less than 10 percent	Recovery is less than 10 percent	NA

Sample ID	Compound	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
	P,P'-DDD	Recovery is less than 10 percent	Acceptable	NA
	P,P'-DDE	Acceptable	Recovery is less than 10 percent	NA
	P,P'-DDT	Recovery is less than 10 percent	Acceptable	NA
	trans-Chlordane	Acceptable	Recovery is less than 10 percent	NA

Notes:
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
NA = Not applicable. When a recovery is significantly low, that recovery determines the relevant result qualification. In these cases, the relative percent difference is of no consequence.
P,P = para, para

As a consequence of these excursions, the listed results have been qualified per **Table 18**.

Table 18 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Pesticides

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than the upper acceptance limit.	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit but greater than 10 percent.	Non-detect	UJ
	Detect	J
Recovery is less than 10 percent.	Non-detect	R
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.7 Internal Standards

In the process required for analyzing a sample, partial losses of target analytes occur. To correct for these losses, some analyses employ internal standards, which are chemicals that are very similar to target analytes but are not expected to be present in samples. Each field sample and QC sample is spiked with known concentrations of the internal standard compounds. Factors that lead to losses

should have the same impact on the recovery of internal standards as they have on the recovery of the target analytes. The final, reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Samples associated with internal standard recoveries outside control limits are listed in **Table 19**.

Table 19 Observed Internal Standard Nonconformances – Pesticides

Sample ID	Internal Standard	Recovery	Reported Compounds Associated with This Internal Standard
180-164778-1	1-Bromo-2-nitrobenzene	Greater than the upper acceptance limit	Aldrin alpha BHC Alpha Endosulfan beta BHC cis-Chlordane delta BHC (Delta Hexachlorocyclohexane) gamma BHC (Lindane) Heptachlor Heptachlor epoxide - isomer b Toxaphene trans-Chlordane
180-164778-3	1-Bromo-2-nitrobenzene	Greater than the upper acceptance limit	Aldrin alpha BHC Alpha Endosulfan beta BHC cis-Chlordane delta BHC gamma BHC (Lindane) Heptachlor Heptachlor epoxide - isomer b Toxaphene trans-Chlordane

Note:
BHC = hexachlorocyclohexane

As a consequence of these QC exceedances, compounds that are quantitated under the deviant internal standards have been qualified in accordance with **Table 20**.

Table 20 Internal Standard Nonconformance Actions – Pesticides

Internal Standard Recovery	Sample Result	Sample Result Qualification[1]
Greater than the upper acceptance limit	Non-detect	No action
	Detect	J
Less than the lower acceptance limit but greater than 20 percent	Non-detect	UJ
	Detect	J
Less than 20 percent	Non-detect	R
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.8 Target Compound Identification

One result from the Method 8081 analyses in this SDG yielded a detection. The dual column percent difference associated with that detection was acceptable.

5.9 Field Duplicates

Acceptance criteria (**Table 21**) were met. One parent sample-field duplicate sample pair was included in this SDG.

Table 21 Acceptable Parent Sample-Field Duplicate Relationships – Pesticides

Parent Sample and Field Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit.	• Relative percent difference is less than or equal to 30 percent (aqueous) **or** • Relative percent difference is less than or equal to 50 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit.	• Absolute difference is less than or equal to 2× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 3× the reporting limit (soil/sediment)

5.10 Additional Notes

Results for both field samples in this SDG were reported from dilutions. A note in the laboratory report narrative states that they "…were diluted due to the nature of the sample matrix."

Soil/sediment samples with at least 30 percent solids do not require qualification of organic results based on the percent solids values. Samples in this data set met this criterion and did not need sample result qualification.

6 Metals Analysis

6.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 22**.

Table 22 Preservation and Holding Time Requirements – Metals

Method	Matrix	Preservation	Holding Time
Metals by Method 6010/6020	Soil/sediment	None	180 days
Simultaneously extracted metals by 6010	Soil/sediment	Less than or equal to 6°C	180 days
Mercury by Method 7471	Soil/sediment	Less than or equal to 6°C	28 days
Simultaneously extracted mercury by 7470	Soil/sediment	Less than or equal to 6°C	28 days

Notes:
(1) Samples to be analyzed for simultaneously extracted metals were prepared using USEPA Method 821-R-91-100
°C = degree Celsius
USEPA = United States Environmental Protection Agency

6.2 Inductively Coupled Plasma-Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: The laboratory's "tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DoD (Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[2] full width at 10% peak height."[3]
- "Resolution < 0.9 amu full width at 10% peak height."[4]

[2] u = unified atomic mass unit
[3] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf
[4] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.4, Appendix B, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

6.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits for all reported metals.
- Contract-required detection limit check standards were analyzed; recoveries were acceptable.

6.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Positive (detected) sample results associated with blank contamination are presented in **Table 23**.

Table 23 Observed Blank Contamination and Associated Actions – Metals

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
AVS/SEM mercury	0.0000153 J µmol/g (MB 180-451270/2-B)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164778-3	Greater than reporting limit but less than 5× the blank result	Report U at the detected concentration
AVS/SEM copper	0.0022 J µmol/g (MB 180-451270/2-A)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164778-3	Greater than reporting limit and greater than 5× the blank result	No qualification needed

Notes:
[1] See **Table 2** for qualifier definitions.
µmol/g = micromoles per gram MB = method blank
AVS/SEM = acid volatile sulfide/simultaneously extracted metals

6.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

6.6 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Laboratory control sample recoveries were within control limits. Recoveries of linear range check standards were also within control limits.

6.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 24**. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

Table 24 Observed Matrix Spike Nonconformances – Metals

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164778-1	Zinc SEM	45 percent	42 percent	Acceptable
	Antimony	Acceptable	Acceptable	Greater than upper acceptance limit
	Arsenic	Acceptable	Acceptable	Greater than upper acceptance limit
	Barium	148 percent	135 percent	Greater than upper acceptance limit
	Beryllium	Acceptable	Acceptable	Greater than upper acceptance limit
	Cadmium	Acceptable	Acceptable	Greater than upper acceptance limit
	Chromium	Acceptable	Acceptable	Greater than upper acceptance limit
	Cobalt	Acceptable	Acceptable	Greater than upper acceptance limit
	Copper	Acceptable	Acceptable	Greater than upper acceptance limit
	Magnesium	255 percent	157 percent	Acceptable
	Manganese	255 percent	Acceptable	Greater than upper acceptance limit
	Nickel	Acceptable	Acceptable	Greater than upper acceptance limit
	Potassium	302 percent	377 percent	Acceptable
	Selenium	Acceptable	Acceptable	Greater than upper acceptance limit
	Silver	Acceptable	Acceptable	Greater than upper acceptance limit
	Sodium	Acceptable	Acceptable	Greater than upper acceptance limit
	Thallium	Acceptable	Acceptable	Greater than upper acceptance limit
	Zinc	152 percent	Acceptable	Greater than upper acceptance limit
	Vanadium	Acceptable	Acceptable	Greater than upper acceptance limit

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Because of the noncompliant matrix spike results, qualifiers (**Table 25**) were applied to results for the listed metals in all field samples in this SDG.

Table 25 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
%R: • 30–74 percent for most metals, including mercury • 20–74 percent for silver, antimony	Non-detect	UJ
	Detect	J

Quality Control Nonconformance	Sample Result	Qualification[1]
%R: • Less than 30 percent for most metals, including mercury • Less than 20 percent for silver, antimony	Non-detect	UJ if PDS %R is greater than or equal to 75 percent
		R if PDS not performed or PDS %R is less than 75 percent
	Detect	J
%R: • Greater than 125 percent for most metals, including mercury • Greater than 150 percent for silver, antimony	Non-detect	No Action
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference: • Greater than 20 percent (aqueous) • Greater than 35 percent (soil/sediment)	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%R = percent recovery
PDS = post-digestion spike

6.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Results associated with laboratory duplicate results outside acceptance limits are shown in **Table 26**. When the parent and duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference. Laboratory duplicate relative percent difference values for two metals were outside laboratory limits but met the criteria applied during validation and are therefore considered acceptable: barium (22 percent) and lead (22 percent).

Table 26 Observed Laboratory Duplicate Nonconformances – Metals

Sample	Analyte	Relative Percent Difference
180-164778-1	Nickel	39 percent

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Because of the noncompliant laboratory duplicate result, qualifiers (**Table 27**) were applied to nickel results for all field samples in this SDG.

Table 27 Laboratory Duplicate Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its duplicate is greater than or equal to 5× the reporting limit and • Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)	Detect	J
Sample and/or its duplicate is less than 5× the reporting limit and • Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

6.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Serial dilution analysis results that were outside control limits are shown in **Table 28**.

Table 28 Observed Serial Dilution Nonconformances - Metals

Sample	Analyte	% Difference
180-164778-1	Potassium	11 percent

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. As a consequence of the noncompliant serial dilution result, qualifiers were applied to potassium results for all field samples in this SDG (**Table 29**).

Table 29 Serial Dilution Nonconformance Actions – Metals

Serial Dilution % Difference	Sample Result	Qualification[1]
Greater than upper acceptance limit	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

6.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

6.11 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result – field duplicate result relationships that are outside acceptance limits are shown in **Table 30**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 30 Observed Field Duplicate Nonconformances – Metals

Samples	Analyte	Parent Sample Result	Duplicate Sample Result	Relationship
PBA-BKG-SD-0-8/ PBA-BKG-DUP-SD-0-8	Nickel	25 mg/kg	14 mg/kg	56.4 percent
	SEM/AVS Ratio	2	4.1	68.9 percent

Notes:
(1) The SEM/AVS ratio is calculated using results from metals and general chemistry analysis. This analyte is presented in field duplicate tables in the metals and general chemistry sections of this report.
AVS/SEM = acid volatile sulfide/simultaneous extracted metals
mg/kg = milligram per kilogram

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied (**Table 31**). Because of the noncompliant parent sample-field duplicate relationships, qualifiers were applied to all results for the listed analytes in field samples in this SDG.

Table 31 Field Duplicate Nonconformance Actions – Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate concentrations are greater than or equal to 5x the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and/or its field duplicate concentrations(s) is/are less than 5x the reporting limit, and • Absolute difference is greater than 2x the reporting limit (aqueous) **or** • Absolute difference is greater than 3x the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

6.12 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Non-aqueous samples with at least 50 percent solids do not require qualification of inorganic analytes based on the percent solids values. In this data set, this criterion was met; no results were qualified because of percent solids values.

7 General Chemistry Analysis

7.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 32**.

Table 32 Preservation and Holding Time Requirements – General Chemistry

Method	Matrix	Preservation	Holding Time
Total organic carbon by The Lloyd Kahn Method	Soil/sediment	Less than or equal to 6°C	14 days from collection to analysis
Acid volatile sulfide by 9034	Soil/sediment	Less than or equal to 6°C, zero headspace from collection to AVS prep	14 days from collection to analysis

Notes:
Samples to be analyzed for acid-volatile sulfide were prepared using USEPA Method 821-R-91-100
°C = degree Celsius
AVS = acid volatile sulfide
USEPA = United States Environmental Protection Agency

7.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- Calibration curves exhibited acceptable correlation coefficients or correlation factors.
- Initial and continuing calibration verification results were within limits.

7.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or ‘clean’ sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met; no detections were reported in laboratory method blanks. Calibration blank results for total organic carbon were non-detect. There was a detection in an acid-volatile sulfides calibration blank (CCB 180-451348/14). However, the initial calibration blank (ICB 180-451348/2) is the instrument blank that is associated with sample data and its result was non-detect.

7.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

7.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is a replicate of the matrix spike. It is a separate aliquot of sample into which the same concentrations of analytes are spiked; this second spiked sample is intended to be identical to the matrix spike. The matrix spike and matrix spike duplicate undergo the same preparation and analytical process as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 33**. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

Table 33 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances – General Chemistry

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164778-1	Acid-volatile sulfides (AVS)	54 percent	57 percent	Acceptable
	Total organic carbon	Less than 30 percent	Less than 30 percent	Acceptable

Because of these excursions, impacted results have been qualified as per the following table. For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Due to the noncompliant acid volatile sulfides (AVS) matrix spike results, qualifiers were

applied to AVS results for all field samples in this SDG. The total organic carbon variance led to the qualification of the total organic carbon result for sample 180-164778-1 (**Table 34**).

Table 34 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions – General Chemistry

Recovery	Sample Result	Qualification[1]
Matrix spike percent recovery is less than 75 percent but greater than or equal to 30 percent.	Non-detect	UJ
	Detect	J
Matrix spike percent recovery is less than 30 percent.	Non-detect	R
	Detect	J
Matrix spike percent recovery is greater than 125 percent.	Non-detect	No Action
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

7.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Not applicable—no laboratory duplicate analysis was reported.

7.7 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 35**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 35 Observed Field Duplicate Nonconformances – General Chemistry

Samples	Analyte	Parent Sample Result	Duplicate Sample Result	Relationship
PBA-BKG-SD-0-8/ PBA-BKG-DUP-SD-0-8	Total organic carbon	17,000 mg/kg	9,700 mg/kg	54.7 percent
	SEM/AVS Ratio	2	4.1	68.9 percent

Notes:
The SEM/AVS ratio is calculated using results from metals and general chemistry analysis. This analyte is presented in field duplicate tables in the metals and general chemistry sections of this report.
AVS/SEM = acid volatile sulfide/simultaneous extracted metals
mg/kg = milligram per kilogram

Because of these excursions, impacted results have been qualified per **Table 36**. For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Due to

the noncompliant relationship between parent and duplicate results for the SEM/AVS ratio, qualifiers were applied to SEM/AVS ratio results for all field samples in this SDG. The total organic carbon variance led to the qualification of the total organic carbon result for the parent and duplicate samples.

Table 36 Field Duplicate Nonconformance Actions – General Chemistry

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate concentrations are greater than or equal to 5× the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J
Sample and/or its field duplicate concentrations(s) is/are less than 5× the reporting limit, and • Absolute difference is greater than 2× the reporting limit (aqueous) **or** • Absolute difference is greater than 3× the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

7.8 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

The laboratory report narrative includes the following note: “The reporting limit for Lloyd Kahn TOC analysis is a nominal value and does not reflect adjustments in sample mass processed on an individual basis. “

Non-aqueous samples with at least 50 percent solids do not require qualification of inorganic analytes based on the percent solids values. In this data set, this criterion was met; no results were qualified because of percent solids values.

Amy Coats

Validation performed by: Amy Coats
EHS Support LLC

8 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	6010D AVS/SEM	Zinc	µmol/g	0.98	J	0.024	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Antimony	mg/kg	0.26	J	0.11	JF2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Arsenic	mg/kg	6.6	J	0.18	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Barium	mg/kg	55	J	0.25	F1F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Beryllium	mg/kg	0.36	J	0.032	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Cadmium	mg/kg	0.25	J	0.054	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Chromium, total	mg/kg	11	J	0.26	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Cobalt	mg/kg	5.5	J	0.11	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Copper	mg/kg	20	J	0.24	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Lead	mg/kg	35		0.10	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Magnesium	mg/kg	2,500	J	6.6	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Manganese	mg/kg	230	J	0.27	F1F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Nickel	mg/kg	25	J	0.26	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Potassium	mg/kg	1,300	J	22	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Selenium	mg/kg	0.28	J	0.14	JF2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Silver	mg/kg	0.22	J	0.055	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Sodium	mg/kg	54	J	32	JF2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Thallium	mg/kg	0.1	J	0.053	JF2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Vanadium	mg/kg	13	J	0.27	F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	6020B	Zinc	mg/kg	97	J	5.4	F1F2	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Aldrin	µg/kg	0.2	R	0.20	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	alpha BHC (Alpha Hexachlorocyclohexane)	µg/kg	0.16	UJ	0.16	UF2F1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Alpha Endosulfan	µg/kg	0.17	R	0.17	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	beta BHC (Beta Hexachlorocyclohexane)	µg/kg	0.17	R	0.17	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Beta Endosulfan	µg/kg	0.14	R	0.14	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	cis-Chlordane	µg/kg	0.16	R	0.16	U*3F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	delta BHC (Delta Hexachlorocyclohexane)	µg/kg	0.2	R	0.20	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Dieldrin	µg/kg	0.16	R	0.16	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Endosulfan sulfate	µg/kg	0.29	R	0.29	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Endrin	µg/kg	0.12	R	0.12	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Endrin Aldehyde	µg/kg	0.23	R	0.23	UF1	180-164778-1	180-164778-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Endrin Ketone	µg/kg	0.087	UJ	0.087	UF2F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	gamma BHC (Lindane)	µg/kg	0.16	R	0.16	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Heptachlor	µg/kg	0.2	UJ	0.20	UF2F1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Heptachlor epoxide - isomer b	µg/kg	0.16	R	0.16	UF1*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Methoxychlor	µg/kg	0.25	R	0.25	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	P,P'-DDD	µg/kg	0.13	R	0.13	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	P,P'-DDE	µg/kg	0.13	R	0.13	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	P,P'-DDT	µg/kg	0.45	R	0.45	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	Toxaphene	µg/kg	17	U	17	U*3	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8081B	trans-Chlordane	µg/kg	0.15	R	0.15	U*3F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/kg	2.7	UJ	2.7	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	1,2-Dibromo-3-Chloropropane	µg/kg	4.3	UJ	4.3	U	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	2-Hexanone	µg/kg	2.1	UJ	2.1	U	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	Chloroethane	µg/kg	3.9	UJ	3.9	U*-	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	Cyclohexane	µg/kg	3.2	UJ	3.2	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	Dichlorodifluoromethane	µg/kg	3.3	UJ	3.3	U	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	Methyl Ethyl Ketone	µg/kg	3.4	UJ	3.4	U	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8260D	Trichlorofluoromethane	µg/kg	5.6	U	5.6	U*+	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	3,3'-Dichlorobenzidine	µg/kg	230	R	230	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	4,6-Dinitro-2-Methylphenol	µg/kg	430	R	430	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Atrazine	µg/kg	110	R	110	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Benzaldehyde	µg/kg	31	R	31	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[a]anthracene	µg/kg	50	J	22	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[a]pyrene	µg/kg	58	J	22		180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[b]fluoranthene	µg/kg	69	J	12	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[g,h,i]perylene	µg/kg	46	J	11	JF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Chrysene	µg/kg	66	J	28	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Fluoranthene	µg/kg	100	J	13	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Hexachlorocyclopentadiene	µg/kg	25	R	25	UF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Indeno(1,2,3-C,D)Pyrene	µg/kg	32	J	25	JF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Phenanthrene	µg/kg	45	J	13	JF1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	8270E	Pyrene	µg/kg	91	J	12	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	9034 AVS/SEM	Acid Volatile Sulfide	µmol/g	0.56	J	0.23	JF1	180-164778-1	180-164778-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-SD-0-8	11/2/2023	Sediment	T	Lloyd Kahn	Total Organic Carbon	mg/kg	17,000	J	1,500	F1	180-164778-1	180-164778-1
PBA-BKG-SD-0-8	11/2/2023	Sediment	N	SEM	SEM/AVS Ratio	None	2	J	0		180-164778-1	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	1,2-Dibromo-3-Chloropropane	µg/kg	3.2	UJ	3.2	U	180-164778-2	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	2-Hexanone	µg/kg	1.6	UJ	1.6	U	180-164778-2	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	Chloroethane	µg/kg	2.9	UJ	2.9	U*-	180-164778-2	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	Dichlorodifluoromethane	µg/kg	2.5	UJ	2.5	U	180-164778-2	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	Methyl Ethyl Ketone	µg/kg	2.5	UJ	2.5	U	180-164778-2	180-164778-1
TB-20231102	11/2/2023	Sediment	N	8260D	Trichlorofluoromethane	µg/kg	4.2	U	4.2	U*+	180-164778-2	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	0.12		0.0012	B	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	6010D AVS/SEM	Zinc	µmol/g	0.87	J	0.023		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Antimony	mg/kg	0.27	J	0.097		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Arsenic	mg/kg	6.9	J	0.16		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Barium	mg/kg	54	J	0.22		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Beryllium	mg/kg	0.29	J	0.029		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Cadmium	mg/kg	0.23	J	0.049		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Chromium, total	mg/kg	10	J	0.23		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Cobalt	mg/kg	5.4	J	0.097		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Copper	mg/kg	14	J	0.22		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Magnesium	mg/kg	2300	J	6.0		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Manganese	mg/kg	250	J	0.24		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Nickel	mg/kg	14	J	0.23		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Potassium	mg/kg	1,000	J	19		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Vanadium	mg/kg	12	J	0.24		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	6020B	Zinc	mg/kg	110	J	4.9		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.000041	U	0.000041	B	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	Aldrin	µg/kg	0.18	U	0.18	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	alpha BHC (Alpha Hexachlorocyclohexane)	µg/kg	0.15	U	0.15	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	Alpha Endosulfan	µg/kg	0.16	U	0.16	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	beta BHC (Beta Hexachlorocyclohexane)	µg/kg	0.16	U	0.16	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	cis-Chlordane	µg/kg	0.15	U	0.15	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	delta BHC (Delta Hexachlorocyclohexane)	µg/kg	0.19	U	0.19	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	gamma BHC (Lindane)	µg/kg	0.15	U	0.15	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	Heptachlor	µg/kg	0.18	U	0.18	U*3	180-164778-3	180-164778-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	Heptachlor epoxide - isomer b	µg/kg	0.15	U	0.15	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	Toxaphene	µg/kg	16	U	16	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8081B	trans-Chlordane	µg/kg	0.14	U	0.14	U*3	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8260D	1,2-Dibromo-3-Chloropropane	µg/kg	4.4	UJ	4.4	U	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8260D	Chloroethane	µg/kg	4	UJ	4.0	U	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8260D	Dichlorodifluoromethane	µg/kg	3.4	UJ	3.4	U	180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[a]anthracene	µg/kg	130	J	21		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[a]pyrene	µg/kg	130	J	20		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[b]fluoranthene	µg/kg	190	J	12		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Benzo[g,h,i]perylene	µg/kg	120	J	10		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Chrysene	µg/kg	170	J	26		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Fluoranthene	µg/kg	320	J	12		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Phenanthrene	µg/kg	160	J	13		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	8270E	Pyrene	µg/kg	260	J	11		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	T	Lloyd Kahn	Total Organic Carbon	mg/kg	9,700	J	1,400		180-164778-3	180-164778-1
PBA-BKG-DUP-SD-0-8	11/2/2023	Sediment	N	SEM	SEM/AVS Ratio	None	4.1	J	0		180-164778-3	180-164778-1

Notes:
*- = LCS and/or LCSD is outside acceptance limits, low biased.
*+ = LCS and/or LCSD is outside acceptance limits, high biased.
*3 = Internal standard response or retention time outside acceptable limits.
µg/kg = microgram per kilogram
µmol/g = micromole per gram
AVS/SEM = acid volatile sulfide/simultaneous extracted metals
B = Compound was found in the blank and sample.
F1 = Matrix spike and/or matrix spike duplicate recovery exceeds control limits.
F2 = Matrix spike/matrix spike duplicate relative percent difference exceeds control limits.
J (laboratory qualifier) = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
LCS = laboratory control sample
LCSD = laboratory control sample duplicate
MS = matrix spike
MSD = matrix spike duplicate
mg/kg = milligram per kilogram
RPD = relative percent difference
SDG = sample delivery group
T = Total
U (laboratory qualifier) = Not detected at a concentration equal to or greater than the quantitation limit
U (validation qualifier) = The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.

EHS Support Validation Report Number: 745

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164866-1
Analyses: SVOC, Metals
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Cleveland, Ohio

EHS Support℠

Report Date:

January 30, 2025

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Appendix

1 Sample and Analytical Protocol Summary

Tissue samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Method 6020B for metals
- USEPA Methods:
  - 1630 for methylmercury
  - 1631E for low-level mercury

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses	
					SVOC	Metals
180-164866-1	180-164866-1	PBA-BKG-TI	Tissue	11/3/2023	X	X
180-164866-1	180-164866-2	PBA-04-TI	Tissue	11/1/2023	X	X
180-164866-1	180-164866-3	PBA-02-TI	Tissue	11/1/2023	X	X

Notes:
SDG = sample delivery group
SVOC = semi-volatile organic compound

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The chain of custody was properly completed; the gap between relinquishing date/time and receiving date/time is assumed to be associated with sample shipment. It is assumed that custody was maintained. No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, no QC excursions encountered led to the rejection of data. Results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Semi-Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements—Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Methylmercury by Method 1630	Tissue	Frozen, between -10 and -30°C	28 days

Note:
°C = degree Celsius

Analytical holding time criteria were met. A note in the laboratory report narrative states, "The following samples were stored in a refrigerator between 2-6 degrees C as opposed to the required negative 10-30 degrees C: PBA-BKG-TI (180-164866-1), PBA-04-TI (180-164866-2), PBA-02-TI (180-164866-3), (180-164866-C-1 MS) and (180-164866-C-1 MSD)." Laboratory staff provided additional information via email, "The fact that samples were stored in the walk-in was not discovered until the analyst performing the methyl mercury analysis went to pull the samples for prep. Samples were digested for MeHg analysis on 11/28 and that's when the analyst moved the samples to a freezer location."

Methylmercury results for these samples have been qualified as estimated (J/UJ).

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- Correlation coefficients were acceptable.
- The continuing calibration verification percent difference results were within limits.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when

associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

No sample results were qualified due to blank results. Methylmercury was detected in the laboratory method blank. The concentration of methylmercury in field samples was significantly greater than in the blank; therefore, no qualification was needed.

3.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

3.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or ‘clean’ sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. The reported recovery was within control limits.

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike, i.e., a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The

relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Not applicable—matrix spike/matrix spike duplicate analysis was performed on sample 180-164866-1 however, results could not be evaluated because the concentration of the analyte in the unspiked parent sample was significantly greater than the spike amount. Matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

3.7 Target Compound Identification

Acceptable—no issues were encountered. Retention times for the analyte and surrogate were within limits. No reported results were greater than the calibrated range of the instrument.

3.8 Field Duplicates

Not applicable—no field duplicate samples were included in this SDG.

3.9 Additional Notes

All results in this SDG are associated with a 10x dilution factor.

4 Metals Analysis

4.1 Preservation and Holding Times

Relevant preservation and holding time requirements for metals are presented in **Table 4**.

Table 4 Preservation and Holding Time Requirements—Metals

Method	Matrix	Preservation	Holding Time
Metals (except mercury) by Method 6020	Tissue	Frozen	180 days from collection to analysis
Low-level mercury by Method 1631E	Tissue	Frozen	1 year from collection to digestion 90 days from prep to analysis

Notes in the narrative state that all samples in this SDG were "stored in a refrigerator between 2-6 degrees C as opposed to the required negative 10-30 degrees C". Laboratory staff provided additional information in email correspondence: "The date that 1631 samples were properly preserved was on 11/28/2023."

Results have been qualified as estimated (J/UJ).

4.2 Inductively Coupled Plasma-Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: the laboratory's "…tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DOD [Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[1] full width at 10% peak height."[2]
- "Resolution < 0.9 amu full width at 10% peak height."[3]

[1] u = unified atomic mass unit

[2] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. Washington, DC. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf

[3] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual for Environmental Laboratories, Version 5.4, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits.
- Contract-required detection limit check standards were analyzed; recoveries were acceptable.

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met—no detections were reported from the laboratory method blanks or instrument blanks associated with reported results in this data set.

4.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

4.6 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met—laboratory control sample recoveries were within acceptance limits. Recoveries of linear range check standards were also within control limits.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike—that is, a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on sample 180-164859-3 for Method 6020. Results of the matrix spike/matrix spike duplicate analysis for mercury could not be evaluated because the concentration of the analyte in the unspiked parent sample was significantly greater than the spike amount. Matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

4.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 5**) were met. A laboratory duplicate of sample 180-164866-1 was analyzed by Method 6020.

Table 5 Acceptable Parent Sample-Laboratory Duplicate Relationships—Metals

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and its lab duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or its lab duplicate concentrations(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

4.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Not applicable—serial dilution analysis of Method 6020 metals was performed on sample 180-164866-1. However, results could not be evaluated because analyte concentrations in the original sample were not sufficient. Serial dilution analysis is evaluated for analytes that were detected in the original sample at sufficient concentrations.

4.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

4.11 Field Duplicates

Not applicable—no field duplicate samples were included in this SDG.

4.12 Additional Notes

All results in this SDG are associated with a 2× or 10× dilution factor.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Amy Coats

Validation performed by: Amy Coats
EHS Support LLC

5 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-BKG-TI	11/3/2023	Tissue	N	1630	Methylmercury	µg/kg	89	J	2.2	B	180-164866-1	180-164866-1
PBA-BKG-TI	11/3/2023	Tissue	T	1631E	Mercury	µg/kg	99	J	4.0		180-164866-1	180-164866-1
PBA-04-TI	11/1/2023	Tissue	N	1630	Methylmercury	µg/kg	74	J	2.4	B	180-164866-2	180-164866-1
PBA-04-TI	11/1/2023	Tissue	T	1631E	Mercury	µg/kg	110	J	4.1		180-164866-2	180-164866-1
PBA-02-TI	11/1/2023	Tissue	N	1630	Methylmercury	µg/kg	120	J	2.2	B	180-164866-3	180-164866-1
PBA-02-TI	11/1/2023	Tissue	T	1631E	Mercury	µg/kg	160	J	4.0		180-164866-3	180-164866-1

Notes:
µg/kg = microgram per kilogram
B = Compound was found in the blank and sample.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N = not applicable
SDG = sample delivery group
T = total

EHS Support Validation Report Number: 746

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-164867-1
Analyses: SVOC, Metals, and General Chemistry
Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, and *Eurofins* in Cleveland, Ohio and Pittsburgh, Pennsylvania

EHS Support™

Report Date:

January 23, 2025

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Appendix

1 Sample and Analytical Protocol Summary

Sediment samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods:
  - 6010D for acid volatile sulfide/simultaneously extracted metals (AVS/SEM) metals
  - 6020B for metals
  - 7470A for AVS/SEM mercury
  - 7470A for mercury
  - 7471B for mercury
  - 9034 for AVS/SEM acid-volatile sulfide
  - 9040C for pH
- USEPA Method 1630 for methylmercury
- Standard Methods (SM) 5310 for total organic carbon
- The Lloyd Kahn Method for total organic carbon

Additional analyses were performed by the laboratory; samples were analyzed at Eurofins in Burlington, Vermont for grain size by ASTM[1] Method D422. No results of these analyses were validated. Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Analyses		
					SVOC	Metals	Gen Chem
180-164867-1	180-164867-1	PBA-01-SD-0-8	Sediment	11/3/2023	X	X	X
180-164867-1	180-164867-2	PBA-02-SD-0-10	Sediment	11/2/2023	X	X	X
180-164867-1	180-164867-3	PBA-03-SD-0-12	Sediment	11/2/2023	X	X	X
180-164867-1	180-164867-4	PBA-04-SD-0-8	Sediment	11/2/2023	X	X	X
180-164867-1	180-164867-5	DUP-SD	Sediment	11/3/2023	X	X	X
180-164867-1	180-164867-6	EQB-SED-231103	Water	11/3/2023	X	X	X

Notes:
Gen chem = general chemistry
SDG = sample delivery group
SVOC = semi-volatile organic compound

[1] ASTM International, formerly known as American Society for Testing and Materials.

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017a] and Organic [USEPA, 2017b]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The chain of custody was properly completed; the gap between relinquishing date/time and receiving date/time is assumed to be associated with sample shipment. It is assumed that custody was maintained. No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, no QC excursions encountered led to the rejection of data. Results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Semi-Volatile Organic Compound Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements—Semi-Volatile Organic Compounds

Method	Matrix	Preservation	Holding Time
Methylmercury by Method 1630	Water	Amber glass vials, hydrochloric acid to pH less than 2	180 days from collection to analysis
Methylmercury by Method 1630	Soil/ sediment	Amber glass jars, less than or equal to 6°C	28 days

Note:
°C = degree Celsius

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration relative standard deviation values, and/or the regression coefficient values, were acceptable.
- Correlation coefficients were acceptable.
- The continuing calibration verification percent difference results were within limits.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or ‘clean’ sand when associated samples are solids) that are preserved and analyzed the same as field samples. The following are some common types of blanks:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. Results for the laboratory method blanks and equipment blank were non-detect.

3.4 Surrogates

Surrogates are chemicals that are similar to target compounds in chemical composition, extraction, and chromatography but are not expected to be present in samples. Each field sample and QC sample is spiked with a known concentration of the appropriate surrogate compound(s) before sample preparation and analysis. Surrogates are incorporated into samples, and their recoveries are shown to predict experimental recoveries of target analytes. Surrogates are used to monitor performance of the preparation and analysis process, particularly extraction efficiency and possible matrix interference, on a sample-specific basis.

Acceptance criteria were met. The relationship between the amount of surrogate added and the amount of surrogate detected for each sample was within acceptance limits.

3.5 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as the field samples. It is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Reported recoveries were within control limits.

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of a field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike, i.e., a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Acceptance criteria were met. Matrix spike/matrix spike duplicate analysis was performed on sample 180-164867-2. Recoveries, as well as the relative percent difference between the matrix spike and matrix spike duplicate results, were within control limits.

3.7 Target Compound Identification

Acceptable—no issues were encountered. Retention times for the analyte and surrogate were within limits. No reported results were greater than the calibrated range of the instrument.

3.8 Field Duplicates

One parent sample-field duplicate pair was submitted in this SDG. Cases in which the relationship between parent and duplicate results was outside the acceptance limits are presented in **Table 4**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 4 Observed Field Duplicate Nonconformances—Semi-Volatile Organic Compounds

Samples	Compound	Parent Sample Result (µg/kg)	Duplicate Sample Result (µg/kg)	Relationship
PBA-01-SD-0-8/ DUP-SD	Methylmercury	2.5	5.5	75 percent

Note:
µg/kg = micrograms per kilogram

As a consequence of these QC excursions, parent and duplicate sample results for methylmercury have been qualified as estimated (J), in accordance with **Table 5**.

Table 5 Field Duplicate Nonconformance Actions—Semi-Volatile Organic Compounds

Quality Control Nonconformance	Sample Result	Qualification[(1)]
Sample and its field duplicate is greater than or equal to 5x the reporting limit and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J
Sample and/or its field duplicate is less than 5x the reporting limit and • Absolute difference is greater than 2x the reporting limit (aqueous) **or** • Absolute difference is greater than 3x the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
(1) See **Table 2** for qualifier definitions.

3.9 Additional Notes

No reported results are associated with dilutions.

Soil/sediment samples with at least 30 percent solids do not require qualification of organic results based on the percent solids values. Samples in this data set met this criterion and did not need sample result qualification.

4 Metals Analysis

4.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 6**.

Table 6 Preservation and Holding Time Requirements—Metals

Method	Matrix	Preservation	Holding Time
Metals by Method 6010/6020	Water	pH less than 2	180 days
Metals by Method 6010/6020	Soil/sediment	None	180 days
Simultaneously extracted metals by 6010	Soil/sediment	Less than or equal to 6°C	180 days
Mercury by Method 7471	Soil/sediment	Less than or equal to 6°C	28 days
Mercury by Method 7470	Water	Less than or equal to 6°C	28 days
Simultaneously extracted mercury by Method 7470	Soil/sediment	Less than or equal to 6°C	28 days

Notes:
°C = degree Celsius
Samples to be analyzed for simultaneously extracted metals were prepared using USEPA Method 821-R-91-100

4.2 Inductively Coupled Plasma–Mass Spectrometry Tune

Inductively coupled plasma-mass spectrometry instruments are tuned to optimize the equipment by adjusting physical and electronic elements. Instrument tuning is periodically checked and adjusted. Peak shape and width, as well as mass accuracy, can be evaluated.

Acceptance criteria were met:

- The relative standard deviation for each analyte is less than 5 percent.
- Average peak width is less than 0.9 atomic mass units (amu) at 10 percent peak height. This is the criterion applied by the laboratory.

Laboratory staff provided the following information: the laboratory's "tune check point-of-failure is 0.9 amu at 10% peak height… There is a trade-off between peak width and sensitivity, so we are tuning to the manufacturer's recommended settings. Our tuning performance specifications are set to meet the newer guidance from EPA 6020 and DoD [Department of Defense] source documents." Laboratory staff also provided the following statements from referenced guidance:

- "The resolution must also be verified to be less than 0.9 u[2] full width at 10% peak height."[3]

[2] u = unified atomic mass unit

[3] United States Environmental Protection Agency. (2014). Method 6020B (SW-846): Inductively Coupled Plasma-Mass Spectrometry, Revision 2, Section 10.1. Washington, DC. https://19january2021snapshot.epa.gov/sites/static/files/2015-12/documents/6020b.pdf

- "Resolution < 0.9 amu full width at 10% peak height."[4]

4.3 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits for all reported metals.
- Contract required detection limit check standards were analyzed; recoveries were acceptable.

4.4 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Positive (detected) sample results associated with blank contamination are presented in **Table 7**.

Table 7 Observed Blank Contamination and Associated Actions—Metals

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification(1)
Copper AVS/SEM	0.140 J mg/kg(2) (MB 180-451270/2-A)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164867-1 180-164867-2 180-164867-3 180-164867-4 180-164867-5	Greater than or equal to the reporting limit and greater than or equal to 5× the blank concentration	No qualification

[4] Department of Defense and Department of Energy. (2021). Consolidated Quality Systems Manual for Environmental Laboratories, Version 5.4, Table B-9. https://www.denix.osd.mil/edqw/denix-files/sites/43/2021/10/QSM-Version-5.4-FINAL.pdf

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Copper Method 6020	0.49 J µg/lb (EQB-SED-231103)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-164867-1 180-164867-2 180-164867-3 180-164867-4 180-164867-5	Greater than or equal to the reporting limit and greater than or equal to 5× the blank concentration	No qualification
Mercury AVS/SEM	0.00308 J mg/kg[2] (MB 180-451270/2-B)	Greater than or equal to the method detection limit but less than or equal to reporting limit	180-164867-1 180-164867-2	Greater than or equal to the reporting limit and greater than or equal to 5× the blank concentration	No qualification
			180-164867-3	Greater than or equal to the method detection limit but less than or equal to the reporting limit.	Report U at the reporting limit
			180-164867-5	Greater than reporting limit and greater than the blank result but less than 5× the blank result	Report U at the detected concentration

Notes:
[1] See **Table 2** for qualifier definitions.
[2] Converted to mg/kg for comparison with sample results.
µg/lb = microgram per pound
AVS = acid-volatile sulfide
MB = method blank
mg/kg = milligram per kilogram
SEM = simultaneously extracted metals

4.5 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

4.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is, as the name implies, a separate QC sample that is created just as the laboratory control sample is created. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and from the laboratory control sample duplicate are evaluated to access accuracy and bias. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Acceptance criteria were met. Some batches were associated with laboratory control sample/laboratory control sample duplicate pairs, others were associated with single laboratory control samples. Laboratory control sample and laboratory control sample duplicate recoveries, as well as the relative percent difference between laboratory control sample and laboratory control sample duplicate results, were within acceptance limits.

4.7 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike—that is, a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 8**. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4× the spike amount.

Table 8 Observed Matrix Spike Nonconformances—Metals

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164867-2	Mercury 7470 AVS/SEM	209 percent	321 percent	Greater than upper acceptance limit

Notes:
AVS = acid-volatile sulfide
SEM = simultaneously extracted metals

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Because of the noncompliant matrix spike results, qualifiers were applied to 7470A AVS/SEM mercury results for all field samples in this SDG.

Table 9 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions—Metals

QC Nonconformance	Sample Result	Qualification[(1)]
%R: • 30–74 percent for most metals including mercury • 20–74 percent for silver, antimony	Non-detect	UJ
	Detect	J
%R: • Less than 30 percent for most metals including mercury • Less than 20 percent for silver, antimony	Non-detect	UJ if PDS %R is greater than or equal to 75 percent
		R if PDS not performed or PDS %R is less than 75 percent
	Detect	J
%R: • Greater than 125 percent for most metals including mercury • Greater than 150 percent for silver, antimony	Non-detect	No Action
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference: • Greater than 20 percent (aqueous) • Greater than 35 percent (soil/sediment)	Non-detect	UJ
	Detect	J

Notes:
(1) See **Table 2** for qualifier definitions.
%R = percent recovery
PDS = post-digestion spike

4.8 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 10**) were met. Laboratory duplicate analysis was performed on sample 180-164867-2.

Table 10 Acceptable Parent Sample–Laboratory Duplicate Relationships—Metals

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

4.9 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Serial dilution analysis results that were outside control limits are shown in **Table 11**.

Table 11 Observed Serial Dilution Nonconformances—Metals

Sample	Analyte	% Difference
180-164867-2	Copper SEM	11 percent

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. As a consequence of the noncompliant serial dilution result, qualifiers were applied to 6010D AVS/SEM copper results for all field samples in this SDG (**Table 12**).

Table 12 Serial Dilution Nonconformance Actions—Metals

Serial Dilution % Difference	Sample Result	Qualification[(1)]
Greater than upper acceptance limit	Detect	J

Notes:
[(1)] See **Table 2** for qualifier definitions.

4.10 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards relative intensity values associated with reported results were within control limits.

4.11 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 13**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 13 Observed Field Duplicate Nonconformances—Metals

Samples	Analyte	Parent Sample Result	Duplicate Sample Result	Relationship
PBA-01-SD-0-8/ DUP-SD	Copper 6010D AVS/SEM	2.4 µmol/g	1 µmol/g	82.4 percent
	Mercury 7470A AVS/SEM	0.00031 µmol/g	0.000047 µmol/g	NC

Notes:
µmol/g = micromole per gram
AVS = acid-volatile sulfide
NC = Not compliant—this refers to cases in which the sample and/or duplicate concentration is less than 5x the reporting limit and the difference between the two is outside the acceptance limits.
SEM = simultaneously extracted metals

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied (**Table 14**). Because of the noncompliant parent sample-field duplicate relationships, qualifiers were applied to all results for the listed analytes in field samples in this SDG.

Table 14 Field Duplicate Nonconformance Actions—Metals

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and its field duplicate concentrations are greater than or equal to 5× the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J
Sample and/or its field duplicate concentrations(s) is/are less than 5× the reporting limit, and • Absolute difference is greater than 2× the reporting limit (aqueous) **or** • Absolute difference is greater than 3× the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

4.12 Additional Notes

Sample results associated with linear range check (LRC) recoveries outside control limits are listed in **Table 15**.

Table 15 Observed Linear Range Check Standard Nonconformances—Metals

LRC Sample ID	Analyte	LRC Recovery	Associated Samples
LRC 410-447227/9	Selenium	83 percent	180-164867-6

Note:
LRC = linear range check

Sample results associated with noncompliant linear range check recoveries are qualified in accordance with **Table 16**.

Table 16 Linear Range Check Standard Nonconformance Actions—Metals

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
Recovery is greater than upper acceptance limit	Non-detect	No Action
	Detect	J
Recovery is less than the lower acceptance limit	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Non-aqueous samples with at least 50 percent solids do not require qualification of inorganic analytes based on the percent solids values. Samples with less than 50 percent solids are listed in **Table 17**.

Table 17 Observed Percent Solids Nonconformances—Metals

Sample ID	Percent Solids
180-164867-1	39.6 percent

Because of this QC exceedance, metals results for this sample have been qualified as estimated in accordance with **Table 18**.

Table 18 Percent Solids Nonconformance Actions—Metals

Percent Solids	Sample Result	Sample Result Qualification[(1)]
Less than 50 percent but greater than or equal to 10 percent.	Non-detect	UJ
	Detect	J
Less than 10 percent.	Non-detect	R
	Detect	J

Note:
(1) See **Table 2** for qualifier definitions.

5 General Chemistry Analysis

5.1 Preservation and Holding Times

Relevant preservation and holding time requirements are presented in **Table 19**.

Table 19 Preservation and Holding Time Requirements—General Chemistry

Method	Matrix	Preservation	Holding Time
Total organic carbon by The Lloyd Kahn Method	Soil/Sediment	Less than or equal to 6°C	14 days
Total organic carbon by Method SM5310C	Water	Less than or equal to 6°C, pH less than 2	28 days
Acid volatile sulfide by Method 9034	Soil/Sediment	Less than or equal to 6°C, zero headspace from collection to AVS prep	14 days
pH by Method 9040	Water	Less than or equal to 6°C	15 minutes

Notes:
Samples to be analyzed for acid-volatile sulfide were prepared using USEPA Method 821-R-91-100
°C = degree Celsius
USEPA = United States Environmental Protection Agency

Reported results associated with analyses performed outside of the specified holding times are listed in **Table 20**. All other holding time criteria were met.

Table 20 Observed Preservation and/or Holding Time Nonconformances—General Chemistry

Lab Sample ID	Analysis	Holding Time	Observed Holding Time
180-164867-6	pH by Method 9040	15 minutes	29 days

The samples listed in Table 20 have been qualified as shown in Table 21.

Table 21 Preservation and Holding Time Nonconformance Actions—General Chemistry

Quality Control Excursion	Qualification[1]	
	Detected Analytes	Non-Detect Analytes
Technical holding time exceeded; analysis performed in less than 2× holding time	J	UJ
Technical holding time exceeded; analysis performed in more than 2× holding time	J	R

Note:
[1] See **Table 2** for qualifier definitions.

5.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed, and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- Calibration curves exhibited acceptable correlation coefficients or correlation factors.
- Initial and continuing calibration verification results were within limits.

5.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or 'clean' sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Acceptance criteria were met. No detections were reported in laboratory method blanks. Results for calibration blanks that are associated with field sample results were non-detect.

5.4 Laboratory Control Sample Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

Acceptance criteria were met. Recoveries were within acceptable limits.

5.5 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike—that is, a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Matrix spike recoveries and/or relative percent difference values outside control limits are presented in **Table 22**. Note that matrix spike analyses cannot be evaluated if the unspiked sample concentration of the relevant analyte is greater than or equal to 4x the spike amount.

Table 22 Observed Matrix Spike/Matrix Spike Duplicate Nonconformances—General Chemistry

Sample ID	Analyte	Recovery		Matrix Spike/Matrix Spike Duplicate Relative Percent Difference
		Matrix Spike	Matrix Spike Duplicate	
180-164867-2	Total organic carbon	39 percent	43 percent	Acceptable

Because of this excursion, the total organic carbon result for sample 180-164867-2 has been qualified as estimated in accordance with **Table 23**.

Table 23 Matrix Spike/Matrix Spike Duplicate Nonconformance Actions—General Chemistry

Recovery	Sample Result	Qualification[1]
Matrix spike percent recovery is less than 75 percent but greater than or equal to 30 percent.	Non-detect	UJ
	Detect	J
Matrix spike percent recovery is less than 30 percent.	Non-detect	R
	Detect	J
Matrix spike percent recovery is greater than 125 percent.	Non-detect	No Action
	Detect	J
Matrix spike/matrix spike duplicate relative percent difference is greater than the upper acceptance limit.	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.6 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as a normal field sample. The analytical results of the two laboratory duplicates are compared to assess precision.

Acceptance criteria (**Table 24**) were met. Laboratory duplicate analysis of pH was performed on 180-164867-6.

Table 24 Acceptable Parent Sample–Laboratory Duplicate Relationships—General Chemistry

Parent Sample and Laboratory Duplicate Sample Concentrations	Difference
Sample and field duplicate concentrations are greater than or equal to 5× the reporting limit	• Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)
Sample and/or field duplicate concentration(s) is/are less than 5× the reporting limit	• Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)

5.7 Field Duplicates

One field duplicate sample was submitted in this SDG. The parent result-field duplicate result relationships that are outside acceptance limits are shown in **Table 25**. When the parent and field duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 25 Observed Field Duplicate Nonconformances—General Chemistry

Samples	Analyte	Parent Sample Result	Duplicate Sample Result	Relationship
PBA-01-SD-0-8/ DUP-SD	Acid-volatile sulfide	8.6 µmol/g	3.3 µmol/g	NC

Notes:
µmole/g = micromole per grams
NC = Not compliant—this refers to cases in which the sample and/or duplicate concentration is less than 5× the reporting limit and the difference between the two is outside the acceptance limits.

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. Due to the noncompliant relationship between parent and duplicate results for acid-volatile sulfide, qualifiers (Table 26) were applied to acid-volatile sulfide results for all field samples in this SDG.

Table 26 Field Duplicate Nonconformance Actions—General Chemistry

Quality Control Nonconformance	Sample Result	Qualification(1)
Sample and its field duplicate concentrations are greater than or equal to 5x the reporting limit, and • Relative percent difference is greater than 30 percent (aqueous) **or** • Relative percent difference is greater than 50 percent (soil/sediment)	Detect	J

Quality Control Nonconformance	Sample Result	Qualification[1]
Sample and/or its field duplicate concentrations(s) is/are less than 5× the reporting limit, and • Absolute difference is greater than 2× the reporting limit (aqueous) **or** • Absolute difference is greater than 3× the reporting limit (soil/ sediment)	Non-detect	UJ
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

5.8 Additional Notes

The laboratory report narrative includes the following note: "The reporting limit for Lloyd Kahn TOC analysis is a nominal value and does not reflect adjustments in sample mass processed on an individual basis."

Non-aqueous samples with at least 50 percent solids do not require qualification of inorganic analytes based on the percent solids values. Samples with less than 50 percent solids are listed in **Table 27**.

Table 27 Observed Percent Solids Nonconformances—General Chemistry

Sample ID	Percent Solids
180-164867-1	39.6 percent

Because of this QC exceedance, general chemistry results for this sample have been qualified as estimated in accordance with **Table 28**.

Table 28 Percent Solids Nonconformance Actions—General Chemistry

Percent Solids	Sample Result	Sample Result Qualification[1]
Less than 50 percent but greater than or equal to 10 percent	Non-detect	UJ
	Detect	J
Less than 10 percent	Non-detect	R
	Detect	J

Note:
[1] See **Table 2** for qualifier definitions.

Amy Coats

Validation performed by: Amy Coats
EHS Support LLC

6 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017a, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

United States Environmental Protection Agency. (2017b, January). *National Functional Guidelines for Organic Superfund Methods Data Review.* Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-002. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_01302017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-01-SD-0-8	11/3/2023	Sediment	N	1630	Methylmercury	µg/kg	2.5	J	0.18		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	2.4	J	0.0022	B	180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	N	6010D AVS/SEM	Zinc	µmol/g	0.77	J	0.040		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6020B	Copper	mg/kg	240	J	0.41		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6020B	Selenium	mg/kg	2.6	J	0.23		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6020B	Zinc	mg/kg	210	J	9.1		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.00031	J	0.000032	B	180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7471B	Mercury	mg/kg	1.4	J	0.050		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	N	9034 AVS/SEM	Acid Volatile Sulfide	µmol/g	8.6	J	0.39		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	Lloyd Kahn	Total Organic Carbon	mg/kg	33,000	J	2500		180-164867-1	180-164867-1
PBA-01-SD-0-8	11/3/2023	Sediment	N	SEM	SEM/AVS Ratio	none	0.37	J	0		180-164867-1	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	3.8	J	0.0016	B	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	N	6010D AVS/SEM	Zinc	µmol/g	2.1		0.15	F2	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6020B	Copper	mg/kg	1,000		1.6	F2	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6020B	Zinc	mg/kg	340		35	F1	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.00025	J	0.000023	BF1F2	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	N	9034 AVS/SEM	Acid Volatile Sulfide	µmol/g	0.29	UJ	0.29	U	180-164867-2	180-164867-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	Lloyd Kahn	Total Organic Carbon	mg/kg	39,000	J	1,800	F1	180-164867-2	180-164867-1
PBA-03-SD-0-12	11/2/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	0.087	J	0.0063	B	180-164867-3	180-164867-1
PBA-03-SD-0-12	11/2/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.000036	UJ	0.000036	JB	180-164867-3	180-164867-1
PBA-03-SD-0-12	11/2/2023	Sediment	N	9034 AVS/SEM	AVS	µmol/g	0.23	UJ	0.23	U	180-164867-3	180-164867-1
PBA-04-SD-0-8	11/2/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	0.024	J	0.0013	B	180-164867-4	180-164867-1
PBA-04-SD-0-8	11/2/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.000018	UJ	0.000018	U	180-164867-4	180-164867-1
PBA-04-SD-0-8	11/2/2023	Sediment	N	9034 AVS/SEM	Acid Volatile Sulfide	µmol/g	0.23	UJ	0.23	U	180-164867-4	180-164867-1
DUP-SD	11/3/2023	Sediment	N	1630	Methylmercury	µg/kg	5.5	J	0.13		180-164867-5	180-164867-1
DUP-SD	11/3/2023	Sediment	N	6010D AVS/SEM	Copper	µmol/g	1	J	0.0015	B	180-164867-5	180-164867-1
DUP-SD	11/3/2023	Sediment	N	7470A AVS/SEM	Mercury	µmol/g	0.000047	UJ	0.000047	B	180-164867-5	180-164867-1
DUP-SD	11/3/2023	Sediment	N	9034 AVS/SEM	Acid Volatile Sulfide	µmol/g	3.3	J	0.27		180-164867-5	180-164867-1
EQB-SED-231103	11/3/2023	Water	T	6020B	Selenium	µg/L	0.28	UJ	0.28	U	180-164867-6	180-164867-1
EQB-SED-231103	11/3/2023	Water	T	9040C	pH	s.u.	5.7	J	0.1	HF	180-164867-6	180-164867-1

Notes:
µg/kg = microgram per kilogram
µmol/g = micromole per gram
B = Compound was found in the blank and sample.
F1 = Matrix spike and/or matrix spike duplicate recovery exceeds control limits.
F2 = Matrix spike/matrix spike duplicate relative percent difference exceeds control limits.
HF = Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
ISTD = internal standard
J (laboratory qualifier) = Result is less than the reporting limit but greater than or equal to the method detection limit; the concentration is an approximate value.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/kg = milligram per kilogram
SDG = sample delivery group
SEM =
s.u. = standard unit
T = total
U (laboratory qualifier) = Not detected at a concentration equal to or greater than the quantitation limit.
U (validation qualifier) = The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

EHS Support Validation Report Number: 747

Dyno Nobel Port Ewen Site
Port Ewen, New York

Sample Delivery Group (SDG): 180-165055-1

Analyses: Metals

Review Level: Data Usability Summary Report (DUSR)

Analyses performed by:
Eurofins
Knoxville, Tennessee

EHS Support℠

Report Date:

January 19, 2025

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Appendix

1 Sample and Analytical Protocol Summary

Sediment samples were collected at the Dyno Nobel Port Ewen Site in Port Ewen, New York, and were analyzed using the following methods:

- United States Environmental Protection Agency (USEPA) SW-846 Methods
  - 6010B for acid-volatile sulfide/simultaneously extracted metals (AVS/SEM) metals
  - 7470A for AVS/SEM mercury

Samples included in this sample delivery group (SDG), and in this data validation report, are listed in **Table 1**.

Table 1 Sample and Analytical Protocol Summary

SDG	Lab Sample ID	Field Sample ID	Sample Matrix	Sample Collection Date	Metals Analysis
180-165055-1	180-165055-1	PBA-01-SD-0-8	Sediment	11/3/2023	X
180-165055-1	180-165055-2	PBA-02-SD-0-10	Sediment	11/2/2023	X
180-165055-1	180-165055-3	PBA-03-SD-0-12	Sediment	11/2/2023	X

Notes:
Gen chem = general chemistry
SDG = sample delivery group

2 Data Review Summary

2.1 Guidelines and Qualifiers

Data were reviewed in accordance with the USEPA Contract Laboratory Program National Functional Guidelines (Inorganic [USEPA, 2017]), New York State Department of Environmental Conservation (NYSDEC) DER-10 technical guidance (NYSDEC, 2010), laboratory analytical methods, and professional judgment. It is expected that the laboratory conducted a sufficient quality review of the data before reporting. While quality control (QC) is meant to increase confidence in analytical data, it is important to note that no compound concentration is guaranteed to be accurate, even if all QC criteria are met.

Data validation includes a review of reported results and supporting documentation in the laboratory report. Based on this evaluation, qualifiers may be added, deleted, or modified. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines (**Table 2**).

Table 2 Qualifier Codes and Definitions

Qualifier Code	Definition
U	The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ	The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Note:
QC = quality control

2.2 Sample Custody and Receipt

The chain of custody was properly completed; the gap between relinquishing date/time and receiving date/time is assumed to be associated with sample shipment. It is assumed that custody was maintained. No notes were encountered that indicate issues with sample condition upon receipt; samples appear to have been received in good condition and appropriately preserved.

2.3 Assessment Summary and Data Usability

In this SDG, eight results have been rejected. Remaining results reported in this SDG are considered usable. The specific QC variances and data qualification are outlined in this report. Records that have updated qualifiers are presented in **Appendix A**.

3 Metals Analysis

3.1 Preservation and Holding Times

Acceptance criteria were met. Relevant preservation and holding time requirements for metals are presented in **Table 3**.

Table 3 Preservation and Holding Time Requirements—Metals

Method	Matrix	Preservation	Holding Time
Simultaneously extracted metals by 6010	Soil/sediment	Less than or equal to 6°C	180 days
Simultaneously extracted mercury by 7470	Soil/sediment	Less than or equal to 6°C	28 days

Notes:
Samples to be analyzed for simultaneously extracted metals were prepared using USEPA Method 821-R-91-100
°C = degree Celsius
USEPA = United States Environmental Protection Agency

3.2 Calibration

Instrument calibration is the process that determines the relationship between analyte concentration and instrument signal. Standards with known concentrations are analyzed and appropriate concentration values are correlated with the resultant signals. Analytical methods include specific criteria for initial calibrations, which demonstrate acceptable performance at the beginning of an analytical run, and for continuing calibrations, which demonstrate instrument performance throughout the analytical sequence. The objective is to ensure that instruments are calibrated accurately to produce acceptable qualitative and quantitative data for analytes included in the calibration.

Acceptance criteria were met:

- The initial calibration verification and continuing calibration verification recoveries were within limits for all reported metals.
- Contract required detection limit check standards were analyzed; recoveries were acceptable.

3.3 Blanks

Blanks are analyzed to identify contamination that may have been introduced into samples. There are several types of blanks that undergo different portions of the process undergone by field samples. Blanks are containers of analyte-free water (and in some cases, analyte-free or ‘clean’ sand when associated samples are solids). Some common types of blanks follow:

- Laboratory method blanks indicate contamination introduced during sample preparation and/or analysis from sources such as reagents, glassware, equipment, sample handling, and ambient laboratory conditions.
- Equipment blanks indicate the effectiveness of the field decontamination procedures as well as contamination from new sampling equipment. They also identify contamination introduced from bottleware and ambient conditions.

Positive (detected) sample results associated with blank contamination are presented in **Table 4**.

Table 4 Observed Blank Contamination and Associated Actions—Metals

Analyte	Blank Detection	Blank Result (Category)	Associated Samples	Sample Result	Qualification[1]
Zinc	0.556 J mg/kg (MB 140-80382/5-B, step 3)	Greater than or equal to the method detection limit but less than or equal to reporting limit.	180-165055-1 180-165055-2	Greater than reporting limit, greater than 5× the blank result	No qualification needed.
			180-165055-3	Equal to the reporting limit and greater than or equal to the blank concentration but less than 5× the blank result	Report U at the reported concentration

Notes:
[1] See **Table 2** for qualifier definitions.
MB = method blank
mg/kg = milligram per kilogram

3.4 Inductively Coupled Plasma Interference Check Sample

Interference check samples are analyzed to determine the validity of the analytical results specifically related to the instrument's ability to overcome interferences that commonly occur in samples. Spectral interference is the overlap of emission from more than one species. This occurs if wavelength separation of interfering species is less than instrument resolution. Laboratories can correct for spectral interferences using inter-element correction and background correction. Interference check sample solutions are analyzed to verify the inter-element and background correction factors. One of the interference check sample solutions includes common interferents as well as target analytes. Interference check sample solutions are analyzed and recovery of target analytes within 20 percent of the true value is considered acceptable.

Acceptance criteria were met.

3.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis

A laboratory control sample is prepared when known concentrations of target analytes are spiked into an aliquot of analyte-free material (deionized water or 'clean' sand). The laboratory control sample undergoes the same preparation and analytical procedure as field samples. The laboratory control sample is analyzed to determine, without sample matrix, whether the overall procedure is working within control limits. The recoveries of the spiked analytes are evaluated to determine accuracy.

A laboratory control sample duplicate is a separately prepared QC sample that is meant to be identical to the laboratory control sample. It undergoes the same preparation and analytical procedure. Recoveries of analytes from the laboratory control sample and laboratory control sample duplicate are

evaluated to access accuracy. The relative percent difference between laboratory control sample and laboratory control sample duplicate results is evaluated to assess precision.

Sample results associated with laboratory control sample recoveries outside control limits are listed in **Table 5**.

Table 5 Observed Laboratory Control Sample/Laboratory Control Sample Duplicate Nonconformances—Metals

LCS/LCSD Sample ID	Analyte	LCS and/or LCSD Recovery	RPD	Associated Samples
LCS 140-80461/6-B LCSD 140-80461/9-B	Selenium	<40 percent	NA	Step 4 180-165055-1 180-165055-2 180-165055-3
LCS 140-80186/6-C LCSD 140-80186/9-C	Mercury	<40 percent	NA	Step 1 180-165055-1 180-165055-2 180-165055-3
LCS 140-80332/6-C LCSD 140-80332/9-C	Mercury	<40 percent	NA	Step 2 180-165055-1 180-165055-2 180-165055-3

Notes:
LCS/LCSD = laboratory control sample/ laboratory control sample duplicate
NA = Not applicable —when a recovery is significantly low, that recovery determines the relevant result qualification. In these cases, the relative percent difference is of no consequence.
RPD = relative percent difference

Sample results associated with noncompliant laboratory control sample recoveries or relative percent difference values are qualified in accordance with **Table 6**. When the result for one step is qualified, results for the total and sum have been qualified as estimated (J/UJ).

Table 6 Laboratory Control Sample Nonconformance Actions—Metals

Quality Control Nonconformance	Sample Result	Sample Result Qualification[(1)]
%R: • Greater than 130 percent for most metals including mercury • Greater than 150 percent for silver, antimony	Non-detect	No Action
	Detect	J
%R: • 40–69 percent for most metals including mercury • 20–69 percent for silver, antimony	Non-detect	UJ
	Detect	J

Quality Control Nonconformance	Sample Result	Sample Result Qualification[1]
%R: • Less than 40 percent for most metals including mercury • Less than 20 percent for silver, antimony	Non-detect	R
	Detect	J
Laboratory control sample/laboratory control sample duplicate relative percent difference is: • Greater than 20 percent (aqueous) • Greater than 30 percent (soil/sediment)	Non-detect	UJ
	Detect	J

Notes:
[1] See **Table 2** for qualifier definitions.
%R = percent recovered

3.6 Matrix Spike/Matrix Spike Duplicate Analysis

A matrix spike is prepared when known concentrations of target analytes are spiked into an aliquot of field sample. The matrix spike undergoes the same preparation and analytical procedure as normal (unspiked) field samples. It is analyzed to evaluate the effects of interferences caused by the sample matrix. Poor spike recoveries could indicate matrix interference issues.

A matrix spike duplicate is an additional replicate of the matrix spike—that is, a separate aliquot of sample into which the same concentrations of analytes are spiked. The matrix spike and matrix spike duplicate undergo the same preparation and analytical testing as the original sample. Recoveries of analytes from matrix spiked samples and from matrix spiked duplicates are evaluated to assess accuracy and bias. The relative percent difference between the matrix spike result and the matrix spike duplicate result is evaluated to assess precision.

Not applicable—no matrix spike analysis was reported in this data set.

3.7 Laboratory Duplicate Analysis

When a field sample is split into two sub-samples, these sub-samples are called laboratory duplicates or laboratory replicates. Each undergoes the same preparation and analysis as the normal field samples. The analytical results of the two laboratory duplicates are compared to assess precision.

Results associated with laboratory duplicate results outside acceptance limits are shown in **Table 7**. When the parent and duplicate results are both significantly greater than the associated reporting limit, the relationship between the two results is expressed numerically as the relative percent difference.

Table 7 Observed Laboratory Duplicate Nonconformances—Metals

Sample	Analyte	Relationship
180-165055-3 (step 5)	Copper	NC
180-165055-3 (step 5)	Mercury	NC

Note:
NC = Not compliant—this refers to cases in which the sample and/or duplicate concentration is less than 5× the reporting limit and the difference between the two is outside the acceptance limits.

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications (**Table 8**) are applied. Because of the noncompliant laboratory duplicate results, qualifiers were applied to results for step 5 copper and step 5 mercury in all field samples in this SDG. Results for totals and sums were consequently qualified as estimated.

Table 8 Laboratory Duplicate Nonconformance Actions—Metals

Quality Control Nonconformance	Sample Result	Qualification[(1)]
Sample and its duplicate is greater than or equal to 5× the reporting limit and • Relative percent difference is less than or equal to 20 percent (aqueous) **or** • Relative percent difference is less than or equal to 35 percent (soil/sediment)	Detect	J
Sample and/or its duplicate is less than 5× the reporting limit and • Absolute difference is less than or equal to 1× the reporting limit (aqueous) **or** • Absolute difference is less than or equal to 2× the reporting limit (soil/sediment)	Non-detect	UJ
	Detect	J

Note:
(1) See **Table 2** for qualifier definitions.

3.8 Serial Dilution

Serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. A sample is analyzed undiluted and at a five-fold dilution, then the calculated results are compared. Serial dilution analysis is evaluated for analytes that were detected in the original sample at concentrations sufficiently greater than the relevant quantitation limit. The results are deemed acceptable when the percent difference between the original analysis and the diluted analysis is less than or equal to 10 percent.

Serial dilution analysis results that were outside control limits are shown in **Table 9**.

Table 9 Observed Serial Dilution Nonconformances – Metals

Sample	Analyte	% Difference
180-165055-3 (step 6) (6010B SEP)	Zinc	15 percent

Sample	Analyte	% Difference
180-165055-3 (6010B – Total)	Copper	23 percent
	Zinc	21 percent

For inorganic analyses in which samples undergo batch digestion or batch distillation, batch qualifications are applied. As a consequence of the noncompliant serial dilution results, qualifiers (**Table 10**) were applied as follows: zinc step 6, sum, and total results were qualified. Copper total results were qualified.

Table 10 Serial Dilution Nonconformance Actions – Metals

Serial Dilution % Difference	Sample Result	Qualification[(1)]
Greater than upper acceptance limit	Detect	J

Note:
[(1)] See **Table 2** for qualifier definitions.

3.9 Inductively Coupled Plasma–Mass Spectrometry Internal Standards

Internal standards are used to correct for a variety of factors. An internal standard has physical and chemical properties that are similar to those of target analytes and is expected to exhibit behavior similar to the analytes' behavior. The ratio of analyte to associated internal standard should be independent of sample matrix or fluctuations in instrument operating conditions. A known quantity of internal standard is added to each sample, standard, and blank and reported quantities of target analytes are calculated based on the relative instrument measurements of the target analyte (whose concentration is unknown) and the associated internal standard (whose concentration is known). In other words, target analytes are quantitated using the internal standards.

Acceptance criteria were met. Internal standards exhibited relative intensity values within control limits.

3.10 Field Duplicates

Not applicable—no field duplicate sample was submitted in this SDG.

3.11 Additional Notes

Results reported at concentrations greater than the method detection limit but less than the reporting limit are considered estimated due to the inherent uncertainty associated with concentrations that are less than the reporting limit.

Percent moisture analysis was performed for the following samples: 180-165055-1, 180-165055-2 and 180-165055-3. Non-aqueous samples with at least 50 percent solids do not require qualification of inorganic analytes based on the percent solids values. In this data set, this criterion was met; no results were qualified because of percent solids values.

Validation performed by: Maria Melendez
EHS Support LLC

Peer review performed by: Amy Coats
EHS Support LLC

4 References

New York State Department of Environmental Conservation. (2010, May 3). *DER-10: Technical Guidance for Site Investigation and Remediation*. https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

United States Environmental Protection Agency. (2017, January). *National Functional Guidelines for Inorganic Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-540-R-2017-001. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

Appendix A Records with Updated Qualifiers

Table A-1 Records with Updated Qualifiers

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Step 3	Zinc	mg/kg	23		0.24	B	180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Step 4	Selenium	mg/kg	1.1	R	1.1	U	180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Step 5	Copper	mg/kg	160	J	2.9		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Step 6	Zinc	mg/kg	24	J	0.24		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Sum 1-7	Copper	mg/kg	630	J	0.080		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Sum 1-7	Selenium	mg/kg	0.17	UJ	0.17	U	180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Sum 1-7	Zinc	mg/kg	210	J	0.10		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Total	Copper	mg/kg	530	J	0.19		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Total	Selenium	mg/kg	3.6	J	0.81		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	6010B SEP Total	Zinc	mg/kg	160	J	0.55		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7470A SEP Step 1	Mercury	mg/kg	0.014	R	0.014	U*-	180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7470A SEP Step 2	Mercury	mg/kg	0.014	R	0.014	U*-	180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7470A SEP Step 5	Mercury	mg/kg	2.8	J	0.031		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7470A SEP Sum 1-7	Mercury	mg/kg	6.7	J	0.040		180-165055-1	180-165055-1
PBA-01-SD-0-8	11/3/2023	Sediment	T	7470A SEP Total	Mercury	mg/kg	5.8	J	0.095		180-165055-1	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Step 3	Zinc	mg/kg	30		0.19	B	180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Step 6	Zinc	mg/kg	30	J	0.19		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Copper	mg/kg	570	J	0.080		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Selenium	mg/kg	6.8	J	0.17		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Zinc	mg/kg	290	J	0.10		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Total	Copper	mg/kg	910	J	0.15		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Total	Selenium	mg/kg	8.6	J	0.66		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	6010B SEP Total	Zinc	mg/kg	240	J	0.44		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	7470A SEP Step 1	Mercury	mg/kg	0.011	R	0.011	U*-	180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	7470A SEP Step 2	Mercury	mg/kg	0.011	R	0.011	U*-	180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	7470A SEP Step 5	Mercury	mg/kg	0.77	J	0.025		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	7470A SEP Sum 1-7	Mercury	mg/kg	2.7	J	0.040		180-165055-2	180-165055-1
PBA-02-SD-0-10	11/2/2023	Sediment	T	7470A SEP Total	Mercury	mg/kg	6.2	J	0.077		180-165055-2	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Step 3	Zinc	mg/kg	1.4	U	1.4	B	180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Step 4	Selenium	mg/kg	0.68	R	0.68	U	180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Step 5	Copper	mg/kg	370	J	1.7		180-165055-3	180-165055-1

Sample Name	Sample Date	Matrix	Fraction	Analytical Method	Analyte	Unit	Result Value	Interpreted Qualifier	Quantitation Limit Value	Lab Qualifier	Lab Sample ID	SDG
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Step 6	Zinc	mg/kg	24	J	0.14		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Copper	mg/kg	390	J	0.080		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Selenium	mg/kg	5.5	J	0.17		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Sum 1-7	Zinc	mg/kg	100	J	0.10		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Total	Copper	mg/kg	18	J	0.23		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	6010B SEP Total	Zinc	mg/kg	91	J	0.66		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	7470A SEP Step 1	Mercury	mg/kg	0.0085	R	0.0085	U*-	180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	7470A SEP Step 2	Mercury	mg/kg	0.0082	R	0.0082	U*-	180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	7470A SEP Step 5	Mercury	mg/kg	3.3	J	0.094		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	7470A SEP Sum 1-7	Mercury	mg/kg	3.3	J	0.040		180-165055-3	180-165055-1
PBA-03-SD-0-12	11/2/2023	Sediment	T	7470A SEP Total	Mercury	mg/kg	0.058	UJ	0.058	U	180-165055-3	180-165055-1

Notes:
*- = Laboratory control sample and/or laboratory control sample duplicate is outside acceptance limits (low-biased).
mg/kg = milligram per kilogram
B = Compound was found in the blank and sample.
J (laboratory qualifier) = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
J (validation qualifier) = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/kg = milligrams per kilogram
R = Rejected—the data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
RPD = relative percent difference
SDG = sample delivery group
T = total
U (laboratory qualifier) = Not detected at a concentration equal to or greater than the quantitation limit.
U (validation qualifier) = The analyte was included in the analysis but was not detected above the reported quantitation limit, or the result is considered non-detect as a consequence of associated blank contamination.
UJ = The analyte was included in the analysis but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.