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DATA EVALUATION REPORT

IRON HORSE PARK SUPERFUND SITE
OPERABLE UNIT 4
North Billerica, Massachusetts

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INTRODUCTION

The U.S. Environmental Protection Agency, Region I, New England (EPA) headquartered in Boston, Massachusetts contracted with Metcalf & Eddy, Inc. (M&E), of Wakefield, Massachusetts under EPA's Response Action Contract (RAC) to provide Remedial Investigation/Feasibility Study (RI/FS) services for Operable Unit 4 (OU-4) of the Iron Horse Park Superfund Site in North Billerica, Massachusetts (the Site). This Data Evaluation Report will help to form the basis for a focused ecological risk assessment that will be performed as an addendum to the baseline ecological risk assessment (BERA) conducted for Operable Unit 3 (OU-3) (M&E, 1997).

1.1 Site Background

The Iron Horse Park Superfund Site occupies approximately 553 acres in North Billerica, Massachusetts, near the Tewksbury town line, approximately 20 miles northwest of Boston (Figure 1-1). The Site is bounded on the north by the B&M railroad tracks, on the west by High Street and an auto salvage yard, on the east by Gray Street, and on the south by a wetland, Pond Street, and the Middlesex Canal (Figure 1-2). The Middlesex Canal flows through the Site to the east, where it joins Content Brook at the southeastern edge of the Shaffer Landfill. It then flows to the Shawsheen River and ultimately to the Merrimack River to the north. There are abundant wetlands and forested areas at the Site. Approximately 20% of the Site is forested while 17% is wetland habitat. In addition, several large wetland complexes border the Site which increases the total acreage of the wetlands at the Site to 266 acres.

The Site is divided into four operable units. OU-1 is the Boston & Maine (B&M) Wastewater Lagoons, OU-2 is the Shaffer Landfill, and OU-3 is the remainder of the Site. OU-3 includes an active industrial complex (the Iron Horse Industrial Park), a railyard, numerous manufacturing operations, open storage facilities, landfills, and lagoons. Investigational activities, including a BERA, were completed for OU-3 in 1997. M&E is charged with conducting additional investigative activities and a focused ecological risk assessment and feasibility study for the Site (OU-4) in order to support selection of a remedy to control ecological risks to the environment.

The investigational activities included supplemental sampling of surface water, sediment, and fish to better characterize ecological risks identified during the BERA conducted for OU-3 (M&E, 1997). The objective of the focused ecological risk assessment for OU-4 is to determine the risk of adverse effects of contaminants in sediment, surface water, and biota on ecological receptors, either through direct exposure to contaminants in sediment and surface water or through indirect exposure through the food web. Previous investigations established that concentrations of some contaminants exceed screening-level benchmarks in surface water and sediment. A benthic community study indicated that there was no discernible impact at about 20 site locations relative to five reference locations. Screening-level food web modeling indicated that there were potential effects on heron through fish consumption based on modeled (not measured) fish tissue contaminant concentrations. Therefore, the sampling and analysis program for the work described herein was designed to measure toxicity of sediment and surface water on aquatic organisms and to refine the food web model for heron using fish tissue analysis and updated toxicity reference values from the literature.

The RI/FS Addendum (OU-4) will supplement the RI (M&E, 1997) and FS (M&E, 2004a) for OU-3.

1.2 Site History

The Site was first purchased by the B&M Railroad (now known as B&M Corporation) in 1911. Since 1911, a variety of industrial disposal practices have resulted in the creation of numerous lagoons, landfills, and open storage areas. The B&M Railroad began operations at the Site in 1913, including the operation of an oil and sludge recycling area beginning sometime prior to 1938. The B&M Railroad has operated the Site's sewage collection system since 1924. The system includes subsurface sewer lines, a dismantled pump house, two unlined filter lagoons, and one overflow lagoon (these wastewater lagoons are OU-1). In addition to septic wastes, the lagoons also received industrial/hazardous wastes such as solvents, waste oils, and other chemicals from various floor and yard drains found throughout the industrial park. Sludge from the bottom of these lagoons was periodically dredged during the past 60 years of operation and deposited in piles adjacent to the lagoons.

In 1944, the B&M Railroad sold land in the western portion of the Site to Johns-Manville Products Corporation, which at that time began to manufacture structural insulating board that contained asbestos. Three unlined lagoons were built to dispose of the resulting asbestos sludge waste. The B&M Railroad also leased land in the eastern portion of the Site to Johns-Manville to be used as a landfill for asbestos sludge and other asbestos mill wastes generated by their manufacturing operations. EPA capped this landfill in 1984.

In 1961, the Johns-Manville Products Corporation sold the western portion of its land to the General Latex and Chemical Corporation, which manufactured acrylic and vinyl acetate polymers and copolymers used in fabrics, paper, and insulation. The liquid filtrate from the latex and polymerization wastes was discharged to the ground through sand filters. This practice was discontinued in May 1982, when General Latex was connected to the Billerica sewer system.

In 1966, the B&M Corporation sold 106 acres of land north of the Middlesex Canal and east of Pond Street to Phillip Shaffer. This land later became the Shaffer Landfill and is currently OU-2 of the Site. This landfill received commercial and residential waste materials from private clients, wastewater treatment sludge from the town of Billerica, and domestic waste from Billerica residents. The landfill stopped receiving waste in April 1986. The Potentially Responsible Parties (PRPs) completed construction of the remedy for the landfill in 2003.

According to 1969 aerial photographs, the B&M Corporation was using a parcel of land located east of the railyard on the south side of the Middlesex Canal as a borrow pit for sand and gravel. This area was leased by B&M Corporation to Reclamation Services, Inc. (RSI) for use as a landfill to dispose of municipal and light industrial waste. In 1976, the B&M Corporation sold approximately 150 acres of primarily developed land to the Massachusetts Bay Transportation Authority (MBTA), which has since used the land to operate passenger rail service. The B&M Corporation now leases much of this land from the MBTA.

M&E finalized the RI for OU-3 in 1997. RI sampling data collected between June 1993 to August

1995 for groundwater, surface soil, subsurface soil, surface water, and sediment from nine potential source areas within the Site (the B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, the Reclamation Services Inc. [RSI] Landfill, the Old B&M Oil/Sludge Recycling Area, the Contaminated Soils Area, the Asbestos Landfill, the Asbestos Lagoons, and Site-Wide Surface Water and Sediment Contamination) indicates the presence of contaminants. A BERA was also conducted as part of the RI for OU-3 (M&E, 1997). The following sections briefly describe contamination previously detected at the areas of concern and in site-wide surface water and sediment, and provide a summary of the results of the BERA conducted for OU-3.

B&M Railroad Landfill. The B&M Railroad landfill is approximately 14 acres in size and is located in a wetland area, north of the Middlesex Canal and east of the railyard. The wetland was filled in by the B&M Railroad and used to dispose of various kinds of debris. Similar types of organic compounds including volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), phthalates, petroleum hydrocarbons, pesticides, and polychlorinated biphenyls (PCBs) were detected in surface and subsurface soils, with the highest concentrations occurring in subsurface soils. These contaminants were considerably less prevalent in groundwater.

RSI Landfill. The 6-acre RSI Landfill, located east of the B&M railyard near the Johns-Manville Asbestos Landfill, is bounded on the south by an unnamed brook and on the east by a wetland, which is drained by the Middlesex Canal. Waste and fill present in the west-central portion of the landfill include organic compounds and metals, detected in subsurface soils, and pesticides, PCBs, and phthalates, found in subsurface and surface soils. Aromatic VOCs, pesticides, and PCBs were detected in groundwater at low concentrations.

B&M Locomotive Shop Disposal Areas. The B&M Locomotive Shop Disposal Areas consist of two disposal areas (A and B) separated by a manmade channel that flows into an unnamed brook. Metals and organic compounds including pesticides, PAHs, and petroleum hydrocarbons were detected in surface and subsurface soils in both areas. An isolated occurrence of PCBs was also noted at one subsurface soil location. A few organic compounds (including one VOC, a few pesticides, and one PCB Aroclor) and metals were detected in groundwater in the downgradient and vicinity wells.

Old B&M Oil/Sludge Recycling Area. The 6-acre, Old B&M Oil/Sludge Recycling Area was established sometime prior to 1938 for the purpose of recycling oil. Contaminants detected in surface and subsurface soils consist primarily of PAHs, long-chain alkanes, and petroleum hydrocarbons. Numerous pesticides and PCBs were detected in the northern area, and metals were measured in both areas. Although aromatic VOCs, PAHs, and petroleum hydrocarbons were generally not present in groundwater, chlorinated VOCs and metals were detected. Metals, which were detected primarily in shallow overburden groundwater, included arsenic, chromium, cobalt, lead, mercury, nickel, and zinc. Petroleum hydrocarbons were measured in one well and several inches of floating product were observed in one piezometer in the southern oil/sludge area.

Contaminated Soils Area. The Contaminated Soils Area is located in the center of the Site and is approximately 50 acres in size. Contaminated soil was first identified as a problem in this area after a random soil boring program conducted across the Site indicated elevated levels of lead (310 to 76,600 parts per million [ppm]) at nine out of forty locations. Organic compounds, including PAHs, petroleum

hydrocarbons, and pesticides, were measured in surface soils in localized areas. Lead and manganese were the metals that were detected most often and in the highest concentrations.

Asbestos Landfill. The Site has historically been identified with asbestos contamination due to asbestos landfilling operations conducted by Johns-Manville over a 32-year period. Although EPA capped the Asbestos Landfill in 1984, asbestos materials have been found outside the limits of the cap. However, the results of the off-site soil sampling indicated that, with one exception, there were no detectable levels of asbestos in residential areas. No additional analytical data were collected for this area as part of the RI.

Asbestos Lagoons. In addition to the Asbestos Landfill, there are three unlined asbestos lagoons on Johns-Manville property. Groundwater samples collected from beneath the lagoons contained VOCs (primarily aromatic and chlorinated VOCs), PAHs, PCBs, and pesticides. Chlorinated VOCs and metals (arsenic, cobalt, lead, and zinc) were detected in the shallow overburden, deep overburden, and bedrock flow zones.

Site-Wide Surface Water and Sediment Contamination. Two rounds of surface water and sediment sampling conducted in June and September of 1993 revealed aromatic and chlorinated VOCs at multiple surface water locations. In general, PAHs, pesticides, and metals were detected more often and in higher concentrations in the data from the June sampling round compared to data collected in September. In the vicinity of Shaffer Landfill, specific conductance and metals concentrations were higher than in other areas of the site. Similar to surface water, the frequency of detection and the concentrations of contaminants in sediment, including aromatic and chlorinated VOCs, PAHs, pesticides, and PCBs, were generally greater in June than September. Metals were detected at similar concentrations during both sediment sampling rounds.

Baseline Ecological Risk Assessment Summary. The BERA for the Site included an evaluation of the potential adverse effects of site contaminants of potential concern (COPCs) to receptor populations in both terrestrial and aquatic habitats. Areas of concern for terrestrial habitats are the seven areas described above. Aquatic habitats were separated into the West Middlesex Canal Group, Wetland 2 Group, East Middlesex Canal Group, Richardson Pond Group, and Content Brook Wetland Group as shown on Figure 1-2.

Adverse effects to soil invertebrates and dietary exposures of semivolatile organic compounds (SVOCs), pesticides, and metals to short-tailed shrews from the ingestion of earthworms, surface soil, and surface water at the B&M Railroad Landfill, RSI Landfill, and B&M Locomotive Shop Disposal Areas (Areas A and B) were evaluated. The results of the earthworm and short-tailed shrew analyses indicated the potential for reductions in both soil invertebrate and small mammal populations at the B&M Railroad Landfill and B&M Locomotive Shop Disposal Areas (Areas A and B). In general, metals and SVOCs (mostly PAHs) are the two contaminant groups of concern. The proposed remedies (source control via capping and/or excavation) for these areas are expected to eliminate the exposure pathways for terrestrial receptors.

The evaluation of ecological risk in aquatic habitats identified minimal risks from surface water in the

Middlesex Canal. The results of the evaluation of potential risks to benthic receptors due to exposure to sediment COPCs in the Middlesex Canal indicate potential risks in West Middlesex Canal from exposure to SVOCs and also from exposure to copper, lead, PCBs, and 4,4'-DDD on a limited spacial scale. The evaluation also indicated the potential for adverse effects on aquatic populations as a result of the observed concentrations of metals in surface water in the Wetland 2 Group (barium, iron, and lead), Richardson Pond Group (barium, iron, and lead), and Content Brook Wetland Group (barium, aluminum, arsenic, iron, manganese, and silver). Results of the sediment analysis for benthic receptors indicated potential adverse effects on benthic invertebrate communities could occur as a result of the observed concentrations of PAHs and metals in sediments in the Wetland 2 Group, Richardson Pond Group, and Content Brook Wetland Group. Although the sediment contaminant concentrations indicated the potential for adverse effects, this result was not supported by the qualitative benthic community data. A potential for adverse effects on migratory bird populations was identified in the Wetland 2 Group, Richardson Pond Group, and the Content Brook Wetland Group from exposures to metals (particularly mercury and zinc) and SVOCs (particularly dibenz[a,h]anthracene).

Based on the results of the BERA, the primary COPCs identified include 4,4'-DDD in sediment, PAHs in sediment, PCBs in sediment, and target metals (aluminum [Al], arsenic [As], barium [Ba], manganese [Mn], silver [Ag], chromium [Cr], cobalt [Co], copper [Cu], lead [Pb], vanadium [V], and zinc [Zn]) in surface water and sediment. In addition, there was potential risk associated with dietary exposures of great blue heron to target metals and PAHs through the ingestion of fish.

1.3 Conceptual Site Model

The conceptual site model (CSM) summarizes the release of contaminants from industrial and urban sources, which have been transported through groundwater discharge, surface drainage, and sediment transport (secondary sources) to surface water and sediment within various area of the Site. The complete ecological exposure pathways are also summarized in the CSM (Figure 1-3).

As described in Section 1.1, groundwater, surface water, sediments, and soil contamination were studied in the RI/FS for OU-3 Groundwater in both the overburden and bedrock aquifers generally enters the Site from the southwest and flows to the northwest. Similarly, surface water flows onto the Site from the south and flows to the northwest, where it converges with B&M Pond and associated wetlands. Based on seepage meter, staff gauge, and mini-piezometer results summarized in the OU-3 RI/FS (M&E, 1997 and M&E, 2004a), the potential for groundwater to discharge to surface water was evident throughout most of the Site.

Groundwater studies conducted as part of the OU-3 RI/FS included groundwater modeling, which utilized site-specific information such as boring logs, slug tests, water levels from monitoring wells and staff gauges, and stream seepage tests to simulate groundwater migration used to estimate relative times to achieve remedial action objectives (RAOs) for groundwater cleanup. The modeling indicated that the time to reach RAOs was greater than the EPA default period of 30 years. As a result, EPA decided to address potential groundwater cleanup by initially performing source control measures, then monitoring groundwater and evaluating trends in contaminant concentrations that result from those actions.

Contaminated sediments and surface water at the Site are likely the result of contaminated groundwater discharge and runoff containing contaminated soils. Based on the transport pathways described and the results of the baseline ecological risk assessment conducted for OU-3 (see Section 1.2), the primary ecological receptors for potential exposure to contaminated media at the Site include organisms such as benthic invertebrates and aquatic receptors directly exposed to contaminants in sediment and surface water, and migratory birds that feed primarily on fish that may be impacted by site-related contamination. The aquatic and semiaquatic receptors include organisms such as invertebrates in the surface water (zooplankton community), warmwater fish, predatory birds, and benthic invertebrates exposed to sediments affected by COPCs. Based on the OU-3 BERA results, the indicator species and indicator communities identified at the Site selected for further evaluation included aquatic receptors (zooplankton and fish), benthic invertebrates, and predatory birds, represented by the great blue heron.

Each of these indicator species or indicator communities may be exposed to substantial levels of contaminants through direct contact with and consumption of contaminated abiotic media or through the consumption of prey items that carry contaminant body burdens. The CSM shows the exposure pathways by which these species may be exposed to COPCs (Figure 1-3). This model allows evaluation of direct and indirect (food-chain) impacts on major components of the aquatic and semi-aquatic food chains at the Site.

1.4 Problem Definition/Present Study

To date, investigational work performed at the Site has identified the potential for ecological risks associated with the presence of COPCs in surface water, sediment, and biota. This work assignment focuses on supporting the selection of a remedy by collecting environmental data to fill data gaps and determine the actual risk of adverse effects to ecological receptors. The focused ecological risk assessment will be used to select an approach for control of ecological risks at the Site that results in a well-supported Record of Decision for the Site.

Specifically, the investigation was designed to address:

- Risks to aquatic receptors directly exposed to target metals in surface water in the Middlesex Canal (downgradient of the Johns-Manville outfall), Richardson Pond, B&M Pond, and Content Brook;

- Risks to benthic invertebrates directly exposed to 4,4'-DDD, PCBs, PAHs, and target metals in sediment within the on-site wetlands and ponds; and

- Risks to predatory birds (e.g., heron) indirectly exposed to PAHs and target metals in biota within the Middlesex Canal (downgradient of the Johns-Manville outfall), Richardson Pond, B&M Pond, and Content Brook.

To address these specific risk issues, supplementary surface water, sediment, and fish tissue samples were collected for the focused risk assessment. Samples collected and analyses conducted are summarized in Table 1-1. Surface water samples were collected from one reference area (Round Pond) and four surface water areas on-site including the Middlesex Canal, Richardson Pond, B&M Pond, and

Content Brook. These samples will be used to evaluate toxicity to aquatic receptors from exposure to metals in surface water. Fish tissue samples were also collected at these five open water locations (four on-site and one reference) to model dietary exposure of heron based on site-specific fish tissue concentrations of PAHs and target metals.

Sediment samples were collected to further evaluate toxicity to benthic invertebrates from exposure to 4,4'-DDD, PCBs, PAHs, and metals in sediment within the on-site wetlands and ponds. Sediment samples were collected in a phased approach. Based on historic data and a site reconnaissance, twenty on-site sampling locations and three reference locations were selected for screening-level analysis for target metals, PAHs, PCBs, and Microtox® toxicity, using standard field-screening methods, which are further described in Section 3. Based on the field screening results, a subset of four on-site sediment sampling locations were selected to represent the sediments with highest potential toxicity. The least toxic/contaminated location among the three potential reference locations was selected for analysis as the representative reference location. These five sediment samples, including four non-reference and one reference location, were evaluated using laboratory sediment toxicity testing and analytical methods. These data will be used to evaluate the potential toxicity of site-related contaminants on benthic organisms from locations representing the highest contaminant levels based on historic data and screening results.

The data from the sediment, surface water, and fish sampling described above are evaluated in this report in preparation for use in the focused ecological risk assessment.

SECTION 2.0
FIELD OPERATIONS

This section summarizes the field activities conducted by M&E at the Site in September and October 2004. The design details of the field program are described in the *Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Remedial Investigation/Feasibility Study Addendum (OU-4) - Revision 00, Iron Horse Park Superfund Site, North Billerica, Massachusetts* (SAP) (M&E, 2004b).

2.1 Field Activities

Field activities were conducted at the Site from September 13, 2004 to October 1, 2004 in accordance with the SAP (M&E, 2004b). EPA's primary objective for the sampling activities was to provide sufficient data to support the focused ecological risk assessment.

To achieve EPA's objective, M&E collected 23 sediment samples, 5 triplicate surface water samples, and 124 fish, which were later composited into 25 fish samples. Non-reference sediment sampling locations selected for field screening are shown on Figure 2-1. Non-reference surface water and fish sampling locations are shown on Figure 2-2, along with non-reference sediment samples selected for full characterization based on the screening-level analyses. As identified in Figure 2-2, non-reference (or site) sediment sampling locations SED-01, SED-05, SED-11, and SED-18 were selected for full characterization. Figure 2-3 shows reference sediment (screening locations), surface water, and fish sampling locations. Reference sediment sampling location SED-22 was selected for full characterization. Photographs of sampling locations are provided in Appendix A.

2.1.1 Sampling Locations

Sampling locations were selected during a site reconnaissance conducted on July 8, 2004 and attended by M&E personnel, the EPA RPM and EPA ecological risk assessor, and the Massachusetts Department of Environmental Protection (MADEP) project manager. Sediment sampling locations were selected based on their positions in relation to historical sampling locations which had shown elevated levels of contamination and visual observations made during the site reconnaissance. In most cases, the staked location from historical sampling was located and samples were collected within a few feet of the previously sampled location. If a previous sampling location was not located or if sampling was to occur in a new location, the sediment sampling locations were selected based on where sediment deposition was likely to have occurred. Sediment sampling locations are shown on Figures 2-1 and 2-3.

Fish and surface water sampling locations were selected based on habitats that could support fish. Fish and surface water sampling locations are shown on Figures 2-2 and 2-3.

Sediment Sampling Locations

The locations and rationale for sediment sample selection are provided below. Further details regarding the rationale for the selection of sediment sampling locations from historical data are provided in Table 2-1. Overall, locations were selected to provide a representative sampling of the wetland areas across the Site.

Sediment samples SED-01, SED-02, SED-03, and SED-04 were collected from the Content Brook Area. All of these samples were collected within the vicinity of historical sampling locations which had reported exceedances of preliminary remediation goals (PRGs) as identified in the OU-3 FS (M&E, 2004a).

Sediment samples SED-05, SED-06, and SED-07 were collected on the shores of B&M Pond. Two of these three locations (SED-05 and SED-06) were collected near locations with historical PRG exceedances. The third sample, SED-07, was collected in the northwest corner of B&M Pond. This location was selected to provide better spatial coverage of the pond.

Sediment sample SED-08 was collected within the wetland just off the East Middlesex Canal, south of the B&M Railroad Landfill. This location is in the vicinity of a previously collected sample which had historical PRG exceedances.

Sediment samples SED-09, SED-10, SED-11, and SED-12 were collected within the West Middlesex Canal. Samples from the West Middlesex Canal have historically shown elevated concentrations of PAHs. In addition, SED-11, located just downstream of the Johns-Manville outfall, was sampled in the vicinity of the location with the reported highest historical PCB concentration.

Sediment samples SED-13, SED-14, SED-15, and SED-16 were collected within Richardson Pond and the surrounding wetlands. One sampling location (SED-13) was located within an area that had historically reported PRG exceedances. This wetland area was considered a likely habitat for heron, a receptor to be included in the focused ecological risk assessment.

Sediment samples SED-17, SED-18, SED-19, and SED-20 were collected within the Unnamed Brook. These samples were all collected within the vicinity of previous sampling locations for which exceedances of PRGs were reported.

Sediment samples SED-21, SED-22, and SED-23 were collected within Round Pond. These samples were collected to serve as reference locations.

A survey of all sediment sampling locations was conducted by M&E using a hand-held GPS unit. The survey was conducted in accordance with the following standards: Horizontal Controls are geographic coordinates WGS 84 (World Geodetic System of 1984). Vertical datum was not recorded. GPS coordinates for sediment sampling locations are provided in Appendix B.

Surface Water Sampling Locations

Surface water samples were collected in triplicate at five locations corresponding to where fish sampling was to occur, including Richardson Pond (SW-RP samples), Content Brook (SW-CB samples), West Middlesex Canal (SW-MC samples), B&M Pond (SW-BM samples), and Round Pond (SW-RF reference samples). Surface water sample nomenclature includes the location prefix (e.g. SW-CB) and a suffix (i.e. -01, -02, or -03) indicating triplicate sample identifications.

Fish Sampling Locations

Fish samples were collected from four on-site surface water bodies (B&M Pond, Richardson Pond, Middlesex Canal down gradient of the Johns-Manville outfall, and Content Brook) and the reference water body (Round Pond). Initially, the fish collected were assigned a subsample ID. This was done because most fish collected were not of sufficient weight to constitute a sample, and therefore, were expected to be composited. Once composited, there were 25 fish samples for analysis. Once composited, sample nomenclature included a location prefix (e.g., BM for B&M Pond), followed by a species abbreviation (e.g, BB for brown bullhead and GS for golden shiner), and then a sequential sample number. For example, fish tissue sample MC-AE-1 was a composite sample of American eel collected from the West Middlesex Canal.

2.1.2 Sediment Sampling

Sediment samples were collected from September 13, 2004 through September 20, 2004. All twenty-three sediment samples were collected with an Eckman dredge, which generally captures the first six inches of sediment below the sediment-water interface. Collected sediment was placed in one or more stainless steel bowls and photoionization detector (PID) readings were taken and recorded (Appendix C). Sediment was then homogenized with a stainless steel spoon or trowel, and grain size, Munsell color, and sample descriptions were recorded on field sampling sheets. Depth to the river bottom was also measured and recorded. Sediment was placed into sampling containers and immediately placed in a cooler with ice (with the exception of sample aliquots for grain size analyses). Samples were later recorded onto chain-of-custody (CoC) forms and submitted to laboratories to be held for possible analysis.

All sampling equipment was decontaminated between each sample location according to M&E standard operating procedures (SOPs) in accordance with M&E's SAP (M&E, 2004b). Sediment sampling field data sheets are provided in Appendix C.

Sediment samples were collected for the initial screening of toxicity with Microtox®, PAHs and PCBs with immunoassay test kits, and target metals except aluminum by X-Ray Fluorescence Spectroscopy (XRF). In addition, sediment was collected for possible full characterization, including analyses for toxicity, 4,4'-DDD/PCBs, PAHs, target metals, total organic carbon (TOC), and grain size in accordance with the SAP (M&E, 2004b). Samples were preserved with ice. Additional sample volume was collected from sediment location SED-05 for field duplicate analyses. The sample location identification used for the field duplicate was SED-25. At locations SED-21, SED-22, and SED-23, additional sample volume was collected for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses

for PAHs, 4,4'-DDD/PCBs, target metals, and TOC. Equipment blanks were also collected and submitted for analyses. A temperature blank was included with each cooler prior to sample shipment. CoC documentation for each sample shipment is included in Appendix D. Upon arrival at the laboratories, sediment samples were frozen to suspend the holding times while awaiting a decision concerning those samples to undergo full characterization.

2.1.3 Surface Water Sampling

Surface water samples were collected in triplicate from five locations within various water bodies located in and around the Site from September 21, 2004 through September 24, 2004. Surface water sampling was conducted prior to electroshocking for fish to minimize sediment disturbances caused by the electroshocker, which could potentially lead to elevated turbidity levels in the surface water samples.

Surface water samples were collected using a teflon-coated dipper to transfer sample aliquots to sample containers. For the dissolved target metals sample aliquot, surface water was placed into an interim bottle from which volume was later pumped through a 0.45 µm filter and transferred to another bottle to be submitted to the laboratory. All samples were preserved according to analytical methodologies, placed in a cooler with ice, documented onto a CoC form, and submitted for laboratory analyses.

At each sampling location, the depth of the water column was measured and velocity of the current was visually estimated and recorded. In addition, water quality and field parameters (pH, dissolved oxygen, specific conductivity, oxidation reduction potential [ORP], temperature, and turbidity) were measured and recorded.

Non-dedicated sampling equipment (i.e., the dipper) was decontaminated between each surface water sampling location according to SOPs in the SAP (M&E, 2004b). Surface water sampling field data sheets are provided in Appendix C.

All surface water samples were collected for analysis of toxicity to daphnia and minnow, target metals (total and dissolved), and alkalinity in accordance with the SAP (M&E, 2004b). Samples collected for target metals analysis were preserved with nitric acid (HNO_3). Alkalinity and toxicity testing samples were not preserved. Additional sample volume was collected from location SW-MC-01 (the first of the triplicate samples collected in the West Middlesex Canal) for field duplicate analyses for target metals and alkalinity. The sample location identification used for the field duplicate was SW-MC-21. At location SW-RF-01, additional sample volume was collected for MS/MSD analyses for target metals and alkalinity. Equipment blanks (for total and dissolved target metals) were collected and submitted for analysis. A temperature blank was included with each sample shipment. CoC documentation for each sample shipment is included in Appendix D.

2.1.4 Fish Sampling

Fish samples were collected from four on-site surface water bodies (B&M Pond, Richardson Pond, Middlesex Canal down gradient of the Johns-Manville outfall, and Content Brook) and the reference water body (Round Pond) consistent with the SAP (M&E, 2004b) procedures. Coinciding with surface water sampling, the initial fish sampling event occurred during the week of September 21, 2004 through September 24, 2004. M&E in consultation with EPA, conducted an additional three days of fish sampling from September 29, 2004 through October 1, 2004. Additional fish sampling was necessary to obtain sufficient sample mass for brown bullhead (*Ameiurus nebulosus*) from Content Brook and Round Pond.

At each location, five 50-gram samples were targeted which consisted of either a single fish or a composite of multiple fish of the same species. After all samples were collected, EPA in consultation with M&E, decided which specific fish from each area would be composited by the laboratory for analysis. Each composited fish sample was analyzed on a whole fish basis for total lipids, target metals, and PAHs.

Prior to fish sampling, a Scientific Collection Permit was filed with the Massachusetts Department of Fisheries and Wildlife (Appendix E). During the week of September 21, 2004 through the 24, 2004, fish were collected at all locations using a direct-current (DC) powered backpack electroshocker. Sampling was conducted by wading in a downstream to upstream fashion within Middlesex Canal and Content Brook. At locations where water levels were too deep or the substrate too soft to allow wading, the field crew used either a canoe or a small inflatable zodiac boat. In all pond locations, including Richardson Pond, B&M Pond, and Round Pond, electrofishing was conducted in anticipated fish habitat (i.e., submergent and emergent vegetation) in water depths up to four feet.

During the week of September 29,2004 through October 1, 2004, fish were collected using a combination of sampling gear including hoop nets, trot lines, gill nets, and angling. Fish within Round Pond and Content Brook were collected using baited hoop nets and trot lines which were soaked overnight and collected the following morning. Gill nets and angling were also used to supplement fish collection within Round Pond. Gill nets, consisting of variable mesh sizes (2.0-inch, 2.5-inch, 3.0-inch and 3.5-inch), were soaked for two hour sets. At all locations, an on-shore observer was present during fish sampling events.

All collected fish were placed into holding bins which consisted of a tank with sufficient water to maintain proper temperature and oxygen levels to minimize stress. All fish collected were kept alive until final decisions were made regarding which individuals were to be retained for fish tissue analysis. All fish selected for the fish tissue analysis were euthanized, enumerated, identified to species, and measured for length and weight. Scales or fin samples were also removed for potential age analysis. Whole body fish samples were then packed in dry ice and shipped to the laboratory for processing and analysis. All fish sampling field data sheets are provided in Appendix C.

2.2 Field Observations

Field observations made during the sampling of sediment, surface water, and fish are detailed below.

2.2.1 Sediment Observations

Field observations made during sediment sampling are provided herein, by area. A summary of sediment sample descriptions is provided in Table 2-2. Field sampling sheets are included in Appendix C.

Content Brook Area
Sediment samples collected within the Content Brook Area were generally dark brown or dark gray in color and consisted of silt and fine or very fine sand. The one exception was that only silt with some organic material was noted in sediment sample SED-02, which was collected within a phragmites wetland at the foot of Shaffer Landfill.

Sediment sample SED-01 was collected in a very shallow stream (water depth less than 2 inches). This sediment sample was stained with an orange color and appeared to have a sheen. A hydrocarbon odor was noted for this sample, as well as sediment sample SED-02. A sulfide odor was noted for sediment sample SED-04.

B&M Pond
Sediment samples collected from B&M Pond (SED-05, SED-06, and SED-07) and in the vicinity (SED-08) were characterized as black or very dark grayish brown silt and fine or very fine sandy sediment with some organic material, including roots, leaves, and twigs. A sheen was observed on the surface water when sediment samples SED-05, SED-07, and SED-08 were collected.

West Middlesex Canal
Sediment samples collected within the West Middlesex Canal consisted of silt and various classes of sand and were very dark grayish brown or black in color. The canals are tree-lined and all samples contained twigs. A sheen on the water surface was noted when samples SED-09, SED-10, and SED-12 were collected.

Richardson Pond
Sediment samples collected within Richardson Pond were characterized as very dark gray or brown silt, with little or some fine sand and/or coarse sand. All samples contained some amount of organic matter, consisting of wetland vegetation and phragmites roots. The surface water in Richardson Pond, where the sediment samples were collected, was stained with limited visibility. Surface sheens were observed at SED-13 and SED-15.

Unnamed Brook
Sediment samples collected from the Unnamed Brook (SED-17, SED-18, SED-19, and SED-20) contained silt and various sand classes that were very dark gray or black in color. A sheen on the water surface was noted at all locations.

Reference Area - Round Pond
Samples collected at Round Pond were very dark brown or black in color and consisted of silt and fine

or very fine sand. A high organic fraction (i.e., leaves and roots) was noted for SED-21 and SED-22; only some twigs were noted for sample SED-23. Stained water was noted above all sample locations and a sulfide odor was noted for SED-21.

2.2.2 Surface Water and Fish Observations

Observations made during surface water and fish sampling are discussed together within this section, as these samples were collected concurrently. Observations are discussed by surface water body. Fish data collected, such as weight and length, are considered results, and thus, are discussed in Section 6.

At all surface water bodies, water quality parameters, including temperature, dissolved oxygen (DO), specific conductivity, pH, oxidation reduction potential (ORP), and turbidity were measured. Table 2-3 summarizes water quality parameters measured within surface water bodies at the Site.

Similar temperature readings were recorded for each surface water body. Temperatures ranged between 15.36 and 18.06 ^{o}C. The variability can be largely attributed to time of day and depth of sample. The pH was slightly acidic (6.08 - 6.53) at all surface water bodies, with the exception of the reference location, Round Pond, where a slightly basic pH of 7.53 was recorded. Low specific conductivity readings were recorded at all surface water bodies. Richardson Pond had the highest specific conductivity with a reading of 378 microSiemens per centimeter (µS/cm). A range of 129 to 211 µS/cm was noted at the other surface water bodies. At each surface water body, the water color was noted to be slightly stained; however, turbidity was very low at all locations, with values ranging between 1.3 to 5.26 Nephlometric Turbidity Units (NTU).

All five surface water bodies were depleted with respect to DO, with concentrations reported between 0.90 and 4.85 milligrams per liter (mg/L). The reference location, Round Pond, and Richardson Pond had the lowest DO with 0.90 and 1.35 mg/L, respectively. All bodies of water had ORP readings between 53.5 and 298 millivolts (mV). It should be noted that the bodies of water with the lowest DO concentrations had the highest ORP readings.

Low current speeds were noted (1 to 2 ft/sec) at Richardson Pond, Middlesex Canal, and Content Brook. Current speeds were estimated based on the distance that a floating object such as a leaf traveled over a specific time. No current was observed at B&M Pond and Round Pond.

SECTION 3.0
ANALYTICAL METHODS

Screening analyses for target metals (except aluminum), PAHs, and PCBs were performed off-site by the M&E team using procedures described in Appendix G of the SAP (M&E, 2004b). Microtox® screening analyses were performed by EnviroSystems, Incorporated (ESI), of Hampton, New Hampshire using the procedure provided in Appendix J of the SAP (M&E, 2004b). Grain size analysis was performed by a subcontracted geotechnical testing laboratory using the procedure described in Appendix I of the SAP (M&E, 2004b). Toxicity testing was performed by ESI using standard operating procedures (SOPs) provided in Appendix J of the SAP (M&E, 2004b). For definitive chemical analyses, the laboratories performed the analytical procedures according to the M&E Delivery of Analytical Services (DAS) specifications included in Appendix H of the SAP (M&E, 2004b). DAS specifications are developed under the EPA DAS program and are based on EPA analysis methods. Chemical analysis work was subcontracted to laboratories procured under the DAS program. DAS specifications were utilized, modified, or developed to meet the project data quality objectives (DQOs) for the sampling event. Analytical methods were selected to assess sample concentrations relative to each parameter's project action limit (PAL). The PAL for each analyte in each media was chosen based upon the lowest of chosen ecological published risk-based criteria. The PALs are listed in the analytical result tables of this report. The specific source of each individual PAL is included in Tables 6-1, 6-2, and 6-3 of the SAP (M&E, 2004b).

This section provides summaries of the analytical methods used to determine target analyte concentrations. All quality control requirements associated with the procedures are detailed in the procedures and DAS specifications referenced above. Any modifications or deviations from the DAS specifications performed by the laboratories received approval by M&E and are discussed in Section 5.0.

3.1 Sediment

The sediment sampling program was designed such that twenty-three sediment samples, including twenty site samples and three reference samples, would be collected and field-screened for toxicity, PAHs, PCBs, and target metals (except aluminum). From the results, four samples (with the possibility of a fifth) would be selected for analysis by M&E and EPA for full characterization, based on the highest screening results for three site samples and the lowest screening result for the reference sample. A fifth sediment sample would be analyzed by the laboratory if the site sample collected in the vicinity of the highest historical 4,4'-DDD concentration had not been selected based on the highest screening results.

3.1.1 Screening Analyses

3.1.1.1 Microtox® Screening. The Microtox® Acute Toxicity Test is a timed metabolic inhibition test which uses freeze-dried luminescent bacteria (Vibrio fischeri NRRL B-11177) to evaluate the acute toxicity of water, soil, or sediment samples. Bacterial bioluminescence is directly proportional to cellular respiration and any inhibition of cellular activity (toxicity)

results in a decreased rate of cellular respiration and a corresponding decrease in the rate of luminescence. The more toxic the sample, the greater the percent light loss from the test suspension of luminescent bacteria.

3.1.1.2 PAH Screening. The PAH RaPID Assay kit applies the principles of enzyme linked immunosorbent assay (ELISA) to the determination of PAHs and related compounds. The sample to be tested is added, along with an enzyme conjugate, to a disposable test tube, followed by paramagnetic particles with attached antibodies specific to PAHs. The PAHs (which may be in the sample) and the enzyme-labeled PAHs (the enzyme conjugate) compete for antibody binding sites on the magnetic particles. At the end of an incubation period, a magnetic field is applied to hold the paramagnetic particles (with PAHs and labeled PAH analog bound to the antibodies on the particles, in proportion to their original concentration) in the tube and allow the unbound reagents to be decanted.

The presence of PAHs is detected by adding the enzyme substrate (hydrogen peroxide) and the chromogen (3,3',5,5'-tetramethylbenzidine). The enzyme-labeled PAH analog bound to the PAH antibody catalyzes the conversion of the substrate/chromogen mixture to a colored product. Since the labeled PAHs (conjugates) were in competition with the unlabeled PAHs (sample) for the antibody sites, the color developed is inversely proportional to the concentration of PAHs in the sample.

3.1.1.3 PCB Screening. The PCB RaPID Assay kit applies the principles of ELISA to the determination of PCBs and related compounds. The sample to be tested is added, along with an enzyme conjugate, to a disposable test tube, followed by paramagnetic particles with attached antibodies specific to PCBs. The PCBs (which may be in the sample) and the enzyme-labeled PCBs (the enzyme conjugate) compete for antibody binding sites on the magnetic particles. At the end of an incubation period, a magnetic field is applied to hold the paramagnetic particles (with PCBs and labeled PCB analog bound to the antibodies on the particles, in proportion to their original concentration) in the tube and allow the unbound reagents to be decanted.

The presence of PCBs is detected by adding the enzyme substrate (hydrogen peroxide) and the chromogen (3,3',5,5'-tetramethylbenzidine). The enzyme-labeled PCB analog bound to the PCB antibody catalyzes the conversion of the substrate/chromogen mixture to a colored product. Since the labeled PCBs (conjugates) were in competition with the unlabeled PCBs (sample) for the antibody sites, the color developed is inversely proportional to the concentration of PCBs in the sample.

3.1.1.4 Target Metals Screening. The X-ray fluorescence (XRF) spectrometer uses gamma-ray bombardment to produce nuclear excitement of atoms within the test material. Upon relaxation of each excited atom, a characteristic X-ray is emitted which is proportional to the atomic number of the excited atom. By analyzing the spectral X-ray intensities, the types of elements present and their respective concentrations can be determined.

3.1.2 Full Characterization Analyses

3.1.2.1 Grain Size. The sediment samples were analyzed for grain size according to ASTM D-422-98. A quantitative determination of the distribution of particle sizes retained on the No. 10 sieve was determined by sieving using various sieve sizes ranging from 3 inch to No. 10.

3.1.2.2 Total Organic Carbon/Total Combustible Organics. The sediment samples were analyzed for total organic carbon (TOC) and total combustible organics (TCO) according to M&E DAS specification D-005.1, which is based upon the Lloyd Kahn method for TOC and ASTM D2974-87 for TCO. For TOC, the TOC analyzer converted the carbonaceous material in the samples to CO_2 by catalytic combustion. The CO_2 formed from each sample was measured by an infrared detector and was directly proportional to the concentration of organic carbonaceous material in the sample. The TOC was reported if the TCO results were less than 1 percent. The TCO was determined by measuring the ash content of the samples by combustion at 750°C.

3.1.2.3 Target Metals. M&E DAS Specification D-044.2 was used to determine concentrations of aluminum (Al), arsenic (As), barium (Ba), manganese (Mn), silver (Ag), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), vanadium (V), and zinc (Zn) in the sediment samples. Freeze-dried aliquots of the samples were digested and analyzed for the target metals by inductively coupled plasma/mass spectroscopy (ICP-MS) according to the CLP Statement of Work (SOW) ILM04.1 as modified by the DAS specification.

3.1.2.4 Pesticides and PCBs. M&E DAS Specification D-043.1 was used to determine concentrations of 4,4'-DDD and PCBs in the sediment samples. Freeze-dried aliquots of the samples were extracted and analyzed for the target compounds by gas chromatography using an electron capture detector (GC/ECD) according to the CLP SOW OLM04.3 as modified by the DAS specification.

3.1.2.5 Polynuclear Aromatic Hydrocarbons. M&E DAS Specification D-054.1 was used to determine concentrations of PAHs in the sediment samples. Freeze-dried aliquots of the samples were extracted and analyzed for the target compounds by gas chromatography/mass spectrometry (GC/MS) single ion monitoring (SIM) according to the CLP SOW OLM04.3 as modified by the DAS specification.

3.1.2.6 Toxicity. Sediment toxicity tests were conducted for the freshwater midge *Chironomus tentans,* and the amphipod *Hyalella azteca* by ESI according to ESI SOPs (M&E, 2004b), based on programs and protocols outlined in Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates (ASTM, 2001), Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates (EPA, 2000), and Standard Methods for the Examination of Water and Wastewater, 20th Edition (APHA, 1998). *C. tentans* 10-day survival and growth toxicity tests were conducted according to ASTM method E 1706-95 and EPA method 100.5 (ESI SOP QA-1407). *H. azteca* 10-day survival and growth tests were conducted according to ASTM method E 1706-95 and EPA method 100.4 (ESI SOP QA-1406).

3.2 Surface Water

3.2.1 Total and Dissolved Target Metals

M&E DAS Specification D-004.1 was used to determine concentrations of Al, As, Ba, Mn, Ag, Cr, Co, Cu, Pb, V, and Zn, as well as calcium (Ca) and magnesium (Mg). Both field-filtered and unfiltered samples, representing dissolved and total metals, respectively, were digested and analyzed for the target metals by inductively coupled plasma/mass spectroscopy (ICP-MS) according to the CLP Statement of Work (SOW) ILM04.1 as modified by the DAS specification.

3.2.2 Alkalinity

M&E DAS Specification D-033.1 was used to determine alkalinity in surface water samples. An unaltered sample is titrated to an electrometrically determined end point of pH 4.5 with acid according to EPA Method 310.1 as modified by the DAS specification.

3.2.3 Toxicity

The surface water chronic renewal toxicity tests using the daphnid, *Ceriodaphnia dubia* and fathead minnow, *Pimephales promelas*, were performed at ESI according to ESI SOPs (M&E, 2004b), based on programs and protocols outlined in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA, 2002), and Standard Methods for the Examination of Water and Wastewater, 20th Edition (APHA, 1998). The *C. dubia* survival and reproduction assay chronic toxicity tests were conducted according to EPA method 1002.0 (ESI SOP QA-1408). The *P. promelas* survival and growth assay 7-day surface water tests were conducted according to EPA method 1000.0 (ESI SOP QA-1409).

3.3 Fish Tissue

The following sections describe methods used for analysis of fish samples collected at the Site.

3.3.1 External Examination, Weight, Length and Age

All fish were removed from the holding bin and individually examined for gross histo-pathology to detect obvious abnormalities (i.e., tumors, lesions, unusual parasitism, fin erosion, eroded gills, and other visible deformities). Each fish was also inspected for physical deformities or abnormalities, which were recorded on the field data sheet.

Following inspection, individual fish were measured for fork length (± 1millimeter [mm]) and weight (± 0.1 gram [g]) consistent with procedures identified in the SAP (M&E, 2004b). Scales were obtained from all species except brown bullhead (*Ameiurus nebulosus)* and American eel (*Auguilla rostrata*). Dorsal spines were taken from brown bullhead. All scale and dorsal spine samples are being held at Metcalf & Eddy for potential future aging analysis if deemed necessary. American eel will not be aged due to the lack of bony structures.

3.3.2 Fish Compositing Scheme

All fish captured were rinsed with deionized ultra-filtered (DIUF) water and shipped in individual packages to the laboratory as whole body samples. M&E, in consultation with EPA, then decided which samples to analyze from each individual surface water body. Table 3-1 presents the number and mass of samples submitted for fish tissue preparation and analysis. Whenever possible, a single fish constituted one sample. If individual fish were not large enough to provide the required sample mass (approximately 50 g), multiple fish of the same species were composited at the laboratory. To the extent possible, fish of similar size and species were composited to achieve the tissue mass required for analysis. The laboratory then homogenized the whole body samples according to M&E DAS Specification D-051.1 prior to digestion for target metals and extraction for PAH and lipid content analyses.

3.3.3 Target Metals

Fish tissue samples were analyzed for target metals (Al, As, Ba, Mn, Ag, Cr, Co, Cu, Pb, V, and Zn) according to procedures outlined in M&E DAS Specification D-134. The target analytes were the same as those analyzed for sediment samples. The samples were digested and analyzed for the target metals by inductively coupled plasma/mass spectroscopy (ICP-MS) according to the CLP Statement of Work (SOW) ILM04.1 as modified by the DAS specification.

3.3.4 Polynuclear Aromatic Hydrocarbons

Fish tissue samples were analyzed for PAHs according to procedures outlined in M&E DAS Specification D-052.1. Tissue samples (approximately 5 grams) were extracted using SW-846 Method 3545 (pressurized fluid extraction). Clean-up techniques included the use of silica gel and copper. The samples were analyzed for PAHs by GC/MS using the CLP SOW OLM04.3 as modified by the DAS specification which incorporated the use of single ion monitoring (SIM) for detection of low concentrations of PAHs.

3.3.5 Lipid Content

Fish tissue samples were analyzed for total lipids according to procedures outlined in M&E DAS Specification D-058.1. The lipids analysis was performed on a split of the extract used for PAH analysis. The samples were analyzed using gravimetric methodology from EPA 823-R-95-007 *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories* as modified by the DAS specification.

SECTION 4.0
DATA QUALITY AND DATA VALIDATION

4.1 Project Quality Objectives

Data generated during the September and October 2004 sampling events are to be used for a focused ecological risk assessment to determine the potential for adverse effects of contaminants in sediment, surface water, and biota on ecological receptors, either through direct exposure to contaminants in sediment and surface water or through indirect exposure through the food web. The following Data Quality Objectives (DQOs), as presented in the SAP (M&E, 2004b), were set for this project:

- Provide additional data for the RI/FS to support selection of a remedy to control ecological risks to the environment, including providing data to assess the risks to aquatic receptors directly exposed to metals in on-site surface water bodies;

- Assess the risks to aquatic receptors directly exposed to 4,4'-DDD, PAHs, and metals in sediment within the on-site wetlands and ponds; and

- Assess the risks to predatory birds indirectly exposed to PAHs and metals through ingestion of fish from on-site surface water bodies.

A complete discussion of project data validation and data quality is provided in Appendix F. This narrative is based on data validation memoranda submitted to EPA between November 2004 and February 2005. Tier II data validation was performed on all chemistry data, with the exception of alkalinity and TOC, associated with the September and October 2004 sampling event. The level of validation required was defined in the SAP (M&E, 2004b).

In order to determine if project DQOs were met, the quality of the actual sample and quality control results was assessed. Data quality was assessed in terms of precision, accuracy, representativeness, completeness, and comparability. For each of these terms, quality objectives were established prior to the onset of the program, and actual sample and quality control results were evaluated in relation to these quality objectives.

Data quality and test acceptability for sediment and surface water toxicity tests are discussed in Appendices G and H, respectively. Specific data validation procedures for toxicity test data are not available, however, test acceptability requirements were evaluated and protocol deviations were reviewed and reported (Appendices G and H). Results of reference toxicant evaluations conducted by the laboratory are also reported.

SECTION 5.0
DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

5.1 Field Methods

Field method variations to the SAP include the following:

- A dipper was used to collect surface water samples instead of filling the bottles directly, as indicated in the SAP. A dipper is a teflon-coated beaker attached to a long-handled pole, which allows collection of surface water from the shore of water bodies, and are commonly used to collect surface water. This procedure further reduced the possibility of sediment disturbances and contamination within the surface water samples.

- As noted in Section 2.1.4, fish were collected by a variety of methods during the week of September 29, 2004 through October 1, 2004. M&E, in consultation with EPA, elected to collect additional samples using baited hoop nets, trot lines, gill nets, and angling. All fish collected during the previous week were collected via electroshocking, in accordance with the SAP.

5.2 Analytical Methods

In general, analyses performed by the laboratories for this program were in accordance with the M&E DAS Analytical Specification requirements, as modified by the project specific modifications presented in the SAP (M&E, 2004b). However, additional deviations between what was performed by the laboratory and what was required by the DAS Analytical Specifications and the SAP (M&E, 2004b) were noted in several instances. These deviations were discussed with and approved by M&E prior to analysis and are listed below.

5.2.1 PAHs in Sediments

As provided in worksheet #9B in the SAP (M&E, 2004b), the laboratory had a quantitation limit (QL) of 2.0 µg/kg for most target PAHs, compared to the required 0.33 µg/kg required in DAS specification D-054.1. As the laboratory QL was consistent with the project quantitation limit of 2.0 µg/kg for each target analyte, the laboratory was approved to report sediment PAH data with a QL of 2.0 µg/kg.

5.2.2 Surface Water Toxicity Test

Review of testing procedures and data generated from surface water testing indicated one deviation from standard protocols. Sample SW-MC-01 lost two minnows from Replicate D on Day 2 due to a technician error. All statistical analysis for this replicate was, therefore, based upon the assumption that eight fish instead of ten were added at the start of testing. It is the opinion of the Study Director at ESI that this deviation had no negative impact on the outcome of the assay.

5.2.3 Method Detection Limit Studies for Tissue Analyses

The laboratory indicated that tissue method detection limit (MDL) studies are difficult and not performed on a routine basis. The DAS methods for PAH and metals analysis of tissue samples (D-052.1 and D-134, respectively) required that an MDL study be performed in the previous nine months. The laboratory had performed MDL studies several years ago, and this was deemed sufficient by the project chemist for meeting the objectives of the MDL studies.

5.2.4 Analysis of Tissue Standard Reference Materials

The laboratory indicated that freeze dried standard reference materials (SRMs) analyzed in conjunction with samples had matrix issues that overloaded the analytical systems, causing analytical problems that were not indicative of analysis of the other field samples. The laboratory was approved to reduce the sample size of co-analyzed SRMs such that the SRM-specific overloading issues were minimized.

SECTION 6.0
RESULTS

This section summarizes the results for sediment, surface water, and fish tissue sampling conducted by M&E during September and October 2004.

6.1 Sediment

Twenty-three sediment samples underwent screening analyses, five of which were selected for full characterization. The results are presented below.

6.1.1 Screening Analyses

6.1.1.1 Microtox® Results. The Microtox® results were used in conjunction with the other screening analyses to select sediment samples for full characterization analysis. Microtox® utilizes a reconstituted bioluminescent marine bacteria, *Vibrio fischeri*, where a reduction in light output serves as a measure of toxicity, and percent effect, or reduction in light, is quantified at 5 and 15 minutes. In two samples collected from B&M Pond (SED-05 and SED-08), approximately 60% effect was measured at 5 minutes. SED-05 was selected for full characterization. From the West Middlesex Canal, two sediment samples (SED-10 and SED-11) showed approximately 50% effect at 15 minutes; SED-11 was one of the samples chosen for full characterization. Three of the four samples from Content Brook (SED-01, SED-02, and SED-04) showed percent effects ranging from 28% to 37% at 5 minutes, including SED-01 which was also selected for full characterization. Lower percent effects were observed in samples from the Unnamed Brook (SED-17, SED-18, SED-19, and SED-20), Richardson Pond (SED-13, SED-14, and SED-15), and Round Pond (reference samples SED-21, 22, and 23), with the exception of sample SED-16 from Richardson Pond. Differences in percent effect at 5 and 15 minutes are hypothesized due to varying response times for different chemicals, as well as adaption on behalf of the bacteria. The sediment toxicity report generated by ESI including Microtox® data is provided in Appendix G.

6.1.1.2 PAH Screening Results. The screening results for total PAHs were corrected for dry weight and are summarized in Table 6-1. Information used to determine dry weight results is provided in Appendix I. Total PAH concentrations were detected in all samples, with an average concentration of 51.1 mg/kg dry weight (wt.) in the 23 samples. The highest concentrations were detected in samples SED-05 (161.6 mg/kg dry wt.) and SED-07 (163.13 mg/kg dry) from B&M Pond, SED-12 (156.8 mg/kg dry wt.) from the West Middlesex Canal, and SED-18 (116.84 mg/kg dry wt.) from the Unnamed Brook.

PAH concentrations were 20 mg/kg or less in Content Brook and at Round Pond, the reference location. Of the four sediment samples from B&M Pond, two had total PAHs

greater than 160 mg/kg dry wt., and the other two samples had total PAH concentrations less than 20 mg/kg dry wt. Samples from the West Middlesex Canal had total PAH concentrations ranging between 47.36 and 156.8 mg/kg dry wt., with the exception of sample SED-11 (6.1 mg/kg dry wt.). PAH detections within samples from the Unnamed Brook ranged between 28.24 and 116.84 mg/kg dry wt. In Richardson Pond, total PAH concentrations ranged between 7.69 and 59.36 mg/kg dry wt.

6.1.1.3 PCB Screening Results. The screening results for total PCBs were corrected for dry weight and are summarized in Table 6-1. Information used to determine dry weight results is provided in Appendix I. In all sediment samples, total PCB concentrations were below the detection limit, specific to percent solids of the sample.

6.1.1.4 Target Metals Screening Results. Screening analysis was performed for ten metals for the sediment samples collected, including arsenic, barium, cobalt, copper, chromium, lead, manganese, silver, vanadium, and zinc. The results are summarized in Table 6-1. An XRF screening form providing additional information about the analysis is provided in Appendix I.

Arsenic was detected in 10 of the 23 sediment samples collected, with results ranging from 40.6 to 334 mg/kg, and detections occurring within at least one sample collected from each area, except the reference location, Round Pond. The highest arsenic concentrations were recorded in samples SED-01 (334 mg/kg) and SED-14 (317 mg/kg), from Content Brook and Richardson Pond, respectively. Three of four samples from Content Brook had detectable arsenic concentrations.

Lead concentrations were detected in 22 of the 23 sediment samples collected. The average lead concentration in sediment was 285 mg/kg. Lead was detected at all areas, including the reference pond. The highest concentrations were in samples SED-05 (822 mg/kg) from B&M Pond, SED-11 (929 mg/kg) from West Middlesex Canal, and SED-17 (914 mg/kg) from the Unnamed Brook. The sediment samples from Content Brook and Round Pond, the reference location, contained lead at concentrations less than 200 mg/kg.

Detectable concentrations of barium were recorded in 18 of the 23 sediment samples collected. The detected concentrations ranged between 83.7 and 497 mg/kg, with the highest barium concentration in SED-20 collected from the Unnamed Brook. Copper was detected in 4 of 23 total samples, with detected concentrations ranging between 121 and 930 mg/kg. These samples were collected from B&M Pond, the West Middlesex Canal, and the Unnamed Brook. Manganese was found at detectable concentrations in six sediment samples. The highest manganese concentrations were detected in B&M Pond samples SED-06 and SED-07 (839 and 3,120 mg/kg, respectively). All sediment samples collected from the reference pond contained detectable manganese concentrations (333 to 581 mg/kg). Zinc was detected in 21 of 23 sediment samples, with an average concentration of 370 mg/kg. The highest zinc concentrations were detected at locations

SED-05 (3,870 mg/kg) collected from B&M Pond and SED-13 (1,090 mg/kg) collected within the Richardson Pond wetland. Chromium was only detected in sample SED-19 collected from the Unnamed Brook (511 mg/kg). Cobalt, silver, and vanadium were not detected at concentrations above their specific detection limit in any sample.

6.1.2 Full Characterization Analyses

In consultation with EPA, five sediment samples were selected for full characterization analyses, including four that were based on either elevated field-screening results (three site samples) or the lowest screening result (one reference sample), as well as one location within B&M Pond that had been the location of the highest historical 4,4'-DDD detection. Since the samples were screened for toxicity, PAHs, PCBs, and ten target metals, there were numerous variables to consider within the screening results to select samples for full characterization analyses. In addition, the spatial separation of full characterization samples across the site was desired, to be able to better characterize site-wide risks during the focused ecological risk assessment.

Sediment samples selected for full characterization include SED-01 (within the Content Brook Area), SED-05 (within B&M Pond), SED-11 (within the West Middlesex Canal), SED-18 (within the Unnamed Brook), and SED-22 (within the reference area - Round Pond). No samples were selected from Richardson Pond for full characterization. The rationale for the selection of sediment samples for full characterization is provided in Table 6-2. Historical data, as well as the field-screening results, were considered during the selection of samples for full characterization. The sediment samples not selected for full characterization are being held by the laboratories in a frozen state should additional samples require full characterization.

Samples selected for full characterization were analyzed for grain size, toxicity, and chemical analyses including TOC, target metals, 4,4'-DDD, PCBs, and PAHs. Sample aliquots for target metals, 4,4'-DDD, PCBs, and PAHs were freeze-dried upon receipt at the laboratory if the percent moisture was measured to be 50% or more. For grain size, toxicity, and TOC analyses, samples were not freeze-dried prior to analysis. Grain size results are summarized in Table 6-3. Results for the chemical analyses are provided in Table 6-4. Toxicity testing results are provided in the report generated by ESI in Appendix G. Analytical results tables are included in Appendix J. The grain size analysis report is included in Appendix K.

6.1.2.1 Grain Size. The grain size analysis confirmed that the sediments were predominantly sand (69.6% to 88.1 %) with smaller fractions of silt and clay (4.3% to 28.4%) and gravel (0.0% to 16.6 %). Large particulate organic matter (such as sticks, roots, and plant stems) are typically removed by the laboratory, if not already removed during the collection of the sample, prior to the sieve analysis. However, smaller organic matter, such as leaves, undergoes the sieve analysis, and thus is captured on the appropriately-sized sieve, contributing toward the total weight retained on that sieve.

6.1.2.2 Total Organic Carbon. Organic material was observed and recorded in each of the samples. The TOC content within the four site samples ranged between 16.1 and 32.3%. However, for the field duplicate of SED-05, which was called SED-25, a TOC value of 272% was reported. Although this value was not rejected during data validation, the usability and reliability of this value is considered questionable. The TOC content in the sediment sample from Round Pond, the reference location, was reported at 86.5%.

6.1.2.3 Target Metals. Several target metals, including arsenic, chromium, copper, lead, manganese, silver, and zinc, were detected at concentrations exceeding PALs in one or more site samples. Within the reference sample, SED-22, lead was estimated at a concentration equivalent to the PAL. The sediment sample collected from B&M Pond (SED-05, field duplicate SED-25) contained the highest concentrations of each of the metals except arsenic and lead, with an exceedance of PALs for six metals (seven within the duplicate). As, Ba, Cr, Co, Cu, Pb, and Zn concentrations in SED-05 exceeded reference metal concentrations by one to two orders of magnitude. The lowest metals concentrations of the site locations were detected in the West Middlesex Canal sediment sample (SED-11), with concentrations similar to those in the reference pond sample. The sediment sample from Content Brook (SED-01) contained the highest concentrations of arsenic (360 mg/kg) and manganese (1,600 mg/kg) of the site samples. In addition, at location SED-01, copper and lead were detected at concentrations slightly above their respective PALs. For sediment sample SED-18, six metals exceeded their PALs.

As discussed in Appendix F, the equipment blank contained detectable levels of barium, manganese, and zinc. Because the equipment blank is a different matrix than the sediment samples, the sample data was not qualified during data validation, but was flagged with an 'EB' to indicate there may be some contribution to the sample result from equipment blank contamination. Although the impact on the sample result from the contamination seen in the equipment blank cannot be easily quantified, it would be reasonable to assume that any contamination would impact all associated samples in a fairly consistent manner. Therefore, in an effort to gauge the effects of possible contamination, the lowest result for a given analyte in the sample set can be used to gauge the maximum possible contribution caused by the contamination seen in the equipment blank. For other samples, any contribution from the contamination seen in the equipment blank would become less substantial as the detected concentration in the sample increases. For a sample with a concentration an order of magnitude or more higher than the lowest result, it is reasonable to assume that any impact from the contamination seen in the equipment blank becomes less. This may not be the case, but it provides an estimation of how reported contamination in the equipment blank may have affected a sample's reported concentration.

For barium, the lowest detection was 27 mg/kg as measured in SED-22. Although it cannot be quantified, the potential exists that this result may have been impacted by the contamination that was detected in the equipment blank. Since the barium concentration

at SED-11 was reported as 28 mg/kg, this result may be similarly affected by the contamination seen in equipment blank. Assuming a worst case scenario, where the contamination seen in the equipment blank potentially contributes about 27 mg/kg to the sediment sample result, SED-18, with a concentration of barium detected at 110 mg/kg, may be less affected than SED-11 and SED-22. The concentrations of barium within all other samples, including SED-01 and SED-05 (SED-25 duplicate) may be the least affected, since the concentrations were approximately one order of magnitude higher than the lowest concentration detected.

Likewise, the lowest detection of manganese within the sediment samples was 220 mg/kg estimated in SED-11. Assuming the worst case scenario that the total manganese concentration within this sample is due to equipment blank contamination, sediment samples SED-05, SED-18, and SED-22 may be affected, while SED-01 may be less affected.

The lowest detection for zinc which also had equipment blank contamination was 21 mg/kg (SED-11). Assuming the same rationale as above, the results for SED-11 and SED-22 may be affected, SED-01 and SED-18 may be less affected, and SED-05 may be the least affected.

6.1.2.4 Pesticide/Polychlorinated Biphenyls. The highest concentrations of 4,4'-DDD, Aroclor-1254, and Aroclor-1260 were detected in SED-05 (and duplicate SED-25), the sediment sample collected within B&M Pond. The average concentration of 4,4'-DDD in the sediment sample (SED-05) and its field duplicate (SED-25) was 92.5 µg/kg, which is higher than the PAL of 2 µg/kg. Concentrations of Aroclor 1254 and 1260 also exceeded their respective PALs, at average concentrations of 2,695 and 1940 µg/kg. Lower concentrations of 4-4'-DDD were reported in SED-01 (2.69 µg/kg), which was collected from Content Brook, and SED-18 (17.9 µg/kg) collected from the Unnamed Brook, both of which exceeded the PAL for 4,4'-DDD (2 µg/kg). These two locations (SED-01 and SED-18) also had exceedances of the Aroclor-1260 PAL (5 µg/kg), with estimated concentrations of 11.5 µg/kg and 20.1 µg/kg, respectively. There were also exceedances of 4,4'-DDD and Aroclor-1260 at the reference location, SED-22, with concentrations detected at 14.5 µg/kg and 13.7 µg/kg, respectively. For SED-11, the concentration of 4,4'-DDD was rejected during data validation due to poor dual column precision. Further details on the rejection are provided in Appendix F.

It should be noted that in some instances, the detection limit for specific PCB Aroclors was elevated in relation to the PAL due to sample dilution, needed to analyze other compounds within the sample.

6.1.2.5 Polynuclear Aromatic Hydrocarbons. The sediment sample collected from B&M Pond, SED-05, had the highest concentrations of PAHs, with PAL exceedances occurring for 17 of 25 PAH compounds. The total PAH concentration detected in the

B&M Pond sediment sample (SED-05 and duplicate SED-25) was 173,860 µg/kg. For PAH compounds, the concentration was two to three orders of magnitude greater than that from the reference pond sample. A total PAH concentration of 12,416 µg/kg was detected in SED-18, collected from the Unnamed Brook. PALs were exceeded for 17 PAH compounds within this sample. Lower concentrations of PAHs were detected in SED-11, collected from the West Middlesex Canal, and SED-01, collected within Content Brook, with the concentrations on the same order as SED-22, the reference sample. However, there were PAL exceedances for four compounds within SED-01. For SED-11 and SED-22, there were no PAL exceedances. The total PAH concentrations in SED-01, SED-11, and SED-22 were 1,955 µg/kg, 627 µg/kg, and 933 µg/kg, respectively. As discussed in Appendix F, the equipment blank contained detectable levels of naphthalene, 1-methylnaphthalene, phenanthrene, 1-methylphenanthrene, fluoranthrene, pyrene, and benzo[b]fluoranthene. Because the equipment blank is a different matrix than the sediment samples, the sample data was not qualified during data validation, but was flagged with an 'EB' to indicate there may be some contribution to the sample result from equipment blank contamination. Although the impact on the sample result from the contamination seen in the equipment blank cannot be easily quantified, it would be reasonable to assume that any contamination would impact all associated samples in a fairly consistent manner. Therefore, in an effort to gauge the effects of possible contamination, the lowest result for a given analyte in the sample set can be used to gauge the maximum possible contribution caused by the contamination reported in the equipment blank. For other samples, any contribution from the contamination seen in the equipment blank would become less substantial as the detected concentration in the sample increases. For a sample with a concentration an order of magnitude or more higher than the lowest result, it is reasonable to assume that any impact from the contamination reported in the equipment blank becomes less. This may not be the case, but it provides an estimation of how reported contamination in the equipment blank may have affected a sample's reported concentration.

As shown on Table 6-4, the lowest concentrations of these compounds were detected in either SED-11 or SED-22. Although unquantifiable, the potential exists that these results may have been impacted by the contamination that was detected in the equipment blank. Assuming a worst case scenario, where the contamination reported in the equipment blank potentially contributes the lowest detected concentrations to the sediment sample results, in general, the results for the seven PAHs listed above within SED-11 and SED-22 may have been affected, within SED-01 may have been less affected, and within SED-05 may have been the least affected.

6.1.2.6 Sediment Toxicity. In ten-day toxicity tests, average survival of the midge larvae (8 replicates), *Chironomus tentans*, in the sediment from the reference location was 77.5%, with a range of 70 to 100% (Table 6-5; Table 2 of sediment lab report in Appendix G). The highest chironomid growth was observed at SED-01 (Content Brook) at 2.21 mg/larvae, which exceeded growth in both the reference (SED-22) and lab control

(Table 6-6; Table 3 of sediment lab report in Appendix G). Both survival and growth of individuals in the reference sediment, SED-22, were not statistically different from the laboratory control. The survival of midge larvae in the sediment sample collected from the West Middlesex Canal (SED-11, 71.3%)) was significantly lower than the laboratory control, but not when compared to the reference location sediment (Table 6-5). Midge larvae maintained in sediment collected from B&M Pond (SED-05), the West Middlesex Canal (SED-11), and the Unnamed Brook (SED-18) showed statistically lower growth than both the laboratory control and reference location sediment (Table 6-6).

At the end of the 10-day exposure period, mean survival in the laboratory control sediment was 83.8%. Larvae recovered from the laboratory control sediment had a mean ash free dry weight of 2.03 mg/larvae. The minimum acceptable criteria for survival in the laboratory control is 70% and the minimum acceptable criteria for growth is a mean ash free dry weight of 0.48 mg/larvae. These data indicate that the organisms were healthy and not stressed by handling.

Chironomid survival in the project reference sediment (SED-22) at the end of the 10-day exposure period was 77.5%, with individual replicates ranging from 70 to 100%. Surviving midge larvae had a mean ash free dry weight of 1.84 mg/larvae. Survival and growth of midge larvae maintained in the reference sediment was not statistically less than that observed in the laboratory control.

With eight replicates, mean 10-day survival of amphipods, *Hyalella azteca*, observed in the reference sediment was 92.5%, which was statistically less than the 100% survival in the laboratory control (Table 6-7; Table 4 of sediment lab report in Appendix G). However, growth was not statistically lower in the reference sample as compared to the laboratory control sample (Table 6-8; Table 5 of sediment lab report in Appendix G). Survival of amphipods maintained in sediment samples from Content Brook (SED-01), B&M Pond (SED-05), and the West Middlesex Canal (SED-11) ranged from 87.5% to 92.5%, but were statistically lower than the laboratory control (100%). These samples did not show survival rates of amphipods statistically lower than the reference sample. The survival of amphipods on sediment from the Unnamed Brook (SED-18) was 7.5% and statistically lower than both the reference and control samples. Growth data of amphipods in sediment from the four site locations were not statistically lower than the laboratory control or the reference location.

At the end of the 10-day exposure period, mean survival in laboratory control sediment was 100%. Amphipods, recovered from laboratory control sediment, had a mean dry weight of 0.080 mg/amphipod. The dry weight of a representative group of amphipods at the start of the assay was 0.030 mg/individual. The minimum test acceptability criteria for survival in the laboratory control is 80%. The minimum acceptable criteria for growth is a demonstration of increased dry weight after 10 days exposure. These data indicate that the organisms were healthy and not stressed by handling.

Amphipod survival in the reference sediment (SED-22) at the end of the 10-day exposure period was 92.5% survival, with individual replicates ranging from 80 to 100%. Surviving amphipods had a mean dry weight of 0.078 mg/amphipod. Survival, but not growth, of the amphipods observed in the reference sediment was statistically less than that observed in the laboratory control.

Review of water quality parameters collected at the beginning and end of the assays documented a greater than 50% change in the alkalinity, ammonia, hardness, and conductivity levels of the overlying water between the start and end of the chironomid assay. A similar deviation was noted for the alkalinity and ammonia levels in the amphipod assay. Review of the water quality data collected on the renewal water used in the assays documented that, prior to being added to the test chambers, there was less than a 50% change in concentration for the identified parameters between the start and end of the assay. The changes reported in the test chambers were interpreted by the lab as reflecting the influence of the substrate on the water quality parameters. Measured ammonia concentrations in overlying water were generally less than 2 mg/L. The highest observed value was 23 mg/L in SED-01, which dropped over the 10-day period to 0.2 mg/L. Survival and growth were high in this sample. The observed deviations do not appear to have affected the test results.

6.2 Surface Water

Surface water results for total and dissolved target metals and alkalinity are provided in Table 6-9 and described below. Toxicity testing results are summarized in Tables 6-10 through 6-13. The surface water toxicity laboratory report generated by ESI is included in Appendix H.

6.2.1 Total and Dissolved Target Metals

PAL exceedances occurred for barium and manganese within all samples for both the total and dissolved analyses. In addition, total arsenic was estimated at concentrations greater than or equal to the PAL within all samples collected within Richardson Pond (SW-RP-01, -02, and -03) and one sample collected within Content Brook (SW-CB-02). A total aluminum PAL exceedance also occurred within this Content Brook sample (SW-CB-02).

Aluminum was detected within all five water bodies, with the highest average concentrations reported in Content Brook (98.8 µg/L). Slightly more than half of the total aluminum concentration was as dissolved aluminum within samples collected from the West Middlesex Canal (SW-MC samples), Content Brook (SW-CB samples), and B&M Pond (SW-BM samples). For samples collected within remaining areas, including Richardson Pond (SW-RP samples) and Round Pond (SW-RF samples), the majority of the aluminum detected was in the dissolved phase. Arsenic concentrations ranged from 1.1 to 3.4 µg/L, with concentrations almost entirely in the dissolved phase reported in samples collected from the West Middlesex Canal, B&M Pond, and

Round Pond. Total arsenic concentrations exceeded PALs within one or more samples collected from Richardson Pond and Content Brook. Total lead was detected at each body of water, with average concentrations ranging between 0.26 and 1.6 µg/L. Approximately half of the total lead detected was in the dissolved phase. Concentrations of total and dissolved lead detected in Round Pond were higher than those detected from Richardson Pond.

Barium, calcium, magnesium, and manganese were detected in each body of water. For barium, the average total concentrations were reported between 18.4 and 39.6 µg/L, which are all above the PAL of 3.9 µg/L. The average total calcium concentrations ranged between 8,963 and 13,200 µg/L. The range of average total magnesium in the surface water samples was 1,677 to 3,167 µg/L. Average total manganese concentrations were between 132 and 297 µg/L, all of which are above the manganese PAL of 80 µg/L. Similar to arsenic, the dissolved phase accounted for nearly all of the total concentrations of barium, calcium, magnesium, and manganese. Trace concentrations of zinc were measured in one or more samples collected from each body of water except Richardson Pond. Copper was estimated at concentrations slightly above the detection limit in all samples collected from B&M Pond. Chromium, cobalt, silver, and vanadium were not detected in any surface water samples.

6.2.2 Alkalinity

Total alkalinity concentrations did not vary significantly in the samples collected at the Site. The average concentrations for the four site locations were 26.0 mg/L as calcium carbonate ($CaCO_3$) in B&M Pond, 31.6 mg/L as $CaCO_3$ in West Middlesex Canal, 34.9 mg/L as $CaCO_3$ in Richardson Pond, and 36.1 as $CaCO_3$ in Content Brook. The lowest average alkalinity was measured in the surface water of Round Pond, with a value of 18.8 mg/L as $CaCO_3$.

6.2.3 Toxicity

Three sets of assays for daphnid, *Ceriodaphnia dubia*, were performed and survival varied between 70% and 100% (Table 6-10; Tables 2 and 4 of surface water laboratory report in Appendix H). Due to holding time considerations, samples were analyzed as they were received with each group of samples receiving its own laboratory control treatment. From statistical comparison with the laboratory control, Round Pond, the reference location was the only body of water where survival of *C. dubia* was significantly reduced. Since survival was lowest at the reference location, comparisons of the other sites to the reference data all showed greater survival, and statistical comparisons to detected differences were not performed.

Reproduction, measured as the number of juveniles produced per female, ranged from 21.9 to 33.2 juveniles per female (Table 6-11; Tables 3 and 5 of surface water laboratory report in Appendix H). Reproduction was lower in samples from Richardson Pond and Round Pond, the reference location. However, comparison of reproduction data for *C. dubia* against Round Pond showed that reproduction in the other project sites was not statistically different from that observed at Round Pond. The two surface water bodies having the lowest dissolved oxygen

(DO) concentrations in the surface water were Richardson Pond and Round Pond, with 1.35 and 0.90 mg/L, respectively.

Laboratory controls met test acceptability criteria for both survival and reproduction endpoints for *C. dubia* assays. Laboratory control survival was 100% in each series. Reproduction in the laboratory controls ranged from 28.4 to 33.7 juveniles per female. Minimum test acceptability criteria require 80% survival, mean production of 15 juveniles/female, and production of 3 broods by at least 60% of control animals (EPA, 2002). These results are an indication of healthy test organisms.

Survival rates ranged from 57.5% to 100% in assays performed with minnows, *Pimephales promelas* (Table 6-12; Tables 6 and 8 of surface water laboratory report in Appendix H). Survival in the sample from the West Middlesex Canal (57.5%) was statistically less than both the laboratory control and the reference pond. Growth, measured as mean dry weight, ranged from 0.346 to 0.534 mg/fish (Table 6-13; Tables 7 and 9 of surface water laboratory report in Appendix H). Growth was not significantly lower in any of the site samples when compared to the laboratory controls. However, minnow growth in water from Content Brook and Middlesex Canal was statistically less than Round Pond, the reference location.

Although statistical analyses have been performed against both control and reference samples for the surface water toxicity tests, there is some uncertainty in these comparisons. Due to holding time considerations, surface water samples were analyzed as they were received with each group of samples receiving its own laboratory control treatment. There is an added uncertainty in the statistical results for the surface water toxicity tests when the comparisons to reference samples were calculated since these samples groups were run on different days using different laboratory controls. The laboratory data indicate that the control run with the reference pond (RF-01) showed higher growth rates during the test than any other sample group (Table 6-13). This makes the statistical significance of the comparison of Content Brook and Middle sex Canal to the reference pond questionable.

Laboratory controls met test acceptability criteria for both survival and growth endpoints for *P. promelas* assays. Laboratory control survival was 87.5 to 100%. Growth ranged from 0.448 to 0.482 mg/fish in laboratory controls. Minimum test acceptability criteria require 80% survival and mean dry weight of 0.250 mg/fish (EPA, 2002). These results are an indication of healthy test organisms.

Review of testing procedures and data generated from surface water testing indicated one deviation from standard protocols. Sample SW-MC-01 lost two minnows from Replicate D on Day 2 due to a technician error. All statistical analysis for this replicate was, therefore, based upon the assumption that eight fish instead of ten were added at the start of testing. It is the opinion of the Study Director at ESI that this deviation had no negative impact on the outcome of the assay.

6.3 Fish Tissue

During the fish sampling event, a total of 146 fish were collected, consisting of 12 species: bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), brown bullhead (*Ameiurus nebulosus*), yellow bullhead (*Ameiurus natalis*), golden shiner (*Notemigonus crysoleucas*), longnose dace (*Rhinichthys cataractae*), American eel (*Auguilla rostrata*), redfin pickerel (*Esox americanus*), and chain pickerel (*Esox niger*) (Table 6-14). Golden shiner and longnose dace were the most abundant fish species collected and pumpkinseed and chain pickerel were the least common.

All fish collected during this study, except the American eel, are not known to migrate over significant distances and may be considered local residents of the surrounding study area. Due to the migratory nature of the American eel, contaminant levels found in these individuals may not be representative of the study area. Fish feeding behavior, which varies between species, was not considered during discussion of the tissue contaminant results.

Fish analyses included an external examination, measurements of weight and length, and laboratory analyses for target metals, PAHs, and lipid content.

6.3.1 External Examination, Length, and Weight

Individual length (mm), weight (g), and external pathology was determined for each fish sampled and is summarized in Table 6-14. On average, the largest fish, both in length and weight, were collected from Round Pond, the reference location. The length of the fish from Round Pond ranged from 45 mm (bluegill) to 424 mm (American eel). The weight of the fish from Round Pond ranged from 0.7 g (yellow perch) to 474 g (brown bullhead). Round Pond also contained the highest diversity of species, with the black crappie, chain pickerel, pumpkinseed, and yellow perch only being captured from Round Pond. Richardson Pond contained the least diverse fisheries community with golden shiner and brown bullhead being the only two species encountered. No single fish species was collected at all sample locations. However, with the exception of Content Brook, brown bullhead were collected at all other locations. In Content Brook, eight yellow bullhead were captured, which are a very similar species to the brown bullhead occupying similar ecological niches.

All fish appeared to be in excellent physical condition with no major abnormalities or parasites, with the exception of one golden shiner (collected from Round Pond) which had parasites. Three brown bullhead collected from B&M Pond had minor caudal hemorrhaging. Fish collected from Richardson Pond all appeared normal with the exception of two golden shiner specimens which had minor pelvic and caudal hemorrhaging.

6.3.2 Target Metals

Analysis of the 11 target metals was conducted on twenty site and five reference fish composite samples collected. Metals results are summarized in Table 6-15. The PAL for lead was exceeded in two samples, CB-BH-4 and CB-AE-1, collected from Content Brook, and one sample, MC-AE-1, collected from the West Middlesex Canal. In addition, copper was estimated at a concentration equivalent to the PAL (13 mg/kg) in sample CB-BH-4 collected from Content Brook.

Overall, the highest average concentrations of most metals, including aluminum, arsenic, barium, chromium, cobalt, copper, and manganese, were detected in fish tissue samples collected from B&M Pond. However, there were no PAL exceedances from any samples collected from this location. The highest average concentrations of lead, silver, and zinc were detected in samples collected from Content Brook. Average vanadium concentrations were similar in tissue samples collected from all water bodies, including the reference pond. The fish tissue samples from the reference pond, as well as Richardson Pond, generally had low concentrations of metals. Samples from the West Middlesex Canal had metals concentrations higher than the reference pond, although concentrations of chromium, cobalt, vanadium, and zinc were similar to those detected in Round Pond.

In evaluating the metals data in bullheads only, samples collected from B&M Pond had higher concentrations than the reference samples and the other site samples. Bullheads collected from Content Brook and Middlesex Canal also had aluminum, zinc, and manganese levels greater than the reference samples.

6.3.3 Polynuclear Aromatic Hydrocarbons

There were exceedances of the acenaphthene PAL in four composite tissue samples collected from B&M Pond, one sample collected from Content Brook, and one sample collected from the West Middlesex Canal. In addition, there was one exceedance of the phenanthrene PAL, which occurred in BM-BH-1 collected from B&M Pond. PAH results are summarized in Table 6-15.

Total PAH concentrations for whole body samples ranged from non-detect to 66.8 µg/kg wet weight. Generally, the highest concentrations of PAHs in fish tissue for all species were in fish collected from B&M Pond and West Middlesex Canal. Fish collected from Content Brook and Richardson Pond had lower concentrations of PAHs. The PAH concentrations in fish collected from the reference location were non-detect or estimated below the detection limit.

6.3.4 Lipid Content

Total lipid content for each fish composite sample is summarized in Table 6-15. Percent lipids varied between 0.51% and 7.9%. The highest % lipids were in the American Eel specimens (1.7%, 5.2%, and 7.9%). The average lipid concentration for bullheads was 1.42% and ranged from 0.51% to 2.8%. Lipid content of the three green shiners collected ranged between 1.6% and 2.8%.

6.3.5 Chemistry Interrelationships

Relationships between contaminant concentrations and % lipids in fish were evaluated to determine the likelihood of high contaminant levels relative to high lipid content. When the data from all samples collected are pooled, total PAH concentrations appear to be independent of percent lipids (the R^2 value equals 0.004). However, in B&M Pond, a positive relationship between percent lipids and total PAHs was observed (the R^2 value equals 0.94). In Content Brook, the total PAH concentration increased slightly with percent lipids, but the correlation was weak (the R^2 value equals 0.41). Figure 6-1 demonstrates the relationship between total PAHs and percent lipids, by water body.

A strong positive correlation is also apparent in B&M Pond between % lipids and total PAH concentrations in bullheads (the R^2 value equals 0.996), as shown in Figure 6-2. There is no relationship between percent lipids and PAH concentrations in bullheads in other on-site water bodies. These comparisons are based on small data sets within each location. Therefore, these relationships may not extrapolate to larger population sets.

SECTION 7.0
CONCLUSIONS

During September and October 2004, M&E conducted a sampling program at the Iron Horse Park Superfund Site - OU-4 in North Billerica, Massachusetts, for U.S. Environmental Protection Agency (EPA) Region I. Sediment, surface water, and fish samples were collected from various site areas, including Content Brook, the West Middlesex Canal, B&M Pond, the Unnamed Brook, and Richardson Pond, as well as Round Pond, a reference area. Data collected will be used in a focused ecological risk assessment for the Site.

As specified in the *Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Remedial Investigation/Feasibility Study Addendum (OU-4) - Revision 00, Iron Horse Park Superfund Site, North Billerica, Massachusetts* (M&E, 2004b), Tier II data validation was performed on all the analytical chemistry data, except for TOC and alkalinity, which was validated to Tier I. Grain size and toxicity data were not formally validated. The required level of validation was met for all matrices.

7.1 Summary of Results

7.1.1 Sediment

Twenty-three sediment samples were collected within the Site and reference areas and screened for toxicity, PAHs, PCBs, and target metals, excluding aluminum. Based on the screening analysis results, four sediment samples, including three site samples and one reference sample, were selected for full characterization analyses, including grain size, toxicity, TOC, 4,4'-DDD, PCBs, PAHs, and target metals. An additional sample, which had been collected in the vicinity of the highest historical 4,4'-DDD concentration, was submitted for full characterization analyses since it had not been selected based on screening results, and full characterization of this sample was desired.

The analytical results indicated instances where concentrations exceeded the PALs for 4,4'-DDD, PCBs, PAHs, and target metals. The exceedances were most numerous for samples collected from B&M Pond (SED-05 and its field duplicate SED-25) and the Unnamed Brook (SED-18). Fewer PAL exceedances occurred for the Content Brook sediment sample (SED-01), although the PAL was still exceeded for ten compounds/analytes. There were no PAL exceedances for the West Middlesex Canal sample (SED-11). The sample collected within the reference area, Round Pond, had two PAL exceedances (4,4'-DDD and Aroclor-1260).

Toxicity test results with the midge, *Chironomus tentans*, showed a small reduction in survival of larvae exposed to West Middlesex Canal sediment (SED-11) as compared to survival of the laboratory control. However, the reduction in survival was not significant when compared to the survival of organisms from the reference sediment sample. Toxicity test results also showed a

small reduction in growth of midges exposed to sediment from SED-05, SED-11, and SED-18 when compared to the growth of organisms from both the laboratory control and reference sediment sample.

For toxicity tests with the amphipod, *Hyalella azteca*, results showed that after 10 days of exposure, survival of amphipods maintained in sediments from samples SED-01, SED-05, SED-11, and SED-18 was statistically less than survival of the laboratory control. However, when statistical comparisons were made against the reference sample, the sediment from sample SED-18 was the only sample with significantly lower survival. Analysis of growth data showed no toxicity to amphipods maintained on all four sediment samples as compared to both the laboratory control and the reference sediment.

7.1.2 Surface Water

Surface water was collected in triplicate from five different water bodies, including Content Brook, the West Middlesex Canal, the Unnamed Brook, Richardson Pond, and the reference area, Round Pond. Surface water analyses conducted include total and dissolved target metals, alkalinity, and toxicity testing.

There were PAL exceedances for total and dissolved barium and manganese within all samples collected, including the samples collected from Round Pond. In addition, total arsenic concentrations exceeded the PAL in samples collected from Richardson Pond. In addition, the total arsenic concentration was estimated at a value equivalent to the PAL in one sample collected from Content Brook. Total aluminum also exceeded the PAL in the Content Brook sample.

Toxicity test results with the daphnid, *Ceriodaphnia dubia*, showed toxicity (i.e., lower survival) at the reference location (Round Pond) when compared to the laboratory control. No reduction in survival of daphnids was observed at any of the site surface water samples. Reproduction data indicated statistically significant negative impacts on daphnid reproduction in water from SW-RP-01 when evaluated against the associated laboratory control, but no significant toxicity when compared to the reference sample (SW-RF-01).

Toxicity test results with the minnow, *Pimephales promelas*, indicated that samples collected from the West Middlesex Canal (SW-MC-01) displayed lower survival than the laboratory control and the reference sample. However, no impairments of growth of minnows compared to either laboratory controls or the reference sample was observed, including samples from the West Middlesex Canal.

7.1.3 Fish Tissue

A total of 146 fish were collected for this study, which were later composited into 25 samples for analysis. All collected fish underwent an external examination and were weighed and length measured. Fish tissue analyses conducted include target metals, PAHs, and percent lipids.

Metals detected at concentrations exceeding their PALs include lead (in two samples collected from Content Brook and one sample collected from the West Middlesex Canal) and copper (estimated at a value equivalent to the PAL in one sample collected from Content Brook). There were two PAHs for which PALs were exceeded (acenaphthene and phenanthrene). Samples for which the acenaphthene concentration exceeded its PAL include all four samples from B&M Pond, one sample from Content Brook, and one sample from the West Middlesex Canal. Only one phenanthrene exceedance occurred, within a sample collected from B&M Pond.

7.2 Further Analysis

The Work Plan for the OU-4 RI/FS Addendum includes a step for reviewing the sediment toxicity testing and chemistry data to determine if additional stored sediment samples, collected during the 2004 field event, require full characterization (i.e., toxicity and chemical analysis). Based on the toxicity test results presented in this report, sediment toxicity of greater than 30% inhibition of survival for *H. azteca* and greater than 30% inhibition of growth of *C. tenans* was observed at sampling location SED-18. Lesser degrees of toxicity, with smaller reductions of growth of *C. tenans*, were observed at sampling locations SED-05 and SED-11. The Statement of Work for the OU-4 RI/FS stated that, "If toxicity is found, then an attempt will be made to identify risk-based cleanup concentrations based on regression analysis of contaminant concentration versus toxicity from these four sediment samples". Further discussions with EPA are recommended to determine whether significant toxicity has been demonstrated at site locations and whether additional sediment samples should be analyzed for toxicity and chemistry, should PRGs need to be established based on the results of the sediment toxicity tests.

SECTION 8.0
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TABLES

Table 1-1. Summary of Samples Collected and Analyses Conducted
Iron Horse Park Superfund Site - OU-4

Medium	Samples Collected	Analyses Conducted
Sediment	SED-01	Screening Analyses[(1)], PAHs, 4,4'-DDD/PCBs, target metals, toxicity testing, TOC, and grain size
	SED-02	Screening Analyses[(1)]
	SED-03	Screening Analyses[(1)]
	SED-04	Screening Analyses[(1)]
	SED-05	Screening Analyses[(1)], PAHs, 4,4'-DDD/PCBs, target metals, toxicity testing, TOC, and grain size
	SED-06	Screening Analyses[(1)]
	SED-07	Screening Analyses[(1)]
	SED-08	Screening Analyses[(1)]
	SED-09	Screening Analyses[(1)]
	SED-10	Screening Analyses[(1)]
	SED-11	Screening Analyses[(1)], PAHs, 4,4'-DDD/PCBs, target metals, toxicity testing, TOC, and grain size
	SED-12	Screening Analyses[(1)]
	SED-13	Screening Analyses[(1)]
	SED-14	Screening Analyses[(1)]
	SED-15	Screening Analyses[(1)]
	SED-16	Screening Analyses[(1)]
	SED-17	Screening Analyses[(1)]
	SED-18	Screening Analyses[(1)], PAHs, 4,4'-DDD/PCBs, target metals, toxicity testing, TOC, and grain size
	SED-19	Screening Analyses[(1)]
	SED-20	Screening Analyses[(1)]
	SED-21	Screening Analyses[(1)]
	SED-22	Screening Analyses[(1)], PAHs, 4,4'-DDD/PCBs, target metals, toxicity testing, TOC, and grain size
	SED-23	Screening Analyses[(1)]
Surface Water	SW-BM-01	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-BM-02	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-BM-03	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-RP-01	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-RP-02	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-RP-03	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-MC-01	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-MC-02	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-MC-03	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-CB-01	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-CB-02	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-CB-03	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-REF-01	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-REF-02	Total and Dissolved Metals, Alkalinity, and toxicity
	SW-REF-03	Total and Dissolved Metals, Alkalinity, and toxicity

Table 1-1. Summary of Samples Collected and Analyses Conducted
Iron Horse Park Superfund Site - OU-4

Medium	Samples Collected	Analyses Conducted
Fish	BM-BH-1	PAHs, Target Metals, and Percent Lipids
	BM-BH-2	PAHs, Target Metals, and Percent Lipids
	BM-BH-3	PAHs, Target Metals, and Percent Lipids
	BM-BH-4	PAHs, Target Metals, and Percent Lipids
	CB-RP-1	PAHs, Target Metals, and Percent Lipids
	CB-BH-1	PAHs, Target Metals, and Percent Lipids
	CB-BH-2	PAHs, Target Metals, and Percent Lipids
	CB-BH-3	PAHs, Target Metals, and Percent Lipids
	CB-BH-4	PAHs, Target Metals, and Percent Lipids
	CB-AE-1	PAHs, Target Metals, and Percent Lipids
	CB-GS-1	PAHs, Target Metals, and Percent Lipids
	RP-BH-1	PAHs, Target Metals, and Percent Lipids
	RP-BH-2	PAHs, Target Metals, and Percent Lipids
	RP-GS-1	PAHs, Target Metals, and Percent Lipids
	RP-GS-2	PAHs, Target Metals, and Percent Lipids
	MC-BH-1	PAHs, Target Metals, and Percent Lipids
	MC-BH-2	PAHs, Target Metals, and Percent Lipids
	MC-BH-3	PAHs, Target Metals, and Percent Lipids
	MC-AE-1	PAHs, Target Metals, and Percent Lipids
	MC-LD-1	PAHs, Target Metals, and Percent Lipids
	RF-BH-1	PAHs, Target Metals, and Percent Lipids
	RF-BH-2	PAHs, Target Metals, and Percent Lipids
	RF-BH-3	PAHs, Target Metals, and Percent Lipids
	RF-CP-1	PAHs, Target Metals, and Percent Lipids
	RF-AE-1	PAHs, Target Metals, and Percent Lipids

(1) Sediments were screened for PAH, PCBs, metals, and Microtox® toxicity

Table 2-1. Sediment Sample Location Rationale
Iron Horse Park Superfund Site - OU-4

Area	Sample ID	Historical Sampling Location	Rationale/Relative Contaminant Concentrations[(1)]
Content Brook	SED-01	SD-030	Maximum silver and arsenic
	SED-02	SD-310	Maximum aluminum; intermediate DDD
	SED-03	SD-102	Slightly lower levels of metals; intermediate DDD
	SED-04	SD-117	Lower levels of metals than SD-102
B&M Pond	SED-05	SD-304	Maximum chromium, zinc, and DDD
	SED-06	SD-107	low DDD; less than half concentrations of metals in SD-304
	SED-07	New location	Sample in pond toward NW corner
	SED-08	New location	Berm breach between SD-016 and SD-303
W. Middlesex Canal	SED-09	SD-029	Maximum vanadium and cobalt
	SED-10	SD-028	Maximum manganese
	SED-11	SD-308	higher PAHs than SD-029/028; variable metals
	SED-12	SD-026	intermediate DDD; variable metals
Richardson Pond	SED-13	SD-111	Maximum barium; intermediate DDD
	SED-14	New location	Near SD-111, but in open water
	SED-15	SD-309	Intermediate metals; intermediate PAHs
	SED-16	SD-314	low PAHs, low metals
Unnamed Brook	SED-17	SD-317	Maximum lead and copper
	SED-18	SD-013	High metals
	SED-19	SD-010	High PAHs; lower metals than SD-013; intermediate DDD
	SED-20	SD-118	Maximum PAHs
Round Pond	SED-21	reference	wetland area at end of John E. Smith Drive
	SED-22	reference	backwater area at end of John E. Smith Drive
	SED-23	reference	open water sample in pond

(1) Based on historical results from 1993 events.

Table 2-2. Summary of Sediment Sample Descriptions [(1)]
Iron Horse Park Superfund Site - OU-4

Area	Sample Location	Habitat [(2)]	Water Depth (ft)	Color [(3)]	Sample Description	Comments
Content Brook Area	SED-01	Brook	0.1	Dark Brown	silt & v. fine sand, some sand, iron staining, sheen on sediment near location	hydrocarbon odor
	SED-02	Wetland	0.33	V. Dark Grayish Brown	silt, with some organics (mostly phragmites & roots)	gray, turbid water, hydrocarbon odor
	SED-03	Brook	2	V. Dark Brown	silt & fine sand, some sand and leaves	brown, stained water
	SED-04	Brook	2-3	V. Dark Gray	silt & fine sand, some leaves and twigs	sulfide odor, submerged vegetation
B&M Pond Area	SED-05	Open Water	3	Black	silt & v. fine sand, some roots and twigs	hydrocarbon/sulfide odors, sheens on water surface
	SED-06	Open Water	2.7	V. Dark Grayish Brown	sand, fine sand & silt, some gravel, twigs, acorns	high degree of staining, dense submerged vegetation
	SED-07	Open Water	2.5	Black	silt & v. fine sand, some roots, twigs	stained water with some sheens
	SED-08	Wetland / Canal	2.5	Black	silt & fine sand, little coarse sand, leaves, twigs	brown, stained water with some sheens and algal cover
West Middlesex Canal	SED-09	Canal	2	V. Dark Grayish Brown	silt & v. fine sand with some fine sand, twigs	stained water with biological sheens when sediment disturbed, hydrocarbon odor
	SED-10	Canal	2.4	V. Dark Grayish Brown	silt and v. fine sand with some sand, coarse sand, leaves, twigs	stained water with some sheens, submerged vegetation
	SED-11	Canal	2.5-3.5	V. Dark Brown	silt, fine & coarse sand, some sticks	duck weed at surface, submerged vegetation
	SED-12	Canal	0.8	Black	silt & fine sand, some v. fine sand, little coarse sand, leaves, twigs	stained water with some sheens, hydrocarbon odor in sediment
Richardson Pond	SED-13	Wetland	0.25	V. Dark Gray	silt, little fine & coarse sand, roots	murky, stained water with some sheens
	SED-14	Wetland	1.33	V. Dark Grayish Brown	silt, little fine sand, phragmite roots	slight staining, 2 feet visibility
	SED-15	Wetland	0.05	V. Dark Brown	silt, some fine & coarse sand, organics	stained water, some biological sheen
	SED-16	Open Water	2.5	Not Recorded	silt & v. fine sand, little fine sand, organics	slight stained water, 2-3 feet visibility

Table 2-2. Summary of Sediment Sample Descriptions [(1)]
Iron Horse Park Superfund Site - OU-4

Area	Sample Location	Habitat [(2)]	Water Depth (ft)	Color [(3)]	Sample Description	Comments
Unnamed Brook	SED-17	Channel / Brook	1	Black	silt, little coarse sand, leaves, fragments of cement	sheen on water & in sediment sample
	SED-18	Channel / Brook	2.5	Very Dark Gray	silt & fine sand, some fine and coarse sand	little staining, biological sheens
	SED-19	Channel / Brook	1.5	Very Dark Gray	fine & coarse sand, some silt	upstream of outfall, hydrocarbon odor, some sheens
	SED-20	Channel / Brook	0.5 - 1	Black	silt & v. fine silt, little coarse sand, twigs	very turbid, stained water with sheens
Reference Area - Round Pond	SED-21	Open Water	1.7	Black	high organic fraction with roots, leaves, twigs with some silt and fine sand	sulfide odor in sediment, stained water
	SED-22	Open Water	2.2	Very Dark Brown	high organic fraction with roots, leaves, with some silt and fine sand	slightly stained water
	SED-23	Open Water	4.6	Black	silt & v. fine sand, some twigs	stained water with heavy vegetation

(1) Further detail can be found on the sediment sampling field data sheets in Appendix C.

(2) Habitats include wetland, open water (sample collected at edge of open water), channel, or canal

(3) Color as determined with the Munsell Color Chart. See field data sheets in Appendix C for Munsell classification

Table 2-3. Summary of Surface Water Sampling Field Parameters
Iron Horse Park Superfund Site - OU-4

Water Body	Sample Location ID [(1)]	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
B&M Pond	SW-BM	15.36	6.08	3.04	211	53.5	3.51
Richardson Pond	SW-RP	16.53	6.53	1.35	378	298	1.64
West Middlesex Canal	SW-MC	17.98	6.48	2.51	129	NM	NM
Content Brook	SW-CB	16.88	6.52	4.85	163	75.6	5.26
Round Pond	SW-REF	18.06	7.53	0.90	144	240	1.30

[(1)] Sample Location IDs also contained -01, -02, and -03 suffixes since samples were collected in triplicate from the same location.

Table 3-1. Fish Compositing Scheme
Iron Horse Park Superfund Site - OU-4

DAS Sample No.	Sample ID	Subsample	Station Location	Species	Weight (grams)	Length (mm)	Total Weight (grams)
D05301	BM-BH-1	F0001	Fl-BM-BH-001	BB	36.5	145	97.2
		F0004	Fl-BM-BH-004	BB	60.7	175	
D05302	BM-BH-2	F0002	Fl-BM-BH-002	BB	24	134	64.7
		F0003	Fl-BM-BH-003	BB	40.7	148	
D05303	BM-BH-3	F0005	Fl-BM-BH-005	BB	24.7	138	61.5
		F0006	Fl-BM-BH-006	BB	36.8	154	
D05304	BM-BH-4	F0007	Fl-BM-BH-007	BB	77.9	190	77.9
D05305	CB-RP-1	F0092	Fl-CB-RP-092	RP	25.4	143	59.5
		F0093	Fl-CB-RP-093	RP	7.5	106	
		F0094	Fl-CB-RP-094	RP	7.5	103	
		F0095	Fl-CB-RP-095	RP	5.4	90	
		F0096	Fl-CB-RP-096	RP	6.3	94	
		F0097	Fl-CB-RP-097	RP	7.4	104	
D05306	CB-BH-1	F0128	Fl-CB-YB-128	YB	128.7	207	254.7
		F0132	Fl-CB-YB-132	YB	126	200	
D05307	CB-BH-2	F0129	Fl-CB-YB-129	YB	73.4	188	175.4
		F0134	Fl-CB-YB-134	YB	102	192	
D05308	CB-BH-3	F0130	Fl-CB-YB-130	YB	65	170	132.8
		F0133	Fl-CB-YB-133	YB	67.8	168	
D05309	CB-BH-4	F0131	Fl-CB-YB-131	YB	82.5	182	142.3
		F0135	Fl-CB-YB-135	YB	59.8	171	
D05310	CB-AE-1	F0098	Fl-CB-AE-098	AE	97.3	370	97.3
D05311	CB-GS-1	F0136	Fl-CB-GS-136	GS	60.1	171	60.1
D05312	RP-BH-1	F0047	Fl-RP-BB-047	BB	81.5	180	81.5
D05313	RP-BH-2	F0046	Fl-RP-BB-046	BB	6.1	82	66.2
		F0048	Fl-RP-BB-048	BB	60.1	155	
D05314	RP-GS-1	F0010	Fl-RP-GS-010	GS	3.7	67	63.6
		F0011	Fl-RP-GS-011	GS	15.1	107	
		F0012	Fl-RP-GS-012	GS	5.7	82	
		F0013	Fl-RP-GS-013	GS	3.7	68	
		F0014	Fl-RP-GS-014	GS	3.9	70	
		F0015	Fl-RP-GS-015	GS	4	68	
		F0016	Fl-RP-GS-016	GS	4.2	70	
		F0017	Fl-RP-GS-017	GS	3.8	68	
		F0018	Fl-RP-GS-018	GS	4	70	
		F0019	Fl-RP-GS-019	GS	2.8	60	
		F0020	Fl-RP-GS-020	GS	5	73	
		F0021	Fl-RP-GS-021	GS	3.8	66	
		F0022	Fl-RP-GS-022	GS	3.9	66	

Table 3-1. Fish Compositing Scheme
Iron Horse Park Superfund Site - OU-4

DAS Sample No.	Sample ID	Subsample	Station Location	Species	Weight (grams)	Length (mm)	Total Weight (grams)
D05315	RP-GS-2	F0023	Fl-RP-GS-023	GS	3.1	65	61
		F0024	Fl-RP-GS-024	GS	3.8	70	
		F0025	Fl-RP-GS-025	GS	2.8	64	
		F0026	Fl-RP-GS-026	GS	1.7	54	
		F0027	Fl-RP-GS-027	GS	3.2	68	
		F0028	Fl-RP-GS-028	GS	4.2	70	
		F0029	Fl-RP-GS-029	GS	3	64	
		F0030	Fl-RP-GS-030	GS	2.8	65	
		F0031	Fl-RP-GS-031	GS	3.7	67	
		F0032	Fl-RP-GS-032	GS	4.6	70	
		F0033	Fl-RP-GS-033	GS	3.9	68	
		F0034	Fl-RP-GS-034	GS	3.8	68	
		F0035	Fl-RP-GS-035	GS	2.4	63	
		F0036	Fl-RP-GS-036	GS	2.1	68	
		F0037	Fl-RP-GS-037	GS	1.7	53	
		F0038	Fl-RP-GS-038	GS	1.7	52	
		F0039	Fl-RP-GS-039	GS	2.9	63	
		F0040	Fl-RP-GS-040	GS	1.9	54	
		F0041	Fl-RP-GS-041	GS	2	54	
		F0042	Fl-RP-GS-042	GS	1.5	54	
		F0043	Fl-RP-GS-043	GS	1.9	54	
		F0044	Fl-RP-GS-044	GS	1.4	54	
		F0045	Fl-RP-GS-045	GS	0.9	45	
D05316	MC-BH-1	F0086	Fl-MC-BB-086	BB	98.6	195	98.6
D05317	MC-BH-2	F0084	Fl-MC-BB-084	BB	59.8	174	73.6
		F0085	Fl-MC-BB-085	BB	13.8	104	
D05318	MC-BH-3	F0082	Fl-MC-YB-082	YB	37.7	142	90.2
		F0083	Fl-MC-BB-083	BB	52.5	164	
D05319	MC-AE-1	F0090	Fl-MC-AE-090	AE	38.2	295	49.5
		F0091	Fl-MC-AE-091	AE	11.3	175	

Table 3-1. Fish Compositing Scheme
Iron Horse Park Superfund Site - OU-4

DAS Sample No.	Sample ID	Subsample	Station Location	Species	Weight (grams)	Length (mm)	Total Weight (grams)
D05320	MC-LD-1	F0050	Fl-MC-LD-050	LD	3.1	53	43.3
		F0052	Fl-MC-LD-052	LD	1.1	42	
		F0053	Fl-MC-LD-053	LD	0.9	44	
		F0055	Fl-MC-LD-055	LD	0.6	35	
		F0056	Fl-MC-LD-056	LD	1.8	55	
		F0057	Fl-MC-LD-057	LD	2.2	58	
		F0058	Fl-MC-LD-058	LD	3.2	58	
		F0059	Fl-MC-LD-059	LD	1.5	53	
		F0060	Fl-MC-LD-060	LD	0.4	36	
		F0061	Fl-MC-LD-061	LD	1.5	46	
		F0062	Fl-MC-LD-062	LD	0.8	46	
		F0063	Fl-MC-LD-063	LD	1	40	
		F0064	Fl-MC-LD-064	LD	0.8	44	
		F0066	Fl-MC-LD-066	LD	2.5	57	
		F0068	Fl-MC-LD-068	LD	0.8	34	
		F0069	Fl-MC-LD-069	LD	0.5	37	
		F0070	Fl-MC-LD-070	LD	0.4	30	
		F0071	Fl-MC-LD-071	LD	1.4	55	
		F0072	Fl-MC-LD-072	LD	0.9	40	
		F0073	Fl-MC-LD-073	LD	2.1	55	
		F0076	Fl-MC-LD-076	LD	2	51	
		F0077	Fl-MC-LD-077	LD	1.4	40	
		F0078	Fl-MC-LD-078	LD	0.6	38	
		F0080	Fl-MC-LD-080	LD	0.6	35	
		F0087	Fl-MC-LD-087	LD	9.5	92	
		F0088	Fl-MC-LD-088	LD	1	45	
		F0089	Fl-MC-LD-089	LD	0.7	42	
D05321	RF-BH-1	F0143	Fl-RF-BB-143	BB	386	294	386
D05322	RF-BH-2	F0144	Fl-RF-BB-144	BB	422	310	422
D05323	RF-BH-3	F0145	Fl-RF-BB-145	BB	474	321	474
D05324	RF-CP-1	F0121	Fl-RF-CP-121	CP	97.3	265	97.3
D05325	RF-AE-1	F0122	Fl-RF-AE-122	AE	102.1	350	172
		F0124	Fl-RF-AE-124	AE	69.9	311	

Sample ID: Location-Species-Sample #

Location Key		
	BM	B&M Pond
	CB	Content Brook
	RP	Richardson Pond
	MC	Middlesex Canal
	RF	Reference (Round Pond

Species Key		
	BB	Brown Bullhead
	YB	Yellow Bullhead
	BH	Bullhead (general)
	RP	Redfin Pickerel
	AE	American Eel
	GS	Golden Shiner
	LD	Longnose Dace
	CP	Chain Pickerel

Table 6-1. Summary of Sediment Screening Results

Iron Horse Park Superfund Site - OU-4

Sample ID	Microtox® Results		Total PAHs [1] (mg/kg)	Total PCBs [1] (mg/kg)	Metals [2] (mg/kg)									
	% Effect 5 min.	% Effect 15 min.			As	Ba	Co	Cu	Cr	Pb	Mn	Ag	V	Zn
SED-01	28.63	0	9.34	<1.32	334 +/- 60	403 +/- 130	< 1200	< 180	< 1200	< 47	< 2400	< 280	< 1800	< 110
SED-02	37.08	0	16.60	<2.5	145 +/- 40	281 +/- 100	< 1000	< 130	< 820	117 +/- 31	< 1600	< 250	< 2500	184 +/- 59
SED-03	0	0	14.55	<2.27	46.2 +/- 30	147 +/- 79	< 430	< 89	< 390	135 +/- 27	< 700	< 250	< 1800	81.7 +/- 40
SED-04	35.98	1.16	20.00	<1.22	< 36	229 +/- 120	< 390	< 99	< 390	63.2 +/- 23	< 640	< 330	< 1900	65.9 +/- 42
SED-05	59.16	0	161.6 E	<2.0	132 +/- 76	< 180	< 110	690 +/- 180	< 880	822 +/- 75	< 1600	< 360	< 1400	3870 +/- 210
SED-06	13.64	5.96	12.86	<0.72	< 49	265 +/- 140	< 450	< 110	< 430	148 +/- 31	839 +/- 510	< 330	< 2800	196 +/- 56
SED-06-DUP	NA	NA	NA	<0.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-07	4.27	0	163.13	<3.33	142 +/- 69	230 +/- 140	< 990	< 140	< 870	749 +/- 67	3120 +/- 1100	< 360	< 1900	612 +/- 84
SED-08	62.95	27.82	15.38	<2.38	< 49	210 +/- 130	< 640	< 120	< 550	134 +/- 30	< 1000	< 360	< 1800	371 +/- 66
SED-08-DUP	NA	NA	NA	NA	< 54	233 +/- 130	< 760	< 150	< 640	137 +/- 35	< 1200	< 330	< 1900	414 +/- 79
SED-09	28.42	13.07	84.67	<4.17	147 +/- 51	< 140	< 880	174 +/- 100	< 720	269 +/- 44	< 1400	< 310	< 2200	473 +/- 81
SED-10	4.2	55.61	47.36	<3.57	84.4 +/- 47	219 +/- 87	< 690	< 130	< 600	240 +/- 43	< 1100	< 240	< 1900	284 +/- 68
SED-11	0	45.72	6.12	<1.0	< 97	345 +/- 110	< 360	< 98	< 400	929 +/- 69	< 580	< 250	< 2100	< 61
SED-11-DUP	NA	NA	NA	<1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-12	35.66	14.54	156.8 E	<1.61	< 54	271 +/- 110	< 760	< 130	< 660	147 +/- 33	< 1300	< 280	< 1900	409 +/- 73
SED-13	13.74	0	59.36	<1.52	< 74	399 +/- 160	< 1100	< 180	< 850	334 +/- 50	< 1600	< 330	< 2200	1090 +/- 120
SED-14	0	0	36.27	<4.54	317 +/- 56	279 +/- 110	< 820	< 140	< 690	263 +/- 42	< 1300	< 270	< 1900	466 +/- 77
SED-15	7.75	0	7.69	<3.13	40.6 +/- 24	170 +/- 97	< 450	< 78	< 370	106 +/- 21	< 720	< 280	< 1800	80.7 +/- 34
SED-16	0	45.48	24.13	<6.25	< 47	< 110	< 280	< 79	< 300	242 +/- 30	< 480	< 300	< 1400	206 +/- 42
SED-17	0	0	73.33	<0.83	< 87	389 +/- 100	< 550	930 +/- 110	< 480	914 +/- 60	< 900	< 220	< 1400	359 +/- 65
SED-18	0	0	116.84	<1.32	57 +/- 37	209 +/- 100	< 370	121 +/- 63	< 340	332 +/- 35	< 600	< 270	< 1400	162 +/- 43
SED-18-DUP	NA	NA	NA	<1.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-19	5.6	0	87.85 E	<0.63	< 31	449 +/- 120	< 310	< 92	511 +/- 200	136 +/- 20	< 490	< 250	< 1500	100 +/- 35
SED-20	6.51	0	28.24	<0.81	< 32	497 +/- 92	< 270	< 72	< 270	146 +/- 20	479 +/- 300	< 180	< 1300	150 +/- 34
SED-21	0	0	14.44	<2.78	< 37	< 110	< 220	< 66	< 220	179 +/- 25	< 360	< 270	< 1400	225 +/- 39
SED-21-DUP	NA	NA	NA	NA	< 29	< 99	< 160	< 55	< 180	192 +/- 19	333 +/- 190	< 240	< 1200	197 +/- 29
SED-22	0	0	6.67	<2.78	< 31	83.7 +/- 52	< 300	< 76	< 310	63.3 +/- 19	581 +/- 340	< 190	< 1500	53.1 +/- 34
SED-23	7.89	0	12.60	<10	< 21	< 73	< 190	< 59	< 210	41.7 +/- 12	490 +/- 230	< 300	< 1400	92.7 +/- 27

[1] Dry weight corrected result

[2] For metals, detected results are shown as recorded result ± standard deviation for each metal

E - Estimated value; exceeds upper limit of calibration

Table 6-2. Rationale for Selection of Sediment Samples for Full Characterization
Iron Horse Park Superfund Site - OU-4

Area	Sample Location	Selected for Full Characterization? [1]		Rationale for Selection
		Yes	No	
Content Brook Area	SED-01	X		Maximum arsenic detection
	SED-02		X	
	SED-03		X	
	SED-04		X	
B&M Pond	SED-05	X		Maximum historical DDD detection, high Microtox toxicity, Cu, Pb, and PAHs
	SED-06		X	
	SED-07		X	
	SED-08		X	
West Middlesex Canal	SED-09		X	
	SED-10		X	
	SED-11	X		Highest historical PCB detections, high Microtox toxicity and Pb
	SED-12		X	
Richardson Pond	SED-13		X	
	SED-14		X	
	SED-15		X	
	SED-16		X	
Unnamed Brook	SED-17		X	
	SED-18	X		High PAHs, low metals and Microtox toxicity (Microtox assay is not very sensitive to PAHs)
	SED-19		X	
	SED-20		X	
Reference Area - Round Pond	SED-21		X	
	SED-22	X		No detectable Microtox toxicity (lower Pb than SED-21, lower Microtox results than SED-23)
	SED-23		X	

[1] All sampling locations underwent screening analyses (including Microtox® testing, XRF screening for target metals, and PAH and PCB immunoassay test kits). Full characterization includes toxicity testing, grain size analyses, and chemical analyses for 4,4'-DDD/PCBs, PAHs, target metals, and TOC)

Table 6-3. Summary of Sediment Characteristics
Iron Horse Park Superfund Site - OU-4

Area	Sample Location	Habitat	Water Depth (ft)	% Solids	Grain Size Description	Notes from Grain Size Analysis
Content Brook Area	SED-01	Brook	0.1	33.2	82.3% Sand; 15.9% Silt&Clay; 1.8% Gravel	Very high organic content; wet, very dark brown silty sand
B&M Pond Area	SED-05	Open Water	3	11.2	87.2% Sand; 8.4% Silt&Clay; 4.4% Gravel	Very high organic content; wet, very dark brown sand with silt; smell of petroleum
West Middlesex Canal	SED-11	Canal	2.5-3.5	28.1	79.1% Sand; 16.6% Gravel; 4.3% Silt&Clay	Wet, black sand with gravel and organics
Unnamed Brook	SED-18	Channel / Brook	2.5	33.9	69.6% Sand; 28.4% Silt&Clay; 2.0% Gravel	High organic content; wet, very dark brown silty sand
Reference Area - Round Pond	SED-22	Open Water	2.2	17.5	88.1% Sand; 11.9% Silt&Clay	High organic content; wet, very dark brown sand with silt and organics

Table 6-4. Summary of Sediment Analytical Results
Iron Horse Park Superfund Site - OU-4

	M&E Sample ID	SED-01	SED-05	SED-25	SED-11	SED-18	SED-22
	Date Sampled	09/14/04	09/15/04	09/15/04	09/16/04	09/16/04	09/13/04
	Comments		FD of SED-25	FD of SED-05			
Polychlorinated Biphenyls (PCBs) and 4,4-DDD (ug/Kg dry wt.)	PAL						
4,4'-DDD	2.0	2.69 J	102 J	83 J	-- R	17.9 J	14.5
Aroclor-1016	7.0	6.5 U	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1221	120	13 U	130 U	132 U	13.2 U	13.2 U	13.3 U
Aroclor-1232	600	6.5 U	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1242	170	6.5 U	65.1 U	65.9 U	22.8	6.62 U	6.65 U
Aroclor-1248	30	14.8	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1254	60	6.5 U	2870 J	2520 J	6.6 U	36.3	6.65 U
Aroclor-1260	5	11.5 J	1910 J	1970 J	6.6 U	20.1 J	13.7 J
Total Organic Carbon (mg/Kg dry wt.)	PAL						
TOC Average Duplicates	none	253000	277000	2720000	161000	323000	865000
Metals (mg/Kg dry wt.)	PAL						
Aluminum	none	6500	9900	16000	4200	16000	4700
Arsenic	6	360 J	60 J	90 J	2.9 J	61 J	3.1 J
Barium	none	370 EB	250 EB	400 EB	28 EB	110 EB	27 EB
Chromium	26	14 J	520 J	870 J	10 J	34 J	8 J
Cobalt	50	7.8 J	24 J	38 J	2 J	18 J	2.3 J
Copper	16	19 J	550 J	850 J	5 J	210 J	8.8 J
Lead	30	35 J	620 J	1000 J	16 J	380 J	30 J
Manganese	460	1600 JEB	380 JEB	830 JEB	220 JEB	490 JEB	250 JEB
Silver	0.5	0.27 J	0.57 J	0.86 J	0.033 J	0.17 J	0.069 J
Vanadium	none	19 J	30 J	58 J	7.5 J	28 J	13 J
Zinc	120	110 JEB	2700 JEB	4400 JEB	21 JEB	150 JEB	42 JEB

Table 6-4. Summary of Sediment Analytical Results
Iron Horse Park Superfund Site - OU-4

	M&E Sample ID Date Sampled Comments	SED-01 09/14/04	SED-05 09/15/04 FD of SED-25	SED-25 09/15/04 FD of SED-05	SED-11 09/16/04	SED-18 09/16/04	SED-22 09/13/04
Polynuclear Aromatic Hydrocarbons (PAHs) (ug/Kg dry wt.)	PAL						
Naphthalene	160	59 EBJ	2800 EBJ	1700 EBJ	52 EBJ	360 EBJ	18 EBJ
2-Methylnaphthalene	70	21 J	3300 J	1800 J	20 J	410 J	10 J
1-Methylnaphthalene	none	28 EBJ	2700 EBJ	1500 EBJ	67 EBJ	390 EBJ	9.6 EBJ
Biphenyl	none	5.3 J	150 J	91 J	7.4 J	79 J	2.4 UJ
2,6-Dimethylnaphthalene	none	37 J	1300 J	730 J	24 J	360 J	6 J
Acenaphthylene	44	31 J	3800 J	2300 J	5.4 J	98 J	11 J
Acenaphthene	16	17 J	5300 J	3400 J	7.3 J	83 J	7.1 J
Dibenzofuran	none	17 J	3700 J	2200 J	6.7 J	240 J	7.2 J
Fluorene	19	21 J	6200 J	4000 J	11 J	260 J	12 J
2,3,5-Trimethylnaphthalene	none	3.9 J	310 J	190 J	3.8 J	220 J	2.1 J
Phenanthrene	204	93 EBJ	13000 EBJ	7200 EBJ	29 EBJ	1100 EBJ	84 EBJ
Anthracene	27	42 J	6700 J	4400 J	8.2 J	360 J	19 J
1-Methylphenanthrene	none	12 EBJ	1100 EBJ	720 EBJ	1.8 EBJ	370 EBJ	12 EBJ
Fluoranthene	423	230 EBJ	24000 EBJ	11000 EBJ	70 EBJ	2000 EBJ	150 EBJ
Pyrene	195	160 EBJ	16000 EBJ	7300 EBJ	48 EBJ	1200 EBJ	84 EBJ
Benzo[a]anthracene	108	91 J	14000 J	7700 J	24 J	640 J	43 J
Chrysene	166	140 J	14000 J	8100 J	36 J	770 J	69 J
Benzo[b]fluoranthene	240	160 EBJ	11000 EBJ	6200 EBJ	36 EBJ	810 EBJ	59 EBJ
Benzo[k]fluoranthene	240	300 J	10000 J	5300 J	32 J	700 J	120 J
Benzo[e]pyrene	none	120 J	7200 J	3800 J	24 J	430 J	43 J
Benzo[a]pyrene	140	130 J	11000 J	5300 J	27 J	560 J	49 J
Perylene	none	52 J	2700 J	1300 J	56 J	430 J	41 J
Indeno[1,2,3-cd]pyrene	200	80 J	6200 J	2700 J	13 J	240 J	32 J
Dibenz[a,h]anthracene	33	25 J	2200 J	1000 J	3.8 J	76 J	9 J
Benzo[g,h,i]perylene	170	79 J	5200 J	2300 J	14 J	230 J	33 J
Total PAHs[(1)]		1955	173860	92231	627	12416	930

PAL Exceedances are highlighted

[(1)] Total PAH results are the sum of detected concentrations. Non-detect values were not included, as they were assumed to be zero for this summation

EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank

FD - Field Duplicate

J - The concentration is an estimated quantity

mg/Kg - milligrams per Kilogram

mg/L - milligrams per Liter

PAL - Project Action Limit

R - The data are rejected as unusable

U - Analyte was analyzed for but not detected

ug/Kg - micrograms per Kilogram

ug/L - micrograms per Liter

UJ - The sample quantitation limit is an estimated quantity

Metal and PAH samples for sediments were freeze dried

Table 6-5. *Chironomus tentans* Survival Summary
Iron Horse Park Superfund Site - OU-4

Site Reference	Mean Survival	Distributior	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Survival Against Laboratory Control							
Lab Control	83.80%						
SED-22	77.50%	Normal	Equal	0.9946	1.8946	0.1765	NO
SED-01	90.00%	Normal	Equal	-1.1632	1.77613	0.8679	NO
SED-05	93.80%	Normal	Equal	-2.0281	1.8946	0.9589	NO
SED-11	71.30%	Normal	Equal	2.1719	1.8946	0.0332	YES
SED-18	88.80%	Normal	Equal	-1.1929	1.8946	0.8641	NO
Statistical Comparison of Survival Against Project Reference Site - SED-22							
SED-22	77.50%						
SED-01	90.00%	Normal	Equal	-1.8964	1.8946	0.9501	NO
SED-05	93.80%	Normal	Equal	-3.475	1.8946	0.9948	NO
SED-11	71.30%	Normal	Equal	1.2556	1.8946	0.1248	NO
SED-18	88.80%	Normal	Equal	-1.8853	1.8946	0.9493	NO

Table 6-6. *Chironomus tentans* Growth Summary
Iron Horse Park Superfund Site - OU-4

Site Reference	Mean AFDW (mg)	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Growth Against Laboratory Control							
Lab Contrc	2.03						
SED-22	1.84	Normal	Equal	1.6067	1.8946	0.0761	NO
SED-01	2.21	Normal	Equal	-1.2646	1.8946	0.8767	NO
SED-05	1.34	Normal	Equal	8.2081	1.8946	0	YES
SED-11	1.4	Normal	Equal	5.6588	1.8946	0.0004	YES
SED-18	0.94	Normal	Equal	17.2139	1.8946	0	YES
Statistical Comparison of Growth Against Project Reference Site - SED-22							
SED-22	1.84						
SED-01	2.21	Normal	Equal	-2.758	1.7613	0.9923	NO
SED-05	1.34	Normal	Equal	4.5019	1.7613	0.0002	YES
SED-11	1.4	Normal	Equal	3.2943	1.7613	0.0027	YES
SED-18	0.94	Normal	Equal	8.4356	1.7613	0	YES

Table 6-7. *Hyalella azteca* Survival Summary
Iron Horse Park Superfund Site - OU-4

Site Reference	Mean Survival	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Survival Against Laboratory Control							
Lab Control	100						
SED-22	92.5	Non Normal	Unequal	3.074	1.8946	0.009	YES
SED-01	96.3	Non Normal	Unequal	2.0494	1.8946	0.0398	YES
SED-05	87.5	Non Normal	Unequal	5.2354	1.8946	0.0006	YES
SED-11	87.5	Non Normal	Unequal	2.1806	1.8946	0.0328	YES
SED-18	7.5	Non Normal	Unequal	17.5529	1.8946	0	YES
Statistical Comparison of Survival Against Project Reference Site - SED-22							
SED-22	92.5						
SED-01	96.3	Normal	Equal	-1.1482	1.8946	0.8557	NO
SED-05	87.5	Normal	Equal	1.5614	1.8946	0.0812	NO
SED-11	87.5	Normal	Equal	0.836	1.8946	0.2154	NO
SED-18	7.5	Non Normal	Equal	12.2955	1.8946	0	YES

Table 6-8. *Hyalella azteca* Growth Summary
Iron Horse Park Superfund Site - OU-4

Site Reference	Mean AFDW (mg)	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Growth Against Laboratory Control							
Lab Control	0.08						
SED-22	0.077	Normal	Equal	0.6173	1.8946	0.2783	NO
SED-01	0.087	Normal	Equal	-0.8792	1.8946	0.7958	NO
SED-05	0.077	Normal	Equal	0.53	1.8946	0.3063	NO
SED-11	0.07	Normal	Equal	1.339	1.8946	0.1112	NO
SED-18	0.097	Normal	Unequal	-0.5068	2.92	0.6687	NO
Statistical Comparison of Growth Against Project Reference Site - SED-22							
SED-22	0.077						
SED-01	0.087	Normal	Equal	-1.153	1.8946	0.8566	NO
SED-05	0.077	Normal	Equal	0.1433	1.8946	0.445	NO
SED-11	0.07	Normal	Equal	1.2637	1.8946	0.1234	NO
SED-18	0.097	Normal	Unequal	-0.5987	2.92	0.6949	NO

Table 6-9. Summary of Surface Water Metals Analytical Results
Iron Horse Park Superfund Site - OU-4

	M&E Sample ID	SW-RP-01	SW-RP-02	SW-RP-03	SW-MC-01	SW-MC-21	SW-MC-02	SW-MC-03
	Date Sampled	09/22/04	09/22/04	09/22/04	09/23/04	09/23/04	09/23/04	09/23/04
	Comments				FD of SW-MC-21	FD of SW-MC-01		
Dissolved Metals (ug/L)	PAL							
Aluminum	87	15.0 U	15.0 U	15.0 U	23.2 J	21.4 J	21.5 J	20.8 J
Arsenic	3.1	2.8 J	2.8 J	2.7 J	1.3 J	1.2 J	1.3 J	1.3 J
Barium	3.9	25.5	25.1	25.2	26.6	26.6	26.7	26.4
Calcium	none	13400	13300	13300	12000	12000	12000	12000
Chromium	11	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	2.5	0.19 J	0.16 J	0.13 J	0.41	0.31	0.39	0.34
Magnesium	none	3190	3170	3150	2040	2060	2050	2040
Manganese	80	216	214	214	135	133	132	131
Silver	0.36	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	19	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	100	5.0 U	5.0 U	5.0 U	9.5 J	5.0 U	5.0 U	5.0 U
Total Metals (ug/L)	PAL							
Aluminum	87	15.0	17.5 J	16.0 J	31.1	40.8	39.9	40.0
Arsenic	3.1	3.4 J	3.4 J	3.3 J	1.4 J	1.4 J	1.5 J	1.5 J
Barium	3.9	24.9	24.7	24.7	25.9	26.2	26.3	26.5
Calcium	none	13300	13200	13100	11800	11900	11900	11900
Chromium	11	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	2.5	0.25	0.27	0.25	0.66	0.69	0.75	0.80
Magnesium	none	3190	3160	3150	2040	2060	2060	2060
Manganese	80	219	218	216	140	146	154	164
Silver	0.36	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	19	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Alkalinity (mg/L)	PAL							
Alkalinity, Total as $CaCO_3$	none	32.6	33.4	38.6	30.4	30.9	33.4	31.5

Table 6-9. Summary of Surface Water Metals Analytical Results
Iron Horse Park Superfund Site - OU-4

	M&E Sample ID	SW-CB-01	SW-CB-02	SW-CB-03	SW-BM-01	SW-BM-02	SW-BM-03	SW-RF-01	SW-RF-02	SW-RF-03
	Date Sampled	09/23/04	09/23/04	09/23/04	09/21/04	09/21/04	09/21/04	09/24/04	09/24/04	09/24/04
	Comments									
Dissolved Metals (ug/L)	PAL									
Aluminum	87	49.6	50.2	54.2	26.4 J	27.0 J	28.1 J	34.3	36.9	38.4
Arsenic	3.1	1.7 J	1.7 J	1.8 J	2.3 J	2.2 J	2.1 J	1.0 J	1.0 J	1.1 J
Barium	3.9	39.1	39.1	39.4	24.1	24.7	24.4	18.1	18.3	18.3
Calcium	none	13200	13200	13200	10300	10400	10300	8940	8970	8950
Chromium	11	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	3	1.0 U	1.0 U	1.1 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	2.5	0.34	0.37	0.45	0.83	0.70	0.61	0.41	0.31	0.32
Magnesium	none	2500	2490	2500	1740	1760	1740	1660	1670	1670
Manganese	80	263	263	274	128	127	112	177	175	173
Silver	0.36	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	19	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	100	5.5 J	6.0 J	12.6	6.2 J	5.0 U	5.0 U	8.2 J	5.0 U	5.0 U
Total Metals (ug/L)	PAL									
Aluminum	87	73.2	152.0	71.2	52.2	52.0	51.1	42.5	37.0	36.2
Arsenic	3.1	2.5 J	3.1 J	2.4 J	2.6 J	2.5 J	2.6 J	1.1 J	1.1 J	1.1 J
Barium	3.9	38.9	41.2	38.7	24.3	24.2	23.9	18.8	18.2	18.1
Calcium	none	13100	13300	13100	10300	10200	10200	8970	8960	8960
Chromium	11	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	9	1.0 U	1.0 U	1.0 U	1.1 J	1.1 J	1.4 J	1.0 U	1.0 U	1.0 U
Lead	2.5	1.0	1.7	0.96	1.6	1.6	1.6	0.58	0.44	0.41
Magnesium	none	2500	2530	2500	1760	1750	1730	1670	1680	1680
Manganese	80	282	330	280	136	137	123	253	230	200
Silver	0.36	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	19	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	100	5.0 U	6.7 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Alkalinity (mg/L)	PAL									
Alkalinity, Total as $CaCO_3$	none	35.5	36.7	36.2	27.2	23.7	27.7	20.7	21.8	13.9

PAL Exceedances are highlighted

EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
PAL - Project Action Limit
R - The data are rejected as unusable
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity

Table 6-10. *Ceriodaphnia dubia* Survival Summary
Iron Horse Park Superfund Site - OU-4

Site	Mean Survival (%)	Distribution	Variance	t-Test Statistics			Significant Difference
				t Value	Critical t Value	p Value	
Statistical Comparison of Survival Against Laboratory Control							
Lab Control	100.00%	-	-	-	-	-	-
SW-BM-01	80.00%	Non-normal	Unequal	1.5000	1.8331	0.0839	NO
SW-RP-01	100.00%	-	-	-	-	-	NO
Lab Control	100.00%	-	-	-	-	-	-
SW-MC-01	100.00%	-	-	-	-	-	NO
SW-CB-01	90.00%	Non-normal	Unequal	1.0000	1.8331	0.1717	NO
Lab Control	100.00%	-	-	-	-	-	-
SW-RF-01	70.00%	Non-Normal	Unequal	1.9640	1.8331	0.0406	YES
Statistical Comparison of Survival Against Project Reference Site - SW-RF-01							
SW-RF-01	70.00%						
SW-BM-01	80.00%	-	-	-	-	-	NO
SW-RP-01	100.00%	-	-	-	-	-	NO
SW-MC-01	100.00%	-	-	-	-	-	NO
SW-CB-01	90.00%	-	-	-	-	-	NO

‡ - Statistical significance evaluated at p=0.05 ; in cases were the evaluated endpoint was equal to or greater than experienced in the laboratory control, statistical analysis may not have been conducted.

Table 6-11. *Ceriodaphnia dubia* Reproduction Summary
Iron Horse Park Superfund Site - OU-4

Site	Mean Juvenile per Adult	Distribution	Variance	t-Test Statistics			Significant Difference
				t Value	Critical t Value	p Value	
Statistical Comparison of Reproduction Against Laboratory Control							
Lab Control	28.4	-	-	-	-	-	-
SW-BM-01	22.5	Normal	Equal	1.4715	1.7341	0.0792	NO
SW-RP-01	21.9	Normal	Equal	2.0405	1.7341	0.0281	YES
Lab Control	32	-	-	-	-	-	
SW-MC-01	30.9	Normal	Equal	0.3308	1.7341	0.3723	NO
SW-CB-01	33.2	-	-	-	-	-	NO
Lab Control	33.7						-
SW-RF-01	23.6	Normal	Equal	2.7205	1.7341	0.007	YES
Statistical Comparison of Reproduction Against Project Reference Site - SW-RF-01							
SW-RF-01	23.6						
SW-BM-01	22.5	Normal	Equal	0.2235	1.7341	0.4128	NO
SW-RP-01	21.9	Normal	Equal	0.4264	1.7341	0.3374	NO
SW-MC-01	30.9	Normal	Equal	-1.234	1.7341	0.8835	NO
SW-CB-01	33.2	Normal	Equal	-1.4174	1.7341	0.9133	NO

‡ - Statistical significance evaluated at p=0.05 ; in cases were the evaluated endpoint was equal to or greater that experienced in the laboratory control, no statistical analysis was conducted.

Table 6-12. *Pimephales promelas* Survival Summary
Iron Horse Park Superfund Site - OU-4

Site	Mean Survival (%)	Distribution	Variance	t-Test Statistics			Significant Difference
				t Value	Critical t Value	p Value	
Statistical Comparison of Survival Against Laboratory Control							
Lab Control	87.50%	-	-	-	-	-	-
SW-BM-01	77.50%	Normal	Equal	1.2127	1.9432	0.1354	NO
SW-RP-01	100.00%	-	-	-	-	-	NO
Lab Control	97.50%	-	-	-	-	-	-
SW-MC-01	57.50%	Normal	Equal	2.9943	1.9432	0.0121	YES
SW-CB-01	87.50%	Normal	Equal	1.5194	1.9432	0.0897	NO
Lab Control	100.00%	-	-	-	-	-	-
SW-RF-01	87.50%	Normal	Unequal	1.6894	2.3534	0.0949	NO
Statistical Comparison of Survival Against Project Reference Site - SW-RF-01							
SW-RF-01	87.50%						
SW-BM-01	77.50%	Normal	Equal	0.9664	1.9432	0.1856	NO
SW-RP-01	100.00%	-	-	-	-	-	NO
SW-MC-01	57.50%	Normal	Equal	2.0148	1.9432	0.0453	YES
SW-CB-01	87.50%	Normal	Equal	0.0381	1.9432	0.4854	NO

‡ - Statistical significance evaluated at p=0.05 ; in cases were the evaluated endpoint was equal to or greater that experienced in the laboratory control, no statistical analysis was conducted.

Table 6-13. *Pimephales promelas* Growth Summary
Iron Horse Park Superfund Site - OU-4

Site	Mean Weight (mg)	Distribution	Variance	t-Test Statistics			Significant Difference
				t Value	Critical t Value	p Value	
Statistical Comparison of Growth Against Laboratory Control							
Lab Control	0.477	-	-	-	-	-	-
SW-BM-01	0.429	Normal	Equal	1.1894	1.9432	0.1396	NO
SW-RP-01	0.534	-	-	-	-	-	NO
Lab Control	0.448	-	-	-	-	-	
SW-MC-01	0.346	Normal	Equal	1.3909	1.9432	0.1068	NO
SW-CB-01	0.437	Normal	Equal	0.2567	1.9432	0.403	NO
Lab Control	0.482	-	-	-	-	-	-
SW-RF-01	0.490	-	-	-	-	-	NO
Statistical Comparison of Growth Against Project Reference Site - SW-RF-01							
SW-RF-01	0.490						
SW-BM-01	0.429	Normal	Equal	1.6281	1.9432	0.0773	NO
SW-RP-01	0.534	Normal	Equal	-0.683	1.9432	0.7399	NO
SW-MC-01	0.346	Normal	Equal	3.0933	1.9432	0.0106	YES
SW-CB-01	0.437	Normal	Equal	2.2471	1.9432	0.0329	YES

‡ - Statistical significance evaluated at p=0.05 ; in cases were the evaluated endpoint was equal to or greater that experienced in the laboratory control, no statistical analysis was conducted.

Table 6-14. Length and Weight of Collected Fish
Iron Horse Park Superfund Site - OU-4

Area	M&E ID	Sampling gear	Common Name	Scientific Name	Length (mm)	Weight (g)
B&M Pond	Fl-BM-BG-008	Electrofishing	bluegill	*Lepomis macrochirus*	86	13.6
	Fl-BM-BH-001	Electrofishing	brown bullhead	*Ameiurus nebulosus*	145	36.5
	Fl-BM-BH-002	Electrofishing	brown bullhead	*Ameiurus nebulosus*	134	24
	Fl-BM-BH-003	Electrofishing	brown bullhead	*Ameiurus nebulosus*	148	40.7
	Fl-BM-BH-004	Electrofishing	brown bullhead	*Ameiurus nebulosus*	175	60.7
	Fl-BM-BH-005	Electrofishing	brown bullhead	*Ameiurus nebulosus*	138	24.7
	Fl-BM-BH-006	Electrofishing	brown bullhead	*Ameiurus nebulosus*	154	36.8
	Fl-BM-BH-007	Electrofishing	brown bullhead	*Ameiurus nebulosus*	190	77.9
	Fl-BM-DA-009	Electrofishing	longnose dace	*Rhinichthys cataractae*	46	0.9
Content Brook	Fl-CB-AE-098	Electrofishing	American eel	*Auguilla rostrata*	370	97.3
	Fl-CB-AE-099	Electrofishing	American eel	*Auguilla rostrata*	175	8.2
	Fl-CB-GS-136	Hoop Net	golden shiner	*Notemigonus crysoleucas*	171	60.1
	Fl-CB-RP-092	Electrofishing	redfin pickerel	*Esox americanus*	143	25.4
	Fl-CB-RP-093	Electrofishing	redfin pickerel	*Esox americanus*	106	7.5
	Fl-CB-RP-094	Electrofishing	redfin pickerel	*Esox americanus*	103	7.5
	Fl-CB-RP-095	Electrofishing	redfin pickerel	*Esox americanus*	90	5.4
	Fl-CB-RP-096	Electrofishing	redfin pickerel	*Esox americanus*	94	6.3
	Fl-CB-RP-097	Electrofishing	redfin pickerel	*Esox americanus*	104	7.4
	Fl-CB-YB-128	Trot Lines	yellow bullhead	*Ameiurus natalis*	207	128.7
	Fl-CB-YB-129	Trot Lines	yellow bullhead	*Ameiurus natalis*	188	73.4
	Fl-CB-YB-130	Trot Lines	yellow bullhead	*Ameiurus natalis*	170	65
	Fl-CB-YB-131	Trot Lines	yellow bullhead	*Ameiurus natalis*	182	82.5
	Fl-CB-YB-132	Trot Lines	yellow bullhead	*Ameiurus natalis*	200	126
	Fl-CB-YB-133	Trot Lines	yellow bullhead	*Ameiurus natalis*	168	67.8
	Fl-CB-YB-134	Trot Lines	yellow bullhead	*Ameiurus natalis*	192	102
	Fl-CB-YB-135	Trot Lines	yellow bullhead	*Ameiurus natalis*	171	59.8
West Middlesex Canal	Fl-MC-AE-090	Electrofishing	American eel	*Auguilla rostrata*	295	38.2
	Fl-MC-AE-091	Electrofishing	American eel	*Auguilla rostrata*	175	11.3
	Fl-MC-BB-083	Electrofishing	brown bullhead	*Ameiurus nebulosus*	164	52.5
	Fl-MC-BB-084	Electrofishing	brown bullhead	*Ameiurus nebulosus*	174	59.8
	Fl-MC-BB-085	Electrofishing	brown bullhead	*Ameiurus nebulosus*	104	13.8
	Fl-MC-BB-086	Electrofishing	brown bullhead	*Ameiurus nebulosus*	195	98.6
	Fl-MC-BG-051	Electrofishing	bluegill	*Lepomis macrochirus*	70	13.3
	Fl-MC-GS-049	Electrofishing	golden shiner	*Notemigonus crysoleucas*	60	3.9
	Fl-MC-GS-054	Electrofishing	golden shiner	*Notemigonus crysoleucas*	34	0.8
	Fl-MC-GS-065	Electrofishing	golden shiner	*Notemigonus crysoleucas*	44	0.9
	Fl-MC-GS-067	Electrofishing	golden shiner	*Notemigonus crysoleucas*	36	0.3
	Fl-MC-GS-074	Electrofishing	golden shiner	*Notemigonus crysoleucas*	50	1.7
	Fl-MC-GS-079	Electrofishing	golden shiner	*Notemigonus crysoleucas*	34	0.6
	Fl-MC-GS-081	Electrofishing	golden shiner	*Notemigonus crysoleucas*	35	0.5
	Fl-MC-LD-050	Electrofishing	longnose dace	*Rhinichthys cataractae*	53	3.1
	Fl-MC-LD-052	Electrofishing	longnose dace	*Rhinichthys cataractae*	42	1.1
	Fl-MC-LD-053	Electrofishing	longnose dace	*Rhinichthys cataractae*	44	0.9
	Fl-MC-LD-055	Electrofishing	longnose dace	*Rhinichthys cataractae*	35	0.6
	Fl-MC-LD-056	Electrofishing	longnose dace	*Rhinichthys cataractae*	55	1.8
	Fl-MC-LD-057	Electrofishing	longnose dace	*Rhinichthys cataractae*	58	2.2
	Fl-MC-LD-058	Electrofishing	longnose dace	*Rhinichthys cataractae*	58	3.2
	Fl-MC-LD-059	Electrofishing	longnose dace	*Rhinichthys cataractae*	53	1.5
	Fl-MC-LD-060	Electrofishing	longnose dace	*Rhinichthys cataractae*	36	0.4
	Fl-MC-LD-061	Electrofishing	longnose dace	*Rhinichthys cataractae*	46	1.5
	Fl-MC-LD-062	Electrofishing	longnose dace	*Rhinichthys cataractae*	46	0.8
	Fl-MC-LD-063	Electrofishing	longnose dace	*Rhinichthys cataractae*	40	1
	Fl-MC-LD-064	Electrofishing	longnose dace	*Rhinichthys cataractae*	44	0.8
	Fl-MC-LD-066	Electrofishing	longnose dace	*Rhinichthys cataractae*	57	2.5
	Fl-MC-LD-068	Electrofishing	longnose dace	*Rhinichthys cataractae*	34	0.8
	Fl-MC-LD-069	Electrofishing	longnose dace	*Rhinichthys cataractae*	37	0.5
	Fl-MC-LD-070	Electrofishing	longnose dace	*Rhinichthys cataractae*	30	0.4
	Fl-MC-LD-071	Electrofishing	longnose dace	*Rhinichthys cataractae*	55	1.4

Table 6-14. Length and Weight of Collected Fish
Iron Horse Park Superfund Site - OU-4

Area	M&E ID	Sampling gear	Common Name	Scientific Name	Length (mm)	Weight (g)
West Middlesex Canal	Fl-MC-LD-072	Electrofishing	longnose dace	*Rhinichthys cataractae*	40	0.9
	Fl-MC-LD-073	Electrofishing	longnose dace	*Rhinichthys cataractae*	55	2.1
	Fl-MC-LD-076	Electrofishing	longnose dace	*Rhinichthys cataractae*	51	2
	Fl-MC-LD-077	Electrofishing	longnose dace	*Rhinichthys cataractae*	40	1.4
	Fl-MC-LD-078	Electrofishing	longnose dace	*Rhinichthys cataractae*	38	0.6
	Fl-MC-LD-080	Electrofishing	longnose dace	*Rhinichthys cataractae*	35	0.6
	Fl-MC-LD-087	Electrofishing	longnose dace	*Rhinichthys cataractae*	92	9.5
	Fl-MC-LD-088	Electrofishing	longnose dace	*Rhinichthys cataractae*	45	1
	Fl-MC-LD-089	Electrofishing	longnose dace	*Rhinichthys cataractae*	42	0.7
	Fl-MC-RP-075	Electrofishing	redfin pickerel	*Esox americanus*	150	27.4
	Fl-MC-YB-082	Electrofishing	yellow bullhead	*Ameiurus natalis*	142	37.7
Richardson Pond	Fl-RP-BB-046	Electrofishing	brown bullhead	*Ameiurus nebulosus*	82	6.1
	Fl-RP-BB-047	Electrofishing	brown bullhead	*Ameiurus nebulosus*	180	81.5
	Fl-RP-BB-048	Electrofishing	brown bullhead	*Ameiurus nebulosus*	155	60.1
	Fl-RP-GS-010	Electrofishing	golden shiner	*Notemigonus crysoleucas*	67	3.7
	Fl-RP-GS-011	Electrofishing	golden shiner	*Notemigonus crysoleucas*	107	15.1
	Fl-RP-GS-012	Electrofishing	golden shiner	*Notemigonus crysoleucas*	82	5.7
	Fl-RP-GS-013	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	3.7
	Fl-RP-GS-014	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	3.9
	Fl-RP-GS-015	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	4
	Fl-RP-GS-016	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	4.2
	Fl-RP-GS-017	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	3.8
	Fl-RP-GS-018	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	4
	Fl-RP-GS-019	Electrofishing	golden shiner	*Notemigonus crysoleucas*	60	2.8
	Fl-RP-GS-020	Electrofishing	golden shiner	*Notemigonus crysoleucas*	73	5
	Fl-RP-GS-021	Electrofishing	golden shiner	*Notemigonus crysoleucas*	66	3.8
	Fl-RP-GS-022	Electrofishing	golden shiner	*Notemigonus crysoleucas*	66	3.9
	Fl-RP-GS-023	Electrofishing	golden shiner	*Notemigonus crysoleucas*	65	3.1
	Fl-RP-GS-024	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	3.8
	Fl-RP-GS-025	Electrofishing	golden shiner	*Notemigonus crysoleucas*	64	2.8
	Fl-RP-GS-026	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	1.7
	Fl-RP-GS-027	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	3.2
	Fl-RP-GS-028	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	4.2
	Fl-RP-GS-029	Electrofishing	golden shiner	*Notemigonus crysoleucas*	64	3
	Fl-RP-GS-030	Electrofishing	golden shiner	*Notemigonus crysoleucas*	65	2.8
	Fl-RP-GS-031	Electrofishing	golden shiner	*Notemigonus crysoleucas*	67	3.7
	Fl-RP-GS-032	Electrofishing	golden shiner	*Notemigonus crysoleucas*	70	4.6
	Fl-RP-GS-033	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	3.9
	Fl-RP-GS-034	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	3.8
	Fl-RP-GS-035	Electrofishing	golden shiner	*Notemigonus crysoleucas*	63	2.4
	Fl-RP-GS-036	Electrofishing	golden shiner	*Notemigonus crysoleucas*	68	2.1
	Fl-RP-GS-037	Electrofishing	golden shiner	*Notemigonus crysoleucas*	53	1.7
	Fl-RP-GS-038	Electrofishing	golden shiner	*Notemigonus crysoleucas*	52	1.7
	Fl-RP-GS-039	Electrofishing	golden shiner	*Notemigonus crysoleucas*	63	2.9
	Fl-RP-GS-040	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	1.9
	Fl-RP-GS-041	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	2
	Fl-RP-GS-042	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	1.5
	Fl-RP-GS-043	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	1.9
	Fl-RP-GS-044	Electrofishing	golden shiner	*Notemigonus crysoleucas*	54	1.4
	Fl-RP-GS-045	Electrofishing	golden shiner	*Notemigonus crysoleucas*	45	0.9

Table 6-14. Length and Weight of Collected Fish
Iron Horse Park Superfund Site - OU-4

Area	M&E ID	Sampling gear	Common Name	Scientific Name	Length (mm)	Weight (g)
Round Pond	Fl-RF-AE-122	Electrofishing	American eel	*Auguilla rostrata*	350	102.1
	Fl-RF-AE-123	Electrofishing	American eel	*Auguilla rostrata*	270	35.2
	Fl-RF-AE-124	Electrofishing	American eel	*Auguilla rostrata*	311	69.9
	Fl-RF-AE-127	Electrofishing	American eel	*Auguilla rostrata*	434	169.3
	Fl-RF-BB-143	Trot Lines	brown bullhead	*Ameiurus nebulosus*	294	386
	Fl-RF-BB-144	Trot Lines	brown bullhead	*Ameiurus nebulosus*	310	422
	Fl-RF-BB-145	Trot Lines	brown bullhead	*Ameiurus nebulosus*	321	474
	Fl-RF-BC-102	Electrofishing	black crappie	*Pomoxis nigromaculatus*	71	4.5
	Fl-RF-BC-107	Electrofishing	black crappie	*Pomoxis nigromaculatus*	68	4
	Fl-RF-BC-108	Electrofishing	black crappie	*Pomoxis nigromaculatus*	73	4.8
	Fl-RF-BC-119	Electrofishing	black crappie	*Pomoxis nigromaculatus*	119	4.1
	Fl-RF-BC-126	Electrofishing	black crappie	*Pomoxis nigromaculatus*	69	4.5
	Fl-RF-BC-139	Trot Lines	black crappie	*Pomoxis nigromaculatus*	197	107.3
	Fl-RF-BG-103	Electrofishing	bluegill	*Lepomis macrochirus*	60	3.3
	Fl-RF-BG-112	Electrofishing	bluegill	*Lepomis macrochirus*	45	2.1
	Fl-RF-BG-140	Trot Lines	bluegill	*Lepomis macrochirus*	213	224.4
	Fl-RF-CP-101	Electrofishing	chain pickerel	*Esox niger*	111	5.7
	Fl-RF-CP-121	Electrofishing	chain pickerel	*Esox niger*	265	97.3
	Fl-RF-GS-117	Electrofishing	golden shiner	*Notemigonus crysoleucas*	69	1.7
	Fl-RF-LB-105	Electrofishing	largemouth bass	*Micropterus salmoides*	78	6.6
	Fl-RF-LB-106	Electrofishing	largemouth bass	*Micropterus salmoides*	91	11.3
	Fl-RF-LB-113	Electrofishing	largemouth bass	*Micropterus salmoides*	124	28.1
	Fl-RF-LB-114	Electrofishing	largemouth bass	*Micropterus salmoides*	85	9.3
	Fl-RF-LB-116	Electrofishing	largemouth bass	*Micropterus salmoides*	75	4.5
	Fl-RF-LB-146	Hook and Line	largemouth bass	*Micropterus salmoides*	185	82
	Fl-RF-PS-111	Electrofishing	pumpkinseed	*Lepomis gibbosus*	94	16
	Fl-RF-YP-100	Electrofishing	yellow perch	*Perca flavescens*	54	1.8
	Fl-RF-YP-104	Electrofishing	yellow perch	*Perca flavescens*	75	5.8
	Fl-RF-YP-109	Electrofishing	yellow perch	*Perca flavescens*	74	4.8
	Fl-RF-YP-110	Electrofishing	yellow perch	*Perca flavescens*	68	3.4
	Fl-RF-YP-115	Electrofishing	yellow perch	*Perca flavescens*	58	1.9
	Fl-RF-YP-118	Electrofishing	yellow perch	*Perca flavescens*	60	2.3
	Fl-RF-YP-120	Electrofishing	yellow perch	*Perca flavescens*	59	1.9
	Fl-RF-YP-125	Electrofishing	yellow perch	*Perca flavescens*	54	0.7
	Fl-RF-YP-137	Trot Lines	yellow perch	*Perca flavescens*	215	115.8
	Fl-RF-YP-138	Trot Lines	yellow perch	*Perca flavescens*	260	240
	Fl-RF-YP-141	Trot Lines	yellow perch	*Perca flavescens*	260	274.2
	Fl-RF-YP-142	Trot Lines	yellow perch	*Perca flavescens*	284	291.8

Table 6-15. Summary of Fish Tissue Analytical Results
Iron Horse Park Superfund Site - OU-4

	M&E Sample ID	BM-BH-1	BM-BH-2	BM-BH-3	BM-BH-4	CB-RP-1	CB-BH-1	CB-BH-2	CB-BH-3	CB-BH-4	CB-AE-1	CB-GS-1	RP-BH-1
	Date Sampled	09/21/04	09/21/04	09/21/04	09/21/04	09/23/04	09/30/04	09/30/04	09/30/04	09/30/04	09/23/04	09/30/04	09/22/04
	Comments												
Metals (mg/kg)	PAL												
Aluminum	580	20 J	13	7.4	15	11	1.4 J	12	11	11	12	0.82 UJ	2.1 U
Arsenic	0.52	0.16 J	0.074 J	0.10 J	0.13 J	0.29 J	0.047 J	0.078 J	0.059 J	0.062 J	0.10 J	0.059 J	0.090 J
Barium	1100	2.1 J	1.5 J	2.2 J	2.2 J	2.8 J	0.69 J	0.50 J	0.27 J	1.7 J	1.8 J	1.4 J	1.2 J
Chromium	5.0	0.85 J	1.7 J	1.0 J	0.83 J	1.2 J	2.8 J	0.69 J	0.61 J	0.79 J	0.68 J	0.29 J	0.47 J
Cobalt	26	0.046 J	0.062 J	0.093 J	0.053 J	0.057 J	0.10 J	0.028 J	0.027 J	0.039 J	0.055 J	0.057 J	0.016 J
Copper	13	3.4 J	4.8 J	4.2 J	2.9 J	3.4 J	0.49 J	2.8 J	1.2 J	13 J	6.2 J	0.46 J	0.61 J
Lead	0.45	0.27 J	0.26 J	0.30 J	0.32 J	0.31 J	0.12 J	0.38 J	0.15 J	2.3 J	0.93 J	0.028 J	0.043 J
Manganese	5100	6.0 J	6.2 J	13.0 J	6.8 J	11.0 J	6.0 J	3.6 J	1.9 J	7.8 J	7.9 J	5.1 J	6.0 J
Silver	0.12	0.0032 U	0.0037 J	0.0032 U	0.0032 U	0.0030 U	0.0031 U	0.0030 U	0.0031 U	0.021 J	0.010 J	0.0032 U	0.0031 U
Vanadium	60	0.050 J	0.041 J	0.053 J	0.044 J	0.053 J	0.054 J	0.032 J	0.070 J	0.041 J	0.029 J	0.026 J	0.031 J
Zinc	76	14 J	16 J	24 J	14 J	34 J	17 J	16 J	14 J	17 J	21 J	28 J	12 J
Polynuclear Aromatic Hydrocarbons (ug/Kg)	PAL												
Naphthalene	740	7.4 UJ	2.9 UJ	2.5 UJ	4.4 UJ	2.8 UJ	2.4 UJ	3.0 UJ	2.1 UJ	2.1 UJ	2.8 UJ	2.6 UJ	3.7 UJ
2-Methylnaphthalene	none	8.9 UJ	2.1 U	2.7 UJ	7.4 UJ	2.2 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2.7 UJ	2.1 U	2.1 U
1-Methylnaphthalene	none	6.2 J	2.1 U	2.1 U	4.3 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.6 J	2.1 U	2.1 U
Biphenyl	none	2.4 J	2.1 U	1.3 J	2.9 J	2.4 J	2.1 U	2.4 J	2.1 U	2.1 U	1.2 J	2.1 U	2.1 U
2,6-Dimethylnaphthalene	none	6.7 J	1.7 J	3.0 J	7.0 J	1.4 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 J	1.2 J	2.1 U
Acenaphthylene	700	2.0 U	2.1 U	3.2 UJ	2.1 U	2.1 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 UJ
Acenaphthene	4	30 J	9.4 J	7.2 J	11 J	3.6 UJ	7.2 J	2.9 UJ	2.1 UJ	2.1 U	4.8 UJ	2.4 UJ	3.0 UJ
Dibenzofuran	none	9.5	4.4	2.1 U	3.2	1.9 J	1.6 J	2.7 J	1.4 J	2.2 J	2.7 J	2.4 J	1.4 J
Fluorene	660	24 J	7.7 J	6.2 UJ	9.6 J	3.0 UJ	3.9 UJ	2.6 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.7 UJ
2,3,5-Trimethylnaphthalene	none	4.1 J	2.1 U	2.1 U	2.6 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	1.1 J	2.1 U
Phenanthrene	17	29 J	9.2 UJ	8.5 UJ	15 J	3.1 UJ	5.2 UJ	3.5 UJ	3.5 UJ	2.7 UJ	3.8 UJ	3.2 UJ	4.4 UJ
Anthracene	5300	7.1 J	2.1 J	1.6 J	3.6 J	1.6 J	2.1 J	1.6 J	2.1 U	2.1 U	2.6 J	2.1 U	1.4 J
1-Methylphenanthrene	none	1.2 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Fluoranthene	20	12 J	5.0 UJ	5.2 UJ	8.5 UJ	2.4 UJ	2.1 U	2.6 UJ	2.1 UJ	2.1 UJ	5.8 UJ	2.1 U	2.1 UJ
Pyrene	20	5.4 J	2.3 J	1.6 J	3.0 J	1.8 J	2.1 UJ	1.8 J	2.1 UJ	2.1 UJ	4.3 J	2.1 UJ	1.4 J
Benz[a]anthracene	7	2.1 UJ	2.1 UJ	2.1 U	2.1 U	3.2 UJ	2.1 UJ	2.8 UJ	2.1 UJ	2.1 U	2.6 UJ	2.1 U	2.1 U
Chrysene	7	2.3 UJ	2.1 UJ	2.1 U	2.1 U	2.6 UJ	2.1 UJ	2.3 UJ	2.1 UJ	2.1 U	2.1 UJ	2.1 U	2.1 U
Benzo[b]fluoranthene	7	2.2 UJ	2.1 UJ	2.1 U	2.1 UJ	3.6 UJ	2.1 UJ	2.5 UJ	2.1 U	2.1 U	2.1 UJ	2.1 U	2.1 UJ
Benzo[k]fluoranthene	7	2.0 UJ	2.1 UJ	2.1 U	2.1 UJ	3.4 UJ	2.1 UJ	2.2 UJ	2.1 UJ	2.1 U	2.1 UJ	2.1 U	2.1 UJ
Benzo[e]pyrene	none	2.0 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Benzo[a]pyrene	7	2.0 UJ	2.1 U	2.1 U	2.1 U	3.6 UJ	2.1 UJ	2.2 UJ	2.1 U	2.1 U	2.1 UJ	2.1 U	2.1 UJ
Perylene	none	2.0 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Indeno[1,2,3-cd]pyrene	7	2.0 UJ	2.1 UJ	2.1 U	2.1 U	4.1 UJ	2.1 UJ	2.6 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2.1 UJ
Dibenz[a,h]anthracene	7	2.0 UJ	2.1 UJ	2.1 U	2.1 U	3.8 UJ	2.1 UJ	2.8 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ
Benzo[g,h,i]perylene	30	2.0 UJ	2.1 UJ	2.1 U	2.1 U	4.7 UJ	2.1 UJ	3.0 UJ	2.1 U	2.1 U	2.1 UJ	2.1 U	2.1 UJ
Total PAHs[(1)]		138	28	15	62	9.1	11	8.5	1.4	2.2	16	4.7	4.2
Percent Lipids (%)	PAL												
Percent Lipids	none	1.8	0.84	0.80	0.94	0.83	2.4	0.81	0.96	0.51	1.7	1.6	1.5

Table 6-15. Summary of Fish Tissue Analytical Results
Iron Horse Park Superfund Site - OU-4

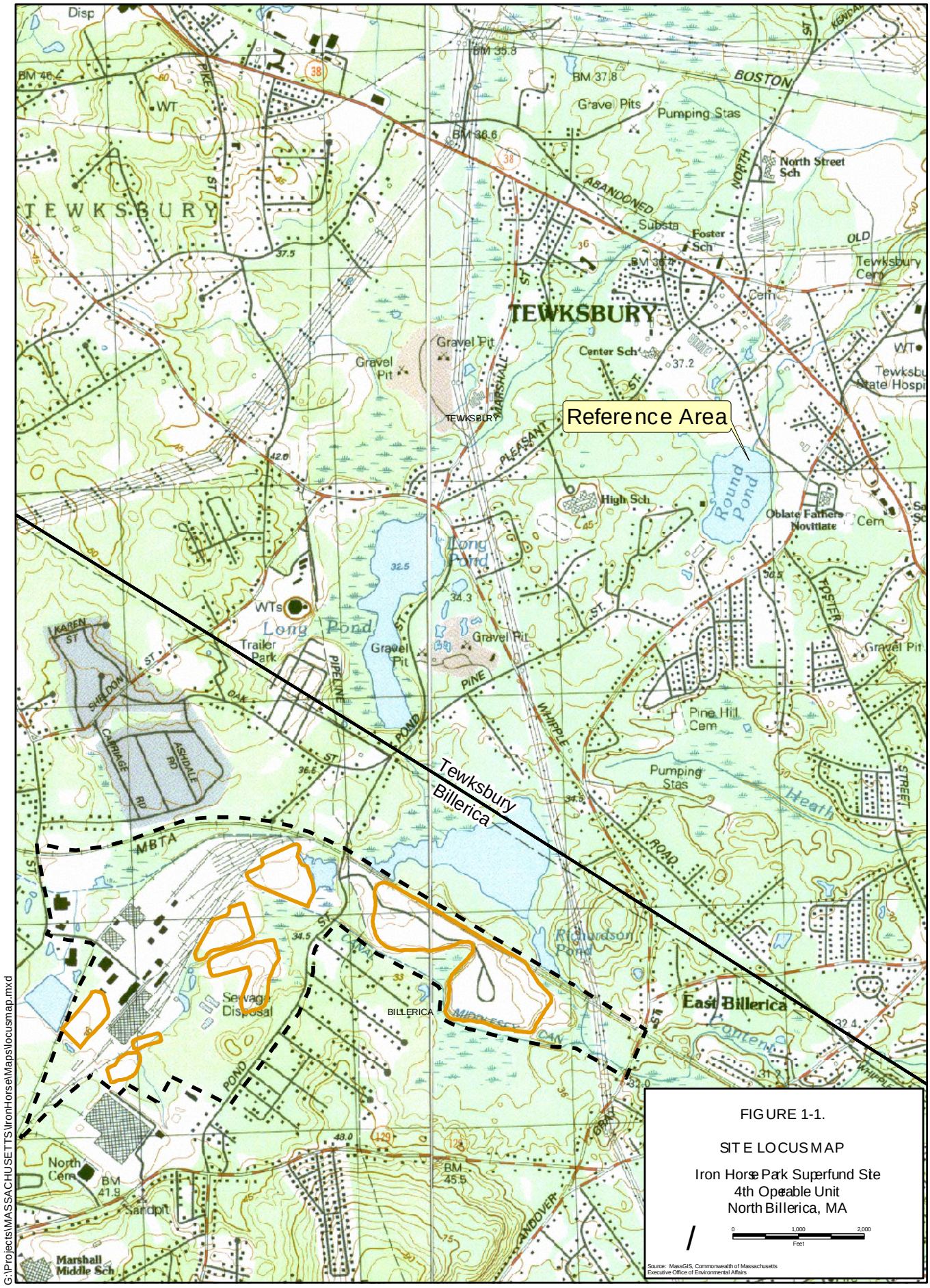
	M&E Sample ID Date Sampled Comments	RP-BH-2 09/22/04	RP-GS-1 09/22/04	RP-GS-2 09/22/04	MC-BH-1 09/23/04	MC-BH-2 09/23/04	MC-BH-3 09/23/04	MC-AE-1 09/23/04	MC-LD-1 09/23/04	RF-BH-1 10/01/04	RF-BH-2 10/01/04	RF-BH-3 10/01/04	RF-CP-1 09/24/04	RF-AE-1 09/24/04
Metals (mg/kg)	PAL													
Aluminum	580	2.1 U	2.7	2.0 U	3.2	10	23	6.8	10	0.68 UJ	9.3	3.6	1.6 U	5.0
Arsenic	0.52	0.087 J	0.12 J	0.13 J	0.015 J	0.13 J	0.075 J	0.041 J	0.21 J	0.012 J	0.031 J	0.018 J	0.013 J	0.029 J
Barium	1100	1.2 J	2.8 J	2.7 J	0.98 J	1.2 J	0.99 J	0.56 J	3.8 J	0.64 J	0.52 J	0.21 J	0.22 J	0.55 J
Chromium	5.0	0.31 J	0.37 J	0.26 J	0.36 J	0.29 J	0.50 J	0.63 J	0.21 J	0.55 J	0.47 J	0.40 J	0.18 J	0.27 J
Cobalt	26	0.019 J	0.022 J	0.021 J	0.032 J	0.036 J	0.048 J	0.022 J	0.056 J	0.023 J	0.026 J	0.015 J	0.0068 J	0.011 J
Copper	13	0.73 J	0.49 J	0.46 J	0.49 J	0.81 J	4.7 J	11 J	0.88 J	0.48 J	0.43 J	0.48 J	1.3 J	1.0 J
Lead	0.45	0.049 J	0.038 J	0.047 J	0.039 J	0.28 J	0.41 J	0.54 J	0.083 J	0.052 J	0.14 J	0.062 J	0.054 J	0.083 J
Manganese	5100	3.8 J	13 J	8.4 J	21 J	3.5 J	3.4 J	4.1 J	14 J	4.5 J	1.8 J	0.55 J	6.6 J	8.5 J
Silver	0.12	0.0032 U	0.0032 U	0.0031 U	0.0029 U	0.0030 U	0.0029 U	0.0031 J	0.0033 U	0.0032 U	0.0030 U	0.0031 U	0.0030 U	0.0032 U
Vanadium	60	0.019 J	0.012 J	-- R	0.041 J	0.040 J	0.067 J	0.021 J	0.039 J	0.033 J	0.063 J	0.025 J	-- R	0.018 J
Zinc	76	16 J	30 J	36 J	13 J	9.6 J	12 J	22 J	36 J	13 J	8.2 J	6.9 J	34 J	24 J
Polynuclear Aromatic Hydrocarbons (ug/Kg)	PAL													
Naphthalene	740	5.2 UJ	3.0 UJ	6.4 UJ	2.5 UJ	4.0 UJ	3.2 UJ	3.9 UJ	2.8 U	2.4 UJ	2.1 UJ	2.2 UJ	2.3 UJ	3.4 UJ
2-Methylnaphthalene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.9 UJ	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
1-Methylnaphthalene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	3.0 J	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Biphenyl	none	2.8 J	2.1 U	2.2 U	2.2 U	1.3 J	1.1 J	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
2,6-Dimethylnaphthalene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.2 J	2.1 J	2.0 J	3.6	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Acenaphthylene	700	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 UJ	2.1 U	7.0 UJ	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Acenaphthene	4	5.5 UJ	3.7 UJ	4.5 UJ	3.5 UJ	2.1 U	5.8 UJ	10 J	5.6 U	6.0 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Dibenzofuran	none	2.7 J	1.6 J	1.7 J	2.2 U	7.2	3.4	2.1 U	3.8	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Fluorene	660	4.2 UJ	2.3 UJ	4.1 UJ	2.7 UJ	13 J	4.6 UJ	2.9 UJ	4.7 UJ	2.2 UJ	2.1 U	2.2 UJ	2.2 U	2.0 UJ
2,3,5-Trimethylnaphthalene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Phenanthrene	17	7.7 UJ	4.5 UJ	5.1 UJ	7.7 UJ	13 J	11 UJ	4.9 UJ	6.5 U	3.6 UJ	3.7 UJ	5.4 UJ	2.8 UJ	3.2 UJ
Anthracene	5300	1.6 J	2.1 U	1.5 J	1.4 J	6 J	2.2 J	2.1 U	3.1 J	2.1 U	1.1 J	2.2 U	2.2 U	2.0 U
1-Methylphenanthrene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Fluoranthene	20	3.2 UJ	2.1 U	2.2 UJ	3.8 UJ	17 J	6.1 UJ	2.8 UJ	3.5 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Pyrene	20	1.7 J	1.8 J	1.1 J	2.8 J	7.1 J	4.1 J	2.1 UJ	1.6 J	1.2 J	2.1 UJ	1.1 J	2.2 UJ	2.0 UJ
Benz[a]anthracene	7	2.1 U	2.1 U	2.2 U	2.2 UJ	2.1 UJ	2.2 UJ	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Chrysene	7	2.1 UJ	2.1 U	2.2 U	2.2 UJ	2.1 UJ	2.5 UJ	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[b]fluoranthene	7	2.1 UJ	2.1 U	2.2 UJ	2.2 UJ	2.1 UJ	2.2 UJ	2.1 U	2.2 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[k]fluoranthene	7	2.1 UJ	2.1 U	2.2 UJ	2.2 UJ	2.1 U	2.2 UJ	2.1 U	2.2 U	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[e]pyrene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Benzo[a]pyrene	7	2.1 UJ	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Perylene	none	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	1.3 J	2.1 U	2.2 U	2.2 U	2.0 U
Indeno[1,2,3-cd]pyrene	7	2.1 UJ	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 UJ	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Dibenz[a,h]anthracene	7	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.1 UJ	2.2 UJ	2.1 UJ	2.2 UJ	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Benzo[g,h,i]perylene	30	2.1 UJ	2.1 U	2.2 UJ	2.2 U	2.1 U	2.2 U	2.1 U	2.2 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Total PAHs[(1)]		6.0	3.4	4.3	4.2	67	13	12	15	2.5	1.1	1.1	--	--
Percent Lipids (%)	PAL													
Percent Lipids	none	2.5	1.8	2.8	2.8	1.5	1.9	5.2	2.1	0.98	0.88	1.6	0.52	7.9

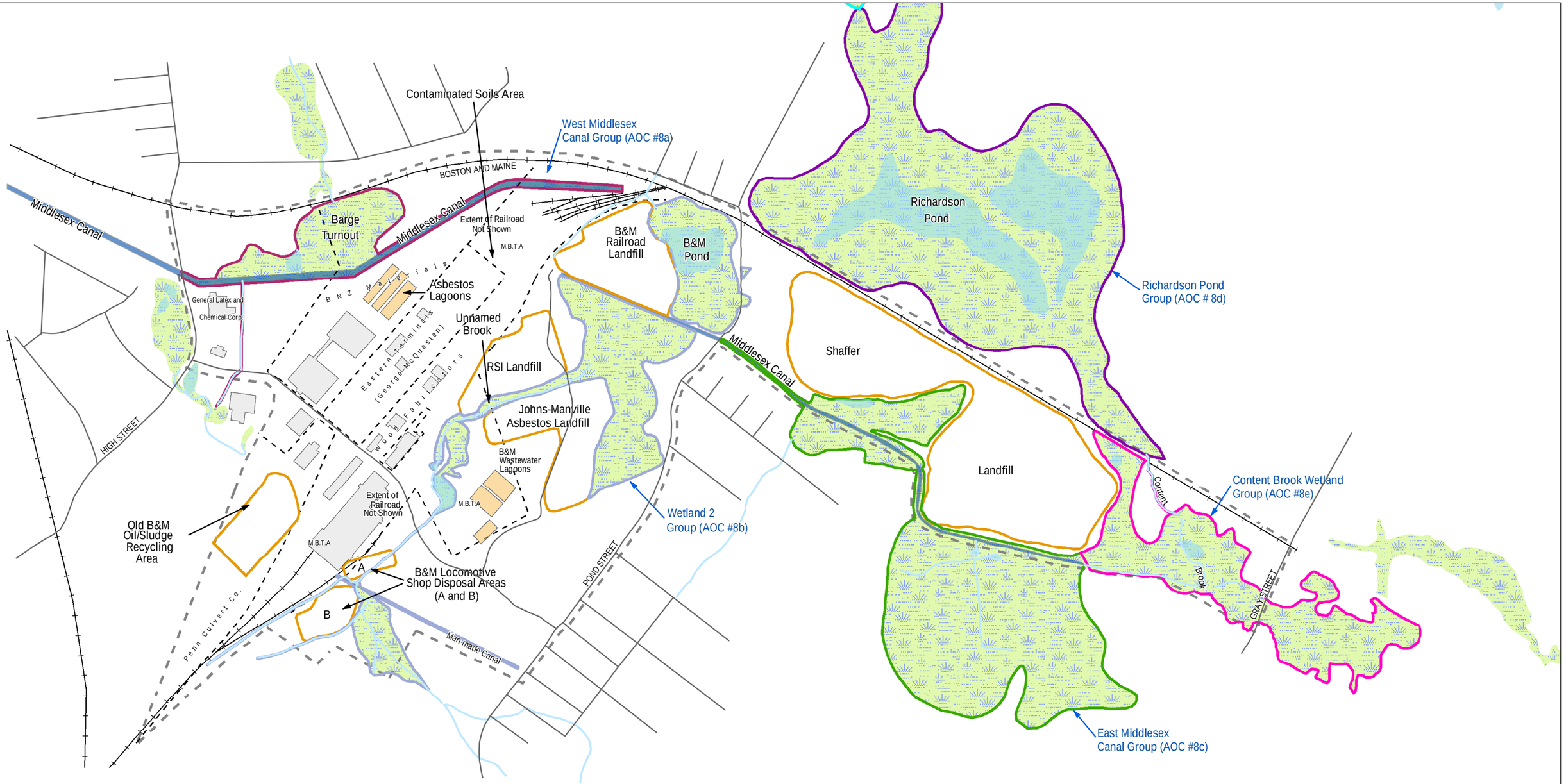
PAL Exceedances are highlighted

[(1)] Total PAH results are the sum of detected concentrations. Non-detect values were not included, as they were assumed to be zero for this summation

EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
PAL - Project Action Limit
R - The data are rejected as unusable
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity

FIGURES


Reference Area
Tewksbury
Billerica
TEWKSBURY
BILLERICA
East Billerica
Long Pond
Round Pond
Richardson Pond
Gravel Pit
Pumping Stas
Trailer Park
Sewage Disposal
Pine Hill Cem
Oblate Fathers Novitiate
North Street Sch
Foster Sch
Center Sch
High Sch
Marshall Middle Sch
North Cem
Tewksbury Cem
MBTA
BOSTON ROAD
PIPELINE
FIGURE 1-1.
SITE LOCUS MAP
Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA
0 1,000 2,000
Feet
Source: MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs
G:\Projects\MASSACHUSETTS\IronHorse\Maps\locusmap.mxd



Legend

- Property Boundary
- Site Boundary
- Roads
- Railroad
- Disposal Area Boundary
- Surface Water
- Wetlands
- Lagoon
- Building
- Content Brook Wetland Group
- East Middlesex Canal Group
- Richardson Pond Group
- West Middlesex Canal Group
- Wetland 2 Group

N

W E

S

800 400 0 800

Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs

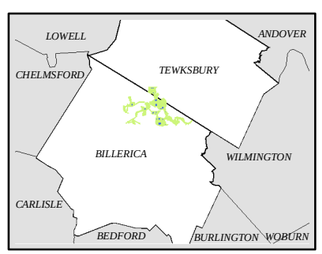


FIGURE 1-2

SITE MAP

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

G:\Projects\MASSACHUSETTS\IronHorse\Maps\IronHorse-SiteMap.mxd

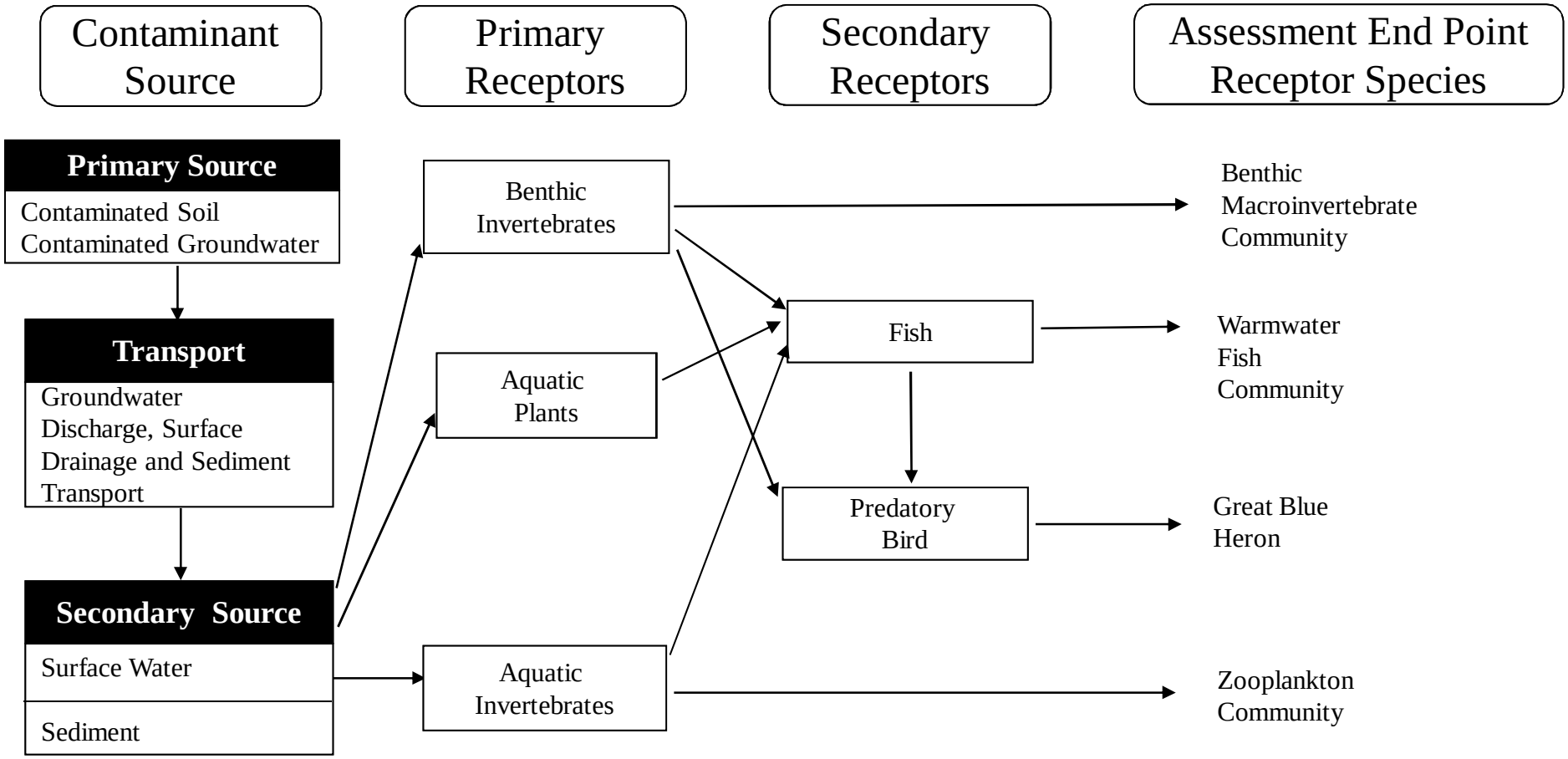


FIGURE 1-3.
SITE CONCEPTUAL MODEL
Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

Legend

- Property Boundary
- Railroad
- Disposal Area Boundary
- Building
- Lagoon
- Surface Water
- Wetlands
- 2004 Sediment Sampling Location

N
W E
S

800 400 0 800
Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs

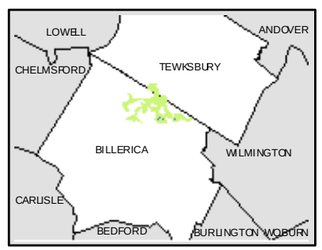


FIGURE 2-1.

SEDIMENT SAMPLING LOCATIONS FOR SCREENING-LEVEL ANALYSIS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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Legend

- Property Boundary
- Railroad
- Disposal Area Boundary
- Building
- Lagoon
- Surface Water
- Wetlands
- 2004 Fish Sampling Location Electrofishing
- 2004 Fish Sampling Location Hoop Net
- 2004 Fish Sampling Location Trot Line
- 2004 Sediment Sampling Location
- 2004 Surface Water Sampling Location

N W E S

800 400 0 800
Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs

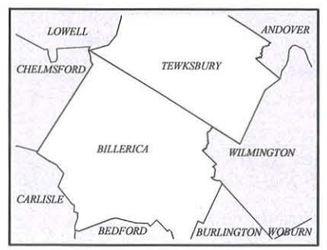


FIGURE 2-2.

SEDIMENT, SURFACE WATER, AND FISH SAMPLING LOCATIONS FOR LABORATORY ANALYSIS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

G:\Projects\MASSACHUSETTS\IronHorse\Maps\IronHorse-LabAnalysis.mxd

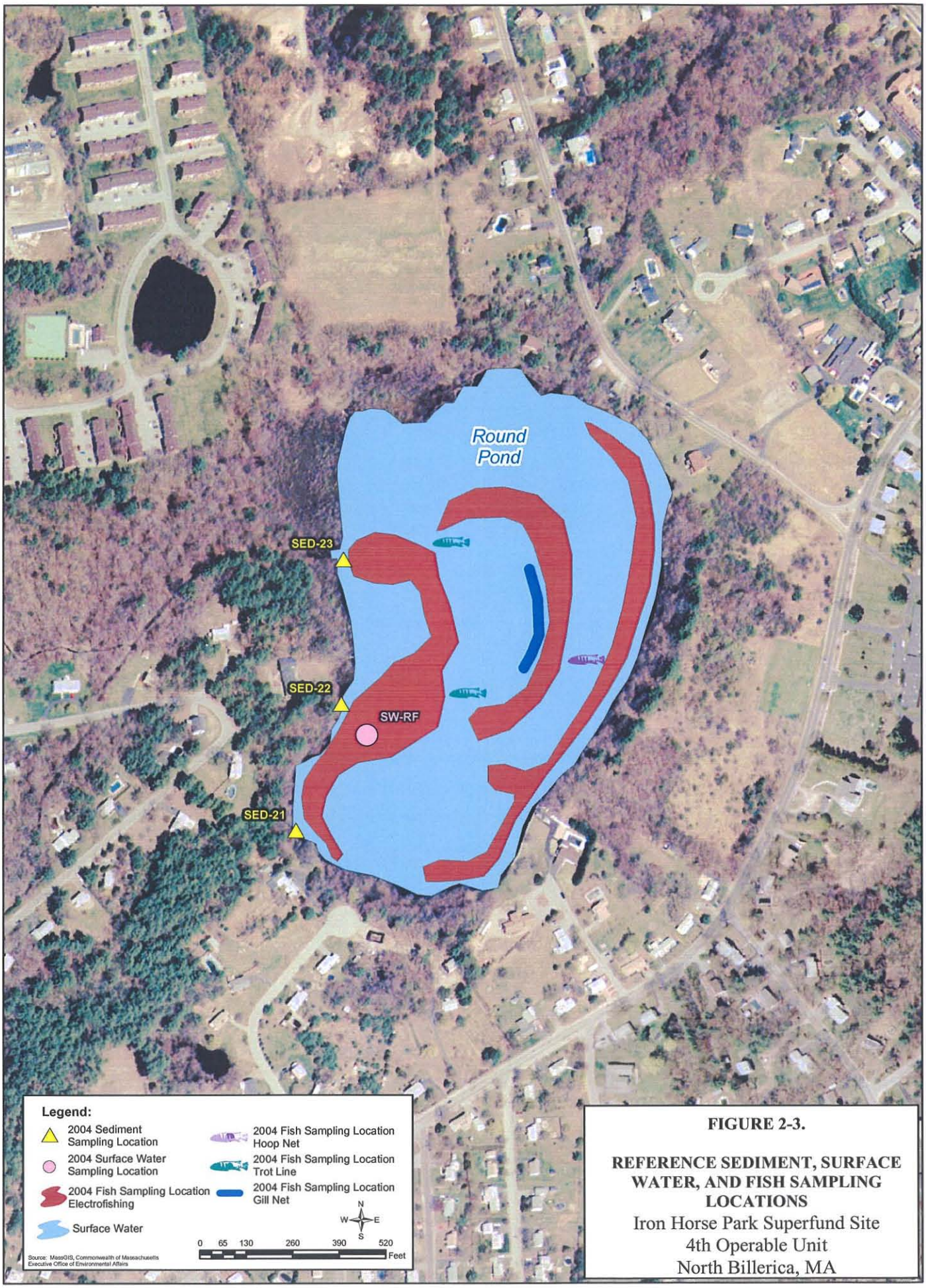


FIGURE 2-3.

REFERENCE SEDIMENT, SURFACE WATER, AND FISH SAMPLING LOCATIONS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

Figure 6-1. Chemical Interrelationship Between Total PAH Concentration and % Lipids for All Fish Species

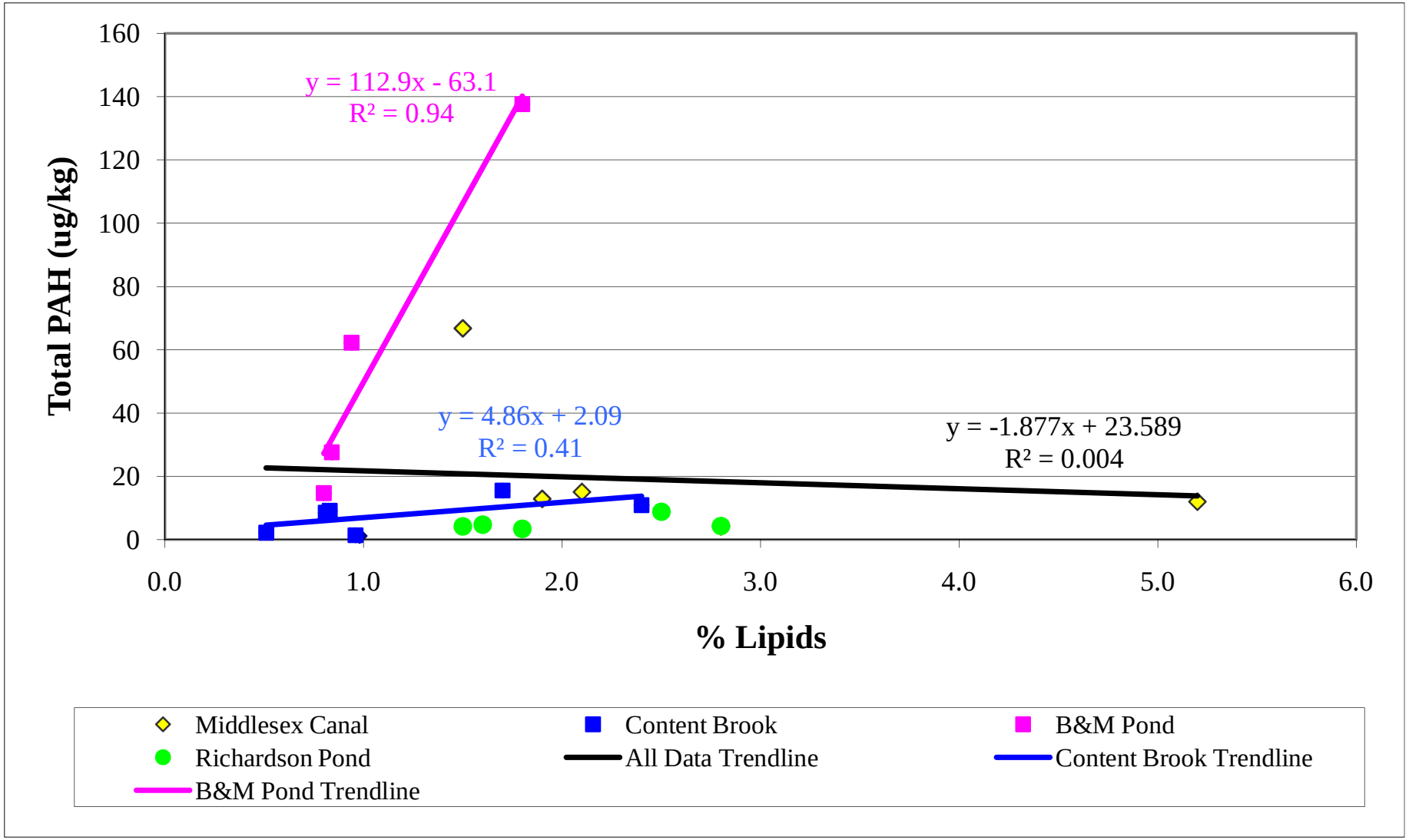
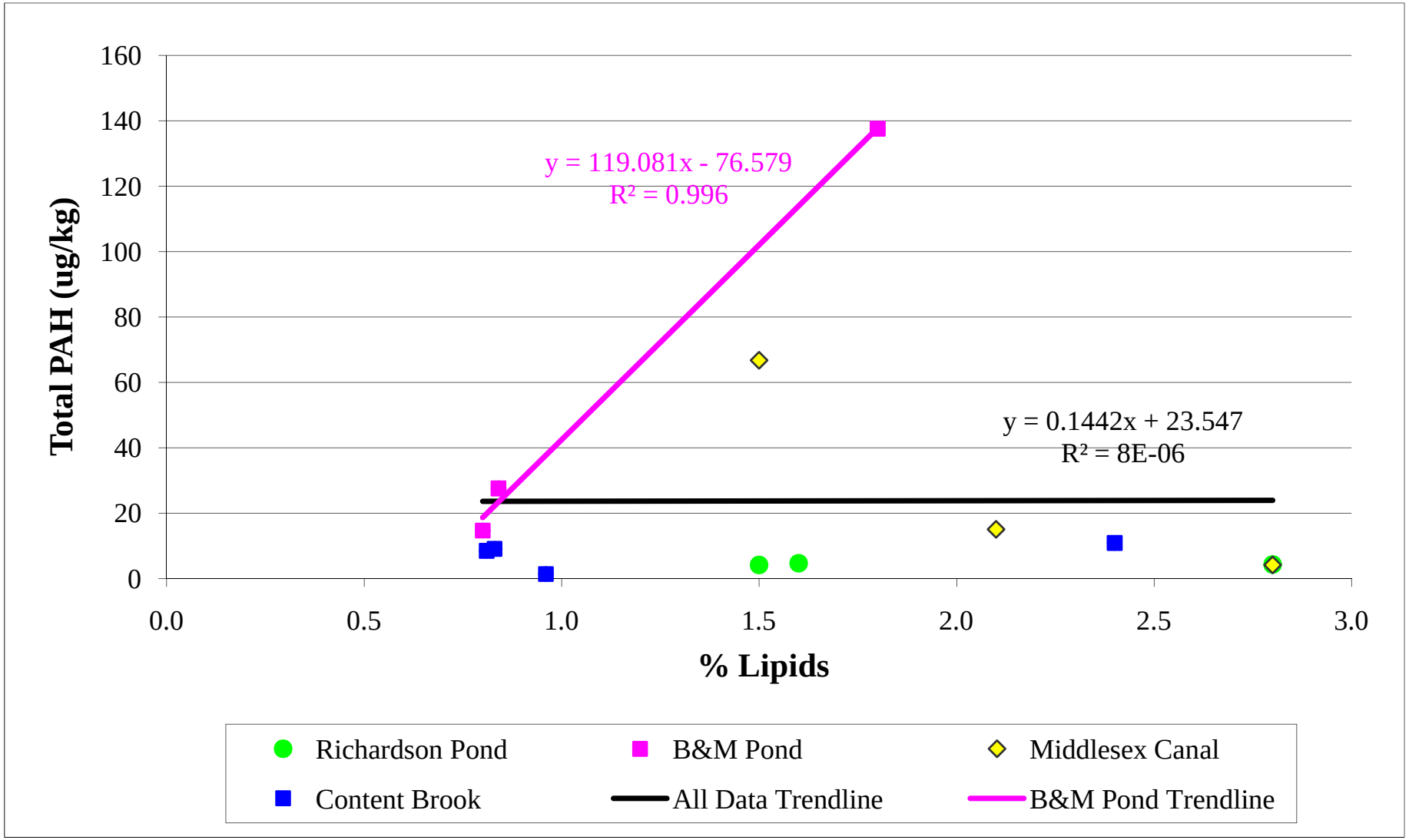


Figure 6-2. Chemical Interrelationship Between Total PAH Concentration and % Lipids for Bullheads Only



APPENDIX A

Photographs from the Site Investigation

Photo 1. Sediment sampling location SED-01

Photo 2. View of phragmites wetland where SED-02 was collected.

Photo 3. Sediment sampling location SED-03

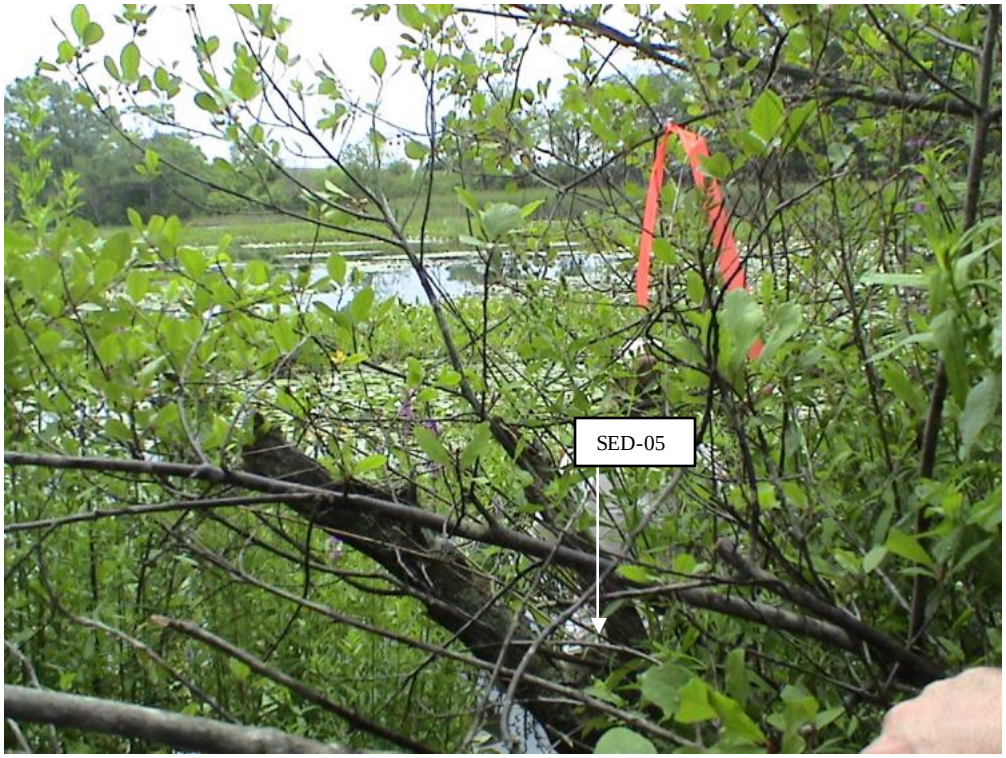


Photo 4. Sediment sampling location SED-05

Photo 5. SED-06 (stake at lower right) and general vicinity of SED-07 in B&M Pond.

Photo 6. General vicinity of SED-08.

Photo 7. Sediment sampling location SED-09


Photo 8. The West Middlesex Canal in the vicinity of SED-10.

Photo 9. Sediment sampling location SED-10.

Photo 10. The West Middlesex Canal east of the culvert near SED-11.

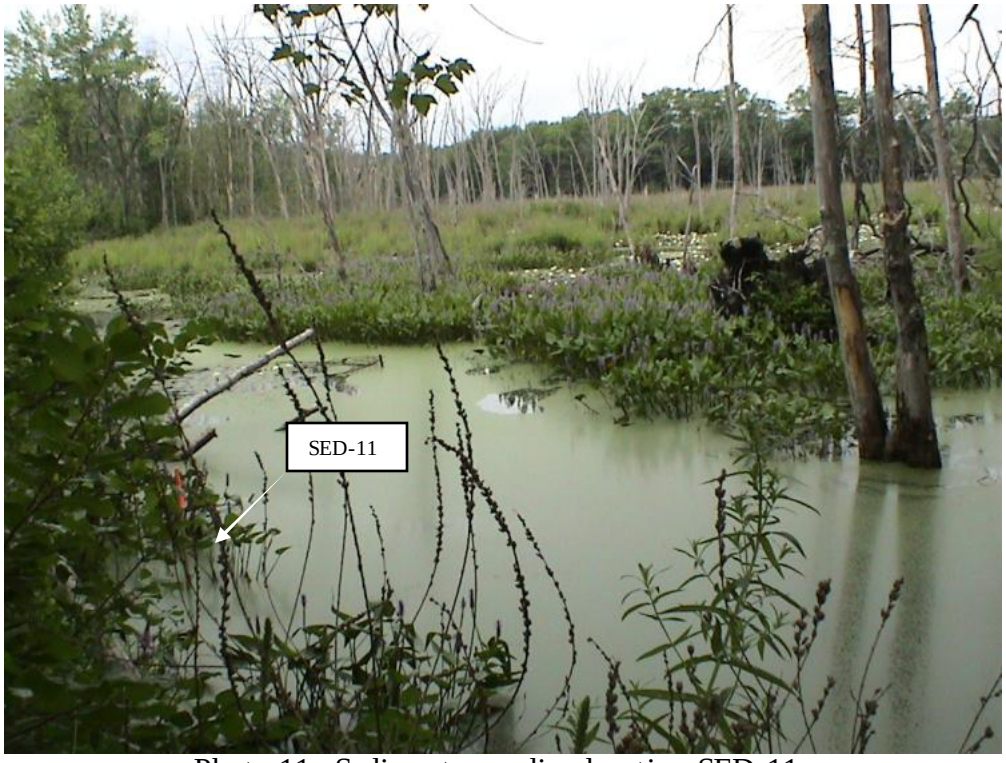


Photo 11. Sediment sampling location SED-11.

Photo 12. Sediment sampling location SED-12

Photo 13. Sediment sampling location SED-13.

Photo 14. Sediment sampling location SED-14.

Photo 15. Sediment sampling location SED-15, showing old stake and new location moved approx. 15 ft into wetland since ground was dry at old stake.

Photo 16. Sediment sampling location SED-17.

Photo 17. Sediment sampling location SED-18

Photo 18. Sediment sampling location SED-19.

Photo 19. Sediment sampling location SED-20.

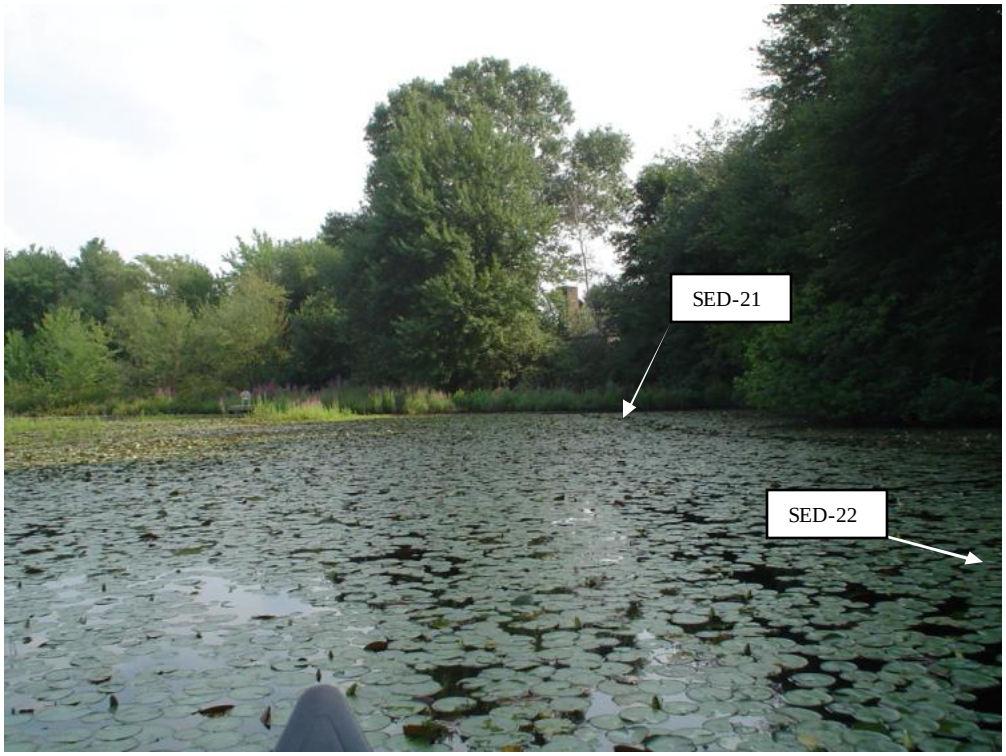


Photo 20. In canoe on Round Pond, showing vicinity of SED-21 & SED-22.

Photo 21. Richardson Pond from Pond Street near Shaffer Landfill.

Photo 22. B&M Pond from Pond Street.

APPENDIX B

Sediment Sample Location GPS Coordinates

Iron Horse Park OU4 Sediment Sampling GPS Coordinates

Datum: WGS 84

Location	GPS Coordinate		
	degree	minute	second
SED-01	42	34	48.4
	71	14	29.2
SED-02	42	34	56.5
	71	14	33.9
SED-03	42	34	45
	71	14	19.2
SED-04	42	34	52.5
	71	14	25.8
SED-05	42	35	12
	71	15	21.8
SED-06	42	35	13.9
	71	15	16.8
SED-07	42	35	15.7
	71	15	23.4
SED-08	42	35	9.1
	71	15	28.1
SED-09	42	35	18.9
	71	15	31.6
SED-10	42	35	18.4
	71	15	43.3
SED-11	42	35	13.5
	71	15	54.4
SED-12	42	35	11.7
	71	16	9.8
SED-13	42	35	15.3
	71	15	12.5
SED-14	42	35	14.3
	71	15	9.8
SED-15	42	35	6.5
	71	14	51.7
SED-16	42	35	16.8
	71	14	44.4
SED-17	42	34	46.5
	71	15	58.2
SED-18	42	34	52.6
	71	15	48.8
SED-19	42	34	55.6
	71	15	48.9
SED-20	42	34	59.9
	71	15	47.3
SED-21	42	36	4.6
	71	14	1.9
SED-22	42	36	8.1
	71	14	0.2
SED-23	42	36	12.1
	71	14	0.1

APPENDIX C

Field Sampling Documentation

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/14/04
Sample Location ID:	SED-01	**Time:**	9:20
Sample #:	D05199	**Weather:**	~75° - clear skies, sunny
Samplers:	N. Henderson, P. Dombrowski.		

Sample Information:

Sample Depth:	0-6 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	1-2 in.		
Distance from Shore:	6-8 in.	**GPS Location:**	42°34'48.4, 71°14'29.2
Approx. Flow Rate:	0.5 ft/sec		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: Silt and V. fine sand, some sand

Sample Description: ~~10YR~~ 7.5YR 3/2 dark brown

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Iron staining, sheen on sediment ~~at~~ near location

no odor.

Sample collected in small brook.

Hydrocarbon odor

Sample Comments/Description:

PID reading (after sample homogenization) = 0.0

Moisture meter reading

55.5%

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/14/04
Sample Location ID:	SED-02	**Time:**	15:05
Sample #:	D05200	**Weather:**	sunny, high 70's clear skies
Samplers:	N. Henderson / P. Dombrowski		

Sample Information:

Sample Depth:	0-6 in	**Sampling Device:**	Eckman Dredge
Water Depth:	4 inches		
Distance from Shore:	no shore	**GPS Location:** (see below)	not measured location is 1/2 way between fence + RR tracks
Approx. Flow Rate:	None		
Field Decon:	(Yes) / No / Dedicated	**Sample Type:**	(Grab) / Composite

Munsell Color: 2.5Y 3/2 very dark grayish brown

Sample Description: silt - some organics - phragmite roots + leaves.

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

water turbid - grayish in color
sheen
phragmites everywhere - sample collected in middle of phragmites wetland.
hydrocarbon odor

Sample Comments/Description:

PID reading (after sample homogenization) = 0.0 ppm as isobutylene

Moisture meter reading
70.3 %

GPS location
42° 34' 56.5"
71° 14' 33.9"
went back on 9/23/04 for GPS measurement

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/14/04
Sample Location ID:	SED-03	**Time:**	11:10
Sample #:	D05201	**Weather:**	Sunny, high 70s
Samplers:	N. Henderson/P. Bombrowski		

Sample Information:

Sample Depth:	0-6 in	**Sampling Device:**	Eckman Dredge
Water Depth:	2 ft.		
Distance from Shore:	6 ft.	**GPS Location:**	Same as before (see below)
Approx. Flow Rate:	0 (no flow)		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10 YR 2/2 very dark brown

Sample Description: Silt and fine sand, some sand leaves.

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

A lot of floating pollen.
water is stained. Visibility is 6 inches.
Color - brown

Sample Comments/Description:

Neighbor came over at 11:30 + asked about us if we were working on the beaver problem. She said that there should be flow here, but beaver dams stop flow.

PID reading (after sample homogenization) = 0.0

Moisture meter reading
84.3%

GPS measurement done during 2nd site visit -
42° 34' 45"
71° 14' 19.2"

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/14/04
Sample Location ID:	SED-04	**Time:**	1310
Sample #:	DOS202	**Weather:**	clear
Samplers:	Henderson, Dombrowski, O'Connor		

Sample Information:

Sample Depth:	2-4"	**Sampling Device:**	Eckman Dredge
Water Depth:	2-3'		
Distance from Shore:	4-10'	**GPS Location:**	42° 34' 52.6"
Approx. Flow Rate:	0		71° 14' 25.8
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite Eckman

Munsell Color: 2.5Y 3/1 very dark grey

Sample Description: Silt and fine sand
some leaves + sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Duckweed, small sulfur odor
bottom hard, many grabs to compose a sample,
- water stained
- 1" visibility
- lilipads and submerged vegetation along banks
- no sheens

Sample Comments/Description:

PID reading (after sample homogenization) = 0.0 ppm
on isobutylene

Moisture meter reading
85.8 %

Sample difficult to collect. A lot of downed trees/branches in water.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/15/04
Sample Location ID:	SED-05 (25)	**Time:**	1200
Sample #:	D05203	**Weather:**	Warm Blue Skies
Samplers:	PD/NH		

Sample Information:

Sample Depth:	4-6 inches	**Sampling Device:**	Eckman Dredge
Water Depth:	3 feet		
Distance from Shore:	5 feet	**GPS Location:**	
Approx. Flow Rate:	0	42° 35' 12.0"	71° 15' 21.8"
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 5Y 2.5/2 black

Sample Description: silt and very fine sand
some sticks + roots

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained
visibility ~ 1 foot
Sheens
Odors - sulfide/hydrocarbon

Sample Comments/Description:

Field Duplicate - SED-25 sample time 11:00

Moisture meter reading
87.8 %

PID reading = 0.0 ppm as Isobutylene
(after homogenization in grain size jar)

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/15/04
Sample Location ID:	SED-06	**Time:**	11:20
Sample #:	D05205	**Weather:**	sunny, partly cloudy, ~75°F
Samplers:	N. Henderson / P. Dombrowski		

Sample Information:

Sample Depth:	0-6 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	2.7 ft.		
Distance from Shore:	4 ft	**GPS Location:**	42° 35' 13.9" 71° 15' 16.8"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5Y 3/2 very dark grayish brown

Sample Description: sand, fine sand, + silt, some gravel + rocks, sticks, acorns

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

high degree of staining
no visible sheens
submerged aquatic vegetation - dense along shore
lily pads
clarity - 1.5'
low turbidity

Sample Comments/Description:

Moisture meter reading

75.7%

sample is somewhat cohesive

PID reading - 1.4 ppm as isobutylene

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/15/04
Sample Location ID:	SED-07	**Time:**	1300
Sample #:	DUS206	**Weather:**	Blue Skies
Samplers:	PD/NH		

Sample Information:

Sample Depth:	4-6 inches	**Sampling Device:**	Ekman
Water Depth:	2.5 feet		
Distance from Shore:	30 feet	**GPS Location:**	
Approx. Flow Rate:	0	42° 35' 15.7"	71° 15' 23.4"
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10YR 2/1 black

Sample Description: silt and v. fine sand, ~~silt~~ little fine sand sticks, organics

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained Color

Some sheens

No odor

Sample Comments/Description:

Moisture meter reading 81.1 %.

PID reading - 0.0 ppm as isobutylene

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/15/04
Sample Location ID:	SED-08	**Time:**	9:15
Sample #:	D05207	**Weather:**	Cool, Blue Skies
Samplers:	PD, JNH		

Sample Information:

Sample Depth:	4-6 inches	**Sampling Device:**	see below
Water Depth:	2.5 feet		
Distance from Shore:	n/a wetland	**GPS Location:**	Eleven Dredge
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10YR 2/1 black

Sample Description: Silt and v. fine sand, some fine sand, little coarse sand leaves + twigs

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained - brown color
some sheens
~~Heavy~~ algae cover - duckweed - filamentous algae on bottom
Some dead trees

Sample Comments/Description:

Moisture Meter reading

75.5 %

GPS measurement - done during 2nd site visit
42° 35.151
71° 15.486

PID reading = 0.0 ppm as isobutylene

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-09	**Time:**	8:40
Sample #:	D05208	**Weather:**	cloudy, high 60's
Samplers:	P. Dombrowski + N. Henderson		

Sample Information:

Sample Depth:	0-6 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	2 ft.		
Distance from Shore:	5 ft.	**GPS Location:**	42° 35' 18.9" 71° 15' 31.6"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5Y 3/2 very dark grayish brown

Sample Description: silt and v. fine sand. some fine sand sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained water
visibility - 1 ft.
no submergent vegetation
a lot of overhanging brush
~~no sheen~~ sheen when sediment disturbed
sed. smells like hydrocarbon

Sample Comments/Description:

sheen on sediment in bowl + in jars
PID = 2.6 ppm as isobutylene

Moisture meter reading
98.1 %

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-10	**Time:**	9:30
Sample #:	D05209	**Weather:**	cloudy.
Samplers:	P. Dombrowski, N. Henderson		drizzle. 70°s

Sample Information:

Sample Depth:	0-6 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	2.4-		
Distance from Shore:	2-4 ft	**GPS Location:**	42° 35' 18.4" = 71° 15' 43.3" =
Approx. Flow Rate:	< 0.5 ft/sec		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10 YR 3/2 very dark grayish brown

Sample Description: silt and very fine sand, some sand, little coarse sand, leaves + sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained water
visibility - 2-3 ft.
submerged aquatic vegetation (lily pads)
some sheen when sediments disturbed
downed trees

Sample Comments/Description:

Sediment in bowl shows sheen + in jar

PID reading - 2.0 ppm as isobutylene

Moisture meter reading
98.4 %.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-11	**Time:**	10:35
Sample #:	D0521D	**Weather:**	rain, ~65°F
Samplers:	P. Dombrowski, N. Henderson		

Sample Information: 0-3 in

Sample Depth:	~~0-6 in.~~	**Sampling Device:**	Eckman Dredge
Water Depth:	2.5-3.5 ft.		
Distance from Shore:	6 ft.	**GPS Location:**	71° 15' 54.4" 42° 35' 13.5"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 7.5 YR 3/2 very dark brown

Sample Description: silt, fine and coarse sand
some sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

duck weed floating on water surface
submergent vegetation
no sheen
no odor

Sample Comments/Description:

PID reading = 2.6 ppm as isobutylene

Moisture meter reading

83.1%.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-12	**Time:**	12:00
Sample #:	D05211	**Weather:**	Cloudy. High 60's-70's
Samplers:	P. Dombrowski / ~~A.~~ L. O'Connor		

Sample Information:

Sample Depth:	0-4 in	**Sampling Device:**	Eckman Dredge
Water Depth:	9-10 in.		
Distance from Shore:	10 ft	**GPS Location:**	42° 35' 11.7" 71° 16' 9.8"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5Y 2.5/1 black

Sample Description: Silt and fine sand, some V. fine sand, little coarse sand. some sticks & leaves

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

duck weed
Sheens
Hydrocarbon smell (in sediment)
visibility - 6 inches
stained water

Sample Comments/Description:

PID reading - 0.1 ppm as isobutylene

Moisture meter reading

86.5%.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/20/04
Sample Location ID:	SED-13	**Time:**	10:30
Sample #:	D05212	**Weather:**	clear skies, sunny, 75°F
Samplers:	P. Dombrowski / R. Shoemaker		

Sample Information:

Sample Depth:	0-6 in	**Sampling Device:**	Eckman Dredge
Water Depth:	2-3 in		
Distance from Shore:	Not Applicable	**GPS Location:**	see below
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5 Y 3/1 very dark gray

Sample Description: silt. ~~Some~~ little fine and coarse sand. Phragmite roots.

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained water
murky
cattails
purple loosestrife
sheens - probably biological

Sample Comments/Description:

PID reading = 0.0 ppm as isobutylene (in grain size jar)

Moisture meter reading - 77.2 %.

GPS measurement done during 2nd site visit
42° 35' 15.3"
71° 15' 12.5"

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9-20-04
Sample Location ID:	SED-14	**Time:**	13:20
Sample #:	D05213	**Weather:**	clear skies, sunny 75° F
Samplers:	P. Dombrowski / R. Shuemaker-		

Sample Information:

Sample Depth:	6 inches	**Sampling Device:**	Ekman
Water Depth:	16 inches		
Distance from Shore:	N/A wetland	**GPS Location:**	see below
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5Y 3/2 very dark grayish brown

Sample Description: silt. little very fine sand. phragmite roots

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Visibility ~2 feet, low turbidity
no odor
no sheens
color - slight staining

[little organics (roots, leaves, etc) on surface of sediment]

Sample Comments/Description:

@ SED-14 staking

PID reading = 0.6 ppm as isobutylene ~~Carbon~~ in gram size jar

Moisture meter reading
98.2 %.

GPS coordinates taken during 2nd site visit
42° 35' 14.3"
71° 15' 9.8"

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/17/04
Sample Location ID:	SED-15	**Time:**	12:15
Sample #:	DO 5214	**Weather:**	overcast
Samplers:	SNH, LAO, PMD		

Sample Information:

Sample Depth:	0-7"	**Sampling Device:**	
Water Depth:	surface H2O ½"		Ekman
Distance from Shore:	30'	**GPS Location:**	
Approx. Flow Rate:	0		Not taken, Have from previous (see below)
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite
			Ekman Yes

Munsell Color: 10YR 2/2 very dark brown

Sample Description: Silt ~~and fine~~ Some fine and coarse sand. Sticks + organics

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Stained, Biological sheen on surface, Sample in middle of dense wetland vegetation along shore

Sample Comments/Description:

PID reading- 3.4 ppm as isobutylene

Moisture meter reading

93.1 %.

GPS coord. taken during 2nd site visit

42° 35' 6.5"
71° 14' 51.7"

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/17/04
Sample Location ID:	SED-16	**Time:**	9:45
Sample #:	D05215	**Weather:**	overcast, partly sunny. 70's
Samplers:	D. Dembowski / N. Henderson		

Sample Information:

Sample Depth:	0-6 inch.	**Sampling Device:**	Eckman Dredge
Water Depth:	2.5 ft	**GPS Location:** (see below)	no taken - see figure below
Distance from Shore:	50 yd.		
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

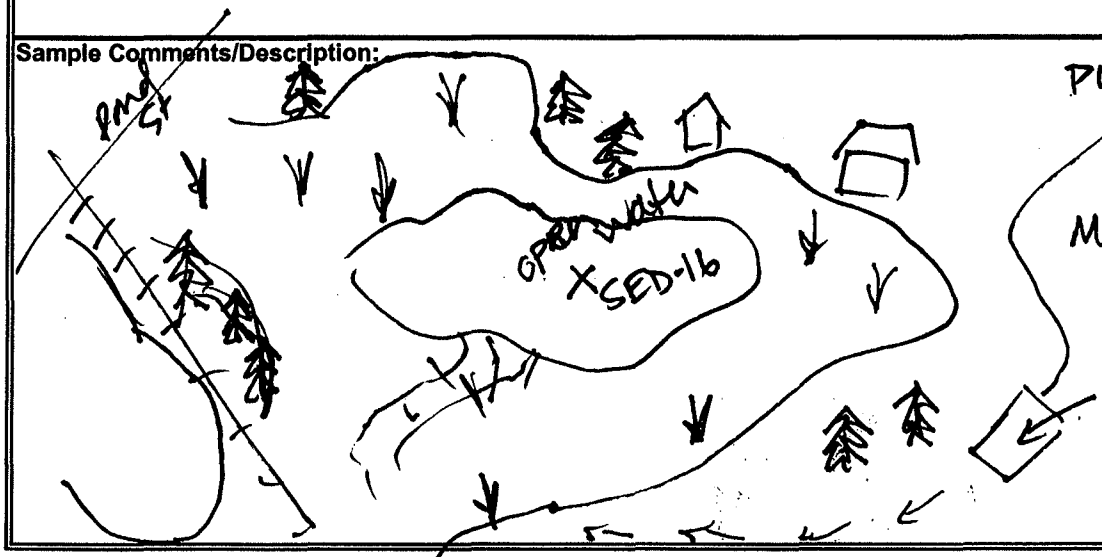
Munsell Color:

Sample Description: Silt and v. fine sand. little fine sand some organics

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Slightly stained color
minor turbidity
visibility - 2-3'
some duckweed

Sample Comments/Description:



GPS location
42° 35.28'
71° 14.74'
Went back 9/22/04

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-17	**Time:**	14:50
Sample #:	D05216	**Weather:**	overcast, ~75°F
Samplers:	N. Henderson / P. Dombrowski		

Sample Information:

Sample Depth:	0-3 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	1 ft		
Distance from Shore:	4 ft	**GPS Location:**	42 34' 46.5" 71 15' 58.2"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10YR 2/1 black

Sample Description: silt ~~and coarse~~ little coarse sand. leaves + sticks. ~~Saw~~ Cement blocks in sample.

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

clarity 2-3 ft.
no submergent vegetation
sandy + cobbley - scouring likely
sheen on water

Sample Comments/Description:

beaver dam + lodge in the area
sheen in sed. sample

PID reading - 3.6 ppm as isobutylene

Moisture meter reading -

81.3%

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/16/04
Sample Location ID:	SED-18	**Time:**	13:45
Sample #:	D05217	**Weather:**	overcast
Samplers:	N. Henderson / P. Dombrowski		70°S

Sample Information: 0-8 in

Sample Depth:	~~0-6 in~~	**Sampling Device:**	Eckman Dredge
Water Depth:	2.5 ft		
Distance from Shore:	8 ft	**GPS Location:**	42° 34' 52.6" 71° 15' 48.8"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5 Y 3/1 very dark grey

Sample Description: silt and fine sand. Some fine sand and some coarse sand

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

~~Stained water~~ little staining
clarity - 2-3 ft
no algae, no submerged aquatic veg.
biological sheens
no odor

Sample Comments/Description:

sediment in brook is deep
sheen on sample
PID reading = 4.4 ppm as isobutylene

Moisture meter reading
94.3%.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/17/04
Sample Location ID:	SED-19	**Time:**	15:00
Sample #:	D05218	**Weather:**	hazy, hot, humid ~ 85°F
Samplers:	N. Handlison / P. Dombrowski		

Sample Information:

Sample Depth:	0-3 inches	**Sampling Device:**	Eckman Dredge
Water Depth:	1.5 ft		
Distance from Shore:	3 ft	**GPS Location:**	42° 34' 55.6" 71° 15' 48.9"
Approx. Flow Rate:	0.5 ft/sec		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5 Y 3/1 very dark gray

Sample Description: fine and coarse sand. some silt

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

siltation from outfall
blue-green algae
no submergent vegetation
hydrocarbon odor
sheens

Sample Comments/Description:

Sample is just upstream of outfall ponding area.

PID reading - 5.2 ppm as isobutylene

Moisture meter reading - 71.9%.

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9/17/04
Sample Location ID:	SED-20	**Time:**	14:10
Sample #:	D05219	**Weather:**	hazy, hot, humid, 85°F
Samplers:	P. Dombrowski / N. Henderson		

Sample Information:

Sample Depth:	0-4 in.	**Sampling Device:**	Eckman Dredge
Water Depth:	6-12 in.		
Distance from Shore:	3-4 ft	**GPS Location:**	42° 34' 59.9" 71° 15' 47.3"
Approx. Flow Rate:	0.5 ft/sec		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 2.5Y 2.5/1 black

Sample Description: silt and v. fine sand. little coarse sand some sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

stained water
very turbid
clarity = 6 inches
sheens

Sample Comments/Description:

PID reading - 6.6 ppm as isobutylene

Moisture meter reading - 78.5 %

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9-13-04
Sample Location ID:	SED-21	**Time:**	1320
Sample #:	D05220	**Weather:**	Partly / Blue Sky
Samplers:	PD, WH		

Sample Information:

– **Sample Depth:**	4 inches	– **Sampling Device:**	SED-21 Ekman
– **Water Depth:**	1.7 feet		
– **Distance from Shore:**	30 feet	– **GPS Location:**	42° 36' 4-6" 71° 14' 1.9" (same as original)
– **Approx. Flow Rate:**	Ø		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 7.5 YR 2.5/1 black

Sample Description: sticks, roots, leaves, a lot of organics silt and fine sand, some sand

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

* Color - stained
Turbidity - minor, little
Visibility 2-3 feet

No sheen
No dead vegetation

Sediment - slight sulfur odor

Sample Comments/Description:

sample very wet

moisture % (as measured w/ TRCs moisture meter)

98.7 %

PID reading - ~~3.8~~ 3.2 ppm as isobutylene

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9-13-04
Sample Location ID:	Sed-22	**Time:**	1545
Sample #:	D05221	**Weather:**	Sunny, high 70's - 80's
Samplers:	PD / NH		

Sample Information:

Sample Depth:	4 inches	**Sampling Device:**	Ekman
Water Depth:	2.2 feet		
Distance from Shore:	5 feet	**GPS Location:**	42° 36' 5.1" 71° 14' 0.2"
Approx. Flow Rate:	0		
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 10 YR 2/2 very dark brown

Sample Description: a lot of roots (organic matter. little stones silt and fine sand, some angular sand

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Water color - mirodystained

Some turbidity Visibility ~ 1 foot

No odor

No sheen

Sample Comments/Description:

- Heavy vegetation
- Samples are half of organics (roots, leaves)

Moisture meter reading

98.9 %

PID reading - 1.6 ppm as isobutylene

SEDIMENT SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site

Date(s):

Project #:	036200100.0058.00003	**Date:**	9-13-04
Sample Location ID:	SED-23	**Time:**	1425
Sample #:	D05222	**Weather:**	Warm, Partly Cloudy Blue Skies
Samplers:	PD / NH		

Sample Information:

Sample Depth:	6-8 inches	**Sampling Device:**	Ekman
Water Depth:	4.6 feet		
Distance from Shore:	15-18 yards	**GPS Location:**	
Approx. Flow Rate:	0	N 42° 36' 12.1" W 71° 14' 0.1"	
Field Decon:	(Yes) No Dedicated	**Sample Type:**	(Grab) Composite

Munsell Color: 5YR 2.5/1 black

Sample Description: silt and V. fine sand some sticks

Other physical characteristics of water body at sample location:
(Water color, turbidity, odor, presence of sheens, dead\stressed vegetation)

Color: stained
Clarity / Visibility 2-3 feet
heavy vegetation
no sheens
no odors

Sample Comments/Description:

Sample from ~ 10 m south of previously flagged location
Thick mats of vegetation at ~4 feet at flagged location

Moisture meter reading
98.9 %

PID readings
0.6 ppm as isobutylene

SURFACE WATER SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site. North Billerica, MA

Date(s):

Project #:		9/2/04 **Date:**	
Sample Location ID:	B+M Pond	1045 **Time:**	
Sample #:		clear **Weather:**	
Samplers:	JNH, TR		

Location Information:

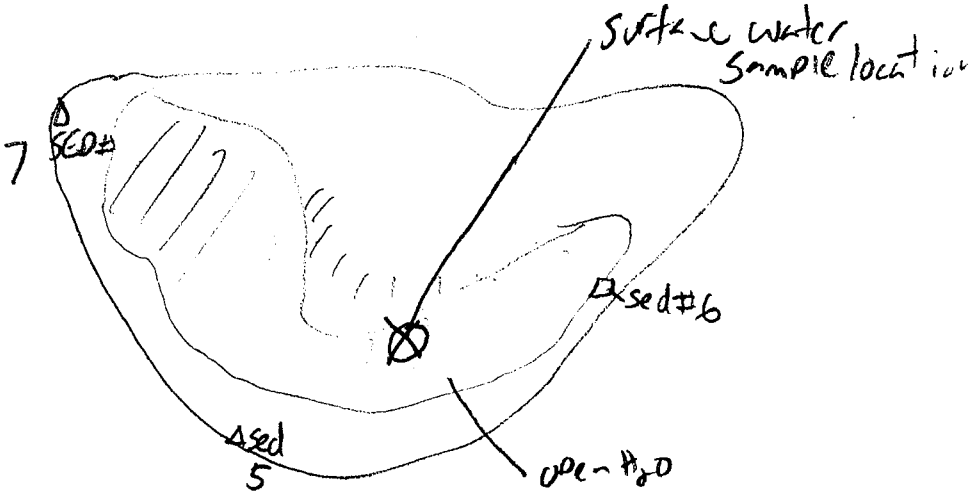
Depth of Water Column:		**Estimated Current Speed:**	
3-4'		0	
Surface **Sample Depth:**			

Sample Information:

pH:	6.08	**Dissolved Oxygen: (mg/l)**	3.04
Specific Conductivity: (µmho/cm)	211.	**Temperature: (°C)**	15.36
Odor (circle one): YES NO		**Color:**	slightly stained, tan.
If yes, describe:			

ORP = 53.5
Turbidity = 3.51 NTU

COMMENTS AND DIAGRAM OF SAMPLING LOCATION:



SURFACE WATER SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site. North Billerica, MA

Date(s):

Project #:		9/22/04 **Date:**	
Sample Location ID:	Richardson Pond	0830 **Time:**	
Sample #:		Clear **Weather:**	
Samplers:	SNH, JR + BS		

Location Information:

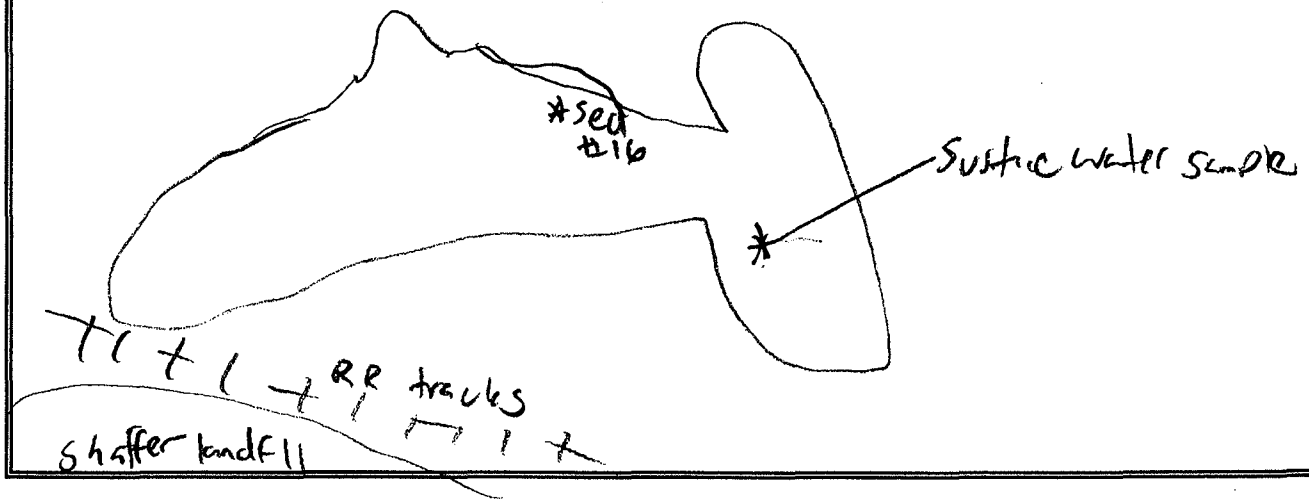
Depth of Water Column:		**Estimated Current Speed:**	
2 feet		2 ft/sec	
Surface **Sample Depth:**			

Sample Information:

pH:	6.53	**Dissolved Oxygen: (mg/l)**	1.35 mg/L 13.6%
Specific Conductivity: (µmho/cm)	378	**Temperature: (°C)**	16.53
Odor (circle one):		**Color:**	Stained
If yes, describe:			

ORP = 298
Turbidity = 1.64 NTU

COMMENTS AND DIAGRAM OF SAMPLING LOCATION:



SURFACE WATER SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site. North Billerica, MA

Date(s):

Project #:			9/23/04	**Date:**	
Sample Location ID:	middlesex Canal			**Time:**	9:25
Sample #:			Clear	**Weather:**	
Samplers:	JNH, JR, BS				

Location Information:

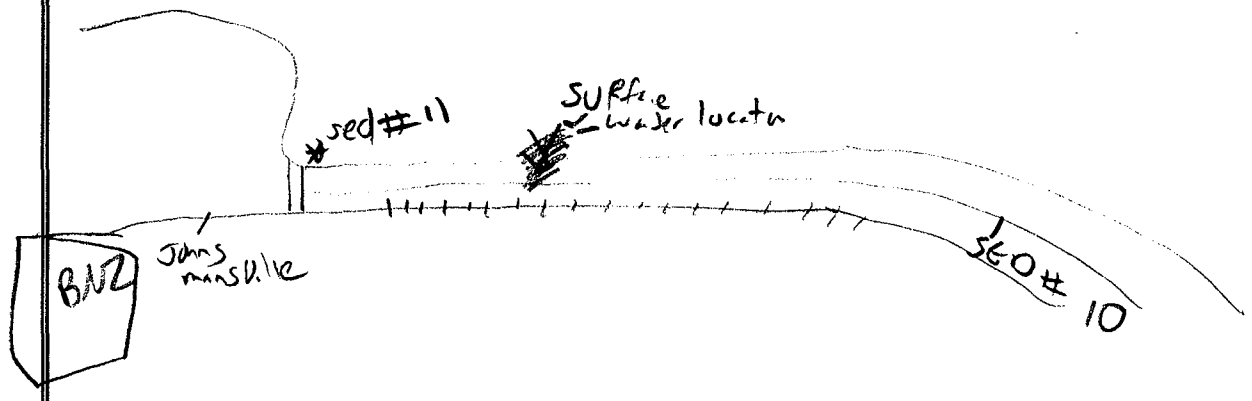
Depth of Water Column:			**Estimated Current Speed:**		
10=			1'/sec		
Sample Depth:					

Sample Information:

pH:			**Dissolved Oxygen:**		
	6.48		**(mg/l)**	2.51 mg/L	26.0%
Specific Conductivity:			**Temperature:**		
(µmho/cm)	129 µS/cm		**(°C)**	17.98	
Odor (circle one):	YES NO		**Color:**		
If yes, describe:				stained	

COMMENTS AND DIAGRAM OF SAMPLING LOCATION:

Between Sed Samples 11, 10



SURFACE WATER SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site. North Billerica, MA

Date(s):

Project #:		9/23/04 **Date:**	
Sample Location ID:	Content Brook	**Time:**	1400
Sample #:		Clear **Weather:**	
Samplers:	TR, JNH, BS		

Location Information:

Depth of Water Column:		**Estimated Current Speed:**	
18"		2 ft/s	
Surface **Sample Depth:**			

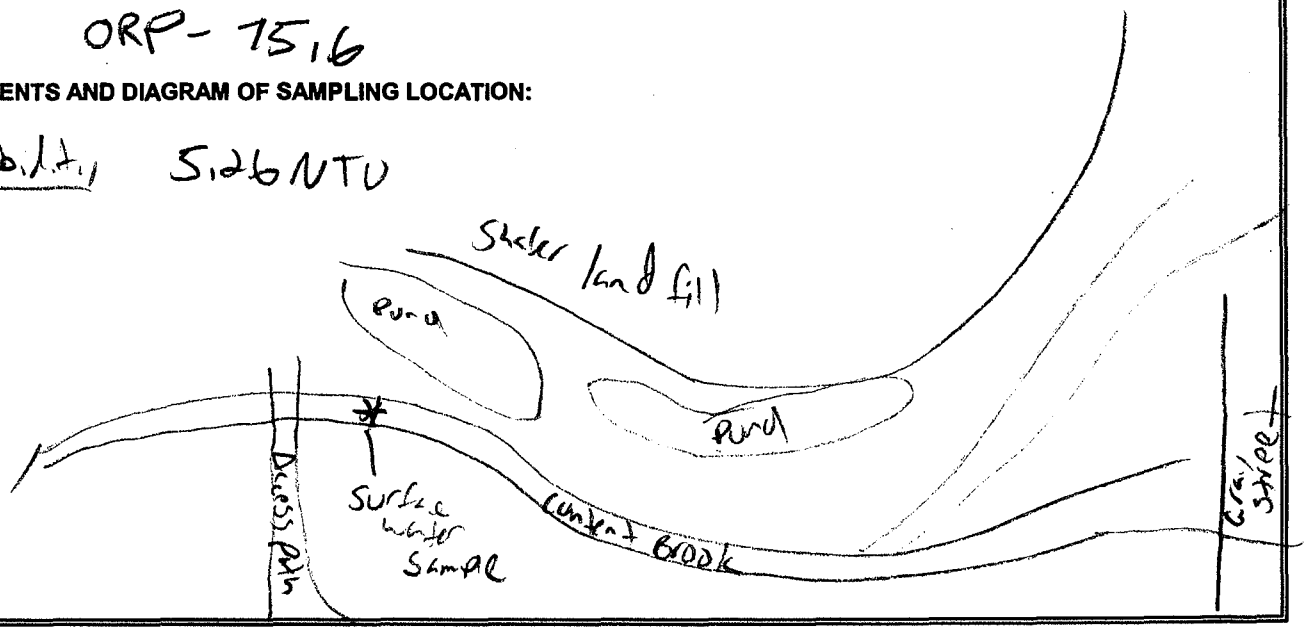
Sample Information:

pH:	6.52	**Dissolved Oxygen (mg/l):**	4.85 50.0%
Specific Conductivity (µmho/cm):	163	**Temperature (°C):**	16.88
Odor (circle one): YES NO		stained tanic **Color:**	
If yes, describe:			

ORP - 75.6

COMMENTS AND DIAGRAM OF SAMPLING LOCATION:

Turbidity 5.26 NTU



SURFACE WATER SAMPLING FIELD DATA SHEET

Project Name: Iron Horse Park OU-4 Superfund Site. North Billerica, MA

Date(s):

Project #:		9/24/04 **Date:**	
Sample Location ID:	Round Pond	9:30 **Time:**	
Sample #:		Clear **Weather:**	
Samplers:	JWH, TR, BS		

Location Information:

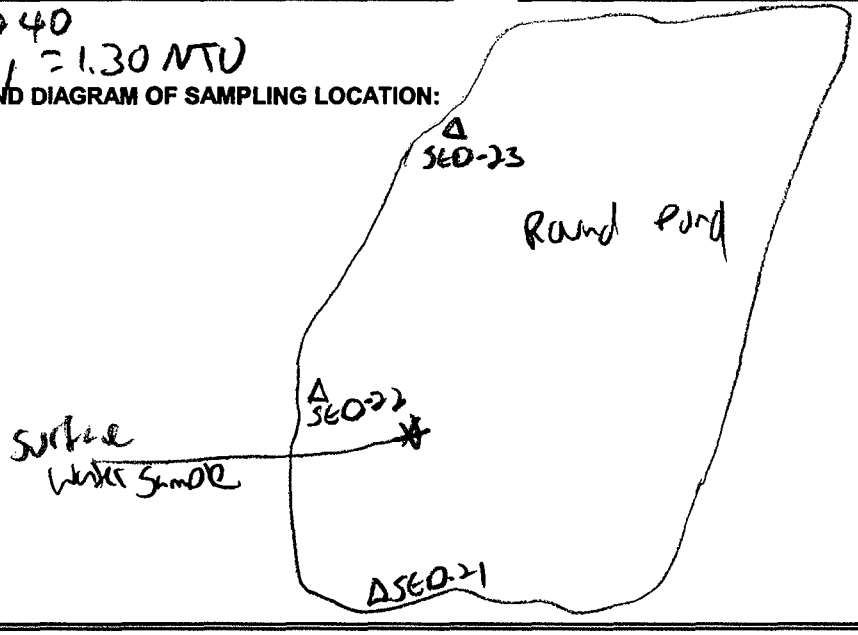
Depth of Water Column:		**Estimated Current Speed:**	
2 ft		0 FT/sec	
Sample Depth:			

Sample Information:

pH:	7.53	**Dissolved Oxygen (mg/l):**	0.90
Specific Conductivity (µmho/cm):	144	**Temperature (°C):**	18.06
Odor (circle one): YES (NO)		**Color:**	None/Slightly Stained
If yes, describe:			

ORP = 240
Turbidity = 1.30 NTU

COMMENTS AND DIAGRAM OF SAMPLING LOCATION:



Fish Sampling Field Data Sheet

System Name B+M Pond
Station #
Lat
Gear used Back Pack Electroshock
Investigators JNH, TR, BS

Location B+M Pond
long
Date 9/21/04
Time 1046

Sample Collection Duration
Shock time start 000000
Shock time end 003635
Sampled w/ 20d. alc boat

Habitat Type
General description - Pond environment, shallow. depth 1-4' at deepest location
-Open water, surface & Littoral in middle of Pond
Submergent & emergent vegetation

Physical data
FF is same
DO 3.04 mg/L
Temperature 15.36 °C
Conductivity 211 ms/cm
pH 6.08
ORP 53.5
Turbidity 3.51

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
1	B Bullhead	145	36.5g	Slight caudal remodeling - good shape	
2	B. Bullhead	134	24 g	"	
3	B. Bullhead	148	40.7	caudal redness	
4	B. Bullhead	175	60.7	great shape	
5	B. Bullhead	138	24.7	slight caudal redness	
6	B. Bullhead	154	36.8	great shape	
7	B. Bullhead	190	77.9	"	
8	Bluegill	86	13.6	"	
9	Longnose dace	46	0.9	"	
10					

(4) (1) (3) (2) (1)
probably same

Shock time/Yesterday 003635

Fish Sampling Field Data Sheet

System Name Richardson Pond
Station #
Lat
Gear used Electrofisher
Investigators JNH, TR, BS

Location Richardson Pond
long
Date 20 Sept 04
Time 0900

Sample Collection Duration

Shock time start 000000
Shock time end 005842
- Sampled w/canoe

Habitat Type

General description Shallow water <1-2 feet, emergent and submergent vegetation covering most of Pond. Duckweed made it difficult to see fish that were shocked

Physical data

DO 1.35 mg/L
Temperature 16.53 C
Conductivity 378 us/cm
pH 6.53
ORP 298
Turbidity 1.64 ntu

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
10	GS	~~307~~	3.7	None	
11	GS	107	15.1	↓	
12	GS	82	5.7	↓	
13	GS	68	3.7	anal fin redness +	some hemorrhage no parasites
14	GS	70	3.9	none	
15	GS	68	4.0		
16	GS	70	4.2		
17	GS	68	3.8		
18	GS	70	4.0	↓	
19	GS	60	2.8	Pectoral + Pelvic hemorrhages	
20	GS	73	5.0	none	
21	GS	66	3.8		
22	GS	66	3.9		
23	GS	65	3.1		
24	GS	70	3.8		
25	GS	64	2.8		
26	GS	54	1.7		
27	GS	68	3.2		
28	GS	70	4.2		
29	GS	64	3.0	↓	

Eddorshing

50g

1

SED-16 - ~~71°36'28"~~ 71°34'74"

GS = Golden Shiner

continued

Fish Sampling Field Data Sheet

System Name Richardson Pond
Station #
Lat
Gear used Electrofishor
Investigators JWH, TPi, RS

Location Richardson Pond
long
Date 22 Sept 04
Time 0900

Sample Collection Duration

Shock time start
Shock time end

Habitat Type

General description

Physical data

DO
Temperature
Conductivity
pH
ORP
Turbidity

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
30	GS	65	2.8		
31	GS	67	3.7		
32	GS	70	4.6		
33	GS	68	3.9		
34	GS	68	3.8		
35	GS	63	2.4		
36	GS	68	2.1		
37	GS	53	1.7		
38	GS	52	1.7		
39	GS	63	2.9		
40	GS	54	1.9		
41	GS	54	2.0		
42	GS	54	1.5		
43	GS	54	1.9		
44	GS	54	1.4		
45	GS	45	0.9		
46	BB	82	6.1		
47	BB	180	81.5		
48	BB	155	60.8		

2
50
3
2
1

BB = Brown Bullhead

Fish Sampling Field Data Sheet

System Name Middleton Canal
Station #
Lat
Gear used Backpack Shocker
Investigators TR, JNH, BS

Location Below Johnsmansville
long
Date 7/28/04
Time 09:25

Sample Collection Duration
Shock time start 003908
Shock time end 008450
- Sampled from shore

- surface water sample

Habitat Type
General description -10-15' wide backwater area w/1-2 ft/sec flow, Beaver dam in middle of reach, discharging pipe and some emergent veg and some submergent veg
- silt made it very difficult to collect w/shocker

Physical data
DO 2.51 mg/L 26.0 %
Temperature 17.98
Conductivity 129 us/cm
pH 6.48
ORP 52.0
Turbidity 2.34

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
Goldenshiner 49	GS	60	3.9	None	
Longnosed Dace 50	LD ~~BG~~	53	3.1		
Bluegill 51	BG	70	13.3		
52	LD	42	1.1		
53	~~LD BG~~	44	0.9		~~Parasites~~
54	GS	34	0.8		Parasites
55	LD	35	0.6		
56	LD	55	1.8		
57	LD	58	2.2		
58	LD	58	3.2		
59	LD	53	1.5		
60	LD	36	0.4		
61	LD	46	1.5		
62	LD	46	0.8		
63	LD	40	1.0		
64	LD	44	0.8		
65	GS	44	0.9		
66	LD	57	2.5		
67	GS	36	0.3		
68	LD	34	0.8		

GS = Goldenshiner
LD = Longnose dace
BG = Bluegill

Continued

Fish Sampling Field Data Sheet

System Name Middlesex Canal
Station #
Lat
Gear used
Investigators

Location
long
Date 9/23/04
Time 10 ea

Sample Collection Duration

Shock time start
Shock time end

Habitat Type

General description

Physical data

DO
Temperature
Conductivity
pH
ORP
Turbidity

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
69	LD	37	0.5	Nml	
70	LD	30	0.4		
71	LD	55	1.4		
72	LD	40	0.9		
73	LD	55	2.1		
74	GS	50	1.7		
75	RP	150	27.4		
76	LD	51	2.0		
77	LD	40	1.4		
78	LD	38	0.6		
79	GS	34	0.6		
80	LD	35	0.6		
81	GS	35	0.5		
82	YB	142	37.7		
83	BB	164	52.5		
84	BB	174	59.8		
85	BB	104	13.8		
86	BB	195	98.6		
87	LD	92	9.5		
88	LD	45	1.0		

Data Continues on Back to #091

LD = Longnose dace
GS = Golden Shiner
RP = Redfin Pickerel
YP = Yellow Bullhead
BB = Brown bullhead

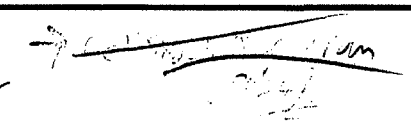
Fish Sampling Field Data Sheet

System Name Contact Creek
Station #
Lat
Gear used
Investigators JNH, TR, BS

Location
long
Date 9/23/04
Time 1400

Sample Collection Duration

Shock time start 000000
Shock time end 003900



Habitat Type

General description - Habitat encompasses both stream & wetland habitat flow in braided approx 2-4 ft/sec

Physical data

DO 4.85 mg/L
Temperature 16.88
Conductivity 163
pH 6.52
ORP 75.6
Turbidity 5.26 NTU

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
092	RP	143	25.4	None	Parasites
93	RP	106	7.5		
94	RP	103	7.5		
95	RP	90	5.4		
96	RP	94	6.3		
97	RP	104	7.4		
98	AE	370	97.3		
99	AE	175	8.2		

(5)

(6)

RP = Redfin Rubrorel
AE = American Eel

Fish Sampling Field Data Sheet

System Name: Round Pond
Station #:
Lat:
Gear used: Electro Shocker
Investigators: JWH TR

Location: Round Pond
long:
Date: 9/24/04
Time: 1100

Sample Collection Duration
Shock time start: 0084550
Shock time end: 0121690

Habitat Type
General description: Warm water pond w/ submergent and emergent vegetation along the shore. Middle of pond up to 20' deep.

Physical data
Surface samples taken in vicinity of sed #
DO: 0.90 - checked 1000.00 infrequently, OK rec'd 9/04
Temperature: 18.06
Conductivity: 144 uS/cm²
pH: 7.57
ORP: 240
Turbidity: 1.30 NTU

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
100	YP	54	1.8	None	
101	CB	111	5.7		
102	BC	71	4.5		
103	BG	60	3.3		
104	YP	75	5.8		
105	LB	78	6.6		
106	LB	91	11.3		
107	BC	68	4.0		
108	BC	73	4.8		
109	YP	74	4.8		
110	YP	68	3.4		
111	PS	94	16.0		
112	BG	45	2.1		
113	LB	124	28.1		
114	LB	85	9.3		
115	YP	58	1.9		
116	LB	75	4.5		
117	GS	69	1.7		parasites all over
118	YP	60	2.3		
119	BC	119	4.1		

yellow perch
chain pickerel
Black Crappie
Bluegill
Largemouth Bass
Pumpkinseed

continued

Fish Sampling Field Data Sheet

System Name Round Pond
Station #
Lat
Gear used Electroshocker
Investigators JNH, TR

Location
long
Date 9/24/04
Time 1100

Sample Collection Duration

Shock time start
Shock time end

Habitat Type

General description

Physical data

DO
Temperature
Conductivity
pH
ORP
Turbidity

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
120	YP	59	1.9		
121	CP	265	973		
122	AE	350	102.1		
123	AE	270	35.2		
124	AE	311	69.9		
125	YP	54	01.7		
126	BC	69	4.5		
127	AE	434	169.3		

Channel Catfish
American Eel

Fish Sampling Field Data Sheet

System Name: Content Brook
Station #:
Lat:
Gear used: Hoop net, 2 trot lines
Investigators: JNH, TR, PD

Location:
long:
Date: 9/30/04
Time: 9:50

Sample Collection Duration: ~~Shock time~~ start:
~~Shock time~~ end:
Hoop nets, +2 trot lines set over night

Habitat Type:
General description: @ gravel street 2-3' of bb & submersant vegetation along the shore

Physical data taken @ gravel street:
DO: 4.44 mg/L 40.5 %
Temperature: 12.59
Conductivity: .276 mS
pH: 6.44
ORP: 215.0
Turbidity:

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
128	YB	207	128.7		Trot lines
129	YB	188	73.4		
130	YB	170	65.0		
131	YB	182	82.5		
132	YB	200	126.0		
133	YB	168	67.8		
134	YB	192	102.0		
135	YB	171	59.8		
136	GS	171	60.1		- Hoop Net

YB = Yellow bullhead
GS = Golden shiner

Fish Sampling Field Data Sheet

System Name: Rand Pond
Station #:
Lat:
Gear used: Gillnet, Trot lines, Hoopnets
Investigators: JNH, TR, PD

Location:
long:
Date: 9/30/04
Time: 1230

Sample Collection Duration	~~Shock time start~~ > Shock time end > set Gillnet @ 12:15 picked up @ 1435 collected 137, 138, 139 w/ gillnet set Trot, + hoop aborted
Habitat Type	General description: Same as last
Physical data	DO: 2.65 mg/L 27.5% Temperature: 17.75 Conductivity: 180 pH: 5.93 ORP: 195.9 Turbidity:

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
137	YP	215	115.8		Trot line
138	YP	260	240.0		↓
139	BC	197	107.3		

Date collected 9/30 Trot line

collected 0/1 from trot line

[redacted]

- collected Trot line 10/1 @ 9:14

cont'

Fish Sampling Field Data Sheet

System Name Round Pond
Station #
Lat
Gear used WT BS, TR
Investigators 2 Trot lines, hoop net

Location
long
Date 10/1/04
Time 9:15 (Sample Time 9:15)

Sample Collection Duration
Shock time start
Shock time end
- collected Trot lines @ 900 from overnight set

Habitat Type
General description

Physical data
DO 1.06 mg/L 10.9%
Temperature 16.44
Conductivity 173
pH 5.83
ORP 196.8
Turbidity

ID	Species	Length (mm)	Weight (g)	Anomalies	Comments
140	B.G.	213	224.4	none	Trot lines
141	YP	260	274.2	none	
142	YP	289	291.8	none	
(1) 143	BB	294	386	none	
(2) 144	BB	310	422	none	
(3) 145	BB	321	474	none	
146	LB	185	82	none	hook+line

APPENDIX D

Chain-of-Custody Documentation

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/14/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx SI	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414251628 MS 9/28/04	1 [signature] 9/14/04 16:05	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05199	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-01	S: 9/14/2004	9:20	–
D05200	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-02	S: 9/14/2004	15:05	–
D05201	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-03	S: 9/14/2004	11:10	–
D05202	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-04	S: 9/14/2004	13:10	–
D05220	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-21	S: 9/13/2004	13:20	–
D05221	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-22	S: 9/13/2004	15:45	–
D05222	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-23	S: 9/13/2004	14:25	–

1 hold

14 EDD 9/16/04

Hold for analysis. Do Not analyze until M+E contact

Call Andy Sekula 4 questions
M+E 781-224 6353

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
	D05220, D05221, D05222		
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

Σ D-005 (TOC = D-005 (TOC)

TR Number: 1-502446878-091404-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/14/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414251528	[signature] 9/14/04 16:05	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05199	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-01	S: 9/14/2004	9:20	--
D05200	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-02	S: 9/14/2004	15:05	--
D05201	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-03	S: 9/14/2004	11:10	--
D05202	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-04	S: 9/13/2004	13:10	--
D05220	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-21	S: 9/13/2004	13:20	--
D05221	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-22	S: 9/13/2004	15:45	--
D05222	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (3)	SED-23	S: 9/13/2004	14:25	--

Hold

Hold for analysis. Do Not analyze until M+E contact

Call Andy Sekula w/ questions
M+E 781-224 6353

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:** D05220, D05221, D05222	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key: D-005 (TOC = D-005 (TOC)	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

TR Number: 1-502446878-091404-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/16/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414255058	1 9/16/04 1810	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05203	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-05	S: 9/15/2004	12:00	FD 1
D05204	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-25	S: 9/15/2004	11:00	FD 1
D05205	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-06	S: 9/15/2004	11:20	--
D05206	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-07	S: 9/15/2004	13:00	--
D05207	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-08	S: 9/15/2004	9:15	--
D05208	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-09	S: 9/16/2004	8:40	--
D05209	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-10	S: 9/16/2004	9:30	--
D05210	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-11	S: 9/16/2004	10:35	--
D05211	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-12	S: 9/16/2004	12:00	--
D05216	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-17	S: 9/16/2004	14:50	--
D05217	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-18	S: 9/16/2004	13:45	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-005 (TOC = D-005 (TOC)			

TR Number: 1-502446878-091604-0006

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/17/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414255117	1 [signature] 9/20/04	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05214	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-15	S: 9/17/2004	12:15	--
D05215	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-16	S: 9/17/2004	9:45	--
D05218	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-19	S: 9/17/2004	15:00	--
D05219	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-20	S: 9/17/2004	14:10	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key: D-005 (TOC = D-005 (TOC)	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

TR Number: 1-502446878-091704-0006

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/20/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414255106	9/20/04 1800	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05212	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-13	S: 9/20/2004	10:30	--
D05213	Sediment/ Laurie O'Connor	L/G	D-005 (TOC (35)	(Ice Only) (1)	SED-14	S: 9/20/2004	13:20	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-005 (TOC = D-005 (TOC)			

TR Number: 1-502446878-092004-0006

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/13/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414251258	1	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05220	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (6)	SED-21	S: 9/13/2004	13:20	–
D05221	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (6)	SED-22	S: 9/13/2004	15:45	–
D05222	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (6)	SED-23	S: 9/13/2004	14:25	–
D05224	PE Sediment/ Laurie O'Connor	L/G	D-054.1 (P (35)	(Ice Only) (1)	PE-ICCSV0982	S: 9/13/2004	14:00	PE
D05227	PE Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35)	(Ice Only) (1)	PE-ICC00029	S: 9/13/2004	14:00	PE

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:** D05220, D05221, D05222	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-044.2 (M = D-044.2 (Metals), D-054.1 (P = D-054.1 (PAHs)			

TR Number: 1-502446878-091304-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/15/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
Account Code:		**Airbill:**	846414251247	1	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05199	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-01	S: 9/14/2004	9:20	–
D05200	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-02	S: 9/14/2004	15:05	–
D05201	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-03	S: 9/14/2004	11:10	–
D05202	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-04	S: 9/14/2004	13:10	–
D05203	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-05	S: 9/15/2004	12:00	FD 1
D05204	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-25	S: 9/15/2004	11:00	FD 1
D05205	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-06	S: 9/15/2004	11:20	–
D05206	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-07	S: 9/15/2004	13:00	–
D05207	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-08	S: 9/15/2004	9:15	–

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-044.2 (M = D-044.2 (Metals), D-054.1 (P = D-054.1 (PAHs)			

TR Number: 1-502446878-091504-0003

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/16/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414251074	1 9/16/04 1700	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05208	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-09	S: 9/16/2004	8:40	--
D05209	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-10	S: 9/16/2004	9:30	--
D05210	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-11	S: 9/16/2004	10:35	--
D05211	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-12	S: 9/16/2004	12:00	--
D05216	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-17	S: 9/16/2004	14:50	--
D05217	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-18	S: 9/16/2004	13:45	--
D05223	Field QC/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(HNO3), (Ice Only) (3)	SED-EB-01	S: 9/15/2004	15:00	Equipment Blank

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-044.2 (M = D-044.2 (Metals EB), D-044.2 (M = D-044.2 (Metals), D-054.1 (P = D-054.1 (PAHs EB), D-054.1 (P = D-054.1 (PAHs)			

TR Number: 1-502446878-091604-0005

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/17/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:	,	**Airbill:**	846414251236	1 9/17/04 1750	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05214	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-15	S: 9/17/2004	12:15	--
D05215	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-16	S: 9/17/2004	9:45	--
D05218	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-19	S: 9/17/2004	15:00	--
D05219	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-20	S: 9/17/2004	14:10	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-044.2 (M = D-044.2 (Metals), D-054.1 (P = D-054.1 (PAHs)

TR Number: 1-502446878-091704-0005

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/20/2004	**Chain of Custody Record**	**Sampler Signature**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
Account Code:		**Airbill:**	846414251225	1 9/20/04 1755	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05212	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-13	S: 9/20/2004	10:30	–
D05213	Sediment/ Laurie O'Connor	L/G	D-044.2 (M (35), D-054.1 (P (35)	(Ice Only) (2)	SED-14	S: 9/20/2004	13:20	–

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**
D-044.2 (M = D-044.2 (Metals), D-054.1 (P = D-054.1 (PAHs)			

TR Number: 1-502446878-092004-0005

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/21/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210946	1 7/21/04 1700	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05245	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-BM-01	S: 9/21/2004	10:45	--
D05246	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-BM-02	S: 9/21/2004	10:45	--
D05247	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-BM-03	S: 9/21/2004	10:45	--
D05252	PE Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	PE-M0000270	S: 9/21/2004	16:20	PE
D05253	PE Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	PE-0014047	S: 9/21/2004	16:25	PE

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-004.1 (D = D-004.1 (Dissolved Metals), D-004.1 (T = D-004.1 (Total Metals)			

TR Number: 1-502446878-092104-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210935	1 9/24/04 1610	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05235	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-RP-01	S: 9/22/2004	8:30	--
D05236	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-RP-02	S: 9/22/2004	8:30	--
D05237	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-RP-03	S: 9/22/2004	8:30	--
D05238	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-MC-01	S: 9/23/2004	9:25	FD 1
D05239	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-MC-21	S: 9/23/2004	9:00	FD 1
D05240	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-MC-02	S: 9/23/2004	9:25	--
D05241	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-MC-03	S: 9/23/2004	9:25	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-004.1 (D = D-004.1 (Dissolved Metals), D-004.1 (T = D-004.1 (Total Metals)

TR Number: 1-502446878-092404-0003

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210924	1 9/24/04 1615	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05238	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-MC-01	S: 9/23/2004	9:25	FD 1
D05239	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-MC-21	S: 9/23/2004	9:00	FD 1
D05240	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-MC-02	S: 9/23/2004	9:25	--
D05241	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-MC-03	S: 9/23/2004	9:25	--
D05242	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-CB-01	S: 9/23/2004	14:00	--
D05243	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-CB-02	S: 9/23/2004	14:00	--
D05244	Surface Water/ Laurie O'Connor	L/G	D-004.1 (T (35)	(HNO3) (1)	SW-CB-03	S: 9/23/2004	14:00	--
D05251	Field QC/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-EB-01	S: 9/23/2004	8:30	Equipment Blank

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-004.1 (D = D-004.1 (Dissolved Metals), D-004.1 (T = D-004.1 (Total Metals)

TR Number: 1-502446878-092404-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case:
Client No: 0243M

R

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210913	1 9/24/04 1600	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05242	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-CB-01	S: 9/23/2004	14:00	--
D05243	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-CB-02	S: 9/23/2004	14:00	--
D05244	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35)	(HNO3) (1)	SW-CB-03	S: 9/23/2004	14:00	--
D05248	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (4)	SW-RF-01	S: 9/24/2004	9:45	--
D05249	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-RF-02	S: 9/24/2004	9:45	--
D05250	Surface Water/ Laurie O'Connor	L/G	D-004.1 (D (35), D-004.1 (T (35)	(HNO3) (2)	SW-RF-03	S: 9/24/2004	9:45	--

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:** D05248	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-004.1 (D = D-004.1 (Dissolved Metals), D-004.1 (T = D-004.1 (Total Metals)			

TR Number: 1-502446878-092404-0005

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/13/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210980	1	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05220	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (6)	SED-21	S: 9/13/2004	13:20	--
D05221	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (6)	SED-22	S: 9/13/2004	15:45	--
D05222	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (6)	SED-23	S: 9/13/2004	14:25	--
D05225	PE Sediment/ Laurie O'Connor	L/G	D-043.1 PC (35)	(Ice Only) (1)	PE-TT05606	S: 9/13/2004	15:00	PE
D05226	PE Sediment/ Laurie O'Connor	L/G	D-043.1 Ps (35)	(Ice Only) (1)	PE-CRM824-050	S: 9/13/2004	15:00	PE

Shipment for Case Complete? X N SD 9/13/04	**Sample(s) to be used for laboratory QC:** D05220, D05221, D05222	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-043.1 (P = D-043.1 (Pest/PCBs), D-043.1 PC = D-043.1 (PCBs only), D-043.1 Ps = D-043.1 (Pest only)

TR Number: 1-502446878-091304-0003

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/15/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210979	1 [signature] 9/15 15:15	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05199	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-01	S: 9/14/2004	9:20	--
D05200	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-02	S: 9/14/2004	15:05	--
D05201	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-03	S: 9/14/2004	11:10	--
D05202	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-04	S: 9/14/2004	13:10	--
D05203	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-05	S: 9/15/2004	12:00	FD 1
D05204	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-25	S: 9/15/2004	11:00	FD 1
D05205	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-06	S: 9/15/2004	11:20	--
D05206	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-07	S: 9/15/2004	13:00	--
D05207	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-08	S: 9/15/2004	9:15	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-043.1 (P = D-043.1 (Pest/PCBs)			

TR Number: 1-502446878-091504-0002

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/16/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
Account Code:		**Airbill:**	846414210887	1 [signature] 9/16/04 (920)	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05208	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-09	S: 9/16/2004	8:40	--
D05209	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-10	S: 9/16/2004	9:30	--
D05210	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-11	S: 9/16/2004	10:35	--
D05211	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-12	S: 9/16/2004	12:00	--
D05216	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-17	S: 9/16/2004	14:50	--
D05217	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-18	S: 9/16/2004	13:45	--
D05223	Field QC/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-EB-01	S: 9/15/2004	15:00	Equipment Blank

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-043.1 (P = D-043.1 (Pest/PCBs EB), D-043.1 (P = D-043.1 (Pest/PCBs)

TR Number: 1-502446878-091604-0007

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: [redacted]3M

Region:	1	**Date Shipped:**	9/17/2004	**Chain of Custody Record**	
Project Code:		**Carrier Name:**	FedEx	**Signature**	
Account Code:		**Airbill:**	846414210968	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	1 [redacted] 9/17/04 (745	
Spill ID:	0157			2	
Site Name/State:	Iron Horse Park Sediment/MA			3	
Project Leader:	Laurie O'Connor			4	
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05214	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-15	S: 9/17/2004	12:15	--
D05215	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-16	S: 9/17/2004	9:45	--
D05218	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-19	S: 9/17/2004	15:00	--
D05219	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-20	S: 9/17/2004	14:10	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-043.1 (P = D-043.1 (Pest/PCBs)			

TR Number: 1-502446878-091704-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case:
Client No: 0243M

Region:	1	**Date Shipped:**	9/20/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414210957	1 9/20/04 1805	
CERCLIS ID:	MAD051787323	**Shipped to:**	Southwest Research Institute 6220 Culebra Road San Antonio TX 78228 (210) 522-3051	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Sediment/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05212	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-13	S: 9/20/2004	10:30	–
D05213	Sediment/ Laurie O'Connor	L/G	D-043.1 (P (35)	(Ice Only) (2)	SED-14	S: 9/20/2004	13:20	–

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-043.1 (P = D-043.1 (Pest/PCBs)			

TR Number: 1-502446878-092004-0007

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: PR
Client No: 0243M

Region:	1	**Date Shipped:**	9/23/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	846414255070	1 9/23/04 1140	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05238	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-MC-01	S: 9/23/2004	9:25	FD 1
D05239	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-MC-21	S: 9/23/2004	9:00	FD 1
D05240	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-MC-02	S: 9/23/2004	9:25	--
D05241	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-MC-03	S: 9/23/2004	9:25	--
D05245	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-BM-01	S: 9/21/2004	10:45	--
D05246	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-BM-02	S: 9/21/2004	10:45	--
D05247	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-BM-03	S: 9/21/2004	10:45	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-033 (Alk = D-033 (Alkalinity)			

TR Number: 1-502446878-092304-0004

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/23/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By / (Date / Time)**	**Received By / (Date / Time)**
Account Code:		**Airbill:**	846414255091	1 9/23/04 1715	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05235	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-RP-01	S: 9/22/2004	8:30	--
D05236	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-RP-02	S: 9/22/2004	8:30	--
D05237	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-RP-03	S: 9/22/2004	8:30	--
D05242	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-CB-01	S: 9/23/2004	14:00	--
D05243	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-CB-02	S: 9/23/2004	14:00	--
D05244	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-CB-03	S: 9/23/2004	14:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key: D-033 (Alk = D-033 (Alkalinity)	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

TR Number: 1-502446878-092304-0005

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	FedEx	**Relinquished By** / **(Date / Time)**	**Received By** / **(Date / Time)**
Account Code:		**Airbill:**	846414255080	1 9/24/04 1625	
CERCLIS ID:	MAD051787323	**Shipped to:**	Severn Trent Laboratories - Connecticut 128 Long Hill Cross Road Shelton CT 06484 (203) 929-8140	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Surface Water/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05248	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (2)	SW-RF-01	S: 9/24/2004	9:45	--
D05249	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-RF-02	S: 9/24/2004	9:45	--
D05250	Surface Water/ Laurie O'Connor	L/G	D-033 (Alk (35)	(Ice Only) (1)	SW-RF-03	S: 9/24/2004	9:45	--

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:** D05248	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key: D-033 (Alk = D-033 (Alkalinity)	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

TR Number: 1-502446878-092404-0006

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 9/24/04 1600	9/24/04 16:00
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
D05254	PE Fish/ Nathan Henderson	L/G	D-134 (Met (45)	(Dry Ice) (1)	PE-MT2976	S: 9/24/2004	15:25	PE
D05255	PE Fish/ Nathan Henderson	L/G	D-052.1 (P (45)	(Dry Ice) (1)	PE-MT2977	S: 9/24/2004	15:25	PE

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-052.1 (P = D-052.1 (PAHs), D-134 (Met = D-134 (Metals)			

TR Number: 1-502446878-092404-0002

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/22/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 9/24/04 15:20	Ed Bather 9/22 15:20
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0001	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) BS 9/22/04	FI-BM-BH-001	S: 9/21/2004	11:30	--
F0002	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-002	S: 9/21/2004	11:30	--
F0003	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-003	S: 9/21/2004	11:30	--
F0004	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-004	S: 9/21/2004	11:30	--
F0005	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-005	S: 9/21/2004	11:30	--
F0006	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-006	S: 9/21/2004	11:30	--
F0007	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BH-007	S: 9/21/2004	11:30	--
F0008	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-BG-008	S: 9/21/2004	11:30	--
F0009	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-BM-DA-009	S: 9/21/2004	11:30	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092204-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/22/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 [signature] 9/23/04 14:00	[signature] 9/23 14:00
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0010	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-010	S: 9/22/2004	13:00	–
F0011	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-011	S: 9/22/2004	13:00	–
F0012	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-012	S: 9/22/2004	13:00	–
F0013	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-013	S: 9/22/2004	13:00	–
F0014	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-014	S: 9/22/2004	13:00	–
F0015	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-015	S: 9/22/2004	13:00	–
F0016	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-016	S: 9/22/2004	13:00	–
F0017	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-017	S: 9/22/2004	13:00	–
F0018	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-018	S: 9/22/2004	13:00	–
F0019	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-019	S: 9/22/2004	13:00	–

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)			

TR Number: 1-502446878-092304-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/22/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 [signature] 9/23/04 14:00	Ed Buttle 9/23 14:00
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0020	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-020	S: 9/22/2004	13:00	--
F0021	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-021	S: 9/22/2004	13:00	--
F0022	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-022	S: 9/22/2004	13:00	--
F0023	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-023	S: 9/22/2004	13:00	--
F0024	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-024	S: 9/22/2004	13:00	--
F0025	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-025	S: 9/22/2004	13:00	--
F0026	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-026	S: 9/22/2004	13:00	--
F0027	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-027	S: 9/22/2004	13:00	--
F0028	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-028	S: 9/22/2004	13:00	--
F0029	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-029	S: 9/22/2004	13:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092304-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/22/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 [signature] 9/23/04 14:10	Ed Bath 9/23 1400
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0030	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-030	S: 9/22/2004	13:00	--
F0031	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-031	S: 9/22/2004	13:00	--
F0032	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-032	S: 9/22/2004	13:00	--
F0033	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-033	S: 9/22/2004	13:00	--
F0034	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-034	S: 9/22/2004	13:00	--
F0035	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-035	S: 9/22/2004	13:00	--
F0036	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-036	S: 9/22/2004	13:00	--
F0037	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-037	S: 9/22/2004	13:00	--
F0038	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-038	S: 9/22/2004	13:00	--
F0039	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-039	S: 9/22/2004	13:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092304-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/22/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 Laurie O'Connor 9/23/04 14:40	Ed Buckley 9/23 14:0
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0040	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-040	S: 9/22/2004	13:00	--
F0041	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-041	S: 9/22/2004	13:00	--
F0042	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-042	S: 9/22/2004	13:00	--
F0043	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-043	S: 9/22/2004	13:00	--
F0044	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-044	S: 9/22/2004	13:00	--
F0045	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-GS-045	S: 9/22/2004	13:00	--
F0046	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-BB-046	S: 9/22/2004	13:00	--
F0047	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-BB-047	S: 9/22/2004	13:00	--
F0048	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) (3)	FI-RP-BB-048	S: 9/22/2004	13:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____
D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)			

TR Number: 1-502446878-092304-0001

REGION COPY

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	~~FedEx~~ Ground	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
Account Code:		**Airbill:**	790[illegible]	[illegible] 9/24/04 600	9/24/04 16:50
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0049	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1) 9/24/04	FI-MC-GS-049	S: 9/23/2004	10:00	--
F0050	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-050	S: 9/23/2004	10:00	--
F0051	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-BG-051	S: 9/23/2004	10:00	--
F0052	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-052	S: 9/23/2004	10:00	--
F0053	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-053	S: 9/23/2004	10:00	--
F0054	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-GS-054	S: 9/23/2004	10:00	--
F0055	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-055	S: 9/23/2004	10:00	--
F0056	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-056	S: 9/23/2004	10:00	--
F0057	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-057	S: 9/23/2004	10:00	--
F0058	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-058	S: 9/23/2004	10:00	--

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1
Project Code:	
Account Code:	
CERCLIS ID:	MAD051787323
Spill ID:	0157
Site Name/State:	Iron Horse Park Fish/MA
Project Leader:	Laurie O'Connor
Action:	Combined RI/FS
Sampling Co:	Metcalf & Eddy, Inc.

Date Shipped:	9/24/2004
Carrier Name:	~~FedEx~~ Courier
Airbill:	(5) 9/24/04
Shipped to:	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
1	9/24/04 1500	Ed Butler	9/24/04 12:00
2			
3			
4			

Sampler Signature:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0059	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1) (5) 9/24/04	FI-MC-LD-059	S: 9/23/2004	10:00	--
F0060	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-060	S: 9/23/2004	10:00	--
F0061	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-061	S: 9/23/2004	10:00	--
F0062	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-062	S: 9/23/2004	10:00	--
F0063	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-063	S: 9/23/2004	10:00	--
F0064	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-064	S: 9/23/2004	10:00	--
F0065	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-GS-065	S: 9/23/2004	10:00	--
F0066	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-066	S: 9/23/2004	10:00	--
F0067	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-GS-067	S: 9/23/2004	10:00	--
F0068	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~(1)	FI-MC-LD-068	S: 9/23/2004	10:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	~~FedEx~~ Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**	(R) 9/24/04	1	Ed Butler 9/24/04 16:00
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0069	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) (R) 9/24/04	FI-MC-LD-069	S: 9/23/2004	10:00	--
F0070	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-070	S: 9/23/2004	10:00	--
F0071	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-071	S: 9/23/2004	10:00	--
F0072	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-072	S: 9/23/2004	10:00	--
F0073	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-073	S: 9/23/2004	10:00	--
F0074	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-GS-074	S: 9/23/2004	10:00	--
F0075	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-RP-075	S: 9/23/2004	10:00	--
F0076	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-076	S: 9/23/2004	10:00	--
F0077	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-077	S: 9/23/2004	10:00	--
F0078	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-078	S: 9/23/2004	10:00	--

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case:
Client No: 0243M

Region:	1	**Date Shipped:**	9/24/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	~~FedEx~~ Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:	,	**Airbill:**	(R) 9/24/04	1 [signature] 9/24/04 1600	E Butler 9/24/04 16:00
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0079	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) (R) 9/24/04	FI-MC-GS-079	S: 9/23/2004	10:00	--
F0080	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-080	S: 9/23/2004	10:00	--
F0081	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-GS-081	S: 9/23/2004	10:00	--
F0082	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-YB-082	S: 9/23/2004	10:00	--
F0083	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-BB-083	S: 9/23/2004	10:00	--
F0084	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-BB-084	S: 9/23/2004	10:00	--
F0085	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-BB-085	S: 9/23/2004	10:00	--
F0086	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-BB-086	S: 9/23/2004	10:00	--
F0087	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-087	S: 9/23/2004	10:00	--
F0088	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-LD-088	S: 9/23/2004	10:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1
Project Code:	
Account Code:	
CERCLIS ID:	MAD051787323
Spill ID:	0157
Site Name/State:	Iron Horse Park Fish/MA
Project Leader:	Laurie O'Connor
Action:	Combined RI/FS
Sampling Co:	Metcalf & Eddy, Inc.

Date Shipped: 9/24/2004
Carrier Name: ~~FedEx~~ Courier
Airbill: 9/24/04
Shipped to: Woods Hole Group
375 Paramount Drive,
Suite B
Raynham MA 02767
(508) 822-9300

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/24/04 1600	E. Butler 9/24/04 16:00
2		
3		
4		

Sampler Signature:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0089	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) 9/24/04	FI-MC-LD-089	S: 9/23/2004	10:00	--
F0090	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-AE-090	S: 9/23/2004	10:00	--
F0091	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-MC-AE-091	S: 9/23/2004	10:00	--
F0092	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-092	S: 9/23/2004	14:00	--
F0093	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-093	S: 9/23/2004	14:00	--
F0094	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-094	S: 9/23/2004	14:00	--
F0095	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-095	S: 9/23/2004	14:00	--
F0096	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-096	S: 9/23/2004	14:00	--
F0097	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-RP-097	S: 9/23/2004	14:00	--
F0098	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-CB-AE-098	S: 9/23/2004	14:00	--

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

F2V5

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1
Project Code:	
Account Code:	
CERCLIS ID:	MAD051787323
Spill ID:	0157
Site Name/State:	Iron Horse Park Fish/MA
Project Leader:	Laurie O'Connor
Action:	Combined RI/FS
Sampling Co:	Metcalf & Eddy, Inc.

Date Shipped:	9/24/2004
Carrier Name:	~~FedEx~~ Courier
Airbill:	9/24/04
Shipped to:	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/24/04 1600	Ed Butler 9/24/04 16:00
2		
3		
4		

Sampler Signature:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0099	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) (3) 9/24/04	FI-CB-AE-099	S: 9/23/2004	14:00	--
F0100	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-100	S: 9/24/2004	11:00	--
F0101	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-CP-101	S: 9/24/2004	11:00	--
F0102	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BC-102	S: 9/24/2004	11:00	--
F0103	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BG-103	S: 9/24/2004	11:00	--
F0104	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-104	S: 9/24/2004	11:00	--
F0105	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-105	S: 9/24/2004	11:00	--
F0106	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-106	S: 9/24/2004	11:00	--
F0107	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BC-107	S: 9/24/2004	11:00	--
F0108	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BC-108	S: 9/17/2004	11:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case:
Client No: 0248M

Region:	1
Project Code:	
Account Code:	,
CERCLIS ID:	MAD051787323
Spill ID:	0157
Site Name/State:	Iron Horse Park Fish/MA
Project Leader:	Laurie O'Connor
Action:	Combined RI/FS
Sampling Co:	Metcalf & Eddy, Inc.

Date Shipped:	9/24/2004
Carrier Name:	~~FedEx~~ Courier
Airbill:	(5) 9/24/04
Shipped to:	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/24/04 1600	Ed Butler 9/24/04 16:00
2		
3		
4		

Sampler Signature:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0109	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) (5) 9/24/04	FI-RF-YP-109	S: 9/24/2004	11:00	--
F0110	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-110	S: 9/24/2004	11:00	--
F0111	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-PS-111	S: 9/24/2004	11:00	--
F0112	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BG-112	S: 9/24/2004	11:00	--
F0113	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-113	S: 9/24/2004	11:00	--
F0114	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-114	S: 9/24/2004	11:00	--
F0115	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-115	S: 9/24/2004	11:00	--
F0116	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-116	S: 9/24/2004	11:00	--
F0117	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-GS-117	S: 9/24/2004	11:00	--
F0118	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-118	S: 9/24/2004	11:00	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

REGION COPY

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1
Project Code:	
Account Code:	
CERCLIS ID:	MAD051787323
Spill ID:	0157
Site Name/State:	Iron Horse Park Fish/MA
Project Leader:	Laurie O'Connor
Action:	Combined RI/FS
Sampling Co:	Metcalf & Eddy, Inc.

Date Shipped:	9/24/2004
Carrier Name:	~~FedEx~~ Courier
Airbill:	(L) 9/24/04
Shipped to:	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
[signature]	9/24/04 1600	Ed Butler	9/24/04 16:00
2			
3			
4			

Sampler Signature: [signature]

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0119	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1) (L) 9/24/04	FI-RF-BC-119	S: 9/24/2004	11:00	–
F0120	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-120	S: 9/24/2004	11:00	–
F0121	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-CP-121	S: 9/24/2004	11:00	–
F0122	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-AE-122	S: 9/24/2004	11:00	–
F0123	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-AE-123	S: 9/24/2004	11:00	–
F0124	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-AE-124	S: 9/24/2004	11:00	–
F0125	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-125	S: 9/24/2004	11:00	–
F0126	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BC-126	S: 9/24/2004	11:00	–
F0127	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-AE-127	S: 9/24/2004	11:00	–

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-092404-0001

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

REGION COPY

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	10/1/2004
Project Code:		**Carrier Name:**	Courier
Account Code:		**Airbill:**	
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300
Spill ID:	0157		
Site Name/State:	Iron Horse Park Fish/MA		
Project Leader:	Laurie O'Connor		
Action:	Combined RI/FS		
Sampling Co:	Metcalf & Eddy, Inc.		

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
1	10/1/04 1340		
2			
3			
4			

Sampler Signature:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0128	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-128	S: 9/30/2004	9:00	--
F0129	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-129	S: 9/30/2004	9:00	--
F0130	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-130	S: 9/30/2004	9:00	--
F0131	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-131	S: 9/30/2004	9:00	--
F0132	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-132	S: 9/30/2004	9:00	--
F0133	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-133	S: 9/30/2004	9:00	--
F0134	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-134	S: 9/30/2004	9:00	--
F0135	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-YB-135	S: 9/30/2004	9:00	--
F0136	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-CB-GS-136	S: 9/30/2004	9:00	--
F0137	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	Fl-RF-YP-137	S: 9/30/2004	14:00	--

10/1/04

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-100104-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case: R
Client No: 0243M

Region:	1	**Date Shipped:**	10/1/2004	**Chain of Custody Record**	**Sampler Signature:**
Project Code:		**Carrier Name:**	Courier	**Relinquished By (Date / Time)**	**Received By (Date / Time)**
Account Code:		**Airbill:**		1 10/1/04 1340	10/1/04 13:40
CERCLIS ID:	MAD051787323	**Shipped to:**	Woods Hole Group 375 Paramount Drive, Suite B Raynham MA 02767 (508) 822-9300	2	
Spill ID:	0157			3	
Site Name/State:	Iron Horse Park Fish/MA			4	
Project Leader:	Laurie O'Connor				
Action:	Combined RI/FS				
Sampling Co:	Metcalf & Eddy, Inc.				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
F0138	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-138	S: 9/30/2004	14:00	–
F0139	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BC-139	S: 9/30/2004	14:00	–
F0140	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BG-140	S: 10/1/2004	9:15	–
F0141	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-141	S: 10/1/2004	9:15	–
F0142	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-YP-142	S: 10/1/2004	9:15	–
F0143	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BB-143	S: 10/1/2004	9:15	–
F0144	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BB-144	S: 10/1/2004	9:15	–
F0145	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-BB-145	S: 10/1/2004	9:15	–
F0146	Fish/ Nathan Henderson	L/G	D-052.1 (P (45), D-058.1 (L (45), D-134 (Met (45)	(Dry Ice) ~~(3)~~ (1)	FI-RF-LB-146	S: 10/1/2004	~~10:15~~ 9:15	–

10/1/04 10/1/04

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** _____

D-052.1 (P = D-052.1 (PAHs), D-058.1 (L = D-058.1 (Lipids), D-134 (Met = D-134 (Metals)

TR Number: 1-502446878-100104-0001

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

REGION COPY

APPENDIX E

Massachusetts Department of Fisheries and Wildlife Scientific Collection Permit

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

Scientific Collection Permit

FISH

VALID

2004

METCALF & EDDY, INC.
NATHAN HENDERSON
701 EDGEWATER DRIVE
WAKEFIELD, MA 01880

DATE: **8/19/2004**
PERMIT#: **204.04SCF**

Subpermitee(s): TONY RODOLAKIS

Is (are) hereby authorized, in accordance with the provisions of Section 4, Chapter 131 and 131A of the Massachusetts General Laws, to remove from the wild within the Commonwealth, subject to conditions set forth below, the following species and numbers:

MAY TAKE UP TO A TOTAL 200 FISH OF ANY SPECIES FROM WATER WITHIN AND ADJACENT TO IRON HORSE PARK FOR BASELINE ECOLOGICAL RISK ASSESSMENT.

The following method(s) of taking is (are) hereby authorized:

BACKPACK ELECTROSHOCKING, HOOP NETS, SEINES

Collection activites under this permit shall be restricted to the following locations, subject to the approval of private landowners

IRONHORSE PARK, BILLERICA/TEWKSBURY

All specimens secured under this permit shall be donated to the following institutions:

RETAINED FOR FLESH ANALYSIS

No specimen taken under the authority of this permit may be sold. No specimes may be transferred to another not duly licensed.

This permit of a copy thereof shall be carried at all times by the permittee and subpermittee(s) while engaged in the activities authorized herein.

This permit does not absolve the permittee from compliance in full with any and all other applicable federal, state and local requirements, including the acquisition of a federal endangered species permit if required.

Upon expiration of this permit, a complete report detailing all collection activities shall be filled with this office and must include a listing of all species taken, numbers of specimens, and the disposition of same.

This permit, unless sooner revoked for cause, shall expire on December 31 of the year of issue.

Wayne F. MacCallum

Wayne F. MacCallum, Director

Division of Fisheries & Wildlife
251 Causeway Street, Suite 400, Boston, MA 02114-2104
Phone: (617) 626-1590 Fax: (617) 626-1517 Web: www.masswildlife.org
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement

APPENDIX F

Data Validation and Data Quality Objectives Evaluation

F.1 DATA VALIDATION

Tier II data validation was performed on all laboratory chemical analytical data associated with the September/October 2004 sampling event with the exception of alkalinity and TOC, which was validated to Tier I. The level of validation required was defined in the site-specific SAP (M&E, 2004b) and was met for all matrices. Non-chemical analyses for grain size and toxicity were not formally validated.

The analytical data was validated in accordance with the following U.S. EPA Region I guidance documents, modified where appropriate: *Region I EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses* (U.S. EPA, 1996), *Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, February 1989 criteria* (U.S. EPA, 1988) and *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (U.S. EPA, 2004). In Tier II data validation a completeness evidence audit is performed to verify the presence of all laboratory data and documentation and the results of all quality control checks and procedures are evaluated and used to assess and qualify the sample results.

F.2 DATA QUALITY OBJECTIVES EVALUATION

To determine if project data quality objectives (DQOs) for this project were met, the sample and quality control results were assessed during Tier II data validation. Data quality was assessed in terms of precision, accuracy and bias, sensitivity, representativeness, completeness, and comparability. For each of these criteria, quality objectives were established prior to the onset of the sampling program and sample and quality control results were evaluated in relation to these quality objectives. To achieve the project DQOs and for data to be deemed usable, these established quality objectives must be met. The assessment of the sample data precision, accuracy and bias, sensitivity, representativeness, completeness, comparability, and the usability of the data, as a result of this assessment, is discussed in detail below.

F.2.1 Precision

Precision is defined as the degree to which two or more measurements are in agreement. Field precision was measured by comparing sample results of field duplicate samples and analytical precision was measured by comparing sample results of matrix spike/matrix spike duplicate (MS/MSD) sample results for organic parameters and laboratory replicate samples for inorganic parameters, as well as dual column precision for DDD/PCBs analyses. The relative percent difference (RPD) between duplicate results was calculated and then compared to quality control acceptance criteria.

F.2.1.1 Field Precision. Field duplicates were collected by taking two aliquots of the same sample and submitting them to the laboratory for analysis as two separate samples (duplicate subsamples). Field duplicate samples were collected at a frequency of at least one for every 20 samples per matrix per parameter for use in assessing field precision. The actual number of field duplicates collected are specified in Table F-1. Field duplicates for sediment and surface water samples were collected at the required frequency for all parameters (fish field duplicate samples

were not required).

Field duplicate precision was assessed by comparing the calculated relative percent differences (RPDs) to the quality control acceptance criteria specified in the data validation guidelines. If the sample results were near or below the quantitation limit (QL), the RPD was not calculated and the sample results were considered to meet precision acceptance criteria and were not qualified. When the RPD acceptance criteria were exceeded, the results for those compounds in the associated samples were considered to be estimated values. Sample heterogeneity is one possible cause.

Sediment. For PAHs, 17 of 25 results were qualified as estimated due to high field duplicate RPD. In all instances, the concentration of the target analyte was higher in the parent field sample than its field duplicate, with the RPD exceedence ranging from 51 to 79%. The sample location selected for field duplicate analysis had PAH concentrations an order of magnitude higher than any other location, and may be subject to more heterogeneity than other locations.

Field duplicates met RPD acceptance criteria for the DDD/PCBs analysis.

For metals, two target analytes (manganese and vanadium) had poor field duplicate precision.

Surface Water. The field duplicate results met RPD acceptance criteria.

Fish. No field duplicates were collected for fish analysis.

Precision as measured by field duplicate evaluation was within project quality objectives for 32% of the PAH sediment data, 100% of the DDD/PCBs sediment data, 82% of the metals sediment data, and 100% of the surface water metals data. Overall, the field duplicate assessment indicated acceptable field precision for all matrices, with the exception of sediment PAHs, for the September/October 2004 sampling event.

F.2.1.2 Analytical Precision. Matrix spike and matrix spike duplicate samples for the PAH and DDD/PCBs analyses and matrix spike and laboratory replicate samples for the inorganic analyses were performed at a frequency of one per sample preparation batch, as stated in the DAS analytical specifications. Dual column precision was evaluated for every sample for DDD/PCBs analysis.

The method precision objectives, in terms of duplicate sample RPDs, were assessed using the criteria summarized in the DAS analytical specifications. For MS/MSD and replicate assessment, if the acceptance criteria were not met for the organic analyses analytical precision checks, only the associated results in the investigative sample were qualified as estimated. If the acceptance criteria were not met for the inorganic analyses precision checks, the associated results for all samples in the sample batch were qualified as estimated. If the analyte levels in the investigative sample were higher than the spike concentrations, the duplicate analysis was not evaluated since initially high concentrations of the analytes can preclude the quantitation of the spike amounts added.

Sediments. For PAHs, all 25 target analytes were qualified as estimated due to poor MS/MSD precision. Recoveries were consistently low, and the MSD was consistently lower than the MS sample. A possible cause of this imprecision may be sample heterogeneity, as sample concentrations, as measured in the unspiked sample, are subtracted from the spiked sample result prior to calculating recovery and RPD.

All MS/MSD results met acceptance criteria for DDD/PCBs analysis.

For metals, one analyte (silver) was qualified as estimated in all samples due to poor laboratory duplicate precision.

Surface Water. All laboratory duplicate precision criteria were met.

Fish. All MS/MSD RPD criteria were met for the PAH analysis.

For metals, four analytes (barium, chromium, cobalt, and manganese) were qualified as estimated due to poor laboratory duplicate precision.

Precision as measured by MS/MSD and laboratory duplicate evaluation was within the project quality objectives for none of the sediment PAH data, 100% of the DDD/PCBs sediment data, 91% of the sediment metals data, 100% of the surface water data, 100% of the fish PAH data, and 64% of the fish metals data.

Overall, the MS/MSD and laboratory duplicate assessment indicated acceptable precision for all matrices, with the exception of sediment PAHs, for the September/October 2004 sampling event.

Dual column precision for pesticide analyses was assessed by evaluating the percent difference (%D) between column results for each compound for each sample. Sample results were considered estimated or unusable according to the dual column precision nonconformances. When possible, results that would have been rejected due to poor dual column precision were reported from a less dilute analysis for which the result was above the calibration range (requiring it to be qualified as estimated) but for which dual column precision was within acceptance criteria.

For dual column precision, one DDD result was rejected and four Aroclor 1260 results were estimated in sediment samples due to poor dual column precision. Precision as measured by dual column percent difference was within the project quality objectives for 90% of the DDD/PCBs data.

F.2.2 Accuracy and Bias

Accuracy is defined as the degree to which the detected value represents the true value. Accuracy in the field was assessed through the collection and analysis of equipment blanks for PAHs, DDD/PCBs, and metals analyses for sediment samples; and metals analyses for surface water samples. Analytical accuracy in the laboratory was assessed through the evaluation of cooler temperatures, sample preservation and holding times, laboratory method blanks, surrogate spike recoveries, MS/MSD recoveries, laboratory fortified blanks, laboratory control spikes, and

performance evaluation (PE) samples. The field and analytical accuracy assessment is described below.

F.2.2.1 Field Accuracy. Accuracy in the field was assessed through the collection and analysis of equipment blanks for PAHs, DDD/PCBs, and metals analyses.

Equipment Blanks

Equipment blanks were used to evaluate the potential contamination of samples from the sampling equipment, sample containers, and sample handling and collection procedures. To collect the equipment blanks, deionized water was run over or through sample collection equipment after the initial decontamination procedure and prior to use. One equipment blank was collected for each matrix per parameter. Equipment blanks were not required for TOC/TCO, alkalinity, grain size, or toxicity samples due to the nature of the analysis. The scheduled frequency for the collection of equipment blanks was met or exceeded for all matrices and parameters during the sampling event.

Equipment blank results were evaluated to determine if contaminants were detected and the quantity of samples affected. Since an aqueous equipment blank cannot be directly applied to qualify results for solid matrices, sediment results were qualified with an "EB" flag for those compounds detected in the associated equipment blank. The "EB" qualifier indicates an indeterminate amount of sampling error has potentially affected the sample results.

Sediments. Seven target PAHs were detected in the equipment blank, with 42 associated results qualified with an "EB" to indicate that an indeterminant amount of the concentration may be attributable to contamination from equipment for these compounds. Note: Nondetect PAH results in the equipment blank were rejected due to a gross exceedence of holding time.

No target analytes were detected in the equipment blank associated with DDD/PCBs analysis.

For metals analysis three target analytes (barium, manganese, and zinc) were detected in the equipment blank resulting in 18 associated sample results qualified with an "EB" to indicate that an indeterminant amount of the concentration may be attributable to contamination from equipment for these analytes.

Surface Water. No data required qualification due to equipment blank contamination.

Fish. No equipment blank was associated with the fish samples.

Accuracy and bias as measured by equipment blank evaluation against project quality objectives for the sediment PAHs could not be evaluated due to the rejection of nondetect results in the equipment blank. Therefore, 28% of the sediment PAH data did not meet project quality objectives. Accuracy and bias as measured by equipment blank evaluation against project quality objectives for the sediment metals and surface water metals was 73% and 100%, respectively. Although it cannot be quantified, the potential of contamination from the equipment blank causing a false positive is reduced as the reported sample concentration increases. For example, it is

prudent to assume that any equipment contamination is negligible for the highest reported concentration of phenathrene (13,000 µg/kg) compared to a possible impact on the lowest reported concentration (29 µg/Kg) in the sediment samples.

F.2.2.2 Analytical Accuracy. Analytical accuracy in the laboratory was assessed through the evaluation of sample preservation and holding times, laboratory blanks, surrogate spike recoveries, MS/MSD recoveries, laboratory control sample recoveries, and performance evaluation (PE) samples.

Sample Preservation and Holding Times

In order to obtain accurate sample results, the samples must be properly cooled and chemically preserved prior to analysis and analyzed/prepared within the technical holding time specified in the analytical method. Shipment cooler temperatures were evaluated upon receipt at the laboratory for all samples. All cooler temperatures for this sampling event were received within the required range, with the exception of coolers received by the lab with sediment metals samples from their freeze drying subcontractor. No validation actions were taken as the metals results would not be expected to be adversely affected by the temperature exceedences that were noted. Sample pH was measured by the laboratory for the surface water samples and equipment blanks submitted for metals analysis to verify sample preservation in the field. The data usability was not affected by thermal and chemical preservation.

Technical holding times were assessed for each parameter. If the holding time was exceeded, positive and nondetect results were qualified as estimated, biased low, for all results for that sample. If the holding time exceeded double the method requirement, positive results were qualified as estimated, biased low, and nondetect results were rejected to eliminate false negatives caused by sample degradation.

All sediment PAH results were qualified as estimated due to holding time exceedences. In addition, nondetect PAH results for thte sediment equipment blank was rejected due to holding time exceedances more than double the method requirement.

Analytical accuracy and bias as measured by holding time evaluation were within project objectives for none of the PAH sediment samples. Holding times were not exceeded for the sediment DDD/PCBs and metals analyses, surface water analyses, and fish analyses. Overal data usability was not affected by holding time exceedances.

Laboratory Blanks

Laboratory blanks were used to evaluate the potential contamination of samples from the preparation and analytical procedures. Laboratory blanks were prepared and/or analyzed along with each batch of field samples, at a frequency of one per 20 samples per matrix per parameter per day of digestion/extraction and/or analysis. The scheduled frequency for the analysis of laboratory blanks was met or exceeded for all matrices and parameters. Laboratory blanks were evaluated against their associated field samples to determine if a laboratory condition contributed to false positives or high bias in the field samples. Select sample results were negated on the basis

of this comparison, in accordance with the data validation guidelines.

Sediments. For PAH analyses, nine target analytes were detected in the method blank, but only one sample result required qualification as nondetect as other results were either nondetect or greater than the blank action level.

No blank qualification of data was necessary for the sediment DDD/PCBs or metals analysis.

Surface Water. No blank qualification of surface water data was required.

Fish. PAH results were affected by low levels of PAHs in laboratory blanks. Data were blank qualified for fifteen target analytes. A total of 84 results were qualified as nondetect at the detection limit and 110 results were qualified as nondetect at the reported concentration. Blank action levels for qualifying data ranged up to ten times the quantitation limit.

Laboratory blank contamination required qualification of 18 results in 13 samples for two target analytes (aluminum and cobalt). Cobalt results were estimated and aluminum results were qualifed as nondetect at the reported concentration. The maximum concentration of aluminum data qualified was 2.1 µg/L, compared to a method quantitation limit of 1.0 µg/L.

Accuracy and bias as measured by laboratory blank evaluation was within project quality objectives for 99% of the sediment PAH data, 100% of the sediment DDD/PCBs and metals data, 100% of the surface water data, 69% of the fish PAH data, and 93% of the fish metals data.

Surrogate Spike Recoveries

Surrogate compounds were added to each sample undergoing organic analyses to assess method performance and/or extraction efficiency. Surrogate recoveries were evaluated using acceptance criteria specified in the analytical methods; sample results associated with high surrogate recoveries were considered estimated values with a high bias and results associated with low surrogate recoveries were considered estimated values with a low bias. In general, the samples in each matrix yielded acceptable surrogate spike performances.

Sediment. Three samples had positive PAH results qualified due to low surrogate recovery. For DDD/PCBs analysis four DDD results and two PCB results were qualified as estimated due to high surrogate recovery.

Surface Water. No analyses requiring surrogates was performed on surface water samples.

Fish. All fish PAH analyses met surrogate recovery criteria.

Accuracy and bias as measured by surrogate recovery evaluation was within project quality objectives for 50% of sediment PAH results, 88% of sediment DDD/PCBs results, and 100% of fish PAH results.

MS/MSD Recoveries

Matrix spike compounds were added to select samples prior to preparation and/or analysis to assess the effect of sample matrix on the method performance. The recoveries of the MS compounds were evaluated and compared to acceptance criteria to determine if there was a matrix effect which would affect sample analysis.

Matrix spike analyses were scheduled to be performed at a frequency of one per 20 samples per matrix per parameter, except for fish tissue, which had one per 25 samples, in accordance with the site-specific SAP (M&E, 2004b). The scheduled frequency was met for all samples analyzed for this sampling event.

Matrix spike recoveries were evaluated to assess if matrix effects contributed to a high or low bias in the sample results. In accordance with the data validation guidelines, for organic parameters only, the results of the sample submitted for MS/MSD analysis were qualified if the spike recoveries were outside of the method-specified acceptance criteria. For inorganic parameters, results for all associated samples were qualified if matrix spike or post-digestion spike recoveries were outside of criteria. For organic and inorganic parameters, extremely low recoveries indicated a lack of confidence in associated nondetect results and results for spike compounds that recovered very low were rejected.

Sediments. All 25 target PAHs were qualified as estimated in the sample used for MS/MSD analysis due to low MS and MSD recovery. Recoveries were consistently low, and the MSD was consistently lower than the MS sample. A possible cause of this imprecision may be sample heterogeneity, as sample concentrations, as measured in the unspiked sample, are subtracted from the spiked sample result prior to calculating recovery.

All MS/MSD criteria were met for the DDD/PCBs analysis.

For metals one target analyte (lead) had low MS recovery, resulting in the qualification of all sample results for this analyte.

Surface Water. All MS recovery criteria were met.

Fish. All MS/MSD recovery criteria were met in the PAH analysis. Two metals analytes (cobalt and lead) had MS recoveries outside of acceptance windows that resulted in all results for these analytes being qualified as estimated.

Accuracy and bias as measured by MS and MSD recovery evaluation was within project quality objectives for none of the sediment PAH results, 100% of sediment DDD/PCBs results, 91% of sediment metals results, 100% of fish PAH results, and 82% of fish metals results.

PE Samples. PE samples served as a single-blind check on the laboratory's accuracy. PE samples were scheduled to be submitted to the laboratory at a frequency of one per SDG per matrix per parameter, with the exception of alkalinity, TOC, grain size, and toxicity, for which no PE samples were submitted to the laboratory. The required PE sample frequency was met for all parameters.

Sediments. For PAHs one target analyte (naphthalene) was evaluated as "Action Low" in U.S. EPA's evaluation of the PE sample results. This evaluation requires rejection of nondetects for this analyte, but since all samples had detections no validation action was required. Both the metals and DDD/PCBs had acceptable results for the PE samples.

Surface Water. All PE samples had acceptable results.

Fish. For PAH analysis 128 results for ten analytes were qualified as estimated due to PE recoveries outside of acceptance windows. All metals PE results met criteria.

Accuracy and bias as measured by PE sample evaluation was within project quality objectives for 100% of sediment PAH, DDD/PCBs, and metals results, 100% of surface water and fish metals results, and 80% of fish PAH results.

F.2.3 Sensitivity

Sensitivity was assessed by the evaluation of analytical quantitation limits (QLs) and the recoveries of target analytes in laboratory fortified blanks (LFBs). Analytical methods were selected such that QLs would allow comparison to the program action limits (PALs) and to historical data. It should be noted that the QLs for PAH analysis were higher than those in the DAS specification, and were based on discussions between M&E and the laboratory prior to commencement of the sampling program, and these revised QLs were incorporated into the site-specific SAP (M&E, 2004b). The revised QLs still were appropriate for comparison to PALs. It should be noted the QLs should be considered target values only, as actual QLs were affected by sample dilutions. Several samples required dilutions due to high concentrations of target analytes. For the most part, QLs were not affected by these dilutions since the results of the undiluted and diluted analyses were combined during the validation in order to report the lowest possible QLs and all results within the calibration range.

An LFB is a reagent blank spiked with all target compounds at or below the QL. The LFB data were used to assess laboratory sensitivity and bias for specific compounds at the QL within an analytical method on a specific instrument and column at the time of sample preparation and analysis. Sensitivity objectives for the LFBs were listed in the DAS specifications for each method in terms of percent recovery. The LFBs were scheduled to be analyzed at a frequency of once per 20 samples per matrix per parameter, except for fish tissue, which had one per 25 samples, in accordance with the site-specific SAP (M&E, 2004b).

The QLs were evaluated for each matrix and parameter to verify that the limits were at or below the QLs required in the associated DAS analytical specification (and discussions with the lab for PAH analyses).

The LFB recoveries were evaluated for each parameter for each matrix to determine if percent recoveries of the spiked analytes were within acceptance criteria. For those compounds with LFB percent recoveries outside of acceptance criteria, associated results were considered estimated. Extremely low recoveries indicated the possibility of false negatives due to poor instrument sensitivity, and associated nondetect results were rejected.

Sediment. For PAH results, one target analyte (dibenzofuran) had a high LFB recovery that exceeded the acceptance window resulting in the qualification as estimated of all results for this analyte.

All LFB criteria were met for the DDD/PCBs and metals analyses.

Surface Water. All LFB criteria were met.

Fish. High PAH LFB recoveries were noted for 20 of 25 target analytes, resulting in the qualification of 229 results. It is reasonable to assume that the low level laboratory blank contamination adversely affected the calculation of LFB recoveries, as no blank correction is performed when calculating the recovery. For metals, two nondetect results for one analyte (vanadium) were rejected due to low LFB recovery. The LFB recovery outside acceptance criteria for four analytes (chromium, copper, vanadium, and zinc) also resulted in the qualification as estimated 98 metals results.

Sensitivity as measured by LFB evaluation was within project quality objectives for 96% of sediment PAH results, 100% for sediment DDD/PCBs and metals results, 100% of surface water metals results, 63% of fish PAH results, and 64% of fish PAH results.

F.2.4 Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected. For this site, completeness was assessed by comparing: 1) the number of samples successfully analyzed to the number submitted, and; 2) the number of valid measurements to the number of measurements obtained. Completeness was calculated according to the following equations:

1. % completeness = [(number of samples analyzed)/(number of samples submitted)] x 100
2. % completeness = [(number of usable results)/(number of expected results)] x 100

Completeness was evaluated for each matrix and for all samples. The goal for completeness was 90%.

All samples submitted for laboratory analysis were successfully analyzed and 100% completeness was established in these terms for the sampling event.

Sediment. Not including results for the equipment blank, all sediment results were valid and usable, resulting in 100% completeness for that parameter. If equipment blank results are also included in the completeness assessment, 90% completeness was achieved.

The DDD/PCBs analyses achieved 98% completeness and the metals analyses achieved 100% completeness.

Surface Water. 100% completeness was achieved for surface water analyses.

Fish. 100% completeness was achieved for PAH analyses, and 99% completeness was achieved for metals analyses.

Overall, for all matrices a completeness of 99.8% was achieved.

F.2.5 Representativeness

Representativeness expresses the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is a qualitative parameter that is dependent upon the proper design of the sampling program and the laboratory quality control program.

Representativeness in the field was dependent upon the proper design of the sampling program and was satisfied during this sampling event by following the project SAP (M&E, 2004b) and using proper sampling, sample handling, and sample preservation techniques.

Representativeness in the laboratory was provided by using the proper analytical procedures, appropriate methods, and meeting sample holding times. The data are of sufficient quantity and quality to represent the site conditions accurately and precisely and be used to meet project DQOs.

F.2.6 Comparability

Comparability expresses the confidence with which one data set can be compared to another. In order to meet DQOs, data from this sampling event needed to be comparable to each other, to program action levels, and to historical data.

Comparability in the field was dependent upon the proper design of the sampling program and was satisfied by providing that the sampling program was followed and sampling techniques were consistent and correct. Sampling techniques and procedures were kept consistent throughout the September/October 2004 event.

Comparability of laboratory results was dependent on the consistent use of comparable EPA-approved DAS analytical methods, the reporting of data in standardized units, and acceptable PE sample results. The data from this sampling event met these comparability criteria.

F.3 SUMMARY

In general, the data collected during this sampling event met the established quality objectives and

can be considered valid for project DQOs and decision-making purposes. However, 31% of the PAH results in tissue samples were blank qualified due to laboratory issues. The affected positive results for target PAH compounds in the samples were qualified as nondetects (U) at the reported values for those results greater than the quantitation limit or as nondetects (U) at the quantitation limit for those samples concentrations below the quantitation limit due to method blank contamination. The results are usable for project objectives as nondetects at raised detection limits. This qualification has a minor impact on the data usability. The reporting limit for the PAHs was 2.0 µg/kg. On average, the detection limits after blank qualification were less than five times the original reporting limit. With the exception of six results for acenapthene, where the blank qualified nondetect result was higher than acenapthene's PAL, all nondetects at raised detection limits were below PALs. For the six acenapththene results, the highest raised detection limit was 50% higher than the PAL. Poor field duplicate precision was also noted for the sediment PAH analysis, although the concentrations of target PAHs in the parent and field duplicate sample had higher concentrations of PAHs (generally one to two orders of magnitude) than other samples, suggesting that these elevated concentrations were consistently detected at this location. Therefore, the data are considered usable for the project. The 90% completeness goal for all samples was met.

Table F.1 Quality Control Sample Summary Table

Medium/ Matrix	Analytical Parameter	Analytical Method	No. of Field Duplicate Pairs	Organic		Inorganic		No. of Trip Blanks	No. of Equipment Blanks	No. of PE Samples
				No. of MS	No. of MSD	No. of Duplicates	No. of MS			
SW	metals - total	DAS D-004.1	1	0	0	1	1	0	1	1
SW	metals - dissolved	DAS D-004.1	1	0	0	1	1	0	1	1
SW	alkalinity	DAS D-033.1	1	0	0	1	0	0	0	0
SE	PAHs	DAS D-054.1	1	1	1	0	0	0	1	1
SE	pest/PCBs	DAS D-043.1	1	1	1	0	0	0	1	1
SE	metals	DAS D-004.1	1	0	0	1	1	0	1	1
SE	total organic carbon	DAS D-005.1	1	1	0	all samples	0	0	0	0
FI	PAHs	DAS D-052.1	0	1	1	0	0	0	0	1
FI	metals	DAS D-134	0	0	0	1	1	0	0	1
FI	lipids	DAS D-058.1	0	0	0	1	0	0	0	0

SW - Surface Water
SE - Sediment
FI - Fish
MS - Matrix Spike
MSD - Matrix Spike Duplicate
PE - Performance Evaluation

APPENDIX G

ESI's Sediment Toxicity Testing Report

ESI

EnviroSystems, Inc.
One Lafayette Road
P.O. Box 778
Hampton, N.H. 03843-0778
(603) 926-3345 • (603) 926-3521 Fax
www.envirosystems.com

November 3, 2004

Mr. Andy Schkuta
Metcalf & Eddy, Incorporated
701 Edgewater Drive
Wakefield, Massachusetts 01880

Dear Mr. Schkuta

Enclosed, please find two (2) copies of our final report evaluating the toxicity of sediment samples collected as part of the Iron Horse Park Sediment Evaluation. Sediment toxicity was evaluated during October 2004 using the freshwater midge, *Chironomus tentans* and amphipod, *Hyalella azteca*. Sediment toxicity was also evaluated by Microtox®. The Microtox® results can be found in Appendix A.

Please do not hesitate to call me or Brian Buzby should you have any questions or comments on the report.

Sincerely,

EnviroSystems, Incorporated

Kenneth A. Simon
President

Enclosure
Two (2) Copies: One (1) Bound, One (1) Unbound
Report Number 12551-04-10

TOXICOLOGICAL EVALUATION OF SEDIMENT SAMPLES

Iron Horse Park Sediment Evaluation *Chironomus tentans* and *Hyalella azteca* Survival and Growth Tests

Prepared For

Metcalf & Eddy, Incorporated
701 Edgewater Drive
Wakefield, Massachusetts 01880

Client Reference: W/A #158-RICO-0157
EPA RAC Contract # 68-W6-0042

By

EnviroSystems, Incorporated
1 Lafayette Road
Hampton, New Hampshire 03842

October 2004
Reference Number 12551-04-10

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TOXICOLOGICAL EVALUATION OF SEDIMENT SAMPLES October 2004

Iron Horse Park Sediment Evaluation *Chironomus tentans* and *Hyalella azteca* Chronic Exposure Sediment Toxicity Tests

Client Reference: W/A #158-RICO-0157
EPA RAC Contract # 68-W6-0042

1.0 INTRODUCTION

Toxicity tests expose groups of organisms to environmental samples, a laboratory control and/or a field reference site for a specified period to assess potential impacts on a variety of endpoints, such as survival, growth or reproduction. Analysis of variance techniques are used to determine the relative toxicity of the samples as compared to the laboratory control and/or field reference site.

This report presents the results of chronic exposure, survival and growth, toxicity tests conducted on five samples collected from the Iron Horse Park in central Massachusetts. The samples were provided by Metcalf & Eddy, Inc., Wakefield, Massachusetts . Testing was based on programs and protocols developed by the ASTM (2001) and US EPA (2000). The toxicity of the samples was assessed by conducting toxicity tests using the freshwater midge, *Chironomus tentans* and amphipod *Hyalella azteca*. Assays and supporting analyses were performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire.

2.0 MATERIALS AND METHODS

2.1 General Methods, Biological Evaluations

Toxicological and analytical protocols used in this program follow procedures outlined in *Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates* (ASTM 2001), *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (US EPA 2000) and *Standard Methods for the Examination of Water and Wastewater*, 20th Edition (APHA 1998). These protocols provide standard approaches for physical and chemical analysis and for the evaluation of toxicological effects of sediments on aquatic invertebrates.

2.2 Test Species

C. tentans were obtained from Aquatic Research Organisms, Inc., Hampton, New Hampshire. Larvae were classed as second instar and were approximately 13 days old at the start of the assay. Organisms were received at ESI the day prior to starting the assays. Organisms were held in natural surface water prior to the start of the assay.

H. azteca were obtained from Aquatic Research Organisms (ARO), Hampton, New Hampshire. Organisms were approximately 10 days old at the start of the assay. Organisms were

received at ESI the day prior to starting the assays. Organisms were held in a mix of moderately hard and natural surface water prior to the start of the assay.

2.3 Test Samples and Laboratory Control Sediment

2.3.1 Test Samples

A total of twenty-three (23) sediment samples from the Iron Horse Park project site were received at ESI between September 14 and September 21, 2004. Once received, samples were inspected, to determine integrity, given unique sample numbers and logged into the laboratory sample management database. Once logged into the sample management database samples were placed in a secure refrigerated, 2 - 4 °C, storage area until required. A listing of sample description, collection and receipt information is summarized in Table 1.

Prior to use in the assays sediments were screened using a MicroTox® solid phase screening assay. Results of the screening assays are provided in a Appendix A. Data from the screening assays was transmitted to Metcalf & Eddy on completion of the tests. The Metcalf & Eddy staff then provided ESI with a list of 5 samples to be evaluated using the 10-day acute exposure amphipod and midge larvae assays.

2.3.2 Control Sediments and Overlying Waters

For the midge larvae, the control substrate was an artificial sediment consisting primarily of silica sand, with approximately 2-3% organic material, by weight, added to the sand (EnviroSystems SOP QA-1470). Overlying water was a natural surface water collected from Bow Lake, Strafford, New Hampshire. Use of natural surface water over an artificial reconstituted water is recommended by the protocol (EPA 2000, ASTM 2001).

The amphipod assay laboratory control substrate was an artificial sediment consisting primarily of silica sand, with approximately 2-3%, by weight, of natural detritus. The detritus was collected above the water line in the pond but in a damp area. The top 0.5 to 1.0 cm of the sediment was collected. The organic detritus was mixed into the silica sand. Overlying water was a mix of moderately hard synthetic and natural surface water. The surface water was collected from Bow Lake, Strafford, New Hampshire. Use of synthetic/natural surface water over an artificial reconstituted water is recommended by the protocol (EPA 2000, ASTM 2001).

2.4 *Chironomus tentans* Survival and Growth Assays

The 10-day midge survival and growth evaluation sediment tests were conducted according to ASTM method E 1706-95 (ASTM 2001) and EPA method 100.5 (EPA 2000). Endpoints of the 10 day exposure were survival and growth, measured as ash free dry weight. The tests were started on October 5 and terminated on October 15, 2004.

The site sediment and laboratory control sediment treatments consisted of 8 replicates with 10 organisms/replicate. Test vessels were 400 mL glass beakers containing approximately 100 mL of sediment and 250 mL of overlying water. Test vessels were drilled at a consistent height above their bases and the hole covered with Nytex® screen. The screened hole facilitated water exchange without compromising organisms. The overlying water volume to sediment surface area ratio was approximately 7:1. Vessels were maintained in a water bath during the assay. Depth of the water in the bath was set to be approximately 1 cm below the drain hole in the test vessel to eliminate flow of water from the bath into the test vessel. The water bath was maintained in a limited access, temperature controlled room. Temperatures in the room and water bath were independently maintained at 23 ±1°C. The photoperiod in the test chamber was set at 16:8 hour light:dark. Light was provided by cool white flourescent bulbs.

The day prior to test initiation (day -1), control and test sediments were sieved using a 2 mm sieve to remove rocks, twigs, and other debris. Sediments were placed in the test vessels. Overlying water was immediately added, and the vessels were left undisturbed overnight to settle. Floating detritus was removed the next morning. On day 0, larvae were added below the water surface of each test vessel.

Overlying water in each replicate was renewed daily after collection of water quality data. The volume of water added to each test chamber was approximately 500 mL, two volumes. Water exchanges were facilitated by use of a distribution system designed to provide equal, regulated, flow to each chamber. The system was activated manually by the addition of the water.

Prior to the daily overlying water renewal, temperature, specific conductance, pH, and dissolved oxygen were measured in one replicate of each treatment. Temperature data collected in a surrogate test chamber on an hourly basis during the 10 day exposure period documented a mean temperature of 24.5°C with values ranging from 20.0 to 25.5°C. Alkalinity, ammonia, and hardness of the overlying water were measured at the beginning and end of the assay. Water quality data are presented in Table 7. Daily overlying water quality records are available in Appendix A. Each replicate was fed 1.5 mL of a 6 g/L Tetramin® flake fish food suspension after the daily renewal.

After 10 days exposure, all replicates of each test treatment were terminated to collect data for the initial survival and growth portion of the tests. Each test chamber was gently swirled to loosen the sediments and the test material was dumped into an 8" stainless steel sieve with a 0.5 mm mesh screen. The sediments were washed through the sieve using synthetic, moderately hard reconstituted water and material left on the screen was sorted to recover of the organisms. This process was continued until the entire sample was evaluated. Surviving larvae were placed on tared weighing pans; partially and fully emerged organisms were recorded in survival counts but not included in weight measurements. Pans were dried overnight at 70°C to obtain dry weight to the nearest 0.01 mg. The organisms were then fired in a muffle furnace for two hours at 550 °C to obtain the ash free dry weight to the nearest 0.01 mg. The mean weight of surviving organisms was determined to assess growth.

2.5 *H. azteca* Survival and Growth Assays

The 10 day amphipod survival and growth tests were conducted according to ASTM Method E 1706-95 (ASTM 2001) and EPA method 100.4 (EPA 2000). Endpoints of the 10 day exposure were survival and growth, measured as dry weight. The tests were started on October 5 and terminated on October 15, 2004.

The site sediment and laboratory control sediment treatments consisted of 8 replicates with 10 organisms/replicate. Test vessels were 400 mL glass beakers containing approximately 100 mL of sediment and 250 mL of overlying water. The overlying water volume to sediment surface area ratio was approximately 7:1. Test vessels were drilled at a consistent height above their bases and the hole covered with Nytex® screen. The screened hole facilitated water exchange without compromising organisms. Vessels were maintained in a water bath during the assay. Depth of the water in the bath was set to be approximately 1 cm below the drain hole in the test vessel to eliminate flow of water from the bath into the test vessel. The water bath was maintained in a limited-access temperature controlled room. Temperatures in the room and water bath were independently maintained at 23 ±1°C. The photoperiod in the test chamber was set at 16:8 hour light:dark. Light was provided by cool white flourescent bulbs.

One day prior to test initiation (Day -1), control and test sediments were sieved using a 2 mm sieve to remove rocks, twigs, and other debris. Sediments were placed in the test vessels. Overlying water was immediately added, and the vessels were left undisturbed overnight to settle. Floating detritus was removed the next morning. On Day 0, organisms were added below the water surface of each test vessel.

Overlying water in each replicate was renewed daily after collection of water quality data. The volume of water added to each test chamber was approximately 500 mL or two volumes. Water exchanges were facilitated by use of a distribution system designed to provide equal, regulated, flow to each chamber. The system was activated manually by the addition of water during the assay.

Prior to the daily overlying water renewal, temperature, specific conductance, pH, and dissolved oxygen were measured in one replicate of each treatment. Temperature data collected in a surrogate test chamber collected on a hourly basis during the 10 day exposure period documented a mean temperature of 24.5°C with values ranging from 20.0 to 25.5°C. Alkalinity, ammonia, and hardness of the overlying water were measured at the beginning and end of the assay. Water quality data are presented in Table 7. Daily overlying water quality records are available in Appendix A. Each replicate was fed 1.0 mL of a yeast/trout chow/alfalfa suspension after the daily renewal.

After 10 days exposure, all replicates of each test treatment were terminated to collect data for the survival and growth endpoints. Each test chamber was gently swirled to loosen the sediments and the test material was dumped into an 8" stainless steel sieve with a 0.35 mm mesh screen. The sediments were washed through the sieve using synthetic, moderately hard reconstituted water and material left on the screen was sorted to recover of the organisms. This process was continued until the entire sample was evaluated. Organisms recovered were set aside to determine growth. Surviving amphipods were counted and placed on tared weighing pans. Pans were dried overnight at 70°C to obtain dry weight to the nearest 0.01 mg. The mean dry weight of surviving organisms was determined to assess growth.

2.6 Statistical Analysis

Endpoints were analyzed using CETIS® (Comprehensive Environmental Toxicity Information System) software to determine significant differences between the test sediments and the laboratory control sediment. Data sets were evaluated to determine normality of distribution and homogeneity of sample variance. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Pair-wise comparisons were made using the most appropriate two sample analysis. Statistical difference was evaluated at α=0.05. Statistical comparisons were made against the laboratory control treatment and the project's reference site.

2.7 Quality Control

As part of the laboratory quality control program, reference toxicant evaluations are conducted by ESI on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Results were within two standard deviations of ESI's historic mean for the species. Results are summarized in Table 8.

2.8 Protocol Deviations

Review of data collected during this series of assays documented the following deviations from the prescribed protocol. Review of water quality parameters collected at the beginning and end of the assays documented a greater than 50% change in the alkalinity, ammonia, hardness and conductivity levels of the overlying water between the start and end of the chironomid assay. A similar deviation was noted for the alkalinity and ammonia levels in the amphipod assay. Review of the water quality data collected on the renewal water used in the assays documented, that prior to being added to the test chambers, there was less than a 50% change in concentration for the identified parameters between the start and end of the assay. The changes reported in the test chambers reflect the influence of the substrate on the water quality parameters.

It is the opinionof the study director that the protocol deviations recorded as part of a review of the project data had no significant impact on the overall outcome of the assays.

3.0 TOXICOLOGICAL TESTING RESULTS AND DISCUSSION

Chironomid survival and growth data are summarized in Tables 2 and 3, respectively. Amphipod survival and growth data from day 10 are summarized in Tables 4 and 5, respectively. Water quality data collected during the assays is summarized in Table 6 and 7. Reference toxicant data is summarized in Table 8. Support data, including copies of laboratory bench sheets, individual endpoint summaries and statistical analysis data printouts are provided in Appendix A.

3.1 *Chironomus tentans* Survival and Growth Evaluation

At the end of the 10 day exposure period, mean survival in the laboratory control sediment was 83.8%. Larvae recovered from the laboratory control sediment had a mean ash free dry weight of 2.03 mg/larvae. The minimum acceptable criteria for survival in the laboratory control is 70% and the minimum acceptable criteria for growth is a mean ash free dry weight of 0.48 mg/larvae. These data indicate that the organisms were healthy and not stressed by handling.

Chironomid survival in the project reference site sediment (SED-22) at the end of the 10-day exposure period was 77.5%, with individual replicates ranging from 70 to 100%. Surviving midge larvae had a mean ash free dry weight of 1.84 mg/larvae. Survival and growth of midge larvae maintained in the reference site sediment was not statistically less from that observed in the laboratory control.

Tables 2 and 3 summarize the survival and growth results associated with all five sediment sites.

3.2 *Hyalella azteca* Survival and Growth Evaluation

At the end of the 10 day exposure period, mean survival in laboratory control sediment was 100%. Amphipods recovered from laboratory control sediment had a mean dry weight of 0.080 mg/amphipod. The dry weight of a representative group of amphipods at the start of the assay was 0.030 mg/individual. The minimum test acceptability criteria for survival in the laboratory control is 80%. The minimum acceptable criteria for growth is a demonstration of increased dry weight after 10 days exposure. These data indicate that the organisms were healthy and not stressed by handling.

Amphipod survival in the project reference site sediment (SED-22) at the end of the 10-day exposure period was 92.5% survival, with individual replicates ranging from 80 to 100%. Surviving amphipods had a mean dry weight of 0.078 mg/amphipod. Survival but not growth of the amphipods maintained in the reference site sediment was statistically less than that observed in the laboratory control.

Tables 4 and 5 summarize the survival and growth results associated with all five sediment sites.

3.3 Summary

3.3.1 *Chironomus tentans* Test Summary

Review of survival data showed that after 10 days exposure survival of chironomids maintained in sediment from site SED-11 was significantly less as compared to the laboratory control, but not as compared to the reference site sediment. Analysis of growth data, ash free dry weight, showed that larvae maintained in sediment from SED-05, SED-11 and SED18 project sites exhibited statistically lower growth when compared to both the laboratory control and project reference site sediment.

3.3.2 *Hyalella azteca* Test Summary

Review of survival data showed that after 10 days exposure survival of amphipods maintained in sediments from sites SED-01, SED-05, SED-11 and SED18 was significantly less as compared to the laboratory control. When statistical comparisons for survival were made against the project reference site survival in sediment from site SED-18 was found to be significantly less.

Analysis of growth data showed that amphipods maintained all four sediment project sites did not exhibit statistically lower growth as compared to both the laboratory control and the project reference site sediment.

4.0 REFERENCES

APHA. 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition. Washington D.C.

ASTM. 2001. Annual Book of ASTM Standards. Volume 11.05. *Test Methods for Measuring the Toxicity of sediment-Associated Contaminants with Freshwater Invertebrates.* E 1706-00. ASTM, Philadelphia.

U.S. EPA. 2000. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.* Second Edition. EPA/600-R-99/064.

EnviroSystems' SOP QA-1470: Chronic Toxicity of Sediments To Midge Larvae, *Chironomus tentans*, Based on Emergence

Table 1. Sample Collection and Receipt Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004

Station Location	M&E Sample #	ESI Ref#	Matrix	Sample Collected		Sample Received	
				Date	Time	Date	Time
SED-01	D05199	004	Sediment	09/14/04	0920	09/15/04	1045
SED-02	D05200	005	Sediment	09/14/04	1505	09/15/04	1045
SED-03	D05201	006	Sediment	09/14/04	1110	09/15/04	1045
SED-04	D05202	007	Sediment	09/13/04	1310	09/15/04	1045
SED-05	D05203	011	Sediment	09/15/04	1200	09/17/04	1040
SED-06	D05205	008	Sediment	09/15/04	1120	09/16/04	1000
SED-07	D05206	009	Sediment	09/15/04	1300	09/16/04	1000
SED-08	D05207	010	Sediment	09/15/04	0915	09/16/04	1000
SED-09	D05208	012	Sediment	09/16/04	0840	09/17/04	1040
SED-10	D05209	013	Sediment	09/16/04	0930	09/17/04	1040
SED-11	D05210	014	Sediment	09/16/04	1035	09/17/04	1040
SED-12	D05211	015	Sediment	09/16/04	1200	09/17/04	1040
SED-13	D05212	022	Sediment	09/20/04	1030	09/21/04	1020
SED-14	D05213	023	Sediment	09/20/04	1320	09/21/04	1020
SED-15	D05214	017	Sediment	09/17/04	1215	09/20/04	0830
SED-16	D05215	018	Sediment	09/17/04	0945	09/20/04	0830
SED-17	D05216	016	Sediment	09/16/04	1450	09/17/04	1040
SED-18	D05217	019	Sediment	09/16/04	1345	09/20/04	0830
SED-19	D05218	020	Sediment	09/17/04	1500	09/20/04	0830
SED-20	D05219	021	Sediment	09/17/04	1410	09/20/04 & 09/21/04	0830 & 1020
SED-21	D05220	001	Sediment	09/13/04	1320	09/14/04	1100
SED-22	D05221	002	Sediment	09/13/04	1545	09/14/04	1100
SED-23	D05222	003	Sediment	09/13/04	1425	09/14/04	1100

Table 2. *Chironomus tentans* Survival Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site Reference	ESI Ref #	Mean Survival	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Survival Against Laboratory Control								
Lab Control	000	83.8%						
SED-22	-002	77.5%	Normal	Equal	0.9946	1.8946	0.1765	NO
SED-01	-004	90.0%	Normal	Equal	-1.1632	1.77613	0.8679	NO
SED-05	-011	93.8%	Normal	Equal	-2.0281	1.8946	0.9589	NO
SED-11	-014	71.3%	Normal	Equal	2.1719	1.8946	0.0332	YES
SED-18	-019	88.8%	Normal	Equal	-1.1929	1.8946	0.8641	NO
Statistical Comparison of Survival Against Project Reference Site - SED-22								
SED-22	-002	77.5%						
SED-01	-004	90.0%	Normal	Equal	-1.8964	1.8946	0.9501	NO
SED-05	-011	93.8%	Normal	Equal	-3.4750	1.8946	0.9948	NO
SED-11	-014	71.3%	Normal	Equal	1.2556	1.8946	0.1248	NO
SED-18	-019	88.8%	Normal	Equal	-1.8853	1.8946	0.9493	NO

Table 3. *Chironomus tentans* Growth Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site Reference	ESI Ref #	Mean AFDW (mg)	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Growth Against Laboratory Control								
Lab Control	000	2.03						
SED-22	-002	1.84	Normal	Equal	1.6067	1.8946	0.0761	NO
SED-01	-004	2.21	Normal	Equal	-1.2646	1.8946	0.8767	NO
SED-05	-011	1.34	Normal	Equal	8.2081	1.8946	0.0000	YES
SED-11	-014	1.40	Normal	Equal	5.6588	1.8946	0.0004	YES
SED-18	-019	0.94	Normal	Equal	17.2139	1.8946	0.0000	YES
Statistical Comparison of Growth Against Project Reference Site - SED-22								
SED-22	-002	1.84						
SED-01	-004	2.21	Normal	Equal	-2.7580	1.7613	0.9923	NO
SED-05	-011	1.34	Normal	Equal	4.5019	1.7613	0.0002	YES
SED-11	-014	1.40	Normal	Equal	3.2943	1.7613	0.0027	YES
SED-18	-019	0.94	Normal	Equal	8.4356	1.7613	0.0000	YES

Table 4. *Hyalella azteca* Survival Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site Reference	ESI Ref #	Mean Survival (%)	Distribution	Variance	t Value	t- Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Survival Against Laboratory Control								
Lab Control	-000	100.0						
SED-22	-002	92.5	Non Normal	Unequal	3.0740	1.8946	0.0090	YES
SED-01	-004	96.3	Non Normal	Unequal	2.0494	1.8946	0.0398	YES
SED-05	-011	87.5	Non Normal	Unequal	5.2354	1.8946	0.0006	YES
SED-11	-014	87.5	Non Normal	Unequal	2.1806	1.8946	0.0328	YES
SED-18	-019	7.5	Non Normal	Unequal	17.5529	1.8946	0.0000	YES
Statistical Comparison of Survival Against Project Reference Site - SED-22								
SED-22	-002	92.5						
SED-01	-004	96.3	Normal	Equal	-1.1482	1.8946	0.8557	NO
SED-05	-011	87.5	Normal	Equal	1.5614	1.8946	0.0812	NO
SED-11	-014	87.5	Normal	Equal	0.8360	1.8946	0.2154	NO
SED-18	-019	7.5	Non Normal	Equal	12.2955	1.8946	0.0000	YES

Table 5. *Hyalella azteca* Growth Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site Reference	ESI Ref #	Mean Dry Weight (mg)	Distribution	Variance	t Value	t-Test Critical t Value	p Value	Significant Difference
Statistical Comparison of Growth Against Laboratory Control								
Lab Control	000	0.080						
SED-22	-002	0.077	Normal	Equal	0.6173	1.8946	0.2783	NO
SED-01	-004	0.087	Normal	Equal	-0.8792	1.8946	0.7958	NO
SED-05	-011	0.077	Normal	Equal	0.5300	1.8946	0.3063	NO
SED-11	-014	0.070	Normal	Equal	1.3390	1.8946	0.1112	NO
SED-18	-019	0.097	Normal	Unequal	-0.5068	2.9200	0.6687	NO
Statistical Comparison of Growth Against Project Reference Site - SED-22								
SED-22	-002	0.077						
SED-01	-004	0.087	Normal	Equal	-1.1530	1.8946	0.8566	NO
SED-05	-011	0.077	Normal	Equal	0.1433	1.8946	0.4450	NO
SED-11	-014	0.070	Normal	Equal	1.2637	1.8946	0.1234	NO
SED-18	-019	0.097	Normal	Unequal	-0.5987	2.9200	0.6949	NO

Table 6. *Chironomus tentans* Water Quality Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site ID	ESI Reference	Day	Alkalinity (mg/L)	Ammonia (mg/L)	Hardness (mg/L)	pH (SU)	Conductivity (µmhos/cm)
	POND	Day 0	ND	ND	9	-	-
		Day 10	ND	ND	9	-	-
Lab Control	-000	Day 0	16	ND	45	7.27	206
		Day 10	30	1.8	25	6.95	116
SED-22	-002	Day 0	ND	0.2	17	6.21	78
		Day 10	13	1.8	7	6.55	99
SED-01	-004	Day 0	120	23	55	7.82	685
		Day 10	75	4.8	38	7.33	213
SED-05	-011	Day 0	22	0.9	45	7.35	160
		Day 10	18	1.5	20	6.90	95
SED-11	-014	Day 0	ND	0.5	65	7.13	101
		Day 10	ND	1.0	16	6.74	77
SED-18	-019	Day 0	ND	ND	37	6.99	123
		Day 10	ND	0.9	12	6.71	85

Table 7. *Hyalella azteca* Water Quality Summary.
Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy, October 2004.

Site ID	ESI Reference	Day	Alkalinity (mg/L)	Ammonia (mg/L)	Hardness (mg/L)	pH (SU)	Conductivity (µmhos/cm)
	MHR/POND	Day 0	37	ND	56	-	-
		Day 10	38	ND	56	-	-
Lab Control	-000	Day 0	ND	0.7	36	6.88	166
		Day 10	32	0.4	54	7.14	195
SED-22	-002	Day 0	12	0.3	35	7.03	163
		Day 10	24	0.8	47	7.16	193
SED-01	-004	Day 0	160	23	75	7.75	729
		Day 10	66	0.2	69	7.11	266
SED-05	-011	Day 0	33	1.1	67	7.39	260
		Day 10	36	0.7	56	7.21	214
SED-11	-014	Day 0	30	0.4	73	7.15	195
		Day 10	26	ND	55	7.22	198
SED-18	-019	Day 0	39	ND	59	7.15	229
		Day 10	28	0.4	55	7.17	205

COMMENTS:
ND - Not detected.
Reporting Limits: Alkalinity = 10 mg/L; Ammonia = 0.1 mg/L

TABLE 8. Reference Toxicant Evaluation.
Iron Horse Park Sediment Evaluation. Metcalf & Eddy, October 2004.

REFERENCE TOXICANT EVALUATION
(Results are expressed as µg/L Cadmium)

Species	Start Date	LC-50	Historic Mean	Number of Tests	±1 Std Deviation	±2 Std Deviation
C. tentans	10/27/04	12.59	3.67	11	5.35	10.70
H. azteca	10/05/04	0.0001	0.015	39	0.031	0.062

Note: Reference toxicant testing was conducted at ESI. The historic mean for survival represents the mean determined from the ESI-conducted reference toxicant testing database.

APPENDIX A
RAW DATA
STATISTICAL SUPPORT

C. tentans 10 DAY EXPOSURE SEDIMENT ASSAY

STUDY #	CLIENT:	OVERLYING WATER:	START DATE:
12551	Metcalf & Eddy	POND	10/05/04

DAY	Lab				-004				-011			
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)
0	8.3	206	7.27	23	7.5	685	7.82	23	7.4	160.1	7.35	23
1	7.7	222	7.30	23	6.4	529	7.61	23	6.3	174	6.91	23
2	6.2	167	7.31	23	6.3	481	7.61	23	6.5	153	7.01	23
3	6.6	153	7.01	21	6.0	425	7.42	22	5.4	138	6.85	22
4	6.6	145	6.92	24	6.2	340	7.39	24	6.2	128	6.83	24
5	5.6	131	7.34	24	5.0	332	7.76	24	5.1	118	7.40	24
6	6.1	131	7.34	24	6.8	312	7.61	24	6.1	106	7.28	24
7	6.6	125	7.35	24	6.5	267	7.65	24	6.2	101	7.27	24
8	6.1	120	7.22	22	6.3	240	7.60	22	6.3	96	7.33	22
9	6.2	118	7.07	23	6.2	222	7.40	23	6.4	95	7.00	23
10	6.1	116	6.95	24	6.0	213	7.33	24	5.9	95	6.90	24

DAY	-014				-019				Water Quality Station #	S/C Meter #	ΔH_2O fed	DATE	INIT
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)					
0	7.0	101.1	7.13	22	7.4	122.9	6.99	23	1	330i	✓	10/5/04	DHB
1	6.3	123	6.88	24	6.9	154	6.79	24	1	330i	✓	10/6/04	DHB
2	6.4	109	6.88	24	6.2	126	6.81	24	1	330i	✓	10/7/04	DHB
3	5.3	107	6.80	22	6.3	125	6.74	22	2	330i	✓	10/8/04	DHB
4	6.0	93	6.58	24	6.3	114	6.54	24	2	330i	✓	10/9	KL
5	5.5	85	7.07	24	6.2	103	7.09	24	1	330i	✓	10/10	LM
6	6.4	86	7.23	24	6.7	107	7.14	24	2	330i	✓	10/11/04	DHB
7	6.3	82	7.17	24	6.7	98	7.11	24	2	330i	✓	10/12/04	DHB
8	6.2	78	7.26	22	6.2	90	7.14	22	2	330i	✓	10/13/04	DHB
9	6.2	80	6.80	23	6.4	87	6.78	23	1	330i	✓	10/14/04	DHB
10	6.1	77	6.74	24	6.2	85	6.71	24	1	330i	✓	10/15/04	DHB

Date & Initial Chemistry Sampling

DAY 0 Alkalinity, Hardness & Ammonia in POND	DAY 0 Alkalinity, Hardness & Ammonia in each treatment	DAY 10 Alkalinity, Hardness & Ammonia in each treatment
10/5/04 DHB	✓	✓

FEED 1.5 mL of 6g/L fish food mixture/replicate Two Volume additions Daily 23 °C

C. tentans 10 DAY EXPOSURE SEDIMENT ASSAY

STUDY #	CLIENT:	OVERLYING WATER:	START DATE:
12551	Metcalf & Eddy	POND	10/05/04

DAY	-002											
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)
0	7.9	77.7	6.21	23								
1	6.8	87	6.53	24								
2	6.2	76	6.63	24								
3	6.1	72	6.53	22								
4	6.2	69	6.40	24								
5	5.9	66	6.72	24								
6	6.5	68	6.94	25								
7	6.9	70	7.02	24								
8	6.4	97	7.05	22								
9	6.5	105	6.57	23								
10	6.3	99	6.55	24								

DAY									Water Quality Station #	S/C Meter #	ΔH_2O fed	DATE	INIT
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)					
0									1	330i	✓	10/5/04	DHB
1									1	330i	✓	10/6/04	DHB
2									1	330i	✓	10/7/04	DHB
3									2	330i	✓	10/8/04	DHB
4									2	330i	✓	10/9/04	KY
5									~~2~~ 1	330i	✓	10/10	
6									2	330i	✓	10/11/04	DHB
7									2	330i	✓	10/12/04	DHB
8									2	330i	✓	10/13/04	DHB
9									1	330i	✓	10/14/04	DHB
10									1	330i	✓	10/15/04	DHB

Date & Initial Chemistry Sampling

DAY 0 Alkalinity, Hardness & Ammonia in POND	DAY 0 Alkalinity, Hardness & Ammonia in each treatment	DAY 10 Alkalinity, Hardness & Ammonia in each treatment
10/5/04 DHB	✓	✓

FEED 1.5 mL of 6g/L fish food mixture/replicate Two Volume additions Daily 23 °C

STUDY: 12551
CLIENT: Metcalf & Eddy
PROJECT: Iron Horse Park
TASK: Chironomus tentans 10 Day ExposureSediment Toxicity Tests
DATA: Day 10 Survival Data Summary
START DATE: 10/05/04
DATE ENDED: 10/15/04

Project Site	ESI Ref #	Replicate	Larvae @ Start	Day 10 Surviving Organisms	Survival Rate	Mean Survival/ Site	Distribution	Variance	t Value	Critical t Value	p Value	Significant Difference ("<") in Day 20 Survival vs	
Lab Control	000	A	10	10	100.0%	83.8%							
		B	10	8	80.0%								
		C	10	7	70.0%								
		D	10	9	90.0%								
		E	10	8	80.0%								
		F	10	9	90.0%								
		G	10	7	70.0%								
		H	10	9	90.0%								
SED-01	-004	A	10	10	100.0%	90.0%	Normal	Equal	-1.1632	1.7613	0.8679	Lab	NO
		B	10	8	80.0%		Normal	Equal	-1.8964	1.8946	0.9501	SED-22	NO
		C	10	7	70.0%								
		D	10	9	90.0%								
		E	10	10	100.0%								
		F	10	8	80.0%								
		G	10	10	100.0%								
		H	10	10	100.0%								
SED-05	-011	A	10	9	90.0%	93.8%	Normal	Equal	-2.0281	1.8946	0.9589	Lab	NO
		B	10	8	80.0%		Normal	Equal	-3.4750	1.8946	0.9948	SED-22	NO
		C	10	10	100.0%								
		D	10	10	100.0%								
		E	10	8	80.0%								
		F	10	10	100.0%								
		G	10	10	100.0%								
		H	10	10	100.0%								
SED-11	-014	A	10	8	80.0%	71.3%	Normal	Equal	2.1719	1.8946	0.0332	Lab	YES
		B	10	5	50.0%		Normal	Equal	1.2556	1.8946	0.1248	SED-22	NO
		C	10	9	90.0%								
		D	10	7	70.0%								
		E	10	7	70.0%								
		F	10	9	90.0%								
		G	10	5	50.0%								
		H	10	7	70.0%								
SED-18	-019	A	10	9	90.0%	88.8%	Normal	Equal	-1.1929	1.8946	0.8641	Lab	NO
		B	10	9	90.0%		Normal	Equal	-1.8853	1.8946	0.9493	SED-22	NO
		C	10	8	80.0%								
		D	10	9	90.0%								

		E	10	10	100.0%								
		F	10	10	100.0%								
		G	10	8	80.0%								
		H	10	8	80.0%								
SED-22	-002	A	10	8	80.0%	77.5%	Normal	Equal	0.9946	1.8946	0.1765	Lab	NO
		B	10	7	70.0%								
		C	10	10	100.0%								
		D	10	7	70.0%								
		E	10	8	80.0%								
		F	10	7	70.0%								
		G	10	7	70.0%								
		H	10	8	80.0%								

ESI STUDY# 12551 Metcalf & Eddy
***C. tentans* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
LAB A	1108	10	
LAB B	1110	7 + 1 emerged	
LAB C	1113	6 + 1 emerged	
LAB D	1118	8 + 1 emerged	
LAB E	1121	7 + 1 emerged	
LAB F	1124	8 + 1 emerged	
LAB G	1127	4 + 3 emerged	
LAB H	1138	4 + 5 emerged	
-004 A	1143	9 + 1 emerged	
-004 B	1147	7 + 1 emerged	
-004 C	1153	4 + 3 emerged	
-004 D	1157	9	
-004 E	1232	9 + 1 emerged	
-004 F	1236	8	
-004 G	1240	9 + 1 emerged	
-004 H	1243	8 + 2 emerged	

ANALYST: _____

DATE: 10/15/04

ESI STUDY# 12551 Metcalf & Eddy
***C. tentans* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-011A	1249	9	
-011B	1253	8	
-011F	1258	10	
-011G	1302	10	
-011H	1309	10	
-014C	1312	9	
-014D	1319	6 + 1 emerged	
-014E	1323	7	
-014F	1327	8 + 1 emerged	

ANALYST: _____
DATE: 10/15/04

ESI STUDY# 12551 Metcalf & Eddy
***C. tentans* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-002A	12:55	8	
-002B	1:00	11 7	
-002C	1:05	10	
-002D	1:07	7	
-002E	1:12	8	
-002F	1:16	7	
-002G	1:20	7	
-002H	1:25	8	

ANALYST: BA
DATE: 10/15/04

ESI STUDY# 12551 Metcalf & Eddy
***C. tentans* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-019A	1254	9	
-019B B	1301	~~8~~ 9 (E3) JH 10/15	
-019H	1302	8	
-019C	1305	8	
-19D	1308	9	
-19E	1311	10	
-19F	1312	10	
19G	1313	8	
-014A	1317	8	
-014B	1319	5	
-014G	1322	5	
-014H	1325	7	
-011C	1328	10	
-011D	1331	10	
-011E	1335	8	

ANALYST: JH
DATE: 10/15

CETIS Test Summary

Report Date: 18 Oct-04 10:29 PM
Link: 10-3090-1601

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Test No:	04-0236-1088	**Test Type:**	Survival-AF Growth	**Duration:**	10d 0h
Start Date:	05 Oct-04 12:00 PM	**Protocol:**	EPA/600/R-99/064 (2000)	**Species:**	Chironomus tentans
Ending Date:	15 Oct-04 12:00 PM	**Dil Water:**	Natural Surface Water	**Source:**	Aquatic Research Organisms, NH
Setup Date:	05 Oct-04 12:00 PM	**Brine:**	Not Applicable		

Sample No:	08-0492-1343	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	17 Oct-04 09:14 PM	**Code:**	12551-000	**Project:**	Ecologcal Risk Assessment
Receive Date:		**Source:**	Iron Horse Park		
Sample Age:	N/A (4 °C)	**Station:**	Lab Control		

Sample No:	12-8471-8881	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	13 Sep-04 02:25 PM	**Code:**	12551-002	**Project:**	Ecologcal Risk Assessment
Receive Date:	14 Sep-04 11:00 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 21h (4 °C)	**Station:**	D05221 / SED-22		

Sample No:	17-6928-3398	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	14 Sep-04 09:20 AM	**Code:**	12551-004	**Project:**	Ecologcal Risk Assessment
Receive Date:	15 Sep-04 10:45 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 2h (4 °C)	**Station:**	D05199 / SED-01		

Sample No:	13-9878-1980	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	15 Sep-04 12:00 PM	**Code:**	12551-011	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	20d 0h (4 °C)	**Station:**	D05203 / SED-05		

Sample No:	02-5849-5922	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 10:35 AM	**Code:**	12551-014	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	19d 1h (4 °C)	**Station:**	D05210 / SED-11		

Sample No:	04-0735-4420	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 01:45 PM	**Code:**	12551-019	**Project:**	Ecologcal Risk Assessment
Receive Date:	20 Sep-04 08:30 AM	**Source:**	Iron Horse Park		
Sample Age:	18d 22h (4 °C)	**Station:**	D05217 / SED-18		

Proportion Survived Summary

Sample Code	Reps	Mean	Minimum	Maximum	SE	SD	CV
12551-000	8	0.83750	0.70000	1.00000	0.03750	0.10607	12.66%
12551-002	8	0.77500	0.70000	1.00000	0.03660	0.10351	13.36%
12551-004	8	0.90000	0.70000	1.00000	0.04226	0.11952	13.28%
12551-011	8	0.93750	0.80000	1.00000	0.03239	0.09161	9.77%
12551-014	8	0.71250	0.50000	0.90000	0.05489	0.15526	21.79%
12551-019	8	0.88750	0.80000	1.00000	0.02950	0.08345	9.40%

Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000
12551-004	1.00000	0.80000	0.70000	0.90000	1.00000	0.80000	1.00000	1.00000
12551-011	0.90000	0.80000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000
12551-014	0.80000	0.50000	0.90000	0.70000	0.70000	0.90000	0.50000	0.70000
12551-019	0.90000	0.90000	0.80000	0.90000	1.00000	1.00000	0.80000	0.80000

CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:27 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.03892	8.88539	0.96113	Equal Variances
Distribution	Shapiro-Wilk W	0.90494	0.84420	0.09672	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0270336	0.0270336	1	1.29	0.27464	Non-Significant Effect
Error	0.2927814	0.020913	14			
Total	0.31981500	0.0479465	15			

Group Comparisons

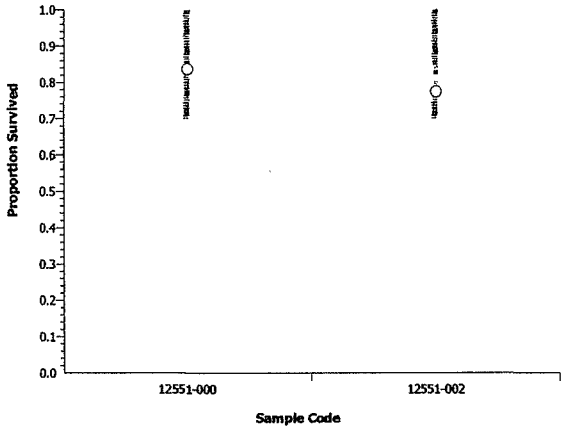
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-002	0.99458	1.89458	0.1765	0.15660	Non-Significant Effect

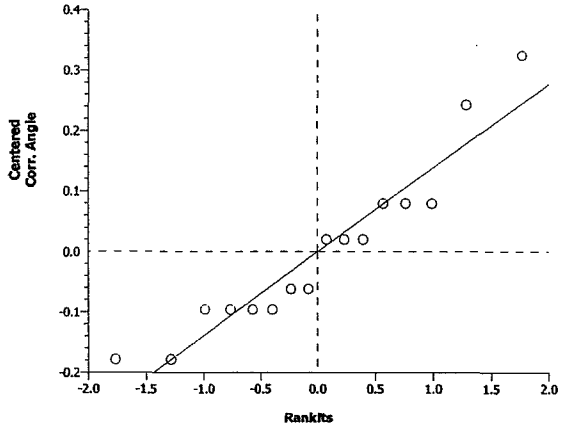
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.83750	0.70000	1.00000	0.10607	1.16947	0.99116	1.41202	0.14599
12551-002	8	0.77500	0.70000	1.00000	0.10351	1.08726	0.99116	1.41202	0.14323

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	01 Nov-04 9:20 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.41768	8.88539	0.65669	Equal Variances
Distribution	Shapiro-Wilk W	0.92637	0.84420	0.21108	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0348569	0.0348569	1	1.35	0.26420	Non-Significant Effect
Error	0.3606805	0.0257629	14			
Total	0.39553743	0.0606198	15			

Group Comparisons

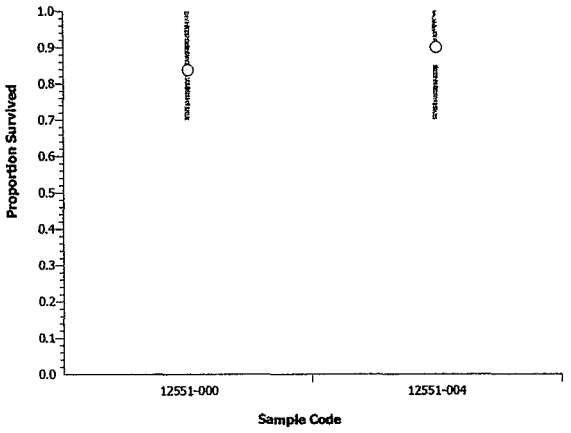
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-004	-1.1632	1.76131	0.8679	0.14135	Non-Significant Effect

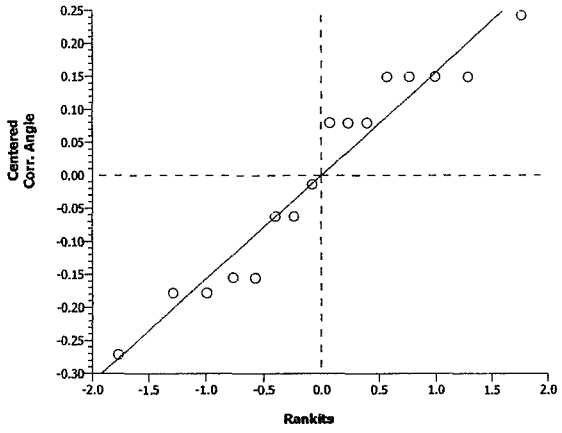
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.83750	0.70000	1.00000	0.10607	1.16947	0.99116	1.41202	0.14599
12551-004	8	0.90000	0.70000	1.00000	0.11952	1.26282	0.99116	1.41202	0.17382

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000		
12551-004	1.00000	0.80000	0.70000	0.90000	1.00000	0.80000	1.00000	1.00000		

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.08251	8.68539	0.91939	Equal Variances
Distribution	Shapiro-Wilk W	0.86695	0.84420	0.02347	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0852143	0.0852143	1	4.16	0.06081	Non-Significant Effect
Error	0.2869982	0.0204999	14			
Total	0.37221251	0.1057142	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-011	-2.0281	1.89458	0.9589	0.13635	Non-Significant Effect

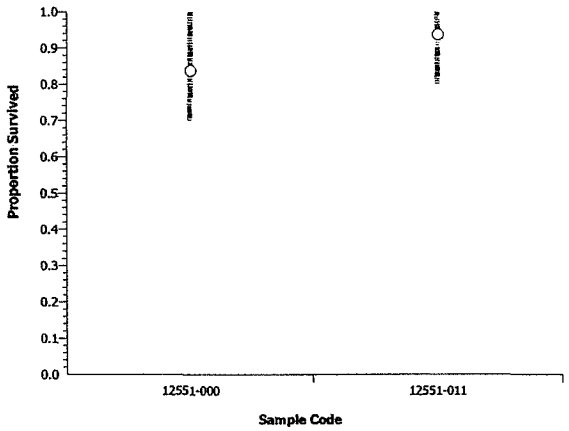
Data Summary

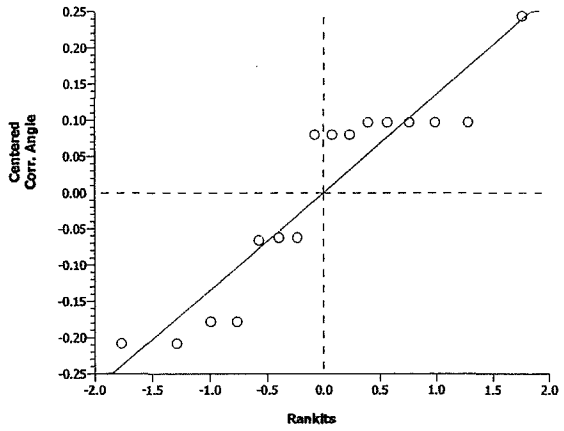
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.83750	0.70000	1.00000	0.10607	1.16947	0.99116	1.41202	0.14599
12551-011	8	0.93750	0.80000	1.00000	0.09161	1.31543	1.10715	1.41202	0.14031

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000
12551-011	0.90000	0.80000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.50871	8.88539	0.60080	Equal Variances
Distribution	Shapiro-Wilk W	0.92701	0.84420	0.21601	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0909411	0.0909411	1	3.40	0.08639	Non-Significant Effect
Error	0.3742617	0.026733	14			
Total	0.46520281	0.1176741	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-014	2.17193	1.89458	0.0332	0.13153	Significant Effect

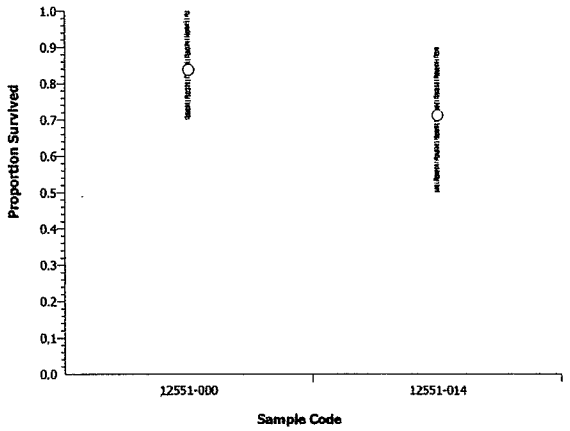
Data Summary

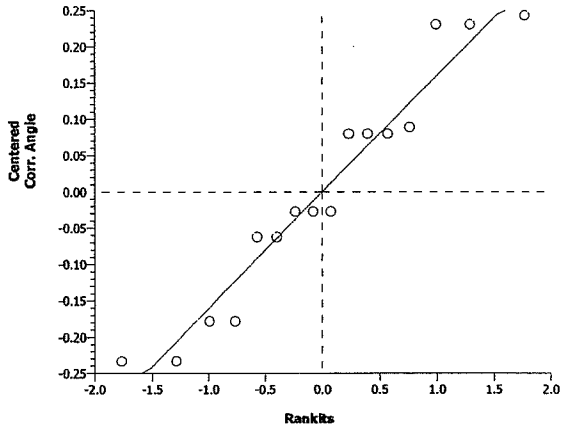
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.83750	0.70000	1.00000	0.10607	1.16947	0.99116	1.41202	0.14599
12551-014	8	0.71250	0.50000	0.90000	0.15526	1.01869	0.78540	1.24905	0.17931

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000
12551-014	0.80000	0.50000	0.90000	0.70000	0.70000	0.90000	0.50000	0.70000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.32869	8.88539	0.71718	Equal Variances
Distribution	Shapiro-Wilk W	0.93899	0.84420	0.32804	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0180131	0.0180131	1	0.96	0.34272	Non-Significant Effect
Error	0.261464	0.018676	14			
Total	0.27947708	0.0366891	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-019	-1.1929	1.89458	0.8641	0.10658	Non-Significant Effect

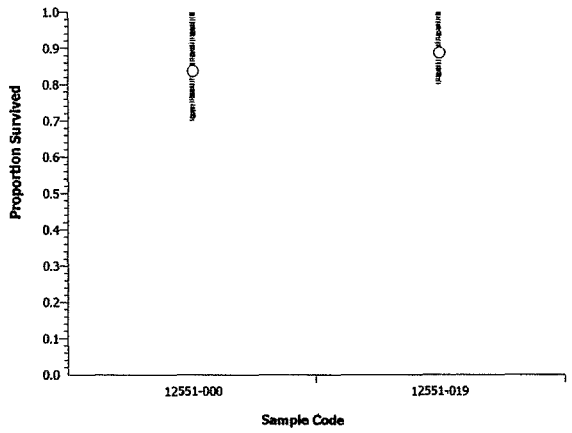
Data Summary

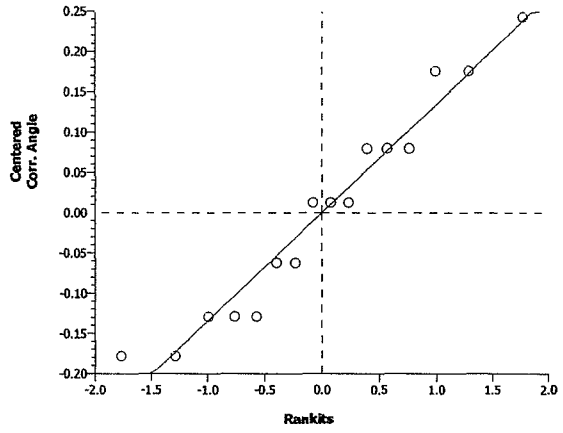
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.83750	0.70000	1.00000	0.10607	1.16947	0.99116	1.41202	0.14599
12551-019	8	0.88750	0.80000	1.00000	0.08345	1.23658	1.10715	1.41202	0.12665

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	0.80000	0.70000	0.90000	0.80000	0.90000	0.70000	0.90000
12551-019	0.90000	0.90000	0.80000	0.90000	1.00000	1.00000	0.80000	0.80000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.47285	8.88539	0.62213	Equal Variances
Distribution	Shapiro-Wilk W	0.95050	0.84420	0.47792	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1232845	0.1232845	1	4.86	0.04471	Significant Effect
Error	0.3550924	0.0253638	14			
Total	0.47837692	0.1486482	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-004	-1.8964	1.89458	0.9501	0.17539	Non-Significant Effect

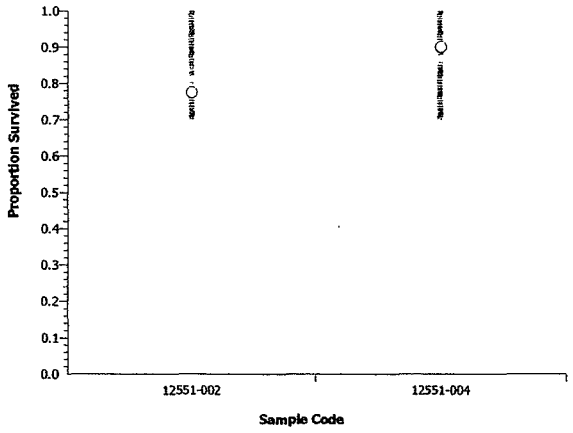
Data Summary

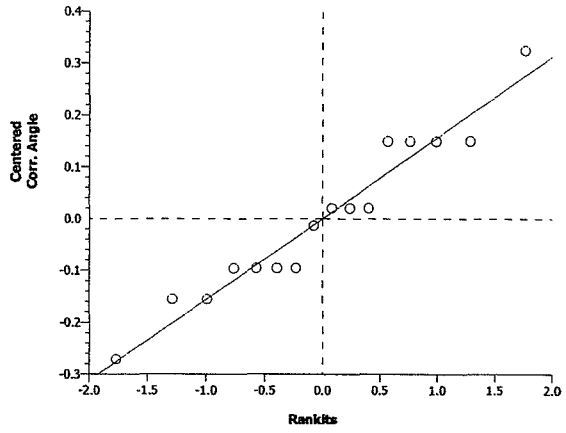
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.77500	0.70000	1.00000	0.10351	1.08726	0.99116	1.41202	0.14323
12551-004	8	0.90000	0.70000	1.00000	0.11952	1.26282	0.99116	1.41202	0.17382

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000
12551-004	1.00000	0.80000	0.70000	0.90000	1.00000	0.80000	1.00000	1.00000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.04196	8.88539	0.95815	Equal Variances
Distribution	Shapiro-Wilk W	0.91743	0.84420	0.15295	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.2082405	0.2082405	1	10.36	0.00619	Significant Effect
Error	0.2814101	0.0201007	14			
Total	0.48965065	0.2283412	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-011	-3.4750	1.89458	0.9948	0.1244	Non-Significant Effect

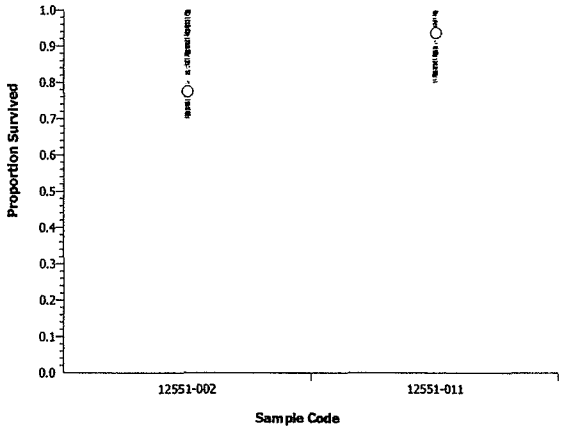
Data Summary

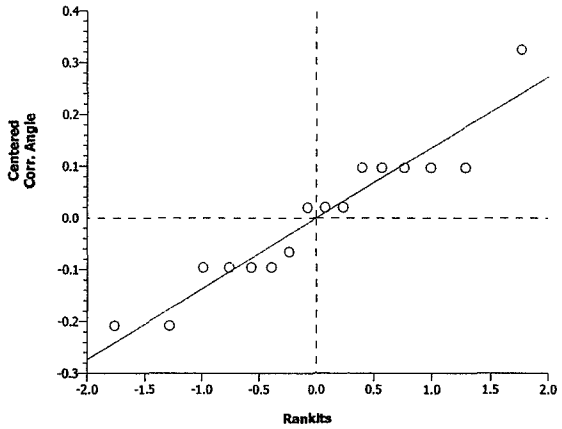
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.77500	0.70000	1.00000	0.10351	1.08726	0.99116	1.41202	0.14323
12551-011	8	0.93750	0.80000	1.00000	0.09161	1.31543	1.10715	1.41202	0.14031

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000
12551-011	0.90000	0.80000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.56742	8.88539	0.56769	Equal Variances
Distribution	Shapiro-Wilk W	0.92518	0.84420	0.20234	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0188089	0.0188089	1	0.71	0.41225	Non-Significant Effect
Error	0.3686736	0.0263338	14			
Total	0.38748253	0.0451427	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-014	1.25559	1.89458	0.1248	0.10347	Non-Significant Effect

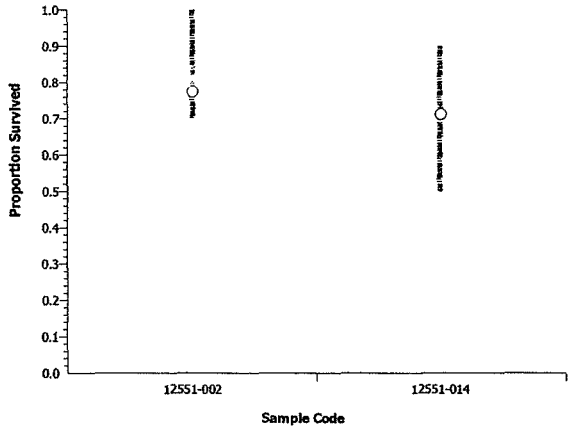
Data Summary

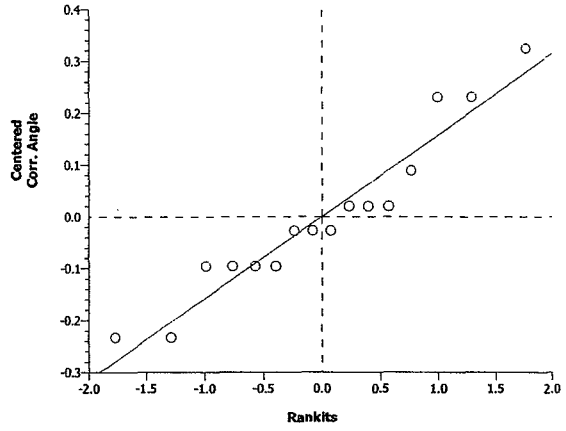
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.77500	0.70000	1.00000	0.10351	1.08726	0.99116	1.41202	0.14323
12551-014	8	0.71250	0.50000	0.90000	0.15526	1.01869	0.78540	1.24905	0.17931

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000
12551-014	0.80000	0.50000	0.90000	0.70000	0.70000	0.90000	0.50000	0.70000

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:28 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.27892	8.88539	0.75375	Equal Variances
Distribution	Shapiro-Wilk W	0.84200	0.84420	0.00921	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0891809	0.0891809	1	4.88	0.04435	Significant Effect
Error	0.2558759	0.0182769	14			
Total	0.34505682	0.1074578	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-019	-1.8853	1.89458	0.9493	0.15005	Non-Significant Effect

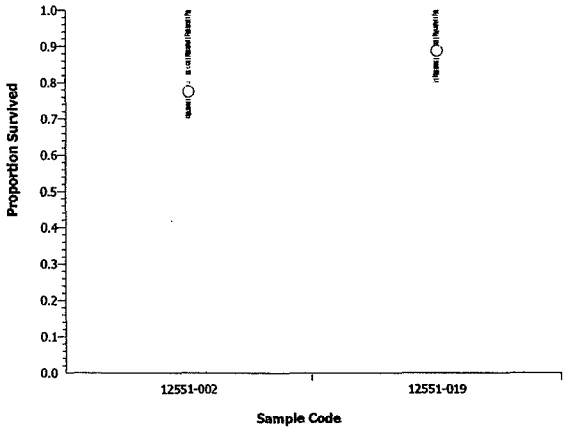
Data Summary

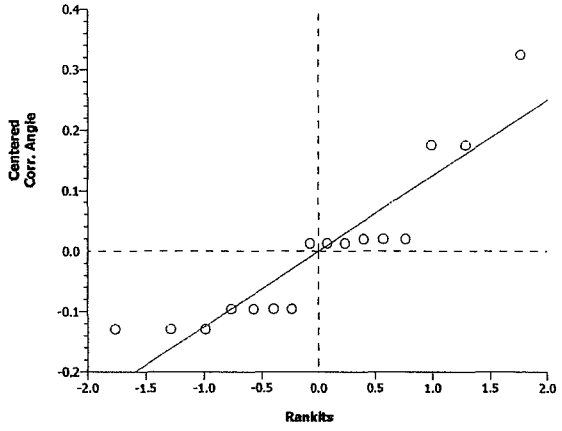
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.77500	0.70000	1.00000	0.10351	1.08726	0.99116	1.41202	0.14323
12551-019	8	0.88750	0.80000	1.00000	0.08345	1.23658	1.10715	1.41202	0.12665

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.70000	1.00000	0.70000	0.80000	0.70000	0.70000	0.80000
12551-019	0.90000	0.90000	0.80000	0.90000	1.00000	1.00000	0.80000	0.80000

Graphics





STUDY: 12551
CLIENT: Metcalf & Eddy
PROJECT: Iron Horse Park
TASK: Chironomus tentans 10 Day ExposureSediment Toxicity Tests
DATA: Day 10 Growth Summary
START DATE: 10/05/04
DATE ENDED: 10/15/04

Project Site	ESI Ref #	Replicate	Ash Free Dry Weight (mg/individual)	Mean AFDW /Site	Normal Distribution	Homogeneous Variance	t Value	Critical t Value	p Value	Significant Difference ("<") in Day 20 Growth vs	
Lab Control	000	A	2.04	2.03							
		B	2.38								
		C	1.89								
		D	2.04								
		E	2.19								
		F	1.90								
		G	1.99								
		H	1.80								
SED-01	-004	A	2.18	2.21	Normal	Equal	-1.2646	1.8946	0.8767	Lab	NO
		B	1.95		Normal	Equal	-2.7580	1.7613	0.9923	SED-22	NO
		C	2.10								
		D	1.97								
		E	2.17								
		F	2.84								
		G	2.14								
		H	2.35								
SED-05	-011	A	1.40	1.34	Normal	Equal	8.2081	1.8946	0.0000	Lab	YES
		B	1.46		Normal	Equal	4.5019	1.7613	0.0002	SED-22	YES
		C	1.21								
		D	1.41								
		E	1.29								
		F	1.51								
		G	1.02								
		H	1.46								
SED-11	-014	A	1.42	1.40	Normal	Equal	5.6588	1.8946	0.0004	Lab	YES
		B	1.65		Normal	Equal	3.2943	1.7613	0.0027	SED-22	YES
		C	1.09								
		D	1.09								
		E	1.22								
		F	1.27								
		G	1.73								
		H	1.71								

SED-18	-019	A	0.84	0.94	Normal	Equal	17.2139	1.8946	0.0000	Lab	YES
		B	1.06		Normal	Equal	8.4356	1.7613	0.0000	SED-22	YES
		C	1.01								
		D	0.77								
		E	1.02								
		F	0.83								
		G	1.16								
		H	0.84								
SED-22	-002	A	1.40	1.84	Normal	Equal	1.6067	1.8946	0.0761	Lab	NO
		B	1.75								
		C	1.70								
		D	1.62								
		E	2.14								
		F	1.96								
		G	1.95								
		H	2.16								

C. tentans Assay
GROWTH DATA

STUDY NUMBER: 12551 **CLIENT:** Metcalf & Eddy

ESI SAMPLE ID	REP	FOIL TARE WEIGHT (g)	*C.tentans* Dry + FOIL (g)	*C.tentans* Ashed + FOIL (g)
LAB	A	0.00943	0.03157	0.01114
	B	0.00986	0.02810	0.01144
	C	0.00975	0.02211	0.01080
	D	0.01139	0.02897	0.01267
	E	0.01054	0.02721	0.01187
	F	0.01021	0.02706	0.01189
	G	0.00979	0.01834	0.01039
	H	0.01134	0.01918	0.01199
-004	A	0.00885	0.03077	0.01116
	B	0.00919	0.02446	0.01080
	C	0.00942	0.01863	0.01025
	D	0.01045	0.03000	0.01229
	E	0.00924	0.03139	0.01185
	F	0.00884	0.03438	0.01167
	G	0.00936	0.03043	0.01113
	H	0.00975	0.03059	0.01180
-011	A	0.00939	0.02297	0.01039
	B	0.00953	0.02226	0.01054
	C	0.01079	0.02369	0.01163
	D	0.01055	0.02559	0.01147
	E	0.00904	0.02003	0.00972
	F	0.00977	0.02591	0.01086
	G	0.00882	0.01977	0.00956
	H	0.01039	0.02628	0.01173
-014	A	0.00941	0.02168	0.01036
	B	0.00948	0.01830	0.01006
	C	0.00999	0.02059	0.01082
	D	0.01038	0.01739	0.01086
	E	0.00882	0.01803	0.00952
	F	0.00929	0.02031	0.01013
	G	0.00889	0.01823	0.00956
	H	0.00984	0.02274	0.01077
RECORDED BY:		[illegible]	[illegible]	[illegible]
DATE:		10/15/04	10/16/04	10/18/04

NOTES:

C. tentans Assay
GROWTH DATA

STUDY NUMBER: 12551 **CLIENT:** Metcalf & Eddy

ESI SAMPLE ID	REP	FOIL TARE WEIGHT (g)	*C.tentans* Dry + FOIL (g)	*C.tentans* Ashed + FOIL (g)
-019	A	0.00876	0.01763	0.01006
	B	0.00998	0.02056	0.01102
	C	0.00987	0.01942	0.01135
	D	0.01007	0.01832	0.01136
	E	0.00887	0.02045	0.01027
	F	0.00971	0.01918	0.01092
	G	0.01038	0.02110	0.01181
	H	0.00992	0.01755	0.01086
-002	A	0.00972	0.02194	0.01072
	B	0.00951	0.02282	0.01054
	C	0.00988	0.02818	0.01117
	D	0.00966	0.02195	0.01058
	E	0.00945	0.02791	0.01076
	F	0.01024	0.02515	0.01144
	G	0.01083	0.02553	0.01191
	H	0.01038	0.02910	0.01185
	A			
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	A			
	B			
	C			
	D			
	F			
	F			
	G			
	H			
RECORDED BY:				
DATE:		10/15/04	10/16/04	10/18/04

NOTES:

C. tentans Assay

STUDY NUMBER: 12551 **CLIENT:** M+E

ESI SAMPLE ID	REP	TARE WEIGHT (G)	*C. tentans* + FOIL (G)	NET WEIGHT (MG)	# *C.tentans*	MEAN DRY WEIGHT PER *C.tentans* (MG)
START ORGANISMS	A	0.2096	0.21581	0.621	10	0.621
	B	0.2073	0.21260	0.530	10	0.530
	C	0.2078	0.21452	0.672	10	0.672
	D	0.2083	0.21554	0.724	60	0.724
RECORDED BY:		DHB	BJB			
DATE:		10/5/04	10/6/04			

0.637

NOTES:

CETIS Test Summary

Report Date: 01 Nov-04 9:50 PM
Link: 10-3090-1601

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Test No:	04-0236-1088	**Test Type:**	Survival-AF Growth	**Duration:**	10d 0h
Start Date:	05 Oct-04 12:00 PM	**Protocol:**	EPA/600/R-99/064 (2000)	**Species:**	Chironomus tentans
Ending Date:	15 Oct-04 12:00 PM	**Dil Water:**	Natural Surface Water	**Source:**	Aquatic Research Organisms, NH
Setup Date:	05 Oct-04 12:00 PM	**Brine:**	Not Applicable		

Sample No:	08-0492-1343	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	17 Oct-04 09:14 PM	**Code:**	12551-000	**Project:**	Ecologcal Risk Assessment
Receive Date:		**Source:**	Iron Horse Park		
Sample Age:	N/A (4 °C)	**Station:**	Lab Control		
Sample No:	12-8471-8881	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	13 Sep-04 02:25 PM	**Code:**	12551-002	**Project:**	Ecologcal Risk Assessment
Receive Date:	14 Sep-04 11:00 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 21h (4 °C)	**Station:**	D05221 / SED-22		
Sample No:	17-6928-3398	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	14 Sep-04 09:20 AM	**Code:**	12551-004	**Project:**	Ecologcal Risk Assessment
Receive Date:	15 Sep-04 10:45 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 2h (4 °C)	**Station:**	D05199 / SED-01		
Sample No:	13-9878-1980	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	15 Sep-04 12:00 PM	**Code:**	12551-011	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	20d 0h (4 °C)	**Station:**	D05203 / SED-05		
Sample No:	02-5849-5922	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 10:35 AM	**Code:**	12551-014	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	19d 1h (4 °C)	**Station:**	D05210 / SED-11		
Sample No:	04-0735-4420	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 01:45 PM	**Code:**	12551-019	**Project:**	Ecologcal Risk Assessment
Receive Date:	20 Sep-04 08:30 AM	**Source:**	Iron Horse Park		
Sample Age:	18d 22h (4 °C)	**Station:**	D05217 / SED-18		

Mean AF Weight-mg Summary

Sample Code	Reps	Mean	Minimum	Maximum	SE	SD	CV
12551-000	8	2.02727	1.79750	2.38000	0.06594	0.18651	9.20%
12551-002	8	1.83579	1.40250	2.15625	0.09277	0.26240	14.29%
12551-004	8	2.21202	1.95143	2.83875	0.10001	0.28286	12.79%
12551-011	8	1.34382	1.02100	1.50500	0.05776	0.16337	12.16%
12551-014	8	1.39614	1.08556	1.73400	0.09594	0.27137	19.44%
12551-019	8	0.94434	0.77333	1.16125	0.05061	0.14314	15.16%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-002	1.40250	1.75429	1.70100	1.62429	2.14375	1.95857	1.94571	2.15625
12551-004	2.17889	1.95143	2.09500	1.96778	2.17111	2.83875	2.14444	2.34875
12551-011	1.39778	1.46500	1.20600	1.41200	1.28875	1.50500	1.02100	1.45500
12551-014	1.41500	1.64800	1.08556	1.08833	1.21571	1.27250	1.73400	1.71000
12551-019	0.84111	1.09000	1.00875	0.77333	1.01800	0.82600	1.16125	0.83625

CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.04814	8.88539	0.36489	Equal Variances
Distribution	Shapiro-Wilk W	0.96366	0.84420	0.69521	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1569787	0.1569787	1	2.96	0.10731	Non-Significant Effect
Error	0.7422256	0.0530161	14			
Total	0.89920434	0.2099948	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-002	1.60671	1.89458	0.0761	0.2336	Non-Significant Effect

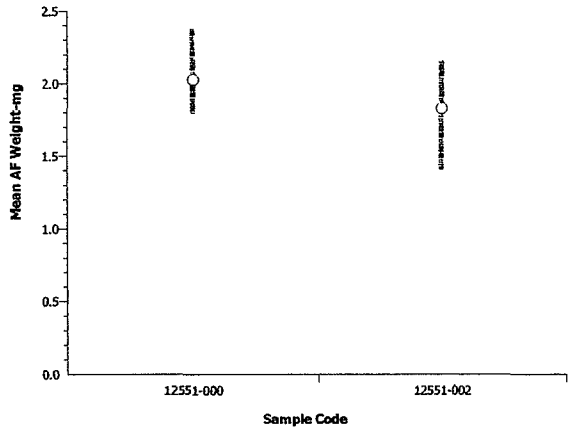
Data Summary

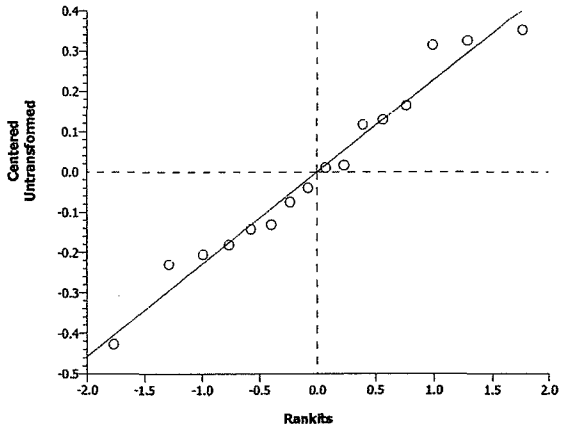
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	2.02727	1.79750	2.38000	0.18651				
12551-002	8	1.82917	1.40250	2.15625	0.26692				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-002	1.40250	1.75429	1.64800	1.62429	2.14375	1.95857	1.94571	2.15625

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.30011	8.88539	0.29412	Equal Variances
Distribution	Shapiro-Wilk W	0.86667	0.84420	0.02322	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1365252	0.1365252	1	2.38	0.14531	Non-Significant Effect
Error	0.8035807	0.0573986	14			
Total	0.94010590	0.1939238	15			

Group Comparisons

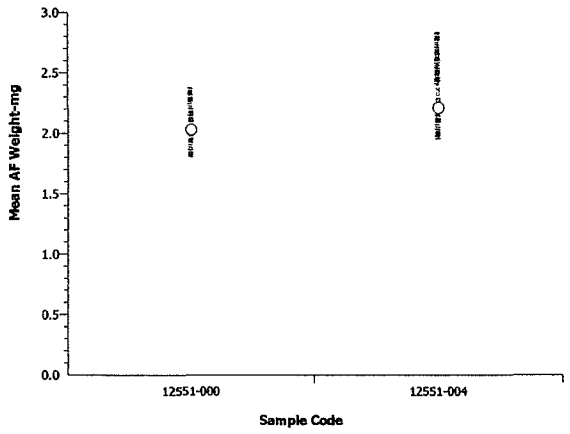
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-004	-1.2646	1.89458	0.8767	0.27679	Non-Significant Effect

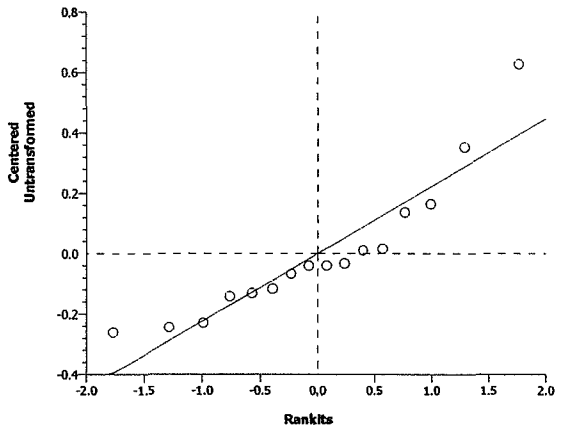
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	2.02727	1.79750	2.38000	0.18651				
12551-004	8	2.21202	1.95143	2.83875	0.28286				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-004	2.17889	1.95143	2.09500	1.96778	2.17111	2.83875	2.14444	2.34875

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.30337	8.88539	0.73554	Equal Variances
Distribution	Shapiro-Wilk W	0.98477	0.84420	0.98040	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.868451	1.868451	1	60.79	0.00000	Significant Effect
Error	0.4303257	0.0307376	14			
Total	2.29877624	1.8991881	15			

Group Comparisons

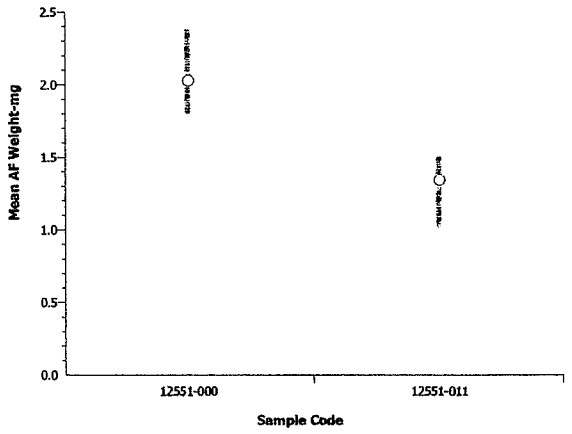
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-011	8.20811	1.89458	0.0000	0.15775	Significant Effect

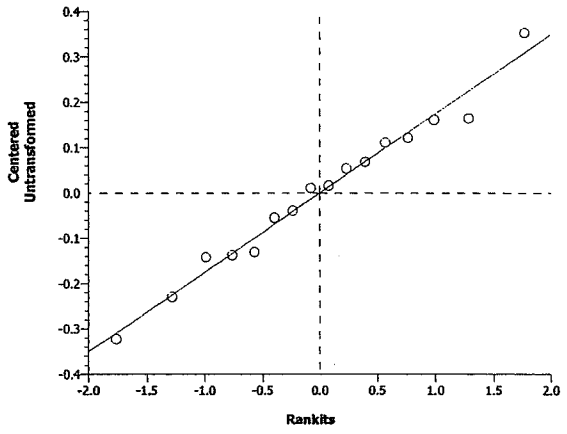
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	2.02727	1.79750	2.38000	0.18651				
12551-011	8	1.34382	1.02100	1.50500	0.16337				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-011	1.39778	1.46500	1.20600	1.41200	1.28875	1.50500	1.02100	1.45500

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.11701	8.88539	0.34364	Equal Variances
Distribution	Shapiro-Wilk W	0.92371	0.84420	0.19194	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.593323	1.593323	1	29.39	0.00009	Significant Effect
Error	0.7589959	0.054214	14			
Total	2.35231853	1.6475366	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-014	5.65883	1.89458	0.0004	0.21130	Significant Effect

Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	2.02727	1.79750	2.38000	0.18651				
12551-014	8	1.39614	1.08556	1.73400	0.27137				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-014	1.41500	1.64800	1.08556	1.08833	1.21571	1.27250	1.73400	1.71000

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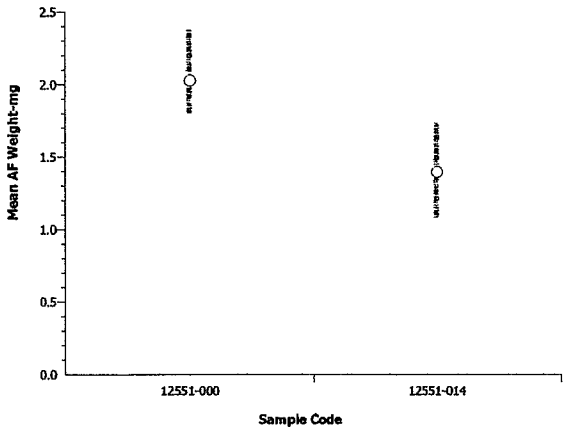

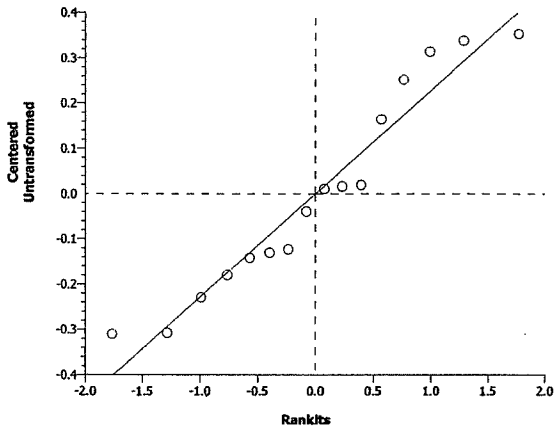

CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	18 Oct-04 10:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.69772	8.88539	0.50161	Equal Variances
Distribution	Shapiro-Wilk W	0.94969	0.84420	0.46598	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.690998	4.690998	1	169.73	0.00000	Significant Effect
Error	0.38693	0.0276379	14			
Total	5.07792756	4.7186355	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-019	17.2139	1.89458	0.0000	0.11919	Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	2.02727	1.79750	2.38000	0.18651				
12551-019	8	0.94434	0.77333	1.16125	0.14314				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	2.04300	2.38000	1.88500	2.03750	2.19143	1.89625	1.98750	1.79750
12551-019	0.84111	1.09000	1.00875	0.77333	1.01800	0.82600	1.16125	0.83625

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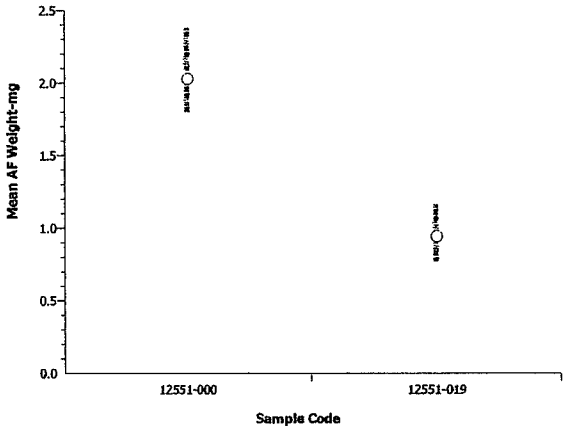
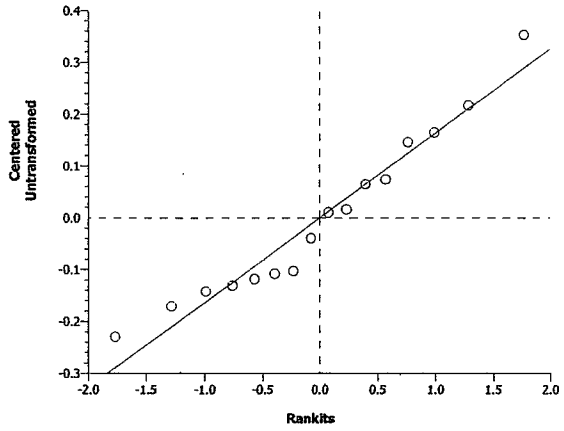




CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	01 Nov-04 9:49 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.16204	8.88539	0.84803	Equal Variances
Distribution	Shapiro-Wilk W	0.95449	0.84420	0.53969	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.5661789	0.5661789	1	7.61	0.01540	Significant Effect
Error	1.042057	0.0744327	14			
Total	1.60823625	0.6406115	15			

Group Comparisons

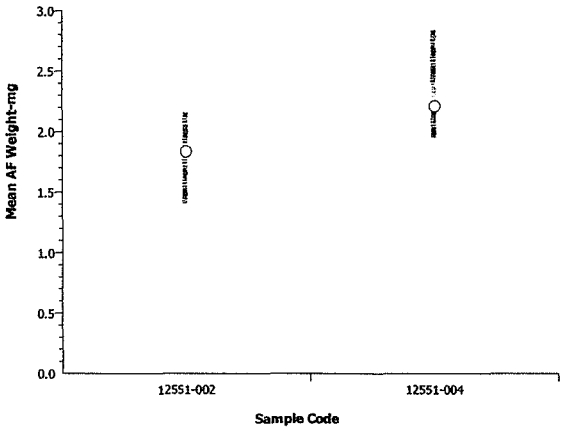
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-004	-2.7580	1.76131	0.9923	0.24026	Non-Significant Effect

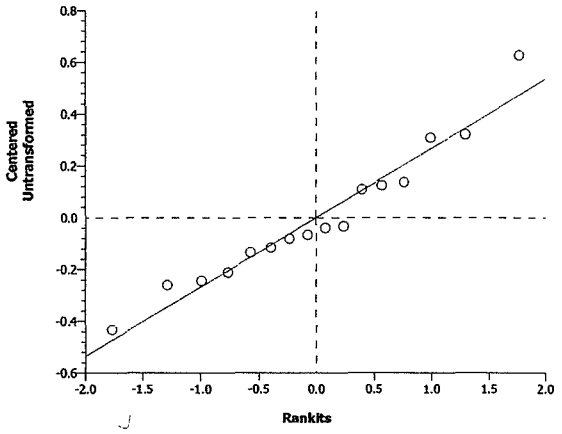
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	1.83579	1.40250	2.15625	0.26240				
12551-004	8	2.21202	1.95143	2.83875	0.28286				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
12551-002	1.40250	1.75429	1.70100	1.62429	2.14375	1.95857	1.94571	2.15625		
12551-004	2.17889	1.95143	2.09500	1.96778	2.17111	2.83875	2.14444	2.34875		

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	01 Nov-04 9:49 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.57985	8.88539	0.23439	Equal Variances
Distribution	Shapiro-Wilk W	0.95591	0.84420	0.56271	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.9681721	0.9681721	1	20.27	0.00050	Significant Effect
Error	0.6688024	0.0477716	14			
Total	1.63697457	1.0159437	15			

Group Comparisons

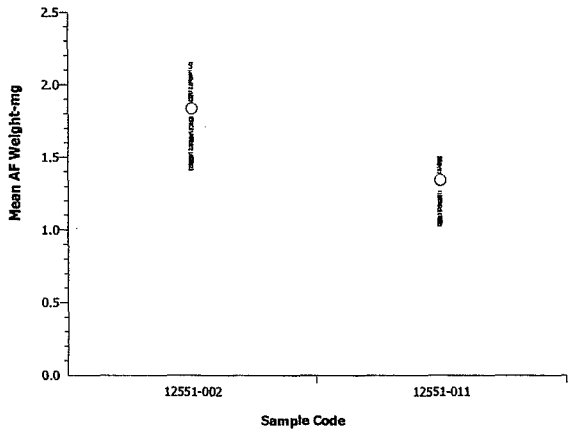
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-011	4.50185	1.76131	0.0002	0.19248	Significant Effect

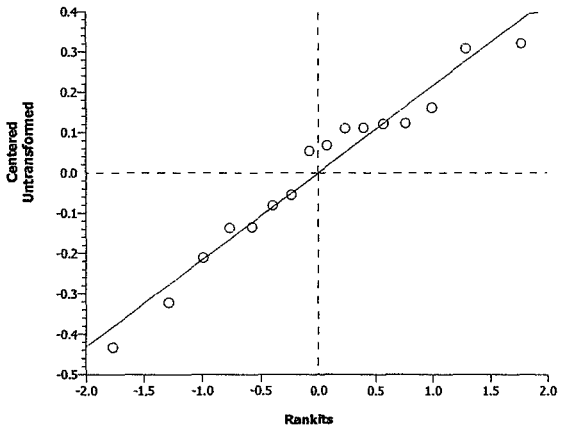
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	1.83579	1.40250	2.15625	0.26240				
12551-011	8	1.34382	1.02100	1.50500	0.16337				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
12551-002	1.40250	1.75429	1.70100	1.62429	2.14375	1.95857	1.94571	2.15625		
12551-011	1.39778	1.46500	1.20600	1.41200	1.28875	1.50500	1.02100	1.45500		

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	01 Nov-04 9:49 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.06954	8.88539	0.93161	Equal Variances
Distribution	Shapiro-Wilk W	0.92241	0.84420	0.18320	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.7731921	0.7731921	1	10.85	0.00532	Significant Effect
Error	0.9974726	0.0712480	14			
Total	1.77066469	0.8444401	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-014	3.29426	1.76131	0.0027	0.23507	Significant Effect

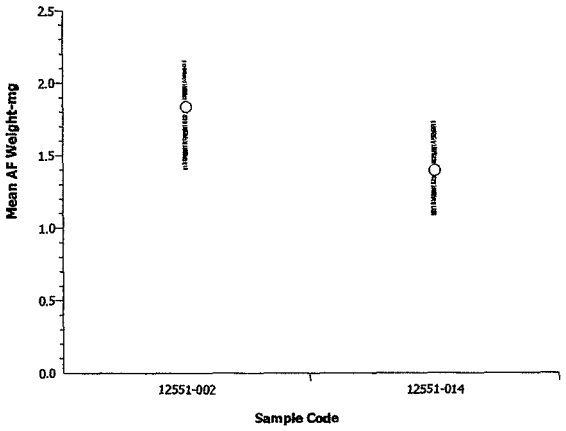
Data Summary

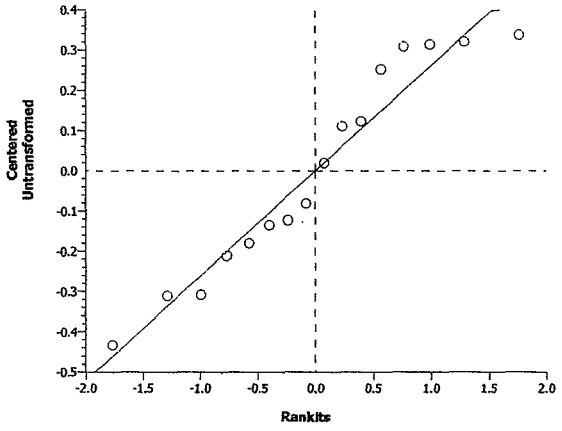
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	1.83579	1.40250	2.15625	0.26240				
12551-014	8	1.39614	1.08556	1.73400	0.27137				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
12551-002	1.40250	1.75429	1.70100	1.62429	2.14375	1.95857	1.94571	2.15625		
12551-014	1.41500	1.64800	1.08556	1.08833	1.21571	1.27250	1.73400	1.71000		

Graphics





CETIS Analysis Detail

Chironomus 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	10-3090-1601	10-3090-1601	01 Nov-04 9:49 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.36041	8.88539	0.13228	Equal Variances
Distribution	Shapiro-Wilk W	0.95870	0.84420	0.60924	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.178788	3.178788	1	71.16	0.00000	Significant Effect
Error	0.6254067	0.0446719	14			
Total	3.80419487	3.2234601	15			

Group Comparisons

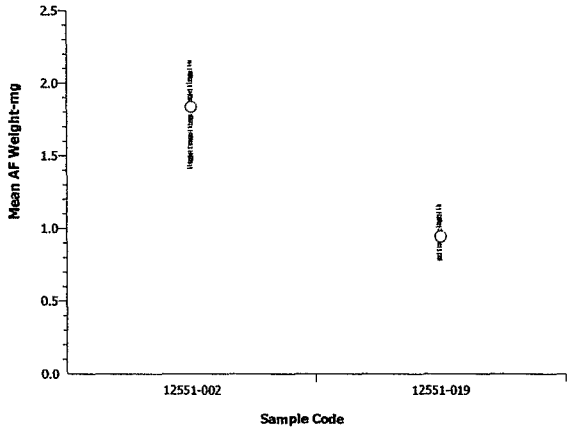
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-019	8.43555	1.76131	0.0000	0.18613	Significant Effect

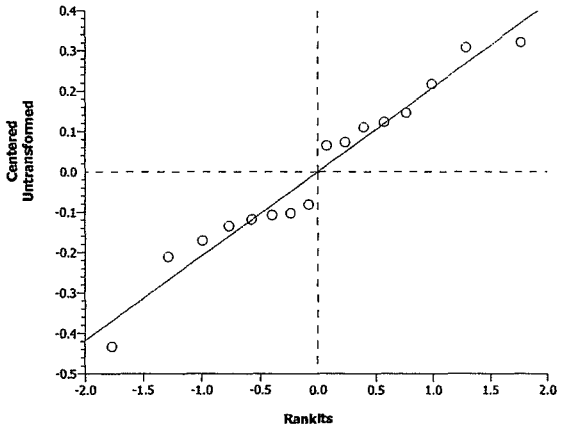
Data Summary		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	1.83579	1.40250	2.15625	0.26240				
12551-019	8	0.94434	0.77333	1.16125	0.14314				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
12551-002	1.40250	1.75429	1.70100	1.62429	2.14375	1.95857	1.94571	2.15625		
12551-019	0.84111	1.09000	1.00875	0.77333	1.01800	0.82600	1.16125	0.83625		

Graphics





Aquatic Research Organisms

DATA SHEET

I. **Organism History**

Species: Chironomus dilutus

Source: Lab reared X Hatchery reared _____ Field collected _____

Hatch date _____ Receipt date _____

Lot number 092204cr Strain ARO

Brood Origination _____

II. **Water Quality**

Temperature 24 °C Salinity ~ ppt DO SAT

pH 7.4 Hardness ≈120 ppm

III. **Culture Conditions**

System: FW static renewal

Diet: Flake Food X Phytoplankton _____ Trout Chow X

Brine Shrimp _____ Rotifers _____ Other Alfalfa

Prophylactic Treatments: _____

Comments: _____

_____

IV. **Shipping Information**

Client: Est # of Organisms: 600

Carrier: Pick-up Date Shipped: 10/5/04

Biologist: _____

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

H. azteca 10 DAY EXPOSURE SEDIMENT ASSAY

STUDY #	CLIENT:	OVERLYING WATER:	START DATE:
12551	Metcalf & Eddy	MHR/POND	10/05/04

	Lab Control				-004				-011			
DAY	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)
0	8.5	166.0	6.88	23	7.5	729	7.75	23	7.7	260	7.39	23
1	7.9	180	7.28	23	7.4	571	7.76	23	7.3	238	7.22	23
2	7.7	181	7.09	24	7.1	447	7.74	23	7.3	218	7.30	23
3	7.4	182	7.22	21	6.9	393	7.56	21	7.5	209	7.33	21
4	7.6	174	7.01	24	6.8	348	7.46	24	7.4	203	7.17	24
5	7.6	200	7.44	24	6.5	351	7.75	24	7.0	226	7.51	24
6	7.8	198	7.71	24	6.7	328	7.62	24	7.5	222	7.61	24
7	7.5	182	7.50	24	6.8	285	7.50	24	7.1	201	7.47	24
8	7.6	197	7.32	22	6.6	283	7.37	22	7.2	215	7.42	22
9	7.3	200	7.36	23	6.1	275	7.30	23	6.5	216	7.32	23
10	7.1	195	7.14	24	5.8	266	7.11	24	6.6	214	7.21	24

	-014				-019				Water Quality Station #	S/C Meter #	ΔH_2O fed	DATE	INIT
DAY	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)					
0	7.8	194.8	7.15	23	7.8	229	7.15	22	1	330 i	✓	10/5/04	DHB
1	7.5	205	7.22	23	7.5	231	7.18	23	1	330 i	✓	10/6/04	DHB
2	7.5	197	7.30	23	7.2	217	7.24	23	1	330 i	✓	10/7/04	DHB
3	7.3	181	7.25	21	6.9	209	7.15	21	2	330 i	✓	10/8/04	DHB
4	7.2	183	7.08	24	7.1	200	7.07	24	2	330 i	✓	10/9/04	KK
5	7.4	207	7.49	24	7.2	218	7.44	24	1	330 i	✓	10-10	✓
6	7.6	198	7.55	24	7.4	221	7.45	24	2	330 i	✓	10/11/04	DHB
7	7.4	181	7.45	24	7.3	196	7.37	24	2	330 i	✓	10/12/04	DHB
8	7.3	197	7.40	22	7.1	209	7.30	22	2	330 i	✓	10/13/04	DHB
9	6.8	200	7.30	23	6.5	210	7.22	23	1	330 i	✓	10/14/04	DHB
10	7.3	198	7.22	24	6.8	205	7.17	24	1	330 i	✓	10/15/04	DHB

Date & Initial Chemistry Sampling

DAY 0 Alkalinity, Hardness & Ammonia in MHR/POND	DAY 0 Alkalinity, Hardness & Ammonia in each treatment	DAY 10 Alkalinity, Hardness & Ammonia in each treatment
10/5/04 DHB	✓	✓

FEED 1 mL of YCT food mixture/replicate Two Volume additions Daily 23 °C

H. azteca 10 DAY EXPOSURE SEDIMENT ASSAY

STUDY #	CLIENT:	OVERLYING WATER:	START DATE:
12551	Metcalf & Eddy	MHR/POND	10/05/04

DAY	-002											
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)
0	7.9	163.3	7.03	22								
1	7.9	181	7.17	23								
2	7.6	183	7.20	23								
3	7.6	~~180~~ 183	7.13	21								
4	7.7	172	6.97	21								
5	7.5	189	7.15	24								
6	7.6	194	7.43	24								
7	7.5	182	7.36	24								
8	7.4	197	7.31	22								
9	7.0	197	7.20	23								
10	7.0	193	7.16	24								

DAY									Water Quality Station #	S/C Meter #	ΔH_2O fed	DATE	INIT
	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)	DO (mg/L)	S/C (umhos/cm)	pH (SU)	TEMP (°C)					
0									1	330i	✓	10/5/04 DHB	DHB
1									1	330i	✓	10/6/04	DHB
2									1	330i	✓	10/7/04	DHB
3									2	330i	✓	10/8/04	DHB
4									2	330i	✓	10/9/04	KK
5									1	330i	✓	10/10	LL
6									2	330i	✓	10/11/04	DHB
7									2	330i	✓	10/12/04	DHB
8									2	330i	✓	10/13/04	DHB
9									1	330i	✓	10/14/04	DHB
10									1	330i	✓	10/15/04	DHB

Date & Initial Chemistry Sampling

DAY 0 Alkalinity, Hardness & Ammonia in MHR/POND	DAY 0 Alkalinity, Hardness & Ammonia in each treatment	DAY 10 Alkalinity, Hardness & Ammonia in each treatment
10/5/04 DHB	✓	✓

FEED 1 mL of YCT food mixture/replicate Two Volume additions Daily 23 °C

STUDY: 12551
CLIENT: Metcalf & Eddy
PROJECT: Iron Horse Park
TASK: Hyalella azteca 10 Day Exposure Assay
DATA: Day 10 Survival Data Summary
START DATE: 10/05/04
DATE ENDED: 10/15/04

Project Site	ESI Ref #	Replicate	Larvae @ Start	Day 10 Surviving Organisms	Survival Rate	Mean Survival/ Site	Distribution	Variances	t Value	Critical t Value	p Value	Significant Difference ("<") in Day 10 Survival vs	
Lab Control	000	A	10	10	100.0%	100.0%							
		B	10	10	100.0%								
		C	10	10	100.0%								
		D	10	10	100.0%								
		E	10	10	100.0%								
		F	10	10	100.0%								
		G	10	10	100.0%								
		H	10	10	100.0%								
SED-01	-004	A	10	10	100.0%	96.3%	Non Normal	Unequal	2.0494	1.8946	0.0398	Lab	YES
		B	10	9	90.0%		Normal	Equal	-1.1482	1.8946	0.8557	SED-22	NO
		C	10	9	90.0%								
		D	10	9	90.0%								
		E	10	10	100.0%								
		F	10	10	100.0%								
		G	10	10	100.0%								
		H	10	10	100.0%								
SED-05	-011	A	10	9	90.0%	87.5%	Non Normal	Unequal	5.2354	1.8946	0.0006	Lab	YES
		B	10	8	80.0%		Normal	Equal	1.5614	1.8946	0.0812	SED-22	NO
		C	10	9	90.0%								
		D	10	9	90.0%								
		E	10	8	80.0%								
		F	10	10	100.0%								
		G	10	9	90.0%								
		H	10	8	80.0%								
SED-11	-014	A	10	5	50.0%	87.5%	Non Normal	Unequal	2.1806	1.8946	0.0328	Lab	YES
		B	10	10	100.0%		Normal	Equal	0.8360	1.8946	0.2154	SED-22	NO
		C	10	9	90.0%								
		D	10	8	80.0%								
		E	10	10	100.0%								
		F	10	10	100.0%								
		G	10	10	100.0%								
		H	10	8	80.0%								
SED-18	-019	A	10	1	10.0%	7.5%	Non Normal	Unequal	17.5529	1.8946	0.0000	Lab	YES
		B	10	0	0.0%		Non Normal	Equal	12.2955	1.8946	0.0000	SED-22	YES
		C	10	0	0.0%								
		D	10	1	10.0%								
		E	10	0	0.0%								
		F	10	0	0.0%								

		G	10	0	0.0%								
		H	10	4	40.0%								
SED-22	-002	A	10	8	80.0%	92.5%	Non Normal	Unequal	3.0740	1.8946	0.0090	Lab	YES
		B	10	9	90.0%								
		C	10	9	90.0%								
		D	10	10	100.0%								
		E	10	10	100.0%								
		F	10	10	100.0%								
		G	10	9	90.0%								
		H	10	9	90.0%								

ESI STUDY# 12551 Metcalf & Eddy
***H. azteca* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
LabA	0951	10	
Lab B	0953	10	
LabC	0955	10	
Lab D	0957	10	
LabE	0959	10	
Lab F	1001	10	
Lab G	1003	10	
LabH	1005	10	
-004A	1007	10	
-004B	1016	9	
-004C	1020	9	
-004D	1024	9	
-004E	1027	10	
-004F	1029	10	
-004G	1032	10	
-004H	1035	10	

ANALYST: JH
DATE: 10/15

ESI STUDY# 12551 Metcalf & Eddy
***H. azteca* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-002A	1131	8	
-002B	1136	9	
-002C	1142	9	
-002D	1147	10	
-002E	1152	10	

ANALYST: ZH
DATE: 10/15

ESI STUDY# 12551 Metcalf & Eddy
***H. azteca* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-011A	1020	9	
-011B	1030	(R3) ~~9~~ 8	
-011C	1040	9	
-011D	1050	9	
-011E	1100	8	
-011F	1110	10	
-011G	1120	9	
-011H	1130	8	
-002H	1135	9	
-002G	1145	9	
-002F	1155	10	

ANALYST: BB
DATE: 10/15/04

ESI STUDY# 12551 Metcalf & Eddy
***H. azteca* SEDIMENT ASSAY**

DAY 10:

SAMPLE ID	TIME	#LIVE	COMMENTS
-014A	1041	5	
-014B	1045	10	
-014C	1050	9	
-014D	1055	8	
-014E	1101	10	
-014F	1104	10	
-014G	1108	10	
-014H	1112	8	
-019A	1115	1	
-019B	1117	0	
-019C	1118	0	
-019D	1120	1	
-019E	1121	0	
-019F	1122	0	
-019G	1124	0	
-019H	1126	4	

ANALYST: SH
DATE: 10/15

CETIS Test Summary

Report Date: 19 Oct-04 7:37 AM
Link: 07-0789-2532

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Test No:	00-8937-0577	**Test Type:**	Survival-Growth	**Duration:**	10d 0h
Start Date:	05 Oct-04 12:00 PM	**Protocol:**	EPA/600/R-99/064 (2000)	**Species:**	Hyalella azteca
Ending Date:	15 Oct-04 12:00 PM	**Dil Water:**	Reconstituted Water	**Source:**	Aquatic Research Organisms, NH
Setup Date:	05 Oct-04 12:00 PM	**Brine:**	Not Applicable		

Sample No:	08-0492-1343	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	17 Oct-04 09:14 PM	**Code:**	12551-000	**Project:**	Ecologcal Risk Assessment
Receive Date:		**Source:**	Iron Horse Park		
Sample Age:	N/A (4 °C)	**Station:**	Lab Control		

Sample No:	07-1311-4563	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	13 Sep-04 02:25 PM	**Code:**	12551-002	**Project:**	Ecologcal Risk Assessment
Receive Date:	14 Sep-04 11:00 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 21h (4 °C)	**Station:**	D05221 / SED-22		

Sample No:	16-3525-2040	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	14 Sep-04 09:20 AM	**Code:**	12551-004	**Project:**	Ecologcal Risk Assessment
Receive Date:	15 Sep-04 10:45 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 2h (4 °C)	**Station:**	D05199 / SED-01		

Sample No:	04-0798-5579	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	15 Sep-04 12:00 PM	**Code:**	12551-011	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	20d 0h (4 °C)	**Station:**	D05203 / SED-05		

Sample No:	10-3483-0601	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 10:35 AM	**Code:**	12551-014	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	19d 1h (4 °C)	**Station:**	D05210 / SED-11		

Sample No:	04-0735-4420	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 01:45 PM	**Code:**	12551-019	**Project:**	Ecologcal Risk Assessment
Receive Date:	20 Sep-04 08:30 AM	**Source:**	Iron Horse Park		
Sample Age:	18d 22h (4 °C)	**Station:**	D05217 / SED-18		

Proportion Survived Summary

Sample Code	Reps	Mean	Minimum	Maximum	SE	SD	CV
12551-000	8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
12551-002	8	0.92500	0.80000	1.00000	0.02500	0.07071	7.64%
12551-004	8	0.96250	0.90000	1.00000	0.01830	0.05175	5.38%
12551-011	8	0.87500	0.80000	1.00000	0.02500	0.07071	8.08%
12551-014	8	0.87500	0.50000	1.00000	0.06196	0.17525	20.03%
12551-019	8	0.07500	0.00000	0.40000	0.04910	0.13887	185.16

Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000
12551-004	1.00000	0.90000	0.90000	0.90000	1.00000	1.00000	1.00000	1.00000
12551-011	0.90000	0.80000	0.90000	0.90000	0.80000	1.00000	0.90000	0.80000
12551-014	0.50000	1.00000	0.90000	0.80000	1.00000	1.00000	1.00000	0.80000
12551-019	0.10000	0.00000	0.00000	0.10000	0.00000	0.00000	0.00000	0.40000

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	47715880000	8.88539	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81935	0.84420	0.00393	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0572105	0.0572105	1	9.45	0.00825	Significant Effect
Error	0.0847604	0.0060543	14			
Total	0.14197095	0.0632648	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-002	3.07401	1.89458	0.0090	0.07371	Significant Effect

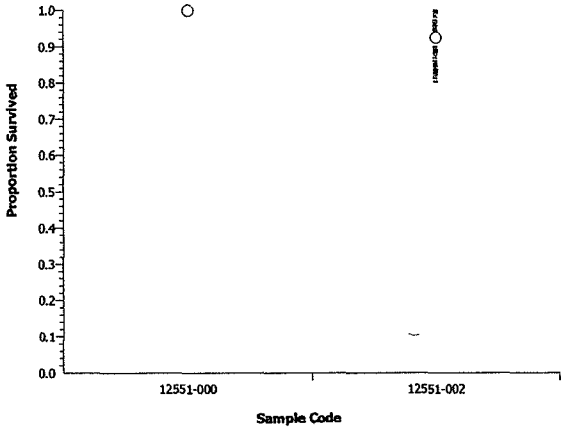
Data Summary

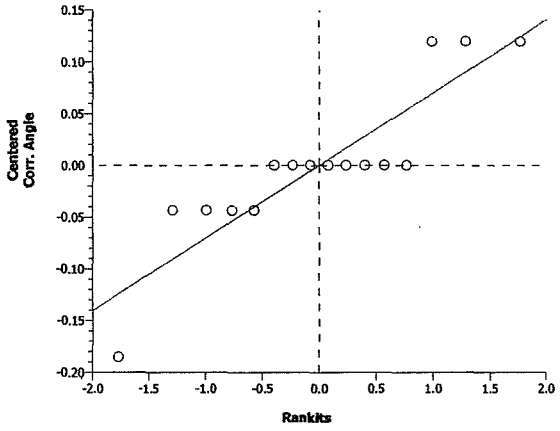
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00025
12551-002	8	0.92500	0.80000	1.00000	0.07071	1.29242	1.10715	1.41202	0.11004

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	28034200000	8.88539	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.78560	0.84420	0.00109	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0149396	0.0149396	1	4.20	0.05965	Non-Significant Effect
Error	0.0497988	0.0035571	14			
Total	0.06473837	0.0184967	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-004	2.04939	1.89458	0.0398	0.0565	Significant Effect

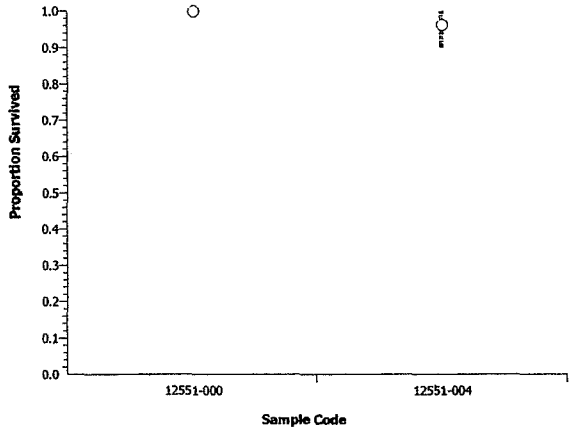
Data Summary

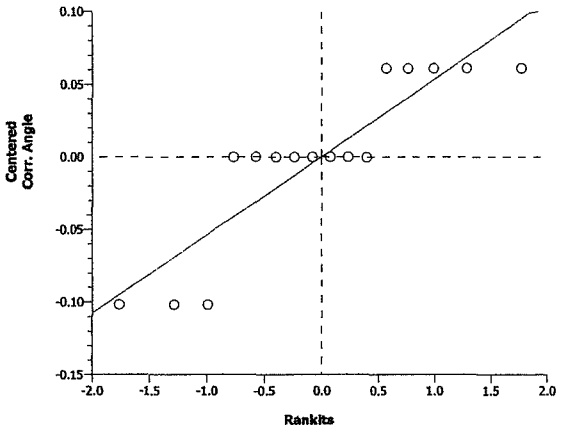
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00025
12551-004	8	0.96250	0.90000	1.00000	0.05175	1.35090	1.24905	1.41202	0.08435

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-004	1.00000	0.90000	0.90000	0.90000	1.00000	1.00000	1.00000	1.00000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	44099180000	8.88539	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.78334	0.84420	0.00100	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1533669	0.1533669	1	27.41	0.00013	Significant Effect
Error	0.0783359	0.0055954	14			
Total	0.2317028	0.1589623	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-011	5.2354	1.89458	0.0006	0.07086	Significant Effect

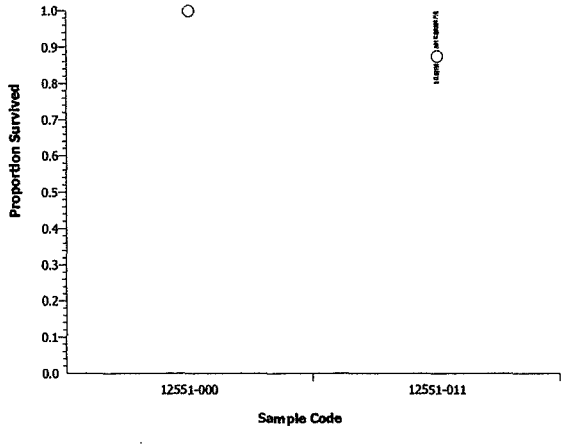
Data Summary

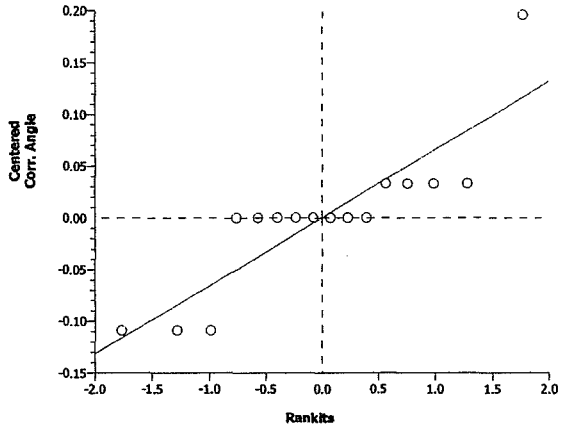
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00025
12551-011	8	0.87500	0.80000	1.00000	0.07071	1.21621	1.10715	1.41202	0.10579

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-011	0.90000	0.80000	0.90000	0.90000	0.80000	1.00000	0.90000	0.80000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	20285030000	8.88539	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.77844	0.84420	0.00083	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1223816	0.1223816	1	4.75	0.04677	Significant Effect
Error	0.3603345	0.0257382	14			
Total	0.48271608	0.1481197	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-014	2.18057	1.89458	0.0328	0.15197	Significant Effect

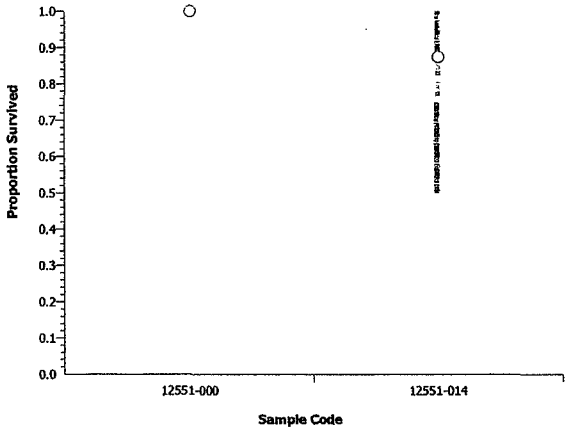
Data Summary

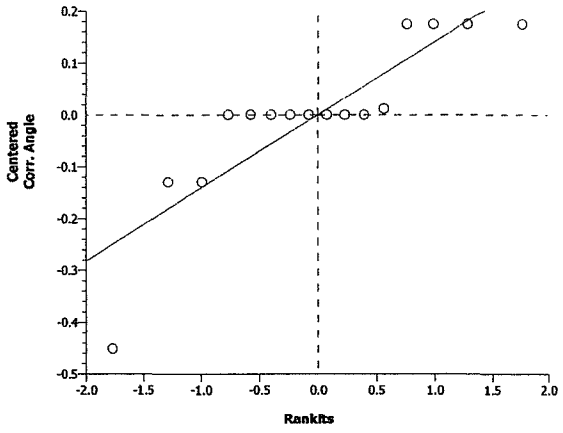
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00025
12551-014	8	0.87500	0.50000	1.00000	0.17525	1.23710	0.78540	1.41202	0.22688

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-014	0.50000	1.00000	0.90000	0.80000	1.00000	1.00000	1.00000	0.80000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	13455520000	8.88539	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.65831	0.84420	0.00001	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.260151	5.260151	1	308.10	0.00000	Significant Effect
Error	0.2390181	0.0170727	14			
Total	5.49916902	5.2772236	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-019	17.5529	1.89458	0.0000	0.12378	Significant Effect

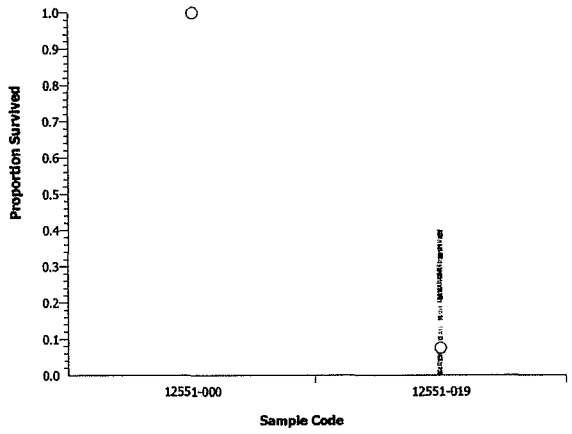
Data Summary

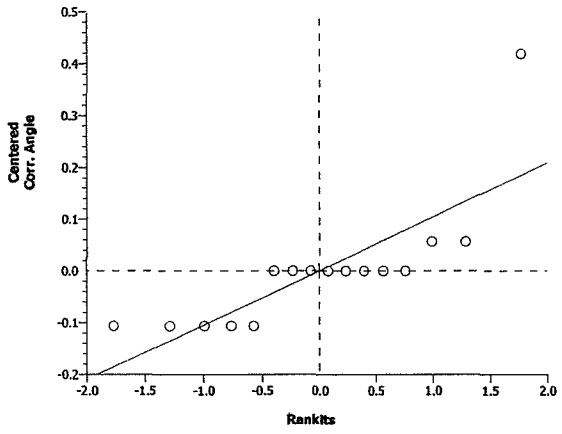
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00025
12551-019	8	0.07500	0.00000	0.40000	0.13887	0.26527	0.15878	0.68472	0.18478

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
12551-019	0.10000	0.00000	0.00000	0.10000	0.00000	0.00000	0.00000	0.40000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.70206	8.88539	0.49957	Equal Variances
Distribution	Shapiro-Wilk W	0.90151	0.84420	0.08520	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0136795	0.0136795	1	1.42	0.25269	Non-Significant Effect
Error	0.1345592	0.0096114	14			
Total	0.14823869	0.0232909	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-004	-1.1482	1.89458	0.8557	0.09649	Non-Significant Effect

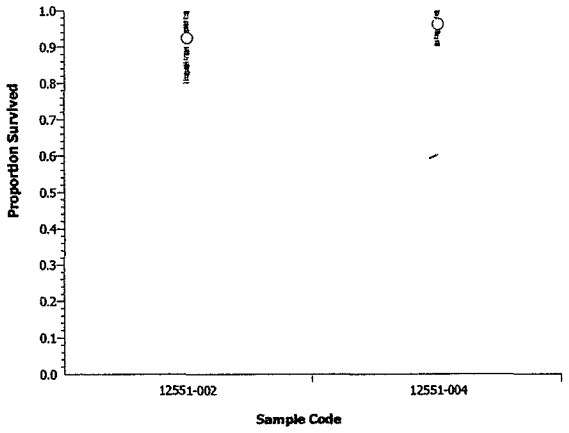
Data Summary

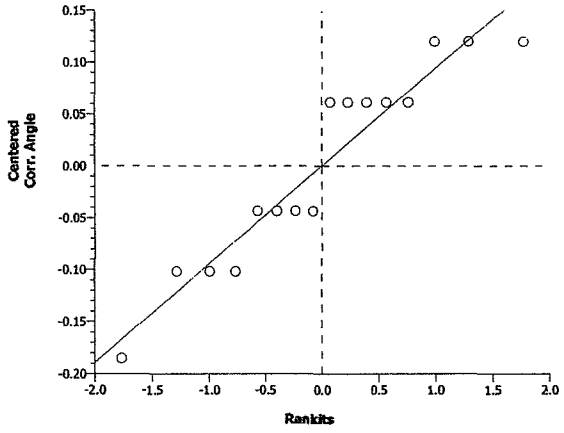
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.92500	0.80000	1.00000	0.07071	1.29242	1.10715	1.41202	0.11004
12551-004	8	0.96250	0.90000	1.00000	0.05175	1.35090	1.24905	1.41202	0.08435

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000
12551-004	1.00000	0.90000	0.90000	0.90000	1.00000	1.00000	1.00000	1.00000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:33 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.08201	8.88539	0.91986	Equal Variances
Distribution	Shapiro-Wilk W	0.95462	0.84420	0.54173	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0232360	0.0232360	1	1.99	0.17971	Non-Significant Effect
Error	0.1630963	0.0116497	14			
Total	0.18633234	0.0348858	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-011	1.56138	1.89458	0.0812	0.09248	Non-Significant Effect

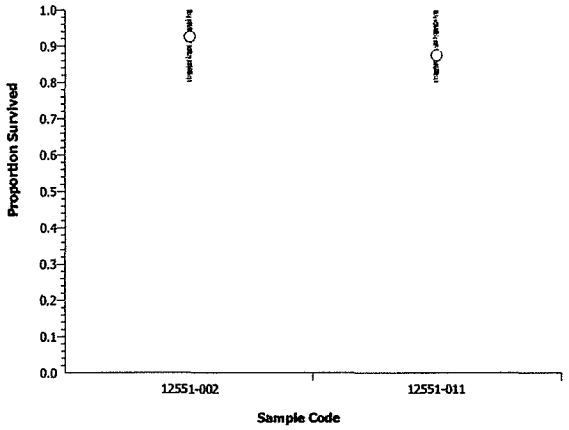
Data Summary

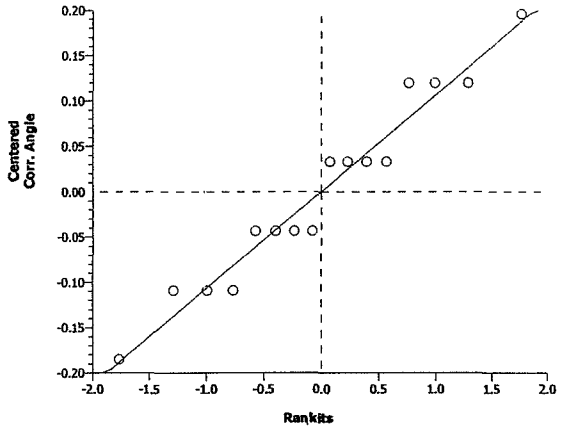
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.92500	0.80000	1.00000	0.07071	1.29242	1.10715	1.41202	0.11004
12551-011	8	0.87500	0.80000	1.00000	0.07071	1.21621	1.10715	1.41202	0.10579

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000
12551-011	0.90000	0.80000	0.90000	0.90000	0.80000	1.00000	0.90000	0.80000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	4.25121	8.88539	0.07542	Equal Variances
Distribution	Shapiro-Wilk W	0.86922	0.84420	0.02555	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.012242	0.012242	1	0.39	0.54488	Non-Significant Effect
Error	0.4450949	0.0317925	14			
Total	0.45733695	0.0440345	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-014	0.83598	1.89458	0.2154	0.12538	Non-Significant Effect

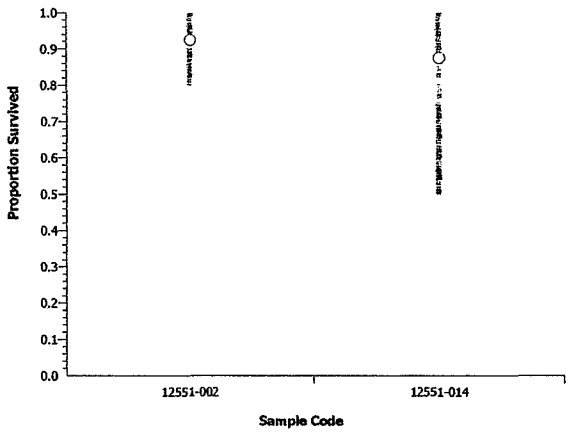
Data Summary

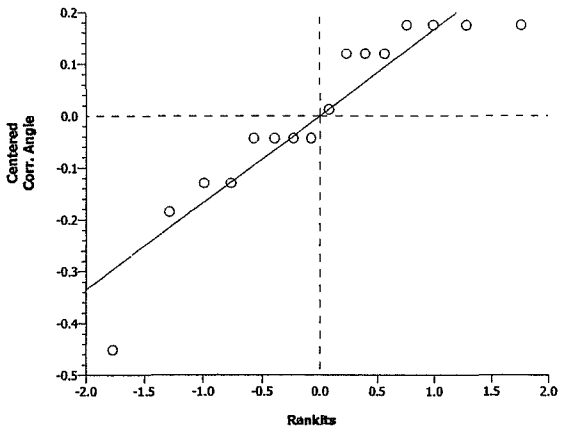
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.92500	0.80000	1.00000	0.07071	1.29242	1.10715	1.41202	0.11004
12551-014	8	0.87500	0.50000	1.00000	0.17525	1.23710	0.78540	1.41202	0.22688

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000
12551-014	0.50000	1.00000	0.90000	0.80000	1.00000	1.00000	1.00000	0.80000

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Angular (Corrected)				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.81993	8.88539	0.19478	Equal Variances
Distribution	Shapiro-Wilk W	0.83810	0.84420	0.00795	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.220209	4.220209	1	182.48	0.00000	Significant Effect
Error	0.3237785	0.0231270	14			
Total	4.54398718	4.2433357	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-019	12.2955	1.89458	0.0000	0.15827	Significant Effect

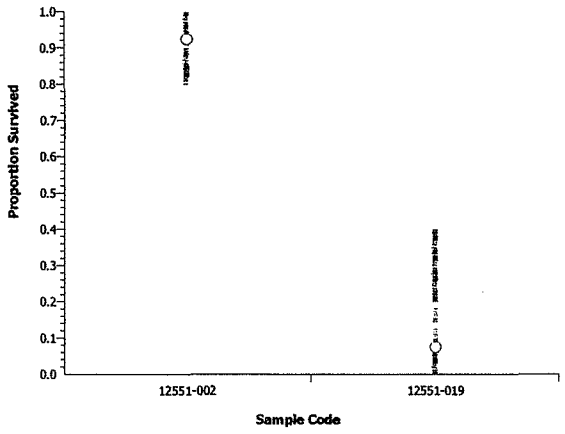
Data Summary

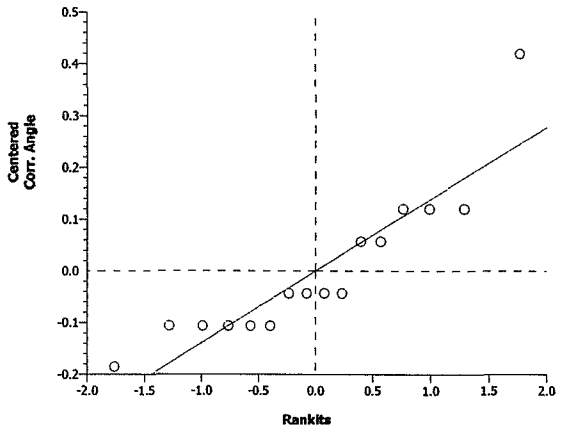
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.92500	0.80000	1.00000	0.07071	1.29242	1.10715	1.41202	0.11004
12551-019	8	0.07500	0.00000	0.40000	0.13887	0.26527	0.15878	0.68472	0.18478

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.80000	0.90000	0.90000	1.00000	1.00000	1.00000	0.90000	0.90000
12551-019	0.10000	0.00000	0.00000	0.10000	0.00000	0.00000	0.00000	0.40000

Graphics





STUDY: 12551
CLIENT: Metcalf & Eddy
PROJECT: Iron Horse Park
TASK: Hyalella azteca 10 Day Exposure Assay
DATA: Day 10 Growth Summary
START DATE: 10/05/04
DATE ENDED: 10/15/04
INITIAL DRY WT.: 0.030 mg/individual

Project Site	ESI Ref #	Replicate	Dry Weight (mg/individual)	Mean Dry Weight for Site	Distribution	Variance	t Value	Critical t Value	p Value	Significant Difference ("<") in Day 10 Growth vs	
Lab Control	000	A	0.078	0.080							
Lab Control	000	B	0.072								
		C	0.081								
		D	0.083								
		E	0.106								
		F	0.090								
		G	0.062								
		H	0.071								
SED-01	-004	A	0.107	0.087	Normal	Equal	-0.8792	1.8946	0.7958	Lab	NO
		B	0.080		Normal	Equal	-1.1530	1.8946	0.8566	SED-22	NO
		C	0.099								
		D	0.101								
		E	0.074								
		F	0.071								
		G	0.070								
		H	0.094								
SED-05	-011	A	0.079	0.077	Normal	Equal	0.5300	1.8946	0.3063	Lab	NO
		B	0.081		Normal	Equal	0.1433	1.8946	0.4450	SED-22	NO
		C	0.058								
		D	0.073								
		E	0.072								
		F	0.080								
		G	0.069								
		H	0.101								
SED-11	-014	A	0.106	0.070	Normal	Equal	1.3390	1.8946	0.1112	Lab	NO
		B	0.064		Normal	Equal	1.2637	1.8946	0.1234	SED-22	NO
		C	0.062								
		D	0.058								
		E	0.075								
		F	0.057								
		G	0.081								
		H	0.054								

SED-18	-019	A	0.150	0.097	Normal	Unequal	-0.5068	2.9200	0.6687	Lab	NO
		B			Normal	Unequal	-0.5987	2.9200	0.6949	SED-22	NO
		C									
		D	0.100								
		E									
		F									
		G									
		H	0.040								
SED-22	-002	A	0.075	0.077	Normal	Equal	0.6173	1.8946	0.2783	Lab	NO
		B	0.086								
		C	0.071								
		D	0.064								
		E	0.097								
		F	0.077								
		G	0.081								
		H	0.069								

Hyalella azteca Assay
GROWTH DATA

STUDY NUMBER: 12551 **CLIENT:** Metcalf & Eddy

ESI SAMPLE ID	REP	FOIL TARE WEIGHT (g)	*H. azteca* + FOIL (g)
LAB	A	0.20463	0.20541
	B	0.21204	0.21296
	C	0.20783	0.20864
	D	0.20697	0.20780
	E	0.20617	0.20723
	F	0.21052	0.21142
	G	0.20965	0.21027
	H	0.20869	0.20940
-004	A	0.20796	0.20903
	B	0.21029	0.21101
	C	0.20828	0.20917
	D	0.21028	0.21119
	E	0.20791	0.20865
	F	0.20545	0.20616
	G	0.20855	0.20925
	H	0.20820	0.20914
-011	A	0.20680	0.20751
	B	0.21100	0.21165
	C	0.21284	0.21336
	D	0.21160	0.21226
	E	0.21243	0.21301
	F	0.21332	0.21412
	G	0.20857	0.20919
	H	0.20614	0.20695
-014	A	0.21074	0.21127
	B	0.20754	0.20818
	C	0.21193	0.21249
	D	0.21219	0.21265
	E	0.21022	0.21097
	F	0.20758	0.20815
	G	0.21084	0.21165
	H	0.21128	0.21171
RECORDED BY:		[illegible]	[illegible]
DATE:		10/15/04	10/16/04

ESI SAMPLE ID	REP	FOIL TARE WEIGHT (g)	*H. azteca* + FOIL (g)
-019	A	0.20915	0.20930
	B	0.21139	0.21146 *
	C	0.20873	0.20882 *
	D	0.20709	0.20719
	E	0.21239	0.21237 *
	F	0.21192	0.21192 *
	G	0.21127	0.21132 *
	H	0.21332	0.21348
-002	A	0.20811	0.20871
	B	0.20801	0.20878
	C	0.20946	0.20810
	D	0.21093	0.21157
	E	0.21256	0.21353
	F	0.21098	0.21175
	G	0.21248	0.21321
	H	0.20968	0.21030
	A		
	B		
	C		
	D		
	E		
	F		
	G		
	H		
	A		
	B		
	C		
	D		
	E		
	F		
	G		
	H		
RECORDED BY:		[illegible]	[illegible]
DATE:		10/15/04	10/16/04

* No org. in Foil

NOTES: _____

Hyalella azteca Assay

STUDY NUMBER: 12551 **CLIENT:** M+E

ESI SAMPLE ID	REP	TARE WEIGHT (G)	*H. azteca* + FOIL (G)	NET WEIGHT (MG)	# *H. azteca*	MEAN DRY WEIGHT PER *H. azteca* (MG)
START ORGANISMS	A	0.2093	0.20957	0.270	10	0.027
	B	0.2095	0.20993	0.430	10	0.043
	C	0.2084	0.20864	0.240	10	0.024
	D	0.2057	0.20594	0.240	10	0.024
RECORDED BY:		DHB	BJB			
DATE:		10/5/04	10/6/04			

0.030

NOTES:

CETIS Test Summary

Report Date: 19 Oct-04 7:35 AM
Link: 07-0789-2532

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Test No:	00-8937-0577	**Test Type:**	Survival-Growth	**Duration:**	10d 0h
Start Date:	05 Oct-04 12:00 PM	**Protocol:**	EPA/600/R-99/064 (2000)	**Species:**	Hyalella azteca
Ending Date:	15 Oct-04 12:00 PM	**Dil Water:**	Reconstituted Water	**Source:**	Aquatic Research Organisms, NH
Setup Date:	05 Oct-04 12:00 PM	**Brine:**	Not Applicable		

Sample No:	08-0492-1343	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	17 Oct-04 09:14 PM	**Code:**	12551-000	**Project:**	Ecologcal Risk Assessment
Receive Date:		**Source:**	Iron Horse Park		
Sample Age:	N/A (4 °C)	**Station:**	Lab Control		
Sample No:	07-1311-4563	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	13 Sep-04 02:25 PM	**Code:**	12551-002	**Project:**	Ecologcal Risk Assessment
Receive Date:	14 Sep-04 11:00 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 21h (4 °C)	**Station:**	D05221 / SED-22		
Sample No:	16-3525-2040	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	14 Sep-04 09:20 AM	**Code:**	12551-004	**Project:**	Ecologcal Risk Assessment
Receive Date:	15 Sep-04 10:45 AM	**Source:**	Iron Horse Park		
Sample Age:	21d 2h (4 °C)	**Station:**	D05199 / SED-01		
Sample No:	04-0798-5579	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	15 Sep-04 12:00 PM	**Code:**	12551-011	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	20d 0h (4 °C)	**Station:**	D05203 / SED-05		
Sample No:	10-3483-0601	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 10:35 AM	**Code:**	12551-014	**Project:**	Ecologcal Risk Assessment
Receive Date:	17 Sep-04 10:40 AM	**Source:**	Iron Horse Park		
Sample Age:	19d 1h (4 °C)	**Station:**	D05210 / SED-11		
Sample No:	04-0735-4420	**Material:**	Freshwater Sedment	**Client:**	Metcalf & Eddy, Inc.
Sample Date:	16 Sep-04 01:45 PM	**Code:**	12551-019	**Project:**	Ecologcal Risk Assessment
Receive Date:	20 Sep-04 08:30 AM	**Source:**	Iron Horse Park		
Sample Age:	18d 22h (4 °C)	**Station:**	D05217 / SED-18		

Mean Dry Weight-mg Summary

Sample Code	Reps	Mean	Minimum	Maximum	SE	SD	CV
12551-000	8	0.08037	0.06200	0.10600	0.00474	0.01341	16.68%
12551-002	8	0.07750	0.06400	0.09700	0.00370	0.01047	13.52%
12551-004	8	0.08700	0.07000	0.10700	0.00526	0.01489	17.12%
12551-011	8	0.07662	0.05800	0.10100	0.00437	0.01236	16.13%
12551-014	8	0.06963	0.05400	0.10600	0.00614	0.01736	24.94%
12551-019	8	0.09667	0.04000	0.15000	0.03180	0.05508	56.97%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900
12551-004	0.10700	0.08000	0.09900	0.10100	0.07400	0.07100	0.07000	0.09400
12551-011	0.07900	0.08100	0.05800	0.07300	0.07200	0.08000	0.06900	0.10100
12551-014	0.10600	0.06400	0.06200	0.05800	0.07500	0.05700	0.08100	0.05400
12551-019	0.15000	N/A	N/A	0.10000	N/A	N/A	N/A	0.04000

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.63786	8.88539	0.53077	Equal Variances
Distribution	Shapiro-Wilk W	0.95768	0.84420	0.59207	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.306E-05	3.306E-05	1	0.23	0.64003	Non-Significant Effect
Error	0.0020259	0.0001447	14			
Total	0.00205894	0.0001778	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-002	0.61726	1.89458	0.2783	0.00882	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.08037	0.06200	0.10600	0.01341				
12551-002	8	0.07750	0.06400	0.09700	0.01047				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900

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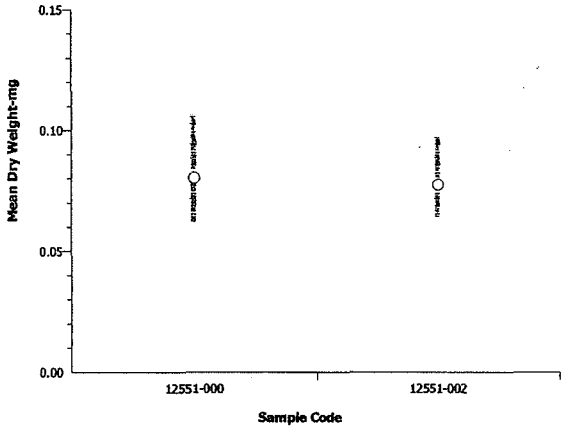

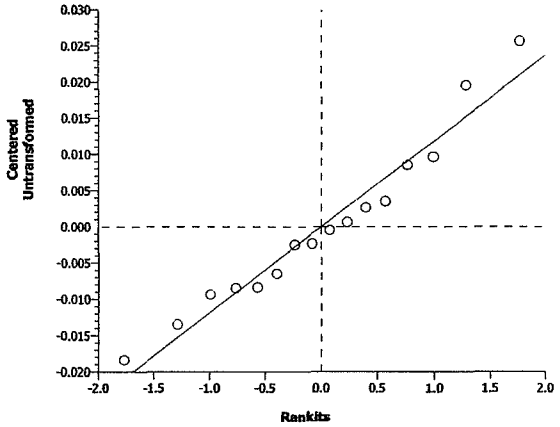

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.23383	8.88539	0.78869	Equal Variances
Distribution	Shapiro-Wilk W	0.95324	0.84420	0.51971	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0001756	0.0001756	1	0.87	0.36550	Non-Significant Effect
Error	0.0028099	0.0002007	14			
Total	0.00298544	0.0003763	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-004	-0.8792	1.89458	0.7958	0.01428	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.08037	0.06200	0.10600	0.01341				
12551-004	8	0.08700	0.07000	0.10700	0.01489				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-004	0.10700	0.08000	0.09900	0.10100	0.07400	0.07100	0.07000	0.09400

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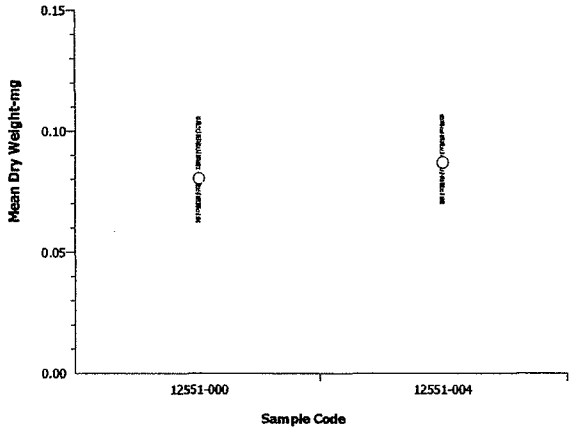
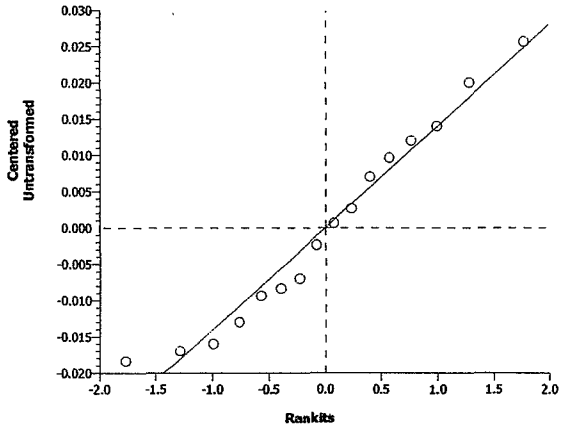




CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.17572	8.88539	0.83636	Equal Variances
Distribution	Shapiro-Wilk W	0.92629	0.84420	0.21051	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.625E-05	5.625E-05	1	0.34	0.57005	Non-Significant Effect
Error	0.0023278	0.0001663	14			
Total	0.00238400	0.0002225	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-011	0.53	1.89458	0.3063	0.01341	Non-Significant Effect

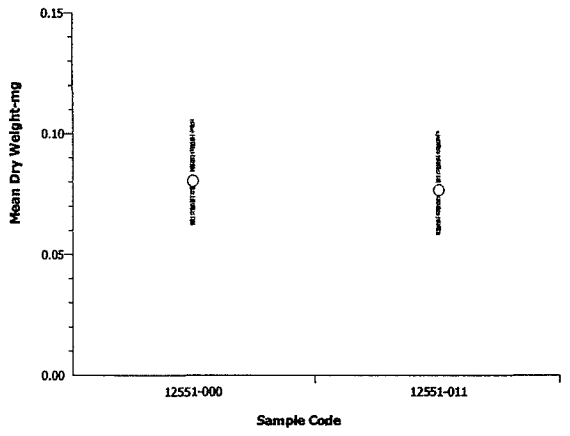
Data Summary

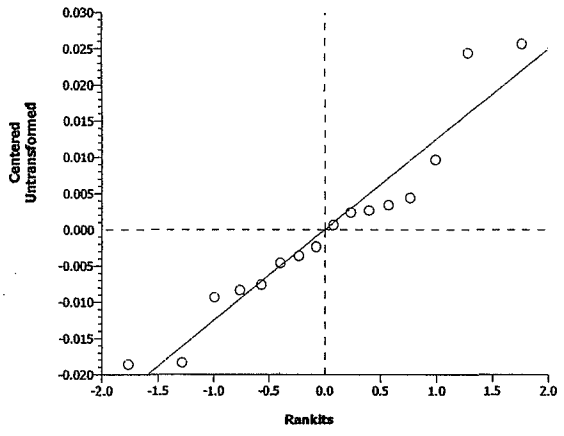
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.08037	0.06200	0.10600	0.01341				
12551-011	8	0.07662	0.05800	0.10100	0.01236				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-011	0.07900	0.08100	0.05800	0.07300	0.07200	0.08000	0.06900	0.10100

Graphics





CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.67733	8.88539	0.51132	Equal Variances
Distribution	Shapiro-Wilk W	0.90531	0.84420	0.09805	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0004622	0.0004622	1	1.92	0.18736	Non-Significant Effect
Error	0.0033678	0.0002406	14			
Total	0.00383	0.0007028	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-014	1.339	1.89458	0.1112	0.01521	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.08037	0.06200	0.10600	0.01341				
12551-014	8	0.06963	0.05400	0.10600	0.01736				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-014	0.10600	0.06400	0.06200	0.05800	0.07500	0.05700	0.08100	0.05400

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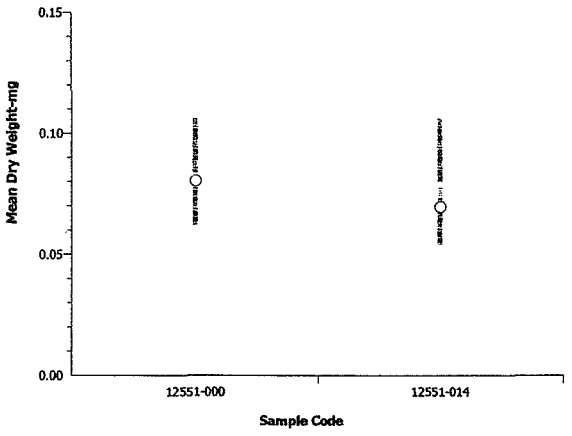

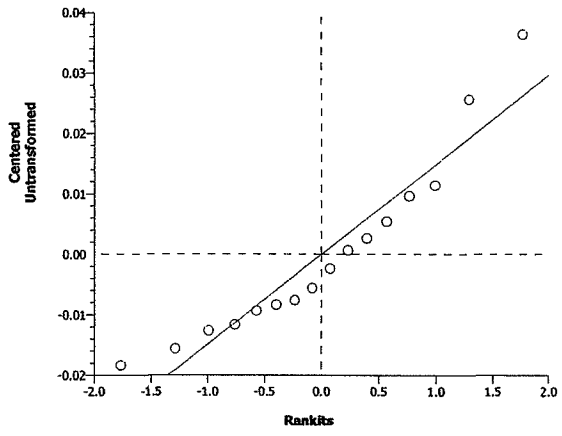

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:34 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	16.88032	12.40396	0.00420	Unequal Variances
Distribution	Shapiro-Wilk W	0.92950	0.79200	0.38943	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0005791	0.0005791	1	0.71	0.42078	Non-Significant Effect
Error	0.0073245	0.0008138	9			
Total	0.00790364	0.0013929	10			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-000		12551-019	-0.5068	2.91999	0.6687	0.09388	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-000	8	0.08037	0.06200	0.10600	0.01341				
12551-019	3	0.09667	0.04000	0.15000	0.05508				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-000	0.07800	0.07200	0.08100	0.08300	0.10600	0.09000	0.06200	0.07100
12551-019	0.15000	0.10000	0.04000					

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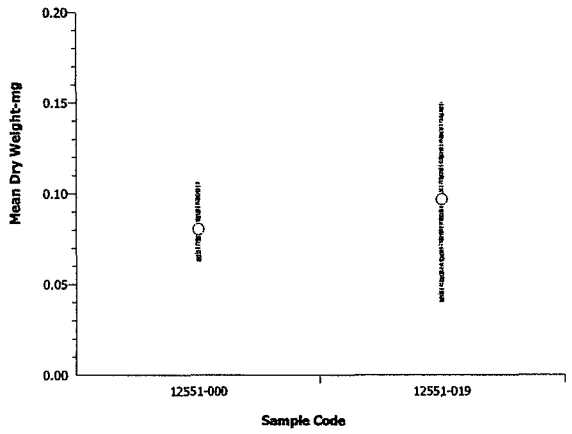

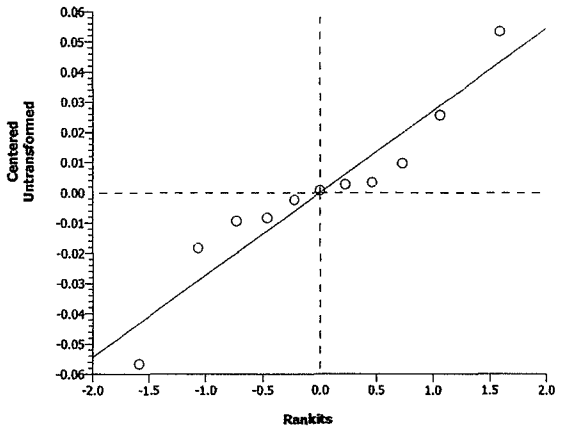

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:35 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.02083	8.88539	0.37377	Equal Variances
Distribution	Shapiro-Wilk W	0.93867	0.84420	0.32447	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.000361	0.000361	1	2.18	0.16209	Non-Significant Effect
Error	0.00232	0.0001657	14			
Total	0.002681	0.0005267	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-004	-1.153	1.89458	0.8566	0.01561	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.07750	0.06400	0.09700	0.01047				
12551-004	8	0.08700	0.07000	0.10700	0.01489				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900
12551-004	0.10700	0.08000	0.09900	0.10100	0.07400	0.07100	0.07000	0.09400

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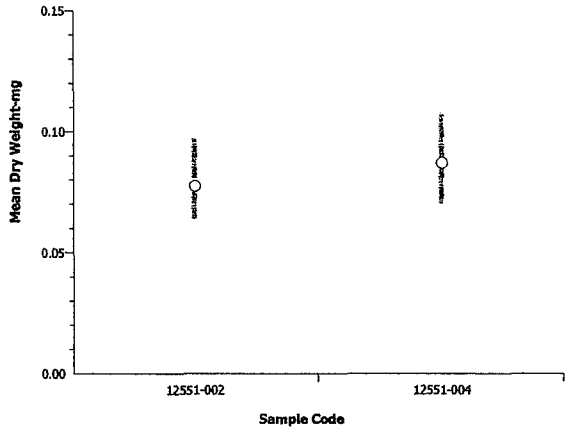

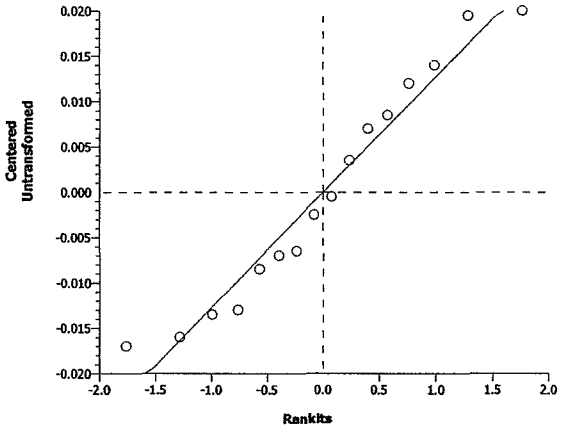

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:35 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.39307	8.88539	0.67282	Equal Variances
Distribution	Shapiro-Wilk W	0.95325	0.84420	0.51991	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.063E-06	3.063E-06	1	0.02	0.88078	Non-Significant Effect
Error	0.0018379	0.0001313	14			
Total	0.00184094	0.0001343	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-011	0.14334	1.89458	0.4450	0.01157	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.07750	0.06400	0.09700	0.01047				
12551-011	8	0.07662	0.05800	0.10100	0.01236				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900
12551-011	0.07900	0.08100	0.05800	0.07300	0.07200	0.08000	0.06900	0.10100

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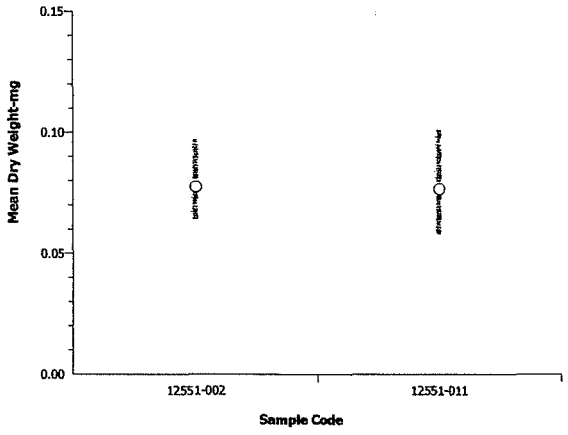

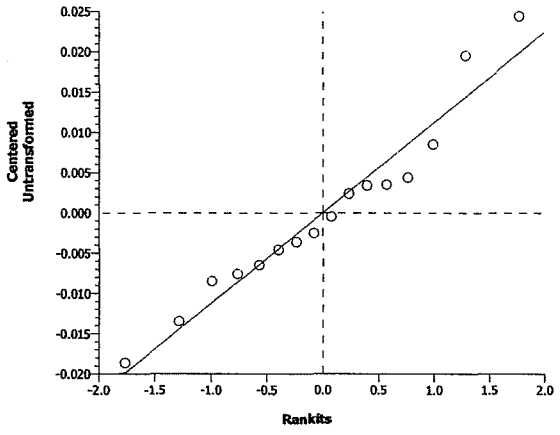

CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — EnviroSystems, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:35 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Paired Sample t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.74723	8.88539	0.20582	Equal Variances
Distribution	Shapiro-Wilk W	0.89121	0.84420	0.05810	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0002481	0.0002481	1	1.21	0.29051	Non-Significant Effect
Error	0.0028779	0.0002056	14			
Total	0.00312594	0.0004536	15			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-014	1.26365	1.89458	0.1234	0.01181	Non-Significant Effect

Data Summary

		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.07750	0.06400	0.09700	0.01047				
12551-014	8	0.06963	0.05400	0.10600	0.01736				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900
12551-014	0.10600	0.06400	0.06200	0.05800	0.07500	0.05700	0.08100	0.05400

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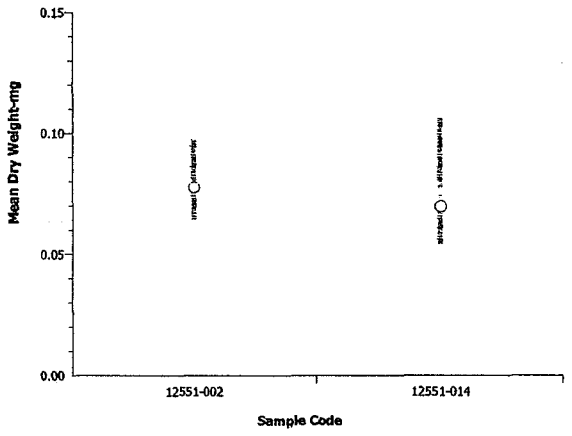
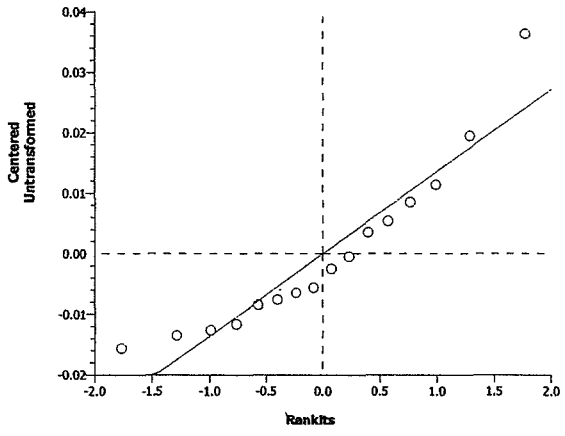




CETIS Analysis Detail

Hyalella 10-d Survival and Growth Sediment Test — **EnviroSystems, Inc.**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	07-0789-2532	07-0789-2532	19 Oct-04 7:35 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed				N/A		

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	27.64757	12.40396	0.00095	Unequal Variances
Distribution	Shapiro-Wilk W	0.89535	0.79200	0.16592	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0008015	0.0008015	1	1.06	0.33107	Non-Significant Effect
Error	0.0068347	0.0007594	9			
Total	0.00763618	0.0015609	10			

Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
12551-002		12551-019	-0.5987	2.91999	0.6949	0.09348	Non-Significant Effect

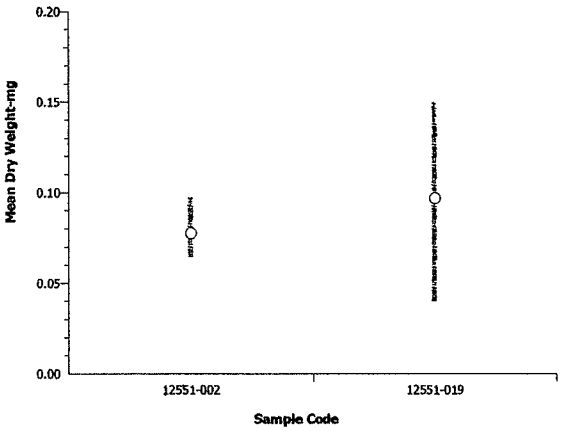
Data Summary

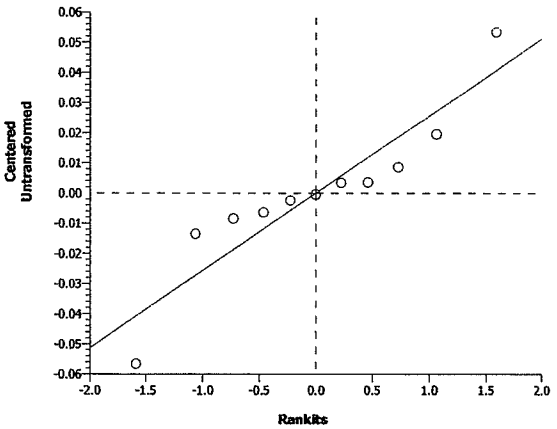
		Original Data				Transformed Data			
Sample Code	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
12551-002	8	0.07750	0.06400	0.09700	0.01047				
12551-019	3	0.09667	0.04000	0.15000	0.05508				

Data Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
12551-002	0.07500	0.08600	0.07100	0.06400	0.09700	0.07700	0.08100	0.06900
12551-019	0.15000	0.10000	0.04000					

Graphics





Aquatic Research Organisms

DATA SHEET

I. **Organism History**

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 9/28/04 Receipt date _____

Lot number 092804HA Strain ARO

Brood Origination USFWS MO

II. **Water Quality**

Temperature 23 °C Salinity — ppt DO Sat

pH 7.0 Hardness ~120 ppm

III. **Culture Conditions**

System: RW STATIC RENEWAL

Diet: Flake Food ✓ Phytoplankton _____ Trout Chow ✓

Brine Shrimp _____ Rotifers _____ Other _____

Prophylactic Treatments: _____

Comments: _____

IV. **Shipping Information**

Client: EST # of Organisms: 600

Carrier: PICK UP Date Shipped: 10/5/04

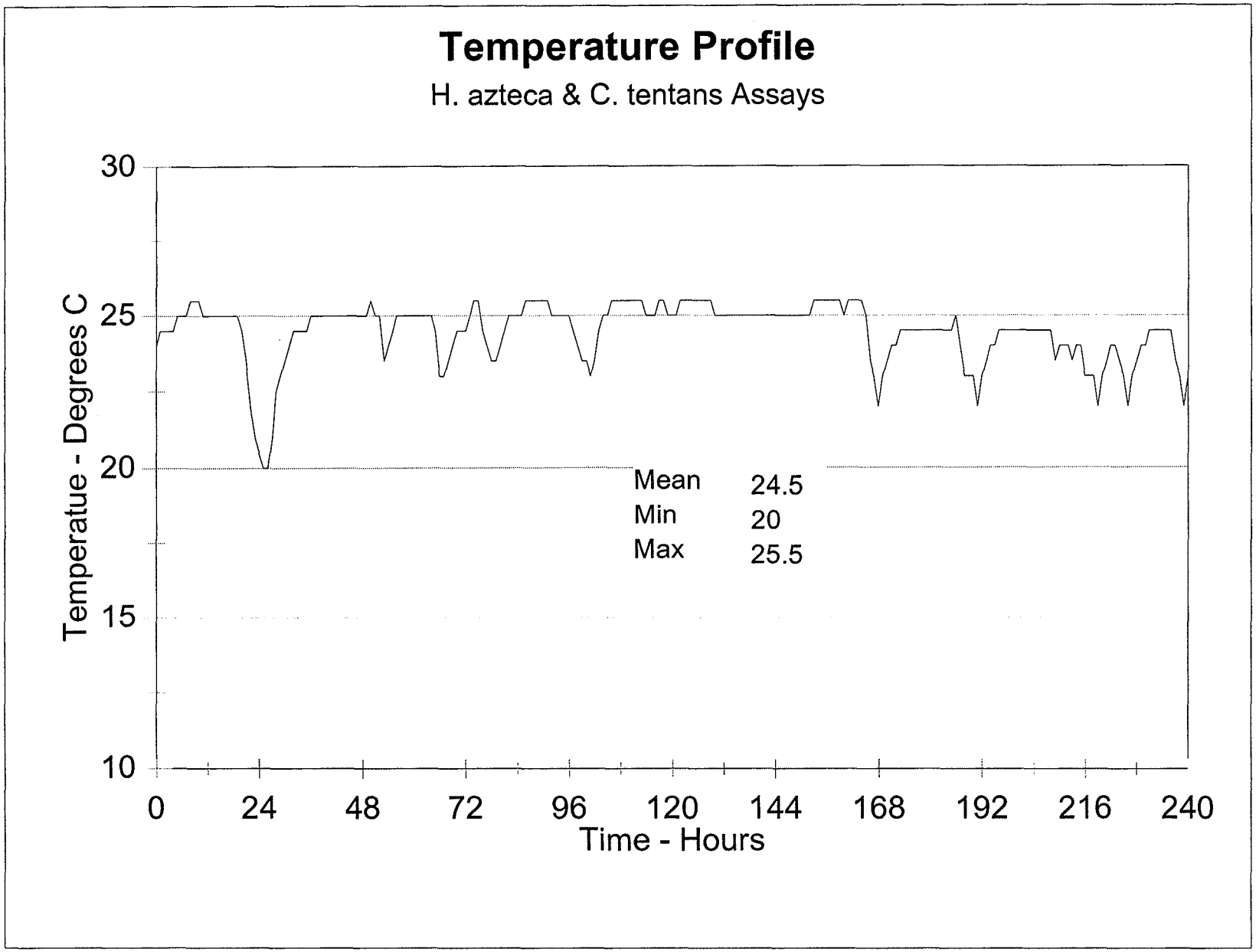
Biologist: Stan Sandrzki

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

STUDY: 12551
CLIENT: Metcalf & Eddy
PROJECT: Iron Horse Park
TASK: Microtox® Analysis
DATA: % Effect
START DATE: 09/22/04
DATE ENDED: 09/22/04

Field ID	ESI #	As Received Salinity (ppt)	Adjusted Salinity (ppt)	pH (SU)	%Effect 5 Min	%Effect 15 Min
SED-21	12551-001	<1	18	5.26	0.00	0.00
SED-22	12551-002	<1	18	4.98	0.00	0.00
SED-23	12551-003	<1	18	5.31	7.89	0.00
SED-01	12551-004	<1	19	6.75	28.63	0.00
SED-02	12551-005	<1	19	6.59	37.08	0.00
SED-03	12551-006	<1	18	5.77	0.00	0.00
SED-04	12551-007	<1	18	5.31	35.98	1.16
SED-06	12551-008	<1	18	5.57	13.64	5.96
SED-07	12551-009	<1	18	5.80	4.27	0.00
SED-08	12551-010	<1	18	6.36	62.95	27.82
SED-05	12551-011	<1	18	6.14	59.16	0.00
SED-09	12551-012	<1	18	5.99	28.42	13.07
SED-10	12551-013	<1	18	5.64	4.20	55.61
SED-11	12551-014	<1	19	5.58	0.00	45.72
SED-12	12551-015	<1	18	5.85	35.66	14.54
SED-17	12551-016	<1	18	6.16	0.00	0.00
SED-15	12551-017	<1	18	5.34	7.75	0.00
SED-16	12551-018	<1	18	5.40	0.00	45.48
SED-18	12551-019	<1	19	5.81	0.00	0.00
SED-19	12551-020	<1	19	5.78	5.60	0.00
SED-20	12551-021	<1	19	5.48	6.51	0.00
SED-13	12551-022	<1	18	5.69	13.74	0.00
SED-14	12551-023	<1	18	5.49	0.00	0.00


Temperature Profile
H. azteca & C. tentans Assays
Temperatue - Degrees C
30
25
20
15
10
Mean 24.5
Min 20
Max 25.5
0
24
48
72
96
120
144
168
192
216
240
Time - Hours

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/14/04 1100

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: M+E

Via: Fed Ex

Description of Shipping / Packing Containers(s) 2 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed 21		2x1g		
Sed 22		↓		
Sed 23		↓		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 9/14/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/15/04 1045

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: M+E

Via: Fed Ex

Description of Shipping / Packing Containers(s) 3 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed-01		2x1g		
Sed-02		"		
Sed-03		"		
Sed-04		"		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 9/15/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/16/04 1000

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: M+E

Via: Fed Ex

Description of Shipping / Packing Containers(s) 2 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed-06		2x1g		
Sed-07		1		
Sed-08		L		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 9/16/04

Notes: Recd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/17/04 1040

Client Name and Address: Metcalf and Eddy

Method of Shipment/ Pick Up: From: M+E

Via: Fed Ex

Description of Shipping / Packing Containers(s) 4 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed 05		2x1g		
Sed 09		↓		
Sed 10				
Sed 11				
Sed 12				
Sed 17				

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: _____ Date: 9/17/04

Notes: Recd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/21/04 1020

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: Metcalf + Eddy

Via: Fed Ex

Description of Shipping / Packing Containers(s) 2 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed-13		1x1g		
Sed-14		1x1g		
Sed-20		1x1g		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: _____ Date: 9/21/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/20/04 0830 *

Client Name and Address: M+E

Method of Shipment/ Pick Up: From: Client

Via: Fed Ex

Description of Shipping / Packing Containers(s) 3 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
Sed-15		2x1g		
Sed-16		↓		
Sed-18		↓		
Sed-19		↓		
Sed-20		1x1g		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 9/20/04

Notes: * Samples Rec'd at lab 9/18/04 - placed in Fridge F over weekend. Logged in 9/20/04. Rec'd on ice 4°C.

Date and Description of Final Sample Removal / Disposal:

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: ~~0243M~~ EAD 9/13/04 L
SDG No:

Date Shipped:	9/13/2004
Carrier Name:	FedEx
Airbill:	846414255025
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/13/04 15:00	9/14/04 1100
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05220	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (2) EAD 9/13/04	SED-21	S: 9/13/2004	13:20	
D05221	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-22	S: 9/13/2004	15:45	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091304-0001

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: ~~0243M~~ EAD 9/13/04
SDG No:

Date Shipped:	9/13/2004
Carrier Name:	FedEx
Airbill:	846414255036
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	EAD 9/13/04	9/14/04 1100
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05221	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) (2) EAD 9/13/04	SED-22	S: 9/13/2004	15:45	
D05222	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3) 2 EAD 9/13/04	SED-23	S: 9/13/2004	14:25	

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091304-0002

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Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: ~~0243M~~ ED 9/14/04 L
SDG No:

Date Shipped:	9/14/2004
Carrier Name:	FedEx
Airbill:	846414255014
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/14/04 14:45	9/15/04 1045
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05199	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) (2)	SED-01	S: 9/14/2004	9:20	
D05201	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (2)	SED-03	S: 9/14/2004	11:10	

ED 9/14/04

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091404-0001

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Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Envirosystems #3

Reference Case
Client No: ~~0243M~~ EDD 9/14/04 L
SDG No:

Date Shipped:	9/14/2004
Carrier Name:	FedEx
Airbill:	846414254990
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/14/04 16:00	9/15/04 1045
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05200	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3) 2 EDD 9/14/04	SED-02	S: 9/14/2004 15:05	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:	
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091404-0003

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PR provides preliminary results. Requests for preliminary results will increase analytical costs.
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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: ~~0243M~~ 9/14/04
SDG No: L

Date Shipped:	9/14/2004
Carrier Name:	FedEx
Airbill:	846414255003
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/14/04 15:30	9/15/04 1045
2		
3		
4		

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05199	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-01	S: 9/14/2004	9:20	
D05202	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3) 2 EAD 9/14/04	SED-04	S: 9/13/2004	13:10	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091404-0002

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Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/15/2004
Carrier Name:	FedEx
Airbill:	846414254978
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		9/15/04 1530		9/16/04 1000
2				
3				
4				

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05205	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) (2) 1 EAD	SED-06	S: 9/15/2004	11:20	on ice 4°C
D05207	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (2) 2 9/16/04	SED-08	S: 9/15/2004	9:15	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091504-0004

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:

L

Date Shipped:	9/15/2004
Carrier Name:	FedEx
Airbill:	846414254989
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/15/04 15:30	9/16/04 1000
2		
3		
4		

Sampler Signature:

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05205	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-06	S: 9/15/2004 11:20	on ice 4°c
D05206	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3) 2 EAD 9/15/04	SED-07	S: 9/15/2004 13:00	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091504-0005

LABORATORY COPY

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/16/2004
Carrier Name:	FedEx
Airbill:	846414251030
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		9/16/04 1615		9/17/04 1040
2				
3				
4				

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05210	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(3)~~ (2) RS 9/16/04	SED-11	S: 9/16/2004	10:35
D05211	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) ~~(2)~~ (1) RS 9/16/04	SED-12	S: 9/16/2004	12:00

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Cooler Temperature Upon Receipt:**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Custody Seal Intact?** ___	**Shipment Iced?** ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091604-0003

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/16/2004
Carrier Name:	FedEx
Airbill:	846414255139
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		9/16/04 1630		9/17/04 1040
2				
3				
4				

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05211	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-12	S: 9/16/2004	12:00	
D05216	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(1)~~(2) RS 9/16/04	SED-17	S: 9/16/2004	14:50	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091604-0004

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/16/2004
Carrier Name:	FedEx
Airbill:	846414255140
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/16/04 1445	9/17/04 1040
2		
3		
4		

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05203	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(3)~~ (2) RS 9/16/04	SED-05	S: 9/15/2004	12:00	
D05208	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) ~~(2)~~ (1) RS 9/16/04	SED-09	S: 9/16/2004	8:40	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091604-0001

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/16/2004
Carrier Name:	FedEx
Airbill:	846414254901
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	[signature]	1450 9/16/04	[signature]	9/17/04 1040
2				
3				
4				

Sampler Signature: [signature]

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05208	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-09	S: 9/16/2004	8:40	
D05209	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(3)~~ (2) RS 9/16/04	SED-10	S: 9/16/2004	9:30	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091604-0002

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/17/2004
Carrier Name:	FedEx
Airbill:	846414254923
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	[signature]	9/17/04 1730	[signature]	9/20/04 0830
2				
3				
4				

Sampler Signature: [signature]

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05214	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) ~~(2)~~ (1) (RS) 9/17/04	SED-15	S: 9/17/2004	12:15	On ice 4°C Samples rec'd at lab 9/18/04, logged in 9/20/04
D05217	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(2)~~ (1) (RS) 9/17/04	SED-18	S: 9/16/2004	13:45	

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Cooler Temperature Upon Receipt:**	**Chain of Custody Seal Number:**	
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G		**Custody Seal Intact?** ___	**Shipment Iced?** ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091704-0001

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/17/2004
Carrier Name:	FedEx
Airbill:	846414251041
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/17/04 1740	9/20/04 0830
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05218	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(3)~~ ~~(2)~~ (RS) 9/17/04	SED-19	S: 9/17/2004	15:00	on ice 4°C samples rec'd at lab 9/18/04, logged in on 9/20/04
D05219	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), Microtox S (48 hours)	(Ice Only) ~~(2)~~ (1) (RS) 9/17/04	SED-20	S: 9/17/2004	14:10	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:	
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091704-0003

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/17/2004
Carrier Name:	FedEx
Airbill:	846414254912
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/17/04 1730	9/20/04 0830
2		
3		
4		

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05214	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-15	S: 9/17/2004	12:15	On ice 4°C Samples recd at lab 9/18/04, logged in 9/20/04
D05215	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) ~~(3)~~ (2) RS 9/17/04	SED-16	S: 9/17/2004	9:45	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-091704-0002

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:

L

Date Shipped:	9/20/2004
Carrier Name:	FedEx
Airbill:	846414254945
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/20/04 1750	9/21/04 1020
2		
3		
4		

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05213	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3)	SED-14	S: 9/20/2004 13:20	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-092004-0004

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/20/2004
Carrier Name:	FedEx
Airbill:	846414254934
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/20/04 1745	9/21/04 1020
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05212	Sediment/ Laurie O'Connor	L/G	EPA 100.1 (21), EPA 100.4 (21), Microtox S (48 hours)	(Ice Only) (3)	SED-13	S: 9/20/2004	10:30	
D05219	Sediment/ Laurie O'Connor	L/G	EPA 100.4 (21)	(Ice Only) (1)	SED-20	S: 9/17/2004	14:10	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 100.1 = EPA 100.1 (Toxicity), EPA 100.4 = EPA 100.4 (Toxicity), Microtox S = Microtox Screening

TR Number: 1-502446878-092004-0003

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/21/2004
Carrier Name:	FedEx
Airbill:	846414254956
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/21/04 1705	9/22/04 1010
2		
3		
4		

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05245	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA 1002.0 (21)	(Ice Only) (2)	SW-BM-01	S: 9/21/2004	10:45	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092104-0002

LABORATORY COPY

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/22/2004
Carrier Name:	FedEx
Airbill:	846414251306
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		9/22/04 1550		9/23/04 1015
2				
3				
4				

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05235	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA 1002.0 (21)	(Ice Only) (2)	SW-RP-01	S: 9/22/2004	8:30	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092204-0002

LABORATORY COPY

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Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:

L

Date Shipped:	9/23/2004
Carrier Name:	FedEx
Airbill:	846414252427
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	Robert Hall	9/23/04 1900	[signature]	9/23/04 1015
2				
3				
4				

Sampler Signature: [signature]

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05242	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-CB-01	S: 9/23/2004	14:00	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092304-0002

LABORATORY COPY

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EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/23/2004
Carrier Name:	FedEx
Airbill:	846414252416
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	[signature]	9/23/04 1905	[signature]	9/24/04 1015
2				
3				
4				

Sampler Signature: [signature]

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05238	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-MC-01	S: 9/23/2004 9:25	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092304-0003

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/24/2004
Carrier Name:	FedEx
Airbill:	846414254967
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/24/04 1630	9/25/04 1140
2		
3		
4		

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05248	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-RF-01	S: 9/24/2004 9:45	

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092404-0007

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APPENDIX H

ESI's Surface Water Toxicity Testing Report

ESI

EnviroSystems, Inc.
One Lafayette Road
P.O. Box 778
Hampton, N.H. 03843-0778
(603) 926-3345 • (603) 926-3521 Fax
www.envirosystems.com

November 5, 2004

Received
11/17/04

Mr. Andy Schkuta
Metcalf & Eddy, Incorporated
701 Edgewater Drive
Wakefield, Massachusetts 01880

Dear Mr. Schkuta

Enclosed, please find two (2) copies of our final report evaluating the toxicity of water samples collected as part of the Iron Horse Park Sediment Evaluation. Toxicity was evaluated during September 2004 using the daphnid, *Ceriodaphnia dubia,* and minnow, *Pimephales promelas.*

Please do not hesitate to call me or Brian Buzby should you have any questions or comments on the report.

Sincerely,

EnviroSystems, Incorporated

Kenneth A. Simon
President

Enclosure
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Report Number 12551-04-09

TOXICOLOGICAL EVALUATION OF SURFACE WATER SAMPLES

Ceriodaphnia dubia* and *Pimephales promelas
Surface Water Toxicity Tests
Iron Horse Park Surface Water Evaluation

Prepared For

Prepared For

Metcalf & Eddy, Incorporated
701 Edgewater Drive
Wakefield, Massachusetts 01880

Client Reference: W/A #158-RICO-0157
EPA RAC Contract # 68-W6-0042

By

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1.0 INTRODUCTION

Toxicity tests expose groups of organisms to environmental samples and a laboratory control and/or a field reference site for a specified period to assess potential impact on survival and growth. Chronic toxicity tests measure sublethal effects, exposing test organisms to samples during a sensitive period in the life cycle. Analysis of variance techniques are used to determine the relative toxicity of the samples as compared to the laboratory control and/or field reference site.

This report presents the results of chronic toxicity tests conducted on five surface water samples collected from the Iron Horse Park project site. Surface water samples were provided by Metcalf and Eddy, Inc. staff from the Wakefield, Massachusetts office. Testing was based on programs and protocols developed by the US EPA (2002). The toxicity of the samples was assessed by conducting chronic renewal toxicity tests using the daphnid, *Ceriodaphnia dubia* and fathead minnow, *Pimephales promelas*. Assays and supporting analyses were performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire.

2.0 MATERIALS AND METHODS

2.1 General Methods

Toxicological and analytical protocols used in this program follow procedures outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA 2002), and *Standard Methods for the Examination of Water and Wastewater*, 20th Edition (APHA 1998). These protocols provide standard approaches for physical and chemical analysis and for the evaluation of toxicological effects of surface waters on aquatic organisms.

2.2 Test Species

C. dubia, cultured at ESI, were maintained in laboratory water at 25±1°C with a photoperiod of 16:8 hours light:dark. Cultures are fed daily with a yeast/trout chow/Cerophyll or alfalfa leaves (YTC) mixture supplemented with *Selenastrum capricornutum* (algae) (EPA 2002). Organisms used in the assay were <24 hours old juveniles, released within 8 hours of one another, and from broods of ≥8 juveniles.

P. promelas, ≤24 hours old, were obtained from Aquatic Bio Systems, Incorporated, Fort Collins, Colorado, and Aquatic Research Organisms, Hampton, New Hampshire. Test organisms were transferred from acclimation tanks to test chambers using a large bore glass pipet, minimizing the amount of water added to the test sample.

2.3 Test Samples and Laboratory Control Water

Five (5) surface water samples collected from the Iron Horse Park project site for *C. dubia* and *P. promelas* testing were received at ESI between September 23 and September 25, 2004. Upon arrival at the laboratory, the samples were given an internal sample control number and logged into the project sample control system. Prior to testing, samples were placed in a secure refrigerator and stored at a temperature of 2-4°C until test initiation. Sample identification, collection and receipt information is summarized in Table 1. Samples were warmed to the appropriate test temperature prior to testing. Due to holding time considerations, samples were analyzed as they were received with each group or samples received its own laboratory control treatment.

Laboratory control water for the daphnid and minnow assays was synthetic, soft, reconstituted water prepared at ESI according to protocol (EPA 2002). This water has been used to successfully culture fresh water test organisms since 1992.

2.4 *C. dubia* Survival and Reproduction Assay

The chronic toxicity tests were conducted according to EPA method 1002.0, which called for the daily renewal of test solutions (EPA 2002). Protocol suggests that surface water samples are evaluated as 100% surface water with a laboratory control (EPA 2002). Iron Horse Park project site test replicates were renewed with the appropriate site specific surface water sample. Endpoints of the assay were survival and reproduction. Testing occurred between September 23,2004 and October 1, 2004; testing was completed in three separate testing events, each supported by its own laboratory control (see Table 1). Each daphnid testing event was 7 days in duration.

Test chambers for the chronic exposure daphnid assays were 30 mL portion cups containing 20 mL of test solution in each of 10 replicates with 1 organism/replicate. Survival and juvenile production were monitored daily. Dissolved oxygen, pH, conductivity and temperature were measured in each new test solution. Daphnids were fed 200 µL each of YTC and algae as part of the daily renewals.

2.5 *P. promelas* Survival and Growth Assay

The 7-day surface water tests were conducted according to EPA method 1000.0, which called for the daily renewal of test solutions (EPA 2002). Protocol suggests that surface water samples are evaluated as 100% surface water with a laboratory control (EPA 2002). Iron Horse Park project site test replicates were renewed with the appropriate site specific surface water sample. Endpoints of the assay were survival and growth. Testing occurred between September 23, 2004 and October 1, 2004; testing was completed in three separate testing events, each supported by its own laboratory control.

All assays incorporated four replicates with 10 organisms/replicate. Test vessels were 400 mL glass beakers containing approximately 250 mL of solution. Dissolved oxygen, pH, temperature, and conductance were measured in one replicate of each new test solution. Vessels were maintained in a temperature-controlled incubator during testing. Temperature in the incubator was maintained at 25 ±1°C. The photoperiod in the test chamber was set at 16:8 hour light:dark. Light was provided by cool white flourescent bulbs.

Prior to daily minnow renewals, survival and dissolved oxygen were measured in all replicates, and pH, temperature and specific conductance were measured in one replicate of each test treatment. Alkalinity, ammonia, and hardness of the surface water and laboratory control water treatments were measured on Day 0. Fish were fed newly hatched *Artemia* nauplii daily. Dead nauplii from previous feedings were removed during daily renewals.

On Day 7 of the assay, surviving fish were euthanized using Finquel® tricaine methanesulfonate and rinsed with DI water to remove any surface detritus that may interfere with the weighing process. Fish were placed on tared weighing pans and dried overnight at 104°C to obtain dry weight to 0.01 mg. Final dry weight/fish for statistical comparisons was calculated by dividing the net dry weight by the number of organisms introduced on Day 0.

2.6 Statistical Analysis

Survival and reproduction data were analyzed using TOXSTAT® software to determine significant differences between the test samples and their associated laboratory controls and reference sites. Statistical comparisons for each sample site were made against the associated laboratory control and project reference site. Survival and reproduction data were evaluated to determine homogeneity of sample variances and normality of distribution using Shapiro-Wilk's Test for Normality and the F-Test for Equality of Two Variances, respectively. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Pair-wise comparisons were based on the 2 sample t-Test. Statistical difference was evaluated at α=0.05. In cases where the observed endpoint in the treatment was greater than that observed in the laboratory control and reference site sample no statistical evaluation was conducted.

2.7 Quality Control

As part of the laboratory quality control program, reference toxicant evaluations are conducted by ESI on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Results were within one standard deviation of ESI's historic mean for the species. Results of these tests are presented in Table 7.

2.8 Protocol Deviations

Review of testing procedures and data generated from testing indicated one deviation from standard protocols. Sample SW-MC-01 lost two minnows from Replicate D on Day 2 due to a technician error. All statistical analysis for this replicate was therefore based upon the assumption that eight fish instead of ten were added at the start of testing. It is the opinion of the Study Director that this deviation had no negative impact on the outcome of the assay.

3.0 RESULTS AND DISCUSSION

Survival and reproduction data from the *C. dubia* assays are summarized in Tables 2 and 3, respectively, while *P. promelas* survival and growth data are summarized in Tables 4 and 5. Water quality data collected during the assays is summarized in Table 6. Reference toxicant data for the organisms is summarized in Table 7. Support data, including copies of laboratory bench sheets, are provided in Appendix A.

3.1 *C. dubia* Chronic Exposure Survival and Reproduction Assays

For the three separate exposure periods, laboratory control survival in each series was 100%. Reproduction, measured as number of juveniles produced per female, ranged from 28.4 to 33.7 juveniles per female. Three or more broods were produced by 100% of the laboratory water control females by the end of each of the three exposures. Minimum test acceptability criteria require 80% survival, mean production of 15 juveniles/female, and production of 3 broods by at least 60% of control animals (EPA 2002). These results are an indication of healthy test organisms.

Review of data generated during the three sets of daphnid assays showed survival in waters from the project sites ranged from 70% to 100%. Statistical analysis of the data showed that survival of daphnids maintained in water from site SW-RF-01 was the only site where survival, when compared to the laboratory control, was negatively impacted. Comparison of juvenile production showed mean numbers of juveniles produced by daphnids maintained in project surface waters ranged from 21.9 to 33.2 juveniles per adult. Statistical comparisons of the reproduction data against the laboratory controls showed that reproduction in the project sites SW-RP-01 and SW-RF-01 was negatively impacted. Statistical comparisons of the reproduction data against site SW-RF-01 showed that reproduction in the other project sites was not statistically different from that observed at SW-RF-01. Tables 2 and 3 provide a summary of survival and reproduction data for the laboratory controls and project sites.

3.2 *P. promelas* Chronic Exposure Survival and Growth Assays

At the end of the three separate assays, laboratory control survival ranged from 87.5 to 100%. Growth, measured as mean dry weight, ranged from 0.448 to 0.482 mg/fish. Minimum test acceptability criteria require 80% survival and mean dry weight of 0.250 mg/fish. (EPA 2002). These results are an indication of healthy test organisms.

Review of minnow survival data from the project sites for the three series of assays showed survival rates ranging from 61.25% to 100%. Results of statistical analyses conducted with the associated laboratory control treatments show that minnow survival in the SW-MC-01 site was statistically less than that observed in the associated control. A statistical comparison of survival between sites SW-RF-01 and SW-MC-01 showed survival in SW-MC-01 was significantly less than that observed for SW-RF-01. Mean dry weight in the project sites ranged from 0.346 mg/fish to 0.534mg/fish. No project sites showed growth significantly less than the laboratory controls. Statistical comparisons of growth made against the SW-RF-01 site showed that minnow growth from site SW-CB-01 was statistically less than that observed for site SW-RF-0. Tables 4 and 5 provide a summary of survival and growth data for the laboratory controls and project sites.

3.3 Summary

Results of the chronic exposure daphnid assays document that one of the surface water samples evaluated, SW-RF-01, had a significant negative impact on daphnid survival when compared to the associated laboratory control. Review of reproduction data indicated significant negative impacts on daphnid juvenile production in water from two sites, SW-RP-01 and SW-RF-01, when evaluated against the associated laboratory control. Statistical comparisons for survival and reproduction made against the SW-RF-01 site showed no statistically significant negative effects.

Review of chronic exposure minnow assays documented that survival and growth in one project site water, SW-MC-01, was significantly impacted when compared to the laboratory control and site SW-RF-01.

4.0 LITERATURE CITED

APHA. 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition. Washington D.C.

US EPA. 2002. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*. Fourth Edition. EPA-821-R-02-013.

TABLE 1. Summary of Sample Collection Information. *C. dubia* and *P. promelas* Chronic Exposure Surface Water Assays. Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy. September 2004.

Sample Identification	Sample Type	ESI ID	Sample Collection		Sample Receipt		Assay Start Date
			Date	Time	Date	Time	
SW-BM-01	Water	-024	09/21/04	1045	09/22/04	1010	09/23/04
SW-RP-01	Water	-025	09/22/04	0830	09/23/04	1015	09/23/04
SW-MC-01	Water	-032	09/23/04	0925	09/24/04	1015	09/24/04
SW-CB-01	Water	-033	09/23/04	1400	09/24/04	1015	09/24/04
SW-RF-01	Water	-040	09/24/04	0945	09/25/04	1140	09/25/04

Table 2. ***Ceriodaphnia dubia*** **Survival Summary. Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy. September 2004.**

Site	ESI Ref	Mean Survival (%)	Distribution	Variance	t-Test Statistics			Significant Difference
					t Value	Critical t Value	p Value	
Lab Control	-000a	100.0%	-	-	-	-	-	-
SW-BM-01	-024	80.0%	Non-normal	Unequal	1.5000	1.8331	0.0839	NO
SW-RP-01	-025	100.0%	-	-	-	-	-	NO
Lab Control	-000b	100.0%	-	-	-	-	-	-
SW-MC-01	-032	100.0%	-I	-	-	-	-	NO
SW-CB-01	-033	90.0%	Non-normal	Unequal	1.0000	1.8331	0.1717	NO
Lab Control	-000c	100.0%	-	-	-	-	-	-
SW-RF-01	-040	70.0%	Non-Normal	Unequal	1.9640	1.8331	0.0406	YES

Table 3. ***Ceriodaphnia dubia*** **Reproduction Summary. Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy. September 2004.**

Site	ESI Ref	Mean Juveniles per Adult	Distribution	Variance	t-Test Statistics			Significant Difference
					t Value	Critical t Value	p Value	
Lab Control	-00a	28.4	-	-	-	-	-	-
SW-BM-01	-24	22.5	Normal	Equal	1.4715	1.7341	0.0792	NO
SW-RP-01	-25	21.9	Normal	Equal	2.0405	1.7341	0.0281	YES
Lab Control	-00b	32.0	-	-	-	-	-	
SW-MC-01	-32	30.9	Normal	Equal	0.3308	1.7341	0.3723	NO
SW-CB-01	-33	33.2	-	-	-	-	-	NO
Lab Control	-00c	33.7						-
SW-RF-01	-40	23.6	Normal	Equal	2.7205	1.7341	0.0070	YES

‡ - Statistical significance evaluated at $\propto$=0.05 ; in cases were the evaluated endpoint was equal to or greater that experienced in the laboratory control, no statistical analysis was conducted.

Table 4. ***Pimephales promelas*** **Survival Summary. Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy. September 2004.**

Site	ESI Ref	Mean Survival (%)	Distribution	Variance	t-Test Statistics			Significant Difference
					t Value	Critical t Value	p Value	
Lab Control	-000a	87.5%	-	-	-	-	-	-
SW-BM-01	-024	77.5%	Normal	Equal	1.2127	1.9432	0.1354	NO
SW-RP-01	-025	100.0%	-	-	-	-	-	NO
Lab Control	-000b	97.5%	-	-	-	-	-	-
SW-MC-01	-032	57.5%	Normal	Equal	2.9943	1.9432	0.0121	YES
SW-CB-01	-033	87.5%	Normal	Equal	1.5194	1.9432	0.0897	NO
Lab Control	-000c	100.0%	-	-	-	-	-	-
SW-RF-01	-040	87.5%	Normal	Unequal	1.6894	2.3534	0.0949	NO

Table 5. ***Pimephales promelas*** **Growth Summary. Iron Horse Park Ecological Risk Evaluation. Metcalf & Eddy. September 2004.**

Site	ESI Ref	Mean Weight (mg)	Distribution	Variance	t-Test Statistics			Significant Difference
					t Value	Critical t Value	p Value	
Lab Control	-00a	0.477	-	-	-	-	-	-
SW-BM-01	-24	0.429	Normal	Equal	1.1894	1.9432	0.1396	NO
SW-RP-01	-25	0.534	-	-	-	-	-	NO
Lab Control	-00b	0.448	-	-	-	-	-	
SW-MC-01	-32	0.346	Normal	Equal	1.3909	1.9432	0.1068	NO
SW-CB-01	-33	0.437	Normal	Equal	0.2567	1.9432	0.4030	NO
Lab Control	-00c	0.482	-	-	-	-	-	-
SW-RF-01	-40	0.490	-	-	-	-	-	NO

‡ - Statistical significance evaluated at $\propto$=0.05 ; in cases were the evaluated endpoint was equal to or greater that experienced in the laboratory control, no statistical analysis was conducted.

TABLE 6. Summary of Initial Water Qualities. *C. dubia* Chronic Exposure Surface Water Assays. Iron Horse Park Ecological Risk Assessment. Metcalf & Eddy. September 2004.

Sample Description	Start Date	ESI ID	Range Throughout Testing Event		Day 0 Concentrations		
			pH (SU)	Conductance (µmhos/cm)	Alkalinity (mg/L)	Ammonia (mg/L)	Hardness (mg/L)
Laboratory Control	09/23/04	-00a	7.68-7.92	174-203	29	<0.1	50
SW-BM-01	09/23/04	-24	6.35-7.25	198-200	20	<0.1	34
SW-RP-01	09/23/04	-25	6.36-7.32	355-365	28	<0.1	48
Laboratory Control	09/24/04	-00b	7.59-7.89	175-202	37	<0.1	51
SW-MC-01	09/24/04	-32	6.44-7.18	231-233	28	<0.1	40
SW-CB-01	09/24/04	-33	6.56-7.30	289-350	34	0.1	46
Laboratory Control	09/25/04	-00c	7.66-7.90	177-204	38	<0.1	51
SW-RF-01	09/25/04	-40	6.24-7.07	206-210	19	<0.1	30

TABLE 7. Reference Toxicant Evaluation. Iron Horse Park Ecological Risk Assessment. Metcalf & Eddy. September 2004.

C.dubia
Reference Toxicant: Sodium Dodecyl Sulfate (mg/L)

Date	NOEC for Survival	Historic Mean	Number of Tests	±1 STD Deviation	±2 STD Deviations
09/29/04	30.0	24.3	20	13.0	25.9

Date	NOEC for Reproduction	Historic Mean	Number of Tests	±1 STD Deviation	±2 STD Deviations
09/29/04	15.0	15.9	20	10.2	20.5

P. promelas
Reference Toxicant: Sodium Dodecyl Sulfate (mg/L)

Date	NOEC for Survival	Historic Mean	Number of Tests	±1 STD Deviation	±2 STD Deviations
08/25/04	20.0	21.0	20	9.68	19.4

Date	NOEC for Growth	Historic Mean	Number of Tests	±1 STD Deviation	±2 STD Deviations
08/25/04	20.0	21.0	20	9.68	19.4

Note: Reference toxicant testing was conducted at ESI. The historic means for survival, growth, and reproduction represent the mean determined from the respective ESI-conducted reference toxicant testing databases.

APPENDIX A
RAW DATA
STATISTICAL SUPPORT

Contents	Number of Pages
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NEW WATER QUALITIES

STUDY:12551	CLIENT:Metcalf & Eddy	SAMPLE: Iron Horse Park	DILUENT:N/A

NEW DISSOLVED OXYGEN (mg/L)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	8.7	7.9	8.3	8.6	8.5	8.4	8.3	
-024	A	7.7	7.6	8.2	8.5	9.0	8.8	9.0	
-025	A	4.0	7.7	8.3	8.6	9.0	8.9	9.2	
	A								
	A								
	A								
	A								

NEW pH (SU)

0	1	2	3	4	5	6	7
7.68	7.36	7.59	7.77	7.84	7.92	7.80	
6.47	6.35	6.51	6.75	6.93	7.19	7.25	
6.45	6.36	6.51	6.90	6.98	7.22	7.32	

NEW SPECIFIC CONDUCTIVITY (µMHOS/CM)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	181	179	175	174	203	179	182	
-024	A	198	198	199	198	198	200	200	
-025	A	359	359	356	359	355	361	365	
	A								
	A								
	A								
	A								

INC TEMP (°C):	25	25	25	25	25	25	27	
DATE:	9/23/04	9/24/04	9/25	9/26	9/27	9/28	9/29	
TIME:	1320	1425	1615	1045	1300	1340	1305	
INITIALS:	BB	BB	BB	TP	TP	TP	TP	

	DAY 0 (START)			
	ALK	HAR	AMM	TRC
Lab	007	008	009	<0.05
024	026	027	028	<0.05
025	029	030	031	<0.05

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

STUDY # 12551

CLIENT: Metcalf & Eddy

SAMPLE: Iron Horse Park

DILUENT: N/A

Cerio Data source: RB ☒ MHR ☐
collected: previous pm ☐ test day am ☒

DAY 0 9/23/04 TIME: 1345 FED: BB

DAY 1 9/24/04 TIME: 1435 FED: BB

DAY 2 9/25/04 TIME: 1630 FED: RK

DAY 3 9/26/04 TIME: FED: TP

DAY 4 9/27/04 TIME: 1415 FED: TP

DAY 5 9/28/04 TIME: 1345 FED: TP

DAY 6 9/29/04 TIME: 1345 FED: TP

DAY 7 9/30/04 TIME: 1305 FED: TP

DAY 8 TIME: FED:

CONC.	DAY	A	B	C	D	E	F	G	H	I	J	SUM	SURV.
LAB	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	+	+	+	+	+	+	+	+	+	+	0	10
	4	5	6	5	3	4	8	4	3	5	6	49	10
	5	5	11	12	10	14	8	4	10	10	12	96	10
	6	+	+	18	12	12	+	10	+	+	4	56	10
	7	12	15	+	+	+	16	+	14	11	15	83	10
	8												
	TOTAL	22	32	35	25	30	32	18	27	26	37	284	10
-024	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	*	+	+	+	+	+	+	+	+	+	0	9 (3)
	4	♂ (3)	5	4	5	3	3	6	5	6	4	38	9
	5		6	2	8	10	5	4	8	12	16	71	9
	6		12	10	6	16	−	+	12	14	8	78	8
	7		+	12	+	8	|	18	+	+	+	38	8
	8	↓					↓						
	TOTAL	0	20	28	19	37	8	28	25	32	28	225	8
-025	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	L	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	+	+	+	+	+	+	+	+	+	+	0	10
	4	5	4	5	6	3	2	4	4	5	6	44	10
	5	8	10	12	11	4	5	12	10	8	15	95	10
	6	+	+	+	2	4	+	+	+	5	+	11	10
	7	4	8	12	10	+	2	6	15	+	12	69	10
	8												
	TOTAL	17	22	29	29	11	9	22	29	18	33	219	10
	0												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	TOTAL												

LEGEND:

+ = LIVE

- = DEAD

♂ = MALE

M = MISSING

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1.6000
W = 0.6032

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The F-test of homogeneity is sensitive to non-normality and should not be performed with this data as is.

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab 00a	0.0000	
2	-024	0.1778	99999.0000

(p-value = 0.0000)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F > Critical F, REJECT Ho: Equal Variances (alpha = 0.01).

NOTE: This test requires positive variances. If one of the variances is zero, the test will always reject Ho: Equal Variances.

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab 00a	10	1.0000	1.0000	1.0000
2	-024	10	0.0000	1.0000	0.8000

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab 00a	0.0000	0.0000	0.0000	0.0000
2	-024	0.1778	0.4216	0.1333	52.7046

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.2000	0.2000	2.2500
Within (Error)	18	1.6000	0.0889	
Total	19	1.8000		

(p-value = 0.1510)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Lab 00a	1.0000	1.0000		
2	-024	0.8000	0.8000	1.5000	

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0755)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab 00a	1.0000	1.0000		
2	-024	0.8000	0.8000	1.5000	

Unequal Var: t critical value = 1.8331 (1 Tailed, alpha = 0.05, df = 9)
(p-value = 0.0839)

Title: STUDY 12551: Cerio Survival
File: mecds24 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00a	10			
2	-024	10	0.2312	23.1	0.2000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00a	10			
2	-024	10	0.2444	24.4	0.2000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.3400	4.8400	7.6400	4.8400	1.3400
OBSERVED	2	3	9	6	0

Chi-Square = 2.8847 (p-value = 0.5773)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1446.9000
W = 0.9447

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	34.9333	
2	-24	125.8333	3.6021

(p-value = 0.0699)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	10	18.0000	37.0000	28.4000
2	-24	10	0.0000	37.0000	22.5000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	34.9333	5.9104	1.8690	20.8114
2	-24	125.8333	11.2175	3.5473	49.8558

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	174.0500	174.0500	2.1652
Within (Error)	18	1446.9000	80.3833	
Total	19	1620.9500		

(p-value = 0.1584)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Lab	28.4000	28.4000		
2	-24	22.5000	22.5000	1.4715	

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0792)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	28.4000	28.4000		
2	-24	22.5000	22.5000	1.4715	

Unequal Var: t critical value = 1.7613 (1 Tailed, alpha = 0.05, df = 14)
(p-value = 0.0816)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-24	10	6.9529	24.5	5.9000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-24	10	7.0621	24.9	5.9000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.3400	4.8400	7.6400	4.8400	1.3400
OBSERVED	2	4	6	8	0

Chi-Square = 4.2260 (p-value = 0.3763)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 913.3000
W = 0.9602

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	34.9333	
2	-25	66.5444	1.9049

(p-value = 0.3511)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	10	18.0000	37.0000	28.4000
2	-25	10	9.0000	33.0000	21.9000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	34.9333	5.9104	1.8690	20.8114
2	-25	66.5444	8.1575	2.5796	37.2488

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	211.2500	211.2500	4.1635
Within (Error)	18	913.3000	50.7389	
Total	19	1124.5500		

(p-value = 0.0563)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Lab	28.4000	28.4000		
2	-25	21.9000	21.9000	2.0405	*

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0281)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	28.4000	28.4000		
2	-25	21.9000	21.9000	2.0405	*

Unequal Var: t critical value = 1.7459 (1 Tailed, alpha = 0.05, df = 16)
(p-value = 0.0291)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-25	10	5.5240	19.5	6.5000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-25	10	5.5616	19.6	6.5000

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

OLD WATER QUALITIES

STUDY:12551	CLIENT: Metcalf & Eddy	SAMPLE: Iron Horse Park	DILUENT: N/A

CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	INC TEMP (°C)	INIT
LAB	1	7.48	8.2	196		1				25	BB
	2	7.68	8.3	194		2				25	LK
	3	7.73	8.2	187		3				25	TP
	4	7.70	8.5	200		4				25	TP
	5	7.66	8.3	217		5				25	TP
	6	7.76	8.1	196		6				27	TP
	7	7.60	7.6	202		7				26	TP
	8					8					
-024	1	7.52	8.2	214		1					
	2	7.66	8.4	212		2					
	3	7.60	8.1	203		3					
	4	7.63	8.4	220		4					
	5	7.60	8.4	214		5					
	6	7.66	8.0	219		6					
	7	7.56	7.8	224		7					
	8					8					
-025	1	7.58	8.3	374		1					
	2	7.73	8.1	372		2					
	3	7.63	8.1	376		3					
	4	7.61	8.5	385		4					
	5	7.65	8.3	377		5					
	6	7.66	8.0	390		6					
	7	7.60	7.8	397		7					
	8					8					
	1					1					
	2					2					
	3					3					
	4					4					
	5					5					
	6					6					
	7					7					
	8					8					

DILUTIONS

STUDY:12551 | CLIENT: Metcalf & Eddy

SPECIES: *C. dubia & P. promelas* | TEST: chronic renewal

START Diluent:N/A Concentration	Day: 0 Sample: EOA EOA		Day: 1 Sample: EOB, EOA		Day: 2 Sample: EOB/EOA	
	Sample Vol	Final Vol	Sample Vol	Final Vol	Sample Vol	Final Vol.
Lab	1200	1200	1000	1000	1000	1000
-024	"	"	"	"	1000	"
-025	"	"	"	"	1000	"

Day	Date	Time	Init
0	9/23/04	1325	BB
1	9/24/04	1420	BB
2	9/25/04	1610	BB
3	9/26/04	1025	TP
4	9/27	1250	TP
5	9/28	1330	TP
6	9/29	1225	TP
7			

COMMENTS

Diluent: N/A Concentration	Day: 3 Sample: EOB/EOA		Day: 4 Sample: EOB/EOA		Day: 5 Sample: EOB/EOA	
	Sample Vol	Final Vol	Sample Vol	Final Vol	Sample Vol	Final Vol.
Lab	1000	1000	1000	1000	1000	1000
-024	1000	"	1000	"	1000	"
-025	1000	"	1000	"	1000	"

Diluent: N/A Concentration	Day: 6 Sample: EOB/EOA		Day: Sample:		Day: Sample:	
	Sample Vol	Final Vol.	Sample Vol	Final Vol	Sample Vol	Final Vol.
Lab	1000	1000				
-024	1000	"				
-025	1000	"				

RECORD OF METERS USED

FRESHWATER CHRONIC

C. dubia & P. promelas

STUDY:12551	CLIENT: Metcalf & Eddy

OLD WATER QUALITIES - *P. promelas*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		2	1	1	1	1	1	2	
Initials		BB	BB	TP	TP	TP	TP	TP	

NEW WATER QUALITIES - Both Species

	0	1	2	3	4	5	6	7	8
Water Quality Station #	1	2	1	2	1	1	1	1	
Initials	BB	BB	BB	TP	TP	TP	TP		

OLD WATER QUALITIES - *C. dubia*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		2	1	1	2	1	1	2	
Initials		BB	KK	TP	TP	TP	TP	TP	
Date	9/23/04	9/24/04	9/25/04	9/26	9/27	9/28	9/29	9/30	

Water Quality Station #1		Water Quality Station #2		**COMMENTS**
DO meter #	18	DO meter #	19	
DO probe #	10	DO probe #	6	
pH meter #	1097	pH meter #	1138	
pH probe #	40	pH probe #	39	
S/C meter #	YSI 30B	S/C meter #	YSI 30B	
S/C probe #	L	S/C probe #	L	

Pimephales promelas 7 DAY CHRONIC ASSAY

STUDY	CLIENT	SAMPLE	DILUENT	FISH/BATCH
12551	Metcalf &Eddy	Iron Horse Park	N/A	

CONC	REP	NUMBER OF SURVIVORS 0	1	2	3	4	5	6	7	OLD DISSOLVED OXYGEN (mg/L) 1	2	3	4	5	6	7
LAB	A	10	10	10	9	9	9	9	9	7.7	5.7	5.3	4.8	5.5	5.6	5.8
	B	10	10	10	9	9	9	9	9	7.8	5.9	5.8	6.0	6.0	6.1	5.7
	C	10	10	10	9	9	9	9	9	7.9	6.7	6.4	5.5	4.6	5.2	5.5
	D	10	10	10	10	8	8	8	8	7.8	5.8	5.8	4.6	5.4	5.8	5.8
-024	A	10	10	10	10	10	10	9	7	7.7	5.3	6.0	5.6	5.2	4.8	4.5
	B	10	10	10	10	10	10	10	9	7.9	4.8	6.1	5.9	4.3	4.8	5.0
	C	10	10	10	10	10	10	10	9	7.8	4.9	5.9	4.5	3.5	4.1	4.2
	D	10	10	10	10	10	10	9	6	7.7	4.3	6.0	5.4	5.0	5.2	4.6
-025	A	10	10	10	10	10	10	10	10	7.8	4.4	4.5	4.0	4.0	4.0	4.5
	B	10	10	10	10	10	10	10	10	7.8	4.3	5.6	5.6	4.3	4.9	5.2
	C	10	10	10	10	10	10	10	10	7.8	4.8	5.5	5.8	4.8	5.1	5.5
	D	10	10	10	10	10	10	10	10	7.8	4.3	6.0	5.7	5.2	5.0	5.4
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															

		OLD PH (SU)							OLD SPECIFIC CONDUCTIVITY (uMHOS/CM)						
LAB	A	7.13	7.09	7.23	7.04	7.24	7.08	7.10	263	238	235	241	217	230	211
-024	A	7.10	7.02	7.06	7.00	7.05	6.98	7.03	262	258	238	259	219	244	229
-025	A	7.09	6.96	7.00	6.96	7.05	6.94	7.10	438	469	446	428	388	419	401
	A														
	A														
	A														
	A														
INC TEMP °C:		25	25	25	25	25	25	25	26						
DATE: 9/23/04		9/23/04	9/24/04	9/25	9/26	9/27	9/28	9/29	9/30						
TIME:		1610	1410	1535	1010	1240	1315	1150	1250						
INITIALS:		DH/BB	BB	BB	TP	TP	TP	TP	TP						

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.1170
W = 0.9114

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0050	
2	-24	0.0340	6.7470

(p-value = 0.1512)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	1.1071	1.2490	1.2136
2	-24	4	0.8861	1.2490	1.0938

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0050	0.0709	0.0355	5.8463
2	-24	0.0340	0.1843	0.0921	16.8480

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0287	0.0287	1.4707
Within (Error)	6	0.1170	0.0195	
Total	7	0.1457		

(p-value = 0.2708)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05

1	Lab	1.2136	0.8750	
2	-24	1.0938	0.7750	1.2127

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.1354)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab	1.2136	0.8750		
2	-24	1.0938	0.7750	1.2127	

Unequal Var: t critical value = 2.1318 (1 Tailed, alpha = 0.05, df = 4)
(p-value = 0.1460)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-24	4	0.1501	17.1	0.1000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-24	4	0.1669	19.0	0.1000

LARVAL FISH DRY WEIGHTS

CLIENT: Metcalf & Eddy TEST END DATE:

STUDY #: SPECIES:

CONC	REP	TARE WT (g)	FISH + FOIL (g)
Lab	A	0.01015	0.01536
	B	0.01047	0.01513
	C	0.00943	0.01450
	D	0.01040	0.01454
-024	A	0.00969	0.01383
	B	0.00912	0.01381
	C	0.00990	0.01479
	D	0.00952	0.01295
-025	A	0.01049	0.01746
	B	0.01046	0.01480
	C	0.00960	0.01406
	D	0.00927	0.01486
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
DATE:		9/30/04	10/1/04
TIME:		0920	1100
INIT:		✓	✓

CLIENT: Metcalf & Eddy
ESI # 12551

TEST DATE:

SPECIES: *Pimephales promelas*

Conc.	Rep.	Tare Foil	Foil+Fish	Net Fish (mg)	# Day 0	mg Day 0	# Day 7	mg Day 7		
Lab	A	0.01015	0.01536	5.210	10	0.521	9	0.579	0.9	0.9
Lab	B	0.01047	0.01513	4.660	10	0.466	9	0.518	0.9	0.9
Lab	C	0.00943	0.01450	5.070	10	0.507	9	0.563	0.9	0.9
Lab	D	0.01040	0.01454	4.140	10	0.414	8	0.518	0.8	0.8
-24	A	0.00969	0.01383	4.140	10	0.414				
-24	B	0.00912	0.01381	4.690	10	0.469				
-24	C	0.00990	0.01479	4.890	10	0.489	.428			
-24	D	0.00952	0.01295	3.430	10	0.343				
-25	A	0.01049	0.01746	6.970	10	0.697				
-25	B	0.01046	0.01480	4.340	10	0.434				
-25	C	0.00960	0.01406	4.460	10	0.446	.534			
-25	D	0.00927	0.01486	5.590	10	0.559				

		Day 0	Day 7
LAB CONTROL	**GROWTH**	0.477 **mg**	0.544
	SURVIVAL		87.5%

Date: 10/13/04 Time: 02:32 PM Initials: BB

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0197
W = 0.9107

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0023	
2	-24	0.0043	1.8511

(p-value = 0.6256)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	0.4140	0.5210	0.4770
2	-24	4	0.3430	0.4890	0.4288

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0023	0.0480	0.0240	10.0731
2	-24	0.0043	0.0654	0.0327	15.2473

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0047	0.0047	1.4148
Within (Error)	6	0.0197	0.0033	
Total	7	0.0244		

(p-value = 0.2792)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	Lab	0.4770	0.4770	
2	-24	0.4288	0.4288	1.1894

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.1396)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	0.4770	0.4770		
2	-24	0.4288	0.4288	1.1894	

Unequal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.1396)

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-24	4	0.0788	16.5	0.0482

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-24	4	0.0788	16.5	0.0482

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Pimephales promelas

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 9-23-04 Receipt date _____

Lot number 091904FH Strain _____

Brood Origination EPA OHIO

II. Water Quality

Temperature 25 °C Salinity <1 ppt DO —

pH 7.2 Hardness — ppm

III. Culture Conditions

System: RECIRC

Diet: Flake Food ✓ Phytoplankton _____ Trout Chow _____

Brine Shrimp ✓ Rotifers ✓ Other Encap. Shrimp Diet

Prophylactic Treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: ESI # of Organisms: 480+

Carrier: _____ Date Shipped: 9-23-04

Biologist: Mark Rosengrist

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

NEW WATER QUALITIES

STUDY:12551	CLIENT:Metcalf & Eddy	SAMPLE: Iron Horse Park	DILUENT:N/A

NEW DISSOLVED OXYGEN (mg/L)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	8.4	8.3	8.0	8.5	8.5	8.6	8.6	
-032	A	5.2	5.3	7.9	8.3	8.7	9.2	9.1	
-033	A	6.7	7.1	7.9	8.4	8.9	9.3	9.2	
	A								
	A								
	A								
	A								

NEW pH (SU)

0	1	2	3	4	5	6	7
7.69	7.59	7.63	7.79	7.81	7.83	7.89	
6.47	6.44	6.79	6.78	6.93	7.04	7.18	
6.56	6.57	6.89	6.94	7.15	7.21	7.30	

NEW SPECIFIC CONDUCTIVITY (µMHOS/CM)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	175	175	180	202	178	180	182	
-032	A	232	232	231	332	232	233	232	
-033	A	289	289	350	347	348	348	349	
	A								
	A								
	A								
	A								
INC TEMP (°C):		25	25	28	25	25	27	24	
DATE:		9/24/04	9/25	9/26	9/27	9/28	9/29	9/30	
TIME:		1250	1615	1045	1330	1425	1305	1425	
INITIALS:		BB	BB	TP	TP	TP	TP	TP	

12566

	DAY 0 (START)			
	ALK	HAR	AMM	TRC
Lab	010	011	012	<0.05
032	034	035	036	<0.05
033	037	038	039	<0.05

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

STUDY # 12551

CLIENT: Metcalf & Eddy

SAMPLE: Iron Horse Park

DILUENT: N/A

Cerio Data
source: RB ☒
MHR ☐
collected:
previous pm ☐
test day am ☒

DAY 0 9/24/04
TIME: 1300
FED: BB

DAY 1 9/25/04
TIME: 1625
FED: BB

DAY 2 9/26/04
TIME: 1100
FED: TP

DAY 3 9/27/04
TIME: 1410
FED: TP

DAY 4 9/28/04
TIME: 1430
FED: TP

DAY 5 9/29/04
TIME: 1335
FED: TP

DAY 6 9/30/04
TIME: 1450
FED: TP

DAY 7 10/01/04
TIME: 1220
FED: PS

DAY 8
TIME:
FED:

LEGEND:

+ = LIVE

- = DEAD

♂ = MALE

M = MISSING

CONC.	DAY	A	B	C	D	E	F	G	H	I	J	SUM	SURV.
LAB	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	+	5	4	+	+	4	6	+	5	+	24	10
	4	4	+	2	5	6	+	2	2	+	4	25	10
	5	10	12	8	6	13	12	15	18	10	16	120	10
	6	13	14	8	16	10	18	12	+	12	11	114	10
	7	+	+	19	+	+	+	+	18	+	+	37	10
	8												
	TOTAL	27	31	~~(F3) 05 41~~	27	29	34	35	38	27	31	320	10
-032	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	3	+	6	+	+	5	+	5	4	+	23	10
	4	+	5	2	+	4	3	2	2	6	5	29	10
	5	13	12	10	8	16	15	15	14	10	16	129	10
	6	10	15	16	18	10	8	6	12	+	14	109	10
	7	+	+	+	+	+	+	+	+	+	19	19	10
	8												
	TOTAL	26	32	34	26	30	31	23	33	20	54	309	10
-033	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	+	+	+	5	+	4	+	+	3	+	12	10
	4	2	4	5	2	3	6	3	2	5	4	~~(F3) 84~~ 136	10
	5	10	8	6	6	12	8	15	4	6	9	84	10
	6	20	18	14	16	10	16	11	13	12	10	140	10
	7	+	-	+	+	20	+	21	19	+	+	60	9
	8		↓										
	TOTAL	32	30	25	29	45	34	50	38	26	23	332	9
	0												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	TOTAL												

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

OLD WATER QUALITIES

STUDY:12551		CLIENT: Metcalf & Eddy				SAMPLE: Iron Horse Park				DILUENT: N/A	
CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	INC TEMP (°C)	INIT
LAB	1	7.74	8.4	193		1				25	BB
	2	7.69	8.2	187		2				25	TP
	3	7.63	8.1	195		3				25	TP
	4	7.64	8.2	216		4				25	TP
	5	7.70	8.3	188		5				27	TP
	6	7.55	8.4	196		6				26	TP
	7	7.82	8.6	205		7				28	PS
	8					8					
-032	1	7.66	8.2	247		1					
	2	7.58	8.1	242		2					
	3	7.59	8.3	253		3					
	4	7.66	8.3	245		4					
	5	7.66	8.2	243		5					
	6	7.56	8.3	260		6					
	7	7.65	8.2	260		7					
	8					8					
-033	1	7.65	7.9	314		1					
	2	7.67	8.0	300		2					
	3	7.60	8.4	368		3					
	4	7.72	8.3	363		4					
	5	7.68	8.1	362		5					
	6	7.63	8.2	369		6					
	7	7.70	8.3	366		7					
	8					8					
	1					1					
	2					2					
	3					3					
	4					4					
	5					5					
	6					6					
	7					7					
	8					8					

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.2467
W = 0.4049

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The F-test of homogeneity is sensitive to non-normality and should not be performed with this data as is.

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab 00b	0.0000	
2	-033	0.0274	99999.0000

(p-value = 0.0000)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F > Critical F, REJECT Ho: Equal Variances (alpha = 0.01).

NOTE: This test requires positive variances. If one of the variances is zero, the test will always reject Ho: Equal Variances.

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab 00b	10	1.0472	1.0472	1.0472
2	-033	10	0.5236	1.0472	0.9948

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab 00b	0.0000	0.0000	0.0000	0.0000
2	-033	0.0274	0.1656	0.0524	16.6436

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0137	0.0137	1.0000
Within (Error)	18	0.2467	0.0137	
Total	19	0.2605		

(p-value = 0.3306)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05
1	Lab 00b	1.0472	1.0000		
2	-033	0.9948	0.9000	1.0000	

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.1653)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab 00b	1.0472	1.0000		
2	-033	0.9948	0.9000	1.0000	

Unequal Var: t critical value = 1.8331 (1 Tailed, alpha = 0.05, df = 9)
(p-value = 0.1717)

Title: STUDY 12551: Cerio Survival
File: mecds33 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00b	10			
2	-033	10	0.0823	11.0	0.1000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00b	10			
2	-033	10	0.0872	11.6	0.1000

File: ME Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.3400	4.8400	7.6400	4.8400	1.3400
OBSERVED	0	8	8	2	2

Chi-Square = 5.4116 (p-value = 0.2476)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 994.9000
W = 0.8660

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The F-test of homogeneity is sensitive to non-normality and should not be performed with this data as is.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	24.0000	
2	-32	86.5444	3.6060

(p-value = 0.0696)

Critical F = 6.5411 (P=0.01, 9, 9)

4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	10	27.0000	41.0000	32.0000
2	-32	10	20.0000	54.0000	30.9000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	24.0000	4.8990	1.5492	15.3093
2	-32	86.5444	9.3029	2.9418	30.1066

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	6.0500	6.0500	0.1095
Within (Error)	18	994.9000	55.2722	
Total	19	1000.9500		

(p-value = 0.7446)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	Lab	32.0000	32.0000	
2	-32	30.9000	30.9000	0.3308

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.3723)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	32.0000	32.0000		
2	-32	30.9000	30.9000	0.3308	

Unequal Var: t critical value = 1.7613 (1 Tailed, alpha = 0.05, df = 14)
(p-value = 0.3728)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-32	10	5.7655	18.0	1.1000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-32	10	5.8560	18.3	1.1000

DILUTIONS

STUDY:12551 | CLIENT: Metcalf & Eddy

SPECIES: *C. dubia & P. promelas* | TEST: chronic renewal

START Diluent:N/A Concentration	Day: 0 Sample: EOA / EOA Sample Vol	Final Vol	Day: 1 Sample: EOB / EOB Sample Vol	Final Vol	Day: 2 Sample: EOB / EOB Sample Vol	Final Vol.
Lab	1200	1200	1000	1000	1000	1000
-032	1200	↓	1000	↓	1000	↓
-033	1200	↓	1000	↓	1000	↓

Day	Date	Time	Init
0	9/24/04	1245	BB
1	9/25/04	1610	BB
2	9/26/04	1045	TP
3	9/26/04	1305	TP
4	9/28	1420	TP
5	9/29	1325	TP
6	9/30	1415	TP
7			

COMMENTS

Diluent: N/A Concentration	Day: 3 Sample: EOB / EOB Sample Vol	Final Vol	Day: 4 Sample: EOB / EOB Sample Vol	Final Vol	Day: 5 Sample: EOB / EOB Sample Vol	Final Vol.
Lab	1000	1000	1000	1000	1000	1000
-032	1000	↓	1000	↓	↓	↓
-033	1000	↓	1000	↓	↓	↓

Diluent: N/A Concentration	Day: 6 Sample: EOB / EOB Sample Vol	Final Vol.	Day: Sample: Sample Vol	Final Vol	Day: Sample: Sample Vol	Final Vol.
Lab	1000	1000				
-032	1000	↓				
-033	1000	↓				

RECORD OF METERS USED

FRESHWATER CHRONIC

C. dubia & P. promelas

STUDY:12551	CLIENT: Metcalf & Eddy

OLD WATER QUALITIES - *P. promelas*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		1	2	1	1	1	1	1	
Initials		BB	TP	TP	TP	TP	TP	PS	

NEW WATER QUALITIES - Both Species

	0	1	2	3	4	5	6	7	8
Water Quality Station #	1	1	2	1	1	1	2		
Initials	BB	BB	TP	TP	TP	TP	TP		

OLD WATER QUALITIES - *C. dubia*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		1	1	2	1	1	2	1	
Initials		BB	TP	TP	TP	TP	TP	PS	
Date	9/24/04	9/25/04	9/26	9/27	9/28	9/29	9/30	10/01/04	

Water Quality Station #1		Water Quality Station #2		COMMENTS
DO meter #	18	DO meter #	19	
DO probe #	10	DO probe #	6, 11	
pH meter #	1047	pH meter #	1138	
pH probe #	40	pH probe #	34	
S/C meter #	YSI 30B	S/C meter #	YSI 30B	
S/C probe #	1	S/C probe #	1	

Pimephales promelas 7 DAY CHRONIC ASSAY

STUDY	CLIENT	SAMPLE	DILUENT	FISH/BATCH
12551	Metcalf &Eddy	Iron Horse Park	N/A	

CONC	REP	NUMBER OF SURVIVORS 0	1	2	3	4	5	6	7	OLD DISSOLVED OXYGEN (mg/L) 1	2	3	4	5	6	7
LAB	A	10	10	10	10	10	9	9	9	6.0	7.7	5.6	6.5	6.4	7.5	7.3
	B	10	10	10	10	10	10	10	10	6.3	7.5	5.9	5.8	6.5	7.2	7.0
	C	10	10	10	10	10	10	10	10	5.3	7.1	6.1	6.4	6.6	7.3	7.2
	D	10	10	10	10	10	10	10	10	6.0	7.0	6.3	6.6	6.4	7.0	7.2
-032	A	10	10	10	10	10	10	9	9	5.7	7.5	5.5	5.4	5.6	6.4	6.9
	B	10	10	10	9	5	5	5	5	5.9	7.6	5.9	5.7	6.0	6.5	6.5
	C	10	10	10	8	5	3	3	3	5.8	7.7	6.1	6.0	6.2	7.0	7.1
	D	10	10	*8	8	6	6	6	6	5.8	7.2	6.3	6.1	6.4	7.1	7.0
-033	A	10	10	9	9	9	9	9	9	5.7	7.4	5.4	5.2	5.5	6.5	6.4
	B	10	9	9	9	9	9	9	9	6.2	7.5	5.0	5.1	5.8	5.9	6.3
	C	10	10	10	9	7	7	7	7	6.2	7.8	5.5	6.0	6.0	6.3	6.5
	D	10	10	10	10	10	10	10	10	5.8	7.6	6.2	5.9	6.1	6.7	6.5
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															

		OLD PH (SU)							OLD SPECIFIC CONDUCTIVITY (uMHOS/CM)						
LAB	A	7.17	7.15	7.10	7.43	7.33	7.63	7.44	208	209	230	217	219	208	236
-032	A	7.04	7.03	7.05	7.13	7.18	7.29	7.26	273	269	289	259	276	259	268
-033	A	7.04	6.98	7.15	7.16	7.17	7.32	7.20	344	346	309	375	398	384	388
	A														
	A														
	A														
	A														
INC TEMP °C:		25	25	25	25	25	27	26	28							
DATE:		9/24/04	9/25	9/26	9/27	9/28	9/29	9/30	10/01/04							
TIME:		1510	1535	1035	1330	1350	1315	1350	1145							
INITIALS:		✓	BB	TP	TP	TP	TP	TP	RS							

* Spilled beaker lost 2 fish

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.2782
W = 0.9583

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0066	
2	-32	0.0861	12.9679

(p-value = 0.0636)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	1.2490	1.4120	1.3713
2	-32	4	0.5796	1.2490	0.9153

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0066	0.0815	0.0407	5.9424
2	-32	0.0861	0.2934	0.1467	32.0590

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.4158	0.4158	8.9660
Within (Error)	6	0.2782	0.0464	
Total	7	0.6940		

(p-value = 0.0242)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05

1	Lab	1.3713	0.9750		
2	-32	0.9153	0.6125	2.9943	*

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0121)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab	1.3713	0.9750		
2	-32	0.9153	0.6125	2.9943	*

Unequal Var: t critical value = 2.3534 (1 Tailed, alpha = 0.05, df = 3)
(p-value = 0.0290)

Title: 12551 Metcalf & Eddy P promelas Survival
File: 12551 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-32	4	0.1867	19.4	0.3625

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-32	4	0.2410	25.1	0.3625

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.1107
W = 0.8689

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0066	
2	-33	0.0303	4.5589

(p-value = 0.2446)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	1.2490	1.4120	1.3713
2	-33	4	0.9912	1.4120	1.2253

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0066	0.0815	0.0407	5.9424
2	-33	0.0303	0.1740	0.0870	14.1994

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0426	0.0426	2.3086
Within (Error)	6	0.1107	0.0185	
Total	7	0.1533		

(p-value = 0.1795)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05

1	Lab	1.3713	0.9750	
2	-33	1.2253	0.8750	1.5194

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0897)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab	1.3713	0.9750		
2	-33	1.2253	0.8750	1.5194	

Unequal Var: t critical value = 2.1318 (1 Tailed, alpha = 0.05, df = 4)
(p-value = 0.1016)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-33	4	0.1026	10.7	0.1000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-33	4	0.1155	12.0	0.1000

LARVAL FISH DRY WEIGHTS

CLIENT: Metcalf & Eddy TEST END DATE: 10/01/04

STUDY #: 12551 SPECIES: P. promelas

CONC	REP	TARE WT (g)	FISH + FOIL (g)
Lab	A	0.00978	0.01373
	B	0.00882	0.01436
	C	0.00900	0.01345
	D	0.00949	0.01345
-032	A	0.00937	0.01341
	B	0.00895	0.01258
	C	0.00914	0.01168
	D	0.01042	0.01405
-0.33	A	0.00876	0.01340
	B	0.00950	0.01409
	C	0.00901	0.01312
	D	0.00965	0.01380
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
DATE:		10/1/04	10/4/04
TIME:		1030	1440
INIT:		✓	✓

Larval Fish Dry Weights

CLIENT: Metcalf & Eddy
ESI # 12551
TEST DATE:
SPECIES: *Pimephales promelas*

Conc.	Rep.	Tare Foil	Foil+Fish	Net Fish (mg)	# Day 0	mg Day 0	# Day 7	mg Day 7
Lab	A	0.00978	0.01373	3.950	10	0.395	9	0.439
Lab	B	0.00882	0.01436	5.540	10	0.554	10	0.554
Lab	C	0.00900	0.01345	4.450	10	0.445	10	0.445
Lab	D	0.00949	0.01345	3.960	10	0.396	10	0.396
32	A	0.00937	0.01341	4.040	10	0.404		
32	B	0.00895	0.01258	3.630	10	0.363		
32	C	0.00914	0.01168	2.540	10	0.254		
32	D	0.01042	0.01405	3.630	8	0.454		
33	A	0.00876	0.01340	4.640	10	0.464		
33	B	0.00950	0.01409	4.590	10	0.459		
33	C	0.00901	0.01312	4.110	10	0.411		
33	D	0.00965	0.01380	4.150	10	0.415		

		Day 0	**Day 7**
LAB CONTROL	**GROWTH**	0.448 **mg**	0.458
	SURVIVAL		97.5%

LAB CONTROL ACCEPTABILITY EVALUATION -

Lab Control Survival >80%:	**ASSAY ACCEPTABLE**	
Lab Control CV <20%:	**ASSAY ACCEPTABLE**	(PA Projects Only)
Lab Control Weight >0.25 mg:	**ASSAY ACCEPTABLE**	
Lab Control Weight CV <20%:	**ASSAY ACCEPTABLE**	(PA Projects Only)

Date: 11/09/04 Time: 11:35 AM Initials: bb

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0385
W = 0.9662

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0056	
2	-32	0.0072	1.2956

(p-value = 0.8365)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	0.3950	0.5540	0.4475
2	-32	4	0.2540	0.4540	0.3688

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0056	0.0747	0.0374	16.7011
2	-32	0.0072	0.0851	0.0425	23.0698

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0124	0.0124	1.9346
Within (Error)	6	0.0385	0.0064	
Total	7	0.0509		

(p-value = 0.2136)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	Lab	0.4475	0.4475	
2	-32	0.3688	0.3688	1.3909

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.1068)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	0.4475	0.4475		
2	-32	0.3688	0.3688	1.3909	

Unequal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.1068)

Title: 12551 Metcalf & Eddy P promelas Growth
File: 12551 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-32	4	0.1100	24.6	0.0788

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-32	4	0.1100	24.6	0.0788

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0191
W = 0.8897

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0056	
2	-33	0.0008	7.0623

(p-value = 0.1427)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	0.3950	0.5540	0.4475
2	-33	4	0.4110	0.4640	0.4373

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0056	0.0747	0.0374	16.7011
2	-33	0.0008	0.0281	0.0141	6.4318

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0002	0.0002	0.0659
Within (Error)	6	0.0191	0.0032	
Total	7	0.0193		

(p-value = 0.8060)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	Lab	0.4475	0.4475	
2	-33	0.4373	0.4373	0.2567

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.4030)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	0.4475	0.4475		
2	-33	0.4373	0.4373	0.2567	

Unequal Var: t critical value = 2.1318 (1 Tailed, alpha = 0.05, df = 4)
(p-value = 0.4050)

Title: Metcalf & Eddy P promelas growth
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-33	4	0.0776	17.3	0.0102

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-33	4	0.0851	19.0	0.0102

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 9/23/04

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/23/04

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	23°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	75 mg/l	--
pH:	7.75	--

Comments:

Facility Supervisor

NEW WATER QUALITIES

STUDY:12551	CLIENT:Metcalf & Eddy	SAMPLE: Iron Horse Park	DILUENT:N/A

NEW DISSOLVED OXYGEN (mg/L)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	8.6	8.1	8.4	8.5	8.4	8.4	85	
-040	A	38	8.5	8.5	8.9	9.6	9.0	9.2	
	A								
	A								
	A								
	A								
	A								

NEW pH (SU)

0	1	2	3	4	5	6	7
7.69	7.70	7.80	7.82	7.90	7.76	7.66	
6.24	6.66	6.60	6.76	6.90	7.07	7.02	

NEW SPECIFIC CONDUCTIVITY (µMHOS/CM)

CONC	REP	0	1	2	3	4	5	6	7
LAB	A	191	177	204	179	193	181	193	
-040	A	208	206	208	210	206	207	206	
	A								
	A								
	A								
	A								
	A								

INC TEMP (°C):	25	25	25	25	25	26	26	
DATE:	9/25/01	9/26	9/26	9/28	9/29	9/30	10/1	
TIME:	1220	1300	1315	1250	1130	1425	1105	
INITIALS:	BB	TP	TP	TP	KK	TP	KIC	

12566

	DAY 0 (START)			
	ALK	HAR	AMM	TRC
Lab	013	014	015	<0.05
040	041	042	043	<0.05

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

STUDY # 12551

CLIENT: Metcalf & Eddy

SAMPLE: Iron Horse Park

DILUENT: N/A

Cerio Data source: RB ☒ MHR ☐ collected: previous pm ☐ test day am ☒

DAY 0 9/25/04 TIME: 1225 FED: BB

DAY 1 9/26/04 TIME: 1310 FED: TP

DAY 2 9/27/04 TIME: 1350 FED: TP

DAY 3 9/28/04 TIME: 1255 FED: TP

DAY 4 9/29/04 TIME: 1141 FED: KK

DAY 5 9/30/04 TIME: 1445 FED: TP

DAY 6 10/1/04 TIME: 1145 FED: KK

DAY 7 10/02/04 TIME: 1140 FED: CW

DAY 8 TIME: FED:

LEGEND:

+ = LIVE

- = DEAD

♂ = MALE

M = MISSING

CONC.	DAY	A	B	C	D	E	F	G	H	I	J	SUM	SURV.
LAB	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	4	5	2	6	2	+	2	5	5	4	35	10
	4	+	+	+	+	8	6	+	+	+	+	14	10
	5	6	10	12	10	8	10	13	11	6	12	98	10
	6	14	16	12	13	+	15	16	13	9	16	124	10
	7	+	4	1	14	13	+	19	+	15	+	66	10
	8												
	TOTAL	24	35	27	43	31	31	50	29	35	32	357	10
-040	0	+	+	+	+	+	+	+	+	+	+	0	10
	1	+	+	+	+	+	+	+	+	+	+	0	10
	2	+	+	+	+	+	+	+	+	+	+	0	10
	3	+	2	2	4	5	3	6	+	5	4	31	10
	4	5	+	+	+	+	+	+	+	7	+	12	10
	5	10	6	4	5	8	5	7	10	12	5	72	10
	6	+	10	12	+	13	+	13	14	18	8	88	10
	7	17	2	1	7	-	5	+	-	1	-	33	7
	8					1			1		1		7
	TOTAL	32	20	19	16	26	13	26	24	42	17	236	7
	0												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	TOTAL												
	0												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	TOTAL												

337

236

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.5757
W = 0.7258

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The F-test of homogeneity is sensitive to non-normality and should not be performed with this data as is.

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab 00c	0.0000	
2	-040	0.0640	99999.0000

(p-value = 0.0000)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F > Critical F, REJECT Ho: Equal Variances (alpha = 0.01).

NOTE: This test requires positive variances. If one of the variances is zero, the test will always reject Ho: Equal Variances.

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab 00c	10	1.0472	1.0472	1.0472
2	-040	10	0.5236	1.0472	0.8901

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab 00c	0.0000	0.0000	0.0000	0.0000
2	-040	0.0640	0.2529	0.0800	28.4146

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.1234	0.1234	3.8571
Within (Error)	18	0.5757	0.0320	
Total	19	0.6991		

(p-value = 0.0652)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05
1	Lab 00c	1.0472	1.0000		
2	-040	0.8901	0.7000	1.9640	*

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0326)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab 00c	1.0472	1.0000		
2	-040	0.8901	0.7000	1.9640	*

Unequal Var: t critical value = 1.8331 (1 Tailed, alpha = 0.05, df = 9)
(p-value = 0.0406)

Title: STUDY 12551: Cerio Survival
File: mecds3 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00c	10			
2	-040	10	0.1281	17.1	0.3000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab 00c	10			
2	-040	10	0.1358	18.1	0.3000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.3400	4.8400	7.6400	4.8400	1.3400
OBSERVED	0	7	9	2	2

Chi-Square = 4.5376 (p-value = 0.3381)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1240.5000
W = 0.9095

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	59.3444	
2	-040	78.4889	1.3226

(p-value = 0.6838)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	10	24.0000	50.0000	33.7000
2	-040	10	13.0000	43.0000	23.6000

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	59.3444	7.7035	2.4361	22.8592
2	-040	78.4889	8.8594	2.8016	37.5398

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	510.0500	510.0500	7.4010
Within (Error)	18	1240.5000	68.9167	
Total	19	1750.5500		

(p-value = 0.0140)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	Lab	33.7000	33.7000		
2	-040	23.6000	23.6000	2.7205	*

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0070)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Lab	33.7000	33.7000		
2	-040	23.6000	23.6000	2.7205	*

Unequal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.0070)

Title: Metcalf & Eddy C dubia Reproduction
File: ME Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-040	10	6.4379	19.1	10.1000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	10			
2	-040	10	6.4379	19.1	10.1000

Ceriodaphnia dubia CHRONIC REPRODUCTION ASSAY

OLD WATER QUALITIES

STUDY:12551		CLIENT: Metcalf & Eddy				SAMPLE: Iron Horse Park				DILUENT: N/A	
CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	CONC	DAY	pH (SU)	DO (mg/L)	S/C (µMHOS/CM)	INC TEMP (°C)	INIT
LAB	1	7.64	8.1	188		1				25	TP
	2	7.63	8.3	201		2				25	TP
	3	7.83	8.4	222		3				25	TP
	4	7.55	7.9	194		4				25	KK
	5	7.76	8.3	200		5				26	TP
	6	7.56	8.0	198		6				26	KK
	7	7.55	8.1	210		7				27	CW
	8					8					
-040	1	7.51	8.2	220		1					
	2	7.67	8.4	225		2					
	3	7.67	8.4	223		3					
	4	7.42	8.0	222		4					
	5	7.60	8.1	233		5					
	6	7.31	8.1	221		6					
	7	7.48	8.2	229		7					
	8					8					
	1					1					
	2					2					
	3					3					
	4					4					
	5					5					
	6					6					
	7					7					
	8					8					
	1					1					
	2					2					
	3					3					
	4					4					
	5					5					
	6					6					
	7					7					
	8					8					

DILUTIONS

STUDY:12551 | CLIENT: Metcalf & Eddy

SPECIES: *C. dubia & P. promelas* | TEST: chronic renewal

START Diluent:N/A Concentration	Day: 0 Sample: EOA Sample Vol	Final Vol	Day: 1 Sample: EOA Sample Vol	Final Vol	Day: 2 Sample: EOA Sample Vol	Final Vol.
Lab	1200	1200	1000	1000	1000	1000
-040	1200	1200	1000	↓	1000	↓

Day: 3 Diluent: N/A Sample: EOA Concentration	Sample Vol	Final Vol	Day: 4 Sample: EOA Sample Vol	Final Vol	Day: 5 Sample: EOA Sample Vol	Final Vol.
Lab	1000	1000	1000	1000	1000	1000
-040	1000	1000	1000	1000	1000	↓

Day: 6 Diluent: N/A Sample: EOA Concentration	Sample Vol	Final Vol.	Day: Sample: Sample Vol	Final Vol	Day: Sample: Sample Vol	Final Vol.
Lab	1000	1000				
-040	1000	1000				

Day	Date	Time	Init
0	9/25/11	1210	BB
1	9/26	1250	TP
2	9/27	1310	TP
3	9/28	1245	TP
4	9/29	1125	KK
5	9/30	1415	TP
6	10/1	1100	KK
7			

COMMENTS

RECORD OF METERS USED

FRESHWATER CHRONIC

C. dubia & P. promelas

STUDY:12551	CLIENT: Metcalf & Eddy

OLD WATER QUALITIES - *P. promelas*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		1	1	*2	1	1	2	1	
Initials		TP	TP	TP	KK	TP	KK	CW	

NEW WATER QUALITIES - Both Species

	0	1	2	3	4	5	6	7	8
Water Quality Station #	1	2	1	1	1	2	2		
Initials	PB	TP	TP	TP	KK	TP	KK		

OLD WATER QUALITIES - *C. dubia*

	0	1	2	3	4	5	6	7	8
Water Quality Station #		2	2	1	1	2	2	1	
Initials		TP	TP	TP	KK	TP	KK	CW	
Date	9/25/04	9/26	9/27	9/28	9/29	9/30	10/1	10/2	

Water Quality Station #1		Water Quality Station #2		**COMMENTS**
DO meter #	18	DO meter #	19	*Used DO meter 18, probe 10
DO probe #	10	DO probe #	6	
pH meter #	1097	pH meter #	1138	
pH probe #	40	pH probe #	39	
S/C meter #	YSI30B	S/C meter #	YSI30B	
S/C probe #	L	S/C probe #	L	

Pimephales promelas 7 DAY CHRONIC ASSAY

STUDY	CLIENT	SAMPLE	DILUENT	FISH/BATCH
12551	Metcalf &Eddy	Iron Horse Park	N/A	

CONC	REP	NUMBER OF SURVIVORS								OLD DISSOLVED OXYGEN (mg/L)						
		0	1	2	3	4	5	6	7	1	2	3	4	5	6	7
LAB	A	10	10	10	10	10	10	10	10	7.6	4.2	5.3	5.7	6.0	6.7	7.3
	B	10	10	10	10	10	10	10	10	7.8	4.6	4.1	5.6	6.6	6.9	7.5
	C	10	10	10	10	10	10	10	10	8.0	5.0	4.6	6.3	7.0	6.9	7.6
	D	10	10	10	10	10	10	10	10	7.5	5.8	5.4	6.7	7.2	7.1	7.6
-040	A	10	10	10	10	10	10	10	10	8.0	4.3	4.0	5.9	6.5	6.6	7.0
	B	10	10	10	10	10	7	7	7	7.9	4.0	3.8	5.6	5.8	6.7	7.1
	C	10	10	10	10	10	10	10	10	8.1	4.2	4.0	5.6	5.8	6.6	7.3
	D	10	10	10	10	10	8	8	8	8.1	4.5	4.4	5.8	5.5	6.5	7.3
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															
	A															
	B															
	C															
	D															

		OLD PH (SU)								OLD SPECIFIC CONDUCTIVITY (uMHOS/CM)						
LAB	A		7.35	7.00	7.06	7.21	7.24	7.28	7.37	225	215	215	234	207	201	242
-040	A		7.20	6.80	6.68	6.99	7.11	7.06	7.11	242	251	224	227	227	239	239
	A															
	A															
	A															
	A															
	A															
INC TEMP °C:		25	25	25	25	25	26	26	27							
DATE:		9/25/01	9/26	9/27	9/28	9/29	9/30	10/1	10/2							
TIME:		1240	1240	1305	1220	1110	1400	1045	1110							
INITIALS:		BB	TP	TP	TP	KK	TP	KK	CW							

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.1384
W = 0.8910

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	Lab	0.0000	
2	-40	0.0461	99999.0000

(p-value = 0.0000)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F > Critical F, REJECT Ho: Equal Variances (alpha = 0.01).

NOTE: This test requires positive variances. If one of the variances is zero, the test will always reject Ho: Equal Variances.

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Lab	4	1.4120	1.4120	1.4120
2	-40	4	0.9912	1.4120	1.2306

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Lab	0.0000	0.0000	0.0000	0.0000
2	-40	0.0461	0.2148	0.1074	17.4540

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0658	0.0658	2.8542
Within (Error)	6	0.1384	0.0231	
Total	7	0.2042		

(p-value = 0.1421)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05

1	Lab	1.4120	1.0000	
2	-40	1.2306	0.8750	1.6894

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0710)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	Lab	1.4120	1.0000		
2	-40	1.2306	0.8750	1.6894	

Unequal Var: t critical value = 2.3534 (1 Tailed, alpha = 0.05, df = 3)
(p-value = 0.0949)

Title: Metcalf & Eddy P promelas Survival
File: ME Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-40	4	0.1041	10.7	0.1250

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Lab	4			
2	-40	4	0.1350	13.8	0.1250

LARVAL FISH DRY WEIGHTS

CLIENT: METCALF + EDDY TEST END DATE: 10/02/04

STUDY #: 12551 SPECIES: P. PROMELAS

CONC	REP	TARE WT (g)	FISH + FOIL (g)
Lab	A	0.00980	0.01526
	B	0.01059	0.01507
	C	0.01191	0.01691
	D	0.01134	0.01569
-040	A	0.00936	0.01461
	B	0.01064	0.01523
	C	0.01181	0.01702
	D	0.01120	0.01576
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
	A		
	B		
	C		
	D		
DATE:		10/02/04	10/4/04
TIME:		1115	1430
INIT:		CW	

CLIENT: Metcalf & Eddy
ESI # 12551

TEST DATE:

SPECIES: *Pimephales promelas*

Conc.	Rep.	Tare Foil	Foil+Fish	Net Fish (mg	# Day 0	mg Day 0	# Day 7	mg Day 7		
Lab	A	0.00980	0.01526	5.460	10	0.546	10	0.546	1	1
Lab	B	0.01059	0.01507	4.480	10	0.448	10	0.448	1	1
Lab	C	0.01191	0.01691	5.000	10	0.500	10	0.500	1	1
Lab	D	0.01134	0.01569	4.350	10	0.435	10	0.435	1	1
-40	A	0.00936	0.01461	5.250	10	0.525				
-40	B	0.01064	0.01523	4.590	10	0.459	.490			
-40	C	0.01181	0.01702	5.210	10	0.521				
-40	D	0.01120	0.01576	4.560	10	0.456				

		Day 0	Day 7
LAB CONTROL	**GROWTH**	0.482 **mg**	0.482
	SURVIVAL		100.0%

Date: 10/13/04 Time: 02:34 PM Initials: BB

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 9/24/04

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/24/04

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	23°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	75 mg/l	--
pH:	7.75	--

Comments:

Facility Supervisor

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1824.1000
W = 0.9842

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	76.8444	
2	SW-BM-01	125.8333	1.6375

(p-value = 0.4740)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	10	13.0000	42.0000	23.8000
2	SW-BM-01	10	0.0000	37.0000	22.5000

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	76.8444	8.7661	2.7721	36.8323
2	SW-BM-01	125.8333	11.2175	3.5473	49.8558

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	8.4500	8.4500	0.0834
Within (Error)	18	1824.1000	101.3389	
Total	19	1832.5500		

(p-value = 0.7761)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	SW-RF-01	23.8000	23.8000		
2	SW-BM-01	22.5000	22.5000	0.2888	

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.3880)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	SW-RF-01	23.8000	23.8000		
2	SW-BM-01	22.5000	22.5000	0.2888	

Unequal Var: t critical value = 1.7396 (1 Tailed, alpha = 0.05, df = 17)
(p-value = 0.3881)

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr1 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	10			
2	SW-BM-01	10	7.8067	32.8	1.3000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	10			
2	SW-BM-01	10	7.8317	32.9	1.3000

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1290.5000
W = 0.9671

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	76.8444	
2	SW-RP-01	66.5444	1.1548

(p-value = 0.8338)

Critical F = 6.5411 (P=0.01, 9, 9)
4.0260 (P=0.05, 9, 9)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	10	13.0000	42.0000	23.8000
2	SW-RP-01	10	9.0000	33.0000	21.9000

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	76.8444	8.7661	2.7721	36.8323
2	SW-RP-01	66.5444	8.1575	2.5796	37.2488

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	18.0500	18.0500	0.2518
Within (Error)	18	1290.5000	71.6944	
Total	19	1308.5500		

(p-value = 0.6219)

Critical F = 8.2854 (alpha = 0.01, df = 1,18)
= 4.4139 (alpha = 0.05, df = 1,18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	SW-RF-01	23.8000	23.8000		
2	SW-RP-01	21.9000	21.9000	0.5018	

Equal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.3110)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	SW-RF-01	23.8000	23.8000		
2	SW-RP-01	21.9000	21.9000	0.5018	

Unequal Var: t critical value = 1.7341 (1 Tailed, alpha = 0.05, df = 18)
(p-value = 0.3110)

Title: STUDY 12551: Daphni Reporduction vs SW-RF-01
File: mecdr2 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	10			
2	SW-RP-01	10	6.5663	27.6	1.9000

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	10			
2	SW-RP-01	10	6.5663	27.6	1.9000

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.3967
W = 0.9284

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	0.0461	
2	SW-MC-01	0.0861	1.8665

(p-value = 0.6211)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	4	0.9912	1.4120	1.2306
2	SW-MC-01	4	0.5796	1.2490	0.9153

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	0.0461	0.2148	0.1074	17.4540
2	SW-MC-01	0.0861	0.2934	0.1467	32.0590

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.1988	0.1988	3.0064
Within (Error)	6	0.3967	0.0661	
Total	7	0.5955		

(p-value = 0.1336)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05

1	SW-RF-01	1.2306	0.8750	
2	SW-MC-01	0.9153	0.6125	1.7339

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0668)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	SW-RF-01	1.2306	0.8750		
2	SW-MC-01	0.9153	0.6125	1.7339	

Unequal Var: t critical value = 2.0150 (1 Tailed, alpha = 0.05, df = 5)
(p-value = 0.0717)

Title: STUDY 12551: Pimephales Survival vs RF-01
File: mepp3 Transform: ARC SINE(SQUARE ROOT(Y))

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-MC-01	4	0.2973	33.5	0.2625

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-MC-01	4	0.3102	34.9	0.2625

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0260
W = 0.9425

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	0.0014	
2	SW-MC-01	0.0072	5.0458

(p-value = 0.2167)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	4	0.4560	0.5250	0.4902
2	SW-MC-01	4	0.2540	0.4540	0.3688

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	0.0014	0.0379	0.0189	7.7249
2	SW-MC-01	0.0072	0.0851	0.0425	23.0698

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0295	0.0295	6.8098
Within (Error)	6	0.0260	0.0043	
Total	7	0.0555		

(p-value = 0.0401)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05

1	SW-RF-01	0.4902	0.4902		
2	SW-MC-01	0.3688	0.3688	2.6096	*

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0201)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	SW-RF-01	0.4902	0.4902		
2	SW-MC-01	0.3688	0.3688	2.6096	*

Unequal Var: t critical value = 2.1318 (1 Tailed, alpha = 0.05, df = 4)
(p-value = 0.0297)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: mepp5 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-MC-01	4	0.0905	18.5	0.1215

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-MC-01	4	0.0993	20.2	0.1215

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0067
W = 0.8001

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	0.0014	
2	SW-CB-01	0.0008	1.8134

(p-value = 0.6371)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	4	0.4560	0.5250	0.4902
2	SW-CB-01	4	0.4110	0.4640	0.4373

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	0.0014	0.0379	0.0189	7.7249
2	SW-CB-01	0.0008	0.0281	0.0141	6.4318

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0056	0.0056	5.0495
Within (Error)	6	0.0067	0.0011	
Total	7	0.0123		

(p-value = 0.0657)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	SW-RF-01	0.4902	0.4902		
2	SW-CB-01	0.4373	0.4373	2.2471	*

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0329)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	SW-RF-01	0.4902	0.4902		
2	SW-CB-01	0.4373	0.4373	2.2471	*

Unequal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0329)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP6 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-CB-01	4	0.0458	9.3	0.0530

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-CB-01	4	0.0458	9.3	0.0530

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0171
W = 0.9270

Critical W = 0.7490 (alpha = 0.01 , N = 8)
W = 0.8180 (alpha = 0.05 , N = 8)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

F-Test for Equality of Two Variances

GROUP	IDENTIFICATION	VARIANCE	F
1	SW-RF-01	0.0014	
2	SW-BM-01	0.0043	2.9797

(p-value = 0.3938)

Critical F = 47.4672 (P=0.01, 3, 3)
15.4392 (P=0.05, 3, 3)

Since F <= Critical F, FAIL TO REJECT Ho: Equal Variances (alpha = 0.01).

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SW-RF-01	4	0.4560	0.5250	0.4902
2	SW-BM-01	4	0.3430	0.4890	0.4288

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	SW-RF-01	0.0014	0.0379	0.0189	7.7249
2	SW-BM-01	0.0043	0.0654	0.0327	15.2473

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	1	0.0076	0.0076	2.6506
Within (Error)	6	0.0171	0.0029	
Total	7	0.0247		

(p-value = 0.1546)

Critical F = 13.7450 (alpha = 0.01, df = 1,6)
= 5.9874 (alpha = 0.05, df = 1,6)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	SW-RF-01	0.4902	0.4902		
2	SW-BM-01	0.4288	0.4288	1.6281	

Equal Var: t critical value = 1.9432 (1 Tailed, alpha = 0.05, df = 6)
(p-value = 0.0773)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	SW-RF-01	0.4902	0.4902		
2	SW-BM-01	0.4288	0.4288	1.6281	

Unequal Var: t critical value = 2.0150 (1 Tailed, alpha = 0.05, df = 5)
(p-value = 0.0822)

Title: STUDY 12551: Pimephasel promelas Growth vs RF-01
File: MEPP4 Transform: NO TRANSFORMATION

2 Sample t-Test - TABLE 2 OF 2 Ho: Control<Treatment

Equal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-BM-01	4	0.0734	15.0	0.0615

Unequal Variances:

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	SW-RF-01	4			
2	SW-BM-01	4	0.0761	15.5	0.0615

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/22/04 1010

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: Client

Via: FedEx

Description of Shipping / Packing Containers(s) 1 cooler
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
SW-BM-01	-024	2 x 2.5g		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: _____ Date: 9/22/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/23/04 1015

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: Client

Via: Fed Ex

Description of Shipping / Packing Containers(s) 1 cooler
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
SW-RP-01	-025	2x2.5g		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: _____ Date: 9/23/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/24/04 1015

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: Client

Via: Fed Ex

Description of Shipping / Packing Containers(s) 2 coolers
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
SW-MC-01		2x2.5g		
SW-CB-01		↓		

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 9/24/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 12551 Date/Time Received: 9/25/04 1140

Client Name and Address: Metcalf + Eddy

Method of Shipment/ Pick Up: From: Client

Via: Fed Ex

Description of Shipping / Packing Containers(s) 1 cooler
(Number, Type, Size)

Sample ID	ESI #	# Containers/Vol/Wt	Other	Sampled
SW-RF-01	-040			

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: _____ Date: 9/25/04

Notes: Rec'd on ice 4°C

Date and Description of Final Sample Removal / Disposal: _____

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/21/2004
Carrier Name:	FedEx
Airbill:	846414254956
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	[signature]	9/21/04 1705	[signature]	9/22/04 1018
2				
3				
4				

Sampler Signature: [signature]

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05245	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-BM-01	S: 9/21/2004 10:45	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4c	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092104-0002

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/22/2004
Carrier Name:	FedEx
Airbill:	846414251306
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/22/04 15:50	9/23/04 10:15
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05235	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA 1002.0 (21) (Ice Only) (2)		SW-RP-01	S: 9/22/2004 8:30	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:	
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___	Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092204-0002

LABORATORY COPY

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Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/23/2004
Carrier Name:	FedEx
Airbill:	846414252416
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/23/04 1905	9/24/04 1015
2		
3		
4		

Sampler Signature:

For Lab Use Only
Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
D05238	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-MC-01	S: 9/23/2004	9:25	

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Custody Seal Intact? ___	Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092304-0003

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/23/2004
Carrier Name:	FedEx
Airbill:	846414252427
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/23/04 1900	9/23/04 1015
2		
3		
4		

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05242	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA (Ice Only) (2) 1002.0 (21)		SW-CB-01	S: 9/23/2004	14:00

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 4°C	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092304-0002

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

EPA Metcalf and Eddy DAS Chain of Custody Form
Generic Chain of Custody

Reference Case
Client No: 0243M
SDG No:
L

Date Shipped:	9/24/2004
Carrier Name:	FedEx
Airbill:	846414254967
Shipped to:	Envirosystems, Inc. (Toxicity) One Lafayette Road Hampton NH 03842 (603) 926-3345

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	9/24/04 1630	9/25/04 1140
2		
3		
4		

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	FOR LAB USE ONLY Sample Condition On Receipt
D05248	Surface Water/ Laurie O'Connor	L/G	EPA 1000.0 (21), EPA 1002.0 (21) (Ice Only) (2)		SW-RF-01	S: 9/24/2004 9:45	

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Cooler Temperature Upon Receipt:** 4°C	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G		**Custody Seal Intact?** ___ **Shipment Iced?** ___

EPA 1000.0 = EPA 1000.0 (Toxicity), EPA 1002.0 = EPA 1002.0 (Toxicity)

TR Number: 1-502446878-092404-0007

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

APPENDIX I

Sediment Field Screening Results

Iron Horse Park
PAH Screening Results

Sample ID	% Moisture (1)	Wet Weight (grams)	Dry Weight (grams)	% Solids (2)	Date of Analysis	Time of Analysis	Sample Weight (grams)	Dilution Factor	Measured PAH Concentration (mg/kg)	Dry Weight Corrected Result (mg/kg)
SED-01	55.5	10	3.8	38	9/23/2004	1930	10	1x	3.55	9.34
SED-02	70.3	5	1	20	9/23/2004	1931	10	1x	3.32	16.60
SED-03	84.3	10	2.2	22	9/23/2004	1932	10	1x	3.20	14.55
SED-04	85.5	10	4.1	41	9/24/2004	1945	10	4x	8.20	20.00
SED-05	87.8	10	2.5	25	9/24/2004	1946	10	4x	40.4 E	161.6 E
SED-06	75.7	10	6.9	69	9/24/2004	1947	10	4x	8.87	12.86
SED-07	81.1	10	1.5	15	9/27/2004	1231	10	12x	24.47	163.13
SED-08	75.5	10	2.1	21	9/23/2004	1938	10	1x	3.23	15.38
SED-09	98.1	5	0.6	12	9/24/2004	1950	10	4x	10.16	84.67
SED-10	98.4	5	0.7	14	9/24/2004	1951	10	4x	6.63	47.36
SED-11	83.1	10	5	50	9/23/2004	1941	10	1x	3.06	6.12
SED-12	86.5	10	3.1	31	9/24/2004	1952	10	4x	48.6 E	156.8 E
SED-13	77.2	10	3.3	33	9/24/2004	1953	10	4x	19.59	59.36
SED-14	98.2	10	1.1	11	9/24/2004	1954	10	4x	3.99	36.27
SED-15	93.1	10	1.6	16	9/24/2004	1703	10	1x	1.23	7.69
SED-16	96.7	5	0.4	8	9/24/2004	1704	10	1x	1.93	24.13
SED-17	81.3	10	6	60	9/27/2004	1233	10	12x	44.00	73.33
SED-18	94.3	10	3.8	38	9/27/2004	1234	10	12x	44.40	116.84
SED-19	71.9	10	7.9	79	9/27/2004	1235	10	12x	69.4 E	87.85 E
SED-20	78.5	10	6.2	62	9/24/2004	1959	10	4x	17.51	28.24
SED-21	98.7	5	0.9	18	9/24/2004	1710	10	1x	2.60	14.44
SED-22	98.9	10	1.8	18	9/24/2004	1711	10	1x	1.20	6.67
SED-23	98.9	10	0.5	5	9/24/2004	1712	10	1x	0.63	12.60

(1) Percent moisture measured in the field using HH2 Moisture Meter (Delta-T Devices), as noted on the Chain of Custody.

(2) Percent solids were calculated after samples were partially dried with coffee filters (for wet weight) and after drying in the toaster oven (for dry weight).

E Estimated value; exceeds upper limit of calibration

Iron Horse Park
PCB Screening Results

Sample ID	% Moisture (1)	Wet Weight (grams)	Dry Weight (grams)	% Solids (2)	Date of Analysis	Time of Analysis	Sample Weight (grams)	Dilution Factor	Measured PCB Concentration (mg/kg)	Dry Weight Corrected Result (mg/kg)
1st Run, 1x dilution: PCB Range = 0.5 - 10 mg/kg										
SED-01	55.5	10	3.8	38	9/24/2004	1400	10	1x	<0.5	<1.32
SED-02	70.3	5	1	20	9/24/2004	1401	10	1x	<0.5	<2.5
SED-03	84.3	10	2.2	22	9/24/2004	1402	10	1x	<0.5	<2.27
SED-04	85.5	10	4.1	41	9/24/2004	1403	10	1x	<0.5	<1.22
SED-05	87.8	10	2.5	25	9/24/2004	1404	10	1x	<0.5	<2.0
SED-06	75.7	10	6.9	69	9/24/2004	1405	10	1x	<0.5	<0.72
SED-06-DUP	75.5	10	6.9	69	9/24/2004	1406	10	1x	<0.5	<0.72
SED-07	81.1	10	1.5	15	9/24/2004	1407	10	1x	<0.5	<3.33
SED-08	75.5	10	2.1	21	9/24/2004	1408	10	1x	<0.5	<2.38
SED-09	98.1	5	0.6	12	9/24/2004	1409	10	1x	<0.5	<4.17
SED-10	98.4	5	0.7	14	9/24/2004	1410	10	1x	<0.5	<3.57
SED-11	83.1	10	5	50	9/24/2004	1411	10	1x	<0.5	<1.0
SED-11-DUP	83.1	10	5	50	9/24/2004	1412	10	1x	<0.5	<1.0
SED-12	86.5	10	3.1	31	9/24/2004	1413	10	1x	<0.5	<1.61
SED-13	77.2	10	3.3	33	9/24/2004	1414	10	1x	<0.5	<1.52
SED-14	98.2	10	1.1	11	9/24/2004	1415	10	1x	<0.5	<4.54
SED-15	93.1	10	1.6	16	9/24/2004	1416	10	1x	<0.5	<3.13
SED-16	96.7	5	0.4	8	9/24/2004	1417	10	1x	<0.5	<6.25
SED-17	81.3	10	6	60	9/24/2004	1418	10	1x	<0.5	<0.83
SED-18	94.3	10	3.8	38	9/24/2004	1419	10	1x	<0.5	<1.32
SED-18-DUP	94.3	10	3.8	38	9/24/2004	1420	10	1x	<0.5	<1.32
SED-19	71.9	10	7.9	79	9/24/2004	1421	10	1x	<0.5	<0.63
SED-20	78.5	10	6.2	62	9/24/2004	1422	10	1x	<0.5	<0.81
SED-21	98.7	5	0.9	18	9/24/2004	1423	10	1x	<0.5	<2.78
SED-22	98.9	10	1.8	18	9/24/2004	1424	10	1x	<0.5	<2.78
SED-23	98.9	10	0.5	5	9/24/2004	1425	10	1x	<0.5	<10

(1) Percent moisture measured in the field using HH2 Moisture Meter (Delta-T Devices), as noted on the Chain of Custody.

(2) Percent solids were calculated after samples were partially dried with coffee filters (for wet weight) and after drying in the toaster oven (for dry weight).

XRF Field Screening Form

XRF Make & Model # Niton XL733Q
Serial # U2055
XRF Analyst K. Sears
Date 9/23/2004

Project Name Iron Horse Park
Project # 02136-0580

Sample ID	Date Collected	Date Analyzed	Time	Sample Dried Y	Sample Dried N	As Result (mg/kg)	Ba Result (mg/kg)	Co Result (mg/kg)	Cu Result (mg/kg)	Cr Result (mg/kg)	Pb Result (mg/kg)	Mn Result (mg/kg)	Ag Result (mg/kg)	V Result (mg/kg)	Zn Result (mg/kg)	Comments
Method Blank	--	9/23	16:10		N	< 17	< 42	< 79	< 58	< 130	< 12	< 120	< 250	< 910	< 32	
Blank	--	9/23	16:15	Y		< 18	< 47	< 84	< 56	< 150	< 16	< 130	< 240	< 940	< 38	
Low	--	9/23	16:20		N	< 34	752 +/- 160	< 550	< 110	< 490	< 28	< 900	< 240	< 1100	91.2 +/- 48	
Low	--	9/23	16:30		N	< 33	802 +/- 190	< 570	< 100	< 490	< 30	< 880	< 300	< 1200	< 69	
Low	--	9/23	16:35		N	< 35	662 +/- 160	< 570	< 110	< 490	< 31	< 900	< 250	< 1100	103 +/- 48	
Low	--	9/23	16:40		N	< 29	619 +/- 130	< 540	< 100	< 480	< 24	< 870	< 220	< 1100	99.3 +/- 48	MDL Study
Low	--	9/23	16:50		N	< 37	692 +/- 160	< 610	< 120	< 510	< 30	< 940	< 280	< 1100	91.1 +/- 52	
Low	--	9/23	16:55		N	< 32	877 +/- 200	< 580	< 110	< 480	< 27	< 910	< 280	< 1200	96.4 +/- 49	
Low	--	9/23	17:00		N	< 32	876 +/- 190	< 540	< 99	< 480	< 28	918 +/- 590	< 290	< 1100	97.5 +/- 46	
SED-23		9/23	17:10	Y		< 21	< 73	< 190	< 59	< 210	41.7 +/- 12	490 +/- 230	< 300	< 1400	92.7 +/- 27	
SED-22		9/23	17:15	Y		< 31	83.7 +/- 52	< 300	< 76	< 310	63.3 +/- 19	581 +/- 340	< 190	< 1500	53.1 +/- 34	Replicate Reading
SED-22		9/23	17:20	Y		< 20	93.7 +/- 56	< 210	< 55	< 220	56.1 +/- 13	416 +/- 240	< 190	< 1500	71.4 +/- 25	
SED-21		9/23	17:25	Y		< 37	< 110	< 220	< 66	< 220	179 +/- 25	< 360	< 270	< 1400	225 +/- 39	Duplicate Reading
SED-21		9/23	17:35	Y		< 29	< 99	< 160	< 55	< 180	192 +/- 19	333 +/- 190	< 240	< 1200	197 +/- 29	
SED-20		9/23	17:40	Y		< 32	497 +/- 92	< 270	< 72	< 270	146 +/- 20	479 +/- 300	< 180	< 1300	150 +/- 34	
Blank	--	9/23	17:50	Y		< 18	< 45	< 91	< 72	< 180	< 15	< 150	< 220	< 960	< 42	
SED-19		9/23	18:25	Y		< 31	449 +/- 120	< 310	< 92	511 +/- 200	136 +/- 20	< 490	< 250	< 1500	100 +/- 35	
SED-19		9/23	18:30	Y		< 32	450 +/- 120	< 330	< 88	< 310	135 +/- 21	< 540	< 220	< 1500	121 +/- 36	
SED-19		9/23	18:35	Y		< 30	361 +/- 110	< 330	< 90	417 +/- 180	137 +/- 20	< 510	< 250	< 1400	97 +/- 32	
SED-19		9/23	18:40	Y		< 27	418 +/- 120	< 270	< 66	351 +/- 180	144 +/- 18	< 430	< 250	< 1500	88.2 +/- 27	Precision Sample
SED-19		9/23	18:45	Y		< 28	406 +/- 100	< 340	< 65	342 +/- 160	141 +/- 16	< 490	< 220	< 1400	120 +/- 27	
SED-19		9/23	18:50	Y		< 29	427 +/- 120	< 320	< 70	374 +/- 180	140 +/- 18	< 480	< 230	< 1400	110 +/- 31	
SED-19		9/23	18:55	Y		< 31	432 +/- 120	< 330	< 75	401 +/- 190	138 +/- 20	< 500	< 250	< 1500	107 +/- 34	
SED-18		9/23	19:00	Y		57 +/- 37	209 +/- 100	< 370	121 +/- 63	< 340	332 +/- 35	< 600	< 270	< 1400	162 +/- 43	
SED-17		9/23	19:10	Y		< 87	389 +/- 100	< 550	930 +/- 110	< 480	914 +/- 60	< 900	< 220	< 1400	359 +/- 65	
Blank		9/23	20:30	Y		< 14	< 61	< 66	< 53	< 110	< 13	< 110	< 240	< 1100	< 31	
SED-16		9/23	20:35	Y		< 47	< 110	< 280	< 79	< 300	242 +/- 30	< 480	< 300	< 1400	206 +/- 42	
SED-15		9/23	20:40	Y		40.6 +/- 24	170 +/- 97	< 450	< 78	< 370	106 +/- 21	< 720	< 280	< 1800	80.7 +/- 34	
SED-14		9/23	20:48	Y		317 +/- 56	279 +/- 110	< 820	< 140	< 690	263 +/- 42	< 1300	< 270	< 1900	466 +/- 77	
SED-13		9/23	20:54	Y		< 74	399 +/- 160	< 1100	< 180	< 850	334 +/- 50	< 1600	< 330	< 2200	1090 +/- 120	

Required QC:	Required Frequency	Criteria:
Instrument blank:	Prior to sample analysis, every 2 hours, and at end of sample analysis	(Metals < detection limit)
Method blank:	Prior to sample analysis	(Metals < detection limit)
Duplicate readings:	One per 20 samples or one per day, whichever is more frequent	(RPD ≤ 35)
Replicate measurements:	One per 20 samples or one per day, whichever is more frequent	(RPD ≤ 35)
Precision samples:	One per day	(% RSD ≤ 30 for Cr and % RSD ≤ 20 for remaining metals)
MDL Study:	Once at onset of program using NIST-low standard	NA

Record result ± standard deviation for each metal

* * * F I N A L * * *

QC'd: E. Denly 10/1/04

XRF Field Screening Form

XRF Make & Model # Niton XL733Q
Serial # U2055
XRF Analyst K. Sears
Date 9/23/2004

Project Name Iron Horse Park
Project # 02136-0580

Sample ID	Date Collected	Date Analyzed	Time	Sample Dried Y	Sample Dried N	As Result (mg/kg)	Ba Result (mg/kg)	Co Result (mg/kg)	Cu Result (mg/kg)	Cr Result (mg/kg)	Pb Result (mg/kg)	Mn Result (mg/kg)	Ag Result (mg/kg)	V Result (mg/kg)	Zn Result (mg/kg)	Comments
SED-12		9/23	20:59	Y		< 54	271 +/- 110	< 760	< 130	< 660	147 +/- 33	< 1300	< 280	< 1900	409 +/- 73	
SED-11		9/23	21:09	Y		< 97	345 +/- 110	< 360	< 98	< 400	929 +/- 69	< 580	< 250	< 2100	< 61	
SED-10		9/23	21:14	Y		84.4 +/- 47	219 +/- 87	< 690	< 130	< 600	240 +/- 43	< 1100	< 240	< 1900	284 +/- 68	
SED-09		9/23	21:20	Y		147 +/- 51	< 140	< 880	174 +/- 100	< 720	269 +/- 44	< 1400	< 310	< 2200	473 +/- 81	Replicate Reading
SED-09		9/23	21:26	Y		162 +/- 48	< 150	< 810	158 +/- 92	< 640	261 +/- 41	< 1300	< 310	< 2100	466 +/- 75	
SED-08		9/23	21:31	Y		< 49	210 +/- 130	< 640	< 120	< 550	134 +/- 30	< 1000	< 360	< 1800	371 +/- 66	Duplicate Reading
SED-08		9/23	21:36	Y		< 54	233 +/- 130	< 760	< 150	< 640	137 +/- 35	< 1200	< 330	< 1900	414 +/- 79	
SED-07		9/23	21:40	Y		142 +/- 69	230 +/- 140	< 990	< 140	< 870	749 +/- 67	3120 +/- 1100	< 360	< 1900	612 +/- 84	
SED-06		9/23	21:46	Y		< 49	265 +/- 140	< 450	< 110	< 430	148 +/- 31	839 +/- 510	< 330	< 2800	196 +/- 56	
SED-05		9/23	21:49	Y		132 +/- 76	< 180	< 110	690 +/- 180	< 880	822 +/- 75	< 1600	< 360	< 1400	3870 +/- 210	
SED-04		9/23	21:55	Y		< 36	229 +/- 120	< 390	< 99	< 390	63.2 +/- 23	< 640	< 330	< 1900	65.9 +/- 42	
SED-03		9/23	22:00	Y		46.2 +/- 30	147 +/- 79	< 430	< 89	< 390	135 +/- 27	< 700	< 250	< 1800	81.7 +/- 40	
Blank	--	9/23	22:43	Y		< 27	< 49	< 97	< 94	< 180	< 25	< 210	< 220	< 1100	< 59	
SED-02		9/23	22:50	Y		145 +/- 40	281 +/- 100	< 1000	< 130	< 820	117 +/- 31	< 1600	< 250	< 2500	184 +/- 59	
SED-01		9/23	22:59	Y		334 +/- 60	403 +/- 130	< 1200	< 180	< 1200	< 47	< 2400	< 280	< 1800	< 110	
Blank	--	9/23	23:07	Y		< 21	< 50	< 92	< 87	< 170	< 27	< 200	< 230	< 1100	< 52	

Required QC:	Required Frequency	Criteria:
Instrument blank:	Prior to sample analysis, every 2 hours, and at end of sample analysis	(Metals < detection limit)
Method blank:	Prior to sample analysis	(Metals < detection limit)
Duplicate readings:	One per 20 samples or one per day, whichever is more frequent	(RPD ≤ 35)
Replicate measurements:	One per 20 samples or one per day, whichever is more frequent	(RPD ≤ 35)
Precision samples:	One per day	(% RSD ≤ 30 for Cr and % RSD ≤ 20 for remaining metals)
MDL Study:	Once at onset of program using NIST-low standard	NA

Record result ± standard deviation for each metal

* * * F I N A L * * *

QC'd: E. Denly 10/1/04

APPENDIX J

Analytical Data Tables

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05203

DATA SUMMARY TABLE
Total Organic Carbon (D-005)
Sediment (mg/Kg)

Traffic Report Sample No.		D05203			D05204			D05210			D05217		
M&E Sample ID		SED-05			SED-25			SED-11			SED-18		
Lab Sample ID		207592-001			207592-002			207592-008			207592-011		
Matrix		SE			SE			SE			SE		
Sample Type		FD			NX			NX			NX		
Date Sampled		09/15/04			09/15/04			09/16/04			09/16/04		
Date Received		09/17/04			09/17/04			09/17/04			09/17/04		
Date Extracted													
Date Analyzed		10/19/04			10/19/04			10/19/04			10/19/04		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
% Solids													
Dilution Factor		1			1			1			1		
Mass/Volume of Sample													
Comments													
Analyte	RL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL
% Solids		11.2	0.1	0.1	11.4	0.1	0.1	28.1	0.1	0.1	33.9	0.1	0.1
% Moisture		88.8	0.1	0.1	88.6	0.1	0.1	71.9	0.1	0.1	66.1	0.1	0.1
Organic Carbon, Tot. (TOC)		262000	893	214	2730000	877	210	160000	356	85.3	335000	295	70.7
Organic Carbon, Tot. (TOC2)		293000	893	214	2720000	877	210	161000	356	85.3	311000	295	70.7
TOC Average Duplicates		277000	893	214	2720000	877	210	161000	356	85.3	323000	295	70.7

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05203

DATA SUMMARY TABLE
Total Organic Carbon (D-005)
Sediment (mg/Kg)

Traffic Report Sample No.		D05199			D05221		
M&E Sample ID		SED-01			SED-22		
Lab Sample ID		207592-018			207592-019		
Matrix		SE			SE		
Sample Type		NX			NX		
Date Sampled		09/14/04			09/13/04		
Date Received		09/15/04			09/15/04		
Date Extracted							
Date Analyzed		10/19/04			10/19/04		
Units		mg/Kg			mg/Kg		
% Solids							
Dilution Factor		1			1		
Mass/Volume of Sample							
Comments							
Analyte	RL	Result	DL	MDL	Result	DL	MDL
% Solids		33.2	0.1	0.1	17.5	0.1	0.1
% Moisture		66.8	0.1	0.1	82.5	0.1	0.1
Organic Carbon, Tot. (TOC)		254000	301	72.2	816000	571	137
Organic Carbon, Tot. (TOC2)		252000	301	72.2	914000	571	137
TOC Average Duplicates		253000	301	72.2	865000	571	137

DATA SUMMARY TABLE DEFINITIONS (Inorganics)

BB - As a qualifier for soil/sediment samples: Analyte is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
g - gram
MDL - Method Detection Limit
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
R - The data are rejected as unusable
RL - Reporting Limit
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity
NA - Not Applicable

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05221-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-044.2)
Sediment (mg/Kg)

Traffic Report Sample No.		D05221	D05199	D05203	D05204	D05210	D05217
M&E Sample ID		SED-22	SED-01	SED-05	SED-25	SED-11	SED-18
Lab Sample ID		0409051-02	0409051-06	0409051-10	0409051-11	0409051-17	0409051-20
Date Sampled		09/13/04	09/14/04	09/15/04	09/15/04	09/16/04	09/16/04
Date Extracted		12/01/04	12/01/04	12/01/04	12/01/04	12/01/04	12/01/04
Date Analyzed		12/07/04	12/07/04	12/07/04	12/07/04	12/07/04	12/07/04
% Solids		85.2	91.8	95.5	66.1	98.1	95.3
Dilution Factor		10	100	100	100	20	50
Comments		Freeze-dried	Freeze-dried	Freeze-dried FD of D05204	Freeze-dried FD of D05203	Freeze-dried	Freeze-dried
Analyte	RL						
Aluminum	4.0	4700	6500	9900	16000	4200	16000
Arsenic	0.2	3.1 J	360 J	60 J	90 J	2.9 J	61 J
Barium	2.0	27 EB	370 EB	250 EB	400 EB	28 EB	110 EB
Chromium	1.0	8.0 J	14 J	520 J	870 J	10 J	34 J
Cobalt	2.0	2.3 J	7.8 J	24 J	38 J	2.0 J	18 J
Copper	1.0	8.8 J	19 J	550 J	850 J	5.0 J	210 J
Lead	0.4	30 J	35 J	620 J	1000 J	16 J	380 J
Manganese	1.0	250 JEB	1600 JEB	380 JEB	830 JEB	220 JEB	490 JEB
Silver	0.01	0.069 J	0.27 J	0.57 J	0.86 J	0.033 J	0.17 J
Vanadium	0.5	13 J	19 J	30 J	58 J	7.5 J	28 J
Zinc	2.0	42 JEB	110 JEB	2700 JEB	4400 JEB	21 JEB	150 JEB

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05221-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-044.2)
Aqueous QC (ug/L)

	Traffic Report Sample No.	D05223
	M&E Sample ID	SED-EB-01
	Lab Sample ID	0409051-21
	Date Sampled	09/15/04
	Date Extracted	01/07/05
	Date Analyzed	01/12/05
	Dilution Factor	2
	Comments	Equipment Blank
Analyte	RL	
Aluminum	4.0	31 UJ
Arsenic	0.2	0.13 UJ
Barium	2.0	0.53 J
Chromium	1.0	0.18 UJ
Cobalt	2.0	0.038 UJ
Copper	1.0	2.7 UJ
Lead	0.4	0.63 UJ
Manganese	1.0	4.4 J
Silver	0.01	0.12 U
Vanadium	0.5	1.7 U
Zinc	2.0	14 J

DATA SUMMARY TABLE
DEFINITIONS (Inorganics)

BB - As a qualifier for soil/sediment samples: Analyte is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
g - gram
MDL - Method Detection Limit
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
R - The data are rejected as unusable
RL - Reporting Limit
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity
NA - Not Applicable

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05199-OA

DATA SUMMARY TABLE
4,4'-DDD Analysis (D-043.1)
Sediment (ug/Kg)

	Traffic Report Sample No.	D05199	D05203	D05204	D05210	D05217	D05221
	M&E Sample ID	SED-01	SED-05	SED-25	SED-11	SED-18	SED-22
	Lab Sample ID	251781	251785	251786	251880	251883	251541
	Date Sampled	09/14/04	09/15/04	09/15/04	09/16/04	09/16/04	09/13/04
	Date Analyzed	11/03/04	11/03/04	11/04/04	11/04/04	11/04/04	11/03/04
	% Solids	83%	94%	73%	81%	64%	87%
	Dilution Factor	1	10	10	1	3	3
	Mass/Volume of Sample	0.03698 kg	0.03277 kg	0.04149 kg	0.03731 kg	0.04726 kg	0.03470 kg
	Comments		FD of D05204	FD of D05203			
Analyte	RL						
4,4'-DDD	0.70	2.69 J	102 J	83.0 J	-- R	17.9 J	14.5

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05199-OA

DATA SUMMARY TABLE
PCB Analysis (D-043.1)
Sediment (ug/Kg)

	Traffic Report Sample No.	D05199	D05203	D05204	D05210	D05217	D05221
	M&E Sample ID	SED-01	SED-05	SED-25	SED-11	SED-18	SED-22
	Lab Sample ID	251781	251785	251786	251880	251883	251541
	Date Sampled	09/14/04	09/15/04	09/15/04	09/16/04	09/16/04	09/13/04
	Date Analyzed	11/04/04	11/03/04	11/03/04	11/04/04	11/04/04	11/03/04
	% Solids	83%	94%	73%	81%	64%	87%
	Dilution Factor	1	10	10	1	1	1
	Mass/Volume of Sample	0.03698 kg	0.03277 kg	0.04149 kg	0.03731 kg	0.04726 kg	0.03470 kg
	Comments		FD of D05204	FD of D05203			
Analyte	RL						
Aroclor-1016	7.0	6.5 U	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1221	14	13 U	130 U	132 U	13.2 U	13.2 U	13.3 U
Aroclor-1232	7.0	6.5 U	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1242	7.0	6.5 U	65.1 U	65.9 U	22.8	6.62 U	6.65 U
Aroclor-1248	7.0	14.8	65.1 U	65.9 U	6.6 U	6.62 U	6.65 U
Aroclor-1254	7.0	6.5 U	2870 J	2520 J	6.6 U	36.3	6.65 U
Aroclor-1260	7.0	11.5 J	1910 J	1970 J	6.6 U	20.1 J	13.7 J

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05199-OA

DATA SUMMARY TABLE
4,4'-DDD Analysis (D-043.1)
Aqueous QC Sample (ug/L)

	Traffic Report Sample No.	D05223
	M&E Sample ID	SED-EB-01
	Lab Sample ID	251884
	Date Sampled	09/15/04
	Date Analyzed	11/02/04
	Dilution Factor	1
	Mass/Volume of Sample	0.99 L
	Comments	Equipment Blank
Analyte	RL	
4,4'-DDD	0.0200	0.0202 U

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05199-OA

DATA SUMMARY TABLE
PCB Analysis (D-043.1)
Aqueous QC Sample (ug/L)

	Traffic Report Sample No.	D05223
	M&E Sample ID	SED-EB-01
	Lab Sample ID	251884
	Date Sampled	09/15/04
	Date Analyzed	11/02/04
	Dilution Factor	1
	Mass/Volume of Sample	0.99 L
	Comments	Equipment Blank
Analyte	RL	
Aroclor-1016	0.200	0.202 U
Aroclor-1221	0.400	0.404 U
Aroclor-1232	0.200	0.202 U
Aroclor-1242	0.200	0.202 U
Aroclor-1248	0.200	0.202 U
Aroclor-1254	0.200	0.202 U
Aroclor-1260	0.200	0.202 U

DATA SUMMARY TABLE
DEFINITIONS (Organics)

BB - As a qualifier for soil/sediment samples: Compound is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Compound is also detected in the equipment blank
FD - Field Duplicate
g - gram
J - The concentration is an estimated quantity
kg - kilogram
L - Liter
mg/Kg - milligrams per kilogram
mg/L - milligrams per liter
mL - milliliter
R - The data are rejected and unusable
RL - Reporting Limit
U - Compound was analyzed for but not detected
ug/kg - micrograms per kilogram
UJ - The sample quantitation limit is an estimated quantity
ug/L - micrograms per liter

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05221-OA

DATA SUMMARY TABLE
Semivolatile Organic Analysis (D-054.1)
Sediment (ug/Kg)

Traffic Report Sample No.		D05221	D05199	D05203	D05204	D05210	D05217
M&E Sample ID		SED-22	SED-01	SED-05	SED-25	SED-11	SED-18
Lab Sample ID		0409051-02	0409051-06	0409051-10	0409051-11	0409051-17	0409051-20
Date Sampled		09/13/04	09/14/04	09/15/04	09/15/04	09/16/04	09/16/04
Date Extracted		11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Date Analyzed		12/29/04	12/29/04	12/29/04	12/29/04	12/29/04	12/29/04
% Solids		85.2	91.8	95.5	66.1	98.1	95.3
Dilution Factor		1	1	20	5	1	2
Mass/Volume of Sample		10.42 g	10.39 g	10.45 g	10.48 g	10.45 g	10.29 g
Comments		Freeze Dried	Freeze Dried	Freeze Dried	Freeze Dried	Freeze Dried	Freeze Dried
Analyte	RL						
Naphthalene	1.0	18 EBJ	59 EBJ	2800 EBJ	1700 EBJ	52 EBJ	360 EBJ
2-Methylnaphthalene	1.0	10 J	21 J	3300 J	1800 J	20 J	410 J
1-Methylnaphthalene	1.0	9.6 EBJ	28 EBJ	2700 EBJ	1500 EBJ	67 EBJ	390 EBJ
Biphenyl	1.0	2.4 UJ	5.3 J	150 J	91 J	7.4 J	79 J
2,6-Dimethylnaphthalene	1.0	6.4 J	37 J	1300 J	730 J	24 J	360 J
Acenaphthylene	1.0	11 J	31 J	3800 J	2300 J	5.4 J	98 J
Acenaphthene	1.0	7.1 J	17 J	5300 J	3400 J	7.3 J	83 J
Dibenzofuran	1.0	7.2 J	17 J	3700 J	2200 J	6.7 J	240 J
Fluorene	1.0	12 J	21 J	6200 J	4000 J	11 J	260 J
2,3,5-Trimethylnaphthalene	1.0	2.1 J	3.9 J	310 J	190 J	3.8 J	220 J
Phenanthrene	1.0	84 EBJ	93 EBJ	13000 EBJ	7200 EBJ	29 EBJ	1100 EBJ
Anthracene	1.0	19 J	42 J	6700 J	4400 J	8.2 J	360 J
1-Methylphenanthrene	1.0	12 EBJ	12 EBJ	1100 EBJ	720 EBJ	1.8 EBJ	370 EBJ
Fluoranthene	1.0	150 EBJ	230 EBJ	24000 EBJ	11000 EBJ	70 EBJ	2000 EBJ
Pyrene	1.0	84 EBJ	160 EBJ	16000 EBJ	7300 EBJ	48 EBJ	1200 EBJ
Benzo[a]anthracene	1.0	43 J	91 J	14000 J	7700 J	24 J	640 J
Chrysene	1.0	69 J	140 J	14000 J	8100 J	36 J	770 J
Benzo[b]fluoranthene	1.0	59 EBJ	160 EBJ	11000 EBJ	6200 EBJ	36 EBJ	810 EBJ
Benzo[k]fluoranthene	1.0	120 J	300 J	10000 J	5300 J	32 J	700 J
Benzo[e]pyrene	1.0	43 J	120 J	7200 J	3800 J	24 J	430 J
Benzo[a]pyrene	1.0	49 J	130 J	11000 J	5300 J	27 J	560 J
Perylene	1.0	41 J	52 J	2700 J	1300 J	56 J	430 J
Indeno[1,2,3-cd]pyrene	1.0	32 J	80 J	6200 J	2700 J	13 J	240 J
Dibenz[a,h]anthracene	1.0	9.0 J	25 J	2200 J	1000 J	3.8 J	76 J
Benzo[g,h,i]perylene	1.0	33 J	79 J	5200 J	2300 J	14 J	230 J

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05221-OA

DATA SUMMARY TABLE
Semivolatile Organic Analysis (D-054.1)
Aqueous QC (ug/L)

	Traffic Report Sample No.	D05223
	M&E Sample ID	SED-EB-01
	Lab Sample ID	0409051-21
	Date Sampled	09/15/04
	Date Extracted	12/17/04
	Date Analyzed	12/29/04
	Dilution Factor	1
	Mass/Volume of Sample	950 ml
	Comments	Equipment Blank
Analyte	RL	
Naphthalene	5.0	27 J
2-Methylnaphthalene	5.0	6.6 UJ
1-Methylnaphthalene	5.0	7.4 J
Biphenyl	5.0	-- R
2,6-Dimethylnaphthalene	5.0	-- R
Acenaphthylene	5.0	-- R
Acenaphthene	5.0	-- R
Dibenzofuran	5.0	-- R
Fluorene	5.0	-- R
2,3,5-Trimethylnaphthalene	5.0	-- R
Phenanthrene	5.0	6.7 J
Anthracene	5.0	-- R
1-Methylphenanthrene	5.0	15 J
Fluoranthene	5.0	4.7 J
Pyrene	5.0	2.6 J
Benzo[a]anthracene	5.0	-- R
Chrysene	5.0	-- R
Benzo[b]fluoranthene	5.0	3.4 J
Benzo[k]fluoranthene	5.0	-- R
Benzo[e]pyrene	5.0	-- R
Benzo[a]pyrene	5.0	-- R
Perylene	5.0	-- R
Indeno[1,2,3-cd]pyrene	5.0	-- R
Dibenz[a,h]anthracene	5.0	-- R
Benzo[g,h,i]perylene	5.0	-- R

DATA SUMMARY TABLE DEFINITIONS (Organics)

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FD - Field Duplicate
g - gram
J - The concentration is an estimated quantity
kg - kilogram
L - Liter
mg/Kg - milligrams per kilogram
mg/L - milligrams per liter
ml - milliliter
R - The data are rejected and unusable
RL - Reporting Limit
U - Compound was analyzed for but not detected
ug/kg - micrograms per kilogram
UJ - The sample quantitation limit is an estimated quantity
ug/L - micrograms per liter

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Total Metals (D-004.1)
Surface Water (ug/L)

Traffic Report Sample No.		D05235-T	D05236-T	D05237-T	D05238-T	D05239-T	D05240-T	D05241-T	D05242-T	D05243-T
M&E Sample ID		SW-RP-01	SW-RP-02	SW-RP-03	SW-MC-01	SW-MC-21	SW-MC-02	SW-MC-03	SW-CB-01	SW-CB-02
Lab Sample ID		252746	252747	252748	252749	252750	252751	252752	252753	252754
Date Sampled		09/22/04	09/22/04	09/22/04	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04
Date Received		09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04
Comments					FD of D05239	FD of D05238				
Analyte	RL									
Aluminum	15.0	15.0	17.5 J	16.0 J	31.1	40.8	39.9	40.0	73.2	152
Arsenic	0.10	3.4 J	3.4 J	3.3 J	1.4 J	1.4 J	1.5 J	1.5 J	2.5 J	3.1 J
Barium	1.0	24.9	24.7	24.7	25.9	26.2	26.3	26.5	38.9	41.2
Calcium	25.0	13300	13200	13100	11800	11900	11900	11900	13100	13300
Chromium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	0.10	0.25	0.27	0.25	0.66	0.69	0.75	0.80	1.0	1.7
Magnesium	25.0	3190	3160	3150	2040	2060	2060	2060	2500	2530
Manganese	0.50	219	218	216	140	146	154	164	282	330
Silver	0.25	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.7 J

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Total Metals (D-004.1)
Surface Water (ug/L)

Traffic Report Sample No.		D05244-T	D05245-T	D05246-T	D05247-T	D05248-T	D05249-T	D05250-T
M&E Sample ID		SW-CB-03	SW-BM-01	SW-BM-02	SW-BM-03	SW-RF-01	SW-RF-02	SW-RF-03
Lab Sample ID		252755	252484	252485	252486	252756	252757	252758
Date Sampled		09/23/04	09/21/04	09/21/04	09/21/04	09/24/04	09/24/04	09/24/04
Date Received		09/25/04	09/22/04	09/22/04	09/22/04	09/25/04	09/25/04	09/25/04
Comments								
Analyte	RL							
Aluminum	15.0	71.2	52.2	52.0	51.1	42.5	37.0	36.2
Arsenic	0.10	2.4 J	2.6 J	2.5 J	2.6 J	1.1 J	1.1 J	1.1 J
Barium	1.0	38.7	24.3	24.2	23.9	18.8	18.2	18.1
Calcium	25.0	13100	10300	10200	10200	8970	8960	8960
Chromium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	1.0	1.0 U	1.1 J	1.1 J	1.4 J	1.0 U	1.0 U	1.0 U
Lead	0.10	0.96	1.6	1.6	1.6	0.58	0.44	0.41
Magnesium	25.0	2500	1760	1750	1730	1670	1680	1680
Manganese	0.50	280	136	137	123	253	230	200
Silver	0.25	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Total Metals (D-004.1)
Surface Water (ug/L)

	Traffic Report Sample No.	D05251-T
	M&E Sample ID	SW-EB-01
	Lab Sample ID	252759
	Date Sampled	09/23/04
	Date Received	09/25/04
	Comments	Equipment Blank
Analyte	RL	
Aluminum	15.0	15.0 U
Arsenic	0.10	0.10 UJ
Barium	1.0	1.0 U
Calcium	25.0	25.0 U
Chromium	2.5	2.5 U
Cobalt	1.0	1.0 U
Copper	1.0	1.0 U
Lead	0.10	0.10 U
Magnesium	25.0	25.0 U
Manganese	0.50	0.50 U
Silver	0.25	0.25 U
Vanadium	2.5	2.5 U
Zinc	5.0	5.0 U

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Dissolved Metals (D-004.1)
Surface Water (ug/L)

Traffic Report Sample No.		D05235-D	D05236-D	D05237-D	D05238-D	D05239-D	D05240-D	D05241-D	D05242-D	D05243-D
M&E Sample ID		SW-RP-01	SW-RP-02	SW-RP-03	SW-MC-01	SW-MC-21	SW-MC-02	SW-MC-03	SW-CB-01	SW-CB-02
Lab Sample ID		252824	252825	252826	252827	252828	252829	252830	252831	252832
Date Sampled		09/22/04	09/22/04	09/22/04	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04
Date Received		09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04	09/25/04
Comments					FD of D05239	FD of D05238				
Analyte	RL									
Aluminum	15.0	15.0 U	15.0 U	15.0 U	23.2 J	21.4 J	21.5 J	20.8 J	49.6	50.2
Arsenic	0.10	2.8 J	2.8 J	2.7 J	1.3 J	1.2 J	1.3 J	1.3 J	1.7 J	1.7 J
Barium	1.0	25.5	25.1	25.2	26.6	26.6	26.7	26.4	39.1	39.1
Calcium	25.0	13400	13300	13300	12000	12000	12000	12000	13200	13200
Chromium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	0.10	0.19 J	0.16 J	0.13 J	0.41	0.31	0.39	0.34	0.34	0.37
Magnesium	25.0	3190	3170	3150	2040	2060	2050	2040	2500	2490
Manganese	0.50	216	214	214	135	133	132	131	263	263
Silver	0.25	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	5.0	5.0 U	5.0 U	5.0 U	9.5 J	5.0 U	5.0 U	5.0 U	5.5 J	6.0 J

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Dissolved Metals (D-004.1)
Surface Water (ug/L)

Traffic Report Sample No.		D05244-D	D05245-D	D05246-D	D05247-D	D05248-D	D05249-D	D05250-D
M&E Sample ID		SW-CB-03	SW-BM-01	SW-BM-02	SW-BM-03	SW-RF-01	SW-RF-02	SW-RF-03
Lab Sample ID		252833	252200	252201	252202	252834	252835	252836
Date Sampled		09/23/04	09/21/04	09/21/04	09/21/04	09/24/04	09/24/04	09/24/04
Date Received		09/25/04	09/22/04	09/22/04	09/22/04	09/25/04	09/25/04	09/25/04
Comments								
Analyte	RL							
Aluminum	15.0	54.2	26.4 J	27.0 J	28.1 J	34.3	36.9	38.4
Arsenic	0.10	1.8 J	2.3 J	2.2 J	2.1 J	1.0 J	1.0 J	1.1 J
Barium	1.0	39.4	24.1	24.7	24.4	18.1	18.3	18.3
Calcium	25.0	13200	10300	10400	10300	8940	8970	8950
Chromium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	1.0	1.1 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Lead	0.10	0.45	0.83	0.70	0.61	0.41	0.31	0.32
Magnesium	25.0	2500	1740	1760	1740	1660	1670	1670
Manganese	0.50	274	128	127	112	177	175	173
Silver	0.25	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Vanadium	2.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	5.0	12.6	6.2 J	5.0 U	5.0 U	8.2 J	5.0 U	5.0 U

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05245

DATA SUMMARY TABLE
Dissolved Metals (D-004.1)
Surface Water (ug/L)

	Traffic Report Sample No.	D05251-D
	M&E Sample ID	SW-EB-01
	Lab Sample ID	252837
	Date Sampled	09/23/04
	Date Received	09/25/04
	Comments	Equipment Blank
Analyte	RL	
Aluminum	15.0	15.0 U
Arsenic	0.10	0.10 UJ
Barium	1.0	1.0 U
Calcium	25.0	25.0 U
Chromium	2.5	2.5 U
Cobalt	1.0	1.0 U
Copper	1.0	1.0 U
Lead	0.10	0.10 U
Magnesium	25.0	25.0 U
Manganese	0.50	0.50 J
Silver	0.25	0.25 U
Vanadium	2.5	2.5 U
Zinc	5.0	5.0 U

DATA SUMMARY TABLE DEFINITIONS (Inorganics)

BB - As a qualifier for soil/sediment samples: Analyte is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
g - gram
MDL - Method Detection Limit
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
R - The data are rejected as unusable
RL - Reporting Limit
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity
NA - Not Applicable

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05235-IA

DATA SUMMARY TABLE
INORGANIC ANALYSIS (D-033)
Surface Water (mg/L)

Traffic Report Sample No.		D05235			D05236			D05237			D05242		
M&E Sample ID		SW-RP-01			SW-RP-02			SW-RP-03			SW-CB-01		
Lab Sample ID		207645-001			207645-002			207645-003			207645-004		
Matrix		SW			SW			SW			SW		
Sample Type		NX			NX			NX			NX		
Date Sampled		09/22/04			09/22/04			09/22/04			09/23/04		
Date Received		09/24/04			09/24/04			09/24/04			09/24/04		
Date Extracted													
Date Analyzed		09/30/04			09/30/04			09/30/04			09/30/04		
Units		mg/L			mg/L			mg/L			mg/L		
% Solids													
Dilution Factor		1			1			1			1		
Mass/Volume of Sample													
Comments													
Analyte	RL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL
Alkalinity, Total as CaCO3		32.6	2	0.204	33.4	2	0.204	38.6	2	0.204	35.5	2	0.204

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05235-IA

DATA SUMMARY TABLE
INORGANIC ANALYSIS (D-033)
Surface Water (mg/L)

Traffic Report Sample No.		D05243			D05244			D05238			D05239		
M&E Sample ID		SW-CB-02			SW-CB-03			SW-MC-01			SW-MC-21		
Lab Sample ID		207645-005			207645-006			207645-007			207645-008		
Matrix		SW			SW			SW			SW		
Sample Type		NX			NX			FD			NX		
Date Sampled		09/23/04			09/23/04			09/23/04			09/23/04		
Date Received		09/24/04			09/24/04			09/24/04			09/24/04		
Date Extracted													
Date Analyzed		09/30/04			09/30/04			09/30/04			09/30/04		
Units		mg/L			mg/L			mg/L			mg/L		
% Solids													
Dilution Factor		1			1			1			1		
Mass/Volume of Sample													
Comments													
Analyte	RL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL
Alkalinity, Total as CaCO3		36.7	2	0.204	36.2	2	0.204	30.4	2	0.204	30.9	2	0.204

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05235-IA

DATA SUMMARY TABLE
INORGANIC ANALYSIS (D-033)
Surface Water (mg/L)

Traffic Report Sample No.		D05240			D05241			D05245			D05246		
M&E Sample ID		SW-MC-02			SW-MC-03			SW-BM-01			SW-BM-02		
Lab Sample ID		207645-009			207645-010			207645-011			207645-012		
Matrix		SW			SW			SW			SW		
Sample Type		NX			NX			NX			NX		
Date Sampled		09/23/04			09/23/04			09/21/04			09/21/04		
Date Received		09/24/04			09/24/04			09/24/04			09/24/04		
Date Extracted													
Date Analyzed		09/30/04			09/30/04			09/30/04			09/30/04		
Units		mg/L			mg/L			mg/L			mg/L		
% Solids													
Dilution Factor		1			1			1			1		
Mass/Volume of Sample													
Comments													
Analyte	RL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL
Alkalinity, Total as CaCO3		33.4	2	0.204	31.5	2	0.204	27.2	2	0.204	23.7	2	0.204

SITE: Iron Horse Park
CASE NO.: 0243M
SDG NO.: D05235-IA

DATA SUMMARY TABLE
INORGANIC ANALYSIS (D-033)
Surface Water (mg/L)

Traffic Report Sample No.		D05247			D05248			D05249			D05250		
M&E Sample ID		SW-BM-03			SW-RF-01			SW-RF-02			SW-RF-03		
Lab Sample ID		207645-013			207645-014			207645-015			207645-016		
Matrix		SW			SW			SW			SW		
Sample Type		NX			NX			NX			NX		
Date Sampled		09/21/04			09/24/04			09/24/04			09/24/04		
Date Received		09/24/04			09/25/04			09/25/04			09/25/04		
Date Extracted													
Date Analyzed		09/30/04			09/30/04			09/30/04			09/30/04		
Units		mg/L			mg/L			mg/L			mg/L		
% Solids													
Dilution Factor		1			1			1			1		
Mass/Volume of Sample													
Comments													
Analyte	RL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL	Result	DL	MDL
Alkalinity, Total as CaCO3		27.7	2	0.204	20.7	2	0.204	21.8	2	0.204	13.9	2	0.204

DATA SUMMARY TABLE DEFINITIONS (Inorganics)

BB - As a qualifier for soil/sediment samples: Analyte is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
g - gram
MDL - Method Detection Limit
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
R - The data are rejected as unusable
RL - Reporting Limit
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity
NA - Not Applicable

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-134)
Fish (mg/Kg, wet weight)

Traffic Report Sample No.		D05301	D05302	D05303	D05304	D05305
M&E Sample ID		BM-BH-1	BM-BH-2	BM-BH-3	BM-BH-4	CB-RP-1
Lab Sample ID		0410017-01	0410017-02	0410017-03	0410017-04	0410017-05
Date Sampled		09/21/04	09/21/04	09/21/04	09/21/04	09/23/04
Date Extracted		12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Date Analyzed		12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Mass/Volume of Sample		0.97 g	1.1 g	0.98 g	0.97 g	1.02 g
Comments						
Analyte	RL					
Aluminum	1.0	20 J	13	7.4	15	11
Arsenic	0.01	0.16 J	0.074 J	0.10 J	0.13 J	0.29 J
Barium	0.05	2.1 J	1.5 J	2.2 J	2.2 J	2.8 J
Chromium	0.01	0.85 J	1.7 J	1.0 J	0.83 J	1.2 J
Cobalt	0.01	0.046 J	0.062 J	0.093 J	0.053 J	0.057 J
Copper	0.01	3.4 J	4.8 J	4.2 J	2.9 J	3.4 J
Lead	0.01	0.27 J	0.26 J	0.30 J	0.32 J	0.31 J
Manganese	0.05	6.0 J	6.2 J	13 J	6.8 J	11 J
Silver	0.01	0.0032 U	0.0037 J	0.0032 U	0.0032 U	0.0030 U
Vanadium	0.01	0.050 J	0.041 J	0.053 J	0.044 J	0.053 J
Zinc	0.1	14 J	16 J	24 J	14 J	34 J

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-134)
Fish (mg/Kg, wet weight)

Traffic Report Sample No.		D05306	D05307	D05308	D05309	D05310
M&E Sample ID		CB-BH-1	CB-BH-2	CB-BH-3	CB-BH-4	CB-AE-1
Lab Sample ID		0410017-06	0410017-07	0410017-08	0410017-09	0410017-10
Date Sampled		09/30/04	09/30/04	09/30/04	09/30/04	09/23/04
Date Extracted		12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Date Analyzed		12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Mass/Volume of Sample		0.99 g	1.05 g	1 g	1.04 g	0.96 g
Comments						
Analyte	RL					
Aluminum	1.0	1.4 J	12	11	11	12
Arsenic	0.01	0.047 J	0.078 J	0.059 J	0.062 J	0.10 J
Barium	0.05	0.69 J	0.50 J	0.27 J	1.7 J	1.8 J
Chromium	0.01	2.8 J	0.69 J	0.61 J	0.79 J	0.68 J
Cobalt	0.01	0.10 J	0.028 J	0.027 J	0.039 J	0.055 J
Copper	0.01	0.49 J	2.8 J	1.2 J	13 J	6.2 J
Lead	0.01	0.12 J	0.38 J	0.15 J	2.3 J	0.93 J
Manganese	0.05	6.0 J	3.6 J	1.9 J	7.8 J	7.9 J
Silver	0.01	0.0031 U	0.0030 U	0.0031 U	0.021 J	0.010 J
Vanadium	0.01	0.054 J	0.032 J	0.070 J	0.041 J	0.029 J
Zinc	0.1	17 J	16 J	14 J	17 J	21 J

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-134)
Fish (mg/Kg, wet weight)

Traffic Report Sample No.		D05311	D05312	D05313	D05314	D05315
M&E Sample ID		CB-GS-1	RP-BH-1	RP-BH-2	RP-GS-1	RP-GS-2
Lab Sample ID		0410017-11	0410017-12	0410017-13	0410017-14	0410017-15
Date Sampled		09/30/04	09/22/04	09/22/04	09/22/04	09/22/04
Date Extracted		12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Date Analyzed		12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Mass/Volume of Sample		0.98 g	0.99 g	0.97 g	0.96 g	1 g
Comments						
Analyte	RL					
Aluminum	1.0	0.82 UJ	2.1 U	2.1 U	2.7	2.0 U
Arsenic	0.01	0.059 J	0.090 J	0.087 J	0.12 J	0.13 J
Barium	0.05	1.4 J	1.2 J	1.2 J	2.8 J	2.7 J
Chromium	0.01	0.29 J	0.47 J	0.31 J	0.37 J	0.26 J
Cobalt	0.01	0.057 J	0.016 J	0.019 J	0.022 J	0.021 J
Copper	0.01	0.46 J	0.61 J	0.73 J	0.49 J	0.46 J
Lead	0.01	0.028 J	0.043 J	0.049 J	0.038 J	0.047 J
Manganese	0.05	5.1 J	6.0 J	3.8 J	13 J	8.4 J
Silver	0.01	0.0032 U	0.0031 U	0.0032 U	0.0032 U	0.0031 U
Vanadium	0.01	0.026 J	0.031 J	0.019 J	0.012 J	-- R
Zinc	0.1	28 J	12 J	16 J	30 J	36 J

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-134)
Fish (mg/Kg, wet weight)

Traffic Report Sample No.		D05316	D05317	D05318	D05319	D05320
M&E Sample ID		MC-BH-1	MC-BH-2	MC-BH-3	MC-AE-1	MC-LD-1
Lab Sample ID		0410017-16	0410017-17	0410017-18	0410017-19	0410017-20
Date Sampled		09/23/04	09/23/04	09/23/04	09/23/04	09/23/04
Date Extracted		12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Date Analyzed		12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Mass/Volume of Sample		1.07 g	1.02 g	1.08 g	1.08 g	0.95 g
Comments						
Analyte	RL					
Aluminum	1.0	3.2	10	23	6.8	10
Arsenic	0.01	0.015 J	0.13 J	0.075 J	0.041 J	0.21 J
Barium	0.05	0.98 J	1.2 J	0.99 J	0.56 J	3.8 J
Chromium	0.01	0.36 J	0.29 J	0.50 J	0.63 J	0.21 J
Cobalt	0.01	0.032 J	0.036 J	0.048 J	0.022 J	0.056 J
Copper	0.01	0.49 J	0.81 J	4.7 J	11 J	0.88 J
Lead	0.01	0.039 J	0.28 J	0.41 J	0.54 J	0.083 J
Manganese	0.05	21 J	3.5 J	3.4 J	4.1 J	14 J
Silver	0.01	0.0029 U	0.0030 U	0.0029 U	0.0031 J	0.0033 U
Vanadium	0.01	0.041 J	0.040 J	0.067 J	0.021 J	0.039 J
Zinc	0.1	13 J	9.6 J	12 J	22 J	36 J

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-IA

DATA SUMMARY TABLE
Inorganic Analysis (D-134)
Fish (mg/Kg, wet weight)

Traffic Report Sample No.		D05321	D05322	D05323	D05324	D05325
M&E Sample ID		RF-BH-1	RF-BH-2	RF-BH-3	RF-CP-1	RF-AE-1
Lab Sample ID		0410017-21	0410017-22	0410017-23	0410017-24	0410017-25
Date Sampled		10/01/04	10/01/04	10/01/04	09/24/04	09/24/04
Date Extracted		12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Date Analyzed		12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Mass/Volume of Sample		0.98 g	1.03 g	0.99 g	1.04 g	0.97 g
Comments						
Analyte	RL					
Aluminum	1.0	0.68 UJ	9.3	3.6	1.6 U	5.0
Arsenic	0.01	0.012 J	0.031 J	0.018 J	0.013 J	0.029 J
Barium	0.05	0.64 J	0.52 J	0.21 J	0.22 J	0.55 J
Chromium	0.01	0.55 J	0.47 J	0.40 J	0.18 J	0.27 J
Cobalt	0.01	0.023 J	0.026 J	0.015 J	0.0068 J	0.011 J
Copper	0.01	0.48 J	0.43 J	0.48 J	1.3 J	1.0 J
Lead	0.01	0.052 J	0.14 J	0.062 J	0.054 J	0.083 J
Manganese	0.05	4.5 J	1.8 J	0.55 J	6.6 J	8.5 J
Silver	0.01	0.0032 U	0.0030 U	0.0031 U	0.0030 U	0.0032 U
Vanadium	0.01	0.033 J	0.063 J	0.025 J	-- R	0.018 J
Zinc	0.1	13 J	8.2 J	6.9 J	34 J	24 J

DATA SUMMARY TABLE
DEFINITIONS (Inorganics)

BB - As a qualifier for soil/sediment samples: Analyte is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Analyte is also detected in the equipment blank
FD - Field Duplicate
g - gram
MDL - Method Detection Limit
J - The concentration is an estimated quantity
mg/Kg - milligrams per Kilogram
mg/L - milligrams per Liter
R - The data are rejected as unusable
RL - Reporting Limit
U - Analyte was analyzed for but not detected
ug/Kg - micrograms per Kilogram
ug/L - micrograms per Liter
UJ - The sample quantitation limit is an estimated quantity
NA - Not Applicable

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Polynuclear Aromatic Hydrocarbons (D-052.1)
Tissue (ug/Kg)

Traffic Report Sample No.		D05301	D05302	D05303	D05304	D05305	D05306	D05307	D05308	D05309
M&E Sample ID		BM-BH-1	BM-BH-2	BM-BH-3	BM-BH-4	CB-RP-1	CB-BH-1	CB-BH-2	CB-BH-3	CB-BH-4
Lab Sample ID		0410017-01	0410017-02	0410017-03	0410017-04	0410017-05	0410017-06	0410017-07	0410017-08	0410017-09
Date Sampled		09/21/04	09/21/04	09/21/04	09/21/04	09/23/04	09/30/04	09/30/04	09/30/04	09/30/04
Date Extracted		10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04
Date Analyzed		11/27/04	11/27/04	11/23/04	11/23/04	11/23/04	11/27/04	11/27/04	11/27/04	11/27/04
Dilution Factor		1.11	1.11	1.11	1.12	1.11	1.11	1.11	1.11	1.10
Comments										
Analyte	RL									
Naphthalene	2.0	7.4 UJ	2.9 UJ	2.5 UJ	4.4 UJ	2.8 UJ	2.4 UJ	3.0 UJ	2.1 UJ	2.1 UJ
2-Methylnaphthalene	2.0	8.9 UJ	2.1 U	2.7 UJ	7.4 UJ	2.2 UJ	2.1 U	2.1 U	2.1 U	2.1 U
1-Methylnaphthalene	2.0	6.2 J	2.1 U	2.1 U	4.3 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Biphenyl	2.0	2.4 J	2.1 U	1.3 J	2.9 J	2.4 J	2.1 U	2.4 J	2.1 U	2.1 U
2,6-Dimethylnaphthalene	2.0	6.7 J	1.7 J	3.0 J	7.0 J	1.4 J	2.1 U	2.1 U	2.1 U	2.1 U
Acenaphthylene	2.0	2.0 U	2.1 U	3.2 UJ	2.1 U	2.1 UJ	2.1 U	2.1 U	2.1 U	2.1 U
Acenaphthene	2.0	30 J	9.4 J	7.2 J	11 J	3.6 UJ	7.2 J	2.9 UJ	2.1 UJ	2.1 U
Dibenzofuran	2.0	9.5	4.4	2.1 U	3.2	1.9 J	1.6 J	2.7 J	1.4 J	2.2 J
Fluorene	2.0	24 J	7.7 J	6.2 UJ	9.6 J	3.0 UJ	3.9 UJ	2.6 UJ	2.1 UJ	2.1 UJ
2,3,5-Trimethylnaphthalene	2.0	4.1 J	2.1 U	2.1 U	2.6 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Phenanthrene	2.0	29 J	9.2 UJ	8.5 UJ	15 J	3.1 UJ	5.2 UJ	3.5 UJ	3.5 UJ	2.7 UJ
Anthracene	2.0	7.1 J	2.1 J	1.6 J	3.6 J	1.6 J	2.1 J	1.6 J	2.1 U	2.1 U
1-Methylphenanthrene	2.0	1.2 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Fluoranthene	2.0	12 J	5.0 UJ	5.2 UJ	8.5 UJ	2.4 UJ	2.1 U	2.6 UJ	2.1 UJ	2.1 UJ
Pyrene	2.0	5.4 J	2.3 J	1.6 J	3.0 J	1.8 J	2.1 UJ	1.8 J	2.1 UJ	2.1 UJ
Benz[a]anthracene	2.0	2.1 UJ	2.1 UJ	2.1 U	2.1 U	3.2 UJ	2.1 UJ	2.8 UJ	2.1 UJ	2.1 U
Chrysene	2.0	2.3 UJ	2.1 UJ	2.1 U	2.1 U	2.6 UJ	2.1 UJ	2.3 UJ	2.1 UJ	2.1 U
Benzo[b]fluoranthene	2.0	2.2 UJ	2.1 UJ	2.1 U	2.1 UJ	3.6 UJ	2.1 UJ	2.5 UJ	2.1 U	2.1 U
Benzo[k]fluoranthene	2.0	2.0 UJ	2.1 UJ	2.1 U	2.1 UJ	3.4 UJ	2.1 UJ	2.2 UJ	2.1 UJ	2.1 U
Benzo[e]pyrene	2.0	2.0 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Benzo[a]pyrene	2.0	2.0 UJ	2.1 U	2.1 U	2.1 U	3.6 UJ	2.1 UJ	2.2 UJ	2.1 U	2.1 U
Perylene	2.0	2.0 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Indeno[1,2,3-cd]pyrene	2.0	2.0 UJ	2.1 UJ	2.1 U	2.1 U	4.1 UJ	2.1 UJ	2.6 UJ	2.1 U	2.1 U
Dibenz[a,h]anthracene	2.0	2.0 UJ	2.1 UJ	2.1 U	2.1 U	3.8 UJ	2.1 UJ	2.8 UJ	2.1 UJ	2.1 UJ
Benzo[g,h,i]perylene	2.0	2.0 UJ	2.1 UJ	2.1 U	2.1 U	4.7 UJ	2.1 UJ	3.0 UJ	2.1 U	2.1 U

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Polynuclear Aromatic Hydrocarbons (D-052.1)
Tissue (ug/Kg)

Traffic Report Sample No.		D05310	D05311	D05312	D05313	D05314	D05315	D05316	D05317	D05318
M&E Sample ID		CB-AE-1	CB-GS-1	RP-BH-1	RP-BH-2	RP-GS-1	RP-GS-2	MC-BH-1	MC-BH-2	MC-BH-3
Lab Sample ID		0410017-10	0410017-11	0410017-12	0410017-13	0410017-14	0410017-15	0410017-16	0410017-17	0410017-18
Date Sampled		09/23/04	09/30/04	09/22/04	09/22/04	09/22/04	09/22/04	09/23/04	09/23/04	09/23/04
Date Extracted		10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04	10/19/04
Date Analyzed		11/27/04	11/27/04	11/27/04	11/27/04	11/27/04	11/28/04	11/28/04	11/28/04	11/28/04
Dilution Factor		1.12	1.10	1.11	1.12	1.11	1.13	1.12	1.12	1.12
Comments										
Analyte	RL									
Naphthalene	2.0	2.8 UJ	2.6 UJ	3.7 UJ	5.2 UJ	3.0 UJ	6.4 UJ	2.5 UJ	4.0 UJ	3.2 UJ
2-Methylnaphthalene	2.0	2.7 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
1-Methylnaphthalene	2.0	2.6 J	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Biphenyl	2.0	1.2 J	2.1 U	2.1 U	2.8 J	2.1 U	2.2 U	2.2 U	1.3 J	1.1 J
2,6-Dimethylnaphthalene	2.0	2.1 J	1.2 J	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.2 J	2.1 J
Acenaphthylene	2.0	2.1 U	2.1 U	2.1 UJ	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 UJ
Acenaphthene	2.0	4.8 UJ	2.4 UJ	3.0 UJ	5.5 UJ	3.7 UJ	4.5 UJ	3.5 UJ	2.1 U	5.8 UJ
Dibenzofuran	2.0	2.7 J	2.4 J	1.4 J	2.7 J	1.6 J	1.7 J	2.2 U	7.2	3.4
Fluorene	2.0	2.1 UJ	2.1 UJ	2.7 UJ	4.2 UJ	2.3 UJ	4.1 UJ	2.7 UJ	13 J	4.6 UJ
2,3,5-Trimethylnaphthalene	2.0	2.1 U	1.1 J	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Phenanthrene	2.0	3.8 UJ	3.2 UJ	4.4 UJ	7.7 UJ	4.5 UJ	5.1 UJ	7.7 UJ	13 J	11 UJ
Anthracene	2.0	2.6 J	2.1 U	1.4 J	1.6 J	2.1 U	1.5 J	1.4 J	6.0 J	2.2 J
1-Methylphenanthrene	2.0	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Fluoranthene	2.0	5.8 UJ	2.1 U	2.1 UJ	3.2 UJ	2.1 U	2.2 UJ	3.8 UJ	17 J	6.1 UJ
Pyrene	2.0	4.3 J	2.1 UJ	1.4 J	1.7 J	1.8 J	1.1 J	2.8 J	7.1 J	4.1 J
Benz[a]anthracene	2.0	2.6 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 UJ	2.1 UJ	2.2 UJ
Chrysene	2.0	2.1 UJ	2.1 U	2.1 U	2.1 UJ	2.1 U	2.2 U	2.2 UJ	2.1 UJ	2.5 UJ
Benzo[b]fluoranthene	2.0	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2.1 U	2.2 UJ	2.2 UJ	2.1 UJ	2.2 UJ
Benzo[k]fluoranthene	2.0	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2.1 U	2.2 UJ	2.2 UJ	2.1 U	2.2 UJ
Benzo[e]pyrene	2.0	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Benzo[a]pyrene	2.0	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Perylene	2.0	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Indeno[1,2,3-cd]pyrene	2.0	2.1 U	2.1 U	2.1 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.1 U	2.2 U
Dibenz[a,h]anthracene	2.0	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.1 UJ	2.2 UJ
Benzo[g,h,i]perylene	2.0	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2.1 U	2.2 UJ	2.2 U	2.1 U	2.2 U

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Polynuclear Aromatic Hydrocarbons (D-052.1)
Tissue (ug/Kg)

Traffic Report Sample No.		D05319	D05320	D05321	D05322	D05323	D05324	D05325
M&E Sample ID		MC-AE-1	MC-LD-1	RF-BH-1	RF-BH-2	RF-BH-3	RF-CP-1	RF-AE-1
Lab Sample ID		0410017-19	0410017-20	0410017-21	0410017-22	0410017-23	0410017-24	0410017-25
Date Sampled		09/23/04	09/23/04	10/01/04	10/01/04	10/01/04	09/24/04	09/24/04
Date Extracted		10/19/04	12/16/04	11/18/04	11/18/04	11/18/04	11/18/04	11/18/04
Date Analyzed		11/28/04	12/28/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Dilution Factor		1.11	1.13	1.11	1.12	1.12	1.13	1.13
Comments								
Analyte	RL							
Naphthalene	2.0	3.9 UJ	2.8 U	2.4 UJ	2.1 UJ	2.2 UJ	2.3 UJ	3.4 UJ
2-Methylnaphthalene	2.0	2.1 U	2.9 UJ	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
1-Methylnaphthalene	2.0	2.1 U	3.0 J	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Biphenyl	2.0	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
2,6-Dimethylnaphthalene	2.0	2.0 J	3.6	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Acenaphthylene	2.0	2.1 U	7.0 UJ	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Acenaphthene	2.0	10 J	5.6 U	6.0 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Dibenzofuran	2.0	2.1 U	3.8	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Fluorene	2.0	2.9 UJ	4.7 UJ	2.2 UJ	2.1 U	2.2 UJ	2.2 U	2.0 UJ
2,3,5-Trimethylnaphthalene	2.0	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Phenanthrene	2.0	4.9 UJ	6.5 U	3.6 UJ	3.7 UJ	5.4 UJ	2.8 UJ	3.2 UJ
Anthracene	2.0	2.1 U	3.1 J	2.1 U	1.1 J	2.2 U	2.2 U	2.0 U
1-Methylphenanthrene	2.0	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Fluoranthene	2.0	2.8 UJ	3.5 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Pyrene	2.0	2.1 UJ	1.6 J	1.2 J	2.1 UJ	1.1 J	2.2 UJ	2.0 UJ
Benz[a]anthracene	2.0	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Chrysene	2.0	2.1 U	2.2 U	2.1 U	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[b]fluoranthene	2.0	2.1 U	2.2 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[k]fluoranthene	2.0	2.1 U	2.2 U	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U
Benzo[e]pyrene	2.0	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Benzo[a]pyrene	2.0	2.1 U	2.2 U	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Perylene	2.0	2.1 U	2.2 U	1.3 J	2.1 U	2.2 U	2.2 U	2.0 U
Indeno[1,2,3-cd]pyrene	2.0	2.1 U	2.2 UJ	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Dibenz[a,h]anthracene	2.0	2.1 UJ	2.2 UJ	2.1 UJ	2.1 UJ	2.2 UJ	2.2 UJ	2.0 UJ
Benzo[g,h,i]perylene	2.0	2.1 U	2.2 UJ	2.1 UJ	2.1 U	2.2 U	2.2 U	2.0 U

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Percent Lipids (D-058.1)
Tissue (%)

Traffic Report Sample No.		D05301	D05302	D05303	D05304	D05305	D05306	D05307	D05308	D05309
M&E Sample ID		BM-BH-1	BM-BH-2	BM-BH-3	BM-BH-4	CB-RP-1	CB-BH-1	CB-BH-2	CB-BH-3	CB-BH-4
Lab Sample ID		0410017-01	0410017-02	0410017-03	0410017-04	0410017-05	0410017-06	0410017-07	0410017-08	0410017-09
Date Sampled		09/21/04	09/21/04	09/21/04	09/21/04	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04
Date Extracted		10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04
Date Analyzed		10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04
Dilution Factor		1	1	1	1	1	1	1	1	1
Comments										
Analyte	RL									
Percent Lipids	0.1	1.8	0.84	0.80	0.94	0.83	2.4	0.81	0.96	0.51

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Percent Lipids (D-058.1)
Tissue (%)

	Traffic Report Sample No.	D05310	D05311	D05312	D05313	D05314	D05315	D05316	D05317	D05318
	M&E Sample ID	CB-AE-1	CB-GS-1	RP-BH-1	RP-BH-2	RP-GS-1	RP-GS-2	MC-BH-1	MC-BH-2	MC-BH-3
	Lab Sample ID	0410017-10	0410017-11	0410017-12	0410017-13	0410017-14	0410017-15	0410017-16	0410017-17	0410017-18
	Date Sampled	09/23/04	09/30/04	09/22/04	09/30/04	09/22/04	09/22/04	09/23/04	09/23/04	09/23/04
	Date Extracted	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04
	Date Analyzed	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04	10/22/04
	Dilution Factor	1	1	1	1	1	1	1	1	1
	Comments									
Analyte	RL									
Percent Lipids	0.1	1.7	1.6	1.5	2.5	1.8	2.8	2.8	1.5	1.9

SITE: Iron Horse Park OU4
CASE NO.: 0243M
SDG NO.: D05301-OA

DATA SUMMARY TABLE
Percent Lipids (D-058.1)
Tissue (%)

	Traffic Report Sample No.	D05319	D05320	D05321	D05322	D05323	D05324	D05325
	M&E Sample ID	MC-AE-1	MC-LD-1	RF-BH-1	RF-BH-2	RF-BH-3	RF-CP-1	RF-AE-1
	Lab Sample ID	0410017-19	0410017-20	0410017-21	0410017-22	0410017-23	0410017-24	0410017-25
	Date Sampled	09/23/04	09/23/04	09/23/04	09/23/04	09/23/04	09/24/04	09/24/04
	Date Extracted	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04	10/21/04
	Date Analyzed	10/22/04	12/20/04	11/19/04	11/19/04	11/19/04	10/19/04	11/19/04
	Dilution Factor	1	1	1	1	1	1	1
	Comments							
Analyte	RL							
Percent Lipids	0.1	5.2	2.1	0.98	0.88	1.6	0.52	7.9

DATA SUMMARY TABLE DEFINITIONS (Organics)

BB - As a qualifier for soil/sediment samples: Compound is also detected in the bottle blank
CRQL - Contract Required Quantitation Limit
EB - As a qualifier for soil/sediment samples: Compound is also detected in the equipment blank
FD - Field Duplicate
g - gram
J - The concentration is an estimated quantity
kg - kilogram
L - Liter
mg/Kg - milligrams per kilogram
mg/L - milligrams per liter
ml - milliliter
R - The data are rejected and unusable
RL - Reporting Limit
U - Compound was analyzed for but not detected
ug/kg - micrograms per kilogram
UJ - The sample quantitation limit is an estimated quantity
ug/L - micrograms per liter

APPENDIX K

Grain Size Analysis Report

GeoTesting
express

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Transmittal

TO:

Ms. Diane Silverman
Metcalf & Eddy
701 Edgewater Drive
Wakefield, MA 01880

DATE: 11/09/04	GTX NO: 5496
RE: Iron Horse Park	

COPIES	DATE	DESCRIPTION
	11/09/04	**October 2004 Laboratory Test Reports**
		5 Grain Size Analyses (ASTM D 422)

REMARKS:

SIGNED: _____
Joe Tomei – Laboratory Manager

CC:

APPROVED BY: _____
Fred Hooper - Laboratory Manager

GeoTesting
express

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Geotechnical Test Report

November 9, 2004

Iron Horse Park Project

Billerica, MA

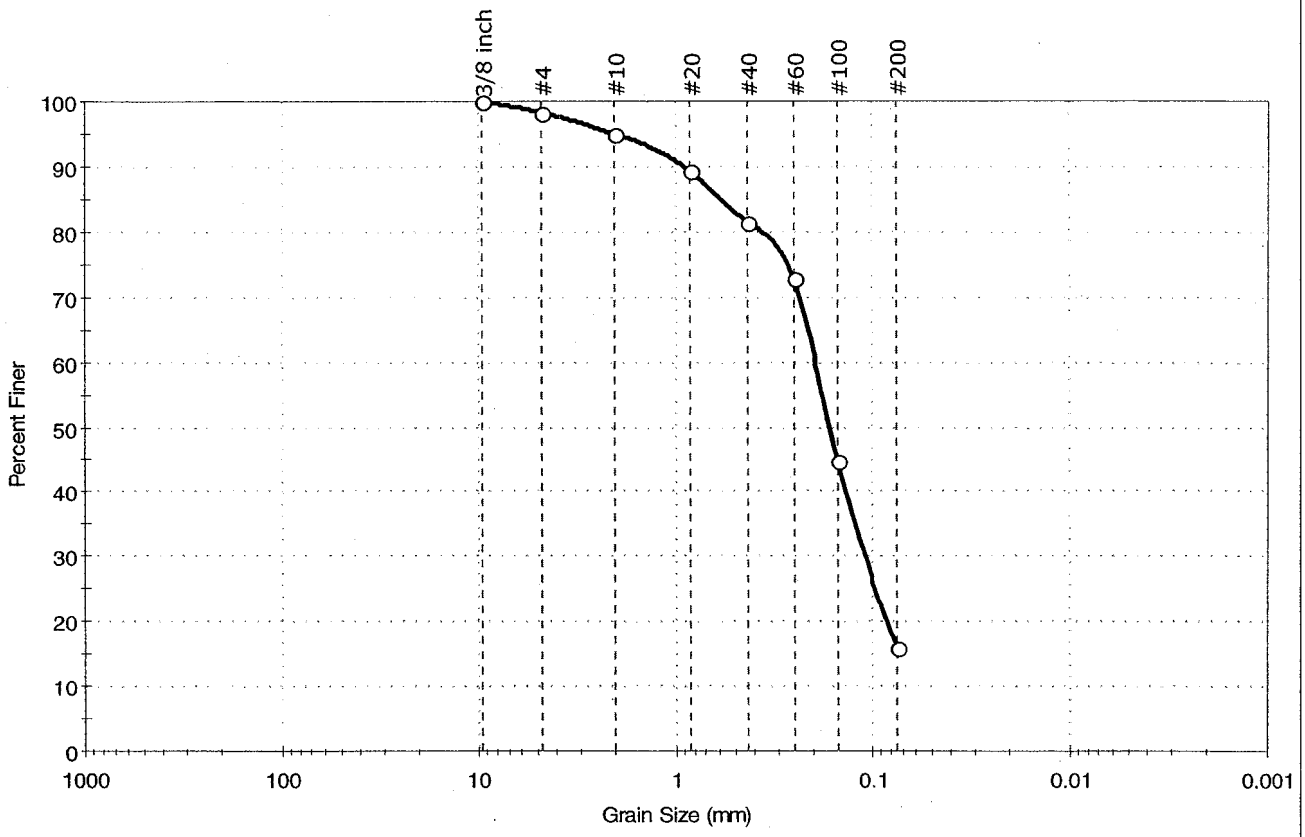
Prepared for:

Metcalf & Eddy

GeoTesting express

Client:	Metcalf & Eddy				
Project:	Iron Horse Park				
Location:	Billerica, MA			Project No:	GTX-5496
Boring ID:	SED-01	Sample Type:	bag	Tested By:	ahp
Sample ID:	D05199	Test Date:	10/06/04	Checked By:	jdt
Depth :	---	Test Id:	61614		
Sample Description:	Wet, very dark brown silty sand				
Sample Comment:	---				
Test Comment:	Very high organic contnent				

Particle Size Analysis - ASTM D 422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	1.8	82.3	15.9

Sieve Name	Sieve Size (mm)	Percent Finer	Spec. Percent	Complies
3/8 inch	9.51	100		
#4	4.75	98		
#10	2.00	95		
#20	0.84	89		
#40	0.42	81		
#60	0.25	73		
#100	0.15	45		
#200	0.075	16		

Coefficients

D_{85} =0.5784 mm	D_{30} =0.1052 mm
D_{60} =0.1982 mm	D_{15} =N/A
D_{50} =0.1651 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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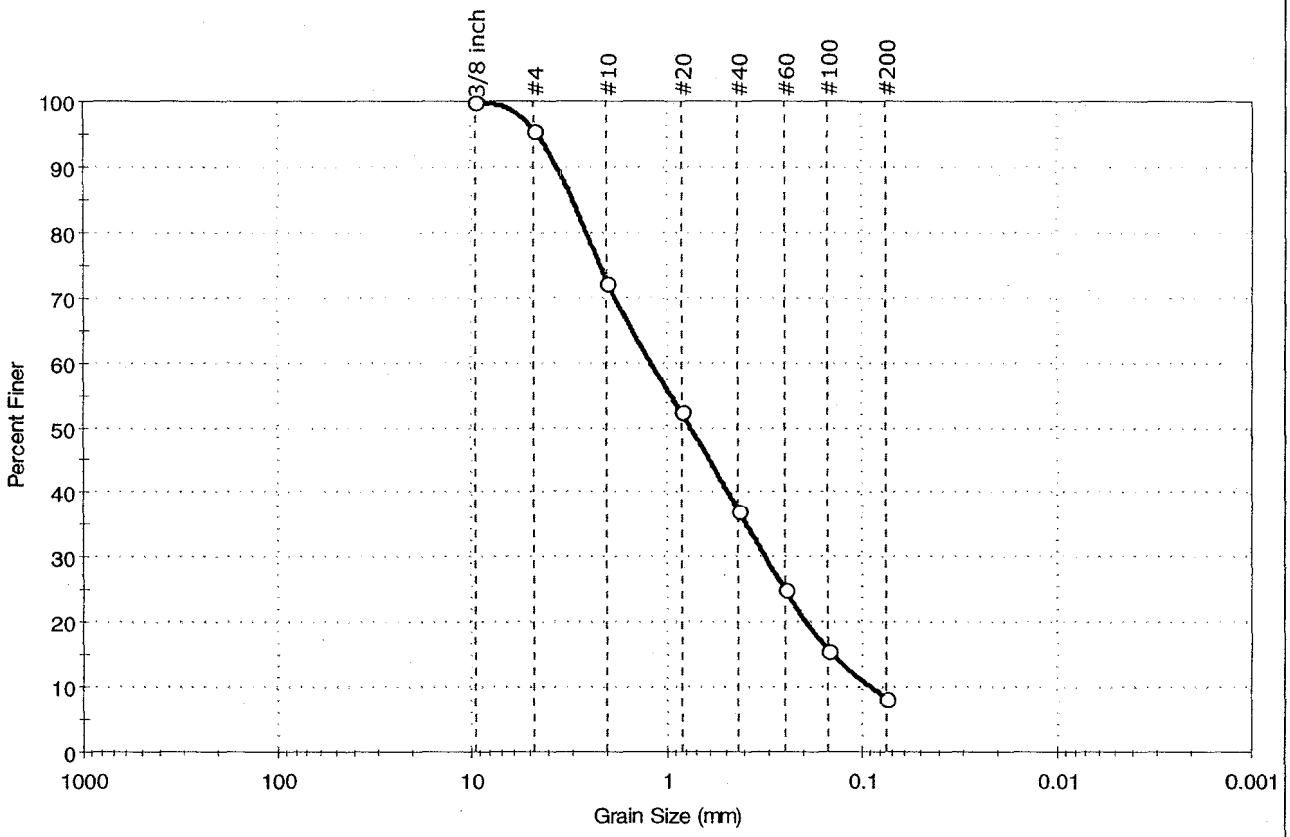
GeoTesting express

Client:	Metcalf & Eddy				
Project:	Iron Horse Park				
Location:	Billerica, MA			Project No:	GTX-5496
Boring ID:	SED-05	Sample Type:	bag	Tested By:	ahp
Sample ID:	D05203	Test Date:	10/08/04	Checked By:	jdt
Depth :	---	Test Id:	61615		
Sample Description:	Wet, very dark brown sand with silt				
Sample Comment:	smell of petrolium				
Test Comment:	very high organic content				

Particle Size Analysis - ASTM D 422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	4.4	87.2	8.4

Sieve Name	Sieve Size (mm)	Percent Finer	Spec. Percent	Complies
3/8 inch	9.51	100		
#4	4.75	96		
#10	2.00	72		
#20	0.84	52		
#40	0.42	37		
#60	0.25	25		
#100	0.15	16		
#200	0.075	8		

Coefficients

D_{85} =3.2046 mm	D_{30} =0.3104 mm
D_{60} =1.1704 mm	D_{15} =0.1395 mm
D_{50} =0.7558 mm	D_{10} =0.0872 mm
C_u =13.422	C_c =0.082

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

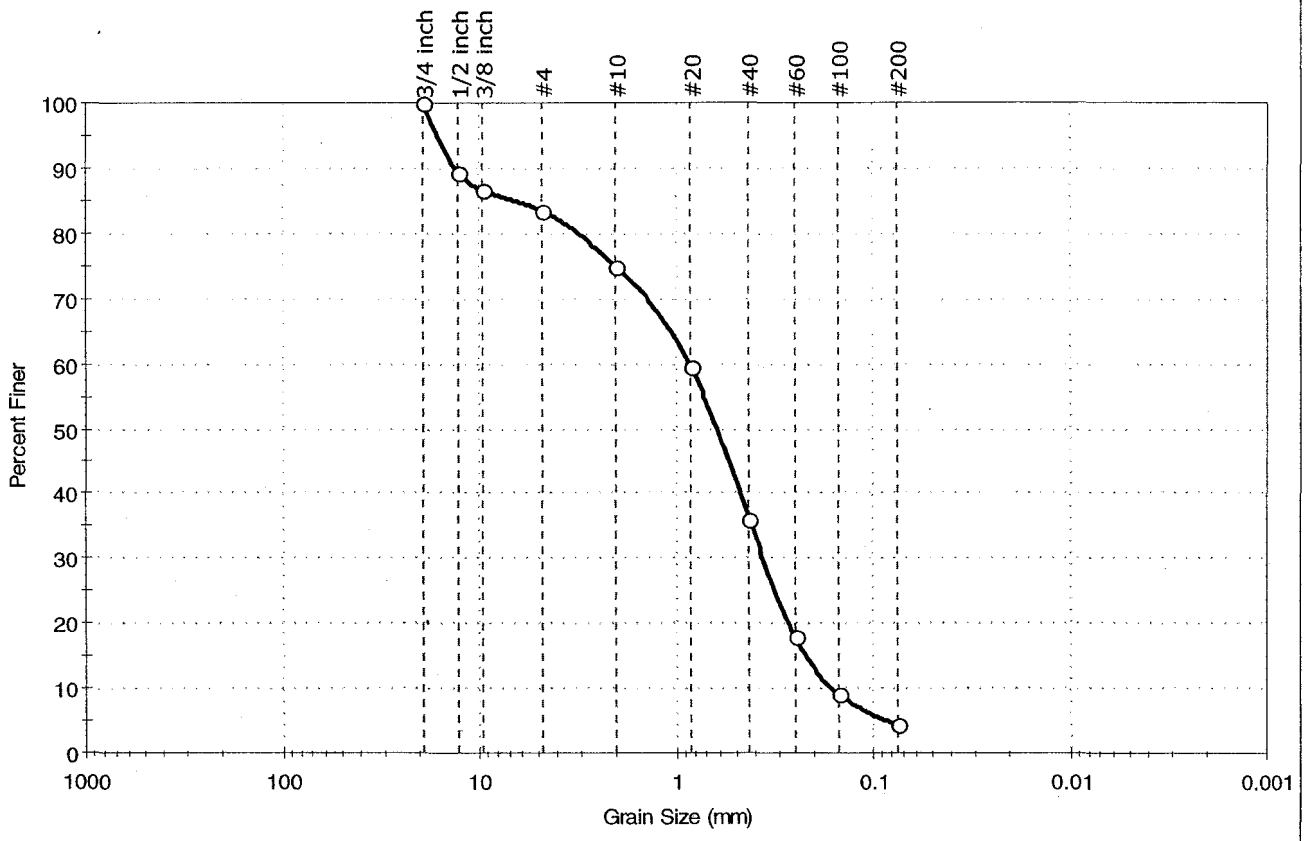
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting express

Client:	Metcalf & Eddy				
Project:	Iron Horse Park				
Location:	Billerica, MA			Project No:	GTX-5496
Boring ID:	SED-11	Sample Type:	bag	Tested By:	ahp
Sample ID:	D05210	Test Date:	10/07/04	Checked By:	jdt
Depth :	---	Test Id:	61616		
Sample Description:	Wet, black sand with gravel and organics				
Sample Comment:	---				
Test Comment:	---				

Particle Size Analysis - ASTM D 422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	16.6	79.1	4.3

Sieve Name	Sieve Size (mm)	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.70	89		
3/8 inch	9.51	87		
#4	4.75	83		
#10	2.00	75		
#20	0.84	60		
#40	0.42	36		
#60	0.25	18		
#100	0.15	9		
#200	0.075	4		

Coefficients

D_{85} =6.6323 mm	D_{30} =0.3560 mm
D_{60} =0.8575 mm	D_{15} =0.2110 mm
D_{50} =0.6360 mm	D_{10} =0.1579 mm
C_u =5.432	C_c =0.148

Classification

ASTM Poorly graded sand with gravel (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

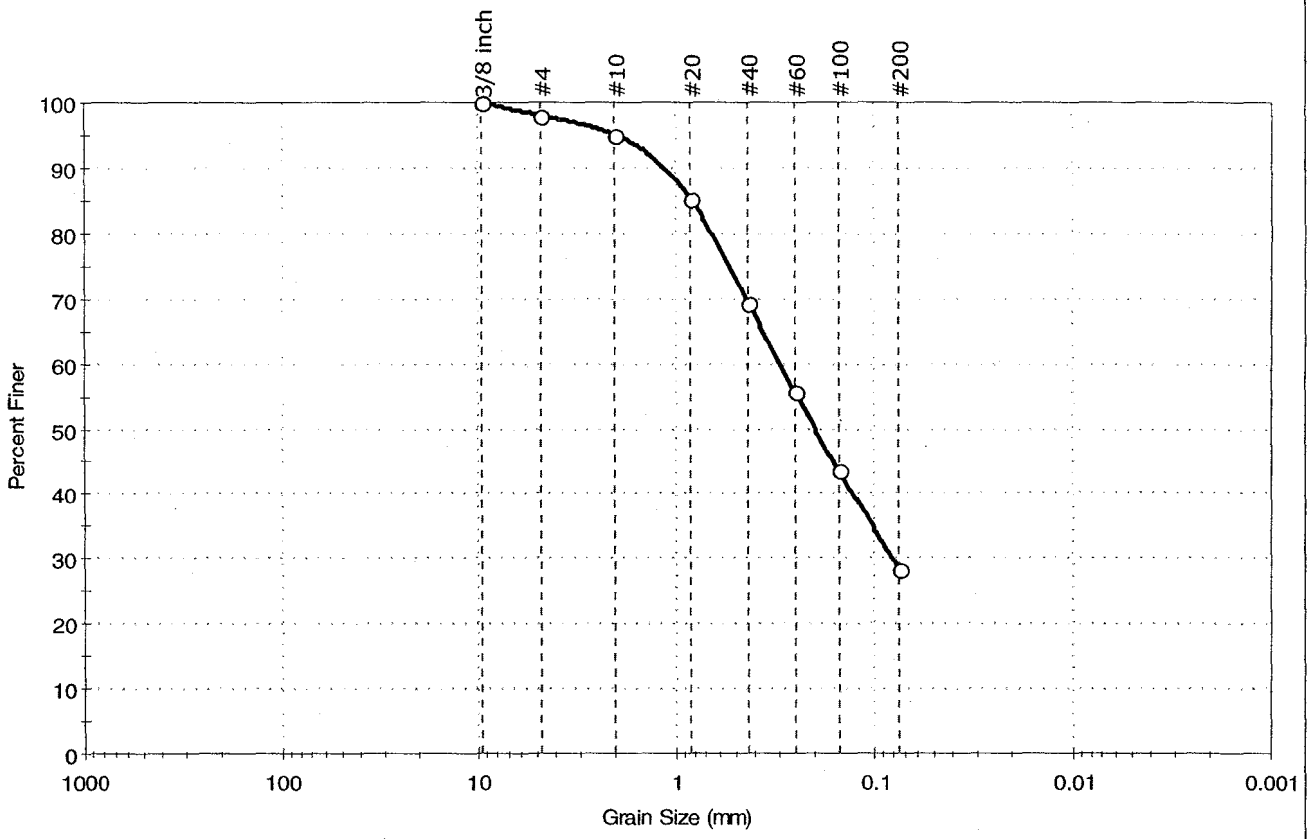
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting express

Client:	Metcalf & Eddy				
Project:	Iron Horse Park				
Location:	Billerica, MA			Project No:	GTX-5496
Boring ID:	SED-18	Sample Type:	bag	Tested By:	ahp
Sample ID:	D05217	Test Date:	10/07/04	Checked By:	jdt
Depth :	---	Test Id:	61617		
Sample Description:	Wet, very dark brown silty sand				
Sample Comment:	---				
Test Comment:	high organic content				

Particle Size Analysis - ASTM D 422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	2.0	69.6	28.4

Sieve Name	Sieve Size (mm)	Percent Finer	Spec. Percent	Complies
3/8 inch	9.51	100		
#4	4.75	98		
#10	2.00	95		
#20	0.84	85		
#40	0.42	69		
#60	0.25	56		
#100	0.15	44		
#200	0.075	28		

Coefficients

D_{85} =0.8271 mm	D_{30} =0.0807 mm
D_{60} =0.2956 mm	D_{15} =N/A
D_{50} =0.1966 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

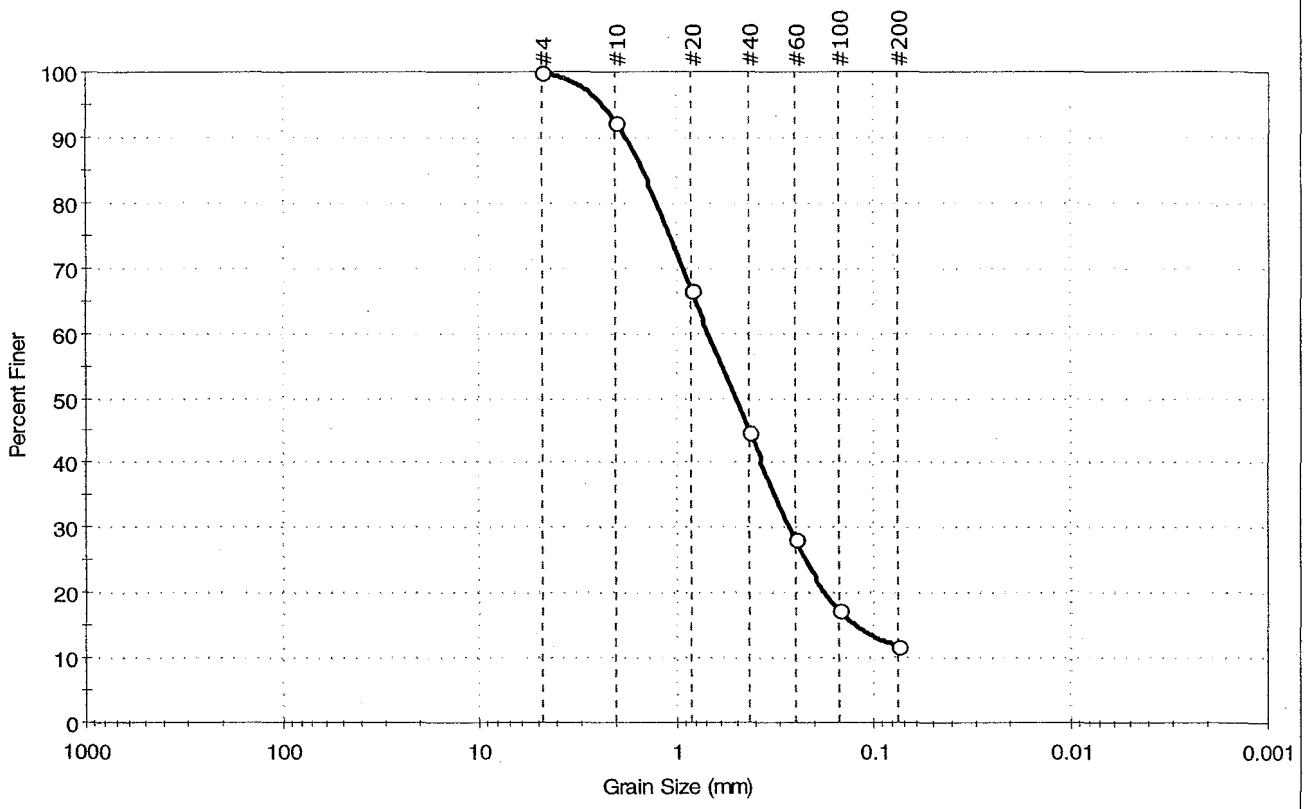
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting express

Client:	Metcalf & Eddy				
Project:	Iron Horse Park				
Location:	Billerica, MA			Project No:	GTX-5496
Boring ID:	SED-22	Sample Type:	bag	Tested By:	ahp
Sample ID:	D05221	Test Date:	10/07/04	Checked By:	jdt
Depth :	---	Test Id:	61618		
Sample Description:	Wet, very dark brown sand with silt and organics				
Sample Comment:	---				
Test Comment:	high organic content				

Particle Size Analysis - ASTM D 422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	88.1	11.9

Sieve Name	Sieve Size (mm)	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	92		
#20	0.84	67		
#40	0.42	45		
#60	0.25	28		
#100	0.15	17		
#200	0.075	12		

Coefficients

D_{85} =1.5628 mm	D_{30} =0.2644 mm
D_{60} =0.6841 mm	D_{15} =0.1120 mm
D_{50} =0.5011 mm	D_{10} =0.0587 mm
C_u =11.651	C_c =0.102

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---