STAGE I ENVIRONMENTAL SCREENING & STAGE II ENVIRONMENTAL RISK CHARACTERIZATION

KEITH MIDDLE SCHOOL WETLAND NEW BEDFORD, MASSACHUSETTS

Prepared for

City of New Bedford
Department of Environmental Stewardship
133 William Street
New Bedford, Massachusetts

Prepared by

TRC Environmental Corporation
650 Suffolk Street
Lowell, Massachusetts 01854

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EXECUTIVE SUMMARY

A Stage I Environmental Screening (ES) and a Stage II Environmental Risk Characterization (ERC) were conducted for the Keith Middle School (KMS) Wetland. The Stage I ES resulted in the identification of potential impacts associated with zinc in surface water samples collected from the aquatic habitat provided by the KMS Wetland, potential impacts to aquatic habitat sediment from 17 polyaromatic hydrocarbons (PAHs), 3 pesticides, polychlorinated biphenyl (PCB) Aroclors 1254 and 1260, and 7 inorganics, potential impacts to surface soil within the southern forested wetland area from 3 pesticides and 2 inorganics and potential impacts to surface soil within the northern forested wetland area associated with 15 PAHs, PCB Aroclors 1254 and 1260, and 6 inorganics. Each of these potential impacts was recommended for further evaluation in the Stage II ERC. Six indicator species and two indicator communities were selected to evaluate risks associated with exposure to potentially impacted sediments in the aquatic habitat of the KMS Wetland while five indicator species were selected to evaluate potential surface soil impacts identified within the forested wetland habitats of the KMS Wetland. Endpoints in the Stage II ERC were selected to represent ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur.

Based on the comparison of surface water zinc concentrations with amphibian toxicity reference values (TRVs), it does not appear that amphibians are at risk from the concentrations of zinc detected within the surface water samples collected from the aquatic habitat of the KMS Wetland. Although amphibians may not be at risk, the zinc concentrations detected in 10 of 13 surface water samples collected in 2009 exceed the acute/chronic national recommended water quality criteria for zinc which represents the Massachusetts Surface Water Standard for zinc promulgated in 314 CMR 4.05(5)(e). The existence of a hazardous material potentially attributable to the site that exceeds its water quality criterion meets the threshold standard defined in the Massachusetts Contingency Plan (MCP) regulations, specifically 310 CMR 40.0995(3)(b)(1). Additional sampling of surface water for zinc analysis was conducted in 2010. Only one of seven surface water samples collected from the KMS Wetland in 2010 detected zinc at a concentration that exceeds its acute/chronic water quality criteria. However, toxicity testing of this surface water sample resulted in no impacts on survival, growth, and/or reproduction to two test organisms (fathead minnow and water flea). The lower observed levels of zinc in surface water samples collected from the KMS Wetland in 2010 coupled with the lack of toxic effects on the survival and growth/reproduction of the two test organisms indicate that impacts from zinc on the aquatic biota community inhabiting the KMS Wetland are not anticipated provided levels remain similar as detected in 2010.

The detections of PCBs (total and Aroclor 1254) and lead (and to a lesser extent, total PAHs and zinc) within the sediments of the aquatic habitat at the KMS Wetland are above sediment benchmarks associated with adverse effects to benthic macroinvertebrates. The pesticide 4,4'-DDT presents less risk potential due to its lower concentration (with respect to its benchmark) and/or its reduced bioavailability (high TOC content in sediments of the aquatic habitat). Six sediment samples containing elevated levels of total PCBs, lead, zinc and/or total PAHs collected from the aquatic habitat of the KMS Wetland were subsequently tested for their toxicity (survival and growth) to aquatic midge larvae (10-day test) and an amphipod (28-day

test) along with a laboratory control and site reference sample (containing low concentrations of the detected constituents). Concentrations of total PCBs (above 5 mg/kg) and total PAHs (above 30 mg/kg) were found to reduce growth rates of midge larvae compared to the control and reference samples. No other significant differences were noted in the remaining sediment samples compared to the control and reference samples. Concentrations of lead and zinc do not appear to present a risk to aquatic macroinvertebrates based on the results of the sediment toxicity testing.

A condition of no significant risk is anticipated for herbivorous birds, omnivorous birds/mammals, and insectivorous bats that forage within the aquatic habitat of the KMS Wetland. Risks to mammalian herbivores and insectivorous birds inhabiting the aquatic habitat provided by the KMS Wetland are somewhat uncertain considering that Hazard Quotients (HQs) for high-molecular weight (HMW) PAHs exceed the No Observable Adverse Effect Level (NOAEL) TRV but are less than the Lowest Observable Adverse Effect Level (LOAEL) TRV or, in the case of lead and selenium, HQs both for the NOAEL and LOAEL TRV are the same but less than the geometric mean of NOAELs reported in the literature. However, PCB congener exposure exceeds both NOAEL and LOAEL TRVs for the insectivorous bird (marsh wren) indicating a condition of no significant risk does not exist for this receptor. Overall, a condition of no significant risk does not exist from the estimated doses of PCB congeners and, to a lesser extent, from detected concentrations of HMW PAHs ingested by the muskrat and/or marsh wren.

A condition of no significant risk exists in the forested wetland habitat provided by the southern wetland area as estimated exposure doses ingested by all indicator species are less than their respective NOAEL TRVs. For those species with larger home ranges than provided by the southern forested wetland area (i.e., red-tailed hawk and red fox), risk is still unlikely considering foraging exposure within the adjacent northern forested wetland area.

Omnivorous birds and mammals (as represented by the American robin and white-footed mouse) as well as insectivorous mammals (as represented by the short-tailed shrew) inhabiting the forested wetland within the northern wetland area may potentially be adversely affected by concentrations of PCB congeners, lead and/or zinc detected within surface soils and estimated to be within terrestrial invertebrates of the northern forested wetland area. A condition of no significant risk exists for foraging carnivorous birds/mammals within this habitat.

Based on the risk estimates presented in the Stage II ERC, preliminary remediation goals (PRGs) are presented for the sediments of the aquatic habitat and surface soils of the northern forested wetland area. Remediation goals for the ecological communities inhabiting the aquatic habitat associated with the KMS Wetland are based primarily on the results of the sediment toxicity testing.

The PCB sediment remediation goal of 5.0 mg/kg, although above the Probable Effect Concentration (PEC) of 0.676 mg/kg is well below the total PCB Severe Effect Level (SEL) of 53 mg/kg and the level (5.44 mg/kg) associated with reduced growth rates in midge larvae. Based on the sediment toxicity testing, a total PAH remediation goal of 30.0 mg/kg is also proposed. This concentration is greater than the PEC of 22.8 mg/kg but below the level (31.6 mg/kg) that was found to result in reduced midge larvae growth in the sediment toxicity tests.

This concentration is also well below the SEL of 1,000 mg/kg for total PAHs based on the organic carbon content present within the aquatic habitat of the KMS Wetland. A zinc remediation goal of 459 mg/kg representing the PEC is also proposed. Although toxicity attributable to zinc sediment concentrations was not noted in the sediment toxicity testing, the sediment samples selected for toxicity testing did not detect zinc as high as 459 mg/kg. Therefore, the zinc PEC is retained as an appropriate sediment remediation goal.

Preliminary remediation goals for those constituents providing potential risk to the wildlife indicator species are calculated based on the mean of concentrations derived using HQs of 1 for the NOAEL and LOAEL TRVs. PRGs for the northern forested wetland area for total PCBs (6.6 mg/kg) and zinc (423 mg/kg) are driven by the PRGs proposed for the American robin. These PRGs represent 95% Upper Confidence Limits (UCLs) of the mean concentrations that would be protective of wildlife that forage within the northern forested wetland area. The PRG for lead (100 mg/kg) within the northern forested wetland area is based on the background level of lead within “natural soils” of Massachusetts (MADEP, 2002).

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) has prepared a Stage I Environmental Screening (ES) and Stage II Environmental Risk Characterization (ERC) for a wetlands area located immediately west of the Keith Middle School in New Bedford, Massachusetts (Figure 1-1). The Stage I ES and Stage II ERC were conducted in accordance with the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000 and current Massachusetts Department of Environmental Protection (MassDEP) risk assessment guidance. The objectives of the initial Stage I ES are to determine potential pathways where ecological receptors at the site (herein referred to as the KMS Wetland) may be exposed to constituents associated with the KMS Wetland and identify the pathway(s) where: a) significant environmental harm is "readily apparent", b) "potentially significant exposure" exists and requires further evaluation (i.e., a Stage II ERC is warranted), or, c) exposure is insignificant based on the characteristics at the KMS Wetland including constituent concentrations. The Stage II ERC further evaluates those ecological exposure pathways where potentially significant exposure exists. The objective of the Stage II ERC is to determine whether a condition of significant risk of harm to the environment exists that would require remediation (if feasible) or, conversely, no significant risk of harm to the environment exists or has been achieved at the Site.

The Stage I ES and Stage II ERC evaluates the existing ecological risk associated with the presence of various organic and inorganic constituents within surface waters, sediments and surface soils of a wetland located adjacent to the Keith Middle School. The assessment follows current MassDEP (1996) guidance for assessment of ecological risk at MCP sites and relied primarily on the following document:

- Massachusetts Department of Environmental Protection. *Guidance for Disposal Site Risk Characterization, Section 9.0 Method 3 – Environmental Risk Characterization.* Interim Final Policy WSC/ORS-95-141. April 1996.

- Massachusetts Department of Environmental Protection. Revised Sediment Screening Values. *Interim Technical Update to Section 9 of Guidance for Disposal Site Risk Characterization.* January 2006.

This report provides introductory information in Section 1.0 including the results of previous environmental investigations relevant to the KMS Wetland. Section 2.0 presents the Stage I ES including the identification of complete exposure pathways, data management and evaluation of analytical sampling results and the effects-based screening evaluation. Section 3.0 presents the initial portion of the Stage II ERC which formulates the problem and presents a description of the ecological setting at the site including exposure pathways and potential receptors, as well as a site conceptual model for the KMS Wetland including the selected assessment and measurement endpoints. Section 4.0 conducts the Stage II ERC analyses by assessing exposure and presenting a discussion on ecological effect levels. Section 5.0 presents the Stage II risk characterization and Section 6.0 presents a list of references cited in the report.

1.1 Site History

The Keith Middle School (KMS) is immediately adjacent to the KMS Wetland and was constructed at the former McCoy Field, which consisted of a recreational area underlain by impacted fill material. This contaminated debris was spread across McCoy Field and then covered with sand/gravel and topsoil around 1994 in order to construct the recreational fields. The edge of the fill material consisted of steep embankments that sloped down to the KMS Wetland. Although fill material was not believed to have been placed directly within the wetlands, impacts occurred to the KMS Wetland over time due to erosion/sedimentation of the embankments as well as from wind deposition (BETA, 2005).

1.2 Previous Environmental Investigations/Regulatory Actions

A synopsis of earlier investigations involving the collection of samples within the KMS Wetland is presented below. This synopsis is focused on polychlorinated biphenyl (PCB) impacts, as PCBs are the focal point of the KMS Wetland although this Stage I ERC addresses all constituents detected within the KMS Wetland.

Sediment sampling was conducted by Vanasse Hangen Brustlin, Incorporated (VHB) at the KMS Wetland in August 2000 and October 2002. In general, PCBs were detected in most of these samples with the maximum detected concentration (18.4 mg/kg) located within the wetland at the toe of the slope where ash fill material was evident. The elevated concentration prompted regulatory reporting and Immediate Response Action (IRA) activities under the MCP. Fencing was subsequently erected to limit access to this portion of the KMS Wetland.

BETA Group, Incorporated (BETA) subsequently collected 124 sediment and/or soil samples from the KMS Wetland in December 2004, January 2005 and April 2005. These samples were analyzed for PCB Aroclors, metals (RCRA 8 metals only), polycyclic aromatic hydrocarbons (PAHs), pesticides (including herbicides) and total organic carbon (TOC). PCBs (Aroclor 1254) were detected in approximately 75 percent of the samples with a maximum detected concentration of 11.8 mg/kg and a mean concentration of 0.91 mg/kg. PAHs were detected relatively infrequently although detections above screening benchmarks were noted at the maximum detected concentrations. Cadmium, chromium, lead and mercury were also detected at elevated levels above their respective sediment screening benchmarks. The results from these samples were used by ESS Group, Incorporated (ESS), a subconsultant to BETA, to conduct an environmental risk characterization at the KMS Wetland (ESS, 2005).

The ERC evaluated potential risk from detected concentrations of constituents within the KMS Wetland to aquatic and terrestrial invertebrates, amphibians, and several omnivorous/ insectivorous/carnivorous wildlife receptors (American robin, short-tailed shrew, red-tailed hawk, raccoon). The ERC concluded that the KMS Wetland posed no significant risk to the environment (ESS, 2005). However, the United States Environmental Protection Agency (USEPA) and MassDEP determined that remediation of sediments containing PCBs at concentrations greater than 1 mg/kg was appropriate for the KMS Wetland.

Excavation of PCB-impacted sediment/surface soil within the KMS Wetland was subsequently undertaken in September 2006. Remediation was conducted within three portions of the KMS Wetland, an area located in the north-central portion of the wetland near Durfee Street and two long and narrow areas located within the wetland along the steep embankment of the fill material. The two remediation areas located along the eastern edge of the KMS Wetland are separated by a narrow band of upland referred to as the land bridge. Removal of PCB-contaminated sediment/soil included the removal of up to six inches of impacted sediments with residual PCB concentrations greater than 1 mg/kg at locations within the KMS Wetland. The 1 mg/kg concentration represents a self-implementing clean-up level for *Bulk Polychlorinated Biphenyl (PCB) Remediation Waste in High Occupancy Areas* under 40 CFR Part 761.61(a)(4)(i)(A) without further conditions, such as capping.

In accordance with provisions for the City's long-term monitoring obligations for wetland sediment at the KMS wetland site, TRC performed sampling of sediment in the wetland in May 2008 at four randomly selected locations along the toe of the slope in the eastern periphery of the wetland (TRC, 2009). Although three of the four samples were non-detect, one sediment sample contained total PCBs at a concentration of 16.56 mg/kg, prompting regulatory reporting and IRA activities under the MCP. The results of the analysis of follow-up sediment and soil samples collected in June 2008 indicate that total PCB concentrations above 1.0 mg/kg were more widespread with several additional sediment samples containing total PCBs at concentrations greater than 10 mg/kg. The results indicated that further sampling was required to delineate the extent of the PCB sediment contamination. Additional sediment sampling was subsequently undertaken by TRC during July 2008 through August 2009 to further delineate the extent of PCB and other potential impacts within the KMS Wetland.

2.0 STAGE I ENVIRONMENTAL SCREENING

2.1 Complete Exposure Pathways

Important components of the ecological community within the KMS Wetland include plants, insects and other invertebrates, amphibians, reptiles, birds and mammals that represent a diverse assemblage of feeding guilds. The constituents detected within the surface water, sediments and surface soils of the wetland may potentially affect ecological receptors directly via contact (e.g., aquatic organisms residing within the water column of the marsh, benthic community inhabiting contaminated sediments) or indirectly via bioaccumulation into vegetation and invertebrates that are subsequently consumed by receptors occupying higher trophic levels within the KMS Wetland.

The KMS Wetland is approximately 4.2 acres in size and can be subdivided based on the presence of an existing, elevated roadbed (fill placed but roadway not constructed) that bisects the KMS Wetland into northern and southern wetland areas. A direct hydrological connection between these two wetland areas is not present although the base of the roadbed may allow seepage of surface water between the two areas. The locations of the southern and northern wetland areas are presented in Figure 2-1. The media of concern are surface water and sediment associated with the open water aquatic habitats associated with the marsh habitat present at the KMS Wetland (northern wetland area) and surface soils within the terrestrial forested habitat associated with the KMS Wetland (southern and northern wetland areas).

In order to distinguish between sediment and surface soils, a TRC ecologist conducted site inspections of the KMS Wetland during Spring 2009 and delineated the extent of aquatic habitat (i.e., shallow/deep marsh) present within the KMS Wetland. No conditions of "readily apparent harm" such as visibly stressed biota or oil/tar were observed within the wetlands during the site visits. Samples collected within the delineated limits of aquatic habitat were considered to represent sediment samples while samples collected within the wetland but outside the delineated aquatic habitat limits (i.e., southern and northern forested wetlands) were viewed as wetland soil samples. Habitat characteristics defining sediment and soil designations are discussed further in Section 3.1. As discussed above, risk of harm is not readily apparent at the KMS Wetland. In order to determine whether the exposure pathways identified at the KMS Wetland clearly do not pose a significant risk, an effects-based screening was conducted.

2.2 Data Management

Analytical data used in the Stage I ES include recent surface water, sediment and surface soil sampling results from the 2008-2009 sampling (TRC, 2009), recent 2009 sampling data (through July) as well as historical sampling data from the KMS Wetland that were collected from non-excavated portions of the wetland. Sampling results for each sample used in this ERC are provided in Attachment A. Samples used to conduct the Stage I ES are discussed below.

Surface Water – Previous surface water sampling results are not available for the KMS Wetland. Therefore, five surface water samples (as well as a field duplicate) were collected by TRC in March 2009 to support the Stage I ES. Each of these samples was analyzed for PCB

homologues, PAHs, the 14 MCP metals (total and dissolved), and hardness. The locations of the surface water samples are depicted on Figure 2-2. Results of each surface water sample are presented in Appendix A (Table A-1).

Sediment – During December 2004 and April 2005, BETA collected 44 sediment samples (0 to 6 inches) that are located outside the limits of the wetland area eventually excavated for the PCB sediment remediation. Each of these 44 samples was analyzed for PCB Aroclors and PAHs while 21 samples were analyzed for RCRA-8 metals. In addition, six of the samples collected by BETA were analyzed for pesticides. From June to December 2008, TRC collected 66 sediment samples (all sampled at 0 to 6 inches with some also sampled at multiple depths) within the marsh habitat present within the northern wetland area. These samples were analyzed for PCB Aroclors. TRC collected an additional 11 sediment samples in March 2009 to support the Stage I ES from the previously excavated northern wetland area. These 11 samples were analyzed for MCP metals and PAHs. In addition, a subset of these samples (three samples) were analyzed for PCB congeners (co-planar congeners correlated with dioxin toxicity) and PCB Aroclors to obtain congener/Aroclor ratios. Six additional sediment samples were collected by TRC in March 2009 in the southeastern portion of the northern wetland area in the vicinity of an elevated PCB Aroclor detection at one of the earlier March 2009 samples. These samples were analyzed for PCB Aroclors. In June 2009, three additional sediment samples were collected in the northwestern portion of the northern wetland area by TRC to delineate the extent of sediment contamination in this vicinity. Each of these samples was analyzed for PCB Aroclors. The locations of all sediment samples collected within the KMS Wetland are depicted on Figure 2-3 and results for each sediment sample presented in Appendix A (Table A-2).

Surface Soil (Southern Wetland Area) – Previous surface soil analytical results are available from samples collected by BETA within the southern wetland area in December 2004 and April 2005. A total of 15 of these samples were located in areas that were not subsequently excavated as part of the PCB remediation. These samples were collected from 0 to six inches in depth and were analyzed for PCB Aroclors, RCRA-8 metals and PAHs as well as TOC. Three of these samples were also analyzed for pesticides. A total of 22 surface soil samples were collected within the top foot (0 to 6 inches or 6 to 12 inches) from the southern wetland area by TRC in November 2007 through December 2008. Each of these samples was analyzed for PCB Aroclors. In March 2009, five additional surface soil samples were collected by TRC from the southern wetland area and analyzed for 4,4-DDT (and its derivatives 4,4-DDD and 4,4-DDE) via SW846 Method 8081A because the previous sampling by BETA detected this pesticide in the southern wetland area. The locations of the surface soil samples collected within the southern wetland area are depicted on Figure 2-4. Results for each surface soil sample are presented in Appendix A (Table A-3).

Surface Soil (Northern Wetland Area) – BETA collected four surface soil samples within the northern wetland area in April 2005 that were located outside the limits of areas that were excavated as part of the PCB remediation. These samples were collected from 0 to six inches in depth and were analyzed for PCB Aroclors, RCRA-8 metals and PAHs as well as total organic carbon. One of these samples was also analyzed for pesticides. A total of 27 surface soil samples were collected within 0 to 6 inches from the northern wetland area by TRC in May through December 2008. Each of these samples was analyzed for PCB Aroclors. In March

2009, one additional surface soil sample was collected by TRC from the northern wetland area and analyzed for MCP metals, PAHs, and PCB congeners (co-planar congeners correlated with dioxin toxicity) and PCB Aroclors to obtain congener/Aroclor ratios. In June 2009, TRC collected 11 additional surface soil samples within the northwestern portion of the northern wetland area. Each of these samples was analyzed for PCB Aroclors while three of these samples were also analyzed for MCP metals and PAHs. The locations of the surface soil samples collected within the northern wetland area are depicted on Figure 2-5 and sampling results presented in Appendix A (Table A-4).

2.3 Data Evaluation

Analytical data for individual surface water, sediment and surface soil samples are presented in Appendix A. Estimated values (e.g., "J" qualified) were used in the Stage I ES without modification. Prior to using analytical data for a primary sample with an associated field duplicate, the analytical values for the primary sample and the field duplicate were averaged together to provide a single set of values for the field duplicate pair. The following conventions were used for field duplicate samples:

- If both samples have detected values (flagged with "J" or unflagged), the average of the values was used. If one value or both values are flagged with "J", prior to averaging, the resulting averaged value was flagged with "J" as appropriate.

- If both samples have nondetected values (flagged with "U" or "UJ"), the lower value and its flag were used.

- If one sample has a nondetect value (flagged with "U" or "UJ") and the other sample has a detected value (flagged with "J" or unflagged) the following is done:

  - If the detected value is less than or equal to the nondetected value, the detected value and its flag were used; or
  - If the detected value is greater than the nondetected value, the average of detected value and the nondetected value were used. The resulting averaged value was flagged with "J".

- If one sample has a nonrejected value (flagged with "J", "U", "UJ", or unflagged) and one sample has a rejected value (flagged with "R"), the nonrejected value and its flag were used.

The range of detection limits was determined based on the individual sample-specific detection limit (or sample quantitation limit) for each analyte. Because of sample dilution and/or sample weights, laboratory detection limits for individual samples can be higher than the method-specified detection limits. Minimum and maximum sample quantitation limits (SQLs) were determined for each non-detect analyte using the sample's SQL.

The frequency of detection is the number of samples with detected values per the number of samples analyzed. The number of samples with detected values was determined by totaling all

samples with detected values. The number of samples analyzed was determined by totaling all samples with detected or nondetected values (flagged with "U", "UJ", "J" or unflagged). Rejected values (flagged with "R") were not included in the total number of samples analyzed. For field duplicate samples, only one value was used when determining the number of samples analyzed and the number of detected values (as determined using the procedure described above).

Constituents detected within the different media include various metals, pesticides, PCBs, and PAHs. A summary of the sampling results that present detection frequency, minimum and maximum detected concentrations, minimum and maximum SQLs, arithmetic mean, and UCL of the mean is presented in Appendix B for each medium. The mean and UCL of the mean were calculated based on the SQL for those samples where a constituent was nondetected. ProUCL (Version 4.04) was used to calculate the summary statistics provided in Appendix B.

2.4 Effects-Based Screening Evaluation

The analytical data were summarized by environmental medium (and northern/southern wetland area for surface soils data). In order to determine if constituents of ecological concern are present for each potential exposure pathway to receptors inhabiting the wetlands area, the concentrations of constituents detected within the surface water, sediment and surface soil samples were compared to screening benchmarks. These benchmarks represent constituent specific concentrations that are identified in the literature to be of concern to a specific ecological receptor group. An exposure pathway is not considered to pose a significant risk if all detected constituents in that exposure medium are below their applicable effects-based screening benchmarks.

Surface water screening benchmarks were used to screen all constituents detected in surface water samples. Surface water quality criteria/benchmarks were obtained from USEPA National Recommended Water Quality Criteria (USEPA, 2006a) and USEPA Region V Ecological Screening Levels (USEPA, 2003). Since only five surface water samples were collected, the maximum detected concentration of each constituent was compared to its applicable surface water screening benchmark. If any constituent was detected at a concentration that exceeds is benchmark, then this exposure pathway is considered complete and further investigated in the Stage II ERC.

For the sediment and surface soil samples, screening benchmarks recommended by MassDEP (2006) were generally used. These benchmarks include benthic invertebrate threshold effect concentrations for organic constituents and mercury (MacDonald, *et al.*, 2000) and benthic invertebrate probable effect concentrations for all remaining inorganic constituents (MacDonald, *et al.*, 2000). For PCBs, the previously established wetland remediation cleanup goal of 1 mg/kg total PCBs established by USEPA and MassDEP was used as the screening benchmark. If all constituents detected in surface soil and/or sediment samples have concentrations (i.e., 95% Upper Confidence Limit (UCL) of the mean concentration) that are less than its benchmark, then that indicates that exposure pathway clearly does not present a significant environmental risk. A brief synopsis of the results of the effects-based screening for each medium (or exposure pathway) is provided below.

2.4.1 Surface Water

A total of five surface water samples were collected from the KMS Wetland. No PAHs or PCBs were detected in the five samples. Several metals including barium, chromium, lead, nickel and zinc were detected in one or more surface water samples (either as total or dissolved concentrations). Surface water benchmarks for metals are based on the dissolved metal fraction present within the water. A comparison of maximum detected surface water constituents with their surface water quality criteria or screening benchmark is presented in Table 2-1.

Barium, nickel and zinc were the only metals detected within the filtered (i.e., dissolved) surface water samples. The maximum detected concentrations of barium and nickel were detected at concentrations below their respective water quality criterion or screening benchmark. However, the concentration of zinc detected at all four of the samples where this metal was detected exceed its respective national recommended water quality criterion, which represents the Massachusetts Surface Water Standard for zinc promulgated in 314 CMR 4.05(5)(e). The existence of a hazardous material potentially attributable to the site that exceeds its water quality criterion meets the threshold standard defined in the Massachusetts Contingency Plan (MCP) regulations, specifically 310 CMR 40.0995(3)(b)(1). As the water quality criterion for zinc is water hardness dependent, it was recommended that the surface water within the aquatic habitat provided by the northern wetland area include additional sampling for zinc and water hardness to further evaluate this potential risk. A total of 19 additional surface water samples were subsequently collected by TRC between July 2009 and August 2010. Each of these samples was analyzed for zinc and water hardness. The results from these additional samples are discussed in the Stage II ERC.

2.4.2 Sediment

A total of 130 sediment samples were collected from the aquatic habitat (i.e., marsh) contained within the northern wetland area of the KMS Wetland. A total of 3 pesticides (4,4-DDT and its derivatives 4,4-DDD and 4,4-DDE), 17 PAHs, PCB Aroclors 1254 and 1260, and 11 inorganics were detected in one or more of the sediment samples. Sampling results were compared to their applicable ecological screening benchmarks (Table 2-2). The 95% UCL of the mean concentrations of all three detected pesticides (4,4-DDT and its derivatives), all detected PAHs, PCB Aroclors 1254 and 1260 (when compared to the total PCBs screening benchmark), and four inorganics (lead, mercury, silver, and zinc) exceed their respective sediment screening benchmarks. Three additional inorganics (barium, selenium and vanadium) detected in one or more sediment samples do not have sediment screening benchmarks available. These exceedences indicate that this pathway presents a potentially significant exposure to ecological receptors and requires further evaluation under a Stage II ERC.

2.4.3 Surface Soil – Southern Wetland Area

Forty-two surface soil samples were collected from the southern wetland area. Analytes detected in these surface soil samples including seven PAHs, three pesticides (DDT and its derivatives), PCB Aroclors 1254 and 1260, and seven inorganics. A comparison of the 95% UCL of the mean concentrations for each constituent with their respective wetland surface soil screening

benchmarks is presented in Table 2-3. The 95% UCL of the mean for all detected analytes except the three detected pesticides (4,4'-DDD, 4,4'-DDE and 4,4'-DDT) are below their associated wetland screening benchmarks. These pesticides were detected in 25% to 38% of the surface soil samples collected from this wetland area and the concentrations of 4,4'DDE and 4,4'-DDT exceed their screening benchmarks by a factor of 10 or greater. Therefore, the presence of these pesticides (as well as all other detected analytes) and their potential ecological risk to ecological receptors should be further investigated in the Stage II ERC.

2.4.4 Surface Soil – Northern Wetland Area

A total of 43 surface soil samples were collected from the northern wetland area. A wide variety of constituents were detected in the surface soil samples including 17 PAHs, PCB Aroclors 1254 and 1260, and 10 inorganics. A comparison of the maximum detected concentrations or 95% UCL for those constituents analyzed in greater number of samples (e.g. PCBs) with their respective surface soil screening benchmarks is presented in Table 2-4. All of the detected PAHs, PCB Aroclors 1254 and 1260 as well as lead, mercury and zinc have maximum of 95% UCL concentrations greater than their respective benchmarks. Therefore, the presence of these analytes and their potential risk to ecological receptors should be further investigated in the Stage II ERC.

3.0 STAGE II ERC – PROBLEM FORMULATION

The Problem Formulation consists of an evaluation of the following:

- Environmental Setting and Potential Receptors;
- Constituent Fate and Transport;
- Complete Exposure Pathways; and
- Assessment and Measurement Endpoints.

The Environmental Setting and Potential Receptors section briefly describe habitats present at or nearby the Site and identifies potential receptor species. Constituents of ecological concern identified in the Stage I ES including their fate and transport mechanisms and toxicological effects are discussed. Complete exposure pathways are also identified. The results of these components are then used to develop the site conceptual model and the proposed assessment and measurement endpoints.

3.1 Environmental Setting and Potential Receptors

The description of the site presented within this section was obtained from previous documents such as the previous ERC that included a description of the KMS Wetland and adjacent areas (ESS, 2005) as well as direct observations by a TRC ecologist during the field activities associated with the Stage I ERC.

The KMS Wetland is approximately 4.2 acres in size and is largely isolated from other undeveloped habitats. A narrow band of forested upland and then dense residential housing is present adjacent to the wetland to the west while roadways and additional densely developed residential areas abut the site to the north (Durfee Street) and south (Ruggles Street). To the east, the Keith Middle School and associated driveways and parking areas are present immediately adjacent to the wetland. The KMS Wetland essentially provides an “island” of undeveloped habitat within a heavily developed and urbanized setting. No known rare plants or animals are known to inhabit the KMS Wetland or are present in the vicinity (ESS, 2005).

Prior to the recent sediment remediation efforts conducted at the site in 2006, the KMS Wetland was representative of a palustrine forested wetland. However, the sediment excavation has resulted in the creation of additional wetland habitat types. Currently, the KMS Wetland can be characterized as the palustrine wetlands system and contain both forested (broad-leaved deciduous), emergent, and open water habitats. The KMS Wetland can be subdivided based on the presence of an existing, elevated roadbed (fill placed but roadway not constructed) that bisects the KMS Wetland into northern and southern wetland areas. A direct hydrological connection between these two wetland areas is not present although the base of the roadbed may allow seepage of surface water between the two areas. The locations of the southern and northern wetland areas as well as each of the identified habitat cover types are presented in Figure 3-1.

The Natural Resources Conservation Service (formerly the Soil Conservation Service) has mapped the soils in Bristol County. The KMS Wetland contains fine sandy loam soil (Whitman soil series). The Whitman soil type is characterized as extremely stony, very poorly drained soils

in depressions or in low-lying areas. These soils consist of a very dense subsurface soil layer at approximately 10 to 30 inches in depth with a water table that is typically at the surface. Slopes within this soil type generally range from 0 to 2 percent.

The southern wetland area is approximately 0.8 acres and consists entirely of a forested wetland. Although a portion of this wetland was formerly excavated in 2006 as a component of the PCB remediation, the excavated soil was backfilled with clean soil/organic matter and replanted with wetland trees and shrubs. Areas of ponded water are not typically present in the southern wetland area except for a very small, seasonally ponded area in the southeast corner of this wetland area. The tree overstory (within the unexcavated portion of this wetland) consists of red maple (*Acer rubrum*) trees approximately 9 to 18 inches diameter at breast height (dbh). The dense shrub understory is comprised of sweet pepperbush (*Clethra alnifolia*) along with gray birch (*Betula populifolia*), highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*) and willow (*Salix* sp.). These latter four species were replanted within the excavated portion of the southern wetland area. Common greenbriar (*Smilax rotundifolia*) and poison ivy (*Toxicodendron radicans*) vines are common while the sparse herbaceous ground vegetation includes sedges (*Carex* spp.) grasses (Poaceae) and Japanese knotweed (*Polyganum japonica*).

The northern wetlands area consists of three different habitat types: forested wetland, emergent wetland dominated by common reed (*Phragmites australis*) and marsh/open water areas where soils were previously excavated for the PCB remediation. The forested portion of the northern wetland area consists of 1.1 acres and is similar to the southern wetland area with red maple and black gum (*Nyssa sylvatica*) present in the tree overstory and sweet pepperbush, highbush blueberry and winterberry holly (*Ilex verticillata*) present in the dense shrub understory. Common greeenbriar forms dense thickets in portions of this wetland area. The herbaceous ground layer of vegetation is comprised of skunk cabbage (*Symplocarpus foetidus*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), and Japanese knotweed. This habitat type is present within the western portion of the northern wetland area.

Emergent wetlands consisting of dense monotypic stands of common reed are present within the northern portion of this wetland area where ponded areas of water exist and soils were not previously excavated for the PCB remediation. Marsh/open water areas are present within those portions of the forested and emergent habitats that were previously excavated for the PCB remediation. The total area of emergent/marsh/open water habitat is approximately 2.3 acres. The marsh/open water habitat represents a shallow/deep marsh cover type with ponded water depths ranging from several inches to greater than three feet. Spring peepers were heard calling from the marsh/open water habitat during a site inspection. Vegetation consists primarily of herbaceous plants including sedges and grasses along with purple loosestrife (*Lythrum salicaria*), cat-tail (*Typha latifolia*) and soft rush (*Juncus effusus*). Common reed and purple loosestrife represent invasive, non-native, plant species. Aquatic plants noted include smartweed (*Polyganum* sp.) and duckweed (*Lemna* sp.). Small hummocks of isolated red maple trees and shrubs are scattered throughout the open water areas. These trees range in size from 6 to 14 inches diameter at breast height (dbh) and likely represent small areas of non-excavated soil during the PCB remediation. Currently, these trees are either dead or stressed but provide nesting sites for various avian species requiring cavities.

Topography within the wetland is very flat with the general direction of surface water flow within this wetland to the north. Surface water flow discharges from the KMS Wetland via a culvert located under Durfee Street. Evidently, the pitch of this culvert is from north to south such that ponded water cannot discharge from the KMS Wetland until a threshold elevation greater than the northern end of the culvert is exceeded. The result is that ponded water is present year-round within the KMS Wetland and surface water flows exiting the KMS Wetland are primarily during the spring and during large storm events.

Although situated within a highly urbanized environment, the forested, emergent and open water wetlands potentially provide suitable habitat for a variety of wildlife species. The various vegetative strata within the forested portions of the wetland provide a wide range of foraging, breeding and cover sites that can be used by amphibians, reptiles, birds and mammals. Birds that breed or forage within the tree canopy or shrub layer are likely to inhabit the wetland as are cavity nesting birds that typically use standing dead trees such as provided by the hummocks within the open water habitat. The herbaceous vegetation, leaf litter, downed trees and branches also provide cover for other ground-nesting birds as well as various amphibians (e.g., frogs), reptiles (e.g., snakes) and small mammals (e.g., mice, voles and shrews). Larger mammalian species such as raccoon and striped skunk are also expected to forage within the wetland complex. Although fish are not present within the aquatic habitat provided by the KMS Wetland, the ponded water provides habitat for several amphibian and reptilian species including various frogs and snakes as well as avian species such as waterfowl and wading birds.

A TRC ecologist conducted site inspections of the KMS Wetland during Spring 2009. Various ecological receptors were noted by TRC within the KMS Wetland including aquatic invertebrates such as water striders, mayflies, and caddisflies, amphibians (spring peepers), and various avian species including Canada geese, mallard, red-winged blackbird, house sparrow, red-tailed hawk, downy woodpecker, northern flicker, common grackle, American robin, Carolina wren and red fox.

3.2 Fate and Transport Characteristics

The site is a wetland adjacent to the Keith Middle School which was constructed at a former recreational area (McCoy Field) underlain by fill material that was relocated to this area from the nearby New Bedford High School. Historic dumping was reported to have occurred prior to the construction of the high school in the early 1970s (BETA, 2005). This PCB-contaminated debris was spread across McCoy Field and then covered with sand/gravel and topsoil around 1994 in order to construct the recreational fields. The edge of the fill material consisted of steep embankments that sloped down to the KMS Wetland. Although fill material was not believed to have been placed directly within the wetlands, impacts to the KMS Wetland appear to have occurred over time due to erosion/sedimentation of the embankments as well as from wind deposition (BETA, 2005). The fate and transport of constituents identified at the KMS Wetland are dependent, in part, upon their physical and chemical properties. Some of these properties important to their fate and transport are solubility, volatility, partition coefficient, biodegradation, and oxidation/reduction.

Potential release mechanisms at the KMS Wetland include releases of sediment-associated constituents to overlying surface water while potential transport mechanisms include surface water transport of constituents within overlying surface waters to downstream environments as well as through erosion and transport of potentially impacted sediment/surface soil by flooding.

The primary constituents detected in environmental media through laboratory analysis at the KMS Wetland (PCBs, pesticides, PAHs and metals) have low solubility and low potential to leach into groundwater. In general, due to high partition coefficients and the infrequent discharge of surface water from the aquatic habitat at the KMS Wetland to downstream environments, transport via surface water flow is not expected to be significant except possibly during flooding events. Fate and transport characteristics are discussed in the following sections.

3.2.1 Polycyclic Aromatic Hydrocarbons (PAHs))

PAHs generally occur in the environment as complex mixtures containing numerous individual PAHs. Due to their relatively high partition coefficients and low water solubility, most PAHs rapidly become adsorbed to organic and inorganic particulate materials and, in aquatic environments, are deposited in sediments (Neff, 1985). Once adsorbed to sediment, PAHs have limited bioavailability to aquatic organisms (Neff, 1985). Sediment-associated PAHs can be accumulated by *bottom*-dwelling invertebrates and fish (Eisler, 1987a). Great Lakes sediments contaminated with elevated levels of PAHs were reported by Eadie *et al.* (1983 in Eisler, 1987a) to be the source of body burdens in bottom-dwelling invertebrates. PAHs are listed as compounds of bioaccumulative concern by the USEPA (2000).

In aquatic environments, exposure to ultraviolet light can result in photomodification of some PAHs to products with increased polarity, water solubility, and toxicity compared to the parent compound. Some of the transport and partitioning characteristics of PAHs are correlated with their molecular weights. Low molecular weight PAHs are associated with increased volatilization and relatively moderate potential to be adsorbed to organic carbon. Higher molecular weight PAHs have a strong tendency to adsorb to organic carbon with little volatilization.

3.2.2 Pesticides/PCBs

Pesticides: The pesticides identified are 4,4'-DDT and its derivatives (4,4'-DDD and 4,4'-DDE) which represent chlorinated pesticides. Organochlorine pesticides such as these are very persistent in the environment and tend to bioaccumulate in both aquatic and terrestrial organisms (USEPA, 1985, 2000). Once acquired, transformation proceeds at a very slow rate due to the complex ring structure and the extent of chlorination. They have a high degree of lipid solubility as characterized by large octanol:water partition coefficients which enables them to concentrate in tissues. Organic carbon partition coefficients are also high which indicates a moderate to strong tendency to adsorb to organic carbon particles. These pesticides generally have low water solubilities, and therefore, are rapidly adsorbed to organic and inorganic particulate material and are not susceptible to leaching.

PCBs: Similar to chlorinated pesticides, PCBs are also persistent with higher chlorinated congeners more persistent than lower chlorinated congeners. PCBs breakdown slowly in the environment through photolysis and microbial degradation. PCBs tend to bioaccumulate and biomagnify in the environment and are of bioaccumulative concern (USEPA, 2000). Due to their high partition coefficients and low water solubility, PCBs are not very mobile and are usually associated with organic matter found in soil and sediment particles.

3.2.3 Inorganics

Metals are found naturally in the earth's crust in various forms. Metals do not readily degrade in the environment but change (e.g., valence state) form based on characteristics (e.g., pH, organic matter, oxidation/reduction) of the media in which they are found. Metals are persistent in the environment and adhere to soil particles. Most metals are not volatile or very soluble in water. Many of the standard chemical/physical fate and transport mechanisms are not applicable to metals. Some metals such as cadmium and mercury may biomagnify within the food chain although most metals tend to bioaccumulate in lower trophic level organisms.

3.3 Ecotoxicity Review

The evaluation of potential ecotoxicological effects was used to evaluate whether the identified constituents cause adverse effects and to focus the Stage II ERC on those ecological receptors who may be exposed to contaminants through applicable exposure pathways. An ecotoxicity literature review has been performed for constituents of concern identified in the Stage I ES and is discussed in the following subsections. Aquatic ecotoxicity information is provided for those constituents detected in surface water and sediment samples while available wildlife ecotoxicity data is presented for all constituents.

3.3.1 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs deposited in sediments can be toxic to benthic invertebrates. In sediment toxicity tests with the tubificid, *Limnodrilus hoffmeisteri*, Lotufo and Fleeger (1996) observed a median lethal phenanthrene level of 298 mg/kg (sediment organic carbon content = 0.7%). In the same study, pyrene levels up to 841 mg/kg were not acutely toxic. Decreases in tubificid reproduction were observed at much lower levels (IC_{25} s [concentration associated with a 25% inhibition in measured endpoint relative to control] of 40.5 mg/kg and 59.1 mg/kg for phenanthrene and pyrene, respectively).

The capacity to metabolize PAHs varies among organisms. Varanasi *et al.* (1985 in ATSDR, 1995) ranked the extent of benzo(a)pyrene metabolism by aquatic organisms as follows: fish > shrimp > amphipod > crustaceans > mussels. The fact that mussels are ranked last may be because mussels show no or limited mixed function oxidase (MFO) activity. MFO is an enzyme system responsible for the initiation of metabolism of various lipophilic organic compounds, including PAHs (Neff, 1985).

PAH exposure in mammalian and avian laboratory species is reported for both low and high molecular weight PAHs (USEPA, 2007a). Juvenile mice orally ingesting 110 mg 2-

methylnaphthalene/kg-body weight/day for 81 weeks exhibited reduced growth (Murata *et al*., 1997 in USEPA, 2007a). Mice orally exposed to benzo(a)pyrene (BaP) for 65 weeks (3.07 mg BaP/kg-body weight/day) were found to have lower survival (Culp *et al*, 1998 in USEPA, 2007a). Little data is available on effects of PAH ingestion to avian species. Patton and Dieter (1980) reported adverse effects on liver function of mallards fed low molecular weight PAHs of 440 mg PAHs/kg-body weight/day over a seven-month period. European starlings (*Sturnus vulgaris*) gavaged with dimethylbenz(a)anthracene at a dose of 20 mg PAHs/kg-body weight/day over a five-day period experienced reduced growth (Trust *et al*., 1994 in USEPA, 2007a).

3.3.2 Pesticides/PCBs

DDT: LC_{50} values between 0.2 and 1,230 µg/L have been reported for aquatic invertebrates exposed to DDT and its breakdown products, DDD and DDE (USEPA, 1980). Other 96-hr LC_{50}s, reported in Mayer and Ellersieck (1986), include 1 µg/L for the freshwater amphipod, *Gammarus lacustris*, and 4 µg/L for the isopod, *Asellus brevicaudus*, as well as 70, 10 and 7 µg/L for mosquito larvae (*Culex fatigans* and *Anopheles albimanus*) and stonefly (*Pteronarcys california*), respectively. The most sensitive freshwater invertebrate reported by Mayer and Ellersieck (1986) was the water flea, *D. pulex*, with a 48-hr EC_{50} of 0.36 µg/L, based on immobilization. In water, DDT is accumulated by invertebrates, which are prey for many ecological receptors.

Median lethal dietary concentrations in the range of 651 to 1,160 mg/kg have been reported for northern short-tailed shrews (*Blarina brevicauda*) exposed to DDT for up to 17 days via a corn oil diet (Blus, 1978). In studies reported in Klaassen *et al.* (1996), female rats given single DDT doses of 50 mg/kg showed estrogenic effects. Also reported are an LD_{50} of 113 mg/kg for male rats fed DDT, and an LD_{50} of 880 mg/kg for rats fed DDE. At sufficiently high doses, DDT can induce death in organisms by interfering with central nervous system transmission through the disruption of sodium ion passage (Connell and Miller, 1984).

Acute median lethal dosages for birds include LD_{50}s of >2,240 mg/kg for mallard ducks and 841 mg/kg for Japanese quail (Hudson *et al.*, 1984). Following chronic exposures to DDT dietary concentrations of 100 mg/kg, 50% of exposed adult mallards died in about one year. DDE has been found to cause eggshell thinning in birds consuming a diet containing DDT and its breakdown products. Weimeyer *et al.*, (1970) found 14 to 15% eggshell thinning in American kestrels (*Falco sparverius*) given a daily DDE dietary concentration of 3 mg/kg for less than 7 months. Stendell *et al*. (1989) fed pine voles (*Microtus pinetorum*) from pesticide-contaminated apple orchards to three captive American kestrels. The pine voles contained 48 mg/kg DDE, 3.5 mg/kg DDD, and 14.1 mg/kg DDT. One of the kestrels, which died at 31 days, contained 147 mg/kg DDE in the carcass (wet weight).

PCBs: PCBs have been shown to cause reproductive failure, birth defects, skin lesions, tumors, liver disorders, and death in fish and wildlife (Eisler, 1986). Due to their high lipid solubility, PCBs bioaccumulate and biomagnify within the food chain. Fish are a major source of PCBs to wildlife. Mink, which consume fish, have been found to be very sensitive to PCBs (Eisler, 1986). A LOAEL for reproductive effects of 3.425 mg/kg-day was observed in mink exposed to

Aroclor-1016 in the diet for 18 months (Aulerich and Ringer, 1980 in Sample *et al.*, 1996). As in mammals, PCBs can severely affect the reproduction of avian piscivores. Waterfowl may also be impacted by PCB contamination. In a study by Heath *et al*. (in Eisler, 1986), LD_{50}s for mallards fed Aroclor-1248 and Aroclor-1260 were associated with dietary concentrations of 2,798 mg/kg and 1,975 mg/kg, respectively. Certain PCB congeners exhibit ecotoxicity responses as expressed by 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The relationship between these PCB congeners and 2,3,7,8-TCDD are correlated by toxicity equivalence factors (TEFs) which is a specific 2,3,7,8-TCDD toxicity value divided by the respective toxicity value of each specific PCB congener. TEFs have currently been developed for 12 PCB congeners. The exposure by ecological receptors to these 12 PCB congeners can subsequently be evaluated by estimating exposure to each individual congener, multiplying that exposure by the congener-specific TEF to derive toxicity equivalence (TEQ), and then summing the congener TEQs to compare to TCDD TEQ toxicity values. The TEF/TEQ methodology was utilized in this Stage II ERC.

3.3.3 Inorganics

Barium: Barium readily forms insoluble carbonate and sulfate salts that have low toxicity, but soluble barium salts may be toxic (USEPA, 1985). BCFs for barium in marine animals, plankton and brown algae are 100, 120 and 260, respectively (ATSDR, 1992). Although there is some evidence that barium may bioconcentrate in certain terrestrial plants and aquatic freshwater organisms, the extent of plant uptake and the subsequent uptake by aquatic or terrestrial animals is not known (ATSDR, 1992). Barium is not considered to be a bioaccumulative compound of concern in the environment (USEPA, 2000). Guidelines for the pollution classification of Great Lakes harbor sediments classify sediment barium concentrations of <20, 20-60, and >60 mg/kg as non-polluted, moderately polluted, and heavily polluted, respectively (USEPA, 1977 in Beyer, 1990).

Oral LD_{50}s for barium (as barium carbonate) are reported as 418 and 200 mg/kg for rats and mice, respectively (Sax and Lewis, 1989). Exposure of barium chloride to rats via water consumption over a 16-month period resulted in a NOAEL of 5.1 mg/kg-day for effects on growth and hypertension (Perry *et al*., 1983 in Sample *et al.*, 1996).

Lead: Lead is toxic to all phyla of aquatic biota (Wong *et al*., 1978 in Eisler, 1988). Based on a review of toxicity testing literature, Eisler (1988) reported adverse effects to aquatic biota associated with lead concentrations ranging from 1 to 5.1 µg/L. Lead is considered to be a bioaccumulative compound of concern in the environment (USEPA, 2000).

For domestic and laboratory animals, Eisler (1988) reported that survival was reduced at acute oral doses of 5 mg/kg (rat), at chronic oral doses of 5 mg/kg-day (dog), and at dietary doses of 1.7 mg/kg-day (horse). Lead affects the kidneys, bone and central nervous system in mammals and can have adverse effects on histopathology, neuropsychology, fetotoxicity, growth and reproduction (Eisler, 2000). In addition, lead may interfere with enzymes involved in cellular oxidative processes, and possibly affect the release of impulses at certain nerve endings (Locke and Thomas, 1996). The primary source of lead poisoning in wild waterfowl, and in large

raptors that prey on waterfowl, has been the ingestion of shotgun pellets (Locke and Thomas, 1996).

Adverse effects associated with lead in soil have been documented for terrestrial plants (Bysshe, 1988; Eisler, 1988). Earthworms may bioaccumulate lead (Beyer, 1990; Roberts and Dorough, 1985), and high concentrations of lead may be toxic to earthworms, affecting both survival and reproduction. Eisler (1988) generalized that organolead compounds are more toxic than inorganic lead compounds, and that younger organisms are more susceptible than older organisms.

Mercury: Mercury is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects. Methylmercury can be bioconcentrated in organisms and biomagnified through food chains (Wolfe *et al*., 1998; Eisler, 1987b). Although inorganic mercury is not considered to be a bioaccumulative compound of concern in the aquatic environment, methylmercury bioaccumulates and biomagnifies into higher trophic levels (USEPA, 2000).

Chronic values for inorganic (or total) mercury are 0.96 µg/L for daphnids (*D. magna* in flow-through life-cycle tests) (Call *et al.,* 1983; Biesinger *et al.,* 1982, respectively, in Suter and Tsao, 1996). The transformation of inorganic mercury by anaerobic sediment microorganisms produces methylmercury (Wolfe *et al.,* 1998). Chronic values for methylmercury are reported as 0.52 µg/L for fish (brook trout in three-generation life-cycle test) and <0.04 µg/L for daphnids (McKim *et al.,* 1976; Biesinger *et al.,* 1982, respectively, in Suter and Tsao, 1996).

As summarized in Sample *et al*. (1996), reproductive NOAELs for animals exposed to mercury in their diet include 1 mg/kg-day for mink exposed to mercuric chloride for 6 months (Aulerich *et al*., 1974 in Sample *et al*., 1996), 0.45 mg/kg-day for Japanese quail exposed to mercuric chloride for 1 year (Hill and Schaffner, 1976 in Sample *et al.*, 1996), 13.2 mg/kg-day for mice exposed to mercuric sulfide for 20 months (Revis *et al.,* 1989 in Sample *et al.*, 1996), and 0.032 mg/kg-day for rats exposed to methyl mercury chloride over 3 generations (Verschuuren *et al*., 1976 in Sample *et al.*, 1996).

Selenium: In flow-through toxicity studies, selenium, as selenate, was found to reduce larval fathead minnow biomass at 108.1 ug/L (LOEC) and to impair algal and rotifer population growth rates at similar concentrations. As reported in Suter and Tsao (1996), LCVs for fish, daphnids, and aquatic plants are 88.32, 91.65 and 100 ug/L, respectively.

Regardless of the original source, adverse environmental effects appear to result largely from transfer of selenium from lower to higher trophic levels (Riedel and Sanders, 1996). High bioconcentration and accumulation of selenium from water by numerous species of algae, fish, and invertebrates is well documented at levels of 0.015 to 3.3 ug/kg (Eisler, 1987c). Selenium is considered to be a bioaccumulative compound of concern in the environment (USEPA, 2000).

Mortality, gross malformations, and internal abnormalities of the young of several wetland bird species have been observed where high selenate concentrations exist (up to 350 ug/L) (Ohlendorf *et al*., 1986; Ohlendorf *et al*., 1990 in Riedel and Sanders, 1996). In mammals, selenium is an

essential trace element that shows evidence of toxicity at higher doses. Based on biological effects data compiled from the literature, sediment selenium concentrations of 2.5 mg/kg would be a threshold based on predicted effects, and concentrations of 4.0 mg/kg would be the observed threshold for fish and wildlife toxicity (Van Derveer and Canton, 1997).

Vanadium: Information on the toxicity and biological fate of vanadium is limited. In a study conducted with mallard ducks, individuals were exposed to vanadyl sulfate in their diet for 12 weeks. The NOAEL for mortality, body weight, and blood chemistry was 11.38 mg/kg-day (White and Dieter, 1978 in Sample *et al.*, 1996). Vanadium is not considered to be a bioaccumulative compound of concern in the aquatic environment (USEPA, 2000).

Zinc: Adverse effects of zinc exposure have been documented on the growth, reproduction, and survival of freshwater species of aquatic plants, invertebrates, and vertebrates at concentrations between 10 and 25 µg/L (Eisler, 1993). 96-Hour LC_{50} values for freshwater invertebrates range from 32 to 40,930 µg/L and from 66 to 40,900 µg/L for freshwater teleosts (Eisler, 1993). LCVs for fish, daphnids, non-daphnid invertebrates, and aquatic plants are 36.41, 46.73, >5,243, and 30 µg/L, respectively (Suter and Tsao, 1996). BCF values ranged from 107 to 1,130 for insects and from 51 to 432 for freshwater fish (USEPA, 1980 in Eisler, 1993). Zinc is considered to be a bioaccumulative compound of concern in the aquatic environment (USEPA, 2000).

Varying concentrations of zinc may also affect sediment invertebrates. At a mine tailings site, populations of freshwater oligochaetes and leeches were reduced in numbers of individuals and numbers of taxa in areas where the concentration of zinc in sediment was >20 g/kg (Willis, 1985 in Eisler, 1993).

Reduced survival has been reported for terrestrial plants (sensitive species) and soil invertebrates at soil concentrations of >100 mg/kg and from 470 to 6,400 mg/kg, respectively (Eisler, 1993). Increased dietary zinc has also been shown to have adverse effects on poultry, avian wildlife, livestock and laboratory animals (Eisler, 1993).

3.4 Complete Exposure Pathways

A variety of exposure pathways may potentially affect ecological receptors inhabiting the KMS Wetland. Aquatic organisms such as amphibians and aquatic macroinvertebrates that inhabit the aquatic habitat provided by the KMS Wetland are directly in contact with constituents present in surface water and sediment and/or potentially feed on organisms residing there. For these aquatic habitats, additional exposure pathways potentially exist to higher trophic level receptors such as mallards and red-winged blackbirds that forage on vegetation and/or macroinvertebrates present in this habitat. Ingestion of constituents present within their food as well as via incidental sediment ingestion are viable exposure routes for these higher trophic levels.

The forested wetland habitat present within both the southern and northern wetland areas provides habitat for a variety of wildlife including herbivorous species such as mourning doves and voles, insectivorous species such as shrews and American robin as well as carnivorous species including the red-tailed hawk and red fox. These terrestrial receptors may be exposed to constituents present within the forested wetlands due to potential ingestion of contaminated

plants, invertebrates and small mammals that have bioaccumulated elevated levels within their tissues from impacted surface soils.

Exposure of biota to subsurface soils and airborne impacts (through volatization or fugitive dust emissions) via inhalation or dermal contact are not expected to represent as significant a pathway as direct ingestion of contaminated media or ingestion of contaminated biota in the food chain.

In summary, a complete exposure pathway exists if the ecological receptors have contact with the constituent in one or more media and there is an exposure route (ingestion, direct contact) to the receptor. Organisms most likely to receive potential exposures to site constituents are those whose activities frequently bring them into direct contact with surface water, sediment and/or surface soil or that feed upon species possessing one or both of these characteristics.

3.5 Site Conceptual Model

The site conceptual model developed for the KMS Wetland is based primarily on the information previously presented in this section concerning the environmental setting, toxicity as well as fate and transport characteristics, and the complete exposure pathways identified above. Figure 3-2 presents a simplified conceptual model for the KMS Wetland area. Primary and secondary ecological receptors and important exposure pathways are identified for both aquatic and non-aquatic (i.e., forested wetland) habitats present within the KMS Wetland.

Past activities associated with the disposition of fill material at McCoy Field prior to the construction of the Keith Middle School have apparently resulted in impacts to the wetland habitats. Important components of the ecological community within this wetland include plants, insects and other invertebrates, amphibians, reptiles, birds and mammals that represent a diverse assemblage of feeding guilds. The constituents detected within the surface water, sediments and surface soils of the KMS Wetland may potentially affect ecological receptors directly via contact (e.g., benthic community inhabiting contaminated sediments) or may bioaccumulate within vegetation and invertebrates that are subsequently consumed by receptors occupying higher trophic levels within the wetland habitats.

3.5.1 Assessment Endpoints

Assessment endpoints are specific selected ecological characteristics (like diversity and growth) that are evaluated in the Stage II ERC. In accordance with the MCP, TRC selected assessment endpoints that provide:

- A clear operational definition;
- An ability to predict and measure a response;
- A susceptibility to constituents of concern (i.e., an exposure pathway is present);
- Ecological relevance (i.e., important feature to ecological health of wetland); and,
- Relevance to program objectives (e.g., wetland species or community is meaningful and valued by society).

Table 3-1 presents the assessment endpoints that were selected for the Stage II ERC. The selected assessment endpoints represent both community level endpoints (e.g., benthic macroinvertebrate diversity and productivity) and population level endpoints (e.g., survival, growth and reproduction of particular guilds such as the local subpopulation of insectivorous birds). The selected assessment endpoints represent both primary trophic level and secondary level receptors as these species may be adversely affected either directly by the concentrations of the various constituents present within the sediments and soils or by foraging on plants or invertebrates that have experienced bioaccumulation. The assessment endpoints selected for the Stage II ERC are:

Amphibian Community Diversity and Abundance

Amphibians inhabiting the aquatic habitats present at the KMS Wetland are directly exposed to the detected surface water constituents. Elevated concentrations of surface water constituents may result in a reduction in amphibian survival, growth or reproduction rate, which would influence amphibian abundance and potentially affect the diversity of amphibians subsequently inhabiting the wetland. The proposed assessment endpoint is:

> *Protection of the amphibian community from toxic effects that could adversely affect their diversity or abundance through direct exposure to constituents present within surface water.*

Benthic Macroinvertebrate Community Diversity and Abundance

Aquatic benthic macroinvertebrates present within the aquatic habitat of the KMS Wetland may be adversely affected by the presence of constituents within the sediment. Concentrations of constituents in the sediment of the aquatic habitat of the KMS Wetland may result in lower populations or biomass of invertebrates through increased mortality or a reduction in their growth and/or reproduction. The proposed assessment endpoint is:

> *Protection of the aquatic benthic macroinvertebrate community from toxic effects that could adversely affect their diversity or abundance through direct exposure to constituents present within sediment.*

Avian Aquatic Herbivore Survival, Reproduction, and Growth

Avian species associated with the KMS Wetland may forage within the aquatic habitats on vegetation. Vegetation may accumulate constituents within their tissues and be consumed by foraging herbivores resulting in potentially toxic effects. In addition, sediment associated with the KMS Wetland may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of herbivorous birds from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation as well as incidental ingestion of contaminated sediment.*

Mammalian Aquatic Herbivore Survival, Reproduction, and Growth

Mammalian species associated with the KMS Wetland may forage and consume plants within the aquatic habitats present in the northern wetland area. Aquatic plants may accumulate constituents and be consumed by herbivorous species resulting in potentially toxic effects. In addition, sediment associated with the KMS Wetland may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of herbivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation as well as incidental ingestion of contaminated sediment.*

Avian Aquatic Omnivore Survival, Reproduction, and Growth

Avian species associated with the KMS Wetland may forage within or along the aquatic habitats for aquatic macroinvertebrates and vegetation. Both vegetation and aquatic macroinvertebrates may accumulate constituents within their tissues and be consumed by receptor species resulting in potentially toxic effects. In addition, sediment associated with the KMS Wetland may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of omnivorous birds from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation and aquatic invertebrates as well as incidental ingestion of contaminated sediment.*

Mammalian Semi-Aquatic Omnivore Survival, Reproduction, and Growth

Mammalian species associated with the KMS Wetland may forage within or along the aquatic habitats for aquatic macroinvertebrates and vegetation. Both vegetation and aquatic macroinvertebrates may accumulate constituents within their tissues and be consumed by foraging omnivorous species resulting in potentially toxic effects. In addition, sediment associated with the KMS Wetland may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of omnivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation and aquatic invertebrates as well as incidental ingestion of contaminated sediment.*

Avian Aquatic Insectivore Survival, Reproduction, and Growth

Avian species associated with the KMS Wetland may forage within or along the aquatic habitats for aquatic macroinvertebrates (including recently emergent insects such as mayflies). Aquatic macroinvertebrates may accumulate constituents within their tissues and be consumed by foraging insectivorous species resulting in potentially toxic effects. In addition, sediment

associated with the KMS Wetland may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of insectivorous birds from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of aquatic invertebrates as well as incidental ingestion of contaminated sediment.*

Mammalian Semi-Aquatic Insectivore Survival, Reproduction, and Growth

Mammalian species inhabiting the KMS Wetland may forage above or along the aquatic habitats for aquatic macroinvertebrates (particularly on recently emergent insects such as midges/mayflies). Aquatic macroinvertebrates may accumulate constituents within their tissues and be consumed by foraging insectivorous species resulting in potentially toxic effects. The proposed assessment endpoint is:

> *Protection of insectivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of aquatic invertebrates.*

Avian Terrestrial Omnivore Survival, Reproduction and Growth

Birds present at the KMS Wetland may forage within the forested wetland habitats on plants (e.g., leaves, seeds) and invertebrates (e.g., worms, arthropods). Vegetation and invertebrates may accumulate constituents within their tissues and be consumed by foraging omnivorous avian species resulting in potentially toxic effects. In addition, surface soils associated with these habitats may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of omnivorous birds from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation and terrestrial invertebrates as well as incidental ingestion of contaminated surface soils.*

Mammalian Terrestrial Omnivore Survival, Reproduction and Growth

Constituents present within vegetation and/or terrestrial invertebrates within the forested wetland habitat associated with the KMS Wetland may adversely affect foraging mammalian omnivores. Vegetation and invertebrates may bioaccumulate constituents in their tissues and as these food items are is subsequently consumed by omnivores foraging within the forested wetland habitat, toxic effects may occur. These receptors may also ingest surface soil during their foraging activities. The proposed assessment endpoint is:

> *Protection of omnivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of vegetation and terrestrial invertebrates and incidental ingestion of contaminated surface soils.*

Mammalian Insectivore Survival, Reproduction and Growth

Mammals present within the KMS Wetland may forage within the forested wetland habitats for terrestrial invertebrates (e.g., beetles, earthworms). Terrestrial invertebrates may accumulate constituents within their tissues and be consumed by foraging insectivorous species resulting in potentially toxic effects. In addition, surface soils associated with the forested wetland areas may be ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of insectivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of terrestrial invertebrates as well as incidental ingestion of contaminated surface soils.*

Avian Carnivore Survival, Reproduction and Growth

Carnivorous birds present within the KMS Wetland may forage within the forested wetland areas and consume small mammals that may have accumulated constituents within their tissues. The consumption of these items by foraging carnivorous species may potentially result in toxic effects. The proposed assessment endpoint is:

> *Protection of carnivorous birds from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of terrestrial vertebrates as well as incidental ingestion of contaminated surface soils.*

Mammalian Carnivore Survival, Reproduction and Growth

Carnivorous mammals present within the KMS Wetland represent tertiary trophic level receptors that may forage within the forested wetland habitats and consume small mammals that may have accumulated constituents within their tissues. The consumption of these vertebrates by foraging carnivorous species may result in potentially toxic effects. In addition, surface soils associated with the forested wetland habitats may be incidentally ingested by these receptors during their foraging activities. The proposed assessment endpoint is:

> *Protection of carnivorous mammals from toxic effects that could adversely affect their survival, reproduction, or growth through exposure to constituents from ingestion of terrestrial small mammal prey as well as incidental ingestion of contaminated surface soils.*

3.5.2 Measurement Endpoints

Measurement endpoints are used to evaluate responses of each assessment endpoint exposed to a stressor (USEPA, 1997). The measurement endpoints proposed for the Stage II ERC are also presented in Table 3-1. Community-based measurement endpoints were selected for community level assessment endpoints and evaluated via community toxicity values (e.g., water quality criteria, sediment quality criteria or benchmarks) as well as sediment toxicity tests on two test species, the midge *Chironomus tentans* and an amphipod, *Hyalella azteca*. For population level endpoints that assess receptor guilds present within the exposure areas (as detailed in the site

conceptual model), specific indicator species were selected to evaluate potential risks to these guilds.

Specific indicator species selected include the Canada goose (*Branta canadensis*), muskrat (*Ondatra zibethicus*), mallard (*Anas platyrhynchos*), raccoon (*Procyon lotor*), marsh wren (*Cistothorus palustris*), little brown bat (*Myotis lucifugus*), American robin (*Turdus migratorius*), white-footed mouse (*Peromyscus leucopus*), short-tailed shrew (*Blarina brevicauda*), red-tailed hawk (*Buteo jamaicensis*) and red fox (*Vulpes vulpes*).

For the aquatic habitat provided by the northern wetland area of the KMS Wetland, the Canada goose and muskrat represent herbivorous species that feed on vegetation while the marsh wren and little brown bat represent insectivorous species that may forage on recently emerged aquatic insects. Mallards and raccoon represent species that may forage on both vegetation and aquatic invertebrates within or along the periphery of the aquatic habitat. Estimated exposure doses will be compared to chronic No Observable Adverse Effect Level (NOAEL) and Lowest Observable Adverse Effect Level (LOAEL) survival, reproductive, or growth effect levels reported in the literature.

Omnivorous small mammals and birds inhabiting the northern and southern forested wetland areas may indirectly consume constituents that have accumulated in vegetation and terrestrial invertebrates as well as directly via ingestion of surface soil. The American robin and white-footed mouse were selected to represent these feeding guilds at the KMS Wetland. Mammalian insectivores represented by the short-tailed shrew are exposed to surface soil constituents either directly via soil ingestion or indirectly by preying on invertebrates that have experienced bioaccumulation within their tissues. Finally, upper trophic level species such as carnivores that are represented by the red-tailed hawk and red fox may be exposed to constituents that accumulate within the tissues of small mammals which are subsequently consumed by these predators. Estimated exposure doses for each of these indicator species will be compared to chronic NOAEL and LOAEL survival, reproductive, or growth effect levels reported in the literature. An exposure dose that exceeds the chronic NOAEL indicates effects are possible while an exposure dose that exceeds a LOAEL suggests adverse effects are likely.

For each of the individual indicator species discussed above, the assessment endpoint references an impact on survival, growth or reproduction of a population. Adverse effects on populations can be inferred from measures associated with impaired survival, growth or reproduction.

4.0 STAGE II ERC – ANALYSIS PHASE

The analysis component of the risk assessment consists of assessing the exposure of the selected measurement receptors to the constituent present at the KMS Wetland (Exposure Assessment) and determining the toxicity of these constituents to the receptors (Toxicity Assessment).

4.1 Exposure Assessment

Exposure represents the contact (including ingestion) of a measurement receptor with an impacted medium through the various exposure pathways identified in Section 3.4. Exposure to community measurement receptors (i.e., amphibians and benthic invertebrates) is simply represented by the concentrations within the media of concern that the particular community inhabits. Surface water (total and dissolved) and sediment concentrations for the aquatic habitat present within the KMS Wetland are provided in Attachment A with a statistical summary of this data provided in Attachment B. The 95% UCL of the mean concentration (or the maximum detected concentration if the calculated 95% UCL exceeds the maximum detected concentration) is assumed to represent the exposure point concentration for these community receptors. For PCBs, the TEF/TEQ approach (USEPA, 2008) was used to evaluate risk to higher trophic level receptors that forage within the northern wetland area aquatic and forested wetland habitats. Three PCB congener/total PCB sediment samples were collected from the aquatic habitat provided by the northern wetland area while one PCB congener/total PCB surface soil sample was collected from the forested habitat present within the northern wetland. Detected concentrations of total PCBs were compared to detected concentrations (or reporting limit if undetected) of the 12 PCB congeners exhibiting dioxin-like toxicity to develop congener-specific ratios for each of the habitat types present in the northern wetland. These ratios were then applied to the 95% UCL of the mean for total PCBs to provide site-specific PCB congener concentrations that were subsequently used in the food chain exposure assessment. The calculated ratio of PCB congeners to total PCBs determined for each habitat exposure area is provided in Table 4-1.

Exposure to constituents via the food chain is evaluated by modeling exposure to the selected indicator species for the aquatic and forested wetland habitats. The exposure scenarios developed in the Problem Formulation place measurement receptors within exposure pathways that are most likely to contribute to intake.

The selected indicator species may be exposed to sediment/surface soil constituents through direct ingestion and through consumption of vegetation, invertebrates, and/or small mammals that have accumulated constituents through bioaccumulation processes. The purpose of the exposure assessment is to formulate these exposure pathways into algorithms that can predict an estimate of total exposure.

The methods and calculations required for quantification of exposure doses are described within this section. Exposure to constituents at the site by the selected indicator species is estimated by the following equation:

$$ED = (SW_{conc} \times SWIR))(AUF)(TUF)/BW + [(S_{conc} \times S_{diet}) + (P_{conc} \times P_{diet}) + (I_{conc} \times I_{diet}) + (SM_{conc} \times SM_{diet})](FIR)(AUF)(TUF)/BW$$

Where:

ED	=	Exposure Dose (mg/kg-body weight-day);
S_{conc}	=	Sediment or Surface Soil constituent concentration (mg/kg);
S_{diet}	=	% of diet sediment or surface soil comprises;
SW_{conc}	=	Surface Water constituent concentration (mg/L);
SWIR	=	Surface Water ingestion rate (L/day);
P_{conc}	=	Plant (aquatic/terrestrial) constituent concentration (mg/kg);
P_{diet}	=	% of diet plants (aquatic or terrestrial) comprise;
I_{conc}	=	Invertebrate (aquatic/terrestrial) constituent concentration (mg /kg);
I_{diet}	=	% of diet invertebrates (aquatic or terrestrial) comprise;
SM_{conc}	=	Small mammal constituent concentration (mg/kg);
SM_{diet}	=	% of diet small mammals comprise;
FIR	=	Food ingestion rate (kg/day);
TUF	=	Temporal use factor (% of year at exposure area);
AUF	=	Area use factor (% of home range comprised of exposure area); and
BW	=	Body weight of indicator species (kg).

Dietary information for the selected indicator species was obtained from Sample and Suter (1994) and USEPA (1993). Specifically, food ingestion rates, body weights, as well as surface water and surface soil/sediment ingestion rates were obtained from these sources. The model inputs for the selected indicator species are presented in Table 4-2.

4.1.1 Constituent Concentrations in Plants

Concentrations of constituents in vegetation (both aquatic and terrestrial stems/foliage and fruits/seeds) were determined by multiplying the mean UCL sediment/surface soil concentrations by an appropriate plant uptake factor. The estimated constituent concentrations within plant tissue were estimated using several sources. Plant uptake factors presented in USEPA eco-SSLs (USEPA 2007b) were used if available. These plant uptake factors are generally based on previous studies where both plant and soil concentrations were reported. These data were then combined and regression was first used to determine an appropriate plant uptake factor.

A plant uptake factor for mercury was based on a value presented in USEPA (1999) for mercuric chloride. The plant uptake factors for the PCB congeners were calculated based on the regression equation presented in Travis and Arms (1988). This plant uptake factor was developed from paired soil and plant concentration data for 29 organic compounds relating soil-to-plant uptake to an organic compounds octanol-water partition coefficient (K_{ow}). The plant uptake factors and calculated 95% UCL of the mean plant tissue (foliage, fruit and/or seed) concentrations are presented in Table 4-3 for the aquatic habitats provided by the open water/marsh areas and Table 4-4 for the southern and northern forested wetland areas.

4.1.2 Constituent Concentrations in Aquatic Invertebrates

The estimated constituent concentrations in aquatic invertebrates inhabiting the aquatic habitat of the northern wetland area are derived through the application of a biota:sediment accumulation factor (BSAF) to the mean UCL sediment concentrations. BSAFs for organic constituents of concern were obtained from the USEPA BSAF Data Set (USEPA, 2007c). The BSAFs represent actual field data collected for nonpolar organics from 20 locations (primarily Superfund sites). BSAFs were determined based on sediment and organic carbon concentrations as well as the lipid content of the aquatic organism.

For inorganics, BSAFs determined by Bechtel Jacobs (1998) from previous field and laboratory studies were used, if available. BSAFs are available for lead, mercury and zinc. An assumed BSAF of 1.0 was used to estimate aquatic invertebrate concentrations of selenium and silver since each of these represents a bioaccumulative compound of concern (USEPA, 2000). A BSAF of 0.0 was assumed for non-bioaccumulative compounds (i.e., barium, vanadium). The mean UCL estimated aquatic invertebrate concentrations are presented in Table 4-5.

4.1.3 Constituent Concentrations in Terrestrial Invertebrates

The mean UCL concentrations of constituents detected within surface soil samples collected from the northern and southern forested wetlands were used to estimate body burdens within invertebrate prey (e.g., insects/earthworms). The estimated constituent concentrations within terrestrial invertebrates were estimated using several sources. BAFs for organics were calculated based on the method presented in Jager (1998) which is based on partitioning between soil solids, soil pore water and the fraction of lipid content within the organism's tissues. The basic assumption underlying this partitioning model is that invertebrates are in equilibrium with the aqueous phase of the surface soil.

For inorganics, earthworm bioaccumulation factors (BAFs) presented in USEPA eco-SSLs (USEPA 2007b) were used if available. The USEPA eco-SSLs used actual BAF ratios (invertebrate tissue:surface soil concentrations) or regression equations relating constituent concentrations in soil and earthworm tissue (Sample *et al.*, 1998) to estimate burdens of barium, lead, selenium, vanadium, and zinc in terrestrial invertebrates. In general, these body burdens are very conservative in that they represent the upper 95% prediction limit for these metals (Sample *et al*., 1998). The bioaccumulation factor for mercury is based on the BAF presented in USEPA (1999). This value represents the geometric mean of laboratory studies that determined actual BAFs (USEPA, 1999). The BAFs and estimated mean UCL concentrations in terrestrial invertebrates are presented in Table 4-6.

4.1.4 Constituent Concentrations in Small Mammals

The mean UCL constituent concentrations within small mammal tissue at the forested wetland habitats were obtained from several sources. Bioaccumulation factor equations presented in the USEPA eco-SSLs (USEPA 2007b) were used if available. BAFs were available for the pesticides 4,4'-DDT and 4,4'DDE and all inorganics of concern except mercury. The inorganic

BAFs are based primarily on diet-to-biota biouptake factors developed for beef cattle (Baes *et al.*, 1984). A BAF for mercury (total) was obtained from USEPA (1999).

BAFs for PAHs are assumed to be 0.0 (USEPA, 2007b) due to rapid metabolism and breakdown of PAHs after ingestion by small mammals. For the PCB congeners and 4,4-DDD, a biotransfer factor (BTF) was calculated from the following equation presented in Travis and Arms (1988): BTF = -7.6 + Log K_{ow}. This equation was developed based on regression analysis which noted that BTFs determined for 36 organic chemicals were directly proportional to their corresponding octanol-water partition coefficient (Travis and Arms, 1988).

The BTF obtained from Travis and Arms (1988) was then multiplied by the daily ingestion rate of an omnivorous small mammal at the KMS Wetland (white-footed mouse) to derive the BAF. This BAF was then multiplied by the mean UCL diet concentration of the white-footed mouse (based on 69% seed and 31% terrestrial invertebrate diet) to obtain the concentration within the tissue of the small mammal. The BAFs and estimated mean UCL concentrations in small mammals are presented in Table 4-7.

4.1.5 Exposure Estimation for Avian/Mammalian Receptors

The daily dose estimate was calculated for each of the avian/mammalian receptors based on the mean UCL concentration detected within sediment samples collected from the aquatic habitat provided by the northern wetland and/or surface soil samples collected from the forested wetlands present within the northern and southern wetlands.

Sediment and surface soil ingestion rates were calculated by multiplying estimates of sediment/surface soil ingestion found in the literature (expressed as a percentage of total food intake) by the food consumption rate. It was conservatively assumed that surface water present within the aquatic habitat of the northern wetland provided drinking water for both aquatic and terrestrial receptor species including species residing in the southern wetland area. Total recoverable metal results were used for estimating surface water exposure. Exposure factors for each of the 11 receptor species are presented in Table 4-2.

For PCB congeners, an exposure estimate for avian species was calculated based on the estimated concentrations within their eggs as this represents the best method for assessing avian risk to PCB congeners exhibiting dioxin-like toxicity (USEPA, 2008). Lipid-normalized bioaccumulation factors (BAFs) for bird eggs:invertebrates presented in Froese *et al*. (1998) were used for the mallard, marsh wren, and American robin to derive estimated PCB congener concentrations in their eggs assuming a diet comprised exclusively of aquatic invertebrates. Although PCB congener BAFs from vegetation or small mammals to avian receptors were not located in the literature, it was conservatively assumed that the bird egg:invertebrate lipid-normalized BAFs are applicable for bird egg:vegetation and bird egg:small mammal BAFs after normalizing vegetation and small mammal PCB congener concentrations to percent lipids.

Mammal PCB congeners were evaluated based on the concentration of PCB congeners in their diets (USEPA, 2008). The percent contribution of individual food items (e.g., vegetation, invertebrates, sediment) were used to derive an average concentration of PCB congeners in each

mammal's diet that was then used to evaluate risk via the TEF/TEQ methodology (USEPA, 2008).

Canada Goose

A body weight of 3.45 kg and a food and surface water ingestion rate of 0.107 kg food (wet weight) and 0.135 liter (L) per day, were obtained from the literature, respectively (USEPA, 1993). The mean UCL sediment concentration was used to estimate dietary dose from incidental sediment ingestion (8.2% of diet) and to estimate aquatic plant tissue concentrations (Table 4-3). Dietary exposure for the Canada goose assumes a diet comprised of 100% aquatic vegetation and that the goose forages at the KMS Wetland exclusively for four months of the year (see Table 4-2). The resulting estimated mean UCL daily dose ingested by the Canada goose for each constituent within the sediments of the aquatic habitat are presented in Table 4-8. Table 4-9 estimates the concentrations of PCB congeners within eggs of the Canada goose.

Muskrat

The muskrat is assumed to forage exclusively on aquatic vegetation present within the aquatic habitat of the northern wetland area throughout the year. A body weight of 1.35 kg and an ingestion rate of 0.459 kg food (wet weight) per day were obtained from the literature (USEPA, 1993). The mean UCL constituent sediment concentration was used to estimate aquatic vegetation concentrations (Table 4-3). Exposure from surface water and sediment ingestion were also evaluated based on estimated surface water (0.13 L/day) and sediment (2.4% of diet) ingestion rates. The resulting estimated mean UCL daily doses ingested by the muskrat for each constituent within the sediment of the northern wetland area aquatic habitat are presented in Table 4-10 while Table 4-11 presents dietary PCB congener doses.

Mallard

A body weight of 1.04 kg and an ingestion rate of 0.136 kg food (wet weight) per day were obtained from the literature (USEPA, 1993). The mean UCL sediment concentration was used to estimate aquatic vegetation (seeds) and invertebrate tissue concentrations (Tables 4-3 and 4-5). Dietary exposure for the mallard assumes a diet comprised of 66% aquatic invertebrates and 34% aquatic vegetation (seeds)(see Table 4-2). The home range of a mallard is estimated to be approximately 274 acres during the breeding season (USEPA, 1993) and the mallard is expected to forage within the aquatic habitat provided by the KMS Wetland for nine months of the year (all year except during ice cover). Surface water and sediment ingestion were assumed to be 0.058 L/day and 2% of diet, respectively (USEPA, 1993). The resulting estimated mean UCL daily doses ingested by the mallard for each constituent of concern within the sediment of the aquatic habitat are presented in Table 4-12. Egg concentrations of PCB congeners are estimated in Table 4-13.

Raccoon

The raccoon is assumed to forage both on aquatic invertebrates (58% of diet) and vegetation (seeds) present within the aquatic habitat of the northern wetland area throughout the year (see Table 4-2). The home range of a raccoon within a dense suburban area such as present in the

vicinity of the KMS Wetland is estimated to be approximately 48.5 acres (Kaufmann, 1982). A body weight of 5.74 kg and an ingestion rate of 1.36 kg food (wet weight) per day were obtained from the literature (USEPA, 1993). The mean UCL constituent sediment concentration was used to estimate aquatic vegetation and aquatic invertebrate concentrations (Tables 4-3 and 4-5). Exposure from surface water and sediment ingestion were also evaluated based on estimated surface water (0.477 L/day) and sediment (9.4% of diet) ingestion rates. The resulting estimated mean UCL daily doses ingested by the raccoon for each constituent within the sediment of the northern wetland area aquatic habitat are presented in Table 4-14. Table 4-15 estimates the dietary PCB congener doses for the raccoon.

Marsh Wren

A body weight of 10.6 grams (0.0106 kg) and an ingestion rate of 0.0071 kg food (wet weight) per day were obtained from the literature (USEPA, 1993) indicating that this receptor eats nearly 75% of its entire weight each day. Marsh wrens ingest an estimated 0.003 L/day of water per day although sediment ingestion is assumed to be negligible since this bird gleans invertebrates from vegetation. The mean UCL sediment constituent concentration was used to estimate aquatic invertebrate tissue concentrations (Table 4-5). Dietary exposure for the marsh wren assumes a diet comprised of 100% aquatic invertebrates and conservatively assumes that the wren would forage at the KMS Wetland for six months of the year (see Table 4-2). The resulting estimated mean UCL daily doses ingested by the marsh wren for each sediment constituent of concern are presented in Table 4-16 while estimated egg concentration of PCB congeners are calculated in Table 4-17.

Little Brown Bat

The little brown bat is assumed to forage on emerging aquatic invertebrates inhabiting the aquatic habitat portion of the KMS Wetland. A body weight of 7.5 grams (0.0075 kg) and an ingestion rate of 0.0037 kg food (wet weight) per day were obtained from the literature (Sample and Suter, 1994). The mean UCL constituent sediment concentration was used to estimate aquatic invertebrate tissue concentrations (Table 4-5). It was assumed that this bat may forage at the site for five months of the year (see Table 4-2). The home range of a lactating little brown bat is estimated to be approximately 40 acres (Henry *et al*., 2002). Exposure from surface water ingestion was also evaluated for those constituents detected in surface water samples. The little brown bat is assumed not to ingest sediment due to its aerial screening foraging technique. The resulting estimated mean UCL daily doses ingested by the little brown bat for each constituent within the sediment of the aquatic habitat are presented in Table 4-18. Dietary concentrations of PCB congeners ingested by the bat are presented in Table 4-19.

American Robin

A body weight of 77 grams (0.077 kg) and an ingestion rate of 0.093 kg food (wet weight) per day were obtained from the literature (USEPA, 1993; Sample and Suter, 1994) indicating that this receptor eats more than its entire weight each day. The mean UCL surface soil concentration for the southern and northern forested wetland areas were used to estimate incidental soil ingestion (2.1% of diet) and to estimate terrestrial plant (fruit) and invertebrate tissue concentrations (Tables 4-4 and 4-6). Dietary exposure for the American robin assumes a

diet comprised of 62% vegetation (fruit) and 38% terrestrial invertebrates. Surface water ingestion was also evaluated based on a daily ingestion rate of 0.011 L/day (USEPA, 1993). It was conservatively assumed that a robin would forage at each of the forested wetlands throughout the year (see Table 4-2). The resulting estimated mean UCL daily doses ingested by the American robin for each surface soil constituent of concern within the southern and northern forested wetlands are presented in Table 4-20. Estimated concentrations of PCB congeners within robins nesting in the northern forested wetland area are presented in Table 4-21.

White-footed Mouse

A white-footed mouse body weight of 22 grams (0.022 kg) and an ingestion rate of 0.0034 kg food (wet weight) per day were obtained from the literature (Sample and Suter, 1994). Surface water ingestion was estimated at 0.007 L/day (Sample and Suter, 1994). Diet composition of the white-footed mouse was assumed to be 69% vegetation (seeds) and 31% terrestrial invertebrates (Sample and Suter, 1994). The mean UCL constituent surface soil concentration was used to estimate mean UCL plant seed (Table 4-4) and terrestrial invertebrate (Table 4-6) concentrations and to calculate a soil ingestion dose based on an estimate of soil ingestion representing 2% of the mouse diet. The resulting estimated mean UCL daily doses ingested by the white-footed mouse for each constituent of concern within the surface soil at the southern and northern forested wetlands are presented in Table 4-22. Dietary concentrations of PCB congeners ingested by the white-footed mouse within the northern forested habitat are estimated in Table 4-23.

Short-tailed Shrew

The short-tailed shrew is assumed to forage 86% on terrestrial invertebrates (e.g., earthworms) and terrestrial vegetation present within the southern and northern forested wetland areas. A body weight of 15 grams (0.015 kg) and an ingestion rate of 9.3 grams food (wet weight) per day were obtained from the literature (USEPA, 1993). Surface water ingestion is estimated at 0.003 L/day (Sample and Suter, 1994). The mean UCL constituent surface soil concentration was used to estimate terrestrial plant and invertebrate concentrations (Tables 4-4 and 4-6) and to calculate a soil ingestion dose based on an estimate of soil ingestion representing 13% of the shrew diet. The resulting estimated mean UCL daily doses ingested by the short-tailed shrew for each constituent within the surface soil at the southern and northern forested wetland areas are presented in Table 4-24. PCB congeners ingested in the shrew diet of the northern forested area are estimated in Table 4-25.

Red-tailed Hawk

A body weight of 1.028 kg and an ingestion rate of 0.117 kg food (wet weight) and water (0.06 L) per day were obtained from the literature (USEPA, 1993; Sample and Suter, 1994) for this carnivorous species. The mean UCL surface soil constituent concentration was used to estimate small mammal constituent concentrations (Table 4-7). It is assumed that the red-tailed hawk does not ingest soil and that this species forages within a home range of 148 acres including the KMS Wetland year-round (see Table 4-2). The resulting estimated mean UCL daily doses ingested by the red-tailed hawk for each constituent within the surface soil of the southern and

northern forested wetlands are presented in Table 4-26. Estimated egg concentrations of PCB congeners for hawks foraging within the northern wetland area are presented in Table 4-27.

Red Fox

A body weight of 4.04 kg and an ingestion rate of 0.596 kg food (wet weight) per day were obtained from the literature (USEPA, 1993; Sample and Suter, 1994) for the red fox. The mean UCL constituent surface soil concentration was used to estimate small mammal constituent concentrations (Table 4-7) and incidental soil ingestion based on a ingestion rate of 2.4% of the diet (see Table 4-2). It is assumed that the red fox forages at the site year-round although the KMS Wetland would provide only a small proportion of its 237 acre home range (see Table 4-2). The resulting estimated mean USL daily doses ingested by the red fox for each constituent within the surface soil of the southern and northern forested wetlands are presented in Table 4-28 while dietary concentrations of PCB congeners for foxes foraging in the northern wetland area are presented in Table 4-29.

4.2 Toxicity Assessment

Toxicity of constituents of concern is assessed by the selection of appropriate toxicity reference values (TRVs) for each of the measurement receptors. Community-level TRVs are media specific (i.e., the concentration in surface water or sediment) while TRVs for wildlife receptor species are provided in terms of dose ingested. The selected TRVs for each receptor are identified and discussed below.

4.2.1 Amphibian TRVs

Amphibian larvae present within the aquatic habitat in the northern wetland area may be exposed to surface water constituents. An effects-based comparison of detected constituents within the surface water samples with screening benchmarks protective of aquatic organisms (including amphibians) was conducted in the Stage I ES. Three inorganics were detected in the surface water samples although zinc was the only constituent retained as a constituent of concern for the surface water samples. A search of amphibian toxicity data for zinc was conducted in the scientific literature. Available toxicity data are primarily limited to acute studies relating to mortality of immature (i.e., embryos, larvae) amphibians. The zinc TRVs for amphibian larvae are presented in Table 4-30. In addition to the amphibian-specific TRVs, zinc water quality criteria (acute and chronic) were included as applicable amphibian TRVs. These zinc criteria were based on the mean water hardness (13.0 mg/L) of the surface water samples collected from the aquatic habitat at the KMS Wetland.

4.2.2 Benthic Invertebrate TRVs

Sediment quality benchmarks were obtained from MacDonald *et al.* (2000) as well as from Persaud *et al.* (1993). The consensus-based threshold effect concentrations (TECs) and the consensus-based probable effect concentrations (PECs) from MacDonald *et al.* (2000) as well as the severe effect levels (SELs) from Persaud *et al.* (1993) were selected as TRVs for benthic invertebrates potentially inhabiting the aquatic habitat associated with the KMS Wetland. The TECs represent concentrations below which toxic effects to benthic biota are unlikely to be

observed while the PECs represent concentrations above which toxicity to benthic organisms are likely. SELs represent levels where substantial impacts to the benthic community would likely occur. For organics, SELs are normalized to the total organic carbon content of the sediment (to a maximum of 10% total organic carbon) which affects bioavailability of these constituents. The sediment TRVs selected for the benthic invertebrate community are presented in Table 4-31. For PAHs, the total PAH benchmarks were selected for comparison with the sum of individual PAHs.

4.2.3 Wildlife TRVs

Wildlife toxicity reference values were selected to evaluate potential effects of the estimated exposure doses received by the selected avian and mammalian receptor species. Because toxicity data for the selected receptor species are unavailable, it is necessary to extrapolate toxicity data from other species, usually laboratory test animals. The test endpoints for the laboratory species must be significant to the measurement receptor species under field conditions. Endpoints that were considered significant for this Stage II ERC included adverse effects on growth, reproduction, and survival that are most likely to result in adverse effects to wild populations of receptors. The lowest chronic No Observable Adverse Effect Level (NOAEL) and the lowest chronic Lowest Observable Adverse Effect Level (LOAEL), if available, were selected for each constituent of concern.

For most constituents of concern identified at the KMS Wetland, USEPA avian and mammalian TRVs used to derive ecological soil screening levels (eco-SSLs) were used as NOAEL and LOAEL TRVs for this Stage II ERC. The eco-SSLs used the geometric mean of the NOAEL TRVs presented in the literature (that met specified quality criteria) to derive a soil concentration that was unlikely to result in unacceptable risks for ecological receptors. However, if the geometric mean of the NOAEL TRVs was greater than the lowest LOAEL TRV available in the literature, the highest NOAEL TRV that was less than this LOAEL TRV was selected. This Stage II ERC uses the NOAEL and LOAEL TRVs presented by USEPA in deriving the eco-SSL concentrations. For those constituents where the highest NOAEL TRV below the lowest LOAEL TRV was selected, the geometric mean NOAEL TRV was also discussed in the risk characterization section of this Stage II ERC.

Toxicity associated with PCBs was evaluated using the TEF/TEQ approach (USEPA, 2008) as various PCB congeners exhibit ecotoxicity responses as expressed by 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The relationship between these PCB congeners and 2,3,7,8-TCDD are correlated by toxicity equivalence factors (TEFs) which is a specific 2,3,7,8-TCDD toxicity value divided by the respective toxicity value of each specific PCB congener. TEFs have currently been developed for 12 PCB congeners (Van den Berg *et al.*, 1998; 2006). The congener-specific TEFs are presented in Table 4-32 for both avian and mammalian wildlife. For PCBs, the TEF/TEQ methodology applies only to PCBs with dioxin-like toxicity effects. However, current data indicates that the highest potential for toxicity to ecological endpoints from PCB mixtures is from PCBs with dioxin-like effects (USEPA, 2008). Therefore, the risk estimates based on the 12 dioxin-like PCB congeners is a reasonable estimate of ecological risk to wildlife.

The exposure by avian ecological receptors to these 12 PCB congeners can be evaluated by estimating concentrations within bird eggs for each individual congener, multiplying that exposure by the congener-specific TEF to derive toxicity equivalence (TEQ), and then summing the congener TEQs. This total TCDD TEQ concentration within the bird egg is then compared to appropriate NOAEL/LOAEL TRVs for avian eggs. For mammals, the average concentration of PCB congeners in their diet is compared to 2,3,7,8-TCDD-equivalency toxicity values derived for mammal diets. A NOAEL dietary TRV is unavailable, however, the LOAEL TRV for mink reproduction is expected to be protective of mammalian receptors at the KMS Wetland since mink are very sensitive to PCBs relative to other mammalian species. The mammal LOAEL TRV represents a dietary concentration resulting in changes in rat liver cell induction (USEPA, 2008).

The NOAEL and LOAEL TRVs selected for each constituent of concern with both the aquatic and forested wetland habitats for avian species are presented in Tables 4-33 and 4-34, respectively. TRVs (NOAELs and LOAELs) for each of the selected mammalian indicator species are presented in Tables 4-35 and 4-36, respectively.

5.0 RISK CHARACTERIZATION

Potential risks to the selected measurement receptors from constituents of concern detected in the surface water, sediment and surface soil samples at the KMS Wetland were evaluated by the quotient method which compares estimated exposure doses with applicable toxicity reference values (TRVs). This comparison (expressed as a hazard quotient) is calculated for each constituent of concern as follows:

$$HQ = ED/TRV$$

where:
- HQ = Hazard Quotient;
- ED = Exposure Dose (from Section 4.1); and,
- TRV = Toxicity Reference Value (from Section 4.2).

If the calculated hazard quotient is less than one, then it is unlikely that that constituent will result in an adverse effect on that measurement receptor. Conversely, a hazard quotient greater than one indicates that that particular measurement receptor may be at risk of an adverse effect from that constituent. It is important to note that HQs provide only a general characterization of potential impacts to the local biota. A HQ less than one is indicative of non-risk, however, a HQ greater than unity does not in itself represent an unacceptable risk. Whether a constituent is likely to cause or have caused an effect at the population level will be dependent upon other site-specific factors such as whether the mean UCL exposure case exceeds the biological threshold, to what degree the threshold is exceeded, and how the constituent is distributed across the Site. For the wildlife indicator species, a hazard index (HI) is also calculated based on the sum of the constituent-specific HQs to determine the risk from multiple stressors.

5.1 Amphibian Larvae

Potential risk to amphibian larvae inhabiting the aquatic habitat associated with the KMS Wetland was evaluated. The evaluation compared detected concentrations of constituents of concern (i.e., zinc) within the surface water of the aquatic habitat with amphibian toxicity benchmarks. The results of this evaluation are presented in Table 5-1.

A total of 21 surface water samples were collected from the aquatic habitat and analyzed for zinc and water hardness. Mean (25.0 ug/L) and maximum (63 ug/L) detected concentrations of zinc are less than all of the amphibian TRV concentrations available through the literature except one (Birge *et al*., 1979 in Pauli *et al.*, 2000). This study reported a concentration of 10 ug/L that was lethal to 50% of *Gastrophryne carolinensis* (eastern narrow-mouth toad) embryos. The applicability and particulars of this study relative to amphibians present at the KMS Wetland are unknown although it is noted that the effect concentration reported in this study is considerably below the national recommended water quality criteria (acute and chronic) for zinc that is protective of aquatic organisms including amphibians. Based on the comparison of zinc concentrations with the remaining amphibian TRVs, the results indicate that amphibians do not appear to be at risk from the concentrations of zinc detected within the surface water samples collected from the aquatic habitat of the KMS Wetland.

Although amphibians may not be at risk, the zinc concentrations detected in 11 of 20 surface water samples exceed the acute/chronic national recommended water quality criteria for zinc (adjusted for the low water hardness present within the KMS Wetland) which represents the Massachusetts Surface Water Standard for zinc promulgated in 314 CMR 4.05(5)(e). The existence of a hazardous material potentially attributable to the site that exceeds its water quality criterion meets the threshold standard defined in the Massachusetts Contingency Plan (MCP) regulations, specifically 310 CMR 40.0995(3)(b)(1). Groundwater sampling of three monitoring wells located along the western edge of the landfill and near the KMS Wetland detected zinc in filtered samples at concentrations of 13, 17 and 57 ug/L.

Although zinc was detected in 11 surface water samples collected from the aquatic habitat of the KMS Wetland above acute/chronic water quality criteria, 10 of these exceedences were noted in 2009. In 2010, despite collection of surface water samples during similar times of the year as collected in 2009, only one of seven surface water samples was found to contain a zinc concentration that exceeds its acute/chronic water quality criteria. This sample detected zinc at a concentration of 23.7 ug/L.

Toxicity testing of this sample containing an elevated concentration of zinc was subsequently conducted to further evaluate the potential effects of zinc on aquatic organisms. Chronic 7-day laboratory toxicity tests were performed for *Pimephales promelas* and *Ceriodaphnia dubia*. The toxicity tests evaluated the survival and growth of *Pimephales promelas* (fathead minnow) and the survival and reproduction of *Ceriodaphnia dubia* (water flea) using USEPA methodology (USEPA, 2002b). Survival of *Pimephales promelas* and *Ceriodaphnia dubia* was 98.4% and 100%, respectively. Growth of *Pimephales promelas* and reproduction (neonates per female) of *Ceriodaphnia dubia* were greater than observed in the laboratory controls. Overall, no adverse effects to either test species were noted in the toxicity testing. The complete laboratory toxicity test report is provided in Appendix C.

The lower observed levels of zinc in surface water samples collected from the KMS Wetland in 2010 coupled with the lack of toxic effects on the survival and growth/reproduction of two test organisms indicate that impacts from zinc on the aquatic biota community inhabiting the KMS Wetland are not anticipated provided levels remain similar as detected in 2010.

5.2 Benthic Invertebrate Community

Risk to the benthic macroinvertebrate community from the detected constituents within the sediments of aquatic habitat of the KMS Wetland were assessed by comparing the mean UCL detected concentrations with benchmarks associated with effects to benthic biota and by conducting sediment toxicity testing to evaluate survival and grown of two benthic invertebrates.

The results of the benchmark comparison are presented in Table 5-2. The mean UCL detected concentrations of PAHs, three pesticides (4,4'-DDT, 4,4'-DDD and 4,4'-DDE), total PCBs and three metals (i.e., lead, mercury and zinc) exceed their respective TEC and result in a total hazard index of 2,100. The highest HQs were noted for total PCBs (HQ = 1,900), total PAHs (HQ = 72) and the three pesticides (HQs range from 10 to 52). Detected concentrations of total PCBs (Aroclors) exceed the TEC benchmark at 86% of the sediment samples collected from the

aquatic habitat. Lead was detected above the TEC benchmark at 69% of the samples while the remaining constituents of concern were detected above the TEC benchmark from 15% to 45% of the samples.

The PEC benchmark total hazard index for the mean UCL sediment concentrations is 190 and primarily attributable to the total PCB HQ of 170. Mean UCL concentrations of total PAHs (HQ = 5), 4,4'-DDT and its derivatives (HQs range from 1 to 3), lead (HQ = 2) and zinc (HQ = 1) also equal or exceed its respective PEC benchmark associated with probable effects to the benthic community. Lead and total PCBs were most frequently detected at concentrations greater than its PEC (44 and 41% of samples, respectively) while the remaining constituents of concern were infrequently detected above their PEC benchmark (4 to 18% of samples). Overall, the detected concentrations of total PCBs and lead may impact benthic macroinvertebrates inhabiting the aquatic habitat at the KMS Wetland by their elevated concentrations present within a substantial subset of the samples collected from this area. Total PAHs and zinc may also present a risk at selected sample locations.

A comparison of the mean UCL detected sediment concentrations with their respective SEL benchmark indicates that Aroclor 1254, total PCBs and lead are elevated with respect to the SELs. The total hazard index is 39 and is primarily due to Aroclor 1254 (HQ = 34). The Aroclor 1254 SEL was exceeded at 12% of the samples collected from the aquatic habitat while 16% of the samples have lead concentrations that exceed its SEL benchmark. Only 2.5% of the sediment samples contain total PCB concentrations above the SEL benchmark. PAHs and 4,4'-DDT (as well as its derivatives) were not detected in any of the samples at concentrations that exceed the SEL benchmarks which is likely attributable to the high total organic carbon (TOC) content present within the aquatic habitat of the KMS Wetland (>10%). Organics including PAHs, pesticides and PCBs tend to bind to organic matter and become less bioavailable to receptors such as benthic macroinvertebrates.

Overall, the detected levels of PCBs (total and Aroclor 1254) and lead within sediments of the aquatic habitat present within the KMS exceed their respective PECs and SELs indicating the macroinvertebrate community within this aquatic habitat may potentially be adversely affected by these constituents. Others constituents including PAHs and zinc may also present a risk to macroinvertebrates within limited portions of the aquatic habitat.

To further evaluate the potential effects of these constituents of concern in sediment on benthic biota, 10-day and 28-day laboratory toxicity tests were performed for *Chironomus tentans* and *Hyalella azteca*, respectively. The toxicity tests evaluated the survival and growth of these organisms within six "contaminated" sediment samples from the site (SD-16, SD-40, SD-48, ERC-SED-7, ERC-SED-9, and ERC-SED-11A-C), a laboratory control reference sediment (Control) and an uncontaminated sediment reference sample collected from the site (ERC-SED-14). The results of the sediment toxicity testing are presented in Table 5-3 along with the sediment chemistry results for total PCB, total PAH, lead and zinc concentrations at each sediment sample location (sampled concurrently with sediment collected for toxicity testing). The complete laboratory toxicity test report is provided in Appendix C.

In the 10-day sediment toxicity test with the midge larvae, *C. tentans*, survival at all six "contaminated" site sediment samples, the control reference sample and the uncontaminated site reference sample was 90 percent or greater with no significant differences noted between the samples. Growth of midge larvae was significantly less than the laboratory control at five of six "contaminated" sediment samples (all except ERC-SED-9) and at the uncontaminated site reference sediment sample. Significantly lower midge larvae growth was noted at samples ERC-SED-7 and ERC-11A-C compared to the site reference sample. Sample ERC-SED-7 has the highest total PAH concentration (31.64 mg/kg) while sediment sample ERC-SED-11A-C has the highest total PCB concentration (5.44 mg/kg).

For the 28-day toxicity test with the amphipod, *H. azteca*, survival exceeded 90 percent at all samples with no significant differences noted between site sediment samples and the laboratory control sediment sample. Growth of the amphipods was significantly lower at all site sediment samples (including the reference sample) compared to the laboratory control sample. However, no statistically significant growth differences were noted between the site "contaminated" sediment samples and the reference sample.

5.3 Wildlife Receptors

The Canada goose, muskrat, mallard, raccoon, marsh wren and little brown bat were selected to represent avian/mammalian herbivores, avian/mammalian omnivores and avian/mammalian insectivores that may potentially forage within the aquatic habitat provided by the KMS Wetland. Potential risks from the ingestion of surface water, sediment, vegetation and/or aquatic invertebrates within the aquatic habitat are evaluated by comparing the estimated exposure doses received by these indicator species with applicable chronic NOAEL and LOAEL TRVs. Similarly, the American robin, white-footed mouse, short-tailed shrew, red-tailed hawk and red fox were selected as representative avian/mammalian omnivores, mammalian insectivore, and avian/mammalian carnivores to evaluate risk from ingestion of surface water, surface soil, vegetation, terrestrial invertebrates, and/or small mammals present within the forested wetland habitats of the northern and southern wetland areas. Potential risks to each of these receptors within the various areas of the KMS Wetland are discussed in the following sections.

5.3.1 Aquatic Habitat

The Canada goose, muskrat, mallard, raccoon, marsh wren and little brown bat were selected to represent avian/mammalian herbivores, omnivores and insectivores that may forage within the aquatic habitat provided by the KMS Wetland. For PCB congeners, the estimated exposure (egg concentrations for birds and dietary concentration for mammals) for each congener is multiplied by its Toxic Equivalency Factor (TEF) to determine its Toxic Equivalency (TEQ). The sum of the individual TEQs are then totaled and compared to the appropriate egg or dietary TRV. This TEF/TEQ analysis is provided in Table 5-4 for each of the indicator species for the aquatic habitat. A comparison of the estimated mean UCL exposure doses for each of the six indicator species with its applicable NOAEL and LOAEL TRV are provided in Tables 5-5 and 5-6, respectively. Results are discussed below for each receptor species.

5.3.1.1 Canada Goose (Herbivorous Bird)

A condition of no significant risk for the herbivorous Canada goose from the ingestion of estimated constituent concentrations within aquatic vegetation as well as from the ingestion of surface water and sediment exists. As indicated in Table 5-5, the NOAEL total hazard index for the Canada goose is 0.4. Therefore, it is unlikely that herbivorous avian species would be adversely affected by detected concentrations of constituents within the aquatic habitat of the KMS Wetland.

5.3.1.2 Muskrat (Herbivorous Mammal)

The total hazard index for the NOAEL and LOAEL TRVs are 4 and 2, respectively. The constituents that have estimated exposure doses greater than the NOAEL TRV include high molecular weight (HMW) PAHs (HQ = 2) and selenium (HQ = 1). The only constituent having a HQ greater than unity for the LOAEL TRV is selenium (HQ = 1). The primary mode of exposure to these constituents by the muskrat is via ingestion of vegetation. Generally, over 85% of the HMW PAH exposure dose modeled to the muskrat is through aquatic plant ingestion while approximately 95% of the selenium exposure dose is via ingestion of vegetation.

The overall risk to herbivorous mammals foraging within the aquatic habitat of the KMS Wetland is somewhat uncertain for HMW PAHs considering that the HMW PAH HQ is low for the NOAEL TRV (HQ = 2) and is less than the LOAEL TRV. Selenium HQs (both for the NOAEL and LOAEL TRV) are at unity. It should be noted that the geometric mean of mammalian selenium NOAELs was reported at 0.44 mg/kg-BW/day (USEPA, 2007d) which is over twice the estimated exposure dose of selenium ingested by the muskrat. Therefore, it seems unlikely that selenium presents a significant risk to foraging mammalian herbivores

5.3.1.3 Mallard (Omnivorous Bird)

The total hazard index for the mallard for its NOAEL TRV is 0.4. Therefore, it is unlikely that omnivorous avian species as represented by the mallard would be adversely affected by the detected concentrations of constituents within the aquatic habitat of the KMS Wetland.

5.3.1.4 Raccoon (Omnivorous Mammal)

Potential risks to omnivorous mammals from the ingestion of estimated constituent concentrations within aquatic vegetation (seeds) and invertebrates as well as from the ingestion of surface water and sediment are not anticipated. As indicated in Table 5-5, the NOAEL total hazard index for the raccoon is 0.5. Therefore, it is unlikely that omnivorous mammals would be adversely affected by detected concentrations of constituents within the aquatic habitat of the KMS Wetland.

5.3.1.5 Marsh Wren (Insectivorous Bird)

The total hazard index for the marsh wren for the NOAEL and LOAEL TRVs are 37 and 7, respectively. HQs greater than unity for the NOAEL TRV were PCB congeners (HQ = 34),

selenium (HQ = 2) and lead (HQ = 1). LOAEL HQs for lead and selenium are each at unity while the LOAEL HQ for PCB congeners is 5. Estimated exposure by the marsh wren to these constituents is entirely through ingestion of aquatic invertebrates. Overall, a condition of no significant risk does not exist for insectivorous birds from PCB congeners as the estimated wren egg concentration of PCB congeners (TCDD-TEQ of 235 pg/g) exceeds by nearly a factor of 5 the upper threshold concentration within eggs resulting in adverse effects to sensitive species. Galbraith (2003) indicates that most sensitive avian species exhibit adverse effects at egg TCDD-TEQ concentrations ranging from 5 to 50 pg/g (wet weight). Less sensitive species are affected at concentrations from 50 to 100 pg/g while least sensitive species are affected at TCDD-TEQ egg levels above 100 pg/g. The predicted marsh wren egg TCDD-TEQ concentration is above the 100 pg/g level associated with less sensitive species.

Risks to the wren from other constituents of concern are somewhat uncertain since the LOAEL TRV HQs for lead and selenium are both at unity based on the lowest LOAEL TRV reported for avian species. However, because the geometric means of avian lead and selenium NOAELs (10.9 and 0.61 mg/kg-BW/day, respectively as reported in USEPA, 2005a and 2007d) are above the estimated doses ingested by the marsh wren, it appears unlikely that avian insectivores would be at a significant risk from the levels of these two inorganics that are present within the aquatic habitat of the KMS Wetland.

5.3.1.6 Little Brown Bat (Insectivorous Mammal)

The total hazard index for the NOAEL TRVs is 0.7. Therefore, potential risks to insectivorous mammals from the ingestion of estimated concentrations within aquatic invertebrates as well as from the ingestion of surface water are not anticipated within the aquatic habitat of the KMS Wetland.

5.3.2 Southern Forested Wetland Area

The American robin, white-footed mouse, short-tailed shrew, red-tailed hawk and red fox were selected to represent avian/mammalian omnivores, insectivores and/or carnivores that may forage within the southern forested wetland area of the KMS Wetland. Potential risks from the ingestion of surface water, surface soil, vegetation, terrestrial invertebrates and/or small mammals within this terrestrial habitat are evaluated by comparing the estimated exposure doses received by these indicator species with applicable chronic NOAEL and LOAEL TRVs. A comparison of the estimated mean UCL exposure doses for each of the five indicator species with its applicable NOAEL and LOAEL TRV are provided in Tables 5-8 and 5-9, respectively.

As indicated in Table 5-8, the total hazard indices and hazard quotients for all five indicator species are less than one when comparing estimated doses with NOAEL TRVs. Based on this comparison, it is concluded that a condition of no significant risk exists in the forested wetland habitat provided by the southern wetland area.

5.3.3 Northern Forested Wetland Area

Potential risks from the ingestion of surface water, surface soil, vegetation, terrestrial invertebrates and/or small mammals by the American robin, white-footed mouse, short-tailed shrew, red-tailed hawk and red fox within this terrestrial habitat are evaluated by comparing the estimated exposure doses received by these indicator species with applicable chronic NOAEL and LOAEL TRVs. For PCB congeners, the estimated exposure dose for each congener is multiplied by its Toxic Equivalency Factor (TEF) to determine its Toxic Equivalency (TEQ). The sum of the individual TEQs are then totaled and compared to the appropriate egg or dietary TRV. This TEF/TEQ analysis is provided in Table 5-7 for each of the indicator species for the northern forested wetland habitat. A comparison of the estimated mean UCL exposure doses for each of the five indicator species with its applicable NOAEL and LOAEL TRV are provided in Tables 5-8 and 5-9, respectively. Results are discussed below for each receptor species.

5.3.3.1 American Robin

The total hazard index for the NOAEL and LOAEL TRVs are 43 and 29, respectively. The constituents that have estimated exposure doses greater than the NOAEL TRV include lead (HQ = 26), PCB congeners (HQ = 10), vanadium (HQ = 4) barium (HQ = 2) and zinc (HQ = 1). The constituents having a HQ greater than unity for the LOAEL TRV are lead (HQ = 21), vanadium (HQ = 3), PCB congeners and zinc (each with an HQ = 1). The primary mode of exposure by the robin varies considerably. Generally, over 85% of the vanadium exposure dose modeled to the American robin is through incidental soil ingestion while the lead exposure dose is approximately equal via ingestion of soil and terrestrial invertebrates. PCB congener exposure is entirely via terrestrial invertebrate ingestion. Zinc exposure is divided between terrestrial invertebrate ingestion (55% of exposure dose), plant ingestion (30% of exposure dose) and soil ingestion (15% of exposure dose). Barium exposure is primarily due to equal contributions via plant and soil ingestion.

The overall potential risk to omnivorous birds is likely to be low for barium considering that the HQ is low for the NOAEL TRV (HQ = 2) but is less than the LOAEL TRV. Barium is unlikely to present a potential risk as the estimated dose received by the robin is similar to the NOAEL TRV and less than the LOAEL. The potential risk to vanadium is also expected to be low as the primarily mode of exposure is via soil ingestion and the conservative modeling approach used in the Stage II ERC assumes 100% bioavailability via soil ingestion. The oral absorption factor of vanadium for mammals is estimated at only 1% (Roshchin *et al*., 1980 in USEPA, 2007b). Even if this absorption factor for birds is ten times greater, the estimated dose to the robin assuming this reduced bioavailability would be well below the NOAEL TRV.

The estimated zinc exposure dose ingested by the robin is approximately equal to the NOAEL and LOAEL TRVs (HQs = 1). The avian NOAEL TRV represents the geometric mean of zinc NOAELs for birds (USEPA, 2007e). As the estimated dose is approximately equal to both the NOAEL and LOAEL TRVs, it is uncertain if adverse effects would occur or not. However, there is a potential risk to omnivorous birds from the detected concentrations of zinc within the northern forested wetland.

The potential risk to the American robin from lead results in the greatest HQs as the HQs for the NOAEL and LOAEL TRVs are both greater than 20. The geometric mean of the avian lead NOAELs was reported at 10.9 mg/kg-BW/day (USEPA, 2005a) which is less than the estimated exposure dose of lead ingested by the robin (41.6 mg/kg-BW/day). Overall, there is a potential risk to omnivorous birds from the concentrations of lead detected in surface soils within the northern forested wetland.

The estimated egg concentrations of PCB congeners (TEQ is 67.8 pg/g) exceeds both the NOAEL TRV (7 pg/g) and the upper threshold concentration (50 pg/g) for sensitive avian species. It is unknown whether the American robin is as sensitive to PCB congeners as specific studies on this species are unavailable. However, the eastern bluebird (*Sialia sialis*) is closely related to the American robin and is not particularly sensitive to TCDD (Nosek *et al*., 1993). It is unknown if the robin would have similar sensitivity to PCB congeners as the bluebird. However, adverse effects from concentrations of PCB congeners within the northern forested wetland area are possible to American robins.

5.3.3.2 White-Footed Mouse

The total hazard index for the white-footed mouse for its NOAEL TRV is 4. The individual constituents having an HQ of 1 or greater include PCB congeners and lead (HQs are 1 for both). Exposure to PCB congeners by the white-footed mouse is primarily through terrestrial invertebrate ingestion while lead exposure is via incidental soil ingestion (50%), invertebrates (30%) and plant ingestion (20%). The total hazard index for the white-footed mouse for its LOAEL TRV is 3 with lead representing the only individual constituent with an HQ greater than unity (HQ = 1). Therefore, a potential risk exists to omnivorous mammalian species as represented by the white-footed mouse by the detected concentrations of lead and PCB congeners within the surface soils of the northern forested wetland.

5.3.3.3 Short-Tailed Shrew

The total hazard index for the NOAEL and LOAEL TRVs are 13 and 10, respectively. The constituents that have estimated exposure doses greater than the NOAEL TRV include lead (HQ = 7), PCBs exhibiting dioxin-like toxicity (i.e., TEF/TEQ methodology) (HQ = 3), high molecular weight (HMW) PAHs (HQ = 1) and zinc (HQ = 1). The only constituents having a HQ greater than unity for the LOAEL TRV is lead (HQ = 6) and PCB congeners (HQ = 1). The primary mode of exposure by the shrew varies considerably. Generally, over 95% of the PCB congener exposure dose modeled to the shrew is through terrestrial invertebrate ingestion while approximately 80% of the HMW PAH and zinc exposure doses are via ingestion of terrestrial invertebrates. Lead exposure is primarily via invertebrate ingestion (55% of exposure dose) and soil ingestion (40% of exposure dose).

The overall risk to insectivorous mammals from HMW PAHs and zinc is expected to be low as the HQs for the NOAEL TRV are both 1 and the HQ for the LOAEL TRV is less than unity. In addition, the mean UCL HMW PAH soil concentration is less than the background levels of HMW PAHs in “natural” Massachusetts soils (MADEP, 2002). Potential risk associated with PCB congeners and lead is greater considering that HQs for are both greater than unity for the

NOAEL TRV and either exceed the LOAEL TRV (lead HQ = 6) or are equal to the LOAEL TRV (PCB congeners). It should be noted that the geometric mean of lead reproductive/growth NOAELs was reported at 40.7 mg/kg-BW/day (USEPA, 2005a) which is greater than the estimated exposure dose of lead ingested by the short-tailed shrew. The PCB NOAEL TRV is based on reproductive effects to mink, a species very sensitive to PCBs while the PCB LOAEL TRV is based on adverse pathological effects to the rat. Overall, there is a potential risk to insectivorous mammals from the concentrations of PCB congeners and lead detected in surface soils within the northern forested wetland.

5.3.3.4 Red-Tailed Hawk

Risks to carnivorous birds from the ingestion of estimated constituent concentrations within small mammals are not anticipated. As indicated in Table 5-8, the NOAEL total hazard index for the red-tailed hawk is 0.007. Therefore, it is unlikely that carnivorous birds would be adversely affected by detected concentrations in the northern forested wetland area.

5.3.3.5 Red Fox

Risks to carnivorous mammals from the ingestion of estimated constituent concentrations within small mammals are also not anticipated. As indicated in Table 5-8, the NOAEL total hazard index for the red fox is 0.009. Therefore, it is unlikely that carnivorous mammals would be adversely affected by detected concentrations in the northern forested wetland area.

5.4 Uncertainty Analysis

There are considerable uncertainties associated with estimates of risk in any ecological risk assessment, as the risk estimates are based on a number of assumptions regarding exposure and toxicity. There is uncertainty associated with the site conceptual model, with natural variation and parameter error, and with model error (USEPA, 1997). A thorough understanding of the uncertainties associated with risk estimates is critical to understanding predicted risks and placing them in proper perspective.

Uncertainty associated with the conceptual model (Figure 3-2) includes assumptions about the sources of constituents and the fate and transport at the Site. The prediction of risk in this Stage II ERC does not initially distinguish the sources of potential impacts that are identified as constituents of concern. The KMS Wetland receives runoff from areas located outside the limits of the former McCoy Field. The source of impacts such as PAHs or inorganics in sediments often cannot be distinguished from Site-related compounds or another source.

There is some uncertainty in the selection of the receptors as representative of communities utilizing the terrestrial and aquatic habitats at or in the vicinity of the KMS Wetland. Habitat quality for some of the receptor species appears marginal within portions of the Site and will influence actual presence or exposure of species or communities within the different portions of the exposure areas. For example, the American robin was selected as an omnivorous bird that forages entirely within the northern forested habitat present at the Site. The assumption that the American robin uses this area exclusively likely overestimated the exposure to surface soil by

omnivorous birds. Therefore the calculated risk to American robin populations is associated with some uncertainty.

5.4.1 Exposure Estimation

Exposure estimates for indicator species are a source of uncertainty in the Stage II ERC. Values for exposure parameters (*e.g.*, body weight, food intake rate, sediment ingestion rate) were based on literature values, not site-specific data. The estimation of body burdens in terrestrial invertebrates was based on soil regression equations developed for earthworms that are in far greater contact with surface soil than would be the prey items (e.g., insects) that are also ingested by insectivorous species such as American robins and short-tailed shrews. However, the approach maintained in the Stage II ERC was to utilize conservative exposure parameters while maintaining a realistic evaluation of the potential for risk.

The bioaccumulative potential of plants varies among species, and even within different parts of the plant. Therefore, there are additional uncertainties in assuming tissue concentrations from whole plants are representative of the exposure of a consumer, particularly for a species that might selectively graze on a specific species or part of a plant. Concentrations of organics in aquatic invertebrates were estimated based on previous BSAFs calculated from data obtained at other Superfund sites that may have characteristics dissimilar to those present at the Site. These BSAF values were used to estimate both dietary concentrations and tissue concentrations of PCB congeners which may overestimate or underestimate actual exposure concentrations present at the KMS Wetland.

Bioaccumulation of PAHs into small mammals is assumed to be negligible (USEPA, 2007a) due to rapid metabolism and breakdown of PAHs after ingestion by small mammals. However, if continuously exposed to PAHs via ingestion, small mammals may contain recently ingested PAHs that may subsequently be ingested by a small mammal predator. This may result in an underestimation of risk to carnivorous receptors for PAH exposure.

There is uncertainty associated with the estimation of exposure estimates to PCBs by wildlife receptors. The ratio of concentrations of PCB congeners exhibiting dioxin-like toxicity to total PCB Aroclor concentrations were determined based on a total of four sediment/surface soil samples collected from the KMS Wetland. These ratios were then applied throughout the KMS Wetland for all PCB samples that analyzed for PCB Aroclors. It is unknown whether these ratios may underestimate or overestimate exposure throughout the KMS Wetland. However, the ratios were developed from sediment/surface soil total PCB Aroclor sampling results that exhibited a diverse range of concentrations.

In general, there is confidence that data collected for the Stage II ERC represent the types and distributions of sediment and surface soil impacts within the terrestrial and aquatic habitats present at the KMS Wetland. Conservative assumptions were also made about exposure duration and site use factors.

5.4.2 Toxicological Data

Toxicity values for indicator species and communities were based on literature values. As is the case for literature-based exposure parameter values, this is a major source of uncertainty in the Stage II ERC. The sensitivity of receptors in the exposure areas associated with the KMS Wetland may be different than the sensitivity of species used in tests reported in the literature. Assumptions about the equality of constituent form between laboratory tests and site field conditions must also be made in the absence of speciation analyses. This is a source of uncertainty, since toxicity may vary with the form of the toxicant in the environment. Thus, the actual toxicities evaluated in this Stage II ERC could be higher or lower than indicated by the TRVs used in the development of HQs.

For PCBs, the TEF/TEQ methodology applies only to PCBs with dioxin-like toxicity effects. However, current data indicates that the highest potential for toxicity to ecological endpoints from PCB mixtures is from PCBs with dioxin-like effects (USEPA, 2008). Therefore, the risk estimates based on the 12 dioxin-like PCB congeners is a reasonable estimate of ecological risk to wildlife.

One of the largest sources of uncertainty in all of these TRV values is the form of the chemical used to determine the laboratory exposure. The HQ approach uses the assumption that the absorption of the chemical from the diet will be the same as the absorption of the chemical in the form used in the laboratory. Often this assumption is very conservative, because absorption of metals ingested with sediment/soil or forage items, is greatly reduced from forms given in laboratory studies.

It is important to note that an oral bioavailability factor of 1 was assumed for each chemical evaluated in the ingestion pathway. The use of a factor of 1 assumes that 100% of the chemical ingested in the diet is bioavailable, and that bioavailability is similar to that of the bioassay from which the toxicity reference value (TRV) is derived. Use of a factor of 1 also assumes that there is no difference in uptake of a chemical between that of the receptor species and the species from which the TRV was derived. This may result in an overestimation of risk to ecological receptors.

6.0 SUMMARY & PRELIMINARY REMEDIATION GOALS

The Stage I ES resulted in the selection of one constituent of concern (zinc) in surface water samples collected from the aquatic habitat provided by the KMS Wetland, 29 constituents of concern in aquatic habitat sediment (17 PAHs, 3 pesticides, PCB Aroclors 1254 and 1260, and 7 inorganics), 5 constituents of concern in surface soil from the southern forested wetland area (3 pesticides and 2 inorganics) and 23 constituents in surface soil from the northern forested wetland area (15 PAHs, PCB Aroclors 1254 and 1260, and 6 inorganics) for evaluation in the Stage II ERC. Six indicator species and two indicator communities were selected to evaluate risks associated with exposure to the constituents in the sediment samples collected from the aquatic habitat of the KMS Wetland while five indicator species were selected to evaluate surface soil impacts identified within the forested wetland habitats of the KMS Wetland. Endpoints in the Stage II ERC were selected to represent ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur.

Based on the comparison of surface water zinc concentrations with amphibian TRVs, it does not appear that amphibians are at risk from the concentrations of zinc detected within the surface water samples collected from the aquatic habitat of the KMS Wetland. However, although amphibians may not be at risk, the zinc concentrations detected in 11 of 20 surface water samples exceed the acute/chronic national recommended water quality criteria for zinc which represents the Massachusetts Surface Water Standard for zinc promulgated in 314 CMR 4.05(5)(e). The existence of a hazardous material potentially attributable to the site that exceeds its water quality criterion meets the threshold standard defined in the Massachusetts Contingency Plan (MCP) regulations, specifically 310 CMR 40.0995(3)(b)(1).

Although zinc was detected in 11 surface water samples collected from the aquatic habitat of the KMS Wetland above acute/chronic water quality criteria, 10 of these exceedences were noted in 2009. In 2010, despite collection of surface water samples during similar times of the year as collected in 2009, only one of seven surface water samples was found to contain a zinc concentration that exceeds its acute/chronic water quality criteria. This sample detected zinc at a concentration of 23.7 ug/L. Toxicity testing of this sample containing an elevated concentration of zinc was subsequently conducted to further evaluate the potential effects of zinc on aquatic organisms. No adverse effects on survival and growth/reproduction to either test species (*Pimephales promelas* or *Ceriodaphnia dubia*) were noted in the toxicity testing. The lower observed levels of zinc in surface water samples collected from the KMS Wetland in 2010 coupled with the lack of toxic effects on the survival and growth/reproduction of two test organisms indicate that impacts from zinc on the aquatic biota community inhabiting the KMS Wetland are not anticipated provided levels remain similar as detected in 2010.

The detected concentrations of total PCBs and PAHs may impact benthic macroinvertebrates inhabiting the aquatic habitat at the KMS Wetland based on their elevated concentrations and the noted reduction in midge larvae growth rates where these constituents of concern were detected at their highest concentrations (see Table 5-3). Lead and zinc do not appear to present a potential risk due to the lack of observed toxicity in tests conducted with elevated levels of these metals. 4,4'-DDT presents only a slight risk potential due to its lower concentrations (with respect to its

benchmarks) and/or its reduced bioavailability (high TOC content in sediments of the aquatic habitat).

A condition of no significant risk is anticipated for herbivorous birds, insectivorous mammals, and omnivorous birds/mammals that forage within the aquatic habitat of the KMS Wetland. Risks to mammalian herbivores and insectivorous birds inhabiting the aquatic habitat provided by the KMS Wetland are somewhat uncertain considering that HQs for HMW PAHs exceed the NOAEL TRV but are less than the LOAEL TRV or, in the case of lead and selenium, HQs both for the NOAEL and LOAEL TRV are the same but less than the geometric mean of NOAELs reported in the literature. However, PCB congener exposure exceeds both NOAEL and LOAEL TRVs for the insectivorous bird (marsh wren) indicating a risk potential to this receptor. Overall, risk is possible from the estimated doses of PCB congeners ingested by the muskrat and/or marsh wren.

A condition of no significant risk exists in the forested wetland habitat provided by the southern wetland area as estimated exposure doses ingested by all indicator species are less than their respective NOAEL TRVs. For those species with larger home ranges than provided by the southern forested wetland area (i.e., red-tailed hawk and red fox), risk is still unlikely considering foraging exposure within the adjacent northern forested wetland area.

Omnivorous birds and mammals (as represented by the American robin and white-footed mouse) as well as insectivorous mammals (as represented by the short-tailed shrew) inhabiting the forested wetland within the northern wetland area may potentially be adversely affected by concentrations of PCB congeners, lead and/or zinc detected within surface soils and estimated to be within terrestrial invertebrates of the northern forested wetland area. No risk is predicted to foraging carnivorous birds/mammals within this habitat.

Based on the potential risk estimates presented in the Stage II ERC, preliminary remediation goals (PRGs) are presented for the sediments of the aquatic habitat and surface soils of the northern forested wetland area. Remediation goals for the benthic community are based on the results of the laboratory toxicity testing for the sediment collected within the KMS Wetland. The PCB remediation goal of 5.0 mg/kg (mid-point of sediment sample concentration resulting in adverse effect compared to reference sample and the highest concentration not resulting in adverse effects compared to reference sample), although above the PEC of 0.676 mg/kg is below the total PCB SEL of 53 mg/kg and the concentration (5.44 mg/kg) where a significantly lower midge larvae growth rate was noted in the laboratory sediment toxicity testing. This total PCB concentration is expected to be protective of benthic receptors given the high total organic carbon levels present in the aquatic habitat of the KMS Wetland. No significant adverse effects were noted in the sediment toxicity testing to midge larvae and amphipods exposed to this total PCB concentration.

Based on the sediment toxicity testing, a total PAH remediation goal of 30 mg/kg is proposed which represents the mid-point of sediment sample concentration resulting in adverse effect compared to reference sample (31.64 mg/kg) and the highest concentration not resulting in adverse effects compared to reference sample (28.45 mg/kg). This concentration is greater than the PEC of 22.8 mg/kg but below the level (31.6 mg/kg) that was found to result in reduced

midge larvae growth in the sediment toxicity tests (see Table 5-3). This concentration is also well below the SEL of 1,000 mg/kg for total PAHs based on the organic carbon content present within the aquatic habitat of the KMS Wetland.

Preliminary remediation goals for those constituents providing risk to the wildlife indicator species are calculated based on the mean of concentrations derived using HQs of 1 for the NOAEL and LOAEL TRVs. This approach has been used in previous regulatory programs involving the establishment of PRGs protective of ecological receptors (TNRCC, 2001) where endangered/threatened species are not present at the site. This calculation uses the following equation for each:

PRG = (Sediment or Soil Concentration / NOAEL and LOAEL TRV HQs) / 2

PRGs for aquatic habitat sediment and surface soils of the northern forested area are presented in Tables 6-1 and 6-2, respectively. PRGs for the northern forested wetland area are driven by the PRGs proposed for the American robin except for lead where the background concentration of lead within "natural soil" (MADEP, 2002) is selected to represent the lead PRG. The PRGs represent 95% UCLs of the mean concentrations that would be protective of wildlife that forage within the northern forested wetland area. Sediment PRGs are driven entirely by the proposed benthic community PRGs (toxicity test concentrations that did not result in reduced growth rates in midge larvae).

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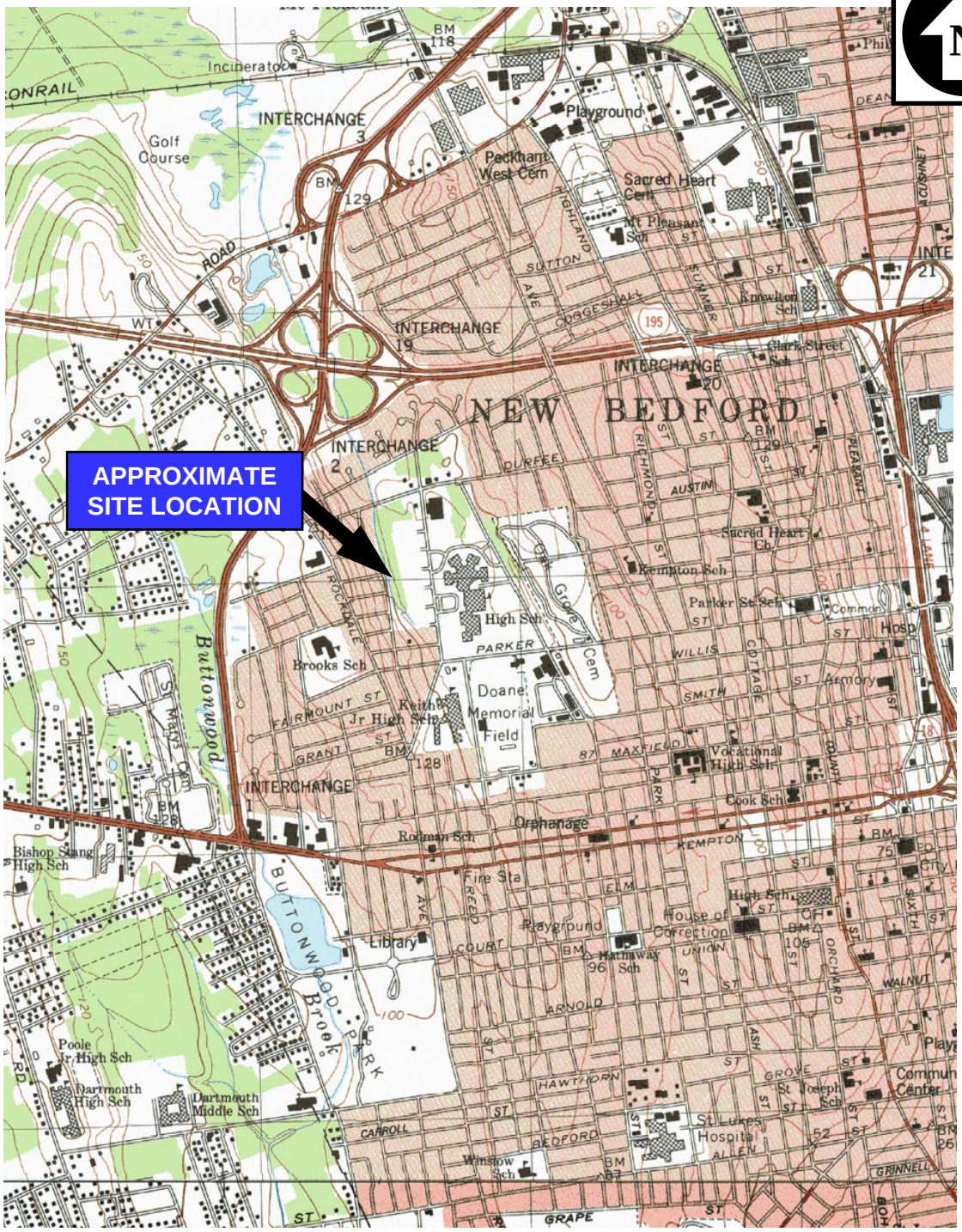
FIGURES



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' X 15' USGS TOPOGRAPHIC QUADRANGLES: NEW BEDFORD NORTH, MA, 1979; NEW BEDFORD SOUTH, MA 1977

0 1000 2000 3000

scale in feet

QUADRANGLE LOCATION

KEITH MIDDLE SCHOOL WETLAND
PCB CONTAMINATED SEDIMENTS
NEW BEDFORD, MASSACHUSETTS

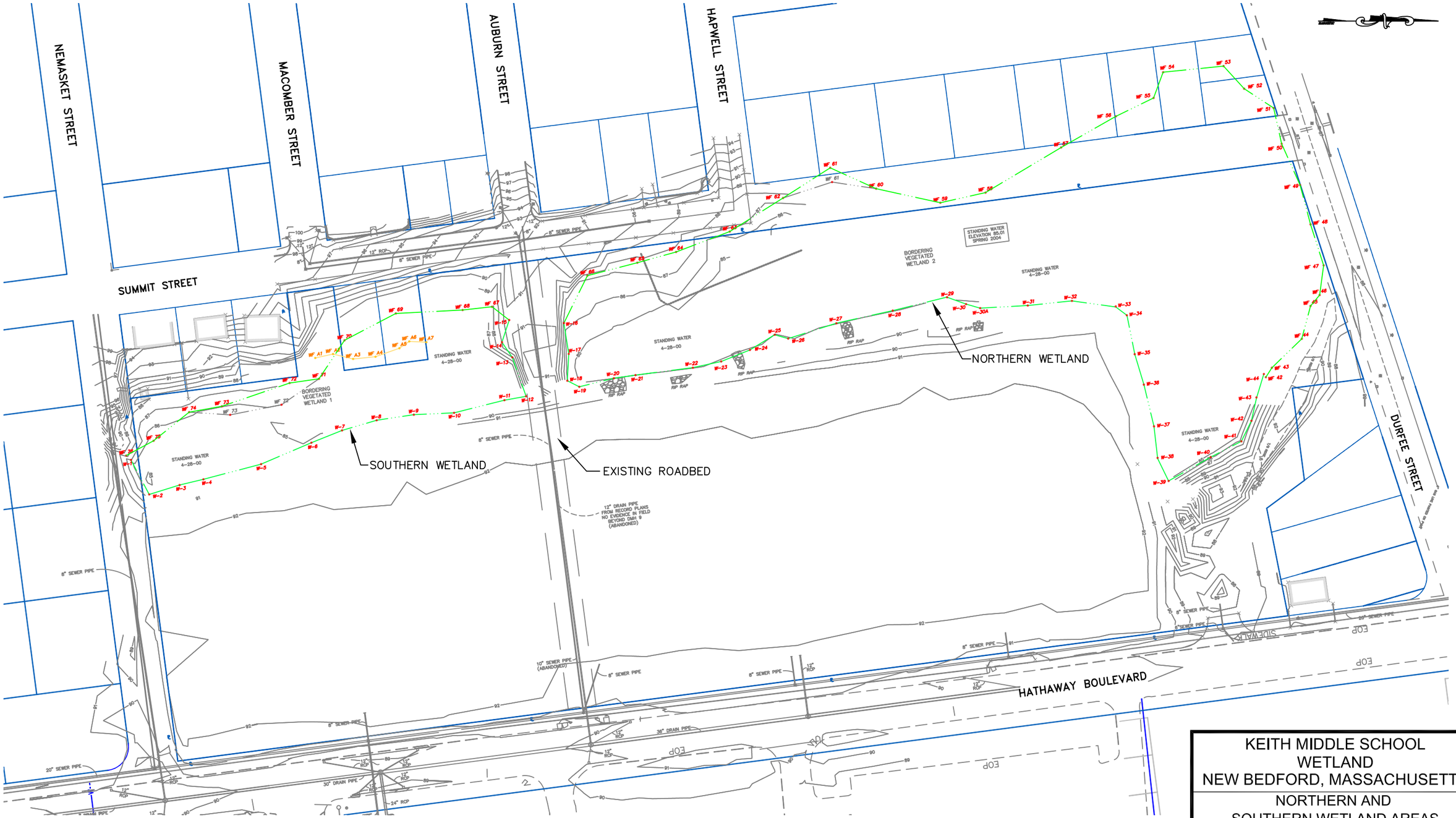
SITE LOCATION MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

Drawn: HWB	SCALE: AS SHOWN
Checked: DS	Date: JULY 2008

FIGURE 1-1

T:\E_CAD\115058\TOPO KEITH MIDDLE SCHOOL.ppt



NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

LEGEND:

WF 64 — WETLAND BOUNDARY

APPROXIMATE GRAPHIC SCALE

0' 50' 100' 200'

KEITH MIDDLE SCHOOL WETLAND NEW BEDFORD, MASSACHUSETTS

NORTHERN AND SOUTHERN WETLAND AREAS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: SH
DATE: SEPT 2009

FIGURE 2-1

FILE: T:\E_CAD\115058\KMS N AND S WETLAND AREAS.dwg

AUBURN STREET

HAPWELL STREET

SUMMIT STREET RIGHT-OF-WAY

SUMMIT STREET

DURFEE STREET

EXCAVATED AREA

NORTHERN WETLAND

EXCAVATED AREA

8" SEWER PIPE

12" DRAIN PIPE FROM RECORD PLANS NO EVIDENCE IN FIELD BEYOND DMH 9 (ABANDONED)

RIP RAP

ERC-SW7
ERC-SW9
ERC-SW11A
ERC-SW14
ERC-SW16
ERC-SW20
ERC-SW21
ERC-SW22
ERC-SW23
ERC-SW24
ERC-SW25
ERC-SW26
ERC-SW-27
ERC-SW-28
ERC-SW-29

W-16 W-17 W-18 W-19 W-20 W-21 W-22 W-23 W-24 W-25 W-26 W-27 W-28 W-29 W-30 W-30A W-31 W-32 W-33 W-34 W-35 W-36 W-37 W-38 W-39 W-40 W-41 W-42 W-43 W-44

WF 42 WF 43 WF 44 WF 45 WF 46 WF 47 WF 48 WF 49 WF 50 WF 51 WF 52 WF 53 WF 54 WF 55 WF 56 WF 57 WF 58 WF 59 WF 60 WF 61 WF 62 WF 63 WF 64 WF 65 WF 66

LEGEND:

- SURFACE WATER SAMPLE LOCATIONS
- WF 59 — WETLAND BOUNDARY
- AREA OF BETA GROUP EXCAVATION

NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

APPROXIMATE GRAPHIC SCALE

0' 30' 60' 120'

KEITH MIDDLE SCHOOL
WETLAND
NEW BEDFORD, MASSACHUSETTS

SURFACE WATER
SAMPLING LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE
2-2

DRAWN BY: HWB
CHECKED BY: SH
DATE: SEPT 2010

FILE: T:\E_CAD\115058\KMS WATER SAMP LOCS.dwg

AUBURN STREET

HAPWELL STREET

SUMMIT STREET RIGHT-OF-WAY

SUMMIT STREET

DURFEE STREET

EXCAVATED AREA

NORTHERN WETLAND

EXCAVATED AREA

8" SEWER PIPE

12" DRAIN PIPE FROM RECORD PLANS NO EVIDENCE IN FIELD BEYOND DMH 9 (ABANDONED)

RIP RAP

LEGEND:

- TRC SEDIMENT SAMPLE LOCATIONS (2008, 2009)
- BETA SURFACE SOIL SAMPLE LOCATIONS (2004, 2005)
- WETLAND BOUNDARY (WF 59)
- LIMIT OF PONDED WATER
- AREA OF BETA GROUP EXCAVATION

APPROXIMATE GRAPHIC SCALE

0' 30' 60' 120'

NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

FILE: T:_CAD\115058\KMS SED SAMP LOCS.dwg

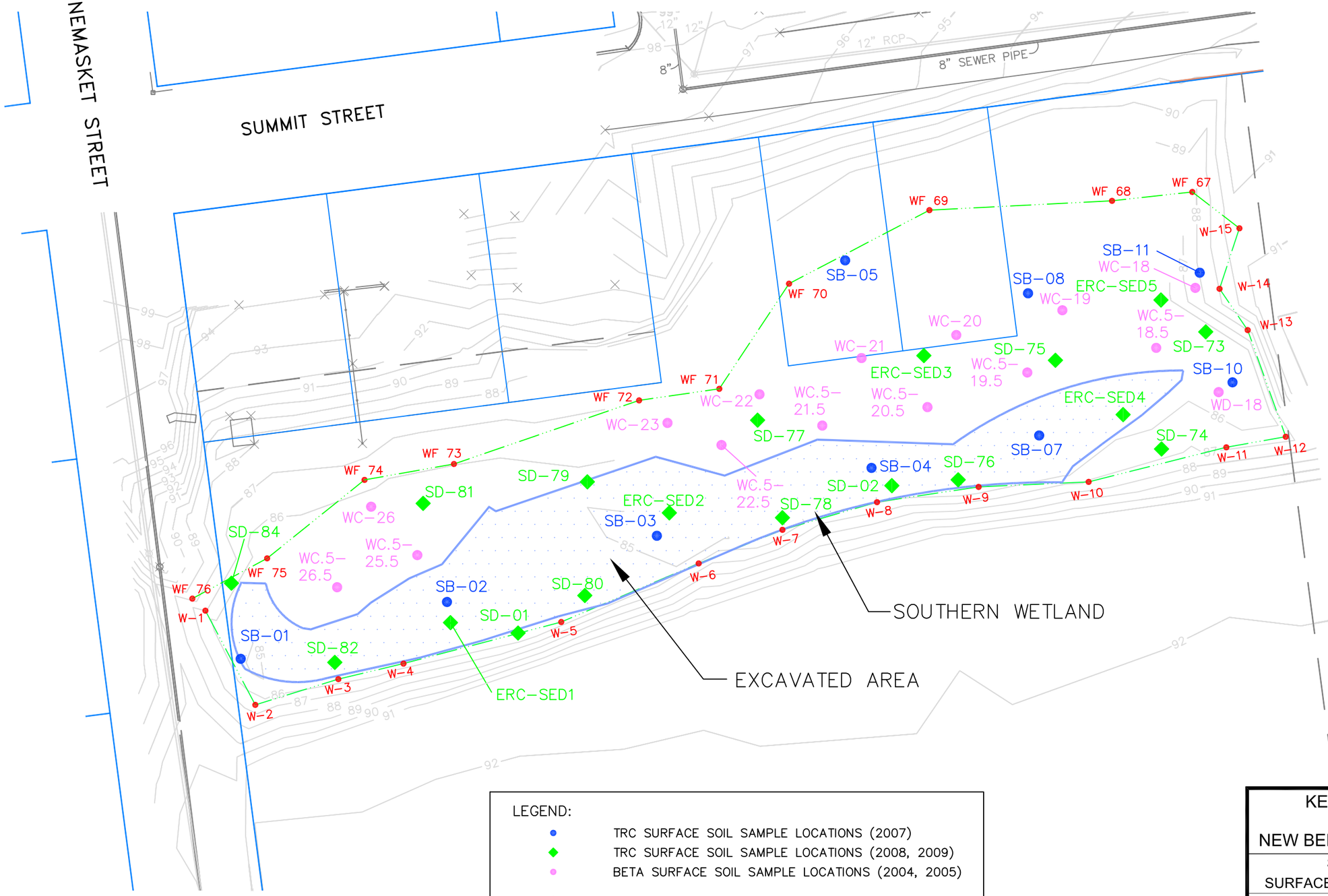
KEITH MIDDLE SCHOOL
WETLAND
NEW BEDFORD, MASSACHUSETTS

NORTHERN WETLAND
SEDIMENT SAMPLE LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: SH
DATE: NOV 2009

FIGURE 2-3



NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

LEGEND:

- TRC SURFACE SOIL SAMPLE LOCATIONS (2007)
- TRC SURFACE SOIL SAMPLE LOCATIONS (2008, 2009)
- BETA SURFACE SOIL SAMPLE LOCATIONS (2004, 2005)
- WF 73 — WETLAND BOUNDARY
- AREA OF BETA GROUP EXCAVATION

APPROXIMATE GRAPHIC SCALE

0' 20' 40' 80'

KEITH MIDDLE SCHOOL
WETLAND
NEW BEDFORD, MASSACHUSETTS

SOUTHERN WETLAND
SURFACE SOILS SAMPLING LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 2-4

DRAWN BY: HWB
CHECKED BY: SH
DATE: SEPT 2009

FILE: T:\E_CAD\115058\KMS SURF SAMP LOCS S.dwg

AUBURN STREET

HAPWELL STREET

SUMMIT STREET RIGHT-OF-WAY

SUMMIT STREET

8" SEWER PIPE

DURFEE STREET

EXCAVATED AREA

NORTHERN WETLAND

EXCAVATED AREA

RIP RAP

12" DRAIN PIPE FROM RECORD PLANS NO EVIDENCE IN FIELD BEYOND DMH 9 (ABANDONED)

LEGEND:

- TRC SURFACE SOIL SAMPLE LOCATIONS (2008, 2009)
- TRC SURFACE SOIL SAMPLE LOCATIONS (2008, 2009)
- BETA SURFACE SOIL SAMPLE LOCATIONS (2005)
- WF 59 — WETLAND BOUNDARY
- LIMIT OF PONDED WATER
- AREA OF BETA GROUP EXCAVATION

NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

APPROXIMATE GRAPHIC SCALE

0' 30' 60' 120'

KEITH MIDDLE SCHOOL WETLAND NEW BEDFORD, MASSACHUSETTS

NORTHERN WETLAND SURFACE SOILS SAMPLING LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 2-5

DRAWN BY: HWB
CHECKED BY: SH
DATE: NOV 2009

FILE: T:\E_CAD\115058\KMS SURF SAMP LOCS N.dwg

NEMASKET STREET

MACOMBER STREET

AUBURN STREET

HAPWELL STREET

SUMMIT STREET

DURFEE STREET

HATHAWAY BOULEVARD

EXCAVATED AREA

NORTHERN WETLAND

EXCAVATED AREA

SOUTHERN WETLAND

EXCAVATED AREA

NOTE: DRAWING BASED ON "McCOY FIELD SITE PLAN" FROM BETA GROUP, NORWOOD, MA DATED 6-04 AND "NEW BEDFORD PROGRESS DRAWING" FROM BETA GROUP, NORWOOD, MA DATED 8-06.

LEGEND:

- COMMON REED
- EXCAVATED AREAS
- FORESTED
- MARSH

APPROXIMATE GRAPHIC SCALE

0' 50' 100' 200'

KEITH MIDDLE SCHOOL
WETLAND
NEW BEDFORD, MASSACHUSETTS

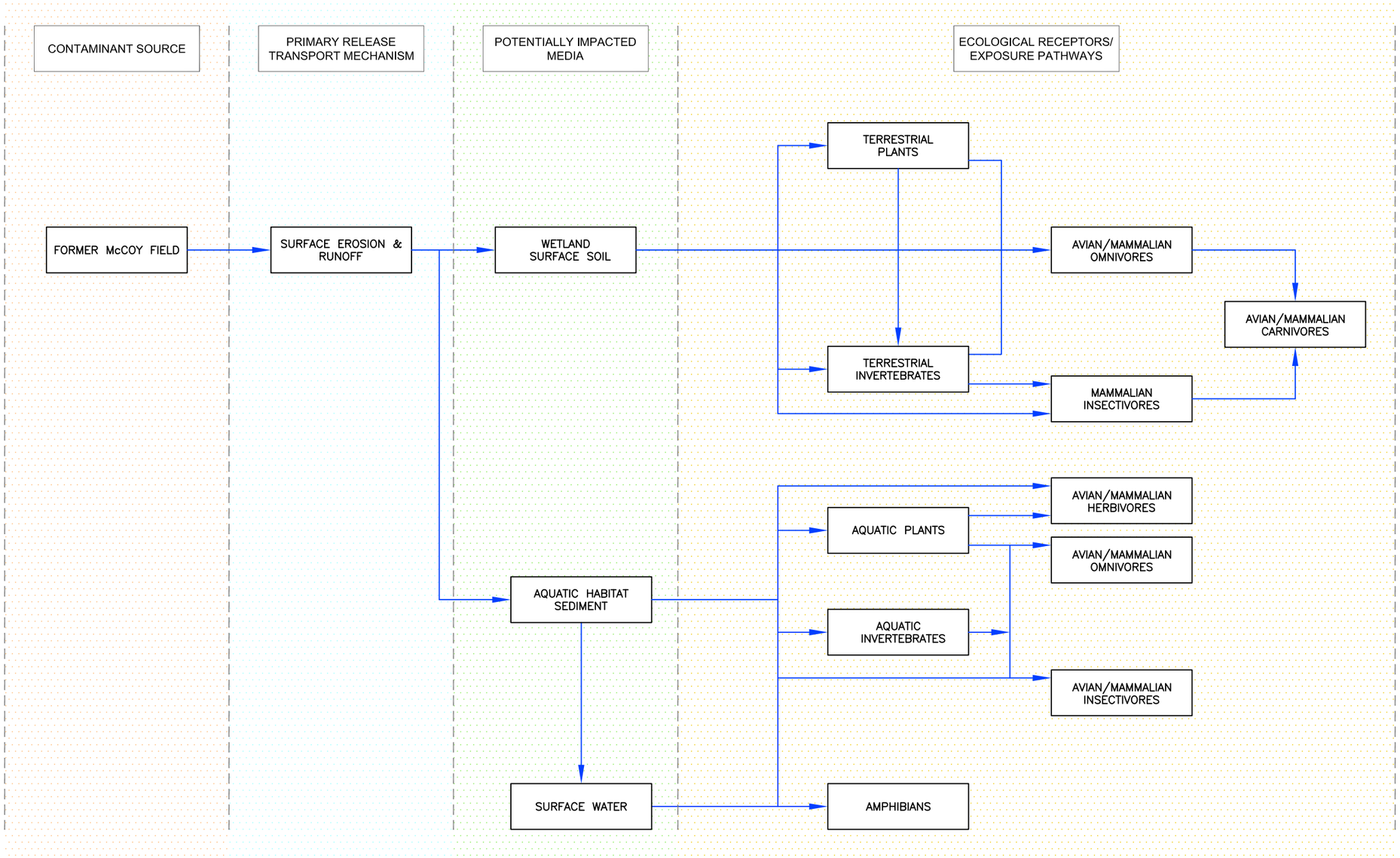
HABITAT COVER TYPES

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: SH
DATE: JUNE 2009

FIGURE 3-1

FILE: T:\E_CAD\115058\KMS HABITAT.dwg



KEITH MIDDLE SCHOOL
WETLANDS
NEW BEDFORD, MASSACHUSETTS

CONCEPTUAL
SITE MODEL

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE
3-2

DRAWN BY: HWB
CHECKED BY: SH
DATE:
JULY 2009

FILE: T:\E_CAD\115058\KMS CONCEPT SITE MODEL.dwg

TABLES

Table 2-1
Effects-Based Screeing Comparison - Surface Water
KMS Wetland
New Bedford, Massachusetts

	Analyte	Ecological Screening Benchmark	Benchmark Source	Maximum Detected Concentration	Detection Frequency	Exceeds Benchmark?	Remarks
PAHS	Acenaphthene	38	USEPA, 2003	ND	0%	No	Not Detected
(ug/L)	Acenaphthylene	4,840	USEPA, 2003	ND	0%	No	Not Detected
	Anthracene	0.035	USEPA, 2003	ND	0%	No	Not Detected
	Benzo(a)anthracene	0.025	USEPA, 2003	ND	0%	No	Not Detected
	Benzo(a)pyrene	0.014	USEPA, 2003	ND	0%	No	Not Detected
	Benzo(b)fluoranthene	9.07	USEPA, 2003	ND	0%	No	Not Detected
	Benzo(g,h,i)perylene	7.64	USEPA, 2003	ND	0%	No	Not Detected
	Benzo(k)fluoranthene	-	NA	ND	0%	NA	Not Detected
	2-Chloronaphthalene	0.396	USEPA, 2003	ND	0%	No	Not Detected
	Chrysene	-	NA	ND	0%	NA	Not Detected
	Dibenzo(a,h)anthracene	-	NA	ND	0%	NA	Not Detected
	Fluoranthene	1.9	USEPA, 2003	ND	0%	No	Not Detected
	Fluorene	19	USEPA, 2003	ND	0%	No	Not Detected
	Indeno(1,2,3-cd)pyrene	4.31	USEPA, 2003	ND	0%	No	Not Detected
	2-Methylnaphthalene	330	USEPA, 2003	ND	0%	No	Not Detected
	Phenanthrene	3.6	USEPA, 2003	ND	0%	No	Not Detected
	Pyrene	0.3	USEPA, 2003	ND	0%	No	Not Detected
PCBs							
(ug/L)	Monochlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Dichlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Trichlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Tetrachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Pentachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Hexachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Heptachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Octachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Nonachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
	Decachlorobiphenyl	0.014 [1]	USEPA, 2006a	ND	0%	No	Not Detected
Inorganics (Total)							
(ug/L)	Antimony	-	NA	ND	0%	NA	Not Detected
	Arsenic	-	NA	ND	0%	NA	Not Detected
	Barium	-	NA	28.0	100%	NA	See dissolved result
	Berylliium	-	NA	ND	0%	NA	Not Detected
	Cadmium	-	NA	ND	0%	NA	Not Detected
	Chromium	-	NA	0.60	20%	NA	See dissolved result
	Lead	-	NA	0.70	20%	NA	See dissolved result
	Nickel	-	NA	0.50	20%	NA	See dissolved result
	Selenium	-	NA	ND	0%	NA	Not Detected
	Silver	-	NA	ND	0%	NA	Not Detected
	Thallium	-	NA	ND	0%	NA	Not Detected
	Vanadium	-	NA	ND	0%	NA	Not Detected
	Zinc	-	NA	33.0	80%	NA	See dissolved result
Inorganics (Dissolved)							
(ug/L)	Antimony	80	USEPA, 2003	ND	0%	No	Not Detected
	Arsenic	150	USEPA, 2006a	ND	0%	No	Not Detected
	Barium	220	USEPA, 2003	26.9	100%	No	Detected at low concentrations
	Beryllium	3.6	USEPA, 2003	ND	0%	No	Not Detected
	Cadmium	0.25	USEPA, 2006a	ND	0%	No	Not Detected
	Chromium	74	USEPA, 2006a	ND	0%	No	Not Detected
	Lead	2.5	USEPA, 2006a	ND	0%	No	Not Detected
	Nickel	7.0 [2]	USEPA, 2006a	0.70	40%	No	Detected at low concentrations
	Selenium	5	USEPA, 2006a	ND	0%	No	Not Detected
	Silver	0.12	USEPA, 2003	ND	0%	No	Not Detected
	Thallium	10	USEPA, 2003	ND	0%	No	Not Detected
	Vanadium	12	USEPA, 2003	ND	0%	No	Not Detected
	Zinc	15.9 [2]	USEPA, 2006a	63.0	91% [3]	Yes	Exceeds criteria at 55% of sampled locations [3]

Notes:

ug/L - micrograms per liter or parts per billion (ppb).

- No benchmark available for this compound.

NA - Not applicable

[1] Water quality criterion applies to total PCBs.

[2] Adjusted for water hardness using site-specific water hardness value of 9.4 mg/L at highest detected concentration location.

[3] Non-detect sampling results with elevated detection limits above water quality benchmark not used.

Table 2-2
Effects-Based Screening Comparison - Sediment
KMS Wetland
New Bedford, Massachusetts

	Analyte	Ecological Screening Benchmark	Benchmark Source	95% UCL Mean Concentration	Detection Frequency	Exceeds Benchmark?	Remarks
PAHS	Acenaphthene	6.71	USEPA, 2003	1,225	7.4%	Yes	> Benchmark
(ug/kg)	Acenaphthylene	5.87	USEPA, 2003	251	11.1%	Yes	> Benchmark
	Anthracene	57	MADEP, 2006	3,073	18.5%	Yes	> Benchmark
	Benzo(a)anthracene	110	MADEP, 2006	10,300	22.2%	Yes	> Benchmark
	Benzo(a)pyrene	150	MADEP, 2006	9,591	20.4%	Yes	> Benchmark
	Benzo(b)fluoranthene	10,400	USEPA, 2003	11,100	20.4%	Yes	> Benchmark
	Benzo(g,h,i)perylene	170	USEPA, 2003	6,297	20.4%	Yes	> Benchmark
	Benzo(k)fluoranthene	240	USEPA, 2003	5,343	20.4%	Yes	> Benchmark
	Chrysene	170	MADEP, 2006	10,030	24.1%	Yes	> Benchmark
	Dibenzo(a,h)anthracene	33	MADEP, 2006	2,864	16.7%	Yes	> Benchmark
	Fluoranthene	420	MADEP, 2006	20,920	27.8%	Yes	> Benchmark
	Fluorene	77	MADEP, 2006	1,295	13.0%	Yes	> Benchmark
	Indeno(1,2,3-cd)pyrene	200	USEPA, 2003	6,354	20.4%	Yes	> Benchmark
	2-Methylnaphthalene	20.2	USEPA, 2003	504	5.6%	Yes	> Benchmark
	Naphthalene	180	MADEP, 2006	1,013	7.4%	Yes	> Benchmark
	Phenanthrene	200	MADEP, 2006	8,703	22.2%	Yes	> Benchmark
	Pyrene	200	MADEP, 2006	16,550	29.6%	Yes	> Benchmark
	Total PAHs	1,600	MADEP, 2006	-		Yes	> Benchmark
Pesticides							
(ug/kg)	Aldrin	2	USEPA, 2003	ND	0%	No	Not Detected
	alpha-BHC	6	USEPA, 2003	ND	0%	No	Not Detected
	beta-BHC	5	USEPA, 2003	ND	0%	No	Not Detected
	delta-BHC	71,500	USEPA, 2003	ND	0%	No	Not Detected
	gamma-BHC (Lindane)	2.4	MADEP, 2006	ND	0%	No	Not Detected
	alpha-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	gamma-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Dieldrin	1.9	MADEP, 2006	ND	0%	No	Not Detected
	4,4'-DDD	4.9	MADEP, 2006	80	16.7%	Yes	> Benchmark
	4,4'-DDE	3.2	MADEP, 2006	32.0	16.7%	Yes	> Benchmark
	4,4'-DDT	5.3	MADEP, 2006	217	16.7%	Yes	> Benchmark
	Endrin	2.2	MADEP, 2006	ND	0%	No	Not Detected
	Endosulfan sulfate	34.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin aldehyde	480	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-I	3.26	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-II	1.94	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor	0.60	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor epoxide	2.5	MADEP, 2006	ND	0%	No	Not Detected
	Methoxychlor	13.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin ketone	-	NA	ND	0%	-	Not Detected
	Toxaphene	0.077	USEPA, 2003	ND	0%	No	Not Detected
PCBs							
(ug/kg)	Aroclor 1254	-	NA	115,900	81.1%	-	-
	Aroclor 1260	-	NA	1,464	3.3%	-	-
	Total PCBs	1,000	Clean-Up Goal	116,000	81.1%	Yes	> Benchmark
Inorganics							
(mg/kg)	Antimony	-	NA	ND	0.0%	No	Not Detected
	Arsenic	33	MADEP, 2006	5.27	31.3%	No	< Benchmark
	Barium	-	NA	203	100.0%	-	No Benchmark Available
	Beryllium	-	NA	ND	0.0%	-	Not Detected
	Cadmium	5	MADEP, 2006	1.78	78.1%	No	< Benchmark
	Chromium	110	MADEP, 2006	20.6	100.0%	No	< Benchmark
	Lead	130	MADEP, 2006	265	100.0%	Yes	> Benchmark
	Mercury	0.18	MADEP, 2006	0.22	96.9%	Yes	> Benchmark
	Nickel	49	MADEP, 2006	24.0	90.9%	No	< Benchmark
	Selenium	-	NA	4.04	31.3%	-	No Benchmark Available
	Silver	0.5	USEPA, 2003	1.48	12.5%	Yes	> Benchmark
	Thallium	-	NA	ND	0.0%	-	Not Detected
	Vanadium	-	NA	27.2	64.0%	-	No Benchmark Available
	Zinc	460	MADEP, 2006	501	100.0%	Yes	> Benchmark

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

ug/kg - micrograms per kilogram (dry weight) or parts per billion (ppb).

ND - Not Detected

PAHs - Polycyclic Aromatic Hydrocarbons

PCBs - Polychlorinated Biphenyls.

- No benchmark available for this compound.

Table 2-3
Effects-Based Screening Comparison - Southern Wetland Area Surface Soil
KMS Wetland
New Bedford, Massachusetts

	Analyte	Ecological Screening Benchmark	Benchmark Source	95% UCL Mean Concentration	Detection Frequency	Exceeds Benchmark?	Remarks
PAHS	Acenaphthene	6.71	USEPA, 2003	ND	0%	No	< Benchmark
(ug/kg)	Acenaphthylene	5.87	USEPA, 2003	ND	0%	No	< Benchmark
	Anthracene	57	MADEP, 2006	ND	0%	No	< Benchmark
	Benzo(a)anthracene	110	MADEP, 2006	83	13%	No	< Benchmark
	Benzo(a)pyrene	150	MADEP, 2006	73	7%	No	< Benchmark
	Benzo(b)fluoranthene	10,400	USEPA, 2003	87	13%	No	< Benchmark
	Benzo(g,h,i)perylene	170	USEPA, 2003	ND	0%	No	< Benchmark
	Benzo(k)fluoranthene	240	USEPA, 2003	ND	0%	No	< Benchmark
	Chrysene	170	MADEP, 2006	81	13%	No	< Benchmark
	Dibenzo(a,h)anthracene	33	MADEP, 2006	ND	0%	No	< Benchmark
	Fluoranthene	420	MADEP, 2006	125	33%	No	< Benchmark
	Fluorene	77	MADEP, 2006	ND	0%	No	< Benchmark
	Indeno(1,2,3-cd)pyrene	200	USEPA, 2003	ND	0%	No	< Benchmark
	2-Methylnaphthalene	20.2	USEPA, 2003	ND	0%	No	< Benchmark
	Naphthalene	180	MADEP, 2006	ND	0%	No	< Benchmark
	Phenanthrene	200	MADEP, 2006	88	13%	No	< Benchmark
	Pyrene	200	MADEP, 2006	128	33%	No	< Benchmark
Pesticides							
(ug/kg)	Aldrin	2	USEPA, 2003	ND	0%	No	Not Detected
	alpha-BHC	6	USEPA, 2003	ND	0%	No	Not Detected
	beta-BHC	5	USEPA, 2003	ND	0%	No	Not Detected
	delta-BHC	71,500	USEPA, 2003	ND	0%	No	Not Detected
	gamma-BHC (Lindane)	2.4	MADEP, 2006	ND	0%	No	Not Detected
	alpha-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	gamma-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Dieldrin	1.9	MADEP, 2006	ND	0%	No	Not Detected
	4,4'-DDD	4.9	MADEP, 2006	33.6	25%	Yes	> Benchmark
	4,4'-DDE	3.2	MADEP, 2006	55.5	38%	Yes	> Benchmark
	4,4'-DDT	5.3	MADEP, 2006	57.7	38%	Yes	> Benchmark
	Endrin	2.2	MADEP, 2006	ND	0%	No	Not Detected
	Endosulfan sulfate	34.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin aldehyde	480	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-I	3.26	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-II	1.94	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor	0.60	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor epoxide	2.5	MADEP, 2006	ND	0%	No	Not Detected
	Methoxychlor	13.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin ketone	-	NA	ND	0%	-	Not Detected
	Toxaphene	0.077	USEPA, 2003	ND	0%	No	Not Detected
PCBs							
(ug/kg)	Aroclor 1254	-	NA	0.264	46%	-	-
	Aroclor 1260	-	NA	0.158	5%	-	-
	Total PCBs	1,000	Clean-Up Goal	0.282	46%	No	< Benchmark
Inorganics							
(mg/kg)	Arsenic	33	MADEP, 2006	1.48	100%	No	< Benchmark
	Barium	-	NA	69.6	100%	-	No Benchmark Available
	Cadmium	5	MADEP, 2006	0.79	100%	No	< Benchmark
	Chromium	110	MADEP, 2006	9.7	100%	No	< Benchmark
	Lead	130	MADEP, 2006	51	100%	No	< Benchmark
	Mercury	0.18	MADEP, 2006	0.07	93%	No	< Benchmark
	Selenium	-	NA	0.38	27%	-	No Benchmark Available
	Silver	0.5	USEPA, 2003	ND	0%	No	Not Detected

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

ug/kg - micrograms per kilogram (dry weight) or parts per billion (ppb).

ND - Not Detected

PAHs - Polycyclic Aromatic Hydrocarbons

PCBs - Polychlorinated Biphenyls.

- No benchmark available for this compound.

Table 2-4
Effects-Based Screening Comparison - Northern Wetland Area Surface Soil
KMS Wetland
New Bedford, Massachusetts

	Analyte	Ecological Screening Benchmark	Benchmark Source	95% UCL Mean Concentration	Detection Frequency	Exceeds Benchmark?	Remarks
PAHS	Acenaphthene	6.71	USEPA, 2003	156	12.5%	Yes	> Benchmark
(ug/kg)	Acenaphthylene	5.87	USEPA, 2003	320	12.5%	Yes	> Benchmark
	Anthracene	57	MADEP, 2006	594	12.5%	Yes	> Benchmark
	Benzo(a)anthracene	110	MADEP, 2006	540	25.0%	Yes	> Benchmark
	Benzo(a)pyrene	150	MADEP, 2006	680	25.0%	Yes	> Benchmark
	Benzo(b)fluoranthene	10,400	USEPA, 2003	770	25.0%	No	< Benchmark
	Benzo(g,h,i)perylene	170	USEPA, 2003	1,040	12.5%	Yes	> Benchmark
	Benzo(k)fluoranthene	240	USEPA, 2003	490	25.0%	Yes	> Benchmark
	Chrysene	170	MADEP, 2006	540	25.0%	Yes	> Benchmark
	Dibenzo(a,h)anthracene	33	MADEP, 2006	400	12.5%	Yes	> Benchmark
	Fluoranthene	420	MADEP, 2006	760	25.0%	Yes	> Benchmark
	Fluorene	77	MADEP, 2006	204	12.5%	Yes	> Benchmark
	Indeno(1,2,3-cd)pyrene	200	USEPA, 2003	976	12.5%	Yes	> Benchmark
	2-Methylnaphthalene	20.2	USEPA, 2003	55	12.5%	Yes	> Benchmark
	Naphthalene	180	MADEP, 2006	108	12.5%	No	< Benchmark
	Phenanthrene	200	MADEP, 2006	1,840	12.5%	Yes	> Benchmark
	Pyrene	200	MADEP, 2006	590	37.5%	Yes	> Benchmark
Pesticides							
(ug/kg)	Aldrin	2	USEPA, 2003	ND	0%	No	Not Detected
	alpha-BHC	6	USEPA, 2003	ND	0%	No	Not Detected
	beta-BHC	5	USEPA, 2003	ND	0%	No	Not Detected
	delta-BHC	71,500	USEPA, 2003	ND	0%	No	Not Detected
	gamma-BHC (Lindane)	2.4	MADEP, 2006	ND	0%	No	Not Detected
	alpha-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	gamma-Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Chlordane	3.2	MADEP, 2006	ND	0%	No	Not Detected
	Dieldrin	1.9	MADEP, 2006	ND	0%	No	Not Detected
	4,4'-DDD	4.9	MADEP, 2006	ND	0%	No	Not Detected
	4,4'-DDE	3.2	MADEP, 2006	ND	0%	No	Not Detected
	4,4'-DDT	5.3	MADEP, 2006	ND	0%	No	Not Detected
	Endrin	2.2	MADEP, 2006	ND	0%	No	Not Detected
	Endosulfan sulfate	34.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin aldehyde	480	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-I	3.26	USEPA, 2003	ND	0%	No	Not Detected
	Endosulfan-II	1.94	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor	0.60	USEPA, 2003	ND	0%	No	Not Detected
	Heptachlor epoxide	2.5	MADEP, 2006	ND	0%	No	Not Detected
	Methoxychlor	13.6	USEPA, 2003	ND	0%	No	Not Detected
	Endrin ketone	-	NA	ND	0%	-	Not Detected
	Toxaphene	0.077	USEPA, 2003	ND	0%	No	Not Detected
PCBs							
(ug/kg)	Aroclor 1254	-	NA	10,750	79.5%	-	-
	Aroclor 1260	-	NA	1,286	13.6%	-	-
	Total PCBs	1,000	Clean-Up Goal	15,770	79.5%	Yes	> Benchmark
Inorganics							
(mg/kg)	Antimony	-	NA	ND	0.0%	-	Not Detected
	Arsenic	33	MADEP, 2006	9.05	50.0%	No	< Benchmark
	Barium	-	NA	583	100.0%	-	No Benchmark Available
	Beryllium	-	NA	ND	0.0%	-	Not Detected
	Cadmium	5	MADEP, 2006	2.81	62.5%	No	< Benchmark
	Chromium	110	MADEP, 2006	70.0	100.0%	No	< Benchmark
	Lead	130	MADEP, 2006	977	100.0%	Yes	> Benchmark
	Mercury	0.18	MADEP, 2006	0.65	87.5%	Yes	> Benchmark
	Nickel	49	MADEP, 2006	21.5	100.0%	No	< Benchmark
	Selenium	-	NA	1.16	25.0%	-	No Benchmark Available
	Silver	0.5	USEPA, 2003	ND	0.0%	No	Not Detected
	Thallium	-	NA	ND	0.0%	-	Not Detected
	Vanadium	-	NA	41.7	100.0%	-	No Benchmark Available
	Zinc	460	MADEP, 2006	615	100.0%	Yes	> Benchmark

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

ug/kg - micrograms per kilogram (dry weight) or parts per billion (ppb).

ND - Not Detected

PAHs - Polycyclic Aromatic Hydrocarbons

PCBs - Polychlorinated Biphenyls.

- No benchmark available for this compound.

Table 3-1
Assessment Endpoints and Measurement Endpoints
KMS Wetland
New Bedford, Massachusetts

Assessment Endpoints	Measurement Endpoints	Exposure Area
Amphibian Community Diversity and Abundance	Comparison of surface water contaminant concentrations with surface water quality criteria protective of aquatic organisms.	Aquatic habitat of northern wetland area
Macrobenthic Community Diversity and Abundance	Comparison of bulk sediment contaminant concentrations with sediment threshold and probable adverse effects to benthic biota; Toxicity test results with *Chironomus tentans* and *Hyalella azteca*.	Aquatic habitat of northern wetland area
Avian Aquatic Herbivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by Canada goose to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Mammalian Aquatic Herbivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by muskrat to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Avian Aquatic Omnivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure dose received by mallard to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Mammalian Semi-Aquatic Omnivore Survival/Reproduction/Growth	Comparison of estimated bioaccumulative PCOPEC exposure dose received by raccoon to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Avian Semi-Aquatic Insectivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure dose received by marsh wren to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Mammalian Semi-Aquatic Insectivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure dose received by little brown bat to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Aquatic habitat of northern wetland area
Avian Terrestrial Omnivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by American robin to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Forested habitat in northern and southern wetland areas

Table 3-1
Assessment Endpoints and Measurement Endpoints
KMS Wetlands
New Bedford, Massachusetts

Assessment Endpoints	Measurement Endpoints	Exposure Area
Mammalian Terrestrial Omnivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by white-footed mouse to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Forested habitat in northern and southern wetland areas
Mammalian Terrestrial Insectivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by short-tailed shrew to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Forested habitat in northern and southern wetland areas
Avian Terrestrial Carnivore Survival/Reproduction/Growth	Comparison of estimated contaminant exposure doses received by red-tailed hawk to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Forested habitat in northern and southern wetland areas
Mammalian Terrestrial Carnivore Survival/Reproduction/ Growth	Comparison of estimated contaminant exposure doses received by red fox to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Forested habitat in northern and southern wetland areas

Table 4-1
PCB Congener - Total PCB Ratios
KMS Wetland
New Bedford, Massachusetts

Analysis	Aquatic Habitat							Forested Wetland Habitat	
	ERC-SED-9		ERC-SED-11A		ERC-SED-14		Mean	ERC-SED-6	
	Concentration	Congener: PCB Ratio[1]	Concentration	Congener: PCB Ratio[1]	Concentration	Congener: PCB Ratio[1]	Congener: PCB Ratio[2]	Concentration	Congener: PCB Ratio[1]
PCB Congeners (pg/g)									
77-TeCB	342	1.59E-04	52.8	1.22E-07	134	5.36E-04	2.32E-04	21.2	7.63E-07
81-TeCB	8.37	3.89E-06	51.2	1.18E-07	6.65	2.66E-05	1.02E-05	20.6	7.41E-07
105-PeCB	16,700	7.77E-03	7,860	1.81E-05	2,550	1.02E-02	6.00E-03	883	3.18E-05
114-PeCB	611.5	2.84E-04	517	1.19E-06	108	4.32E-04	2.39E-04	50.7	1.82E-06
118-PeCB	51,100	2.38E-02	24300	5.60E-05	7580	3.03E-02	1.80E-02	3,130	1.13E-04
123-PeCB	626.5	2.91E-04	292	6.73E-07	113	4.52E-04	2.48E-04	39.3	1.41E-06
126-PeCB	14.9	6.93E-06	149	3.43E-07	10	4.00E-05	1.58E-05	42.2	1.52E-06
156,157-HxCB	7,970	3.71E-03	3,730	8.59E-06	1,280	5.12E-03	2.95E-03	433	1.56E-05
167-HxCB	2,505	1.17E-03	1,080	2.49E-06	432	1.73E-03	9.65E-04	147	5.29E-06
169-HxCB	7.69	3.58E-06	47.8	1.10E-07	8.95	3.58E-05	1.32E-05	19.7	7.09E-07
189-HpCB	266.5	1.24E-04	124	2.86E-07	35.3	1.41E-04	8.85E-05	25.9	9.32E-07
Total PCBs (mg/kg)									
	2.15		434		0.25			27.8	

Notes:

[1] PCB congener concentration * conversion factor (0.000001) / Total PCB concentration

[2] Mean of ERC-SED-9, ERC-SED-11A and ERC-SED-14 ratios.

Table 4-2
Exposure Factors for Selected Indicator Receptor Species
KMS Wetland
New Bedford, Massachusetts

CHARACTER	VALUE	SOURCE	COMMENT
BODY WEIGHT			
Canada Goose	3.45 kg	Bellrose cited in USEPA (1993)	Adult female of *canadensis* subspecies
Muskrat	1.35 kg	Dozier (1950) cited in USEPA (1993)	Adult breeding female in New York in winter
Mallard	1.04 kg	Nelson and Martin (1953) cited in USEPA (1993)	Mean of adult females throughout North America
Raccoon	5.74 kg	Nagel (1943) cited in USEPA (1993)	Adult female in Missouri
Marsh Wren	0.0106 kg	Tintle (unpublished) cited in USEPA (1993)	Adult breeding female in New York
Little Brown Bat	0.0075 kg	Gould (1955) cited in Sample and Suter (1994)	-
American Robin	0.077 kg	Dunning (1984) cited in USEPA (1993)	-
White-footed Mouse	0.022 kg	Green and Millar (1987) cited in Sample and Suter (1994)	-
Short-tailed Shrew	0.015	Schlessinger and Potter (1974) cited in USEPA (1993)	Breeding adults
Red-tailed Hawk	1.028	Craighead and Craighead (1956) cited in USEPA (1993)	Mean of adult males in Michigan and Pennsylvania (lighter than females)
Red Fox	4.04 kg	Storm et al. (1976) cited in USEPA (1993)	Mean female weight in Illinois and Iowa during spring and fall, respectively
FOOD INGESTION RATE			
Canada Goose	0.107 kg/day (wet weight)	Joyner et al. (1984) cited in USEPA (1993)	Captive *interior* subspecies
Muskrat	0.459 kg/day (wet weight)	Svihla and Svihla (1931) cited in USEPA (1993)	Captive in Louisiana
Mallard	0.136 kg/day (wet weight)	Nagy (1987) equation cited in USEPA (1993)	Calculated from equation (0.06 kg/day dry weight) and adjusted to wet weight
Raccoon	1.36 kg/day (wet weight)	Nagy (1987) equation cited in USEPA (1993)	Calculated from equation (0.289 kg/day dry weight) and adjusted to wet weight
Marsh Wren	0.0071 kg/day (wet weight)	Kale (1965) cited in USEPA (1993)	Based on captive birds
Little Brown Bat	0.0037 kg/day (wet weight)	Anthony and Kunz (1977) cited in Sample and Suter (1994)	Highest field rate noted - lactating female
American Robin	0.093 kg/day (wet weight)	Hazelton et al. (1984) and Skorupa & Hothem (1985) cited in Sample & Suter (1994)	Mean of values from two studies
White-footed Mouse	0.0034 kg/day (wet weight)	Green and Millar (1987) cited in Sample and Suter (1994)	Laboratory study
Short-tailed Shrew	0.0093 kg/day (wet weight)	Morrison et al. (1957) cited in USEPA (1993)	62% of body weight per day for adult shrews at 25 degress Celsius
Red-tailed Hawk	0.117 kg/day (wet weight)	Craighead and Craighead (1969) cited in Sample and Suter (1994)	Male ingestion rate in fall/winter (highest male ingestion rate from study)
Red Fox	0.596 kg/day (wet weight)	Vogtsberger and Barret (1973) cited in Sample and Suter (1994)	estimated value

Table 4-2
Exposure Factors for Selected Indicator Receptor Species
KMS Wetland
New Bedford, Massachusetts

CHARACTER	VALUE	SOURCE	COMMENT
SURFACE WATER INGESTION RATE			
Canada Goose	0.135 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Muskrat	0.130 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Mallard	0.058 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Raccoon	0.477 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Marsh Wren	0.003 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Little Brown Bat	0.001 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
American Robin	0.011 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
White-footed Mouse	0.007 L/day	Oswald et al. (1993) cited in Sample and Suter (1994)	Non-breeding female in captivity
Short-tailed Shrew	0.003 L/day	Chew (1951) cited in Sample and Suter (1994)	-
Red-tailed Hawk	0.060 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
Red Fox	0.348 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
SEDIMENT/SOIL INGESTION			
Canada Goose	0.0018 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 8.2% of diet (dry weight basis) for Canada goose
Muskrat	0.0023 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 2.4% of diet (dry weight basis) for meadow vole
Mallard	0.0012 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 2% of diet (dry weight basis) for mallard
Raccoon	0.0272 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 9.4% of diet (dry weight basis) for raccoon
Marsh Wren	0.00 kg/day	-	Vegetation gleaner for arthropods - negligible
Little Brown Bat	0.00 kg/day	Sample and Suter (1994)	Aerial insectivore - negligible
American Robin	0.0019 kg/day (dry weight)	Sample and Suter (1994)	Based on 2.1% of diet
White-footed Mouse	0.00007 kg/day (dry weight)	Beyer et al. (1994) cited in Sample and Suter (1994)	Based on <2% of diet
Short-tailed Shrew	0.0002 kg/day (dry weight)	Talmage and Walton (1993) cited in Sample and Suter (1994)	Based on 13% of diet (dry weight basis)

Table 4-2
Exposure Factors for Selected Indicator Receptor Species
KMS Wetland
New Bedford, Massachusetts

CHARACTER	VALUE	SOURCE	COMMENT
Red-tailed Hawk	0.00 kg/day	Sample and Suter (1994)	Raptor - assumed to be negligible
Red Fox	0.0053 kg/day (dry weight)	Beyer et al. (1994)	Based on 2.8% of diet (dry weight basis)
DIET COMPOSITION			
Canada Goose	100% Vegetation	USEPA (1993)	Primarily grasses and sedges
Muskrat	100% Vegetation	USEPA (1993)	Primarily emergent vegetation
Mallard	66% Aquatic Invertebrates and 34% Vegetation	USEPA (1993)	Breeding female in May - North Dakota
Raccoon	58% Aquatic Invertebrates and 42% Vegetation	Llewellyn & Uhler (1952) cited in USEPA (1993)	Yearly average of animal and plant matter in Maryland bottomland forest
Marsh Wren	100% Invertebrates	Kale (1965) cited in USEPA (1993)	Sping and summer in Georgia salt marsh
Little Brown Bat	100% Aquatic Invertebrates	USEPA (1997)	-
American Robin	38% Terrestrial Invertebrates and 62% Vegetation	Wheelwright (1986) cited in Sample and Suter (1994)	Based on year-round average in Eastern U.S.
White-footed Mouse	31% Terrestrial Invertebrates and 69% Vegetation	Whitaker (1966) cited in Sample and Suter (1994)	Based on study in Indiana
Short-tailed Shrew	86% Earthworms and 14% Vegetation	Whitaker & Ferraro (1963) cited in Sample and Suter (1994)	Based on % volume in New York during summer
Red-tailed Hawk	100% Small Mammals	USEPA (1997)	Conservative for this exposure pathway
Red Fox	100% Small Mammals	USEPA (1997)	Conservative for this exposure pathway
% MOISTURE IN DIET			
Canada Goose	79% - young grasses	USEPA (1993)	Mean of range presented
Muskrat	79% - young grasses	USEPA (1993)	Mean of range presented
Mallard	80% - aquatic invertebrates 9% - seeds	USEPA (1993)	Mean of amphipods, isopods, cladocerans Dicot seeds
Raccoon	80% - aquatic invertebrates 77% - fruit	USEPA (1993)	Mean of amphipods, isopods, cladocerans Fruit pulp/skin
Marsh Wren	65% - invertebrates	USEPA (1993)	Mean of grasshoppers, crickets, beetles
Little Brown Bat	80% - aquatic invertebrates	USEPA (1993)	Mean of amphipods, isopods, cladocerans
American Robin	65% - terrestrial invertebrates 77% - fruit	USEPA (1993)	Mean of grasshoppers, crickets, beetles Fruit pulp/skin
White-footed Mouse	65% - terrestrial invertebrates 9% - seeds	USEPA (1993)	Mean of grasshoppers, crickets, beetles Dicot seeds
Short-tailed Shrew	84% - earthworms 79% - vegetation	Jager (1998) and USEPA (1993)	Mean % moisture from various cited sources
Red-tailed Hawk	68% - mammals	USEPA (1993)	mice, voles, rabbits
Red Fox	68% - mammals	USEPA (1993)	mice, voles, rabbits

Table 4-2
Exposure Factors for Selected Indicator Receptor Species
KMS Wetland
New Bedford, Massachusetts

CHARACTER	VALUE	SOURCE	COMMENT
AREA USE FACTOR			
Canada Goose	1	Observed with brood at site	Conservatively assumed only at site
Muskrat	1	Neal (1968) cited in USEPA (1993)	Mean home range of 0.42 acres in Iowa
Mallard	0.008	Dwyer et al. (1979) cited in USEPA (1993)	Based on 274 acre home range of laying female mallards in spring in North Dakota
Raccoon	0.047	Kaufmann, 1982	Based on average home range of 48.5 acres in dense suburban area
Marsh Wren	1	Leonard & Picman (1986) cited in USEPA (1993)	Based on territory size of 0.17 acres for male in cat-tail marsh in Manitoba
Little Brown Bat	0.058	Henry et al. (2002)	Based on home range of 40 acres for lactating little brown bats
American Robin	1	Pitts (1984) cited in Sample and Suter (1994)	Based on home range (territory) of 1.04 acres in Tennessee
White-footed Mouse	1	Wolff (1985) cited in Sample and Suter (1994)	Mean males and females in mixed forest in Virginia
Short-tailed Shrew	1	Buckner (1966)	Based on 1 acre home range in Manitoba bog
Red-tailed Hawk	0.01	Janes (1984) cited in Sample and Suter (1994)	Smallest home range reported as 148 acres
Red Fox	0.01	Ables (1969) cited in USEPA (1993)	Smallest home range reported as 237 acres
TEMPORAL USE FACTOR			
Canada Goose	0.25	USEPA (1993)	Female assumed to forage at site from incubation through fledging of young
Muskrat	1	-	Resident, non-hibernating species
Mallard	0.75	-	Assumed to be present year-round except during winter when ice present
Raccoon	1	-	Resident, non-hibernating species
Marsh Wren	0.5	Bull (1965)	Migrant - arriving in early May and departing in early October
Little Brown Bat	0.42	Fenton and Barclay (1980) cited in Sample and Suter (1994)	Hibernates from end of September -early May in north
American Robin	1	-	Potential resident, non-migratory species
White-footed Mouse	1	-	Resident, non-hibernating species
Short-tailed Shrew	1	-	Resident, non-hibernating species
Red-tailed Hawk	1	-	Potential resident, non-migratory species
Red Fox	1	-	Resident, non-hibernating species

Table 4-3
Estimated Plant (Foliage and Seed) Constituent Concentrations
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants	Mean UCL Sediment Concentration (mg/kg) [1]	Plant Uptake Factor	Plant Uptake Factor Source [2]	Mean UCL Plant Foliage Concentration (mg/kg) [3]	Mean UCL Plant Seed Concentration (mg/kg) [3]
SVOCs					
Acenaphthene	1.23	see LMW PAHs	-	-	-
Acenaphthylene	0.25	see LMW PAHs	-	-	-
Anthracene	3.07	see LMW PAHs	-	-	-
Benzo(a)anthracene	10.30	see HMW PAHs	-	-	-
Benzo(a)pyrene	9.59	see HMW PAHs	-	-	-
Benzo(b)fluoranthene	11.10	see HMW PAHs	-	-	-
Benzo(g,h,i)perylene	6.30	see HMW PAHs	-	-	-
Benzo(k)fluoranthene	5.34	see HMW PAHs	-	-	-
Chrysene	10.03	see HMW PAHs	-	-	-
Dibenz(a,h)anthracene	2.86	see HMW PAHs	-	-	-
Fluoranthene	20.92	see LMW PAHs	-	-	-
Fluorene	1.30	see LMW PAHs	-	-	-
Indeno(1,2,3-cd)pyrene	6.35	see HMW PAHs	-	-	-
2-Methylnaphthalene	0.50	see LMW PAHs	-	-	-
Naphthalene	1.01	see LMW PAHs	-	-	-
Phenanthrene	8.70	see LMW PAHs	-	-	-
Pyrene	16.55	see HMW PAHs	-	-	-
Total LMW PAHs	36.98	ln(P)=0.4544*ln(S)-1.3205[4]	USEPA, 2007b	2.89E-01	1.25E+00
Total HMW PAHs	78.43	ln(P)=0.9469*ln(S)-1.7026[4]	USEPA, 2007b	2.38E+00	1.03E+01
Pesticides/PCBs					
4,4'-DDD	0.080	0.0157	Travis and Arms (1988)	2.64E-04	1.14E-03
4,4'-DDE	0.032	0.0132	Travis and Arms (1988)	8.87E-05	3.84E-04
4,4'-DDT	0.217	0.0039	Travis and Arms (1988)	1.78E-04	7.70E-04
77-TeCB	0.0269	0.0084	Travis and Arms (1988)	4.76E-05	2.06E-04
81-TeCB	0.0012	0.0084	Travis and Arms (1988)	2.10E-06	9.09E-06
105-PeCB	0.6954	0.0036	Travis and Arms (1988)	5.23E-04	2.27E-03
114-PeCB	0.0277	0.0036	Travis and Arms (1988)	2.09E-05	9.04E-05
118-PeCB	2.0935	0.0036	Travis and Arms (1988)	1.57E-03	6.82E-03
123-PeCB	0.0288	0.0036	Travis and Arms (1988)	2.16E-05	9.37E-05
126-PeCB	0.0018	0.0036	Travis and Arms (1988)	1.37E-06	5.95E-06
156,157-HxCB	0.3416	0.0015	Travis and Arms (1988)	1.09E-04	4.72E-04
167-HxCB	0.1120	0.0015	Travis and Arms (1988)	3.57E-05	1.55E-04
169-HxCB	0.0015	0.0015	Travis and Arms (1988)	4.87E-07	2.11E-06
189-HpCB	0.0103	0.0006	Travis and Arms (1988)	1.39E-06	6.01E-06
Inorganics					
Barium	203	0.156	USEPA, 2007b	6.65E+00	2.88E+01
Lead	265	ln(P)=0.561*ln(S)-1.328 [4]	USEPA, 2007b	1.27E+00	5.52E+00
Mercury [5]	0.22	0.038	USEPA, 1999	1.73E-03	7.51E-03
Selenium	4.04	ln(P)=1.104*ln(S)-0.677 [4]	USEPA, 2007b	4.98E-01	2.16E+00
Silver	1.48	0.014	USEPA, 2007b	4.35E-03	1.89E-02
Vanadium	27.2	0.005	USEPA, 2007b	2.77E-02	1.20E-01
Zinc	501	ln(P)=0.554*ln(S)+1.575 [4]	USEPA, 2007b	3.18E+01	1.38E+02

Notes:

[1] Mean UCL sediment concentration from aquatic habitat area (see Table 2-2) except PCB congeners where mean UCL total PCB concentration multiplied by individual PCB congener:total PCB ratio (see Table 4-1)

[2] Plant Uptake Factors from Travis and Arms (1988) calculated from following equation: Log PUF = 1.588 - 0.578(Log Kow). Log Kow values from EPI Suite (version 4.0)

[3] Plant foliage and seed concentrations presented on wet weight basis

[4] Regression equation cited in source used to calculate plant concentration based on mean UCL sediment concentration. P = Plant Concentration and S = Sediment concentration

[5] Plant Uptake Factor for mercuric chloride.

Plant concentrations from Travis and Arms (1988) and USEPA sources were converted to a wet weight basis by basis by multiplying results (sediment concentration x uptake factor) by proportion dry matter (i.e., % solids) of foliage (0.21) and seeds (0.91) from USEPA (1993).

Table 4-4
Estimated Plant (Foliage, Fruit and Seed) Constituent Concentrations
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants	Mean UCL Surface Soil Concentration (mg/kg) [1]	Plant Uptake Factor	Plant Uptake Factor Source [2]	Mean UCL Plant Foliage Concentration (mg/kg) [3]	Mean UCL Plant Fruit Concentration (mg/kg) [3]	Mean UCL Plant Seed Concentration (mg/kg) [3]
Southern Forested Wetland						
Pesticides						
4,4'-DDD	0.034	0.0157	Travis and Arms (1988)	1.11E-04	1.21E-04	4.80E-04
4,4'-DDE	0.056	0.0132	Travis and Arms (1988)	1.54E-04	1.68E-04	6.67E-04
4,4'-DDT	0.058	0.0039	Travis and Arms (1988)	4.73E-05	5.18E-05	2.05E-04
Inorganics						
Barium	69.6	0.156	USEPA, 2007a	2.28E+00	2.50E+00	9.88E+00
Selenium	0.38	ln(P)=1.104*ln(S)-0.677 [4]	USEPA, 2007a	3.67E-02	4.02E-02	1.59E-01
Northern Forested Wetland						
SVOCs						
Acenaphthene	0.16	see LMW PAHs	-	-	-	-
Acenaphthylene	0.32	see LMW PAHs	-	-	-	-
Anthracene	0.59	see LMW PAHs	-	-	-	-
Benzo(a)anthracene	0.54	see HMW PAHs	-	-	-	-
Benzo(a)pyrene	0.68	see HMW PAHs	-	-	-	-
Benzo(b)fluoranthene	0.77	see HMW PAHs	-	-	-	-
Benzo(g,h,i)perylene	1.04	see HMW PAHs	-	-	-	-
Benzo(k)fluoranthene	0.49	see HMW PAHs	-	-	-	-
Chrysene	0.54	see HMW PAHs	-	-	-	-
Dibenz(a,h)anthracene	0.40	see HMW PAHs	-	-	-	-
Fluoranthene	0.76	see LMW PAHs	-	-	-	-
Fluorene	0.20	see LMW PAHs	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.98	see HMW PAHs	-	-	-	-
2-Methylnaphthalene	0.06	see LMW PAHs	-	-	-	-
Naphthalene	0.11	see LMW PAHs	-	-	-	-
Phenanthrene	1.84	see LMW PAHs	-	-	-	-
Pyrene	0.59	see HMW PAHs	-	-	-	-
Total LMW PAHs	4.04	ln(P)=0.4544*ln(S)-1.3205[4]	USEPA, 2007b	1.06E-01	1.16E-01	4.58E-01
Total HMW PAHs	6.03	ln(P)=0.9469*ln(S)-1.7026[4]	USEPA, 2007b	2.10E-01	2.30E-01	9.09E-01
PCBs						
77-TeCB	0.000012	0.0084	Travis and Arms (1988)	2.13E-08	2.33E-08	9.24E-08
81-TeCB	0.000012	0.0084	Travis and Arms (1988)	2.07E-08	2.27E-08	8.98E-08
105-PeCB	0.000501	0.0036	Travis and Arms (1988)	3.77E-07	4.12E-07	1.63E-06
114-PeCB	0.000029	0.0036	Travis and Arms (1988)	2.16E-08	2.37E-08	9.37E-08
118-PeCB	0.001776	0.0036	Travis and Arms (1988)	1.33E-06	1.46E-06	5.78E-06
123-PeCB	0.000022	0.0036	Travis and Arms (1988)	1.68E-08	1.84E-08	7.26E-08
126-PeCB	0.000024	0.0036	Travis and Arms (1988)	1.80E-08	1.97E-08	7.80E-08
156,157-HxCB	0.000246	0.0015	Travis and Arms (1988)	7.83E-08	8.58E-08	3.39E-07
167-HxCB	0.000083	0.0015	Travis and Arms (1988)	2.66E-08	2.91E-08	1.15E-07
169-HxCB	0.000011	0.0015	Travis and Arms (1988)	3.56E-09	3.90E-09	1.54E-08
189-HpCB	0.000015	0.0006	Travis and Arms (1988)	1.99E-09	2.18E-09	8.61E-09
Inorganics						
Barium	583	0.156	USEPA, 2007b	1.91E+01	2.09E+01	8.28E+01
Lead	977	ln(P)=0.561*ln(S)-1.328 [4]	USEPA, 2007b	2.65E+00	2.90E+00	1.15E+01
Mercury [5]	0.65	0.038	USEPA, 1999	5.12E-03	5.61E-03	2.22E-02
Selenium	1.16	ln(P)=1.104*ln(S)-0.677 [4]	USEPA, 2007b	1.26E-01	1.38E-01	5.45E-01
Vanadium	41.7	0.005	USEPA, 2007b	4.25E-02	4.65E-02	1.84E-01
Zinc	615	ln(P)=0.554*ln(S)+1.575 [4]	USEPA, 2007b	3.56E+01	3.90E+01	1.54E+02

Notes:

[1] Mean UCL surface soil concentrations from forested habitat areas (see Tables 2-3 and 2-4) except PCB congeners where mean UCL total PCB concentration multiplied by individual PCB congener:total PCB ratio (see Table 4-1)

[2] Plant Uptake Factors from Travis and Arms (1988) calculated from following equation: Log PUF = 1.588 - 0.578(Log Kow). Log Kow values from EPI Suite (version 4.0)

[3] Plant foliage, fruit and seed concentrations presented on wet weight basis

[4] Regression equation cited in source used to calculate plant concentration based on mean UCL surface soil concentration.

[5] Plant Uptake Factor for mercuric chloride.

Plant concentrations from Travis and Arms (1988) and USEPA sources were converted to a wet weight basis by basis by multiplying results (surface soil concentration x uptake factor) by proportion dry matter (i.e., % solids) of foliage (0.21), fruit (0.23) and seeds (0.91) from USEPA (1993).

Table 4-5
Estimated Aquatic Invertebrate Constituent Concentrations
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	TOC Normalized Sediment Concentration (mg/kg) [2]	Aquatic Invertebrate BSAF[3]	Aquatic Invertebrate Lipid Content (fraction) [4]	Mean UCL Aquatic Invertebrate Concentration (mg/kg) [5]
SVOCs					
Acenaphthene	1.23	4.218	0.0442	0.031	5.76E-03
Acenaphthylene	0.25	0.864	0.0375	0.031	1.00E-03
Anthracene	3.07	10.582	0.0387	0.031	1.27E-02
Benzo(a)anthracene	10.30	35.468	0.0115	0.031	1.26E-02
Benzo(a)pyrene	9.59	33.027	0.0084	0.031	8.61E-03
Benzo(b)fluoranthene	11.10	38.223	0.0105	0.031	1.24E-02
Benzo(g,h,i)perylene	6.30	21.684	0.0155	0.031	1.04E-02
Benzo(k)fluoranthene	5.34	18.399	0.0148	0.031	8.41E-03
Chrysene	10.03	34.539	0.0071	0.031	7.58E-03
Dibenz(a,h)anthracene	2.86	9.862	0.0110 [6]	0.031	3.36E-03
Fluoranthene	20.92	72.039	0.0095	0.031	2.12E-02
Fluorene	1.30	4.459	0.0547	0.031	7.54E-03
Indeno(1,2,3-cd)pyrene	6.35	21.880	0.0110 [6]	0.031	7.46E-03
2-Methylnaphthalene	0.50	1.736	0.0314 [7]	0.031	1.69E-03
Naphthalene	1.01	3.488	0.0112	0.031	1.20E-03
Phenanthrene	8.70	29.969	0.0239	0.031	2.21E-02
Pyrene	16.55	56.990	0.0089	0.031	1.48E-03
Pesticides/PCBs					
4,4'-DDD	0.080	0.2755	9.558	0.031	8.14E-02
4,4'-DDE	0.032	0.1102	2.248	0.031	7.66E-03
4,4'-DDT	0.217	0.7472	1.016	0.031	2.34E-02
77-TeCB	0.0269	0.0926	1.771	0.031	5.07E-03
81-TeCB	0.0012	0.0041	4.699	0.031	5.92E-04
105-PeCB	0.6954	2.3948	1.545	0.031	1.14E-01
114-PeCB	0.0277	0.0955	1.140	0.031	3.36E-03
118-PeCB	2.0935	7.2092	1.956	0.031	4.36E-01
123-PeCB	0.0288	0.0991	4.729	0.031	1.45E-02
126-PeCB	0.0018	0.0063	1.041	0.031	2.03E-04
156,157-HxCB	0.3416	1.1765	1.864	0.031	6.77E-02
167-HxCB	0.1120	0.3855	1.902	0.031	2.27E-02
169-HxCB	0.0015	0.0053	0.504	0.031	8.19E-05
189-HpCB	0.0103	0.0353	1.774	0.031	1.94E-03
Inorganics					
Barium	203	-	0.00	-	0.00E+00
Lead	265	-	0.066	-	6.12E+00
Mercury	0.22	-	log(I)=0.327*log(S)-0.67	-	4.60E-02
Selenium	4.04	-	1.00	-	1.41E+00
Silver	1.48	-	1.00	-	5.18E-01
Vanadium	27.2	-	0.00	-	0.00E+00
Zinc	501	-	log(I)=0.126*log(S)+1.89	-	5.95E+01

Notes:

[1] Mean UCL sediment concentration (dry weight) from aquatic habitat area (see Table 2-2) except PCB congeners where mean UCL total PCB concentration multiplied by individual PCB congener:total PCB ratio (see Table 4-1)

[2] Mean UCL sediment concentration (dry weight) divided by mean TOC (dry weight) of sediment (29.04%).

[3] Organics from BSAF database (USEPA, 2007c) - benthic invertebrate or crayfish BSAF.
Inorganics from Bechtel Jacobs (1998). Regression equations used where applicable (I = invertebrate conc.; S = soil conc.)
Converted to wet weight by multiplying by percent solids (0.35) of aquatic invertebrates

[4] BSAF database - Mean lipid content of freshwater crusteans and freshwater worms (wet weight fraction).

[5] TOC normalized sediment concentration * aquatic invertebrate BSAF * aquatic invertebrate lipid concent (wet weight).

[6] BSAF not available. Used mean of high molecular weight PAHs.

[7] BSAF not available. Used mean of low molecular weight PAHs.

Table 4-6
Estimated Terrestrial Invertebrate Constituent Concentrations
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Log K_{ow} [2]	K_{oc} [2]	Log Worm/Soil Partitioning Coefficient (Log K_{ww}) [3]	Worm/Soil Partitioning Coefficient K_{ww}	Soil/Water Partitioning Coefficient K_d [4]	BAF [5]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg) [6]
Southern Forested Wetland								
Pesticides								
4,4'-DDD	0.034	5.87	167,600	3.11	1,279	17,162	0.07	2.50E-03
4,4'-DDE	0.056	6.00	446,300	3.22	1,660	45,701	0.04	2.02E-03
4,4'-DDT	0.058	6.91	992,600	4.01	10,273	101,642	0.10	5.83E-03
Inorganics								
Barium	69.6	-	-	-	-	-	0.091	1.01E+00
Selenium	0.38	-	-	-	-	-	ln(I)=0.733*ln(S)-0.075[7]	7.30E-02
Northern Forested Wetland								
SVOCs								
Acenaphthene	0.16	3.92	2,522	1.41	25.73	164	0.16	2.45E-02
Acenaphthylene	0.32	3.94	2,625	1.43	26.78	171	0.16	5.02E-02
Anthracene	0.59	4.45	7,274	1.87	74.39	473	0.16	9.35E-02
Benzo(a)anthracene	0.54	5.76	99,700	3.01	1,026	6,481	0.16	8.55E-02
Benzo(a)pyrene	0.68	6.13	208,800	3.33	2,153	13,572	0.16	1.08E-01
Benzo(b)fluoranthene	0.77	5.78	103,800	3.03	1,068	6,747	0.16	1.22E-01
Benzo(g,h,i)perylene	1.04	6.63	567,300	3.77	5,863	36,875	0.16	1.65E-01
Benzo(k)fluoranthene	0.49	6.11	200,700	3.32	2,069	13,046	0.16	7.77E-02
Chrysene	0.54	5.81	110,200	3.05	1,134	7,163	0.16	8.55E-02
Dibenz(a,h)anthracene	0.40	6.75	473,900	3.87	7,456	30,804	0.24	9.68E-02
Fluoranthene	0.76	5.16	30,060	2.49	308.5	1,954	0.16	1.20E-01
Fluorene	0.20	4.18	4,241	1.64	43.31	276	0.16	3.21E-02
Indeno(1,2,3-cd)pyrene	0.98	6.70	652,400	3.83	6,745	42,406	0.16	1.55E-01
2-Methylnaphthalene	0.06	3.86	2,237	1.36	22.81	145	0.16	8.63E-03
Naphthalene	0.11	3.30	731	0.87	7.43	48	0.16	1.69E-02
Phenanthrene	1.84	4.46	7,421	1.88	75.89	482	0.16	2.89E-01
Pyrene	0.59	4.88	17,180	2.25	176.0	1,117	0.16	9.30E-02
PCBs								
77-TeCB	0.000012	6.34	54,540	3.52	3,279	3,545	0.93	1.11E-05
81-TeCB	0.000012	6.34	37,700	3.52	3,279	2,451	1.34	1.56E-05
105-PeCB	0.000501	6.98	66,870	4.07	11,820	4,347	2.72	1.36E-03
114-PeCB	0.000029	6.98	85,180	4.07	11,820	5,537	2.13	6.14E-05
118-PeCB	0.001776	6.98	101,800	4.07	11,820	6,617	1.79	3.17E-03
123-PeCB	0.000022	6.98	85,180	4.07	11,820	5,537	2.13	4.76E-05
126-PeCB	0.000024	6.98	85,180	4.07	11,820	5,537	2.13	5.11E-05
156,157-HxCB	0.000246	7.62	187,600	4.63	42,599	12,194	3.49	8.58E-04
167-HxCB	0.000083	7.62	165,200	4.63	42,599	10,738	3.97	3.31E-04
169-HxCB	0.000011	7.62	147,300	4.63	42,599	9,575	4.45	4.97E-05
189-HpCB	0.000015	8.27	440,400	5.19	156,639	28,626	5.47	8.04E-05
Inorganics								
Barium	583	-	-	-	-	-	0.091	8.49E+00
Lead	977	-	-	-	-	-	ln(I)=0.807*ln(S)-0.218[7]	3.33E+01
Mercury [8]	0.65	-	-	-	-	-	0.040	4.16E-03
Selenium	1.16	-	-	-	-	-	ln(I)=0.733*ln(S)-0.075[7]	1.66E-01
Vanadium	41.7	-	-	-	-	-	0.042	2.80E-01
Zinc	615	-	-	-	-	-	ln(I)=0.328*ln(S)+4.449[7]	1.12E+02

Notes:

[1] Mean UCL surface soil concentrations from forested habitat areas (see Tables 2-3 and 2-4) except PCB congeners where mean UCL total PCB concentration multiplied by individual PCB congener:total PCB ratio (see Table 4-1)

[2] Log K_{ow} and K_{oc} values from EPI Suite (v. 4.0)

[3] Log K_{ww} = 0.87 * Log K_{ow} - 2.0 (from Jager, 1998)

[4] K_d = foc * K_{oc} (foc in southern wetland = 10.24% and foc in northern wetland = 6.5%)

[5] BAF = K_{ww} (L/kg worm wet wt.) / K_d (L/kg soil dry wt.)

[6] Invertebrate concentration = Mean UCL soil concentration * BAF

[7] Regression equation cited in USEPA source used to calculate invertebrate concentration. I: earthworm concentration S: Soil concentration Converted to wet weight by multiplying by % dry matter (i.e., % solids) of earthworm (16% from Jager, 1998).

[8] BAF value for mercuric chloride (USEPA, 1999).

Table 4-7
Estimated Small Mammal Constituent Concentrations
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Small Mammal:Soil Bioaccumulation Factor	BAF Source [2]	Mean UCL Small Mammal Concentration (mg/kg) [3]
Southern Forested Wetland				
Pesticides				
4,4'-DDD	0.034	0.0000652 [6]	Travis and Arms (1988)	8.27E-08
4,4'-DDE	0.056	ln(M)=0.641*ln(D)+3.6401[5]	USEPA, 2007b	9.29E-02
4,4'-DDT	0.058	ln(M)=0.7254*ln(D)+1.1788[5]	USEPA, 2007b	4.06E-03
Inorganics				
Barium	69.6	0.0075 [5]	USEPA, 2007b	2.18E-02
Selenium	0.38	ln(M)=0.3764*ln(S)-0.4158[4]	USEPA, 2007b	1.47E-01
Northern Forested Wetland				
SVOCs				
Acenaphthene	0.16	0.0	USEPA, 2007b	0.00E+00
Acenaphthylene	0.32	0.0	USEPA, 2007b	0.00E+00
Anthracene	0.59	0.0	USEPA, 2007b	0.00E+00
Benzo(a)anthracene	0.54	0.0	USEPA, 2007b	0.00E+00
Benzo(a)pyrene	0.68	0.0	USEPA, 2007b	0.00E+00
Benzo(b)fluoranthene	0.77	0.0	USEPA, 2007b	0.00E+00
Benzo(g,h,i)perylene	1.04	0.0	USEPA, 2007b	0.00E+00
Benzo(k)fluoranthene	0.49	0.0	USEPA, 2007b	0.00E+00
Chrysene	0.54	0.0	USEPA, 2007b	0.00E+00
Dibenz(a,h)anthracene	0.40	0.0	USEPA, 2007b	0.00E+00
Fluoranthene	0.76	0.0	USEPA, 2007b	0.00E+00
Fluorene	0.20	0.0	USEPA, 2007b	0.00E+00
Indeno(1,2,3-cd)pyrene	0.98	0.0	USEPA, 2007b	0.00E+00
2-Methylnaphthalene	0.06	0.0	USEPA, 2007b	0.00E+00
Naphthalene	0.11	0.0	USEPA, 2007b	0.00E+00
Phenanthrene	1.84	0.0	USEPA, 2007b	0.00E+00
Pyrene	0.59	0.0	USEPA, 2007b	0.00E+00
PCBs				
77-TeCB	0.000012	0.000192 [6]	Travis and Arms (1988)	8.44E-10
81-TeCB	0.000012	0.000192 [6]	Travis and Arms (1988)	1.18E-09
105-PeCB	0.000501	0.000840 [6]	Travis and Arms (1988)	4.47E-07
114-PeCB	0.000029	0.000840 [6]	Travis and Arms (1988)	2.02E-08
118-PeCB	0.001776	0.000840 [6]	Travis and Arms (1988)	1.04E-06
123-PeCB	0.000022	0.000840 [6]	Travis and Arms (1988)	1.56E-08
126-PeCB	0.000024	0.000840 [6]	Travis and Arms (1988)	1.68E-08
156,157-HxCB	0.000246	0.003665 [6]	Travis and Arms (1988)	1.23E-06
167-HxCB	0.000083	0.003665 [6]	Travis and Arms (1988)	4.73E-07
169-HxCB	0.000011	0.003665 [6]	Travis and Arms (1988)	7.11E-08
189-HpCB	0.000015	0.01637 [6]	Travis and Arms (1988)	5.13E-07
Inorganics				
Barium	583	0.0075 [5]	USEPA, 2007b	1.83E-01
Lead	977	ln(M)=0.4422*ln(S)+0.0761[4]	USEPA, 2007b	7.25E+00
Mercury [7]	0.65	0.006	USEPA, 1999	3.90E-03
Selenium	1.16	ln(M)=0.3764*ln(S)-0.4158[4]	USEPA, 2007b	2.23E-01
Vanadium	41.7	0.012	USEPA, 2007b	1.64E-01
Zinc	615	ln(M)=0.0706*ln(S)+4.3632[4]	USEPA, 2007b	3.95E+01

Notes:

[1] Mean UCL surface soil concentrations from forested habitat areas (see Tables 2-3 and 2-4) except PCB congeners where mean UCL total PCB concentration multiplied by individual PCB congener:total PCB ratio (see Table 4-1)

[2] Bioaccumulation Factors calculated from Travis and Arms (1988) where biotransfer factor: Log BTF = -7.6 + Log K_{ow}.
BAF = BTF multiplied by white-footed mouse daily ingestion rate (0.0035 kg/day).
Log K_{ow} values from EPI Suite (version 4.0)

[3] Small mammal concentrations presented on wet weight basis.

[4] Regression equation cited in source used to calculate small mammal concentration (M) based on mean UCL soil concentration (S).

[5] BAF value for this compound multiplied by concentration in diet (39%-terrestrial invertebrates/61%-seeds - dry weight). Diet (D) concentrations from Tables 4-4 and 4-6 adjusted for dry weight basis. Barium (southern forested wetland) example as follows:
Small mammal conc. = [(% diet inverts)(invert. conc.)/(% solids inverts) + (% diet seeds)(seed conc.)/(% solids seeds)](BAF)
Small mammal conc. = [(0.39)(1.01)/(0.16) + (0.61)(9.88)/(0.91)](0.0075)
Small mammal conc. = [(2.46) + (6.62)](0.0075) = 0.0681 * % solids small mammals (0.32) = 0.0218 mg/kg (wet weight)

[6] BAF value for this compound multiplied by concentration in diet (39%-terrestrial invertebrates/61%-seeds - wet weight). Diet concentrations from Tables 4-4 and 4-6. Small mammal conc. = [(invert. conc.)(0.39) + (seed conc.)(0.61)](BAF)

[7] BAF value for total mercury (USEPA, 1999).

Small mammal concentrations from USEPA sources have been converted to a wet weight basis by multiplying results soil concentration x BAF) by proportion dry matter (i.e., % solids) of small mammals (0.32 from USEPA 1993).

Table 4-8
Canada Goose - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW day)[8]
SVOCs													
Total LMW PAHs	3.70E+01	2.89E-01	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	2.24E-03	4.82E-03	0.00E+00	7.07E-03
Total HMW PAHs	7.84E+01	2.38E+00	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	1.85E-02	1.02E-02	0.00E+00	2.87E-02
Pesticides/PCBs													
4,4'-DDD	8.00E-02	2.64E-04	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	2.05E-06	1.04E-05	0.00E+00	1.25E-05
4,4'-DDE	3.20E-02	8.87E-05	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	6.88E-07	4.17E-06	0.00E+00	4.86E-06
4,4'-DDT	2.17E-01	1.78E-04	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	1.38E-06	2.83E-05	0.00E+00	2.97E-05
Inorganics													
Barium	2.03E+02	6.65E+00	1.30E-02	0.107	0.0018	0.135	3.45	1.00	0.25	5.16E-02	2.65E-02	1.27E-04	7.82E-02
Lead	2.65E+02	1.27E+00	5.40E-04	0.107	0.0018	0.135	3.45	1.00	0.25	9.87E-03	3.46E-02	5.28E-06	4.44E-02
Mercury	2.20E-01	1.73E-03	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	1.34E-05	2.87E-05	0.00E+00	4.21E-05
Selenium	4.04E+00	4.98E-01	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	3.87E-03	5.27E-04	0.00E+00	4.39E-03
Silver	1.48E+00	4.35E-03	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	3.37E-05	1.93E-04	0.00E+00	2.27E-04
Vanadium	2.72E+01	2.77E-02	0.00E+00	0.107	0.0018	0.135	3.45	1.00	0.25	2.15E-04	3.55E-03	0.00E+00	3.76E-03
Zinc	5.01E+02	3.18E+01	2.70E-02	0.107	0.0018	0.1350	3.45	1.00	0.25	2.46E-01	6.53E-02	2.64E-04	3.12E-01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 4-3).

[2] Mean UCL aquatic vegetation concentration from Table 4-3.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL plant concentration * food ingestion rate * area use factor * temporal use factor divided by body weight.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL vegetation, sediment and surface water exposure doses.

Table 4-9
Canada Goose - Mean UCL Estimated Egg PCB Congener Concentrations
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Aquatic Vegetation Lipid Content[3]	Mean UCL Lipid Normalized Aquatic Vegetation Concentration (mg/kg)[4]	Lipid Normalized BAF (Egg : Vegetation)[5]	Egg Lipid Content[5]	Area Use Factor[6]	Temporal Use Factor[6]	Unit Converstion Factor[7]	Total Mean UCL Egg Concentration (pg/g wet weight)[8]
77-TeCB	2.69E-02	4.76E-05	0.0125	3.81E-03	0.52	0.059	1.0	0.25	1,000,000	2.92E+01
81-TeCB	1.18E-03	2.10E-06	0.0125	1.68E-04	0.48	0.059	1.0	0.25	1,000,000	1.19E+00
105-PeCB	6.95E-01	5.23E-04	0.0125	4.18E-02	1.88	0.059	1.0	0.25	1,000,000	1.16E+03
114-PeCB	2.77E-02	2.09E-05	0.0125	1.67E-03	1.92	0.059	1.0	0.25	1,000,000	4.73E+01
118-PeCB	2.09E+00	1.57E-03	0.0125	1.26E-01	2.10	0.059	1.0	0.25	1,000,000	3.90E+03
123-PeCB	2.88E-02	2.16E-05	0.0125	1.73E-03	1.65	0.059	1.0	0.25	1,000,000	4.21E+01
126-PeCB	1.83E-03	1.37E-06	0.0125	1.10E-04	1.90	0.059	1.0	0.25	1,000,000	3.08E+00
156,157-HxCB	3.42E-01	1.09E-04	0.0125	8.71E-03	2.38	0.059	1.0	0.25	1,000,000	3.05E+02
167-HxCB	1.12E-01	3.57E-05	0.0125	2.86E-03	3.80	0.059	1.0	0.25	1,000,000	1.60E+02
169-HxCB	1.53E-03	4.87E-07	0.0125	3.89E-05	3.80	0.059	1.0	0.25	1,000,000	2.18E+00
189-HpCB	1.03E-02	1.39E-06	0.0125	3.89E-05	1.96	0.059	1.0	0.25	1,000,000	1.13E+00

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic vegetation concentration from Table 4-4.

[3] from Pokorny and Parkanyiova, 2003 (average of plant tissues).

[4] Mean UCL aquatic vegetation concentration divided by aquatic vegetation lipid content.

[5] from Figure 3 in Froese *et al* . (1998) assuming egg:invertebrate approximately equal to egg:vegetation

[6] from Table 4-2.

[7] Convert mg/kg to pg/g

[8] Mean UCL lipid normalized aquatic vegetation concentration * BAF * egg lipid content * area use factor * temporal use factor * conversion factor.

Table 4-10
Muskrat - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW day)[8]
SVOCs													
Total LMW PAHs	3.70E+01	2.89E-01	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	9.83E-02	6.30E-02	0.00E+00	1.61E-01
Total HMW PAHs	7.84E+01	2.38E+00	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	8.09E-01	1.34E-01	0.00E+00	9.43E-01
Pesticides													
4,4'-DDD	8.00E-02	2.64E-04	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	8.97E-05	1.36E-04	0.00E+00	2.26E-04
4,4'-DDE	3.20E-02	8.87E-05	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	3.02E-05	5.45E-05	0.00E+00	8.47E-05
4,4'-DDT	2.17E-01	1.78E-04	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	6.04E-05	3.70E-04	0.00E+00	4.30E-04
Inorganics													
Barium	2.03E+02	6.65E+00	1.30E-02	0.459	0.0023	0.130	1.35	1.00	1.00	2.26E+00	3.46E-01	1.25E-03	2.61E+00
Lead	2.65E+02	1.27E+00	5.40E-04	0.459	0.0023	0.130	1.35	1.00	1.00	4.33E-01	4.51E-01	5.20E-05	8.84E-01
Mercury	2.20E-01	1.73E-03	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	5.89E-04	3.75E-04	0.00E+00	9.64E-04
Selenium	4.04E+00	4.98E-01	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	1.69E-01	6.88E-03	0.00E+00	1.76E-01
Silver	1.48E+00	4.35E-03	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	1.48E-03	2.52E-03	0.00E+00	4.00E-03
Vanadium	2.72E+01	2.77E-02	0.00E+00	0.459	0.0023	0.130	1.35	1.00	1.00	9.42E-03	4.63E-02	0.00E+00	5.58E-02
Zinc	5.01E+02	3.18E+01	2.70E-02	0.459	0.0023	0.130	1.35	1.00	1.00	1.08E+01	8.54E-01	2.60E-03	1.17E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic vegetation concentration from Table 4-3.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL plant concentration * food ingestion rate * area use factor * temporal use factor divided by body weight.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL vegetation, sediment and surface water exposure doses.

Table 4-11
Muskrat - Mean UCL PCB Congener Dietary Concentration
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Food Ingestion Rate (g/day)[3]	Sediment Ingestion Rate (g/day)[3]	Total Ingestion Rate (g/day)	Area Use Factor[3]	Temporal Use Factor[3]	Unit Conversion Factor [4]	Aquatic Plant Diet Contribution (pg/g)[5]	Sediment Diet Contribution (pg/g)[6]	Total Mean UCL Diet Concentration (pg/g)[7]
77-TeCB	2.69E-02	4.76E-05	459.0	2.3	461.3	1.00	1.00	1,000,000	4.74E+01	1.34E+02	1.81E+02
81-TeCB	1.18E-03	2.10E-06	459.0	2.3	461.3	1.00	1.00	1,000,000	2.09E+00	5.90E+00	7.99E+00
105-PeCB	6.95E-01	5.23E-04	459.0	2.3	461.3	1.00	1.00	1,000,000	5.20E+02	3.47E+03	3.99E+03
114-PeCB	2.77E-02	2.09E-05	459.0	2.3	461.3	1.00	1.00	1,000,000	2.08E+01	1.38E+02	1.59E+02
118-PeCB	2.09E+00	1.57E-03	459.0	2.3	461.3	1.00	1.00	1,000,000	1.57E+03	1.04E+04	1.20E+04
123-PeCB	2.88E-02	2.16E-05	459.0	2.3	461.3	1.00	1.00	1,000,000	2.15E+01	1.43E+02	1.65E+02
126-PeCB	1.83E-03	1.37E-06	459.0	2.3	461.3	1.00	1.00	1,000,000	1.37E+00	9.11E+00	1.05E+01
156,157-HxCB	3.42E-01	1.09E-04	459.0	2.3	461.3	1.00	1.00	1,000,000	1.08E+02	1.70E+03	1.81E+03
167-HxCB	1.12E-01	3.57E-05	459.0	2.3	461.3	1.00	1.00	1,000,000	3.55E+01	5.58E+02	5.94E+02
169-HxCB	1.53E-03	4.87E-07	459.0	2.3	461.3	1.00	1.00	1,000,000	4.84E-01	7.61E+00	8.10E+00
189-HpCB	1.03E-02	1.39E-06	459.0	2.3	461.3	1.00	1.00	1,000,000	1.38E+00	5.12E+01	5.26E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic vegetation concentration from Table 4-3.

[3] from Table 4-2.

[4] Convert from mg/kg to pg/g.

[5] Mean UCL vegetation concentration * food ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Sum of mean UCL aquatic vegetation and sediment diet contributions.

Table 4-12
Mallard - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[3]	Mean UCL Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[10]
SVOCs															
Acenaphthene	1.23E+00	see LMW	5.76E-03	-	0.136	-	-	1.04	0.008	0.75	-	2.98E-06	-	-	-
Acenaphthylene	2.51E-01	see LMW	1.00E-03	-	0.136	-	-	1.04	0.008	0.75	-	5.19E-07	-	-	-
Anthracene	3.07E+00	see LMW	1.27E-02	-	0.136	-	-	1.04	0.008	0.75	-	6.55E-06	-	-	-
Benzo(a)anthracene	1.03E+01	see HMW	1.26E-02	-	0.136	-	-	1.04	0.008	0.75	-	6.53E-06	-	-	-
Benzo(a)pyrene	9.59E+00	see HMW	8.61E-03	-	0.136	-	-	1.04	0.008	0.75	-	4.46E-06	-	-	-
Benzo(b)fluoranthene	1.11E+01	see HMW	1.24E-02	-	0.136	-	-	1.04	0.008	0.75	-	6.42E-06	-	-	-
Benzo(g,h,i)perylene	6.30E+00	see HMW	1.04E-02	-	0.136	-	-	1.04	0.008	0.75	-	5.38E-06	-	-	-
Benzo(k)fluoranthene	5.34E+00	see HMW	8.41E-03	-	0.136	-	-	1.04	0.008	0.75	-	4.36E-06	-	-	-
Chrysene	1.00E+01	see HMW	7.58E-03	-	0.136	-	-	1.04	0.008	0.75	-	3.92E-06	-	-	-
Dibenz(a,h)anthracene	2.86E+00	see HMW	3.36E-03	-	0.136	-	-	1.04	0.008	0.75	-	1.74E-06	-	-	-
Fluoranthene	2.09E+01	see LMW	2.12E-02	-	0.136	-	-	1.04	0.008	0.75	-	1.10E-05	-	-	-
Fluorene	1.30E+00	see LMW	7.54E-03	-	0.136	-	-	1.04	0.008	0.75	-	3.90E-06	-	-	-
Indeno(1,2,3-cd)pyrene	6.35E+00	see HMW	7.46E-03	-	0.136	-	-	1.04	0.008	0.75	-	3.86E-06	-	-	-
2-Methylnaphthalene	5.04E-01	see LMW	1.69E-03	-	0.136	-	-	1.04	0.008	0.75	-	8.75E-07	-	-	-
Naphthalene	1.01E+00	see LMW	1.20E-03	-	0.136	-	-	1.04	0.008	0.75	-	6.23E-07	-	-	-
Phenanthrene	8.70E+00	see LMW	2.21E-02	-	0.136	-	-	1.04	0.008	0.75	-	1.15E-05	-	-	-
Pyrene	1.66E+01	see HMW	1.48E-03	-	0.136	-	-	1.04	0.008	0.75	-	7.68E-07	-	-	-
Total LMW PAHs	3.70E+01	1.25E+00	-	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	3.34E-04	3.79E-05	2.56E-04	0.00E+00	6.28E-04
Total HMW PAHs	7.84E+01	1.03E+01	-	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	2.75E-03	3.74E-05	5.43E-04	0.00E+00	3.33E-03
Pesticides															
4,4'-DDD	8.00E-02	1.14E-03	8.14E-02	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	3.05E-07	4.21E-05	5.54E-07	0.00E+00	4.30E-05
4,4'-DDE	3.20E-02	3.84E-04	7.66E-03	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	1.03E-07	3.96E-06	2.22E-07	0.00E+00	4.29E-06
4,4'-DDT	2.17E-01	7.70E-04	2.34E-02	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	2.05E-07	1.21E-05	1.50E-06	0.00E+00	1.39E-05
Inorganics															
Barium	2.03E+02	2.88E+01	0.00E+00	1.30E-02	0.136	0.0012	0.058	1.04	0.008	0.75	7.69E-03	0.00E+00	1.41E-03	4.35E-06	9.10E-03
Lead	2.65E+02	5.52E+00	6.12E+00	5.40E-04	0.136	0.0012	0.058	1.04	0.008	0.75	1.47E-03	3.17E-03	1.83E-03	1.81E-07	6.48E-03
Mercury	2.20E-01	7.51E-03	4.60E-02	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	2.00E-06	2.38E-05	1.52E-06	0.00E+00	2.73E-05
Selenium	4.04E+00	2.16E+00	1.41E+00	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	5.76E-04	7.32E-04	2.80E-05	0.00E+00	1.34E-03
Silver	1.48E+00	1.89E-02	5.18E-01	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	5.03E-06	2.68E-04	1.02E-05	0.00E+00	2.84E-04
Vanadium	2.72E+01	1.20E-01	0.00E+00	0.00E+00	0.136	0.0012	0.058	1.04	0.008	0.75	3.20E-05	0.00E+00	1.88E-04	0.00E+00	2.20E-04
Zinc	5.01E+02	1.38E+02	5.95E+01	2.70E-02	0.136	0.0012	0.058	1.04	0.008	0.75	3.67E-02	3.08E-02	3.47E-03	9.03E-06	7.10E-02

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2). LMW PAHs comprised of acenaphthene, acenaphthylene, anthracene, fluoranthene, flluorene, 2-methylnaphthalene and phenanthrene. HMW PAHs comprised of remaining PAHs.

[2] Mean UCL aquatic vegetation (seed) concentration from Table 4-3.

[3] Mean UCL aquatic invertebrate concentration from Table 4-5.

[4] Mean UCL surface water concentration from Table 2-1.

[5] from Table 4-2.

[6] Mean UCL plant concentration * food ingestion rate * 0.34 (portion of diet plants comprise) * area use factor * temporal use factor divided by body weight.

[7] Mean UCL aquatic invertebrate concentration * food ingestion rate * 0.66 (portion of diet invertebrates comprise) * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[8] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean UCL aquatic vegetation (seed), aquatic invertebrate, sediment and surface water exposure doses.

Table 4-13
Mallard - Mean UCL Estimated Egg PCB Congener Concentrations
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[2]	Aquatic Invertebrate Lipid Content (fraction)[3]	Mean UCL Lipid Normalized Aquatic Invertebrate Concentration (mg/kg)[4]	Lipid Normalized BAF (Egg : Aquatic Invertebrate)[5]	Egg Lipid Content[5]	Area Use Factor[6]	Temporal Use Factor[6]	Unit Converstion Factor[7]	Total Mean UCL Egg Concentration (pg/g wet weight)[8]
77-TeCB	2.69E-02	5.07E-03	0.031	1.63E-01	0.52	0.059	0.008	0.75	1,000,000	3.01E+01
81-TeCB	1.18E-03	5.92E-04	0.031	1.91E-02	0.48	0.059	0.008	0.75	1,000,000	3.24E+00
105-PeCB	6.95E-01	1.14E-01	0.031	3.69E+00	1.88	0.059	0.008	0.75	1,000,000	2.45E+03
114-PeCB	2.77E-02	3.36E-03	0.031	1.09E-01	1.92	0.059	0.008	0.75	1,000,000	7.38E+01
118-PeCB	2.09E+00	4.36E-01	0.031	1.41E+01	2.10	0.059	0.008	0.75	1,000,000	1.04E+04
123-PeCB	2.88E-02	1.45E-02	0.031	4.67E-01	1.65	0.059	0.008	0.75	1,000,000	2.73E+02
126-PeCB	1.83E-03	2.03E-04	0.031	6.53E-03	1.90	0.059	0.008	0.75	1,000,000	4.39E+00
156,157-HxCB	3.42E-01	6.77E-02	0.031	2.19E+00	2.38	0.059	0.008	0.75	1,000,000	1.84E+03
167-HxCB	1.12E-01	2.27E-02	0.031	7.31E-01	3.80	0.059	0.008	0.75	1,000,000	9.83E+02
169-HxCB	1.53E-03	8.19E-05	0.031	2.64E-03	3.80	0.059	0.008	0.75	1,000,000	3.56E+00
189-HpCB	1.03E-02	1.94E-03	0.031	6.25E-02	1.96	0.059	0.008	0.75	1,000,000	4.34E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic invertebrate concentration from Table 4-5.

[3] from Table 4-5.

[4] Mean UCL aquatic invertebrate concentration divided by aquatic invertebrate lipid content.

[5] from Figure 3 in Froese *et al* . (1998)

[6] from Table 4-2.

[7] Convert mg/kg to pg/g

[8] Mean UCL lipid normalized invertebrate concentration * BAF * egg lipid content * area use factor * temporal use factor * conversion factor.

Table 4-14
Raccoon - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[3]	Mean UCL Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[10]
SVOCs															
Acenaphthene	1.23	see LMW	5.76E-03	-	1.360	-	-	5.74	0.047	1.00	-	3.72E-05	-	-	-
Acenaphthylene	0.25	see LMW	1.00E-03	-	1.360	-	-	5.74	0.047	1.00	-	6.47E-06	-	-	-
Anthracene	3.07	see LMW	1.27E-02	-	1.360	-	-	5.74	0.047	1.00	-	8.17E-05	-	-	-
Benzo(a)anthracene	10.30	see HMW	1.26E-02	-	1.360	-	-	5.74	0.047	1.00	-	8.14E-05	-	-	-
Benzo(a)pyrene	9.59	see HMW	8.61E-03	-	1.360	-	-	5.74	0.047	1.00	-	5.56E-05	-	-	-
Benzo(b)fluoranthene	11.10	see HMW	1.24E-02	-	1.360	-	-	5.74	0.047	1.00	-	8.01E-05	-	-	-
Benzo(g,h,i)perylene	6.30	see HMW	1.04E-02	-	1.360	-	-	5.74	0.047	1.00	-	6.71E-05	-	-	-
Benzo(k)fluoranthene	5.34	see HMW	8.41E-03	-	1.360	-	-	5.74	0.047	1.00	-	5.43E-05	-	-	-
Chrysene	10.03	see HMW	7.58E-03	-	1.360	-	-	5.74	0.047	1.00	-	4.89E-05	-	-	-
Dibenz(a,h)anthracene	2.86	see HMW	3.36E-03	-	1.360	-	-	5.74	0.047	1.00	-	2.17E-05	-	-	-
Fluoranthene	20.92	see LMW	2.12E-02	-	1.360	-	-	5.74	0.047	1.00	-	1.37E-04	-	-	-
Fluorene	1.30	see LMW	7.54E-03	-	1.360	-	-	5.74	0.047	1.00	-	4.87E-05	-	-	-
Indeno(1,2,3-cd)pyrene	6.35	see HMW	7.46E-03	-	1.360	-	-	5.74	0.047	1.00	-	4.82E-05	-	-	-
2-Methylnaphthalene	0.50	see LMW	1.69E-03	-	1.360	-	-	5.74	0.047	1.00	-	1.09E-05	-	-	-
Naphthalene	1.01	see LMW	1.20E-03	-	1.360	-	-	5.74	0.047	1.00	-	7.77E-06	-	-	-
Phenanthrene	8.70	see LMW	2.21E-02	-	1.360	-	-	5.74	0.047	1.00	-	1.43E-04	-	-	-
Pyrene	16.55	see HMW	1.48E-03	-	1.360	-	-	5.74	0.047	1.00	-	9.58E-06	-	-	-
Total LMW PAHs	3.70E+01	1.25E+00	-	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	5.86E-03	4.73E-04	8.24E-03	0.00E+00	1.46E-02
Total HMW PAHs	7.84E+01	1.03E+01	-	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	4.82E-02	4.67E-04	1.75E-02	0.00E+00	6.62E-02
Pesticides															
4,4'-DDD	8.00E-02	1.14E-03	8.14E-02	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	5.35E-06	5.25E-04	1.78E-05	0.00E+00	5.49E-04
4,4'-DDE	3.20E-02	3.84E-04	7.66E-03	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	1.80E-06	4.94E-05	7.13E-06	0.00E+00	5.84E-05
4,4'-DDT	2.17E-01	7.70E-04	2.34E-02	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	3.60E-06	1.51E-04	4.83E-05	0.00E+00	2.03E-04
Inorganics															
Barium	2.03E+02	2.88E+01	0.00E+00	1.30E-02	1.360	0.0272	0.477	5.74	0.047	1.00	1.35E-01	0.00E+00	4.52E-02	5.08E-05	1.80E-01
Lead	2.65E+02	5.52E+00	6.12E+00	5.40E-04	1.360	0.0272	0.477	5.74	0.047	1.00	2.58E-02	3.95E-02	5.90E-02	2.11E-06	1.24E-01
Mercury	2.20E-01	7.51E-03	4.60E-02	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	3.51E-05	2.97E-04	4.90E-05	0.00E+00	3.81E-04
Selenium	4.04E+00	2.16E+00	1.41E+00	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	1.01E-02	9.13E-03	9.00E-04	0.00E+00	2.01E-02
Silver	1.48E+00	1.89E-02	5.18E-01	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	8.82E-05	3.35E-03	3.30E-04	0.00E+00	3.76E-03
Vanadium	2.72E+01	1.20E-01	0.00E+00	0.00E+00	1.360	0.0272	0.477	5.74	0.047	1.00	5.61E-04	0.00E+00	6.06E-03	0.00E+00	6.62E-03
Zinc	5.01E+02	1.38E+02	5.95E+01	2.70E-02	1.360	0.0272	0.477	5.74	0.047	1.00	6.44E-01	3.84E-01	1.12E-01	1.05E-04	1.14E+00

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic vegetation (seed) concentration from Table 4-3.

[3] Mean UCL aquatic invertebrate concentration from Table 4-5.

[4] Mean UCL surface water concentration from Table 2-1.

[5] from Table 4-2.

[6] Mean UCL plant concentration * food ingestion rate * 0.34 (portion of diet plants comprise) * area use factor * temporal use factor divided by body weight.

[7] Mean UCL aquatic invertebrate concentration * food ingestion rate * 0.66 (portion of diet invertebrates comprise) * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[8] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean UCL aquatic vegetation (seed), aquatic invertebrate, sediment and surface water exposure doses.

Table 4-15
Raccoon - Mean UCL PCB Congener Dietary Concentration
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Vegetation Concentration (mg/kg)[2]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[3]	Plant Ingestion Rate (g/day)[4]	Invert. Ingestion Rate (g/day)[4]	Sediment Ingestion Rate (g/day)[4]	Total Ingestion Rate (g/day)	Area Use Factor[4]	Temporal Use Factor[4]	Unit Conversion Factor [5]	Aquatic Plant Diet Contribution (pg/g)[6]	Aquatic Invertebrate Diet Contribution (pg/g)[7]	Sediment Diet Contribution (pg/g)[8]	Total Mean UCL Diet Concentration (pg/g)[9]
77-TeCB	2.69E-02	2.06E-04	5.07E-03	571	789	27.2	1,387	0.047	1.00	1,000,000	4.04E+00	1.37E+02	2.50E+01	8.13E+01
81-TeCB	1.18E-03	9.09E-06	5.92E-04	571	789	27.2	1,387	0.047	1.00	1,000,000	1.78E-01	1.60E+01	1.10E+00	1.28E+00
105-PeCB	6.95E-01	2.27E-03	1.14E-01	571	789	27.2	1,387	0.047	1.00	1,000,000	4.43E+01	3.09E+03	6.47E+02	6.92E+02
114-PeCB	2.77E-02	9.04E-05	3.36E-03	571	789	27.2	1,387	0.047	1.00	1,000,000	1.77E+00	9.08E+01	2.58E+01	2.76E+01
118-PeCB	2.09E+00	6.82E-03	4.36E-01	571	789	27.2	1,387	0.047	1.00	1,000,000	1.33E+02	1.18E+04	1.95E+03	2.08E+03
123-PeCB	2.88E-02	9.37E-05	1.45E-02	571	789	27.2	1,387	0.047	1.00	1,000,000	1.83E+00	3.91E+02	2.68E+01	2.86E+01
126-PeCB	1.83E-03	5.95E-06	2.03E-04	571	789	27.2	1,387	0.047	1.00	1,000,000	1.16E-01	5.47E+00	1.70E+00	1.82E+00
156,157-HxCB	3.42E-01	4.72E-04	6.77E-02	571	789	27.2	1,387	0.047	1.00	1,000,000	9.23E+00	1.83E+03	3.18E+02	3.27E+02
167-HxCB	1.12E-01	1.55E-04	2.27E-02	571	789	27.2	1,387	0.047	1.00	1,000,000	3.02E+00	6.11E+02	1.04E+02	1.07E+02
169-HxCB	1.53E-03	2.11E-06	8.19E-05	571	789	27.2	1,387	0.047	1.00	1,000,000	4.12E-02	2.21E+00	1.42E+00	1.46E+00
189-HpCB	1.03E-02	6.01E-06	1.94E-03	571	789	27.2	1,387	0.047	1.00	1,000,000	1.18E-01	5.23E+01	9.55E+00	6.20E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic vegetation concentration from Table 4-3.

[3] Mean UCL aquatic invertebrate concentration from Table 4-5.

[4] from Table 4-2.

[5] Convert from mg/kg to pg/g.

[6] Mean UCL vegetation concentration * plant ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Mean UCL invertebrate concentration * invertebrate ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[8] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[9] Sum of mean UCL aquatic vegetation, aquatic invertebrate and sediment diet contributions.

Table 4-16
Marsh Wren - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[8]
SVOCs													
Acenaphthene	1.23	5.76E-03	-	0.0071	-	-	0.0106	1.00	0.50	1.93E-03	-	-	-
Acenaphthylene	0.25	1.00E-03	-	0.0071	-	-	0.0106	1.00	0.50	3.35E-04	-	-	-
Anthracene	3.07	1.27E-02	-	0.0071	-	-	0.0106	1.00	0.50	4.24E-03	-	-	-
Benzo(a)anthracene	10.30	1.26E-02	-	0.0071	-	-	0.0106	1.00	0.50	4.22E-03	-	-	-
Benzo(a)pyrene	9.59	8.61E-03	-	0.0071	-	-	0.0106	1.00	0.50	2.88E-03	-	-	-
Benzo(b)fluoranthene	11.10	1.24E-02	-	0.0071	-	-	0.0106	1.00	0.50	4.15E-03	-	-	-
Benzo(g,h,i)perylene	6.30	1.04E-02	-	0.0071	-	-	0.0106	1.00	0.50	3.48E-03	-	-	-
Benzo(k)fluoranthene	5.34	8.41E-03	-	0.0071	-	-	0.0106	1.00	0.50	2.82E-03	-	-	-
Chrysene	10.03	7.58E-03	-	0.0071	-	-	0.0106	1.00	0.50	2.54E-03	-	-	-
Dibenz(a,h)anthracene	2.86	3.36E-03	-	0.0071	-	-	0.0106	1.00	0.50	1.13E-03	-	-	-
Fluoranthene	20.92	2.12E-02	-	0.0071	-	-	0.0106	1.00	0.50	7.10E-03	-	-	-
Fluorene	1.30	7.54E-03	-	0.0071	-	-	0.0106	1.00	0.50	2.52E-03	-	-	-
Indeno(1,2,3-cd)pyrene	6.35	7.46E-03	-	0.0071	-	-	0.0106	1.00	0.50	2.50E-03	-	-	-
2-Methylnaphthalene	0.50	1.69E-03	-	0.0071	-	-	0.0106	1.00	0.50	5.66E-04	-	-	-
Naphthalene	1.01	1.20E-03	-	0.0071	-	-	0.0106	1.00	0.50	4.03E-04	-	-	-
Phenanthrene	8.70	2.21E-02	-	0.0071	-	-	0.0106	1.00	0.50	7.41E-03	-	-	-
Pyrene	16.55	1.48E-03	-	0.0071	-	-	0.0106	1.00	0.50	4.97E-04	-	-	-
Total LMW PAHs	3.70E+01	-	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	2.45E-02	0.00E+00	0.00E+00	2.45E-02
Total HMW PAHs	7.84E+01	-	0.00E+00	0.107	0.00	0.003	0.0106	1.00	0.50	2.42E-02	0.00E+00	0.00E+00	2.42E-02
Pesticides													
4,4'-DDD	8.00E-02	8.14E-02	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	2.72E-02	0.00E+00	0.00E+00	2.72E-02
4,4'-DDE	3.20E-02	7.66E-03	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	2.56E-03	0.00E+00	0.00E+00	2.56E-03
4,4'-DDT	2.17E-01	2.34E-02	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	7.85E-03	0.00E+00	0.00E+00	7.85E-03
Inorganics													
Barium	2.03E+02	0.00E+00	1.30E-02	0.0071	0.00	0.003	0.0106	1.00	0.50	0.00E+00	0.00E+00	1.84E-03	1.84E-03
Lead	2.65E+02	6.12E+00	5.40E-04	0.0071	0.00	0.003	0.0106	1.00	0.50	2.05E+00	0.00E+00	7.64E-05	2.05E+00
Mercury	2.20E-01	4.60E-02	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	1.54E-02	0.00E+00	0.00E+00	1.54E-02
Selenium	4.04E+00	1.41E+00	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	4.74E-01	0.00E+00	0.00E+00	4.74E-01
Silver	1.48E+00	5.18E-01	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	1.73E-01	0.00E+00	0.00E+00	1.73E-01
Vanadium	2.72E+01	0.00E+00	0.00E+00	0.0071	0.00	0.003	0.0106	1.00	0.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	5.01E+02	5.95E+01	2.70E-02	0.0071	0.00	0.003	0.0106	1.00	0.50	1.99E+01	0.00E+00	3.82E-03	1.99E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic invertebrate concentration from Table 4-5.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL aquatic invertebrate concentration * food ingestion rate * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL invertebrate, sediment and surface water exposure doses.

Table 4-17
Marsh Wren - Mean UCL Estimated Egg PCB Congener Concentrations
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[2]	Aquatic Invertebrate Lipid Content[3]	Mean UCL Lipid Normalized Aquatic Invertebrate Concentration (mg/kg)[4]	Lipid Normalized BAF (Egg : Aquatic Invertebrate)[5]	Egg Lipid Content[5]	Area Use Factor[6]	Temporal Use Factor[6]	Unit Converstion Factor[7]	Total Mean UCL Egg Concentration (pg/g wet weight)[8]
77-TeCB	2.69E-02	5.07E-03	0.031	1.63E-01	0.52	0.059	1.00	0.50	1,000,000	2.51E+03
81-TeCB	1.18E-03	5.92E-04	0.031	1.91E-02	0.48	0.059	1.00	0.50	1,000,000	2.70E+02
105-PeCB	6.95E-01	1.14E-01	0.031	3.69E+00	1.88	0.059	1.00	0.50	1,000,000	2.04E+05
114-PeCB	2.77E-02	3.36E-03	0.031	1.09E-01	1.92	0.059	1.00	0.50	1,000,000	6.15E+03
118-PeCB	2.09E+00	4.36E-01	0.031	1.41E+01	2.10	0.059	1.00	0.50	1,000,000	8.71E+05
123-PeCB	2.88E-02	1.45E-02	0.031	4.67E-01	1.65	0.059	1.00	0.50	1,000,000	2.27E+04
126-PeCB	1.83E-03	2.03E-04	0.031	6.53E-03	1.90	0.059	1.00	0.50	1,000,000	3.66E+02
156,157-HxCB	3.42E-01	6.77E-02	0.031	2.19E+00	2.38	0.059	1.00	0.50	1,000,000	1.53E+05
167-HxCB	1.12E-01	2.27E-02	0.031	7.31E-01	3.80	0.059	1.00	0.50	1,000,000	8.19E+04
169-HxCB	1.53E-03	8.19E-05	0.031	2.64E-03	3.80	0.059	1.00	0.50	1,000,000	2.96E+02
189-HpCB	1.03E-02	1.94E-03	0.031	6.25E-02	1.96	0.059	1.00	0.50	1,000,000	3.61E+03

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic invertebrate concentration from Table 4-5.

[3] from Table 4-5.

[4] Mean UCL aquatic invertebrate concentration divided by aquatic invertebrate lipid content.

[5] from Figure 3 in Froese *et al* . (1998)

[6] from Table 4-2.

[7] Convert mg/kg to pg/g

[8] Mean UCL lipid normalized invertebrate concentration * BAF * egg lipid content * area use factor * temporal use factor * conversion factor.

Table 4-18
Little Brown Bat - Mean UCL Estimated Constituent Exposure Dose
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[8]
SVOCs													
Acenaphthene	1.23E+00	5.76E-03	-	0.0037	-	-	0.0075	0.058	0.42	6.93E-05	-	-	-
Acenaphthylene	2.51E-01	1.00E-03	-	0.0037	-	-	0.0075	0.058	0.42	1.20E-05	-	-	-
Anthracene	3.07E+00	1.27E-02	-	0.0037	-	-	0.0075	0.058	0.42	1.52E-04	-	-	-
Benzo(a)anthracene	1.03E+01	1.26E-02	-	0.0037	-	-	0.0075	0.058	0.42	1.51E-04	-	-	-
Benzo(a)pyrene	9.59E+00	8.61E-03	-	0.0037	-	-	0.0075	0.058	0.42	1.04E-04	-	-	-
Benzo(b)fluoranthene	1.11E+01	1.24E-02	-	0.0037	-	-	0.0075	0.058	0.42	1.49E-04	-	-	-
Benzo(g,h,i)perylene	6.30E+00	1.04E-02	-	0.0037	-	-	0.0075	0.058	0.42	1.25E-04	-	-	-
Benzo(k)fluoranthene	5.34E+00	8.41E-03	-	0.0037	-	-	0.0075	0.058	0.42	1.01E-04	-	-	-
Chrysene	1.00E+01	7.58E-03	-	0.0037	-	-	0.0075	0.058	0.42	9.11E-05	-	-	-
Dibenz(a,h)anthracene	2.86E+00	3.36E-03	-	0.0037	-	-	0.0075	0.058	0.42	4.04E-05	-	-	-
Fluoranthene	2.09E+01	2.12E-02	-	0.0037	-	-	0.0075	0.058	0.42	2.55E-04	-	-	-
Fluorene	1.30E+00	7.54E-03	-	0.0037	-	-	0.0075	0.058	0.42	9.06E-05	-	-	-
Indeno(1,2,3-cd)pyrene	6.35E+00	7.46E-03	-	0.0037	-	-	0.0075	0.058	0.42	8.97E-05	-	-	-
2-Methylnaphthalene	5.04E-01	1.69E-03	-	0.0037	-	-	0.0075	0.058	0.42	2.03E-05	-	-	-
Naphthalene	1.01E+00	1.20E-03	-	0.0037	-	-	0.0075	0.058	0.42	1.45E-05	-	-	-
Phenanthrene	8.70E+00	2.21E-02	-	0.0037	-	-	0.0075	0.058	0.42	2.66E-04	-	-	-
Pyrene	1.66E+01	1.48E-03	-	0.0037	-	-	0.0075	0.058	0.42	1.78E-05	-	-	-
Total LMW PAHs	3.70E+01	-	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	8.80E-04	0.00E+00	0.00E+00	8.80E-04
Total HMW PAHs	7.84E+01	-	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	8.69E-04	0.00E+00	0.00E+00	8.69E-04
Pesticides													
4,4'-DDD	8.00E-02	8.14E-02	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	9.78E-04	0.00E+00	0.00E+00	9.78E-04
4,4'-DDE	3.20E-02	7.66E-03	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	9.20E-05	0.00E+00	0.00E+00	9.20E-05
4,4'-DDT	2.17E-01	2.34E-02	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	2.82E-04	0.00E+00	0.00E+00	2.82E-04
Inorganics													
Barium	2.03E+02	0.00E+00	1.30E-02	0.0037	0.00	0.001	0.0075	0.058	0.42	0.00E+00	0.00E+00	4.22E-05	4.22E-05
Lead	2.65E+02	6.12E+00	5.40E-04	0.0037	0.00	0.001	0.0075	0.058	0.42	7.36E-02	0.00E+00	1.75E-06	7.36E-02
Mercury	2.20E-01	4.60E-02	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	5.53E-04	0.00E+00	0.00E+00	5.53E-04
Selenium	4.04E+00	1.41E+00	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	1.70E-02	0.00E+00	0.00E+00	1.70E-02
Silver	1.48E+00	5.18E-01	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	6.23E-03	0.00E+00	0.00E+00	6.23E-03
Vanadium	2.72E+01	0.00E+00	0.00E+00	0.0037	0.00	0.001	0.0075	0.058	0.42	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	5.01E+02	5.95E+01	2.70E-02	0.0037	0.00	0.001	0.0075	0.058	0.42	7.15E-01	0.00E+00	8.77E-05	7.15E-01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic invertebrate concentration from Table 4-5.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL aquatic invertebrate concentration * food ingestion rate * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL invertebrate, sediment and surface water exposure doses.

Table 4-19
Little Brown Bat - Mean UCL PCB Congener Dietary Concentration
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Sediment Concentration (mg/kg) [1]	Mean UCL Aquatic Invertebrate Concentration (mg/kg)[2]	Food Ingestion Rate (g/day)[3]	Sediment Ingestion Rate (g/day)[3]	Total Ingestion Rate (g/day)	Area Use Factor[3]	Temporal Use Factor[3]	Unit Conversion Factor [4]	Aquatic Invertebrate Diet Contribution (pg/g)[5]	Sediment Diet Contribution (pg/g)[6]	Total Mean UCL Diet Concentration (pg/g)[7]
77-TeCB	2.69E-02	5.07E-03	3.7	0.0	3.7	0.058	0.42	1,000,000	1.23E+02	0.00E+00	1.23E+02
81-TeCB	1.18E-03	5.92E-04	3.7	0.0	3.7	0.058	0.42	1,000,000	1.44E+01	0.00E+00	1.44E+01
105-PeCB	6.95E-01	1.14E-01	3.7	0.0	3.7	0.058	0.42	1,000,000	2.78E+03	0.00E+00	2.78E+03
114-PeCB	2.77E-02	3.36E-03	3.7	0.0	3.7	0.058	0.42	1,000,000	8.20E+01	0.00E+00	8.20E+01
118-PeCB	2.09E+00	4.36E-01	3.7	0.0	3.7	0.058	0.42	1,000,000	1.06E+04	0.00E+00	1.06E+04
123-PeCB	2.88E-02	1.45E-02	3.7	0.0	3.7	0.058	0.42	1,000,000	3.53E+02	0.00E+00	3.53E+02
126-PeCB	1.83E-03	2.03E-04	3.7	0.0	3.7	0.058	0.42	1,000,000	4.93E+00	0.00E+00	4.93E+00
156,157-HxCB	3.42E-01	6.77E-02	3.7	0.0	3.7	0.058	0.42	1,000,000	1.65E+03	0.00E+00	1.65E+03
167-HxCB	1.12E-01	2.27E-02	3.7	0.0	3.7	0.058	0.42	1,000,000	5.52E+02	0.00E+00	5.52E+02
169-HxCB	1.53E-03	8.19E-05	3.7	0.0	3.7	0.058	0.42	1,000,000	2.00E+00	0.00E+00	2.00E+00
189-HpCB	1.03E-02	1.94E-03	3.7	0.0	3.7	0.058	0.42	1,000,000	4.72E+01	0.00E+00	4.72E+01

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 2-2).

[2] Mean UCL aquatic invertebrate concentration from Table 4-5.

[3] from Table 4-2.

[4] Convert from mg/kg to pg/g.

[5] Mean UCL invertebrate concentration * food ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[6] Mean UCL sediment concentration * sediment ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Sum of mean UCL aquatic invertebrate and sediment diet contributions.

Table 4-20
American Robin - Mean UCL Estimated Constituent Exposure Dose
Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Vegetation Concentration (mg/kg)[2]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[3]	Mean UCL Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Surface Soil Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Terrestrial Vegetation Exposure Dose (mg/kg/BW-day)[6]	Terrestrial Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Surface Soil Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[10]
Southern Forested Wetland															
Pesticides															
4,4'-DDD	3.36E-02	1.21E-04	2.50E-03	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	9.09E-05	1.15E-03	8.29E-04	0.00E+00	2.07E-03
4,4'-DDE	5.55E-02	1.68E-04	2.02E-03	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	1.26E-04	9.25E-04	1.37E-03	0.00E+00	2.42E-03
4,4'-DDT	5.77E-02	5.18E-05	5.83E-03	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	3.88E-05	2.68E-03	1.42E-03	0.00E+00	4.14E-03
Inorganics															
Barium	6.96E+01	2.50E+00	1.01E+00	2.80E-02	0.093	0.0019	0.011	0.077	1.00	1.00	1.87E+00	4.65E-01	1.72E+00	4.00E-03	4.06E+00
Selenium	3.80E-01	4.02E-02	7.30E-02	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	3.01E-02	3.35E-02	9.38E-03	0.00E+00	7.30E-02
Northern Forested Wetland															
SVOCs															
Acenaphthene	1.56E-01	see LMW	2.45E-02	-	0.093	-	-	0.077	1.00	1.00	-	1.12E-02	-	-	-
Acenaphthylene	3.20E-01	see LMW	5.02E-02	-	0.093	-	-	0.077	1.00	1.00	-	2.31E-02	-	-	-
Anthracene	5.94E-01	see LMW	9.35E-02	-	0.093	-	-	0.077	1.00	1.00	-	4.29E-02	-	-	-
Benzo(a)anthracene	5.40E-01	see HMW	8.55E-02	-	0.093	-	-	0.077	1.00	1.00	-	3.92E-02	-	-	-
Benzo(a)pyrene	6.80E-01	see HMW	1.08E-01	-	0.093	-	-	0.077	1.00	1.00	-	4.95E-02	-	-	-
Benzo(b)fluoranthene	7.70E-01	see HMW	1.22E-01	-	0.093	-	-	0.077	1.00	1.00	-	5.59E-02	-	-	-
Benzo(g,h,i)perylene	1.04E+00	see HMW	1.65E-01	-	0.093	-	-	0.077	1.00	1.00	-	7.59E-02	-	-	-
Benzo(k)fluoranthene	4.90E-01	see HMW	7.77E-02	-	0.093	-	-	0.077	1.00	1.00	-	3.57E-02	-	-	-
Chrysene	5.40E-01	see HMW	8.55E-02	-	0.093	-	-	0.077	1.00	1.00	-	3.92E-02	-	-	-
Dibenz(a,h)anthracene	4.00E-01	see HMW	9.68E-02	-	0.093	-	-	0.077	1.00	1.00	-	4.44E-02	-	-	-
Fluoranthene	7.60E-01	see LMW	1.20E-01	-	0.093	-	-	0.077	1.00	1.00	-	5.51E-02	-	-	-
Fluorene	2.04E-01	see LMW	3.21E-02	-	0.093	-	-	0.077	1.00	1.00	-	1.47E-02	-	-	-
Indeno(1,2,3-cd)pyrene	9.76E-01	see HMW	1.55E-01	-	0.093	-	-	0.077	1.00	1.00	-	7.13E-02	-	-	-
2-Methylnaphthalene	5.50E-02	see LMW	8.63E-03	-	0.093	-	-	0.077	1.00	1.00	-	3.96E-03	-	-	-
Naphthalene	1.08E-01	see LMW	1.69E-02	-	0.093	-	-	0.077	1.00	1.00	-	7.75E-03	-	-	-
Phenanthrene	1.84E+00	see LMW	2.89E-01	-	0.093	-	-	0.077	1.00	1.00	-	1.33E-01	-	-	-
Pyrene	5.90E-01	see HMW	9.30E-02	-	0.093	-	-	0.077	1.00	1.00	-	4.27E-02	-	-	-
Total LMW PAHs	4.04E+00	1.16E-01	-	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	4.76E-02	2.92E-01	9.96E-02	0.00E+00	4.39E-01
Total HMW PAHs	6.03E+00	2.30E-01	-	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	9.43E-02	4.54E-01	1.49E-01	0.00E+00	6.97E-01
Inorganics															
Barium	5.83E+02	2.09E+01	8.49E+00	1.30E-02	0.093	0.0019	0.011	0.077	1.00	1.00	1.57E+01	3.90E+00	1.44E+01	1.86E-03	3.39E+01
Lead	9.77E+02	2.90E+00	3.33E+01	5.40E-04	0.093	0.0019	0.011	0.077	1.00	1.00	2.17E+00	1.53E+01	2.41E+01	7.71E-05	4.16E+01
Mercury	6.50E-01	5.61E-03	4.16E-03	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	4.20E-03	1.91E-03	1.60E-02	0.00E+00	2.21E-02
Selenium	1.16E+00	1.38E-01	1.66E-01	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	1.03E-01	7.60E-02	2.86E-02	0.00E+00	2.08E-01
Vanadium	4.17E+01	4.65E-02	2.80E-01	0.00E+00	0.093	0.0019	0.011	0.077	1.00	1.00	3.48E-02	1.29E-01	1.03E+00	0.00E+00	1.19E+00
Zinc	6.15E+02	3.90E+01	1.12E+02	2.70E-02	0.093	0.0019	0.011	0.077	1.00	1.00	2.92E+01	5.16E+01	1.52E+01	3.86E-03	9.60E+01

Notes:

[1] Mean UCL surface soil concentration from forested wetland habitats (see Tables 2-3 and 2-4).

[2] Mean UCL terrestrial vegetation (fruit) concentration from Table 4-4.

[3] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[4] Mean UCL surface water concentration from Table 2-1.

[5] from Table 4-2.

[6] Mean UCL plant concentration * food ingestion rate * 0.62 (portion of diet plants comprise) * area use factor * temporal use factor divided by body weight.

[7] Mean UCL terrestrial invertebrate concentration * food ingestion rate * 0.38 (portion of diet invertebrates comprise) * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[8] Mean UCL surface soil concentration * surface soil ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean UCL terrestrial vegetation (fruit), terrestrial invertebrate, surface soil and surface water exposure doses.

Table 4-21
American Robin - Mean UCL Estimated Egg PCB Congener Concentrations
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[2]	Terrestrial Invertebrate Lipid Content[3]	Mean UCL Lipid Normalized Invertebrate Concentration (mg/kg)[4]	Lipid Normalized BAF (Egg : Aquatic Invertebrate)[5]	Egg Lipid Content[5]	Area Use Factor[6]	Temporal Use Factor[6]	Unit Converstion Factor[7]	Total Mean UCL Egg Concentration (pg/g wet weight)[8]
77-TeCB	1.20E-05	1.11E-05	0.010	1.11E-03	0.52	0.059	1.00	1.00	1,000,000	3.41E+01
81-TeCB	1.17E-05	1.56E-05	0.010	1.56E-03	0.48	0.059	1.00	1.00	1,000,000	4.43E+01
105-PeCB	5.01E-04	1.36E-03	0.010	1.36E-01	1.88	0.059	1.00	1.00	1,000,000	1.51E+04
114-PeCB	2.88E-05	6.14E-05	0.010	6.14E-03	1.92	0.059	1.00	1.00	1,000,000	6.95E+02
118-PeCB	1.78E-03	3.17E-03	0.010	3.17E-01	2.10	0.059	1.00	1.00	1,000,000	3.93E+04
123-PeCB	2.23E-05	4.76E-05	0.010	4.76E-03	1.65	0.059	1.00	1.00	1,000,000	4.63E+02
126-PeCB	2.39E-05	5.11E-05	0.010	5.11E-03	1.90	0.059	1.00	1.00	1,000,000	5.73E+02
156,157-HxCB	2.46E-04	8.58E-04	0.010	8.58E-02	2.38	0.059	1.00	1.00	1,000,000	1.20E+04
167-HxCB	8.34E-05	3.31E-04	0.010	3.31E-02	3.80	0.059	1.00	1.00	1,000,000	7.42E+03
169-HxCB	1.12E-05	4.97E-05	0.010	4.97E-03	3.80	0.059	1.00	1.00	1,000,000	1.11E+03
189-HpCB	1.47E-05	8.04E-05	0.010	8.04E-03	1.96	0.059	1.00	1.00	1,000,000	9.30E+02

Notes:

[1] Mean UCL sediment concentration from aquatic habitat (see Table 4-1).

[2] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[3] from Cobb *et al* . (1995) based on earthworm (*Lumbricus terrestris*).

[4] Mean UCL terrestrial invertebrate concentration divided by lipid content.

[5] from Figure 3 in Froese *et al* . (1998)

[6] from Table 4-2.

[7] Convert mg/kg to pg/g

[8] Mean UCL lipid normalized invertebrate concentration * BAF * egg lipid content * area use factor * temporal use factor * conversion factor.

Table 4-22
White-Footed Mouse - Mean UCL Estimated Constituent Exposure Dose
Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Vegetation Concentration (mg/kg)[2]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[3]	Mean UCL Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Surface Soil Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Terrestrial Vegetation Exposure Dose (mg/kg/BW-day)[6]	Terrestrial Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Surface Soil Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[10]
Southern Forested Wetland															
Pesticides															
4,4'-DDD	3.36E-02	4.80E-04	2.50E-03	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	5.12E-05	1.20E-04	1.07E-04	0.00E+00	2.78E-04
4,4'-DDE	5.55E-02	6.67E-04	2.02E-03	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	7.11E-05	9.66E-05	1.77E-04	0.00E+00	3.44E-04
4,4'-DDT	5.77E-02	2.05E-04	5.83E-03	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	2.18E-05	2.79E-04	1.84E-04	0.00E+00	4.85E-04
Inorganics															
Barium	6.96E+01	9.88E+00	1.01E+00	2.80E-02	0.0034	0.00007	0.007	0.022	1.00	1.00	1.05E+00	4.85E-02	2.21E-01	8.91E-03	1.33E+00
Selenium	3.80E-01	1.59E-01	7.30E-02	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	1.69E-02	3.50E-03	1.21E-03	0.00E+00	2.16E-02
Northern Forested Wetland															
SVOCs															
Acenaphthene	1.56E-01	see LMW	2.45E-02	-	0.0034	-	-	0.022	1.00	1.00	-	1.17E-03	-	-	-
Acenaphthylene	3.20E-01	see LMW	5.02E-02	-	0.0034	-	-	0.022	1.00	1.00	-	2.41E-03	-	-	-
Anthracene	5.94E-01	see LMW	9.35E-02	-	0.0034	-	-	0.022	1.00	1.00	-	4.48E-03	-	-	-
Benzo(a)anthracene	5.40E-01	see HMW	8.55E-02	-	0.0034	-	-	0.022	1.00	1.00	-	4.10E-03	-	-	-
Benzo(a)pyrene	6.80E-01	see HMW	1.08E-01	-	0.0034	-	-	0.022	1.00	1.00	-	5.17E-03	-	-	-
Benzo(b)fluoranthene	7.70E-01	see HMW	1.22E-01	-	0.0034	-	-	0.022	1.00	1.00	-	5.84E-03	-	-	-
Benzo(g,h,i)perylene	1.04E+00	see HMW	1.65E-01	-	0.0034	-	-	0.022	1.00	1.00	-	7.92E-03	-	-	-
Benzo(k)fluoranthene	4.90E-01	see HMW	7.77E-02	-	0.0034	-	-	0.022	1.00	1.00	-	3.72E-03	-	-	-
Chrysene	5.40E-01	see HMW	8.55E-02	-	0.0034	-	-	0.022	1.00	1.00	-	4.10E-03	-	-	-
Dibenz(a,h)anthracene	4.00E-01	see HMW	9.68E-02	-	0.0034	-	-	0.022	1.00	1.00	-	4.64E-03	-	-	-
Fluoranthene	7.60E-01	see LMW	1.20E-01	-	0.0034	-	-	0.022	1.00	1.00	-	5.75E-03	-	-	-
Fluorene	2.04E-01	see LMW	3.21E-02	-	0.0034	-	-	0.022	1.00	1.00	-	1.54E-03	-	-	-
Indeno(1,2,3-cd)pyrene	9.76E-01	see HMW	1.55E-01	-	0.0034	-	-	0.022	1.00	1.00	-	7.44E-03	-	-	-
2-Methylnaphthalene	5.50E-02	see LMW	8.63E-03	-	0.0034	-	-	0.022	1.00	1.00	-	4.13E-04	-	-	-
Naphthalene	1.08E-01	see LMW	1.69E-02	-	0.0034	-	-	0.022	1.00	1.00	-	8.09E-04	-	-	-
Phenanthrene	1.84E+00	see LMW	2.89E-01	-	0.0034	-	-	0.022	1.00	1.00	-	1.39E-02	-	-	-
Pyrene	5.90E-01	see HMW	9.30E-02	-	0.0034	-	-	0.022	1.00	1.00	-	4.46E-03	-	-	-
Total LMW PAHs	4.04E+00	4.58E-01	-	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	2.41E-02	3.04E-02	1.28E-02	0.00E+00	6.74E-02
Total HMW PAHs	6.03E+00	9.09E-01	-	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	4.78E-02	4.74E-02	1.92E-02	0.00E+00	1.14E-01
Inorganics															
Barium	5.83E+02	8.28E+01	8.49E+00	1.30E-02	0.0034	0.00007	0.007	0.022	1.00	1.00	8.83E+00	4.07E-01	1.86E+00	4.14E-03	1.11E+01
Lead	9.77E+02	1.15E+01	3.33E+01	5.40E-04	0.0034	0.00007	0.007	0.022	1.00	1.00	1.22E+00	1.59E+00	3.11E+00	1.72E-04	5.93E+00
Mercury [5]	6.50E-01	2.22E-02	4.16E-03	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	2.37E-03	1.99E-04	2.07E-03	0.00E+00	4.63E-03
Selenium	1.16E+00	5.45E-01	1.66E-01	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	5.81E-02	7.93E-03	3.69E-03	0.00E+00	6.97E-02
Vanadium	4.17E+01	1.84E-01	2.80E-01	0.00E+00	0.0034	0.00007	0.007	0.022	1.00	1.00	1.96E-02	1.34E-02	1.33E-01	0.00E+00	1.66E-01
Zinc	6.15E+02	1.54E+02	1.12E+02	2.70E-02	0.0034	0.00007	0.007	0.022	1.00	1.00	1.64E+01	5.39E+00	1.96E+00	8.59E-03	2.38E+01

Notes:

[1] Mean UCL surface soil concentration from forested wetland habitats (see Tables 2-3 and 2-4).

[2] Mean UCL terrestrial vegetation (seed) concentration from Table 4-4.

[3] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[4] Mean UCL surface water concentration from Table 2-1.

[5] from Table 4-2.

[6] Mean UCL plant concentration * food ingestion rate * 0.69 (portion of diet plants comprise) * area use factor * temporal use factor divided by body weight.

[7] Mean UCL terrestrial invertebrate concentration * food ingestion rate * 0.31 (portion of diet invertebrates comprise) * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[8] Mean UCL surface soil concentration * surface soil ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean UCL terrestrial vegetation (seeds), terrestrial invertebrate, surface soil and surface water exposure doses.

Table 4-23
White-footed Mouse - Mean UCL PCB Congener Dietary Concentration
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Vegetation Concentration (mg/kg)[2]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[3]	Plant Ingestion Rate (g/day)[4]	Invert. Ingestion Rate (g/day)[4]	Soil Ingestion Rate (g/day)[4]	Total Ingestion Rate (g/day)	Area Use Factor[4]	Temporal Use Factor[4]	Unit Conversion Factor [5]	Terrestrial Plant Diet Contribution (pg/g)[6]	Terrestrial Invertebrate Diet Contribution (pg/g)[7]	Soil Diet Contribution (pg/g)[8]	Total Mean UCL Diet Concentration (pg/g)[9]
77-TeCB	1.20E-05	9.24E-08	1.11E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	6.24E-02	3.38E+00	2.43E-01	3.68E+00
81-TeCB	1.17E-05	8.98E-08	1.56E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	6.07E-02	4.75E+00	2.36E-01	5.05E+00
105-PeCB	5.01E-04	1.63E-06	1.36E-03	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	1.10E+00	4.14E+02	1.01E+01	4.25E+02
114-PeCB	2.88E-05	9.37E-08	6.14E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	6.33E-02	1.86E+01	5.80E-01	1.93E+01
118-PeCB	1.78E-03	5.78E-06	3.17E-03	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	3.91E+00	9.63E+02	3.58E+01	1.00E+03
123-PeCB	2.23E-05	7.26E-08	4.76E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	4.91E-02	1.45E+01	4.50E-01	1.50E+01
126-PeCB	2.39E-05	7.80E-08	5.11E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	5.27E-02	1.55E+01	4.83E-01	1.61E+01
156,157-HxCB	2.46E-04	3.39E-07	8.58E-04	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	2.29E-01	2.61E+02	4.95E+00	2.66E+02
167-HxCB	8.34E-05	1.15E-07	3.31E-04	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	7.79E-02	1.00E+02	1.68E+00	1.02E+02
169-HxCB	1.12E-05	1.54E-08	4.97E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	1.04E-02	1.51E+01	2.25E-01	1.53E+01
189-HpCB	1.47E-05	8.61E-09	8.04E-05	2.35	1.05	0.07	3.47	1.00	1.00	1,000,000	5.82E-03	2.44E+01	2.96E-01	2.47E+01

Notes:

[1] Mean UCL surface soil concentration from northern forested habitat (see Table 4-1).

[2] Mean UCL terrestrial vegetation concentration from Table 4-4.

[3] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[4] from Table 4-2.

[5] Convert from mg/kg to pg/g.

[6] Mean UCL vegetation concentration * plant ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Mean UCL invertebrate concentration * invertebrate ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[8] Mean UCL soil concentration * soil ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[9] Sum of mean UCL terrestrial vegetation, terrestrial invertebrate and soil diet contributions.

Table 4-24
Short-Tailed Shrew - Mean UCL Estimated Constituent Exposure Dose
Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Vegetation Concentration (mg/kg)[2]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[3]	Mean UCL Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Surface Soil Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Terrestrial Vegetation Exposure Dose (mg/kg/BW-day)[6]	Terrestrial Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Surface Soil Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[10]
Southern Forested Wetland															
Pesticides															
4,4'-DDD	3.36E-02	1.11E-04	2.50E-03	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	9.62E-06	1.34E-03	4.48E-04	0.00E+00	1.79E-03
4,4'-DDE	5.55E-02	1.54E-04	2.02E-03	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	1.34E-05	1.07E-03	7.40E-04	0.00E+00	1.83E-03
4,4'-DDT	5.77E-02	4.73E-05	5.83E-03	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	4.10E-06	3.11E-03	7.69E-04	0.00E+00	3.88E-03
Inorganics															
Barium	6.96E+01	2.28E+00	1.01E+00	2.80E-02	0.0093	0.0002	0.003	0.015	1.00	1.00	1.98E-01	5.40E-01	9.28E-01	5.60E-03	1.67E+00
Selenium	3.80E-01	3.67E-02	7.30E-02	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	3.18E-03	3.89E-02	5.07E-03	0.00E+00	4.72E-02
Northern Forested Wetland															
SVOCs															
Acenaphthene	1.56E-01	see LMW	2.45E-02	-	0.0093	-	-	0.015	1.00	1.00	-	1.31E-02	-	-	-
Acenaphthylene	3.20E-01	see LMW	5.02E-02	-	0.0093	-	-	0.015	1.00	1.00	-	2.68E-02	-	-	-
Anthracene	5.94E-01	see LMW	9.35E-02	-	0.0093	-	-	0.015	1.00	1.00	-	4.98E-02	-	-	-
Benzo(a)anthracene	5.40E-01	see HMW	8.55E-02	-	0.0093	-	-	0.015	1.00	1.00	-	4.56E-02	-	-	-
Benzo(a)pyrene	6.80E-01	see HMW	1.08E-01	-	0.0093	-	-	0.015	1.00	1.00	-	5.75E-02	-	-	-
Benzo(b)fluoranthene	7.70E-01	see HMW	1.22E-01	-	0.0093	-	-	0.015	1.00	1.00	-	6.50E-02	-	-	-
Benzo(g,h,i)perylene	1.04E+00	see HMW	1.65E-01	-	0.0093	-	-	0.015	1.00	1.00	-	8.82E-02	-	-	-
Benzo(k)fluoranthene	4.90E-01	see HMW	7.77E-02	-	0.0093	-	-	0.015	1.00	1.00	-	4.14E-02	-	-	-
Chrysene	5.40E-01	see HMW	8.55E-02	-	0.0093	-	-	0.015	1.00	1.00	-	4.56E-02	-	-	-
Dibenz(a,h)anthracene	4.00E-01	see HMW	9.68E-02	-	0.0093	-	-	0.015	1.00	1.00	-	5.16E-02	-	-	-
Fluoranthene	7.60E-01	see LMW	1.20E-01	-	0.0093	-	-	0.015	1.00	1.00	-	6.40E-02	-	-	-
Fluorene	2.04E-01	see LMW	3.21E-02	-	0.0093	-	-	0.015	1.00	1.00	-	1.71E-02	-	-	-
Indeno(1,2,3-cd)pyrene	9.76E-01	see HMW	1.55E-01	-	0.0093	-	-	0.015	1.00	1.00	-	8.28E-02	-	-	-
2-Methylnaphthalene	5.50E-02	see LMW	8.63E-03	-	0.0093	-	-	0.015	1.00	1.00	-	4.60E-03	-	-	-
Naphthalene	1.08E-01	see LMW	1.69E-02	-	0.0093	-	-	0.015	1.00	1.00	-	9.00E-03	-	-	-
Phenanthrene	1.84E+00	see LMW	2.89E-01	-	0.0093	-	-	0.015	1.00	1.00	-	1.54E-01	-	-	-
Pyrene	5.90E-01	see HMW	9.30E-02	-	0.0093	-	-	0.015	1.00	1.00	-	4.96E-02	-	-	-
Total LMW PAHs	4.04E+00	1.06E-01	-	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	2.23E-02	3.39E-01	5.38E-02	0.00E+00	4.15E-01
Total HMW PAHs	6.03E+00	2.10E-01	-	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	4.42E-02	5.27E-01	8.03E-02	0.00E+00	6.52E-01
Inorganics															
Barium	5.83E+02	1.91E+01	8.49E+00	1.30E-02	0.0093	0.0002	0.003	0.015	1.00	1.00	1.66E+00	4.53E+00	7.77E+00	2.60E-03	1.40E+01
Lead	9.77E+02	2.65E+00	3.33E+01	5.40E-04	0.0093	0.0002	0.003	0.015	1.00	1.00	2.30E-01	1.78E+01	1.30E+01	1.08E-04	3.10E+01
Mercury [5]	6.50E-01	5.12E-03	4.16E-03	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	4.44E-04	2.22E-03	8.67E-03	0.00E+00	1.13E-02
Selenium	1.16E+00	1.26E-01	1.66E-01	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	1.09E-02	8.82E-02	1.55E-02	0.00E+00	1.15E-01
Vanadium	4.17E+01	4.25E-02	2.80E-01	0.00E+00	0.0093	0.0002	0.003	0.015	1.00	1.00	3.69E-03	1.49E-01	5.56E-01	0.00E+00	7.09E-01
Zinc	6.15E+02	3.56E+01	1.12E+02	2.70E-02	0.0093	0.0002	0.003	0.015	1.00	1.00	3.09E+00	6.00E+01	8.20E+00	5.40E-03	7.13E+01

Notes:

[1] Mean UCL surface soil concentration from forested wetland habitats (see Tables 2-3 and 2-4).

[2] Mean UCL terrestrial vegetation (foliage) concentration from Table 4-4.

[3] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[4] Mean UCL surface water concentration from Table 2-1.

[5] from Table 4-2.

[6] Mean UCL plant concentration * food ingestion rate * 0.14 (portion of diet plants comprise) * area use factor * temporal use factor divided by body weight.

[7] Mean UCL terrestrial invertebrate concentration * food ingestion rate * 0.86 (portion of diet invertebrates comprise) * area use factor * temporal use factor divided by body weight. PAH exposure summed in Total LMW/HMW PAHs.

[8] Mean UCL surface soil concentration * surface soil ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean UCL terrestrial vegetation (foliage), terrestrial invertebrate, surface soil and surface water exposure doses.

Table 4-25
Short-tailed Shrew - Mean UCL PCB Congener Dietary Concentration
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Terrestrial Vegetation Concentration (mg/kg)[2]	Mean UCL Terrestrial Invertebrate Concentration (mg/kg)[3]	Plant Ingestion Rate (g/day)[4]	Invert. Ingestion Rate (g/day)[4]	Soil Ingestion Rate (g/day)[4]	Total Ingestion Rate (g/day)	Area Use Factor[4]	Temporal Use Factor[4]	Unit Conversion Factor [5]	Terrestrial Plant Diet Contribution (pg/g)[6]	Terrestrial Invertebrate Diet Contribution (pg/g)[7]	Soil Diet Contribution (pg/g)[8]	Total Mean UCL Diet Concentration (pg/g)[9]
77-TeCB	1.20E-05	2.13E-08	1.11E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.92E-03	9.37E+00	2.53E-01	9.62E+00
81-TeCB	1.17E-05	2.07E-08	1.56E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.84E-03	1.32E+01	2.46E-01	1.34E+01
105-PeCB	5.01E-04	3.77E-07	1.36E-03	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	5.16E-02	1.15E+03	1.05E+01	1.16E+03
114-PeCB	2.88E-05	2.16E-08	6.14E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.96E-03	5.17E+01	6.05E-01	5.23E+01
118-PeCB	1.78E-03	1.33E-06	3.17E-03	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	1.83E-01	2.67E+03	3.74E+01	2.71E+03
123-PeCB	2.23E-05	1.68E-08	4.76E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.30E-03	4.01E+01	4.69E-01	4.05E+01
126-PeCB	2.39E-05	1.80E-08	5.11E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.47E-03	4.30E+01	5.04E-01	4.35E+01
156,157-HxCB	2.46E-04	7.83E-08	8.58E-04	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	1.07E-02	7.22E+02	5.17E+00	7.28E+02
167-HxCB	8.34E-05	2.66E-08	3.31E-04	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	3.64E-03	2.79E+02	1.76E+00	2.80E+02
169-HxCB	1.12E-05	3.56E-09	4.97E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	4.88E-04	4.19E+01	2.35E-01	4.21E+01
189-HpCB	1.47E-05	1.99E-09	8.04E-05	1.30	8.00	0.20	9.50	1.00	1.00	1,000,000	2.72E-04	6.77E+01	3.09E-01	6.80E+01

Notes:

[1] Mean UCL surface soil concentration from northern forested habitat (see Table 4-1).

[2] Mean UCL terrestrial vegetation (foliage) concentration from Table 4-4.

[3] Mean UCL terrestrial invertebrate concentration from Table 4-6.

[4] from Table 4-2.

[5] Convert from mg/kg to pg/g.

[6] Mean UCL vegetation concentration * plant ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Mean UCL invertebrate concentration * invertebrate ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[8] Mean UCL soil concentration * soil ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[9] Sum of mean UCL terrestrial vegetation, terrestrial invertebrate and soil diet contributions.

Table 4-26
Red-Tailed Hawk - Mean UCL Estimated Constituent Exposure Dose
Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Small Mammal Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Surface Soil Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Small Mammal Exposure Dose (mg/kg/BW-day)[5]	Surface Soil Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[8]
Southern Forested Wetland													
Pesticides													
4,4'-DDD	3.36E-02	8.27E-08	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	9.41E-11	0.00E+00	0.00E+00	9.41E-11
4,4'-DDE	5.55E-02	9.29E-02	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	1.06E-04	0.00E+00	0.00E+00	1.06E-04
4,4'-DDT	5.77E-02	4.06E-03	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	4.62E-06	0.00E+00	0.00E+00	4.62E-06
Inorganics													
Barium	6.96E+01	2.18E-02	2.80E-02	0.117	0.00	0.06	1.028	0.01	1.00	2.48E-05	0.00E+00	1.63E-05	4.12E-05
Selenium	3.80E-01	1.47E-01	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	1.67E-04	0.00E+00	0.00E+00	1.67E-04
Northern Forested Wetland													
SVOCs													
Acenaphthene	1.56E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Acenaphthylene	3.20E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Anthracene	5.94E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Benzo(a)anthracene	5.40E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Benzo(a)pyrene	6.80E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Benzo(b)fluoranthene	7.70E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Benzo(g,h,i)perylene	1.04E+00	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Benzo(k)fluoranthene	4.90E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Chrysene	5.40E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Dibenz(a,h)anthracene	4.00E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Fluoranthene	7.60E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Fluorene	2.04E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Indeno(1,2,3-cd)pyrene	9.76E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
2-Methylnaphthalene	5.50E-02	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Naphthalene	1.08E-01	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Phenanthrene	1.84E+00	see LMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Pyrene	5.90E-01	see HMW	-	0.117	-	-	1.028	0.01	1.00	-	-	-	-
Total LMW PAHs	4.04E+00	0.00E+00	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total HMW PAHs	6.03E+00	0.00E+00	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Inorganics													
Barium	5.83E+02	1.83E-01	1.30E-02	0.117	0.00	0.06	1.028	0.01	1.00	2.08E-04	0.00E+00	7.59E-06	2.16E-04
Lead	9.77E+02	7.25E+00	5.40E-04	0.117	0.00	0.06	1.028	0.01	1.00	8.25E-03	0.00E+00	3.15E-07	8.25E-03
Mercury [5]	6.50E-01	3.90E-03	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	4.44E-06	0.00E+00	0.00E+00	4.44E-06
Selenium	1.16E+00	2.23E-01	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	2.54E-04	0.00E+00	0.00E+00	2.54E-04
Vanadium	4.17E+01	1.64E-01	0.00E+00	0.117	0.00	0.06	1.028	0.01	1.00	1.87E-04	0.00E+00	0.00E+00	1.87E-04
Zinc	6.15E+02	3.95E+01	2.70E-02	0.117	0.00	0.06	1.028	0.01	1.00	4.50E-02	0.00E+00	1.58E-05	4.50E-02

Notes:

[1] Mean UCL surface soil concentration from forested wetland habitats (see Tables 2-3 and 2-4).

[2] Mean UCL small mammal concentration from Table 4-7.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL small mammal concentration * food ingestion rate * area use factor * temporal use factor divided by body weight.

[6] Mean UCL surface soil concentration * surface soil ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL small mammal, surface soil and surface water exposure doses.

Table 4-27
Red-Tailed Hawk - Mean UCL Estimated Egg PCB Congener Concentrations
Forested Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Soil Concentration (mg/kg) [1]	Mean UCL Small Mammal Concentration (mg/kg)[2]	Small Mammal Lipid Content[3]	Mean UCL Lipid Normalized Small Mammal Concentration (mg/kg)[4]	Lipid Normalized BAF (Egg : Small Mammal)[5]	Egg Lipid Content[5]	Area Use Factor[6]	Temporal Use Factor[6]	Unit Converstion Factor[7]	Total Mean UCL Egg Concentration (pg/g wet weight)[8]
77-TeCB	1.20E-05	8.44E-10	0.055	1.53E-08	0.52	0.059	0.010	1.00	1,000,000	4.71E-06
81-TeCB	1.17E-05	1.18E-09	0.055	2.15E-08	0.48	0.059	0.010	1.00	1,000,000	6.08E-06
105-PeCB	5.01E-04	4.47E-07	0.055	8.13E-06	1.88	0.059	0.010	1.00	1,000,000	9.02E-03
114-PeCB	2.88E-05	2.02E-08	0.055	3.67E-07	1.92	0.059	0.010	1.00	1,000,000	4.15E-04
118-PeCB	1.78E-03	1.04E-06	0.055	1.89E-05	2.10	0.059	0.010	1.00	1,000,000	2.35E-02
123-PeCB	2.23E-05	1.56E-08	0.055	2.84E-07	1.65	0.059	0.010	1.00	1,000,000	2.77E-04
126-PeCB	2.39E-05	1.68E-08	0.055	3.05E-07	1.90	0.059	0.010	1.00	1,000,000	3.42E-04
156,157-HxCB	2.46E-04	1.23E-06	0.055	2.23E-05	2.38	0.059	0.010	1.00	1,000,000	3.13E-02
167-HxCB	8.34E-05	4.73E-07	0.055	8.60E-06	3.80	0.059	0.010	1.00	1,000,000	1.93E-02
169-HxCB	1.12E-05	7.11E-08	0.055	1.29E-06	3.80	0.059	0.010	1.00	1,000,000	2.90E-03
189-HpCB	1.47E-05	5.13E-07	0.055	9.33E-06	1.96	0.059	0.010	1.00	1,000,000	1.08E-02

Notes:

[1] Mean UCL soil concentration from northern forested habitat (see Table 4-1).

[2] Mean UCL small mammal concentration from Table 4-7.

[3] from Unangst and Wunder, 2003 (average of meadow vole during summer/winter).

[4] Mean UCL small mammal concentration divided by small mammal lipid content.

[5] from Figure 3 in Froese *et al* . (1998) assuming egg:invertebrate approximately equal to egg:small mammal

[6] from Table 4-2.

[7] Convert mg/kg to pg/g

[8] Mean UCL lipid normalized small mammal concentration * BAF * egg lipid content * area use factor * temporal use factor * conversion factor.

Table 4-28
Red Fox - Mean UCL Estimated Constituent Exposure Dose
Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Mean UCL Small Mammal Concentration (mg/kg)[2]	Mean UCL Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Surface Soil Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Small Mammal Exposure Dose (mg/kg/BW-day)[5]	Surface Soil Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean UCL Exposure Dose (mg/kg/BW-day)[8]
Southern Forested Wetland													
Pesticides													
4,4'-DDD	3.36E-02	8.27E-08	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	1.22E-10	4.41E-07	0.00E+00	4.41E-07
4,4'-DDE	5.55E-02	9.29E-02	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	1.37E-04	7.28E-07	0.00E+00	1.38E-04
4,4'-DDT	5.77E-02	4.06E-03	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	5.99E-06	7.57E-07	0.00E+00	6.75E-06
Inorganics													
Barium	6.96E+01	2.18E-02	2.80E-02	0.596	0.0053	0.348	4.04	0.01	1.00	3.22E-05	9.13E-04	2.41E-05	9.69E-04
Selenium	3.80E-01	1.47E-01	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	2.16E-04	4.99E-06	0.00E+00	2.21E-04
Northern Forested Wetland													
SVOCs													
Acenaphthene	1.56E-01	see LMW	-	0.117	-	-	4.04	0.01	1.00	-	-	-	-
Acenaphthylene	3.20E-01	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Anthracene	5.94E-01	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Benzo(a)anthracene	5.40E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Benzo(a)pyrene	6.80E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Benzo(b)fluoranthene	7.70E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Benzo(g,h,i)perylene	1.04E+00	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Benzo(k)fluoranthene	4.90E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Chrysene	5.40E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Dibenz(a,h)anthracene	4.00E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Fluoranthene	7.60E-01	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Fluorene	2.04E-01	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Indeno(1,2,3-cd)pyrene	9.76E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
2-Methylnaphthalene	5.50E-02	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Naphthalene	1.08E-01	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Phenanthrene	1.84E+00	see LMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Pyrene	5.90E-01	see HMW	-	0.596	-	-	4.04	0.01	1.00	-	-	-	-
Total LMW PAHs	4.04E+00	0.00E+00	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	0.00E+00	5.30E-05	0.00E+00	5.30E-05
Total HMW PAHs	6.03E+00	0.00E+00	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	0.00E+00	7.91E-05	0.00E+00	7.91E-05
Inorganics													
Barium	5.83E+02	1.83E-01	1.30E-02	0.596	0.0053	0.348	4.04	0.01	1.00	2.70E-04	7.65E-03	1.12E-05	7.93E-03
Lead	9.77E+02	7.25E+00	5.40E-04	0.596	0.0053	0.348	4.04	0.01	1.00	1.07E-02	1.28E-02	4.65E-07	2.35E-02
Mercury	6.50E-01	3.90E-03	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	5.75E-06	8.53E-06	0.00E+00	1.43E-05
Selenium	1.16E+00	2.23E-01	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	3.29E-04	1.52E-05	0.00E+00	3.45E-04
Vanadium	4.17E+01	1.64E-01	0.00E+00	0.596	0.0053	0.348	4.04	0.01	1.00	2.42E-04	5.47E-04	0.00E+00	7.89E-04
Zinc	6.15E+02	3.95E+01	2.70E-02	0.596	0.0053	0.348	4.04	0.01	1.00	5.83E-02	8.07E-03	2.33E-05	6.64E-02

Notes:

[1] Mean UCL surface soil concentration from forested wetland habitats (see Tables 2-3 and 2-4).

[2] Mean UCL small mammal concentration from Table 4-7.

[3] Mean UCL surface water concentration from Table 2-1.

[4] from Table 4-2.

[5] Mean UCL small mammal concentration * food ingestion rate * area use factor * temporal use factor divided by body weight.

[6] Mean UCL surface soil concentration * surface soil ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean UCL surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean UCL small mammal, surface soil and surface water exposure doses.

Table 4-29
Red Fox - Mean UCL PCB Congener Dietary Concentration
Northern Forested Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congeners	Mean UCL Soil Concentration (mg/kg) [1]	Mean UCL Small Mammal Concentration (mg/kg)[2]	Food Ingestion Rate (g/day)[3]	Soil Ingestion Rate (g/day)[3]	Total Ingestion Rate (g/day)	Area Use Factor[3]	Temporal Use Factor[3]	Unit Conversion Factor [4]	Small Mammal Diet Contribution (pg/g)[5]	Soil Diet Contribution (pg/g)[6]	Total Mean UCL Diet Concentration (pg/g)[7]
77-TeCB	1.20E-05	8.44E-10	596	5.3	601	0.01	1.00	1,000,000	8.36E-06	1.06E-03	1.07E-03
81-TeCB	1.17E-05	1.18E-09	596	5.3	601	0.01	1.00	1,000,000	1.17E-05	1.03E-03	1.04E-03
105-PeCB	5.01E-04	4.47E-07	596	5.3	601	0.01	1.00	1,000,000	4.43E-03	4.42E-02	4.86E-02
114-PeCB	2.88E-05	2.02E-08	596	5.3	601	0.01	1.00	1,000,000	2.00E-04	2.54E-03	2.73E-03
118-PeCB	1.78E-03	1.04E-06	596	5.3	601	0.01	1.00	1,000,000	1.03E-02	1.57E-01	1.67E-01
123-PeCB	2.23E-05	1.56E-08	596	5.3	601	0.01	1.00	1,000,000	1.55E-04	1.97E-03	2.12E-03
126-PeCB	2.39E-05	1.68E-08	596	5.3	601	0.01	1.00	1,000,000	1.66E-04	2.11E-03	2.28E-03
156,157-HxCB	2.46E-04	1.23E-06	596	5.3	601	0.01	1.00	1,000,000	1.22E-02	2.17E-02	3.38E-02
167-HxCB	8.34E-05	4.73E-07	596	5.3	601	0.01	1.00	1,000,000	4.69E-03	7.35E-03	1.20E-02
169-HxCB	1.12E-05	7.11E-08	596	5.3	601	0.01	1.00	1,000,000	7.05E-04	9.85E-04	1.69E-03
189-HpCB	1.47E-05	5.13E-07	596	5.3	601	0.01	1.00	1,000,000	5.09E-03	1.30E-03	6.38E-03

Notes:

[1] Mean UCL soil concentration from northern forested habitat (see Table 2-4).

[2] Mean UCL small mammal concentration from Table 4-7.

[3] from Table 4-2.

[4] Convert from mg/kg to pg/g.

[5] Mean UCL small mammal concentration * food ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[6] Mean UCL soil concentration * soil ingestion rate * area use factor * temporal use factor * unit converstion factor divided by total ingestion rate.

[7] Sum of mean UCL small mammal and soil diet contributions.

Table 4-30
Amphibian Toxicity Reference Values - Surface Water
KMS Wetland
New Bedford, Massachusetts

Zinc Compound	Concentration (ug/L)	Water Hardness	Species	Age or Life Stage	Method & Duration	Endpoint	Reference
Zinc chloride	10	195	*Gastrophryne carolinensis*	Embryo	Static renewal - 7 days	Lethal - 50% organisms (LC-50)	Birge et al., 1979 in Pauli et al., 2000
Zinc	21.0	13.0	All aquatic organisms	-	-	Chronic (CCC) Water Quality Criterion	USEPA, 2006a
Zinc	20.8	13.0	All aquatic organisms	-	-	Acute (CMC) Water Quality Criterion	USEPA, 2006a
Zinc	100	?	*Bufo boreas*	Tadpole	?	NOEC - Development	Porter & Hakanson, 1976 in Pauli et al., 2000
Zinc sulfate	400	?	*Xenopus laevis*	Embryo	Static renewal - 4 days	No Observed Effect Concentration (NOEC)	Linder et al., 1991 in Sparling et al., 2000
Zinc sulfate	800	?	*Xenopus laevis*	Embryo	Static renewal - 4 days	Lowest Observed Effect Concentration (LOEC)	Linder et al., 1991 in Sparling et al., 2000
Zinc sulfate	899	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	EC-50 (development)	Fort et al., 1989 in Sparling et al., 2000
Zinc sulfate	1,276	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	EC-50 (development)	Fort et al., 1989 in Sparling et al., 2000
Zinc sulfate	1,300	?	*Xenopus laevis*	Embryo	Static renewal - 4 days	Lethal - 50% organisms (LC-50)	Linder et al., 1991 in Sparling et al., 2000
Zinc sulfate	1,944	?	*Xenopus laevis*	Embryo	Static renewal - 4 days	EC-50 (development)	Bantle et al., 1989 in Sparling et al., 2000
Zinc chloride	2,000	?	*Ambystoma jeffersonianum*	Embryo	Static - 4 days	No Observed Effect Concentration	Horne and Dunson, 1994 in Sparling et al., 2000
Zinc sulfate	2,100	20	*Rana hexadactyla*	Tadpole	Static - 4 days	Lethal - 50% organisms (LC-50)	Khangarot et al., 1985 in Sparling et al., 2000
Zinc chloride	2,380	93 - 105	*Ambystoma opacum*	Embryo	Static - 8 days	Lethal - 50% organisms (LC-50)	Birge1978 in Sparling et al., 2000
Zinc sulfate	3,600	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	EC-50 (development)	Dawson et al., 1983 in Sparling et al., 2000
Zinc sulfate	4,500	296	*Xenopus laevis*	Embryo	Static - 4 days	Lethal - 50% organisms (LC-50)	Woodall et al., 1988 in Sparling et al., 2000
Zinc	4,696	?	*Hyla chrysoscelis*	Tadpole	?	Lethal - 96% organisms (LC-96)	Gottschalk, 1995 in Pauli et al., 2000
Zinc	10,200	?	*Rana pipiens*	Tadpole	?	Lethal - 96% organisms (LC-96)	Gottschalk, 1995 in Pauli et al., 2000
Zinc sulfate	13,689	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	Lethal - 50% organisms (LC-50)	Fort et al., 1989 in Sparling et al., 2000
Zinc sulfate	14,175	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	Lethal - 50% organisms (LC-50)	Fort et al., 1989 in Sparling et al., 2000
Zinc sulfate	19,860	185	*Bufo melanostictus*	Tadpole	Static - 4 days	Lethal - 50% organisms (LC-50)	Khangarot and Ray, 1987 in Sparling et al., 2000
Zinc sulfate	22,410	142 - 145	*Microhyla ornata*	Tadpole (1 week)	Static - 4 days	Lethal - 50% organisms (LC-50)	Rao and Madhyastha, 1987 in Sparling et al., 2000
Zinc sulfate	23,080	142 - 145	*Microhyla ornata*	Tadpole (4 weeks)	Static - 4 days	Lethal - 50% organisms (LC-50)	Rao and Madhyastha, 1987 in Sparling et al., 2000
Zinc	24,380	?	*Microhyla ornata*	Tadpole (4 weeks)	?	Lethal - 50% organisms (LC-50)	Jayaprakash et al., 1987 in Pauli et al., 2000
Zinc	28,380	?	*Rana luteiventris*	Tadpole	?	Lethal - 96% organisms (LC-96)	Lefcort et al., 1998 in Pauli et al., 2000
Zinc	32,000	?	*Bufo arenarum*	Tadpole	? - 3 days	LOEC - Survival	Herkovits & Perez-Coll in Pauli et al., 2000
Zinc sulfate	34,500	100	*Xenopus laevis*	Embryo	Static renewal - 4 days	Lethal - 50% organisms (LC-50)	Dawson et al., 1983 in Sparling et al., 2000
Zinc	39,000	?	*Bufo boreas*	Tadpole	? - 1 day	Lethal - 100% organisms (LC-100)	Porter & Hakanson, 1976 in Pauli et al., 2000
Zinc	155,000	?	*Rana pipiens*	Adult	? - 15 days	Lethal - 50% organisms (LC-50)	Kaplan & Glaczenski, 1965 in Pauli et al., 2000

Table 4-31
Benthic Invertebrate Toxicity Reference Values - Sediment
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminant of Concern	Threshold Effect Concentration (TEC) (mg/kg)[1]	Probable Effect Concentration (PEC) (mg/kg)[1]	Severe Effect Level (SEL) (mg/kg)[2]
SVOCs			
Total PAHs	1.610	22.80	1000.0
Pesticides/PCBs			
4,4'-DDD	0.00488	0.0280	0.6
4,4'-DDE	0.00316	0.0313	1.9
4,4'-DDT	0.00416	0.0629	7.1
Aroclor 1254	NA	NA	3.4
Aroclor 1260	NA	NA	2.4
Total PCBs	0.0598	0.676	53.0
Inorganics			
Barium	NA	NA	NA
Lead	35.8	128	250
Mercury	0.18	1.06	2.0
Selenium	NA	NA	NA
Silver	NA	NA	NA
Vanadium	NA	NA	NA
Zinc	121	459	820

Notes:

[1]from MacDonald et al. (2000)
[2]from Persaud et al. (1993) based on 10% total organic carbon content in sediment

Table 4-32
PCB Congener Toxic Equivalency Factors
KMS Wetland
New Bedford, Massachusetts

PCB Congener	Avian Toxic Equivalency Factor (TEF)[1]	Mammalian Toxic Equivalency Factor (TEF)[2]
77-TeCB	0.05	0.0001
81-TeCB	0.1	0.0003
105-PeCB	0.0001	0.00003
114-PeCB	0.0001	0.00003
118-PeCB	0.00001	0.00003
123-PeCB	0.00001	0.00003
126-PeCB	0.1	0.1
156,157-HxCB	0.0001	0.00003
167-HxCB	0.00001	0.00003
169-HxCB	0.001	0.03
189-HpCB	0.00001	0.00003

Notes:

[1]from Van den Berg et al., 1998

[1]from Van den Berg et al., 2006

Table 4-33
Avian Chronic NOAEL Toxicity Reference Values
KMS Wetland
New Bedford, Massachusetts

Contaminant of Concern	Test Species	Body Weight (kg)	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL	Reference	Avian NOAEL TRV (mg/kg-BW/day)
SVOCs										
Total LMW PAHs	bobwhite	0.034	oral in diet (chronic)	5 days	mortality	1653	NOAEL	1653	USEPA, 2007a	1653
Total HMW PAHs	starling	0.055	oral gavage (chronic)	5 days	growth	2	NOAEL	2	USEPA, 2007a	2.00
Pesticides/PCBs										
Total DDT	chicken	2.037	oral in diet (chronic)	30 days	growth	0.227	NOAEL	0.227	USEPA, 2007e	0.23
PCB Congeners	various species	-	egg concentration	-	-	7.0 [1]	NOAEL	7.0 [1]	Froese *et al* . (1998)	7.0 [1]
Inorganics										
Barium	chicken	0.121	oral in diet (subchronic)	4 weeks	mortality	208	Subchronic NOAEL	20.8	Sample *et al* ., 1996	20.8
Lead	chicken	1.81	oral in diet (chronic)	4 weeks	reproductive	1.63	NOAEL	1.63	USEPA, 2005a	1.63
Mercury	mallard	-	oral in diet (chronic)	3 generations	reproductive	0.039	NOAEL	0.039	USEPA, 2002a	0.039
Selenium	chicken	0.328	oral in diet (chronic)	2 weeks	mortality	0.29	NOAEL	0.29	USEPA, 2007d	0.29
Silver	turkey	0.662	oral in diet (chronic)	5 weeks	growth	20.2	LOAEL	2.02	USEPA, 2006b	2.02
Vanadium	chicken	1.042	oral in diet (chronic)	5 weeks	growth	0.34	NOAEL	0.34	USEPA, 2005b	0.34
Zinc	mean of test species	-	-	-	growth/reprod.	66.1	NOAEL	66.1	USEPA, 2007f	66.1

Notes:

LOAEL - lowest observable adverse effect level

NOAEL - no observable adverse effect level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

[1] Egg concentration in units of pg/g.

Table 4-34
Avian Chronic LOAEL Toxicity Reference Values
KMS Wetland
New Bedford, Massachusetts

Contaminant of Concern	Test Species	Body Weight (kg)	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	LOAEL	Reference	Avian LOAEL TRV (mg/kg-BW/day)
SVOCs										
Total LMW PAHs	-	-	-	-	-	-	-	-	-	-
Total HMW PAHs	starling	0.055	oral gavage (chronic)	5 days	growth	20	LOAEL	20	USEPA, 2007a	20.0
Pesticides/PCBs										
Total DDT	chicken	2.037	oral in diet (chronic)	30 days	growth	2.27	LOAEL	0.227	USEPA, 2007e	2.27
PCB Congeners	various species	-	egg concentration	-	-	50.0 [1]	LOAEL	50.0 [1]	Galbraith, 2003	50.0 [1]
Inorganics										
Barium	chicken	0.121	oral in diet (subchronic)	4 weeks	mortality	417	Subchronic LOAEL	41.7	Sample et al., 1996	41.7
Lead	Japanese quail	0.155	oral in diet (chronic)	5 weeks	reproductive	1.94	LOAEL	1.94	USEPA, 2005a	1.94
Mercury	mallard	-	oral in diet (chronic)	3 generations	mortality	0.18	LOAEL	0.18	USEPA, 2002a	0.18
Selenium	chicken	1.967	oral in diet (chronic)	76 weeks	mortality	0.368	LOAEL	0.368	USEPA, 2007d	0.368
Silver	turkey	0.662	oral in diet (chronic)	5 weeks	growth	20.2	LOAEL	20.2	USEPA, 2006b	20.2
Vanadium	chicken	1.6	oral in diet (chronic)	7 days	reproductive	0.41	LOAEL	0.41	USEPA, 2005b	0.41
Zinc	chicken	2.0	oral in diet (chronic)	10 weeks	reproductive	66.5	LOAEL	66.5	USEPA, 2007f	66.5

Notes:

LOAEL - lowest observable adverse effect level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

[1] Egg concentration in units of pg/g representing upper threshold of sensitive species/lower threshold of less sensitive species.

Table 4-35
Mammalian Chronic NOAEL Toxicity Reference Values
KMS Wetland
New Bedford, Massachusetts

Contaminant of Concern	Test Species	Body Weight (kg)	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL	Reference	NOAEL TRV (mg/kg-BW/day)
SVOCs										
Total LMW PAHs	rat	0.247	oral in diet (chronic)	6 weeks	growth	65.6	NOAEL	65.6	USEPA, 2007a	65.6
Total HMW PAHs	mouse	0.038	oral in diet (chronic)	55 weeks	mortality	0.615	NOAEL	0.615	USEPA, 2007a	0.615
Pesticides/PCBs										
Total DDT	rat	0.0683	oral gavage (chronic)	15 days	reproductive	0.147	NOAEL	0.147	USEPA, 2007e	0.147
PCB Congeners	mink	-	diet (chronic)	-	reproductive	1.9 [1]	NOAEL	1.9 [1]	USEPA, 2008	1.9 [1]
Inorganics										
Barium	rat	0.34	oral - water (chronic)	92 days	growth/survival	61.1	NOAEL	61.1	USEPA, 2005c	61.1
Lead	rat	0.30	oral - water (chronic)	7 weeks	growth	4.7	NOAEL	4.7	USEPA, 2005a	4.7
Mercury	rat	0.22	oral in diet (chronic)	122 days	reproductive	0.25	NOAEL	0.25	USEPA, 2002a	0.25
Selenium	pig	17.8	oral in diet (chronic)	37 days	growth	0.143	NOAEL	0.143	USEPA, 2007d	0.143
Silver	pig	8.86	oral in diet (chronic)	40 days	growth	60.2	LOAEL	6.02	USEPA, 2006b	6.02
Vanadium	mouse	0.0471	oral gavage (chronic)	12 days	reprod./mortality	4.16	NOAEL	4.16	USEPA, 2005b	4.16
Zinc	rabbit	3.21	oral gavage (chronic)	13 days	reprod./mortality	60	NOAEL	60	USEPA, 2007f	60

Notes:

LOAEL - lowest observable adverse effect level

NOAEL - no observable adverse effect level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

[1] Dietary concentration in units of pg/g TEQ

Table 4-36
Mammalian Chronic LOAEL Toxicity Reference Values
KMS Wetland
New Bedford, Massachusetts

Contaminant of Concern	Test Species	Body Weight (kg)	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	LOAEL	Reference	LOAEL TRV (mg/kg-BW/day)
SVOCs										
Total LMW PAHs	mouse	0.04	oral in diet (chronic)	81 weeks	growth	110	LOAEL	110	USEPA, 2007b	110
Total HMW PAHs	mouse	0.038	oral in diet (chronic)	55 weeks	mortality	3.07	LOAEL	3.07	USEPA, 2007a	3.07
Pesticides/PCBs										
Total DDT	rat	0.0683	oral in diet (chronic)	168 days	reproductive	0.274	LOAEL	0.274	USEPA, 2007e	0.274
PCB Congeners	rat	-	diet (chronic)	-	pathology	4.4 [1]	NOAEL	4.4 [1]	USEPA, 2008	4.4 [1]
Inorganics										
Barium	rat	0.34	oral - water (chronic)	92 days	growth/survival	121	LOAEL	121	USEPA, 2005b	121
Lead	rat	0.37	oral - water (chronic)	3 weeks	growth/reproductive	5.0	LOAEL	5.0	USEPA, 2005a	5.0
Mercury	rat	0.22	oral in diet (chronic)	122 days	reproductive	4.0	LOAEL	4.0	USEPA, 2002a	4.0
Selenium	mouse	0.17	oral - water (chronic)	56 days	reproductive	0.145	LOAEL	0.145	USEPA, 2007d	0.145
Silver	pig	8.86	oral in diet (chronic)	40 days	growth	60.2	LOAEL	60.2	USEPA, 2006b	60.2
Vanadium	rat	0.24	oral gavage (chronic)	10 weeks	growth	5.11	LOAEL	5.11	USEPA, 2005c	5.11
Zinc	cattle	580	oral gavage (chronic)	14 weeks	reproductive	75.9	LOAEL	75.9	USEPA, 2007f	75.9

Notes:

LOAEL - lowest observable adverse effect level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

[1] Dietary concentration in units of pg/g TEQ

Table 5-1
Amphibian Risk Characterization - Surface Water
KMS Wetland
New Bedford, Massachusetts

Zinc Compound	Mean - Surface Water Concentration (ug/L)	Maximum - Surface Water Concentration (ug/L)	Amphibian TRV Concentration (ug/L)	Mean Concentration TRV HQ	Maximum Concentration TRV HQ	Water Hardness	Species	Endpoint
Zinc chloride	27.4	63.0	10	3.E+00	6.E+00	195	*Gastrophryne carolinensis*	Lethal - 50% organisms (LC-50)
Zinc - dissolved	25.0	63.0	22.4	1.E+00	3.E+00	14.3	All aquatic organisms	Acute (CMC) Water Quality Criterion
Zinc - dissolved	25.0	63.0	22.6	1.E+00	3.E+00	14.3	All aquatic organisms	Chronic (CCC) Water Quality Criterion
Zinc	27.4	63.0	100	3.E-01	6.E-01	?	*Bufo boreas*	NOEC - Development
Zinc sulfate	27.4	63.0	400	7.E-02	2.E-01	?	*Xenopus laevis*	No Observed Effect Concentration (NOEC)
Zinc sulfate	27.4	63.0	800	3.E-02	8.E-02	?	*Xenopus laevis*	Lowest Observed Effect Concentration (LOEC)
Zinc sulfate	27.4	63.0	899	3.E-02	7.E-02	100	*Xenopus laevis*	EC-50 (development)
Zinc sulfate	27.4	63.0	1,276	2.E-02	5.E-02	100	*Xenopus laevis*	EC-50 (development)
Zinc sulfate	27.4	63.0	1,300	2.E-02	5.E-02	?	*Xenopus laevis*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	1,944	1.E-02	3.E-02	?	*Xenopus laevis*	EC-50 (development)
Zinc chloride	27.4	63.0	2,000	1.E-02	3.E-02	?	*Ambystoma jeffersonianum*	No Observed Effect Concentration
Zinc sulfate	27.4	63.0	2,100	1.E-02	3.E-02	20	*Rana hexadactyla*	Lethal - 50% organisms (LC-50)
Zinc chloride	27.4	63.0	2,380	1.E-02	3.E-02	93 - 105	*Ambystoma opacum*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	3,600	8.E-03	2.E-02	100	*Xenopus laevis*	EC-50 (development)
Zinc sulfate	27.4	63.0	4,500	6.E-03	1.E-02	296	*Xenopus laevis*	Lethal - 50% organisms (LC-50)
Zinc	27.4	63.0	4,696	6.E-03	1.E-02	?	*Hyla chrysoscelis*	Lethal - 96% organisms (LC-96)
Zinc	27.4	63.0	10,200	3.E-03	6.E-03	?	*Rana pipiens*	Lethal - 96% organisms (LC-96)
Zinc sulfate	27.4	63.0	13,689	2.E-03	5.E-03	100	*Xenopus laevis*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	14,175	2.E-03	4.E-03	100	*Xenopus laevis*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	19,860	1.E-03	3.E-03	185	*Bufo melanostictus*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	22,410	1.E-03	3.E-03	142 - 145	*Microhyla ornata*	Lethal - 50% organisms (LC-50)
Zinc sulfate	27.4	63.0	23,080	1.E-03	3.E-03	142 - 145	*Microhyla ornata*	Lethal - 50% organisms (LC-50)
Zinc	27.4	63.0	24,380	1.E-03	3.E-03	?	*Microhyla ornata*	Lethal - 50% organisms (LC-50)
Zinc	27.4	63.0	28,380	1.E-03	2.E-03	?	*Rana luteiventris*	Lethal - 96% organisms (LC-96)
Zinc	27.4	63.0	32,000	9.E-04	2.E-03	?	*Bufo arenarum*	LOEC - Survival
Zinc sulfate	27.4	63.0	34,500	8.E-04	2.E-03	100	*Xenopus laevis*	Lethal - 50% organisms (LC-50)
Zinc	27.4	63.0	39,000	7.E-04	2.E-03	?	*Bufo boreas*	Lethal - 100% organisms (LC-100)
Zinc	27.4	63.0	155,000	2.E-04	4.E-04	?	*Rana pipiens*	Lethal - 50% organisms (LC-50)

Table 5-2
Benthic Invertebrate Risk Characterization - Sediment
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminant of Concern	95% UCL Mean Concentration (mg/kg)[1]	TEC (mg/kg)[2]	PEC (mg/kg)[2]	SEL (mg/kg)[2]	Mean UCL TEC HQ[3]	% > TEC[4]	Mean UCL PEC HQ[3]	% > PEC[4]	Mean UCL SEL HQ[3]	% > SEL[4]
SVOCs										
Total PAHs	115.4	1.610	22.80	1000.0	72	87%[5]	5	7%[6]	0.1	0%
Pesticides/PCBs										
4,4'-DDD	0.080	0.00488	0.0280	0.6	16	17%	3	17%	0.1	0%
4,4'-DDE	0.032	0.00316	0.0313	1.9	10	17%	1	17%	0.02	0%
4,4'-DDT	0.217	0.00416	0.0629	7.1	52	17%	3	17%	0.03	0%
Aroclor 1254	115.9	NA	NA	3.4	-		-		34	12%
Aroclor 1260	1.464	NA	NA	2.4	-		-		0.6	0%
Total PCBs	116	0.0598	0.676	53.0	1940	86%	172	41%	2	2.5%
Inorganics										
Barium	202.6	NA	NA	NA	-	-	-	-	-	-
Lead	264.8	35.8	128	250	7	69%	2	44%	1	16%
Mercury	0.218	0.18	1.06	2.0	1	34%	0.2	0%	0.1	0%
Selenium	4.04	NA	NA	NA	-	-	-	-	-	-
Silver	1.479	NA	NA	NA	-	-	-	-	-	-
Vanadium	27.17	NA	NA	NA	-	-	-	-	-	-
Zinc	501.4	121	459	820	4	45%	1	18%	0.6	0%
		Total Hazard Index			2103	-	187	-	39	-

Notes:

[1] from Table 2-2. Total PAHs represents sum of individual PAH 95% UCL Mean.
[2] from Table 4-20
[3] Sediment concentration divided by sediment effect concentration.
[4] from Table A-2
[5] includes samples with no detects but elevated reporting limits. Actual percent for detected PAHs is 15%.
[6] includes samples with no detects but elevated reporting limits. Actual percent for detected PAHs is 4%.

Table 5-3
Sediment Toxicity Testing Results
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

	Sediment Concentration (mg/kg)				*Chironumus tentans* Toxicity Test		*Hyalella azteca* Toxicity Test	
Sediment Sample	**Total PAHs**	**Total PCBs**	**Lead**	**Zinc**	**Survival**	**Growth - Wt.**	**Survival**	**Growth - Wt.**
Benchmarks								
TEC	1.61	0.06	35.8	121	-	-	-	-
PEC	22.8	0.676	128	459	-	-	-	-
Site								
ERC-SED-7	31.64	0.52	345	398	92.5%	1.26**	98.8%	0.255*
ERC-SED9	3.86	0.77	106	105	92.5%	1.67	100.0%	0.279*
ERC-SED-11A-C	0.453	5.44	59.3	180	92.5%	1.27**	92.5%	0.228*
SD-16	14.87	3.57	630	390	97.5%	1.55*	100.0%	0.304*
SD-40	28.45	4.64	650	380	95.0%	1.47*	100.0%	0.290*
SD-48	8.24	4.08	600	180	97.5%	1.40*	98.8%	0.273*
Reference								
ERC-SED-14	ND	ND	7.84	26.6	90.0%	1.45*	95.0%	0.219*
Laboratory Control								
CONTROL	-	-	-	-	96.3%	1.72	92.5%	0.350

Notes:

TEC - Threshold Effect Concentration

PEC - Probably Effect Concentration

* Statistically significant ($p<0.05$) from laboratory control sample

** Statistically significant ($p<0.05$) from laboratory control sample and reference sample

Table 5-4
PCB Congener Toxic Equivalency Exposure
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

PCB Congener	Canada Goose Egg Conc. (pg/g)[1]	TEF[2]	Canada Goose TEQ[3]	Muskrat Diet (pg/g)[4]	TEF[5]	Muskrat TEQ[3]	Mallard Egg Conc. (pg/g)[6]	TEF[2]	Mallard TEQ[3]
77-TeCB	2.92E+01	0.05	1.46E+00	1.81E+02	0.0001	1.81E-02	3.01E+01	0.05	1.50E+00
81-TeCB	1.19E+00	0.1	1.19E-01	7.99E+00	0.0003	2.40E-03	3.24E+00	0.1	3.24E-01
105-PeCB	1.16E+03	0.0001	1.16E-01	3.99E+03	0.00003	1.20E-01	2.45E+03	0.0001	2.45E-01
114-PeCB	4.73E+01	0.0001	4.73E-03	1.59E+02	0.00003	4.77E-03	7.38E+01	0.0001	7.38E-03
118-PeCB	3.90E+03	0.00001	3.90E-02	1.20E+04	0.00003	3.60E-01	1.04E+04	0.00001	1.04E-01
123-PeCB	4.21E+01	0.00001	4.21E-04	1.65E+02	0.00003	4.95E-03	2.73E+02	0.00001	2.73E-03
126-PeCB	3.08E+00	0.1	3.08E-01	1.05E+01	0.1	1.05E+00	4.39E+00	0.1	4.39E-01
156,157-HxCB	3.05E+02	0.0001	3.05E-02	1.81E+03	0.00003	5.44E-02	1.84E+03	0.0001	1.84E-01
167-HxCB	1.60E+02	0.00001	1.60E-03	5.94E+02	0.00003	1.78E-02	9.83E+02	0.00001	9.83E-03
169-HxCB	2.18E+00	0.001	2.18E-03	8.10E+00	0.03	2.43E-01	3.56E+00	0.001	3.56E-03
189-HpCB	1.13E+00	0.00001	1.13E-05	5.26E+01	0.00003	1.58E-03	4.34E+01	0.00001	4.34E-04
TOTAL TEQ			2.08E+00			1.87E+00			2.83E+00
PCB Congener	**Raccoon Diet (pg/g)[7]**	**TEF[5]**	**Raccoon TEQ[3]**	**Marsh Wren Egg Conc. (pg/g)[6]**	**TEF[2]**	**Marsh Wren TEQ[3]**	**Little Brown Bat Diet (pg/g)[9]**	**TEF[5]**	**Little Brown Bat TEQ[3]**
77-TeCB	8.13E+01	0.0001	8.13E-03	2.51E+03	0.05	1.25E+02	1.23E+02	0.0001	1.23E-02
81-TeCB	1.28E+00	0.0003	3.84E-04	2.70E+02	0.1	2.70E+01	1.44E+01	0.0003	4.32E-03
105-PeCB	6.92E+02	0.00003	2.07E-02	2.04E+05	0.0001	2.04E+01	2.78E+03	0.00003	8.35E-02
114-PeCB	2.76E+01	0.00003	8.28E-04	6.15E+03	0.0001	6.15E-01	8.20E+01	0.00003	2.46E-03
118-PeCB	2.08E+03	0.00003	6.25E-02	8.71E+05	0.00001	8.71E+00	1.06E+04	0.00003	3.18E-01
123-PeCB	2.86E+01	0.00003	8.58E-04	2.27E+04	0.00001	2.27E-01	3.53E+02	0.00003	1.06E-02
126-PeCB	1.82E+00	0.1	1.82E-01	3.66E+02	0.1	3.66E+01	4.93E+00	0.1	4.93E-01
156,157-HxCB	3.27E+02	0.00003	9.82E-03	1.53E+05	0.0001	1.53E+01	1.65E+03	0.00003	4.95E-02
167-HxCB	1.07E+02	0.00003	3.22E-03	8.19E+04	0.00001	8.19E-01	5.52E+02	0.00003	1.66E-02
169-HxCB	1.46E+00	0.03	4.39E-02	2.96E+02	0.001	2.96E-01	2.00E+00	0.03	5.99E-02
189-HpCB	6.20E+01	0.00003	1.86E-03	3.61E+03	0.00001	3.61E-02	4.72E+01	0.00003	1.42E-03
TOTAL TEQ			3.34E-01			2.35E+02			1.05E+00

Notes:

[1]Canada goose egg concentration from Table 4-9
[2]Avian TEFs from Van den Berg et al., 1998
[3]TEQ represents exposure dose multiplied by TEF
[4]Muskrat dietary concentration from Table 4-11
[5]Mammalian TEFs from Van den Berg et al., 2006
[6]Mallard egg concentration from Table 4-13
[7]Raccoon dietary concentration from Table 4-15
[8]Marsh Wren egg concentration from Table 4-17
[9]Little brown bat dietary concentration from Table 4-19

Table 5-5
Wildlife Receptors NOAEL TRV Risk Characterization
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Avian NOAEL TRV (mg/kg-BW/day) [2]	Mammalian TRV (mg/kg-BW/day) [3]	Mean UCL Canada Goose Dose (mg/kg/BW-day) [4]	Mean UCL Muskrat Dose (mg/kg/BW-day) [5]	Mean UCL Mallard Dose (mg/kg/BW-day) [6]	Mean UCL Raccoon Dose (mg/kg/BW-day) [7]	Mean UCL Marsh Wren Dose (mg/kg/BW-day) [8]	Mean UCL Little Brown Bat Dose (mg/kg/BW-day) [9]	Mean UCL Canada Goose NOAEL HQ [10]	Mean UCL Muskrat NOAEL HQ[10]	Mean UCL Mallard NOAEL HQ [10]	Mean UCL Raccoon NOAEL HQ [10]	Mean UCL Marsh Wren NOAEL HQ [10]	Mean UCL Little Brown Bat NOAEL HQ [10]
SVOCs															
Total LMW PAHs	37.0	1653	65.6	7.07E-03	1.61E-01	6.28E-04	1.46E-02	2.45E-02	8.80E-04	0.000004	0.002	0.0000004	0.0002	0.00001	0.00001
Total HMW PAHs	78.4	2.00	0.62	2.87E-02	9.43E-01	3.33E-03	6.62E-02	2.42E-02	8.69E-04	0.01	2	0.002	0.1	0.01	0.001
Pesticides/PCBs															
4,4'-DDD	0.080	-	-	1.25E-05	2.26E-04	4.30E-05	5.49E-04	2.72E-02	9.78E-04						
4,4'-DDE	0.032	-	-	4.86E-06	8.47E-05	4.29E-06	5.84E-05	2.56E-03	9.20E-05						
4,4'-DDT	0.217	-	-	2.97E-05	4.30E-04	1.39E-05	2.03E-04	7.85E-03	2.82E-04						
Total DDT	-	0.23	0.147	4.70E-05	7.41E-04	6.11E-05	8.10E-04	3.77E-02	1.35E-03	0.0002	0.01	0.0003	0.01	0.2	0.01
PCB Congeners	-	7.00	1.90	2.08E+00	1.87E+00	2.83E+00	3.34E-01	2.35E+02	1.05E+00	0.30	0.98	0.4	0.2	34	0.6
Inorganics															
Barium	203	20.8	61.1	7.83E-02	2.61E+00	9.10E-03	1.80E-01	3.96E-03	9.09E-05	0.004	0.04	0.0004	0.003	0.0002	0.000001
Lead	265	1.63	4.70	4.44E-02	8.84E-01	6.48E-03	1.24E-01	2.05E+00	7.36E-02	0.03	0.2	0.004	0.03	1	0.02
Mercury	0.22	0.039	0.250	4.21E-05	9.64E-04	2.73E-05	3.81E-04	1.54E-02	5.53E-04	0.001	0.004	0.001	0.002	0.4	0.002
Selenium	4.04	0.29	0.143	4.39E-03	1.76E-01	1.34E-03	2.01E-02	4.74E-01	1.70E-02	0.02	1	0.005	0.1	2	0.1
Silver	1.48	2.02	6.02	2.27E-04	4.00E-03	2.84E-04	3.76E-03	1.73E-01	6.23E-03	0.0001	0.001	0.0001	0.001	0.1	0.001
Vanadium	27.2	0.34	4.16	3.76E-03	5.58E-02	2.20E-04	6.62E-03	0.00E+00	0.00E+00	0.01	0.01	0.001	0.002	0.000000	0.000000
Zinc	501	66.1	60.0	3.12E-01	1.17E+01	7.10E-02	1.14E+00	1.99E+01	7.15E-01	0.005	0.2	0.001	0.02	0.3	0.01
								Total Hazard Index		0.4	4	0.4	0.5	37	0.7

Notes:

[1] Mean UCL sediment concentration (see Table 2-2).

[2] Avian NOAEL TRVs from Table 4-22 (applies to Canada goose, mallard and marsh wren). PCB congener TRV is for egg concentration in pg/g.

[3] Mammalian NOAEL TRVs from Table 4-24 (applies to muskrat, raccoon and little brown bat). PCB congener TRV is for dietary concentration in pg/g.

[4] Mean UCL Canada goose exposure dose from Tables 4-8 and 5-4.

[4] Mean UCL muskrat exposure dose from Tables 4-10 and 5-4.

[4] Mean UCL mallard exposure dose from Tables 4-12 and 5-4.

[4] Mean UCL raccoon exposure dose from Tables 4-14 and 5-4.

[4] Mean UCL marsh wren exposure dose from Tables 4-16 and 5-4.

[4] Mean UCL little brown bat exposure dose from Tables 4-18 and 5-4.

[10] HQ (Hazard Quotient) = Mean UCL exposure dose / TRV.

Table 5-6
Wildlife Receptor LOAEL TRV Risk Characterization
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Avian LOAEL TRV (mg/kg-BW/day) [2]	Mammalian LOAEL TRV (mg/kg-BW/day) [3]	Mean UCL Canada Goose Dose (mg/kg/BW-day) [4]	Mean UCL Muskrat Dose (mg/kg/BW-day) [5]	Mean UCL Mallard Dose (mg/kg/BW-day) [6]	Mean UCL Raccoon Dose (mg/kg/BW-day) [7]	Mean UCL Marsh Wren Dose (mg/kg/BW-day) [8]	Mean UCL Little Brown Bat Dose (mg/kg/BW-day) [9]	Mean UCL Canada Goose LOAEL HQ [10]	Mean UCL Muskrat LOAEL HQ[10]	Mean UCL Mallard LOAEL HQ [10]	Mean UCL Raccoon LOAEL HQ [10]	Mean UCL Marsh Wren LOAEL HQ [10]	Mean UCL Little Brown Bat LOAEL HQ [10]
SVOCs															
Total LMW PAHs	37.0	-	110	7.07E-03	1.61E-01	6.28E-04	1.46E-02	2.45E-02	8.80E-04	-	0.001	-	0.0001	-	0.00001
Total HMW PAHs	78.4	20.0	3.07	2.87E-02	9.43E-01	3.33E-03	6.62E-02	2.42E-02	8.69E-04	0.001	0.3	0.0002	0.02	0.001	0.0003
Pesticides/PCBs															
4,4'-DDD	0.080	-	-	1.25E-05	2.26E-04	4.30E-05	5.49E-04	2.72E-02	9.78E-04	-	-	-	-	-	-
4,4'-DDE	0.032	-	-	4.86E-06	8.47E-05	4.29E-06	5.84E-05	2.56E-03	9.20E-05	-	-	-	-	-	-
4,4'-DDT	0.217	-	-	2.97E-05	4.30E-04	1.39E-05	2.03E-04	7.85E-03	2.82E-04	-	-	-	-	-	-
Total DDT	-	2.27	0.274	4.70E-05	7.41E-04	6.11E-05	8.10E-04	3.77E-02	1.35E-03	0.00002	0.003	0.00003	0.003	0.02	0.005
PCB Congeners	-	5.00E+01	4.40E+00	2.08E+00	1.87E+00	2.83E+00	3.34E-01	2.35E+02	1.05E+00	0.042	0.4	0.1	0.1	5	0.2
Inorganics															
Barium	203	41.7	121	7.83E-02	2.61E+00	9.10E-03	1.80E-01	3.96E-03	9.09E-05	0.002	0.02	0.0002	0.001	0.0001	0.000001
Lead	265	1.94	5.00	4.44E-02	8.84E-01	6.48E-03	1.24E-01	2.05E+00	7.36E-02	0.02	0.2	0.003	0.02	1	0.01
Mercury	0.22	0.18	4.00	4.21E-05	9.64E-04	2.73E-05	3.81E-04	1.54E-02	5.53E-04	0.0002	0.0002	0.0002	0.0001	0.1	0.0001
Selenium	4.04	0.37	0.145	4.39E-03	1.76E-01	1.34E-03	2.01E-02	4.74E-01	1.70E-02	0.01	1	0.004	0.1	1	0.1
Silver	1.48	20.2	60.2	2.27E-04	4.00E-03	2.84E-04	3.76E-03	1.73E-01	6.23E-03	0.00001	0.0001	0.00001	0.0001	0.01	0.0001
Vanadium	27.2	0.41	5.11	3.76E-03	5.58E-02	2.20E-04	6.62E-03	0.00E+00	0.00E+00	0.01	0.01	0.001	0.001	0.0000000	0.0000000
Zinc	501	66.5	75.9	3.12E-01	1.17E+01	7.10E-02	1.14E+00	1.99E+01	7.15E-01	0.005	0.2	0.001	0.02	0.3	0.01
								Total Hazard Index		0.1	2	0.1	0.3	7	0.4

Notes:

[1] Mean UCL sediment concentration (see Table 2-2).

[2] Avian LOAEL TRVs from Table 4-34 (applies to Canada goose, mallard and marsh wren). PCB congener TRV is for egg concentration in pg/g.

[3] Mammalian LOAEL TRVs from Table 4-36 (applies to muskrat, raccoon and little brown bat). PCB congener TRV is for dietary concentration in pg/g.

[4] Mean UCL Canada goose exposure dose from Tables 4-8 and 5-4.

[4] Mean UCL muskrat exposure dose from Tables 4-10 and 5-4.

[4] Mean UCL mallard exposure dose from Tables 4-12 and 5-4.

[4] Mean UCL raccoon exposure dose from Tables 4-14 and 5-4.

[4] Mean UCL marsh wren exposure dose from Tables 4-16 and 5-4.

[4] Mean UCL little brown bat exposure dose from Tables 4-18 and 5-4.

[10] HQ (Hazard Quotient) = Mean UCL exposure dose / TRV.

Table 5-7
PCB Congener Exposure - Toxic Equivalency
Northern Forested Wetland Area - KMS Wetland
New Bedford, Massachusetts

PCB Congener	American Robin Egg Conc. (pg/g)[1]	TEF[2]	American Robin TEQ[3]	White-footed Mouse Diet (pg/g)[4]	TEF[5]	White-footed Mouse TEQ[3]	Short-tailed Shrew Diet (pg/g)[6]	TEF[5]	Short-tailed Shrew TEQ[3]
77-TeCB	3.41E+01	0.05	1.71E+00	3.68E+00	0.0001	3.68E-04	9.62E+00	0.0001	9.62E-04
81-TeCB	4.43E+01	0.1	4.43E+00	5.05E+00	0.0003	1.51E-03	1.34E+01	0.0003	4.02E-03
105-PeCB	1.51E+04	0.0001	1.51E+00	4.25E+02	0.00003	1.27E-02	1.16E+03	0.00003	3.47E-02
114-PeCB	6.95E+02	0.0001	6.95E-02	1.93E+01	0.00003	5.79E-04	5.23E+01	0.00003	1.57E-03
118-PeCB	3.93E+04	0.00001	3.93E-01	1.00E+03	0.00003	3.01E-02	2.71E+03	0.00003	8.12E-02
123-PeCB	4.63E+02	0.00001	4.63E-03	1.50E+01	0.00003	4.49E-04	4.05E+01	0.00003	1.22E-03
126-PeCB	5.73E+02	0.1	5.73E+01	1.61E+01	0.1	1.61E+00	4.35E+01	0.1	4.35E+00
156,157-HxCB	1.20E+04	0.0001	1.20E+00	2.66E+02	0.00003	7.97E-03	7.28E+02	0.00003	2.18E-02
167-HxCB	7.42E+03	0.00001	7.42E-02	1.02E+02	0.00003	3.07E-03	2.80E+02	0.00003	8.41E-03
169-HxCB	1.11E+03	0.001	1.11E+00	1.53E+01	0.03	4.60E-01	4.21E+01	0.03	1.26E+00
189-HpCB	9.30E+02	0.00001	9.30E-03	2.47E+01	0.00003	7.42E-04	6.80E+01	0.00003	2.04E-03
TOTAL TEQ			6.78E+01			2.12E+00			5.77E+00

PCB Congener	Red-tailed Hawk Egg Conc. (pg/g)[7]	TEF[2]	Red-tailed Hawk TEQ[3]	Red Fox Diet (pg/g)[8]	TEF[5]	Red Fox TEQ[3]
77-TeCB	4.71E-06	0.05	2.35E-07	1.07E-03	0.0001	1.07E-07
81-TeCB	6.08E-06	0.1	6.08E-07	1.04E-03	0.0003	3.13E-07
105-PeCB	9.02E-03	0.0001	9.02E-07	4.86E-02	0.00003	1.46E-06
114-PeCB	4.15E-04	0.0001	4.15E-08	2.73E-03	0.00003	8.20E-08
118-PeCB	2.35E-02	0.00001	2.35E-07	1.67E-01	0.00003	5.00E-06
123-PeCB	2.77E-04	0.00001	2.77E-09	2.12E-03	0.00003	6.36E-08
126-PeCB	3.42E-04	0.1	3.42E-05	2.28E-03	0.1	2.28E-04
156,157-HxCB	3.13E-02	0.0001	3.13E-06	3.38E-02	0.00003	1.01E-06
167-HxCB	1.93E-02	0.00001	1.93E-07	1.20E-02	0.00003	3.61E-07
169-HxCB	2.90E-03	0.001	2.90E-06	1.69E-03	0.03	5.07E-05
189-HpCB	1.08E-02	0.00001	1.08E-07	6.38E-03	0.00003	1.91E-07
TOTAL TEQ			4.26E-05			2.87E-04

Notes:

[1]American robin egg concentration from Table 4-21.
[2]Avian TEFs from Van den Berg et al., 1998
[3]TEQ represents exposure dose multiplied by TEF
[4]White-footed mouse dietary concentation from Table 4-23.
[5]Mammalian TEFs from Van den Berg et al., 2006
[6]Short-tailed shrew dietary concentration from Table 4-25.
[7]Red-tailed hawk egg concentration from Table 4-27.
[8]Red Fox dietary concentratin from Table 4-29.

Table 5-8
Wildlife Receptor NOAEL TRV Risk Characterization
Forested Habitats - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Avian NOAEL TRV (mg/kg-BW/day) [2]	Mammalian NOAEL TRV (mg/kg-BW/day) [3]	Mean UCL American Robin Dose (mg/kg/BW-day) [4]	Mean UCL White-footed Mouse Dose (mg/kg/BW-day) [5]	Mean UCL Short-tailed Shrew Dose (mg/kg/BW-day) [6]	Mean UCL Red-tailed Hawk Dose (mg/kg/BW-day) [7]	Mean UCL Red Fox Dose (mg/kg/BW-day) [8]	Mean UCL American Robin NOAEL HQ[9]	Mean UCL White-footed Mouse NOAEL HQ[9]	Mean UCL Short-tailed Shrew NOAEL HQ[9]	Mean UCL Red-tailed Hawk NOAEL HQ[9]	Mean UCL Red Fox NOAEL HQ[9]
Southern Forested Wetland													
Pesticides													
4,4'-DDD	0.034	-	-	2.07E-03	2.78E-04	1.79E-03	9.41E-11	4.41E-07	-	-	-	-	-
4,4'-DDE	0.056	-	-	2.42E-03	3.44E-04	1.83E-03	1.06E-04	1.38E-04	-	-	-	-	-
4,4'-DDT	0.058	-	-	4.14E-03	4.85E-04	3.88E-03	4.62E-06	6.75E-06	-	-	-	-	-
Total DDT	-	0.23	0.147	8.63E-03	1.11E-03	7.50E-03	1.10E-04	1.45E-04	0.04	0.01	0.1	0.0005	0.001
Inorganics													
Barium	69.6	20.8	61.1	4.06E+00	1.33E+00	1.67E+00	4.12E-05	9.69E-04	0.2	0.02	0.03	0.000002	0.00002
Selenium	0.38	0.29	0.14	7.30E-02	2.16E-02	4.72E-02	1.67E-04	2.21E-04	0.3	0.2	0.3	0.001	0.002
							Total Hazard Index		0.5	0.2	0.4	0.001	0.003
Northern Forested Wetland													
SVOCs													
Total LMW PAHs	4.04	1653	65.6	4.39E-01	6.74E-02	4.15E-01	0.00E+00	5.30E-05	0.0003	0.001	0.01	0.0000000	0.000001
Total HMW PAHs	6.03	2.00	0.62	6.97E-01	1.14E-01	6.52E-01	0.00E+00	7.91E-05	0.3	0.2	1	0.0000000	0.0001
PCBs													
PCB Congeners	-	7.00	1.90	6.78E+01	2.12E+00	5.77E+00	4.26E-05	2.87E-04	10	1	3	0.00001	0.0002
Inorganics													
Barium	583	20.8	61.1	3.39E+01	1.11E+01	1.40E+01	2.25E-04	7.94E-03	2	0.2	0.2	0.00001	0.0001
Lead	977	1.63	4.70	4.16E+01	5.93E+00	3.10E+01	8.25E-03	2.35E-02	26	1	7	0.005	0.005
Mercury	0.65	0.039	0.25	2.21E-02	4.63E-03	1.13E-02	4.44E-06	1.43E-05	0.6	0.02	0.05	0.0001	0.0001
Selenium	1.16	0.29	0.14	2.08E-01	6.97E-02	1.15E-01	2.54E-04	3.45E-04	0.7	0.5	1	0.001	0.002
Vanadium	41.7	0.34	6.02	1.19E+00	1.66E-01	7.09E-01	1.87E-04	7.89E-04	4	0.03	0.1	0.001	0.0001
Zinc	615	66.1	60.0	9.60E+01	2.38E+01	7.13E+01	4.50E-02	6.64E-02	1	0.4	1	0.001	0.001
							Total Hazard Index		43	4	13	0.007	0.009

Notes:

[1] Mean UCL surface soil concentrations (see Tables 2-3 and 2-4).

[2] Avian NOAEL TRVs from Table 4-33 (applies to American robin and red-tailed hawk). PCB congener TRV is for egg concentration in pg/g.

[3] Mammalian NOAEL TRVs from Table 4-35(applies to white-footed mouse, short-tailed shrew and red fox). PCB congener TRV is for dietary concentration in pg/g.

[4] Mean UCL American robin exposure dose from Tables 4-20 and 5-6.

[5] Mean UCL white-footed mouse exposure dose from Tables 4-22 and 5-6.

[6] Mean UCL short-tailed shrew exposure dose from Tables 4-24 and 5-6.

[7] Mean UCL red-tailed hawk exposure dose from Tables 4-26 and 5-6.

[8] Mean UCL red fox hawk exposure dose from Tables 4-28 and 5-6 .

[9] HQ (Hazard Quotient) = Mean UCL exposure dose / NOAEL TRV.

Table 5-9
Wildlife Receptor LOAEL TRV Risk Characterization
Forested Habitats - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Avian LOAEL TRV (mg/kg-BW/day) [2]	Mammalian LOAEL TRV (mg/kg-BW/day) [3]	Mean UCL American Robin Dose (mg/kg/BW-day) [4]	Mean UCL White-footed Mouse Dose (mg/kg/BW-day) [5]	Mean UCL Short-tailed Shrew Dose (mg/kg/BW-day) [6]	Mean UCL Red-tailed Hawk Dose (mg/kg/BW-day) [7]	Mean UCL Red Fox Dose (mg/kg/BW-day) [8]	Mean UCL American Robin LOAEL HQ[9]	Mean UCL White-footed Mouse LOAEL HQ[9]	Mean UCL Short-tailed Shrew LOAEL HQ[9]	Mean UCL Red-tailed Hawk LOAEL HQ[9]	Mean UCL Red Fox LOAEL HQ[9]
Southern Forested Wetland													
Pesticides													
4,4'-DDD	0.034	-	-	2.07E-03	2.78E-04	1.79E-03	9.41E-11	4.41E-07	-	-	-	-	-
4,4'-DDE	0.056	-	-	2.42E-03	3.44E-04	1.83E-03	1.06E-04	1.38E-04	-	-	-	-	-
4,4'-DDT	0.058	-	-	4.14E-03	4.85E-04	3.88E-03	4.62E-06	6.75E-06	-	-	-	-	-
Total DDT	-	2.27	0.274	8.63E-03	1.11E-03	7.50E-03	1.10E-04	1.45E-04	0.004	0.004	0.03	0.00005	0.001
Inorganics													
Barium	69.6	41.7	121.0	4.06E+00	1.33E+00	1.67E+00	4.12E-05	9.69E-04	0.1	0.01	0.01	0.000001	0.00001
Selenium	0.38	0.37	0.15	7.30E-02	2.16E-02	4.72E-02	1.67E-04	2.21E-04	0.2	0.1	0.3	0.0005	0.002
							Total Hazard Index		0.3	0.2	0.4	0.001	0.002
Northern Forested Wetland													
SVOCs													
Total LMW PAHs	2.89	1653	110	4.39E-01	6.74E-02	4.15E-01	0.00E+00	5.30E-05	0.0003	0.001	0.004	0.0000000	0.0000005
Total HMW PAHs	6.26	20.0	3.07	6.97E-01	1.14E-01	6.52E-01	0.00E+00	7.91E-05	0.03	0.04	0.2	0.0000000	0.00003
PCBs													
PCB Congeners	-	50.0	4.40	6.78E+01	2.12E+00	5.77E+00	4.26E-05	2.87E-04	1	0.5	1	0.000001	0.0001
Inorganics													
Barium	583	41.7	121	3.39E+01	1.11E+01	1.40E+01	2.25E-04	7.94E-03	0.8	0.1	0.1	0.00001	0.0001
Lead	977	1.94	5.00	4.16E+01	5.93E+00	3.10E+01	8.25E-03	2.35E-02	21	1	6	0.004	0.005
Mercury	0.65	0.18	4.00	2.21E-02	4.63E-03	1.13E-02	4.44E-06	1.43E-05	0.1	0.001	0.003	0.00002	0.000004
Selenium	1.16	0.368	0.145	2.08E-01	6.97E-02	1.15E-01	2.54E-04	3.45E-04	0.6	0.5	0.8	0.001	0.002
Vanadium	41.7	0.41	5.11	1.19E+00	1.66E-01	7.09E-01	1.87E-04	7.89E-04	3	0.03	0.1	0.0005	0.0002
Zinc	615	66.5	75.9	9.60E+01	2.38E+01	7.13E+01	4.50E-02	6.64E-02	1	0.3	0.9	0.001	0.001
							Total Hazard Index		29	3	10	0.006	0.008

Notes:

[1] Mean UCL surface soil concentrations (see Tables 2-3 and 2-4).

[2] Avian NOAEL TRVs from Table 4-22 (applies to American robin and red-tailed hawk). PCB congener TRV is for egg concentration in pg/g.

[3] Mammalian NOAEL TRVs from Table 4-24 (applies to white-footed mouse, short-tailed shrew and red fox). PCB congener TRV is for dietary concentration in pg/g.

[4] Mean UCL American robin exposure dose from Tables 4-20 and 5-7.

[5] Mean UCL white-footed mouse exposure dose from Tables 4-22 and 5-7.

[6] Mean UCL short-tailed shrew exposure dose from Tables 4-24 and 5-7.

[7] Mean UCL red-tailed hawk exposure dose from Tables 4-26 and 5-7.

[8] Mean UCL red fox hawk exposure dose from Tables 4-28 and 5-7 .

[9] HQ (Hazard Quotient) = Mean UCL exposure dose / LOAEL TRV.

Table 6-1
Risk-Based Sediment Preliminary Remediation Goals
Aquatic Habitat - KMS Wetland
New Bedford, Massachusetts

Sediment/Surface Soil Contaminants of Concern	Mean UCL Sediment Concentration (mg/kg) [1]	Benthic Community PRG (mg/kg)[2]	Muskrat					Marsh Wren				
			NOAEL TRV HQ[3]	NOAEL Goal (mg/kg)[4]	LOAEL TRV HQ[5]	LOAEL Goal (mg/kg)[4]	PRG (mg/kg)[6]	NOAEL TRV HQ[3]	NOAEL Goal (mg/kg)[4]	LOAEL TRV HQ[5]	LOAEL Goal (mg/kg)[4]	PRG (mg/kg)[6]
HMW PAHs	78.4	NA	1.5	52.3	0.3	261.3	**156.8**	NA	-	NA	-	NA
Total PAHs	115.4	**30**	NA	-	NA	-	NA	NA	-	NA	-	NA
PCBs (Total)	116.0	**5.0**	1.0	118.4	0.4	290.0	204.2	33.6	3.4	4.7	24.6	14.0
Zinc	501.0	**459**	NA	-	NA	-	NA	NA	-	NA	-	NA

Notes:

Values in bold represent proposed preliminary remediation goals (PRGs).

[1] Mean UCL sediment concentrations from aquatic habitat area (see Table 2-2).
[2] Based on results of sediment toxicity testing (see Table 5-3).
[3] from Table 5-5
[4] NOAEL/LOAEL goal equal to mean UCL sediment concentration divided by NOAEL/LOAEL TRV
[5] from Table 5-6
[6] Average of NOAEL and LOAEL goals

Table 6-2
Risk-Based Sediment Preliminary Remediation Goals
Northern Forested Wetland Habitat - KMS Wetland
New Bedford, Massachusetts

Surface Soil Contaminants of Concern	Mean UCL Surface Soil Concentration (mg/kg) [1]	Background Surface Soil Concentration (mg/kg) [2]	American Robin					White-footed Mouse					Short-tailed Shrew				
			NOAEL TRV HQ[3]	NOAEL Goal (mg/kg)[4]	LOAEL TRV HQ[5]	LOAEL Goal (mg/kg)[5]	PRG (mg/kg)[6]	NOAEL TRV HQ[3]	NOAEL Goal (mg/kg)[4]	LOAEL TRV HQ[5]	LOAEL Goal (mg/kg)[5]	PRG (mg/kg)[6]	NOAEL TRV HQ[3]	NOAEL Goal (mg/kg)[4]	LOAEL TRV HQ[5]	LOAEL Goal (mg/kg)[5]	PRG (mg/kg)[6]
PCBs (Total)	15.77	NA	9.7	1.6	1.4	11.6	**6.6**	1.1	14.1	0.5	32.7	23.4	3.0	5.2	1.3	12.0	8.6
Lead	977	**100**	25.5	38.3	21.4	45.6	41.9	1.3	774.4	1.2	824	799	6.6	148.1	6.2	157.6	152.9
Zinc	615	100	1.5	423.5	1.5	423.5	**423.5**	0.4	1550.4	0.3	1961	1756	1.2	517.5	0.9	654.7	586.1

Notes:

Values in bold represent proposed preliminary remediation goals (PRGs).

[1] Mean UCL surface soil concentrations from northern forested area (see Table 2-4).
[2] Background surface soil concentrations in "natural soil" from MADEP (2002).
[3] from Table 5-8
[4] NOAEL/LOAEL goal equal to mean UCL sediment concentration divided by NOAEL/LOAEL TRV
[5] from Table 5-9
[6] Average of NOAEL and LOAEL goals

Appendix A

Sampling Analytical Results

Table A-1
Summary of Analytical Results for Surface Water Samples - 2009 and 2010
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	ERC-SW-7							ERC-SW-9				ERC-SW-11A		ERC-SW-14	ERC-SW-16
		Sample Date:	3/5/2009	12/28/2009	3/10/2010	4/21/2010	5/5/2010	5/17/2010	8/23/2010	3/5/2009	3/5/2009 Field Dup	12/28/2009	3/10/2010	3/6/2009	8/23/2010	3/6/2009	3/20/2009
PAHs																	
(ug/L)	Acenaphthene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	2-Chloronaphthalene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Fluoranthene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Naphthalene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Benzo(a)anthracene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Benzo(a)pyrene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Benzo(b)fluoranthene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Benzo(k)fluoranthene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Chrysene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Acenaphthylene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Anthracene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Benzo(ghi)perylene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Fluorene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Phenanthrene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Dibenzo(a,h)anthracene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Indeno(1,2,3-cd)Pyrene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	Pyrene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
	2-Methylnaphthalene		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.19 U	NA	0.20 U	0.20 U
PCB Homologues																	
(ug/L)	Monochlorobiphenyl		0.027 U	NA	NA	NA	NA	NA	NA	0.027 U	0.029 U	NA	NA	0.025 U	NA	0.025 U	0.025 U
	Dichlorobiphenyl		0.027 U	NA	NA	NA	NA	NA	NA	0.027 U	0.029 U	NA	NA	0.025 U	NA	0.025 U	0.025 U
	Trichlorobiphenyl		0.027 U	NA	NA	NA	NA	NA	NA	0.027 U	0.029 U	NA	NA	0.025 U	NA	0.025 U	0.025 U
	Tetrachlorobiphenyl		0.054 U	NA	NA	NA	NA	NA	NA	0.053 U	0.059 U	NA	NA	0.051 U	NA	0.050 U	0.050 U
	Pentachlorobiphenyl		0.054 U	NA	NA	NA	NA	NA	NA	0.053 U	0.059 U	NA	NA	0.051 U	NA	0.050 U	0.050 U
	Hexachlorobiphenyl		0.054 U	NA	NA	NA	NA	NA	NA	0.053 U	0.059 U	NA	NA	0.051 U	NA	0.050 U	0.050 U
	Heptachlorobiphenyl		0.082 U	NA	NA	NA	NA	NA	NA	0.080 U	0.088 U	NA	NA	0.076 U	NA	0.075 U	0.075 U
	Octachlorobiphenyl		0.082 U	NA	NA	NA	NA	NA	NA	0.080 U	0.088 U	NA	NA	0.076 U	NA	0.075 U	0.075 U
	Nonachlorobiphenyl		0.14 U	NA	NA	NA	NA	NA	NA	0.13 U	0.15 U	NA	NA	0.13 U	NA	0.13 U	0.13 U
	Decachlorobiphenyl		0.14 U	NA	NA	NA	NA	NA	NA	0.13 U	0.15 U	NA	NA	0.13 U	NA	0.13 U	0.13 U
	Total PCB		0.14 U	NA	NA	NA	NA	NA	NA	0.13 U	0.15 U	NA	NA	0.13 U	NA	0.13 U	0.13 U
Metals, total																	
(ug/L)	Antimony		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	50 U
	Arsenic		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	5.0 U
	Barium		**11.8**	NA	NA	NA	NA	NA	NA	**9.4**	**9.7**	NA	NA	**27.1**	NA	**5.5**	**28**
	Beryllium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	5.0 U
	Cadmium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	4.0 U
	Calcium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	**0.60**	10 U
	Lead		0.50 U	NA	NA	NA	NA	NA	NA	**0.60**	**0.70**	NA	NA	0.50 U	NA	0.50 U	10 U
	Magnesium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		**0.50**	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	25 U
	Selenium		1.0 U	NA	NA	NA	NA	NA	NA	1.0 U	1.0 U	NA	NA	1.0 U	NA	1.0 U	10 U
	Silver		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	7.0 U
	Thallium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	20 U
	Vanadium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	10 U
	Zinc		**32.1**	NA	NA	NA	NA	NA	NA	**29.8**	**33.0**	NA	NA	**23.4**	NA	**22.5**	50 U
	Mercury		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.20 U	NA	0.20 U	0.20 U

Table A-1
Summary of Analytical Results for Surface Water Samples - 2009 and 2010
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	ERC-SW-7							ERC-SW-9				ERC-SW-11A		ERC-SW-14	ERC-SW-16
		Sample Date:	3/5/2009	12/28/2009	3/10/2010	4/21/2010	5/5/2010	5/17/2010	8/23/2010	3/5/2009	3/5/2009 Field Dup	12/28/2009	3/10/2010	3/6/2009	8/23/2010	3/6/2009	3/20/2009
Metals, dissolved																	
(ug/L)	Antimony		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	50 U
	Arsenic		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	5.0 U
	Barium		**12.2**	NA	NA	NA	NA	NA	NA	**8.6**	**8.3**	NA	NA	**26.9**	NA	**1.7**	**25**
	Beryllium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	5.0 U
	Cadmium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	4.0 U
	Chromium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	10 U
	Lead		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	10 U
	Nickel		**0.70**	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	**0.50**	NA	0.50 U	25 U
	Selenium		1.0 U	NA	NA	NA	NA	NA	NA	1.0 U	1.0 U	NA	NA	1.0 U	NA	1.0 U	10 U
	Silver		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	7.0 U
	Thallium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	20 U
	Vanadium		0.50 U	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	NA	0.50 U	NA	0.50 U	10 U
	Zinc		**35.0**	50 U	**9.30**	**8.50**	**11.90**	**6.30**	5.0 U	**30.4**	**29.2**	50 U	**23.7**	**21.9**	**6.0**	**18.2**	50 U
	Mercury		0.20 U	NA	NA	NA	NA	NA	NA	0.20 U	0.20 U	NA	NA	0.20 U	NA	0.20 U	0.20 U
Hardness																	
(ug/L)	Hardness		**9,400**	**8,700**	**16,000**	**21,000**	**18,000**	**17,000**	**18,000**	**6,800**	**6,600**	**5,700**	**9,600**	**12,000**	**31,000**	**8,200**	**27,000**

Notes:

All units in ug/L unless otherwise specified.
ug/L - micrograms per liter.
NA - Sample not analyzed for the listed analyte.
U - Compound was not detected at specified quantitation limit.
Values in **Bold** indicate the compound was detected.
PAHs - Polynuclear Aromatic Hydrocarbons.
PCBs - Polychlorinated Biphenyls.
* - EPA National Recommended Water Quality Criteria, Freshwater CCC, 2006.

Table A-1
Summary of Analytical Results for Surface Water Samples - 2009 and 2010
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	ERC-SW-20	ERC-SW-21	ERC-SW-22	ERC-SW-23	ERC-SW-24	ERC-SW-25	ERC-SW-26	ERC-SW-27	ERC-SW-28		ERC-SW-29
		Sample Date:	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009 Field Dup	7/17/2009
PAHs													
(ug/L)	Acenaphthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Chloronaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(ghi)perylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB Homologues													
(ug/L)	Monochlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dichlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Trichlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Tetrachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pentachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Hexachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Heptachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Octachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nonachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Decachlorobiphenyl		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total PCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total													
(ug/L)	Antimony		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Calcium		**3,100**	**4,900**	**4,600**	**3,500**	**1,700**	**1,900**	**1,600**	**5,300**	**16,000**	**3,700**	**4,800**
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium		**470**	**590**	**750**	**390**	**280**	**320**	**270**	**620**	**1,800**	**380**	**610**
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1
Summary of Analytical Results for Surface Water Samples - 2009 and 2010
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	ERC-SW-20	ERC-SW-21	ERC-SW-22	ERC-SW-23	ERC-SW-24	ERC-SW-25	ERC-SW-26	ERC-SW-27	ERC-SW-28		ERC-SW-29
		Sample Date:	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009	7/17/2009 Field Dup	7/17/2009
Metals, dissolved													
(ug/L)	Antimony		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		**35**	**38**	**63**	**44**	**42**	20 U	**30**	**27**	**40**	20 U	20 U
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness													
(ug/L)	Hardness		**9,200**	**16,000**	**18,000**	**9,500**	**6,300**	**6,800**	**5,300**	**18,000**	**44,000**	**11,000**	**15,000**

Notes:

All units in ug/L unless otherwise specified.
ug/L - micrograms per liter.
NA - Sample not analyzed for the listed analyte.
U - Compound was not detected at specified quantitation limit.
Values in **Bold** indicate the compound was detected.
PAHs - Polynuclear Aromatic Hydrocarbons.
PCBs - Polychlorinated Biphenyls.
* - EPA National Recommended Water Quality Criteria, Freshwater C

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	WA3	WB4	WB5	WB6	WB7	WC7	WC8	WC.5-8.5	WC.5-9.5	WC.5-10.5	WC.5-11.5	WC.5-12.5	WC.5-13.5	WC.5-14.5	WC.5-15.5	WC.5-16.5
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	12/21/04	12/21/04	12/21/04	12/21/04	12/21/04	12/21/04	12/21/04	4/22/05	4/22/05	4/20/05	4/20/05	4/20/05	4/20/05	4/20/05	4/20/05	4/20/05
PAHs																		
(mg/kg)	2-Methylnaphthalene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Acenaphthene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Acenaphthylene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Anthracene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**0.54**	0.34 U	0.13 U
	Benzo(a)anthracene		0.069 U	**0.75**	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.4**	0.34 U	0.13 U
	Benzo(a)pyrene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.4**	0.34 U	0.13 U
	Benzo(b)fluoranthene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.5**	0.34 U	0.13 U
	Benzo(g,h,i)perylene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.1**	0.34 U	0.13 U
	Benzo(k)fluoranthene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**0.74**	0.34 U	0.13 U
	Chrysene		0.069 U	**0.81**	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.2**	0.34 U	0.13 U
	Dibenzo(a,h)anthracene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Fluoranthene		0.069 U	**2.2**	**0.47**	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.8**	0.34 U	0.13 U
	Fluorene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Indeno(1,2,3-cd)pyrene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**1.1**	0.34 U	0.13 U
	Naphthalene		0.069 U	0.12 U	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.6 U	0.7 U	0.44 U	0.54 U	0.47 U	0.14 U	0.34 U	0.13 U
	Phenanthrene		0.069 U	**1.0**	0.18 U	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**2.2**	0.34 U	0.13 U
	Pyrene		0.069 U	**1.5**	**0.35**	0.33 U	0.31 U	0.23 U	0.36 U	0.65 U	0.60 U	0.70 U	0.44 U	0.54 U	0.47 U	**4.2**	0.34 U	0.13 U
PCBs																		
(mg/kg)	PCB-1254		**0.11**	**0.068**	**0.08**	**0.113**	0.025 U	**0.64**	**0.058**	**0.094**	**0.135**	0.044 U	**0.036**	0.037 U	**0.232**	**0.922**	**0.175**	0.007 U
	PCB-1260		0.005 U	0.010 U	0.0104 U	0.028 U	0.025 U	0.0109 U	0.028 U	0.056 U	0.066 U	0.044 U	0.030 U	0.037 U	0.035 U	0.02 U	0.022 U	0.007 U
	Total PCBs		**0.11**	**0.068**	**0.08**	**0.113**	0.025 U	**0.64**	**0.058**	**0.094**	**0.135**	0.044 U	**0.036**	0.037 U	**0.232**	**0.922**	**0.175**	0.007 U
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		0.010 U	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	0.002 U	NA	NA	0.002 U	NA
	4,4-DDE		0.010 U	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	0.002 U	NA	NA	0.002 U	NA
	4,4-DDT		0.010 U	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	0.002 U	NA	NA	0.002 U	NA
Metals																		
(mg/kg)	Arsenic		**1.09**	**0.27**	**0.58**	0.64 U	**1.11**	0.47 U	0.62 U	0.60 U	0.69 U	0.62 U	0.38 U	**0.83**	0.46 U	**5.27**	**0.82**	0.1 U
	Barium		**23**	**55**	**62**	**99**	**40**	**102**	**73**	**48**	**78**	**80**	**44**	**78**	**86**	**275**	**35**	**5.2**
	Cadmium		**1.04**	**1.76**	**2.05**	**1.8**	**0.98**	**1.31**	**1.11**	**0.66**	**0.76**	**1.18**	**0.45**	**0.78**	**1.15**	**4.73**	**0.7**	**0.22**
	Chromium		**13**	**38**	**42**	**18**	**11**	**12**	**9.84**	**5.89**	**7.12**	**6.27**	**6.01**	**16**	**12**	**26**	**26**	**3.9**
	Lead		**198**	**134**	**127**	**170**	**502**	**184**	**112**	**27**	**23**	**63**	**15**	**26**	**55**	**524**	**13**	**1.7**
	Mercury		**0.037**	**0.094**	**0.096**	**0.136**	**0.235**	**0.128**	**0.197**	**0.078**	**0.075**	**0.088**	**0.056**	**0.117**	**0.114**	**0.457**	**0.039**	0.0101 U
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		0.14 U	0.22 U	0.32 U	0.64 U	**0.86**	0.47 U	0.62 U	**2.34**	**2.21**	**1.86**	**3.61**	**4.04**	**2.89**	**0.38**	0.32 U	0.1 U
	Silver		0.07 U	**0.11**	0.16 U	0.32 U	**0.37**	0.23 U	0.31 U	0.30 U	0.35 U	0.31 U	0.19 U	0.23 U	0.23 U	**0.4**	0.16 U	0.05 U
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		**2.9**	**12**	**12.6**	**38**	**57.1**	**37.6**	**54.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match reported.

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	WD-7	WD8	WD-9	WD-15.5	WD-16	WD.5-6.5	WD.5-17.14	WD.5-17.28	WD.5-17.46	WE-4	WE-5	WE-6	WE.5-2.5	WE.5-3.5	WF-3	WF-4
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	12/21/04	12/21/04	12/22/04	4/20/05	12/22/04	4/22/05	4/20/05	4/20/05	4/20/05	12/22/04	12/22/04	12/22/04	4/25/05	4/25/05	12/22/04	12/22/04
PAHs																		
(mg/kg)	2-Methylnaphthalene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Acenaphthene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Acenaphthylene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Anthracene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Benzo(a)anthracene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Benzo(a)pyrene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Benzo(b)fluoranthene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Benzo(g,h,i)perylene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Benzo(k)fluoranthene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Chrysene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Dibenzo(a,h)anthracene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Fluoranthene		**0.19**	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Fluorene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Indeno(1,2,3-cd)pyrene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Naphthalene		0.17 U	0.27 U	0.28 U	0.05 U	0.23 U	0.57 U	0.3 U	0.2 U	0.32 U	0.5 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Phenanthrene		0.17 U	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	0.30 U	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
	Pyrene		**0.19**	0.27 U	0.28 U	0.050 U	0.23 U	0.57 U	**0.33**	0.20 U	0.32 U	0.50 U	0.33 U	0.51 U	0.51 U	0.93 U	0.34 U	0.34 U
PCBs																		
(mg/kg)	PCB-1254		**0.571**	**0.151**	**0.56**	**0.033**	0.010 U	0.08 U	**0.065**	0.0103 U	**0.118**	**0.122**	**0.32**	0.010 U	**0.601**	0.076 U	**0.74**	**0.64**
	PCB-1260		0.0104 U	0.021 U	0.010 U	0.010 U	0.010 U	0.08 U	0.022 U	0.0103 U	0.023 U	0.010 U	0.010 U	0.010 U	0.061 U	0.076 U	0.010 U	0.010 U
	Total PCBs		**0.571**	**0.151**	**0.56**	**0.033**	0.010 U	0.08 U	**0.065**	0.0103 U	**0.118**	**0.122**	**0.32**	0.010 U	**0.601**	0.076 U	**0.74**	**0.64**
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic		**0.6**	0.51 U	0.39 U	**0.25**	**2.93**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		**104**	**150**	**77**	**14**	**77**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		**2.62**	**2.44**	**0.86**	**0.2**	**0.81**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		**26**	**16**	**4.26**	**8.8**	**40**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		**477**	**162**	**33**	**4.41**	**47**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		**0.245**	**0.155**	**0.117**	**0.035**	**0.164**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		0.34 U	0.51 U	**0.78**	0.12 U	**1.97**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		0.17 U	0.25 U	0.2 U	0.06 U	0.16 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		24	39.9	58.7	NA	29.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	WF-5	WF-6	WH-5.5	WH.5-4.5	WH.5-5.5	WH-6	WI-4	WI-5	WI-6	WI.5-4	WI.5-4.5	WI.5-5.5	SD-3E	SD-3F	SD-3G	SD-3K
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	12/22/04	12/22/04	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	4/22/05	6/19/08	6/19/08	6/19/08	7/30/08
PAHs																		
(mg/kg)	2-Methylnaphthalene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Acenaphthene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Acenaphthylene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Anthracene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Benzo(a)anthracene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Benzo(a)pyrene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Benzo(b)fluoranthene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Benzo(g,h,i)perylene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Benzo(k)fluoranthene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Chrysene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Fluoranthene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Fluorene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Naphthalene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Phenanthrene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
	Pyrene		0.36 U	0.44 U	0.24 U	0.11 U	NA	1.8 U	0.62 U	0.25 U	0.43 U	0.24 U	2.3 U	0.48 U	NA	NA	NA	NA
PCBs																		
(mg/kg)	PCB-1254		0.010 U	**0.27**	**0.1**	**0.086**	**0.056**	0.035 U	**0.24**	**0.09**	**0.254**	**0.045**	**0.085**	**0.074**	**3.64 J**	**20.2 J**	**7.41 J**	**18.3 J**
	PCB-1260		0.010 U	0.010 U	0.026 U	0.0104 U	0.0107 U	0.035 U	0.07 U	0.025 U	0.039 U	0.023 U	0.045 U	0.042 U	0.0736 U	**2.57 J**	**0.951 J**	0.552 U
	Total PCBs		0.010 U	**0.27**	**0.1**	**0.086**	**0.056**	0.035 U	**0.24**	**0.09**	**0.254**	**0.045**	**0.085**	**0.074**	**3.64 J**	**22.77 J**	**8.361 J**	**18.3 J**
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.08**	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.032**	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.217**	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	SD-3L	SD-3M	SD-3R	SD-3T	SD-3U	SD-3V	SD-3W	SD-06	SD-07	SD-09	SD-10	SD-13	SD-14	SD-16	SD-17	SD-19
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	7/30/08	7/30/08	8/19/08	8/19/08	8/19/08 w/ field dup.	8/19/08	8/19/08	9/18/08	9/17/08	9/18/08	9/17/08	10/6/08 w/ field dup.	10/3/08 w/ field dup.	10/3/08	10/3/08	10/3/08
PAHs																		
(mg/kg)	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																		
(mg/kg)	PCB-1254		**5.00 J**	**0.812 J**	**0.470 J**	**0.872 J**	**1.78 J**	**5.64 J**	**1.86 J**	**2.49 J**	**1.84 J**	**0.236 J**	**1.23 J**	**1.886 J**	**1.815 J**	**4.30 J**	**1.55 J**	**2.69 J**
	PCB-1260		0.172 U	0.158 U	0.175 UJ	0.0790 U	0.216 UJ	0.116 U	0.147 U	0.152 U	0.237 UJ	0.134 U	0.188 UJ	**0.2825 J**	0.271 UJ	**0.572 J**	0.212 UJ	0.163 UJ
	Total PCBs		**5.00 J**	**0.812 J**	**0.470 J**	**0.872 J**	**1.78 J**	**5.64 J**	**1.86 J**	**2.49 J**	**1.84 J**	**0.236 J**	**1.23 J**	**2.1125 J**	**1.815 J**	**4.872 J**	**1.55 J**	**2.69 J**
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	SD-20	SD-21	SD-24	SD-25	SD-26	SD-27	SD-28	SD-29	SD-30	SD-31	SD-32	SD-33	SD-34	SD-38	SD-39	SD-40
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	10/3/08	10/3/08	10/22/08	10/22/08	10/22/08	10/22/08	10/22/08	10/22/08	10/22/08	10/22/08	10/22/08	10/23/08	10/23/08	12/3/08	12/3/08	12/3/08
					w/ field dup.										w/ field dup.			w/ field dup.
PAHs																		
(mg/kg)	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																		
(mg/kg)	PCB-1254		**0.331 J**	**1.63 J**	**1.45 J**	**0.600 J**	**1.39 J**	**0.390 J**	**0.0708 J**	**1.39 J**	0.0845 U	**0.747 J**	**0.690 J**	**0.835 J**	**2.334 J**	0.135 U	0.355 UJ	**5.07 J**
	PCB-1260		0.221 UJ	0.190 UJ	0.172 UJ	0.220 UJ	0.184 UJ	0.102 U	0.0699 U	0.247 UJ	0.0845 U	0.254 UJ	0.327 UJ	0.0787 U	0.198 UJ	0.135 U	0.355 UJ	0.185 UJ
	Total PCBs		**0.331 J**	**1.63 J**	**1.45 J**	**0.600 J**	**1.39 J**	**0.390 J**	**0.0708 J**	**1.39 J**	0.0845 U	**0.747 J**	**0.690 J**	**0.835 J**	**2.334 J**	0.135 U	0.355 UJ	**5.07 J**
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
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Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	SD-41	SD-43	SD-44	SD-45	SD-46	SD-47	SD-48	SD-49	SD-50	SD-51	SD-52	SD-53	SD-54	SD-55	SD-56	SD-57
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	12/3/08	12/3/08	12/3/08	12/3/08	12/3/08	12/4/08	12/4/08	12/4/08	12/4/08	12/4/08	12/4/08	12/5/08	12/4/08 w/ field dup.	12/4/08	12/4/08	12/8/08
PAHs																		
(mg/kg)	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																		
(mg/kg)	PCB-1254		**0.692 J**	**1.22 J**	0.317 UJ	**1.06 J**	**0.399 J**	**0.381 J**	**1.36 J**	**0.837 J**	**1.21 J**	0.365 UJ	**1.0 J**	**0.343 J**	**0.471 J**	0.235 UJ	**0.470 J**	**1.36 J**
	PCB-1260		0.226 UJ	0.155 U	0.317 UJ	0.283 UJ	0.0739 U	0.263 UJ	0.156 U	0.104 U	0.209 UJ	0.365 UJ	0.215 UJ	0.0809 U	0.245 UJ	0.235 UJ	0.178 UJ	0.351 UJ
	Total PCBs		**0.692 J**	**1.22 J**	0.317 UJ	**1.06 J**	**0.399 J**	**0.381 J**	**1.36 J**	**0.837 J**	**1.21 J**	0.365 UJ	**1.0 J**	**0.343 J**	**0.471 J**	0.235 UJ	**0.470 J**	**1.36 J**
PCB Congeners																		
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																		
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	SD-58	SD-59	SD-60	SD-61	SD-62	SD-63	SD-64	SD-65	SD-67	SD-68	SD-69	SD-70	SD-71	SD-72	ERC-SED-7
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	12/4/08	12/4/08	12/8/08	12/4/08	12/8/08	12/5/08	12/5/08	12/5/08	12/5/08	12/5/08	12/5/08	12/5/08	12/5/08	12/5/08	3/5/2009
														w/ field dup.			w/ field dup.
PAHs																	
(mg/kg)	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0279 U
	Acenaphthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0279 U
	Acenaphthylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0279 U
	Anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0311 J**
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0833**
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.07275**
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0885**
	Benzo(g,h,i)perylene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.06385**
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.05765**
	Chrysene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0933**
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.06695 J**
	Fluoranthene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.188**
	Fluorene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0279 U
	Indeno(1,2,3-cd)pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0732**
	Naphthalene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0279 U
	Phenanthrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.119**
	Pyrene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.173**
PCBs																	
(mg/kg)	PCB-1254		**1.77 J**	**1.02 J**	**0.820 J**	**0.264 J**	0.0605 U	0.0598 U	0.340 UJ	0.454 UJ	**0.982 J**	**0.961 J**	**0.368 J**	**0.0829 J**	**1.15 J**	**0.526 J**	NA
	PCB-1260		0.197 UJ	0.301 UJ	0.132 U	0.0626 U	0.0605 U	0.0598 U	0.340 UJ	0.454 UJ	0.209 UJ	0.279 UJ	0.165 UJ	0.0675 U	0.359 UJ	0.416 UJ	NA
	Total PCBs		**1.77 J**	**1.02 J**	**0.820 J**	**0.264 J**	0.0605 U	0.0598 U	0.340 UJ	0.454 UJ	**0.982 J**	**0.961 J**	**0.368 J**	**0.0829 J**	**1.15 J**	**0.526 J**	NA
PCB Congeners																	
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																	
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																	
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.69 U
	Barium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**190**
	Cadmium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.97 U
	Chromium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**13**
	Lead		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**201**
	Mercury		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.2415**
	Nickel		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**10.625**
	Selenium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.4 U
	Silver		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.94 U
	Vanadium		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.4 U
	Zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**98.2**
Total Organic Carbon																	
(%)	TOC		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	ERC-SED-8	ERC-SED-9	ERC-SED-10	ERC-SED-11A	ERC-SED-12	ERC-SED-13	ERC-SED-14	ERC-SED-15	ERC-SED-16	ERC-SED-17	SED-11A-A	SED-11A-B	SED-11A-C
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	3/5/2009	3/5/2009 w/ field dup.	3/5/2009	3/6/2009	3/6/2009	3/6/2009	3/6/2009	3/6/2009	3/20/2009	3/20/2009	3/20/2009	3/20/2009 w/ field dup.	3/20/2009
PAHs															
(mg/kg)	2-Methylnaphthalene		**2.15**	0.0135 U	0.040 U	**0.270**	0.0358 U	**0.0314**	0.0127 U	0.0221 U	0.0616 U	0.0401 U	NA	NA	NA
	Acenaphthene		**7.54**	**0.0175**	0.040 U	**1.58**	0.0358 U	**0.0876**	0.0127 U	0.0221 U	0.0616 U	0.0401 U	NA	NA	NA
	Acenaphthylene		**0.837**	**0.0298**	0.040 U	**0.268**	**0.106**	**0.183**	**0.0127**	0.0221 U	0.0616 U	0.0401 U	NA	NA	NA
	Anthracene		**21.4**	**0.0591**	0.040 U	**1.32**	**0.131**	**0.252**	**0.0251**	**0.0394**	0.0616 U	**0.0610**	NA	NA	NA
	Benzo(a)anthracene		**74.7**	**0.172**	**0.0682**	**3.48**	**0.460**	**0.593**	**0.0660**	**0.0951**	0.0616 U	**0.173**	NA	NA	NA
	Benzo(a)pyrene		**69.5**	**0.148**	**0.0561**	**3.31**	**0.433**	**0.563**	**0.0577**	**0.0896**	0.0616 U	**0.176**	NA	NA	NA
	Benzo(b)fluoranthene		**80.8**	**0.168**	**0.0698**	**3.07**	**0.432**	**0.534**	**0.0634**	**0.110**	0.0616 U	**0.266**	NA	NA	NA
	Benzo(g,h,i)perylene		**45.1**	**0.105**	**0.0437**	**2.69**	**0.339**	**0.443**	**0.0453**	**0.0690**	0.0616 U	**0.146**	NA	NA	NA
	Benzo(k)fluoranthene		**38.1**	**0.0985**	**0.0490**	**2.18**	**0.412**	**0.434**	**0.0392**	**0.0741**	0.0616 U	**0.198**	NA	NA	NA
	Chrysene		**72.7**	**0.162**	**0.079**	**3.07**	**0.507**	**0.578**	**0.0645**	**0.110**	**0.065**	**0.260**	NA	NA	NA
	Dibenzo(a,h)anthracene		**20.0**	**0.0404**	0.040 U	**0.766**	**0.117**	**0.133**	**0.0142**	**0.0239**	0.0616 U	**0.0428**	NA	NA	NA
	Fluoranthene		**153**	**0.348**	**0.163**	**5.70**	**1.02**	**1.21**	**0.127**	**0.231**	**0.143**	**0.462**	NA	NA	NA
	Fluorene		**8.18**	**0.0450**	**0.0710**	**0.959**	**0.0921**	**0.214**	0.0127 U	0.0221 U	0.0616 U	**0.174**	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		**45.6**	**0.102**	**0.0418**	**2.30**	**0.316**	**0.382**	**0.0412**	**0.0634**	0.0616 U	**0.132**	NA	NA	NA
	Naphthalene		**6.19**	0.0135 U	0.040 U	**0.396**	**0.0418**	**0.0537**	0.0127 U	0.0221 U	0.0616 U	0.0401 U	NA	NA	NA
	Phenanthrene		**62.3**	**0.219**	**0.0974**	**4.74**	**0.564**	**0.855**	**0.0888**	**0.156**	0.0616 U	**0.248**	NA	NA	NA
	Pyrene		**120**	**0.302**	**0.126**	**6.91**	**0.865**	**1.12**	**0.118**	**0.196**	**0.101**	**0.383**	NA	NA	NA
PCBs															
(mg/kg)	PCB-1254		NA	**2.15 ***	NA	**434 ***	NA	NA	**0.25 ***	NA	NA	NA	**20.6 J**	**755 J**	**9.82 J**
	PCB-1260		NA	0.112 U	NA	20.6 U	NA	NA	0.176 U	NA	NA	NA	0.812 U	19.3 UJ	0.669 UJ
	Total PCBs		NA	**2.15**	NA	**434**	NA	NA	**0.25**	NA	NA	NA	**20.6 J**	**755 J**	**9.82 J**
PCB Congeners															
(pg/g)	77-TeCB		NA	**342**	NA	52.8 U	NA	NA	**134**	NA	NA	NA	NA	NA	NA
	123-PeCB		NA	**626.5**	NA	**292**	NA	NA	**113**	NA	NA	NA	NA	NA	NA
	118-PeCB		NA	**51,100 E**	NA	**24,300**	NA	NA	**7,580**	NA	NA	NA	NA	NA	NA
	114-PeCB		NA	**611.5**	NA	**517**	NA	NA	**108**	NA	NA	NA	NA	NA	NA
	105-PeCB		NA	**16,700 E**	NA	**7,860**	NA	NA	**2,550**	NA	NA	NA	NA	NA	NA
	167-HxCB		NA	**2,505**	NA	**1,080**	NA	NA	**432**	NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	**7,970**	NA	**3,730**	NA	NA	**1,280**	NA	NA	NA	NA	NA	NA
	189-HpCB		NA	**266.5**	NA	**124**	NA	NA	**35.3**	NA	NA	NA	NA	NA	NA
Pesticides															
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
(mg/kg)	Arsenic		9.06 U	5.49 U	12.9 U	9.89 U	11.8 U	10.5 U	6.33 U	7.38 U	20.0 U	13.3 U	NA	NA	NA
	Barium		**906**	**141**	**175**	**647**	**194**	**166**	**66.9**	**72.3**	**50.1**	**66.7**	NA	NA	NA
	Cadmium		**2.65**	**0.91**	1.29 U	**7.19**	**1.77**	1.05 U	0.64 U	0.74 U	2.00 U	1.33 U	NA	NA	NA
	Chromium		**32.8**	**26.9**	**8.79**	**31.1**	**18.6**	**18.2**	**15.7**	**9.74**	**5.99**	**9.87**	NA	NA	NA
	Lead		**685**	**184**	**74.2**	**1,020**	**328**	**143**	**26.6**	**59.7**	**13.2**	**104**	NA	NA	NA
	Mercury		**0.690**	**0.191**	**0.164**	**0.370**	**0.340**	**0.217**	**0.096**	**0.133**	**0.089**	**0.235**	NA	NA	NA
	Nickel		**19.8**	**7.75**	**7.64**	**62.2**	**14.7**	**9.38**	**6.79**	**5.77**	4.00 U	**5.63**	NA	NA	NA
	Selenium		18.2 U	11.0 U	25.8 U	19.8 U	23.5 U	20.9 U	12.7 U	14.8 U	40.0 U	26.5 U	NA	NA	NA
	Silver		1.82 U	1.10 U	2.58 U	**1.98**	2.35 U	2.09 U	1.27 U	1.48 U	4.00 U	2.65 U	NA	NA	NA
	Vanadium		**41.4**	**18.7**	25.8 U	**31.2**	**33.7**	**23.9**	**15.6**	**19.2**	40.0 U	26.5 U	NA	NA	NA
	Zinc		**543**	**167**	**84.3**	**1,180**	**358**	**158**	**91.8**	**50.8**	**40.3**	**58.3**	NA	NA	NA
Total Organic Carbon															
(%)	TOC		NA	**11.9**	NA	**24**	NA	NA	**4.1**	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-2
Summary of Analytical Detected Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Sample ID:	SED-11A-D	SED-11A-E	SED-11A-F	SD-89	SD-90	SD-94
		Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
		Sample Date:	3/20/2009	3/20/2009	3/20/2009	6/25/09	6/25/09	7/17/2009
PAHs								
(mg/kg)	2-Methylnaphthalene		NA	NA	NA	NA	NA	NA
	Acenaphthene		NA	NA	NA	NA	NA	NA
	Acenaphthylene		NA	NA	NA	NA	NA	NA
	Anthracene		NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene		NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene		NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene		NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene		NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene		NA	NA	NA	NA	NA	NA
	Chrysene		NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene		NA	NA	NA	NA	NA	NA
	Fluoranthene		NA	NA	NA	NA	NA	NA
	Fluorene		NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene		NA	NA	NA	NA	NA	NA
	Naphthalene		NA	NA	NA	NA	NA	NA
	Phenanthrene		NA	NA	NA	NA	NA	NA
	Pyrene		NA	NA	NA	NA	NA	NA
PCBs								
(mg/kg)	PCB-1254		**838 J**	**31.3 J**	**5.50 J**	0.275 U	**0.553 ***	0.0673 U
	PCB-1260		30.9 UJ	1.70 UJ	0.485 UJ	0.275 U	0.0777 U	0.0673 U
	Total PCBs		**838 J**	**31.3 J**	**5.50 J**	0.275 U	**0.553**	0.0673 U
PCB Congeners								
(pg/g)	77-TeCB		NA	NA	NA	NA	NA	NA
	123-PeCB		NA	NA	NA	NA	NA	NA
	118-PeCB		NA	NA	NA	NA	NA	NA
	114-PeCB		NA	NA	NA	NA	NA	NA
	105-PeCB		NA	NA	NA	NA	NA	NA
	167-HxCB		NA	NA	NA	NA	NA	NA
	156,157-HxCB		NA	NA	NA	NA	NA	NA
	189-HpCB		NA	NA	NA	NA	NA	NA
Pesticides								
(mg/kg)	4,4-DDD		NA	NA	NA	NA	NA	NA
	4,4-DDE		NA	NA	NA	NA	NA	NA
	4,4-DDT		NA	NA	NA	NA	NA	NA
Metals								
(mg/kg)	Arsenic		NA	NA	NA	NA	NA	NA
	Barium		NA	NA	NA	NA	NA	NA
	Cadmium		NA	NA	NA	NA	NA	NA
	Chromium		NA	NA	NA	NA	NA	NA
	Lead		NA	NA	NA	NA	NA	NA
	Mercury		NA	NA	NA	NA	NA	NA
	Nickel		NA	NA	NA	NA	NA	NA
	Selenium		NA	NA	NA	NA	NA	NA
	Silver		NA	NA	NA	NA	NA	NA
	Vanadium		NA	NA	NA	NA	NA	NA
	Zinc		NA	NA	NA	NA	NA	NA
Total Organic Carbon								
(%)	TOC		NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.
* - The sample exhibits altered PCB pattern; best possible Aroclor match repo

Table A-3
Summary of Analytical Results for Southern Wetland Area Surface Soil Samples - 2004, 2007, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	WC18	WC19	WC20	WC21	WC22	WC23	WC26	WC.5-18.5	WC.5-19.5	WC.5-20.5	WC.5-21.5	WC.5-22.5
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Sample Date:	12/23/04	12/23/04	12/23/04	12/23/04	12/23/04	12/23/04	12/23/04	4/25/05	4/25/05	4/25/05	4/25/05	4/25/05
	Analyte												
PAHs													
(mg/kg)	Benzo(a)anthracene	0.079 U	**0.10**	0.13 U	0.11 U	0.084 U	0.11 U	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	0.088 U
	Benzo(a)pyrene	0.079 U	**0.11**	0.13 U	0.11 U	0.084 U	0.11 U	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	0.088 U
	Benzo(b)fluoranthene	0.079 U	**0.16**	0.13 U	0.11 U	0.084 U	0.11 U	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	**0.12**
	Chrysene	0.079 U	**0.11**	0.13 U	0.11 U	0.084 U	0.11 U	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	0.088 U
	Fluoranthene	0.079 U	**0.18**	0.13 U	0.11 U	**0.12**	**0.11**	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	**0.11**
	Phenanthrene	0.079 U	**0.095**	0.13 U	0.11 U	0.084 U	0.11 U	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	0.088 U
	Pyrene	0.079 U	**0.17**	0.13 U	0.11 U	**0.14**	**0.12**	0.13 U	0.14 U	0.056 U	0.16 U	0.095 U	**0.17**
PCBs													
(mg/kg)	PCB-1254	**0.026**	**0.11**	**0.104**	**0.10**	**0.068**	**0.159**	**0.076**	**0.135**	0.012 U	0.019 U	**0.072**	**1.16**
	PCB-1260	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.017 U	0.012 U	0.019 U	0.017 U	0.021 U
	Total PCBs	**0.026**	**0.11**	**0.104**	**0.10**	**0.068**	**0.159**	**0.076**	**0.135**	0.012 U	0.019 U	**0.072**	**1.16**
Pesticides													
(mg/kg)	4,4-DDD	NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	**0.010**
	4,4-DDE	NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	**0.030**
	4,4-DDT	NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	**0.031**
Metals													
(mg/kg)	Arsenic	**0.94**	**1.37**	**2.38**	**1.17**	**1.23**	**1.91**	**1.94**	**0.38**	**1.03**	**0.78**	**0.96**	**1.08**
	Barium	**9.27**	**23**	**23**	**12**	**13**	**16**	**163**	**6.59**	**9.3**	**9.31**	**23**	**13**
	Cadmium	**0.78**	**0.68**	**0.66**	**0.65**	**0.46**	**0.6**	**1.64**	**0.29**	**0.6**	**0.31**	**0.41**	**0.63**
	Chromium	**5.26**	**6.95**	**5.14**	**3.26**	**4.62**	**7.96**	**25**	**3.71**	**5.97**	**4.16**	**4.94**	**8.38**
	Lead	**19**	**47**	**43**	**16**	**28**	**36**	**119**	**7.41**	**4.22**	**7.1**	**18**	**34**
	Mercury	**0.029**	**0.062**	**0.06**	**0.058**	**0.067**	**0.096**	**0.055**	**0.026**	0.01 U	**0.022**	**0.101**	**0.056**
	Selenium	0.12 U	0.16 U	0.18 U	0.15 U	0.14 U	**0.74**	0.19 U	0.13 U	0.1 U	0.13 U	**0.24**	0.15 U
Total Organic Carbon													
(%)	TOC	**3.45**	**3.97**	**14.75**	**15.1**	**5.92**	**16.23**	**4.94**	NA	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

pg/g - picograms per gram.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not applicable.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

PAHs - Polynuclear Aromatic Hydrocarbons.

PCB - Polychlorinated Biphenyl.

* - The sample exhibits altered PCB pattern; best possible Aroclor match reported.

(a) - The sample was reextracted and reanalyzed to confirm the results

Table A-3
Summary of Analytical Results for Southern Wetland Area Surface Soil Samples - 2004, 2007, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	WC.5-25.5	WC.5-26.5	WD18	SB-01	SB-02	SB-03	SB-04	SB-05	SB-07	SB-08	SB-10	SB-11
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1
	Sample Date:	4/25/05	4/25/05	12/23/04	11/7/2007	11/7/2007	11/7/2007	11/7/2007	11/7/2007	11/7/2007	11/7/2007	11/8/2007	11/8/2007
	Analyte												
PAHs													
(mg/kg)	Benzo(a)anthracene	0.17 U	0.20 U	**0.15**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	0.17 U	0.20 U	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	0.17 U	0.20 U	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	0.17 U	0.20 U	**0.13**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	0.17 U	0.20 U	**0.26**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene	0.17 U	0.20 U	**0.18**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	0.17 U	0.20 U	**0.26**	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs													
(mg/kg)	PCB-1254	**0.119**	**0.14**	**0.724**	**0.177** *	0.0543 U	0.0519 U	0.0514 U	0.0562 U	0.0538 U	0.0564 U	0.0553 U	0.0527 U
	PCB-1260	0.017 U	0.019 U	0.010 U	0.0561 U	0.0543 U	0.0519 U	0.0514 U	0.0562 U	0.0538 U	0.0564 U	0.0553 U	0.0527 U
	Total PCBs	**0.119**	**0.14**	**0.724**	**0.177**	0.0543 U	0.0519 U	0.0514 U	0.0562 U	0.0538 U	0.0564 U	0.0553 U	0.0527 U
Pesticides													
(mg/kg)	4,4-DDD	NA	**0.036**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE	NA	**0.008**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT	NA	**0.073**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
(mg/kg)	Arsenic	**0.96**	**0.84**	**1.61**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	**11**	**23**	**36**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	**0.31**	**0.69**	**0.79**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	**5.41**	**11**	**8.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**17**	**41**	**70**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	**0.046**	**0.073**	**0.115**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	**0.43**	**0.25**	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon													
(%)	TOC	NA	NA	17.56	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or pa
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
N/A - Not applicable.
U - Compound was not detected at specified quant
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detecte
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best
(a) - The sample was reextracted and reanalyzed to

Table A-3
Summary of Analytical Results for Southern Wetland Area Surface Soil Samples - 2004, 2007, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	SD-01	SD-02	SD-73	SD-74	SD-75	SD-76	SD-77	SD-78	SD-79	SD-80	SD-81	SD-82
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Sample Date:	5/27/2008	5/27/2008	12/8/2008	12/8/2008	12/8/2008	12/8/2008	12/8/2008	12/8/2008	12/8/2008	12/9/2008	12/9/2008	12/9/2008
	Analyte	w/duplicate		w/duplicate									
PAHs													
(mg/kg)	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs													
(mg/kg)	PCB-1254	0.275 UJ	0.218 UJ	0.21 UJ	0.253 UJ	**0.612 J**	0.260 UJ	**0.386 J**	0.238 UJ	0.206 UJ	0.297 UJ	**0.183 J**	0.369 UJ
	PCB-1260	0.275 UJ	0.218 UJ	0.21 UJ	0.253 UJ	**0.204 J**	0.260 UJ	**0.134 J**	0.238 UJ	0.206 UJ	0.297 UJ	0.167 UJ	0.369 UJ
	Total PCBs	0.275 UJ	0.218 UJ	0.21 UJ	0.253 UJ	**0.816 J**	0.260 UJ	**0.520 J**	0.238 UJ	0.206 UJ	0.297 UJ	**0.183 J**	0.369 UJ
Pesticides													
(mg/kg)	4,4-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
(mg/kg)	Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon													
(%)	TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or pa
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
N/A - Not applicable.
U - Compound was not detected at specified quant
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detecte
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best
(a) - The sample was reextracted and reanalyzed to

Table A-3
Summary of Analytical Results for Southern Wetland Area Surface Soil Samples - 2004, 2007, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	SD-84	ERC-SED-1	ERC-SED-2	ERC-SED-3	ERC-SED-4	ERC-SED-5
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Sample Date:	12/9/2008	3/5/2009	3/5/2009	3/5/2009	3/5/2009	3/5/2009
	Analyte		w/duplicate				
PAHs							
(mg/kg)	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
	Chrysene	NA	NA	NA	NA	NA	NA
	Fluoranthene	NA	NA	NA	NA	NA	NA
	Phenanthrene	NA	NA	NA	NA	NA	NA
	Pyrene	NA	NA	NA	NA	NA	NA
PCBs							
(mg/kg)	PCB-1254	0.324 UJ	NA	NA	NA	NA	NA
	PCB-1260	0.324 UJ	NA	NA	NA	NA	NA
	Total PCBs	0.324 UJ	NA	NA	NA	NA	NA
Pesticides							
(mg/kg)	4,4-DDD	NA	0.0615 U	0.0875 U	0.0333 U	0.0725 U	0.0238 U
	4,4-DDE	NA	0.0615 U	0.0875 U	**0.106**	0.0725 U	0.0238 U
	4,4-DDT	NA	0.0615 U	0.0875 U	**0.0837**	0.0725 U	0.0238 U
Metals							
(mg/kg)	Arsenic	NA	NA	NA	NA	NA	NA
	Barium	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA
	Chromium	NA	NA	NA	NA	NA	NA
	Lead	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA
Total Organic Carbon							
(%)	TOC	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or pa
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
N/A - Not applicable.
U - Compound was not detected at specified quant
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detecte
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best p
(a) - The sample was reextracted and reanalyzed to

Table A-4
Summary of Analytical Detected Results for Northern Wetland Area Surface Soil Samples - 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	WC.5-17.14	WC.5-17.28	WD-17.46	WD-17.57	SD-03		SD-3A	SD-3B	SD-3C	SD-3D	SD-3H	SD-3I	SD-3J	SD-3N	SD-3P	SD-3Q	SD-3S
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Sample Date:	4/20/05	4/20/05	4/20/05	4/20/05	5/27/2008	6/10/2008	6/10/2008	6/10/2008	6/10/2008	6/10/2008	6/19/2008	6/19/2008	6/19/2008	7/30/2008	7/30/2008	7/30/2008	8/19/2008
	Analyte						w/ field dup.											
PAHs																		
(mg/kg)	2-Methylnaphthalene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene	0.43 U	**0.54**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	0.43 U	**0.68**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	0.43 U	**0.77**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene	0.43 U	**0.49**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	0.43 U	**0.54**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenzo(a,h)anthracene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	0.43 U	**0.76**	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene	0.43 U	0.44 U	0.36 U	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	0.43 U	**1.5**	**0.59**	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																		
(mg/kg)	PCB-1254	**0.441**	**0.546**	**0.282**	**0.035**	**15.0 J**	**12.85 J**	**12.9 J**	0.0576 U	**0.143 J**	**29.9 J**	**11.7 J**	**6.12 J**	**5.05 J**	**21.5 J**	**3.17 J**	**1.61 J**	**0.805 J**
	PCB-1260	0.028 U	0.0103 U	0.026 U	0.0103 U	**1.56 J**	**1.62 J**	**1.68 J**	0.0576 U	0.0588 U	**3.57 J**	0.288 U	**0.673 J**	**0.735 J**	0.779 U	0.132 U	0.0593 U	0.104 U
	Total PCBs	**0.441**	**0.546**	**0.282**	**0.035**	**16.56 J**	**14.47 J**	**14.58 J**	0.0576 U	**0.143 J**	**33.47 J**	**11.7 J**	**6.793 J**	**5.785 J**	**21.5 J**	**3.17 J**	**1.61 J**	**0.805 J**
PCB Congeners																		
(pg/g)	123-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
(mg/kg)	Arsenic	**1.7**	0.4 U	**1.05**	**6.57**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	**0.28**	**30**	**89**	**63**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	**0.71**	**0.96**	**1.05**	**0.48**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	**34**	**20**	**13**	**70**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**12**	**14**	**97**	**22**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	**1.08**	0.4 U	**1.16**	0.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	**0.091**	**0.238**	**0.072**	**0.111**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon																		
(%)	TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best possible Aroclor match reported.

Table A-4
Summary of Analytical Detected Results for Northern Wetland Area Surface Soil Samples - 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	SD-04	SD-05	SD-08	SD-11	SD-12	SD-15	SD-18	SD-22	SD-23	SD-35	SD-36	SD-37	SD-42	SD-66	ERC-SED-6	SD-85	SD-86
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Sample Date:	9/17/2008	9/17/2008	9/17/2008	9/17/2008	9/17/2008	10/3/2008	10/3/2008	10/6/2008	10/6/2008	10/23/2008	10/23/2008	12/3/2008	12/3/2008	12/5/2008	3/5/2009	6/25/2009	6/25/2009
	Analyte	w/ field dup.																
PAHs																		
(mg/kg)	2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0553**	NA	NA
	Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.156**	NA	NA
	Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.320**	NA	NA
	Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.594**	NA	NA
	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.75**	NA	NA
	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.47**	NA	NA
	Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.20**	NA	NA
	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.04**	NA	NA
	Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.32**	NA	NA
	Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.47**	NA	NA
	Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.40**	NA	NA
	Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.02**	NA	NA
	Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.204**	NA	NA
	Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.976**	NA	NA
	Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.108**	NA	NA
	Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.84**	NA	NA
	Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.59**	NA	NA
PCBs																		
(mg/kg)	PCB-1254	**0.641 J**	**0.263 J**	**0.984 J**	**0.909 J**	0.0612 U	**0.771 J**	**1.38 J**	**0.633 J**	0.0758 U	**6.81 J**	**0.152 J**	**0.593 J**	**1.34 J**	**0.244 J**	**27.8 ***	0.143 U	0.170 U
	PCB-1260	0.179 UJ	0.180 UJ	0.158 UJ	0.238 UJ	0.0612 U	0.225 UJ	0.208 UJ	0.179 UJ	0.0758 U	0.249 UJ	0.0983 U	0.175 UJ	0.263 UJ	0.129 U	1.47 U	0.143 U	0.170 U
	Total PCBs	**0.641 J**	**0.263 J**	**0.984 J**	**0.909 J**	0.0612 U	**0.771 J**	**1.38 J**	**0.633 J**	0.0758 U	**6.81 J**	**0.152 J**	**0.593 J**	**1.34 J**	**0.244 J**	**27.8**	0.143 U	0.170 U
PCB Congeners																		
(pg/g)	123-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**39.3**	NA	NA
	118-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3130**	NA	NA
	114-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**50.7**	NA	NA
	105-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**883**	NA	NA
	167-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**147**	NA	NA
	156,157-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**433**	NA	NA
	189-HpCB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**25.9**	NA	NA
Metals																		
(mg/kg)	Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**9.05**	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**583**	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.81**	NA	NA
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**59.0**	NA	NA
	Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**977**	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**21.5**	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.54 U	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**41.7**	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**615**	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.651**	NA	NA
Total Organic Carbon																		
(%)	TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.5**	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or p
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
U - Compound was not detected at specified quant
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detecte
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best

Table A-4
Summary of Analytical Detected Results for Northern Wetland Area Surface Soil Samples - 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Sample ID:	SD-87	SD-88	SD-91	SD-92	SD-93	WSB-2	WSB-8	WSB-9	WSB-10
	Sample Depth (ft.):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-1	0-1
	Sample Date:	6/25/2009	6/25/2009	6/25/2009	7/17/2009	7/17/2009	6/24/2009	6/24/2009	6/24/2009	6/24/2009
	Analyte		w/ field dup.		w/ field dup.					
PAHs										
(mg/kg)	2-Methylnaphthalene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Acenaphthene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Acenaphthylene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Anthracene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Benzo(a)anthracene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Benzo(a)pyrene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Benzo(b)fluoranthene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Benzo(k)fluoranthene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Chrysene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Fluoranthene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Fluorene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Naphthalene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Phenanthrene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
	Pyrene	NA	NA	NA	NA	NA	0.22 U	0.25 U	NA	0.24 U
PCBs										
(mg/kg)	PCB-1254	0.207 U	**0.2695 J**	**2.1 ***	**1.2 ***	**0.140 ***	0.0634 U	0.0775 U	**0.586 ***	**0.445 ***
	PCB-1260	0.207 U	0.159 U	0.141 U	0.0748 U	0.0704 U	0.0634 U	0.0775 U	0.0632 U	0.0905 U
	Total PCBs	0.207 U	**0.2695 J**	**2.1**	**1.2**	**0.140**	0.0634 U	0.0775 U	**0.586**	**0.445**
PCB Congeners										
(pg/g)	123-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	118-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	114-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	105-PeCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	167-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	156,157-HxCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
	189-HpCB	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals										
(mg/kg)	Arsenic	NA	NA	NA	NA	NA	3.3 U	3.6 U	NA	3.5 U
	Barium	NA	NA	NA	NA	NA	**22**	**12**	NA	**21**
	Cadmium	NA	NA	NA	NA	NA	0.33 U	0.36 U	NA	0.35 U
	Chromium	NA	NA	NA	NA	NA	**9.7**	**6.1**	NA	**6.1**
	Lead	NA	NA	NA	NA	NA	**36**	**6.1**	NA	**55**
	Nickel	NA	NA	NA	NA	NA	**4.6**	**2.2**	NA	**4.1**
	Selenium	NA	NA	NA	NA	NA	6.6 U	7.3 U	NA	6.9 U
	Vanadium	NA	NA	NA	NA	NA	**16**	**8.2**	NA	**10**
	Zinc	NA	NA	NA	NA	NA	**19**	**13**	NA	**29**
	Mercury	NA	NA	NA	NA	NA	**0.23**	0.020 U	NA	**0.061**
Total Organic Carbon										
(%)	TOC	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg - milligrams per kilogram (dry weight) or p
pg/g - picograms per gram.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
U - Compound was not detected at specified quant
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detecte
PAHs - Polynuclear Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyl.
* - The sample exhibits altered PCB pattern; best

Appendix B

Statistical Summary of Samples

Table B-1
Statistics of Analytical Results for Surface Water Samples - 2009 and 2010
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects (ug/L)	Max. of Detects (ug/L)	Location of Max. Detected	Min. of Non-Detects (ug/L)	Max. of Non-Detects (ug/L)	Mean Concentration (ug/L)	UCL (ug/L)	UCL Rationale
Metals, total											
	Barium	5/5	100%	5.5	28	ERC-SW-16	--	--	1.6E+01	28	Maximum
	Chromium	1/5	20%	0.6	0.6	ERC-SW-14	0.5	10	2.4E+00	0.6	Maximum
	Lead	1/5	20%	0.65	0.65	ERC-SW-9	0.5	10	2.4E+00	0.65	Maximum
	Nickel	1/5	20%	0.5	0.5	ERC-SW-7	0.5	25	5.4E+00	0.5	Maximum
	Zinc	4/4	100%	22.5	32.1	ERC-SW-7	--	--	2.7E+01	32.1	Maximum
Metals, dissolved											
	Barium	5/5	100%	1.7	26.9	ERC-SW-11A	--	--	1.5E+01	26.9	Maximum
	Calcium	10/10	100%	1600	9850	ERC-SW-28	--	--	4.1E+03	5546	95% Student's-t UCL
	Magnesium	10/10	100%	270	1090	ERC-SW-28	--	--	5.4E+02	685.7	95% Student's-t UCL
	Nickel	2/5	40%	0.5	0.7	ERC-SW-7	0.5	25	5.4E+00	0.7	Maximum
	Zinc	18/21	86%	6	63	ERC-SW-22	5	20	2.5E+01	30.59	95% Student's-t UCL
Hardness											
	Hardness	24/24	100%	5300	31000	ERC-SW-11	--	--	1.4E+04	17080	95% Student's-t UCL

Notes:
ug/L - micrograms per liter.
UCL - Upper concentration limit.

Table B-2
Statistics of Analytical Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects	Max. of Detects	Location of Max. Detected	Min. of Non-Detects	Max. of Non-Detects	Mean Concentration	UCL	UCL Rationale
PAHs											
(mg/kg)	2-Methylnaphthalene	3/54	5.6%	0.0314	2.15	ERC-SED-8	0.0127	2.3	2.2E-01	0.504	97.5% Chebyshev (Mean, Sd) UCL
	Acenaphthene	4/54	7.4%	0.0175	7.54	ERC-SED-8	0.0127	2.3	3.5E-01	1.225	97.5% Chebyshev (Mean, Sd) UCL
	Acenaphthylene	6/54	11.1%	0.0127	0.837	ERC-SED-8	0.0221	2.3	2.0E-01	0.251	95% Approximate Gamma UCL
	Anthracene	10/54	18.5%	0.0251	21.4	ERC-SED-8	0.04	2.3	6.1E-01	3.073	97.5% Chebyshev (Mean, Sd) UCL
	Benzo(a)anthracene	12/54	22.2%	0.066	74.7	ERC-SED-8	0.05	2.3	1.7E+00	10.3	97.5% Chebyshev (Mean, Sd) UCL
	Benzo(a)pyrene	11/54	20.4%	0.0561	69.5	ERC-SED-8	0.05	2.3	1.6E+00	9.591	97.5% Chebyshev (Mean, Sd) UCL
	Benzo(b)fluoranthene	11/54	20.4%	0.0634	80.8	ERC-SED-8	0.05	2.3	1.8E+00	11.1	97.5% Chebyshev (Mean, Sd) UCL
	Benzo(g,h,i)perylene	11/54	20.4%	0.0437	45.1	ERC-SED-8	0.05	2.3	1.1E+00	6.297	97.5% Chebyshev (Mean, Sd) UCL
	Benzo(k)fluoranthene	11/54	20.4%	0.0392	38.1	ERC-SED-8	0.05	2.3	9.6E-01	5.343	97.5% Chebyshev (Mean, Sd) UCL
	Chrysene	13/54	24.1%	0.0645	72.7	ERC-SED-8	0.05	2.3	1.6E+00	10.03	97.5% Chebyshev (Mean, Sd) UCL
	Dibenzo(a,h)anthracene	9/54	16.7%	0.0142	20	ERC-SED-8	0.04	2.3	5.7E-01	2.864	97.5% Chebyshev (Mean, Sd) UCL
	Fluoranthene	15/54	27.8%	0.127	153	ERC-SED-8	0.05	2.3	3.3E+00	20.92	97.5% Chebyshev (Mean, Sd) UCL
	Fluorene	7/54	13.0%	0.045	8.18	ERC-SED-8	0.0127	2.3	3.5E-01	1.295	97.5% Chebyshev (Mean, Sd) UCL
	Indeno(1,2,3-cd)pyrene	11/54	20.4%	0.0412	45.6	ERC-SED-8	0.05	2.3	1.1E+00	6.354	97.5% Chebyshev (Mean, Sd) UCL
	Naphthalene	4/54	7.4%	0.0418	6.19	ERC-SED-8	0.0127	2.3	3.0E-01	1.013	97.5% Chebyshev (Mean, Sd) UCL
	Phenanthrene	12/54	22.2%	0.0888	62.3	ERC-SED-8	0.05	2.3	1.5E+00	8.703	97.5% Chebyshev (Mean, Sd) UCL
	Pyrene	16/54	29.6%	0.101	120	ERC-SED-8	0.05	2.3	2.7E+00	16.55	97.5% Chebyshev (Mean, Sd) UCL
PCBs											
(mg/kg)	PCB-1254	99/122	81.1%	0.033	838	SED-11A-D	0.007	0.454	1.8E+01	115.9	99% Chebyshev (Mean, Sd) UCL
	PCB-1260	4/122	3.3%	0.2825	2.57	SD-3F	0.005	30.9	4.0E-01	1.464	97.5% Chebyshev (Mean, Sd) UCL
	Total PCBs	99/122	81.1%	0.033	838	SED-11A-D	0.007	0.454	1.8E+01	116	99% Chebyshev (Mean, Sd) UCL
PCB Congeners											
(pg/g)	77-TeCB	2/3	66.7%	134	342	ERC-SED-9	52.8	52.8	1.7E+02	342	Max. of Detects
	123-PeCB	3/3	100.0%	113	626.5	ERC-SED-9	--	--	3.4E+02	626.5	Max. of Detects
	118-PeCB	3/3	100.0%	7580	51100	ERC-SED-9	--	--	2.8E+04	51100	Max. of Detects
	114-PeCB	3/3	100.0%	108	611.5	ERC-SED-9	--	--	4.1E+02	611.5	Max. of Detects
	105-PeCB	3/3	100.0%	2550	16700	ERC-SED-9	--	--	9.0E+03	16700	Max. of Detects
	167-HxCB	3/3	100.0%	432	2505	ERC-SED-9	--	--	1.3E+03	2505	Max. of Detects
	156,157-HxCB	3/3	100.0%	1280	7970	ERC-SED-9	--	--	4.3E+03	7970	Max. of Detects
	189-HpCB	3/3	100.0%	35.3	266.5	ERC-SED-9	--	--	1.4E+02	266.5	Max. of Detects
Pesticides											
(mg/kg)	4,4-DDD	1/6	16.7%	0.08	0.08	WI.5-4	0.002	0.01	1.5E-02	0.08	Max. of Detects
	4,4-DDE	1/6	16.7%	0.032	0.032	WI.5-4	0.002	0.01	6.8E-03	0.032	Max. of Detects
	4,4-DDT	1/6	16.7%	0.217	0.217	WI.5-4	0.002	0.01	3.8E-02	0.217	Max. of Detects
Metals											
(mg/kg)	Arsenic	10/32	31.3%	0.25	5.27	WC.5-14.5	0.1	20	2.3E+00	5.27	Max. of Detects
	Barium	32/32	100.0%	5.2	906	ERC-SED-8	--	--	1.3E+02	202.6	95% H-UCL
	Cadmium	25/32	78.1%	0.2	7.19	ERC-SED-11A	0.64	2	1.4E+00	1.781	95% Approximate Gamma UCL
	Chromium	32/32	100.0%	3.9	42	WB5	--	--	1.7E+01	20.58	95% Approximate Gamma UCL
	Lead	32/32	100.0%	1.7	1020	ERC-SED-11A	--	--	1.8E+02	264.8	95% Approximate Gamma UCL
	Mercury	31/32	96.9%	0.035	0.69	ERC-SED-8	0.0101	0.0101	1.7E-01	0.218	95% Approximate Gamma UCL

Table B-2
Statistics of Analytical Results for Sediment Samples - 2004, 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects	Max. of Detects	Location of Max. Detected	Min. of Non-Detects	Max. of Non-Detects	Mean Concentration	UCL	UCL Rationale
	Nickel	10/11	90.9%	5.63	62.2	ERC-SED-11A	4	4	1.4E+01	24.01	95% Approximate Gamma UCL
	Selenium	10/32	31.3%	0.38	4.04	WC.5-12.5	0.1	40	4.3E+00	4.04	Max. of Detects
	Silver	4/32	12.5%	0.11	1.98	ERC-SED-11A	0.05	4	4.8E-01	1.479	99% Chebyshev (Mean, Sd) UCL
	Vanadium	7/11	63.6%	15.6	41.4	ERC-SED-8	19.4	40	2.2E+01	27.17	95% Student's-t UCL
	Zinc	11/11	100.0%	40.3	1180	ERC-SED-11A	--	--	2.6E+02	501.4	95% Approximate Gamma UCL
Total Organic Carbon (%)	TOC	14/14	100.0%	2.9	58.7	WD-9	--	--	2.9E+01	38.14	95% Student's-t UCL

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
pg/g - picograms per gram.
UCL - Upper confidence limit.

Table B-3
Statistics of Analytical Detected Results for Southern Wetland Area Surface Soil Samples - 2004, 2007, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects	Max. of Detects	Location of Max. Detected	Min. of Non-Detects	Max. of Non-Detects	Mean Concentration	UCL	UCL Rationale
PAHs											
(mg/kg)	Benzo(a)anthracene	2/15	13.3%	0.1	0.15	WD18	0.056	0.2	6.8E-02	0.0826	95% Student's-t UCL
	Benzo(a)pyrene	1/15	6.7%	0.11	0.11	WC19	0.056	0.2	6.3E-02	0.0732	95% Student's-t UCL
	Benzo(b)fluoranthene	2/15	13.3%	0.12	0.16	WC19	0.056	0.2	7.1E-02	0.0868	95% Student's-t UCL
	Chrysene	2/15	13.3%	0.11	0.13	WD18	0.056	0.2	6.8E-02	0.0808	95% Student's-t UCL
	Fluoranthene	5/15	33.3%	0.11	0.26	WD18	0.056	0.2	9.4E-02	0.125	95% Approximate Gamma UCL
	Phenanthrene	2/15	13.3%	0.095	0.18	WD18	0.056	0.2	7.0E-02	0.0878	95% Approximate Gamma UCL
	Pyrene	5/15	33.3%	0.12	0.26	WD18	0.056	0.2	1.0E-01	0.128	95% Student's-t UCL
PCBs											
(mg/kg)	PCB-1254	17/37	45.9%	0.026	1.16	WC.5-22.5	0.012	0.369	1.6E-01	0.264	95% H-UCL
	PCB-1260	2/37	5.4%	0.134	0.204	SD-75	0.01	0.369	5.7E-02	0.158	99% Chebyshev (Mean, Sd) UCL
	Total PCBs	17/37	45.9%	0.026	1.16	WC.5-22.5	0.012	0.369	1.7E-01	0.282	95% H-UCL
Pesticides											
(mg/kg)	4,4-DDD	2/8	25.0%	0.01	0.036	WC.5-26.5	0.002	0.0875	2.3E-02	0.0336	95% Student's-t UCL
	4,4-DDE	3/8	37.5%	0.008	0.106	ERC-SED-3	0.002	0.0875	3.3E-02	0.0555	95% Student's-t UCL
	4,4-DDT	3/8	37.5%	0.031	0.0837	ERC-SED-3	0.002	0.0875	3.9E-02	0.0577	95% Student's-t UCL
Metals											
(mg/kg)	Arsenic	15/15	100.0%	0.38	2.38	WC20	--	--	1.2E+00	1.476	95% Student's-t UCL
	Barium	15/15	100.0%	6.59	163	WC26	--	--	2.6E+01	69.6	95% Chebyshev (Mean, Sd) UCL
	Cadmium	15/15	100.0%	0.29	1.64	WC26	--	--	6.3E-01	0.789	95% Approximate Gamma UCL
	Chromium	15/15	100.0%	3.26	25	WC26	--	--	7.4E+00	9.652	95% Approximate Gamma UCL
	Lead	15/15	100.0%	4.22	119	WC26	--	--	3.4E+01	51.06	95% Approximate Gamma UCL
	Mercury	14/15	93.3%	0.022	0.115	WD18	0.01	0.01	5.8E-02	0.0719	95% Student's-t UCL
	Selenium	4/15	26.7%	0.24	0.74	WC23	0.1	0.19	1.6E-01	0.379	95% Chebyshev (Mean, Sd) UCL
Total Organic Carbon											
(%)	TOC	8/8	100.0%	3.45	17.56	WD18	--	--	1.0E+01	17.56	Max. of Detects

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

UCL - Upper confidence limit.

Table B-4
Statistics of Analytical Detected Results for Northern Wetland Area Surface Soil Samples (0-1 foot) - 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects	Max. of Detects	Location of Max. Detected	Min. of Non-Detects	Max. of Non-Detects	Mean Concentration	UCL	UCL Rationale
PAHs											
(mg/kg)	2-Methylnaphthalene	1/8	12.5%	0.0553	0.0553	ERC-SED-6	0.17	0.44	1.4E-01	0.0553	Max. of Detects
	Acenaphthene	1/8	12.5%	0.156	0.156	ERC-SED-6	0.17	0.44	1.5E-01	0.156	Max. of Detects
	Acenaphthylene	1/8	12.5%	0.32	0.32	ERC-SED-6	0.17	0.44	1.7E-01	0.32	Max. of Detects
	Anthracene	1/8	12.5%	0.594	0.594	ERC-SED-6	0.17	0.44	2.1E-01	0.594	Max. of Detects
	Benzo(a)anthracene	2/8	25.0%	0.54	1.75	ERC-SED-6	0.17	0.43	3.9E-01	1.75	Max. of Detects
	Benzo(a)pyrene	2/8	25.0%	0.68	1.47	ERC-SED-6	0.17	0.43	3.7E-01	1.47	Max. of Detects
	Benzo(b)fluoranthene	2/8	25.0%	0.77	1.2	ERC-SED-6	0.17	0.43	3.5E-01	1.2	Max. of Detects
	Benzo(g,h,i)perylene	1/8	12.5%	1.04	1.04	ERC-SED-6	0.17	0.44	2.6E-01	1.04	Max. of Detects
	Benzo(k)fluoranthene	2/8	25.0%	0.49	1.32	ERC-SED-6	0.17	0.43	3.3E-01	1.32	Max. of Detects
	Chrysene	2/8	25.0%	0.54	1.47	ERC-SED-6	0.17	0.43	3.6E-01	1.47	Max. of Detects
	Dibenzo(a,h)anthracene	1/8	12.5%	0.4	0.4	ERC-SED-6	0.17	0.44	1.8E-01	0.4	Max. of Detects
	Fluoranthene	2/8	25.0%	0.76	3.02	ERC-SED-6	0.17	0.43	5.8E-01	3.02	Max. of Detects
	Fluorene	1/8	12.5%	0.204	0.204	ERC-SED-6	0.17	0.44	1.6E-01	0.204	Max. of Detects
	Indeno(1,2,3-cd)pyrene	1/8	12.5%	0.976	0.976	ERC-SED-6	0.17	0.44	2.5E-01	0.976	Max. of Detects
	Naphthalene	1/8	12.5%	0.108	0.108	ERC-SED-6	0.17	0.44	1.5E-01	0.108	Max. of Detects
	Phenanthrene	1/8	12.5%	1.84	1.84	ERC-SED-6	0.17	0.44	3.6E-01	1.84	Max. of Detects
	Pyrene	3/8	37.5%	0.59	2.59	ERC-SED-6	0.17	0.43	6.7E-01	2.59	Max. of Detects
PCBs											
(mg/kg)	PCB-1254	35/44	79.5%	0.035	29.9	SD-3D	0.0576	0.263	3.9E+00	10.75	95% Chebyshev (Mean, Sd) UCL
	PCB-1260	6/44	13.6%	0.673	3.57	SD-3D	0.0103	1.47	3.0E-01	1.286	99% Chebyshev (Mean, Sd) UCL
	Total PCBs	35/44	79.5%	0.035	33.47	SD-3D	0.0576	0.263	4.1E+00	15.77	99% Chebyshev (Mean, Sd) UCL
PCB Congeners											
(pg/g)	123-PeCB	1/1	100.0%	39.3	39.3	ERC-SED-6	--	--	3.9E+01	39.3	Max. of Detects
	118-PeCB	1/1	100.0%	3130	3130	ERC-SED-6	--	--	3.1E+03	3130	Max. of Detects
	114-PeCB	1/1	100.0%	50.7	50.7	ERC-SED-6	--	--	5.1E+01	50.7	Max. of Detects
	105-PeCB	1/1	100.0%	883	883	ERC-SED-6	--	--	8.8E+02	883	Max. of Detects
	167-HxCB	1/1	100.0%	147	147	ERC-SED-6	--	--	1.5E+02	147	Max. of Detects
	156,157-HxCB	1/1	100.0%	433	433	ERC-SED-6	--	--	4.3E+02	433	Max. of Detects
	189-HpCB	1/1	100.0%	25.9	25.9	ERC-SED-6	--	--	2.6E+01	25.9	Max. of Detects
Metals											
(mg/kg)	Arsenic	4/8	50.0%	1.05	9.05	ERC-SED-6	0.4	3.6	3.0E+00	9.05	Max. of Detects
	Barium	8/8	100.0%	0.28	583	ERC-SED-6	--	--	1.0E+02	583	Max. of Detects
	Cadmium	5/8	62.5%	0.48	2.81	ERC-SED-6	0.33	0.36	8.2E-01	2.81	Max. of Detects
	Chromium	8/8	100.0%	6.1	70	WD-17.57	--	--	2.7E+01	70	Max. of Detects
	Lead	8/8	100.0%	6.1	977	ERC-SED-6	--	--	1.5E+02	977	Max. of Detects
	Nickel	4/4	100.0%	2.2	21.5	ERC-SED-6	--	--	8.1E+00	21.5	Max. of Detects

Table B-4
Statistics of Analytical Detected Results for Northern Wetland Area Surface Soil Samples (0-1 foot) - 2005, 2008, and 2009
Keith Middle School
New Bedford, Massachusetts

Analysis	Analyte	Freq. of Detects (# of Detects/ # of samples)	Freq. of Detects	Min. of Detects	Max. of Detects	Location of Max. Detected	Min. of Non-Detects	Max. of Non-Detects	Mean Concentration	UCL	UCL Rationale
	Selenium	2/8	25.0%	1.08	1.16	WD-17.46	0.4	8.54	2.2E+00	1.16	Max. of Detects
	Vanadium	4/4	100.0%	8.2	41.7	ERC-SED-6	--	--	1.9E+01	41.7	Max. of Detects
	Zinc	4/4	100.0%	13	615	ERC-SED-6	--	--	1.7E+02	615	Max. of Detects
	Mercury	7/8	87.5%	0.061	0.651	ERC-SED-6	0.02	0.02	1.8E-01	0.651	Max. of Detects
Total Organic Carbon											
(%)	TOC	1/1	100.0%	6.5	6.5	ERC-SED-6	--	--	6.5E+00	6.5	Max. of Detects

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

pg/g - picograms per gram.

UCL - Upper concentration limit.

Appendix C

Surface Water and Sediment Toxicity Test Reports

Sediment Toxicity Tests

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

February 25, 2010

Mr. Scott Heim
TRC Solutions, Inc.
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Re: New Bedford Sediments

Dear Mr. Heim:

Attached please find the report and data package for *Chironomus tentans* 10-day survival and growth and *Hyalella azteca* 28-day survival and growth toxicity tests conducted on sediment samples received for the City of New Bedford KMS Project.

If you have any questions regarding this report or data package, please contact Dr. Philip C. Downey or me.

Sincerely,

John W. Williams
Manager, Environmental Toxicology

This report consists of the following numbered pages: 1 - 125

273 Commerce Street, Williston, VT 05495 Tel: 802.860.1638 Fax: 802.658.3189

AQUATEC BIOLOGICAL SCIENCES, INC.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Toxicity Summary Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/25/2010
Project: 10009
SDG 12151
Site: City of New Bedford KMS Project#115058

Method: **100.2CT** Species: ***Chironomus tentans***

Sample ID	Sample Name	Control Group	Mean Percent Surviving (%)	Mean Ash-Free Dry weight (mg)
039825	Natural Sediment Control	A	96.25	1.72
039826	ERC-SED 7	A	92.50	1.26 **
039827	ERC-SED 9	A	92.50	1.67
039828	ERC-SED 11-A-C	A	92.50	1.27 **
039831	ERC-SED 14	A	90.00	1.45 *
039833	SD-16	A	97.50	1.55 *
039834	SD-40	A	95.00	1.47 *
039835	SD-48	A	97.50	1.40 *

* Indicates a statistically significant reduction (P<0.05) in the response relative to the corresponding response in the laboratory control sample.

** Indicates a statistically significant reduction (P<0.05) in the response relative to the corresponding response in the laboratory control and the reference control sample.

Samples Tested

Number	Sample Name	Date Time and Collected	Type
039825	**Natural Sediment Control**	12/1/2009	Sediment
039826	**ERC-SED 7**	12/28/2009 10:30:00 AM	Sediment
039827	**ERC-SED 9**	12/28/2009 11:30:00 AM	Sediment
039828	**ERC-SED 11-A-C**	12/28/2009 12:40:00 PM	Sediment
039831	**ERC-SED 14**	12/28/2009 1:45:00 PM	Sediment
039833	**SD-16**	12/28/2009 10:50:00 AM	Sediment
039834	**SD-40**	12/28/2009 12:25:00 PM	Sediment
039835	**SD-48**	12/28/2009 3:30:00 PM	Sediment

Submitted By: _____

AQUATEC BIOLOGICAL SCIENCES, INC.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/26/2010
Project 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Sample ID: **039825** Sample Name: **Natural Sediment Control** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	9	90	2336.62	2320.99	9	1.74
B	10	10	100	2246.63	2231.85	9	1.64
C	10	10	100	2392.54	2376.58	10	1.60
D	10	10	100	2187.43	2169.33	10	1.81
E	10	10	100	2405.2	2387.16	10	1.80
F	10	8	80	2323.73	2309.54	8	1.77
G	10	10	100	2157.43	2141.23	10	1.62
H	10	10	100	2134.75	2116.69	10	1.81
Mean Percent Survival (%):			96.25		Mean Growth Weight:		1.724

Sample ID: **039826** Sample Name: **ERC-SED 7** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	10	100	2206.52	2194.13	10	1.24
B	10	9	90	2257.77	2246.44	9	1.26
C	10	10	100	2296.53	2284.03	10	1.25
D	10	9	90	2344.02	2331.58	9	1.38
E	10	10	100	2138.54	2126.46	10	1.21
F	10	10	100	2271.71	2259.24	10	1.25
G	10	7	70	2178.14	2169.12	7	1.29
H	10	9	90	2303.92	2293.20	9	1.19
Mean Percent Survival (%):			92.50		Mean Growth Weight:		1.258

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/26/2010
Project 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Sample ID: **039827** Sample Name: **ERC-SED 9** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	10	100	2418.39	2402.35	10	1.60
B	10	10	100	2482.96	2466.79	10	1.62
C	10	10	100	2282.29	2265.96	10	1.63
D	10	9	90	2257.17	2241.21	9	1.77
E	10	10	100	2304.03	2287.39	10	1.66
F	10	9	90	2435.43	2421.54	9	1.54
G	10	7	70	2174.04	2160.76	7	1.90
H	10	9	90	2256.81	2242.40	9	1.60

Mean Percent Survival (%): 92.50 Mean Growth Weight: 1.667

Sample ID: **039828** Sample Name: **ERC-SED 11-A-C** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	8	80	2075.63	2064.05	8	1.45
B	10	9	90	2503.28	2492.18	9	1.23
C	10	10	100	2358.68	2346.60	10	1.21
D	10	10	100	2114.08	2102.30	10	1.18
E	10	10	100	2204.41	2191.06	10	1.33
F	10	8	80	2339.3	2328.68	8	1.33
G	10	10	100	2255.15	2244.33	10	1.08
H	10	9	90	2358.03	2345.63	9	1.38

Mean Percent Survival (%): 92.50 Mean Growth Weight: 1.274

Sample ID: **039831** Sample Name: **ERC-SED 14** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	7	70	2395.6	2382.83	7	1.82
B	10	6	60	2217.34	2209.46	6	1.31
C	10	10	100	2255.89	2242.06	10	1.38
D	10	9	90	2422.16	2409.69	9	1.39
E	10	10	100	2246.24	2231.42	10	1.48
F	10	10	100	2421.71	2407.74	10	1.40
G	10	10	100	2202.23	2187.58	10	1.46
H	10	10	100	2320.61	2306.81	10	1.38

Mean Percent Survival (%): 90.00 Mean Growth Weight: 1.454

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/26/2010
Project 10009
SDG: 12151
Site: City of New Bedford KMS
Project#115058

Sample ID: **039833** Sample Name: **SD-16** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	10	100	2124.42	2109.17	10	1.52
B	10	10	100	2231.8	2219.15	10	1.27
C	10	9	90	2301.29	2285.94	9	1.71
D	10	10	100	2340.29	2325.01	10	1.53
E	10	10	100	2355.47	2340.40	10	1.51
F	10	10	100	2453.87	2437.50	10	1.64
G	10	10	100	2156.69	2141.54	10	1.51
H	10	9	90	2228.71	2213.54	9	1.69

Mean Percent Survival (%): 97.50 Mean Growth Weight: 1.546

Sample ID: **039834** Sample Name: **SD-40** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	10	100	2324.36	2309.14	10	1.52
B	10	10	100	2459.82	2446.34	10	1.35
C	10	9	90	2164.42	2150.98	9	1.49
D	10	10	100	2226.55	2213.24	10	1.33
E	10	9	90	2238.7	2225.40	9	1.48
F	10	8	80	2365.25	2351.72	8	1.69
G	10	10	100	2473.25	2458.70	10	1.46
H	10	10	100	2550.69	2536.13	10	1.46

Mean Percent Survival (%): 95.00 Mean Growth Weight: 1.472

Sample ID: **039835** Sample Name: **SD-48** Method: **100.2CT**

Replicate	Start Count	Total Surviving	Percent Surviving	Crucible and Larval Wet Weight (mg)	Ash Crucible and Larval Weight (mg)	Number Weighed	Mean Organism Weight (mg)
A	10	9	90	2407.36	2392.55	9	1.65
B	10	10	100	2118.15	2106.10	9	1.34
C	10	10	100	2439.6	2425.37	10	1.42
D	10	10	100	2290.51	2276.94	10	1.36
E	10	9	90	2415.55	2403.08	9	1.39
F	10	10	100	2316.09	2302.01	10	1.41
G	10	10	100	2191	2176.76	10	1.42
H	10	10	100	2427.68	2415.88	10	1.18

Mean Percent Survival (%): 97.50 Mean Growth Weight: 1.395

AQUATEC BIOLOGICAL SCIENCES, INC.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Toxicity Summary Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/25/2010
Project 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Method: **100.4HA28** Species: ***Hyalella azteca***

Sample ID	Sample Name	Control Group	Mean Percent Surviving (%)	Mean Weight (mg) Growth	
039825	Natural Sediment Control	A	92.5	0.350	
039826	ERC-SED 7	A	98.8	0.255	*
039827	ERC-SED 9	A	100.0	0.279	*
039828	ERC-SED 11-A-C	A	92.5	0.228	*
039831	ERC-SED 14	A	95.0	0.219	*
039833	SD-16	A	100.0	0.304	*
039834	SD-40	A	100.0	0.290	*
039835	SD-48	A	98.8	0.273	*

* Indicates a statistically significant reduction (P<0.05) in the response relative to the corresponding response in the laboratory control sample.

** Indicates a statistically significant reduction (P<0.05) in the response relative to the corresponding response in the laboratory control and the reference control sample.

Samples Tested

Number	Sample Name	Date Time and Collected	Type
039825	**Natural Sediment Control**	12/1/2009	Sediment
039826	**ERC-SED 7**	12/28/2009 10:30:00 AM	Sediment
039827	**ERC-SED 9**	12/28/2009 11:30:00 AM	Sediment
039828	**ERC-SED 11-A-C**	12/28/2009 12:40:00 PM	Sediment
039831	**ERC-SED 14**	12/28/2009 1:45:00 PM	Sediment
039833	**SD-16**	12/28/2009 10:50:00 AM	Sediment
039834	**SD-40**	12/28/2009 12:25:00 PM	Sediment
039835	**SD-48**	12/28/2009 3:30:00 PM	Sediment

Submitted By: _____

Page 1 of 1

AQUATEC BIOLOGICAL SCIENCES, INC.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/25/2010
Project: 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Sample ID: **039825** Sample Name: **Natural Sediment Control** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	9	90	19.95	23.20	9	0.361
B	10	10	100	23.34	26.85	10	0.351
C	10	8	80	22.14	24.67	8	0.316
D	10	9	90	20.93	24.28	9	0.372
E	10	10	100	23.34	26.74	10	0.340
F	10	10	100	23.41	27.13	10	0.372
G	10	9	90	19.27	22.46	9	0.354
H	10	9	90	20.88	23.90	9	0.336
Mean Survival (%)			93			Mean Weight (mg):	0.350

Sample ID: **039826** Sample Name: **ERC-SED 7** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	22.97	25.56	10	0.259
B	10	10	100	22.68	25.20	10	0.252
C	10	10	100	21.76	24.39	10	0.263
D	10	9	90	20.15	22.03	9	0.209
E	10	10	100	22.26	24.82	10	0.256
F	10	10	100	23.96	26.69	10	0.273
G	10	10	100	24.50	27.24	10	0.274
H	10	10	100	24.03	26.61	10	0.258
Mean Survival (%)			99			Mean Weight (mg):	0.255

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/25/2010
Project: 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Sample ID: **039827** Sample Name: **ERC-SED 9** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	17.22	20.13	10	0.291
B	10	10	100	19.68	22.31	10	0.263
C	10	10	100	22.75	25.76	10	0.301
D	10	10	100	21.68	23.89	10	0.221
E	10	10	100	20.39	22.48	10	0.209
F	10	10	100	22.24	24.55	10	0.231
G	10	10	100	16.98	20.44	10	0.346
H	10	10	100	21.86	25.55	10	0.369
Mean Survival (%)			100			Mean Weight (mg):	0.279

Sample ID: **039828** Sample Name: **ERC-SED 11-A-C** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	8	80	22.76	24.71	8	0.244
B	10	10	100	23.01	25.08	10	0.207
C	10	10	100	22.47	24.78	10	0.231
D	10	9	90	24.06	26.32	9	0.251
E	10	8	80	19.37	21.11	8	0.217
F	10	10	100	23.95	26.32	10	0.237
G	10	10	100	21.73	24.06	10	0.233
H	10	9	90	22.96	24.82	9	0.207
Mean Survival (%)			93			Mean Weight (mg):	0.228

Sample ID: **039831** Sample Name: **ERC-SED 14** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	24.45	27.23	10	0.278
B	10	10	100	22.71	24.54	10	0.183
C	10	10	100	23.66	26.23	10	0.257
D	10	10	100	23.07	24.86	10	0.179
E	10	10	100	23.91	25.28	10	0.137
F	10	9	90	23.55	25.98	9	0.270
G	10	9	90	24.01	25.68	9	0.186
H	10	8	80	22.43	24.53	8	0.263
Mean Survival (%)			95			Mean Weight (mg):	0.219

Toxicity Detail Report

TRC Solutions
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Date: 2/25/2010
Project: 10009
SDG: 12151
Site: City of New Bedford KMS Project#115058

Sample ID: **039833** Sample Name: **SD-16** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	21.95	25.35	10	0.340
B	10	10	100	22.34	25.44	10	0.310
C	10	10	100	23.76	26.96	10	0.320
D	10	10	100	23.48	26.25	10	0.277
E	10	10	100	21.39	24.95	10	0.356
F	11	11	100	24.29	27.10	11	0.255
G	10	10	100	22.71	25.65	10	0.294
H	10	10	100	19.45	22.28	10	0.283
Mean Survival (%)			100			Mean Weight (mg):	0.304

Sample ID: **039834** Sample Name: **SD-40** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	25.07	27.74	10	0.267
B	10	10	100	23.04	25.48	10	0.244
C	10	10	100	22.20	25.48	10	0.328
D	10	10	100	23.56	25.89	10	0.233
E	10	10	100	21.81	24.07	10	0.226
F	10	10	100	24.42	29.04	10	0.462
G	10	10	100	23.33	26.52	10	0.319
H	10	10	100	24.75	27.19	10	0.244
Mean Survival (%)			100			Mean Weight (mg):	0.290

Sample ID: **039835** Sample Name: **SD-48** Method: **100.4HA28**

Replicate	Start Count	Total Surviving	Percent Surviving (%)	Initial Pan Weight (mg)	Pan and Larval Dried Weight	Weighed	Mean Replicate Weight (mg)
A	10	10	100	24.06	26.11	10	0.205
B	10	10	100	22.34	24.81	10	0.247
C	10	10	100	24.39	27.72	10	0.333
D	10	10	100	21.27	24.96	10	0.369
E	10	10	100	24.62	27.00	10	0.238
F	10	10	100	23.45	26.02	10	0.257
G	10	9	90	22.64	25.32	9	0.298
H	10	10	100	22.01	24.35	10	0.234
Mean Survival (%)			99			Mean Weight (mg):	0.273

Quality Assurance Report

Aquatec Biological Sciences
Certification Number 1737

TRC Solutions		Date:	2/25/2010
Wannalancit Mills		Project:	10009
650 Suffolk Street		SDG	12151
Lowell, MA	01854	Site:	City of New Bedford KMS

Qualifiers and Special Conditions

Sediment and surface water samples were received at Aquatec Biological Sciences, Inc. on December 29, 2009. A total of eleven sediment samples and two surface water samples were received. Discrepancies were noted between the Chain-of-Custody documentation and the labels on the sample containers regarding time of collection. Samples were logged in and reported based on the collection date and time on the sample containers. One sediment sample (ERC-SED 12) was received but was not included in the list of samples on the Chain-of-Custody.

All sediment and surface water samples were logged in for "hold" pending notification to proceed with testing for specific samples. Notification to proceed with testing of seven sediment samples was received on January 15, 2010. The tested samples included sample 39826 (ERC-SED 7), 39827 (ERC-SED 9), 39828 (ERC-SED 11-A-C), 39831 (ERC-SED 14), 39833 (SD-16), 39834 (SED-40), and 39835 (SED-48). A control treatment consisting of natural sediment (Sample 39825 Lamoille River, VT) was included in the test arrays for both species. The surface water samples 39837 (ERC-SW 7) and 39838 (ERC-SW 9) were not tested and sediment samples 39829 (ERC-SED 12), 39830 (ERC-SED 13), 39832 (ERC-SED 15), and 39836 (SD-71) were also not tested.

Chironomus tentans

Sediments for the selected samples were loaded into test beakers on January 25, 2010 and overlying water was added to each test replicate. The 10-day Chironomus tentans survival and growth tests were started on January 26, 2010 by addition of ten midge larvae per replicate. On January 31, 2010 (Day 5 of the test), aeration was provided to all test replicates until the end of the tests due to declining dissolved oxygen concentrations in some replicates. The tests were ended on February 5, 2010 when surviving midge larvae were recovered from test replicates using a 0.5-mm sieve. Any pupating larvae that were recovered were included in the survival tabulation but were not included in the ash-free-dry-weight (AFDW) determinations. The test data of the site samples (survival and growth by AFDW) were compared statistically with the corresponding response in the control (Sample 39825) and the reference site (Sample 29831, ERC-SED 14).

Quality Assurance Report

Aquatec Biological Sciences
Certification Number 1737

TRC Solutions		Date:	2/25/2010
Wannalancit Mills		Project:	10009
650 Suffolk Street		SDG	12151
Lowell, MA	01854	Site:	City of New Bedford KMS

Hyalella azteca

Sediments for the selected samples were loaded into test beakers on January 25, 2010 and overlying water was added to each test replicate. The 28-day Hyalella azteca survival and growth tests were started on January 26, 2010 by addition of ten amphipods per replicate. Aeration was not required to maintain dissolved oxygen concentrations above 2.5 mg/L. The tests were ended on February 23, 2010 when surviving amphipods were recovered from test replicates using a 0.5-mm sieve. Replicate F of Sample 39833 (SD-16) apparently had one extra amphipod distributed when the test was started because eleven amphipods were recovered from this replicate with the test was ended. The test data of the site samples (survival and growth by dry weight) were compared statistically with the corresponding response in the control (Sample 39825) and the reference site (Sample 29831, ERC-SED 14).

TOXICITY TEST REPORT CERTIFICATION

The results reported relate only to the the samples submitted as received.

I certify under penalty of law that this document and all ATTACHMENTs were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on: 2/25/10
(Date)

(Authorized signature)

John Williams
Toxicity Laboratory Manager
Aquatec Biological Sciences, Inc.

Supportive Documentation

Chain-Of-Custody

Toxicity Test Methods

Amphipod, Hyalella azteca, 28-day survival and growth

Midge, Chironomus tentans 10-Day Survival and Growth Test for Sediments

Standard Reference Toxicant Control Charts

Chain-Of-Custody

Cooler 1 of 1

Aquatec Biological Sciences

Chain-of-Custody-Record

273 Commerce Street
Williston, VT 05495
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION
Name: TRC	Project Name: City of New Bedford KMS	Carrier: Fed Ex
Address: 650 Suffolk St	Project Number: 115058	Airbill Number:
City/State/Zip: Lowell MA	Sampler Name(s): NSB, JM	Date Shipped: 12/28/09
Telephone: 978 970 5600	Quote #: Client Code:	Hand Delivered: ☐ Yes ☒ No
Facsimile:		
Contact Name: D. Sullivan		

VOLUME/CONTAINER TYPE/ PRESERVATIVE					
16oz Plastic	16oz Plastic				

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS/REMARKS	NUMBER OF CONTAINERS					
SD-16	12/28/09	1050		X	S	Toxicity / Hold	X					
SD-46		1225										
SD-48		1530										
SD-71		1510										
ERC-SED7		1030										
ERC-SED9		1130										
ERC-SED11A-C		1240										
ERC-SED 13		1310										
ERC-SED 14		1330										
ERC-SED 15		1345										
ERC-SW 7		1030	X		LW	Toxicity / Run		X				
ERC-SW9		1130	X		GW	" "		X				

Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)
[signature]	12/28/09	1530	FedEx
Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)
	12/29/09	11:30	Karen Downey
Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)

NOTES TO SAMPLER(S):

NOTES TO LAB: Hold soil samples until notified to run.
Cooler Temperatures 2.1°C, 2.4°C, 2.8°C
12/29/09.

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Gmail by Google

J Williams <jwilliams@aquatecb.com>

Toxicity Testing

2 messages

Heim, Scott (Lowell,MA-US) <SHeim@trcsolutions.com> **Fri, Jan 15, 2010 at 4:58 PM**
To: jwilliams@aquatecb.com

Hi John,

Finally got the sediment chemistry results back for those samples collected in New Bedford, MA. I would like toxicity testing (10 day C. tentans and 28 days H. azteca as we previously discussed) conducted on the following seven samples:

1. SD-16
2. SD-40
3. SD-48
4. ERC-SED7
5. ERC-SED9
6. ERC-SED11A-C
7. ERC-SED14

Please go ahead and do the statistical analyses w/ a control sample and the reference sample (ERC-SED14). Let me know if you have any questions. I'm out of the office next week but can be reached via cell phone or email (at night). Have a nice weekend if you're still there.

Scott J. Heim

Senior Ecologist

TRC

PARTNER OF THE YEAR

Wannalancit Mills

650 Suffolk Street

Lowell, MA 01854

(978) 656-3583 (Office)

(978) 453-1995 (Fax)

(508) 320-2678 (Cell)

sheim@trcsolutions.com

J Williams <jwilliams@aquatecb.com> **Fri, Jan 15, 2010 at 5:07 PM**
To: "Heim, Scott (Lowell,MA-US)" <SHeim@trcsolutions.com>
Cc: Philip Downey <pdowney05@yahoo.com>

Thanks Scott. We will proceed.

John

[Quoted text hidden]

--
John Williams
Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Phone: 802-860-1638 ext. 317

Toxicity Test Methods

Midge, *Chironomus dilutus* (formerly *tentans*) , 10-day survival and growth test

ASSOCIATED PROTOCOL: US EPA EPA/600/R-99/064. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* , March, 2000, Method 100.2.

1. Test type:	Whole sediment bioaccumulation (static renewal)
2. Test temperature:	23 ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test chamber:	300-mL glass beakers with screened overflow port
6. Sediment / overlying water volumes:	Nominal 100 ml sediment and 175 ml water
7. Renewal of overlying water:	2 volume exchanges per day (renewed twice daily every 12 h)
8. Age of test organisms:	7-9 days (2nd - 3rd instar)
9. Source of organisms	Aquatic BioSystems, Fort Collins, CO
10. No. organisms / test chamber:	10
11. No. of replicate chambers / sample	8
12. Feeding regime:	1.5 mL of finely ground Tetrafin daily (6 mg dry solids)
13. Cleaning:	None during test
14. Aeration:	None unless dissolved oxygen concentration drops below 2.5 mg/L (Initiated on Day 5)
15. Overlying water:	Moderately hard reconstituted water
16. Control sediment:	Natural sediment, 0.5-mm sieved
17. Test duration:	10 days
18. Monitoring (bioaccumulation test):	Overlying water chemistry: Daily: temperature and dissolved oxygen Weekly: pH, conductivity Days 0, 9: hardness, alkalinity, and ammonia Daily: Systems and biological monitoring Day 10: Survival and growth assessment
19. End points:	Survival and growth (ash-free-dry-weight)
20. Reference toxicant test:	Potassium chloride 96-h LC50, water only
21. Test acceptability	80 percent survival in control
22. Data interpretation:	Statistical comparison to control and/or reference site using CETIS statistical program

Amphipod, *Hyalella azteca* , 28-day survival and growth test

ASSOCIATED PROTOCOL: US EPA EPA/600/R-99/064. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* , March, 2000. Method 100.4 (Modified)

1. Test type:	Whole sediment bioaccumulation (static renewal)
2. Test temperature:	Average 23 ± 1°C (instantaneous range 23 + 1°C)
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test chamber:	300-mL glass beakers with screened overlying water overflow port
6. Sediment / overlying water volumes:	Nominal 100 ml sediment and 175 ml water
7. Renewal of overlying water:	2 volume exchanges per day (renewed twice daily at 12-hour intervals)
8. Age of test organisms:	7 to 8 days old at the start of the test
9. Source of organisms	Aquatic Research Organisms
10. No. organisms / test chamber:	10
11. No. of replicate chambers / sample	8
12. Feeding regime:	Daily, 1 ml YCT to each replicate
13. Cleaning:	Overflow screens, replace delivery tips as needed
14. Aeration:	None unless dissolved oxygen in overlying water drops below 2.5 mg/L
15. Overlying water:	Mix of reconstituted water and Lake Champlain water
16. Control sediment:	Natural sediment, 0.5-mm sieved
17. Test duration:	28 days
18. Monitoring (bioaccumulation test):	Overlying water chemistry: Daily: temperature and dissolved oxygen Weekly: pH, conductivity Days 0, 27: hardness, alkalinity, and ammonia Daily: Systems and biological monitoring Day 28: Survival and growth assessment
19. End points:	Survival and growth (dry weight)
20. Reference toxicant test:	Potassium chloride 96-h LC50, water only
21. Test acceptability	Minumum average of 80 percent survival in control
22. Data interpretation:	Statistical comparison to control and/or reference site using CETIS statistical program

Midge, Chironomus tentans 10-Day Survival and Growth Test for Sediments

Chironomus tentans

Statistical Comparisons

Site vs. Control

CETIS Summary Report

Report Date: 25 Feb-10 14:12 (p 1 of 2)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Test Run No:	04-7629-1363	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	26 Jan-10 17:30	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Reconstituted Water
Ending Date:	05 Feb-10 11:00	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 18h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample Code	Sample No	Sample Date	Receive Date	Sample Age	Client Name	Project
39825	02-5484-4278	01 Dec-09	01 Dec-09	56d 17h		
39826	21-4383-9233	28 Dec-09 10:30	29 Dec-09 11:30	29d 7h	TRC	
39827	06-6182-2813	28 Dec-09 11:30	29 Dec-09 11:30	29d 6h		
39828	07-4990-8471	28 Dec-09 12:40	29 Dec-09 11:30	29d 5h		
39831	09-9831-6619	28 Dec-09 13:30	29 Dec-09 11:30	29d 4h		
39833	17-1160-7841	28 Dec-09 10:50	29 Dec-09 11:30	29d 7h		
39834	01-6873-1309	28 Dec-09 12:25	29 Dec-09 11:30	29d 5h		
39835	07-1405-8545	28 Dec-09 15:30	29 Dec-09 11:30	29d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
39825	Control Sediment	CONTROL	CONTROL		
39826	Sediment	City of New Bedford KMS	ERC-SED 7		
39827	Sediment	City of New Bedford KMS	ERC-SED 9		
39828	Sediment	City of New Bedford KMS	ERC-SED 11-A-C		
39831	Sediment	City of New Bedford KMS	ERC-SED 14		
39833	Sediment	City of New Bedford KMS	SED-16		
39834	Sediment	City of New Bedford KMS	SED-40		
39835	Sediment	City of New Bedford KMS	SED-48		

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
09-5428-7942	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
10-4730-7635	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
11-9111-3744	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
14-7753-9391	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
19-0335-0194	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
19-2200-9501	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria
21-2838-1532	Survival Rate	Control Resp	0.9625	0.7 - NL	Yes	Passes acceptability criteria

Mean AF Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68987	1.75729	1.596	1.80999	0.0164818	0.0902744	5.24%	0.0%
39826	8	1.2581	1.23629	1.27991	1.19111	1.38222	0.0106642	0.0584102	4.64%	27.01%
39827	8	1.66662	1.62391	1.70932	1.54332	1.89715	0.0208789	0.114358	6.86%	3.3%
39828	8	1.27364	1.22911	1.31817	1.08198	1.44748	0.0217724	0.119252	9.36%	26.1%
39831	8	1.45377	1.39452	1.51302	1.31335	1.82429	0.0289706	0.158679	10.91%	15.65%
39833	8	1.54602	1.49408	1.59795	1.26502	1.70557	0.0253938	0.139088	9.0%	10.3%
39834	8	1.4718	1.4302	1.5134	1.33101	1.69125	0.0203379	0.111396	7.57%	14.61%
39835	8	1.39525	1.34729	1.44321	1.18001	1.64556	0.0234502	0.128442	9.21%	19.05%

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934718	0.990282	0.8	1	0.013584	0.0744024	7.73%	0.0%
39826	8	0.925	0.886349	0.963651	0.7	1	0.0188982	0.10351	11.19%	3.9%
39827	8	0.925	0.886349	0.963651	0.7	1	0.0188982	0.10351	11.19%	3.9%
39828	8	0.925	0.891901	0.958099	0.8	1	0.0161835	0.0886405	9.58%	3.9%
39831	8	0.9	0.840122	0.959878	0.6	1	0.029277	0.160357	17.82%	6.49%
39833	8	0.975	0.957715	0.992285	0.9	1	0.0084515	0.046291	4.75%	-1.3%
39834	8	0.95	0.921773	0.978227	0.8	1	0.0138013	0.0755929	7.96%	1.3%
39835	8	0.975	0.957715	0.992285	0.9	1	0.0084515	0.046291	4.75%	-1.3%

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.73668	1.6422	1.596	1.80999	1.804	1.77374	1.62	1.80601
39826	1.23901	1.2589	1.25	1.38222	1.20801	1.247	1.28854	1.19111
39827	1.60398	1.61699	1.63301	1.77333	1.66401	1.54332	1.89715	1.60113
39828	1.44748	1.23334	1.20798	1.178	1.33499	1.32751	1.08198	1.37779
39831	1.82429	1.31335	1.38298	1.38555	1.48201	1.397	1.46499	1.38
39833	1.525	1.26501	1.70557	1.528	1.50701	1.63701	1.51499	1.68555
39834	1.52202	1.348	1.49333	1.33101	1.47778	1.69125	1.455	1.45601
39835	1.64556	1.33887	1.423	1.35701	1.38555	1.40801	1.424	1.18

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.9	1	1	1	1	0.8	1	1
39826	1	0.9	1	0.9	1	1	0.7	0.9
39827	1	1	1	0.9	1	0.9	0.7	0.9
39828	0.8	0.9	1	1	1	0.8	1	0.9
39831	0.7	0.6	1	0.9	1	1	1	1
39833	1	1	0.9	1	1	1	1	0.9
39834	1	1	0.9	1	0.9	0.8	1	1
39835	0.9	1	1	1	0.9	1	1	1

CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 10-4730-7635 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					7.26%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39826	60.5		2	0.2277	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0122065	0.0122065	1	0.696139	0.4181	Non-Significant Effect
Error	0.2454849	0.0175346	14			
Total	0.2576914	0.0297412	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.66413	8.88539	0.5177	Equal Variances
Distribution	Shapiro-Wilk Normality	0.804259		0.0031	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39826	8	0.925	0.885627	0.964373	0.7	1	0.0192213	0.10351	11.19%	3.9%

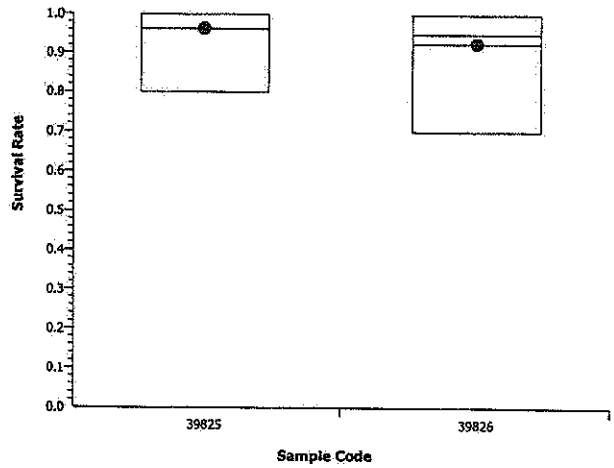
Angular (Corrected) Transformed Summary

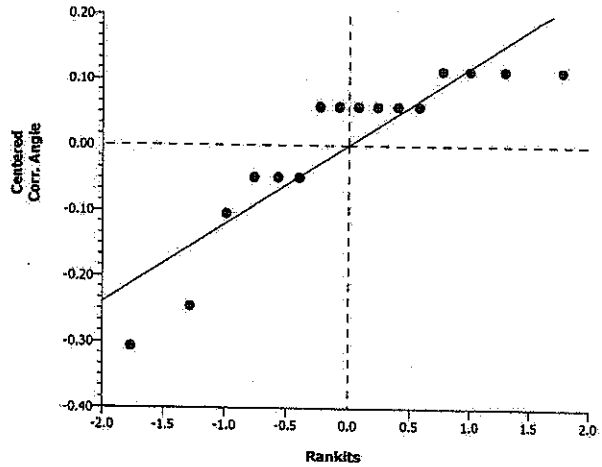
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39826	8	1.2983	1.242	1.35459	0.991157	1.41202	0.027484	0.148006	11.4%	4.08%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39826	1	1	1	1	0.9	0.9	0.9	0.7

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 11-9111-3744 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					7.26%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39827	60.5		2	0.2173	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0122065	0.0122065	1	0.696139	0.4181	Non-Significant Effect
Error	0.2454849	0.0175346	14			
Total	0.2576914	0.0297412	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.66413	8.88539	0.5177	Equal Variances
Distribution	Shapiro-Wilk Normality	0.804259		0.0031	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39827	8	0.925	0.885627	0.964373	0.7	1	0.0192213	0.10351	11.19%	3.9%

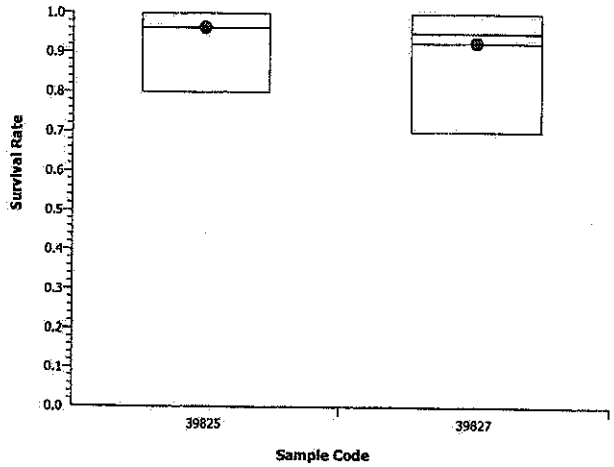
Angular (Corrected) Transformed Summary

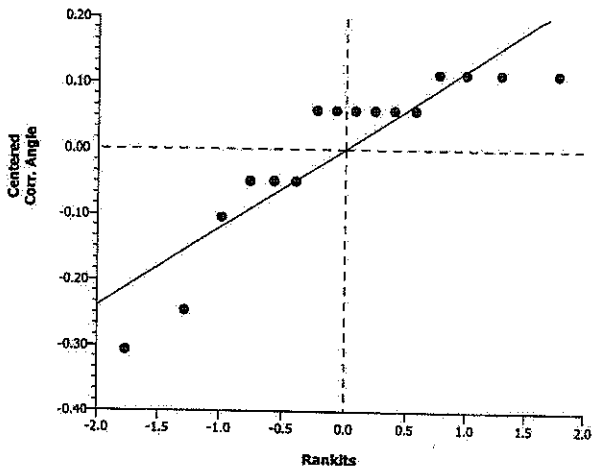
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39827	8	1.2983	1.242	1.35459	0.991157	1.41202	0.027484	0.148006	11.4%	4.08%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39827	1	1	1	1	0.9	0.9	0.9	0.7

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 19-2200-9501 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					6.89%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39828	60		3	0.2559	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0136795	0.0136795	1	0.86378	0.3684	Non-Significant Effect
Error	0.2217153	0.0158368	14			
Total	0.2353948	0.0295163	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.40617	8.88539	0.6642	Equal Variances
Distribution	Shapiro-Wilk Normality	0.831583		0.0074	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39828	8	0.925	0.891283	0.958717	0.8	1	0.0164601	0.0886405	9.58%	3.9%

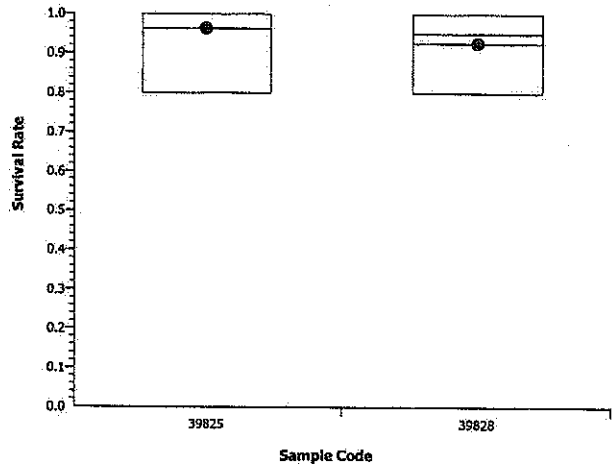
Angular (Corrected) Transformed Summary

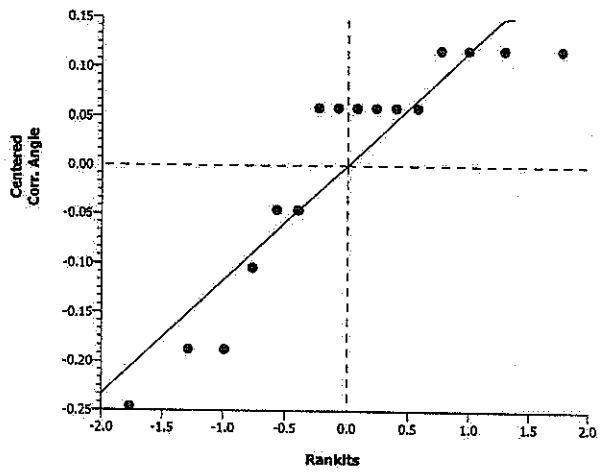
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39828	8	1.29506	1.24331	1.34681	1.10715	1.41202	0.0252642	0.136052	10.51%	4.32%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39828	1	1	1	1	0.9	0.9	0.8	0.8

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 09-5428-7942 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	.	C > T	20000 Trial					9.66%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39831	62.5		2	0.2437	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0257547	0.0257547	1	0.861588	0.3690	Non-Significant Effect
Error	0.41849	0.0298921	14			
Total	0.4442447	0.0556469	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.54167	8.88539	0.1172	Equal Variances
Distribution	Shapiro-Wilk Normality	0.782232		0.0016	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	6.49%

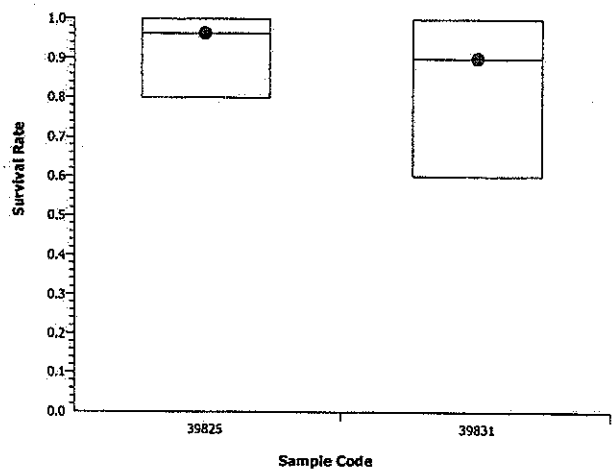
Angular (Corrected) Transformed Summary

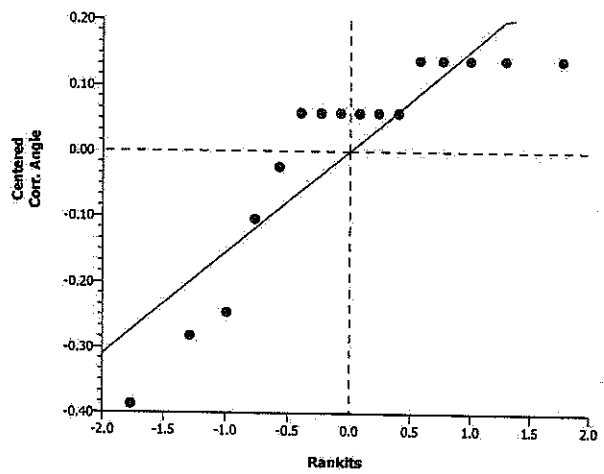
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	5.93%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39831	1	1	1	1	1	0.9	0.7	0.6

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 21-2838-1532 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					5.34%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39833	69		2	0.7165	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0012584	0.0012584	1	0.133486	0.7203	Non-Significant Effect
Error	0.1319834	0.0094274	14			
Total	0.1332419	0.0106858	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.31292	8.88539	0.2910	Equal Variances
Distribution	Shapiro-Wilk Normality	0.659627		0.0001	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39833	8	0.975	0.957392	0.992608	0.9	1	0.0085960	0.046291	4.75%	-1.3%

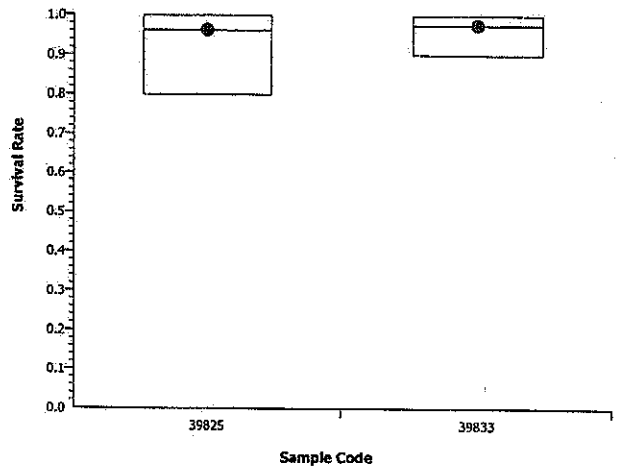
Angular (Corrected) Transformed Summary

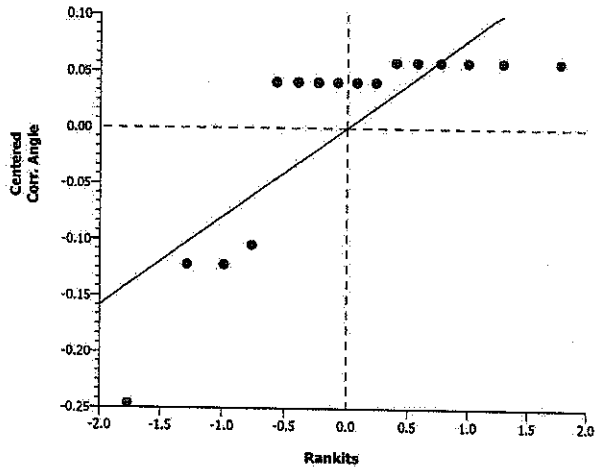
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39833	8	1.37127	1.34258	1.39997	1.24905	1.41202	0.014009	0.0754409	5.5%	-1.31%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39833	1	1	1	1	1	1	0.9	0.9

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 13:00 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 14-7753-9391 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 13:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					6.35%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39834	64.5		3	0.4672	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.00166	0.00166	1	0.123307	0.7307	Non-Significant Effect
Error	0.1884674	0.013462	14			
Total	0.1901273	0.0151219	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.04535	8.88539	0.9549	Equal Variances
Distribution	Shapiro-Wilk Normality	0.711447		0.0002	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39834	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	1.3%

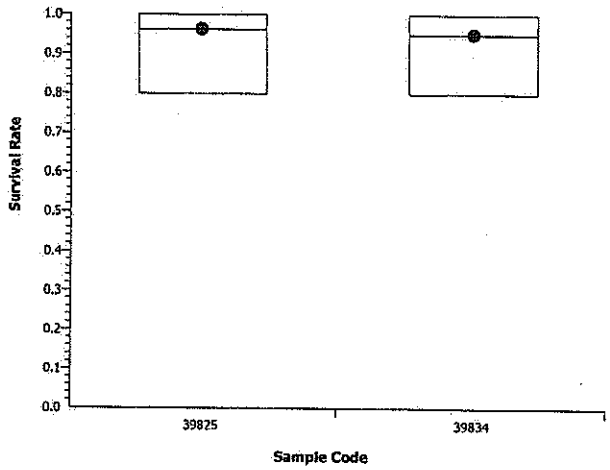
Angular (Corrected) Transformed Summary

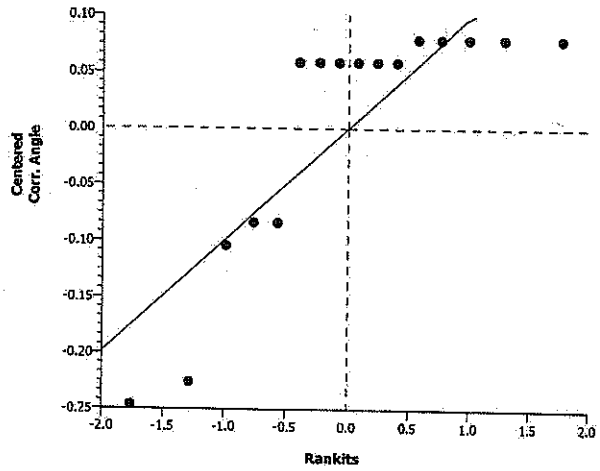
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39834	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	1.51%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39834	1	1	1	1	1	0.9	0.9	0.8

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 19-0335-0194 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					5.34%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39835	69		2	0.7154	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0012584	0.0012584	1	0.133486	0.7203	Non-Significant Effect
Error	0.1319834	0.0094274	14			
Total	0.1332419	0.0106858	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.31292	8.88539	0.2910	Equal Variances
Distribution	Shapiro-Wilk Normality	0.659627		0.0001	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.9625	0.934199	0.990801	0.8	1	0.0138162	0.0744024	7.73%	0.0%
39835	8	0.975	0.957392	0.992608	0.9	1	0.0085960	0.046291	4.75%	-1.3%

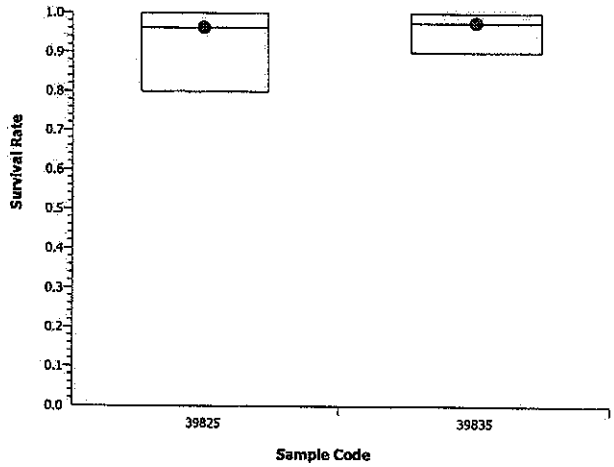
Angular (Corrected) Transformed Summary

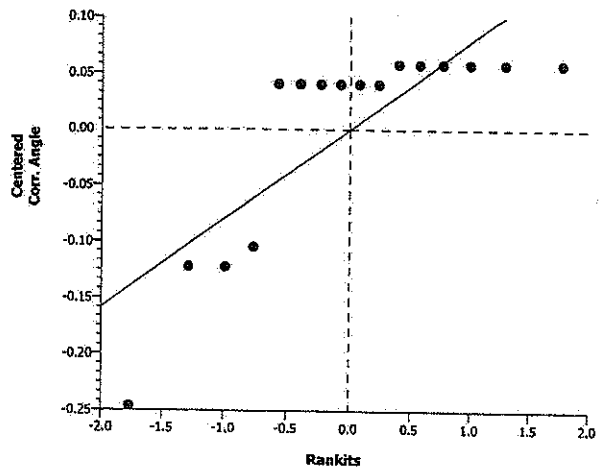
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.35354	1.30989	1.39718	1.10715	1.41202	0.0213053	0.114732	8.48%	0.0%
39835	8	1.37127	1.34258	1.39997	1.24905	1.41202	0.014009	0.0754409	5.5%	-1.31%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	1	1	1	0.9	0.8
39835	1	1	1	1	1	1	0.9	0.9

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 06-6843-0106 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					3.88%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39826	12.2446	1.76131	0.0669565	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.8666815	0.8666815	1	149.929	0.0000	Significant Effect
Error	0.0809285	0.0057806	14			
Total	0.94761	0.8724621	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.38865	8.88539	0.2734	Equal Variances
Distribution	Shapiro-Wilk Normality	0.973862		0.8966	Normal Distribution

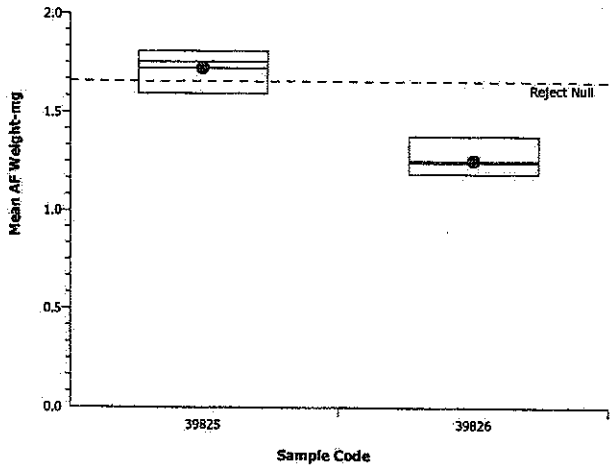
Mean AF Weight-mg Summary

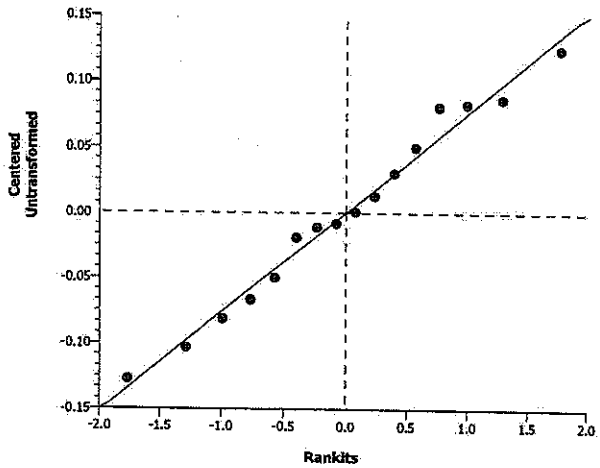
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39826	8	1.2581	1.23588	1.28032	1.19111	1.38222	0.0108465	0.0584102	4.64%	27.01%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39826	1.38222	1.28854	1.2589	1.25	1.247	1.23901	1.20801	1.19111

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 02-0930-9756 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					5.26%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39827	1.1058	1.76131	0.0907273	0.1437	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0129783	0.0129783	1	1.22279	0.2875	Non-Significant Effect
Error	0.1485908	0.0106136	14			
Total	0.1615691	0.0235919	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.60474	8.88539	0.5478	Equal Variances
Distribution	Shapiro-Wilk Normality	0.937281		0.3170	Normal Distribution

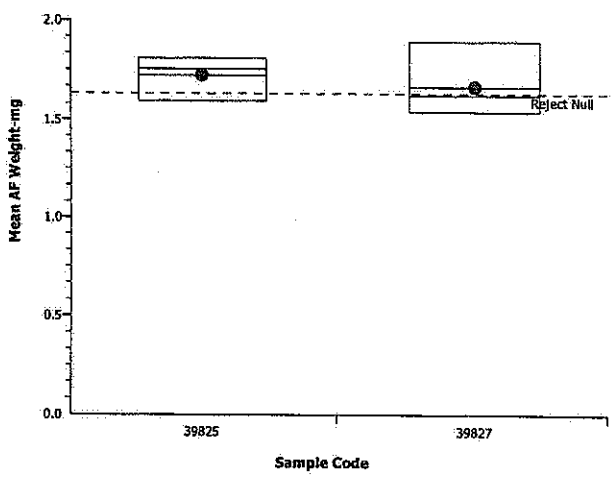
Mean AF Weight-mg Summary

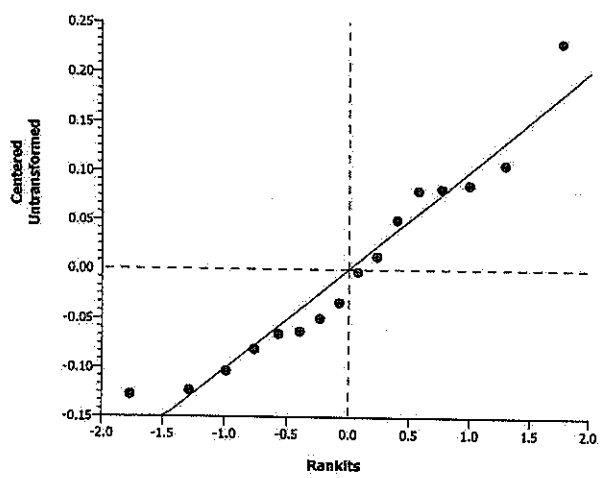
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39827	8	1.66662	1.62312	1.71011	1.54332	1.89715	0.0212358	0.114358	6.86%	3.3%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39827	1.89715	1.77333	1.66401	1.63301	1.61699	1.60398	1.60113	1.54332

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 08-6395-7605 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					5.4%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39828	8.50867	1.76131	0.0931385	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.8097849	0.8097849	1	72.3974	0.0000	Significant Effect
Error	0.1565938	0.0111853	14			
Total	0.9663787	0.8209702	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.74503	8.88539	0.4799	Equal Variances
Distribution	Shapiro-Wilk Normality	0.951366		0.5116	Normal Distribution

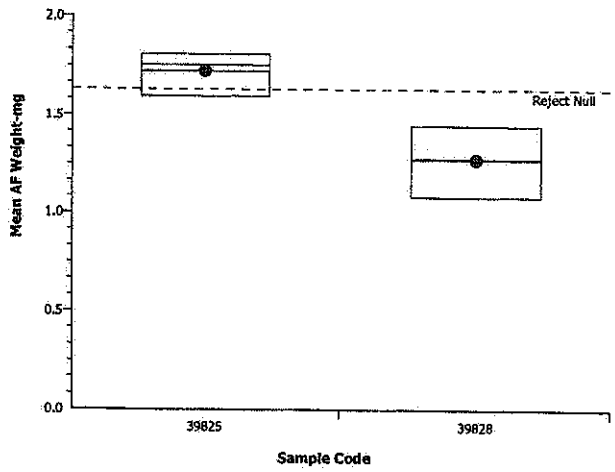
Mean AF Weight-mg Summary

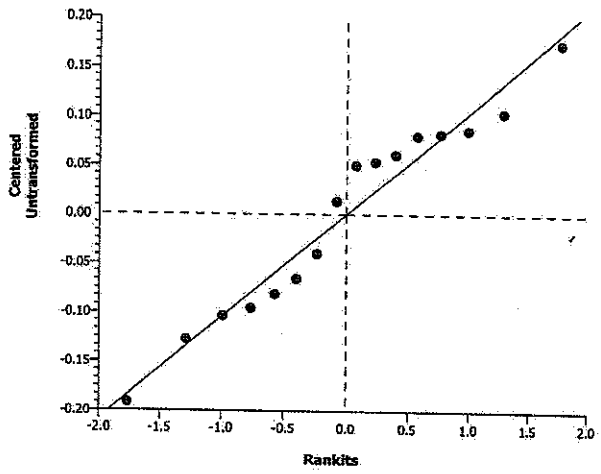
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39828	8	1.27364	1.22827	1.319	1.08198	1.44748	0.0221446	0.119252	9.36%	26.1%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39828	1.44748	1.37779	1.33499	1.32752	1.23334	1.20798	1.178	1.08198

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 10-3345-6920 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					6.6%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39831	44		0	0.0052	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.2911764	0.2911764	1	17.4732	0.0009	Significant Effect
Error	0.2332988	0.0166642	14			
Total	0.5244752	0.3078406	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.08964	8.88539	0.1598	Equal Variances
Distribution	Shapiro-Wilk Normality	0.8338		0.0079	Non-normal Distribution

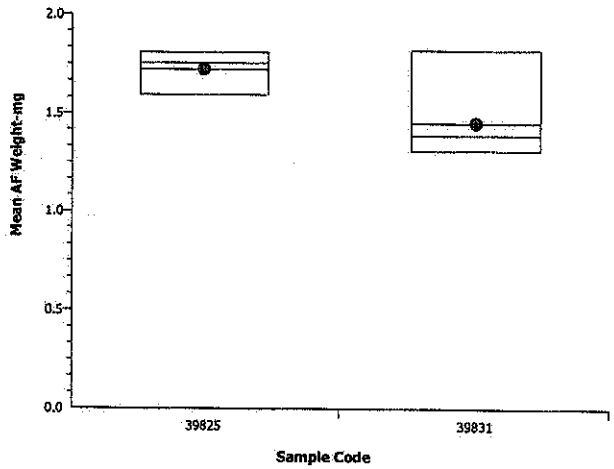
Mean AF Weight-mg Summary

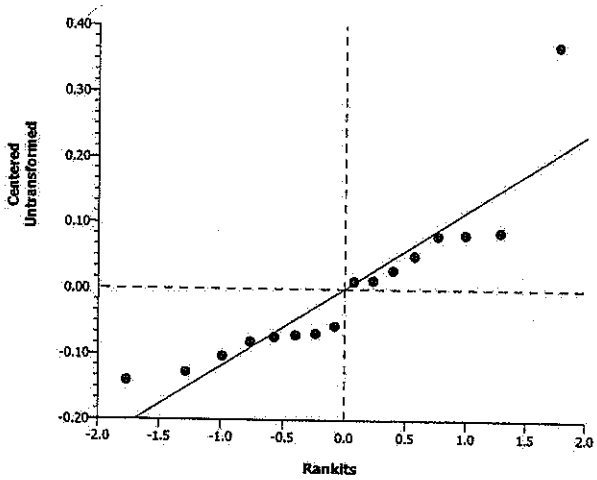
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	15.65%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 21-1754-9332 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					5.99%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39833	3.02873	1.76131	0.103256	0.0045	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.1261082	0.1261082	1	9.17322	0.0090	Significant Effect
Error	0.1924639	0.0137474	14			
Total	0.3185721	0.1398556	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.37382	8.88539	0.2767	Equal Variances
Distribution	Shapiro-Wilk Normality	0.942215		0.3770	Normal Distribution

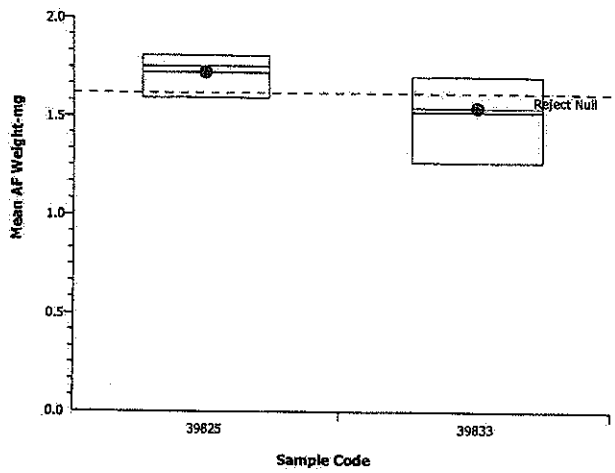
Mean AF Weight-mg Summary

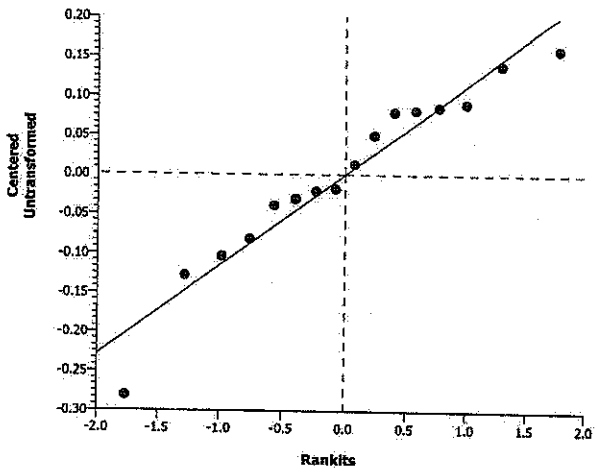
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39833	8	1.54602	1.49311	1.59892	1.26502	1.70557	0.0258279	0.139088	9.0%	10.3%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39833	1.70557	1.68555	1.63701	1.528	1.525	1.51499	1.50701	1.26502

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:16 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 15-3529-6748 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					5.18%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39834	4.96666	1.76131	0.0892865	0.0001	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.2535647	0.2535647	1	24.6677	0.0002	Significant Effect
Error	0.1439091	0.0102792	14			
Total	0.3974738	0.2638439	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.52267	8.88539	0.5927	Equal Variances
Distribution	Shapiro-Wilk Normality	0.942703		0.3835	Normal Distribution

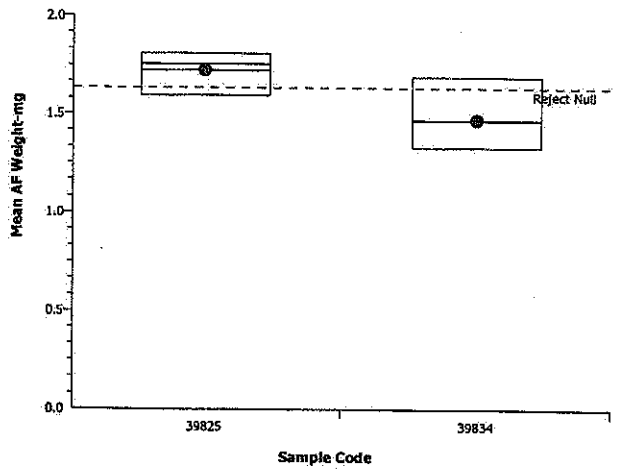
Mean AF Weight-mg Summary

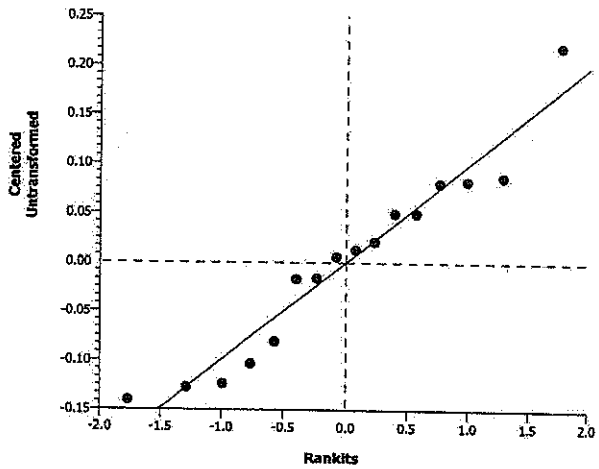
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39834	8	1.4718	1.42943	1.51417	1.33101	1.69125	0.0206856	0.111396	7.57%	14.61%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39834	1.69125	1.52202	1.49333	1.47778	1.45601	1.45501	1.348	1.33101

Graphics





CETIS Analytical Report

Report Date: 08 Feb-10 09:15 (p 1 of 1)
Link/Link Code: 12-2738-4396/12151

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 18-7475-2253 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 08 Feb-10 9:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					5.67%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39835	5.91521	1.76131	0.0977623	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.4311925	0.4311925	1	34.9897	0.0000	Significant Effect
Error	0.1725277	0.0123234	14			
Total	0.6037202	0.4435159	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.02435	8.88539	0.3726	Equal Variances
Distribution	Shapiro-Wilk Normality	0.966881		0.7859	Normal Distribution

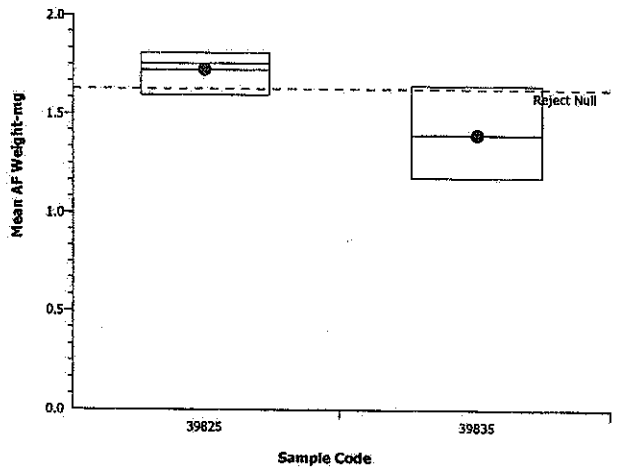
Mean AF Weight-mg Summary

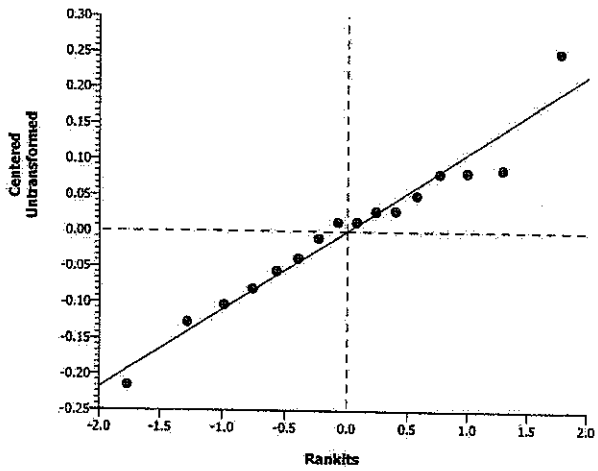
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.72358	1.68924	1.75791	1.596	1.80999	0.0167635	0.0902745	5.24%	0.0%
39835	8	1.39525	1.34639	1.44411	1.18001	1.64556	0.0238511	0.128442	9.21%	19.05%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1.80999	1.80601	1.804	1.77374	1.73668	1.6422	1.62	1.596
39835	1.64556	1.424	1.423	1.40801	1.38555	1.35701	1.33887	1.18001

Graphics





Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Start Date: 26 Jan-10 17:30 **Species:** Chironomus tentans **Sample Code:** 39825
Ending Date: 05 Feb-10 11:00 **Protocol:** EPA/600/R-99/064 (2000) **Sample Source:** CONTROL
Sample Date: 01 Dec-09 **Material:** Control Sediment **Sample Station:** CONTROL

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
39825	1	21	10	9	2336.62	2320.99	9		
39825	2	1	10	10	2246.63	2231.85	9		
39825	3	9	10	10	2392.54	2376.58	10		
39825	4	32	10	10	2187.43	2169.33	10		
39825	5	54	10	10	2405.2	2387.16	10		
39825	6	6	10	8	2323.73	2309.54	8		
39825	7	35	10	10	2157.43	2141.23	10		
39825	8	18	10	10	2134.75	2116.69	10		
39826	1	11	10	10	2206.52	2194.13	10		
39826	2	33	10	9	2257.77	2246.44	9		
39826	3	27	10	10	2296.53	2284.03	10		
39826	4	60	10	9	2344.02	2331.58	9		
39826	5	16	10	10	2138.54	2126.46	10		
39826	6	57	10	10	2271.71	2259.24	10		
39826	7	30	10	7	2178.14	2169.12	7		
39826	8	62	10	9	2303.92	2293.2	9		
39827	1	55	10	10	2418.39	2402.35	10		
39827	2	44	10	10	2482.96	2466.79	10		
39827	3	2	10	10	2282.29	2265.96	10		
39827	4	15	10	9	2257.17	2241.21	9		
39827	5	14	10	10	2304.03	2287.39	10		
39827	6	52	10	9	2435.43	2421.54	9		
39827	7	3	10	7	2174.04	2160.76	7		
39827	8	13	10	9	2256.81	2242.4	9		
39828	1	37	10	8	2075.63	2064.05	8		
39828	2	8	10	9	2503.28	2492.18	9		
39828	3	38	10	10	2358.68	2346.6	10		
39828	4	41	10	10	2114.08	2102.3	10		
39828	5	43	10	10	2204.41	2191.06	10		
39828	6	46	10	8	2339.3	2328.68	8		
39828	7	5	10	10	2255.15	2244.33	10		
39828	8	59	10	9	2358.03	2345.63	9		
39831	1	61	10	7	2395.6	2382.83	7		
39831	2	22	10	6	2217.34	2209.46	6		
39831	3	63	10	10	2255.89	2242.06	10		
39831	4	36	10	9	2422.16	2409.69	9		
39831	5	17	10	10	2246.24	2231.42	10		
39831	6	26	10	10	2421.71	2407.74	10		
39831	7	31	10	10	2202.23	2187.58	10		
39831	8	39	10	10	2320.61	2306.81	10		
39833	1	23	10	10	2124.42	2109.17	10		
39833	2	51	10	10	2231.8	2219.15	10		
39833	3	50	10	9	2301.29	2285.94	9		
39833	4	24	10	10	2340.29	2325.01	10		
39833	5	56	10	10	2355.47	2340.4	10		
39833	6	19	10	10	2453.87	2437.5	10		
39833	7	34	10	10	2156.69	2141.54	10		

CETIS Test Data Worksheet

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
39833	8	40	10	9	2228.71	2213.54	9		
39834	1	64	10	10	2324.36	2309.14	10		
39834	2	25	10	10	2459.82	2446.34	10		
39834	3	49	10	9	2164.42	2150.98	9		
39834	4	28	10	10	2226.55	2213.24	10		
39834	5	42	10	9	2238.7	2225.4	9		
39834	6	12	10	8	2365.25	2351.72	8		
39834	7	48	10	10	2473.25	2458.7	10		
39834	8	47	10	10	2550.69	2536.13	10		
39835	1	7	10	9	2407.36	2392.55	9		
39835	2	45	10	10	2118.15	2106.1	9		
39835	3	20	10	10	2439.6	2425.37	10		
39835	4	58	10	10	2290.51	2276.94	10		
39835	5	10	10	9	2415.55	2403.08	9		
39835	6	53	10	10	2316.09	2302.01	10		
39835	7	4	10	10	2191	2176.76	10		
39835	8	29	10	10	2427.68	2415.88	10		

Chironomus tentans

Statistical Comparisons

Site vs. Reference

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Test Run No:	04-7629-1363	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	26 Jan-10 17:30	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Reconstituted Water
Ending Date:	05 Feb-10 11:00	**Species:**	Chironomus tentans	**Brine:**	
Duration:	9d 18h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample Code	Sample No	Sample Date	Receive Date	Sample Age	Client Name	Project
39831	09-9831-6619	28 Dec-09 13:30	29 Dec-09 11:30	29d 4h	TRC	
39826	21-4383-9233	28 Dec-09 10:30	29 Dec-09 11:30	29d 7h		
39827	06-6182-2813	28 Dec-09 11:30	29 Dec-09 11:30	29d 6h		
39828	07-4990-8471	28 Dec-09 12:40	29 Dec-09 11:30	29d 5h		
39833	17-1160-7841	28 Dec-09 10:50	29 Dec-09 11:30	29d 7h		
39834	01-6873-1309	28 Dec-09 12:25	29 Dec-09 11:30	29d 5h		
39835	07-1405-8545	28 Dec-09 15:30	29 Dec-09 11:30	29d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
39831	Sediment	City of New Bedford KMS	ERC-SED 14		
39826	Sediment	City of New Bedford KMS	ERC-SED 7		
39827	Sediment	City of New Bedford KMS	ERC-SED 9		
39828	Sediment	City of New Bedford KMS	ERC-SED 11-A-C		
39833	Sediment	City of New Bedford KMS	SED-16		
39834	Sediment	City of New Bedford KMS	SED-40		
39835	Sediment	City of New Bedford KMS	SED-48		

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
02-2166-0362	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria
05-1920-3562	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria
07-8528-9212	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria
08-6765-4404	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria
13-9157-9486	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria
18-0138-9019	Survival Rate	Control Resp	0.9	0.7 - NL	Yes	Passes acceptability criteria

Mean AF Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39452	1.51302	1.31335	1.82429	0.0289706	0.158679	10.91%	0.0%
39826	8	1.2581	1.23629	1.27991	1.19111	1.38222	0.0106642	0.0584102	4.64%	13.46%
39827	8	1.66662	1.62391	1.70932	1.54332	1.89715	0.0208789	0.114358	6.86%	-14.64%
39828	8	1.27364	1.22911	1.31817	1.08198	1.44748	0.0217724	0.119252	9.36%	12.39%
39833	8	1.54602	1.49408	1.59795	1.26502	1.70557	0.0253938	0.139088	9.0%	-6.35%
39834	8	1.4718	1.4302	1.5134	1.33101	1.69125	0.0203379	0.111396	7.57%	-1.24%
39835	8	1.39525	1.34729	1.44321	1.18001	1.64556	0.0234502	0.128442	9.21%	4.03%

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.840122	0.959878	0.6	1	0.029277	0.160357	17.82%	0.0%
39826	8	0.925	0.886349	0.963651	0.7	1	0.0188982	0.10351	11.19%	-2.78%
39827	8	0.925	0.886349	0.963651	0.7	1	0.0188982	0.10351	11.19%	-2.78%
39828	8	0.925	0.891901	0.958099	0.8	1	0.0161835	0.0886405	9.58%	-2.78%
39833	8	0.975	0.957715	0.992285	0.9	1	0.0084515	0.046291	4.75%	-8.33%
39834	8	0.95	0.921773	0.978227	0.8	1	0.0138013	0.0755929	7.96%	-5.56%
39835	8	0.975	0.957715	0.992285	0.9	1	0.0084515	0.046291	4.75%	-8.33%

Chironomus 10-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.31335	1.38298	1.38555	1.48201	1.397	1.46499	1.38
39826	1.23901	1.2589	1.25	1.38222	1.20801	1.247	1.28854	1.19111
39827	1.60398	1.61699	1.63301	1.77333	1.66401	1.54332	1.89715	1.60113
39828	1.44748	1.23334	1.20798	1.178	1.33499	1.32751	1.08198	1.37779
39833	1.525	1.26501	1.70557	1.528	1.50701	1.63701	1.51499	1.68555
39834	1.52202	1.348	1.49333	1.33101	1.47778	1.69125	1.455	1.45601
39835	1.64556	1.33887	1.423	1.35701	1.38555	1.40801	1.424	1.18

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.7	0.6	1	0.9	1	1	1	1
39826	1	0.9	1	0.9	1	1	0.7	0.9
39827	1	1	1	0.9	1	0.9	0.7	0.9
39828	0.8	0.9	1	1	1	0.8	1	0.9
39833	1	1	0.9	1	1	1	1	0.9
39834	1	1	0.9	1	0.9	0.8	1	1
39835	0.9	1	1	1	0.9	1	1	1

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 05-1920-3562 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					10.83%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39826	67		3	0.5019	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0025	0.0025	1	0.0729632	0.7910	Non-Significant Effect
Error	0.479686	0.0342633	14			
Total	0.4821859	0.0367632	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.12824	8.88539	0.3403	Equal Variances
Distribution	Shapiro-Wilk Normality	0.767842		0.0011	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39826	8	0.925	0.885627	0.964373	0.7	1	0.0192213	0.10351	11.19%	-2.78%

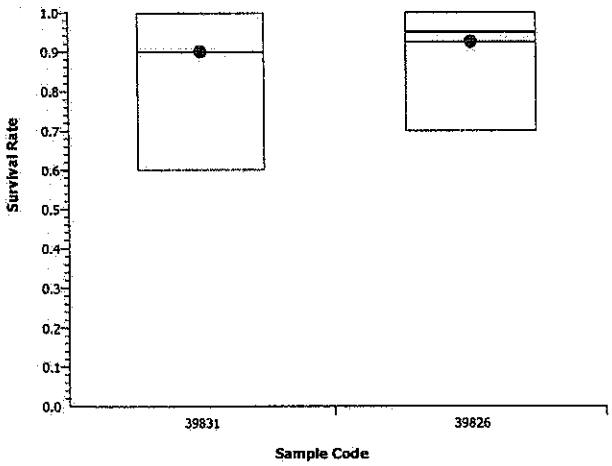
Angular (Corrected) Transformed Summary

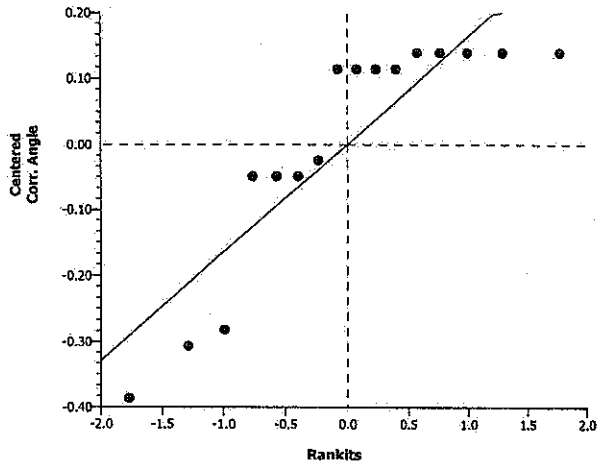
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39826	8	1.2983	1.242	1.35459	0.991157	1.41202	0.027484	0.148006	11.4%	-1.96%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39826	1	1	1	1	0.9	0.9	0.9	0.7

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 18-0138-9019 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					10.83%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39827	67		3	0.4973	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0025	0.0025	1	0.0729632	0.7910	Non-Significant Effect
Error	0.479686	0.0342633	14			
Total	0.4821859	0.0367632	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.12824	8.88539	0.3403	Equal Variances
Distribution	Shapiro-Wilk Normality	0.767842		0.0011	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39827	8	0.925	0.885627	0.964373	0.7	1	0.0192213	0.10351	11.19%	-2.78%

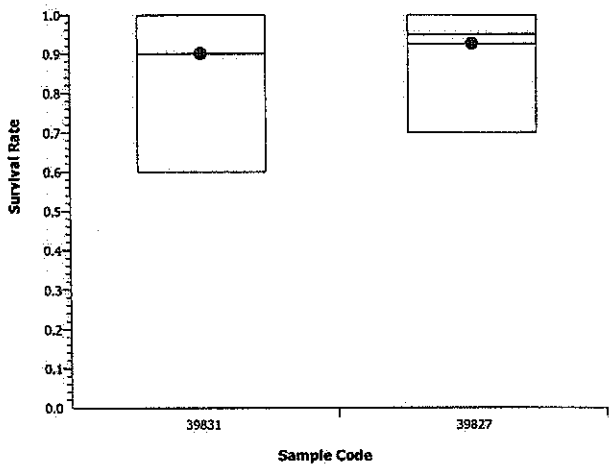
Angular (Corrected) Transformed Summary

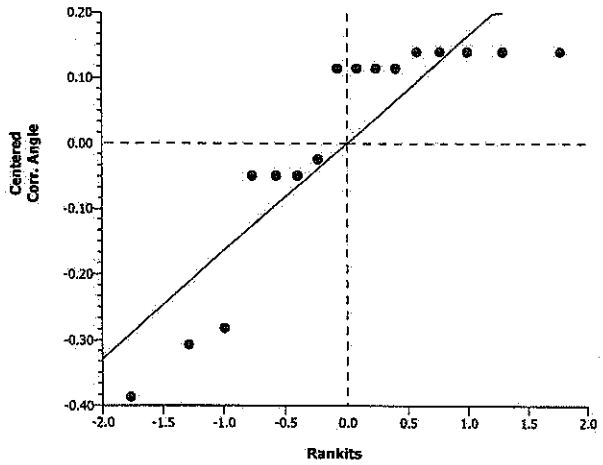
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39827	8	1.2983	1.242	1.35459	0.991157	1.41202	0.027484	0.148006	11.4%	-1.96%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39827	1	1	1	1	0.9	0.9	0.9	0.7

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 08-6765-4404 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					10.47%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39828	67		2	0.4870	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0018943	0.0018943	1	0.0581684	0.8129	Non-Significant Effect
Error	0.4559164	0.0325655	14			
Total	0.4578107	0.0344597	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.51867	8.88539	0.2461	Equal Variances
Distribution	Shapiro-Wilk Normality	0.793755		0.0023	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39828	8	0.925	0.891283	0.958717	0.8	1	0.0164601	0.0886405	9.58%	-2.78%

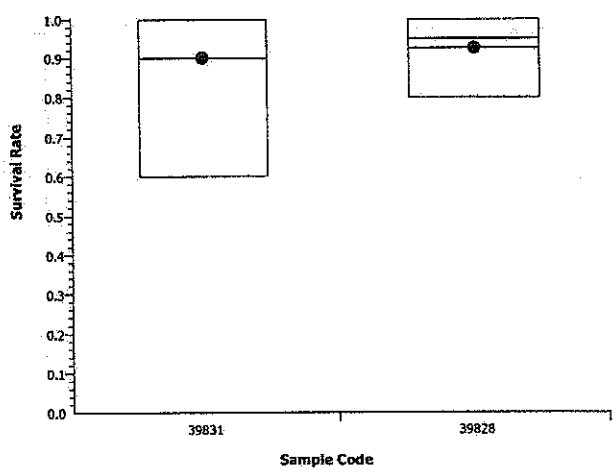
Angular (Corrected) Transformed Summary

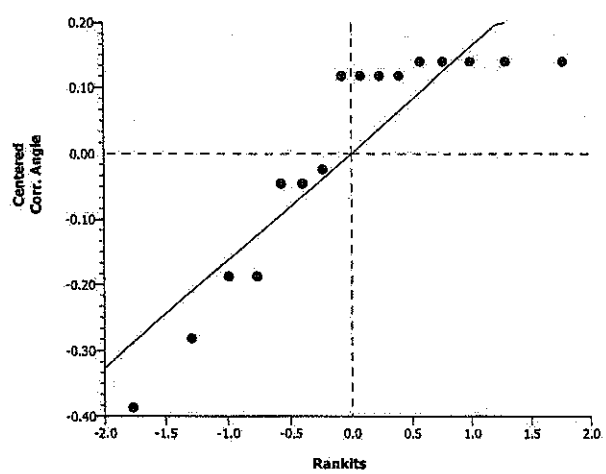
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39828	8	1.29506	1.24331	1.34681	1.10715	1.41202	0.0252642	0.136052	10.51%	-1.71%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39828	1	1	1	1	0.9	0.9	0.8	0.8

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 02-2166-0362 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					9.04%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39833	74		2	0.8564	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0383992	0.0383992	1	1.46808	0.2457	Non-Significant Effect
Error	0.3661845	0.0261560	14			
Total	0.4045837	0.0645552	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	8.19161	8.88539	0.0127	Equal Variances
Distribution	Shapiro-Wilk Normality	0.809259		0.0036	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39833	8	0.975	0.957392	0.992608	0.9	1	0.0085960	0.046291	4.75%	-8.33%

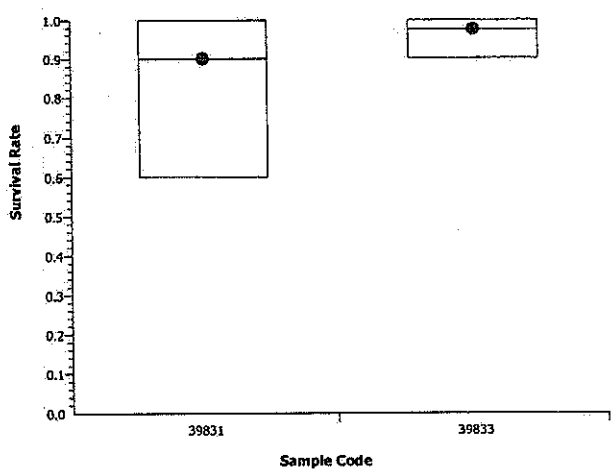
Angular (Corrected) Transformed Summary

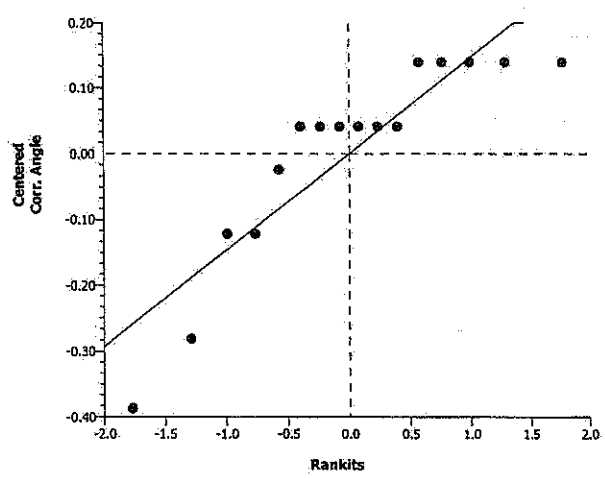
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39833	8	1.37127	1.34258	1.39997	1.24905	1.41202	0.014009	0.0754409	5.5%	-7.69%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39833	1	1	1	1	1	1	0.9	0.9

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 13-9157-9486 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					9.96%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39834	70.5		2	0.6743	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0143377	0.0143377	1	0.474907	0.5020	Non-Significant Effect
Error	0.4226685	0.0301906	14			
Total	0.4370062	0.0445283	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.38804	8.88539	0.1298	Equal Variances
Distribution	Shapiro-Wilk Normality	0.801759		0.0029	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39834	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	-5.56%

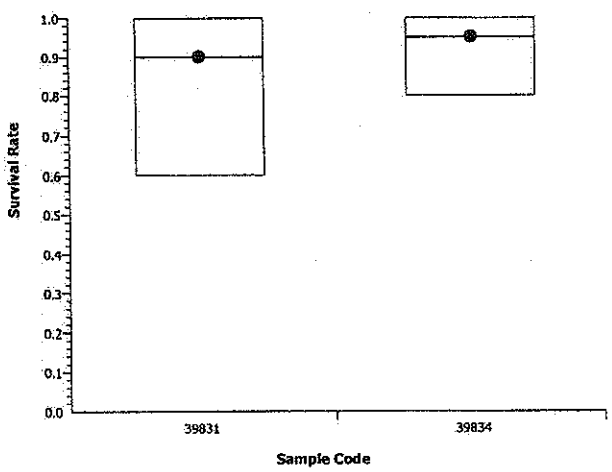
Angular (Corrected) Transformed Summary

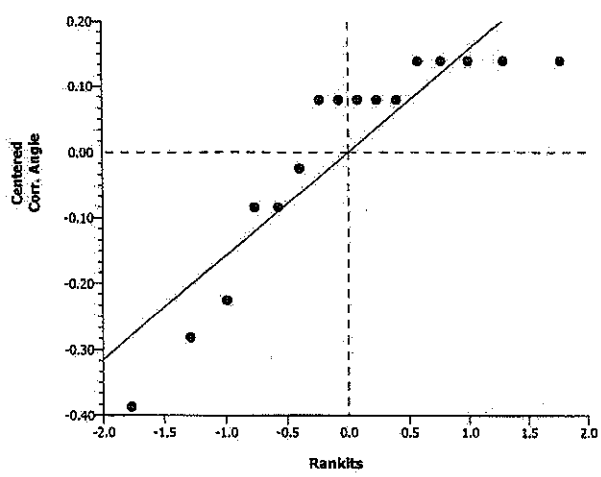
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39834	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	-4.7%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39834	1	1	1	1	1	0.9	0.9	0.8

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 07-8528-9212 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					9.04%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39835	74		2	0.8595	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0383992	0.0383992	1	1.46808	0.2457	Non-Significant Effect
Error	0.3661845	0.0261560	14			
Total	0.4045837	0.0645552	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	8.19161	8.88539	0.0127	Equal Variances
Distribution	Shapiro-Wilk Normality	0.809259		0.0036	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.9	0.839004	0.960996	0.6	1	0.0297775	0.160357	17.82%	0.0%
39835	8	0.975	0.957392	0.992608	0.9	1	0.0085960	0.046291	4.75%	-8.33%

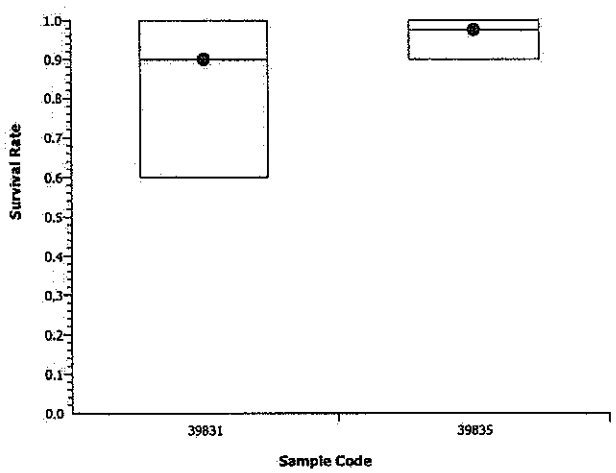
Angular (Corrected) Transformed Summary

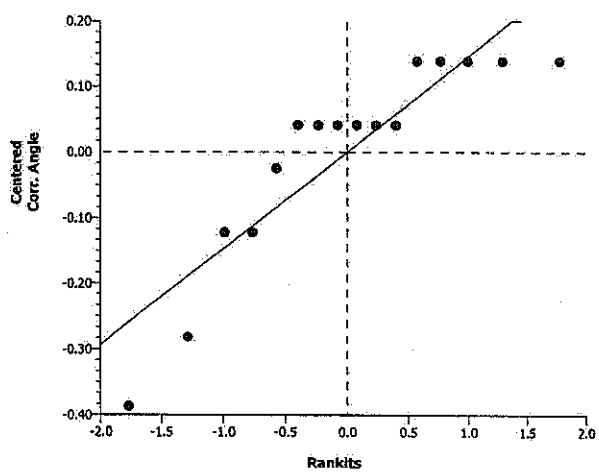
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.2733	1.19116	1.35543	0.886077	1.41202	0.0400951	0.215919	16.96%	0.0%
39835	8	1.37127	1.34258	1.39997	1.24905	1.41202	0.014009	0.0754409	5.5%	-7.69%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.7	0.6
39835	1	1	1	1	1	1	0.9	0.9

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 01-7159-1656 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	20000 Trial					7.24%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39826	38		0	0.0003	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.1531546	0.1531546	1	10.7136	0.0056	Significant Effect
Error	0.2001348	0.0142953	14			
Total	0.3532893	0.1674499	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	7.38006	8.88539	0.0172	Equal Variances
Distribution	Shapiro-Wilk Normality	0.750062		0.0006	Non-normal Distribution

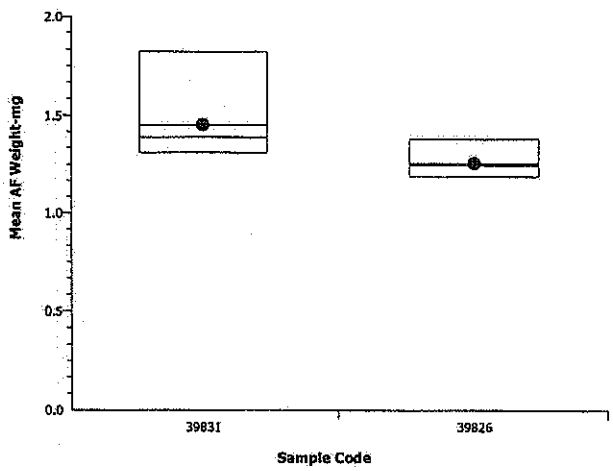
Mean AF Weight-mg Summary

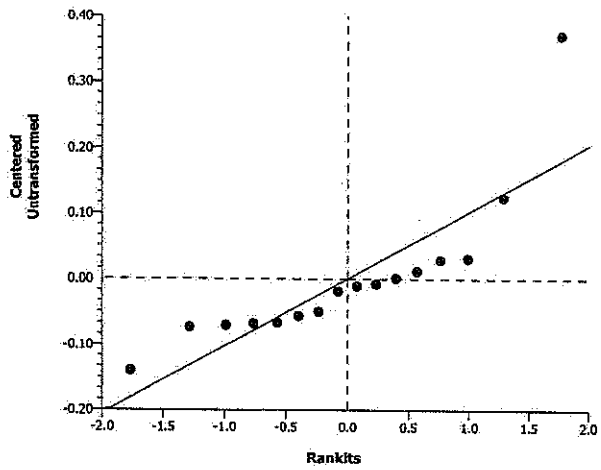
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39826	8	1.2581	1.23588	1.28032	1.19111	1.38222	0.0108465	0.0584102	4.64%	13.46%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39826	1.38222	1.28854	1.2589	1.25	1.247	1.23901	1.20801	1.19111

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 16-8200-0992 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	20000 Trial					8.38%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39827	93		0	0.9965	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.181208	0.181208	1	9.47326	0.0082	Significant Effect
Error	0.2677971	0.0191284	14			
Total	0.4490051	0.2003364	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.92532	8.88539	0.4069	Equal Variances
Distribution	Shapiro-Wilk Normality	0.787311		0.0019	Non-normal Distribution

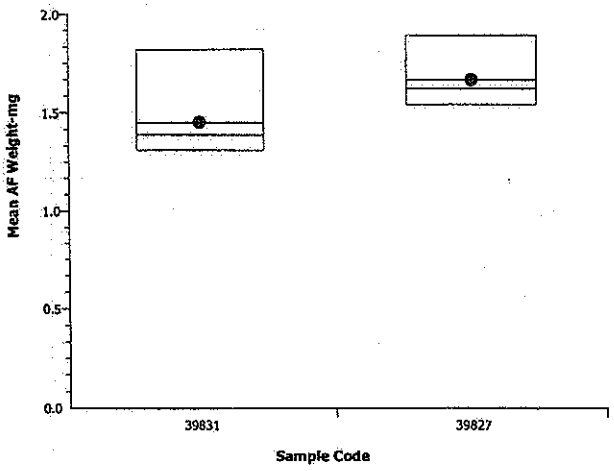
Mean AF Weight-mg Summary

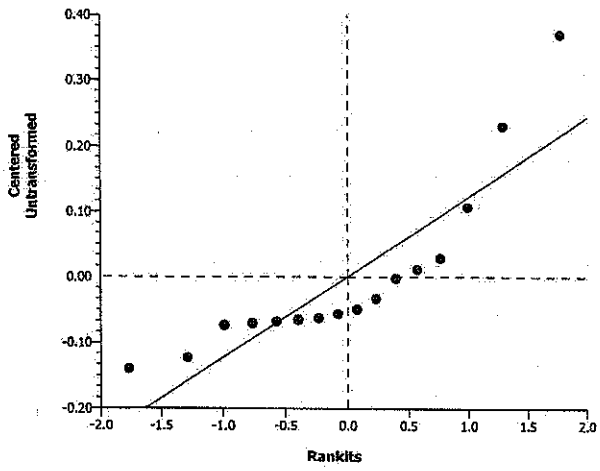
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39827	8	1.66662	1.62312	1.71011	1.54332	1.89715	0.0212358	0.114358	6.86%	-14.64%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39827	1.89715	1.77333	1.66401	1.63301	1.61699	1.60398	1.60113	1.54332

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 07-0087-3221 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					8.5%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39828	2.56684	1.76131	0.123606	0.0112	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.1297965	0.1297965	1	6.58866	0.0224	Significant Effect
Error	0.2758	0.0197	14			
Total	0.4055966	0.1494966	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.77054	8.88539	0.4687	Equal Variances
Distribution	Shapiro-Wilk Normality	0.895073		0.0670	Normal Distribution

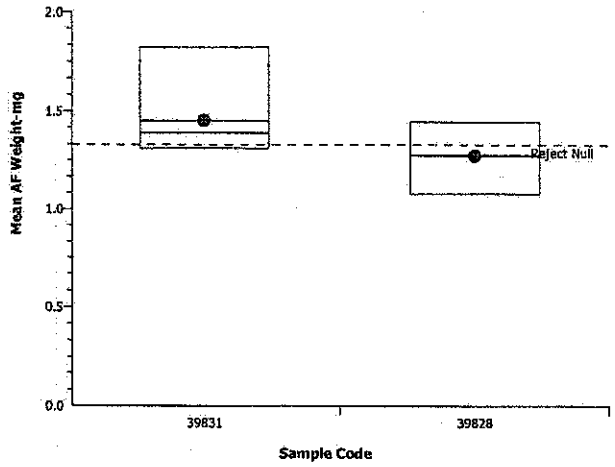
Mean AF Weight-mg Summary

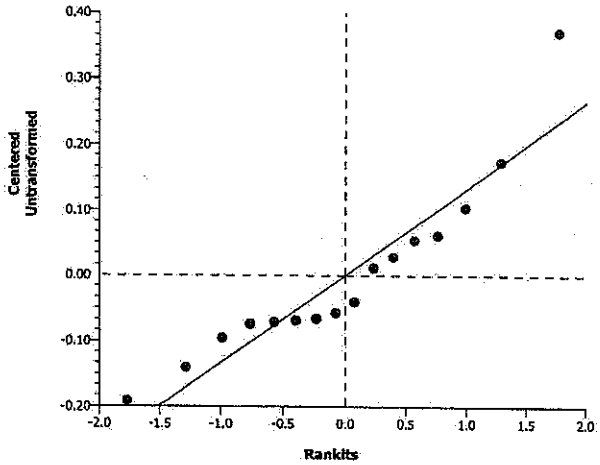
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39828	8	1.27364	1.22827	1.319	1.08198	1.44748	0.0221446	0.119252	9.36%	12.39%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39828	1.44748	1.37779	1.33499	1.32752	1.23334	1.20798	1.178	1.08198

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 05-1258-6430 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					9.04%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39833	-1.23649	1.76131	0.131398	0.8817	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0340367	0.0340367	1	1.52891	0.2366	Non-Significant Effect
Error	0.3116702	0.0222622	14			
Total	0.3457069	0.0562989	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.30155	8.88539	0.7369	Equal Variances
Distribution	Shapiro-Wilk Normality	0.920013		0.1688	Normal Distribution

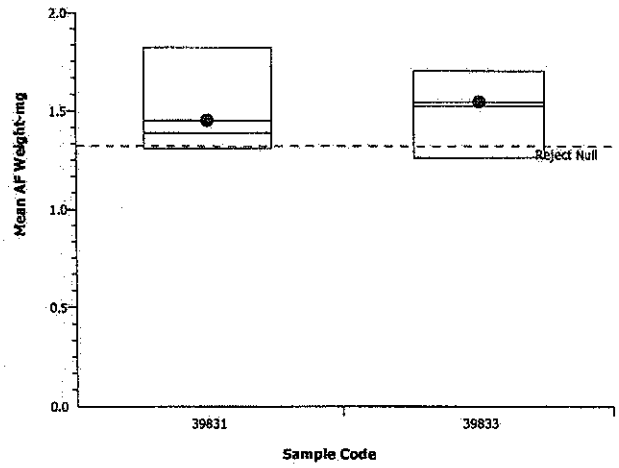
Mean AF Weight-mg Summary

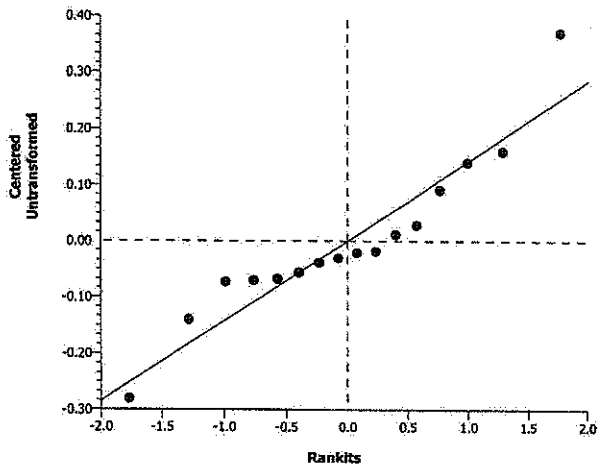
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39833	8	1.54602	1.49311	1.59892	1.26502	1.70557	0.0258279	0.139088	9.0%	-6.35%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39833	1.70557	1.68555	1.63701	1.528	1.525	1.51499	1.50701	1.26502

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 07-8886-3303 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	20000 Trial					8.3%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39834	75		0	0.7473	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0013	0.0013	1	0.0691712	0.7964	Non-Significant Effect
Error	0.2631153	0.018794	14			
Total	0.2644153	0.020094	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.02909	8.88539	0.3711	Equal Variances
Distribution	Shapiro-Wilk Normality	0.824348		0.0058	Non-normal Distribution

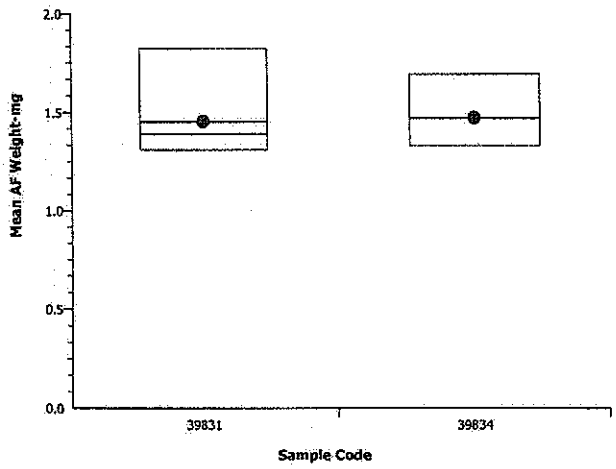
Mean AF Weight-mg Summary

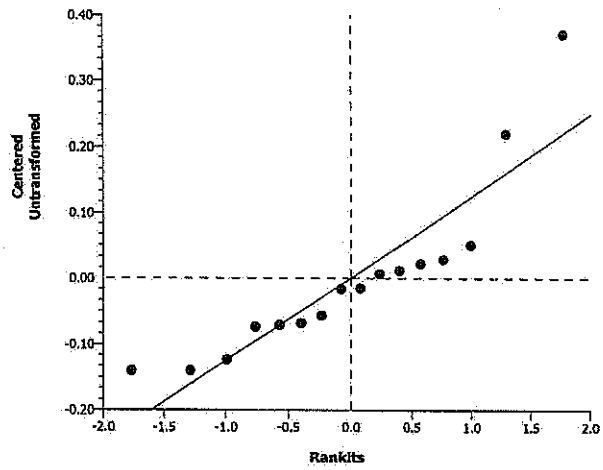
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39834	8	1.4718	1.42943	1.51417	1.33101	1.69125	0.0206856	0.111396	7.57%	-1.24%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39834	1.69125	1.52202	1.49333	1.47778	1.45601	1.45501	1.348	1.33101

Graphics





CETIS Analytical Report

Report Date: 23 Feb-10 14:07 (p 1 of 1)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 08-1078-3059 **Endpoint:** Mean AF Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 23 Feb-10 14:07 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					8.74%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39835	0.810817	1.76131	0.127126	0.2155	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0136995	0.0136995	1	0.657425	0.4310	Non-Significant Effect
Error	0.291734	0.0208381	14			
Total	0.3054335	0.0345377	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.52624	8.88539	0.5907	Equal Variances
Distribution	Shapiro-Wilk Normality	0.841026		0.0101	Normal Distribution

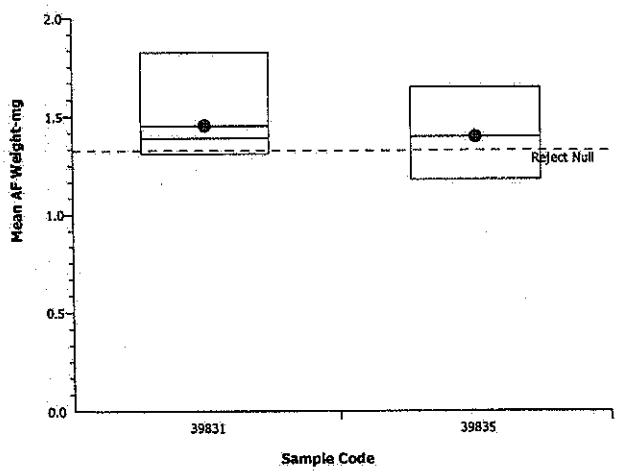
Mean AF Weight-mg Summary

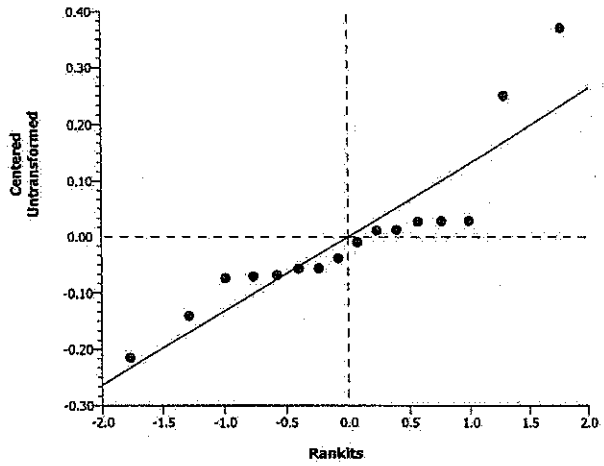
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.45377	1.39341	1.51413	1.31335	1.82429	0.0294659	0.158679	10.91%	0.0%
39835	8	1.39525	1.34639	1.44411	1.18001	1.64556	0.0238511	0.128442	9.21%	4.03%

Mean AF Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1.82429	1.48201	1.46499	1.397	1.38555	1.38298	1.38001	1.31335
39835	1.64556	1.424	1.423	1.40801	1.38555	1.35701	1.33887	1.18001

Graphics





CETIS Test Data Worksheet

Report Date: 23 Feb-10 14:05 (p 1 of 2)
Link/Link Code: 12-1679-3433/12151a

Chironomus 10-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Start Date: 26 Jan-10 17:30 **Species:** Chironomus tentans **Sample Code:** 39831
Ending Date: 05 Feb-10 11:00 **Protocol:** EPA/600/R-99/064 (2000) **Sample Source:** City of New Bedford KMS
Sample Date: 28 Dec-09 13:30 **Material:** Sediment **Sample Station:** ERC-SED 14

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
39831	1	9	10	7	2395.6	2382.83	7		
39831	2	10	10	6	2217.34	2209.46	6		
39831	3	19	10	10	2255.89	2242.06	10		
39831	4	28	10	9	2422.16	2409.69	9		
39831	5	20	10	10	2246.24	2231.42	10		
39831	6	8	10	10	2421.71	2407.74	10		
39831	7	45	10	10	2202.23	2187.58	10		
39831	8	56	10	10	2320.61	2306.81	10		
39826	1	54	10	10	2206.52	2194.13	10		
39826	2	50	10	9	2257.77	2246.44	9		
39826	3	22	10	10	2296.53	2284.03	10		
39826	4	23	10	9	2344.02	2331.58	9		
39826	5	40	10	10	2138.54	2126.46	10		
39826	6	1	10	10	2271.71	2259.24	10		
39826	7	51	10	7	2178.14	2169.12	7		
39826	8	4	10	9	2303.92	2293.2	9		
39827	1	43	10	10	2418.39	2402.35	10		
39827	2	7	10	10	2482.96	2466.79	10		
39827	3	44	10	10	2282.29	2265.96	10		
39827	4	6	10	9	2257.17	2241.21	9		
39827	5	21	10	10	2304.03	2287.39	10		
39827	6	35	10	9	2435.43	2421.54	9		
39827	7	34	10	7	2174.04	2160.76	7		
39827	8	53	10	9	2256.81	2242.4	9		
39828	1	5	10	8	2075.63	2064.05	8		
39828	2	24	10	9	2503.28	2492.18	9		
39828	3	36	10	10	2358.68	2346.6	10		
39828	4	39	10	10	2114.08	2102.3	10		
39828	5	26	10	10	2204.41	2191.06	10		
39828	6	29	10	8	2339.3	2328.68	8		
39828	7	41	10	10	2255.15	2244.33	10		
39828	8	2	10	9	2358.03	2345.63	9		
39833	1	18	10	10	2124.42	2109.17	10		
39833	2	25	10	10	2231.8	2219.15	10		
39833	3	38	10	9	2301.29	2285.94	9		
39833	4	47	10	10	2340.29	2325.01	10		
39833	5	55	10	10	2355.47	2340.4	10		
39833	6	33	10	10	2453.87	2437.5	10		
39833	7	48	10	10	2156.69	2141.54	10		
39833	8	14	10	9	2228.71	2213.54	9		
39834	1	3	10	10	2324.36	2309.14	10		
39834	2	52	10	10	2459.82	2446.34	10		
39834	3	30	10	9	2164.42	2150.98	9		
39834	4	13	10	10	2226.55	2213.24	10		
39834	5	17	10	9	2238.7	2225.4	9		
39834	6	12	10	8	2365.25	2351.72	8		
39834	7	11	10	10	2473.25	2458.7	10		

CETIS Test Data Worksheet

Report Date: 23 Feb-10 14:05 (p 2 of 2)
Link/Link Code: 12-1679-3433/12151a

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
39834	8	42	10	10	2550.69	2536.13	10		
39835	1	27	10	9	2407.36	2392.55	9		
39835	2	15	10	10	2118.15	2106.1	9		
39835	3	16	10	10	2439.6	2425.37	10		
39835	4	49	10	10	2290.51	2276.94	10		
39835	5	32	10	9	2415.55	2403.08	9		
39835	6	31	10	10	2316.09	2302.01	10		
39835	7	46	10	10	2191	2176.76	10		
39835	8	37	10	10	2427.68	2415.88	10		

Midge (*Chironomus tentans*) Day 10 Survival and Ash-free Dry Weight Data

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39825	A	9	—	—	KK	~~10~~ 9	5	2313.48	9	2336.62	2320.99
CTL	B	9	1	—	KK	10	124	2224.49	9	2246.63	2231.85
	C	10	—	—	J	10	143	2365.97	10	2392.54	2376.58
	D	10	—	—	J	10	95	2158.14	10	2187.43	2169.33
	E	10	—	—	KK	10	113	2374.65	10	2405.20	2387.16
	F	8	—	—	J	8	24	2301.73	8	2323.73	2309.54
	G	10	—	—	KK	10	6	2130.12	10	2157.43	2141.23
	H	10	—	—	KK	10	60	2111.01	10	2134.75	2116.69

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39826	A	10	—	—	JG	10	142	2192.76	10	2206.52	2194.13
ERC-SED 7	B	9	—	—	J	9	87	2245.34	9	2257.77	2246.44
	C	10	—	—	JG	10	166	2282.69	10	2296.53	2284.03
	D	9	—	—	KK	9	118	2330.32	9	2344.02	2331.58
	E	10	—	—	JG	10	61	2125.11	10	2138.54	2126.46
	F	10	—	—	JG	10	110	2255.93	10	2271.71	2259.24
QC J	G	7	—	—	KK	7	120	2168.18	7	2178.14	2169.12
	H	9	—	—	KK	9	93	2291.99	9	2303.92	2293.20

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39827	A	10	—	—	JG	10	164	2397.70	10	2418.39	2402.35
ERC-SED 9	B	10	—	—	JG	10	105	2462.82	10	2482.96	2466.79
	C	10	—	—	JG	10	141	2261.35	10	2282.29	2265.96
	D	9	—	—	J	9	194	2236.98	9	2257.17	2241.21
	E	10	—	—	KK	10	9	2283.05	10	2304.03	2287.39
	F	9	—	—	J	9	146	2418.72	9	2435.43	2421.54
QC J	G	7	—	—	KK	7	33	2157.65	7	2174.04	2160.76
	H	9	—	—	KK	9	1	2239.22	9	2256.81	2242.40

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39828	A	8	—	—	JG	8	67	2063.05	8	2075.63	2064.05
ERC-SED	B	9	—	—	JG	9	8	2491.19	9	2503.28	2492.18
11-A-C	C	10	—	—	KK	10	151	2345.59	10	2358.68	2346.60
	D	10	—	—	KK	10	89	2101.22	10	2114.08	2102.30
	E	10	—	—	KK	10	46	2189.96	10	2204.41	2191.06
	F	8	—	—	J	8	131	2327.80	8	2339.30	2328.68
	G	10	—	—	KK	10	133	2243.29	10	2255.15	2244.33
	H	9	—	—	KK	9	197	2344.59	9	2358.03	2345.63
				Date:	2/5/2010	Init./Date:	JG	2-4-2010	JG 2/5	JG 2/6/10 09:35	JG 2/6/10 12:25

Midge (*Chironomus tentans*) Day 10 Survival and Ash-free Dry Weight Data

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39831 QCS	A	7	—	—	JG	7	19	2377.55	7	2395.60	2388.83
ERC-SED 14 QC KK	B	6	—	—	JG	6	39	2204.42	6	2217.34	2209.46
	C	10	—	—	J	10	162	2236.66	10	2255.89	2242.06
	D	9	—	—	KK	9	173	2405.52	9	2422.16	2409.69
	E	10	—	—	KK	10	159	2226.12	10	2246.24	2231.42
	F	10	—	—	KK	10	163	2403.68	10	2421.71	2407.74
	G	10	—	—	J	10	34	2182.43	10	2202.23	2187.58
	H	10	—	—	KK	10	18	2302.13	10	2320.61	2306.81

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg) JG
39833	A	10	—	—	JG	10	54	2105.67	10	2124.42	2108.17
SED-16	B	10	—	—	JG	10	168	2216.29	10	2231.80	2219.15
	C	9	—	—	KK	9	11	2282.36	9	2301.29	2285.94
	D	10	—	—	KK	10	109	2322.25	10	2340.29	2325.01
	E	10	—	—	J	10	153	2337.26	10	2355.47	2340.40
	F	10	—	—	KK	10	130	2434.74	10	2453.87	2437.50
	G	10	—	—	J	10	44	2138.39	10	2156.69	2141.54
	H	9	—	—	KK	9	97	2210.09	9	2228.71	2213.54

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39834	A	10	—	—	KK	10	102	2306.31	10	2324.36	2309.14
SED-40	B	10	—	—	JG	10	157	2443.32	10	2459.82	2446.34
	C	9	—	—	J	9	26	2148.49	9	2164.42	2150.98
	D	10	—	—	KK	10	94	2210.87	10	2226.55	2213.24
	E	9	—	—	J	① ~~10~~ 9	48	2222.78	9	2238.70	2225.40
	F	8	—	—	KK	8	126	2349.35	8	2365.25	2351.72
	G	10	—	—	KK	10	52	2456.05	10	2473.25	2458.70
	H	10	—	—	KK	10	73	2533.69	10	2550.69	2536.13

Sample	Repl.	Larvae	Pupae	Emerged	Init.	Total Surv	Crucible #	Crucible Wt. (mg)	# Weighed	Crucible Wt. & Larval Wt. (mg)	Crucible Wt. & Ashed Larval Wt. (mg)
39835	A	9	—	—	JG	9	12	2389.52	9	2407.36	2392.55
SED-48	B	9	1	—	JG	10	27	2103.25	JG ~~10~~ 9	2118.15	2106.10
	C	10	—	—	KK	10	22	2421.89	10	2439.60	2425.37
	D	10	—	—	KK	10	149	2274.36	10	2290.51	2276.94
	E	9	—	—	J	9	190	2400.87	9	2415.55	2403.08
	F	10	—	—	KK	10	138	2299.54	10	2316.09	2302.01
	G	10	—	—	KK	10	59	2173.44	10	2191.00	2176.76
	H	10	—	—	KK	10	169	2413.57	10	2427.68	2415.88
				Date:	2/5/2010	Init./Date:	JG	2-4-2010	JG 2/5	JG 2/6/10 10:05	JG 2/6/10 14:30

① Assume 9 surviving since no notation of pupa or emerged.
J 2/23/10

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

Midge (*Chironomus tentans*) Day 10 Ash-free Dry Weight Procedure

Balance Asset #: 00708 (Mettler M3)

Batch 1

Organism dry wt date/time in oven:	2/5/10 12:05	Oven temperature (°C):	83	Init. JG
Organism dry wt date/time out of oven:	2/6/10 0930	Oven temperature (°C):	83	Init. JG
Balance QC: 2000 mg =	2000.039			
Organism ashing date/time in furnace:	2/6/10 10:00	Furnace Temperature (°C):	550	Init. JG
Organism ashing date/time out of furnace:	2/6/10 12:05	Furnace Temperature (°C):	550	Init. JG
Balance QC: 2000 mg =	2000.052			

Balance Asset #: 00708 (Mettler M3)

Batch 2

Organism dry wt date/time in oven:	2/5/10 12:05	Oven temperature (°C):	83	Init. JG
Organism dry wt date/time out of oven:	2/6/10 0930	Oven temperature (°C):	83	Init. JG
Balance QC: 2000 mg =	2000.039			
Organism ashing date/time in furnace:	2/6/10 12:10	Furnace Temperature (°C):	550	Init. JG
Organism ashing date/time out of furnace:	2/6/10 14:15	Furnace Temperature (°C):	550	Init. JG
Balance QC: 2000 mg =	2000.040			

Balance Asset #: 00708 (Mettler M3)

Batch 3

Organism dry wt date/time in oven:	~~2/5/10 JG~~	Oven temperature (°C):		Init.
Organism dry wt date/time out of oven:		Oven temperature (°C):		Init.
Balance QC: 2000 mg =				
Organism ashing date/time in furnace:		Furnace Temperature (°C):		Init.
Organism ashing date/time out of furnace:		Furnace Temperature (°C):		Init.
Balance QC: 2000 mg =				

Determination of ash-free dry weights: Ash the crucibles before use at 550 °C for approximately 2 hours. Store in dessicator. Weigh the crucibles, recording the crucible number and the weight in mg. At the end of the test, rinse recovered larvae with deionized water in a 0.5-mm mesh sieve to remove attached detritus. Pool all surviving larvae from a replicate into a numbered crucible and dry at 60-80°C overnight (to a constant dry weight). Weigh to the nearest 0.01 mg and record. Ash the dried larvae at 550 °C for 2 hours and re-weigh / record. The ash-free dry weight equals the difference between the weight of the dried larvae plus crucible and the weight of the ashed larvae plus pan.

Crucible pre-ashing completed 2/3/10 JT

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by: JT
Review date: 2/23/10

Project: 10009
TRC Environmental
City of New Bedford KMS

Chironomus tentans
Head Capsule Width

SDG: 12151

Culture ID: 012610Ct
Age: approximately 9 days post-hatch (2nd-3rd instar)
Target head capsule width, third instar: 0.33-0.45 mm
Magnification: 32X Micrometer calibration: 1 mm = 35 micrometer units
Organisms from cultures used for testing on 01/26/10

Organism Number	Head Capsule Width (Micrometer units)	Head Capsule Width (mm)
1	12	0.34
2	11	0.31
3	12	0.34
4	12	0.34
5	12	0.34
6	12	0.34
7	11	0.31
8	12	0.34
9	11	0.31
10	11	0.31
11	11	0.31
12	11	0.31
13	12	0.34
14	11	0.31
15	12	0.34
16	12	0.34
17	12	0.34
18	12	0.34
19	12	0.34
20	12	0.34
	Average width (mm):	**0.33**
	Measurement date:	2/24/2010 JW

Aquatec Biological Sciences, Inc.
Williston, VT

J 2/24/10

Chironomus tentans Head Capsule Width

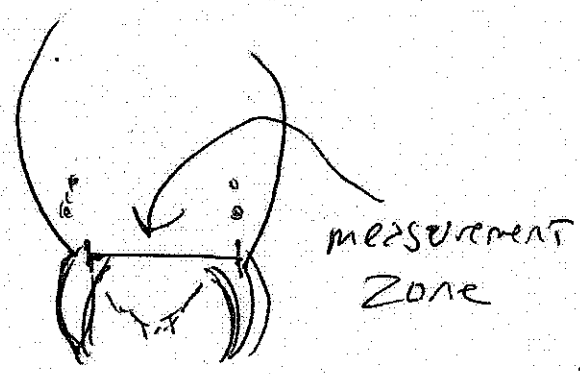
Culture ID: 012610Ct Age: second instar on 01/26/10

Target head capsule width, third instar: 0.33-0.45 mm

Magnification: 32X Micrometer calibration: 1 mm = 35 micrometer units

Organisms from cultures used for testing on 1/26/10

Organism Number	Head Capsule Width (Micrometer units)
1	12
2	11
3	12
4	12
5	12
6	12
7	11
8	12
9	11
10	11
11	11
12	11
13	12
14	~~12~~ 11 ♂
15	~~11~~ 12 ♂
16	12
17	12
18	12
19	12
20	12



Measured on 2/24/10 JW
(preserved subsample of organisms used to start tests.)

2/24/10

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: 1/25/10

SPECIES: *Chironomus dilutus (formerly C. tentans)*

AGE: Deposited on 1/15/2010

LIFE STAGE: Second Instar 1/26/2010

HATCH DATE: Emergent date 2/8/2010

BEGAN FEEDING: Immediately

FOOD: *Selenastrum* sp., Flake slurry

Rec'd 1/26/2010 KK
Temp - 20.1°C
DO - 12.0
pH - ~~12.0~~ KK 6.8
Cond - 549

Water Chemistry Record:

	Current	Range
TEMPERATURE:	23°C	22-26°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	142 mg/l	98-142 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	120 mg/l	50-120 mg/l
pH:	8.10	7.85-8.41

Added Sed, Recon, Water
Fed ✓

Comments:

Facility Supervisor

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

Chironomus dilutus overlying water chemistry

SDG: 12151

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
39825	pH		x	x	x	x	x	x	x	x	7.7	x
	DO (mg/L)		5.6	6.2	7.2		4.7	7.9	7.7	8.7	7.4	8.1
	conductivity (uS)		x	x	x	x	x	x	x	x	391	x
39826	pH		x	x	x	x	x	x	x	x	7.2	x
	DO (mg/L)		5.7	5.8	6.7		5.1	7.5	7.5	8.0	7.1	7.8
	conductivity (uS)		x	x	x	x	x	x	x	x	324	x
39827	pH		x	x	x	x	x	x	x	x	7.4	x
	DO (mg/L)		5.2	5.4	6.4		4.1	8.3	7.8	8.6	7.4	8.0
	conductivity (uS)		x	x	x	x	x	x	x	x	370	x
39828	pH		x	x	x	x	x	x	x	x	7.3	x
	DO (mg/L)		5.5	5.8	6.8		5.4	8.2	7.8	8.7	7.3	8.3
	conductivity (uS)		x	x	x	x	x	x	x	x	345	x
39831	pH		x	x	x	x	x	x	x	x	7.6	x
	DO (mg/L)		5.4	6.1	6.2		5.0	8.3	8.0	9.0	7.4	8.4
	conductivity (uS)		x	x	x	x	x	x	x	x	380	x
39833	pH		x	x	x	x	x	x	x	x	7.6	x
	DO (mg/L)		5.7	5.9	7.0		4.6	8.3	7.8	8.9	7.4	8.3
	conductivity (uS)		x	x	x	x	x	x	x	x	369	x
39834	pH		x	x	x	x	x	x	x	x	7.7	x
	DO (mg/L)		5.8	5.8	7.8		4.1	8.4	8.1	9.0	7.4	8.2
	conductivity (uS)		x	x	x	x	x	x	x	x	389	x
39835	pH		x	x	x	x	x	x	x	x	7.5	x
	DO (mg/L)		5.5	6.3	6.4		5.3	8.4	7.9	8.7	7.3	8.2
	conductivity (uS)		x	x	x	x	x	x	x	x	347	x
2010	Init./Date):	① 26-Jan	OK 27-Jan	OK 28-Jan	KK 29-Jan	~~OK~~ ② JG 30-Jan	OK 31-Jan	OK 1-Feb	OK 2-Feb	OK 3-Feb	OK 4-Feb	JG 5-Feb

① Initial Chems Same as Ha 28-day Day 0 Chems OK

② chems missed; in-beaker D.O.'s measured, reported on a separate page. JG

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by:
Review date:

Notes: In-Beaker DOs

Sample	Day 1	2	Day 3	Day 4	5
39825	4.5	4.5	5.2	4.7	2.5
39826	4.4	4.6	5.0	5.2	3.4
39827	4.~~8~~5 ok	3.8	4.8	4.6	2.2
39828	5.1	4.6	5.3	5.1	2.7
39831	4.1	4.5	5.4	5.4	2.8
39833	4.4	4.6	5.1	5.3	2.5
39834	4.6	4.9	5.1	5.2	2.8
39835	4.5	4.6	5.0	5.1	2.6
	1/27 OK	1/28 OK	1/29 JG	1/30 JG	1/31 OK

AERATION STARTED 1/31/10

Review 2/23/10

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

SDG: 12151

ALKALINITY AND HARDNESS

Sample ID:			Sample Date:	Alkalinity: (mg/L)	Hardness: (mg/L)
39825	Natural Sediment Control	Ct Day 0	1/26/2010	60.0	96.0
39826	ERC-SED 7	Ct Day 0	1/26/2010	52.0	76.0
39827	ERC-SED 9	Ct Day 0	1/26/2010	60.0	88.0
39828	ERC-SED 11-A-C	Ct Day 0	1/26/2010	52.0	86.0
39831	ERC-SED 14	Ct Day 0	1/26/2010	56.0	88.0
39833	SD-16	Ct Day 0	1/26/2010	60.0	90.0
39834	SD-40	Ct Day 0	1/26/2010	76.0	102.0
39835	SD-48	Ct Day 0	1/26/2010	44.0	78.0
39825	Natural Sediment Control	Ct Day 9	2/4/2010	64.0	102.0
39826	ERC-SED 7	Ct Day 9	2/4/2010	36.0	64.0
39827	ERC-SED 9	Ct Day 9	2/4/2010	56.0	86.0
39828	ERC-SED 11-A-C	Ct Day 9	2/4/2010	36.0	44.0
39831	ERC-SED 14	Ct Day 9	2/4/2010	56.0	92.0
39833	SD-16	Ct Day 9	2/4/2010	56.0	78.0
39834	SD-40	Ct Day 9	2/4/2010	56.0	96.0
39835	SD-48	Ct Day 9	2/4/2010	36.0	74.0

Reviewed by: OK Date: 2/25/10

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Species: **HA**

AMMONIA ANALYSIS REPORT

Sample	Pore Water (mg/L) 1/25/201	Overlying Water (mg/L) 1/26/201		2/22/201	
39825	4.1	0.4		0.2	
39826	4.3	0.8		0.1	BR
39827	6.0	0.7		0.1	BR
39828		1.2		0.1	BR
39831	0.6	0.1	BR	0.1	BR
39833	5.2	0.6		0.1	BR
39834	10.5	0.9		0.1	BR
39835	3.8	0.8		0.1	BR

BD- Indicates a concentration value below the reporting limit (<0.1).

Reviewed by: J Date: 2/25/10

ALKALINITY AND HARDNESS

SDG: 12151

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495

Sample ID:			Sample Date:	Alkalinity: (mg/L)	Hardness: (mg/L)
39825	Natural Sediment Control	Ct D-0	1/26/2010	60.0	96.0
39826	ERC-SED 7	Ct D-0	1/26/2010	52.0	76.0
39827	ERC-SED 9	Ct D-0	1/26/2010	60.0	88.0
39828	ERC-SED 11-A-C	Ct D-0	1/26/2010	52.0	86.0
39831	ERC-SED 14	Ct D-0	1/26/2010	56.0	88.0
39833	SD-16	Ct D-0	1/26/2010	60.0	90.0
39834	SD-40	Ct D-0	1/26/2010	76.0	102.0
39835	SD-48	Ct D-0	1/26/2010	44.0	78.0
39825	Natural Sediment Control	Ct D-9	2/4/2010	64.0	102.0
39826	ERC-SED 7	Ct D-9	2/4/2010	36.0	64.0
39827	ERC-SED 9	Ct D-9	2/4/2010	56.0	86.0
39828	ERC-SED 11-A-C	Ct D-9	2/4/2010	36.0	44.0
39831	ERC-SED 14	Ct D-9	2/4/2010	56.0	92.0
39833	SD-16	Ct D-9	2/4/2010	56.0	78.0
39834	SD-40	Ct D-9	2/4/2010	56.0	96.0
39835	SD-48	Ct D-9	2/4/2010	36.0	74.0

Reviewed by: J Date: 2/23/10

Midge, C. tentans, 10-D Survival and Growth

Aquatec Biological Sciences

Client: TRC
Project: TRC-City of New Bedford
Project #: 10009
SDG: 12151
Species: *Chironomus tentans*

Channel #: 6

TEMPERATURE LOG (°C)

DAY	Hour of the Day 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Daily AVE	MIN	MAX
01/26/2010																			22.4	22.2	22.3	22.5	22.5	22.7	22.4	22.2	22.7
01/27/2010	23.0	23.3	23.6	23.7	23.7	23.7	23.7	23.8	23.8	23.9	23.8	23.5	23.1	22.7	22.5	22.3	22.1	22.0	22.2	22.5	22.5	22.6	22.7	22.8	23.1	22.0	23.9
01/28/2010	23.0	23.2	23.3	23.2	23.0	22.9	22.8	22.7	22.8	22.9	22.9	22.8	22.6	22.4	22.6	22.8	23.1	23.2	23.0	23.2	23.3	23.3	23.2	23.2	23.0	22.4	23.3
01/29/2010	23.1	23.1	23.3	23.5	23.7	23.8	24.0	24.0	24.1	24.2	24.3	24.0	23.5	23.1	22.7	22.6	22.4	22.2	22.1	22.0	21.9	22.0	22.1	22.2	23.1	21.9	24.3
01/30/2010	22.6	23.1	23.5	23.7	23.7	23.8	23.8	23.8	24.0	24.1	24.2	23.8	23.1	22.7	23.1	22.6	22.4	22.7	23.0	23.1	22.9	22.7	22.8	23.1	23.3	22.4	24.2
01/31/2010	23.5	24.0	24.3	24.5	24.5	24.5	24.5	24.5	24.5	24.6	24.7	24.6	24.0	23.5	22.9	22.7	22.3	22.1	21.9	21.7	21.6	21.6	21.6	21.6	23.3	21.6	24.7
02/01/2010	21.5	21.6	21.6	21.5	21.4	21.3	21.2	21.2	21.2	21.2	21.2	21.5	21.9	22.2	22.7	23.0	23.2	23.1	22.9	22.7	22.7	22.9	22.9	22.8	22.1	21.2	23.2
02/02/2010	22.7	22.8	22.8	22.6	22.3	22.2	22.1	21.9	21.8	21.8	21.9	22.0	22.1	24.5	24.3	24.1	23.8	23.6	23.6	23.8	23.7	23.6	23.8	23.8	23.0	21.8	24.5
02/03/2010	23.8	23.6	23.8	23.6	23.7	23.8	23.5	23.7	23.6	23.8	23.8	23.5	23.6	23.4	23.3	23.4	23.5	23.6	23.7	23.5	23.4	23.5	23.6	23.5	23.6	23.3	23.8
02/04/2010	23.7	23.2	23.3	23.3	23.3	23.3	23.5	23.4	23.2	23.6	23.5	23.3	23.6	23.1	23.2	23.4	23.2	23.4	23.7	23.4	23.6	23.7	23.6	23.4	23.4	23.1	23.7
02/05/2010	23.5	23.2	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.6	23.3	23.5													23.5	23.2	23.6
Overall Test Temperature:																									**23.1**	**21.2**	**24.7**

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Reviewed by: J Date: 2/25/10

DAILY CHECKLIST FOR SEDIMENT TOXICITY TESTS

Week of: January 24, 2010 **Project: 10009 – *Ct* 10-day** **SDG: 12151**

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs			✓	✓	✓	✓	✓
Noon delivery cycle							
splitter boxes filling?			✓	✓	✓	✓	✓
syringes filling?			✓	✓	✓	✓	✓
needles flowing?			✓	✓	✓	✓	✓
drainage to waste ok?			✓	✓	✓	✓	✓
empty waste buckets?			✓	✓	✓	✓	✓
Test monitoring							
test temperature ok? Probe assignments: **Cart 1: ~~Probe~~** SL2 Channel 6	A.M. P.M	A.M. P.M	A.M. P.M 22.0	A.M. 23.9 J P.M 22.2	A.M. 22.5 P.M 22.5	A.M. 24.3 P.M 22.2	A.M. 23.7 P.M 22.4
D.O. ok?			✓	✓	✓	✓	✓
check for floating organisms			✓	✓	✓	✓	✓
feeding completed?			16:45	1345 OK	1630 OK	1340 JG	1330 JG
Additional activities							
Extra renewals (record time)			✓				
Prior to midnight fill reservoirs			✓	✓	✓	✓	✓
Check water supply			✓	✓	✓	✓	✓
Check delivery tubing to splitter boxes			✓	✓	✓	✓	✓
Corrective Action / Comments		Sediments loaded into beakers, OLW added	Tests started 13:30-17:30 JW	Turned heater down J		TURNED HEATER DOWN	Turned heater down in AM. JG
Initials/Date (2010)	1/24	1/25	1/26	1/27 J OK	1/28 OK	1/29 JG	1/30 JG

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Additional commentary: On a daily basis the D.O. must be measured directly in a representative test replicate for each sample to determine whether additional overlying water renewals (or aeration) are required to maintain D.O. above ~~2~~ 2.5 mg/L.
J

Reviewer: J **Date:** 2/22/10
Aquatec Biological Sciences, Inc.

DAILY CHECKLIST FOR SEDIMENT TOXICITY TESTS

Week of: January 31, 2010 **Project: 10009 – *Ct* 10-day** **SDG: 12151**

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs	✓	✓	✓	✓	✓		
Noon delivery cycle							
splitter boxes filling?	✓	✓	✓	✓	✓		
syringes filling?	✓	✓	✓	✓	✓		
needles flowing?	✓	✓	✓	✓	✓		
drainage to waste ok?	✓	✓	✓	✓	✓		
empty waste buckets?	✓	✓	✓	✓	✓		
Test monitoring							
test temperature ok? Probe assignments: **Cart 1: SL2 Channel 6**	A.M. 24.2 P.M 21.6	A.M. 21.1 P.M 22.9	A.M. 21.6 JG P.M 23.7	A.M. 23.7 P.M 23.7	A.M. 23.4 P.M	A.M. 23.5 P.M	A.M. P.M
D.O. ok?	✓	✓	✓	✓	✓	✓	
check for floating organisms	✓	✓	✓	✓	✓	✓	
feeding completed?	1400 OK	1500 OK	1420 OK	1545 OK	1515 OK		
Additional activities							
~~Extra renewals (record time)~~ Are all reps aerating?			✓ JG	✓ JG		✓	
Prior to midnight fill reservoirs	✓	✓	✓	✓	✓		
Check water supply	✓	✓	✓	✓	✓		
Check delivery tubing to splitter boxes	✓	✓	✓	✓	✓		
Corrective Action / Comments	Turned heater down OK Started aeration	Sediments loaded into beakers, OLW added	OK Tests started 13:30-17:30 JW Turned heater up Heater up JG			Test Ended 11:00	
Initials/Date (2010)	1/31 OK	2/1 OK	2/2 OK	2/3 OK	2/4 OK	2/5 JG KK	2/6

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Additional commentary: On a daily basis the D.O. must be measured directly in a representative test replicate for each sample to determine whether additional overlying water renewals (or aeration) are required to maintain D.O. above 2 mg/L.

Reviewer: JG **Date:** 2/23/10

Aquatec Biological Sciences, Inc.

Amphipod, Hyalella azteca, 28-day survival and growth

Hyalella azteca

Statistical Comparisons

Site vs. Control

0.72 vs. control

CETIS Summary Report

Report Date: 25 Feb-10 14:11 (p 1 of 2)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Test Run No:	00-5116-6156	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	26 Jan-10 14:30	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Water
Ending Date:	23 Feb-10 10:30	**Species:**	Hyalella azteca	**Brine:**	
Duration:	27d 20h	**Source:**	Aquatic Research Organisms, NH	**Age:**	8

Sample Code	Sample No	Sample Date	Receive Date	Sample Age	Client Name	Project
39825	02-5484-4278	01 Dec-09	01 Dec-09	56d 14h		
39826	21-4383-9233	28 Dec-09 10:30	29 Dec-09 11:30	29d 4h	TRC	
39827	06-6182-2813	28 Dec-09 11:30	29 Dec-09 11:30	29d 3h		
39828	07-4990-8471	28 Dec-09 12:40	29 Dec-09 11:30	29d 2h		
39831	09-9831-6619	28 Dec-09 13:30	29 Dec-09 11:30	29d 1h		
39833	17-1160-7841	28 Dec-09 10:50	29 Dec-09 11:30	29d 4h		
39834	01-6873-1309	28 Dec-09 12:25	29 Dec-09 11:30	29d 2h		
39835	07-1405-8545	28 Dec-09 15:30	29 Dec-09 11:30	28d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
39825	Control Sediment	CONTROL	CONTROL		
39826	Sediment	City of New Bedford KMS	ERC-SED 7		
39827	Sediment	City of New Bedford KMS	ERC-SED 9		
39828	Sediment	City of New Bedford KMS	ERC-SED 11-A-C		
39831	Sediment	City of New Bedford KMS	ERC-SED 14		
39833	Sediment	City of New Bedford KMS	SED-16		
39834	Sediment	City of New Bedford KMS	SED-40		
39835	Sediment	City of New Bedford KMS	SED-48		

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
00-2013-2441	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
00-6050-7217	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
02-2680-8151	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
03-8615-6332	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
15-7857-7683	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
19-1037-0944	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
19-7725-5288	Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria

Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.34317	0.357476	0.31625	0.372222	0.0034976	0.0191569	5.47%	0.0%
39826	8	0.255486	0.247875	0.263097	0.208889	0.274	0.0037215	0.0203832	7.98%	27.07%
39827	8	0.278875	0.256992	0.300758	0.209	0.369	0.0106996	0.0586039	21.01%	20.39%
39828	8	0.228379	0.222223	0.234534	0.206667	0.251111	0.0030098	0.0164855	7.22%	34.81%
39831	8	0.219007	0.19897	0.239044	0.137	0.278	0.0097972	0.0536613	24.5%	37.48%
39833	8	0.304432	0.291874	0.31699	0.255455	0.356	0.0061401	0.0336307	11.05%	13.1%
39834	8	0.290375	0.260779	0.319971	0.226	0.462	0.0144706	0.079259	27.3%	17.11%
39835	8	0.272597	0.251792	0.293402	0.205	0.369	0.0101725	0.0557169	20.44%	22.19%

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898596	0.951404	0.8	1	0.0129099	0.0707107	7.64%	0.0%
39826	8	0.9875	0.974298	1	0.9	1	0.006455	0.0353553	3.58%	-6.76%
39827	8	1	1	1	1	1	0	0	0.0%	-8.11%
39828	8	0.925	0.891901	0.958099	0.8	1	0.0161835	0.0886405	9.58%	0.0%
39831	8	0.95	0.921773	0.978227	0.8	1	0.0138013	0.0755929	7.96%	-2.7%
39833	8	1	1	1	1	1	0	0	0.0%	-8.11%
39834	8	1	1	1	1	1	0	0	0.0%	-8.11%
39835	8	0.9875	0.974298	1	0.9	1	0.006455	0.0353553	3.58%	-6.76%

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.361111	0.351	0.31625	0.372222	0.34	0.372	0.354444	0.335556
39826	0.259	0.252	0.263	0.208889	0.256	0.273	0.274	0.258
39827	0.291	0.263	0.301	0.221	0.209	0.231	0.346	0.369
39828	0.24375	0.207	0.231	0.251111	0.2175	0.237	0.233	0.206667
39831	0.278	0.183	0.257	0.179	0.137	0.27	0.185556	0.2625
39833	0.34	0.31	0.32	0.277	0.356	0.255455	0.294	0.283
39834	0.267	0.244	0.328	0.233	0.226	0.462	0.319	0.244
39835	0.205	0.247	0.333	0.369	0.238	0.257	0.297778	0.234

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.9	1	0.8	0.9	1	1	0.9	0.9
39826	1	1	1	0.9	1	1	1	1
39827	1	1	1	1	1	1	1	1
39828	0.8	1	1	0.9	0.8	1	1	0.9
39831	1	1	1	1	1	0.9	0.9	0.8
39833	1	1	1	1	1	1	1	1
39834	1	1	1	1	1	1	1	1
39835	1	1	1	1	1	1	0.9	1

CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 00-2013-2441 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	Not Run					5.0%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39826	-2.25939	1.76131	0.0773488	0.9798	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0393803	0.0393803	1	5.10486	0.0403	Significant Effect
Error	0.1079998	0.0077143	14			
Total	0.1473801	0.0470945	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.64727	8.88539	0.1093	Equal Variances
Distribution	Shapiro-Wilk Normality	0.886989		0.0499	Normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39826	8	0.9875	0.974052	1	0.9	1	0.0065653	0.0353553	3.58%	-6.76%

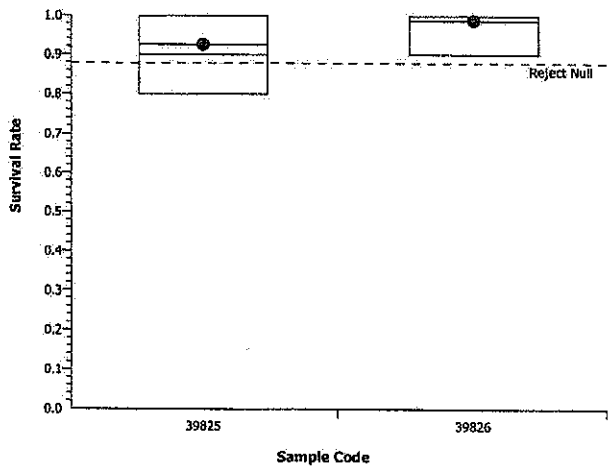
Angular (Corrected) Transformed Summary

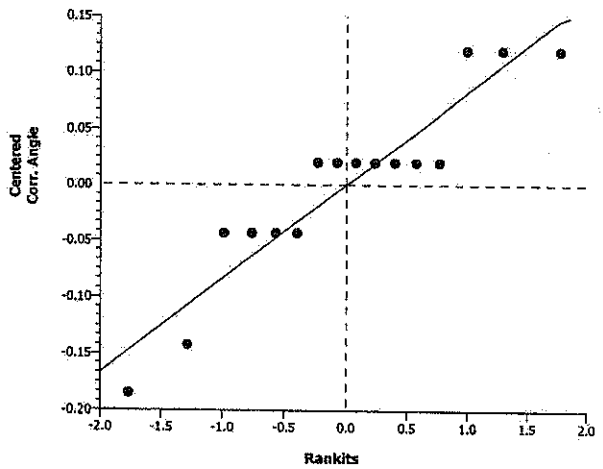
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39826	8	1.39165	1.36973	1.41356	1.24905	1.41202	0.0106996	0.0576192	4.14%	-7.68%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39826	1	1	1	1	1	1	1	0.9

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 00-6050-7217 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.39%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39827	88		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0572105	0.0572105	1	9.44954	0.0082	Significant Effect
Error	0.0847604	0.0060543	14			
Total	0.1419709	0.0632648	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	4.772E+13	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.819148		0.0049	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39827	8	1	1	1	1	1	0	0	0.0%	-8.11%

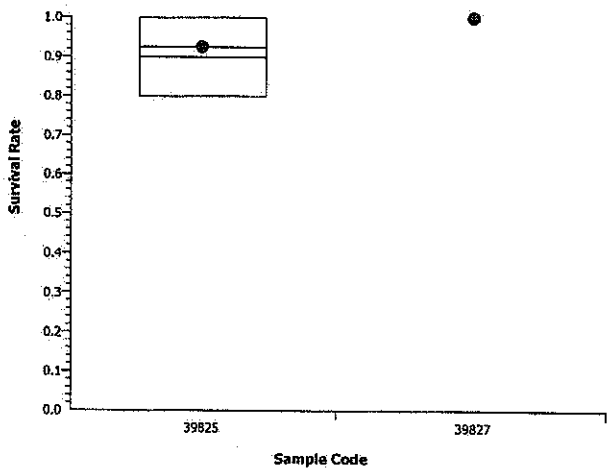
Angular (Corrected) Transformed Summary

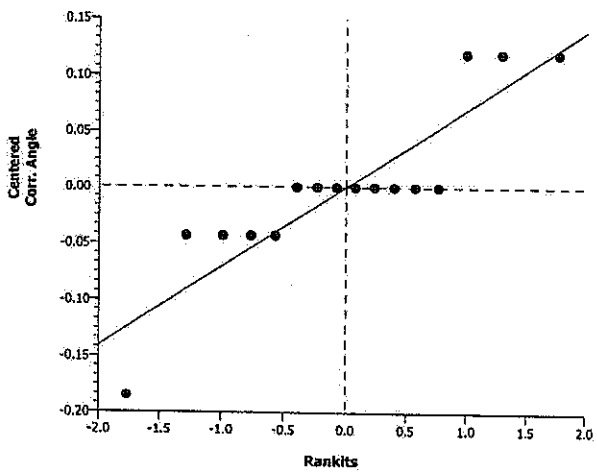
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39827	8	1.41202	1.41192	1.41211	1.41202	1.41202	0	0	0.0%	-9.25%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39827	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 19-1037-0944 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					7.32%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39828	69		3	0.6248	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	2.776E-05	2.776E-05	1	0.001813	0.9666	Non-Significant Effect
Error	0.2143313	0.0153094	14			
Total	0.214359	0.0153371	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.52867	8.88539	0.5893	Equal Variances
Distribution	Shapiro-Wilk Normality	0.800855		0.0028	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39828	8	0.925	0.891283	0.958717	0.8	1	0.0164601	0.0886405	9.58%	0.0%

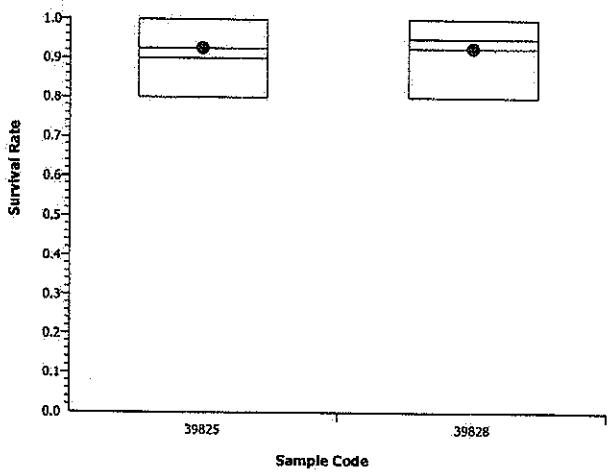
Angular (Corrected) Transformed Summary

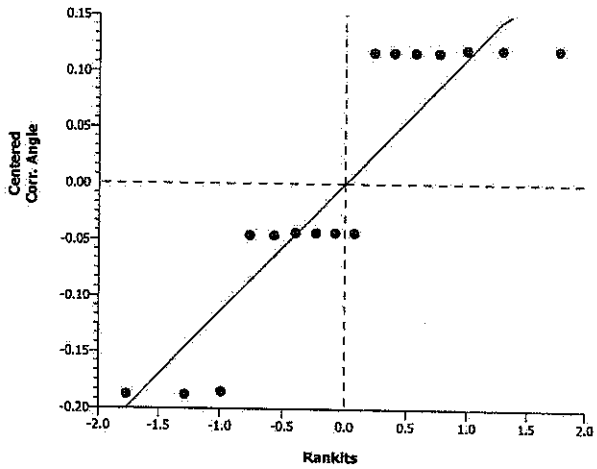
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39828	8	1.29506	1.24331	1.34681	1.10715	1.41202	0.0252642	0.136052	10.51%	-0.2%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39828	1	1	1	1	0.9	0.9	0.8	0.8

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 15-7857-7683 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	Not Run					6.66%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39831	-0.716479	1.76131	0.100157	0.7573	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0066398	0.0066398	1	0.513342	0.4855	Non-Significant Effect
Error	0.1810834	0.0129345	14			
Total	0.1877232	0.0195744	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.13641	8.88539	0.8704	Equal Variances
Distribution	Shapiro-Wilk Normality	0.873296		0.0306	Normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	-2.7%

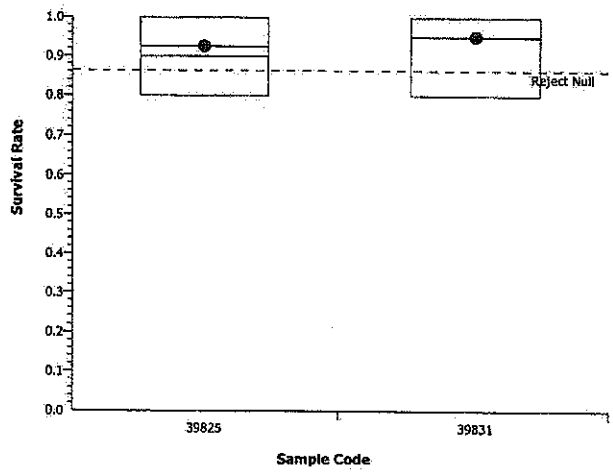
Angular (Corrected) Transformed Summary

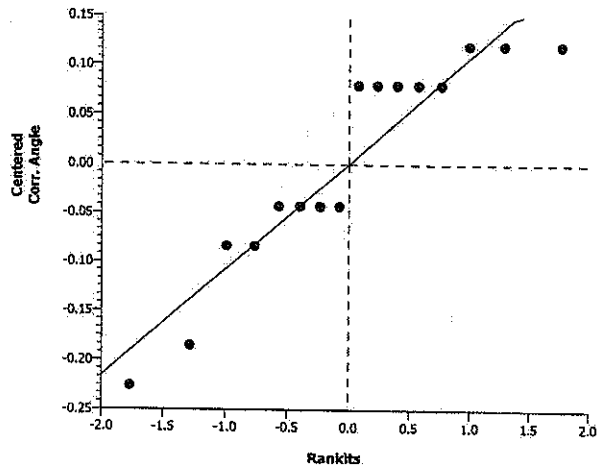
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	-3.15%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39831	1	1	1	1	1	0.9	0.9	0.8

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 19-7725-5288 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.39%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39833	88		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0581047	0.0581047	1	9.59174	0.0079	Significant Effect
Error	0.084809	0.0060578	14			
Total	0.1429136	0.0641624	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1746.45	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.825707		0.0061	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39833	8	1	1	1	1	1	0	0	0.0%	-8.11%

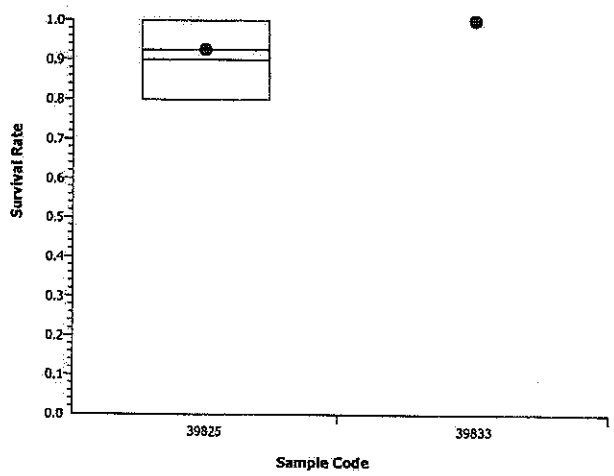
Angular (Corrected) Transformed Summary

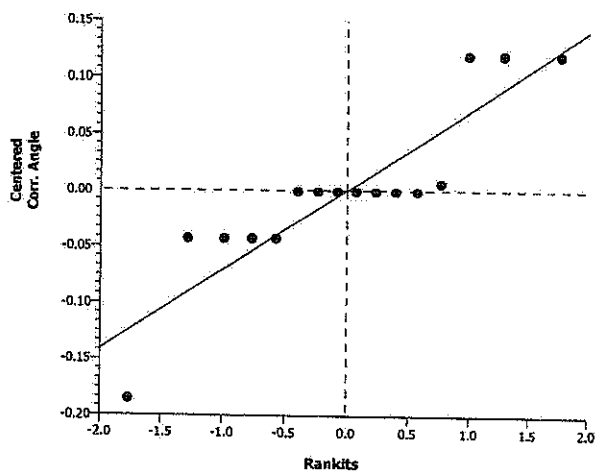
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39833	8	1.41295	1.41194	1.41395	1.41202	1.41946	0.0004913	0.0026455	0.19%	-9.33%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39833	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 02-2680-8151 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.39%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39834	88		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0572105	0.0572105	1	9.44954	0.0082	Significant Effect
Error	0.0847604	0.0060543	14			
Total	0.1419709	0.0632648	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	4.772E+13	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.819148		0.0049	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39834	8	1	1	1	1	1	0	0	0.0%	-8.11%

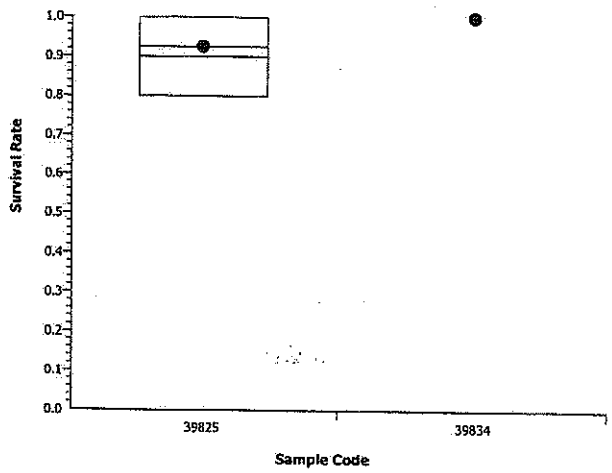
Angular (Corrected) Transformed Summary

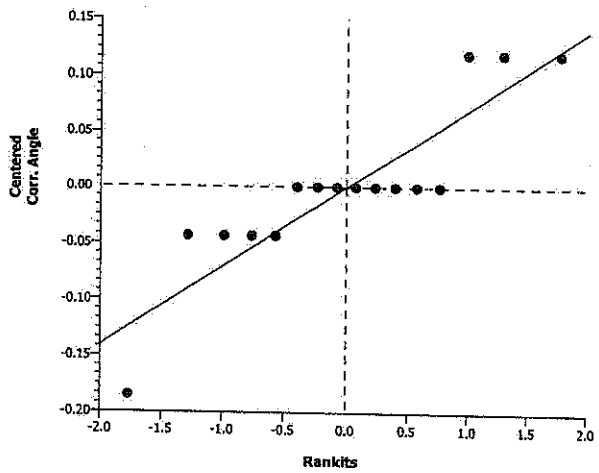
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39834	8	1.41202	1.41192	1.41211	1.41202	1.41202	0	0	0.0%	-9.25%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39834	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 03-8615-6332 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:53 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	Not Run					5.0%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39835	-2.25939	1.76131	0.0773488	0.9798	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0393803	0.0393803	1	5.10486	0.0403	Significant Effect
Error	0.1079998	0.0077143	14			
Total	0.1473801	0.0470945	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.64727	8.88539	0.1093	Equal Variances
Distribution	Shapiro-Wilk Normality	0.886989		0.0499	Normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.925	0.898103	0.951897	0.8	1	0.0131306	0.0707107	7.64%	0.0%
39835	8	0.9875	0.974052	1	0.9	1	0.0065653	0.0353553	3.58%	-6.76%

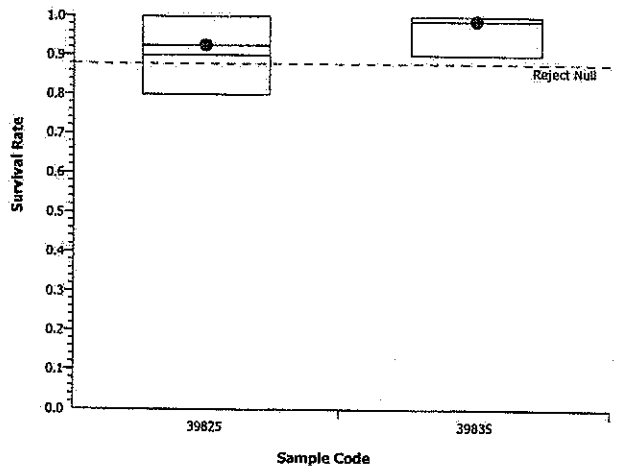
Angular (Corrected) Transformed Summary

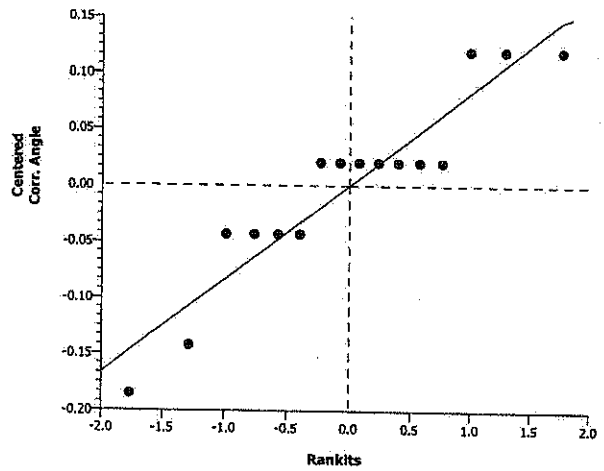
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	1.29242	1.25057	1.33428	1.10715	1.41202	0.0204338	0.110039	8.51%	0.0%
39835	8	1.39165	1.36973	1.41356	1.24905	1.41202	0.0106996	0.0576192	4.14%	-7.68%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	1	1	1	0.9	0.9	0.9	0.9	0.8
39835	1	1	1	1	1	1	1	0.9

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 09-1717-4309 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					4.97%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39826	9.58937	1.76131	0.017419	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0359761	0.0359761	1	91.9561	0.0000	Significant Effect
Error	0.0054772	0.0003912	14			
Total	0.0414533	0.0363673	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.13213	8.88539	0.8742	Equal Variances
Distribution	Shapiro-Wilk Normality	0.888478		0.0527	Normal Distribution

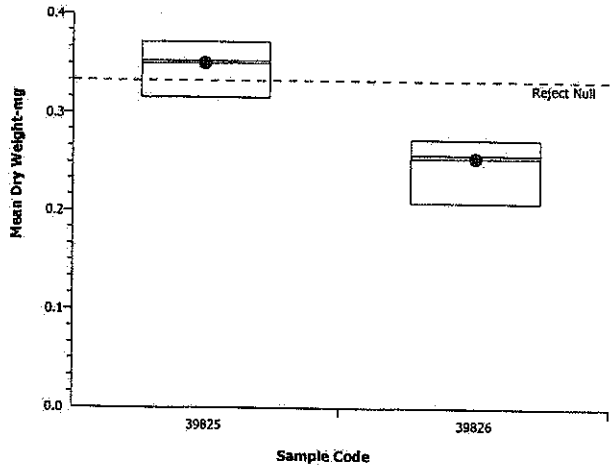
Mean Dry Weight-mg Summary

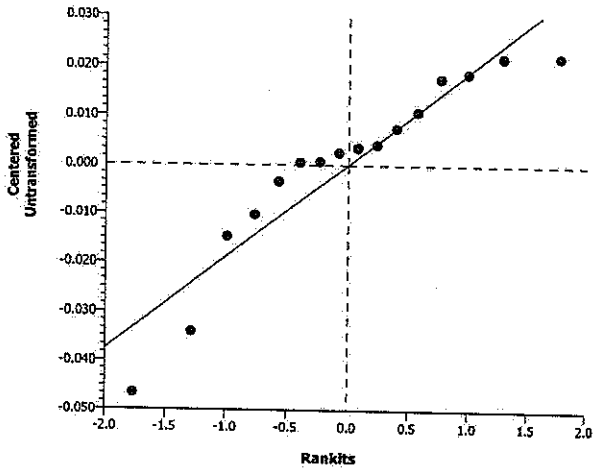
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39826	8	0.255486	0.247733	0.263239	0.208889	0.274	0.0037851	0.0203833	7.98%	27.07%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39826	0.274	0.273	0.263	0.259	0.258	0.256	0.252	0.208889

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 08-3581-2177 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					10.96%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39827	3.27765	1.76131	0.0383939	0.0028	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0204192	0.0204192	1	10.743	0.0055	Significant Effect
Error	0.0266098	0.0019007	14			
Total	0.0470290	0.0223199	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	9.35844	8.88539	0.0086	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.962015		0.6985	Normal Distribution

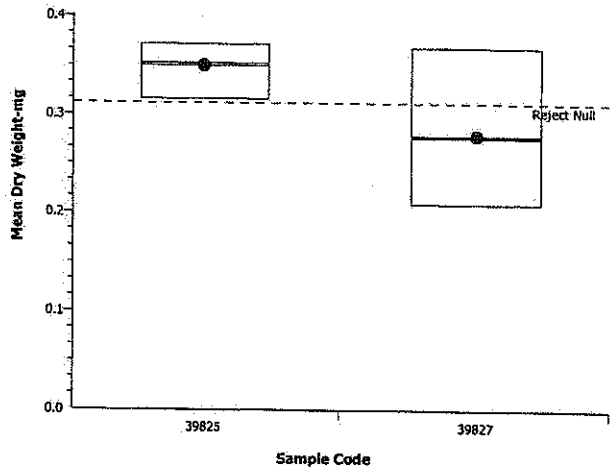
Mean Dry Weight-mg Summary

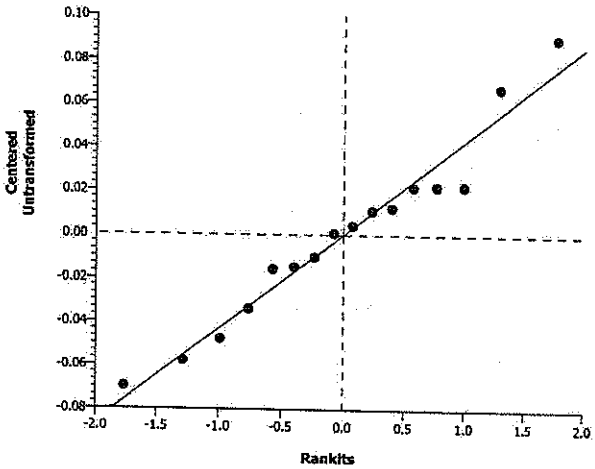
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39827	8	0.278875	0.256583	0.301167	0.209	0.369	0.0108825	0.0586039	21.01%	20.39%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39827	0.369	0.346	0.301	0.291	0.263	0.231	0.221	0.209

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 04-8840-5759 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					4.49%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39828	13.6471	1.76131	0.0157383	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0594818	0.0594818	1	186.243	0.0000	Significant Effect
Error	0.0044713	0.0003194	14			
Total	0.0639531	0.0598012	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.35035	8.88539	0.7019	Equal Variances
Distribution	Shapiro-Wilk Normality	0.946853		0.4415	Normal Distribution

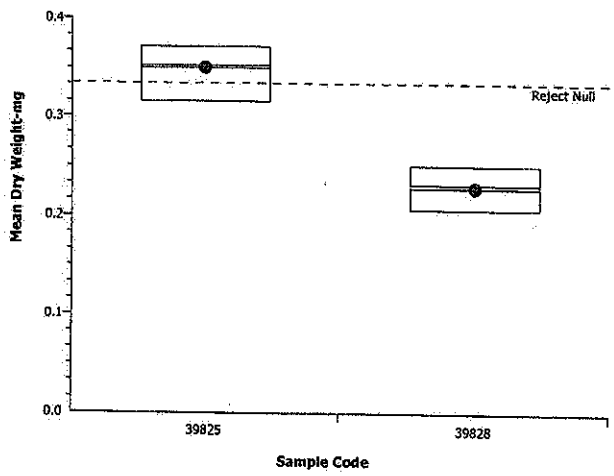
Mean Dry Weight-mg Summary

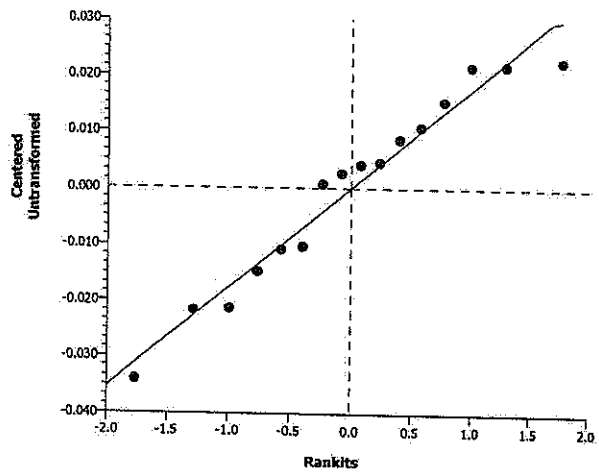
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39828	8	0.228379	0.222108	0.234649	0.206667	0.251111	0.0030613	0.0164855	7.22%	34.81%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39828	0.251111	0.24375	0.237	0.233	0.231	0.2175	0.207	0.206667

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 16-5017-2292 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					10.13%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39831	6.51859	1.76131	0.0354813	0.0000	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0689755	0.0689755	1	42.492	0.0000	Significant Effect
Error	0.0227256	0.0016233	14			
Total	0.0917011	0.0705988	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	7.84645	8.88539	0.0144	Equal Variances
Distribution	Shapiro-Wilk Normality	0.96694		0.7869	Normal Distribution

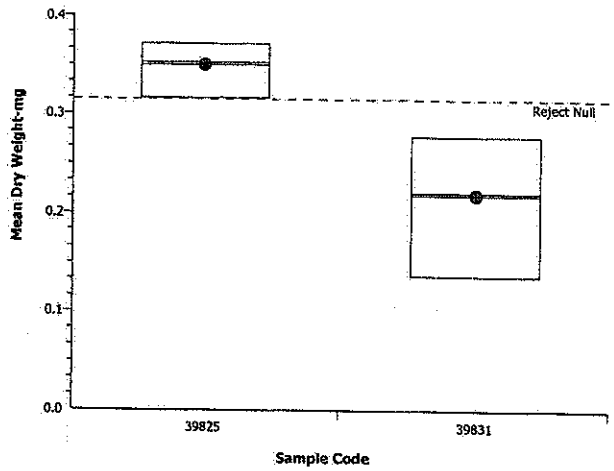
Mean Dry Weight-mg Summary

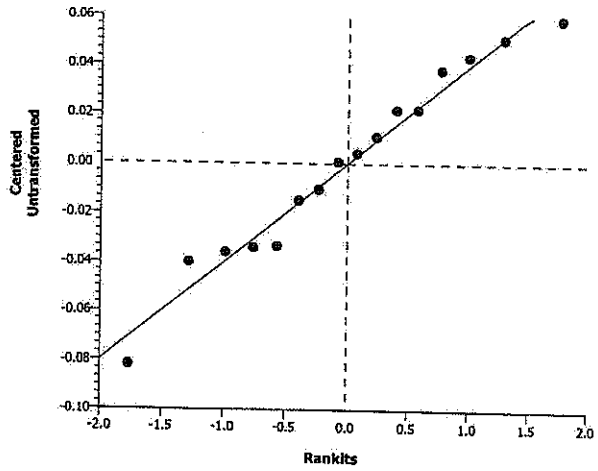
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	37.48%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 13-4203-0826 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					6.88%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39833	3.35364	1.76131	0.0241017	0.0024	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.008424	0.008424	1	11.2469	0.0047	Significant Effect
Error	0.0104861	0.0007490	14			
Total	0.0189100	0.009173	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.08194	8.88539	0.1607	Equal Variances
Distribution	Shapiro-Wilk Normality	0.993763		1.0000	Normal Distribution

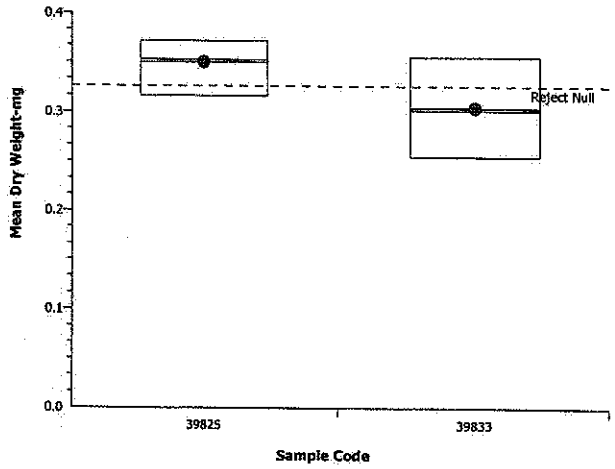
Mean Dry Weight-mg Summary

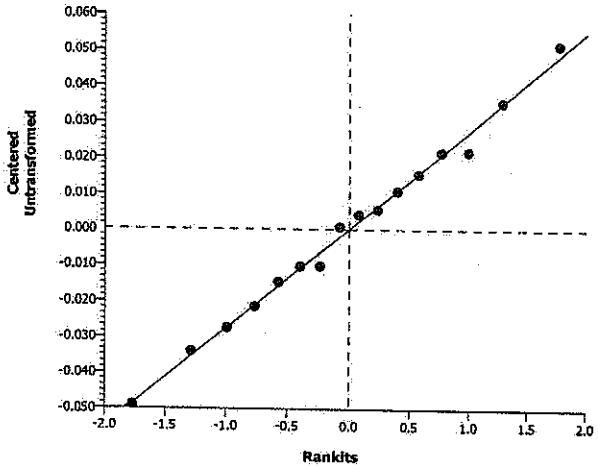
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39833	8	0.304432	0.291639	0.317224	0.255455	0.356	0.0062451	0.0336307	11.05%	13.1%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39833	0.356	0.34	0.32	0.31	0.294	0.283	0.277	0.255455

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Analysis No: 15-8511-8158 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					14.49%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39825		39834	46		0	0.0103	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0143750	0.0143750	1	4.32398	0.0564	Non-Significant Effect
Error	0.0465428	0.0033245	14			
Total	0.0609178	0.0176995	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	17.1178	8.88539	0.0013	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.821721		0.0054	Non-normal Distribution

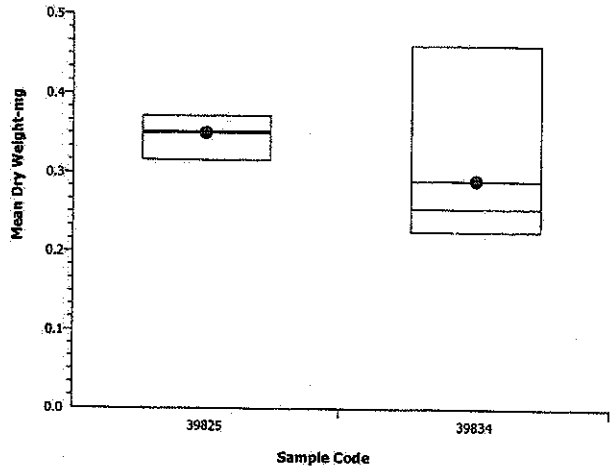
Mean Dry Weight-mg Summary

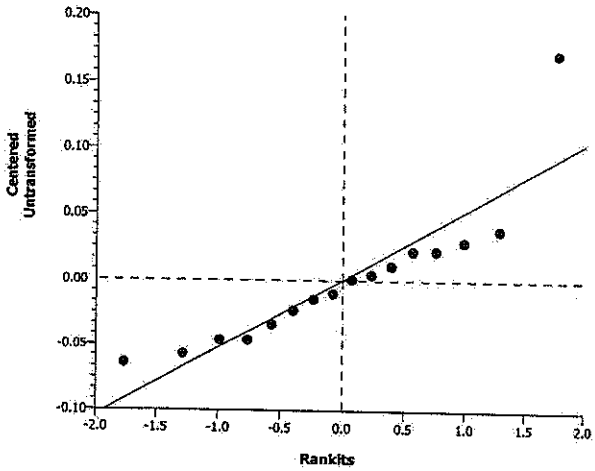
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39834	8	0.290375	0.260226	0.320524	0.226	0.462	0.014718	0.079259	27.3%	17.11%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39834	0.462	0.328	0.319	0.267	0.244	0.244	0.233	0.226

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 13:55 (p 1 of 1)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 02-8534-7562 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 13:54 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					10.47%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39825		39835	3.7313	1.76131	0.0366894	0.0011	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0241651	0.0241651	1	13.9226	0.0022	Significant Effect
Error	0.0242995	0.0017357	14			
Total	0.0484647	0.0259008	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	8.45912	8.88539	0.0116	Equal Variances
Distribution	Shapiro-Wilk Normality	0.95401		0.5557	Normal Distribution

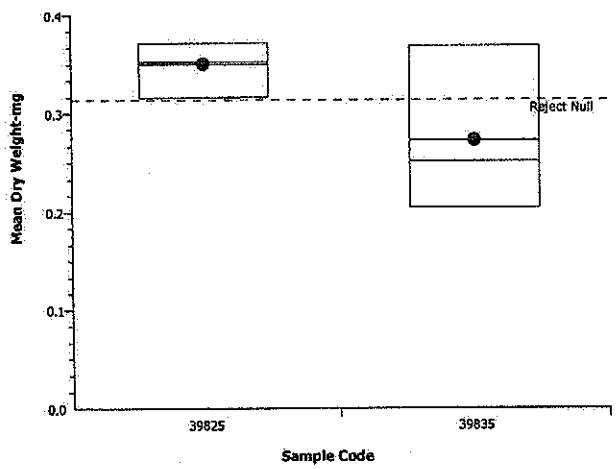
Mean Dry Weight-mg Summary

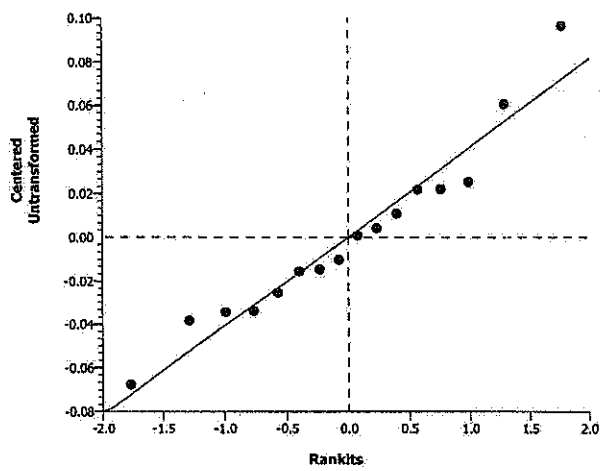
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39825	8	0.350323	0.343036	0.35761	0.31625	0.372222	0.0035573	0.0191568	5.47%	0.0%
39835	8	0.272597	0.251404	0.293791	0.205	0.369	0.0103464	0.0557169	20.44%	22.19%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39825	0.372222	0.372	0.361111	0.354444	0.351	0.34	0.335556	0.31625
39835	0.369	0.333	0.297778	0.257	0.247	0.238	0.234	0.205

Graphics





CETIS Test Data Worksheet

Report Date: 25 Feb-10 13:55 (p 1 of 2)
Link/Link Code: 20-3292-8035/12151C

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Start Date: 26 Jan-10 14:30 **Species:** Hyalella azteca **Sample Code:** 39825
Ending Date: 23 Feb-10 10:30 **Protocol:** EPA/600/R-99/064 (2000) **Sample Source:** CONTROL
Sample Date: 01 Dec-09 **Material:** Control Sediment **Sample Station:** CONTROL

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm
39825	1	9	10	9	23.2	19.95	9	
39825	2	63	10	10	26.85	23.34	10	
39825	3	23	10	8	24.67	22.14	8	
39825	4	20	10	9	24.28	20.93	9	
39825	5	39	10	10	26.74	23.34	10	
39825	6	8	10	10	27.13	23.41	10	
39825	7	7	10	9	22.46	19.27	9	
39825	8	42	10	9	23.9	20.88	9	
39826	1	62	10	10	25.56	22.97	10	
39826	2	22	10	10	25.2	22.68	10	
39826	3	18	10	10	24.39	21.76	10	
39826	4	53	10	9	22.03	20.15	9	
39826	5	1	10	10	24.82	22.26	10	
39826	6	57	10	10	26.69	23.96	10	
39826	7	61	10	10	27.24	24.5	10	
39826	8	55	10	10	26.61	24.03	10	
39827	1	52	10	10	20.13	17.22	10	
39827	2	64	10	10	22.31	19.68	10	
39827	3	24	10	10	25.76	22.75	10	
39827	4	60	10	10	23.89	21.68	10	
39827	5	28	10	10	22.48	20.39	10	
39827	6	48	10	10	24.55	22.24	10	
39827	7	4	10	10	20.44	16.98	10	
39827	8	27	10	10	25.55	21.86	10	
39828	1	38	10	8	24.71	22.76	8	
39828	2	21	10	10	25.08	23.01	10	
39828	3	50	10	10	24.78	22.47	10	
39828	4	37	10	9	26.32	24.06	9	
39828	5	51	10	8	21.11	19.37	8	
39828	6	54	10	10	26.32	23.95	10	
39828	7	31	10	10	24.06	21.73	10	
39828	8	40	10	9	24.82	22.96	9	
39831	1	43	10	10	27.23	24.45	10	
39831	2	56	10	10	24.54	22.71	10	
39831	3	30	10	10	26.23	23.66	10	
39831	4	5	10	10	24.86	23.07	10	
39831	5	10	10	10	25.28	23.91	10	
39831	6	19	10	9	25.98	23.55	9	
39831	7	35	10	9	25.68	24.01	9	
39831	8	41	10	8	24.53	22.43	8	
39833	1	26	10	10	25.35	21.95	10	
39833	2	45	10	10	25.44	22.34	10	
39833	3	49	10	10	26.96	23.76	10	
39833	4	3	10	10	26.25	23.48	10	
39833	5	16	10	10	24.95	21.39	10	
39833	6	2	11	11	27.1	24.29	11	
39833	7	15	10	10	25.65	22.71	10	

CETIS Test Data Worksheet

Link/Link Code: 20-3292-8035/12151C

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm
39833	8	12	10	10	22.28	19.45	10	
39834	1	59	10	10	27.74	25.07	10	
39834	2	46	10	10	25.48	23.04	10	
39834	3	14	10	10	25.48	22.2	10	
39834	4	29	10	10	25.89	23.56	10	
39834	5	32	10	10	24.07	21.81	10	
39834	6	34	10	10	29.04	24.42	10	
39834	7	58	10	10	26.52	23.33	10	
39834	8	47	10	10	27.19	24.75	10	
39835	1	44	10	10	26.11	24.06	10	
39835	2	36	10	10	24.81	22.34	10	
39835	3	13	10	10	27.72	24.39	10	
39835	4	25	10	10	24.96	21.27	10	
39835	5	17	10	10	27	24.62	10	
39835	6	11	10	10	26.02	23.45	10	
39835	7	6	10	9	25.32	22.64	9	
39835	8	33	10	10	24.35	22.01	10	

Hyalella azteca

Statistical Comparisons

Site vs. Reference

SITE VS. REFERENCE

CETIS Summary Report

Report Date: 25 Feb-10 14:12 (p 1 of 2)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Test Run No:	00-5116-6156	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	26 Jan-10 14:30	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Laboratory Water
Ending Date:	23 Feb-10 10:30	**Species:**	Hyalella azteca	**Brine:**	
Duration:	27d 20h	**Source:**	Aquatic Research Organisms, NH	**Age:**	8

Sample Code	Sample No	Sample Date	Receive Date	Sample Age	Client Name	Project
39831	09-9831-6619	28 Dec-09 13:30	29 Dec-09 11:30	29d 1h	TRC	
39826	21-4383-9233	28 Dec-09 10:30	29 Dec-09 11:30	29d 4h		
39827	06-6182-2813	28 Dec-09 11:30	29 Dec-09 11:30	29d 3h		
39828	07-4990-8471	28 Dec-09 12:40	29 Dec-09 11:30	29d 2h		
39833	17-1160-7841	28 Dec-09 10:50	29 Dec-09 11:30	29d 4h		
39834	01-6873-1309	28 Dec-09 12:25	29 Dec-09 11:30	29d 2h		
39835	07-1405-8545	28 Dec-09 15:30	29 Dec-09 11:30	28d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
39831	Sediment	City of New Bedford KMS	ERC-SED 14		
39826	Sediment	City of New Bedford KMS	ERC-SED 7		
39827	Sediment	City of New Bedford KMS	ERC-SED 9		
39828	Sediment	City of New Bedford KMS	ERC-SED 11-A-C		
39833	Sediment	City of New Bedford KMS	SED-16		
39834	Sediment	City of New Bedford KMS	SED-40		
39835	Sediment	City of New Bedford KMS	SED-48		

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
01-1949-2594	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria
03-4064-1678	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria
05-2509-3447	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria
06-5815-6388	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria
10-2088-6819	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria
13-6632-0071	Survival Rate	Control Resp	0.95	0.8 - NL	Yes	Passes acceptability criteria

Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.19897	0.239044	0.137	0.278	0.0097972	0.0536613	24.5%	0.0%
39826	8	0.255486	0.247875	0.263097	0.208889	0.274	0.0037215	0.0203832	7.98%	-16.66%
39827	8	0.278875	0.256992	0.300758	0.209	0.369	0.0106996	0.0586039	21.01%	-27.34%
39828	8	0.228379	0.222223	0.234534	0.206667	0.251111	0.0030098	0.0164855	7.22%	-4.28%
39833	8	0.304432	0.291874	0.31699	0.255455	0.356	0.0061401	0.0336307	11.05%	-39.01%
39834	8	0.290375	0.260779	0.319971	0.226	0.462	0.0144706	0.079259	27.3%	-32.59%
39835	8	0.272597	0.251792	0.293402	0.205	0.369	0.0101725	0.0557169	20.44%	-24.47%

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921773	0.978227	0.8	1	0.0138013	0.0755929	7.96%	0.0%
39826	8	0.9875	0.974298	1	0.9	1	0.006455	0.0353553	3.58%	-3.95%
39827	8	1	1	1	1	1	0	0	0.0%	-5.26%
39828	8	0.925	0.891901	0.958099	0.8	1	0.0161835	0.0886405	9.58%	2.63%
39833	8	1	1	1	1	1	0	0	0.0%	-5.26%
39834	8	1	1	1	1	1	0	0	0.0%	-5.26%
39835	8	0.9875	0.974298	1	0.9	1	0.006455	0.0353553	3.58%	-3.95%

Hyalella azteca 28-d Survival and Growth Sediment Test

Aquatec Biological Sciences, Inc

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.183	0.257	0.179	0.137	0.27	0.185556	0.2625
39826	0.259	0.252	0.263	0.208889	0.256	0.273	0.274	0.258
39827	0.291	0.263	0.301	0.221	0.209	0.231	0.346	0.369
39828	0.24375	0.207	0.231	0.251111	0.2175	0.237	0.233	0.206667
39833	0.34	0.31	0.32	0.277	0.356	0.255455	0.294	0.283
39834	0.267	0.244	0.328	0.233	0.226	0.462	0.319	0.244
39835	0.205	0.247	0.333	0.369	0.238	0.257	0.297778	0.234

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39826	1	1	1	0.9	1	1	1	1
39827	1	1	1	1	1	1	1	1
39828	0.8	1	1	0.9	0.8	1	1	0.9
39833	1	1	1	1	1	1	1	1
39834	1	1	1	1	1	1	1	1
39835	1	1	1	1	1	1	0.9	1

CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 06-5815-6388 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					5.09%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39826	76.5		2	0.9606	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0136795	0.0136795	1	1.60178	0.2263	Non-Significant Effect
Error	0.1195624	0.0085402	14			
Total	0.1332419	0.0222197	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	4.14481	8.88539	0.0803	Equal Variances
Distribution	Shapiro-Wilk Normality	0.794133		0.0023	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39826	8	0.9875	0.974052	1	0.9	1	0.0065653	0.0353553	3.58%	-3.95%

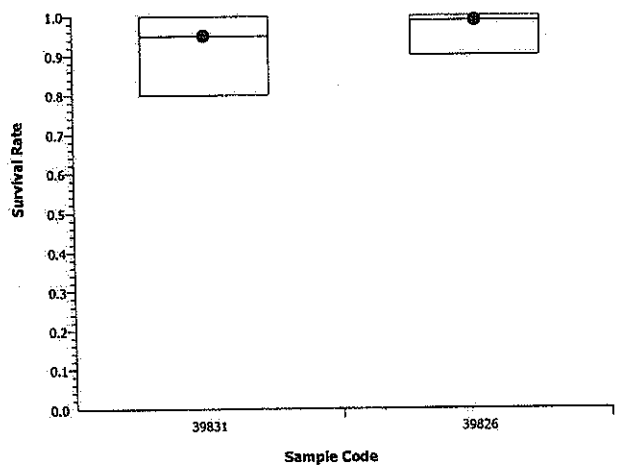
Angular (Corrected) Transformed Summary

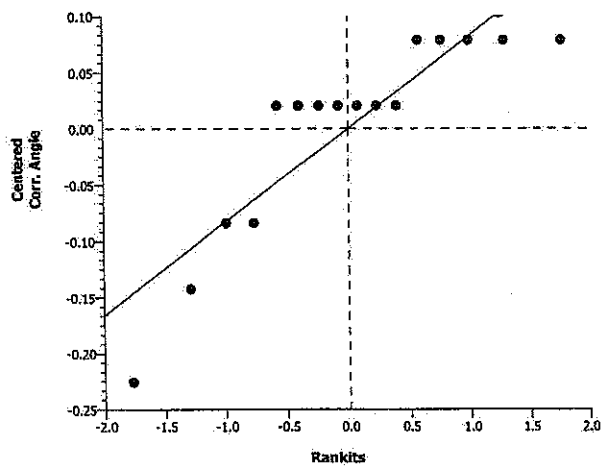
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39826	8	1.39165	1.36973	1.41356	1.24905	1.41202	0.0106996	0.0576192	4.14%	-4.39%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39826	1	1	1	1	1	1	1	0.9

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 10-2088-6819 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.57%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39827	80		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0248699	0.0248699	1	3.61471	0.0781	Non-Significant Effect
Error	0.0963229	0.0068802	14			
Total	0.1211929	0.0317501	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	5.423E+13	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.788053		0.0019	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39827	8	1	1	1	1	1	0	0	0.0%	-5.26%

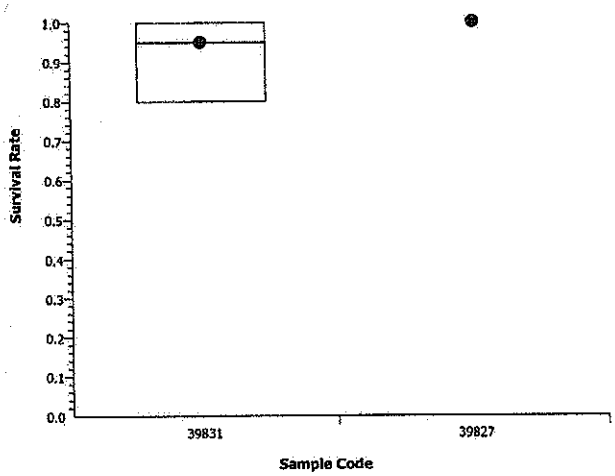
Angular (Corrected) Transformed Summary

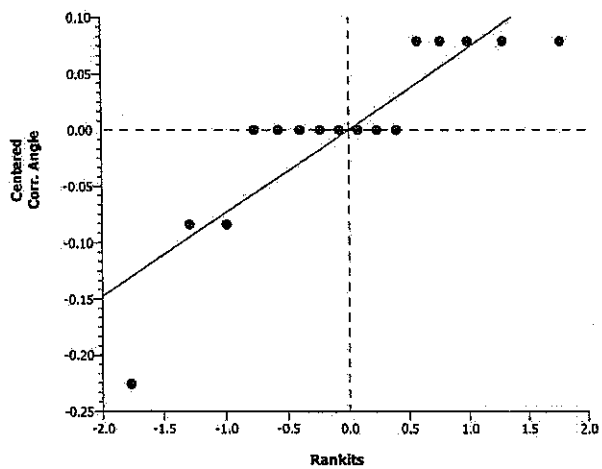
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39827	8	1.41202	1.41192	1.41211	1.41202	1.41202	0	0	0.0%	-5.91%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39827	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 05-2509-3447 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					7.08%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39828	63		3	0.3680	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0058090	0.0058090	1	0.360019	0.5581	Non-Significant Effect
Error	0.2258938	0.0161353	14			
Total	0.2317028	0.0219443	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.34517	8.88539	0.7055	Equal Variances
Distribution	Shapiro-Wilk Normality	0.830294		0.0071	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39828	8	0.925	0.891283	0.958717	0.8	1	0.0164601	0.0886405	9.58%	2.63%

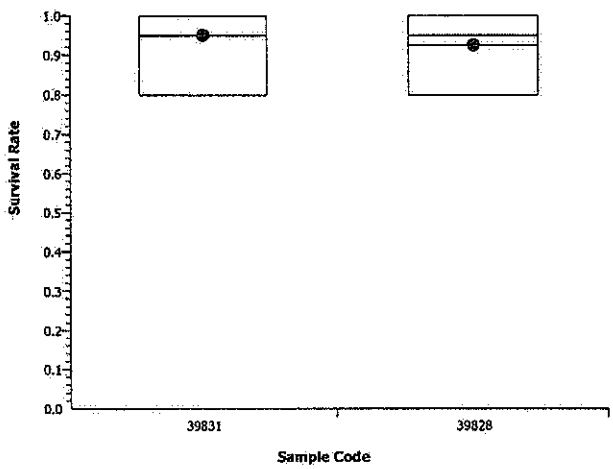
Angular (Corrected) Transformed Summary

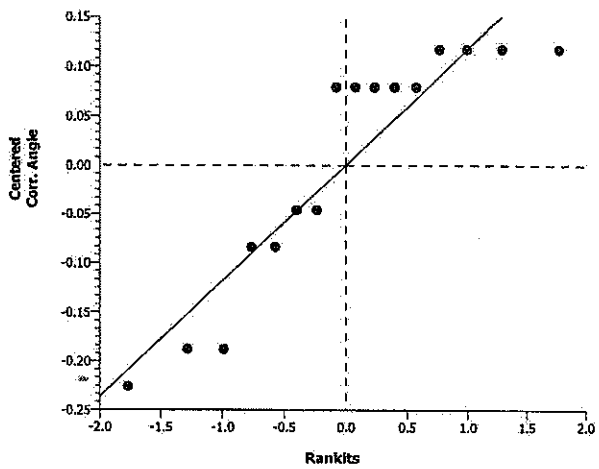
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39828	8	1.29506	1.24331	1.34681	1.10715	1.41202	0.0252642	0.136052	10.51%	2.86%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39828	1	1	1	1	0.9	0.9	0.8	0.8

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 03-4064-1678 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.58%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39833	80		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0254606	0.0254606	1	3.6987	0.0750	Non-Significant Effect
Error	0.0963715	0.0068837	14			
Total	0.1218321	0.0323443	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1984.69	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.793759		0.0023	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39833	8	1	1	1	1	1	0	0	0.0%	-5.26%

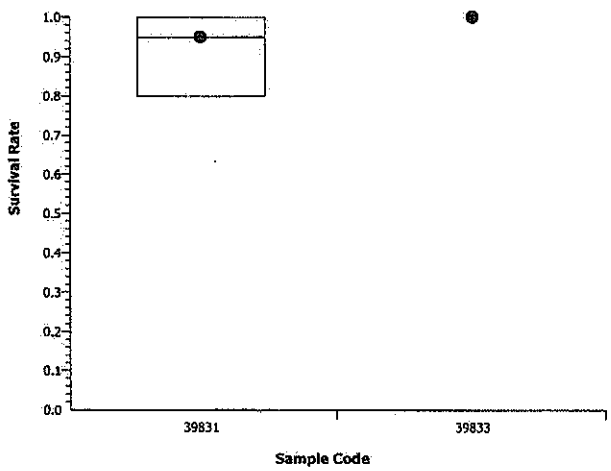
Angular (Corrected) Transformed Summary

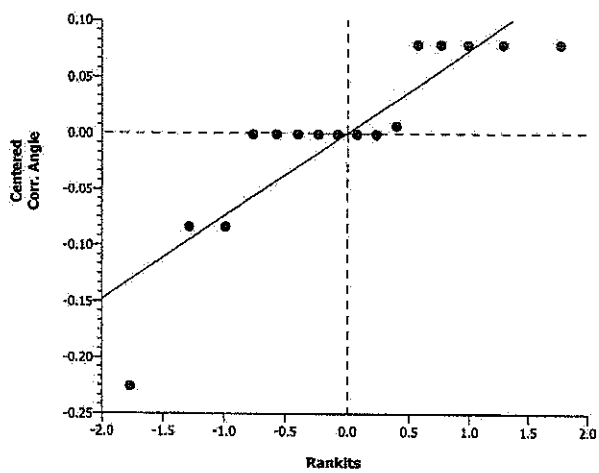
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39833	8	1.41295	1.41194	1.41395	1.41202	1.41946	0.0004913	0.0026455	0.19%	-5.98%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39833	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 01-1949-2594 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					4.57%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39834	80		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0248699	0.0248699	1	3.61471	0.0781	Non-Significant Effect
Error	0.0963229	0.0068802	14			
Total	0.1211929	0.0317501	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	5.423E+13	8.88539	0.0000	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.788053		0.0019	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39834	8	1	1	1	1	1	0	0	0.0%	-5.26%

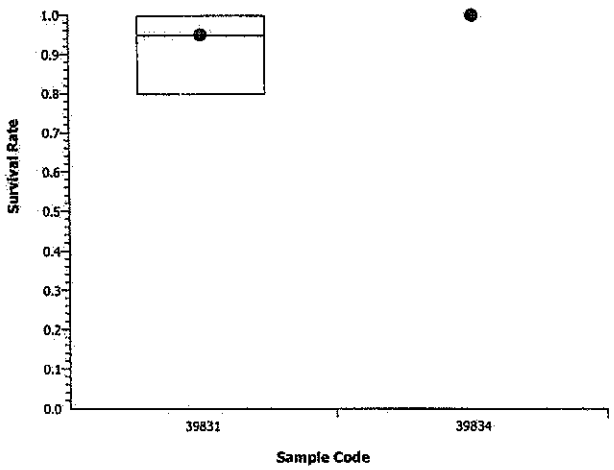
Angular (Corrected) Transformed Summary

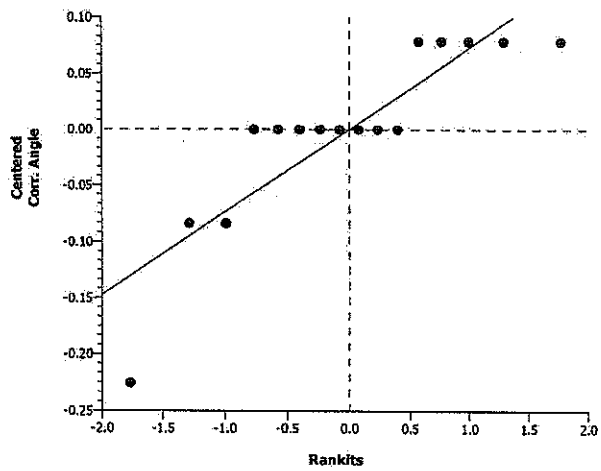
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39834	8	1.41202	1.41192	1.41211	1.41202	1.41202	0	0	0.0%	-5.91%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39834	1	1	1	1	1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 13-6632-0071 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial					5.09%

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	P-Value	Decision(5%)
39831		39835	76.5		2	0.9594	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0136795	0.0136795	1	1.60178	0.2263	Non-Significant Effect
Error	0.1195624	0.0085402	14			
Total	0.1332419	0.0222197	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	4.14481	8.88539	0.0803	Equal Variances
Distribution	Shapiro-Wilk Normality	0.794133		0.0023	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.95	0.921246	0.978754	0.8	1	0.0140372	0.0755929	7.96%	0.0%
39835	8	0.9875	0.974052	1	0.9	1	0.0065653	0.0353553	3.58%	-3.95%

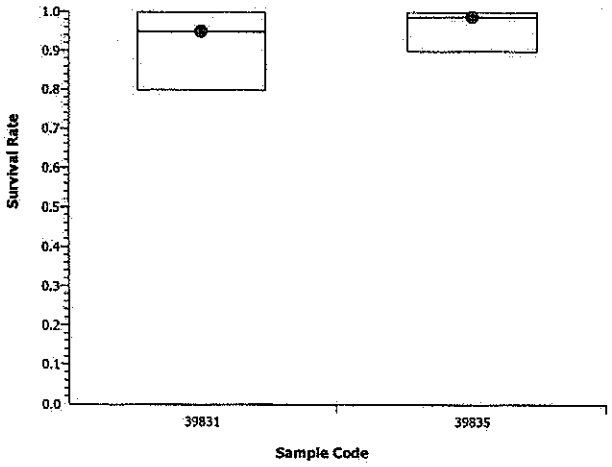
Angular (Corrected) Transformed Summary

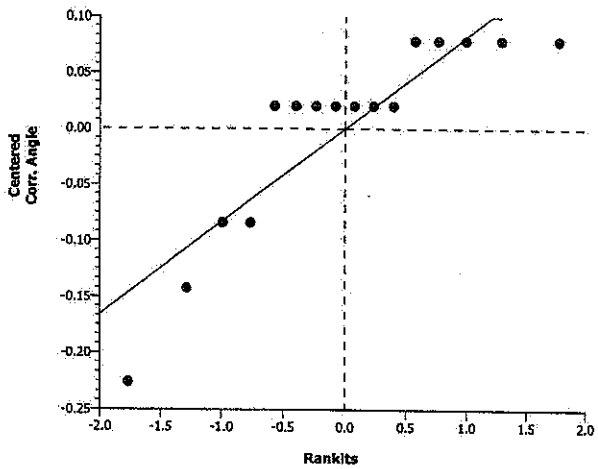
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	1.33317	1.28854	1.37779	1.10715	1.41202	0.021783	0.117305	8.8%	0.0%
39835	8	1.39165	1.36973	1.41356	1.24905	1.41202	0.0106996	0.0576192	4.14%	-4.39%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	1	1	1	1	1	0.9	0.9	0.8
39835	1	1	1	1	1	1	1	0.9

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 17-7737-4312 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					16.32%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39826	-1.79747	1.76131	0.0357453	0.9531	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0053229	0.0053229	1	3.23089	0.0939	Non-Significant Effect
Error	0.0230651	0.0016475	14			
Total	0.028388	0.0069704	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	6.93068	8.88539	0.0205	Equal Variances
Distribution	Shapiro-Wilk Normality	0.960696		0.6745	Normal Distribution

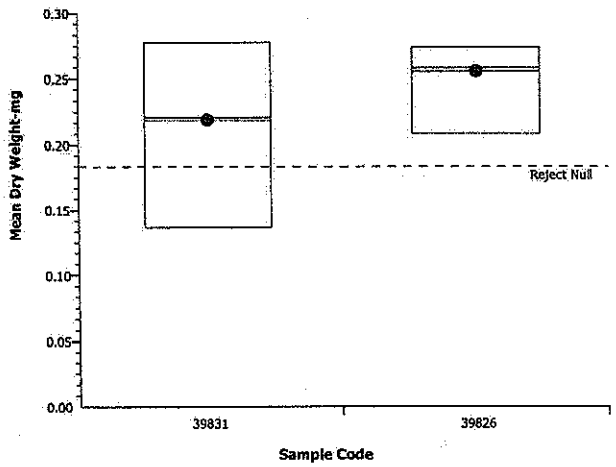
Mean Dry Weight-mg Summary

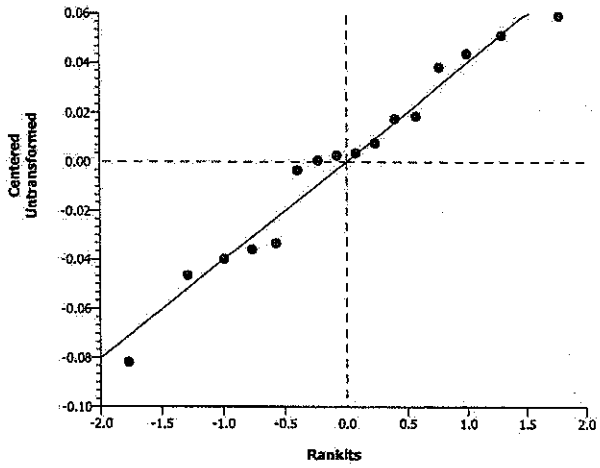
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39826	8	0.255486	0.247733	0.263239	0.208889	0.274	0.0037851	0.0203833	7.98%	-16.66%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39826	0.274	0.273	0.263	0.259	0.258	0.256	0.252	0.208889

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Analysis No: 12-8385-4311 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					22.59%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39827	-2.13103	1.76131	0.0494813	0.9744	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0143367	0.0143367	1	4.54128	0.0513	Non-Significant Effect
Error	0.0441976	0.003157	14			
Total	0.0585343	0.0174937	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.1927	8.88539	0.8221	Equal Variances
Distribution	Shapiro-Wilk Normality	0.942636		0.3826	Normal Distribution

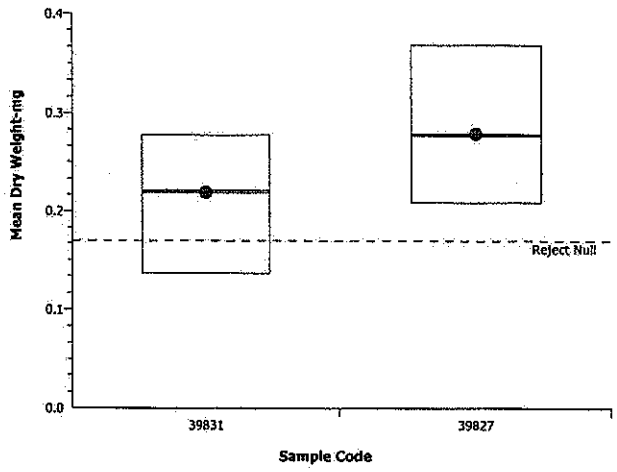
Mean Dry Weight-mg Summary

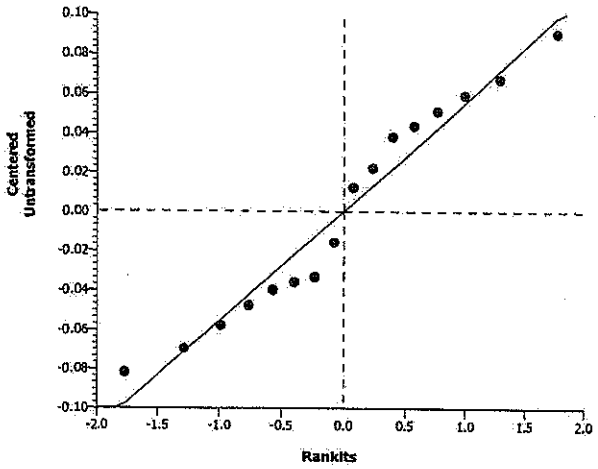
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39827	8	0.278875	0.256583	0.301167	0.209	0.369	0.0108825	0.0586039	21.01%	-27.34%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39827	0.369	0.346	0.301	0.291	0.263	0.231	0.221	0.209

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 18-9093-1299 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					15.96%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39828	-0.472181	1.76131	0.0349572	0.6780	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0003513	0.0003513	1	0.222955	0.6441	Non-Significant Effect
Error	0.0220591	0.0015757	14			
Total	0.0224104	0.001927	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	10.5955	8.88539	0.0059	Unequal Variances
Distribution	Shapiro-Wilk Normality	0.972198		0.8728	Normal Distribution

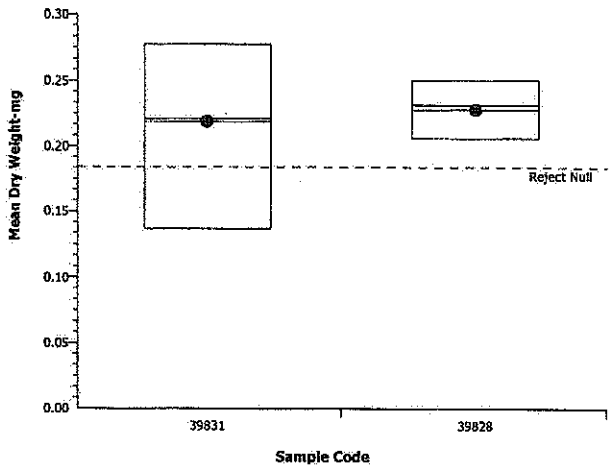
Mean Dry Weight-mg Summary

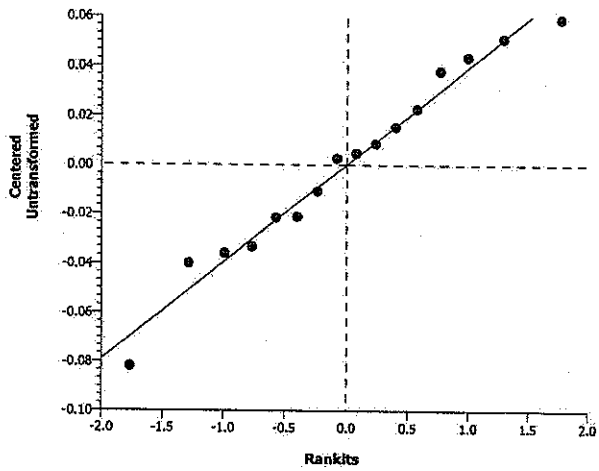
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39828	8	0.228379	0.222108	0.234649	0.206667	0.251111	0.0030613	0.0164855	7.22%	-4.28%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39828	0.251111	0.24375	0.237	0.233	0.231	0.2175	0.207	0.206667

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 20-3538-5889 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					18.01%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39833	-3.81528	1.76131	0.039436	0.9991	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0291896	0.0291896	1	14.5564	0.0019	Significant Effect
Error	0.0280739	0.0020053	14			
Total	0.0572635	0.0311949	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.54595	8.88539	0.2408	Equal Variances
Distribution	Shapiro-Wilk Normality	0.933789		0.2797	Normal Distribution

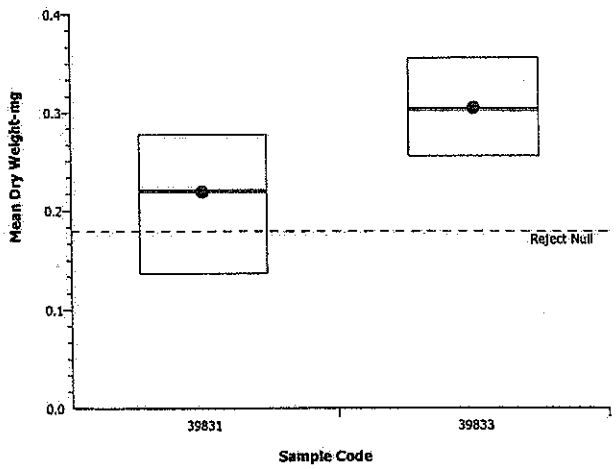
Mean Dry Weight-mg Summary

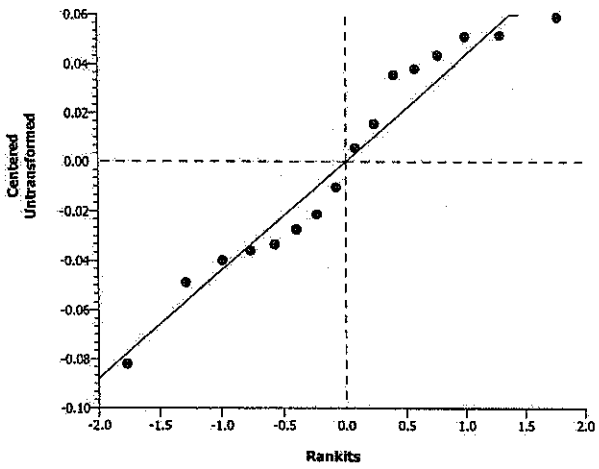
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39833	8	0.304432	0.291639	0.317224	0.255455	0.356	0.0062451	0.0336307	11.05%	-39.01%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39833	0.356	0.34	0.32	0.31	0.294	0.283	0.277	0.255455

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 00-0424-4803 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					27.22%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39834	-2.10894	1.76131	0.0596039	0.9733	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0203736	0.0203736	1	4.44764	0.0534	Non-Significant Effect
Error	0.0641306	0.0045808	14			
Total	0.0845042	0.0249543	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.1816	8.88539	0.3251	Equal Variances
Distribution	Shapiro-Wilk Normality	0.88046		0.0395	Normal Distribution

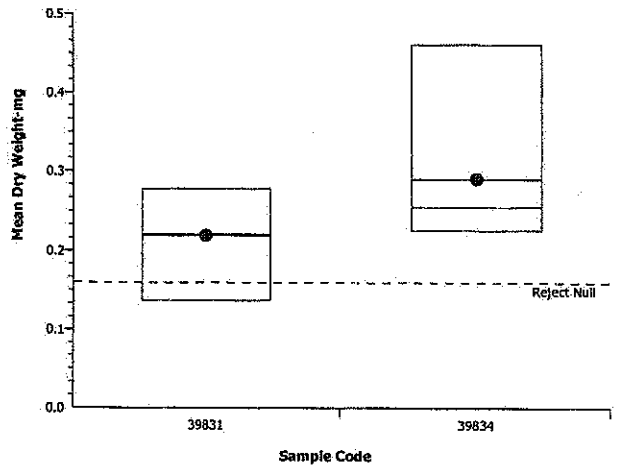
Mean Dry Weight-mg Summary

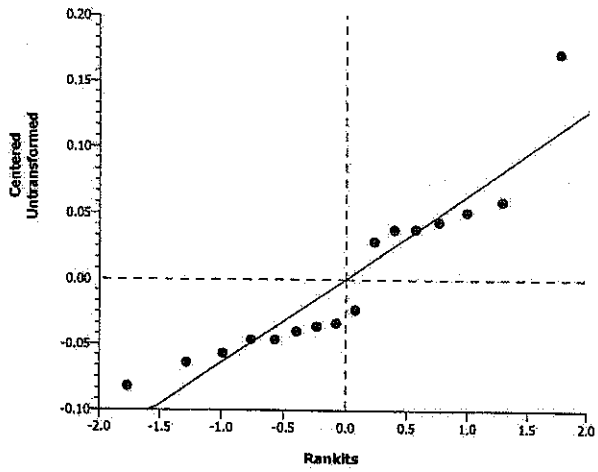
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39834	8	0.290375	0.260226	0.320524	0.226	0.462	0.014718	0.079259	27.3%	-32.59%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39834	0.462	0.328	0.319	0.267	0.244	0.244	0.233	0.226

Graphics





CETIS Analytical Report

Report Date: 25 Feb-10 14:01 (p 1 of 1)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — **Aquatec Biological Sciences, Inc**

Analysis No: 18-7105-7663 **Endpoint:** Mean Dry Weight-mg **CETIS Version:** CETISv1.6.4
Analyzed: 25 Feb-10 14:00 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run					22.0%

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	P-Value	Decision(5%)
39831		39835	-1.95947	1.76131	0.0481707	0.9649	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0114877	0.0114877	1	3.83951	0.0703	Non-Significant Effect
Error	0.0418874	0.002992	14			
Total	0.053375	0.0144796	15			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.07808	8.88539	0.9235	Equal Variances
Distribution	Shapiro-Wilk Normality	0.9278		0.2249	Normal Distribution

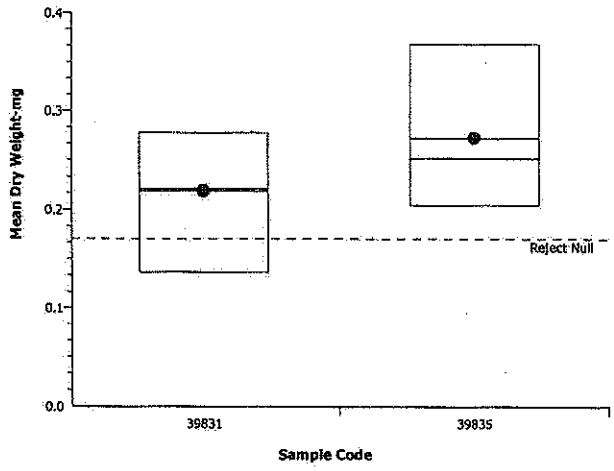
Mean Dry Weight-mg Summary

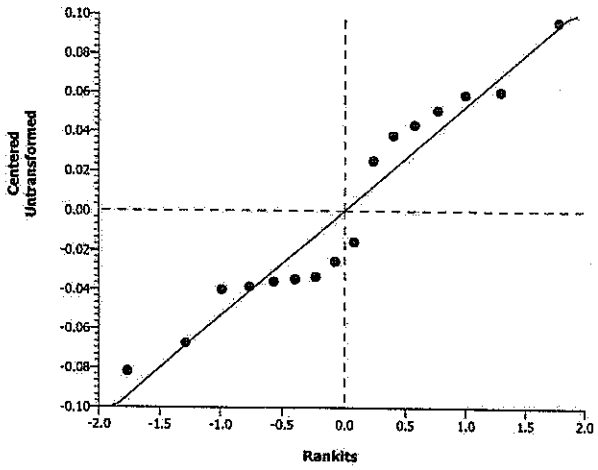
Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
39831	8	0.219007	0.198595	0.239419	0.137	0.278	0.0099647	0.0536613	24.5%	0.0%
39835	8	0.272597	0.251404	0.293791	0.205	0.369	0.0103464	0.0557169	20.44%	-24.47%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
39831	0.278	0.27	0.2625	0.257	0.185556	0.183	0.179	0.137
39835	0.369	0.333	0.297778	0.257	0.247	0.238	0.234	0.205

Graphics





CETIS Test Data Worksheet

Report Date: 25 Feb-10 13:59 (p 1 of 2)
Link/Link Code: 14-7362-1490/12151D

Hyalella azteca 28-d Survival and Growth Sediment Test — Aquatec Biological Sciences, Inc

Start Date: 26 Jan-10 14:30 **Species:** Hyalella azteca **Sample Code:** 39831
Ending Date: 23 Feb-10 10:30 **Protocol:** EPA/600/R-99/064 (2000) **Sample Source:** City of New Bedford KMS
Sample Date: 28 Dec-09 13:30 **Material:** Sediment **Sample Station:** ERC-SED 14

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm
39831	1	2	10	10	27.23	24.45	10	
39831	2	40	10	10	24.54	22.71	10	
39831	3	27	10	10	26.23	23.66	10	
39831	4	55	10	10	24.86	23.07	10	
39831	5	14	10	10	25.28	23.91	10	
39831	6	7	10	9	25.98	23.55	9	
39831	7	6	10	9	25.68	24.01	9	
39831	8	36	10	8	24.53	22.43	8	
39826	1	47	10	10	25.56	22.97	10	
39826	2	33	10	10	25.2	22.68	10	
39826	3	50	10	10	24.39	21.76	10	
39826	4	29	10	9	22.03	20.15	9	
39826	5	42	10	10	24.82	22.26	10	
39826	6	21	10	10	26.69	23.96	10	
39826	7	28	10	10	27.24	24.5	10	
39826	8	12	10	10	26.61	24.03	10	
39827	1	15	10	10	20.13	17.22	10	
39827	2	25	10	10	22.31	19.68	10	
39827	3	9	10	10	25.76	22.75	10	
39827	4	56	10	10	23.89	21.68	10	
39827	5	38	10	10	22.48	20.39	10	
39827	6	45	10	10	24.55	22.24	10	
39827	7	54	10	10	20.44	16.98	10	
39827	8	10	10	10	25.55	21.86	10	
39828	1	18	10	8	24.71	22.76	8	
39828	2	3	10	10	25.08	23.01	10	
39828	3	53	10	10	24.78	22.47	10	
39828	4	19	10	9	26.32	24.06	9	
39828	5	17	10	8	21.11	19.37	8	
39828	6	26	10	10	26.32	23.95	10	
39828	7	1	10	10	24.06	21.73	10	
39828	8	39	10	9	24.82	22.96	9	
39833	1	24	10	10	25.35	21.95	10	
39833	2	16	10	10	25.44	22.34	10	
39833	3	23	10	10	26.96	23.76	10	
39833	4	44	10	10	26.25	23.48	10	
39833	5	46	10	10	24.95	21.39	10	
39833	6	20	11	11	27.1	24.29	11	
39833	7	49	10	10	25.65	22.71	10	
39833	8	31	10	10	22.28	19.45	10	
39834	1	11	10	10	27.74	25.07	10	
39834	2	30	10	10	25.48	23.04	10	
39834	3	5	10	10	25.48	22.2	10	
39834	4	4	10	10	25.89	23.56	10	
39834	5	13	10	10	24.07	21.81	10	
39834	6	51	10	10	29.04	24.42	10	
39834	7	32	10	10	26.52	23.33	10	

CETIS Test Data Worksheet

Report Date: 25 Feb-10 13:59 (p 2 of 2)
Link/Link Code: 14-7362-1490/12151D

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm
39834	8	43	10	10	27.19	24.75	10	
39835	1	52	10	10	26.11	24.06	10	
39835	2	41	10	10	24.81	22.34	10	
39835	3	35	10	10	27.72	24.39	10	
39835	4	37	10	10	24.96	21.27	10	
39835	5	22	10	10	27	24.62	10	
39835	6	34	10	10	26.02	23.45	10	
39835	7	48	10	9	25.32	22.64	9	
39835	8	8	10	10	24.35	22.01	10	

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

Amphipod (*Hyalella azteca*) Day 28 Survival and Dry Weight Data

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39825	A	9	OK	—	—	9	9	19.95	23.20
CTL	B	10	J	—	—	10	10	23.34	26.85
	C	8	OK	—	—	8	8	22.14	24.67
	D	9	JG	—	—	9	9	20.93	24.28
	E	10	OK	—	—	10	10	23.34	26.74
	F	10	OK	—	—	10	10	23.41	27.13
	G	9	J	—	—	9	9	19.27	22.46
	H	9	KK	—	—	9	9	20.98	23.90

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39826	A	~~9~~ 10*	OK	—	—	~~9~~ 10	10	22.97	25.56
ERC-SED 7	B	10	JG	—	—	10	10	22.68	25.20
	C	10	OK	—	—	10	10	21.76	24.39
	D	9	JG	—	—	9	9	20.15	22.03
	E	10	KK	—	—	10	10	22.26	24.82
	F	10	KK	—	—	10	10	23.96	26.69
	G	10	OK	—	—	10	10	24.50	27.24
	H	10	KK	—	—	10	10	24.03	26.61

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39827	A	10	OK	—	—	10	10	17.22	20.13
ERC-SED 9	B	10	J	—	—	10	10	19.68	22.31
	C	10	JG	—	—	10	10	22.75	25.76
	D	10	OK	—	—	10	10	~~22~~ 21.68	23.89
	E	10	JG	—	—	10	10	20.39	22.48
	F	10	KK	—	—	10	10	22.24	24.55
	G	10	OK	—	—	10	10	16.98	20.44
	H	10	KK	—	—	10	10	21.86	25.55

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39828	A	8	J	—	J	8	8	22.76	24.71
ERC-SED	B	10	JG	—	—	10	10	23.01	25.08
11-A-C	C	10	JG	—	—	10	10	22.47	24.78
	D	9	OK	—	—	9	9	24.06	26.32
	E	8	OK	—	—	8	8	19.37	21.11
	F	10	OK	—	—	10	10	23.95	26.32
	G	10	OK	—	—	10	10	21.73	24.06
	H	9	KK	—	—	9	9	22.96	24.82
				Date:	2/23/10	Init./Date:	2/23 OK	2/21 OK	JG 2/24

Into Oven: 83°C 1300 2/23/10 OK
OUT: 2-24-10 10:45 84°C

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by: JG
Review date: J 2/25/10

Amphipod (*Hyalella azteca*) Day 28 Survival and Dry Weight Data

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39831	A	10	J	—	—	10	10	24.45	27.23
ERC-SED 14	B	10	JG	—	—	10	10	22.71	24.54
	C	10	KK	—	—	10	10	23.66	26.23
	D	10	JG	—	—	10	10	23.07	24.86
	E	10	JG	—	—	10	10	23.91	25.28
	F	9	OK	—	—	9	9	23.55	25.98
	G	9	J	—	—	9	9	24.01	25.68
	H	8	KK	—	—	8	8	22.43	24.53

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39833	A	10	JG	—	—	10	10	21.95	25.35
SED-16	B	10	JG	—	—	10	10	22.34	25.44
	C	10	OK	—	—	10	10	23.76	26.96
	D	10	JG	—	—	10	10	23.48	26.25
	E	10	J	—	—	10	10	21.39	24.95
	F	~~10~~ 1 OK	OK	—	—	~~10~~ 1 OK	11	24.29	27.10
	G	10	JG	—	—	10	10	22.71	25.65
	H	10	KK	—	—	10	10	19.45	22.28

Sample	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39834	A	10	KK	—	—	10	10	25.07	27.74
SED-40	B	10	JG	—	—	10	10	23.04	25.48
	C	10	JG	—	—	10	10	22.20	25.48
	D	10	J	—	—	10	10	23.56	25.89
	E	10	OK	—	—	10	10	21.81	24.07
	F	10	KK	—	—	10	10	24.42	29.04
	G	10	OK	—	—	10	10	23.33	26.52
	H	10	KK	—	—	10	10	24.75	27.19

Repl.	Repl.	Number Surviving	Initials	Repick Number Surviving	Initials	Total Surv	Number weighed	Pan Wt. (mg)	Pan plus dried amphipods (mg)
39835	A	10	OK	—	—	10	10	24.06	26.11
SED-48	B	10	JG	—	—	10	10	22.34	24.81
	C	10	KK	—	—	10	10	24.39	27.72
	D	10	KK	—	—	10	10	21.27	24.96
	E	10	JG	—	—	10	10	24.62	27.00
	F	10	OK	—	—	10	10	23.45	26.02
	G	9	J	—	—	9	9	22.64	25.32
	H	10	OK	—	—	10	10	22.01	24.35

Date: 2/23/10 Init./Date: 2/23 OK 2/24 OK JG 2/24

Into Oven: 63°C 1300 2/23/10 OK
OUT: 2-24-10 10:45 84°C

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by: JG
Review date: J 2/

Replicate	# Weighed	Initial Pan Wt. (mg)	Final Pan + dry organism wt. (mg)	Initial Avg. Dry Wt. (mg)
1	10	24.47	24.62	0.015
2	10	24.98	25.12	0.014
3	10	24.22	24.38	0.016
4	10	23.94	24.14	0.02
5	10	22.8	22.95	0.015
6	10	23.47	23.65	0.018
7	10	24.57	24.74	0.017
8	10	23.84	23.99	0.015

Overall Avg. Dry Wt.:	0.016

Client: TRC	Project: 10009	SDG: 12151

Organism Holding and Acclimation

Species: *Hyalella azteca*	Date Received: 1/26/10
Supplier: Aquatic Research Organisms	Age: 8 d
Apparent Condition:	Culture ID: ~~102610~~Ha 01 JG

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change at least once (50%) every two days.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT, 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin. Do not allow excess food to accumulate.

2010 Date	Fed	Temp	pH	D.O.	Conduct.	Behavior*	Water Chg.	Age (Days)	Init.
1/26	✓	17.9	6.8	7.8	862	NORMAL	SRC Added		KK
1/27									

* N = normal, appear healthy. Record # dead if any observed.

Hyalella azteca Initial Dry Weight

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)	Initial Average Wt. (mg)
1	10	24.47	24.62	
2	10	24.98	25.12	
3	10	24.22	~~24.74~~ 24.38	
4	10	23.94	~~22.95~~ 24.14	
5	10	22.80	22.95	
6	10	23.47	23.65	
7	10	24.57	24.74	
8	10	23.84	23.99	
Initials:		KK 1-26-10	1/27/10 OK	
Date:				

Date/time In 1/26/10	Temp(°C) 10.3°C	Init. JG	Date/time out 1/27/10 1425	Temp(°C) 10.3°C	Init. OK
Comments: 1550					

Reviewer: [signature] Date 2/25/10
Laboratory: Aquatec Biological Sciences, Inc. Williston, Vermont

Ha 28d pkg

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species Hyalella azteca

Source: Lab reared x Hatchery reared ____ Field collected ____

Hatch date 1/18/10 Receipt date ____

Lot number 01 18 10 HA Strain ARO

Brood origination US fus MO

II. Water Quality

Temperature 24 °C Salinity — ppt D.O. SAT ppm

pH 7.4 su Hardness ≈120 ppm Alkalinity ≈140 ppm

III. Culture Conditions

Freshwater x Saltwater ____ Other ____

Recirculating ____ Flow through ____ Static x

DIET: Flake food x Phytoplankton ____ Trout chow x

Artemia ____ Rotifers ____ YCT ____ Other ____

Prophylactic treatments: ____

Comments: ____

Rec'd: 1-26-2010
Temp. = 17.9°C
pH = 6.8
D.O. = 7.8
Cond. = 862
Added S. Recon H2O
Condition = Normal

IV. Shipping Information

Client: Aquatech VT # of Organisms 780+

Carrier: fedex Date shipped 1/25/10

Biologist: ____

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
39825	pH	6.8	6.9	x	6.7	x	x	7.2	x	7.2	x	①	x	x	7.4	x	7.3
	DO (mg/L)	6.4	6.4	x	7.5	x	x	7.1	x	6.2	x	7.8	x	x	6.7	x	7.0
	conductivity (uS)	360	x	x	x	x	x	348	x	x	x	x	x	x	355	x	x
39826	pH	6.4	6.6	x	6.7	x	x	6.9	x	7.0	x		x	x	7.1	x	7.1
	DO (mg/L)	6.3	6.2	x	7.2	x	x	6.8	x	7.7	x	7.4	x	x	6.6	x	7.2
	conductivity (uS)	319	x	x	x	x	x	312	x	x	x	x	x	x	337	x	x
39827	pH	6.7	6.8	x	6.7	x	x	7.0	x	7.1	x		x	x	7.1	x	7.1
	DO (mg/L)	6.4	6.1	x	7.0	x	x	6.7	x	8.0	x	6.9	x	x	6.4	x	7.0
	conductivity (uS)	360	x	x	x	x	x	341	x	x	x	x	x	x	357	x	x
39828	pH	6.7	6.7	x	6.8	x	x	7.0	x	7.0	x		x	x	7.1	x	7.1
	DO (mg/L)	6.6	6.2	x	7.1	x	x	6.5	x	7.9	x	7.2	x	x	6.6	x	7.0
	conductivity (uS)	345	x	x	x	x	x	320	x	x	x	x	x	x	353	x	x
39831	pH	6.8	6.8	x	6.8	x	x	7.1	x	7.1	x		x	x	7.2	x	7.2
	DO (mg/L)	6.8	6.2	x	7.5	x	x	7.2	x	7.8	x	7.0	x	x	6.7	x	6.9
	conductivity (uS)	347	x	x	x	x	x	331	x	x	x	x	x	x	352	x	x
39833	pH	7.0	7.0	x	6.9	x	x	7.1	x	7.2	x		x	x	7.2	x	7.2
	DO (mg/L)	6.7	5.9	x	7.3	x	x	6.9	x	8.0	x	6.9	x	x	6.3	x	7.0
	conductivity (uS)	357	x	x	x	x	x	334	x	x	x	x	x	x	353	x	x
39834	pH	7.5	7.3	x	7.0	x	x	7.2	x	7.3	x		x	x	7.2	x	7.4
	DO (mg/L)	7.0	5.9	x	7.3	x	x	6.8	x	8.1	x	7.1	x	x	6.2	x	7.1
	conductivity (uS)	396	x	x	x	x	x	353	x	x	x	x	x	x	368	x	x
39835	pH	7.0	7.0	x	6.9	x	x	7.1	x	7.2	x		x	x	7.1	x	7.2
	DO (mg/L)	6.7	5.9	x	7.1	x	x	6.9	x	7.7	x	7.2	x	x	6.7	x	6.9
	conductivity (uS)	345	x	x	x	x	x	321	x	x	x	x	x	x	339	x	x
2010	Init./Date):	OK 26-Jan	OK 27-Jan	28-Jan	KK 29-Jan	30-Jan	31-Jan	OK 1-Feb	2-Feb	OK 3-Feb	4-Feb	JG 5-Feb	6-Feb	7-Feb	OK 8-Feb	9-Feb	OK 10-Feb

① pH measurements missed. 2-5-10 JG

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by: J
Review date: 2/25

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

Sample	80 percent survival in	16	17	18	19	20	21	22	23	24	25	26	27	28			
39825	pH	x	7.2	x	x	7.0	x	7.2	x	7.1	x	x	7.0	x	x	x	x
	DO (mg/L)	x	7.3	x	x	6.8	x	7.3	x	7.5	x	x	6.5	x	x	x	x
	conductivity (uS)	x	x	x	x	307	x	x	x	x	x	x	325	x	x	x	x
39826	pH	x	7.1	x	x	6.9	x	7.0	x	7.0	x	x	6.9	x	x	x	x
	DO (mg/L)	x	7.3	x	x	7.1	x	7.2	x	7.2	x	x	6.4	x	x	x	x
	conductivity (uS)	x	x	x	x	300	x	x	x	x	x	x	314	x	x	x	x
39827	pH	x	7.1	x	x	7.0	x	7.2	x	7.0	x	x	6.9	x	x	x	x
	DO (mg/L)	x	7.0	x	x	6.9	x	7.4	x	7.6	x	x	6.5	x	x	x	x
	conductivity (uS)	x	x	x	x	309	x	x	x	x	x	x	322	x	x	x	x
39828	pH	x	6.9	x	x	7.0	x	7.2	x	6.9	x	x	6.9	x	x	x	x
	DO (mg/L)	x	7.2	x	x	7.1	x	7.2	x	7.4	x	x	6.5	x	x	x	x
	conductivity (uS)	x	x	x	x	307	x	x	x	x	x	x	320	x	x	x	x
39831	pH	x	7.1	x	x	7.1	x	7.3	x	7.0	x	x	7.0	x	x	x	x
	DO (mg/L)	x	7.2	x	x	7.0	x	7.1	x	7.5	x	x	6.4	x	x	x	x
	conductivity (uS)	x	x	x	x	307	x	x	x	x	x	x	330	x	x	x	x
39833	pH	x	7.1	x	x	7.1	x	7.4	x	7.0	x	x	7.0	x	x	x	x
	DO (mg/L)	x	7.0	x	x	6.8	x	6.9	x	7.3	x	x	6.5	x	x	x	x
	conductivity (uS)	x	x	x	x	308	x	x	x	x	x	x	328	x	x	x	x
39834	pH	x	7.1	x	x	7.2	x	7.4	x	7.0	x	x	7.1	x	x	x	x
	DO (mg/L)	x	7.1	x	x	6.8	x	7.0	x	7.2	x	x	6.5	x	x	x	x
	conductivity (uS)	x	x	x	x	315	x	x	x	x	x	x	334	x	x	x	x
39835	pH	x	7.0	x	x	7.1	x	7.4	x	7.0	x	x	7.0	x	x	x	x
	DO (mg/L)	x	6.9	x	x	7.0	x	7.2	x	7.4	x	x	6.2	x	x	x	x
	conductivity (uS)	x	x	x	x	300	x	x	x	x	x	x	314	x	x	x	x
2010	Init./Date):	11-Feb	JG 12-Feb	13-Feb	14-Feb	OK 15-Feb	16-Feb	OK 17-Feb	18-Feb	JG 19-Feb	20-Feb	21-Feb	OK 22-Feb	23-Feb			

Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by: J
Review date: 2/25

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

Species: **HA**

AMMONIA ANALYSIS REPORT

Sample	Pore Water (mg/L) 1/25/201	Overlying Water (mg/L) 1/26/201	2/22/201
39825	4.1	0.4	0.2
39826	4.3	0.8	0.1 BR
39827	6.0	0.7	0.1 BR
39828		1.2	0.1 BR
39831	0.6	0.1 BR	0.1 BR
39833	5.2	0.6	0.1 BR
39834	10.5	0.9	0.1 BR
39835	3.8	0.8	0.1 BR

BD- Indicates a concentration value below the reporting limit (<0.1).

Reviewed by: Date: 2/25/10

Amphipod, H. azteca, 28-D Survival and Growth Test

Aquatec Biological Sciences

Client: TRC
Project: TRC-City of New Bedford
Project #: 10009
SDG: 12151
Species: *Hyalella azteca*

Channel #: 8

TEMPERATURE LOG (°C)

DAY	Hour of the Day 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Daily AVE	MIN	MAX
01/26/2010																			22.3	21.8	21.8	22.0	22.1	22.2	22.0	21.8	22.3
01/27/2010	22.5	22.9	23.2	23.3	23.3	23.4	23.4	23.4	23.5	23.5	23.5	23.1	22.7	22.2	22.1	21.8	21.6	21.6	21.8	22.1	22.2	22.3	22.3	22.5	22.7	21.6	23.5
01/28/2010	22.6	22.8	22.9	22.8	22.7	22.6	22.6	22.5	22.5	22.6	22.6	22.5	22.2	22.0	22.2	22.5	22.8	23.0	22.6	22.8	22.8	22.8	22.8	22.7	22.6	22.0	23.0
01/29/2010	22.6	22.6	22.9	23.1	23.2	23.5	23.5	23.6	23.7	23.7	23.8	23.6	23.1	22.7	22.3	22.1	21.9	21.7	21.6	21.5	21.5	21.5	21.6	21.8	22.6	21.5	23.8
01/30/2010	22.1	22.6	23.1	23.2	23.3	23.4	23.5	23.5	23.6	23.6	23.7	23.2	22.5	22.0	22.1	21.7	21.6	21.8	22.2	22.3	22.3	22.2	22.2	22.5	22.7	21.6	23.7
01/31/2010	22.8	23.3	23.7	23.8	23.8	23.8	23.8	23.8	23.8	24.0	24.0	24.0	23.5	23.0	22.5	22.2	21.8	21.8	21.6	21.5	21.4	21.3	21.3	21.3	22.8	21.3	24.0
02/01/2010	21.3	21.3	21.3	21.3	21.3	21.2	21.2	21.1	21.1	21.1	21.0	21.3	21.7	22.1	22.6	23.0	23.2	23.0	22.8	22.7	22.6	22.8	22.8	22.7	21.9	21.0	23.2
02/02/2010	22.6	22.6	22.6	22.5	22.3	22.2	22.0	21.8	21.8	21.7	21.8	21.9	22.0	23.9	23.9	23.5	23.1	23.0	22.9	22.7	22.6	22.6	22.6	22.6	22.6	21.7	23.9
02/03/2010	22.5	22.6	22.6	22.7	22.6	22.6	22.6	22.6	22.6	22.5	22.5	22.5	22.5	22.5	22.7	22.8	23.0	23.2	23.5	23.3	23.0	22.8	22.5	22.5	22.7	22.5	23.5
02/04/2010	22.5	22.5	22.5	22.6	22.5	22.7	22.5	22.6	22.5	22.6	22.5	22.6	22.6	22.5	22.5	22.5	22.5	22.6	22.5	22.6	22.5	22.7	22.5	22.7	22.6	22.5	22.7
02/05/2010	22.5	22.4	22.4	22.5	22.5	22.6	22.5	22.6	22.5	22.6	22.5	22.8	22.7	22.6	22.6	22.8	23.0	23.0	23.0	22.9	22.9	22.8	22.8	22.9	22.7	22.4	23.0
02/06/2010	22.9	23.0	23.1	23.0	22.9	22.8	22.6	22.7	22.9	22.8	22.8	22.8	22.9	22.7	22.8	22.8	22.8	22.9	22.9	22.8	22.8	22.8	23.0	22.8	22.8	22.6	23.1
02/07/2010	23.1	23.3	23.6	23.6	23.6	23.7	23.8	23.9	23.8	24.0	23.3	22.6	22.7	22.6	22.7	22.9	22.8	22.8	22.7	22.6	22.6	22.9	22.9	22.8	23.1	22.6	24.0
02/08/2010	22.7	22.6	22.7	22.6	22.8	22.7	22.6	22.8	22.6	22.8	23.0	23.0	22.8	22.7	22.7	22.8	22.8	22.8	23.0	22.8	22.7	22.7	22.8	22.9	22.8	22.6	23.0
02/09/2010	22.8	22.8	22.8	22.8	22.8	22.7	22.6	22.7	22.6	22.7	22.6	22.8	22.9	22.8	22.9	22.7	22.9	22.7	22.9	22.9	23.0	22.8	22.6	22.7	22.8	22.6	23.0
02/10/2010	22.7	22.8	22.7	22.8	22.9	22.8	22.9	22.8	22.8	22.7	22.7	22.7	22.7	22.7	22.7	22.8	22.7	22.7	22.7	22.7	22.9	22.9	23.1	22.6	22.8	22.6	23.1
02/11/2010	22.8	22.6	22.8	22.6	22.8	22.7	22.7	22.8	23.0	22.7	22.7	22.7	22.7	22.8	23.0	22.7	22.8	23.0	22.7	22.9	22.5	22.7	23.0	22.5	22.8	22.5	23.0
02/12/2010	22.6	22.8	22.8	22.7	22.8	23.0	22.7	22.5	22.6	22.8	22.9	22.8	22.8	22.7	22.9	22.9	22.6	22.7	23.0	22.6	22.8	22.9	22.6	22.8	22.8	22.5	23.0
02/13/2010	23.0	22.6	22.5	22.5	22.6	22.7	22.8	22.8	22.6	22.6	22.7	22.8	22.6	22.6	22.7	22.7	22.9	22.6	22.7	22.8	22.5	22.8	22.8	22.6	22.7	22.5	23.0
02/14/2010	22.8	23.0	22.9	23.0	22.6	22.5	22.6	22.7	23.1	22.6	22.7	22.8	22.9	22.6	22.7	23.0	22.6	22.7	22.6	22.8	23.0	22.5	22.8	23.0	22.8	22.5	23.1
02/15/2010	22.6	22.7	22.8	23.0	22.5	22.6	22.7	22.6	22.7	23.0	22.6	22.7	23.0	22.7	23.0	22.7	23.0	22.7	22.9	22.6	23.0	22.7	22.7	22.7	22.8	22.5	23.0
02/16/2010	22.9	22.7	23.0	22.7	23.0	22.7	22.8	22.7	23.1	22.9	22.7	22.9	22.6	22.9	22.6	23.0	22.6	23.0	22.6	23.0	22.7	22.8	22.9	22.8	22.8	22.6	23.1
02/17/2010	23.0	22.7	23.0	22.7	22.8	22.9	22.5	22.7	23.0	22.6	22.8	22.6	22.8	22.6	23.0	22.7	23.0	22.7	23.1	22.8	22.7	22.9	22.7	22.8	22.8	22.5	23.1
02/18/2010	22.8	22.7	22.8	23.0	22.6	22.8	23.0	22.6	22.8	22.6	22.8	22.7	23.0	22.7	23.0	22.7	22.8	22.6	22.7	22.6	22.7	22.6	22.8	22.6	22.7	22.6	23.0
02/19/2010	23.0	22.6	22.9	22.7	22.8	23.0	22.6	22.8	22.7	23.0	22.7	23.0	22.8	22.5	22.8	22.7	22.8	22.9	22.7	22.8	22.6	23.0	22.6	22.9	22.8	22.5	23.0
02/20/2010	22.6	23.1	22.6	22.9	22.6	22.7	22.8	22.6	22.6	23.0	22.6	22.8	22.9	22.7	23.0	22.7	23.1	22.8	22.7	22.8	22.7	23.0	22.7	23.1	22.8	22.6	23.1
02/21/2010	22.6	23.0	22.6	22.8	22.9	22.8	22.6	22.8	22.9	22.6	22.8	23.0	22.7	23.0	22.7	22.8	23.1	22.7	22.9	22.6	22.7	23.1	22.7	23.1	22.8	22.6	23.1
02/22/2010	22.6	22.7	23.0	22.6	22.8	23.0	22.5	22.7	22.8	23.0	22.8	23.1	22.7	23.0	22.7	23.0	22.7	23.1	22.7	23.1	22.9	23.0	22.8	23.1	22.9	22.5	23.1
02/23/2010	22.7	22.9	22.6	22.7	22.9	22.6	22.8	23.0	22.6	22.9															22.8	22.6	23.0
																								Overall Test Temperature:	**22.7**	**21.0**	**24.0**

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Reviewed by: ____ Date: 2/25/10

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

SDG: 12151

ALKALINITY AND HARDNESS

Sample ID:			Sample Date:	Alkalinity: (mg/L)	Hardness: (mg/L)
39825	Natural Sediment Control	Ha Day 0	1/26/2010	60.0	96.0
39826	ERC-SED 7	Ha Day 0	1/26/2010	52.0	76.0
39827	ERC-SED 9	Ha Day 0	1/26/2010	60.0	88.0
39828	ERC-SED 11-A-C	Ha Day 0	1/26/2010	52.0	86.0
39831	ERC-SED 14	Ha Day 0	1/26/2010	56.0	88.0
39833	SD-16	Ha Day 0	1/26/2010	60.0	90.0
39834	SD-40	Ha Day 0	1/26/2010	76.0	102.0
39835	SD-48	Ha Day 0	1/26/2010	44.0	78.0
39825	Natural Sediment Control	Ha Day 27	2/22/2010	68.0	92.0
39826	ERC-SED 7	Ha Day 27	2/22/2010	56.0	84.0
39827	ERC-SED 9	Ha Day 27	2/22/2010	64.0	90.0
39828	ERC-SED 11-A-C	Ha Day 27	2/22/2010	56.0	88.0
39831	ERC-SED 14	Ha Day 27	2/22/2010	60.0	90.0
39833	SD-16	Ha Day 27	2/22/2010	64.0	92.0
39834	SD-40	Ha Day 27	2/22/2010	64.0	94.0
39835	SD-48	Ha Day 27	2/22/2010	60.0	82.0

Reviewed by: OK Date: 2/25/10

Sediment Preparation and Characterization

Sample Number	Sample Identification	Sediment Visual Characterization and Preparation	Indigenous organisms observed?	Pore water pH	Homogenized / loaded for toxicity test (Date/Init.)
39825	CONTROL	Natural sediment control. Press-sieved through a 0.25 and 0.5-mm sieve in the field to remove indigenous organisms. Collected on 12/1/09	N	6.6	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39826	ERC-SED 7	a little organic material dark, chunky, fine mud	N	5.5	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39827	ERC-SED 9	some organic ok material dark, fine ~~mud~~ mud	N	6.0	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39828	ERC-SED 11-A-C	dark, fine, dry mud thick	N	No pore water available	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39831	ERC-SED 14	some organic material fine mud	N	5.4	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39833	SD-16	some organic material dark, thick, fine mud	N	6.4	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39834	SD-40	some organic ok material dark, ~~thick~~, fine mud	N	6.8	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW
39835	SD-48	lots of organic material dark, thick, fine mud	N	5.5	1/25/2010, Nominal 100-mL sediment per replicate, 175 mL OLW

Reviewed by: TJ
Review date: 2/25/10

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of: January 24, 2010 **Project: 10009 – *Ha* 28-day** **SDG: 12151**

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs			✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?			✓	✓	✓	✓	✓
• syringes filling?			✓	✓	✓	✓	✓
• needles flowing?			✓	✓	✓	✓	✓
• drainage to waste ok?			✓	✓	✓	✓	✓
• empty waste buckets?			✓	✓	✓	✓	✓
Test monitoring							
• test temperature ok?	AM	AM	AM	AM	AM	AM	AM
• Probe assignments SL2 Channel 8: (probe 20)	PM	PM	PM 22.2	PM 24.1 ✓ PM 22.3	PM 22.7 PM 22.6	PM 24.2 PM 22.4	PM 23.8 PM 22.2
• D.O. ok?			✓	✓	✓	✓	—
• check for floating organisms			✓	✓	✓	✓	✓
• feeding completed? (1 mL YCT)			1445 JG	1315 OK	1640 OK	1430 JG	1320 JG
Additional activities							
Prior to midnight fill reservoirs			✓	✓	✓	✓	✓
Check sediment water supply			✓	✓	✓	✓	✓
Check delivery tubing to splitter boxes			✓	✓	✓	✓	✓
Corrective Action / Comments			Test start: 1430	Turned heater down ✓		TURNED HEATER DOWN	Turned heater down in AM. JG
Initials/Date	1/24	1/25	1/26 JG	1/27 ✓	1/28 OK	1/29 JG	1/30 JG

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Comments:

Reviewer: ✓ Date 2/25/10

Laboratory: Aquatec Biological Sciences, Inc. Williston, Vermont

Ha 28d pkg

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of: January 31, 2010 **Project: 10009 – *Ha* 28-day** **SDG: 12151**

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓	✓	✓	✓	✓	✓	✓
Test monitoring							
• test temperature ok? • Probe assignments: **SL2 Channel 8**	AM 23.8 PM 21.7	AM 21.3 PM 22.8	AM 22.1 J PM 23.2	AM 22.8 PM 23.9	AM 22.6 PM	AM 22.9 PM 23.2	AM 23.2 PM 23.0
• D.O. ok?	✓	✓	✓	✓	✓	✓	✓
• check for floating organisms	✓	✓	✓	✓		✓	✓
• feeding completed? **(1 mL YCT)**	1400 OK	1500 OK	1410 OK	1530 OK	1500 OK	1245 JG	1215 JG
Additional activities							
Prior to midnight fill reservoirs	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Check delivery tubing to splitter boxes	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments	Turned heater down OK	Turned heater up OK	Heater up J				
Initials/Date	1/31 OK	2/1 OK	2/2 OK	2/3 OK	2/4 OK	2/5 JG KK	2/6 JG

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Comments:

Reviewer: J Date 2/25/10

Laboratory: Aquatec Biological Sciences, Inc. Williston, Vermont

Ha 28d pkg

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

DAILY CHECKLIST FOR *Hyalella azteca* SEDIMENT TOXICITY TESTS
Week of: February 7, 2010

ACTIVITY / DAY:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A.M. Temperature:	23.2	23.0	22.8	23.1	23.0°C	22.8°C	23.0°C
Prior to noon fill reservoirs:	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
syringes filling?	✓	✓	✓	✓	✓	✓	✓
all needles flowing?	✓	✓	✓	✓	✓	✓	✓
empty waste buckets:	✓	✓	✓	✓	✓	✓	✓
Test monitoring							
D.O. ok?	✓	✓	—	✓	—	✓	—
check for floating organisms:	✓	✓	✓	✓	✓	✓	✓
Time feeding completed (1 mL YCT)/Initials:	1400 OK	1315 OK	1315 OK	1510 OK	1415 OK	1300 JG	1250 JG
Additional activities							
Prior to midnight fill reservoirs:	✓	✓	✓	✓	✓	✓	✓
Check water supply:	✓	✓	✓	✓	✓	✓	✓
Check delivery tubing to splitter boxes:	✓	✓	✓	✓	✓	✓	✓
P.M. Temperature:	22.8	22.7	22.9	22.7	22.9	23.0°C	22.9°C
Corrective Action or Comments:							
Initials/Date (2010):	OK 7-Feb	OK 8-Feb	OK 9-Feb	OK 10-Feb	JG OK 11-Feb	JG 12-Feb	JG 13-Feb

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Temperature Probe assignments: SL2 Ch 8

Reviewed by: J
Review date: 2/25/10

DAILY CHECKLIST FOR *Hyalella azteca* SEDIMENT TOXICITY TESTS
Week of: February 14, 2010

ACTIVITY / DAY:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A.M. Temperature:	22.9	23.0	23.1	23.1	23.1	22.8	23.1
Prior to noon fill reservoirs:	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
syringes filling?	✓	✓	✓	✓	✓	✓	✓
all needles flowing?	✓	✓	✓	✓	✓	✓	✓
empty waste buckets:	✓	✓	✓	✓	✓	✓	✓
Test monitoring							
D.O. ok?	—	✓	—	✓	—	✓	—
check for floating organisms:	✓	✓	✓	✓	✓	✓	✓
Time feeding completed (1 mL YCT)/Initials:	1630 OK	1650 OK	1430 OK	1255 OK	1300 OK	1220 JG	1210 JG
Additional activities							
Prior to midnight fill reservoirs:	✓	✓	✓	✓	✓	✓	✓
Check water supply:	✓	✓	✓	✓	✓	✓	✓
Check delivery tubing to splitter boxes:	✓	✓	✓	✓	✓	✓	✓
P.M. Temperature:	22.6	23.2	22.8	23.1	22.6	23.1	22.9
Corrective Action or Comments:							
Initials/Date (2010):	OK 14-Feb	OK 15-Feb	OK 16-Feb	BK 17-Feb	OK JG 18-Feb	KK JG 19-Feb	JG 20-Feb

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

Client: TRC Environmental
Project: 10009 City of New Bedford KMS

SDG: 12151

DAILY CHECKLIST FOR *Hyalella azteca* SEDIMENT TOXICITY TESTS
Week of: February 21, 2010

ACTIVITY / DAY:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A.M. Temperature:	23.3	23.1	22.9				
Prior to noon fill reservoirs:	✓	✓					
Noon delivery cycle							
splitter boxes filling?	✓	✓					
syringes filling?	✓	✓					
all needles flowing?	✓	✓					
empty waste buckets:	✓	✓					
Test monitoring							
D.O. ok?	—	✓					
check for floating organisms:	✓	✓					
Time feeding completed (1 mL YCT)/Initials:	1400 OK	1330 OK					
Additional activities							
Prior to midnight fill reservoirs:	✓	✓					
Check water supply:	✓	✓					
Check delivery tubing to splitter boxes:	✓	✓					
P.M. Temperature:	23.2	23.1					
Corrective Action or Comments:			Test Ended: 10:30				
Initials/Date (2010):	OK 21-Feb	OK 22-Feb	OK 23-Feb	24-Feb	25-Feb	26-Feb	27-Feb

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form.

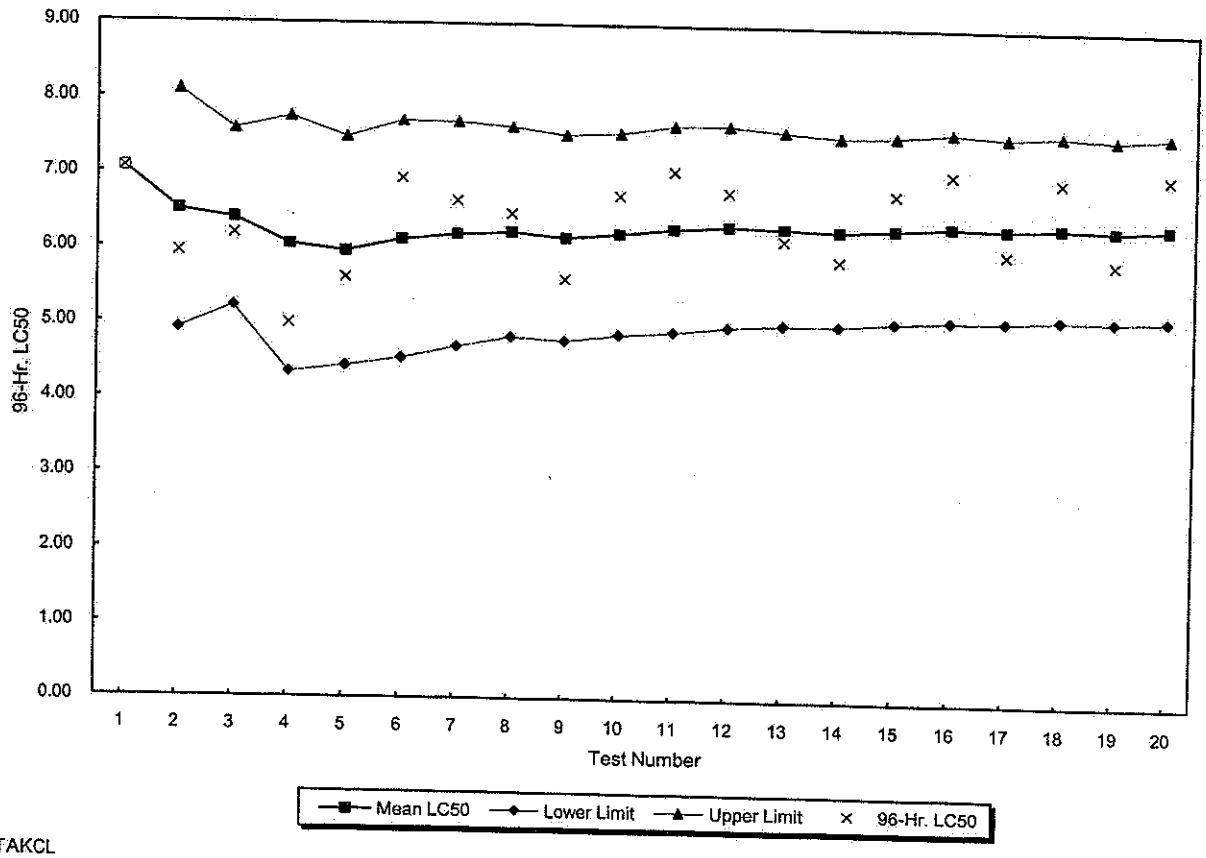
Aquatec Biological Sciences, Inc.,
Williston, VT

Reviewed by:
Review date: 2/25/10

Standard Reference Toxicant Control Charts

Reference Toxicant Control Chart
Chironomus tentans
in Potassium chloride (g/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	11/01/02	9	7.071	7.07			Aquatic BioSystems
2	10/16/03	11	5.946	6.51	4.92	8.10	Aquatic BioSystems
3	10/13/04	10	6.189	6.40	5.22	7.59	Aquatic BioSystems
4	08/19/05	8	5.000	6.05	4.35	7.75	Aquatic BioSystems
5	09/23/05	16	5.612	5.96	4.44	7.49	Aquatic BioSystems
6	11/17/05	11	6.943	6.13	4.54	7.71	Aquatic BioSystems
7	06/30/06	8	6.652	6.20	4.70	7.70	Aquatic BioSystems
8	11/03/06	9	6.484	6.24	4.84	7.64	Aquatic BioSystems
9	12/18/06	9	5.612	6.17	4.79	7.54	Aquatic BioSystems
10	05/01/07	8	6.741	6.23	4.88	7.57	Aquatic BioSystems
11	05/31/07	15	7.071	6.30	4.93	7.68	Aquatic BioSystems
12	11/06/07	8	6.800	6.34	5.00	7.69	Aquatic BioSystems
13	12/05/07	10	6.160	6.33	5.04	7.62	Aquatic BioSystems
14	12/06/07	9	5.900	6.30	5.04	7.56	Aquatic BioSystems
15	05/30/08	9	6.800	6.33	5.09	7.57	Aquatic BioSystems
16	11/07/08	9	7.071	6.38	5.12	7.63	Aquatic BioSystems
17	03/25/09	9	6.020	6.36	5.13	7.58	Aquatic BioSystems
18	10/14/09	13	6.995	6.39	5.16	7.62	Aquatic BioSystems
19	11/03/09	7	5.913	6.37	5.15	7.58	Aquatic BioSystems
20	01/26/10	7	7.071	6.40	5.18	7.62	Aquatic BioSystems



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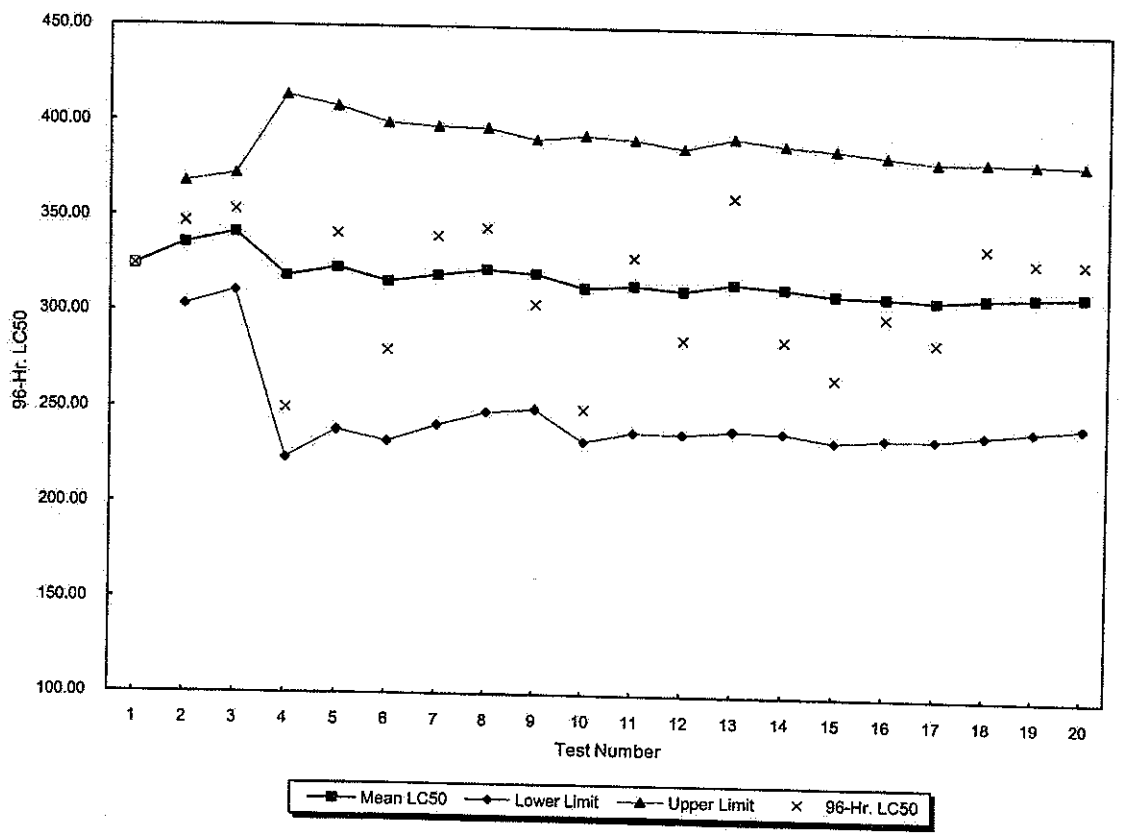
Reference Toxicant Control Chart
Hyalella azteca
in Potassium chloride (mg/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	06/30/06	13	324.210	324.21			Aquatic Research Organisms
2	07/07/06	7	347.163	335.69	303.23	368.15	Aquatic Research Organisms
3	11/03/06	12	353.553	341.64	310.78	372.50	Aquatic Research Organisms
4	11/22/06	8	250.000	318.73	223.69	413.77	Aquatic Research Organisms
5	12/18/06	10	341.510	323.29	238.49	408.08	Aquatic Research Organisms
6	05/17/07	7	280.616	316.18	232.71	399.64	Aquatic Research Organisms
7	11/06/07	12	340.198	319.61	241.28	397.93	Aquatic Research Organisms
8	11/21/07	8	344.592	322.73	248.10	397.37	Aquatic Research Organisms
9	12/06/07	8	304.753	320.73	249.90	391.57	Aquatic Research Organisms
10	01/09/08	8	250.000	313.66	233.28	394.04	Aquatic Research Organisms
11	05/30/08	8	329.877	315.13	238.25	392.02	Aquatic Research Organisms
12	10/10/08	9	287.059	312.79	237.72	387.87	Aquatic Research Organisms
13	11/05/08	12	362.106	316.59	239.68	393.50	Aquatic Research Organisms
14	11/26/08	8	287.175	314.49	238.94	390.03	Aquatic Research Organisms
15	03/25/09	8	267.836	311.38	234.70	388.06	Aquatic Research Organisms
16	04/02/09	9	300.053	310.67	236.37	384.96	Aquatic Research Organisms
17	08/31/09	9	287.175	309.29	236.45	382.12	Aquatic Research Organisms
18	09/25/09	8	337.050	310.83	238.97	382.69	Aquatic Research Organisms
19	10/30/09	12	329.880	311.83	241.45	382.21	Aquatic Research Organisms
20	02/25/10	8	329.877	312.73	243.76	381.71	Aquatic Research Organisms



\SRTS\HAAKCL

Surface Water Toxicity Tests

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

April 8, 2010

Mr. Scott Heim
TRC Solutions, Inc.
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

Re: New Bedford Sediments

Dear Mr. Heim:

Attached please find the report and data package for *Ceriodaphnia dubia* and *Pimphales promelas* screening-level chronic toxicity tests on surface water for the City of New Bedford KMS Project.

If you have any questions regarding this report or data package, please contact Dr. Philip C. Downey or me.

Sincerely,

John W. Williams
Manager, Environmental Toxicology

This report consists of the following numbered pages: 1 - 47

273 Commerce Street, Williston, VT 05495 Tel: 802.860.1638 Fax: 802.658.3189

Aquatec Biological Sciences, Inc.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

SDG: 12246
Project: 10009

Toxicity Summary Report

TRC
650 Suffolk St

Lowell, MA

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.com

Project: TRC-City of New Bedford

Permit No.

Sample Name: **ERC-SW-9**

Sample ID: **40008**

Method	Species	ACUTE % A-NOEC	ACUTE % A-LC50	CHRONIC % C-NOEC	CHRONIC % C-LOEC
1002.0	*Ceriodaphnia dubia*	100	>100	100	>100
1000.0	*Pimephales promelas*	100	>100	100	>100

Samples Received

Number	Sample Name	Date Time and Collected	Type
40008	***ERC-SW-9***	3/10/2010 11:00:00 AM	Receiving
40009	***Lab water***	3/12/2010	Lab Water

Submitted By:

Aquatec Biological Sciences, Inc.
273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

SDG: 12246
Project: 10009

Toxicity Detail Report

TRC
Wannalancit Mills
650 Suffolk St
Lowell, MA 01854

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.com

Project: **TRC-City of New Bedford** Permit No.

Sample ID: ***40008*** ***ERC-SW-9***

Method: 1000.0 *Pimephales promelas*

Response: Survival (%)

Day	0	100
2	100	100
7	98.3	98.5

Response: Growth (mean dry weight in milligrams)

	0	100
7	0.370	0.387

Method: 1002.0 *Ceriodaphnia dubia*

Response: Survival (%)

Day	0	100
2	100	100
7	80	100

Response: Reproduction (mean neonates per female)

	0	100
7	24.8	35.4

Aquatec Biological Sciences, Inc.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

ACCREDITED IN ACCORDANCE WITH nelac
Aquatec Biological Sciences
Certification Number 1737

Toxicity Quality Assurance Report

SDG: 12246
Project: 10009

TRC
Wannalancit Mills
650 Suffolk St
Lowell, MA 01854

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.com

Project: **TRC-City of New Bedford** Permit No.

Method: **1000.0** *Pimephales promelas*

Response: Survival (%)

Day	Sample ID	Dilution Control
2	40008	100
7	40008	98.3

Response: Growth (mean dry weight in milligrams)

Day	Sample ID	Dilution Control
7	40008	0.37

Method: **1002.0** *Ceriodaphnia dubia*

Response: Survival (%)

Day	Sample ID	Dilution Control
2	40008	100
7	40008	80

Response: Reproduction (mean neonates per female)

Day	Sample ID	Dilution Control
7	40008	24.8

TRC
Wannalancit Mills
650 Suffolk St
Lowell, MA 01854

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.com

Project: **TRC-City of New Bedford** Permit No.

Special Conditions and Qualifiers

Two surface water samples (ERC-SW-7 and ERC-SW-9) were collected on March 10, 2010 and received at Aquatec Biological Sciences, Inc. on March 11, 2010. These samples were stored refrigerated until approval was provided to proceed with testing of these samples.

On March 17, 2010, TRC provided notification to proceed with testing of sample 40008 (ERC-SW-9). Ceriodaphnia dubia and Pimephales promelas chronic toxicity tests were started with this sample on March 18, 2010. Sample 40007 (ERC-SW-7) was not tested based on the March 17, 2010 communication.

TRC
Wannalancit Mills
650 Suffolk St
Lowell, MA 01854

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.com

Project: **TRC-City of New Bedford** Permit No.

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION

The results reported relate only to the the samples submitted as received.

I certify under penalty of law that this document and all ATTACHMENTs were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on: 4/6/10
(Date)

(Authorized signature)

John Williams
Toxicity Laboratory Manager
Aquatec Biological Sciences, Inc.

Supportive Documentation

Chain-Of-Custody

Toxicity Test Methods

Daphnid, Ceriodaphnia dubia, Survival and Reproduction Test

Fathead Minnow, Pimephales promelas, Larval Survival and Growth Test

Standard Reference Toxicant Control Charts

Chain-Of-Custody

Aquatec Biological Sciences

Chain-of-Custody-Record

273 Commerce Street
Williston, VT 05495
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION

Name: TRC
Address: 650 Suffolk St
City/State/Zip: Lowell MA 01854
Telephone: 978-656-3565
Facsimile:
Contact Name: Scott Heim

COMPANY'S PROJECT INFORMATION

Project Name: City of New Bedford
Project Number: 115058
Sampler Name(s): Jeff Saunders
Quote #: Unknown Client Code: NA

SHIPPING INFORMATION

Carrier: Fedex
Airbill Number: 8651-6976-0320
Date Shipped: 3/10/10
Hand Delivered: ☐ Yes ☐ No

VOLUME/CONTAINER TYPE/ PRESERVATIVE

1 gal | plastic | none (Ice)

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS/REMARKS	NUMBER OF CONTAINERS
JS 3/10/10 ~~SW~~ ERC-SW-7	3/10/10	1030	X		SW	Toxicity Testing	3
ERC-SW-9	3/10/10	1100	X		SW	Toxicity Testing	3

Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)
[signature]	3/10/10		Via Fedex
Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)
	3/11/10	1020	[signature]
Relinquished by: (signature)	DATE	TIME	Recieved by: (signature)

NOTES TO SAMPLER(S): Cooler Temp = 0.3°C 3/11/10 JG

NOTES TO LAB: * Hold samples pending contact from TRC authorizing analysis
** Tox. analysis per S. Heim - John Williams

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3/17/10

Saunders, Jeffry (Lowell,MA-US) to Dave, me, Scott

show details 7:58 AM (2 hours ago)

John,

Please proceed with the toxicity testing of surface water sample "ERC-SW-9" as indicated in the attached chain-of-custody.

Do not analyze sample "ERC-SW-7" at this time. That sample will need to be recollected in the next week or so. To that end, could you please send another cooler, sample bottles, chain-of-custody form, etc. to my attention in Lowell (same address as Scott Heim)? We will just need bottles sufficient for toxicity testing of one surface water sample.

Please let me know if you have any questions. Thanks.

-Jeff

Toxicity Test Methods

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Daphnid, *Ceriodaphnia dubia*, acute / chronic survival and reproduction

ASSOCIATED PROTOCOL: EPA 2002, 4th Ed. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA-821-R-02-013), Method 1002.0

1. Test type:	Static, daily renewal
2. Test temperature:	25 ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test chamber size:	30 ml
6. Test solution volume:	15-20 ml / replicate
7. Renewal of test concentrations:	Daily
8. Age of test organisms:	Less than 24 hr.; released within an 8 hr. period
9. No. organisms / test chamber:	1
10. No. of replicate chambers / concentration:	10
11. No. of organisms / concentration:	10
12. Feeding regime:	0.1 ml each of YTC and algal suspension daily
13. Cleaning:	Transfer to new solution / test chamber daily
14. Aeration:	None
15. Dilution water:	None
16. Test concentrations:	100% surface water
17. Laboratory control:	1:1 mix of Lamoille River water and moderately hard water
18. Test duration:	Until 60% of control females have three broods
19. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity. Hardness, alkalinity on each new sample. Biological monitoring daily
19. End points:	Survival (Day 2 and end of test) and reproduction
20. Reference toxicant test:	Sodium chloride 48-h LC50
21. Test acceptability (control performance):	80% or greater survival and an average of 15 or more young / female. At least 60% of surviving females in must have produced third brood
22. Data interpretation:	Acute: 48 h LC50 (Point estimate by EPA statistical flowchart using CETIS)
	Chronic: C-NOEC by hypothesis test statistics compared to the receiving water control (EPA statistical flowchart using CETIS)

Reviewed by:
Review date: 3/26/10

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Fathead minnow, *Pimephales promelas*, acute / chronic larval survival and growth

ASSOCIATED PROTOCOL: EPA 2002, 4th Ed. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA-821-R-02-013), Method 1000.0

1. Test type:	Static, daily renewal
2. Test temperature:	25 ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 h light, 8 h dark
5. Test chamber size:	300 ml
6. Test solution volume:	250 ml / replicate
7. Renewal of test concentrations:	Daily
8. Age of test organisms:	Newly hatched larvae, 24 h old
9. No. larvae / test chamber:	15 (minimum 10)
10. No. of replicate chambers / concentration:	4
11. No. of larvae / concentration:	60 (minimum 40)
12. Feeding regime:	0.15 ml *Artemia* nauplii twice daily, 6 h between feedings. Not fed on Day 7
13. Cleaning:	Daily, immediately before test solution renewal
14. Aeration:	None, unless dissoved oxygen drops below 4.0 mg/L
15. Dilution water:	None
16. Test concentrations:	100% surface water
17. Laboratory control:	Reconstituted moderately hard water
18. Test duration:	7 days
19. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity. Hardness, alkalinity on each new sample. Biological monitoring daily
19. End points:	Survival (Days 2 and 7) and growth (dry weight)
20. Reference toxicant test:	Sodium chloride 48-h LC50
21. Test acceptability (control performance):	80% or greater survival; minimum average dry weight of 0.25 mg
22. Data interpretation:	Acute: 48 h LC50 (Point estimate by EPA statistical flowchart using CETIS)
	Chronic: C-NOEC by hypothesis test statistics compared to the receiving water control (EPA statistical flowchart using CETIS)

Reviewed by:
Review date: 3/26/10

Daphnid, Ceriodaphnia dubia, Survival and Reproduction Test

CETIS Summary Report

Report Date: 25 Mar-10 13:18 (p 1 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test

Aquatec Biological Sciences, Inc

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
04-1258-7683	2d Survival Rate	100	> 100	N/A	N/A	Fisher Exact Test
21-0485-7727	6d Survival Rate	100	> 100	N/A	N/A	Fisher Exact Test
06-9677-7015	Reproduction	100	> 100	N/A	37.45%	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis No	Endpoint	Effect-%	Conc-%	95% LCL	95% UCL	Method
03-8425-1374	2d Survival Rate	5	> 100	N/A	N/A	Linear Interpolation (ICPIN)
		10	> 100	N/A	N/A	
		15	> 100	N/A	N/A	
		20	> 100	N/A	N/A	
		25	> 100	N/A	N/A	
		40	> 100	N/A	N/A	
		50	> 100	N/A	N/A	
19-8759-3458	Reproduction	5	> 100	N/A	N/A	Linear Interpolation (ICPIN)
		10	> 100	N/A	N/A	
		15	> 100	N/A	N/A	
		20	> 100	N/A	N/A	
		25	> 100	N/A	N/A	
		40	> 100	N/A	N/A	
		50	> 100	N/A	N/A	

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
06-9677-7015	Reproduction	Control Resp	24.8	15 - NL	Yes	Passes acceptability criteria
19-8759-3458	Reproduction	Control Resp	24.8	15 - NL	Yes	Passes acceptability criteria
06-9677-7015	Reproduction	PMSD	0.374516	0.13 - 0.47	Yes	Passes acceptability criteria

2d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	10	1	1	1	1	1	0	0	0.0%	0.0%
100		10	1	1	1	1	1	0	0	0.0%	0.0%

6d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	10	0.8	0.642558	0.957442	0	1	0.07698	0.421637	52.7%	0.0%
100		10	1	1	1	1	1	0	0	0.0%	-25.0%

Reproduction Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	10	24.8	19.2704	30.3296	0	46	2.70363	14.8084	59.71%	0.0%
100		10	35.4	32.3299	38.4701	20	46	1.50111	8.22192	23.23%	-42.74%

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatec Biological Sciences, Inc

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

6d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1	0	1	1	1	1	1	1	0	1
100		1	1	1	1	1	1	1	1	1	1

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	44	22	20	37	46	27	9	15	0	28
100		46	42	28	43	41	35	27	20	36	36

CETIS Analytical Report

Report Date: 25 Mar-10 13:18 (p 1 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatec Biological Sciences, Inc

Analysis No:	06-9677-7015	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 13:18	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run	100	>100	N/A	1	37.45%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	P-Value	Decision(5%)
Lab Water		100	-1.97902	1.73406	9.28799	0.9683	Non-Significant Effect

Test Acceptability

Attribute	Test Stat	Acceptability Limits	Overlap	Decision
Control Resp	24.8	15 - NL	Yes	Passes acceptability criteria
PMSD	0.374516	0.13 - 0.47	Yes	Passes acceptability criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	561.8	561.8	1	3.9165	0.0633	Non-Significant Effect
Error	2582	143.4444	18			
Total	3143.8	705.2444	19			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	3.24392	6.54109	0.0945	Equal Variances
Distribution	Shapiro-Wilk Normality	0.987824		0.9939	Normal Distribution

Reproduction Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	10	24.8	19.1672	30.4328	0	46	2.74985	14.8084	59.71%	0.0%
100		10	35.4	32.2725	38.5275	20	46	1.52677	8.22192	23.23%	-42.74%

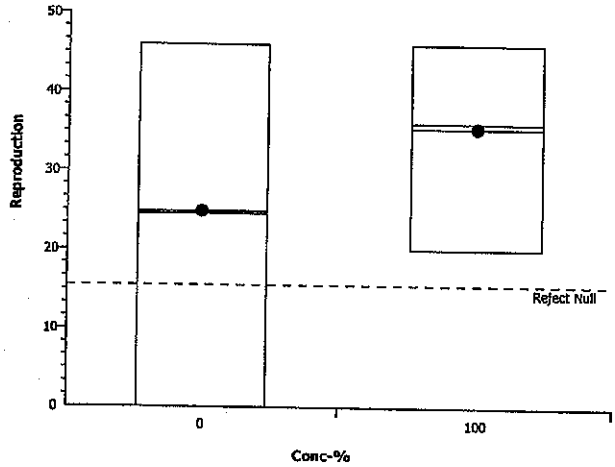
Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatec Biological Sciences, Inc**

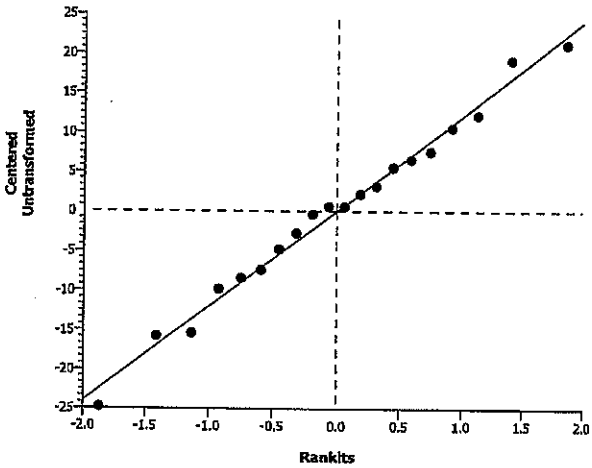
Analysis No: 06-9677-7015 **Endpoint:** Reproduction **CETIS Version:** CETISv1.6.4
Analyzed: 25 Mar-10 13:18 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	46	44	37	28	27	22	20	15	9	0
100		46	43	42	41	36	36	35	28	27	20

Graphics





CETIS Analytical Report

Report Date: 25 Mar-10 13:18 (p 1 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatec Biological Sciences, Inc

Analysis No:	19-8759-3458	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 13:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X + 1)	Linear	57951	200	Yes	Two-Point Interpolation

Test Acceptability

Attribute	Test Stat	Acceptability Limits	Overlap	Decision
Control Resp	24.8	15 - NL	Yes	Passes acceptability criteria

Point Estimates

Effect-%	Conc-%	95% LCL	95% UCL
5	> 100	N/A	N/A
10	> 100	N/A	N/A
15	> 100	N/A	N/A
20	> 100	N/A	N/A
25	> 100	N/A	N/A
40	> 100	N/A	N/A
50	> 100	N/A	N/A

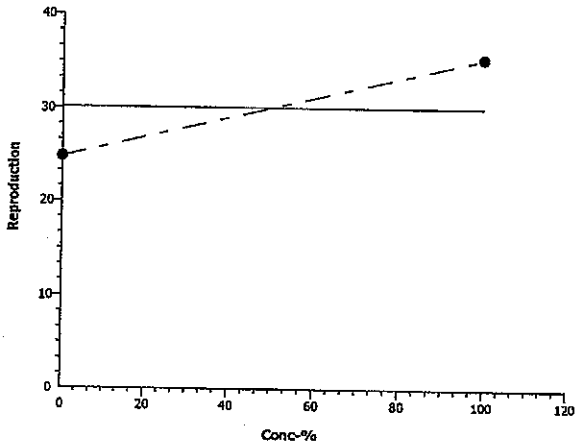
Reproduction Summary

			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	10	24.8	0	46	2.70363	14.8084	59.71%	0.0%
100		10	35.4	20	46	1.50111	8.22192	23.23%	-42.74%

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	44	22	20	37	46	27	9	15	0	28
100		46	42	28	43	41	35	27	20	36	36

Graphics



Analyst:_____ QA: 5/6/10

CETIS Analytical Report

Report Date: 25 Mar-10 13:18 (p 2 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatec Biological Sciences, Inc

Analysis No:	03-8425-1374	**Endpoint:**	2d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 13:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X + 1)	Linear	57951	200	Yes	Two-Point Interpolation

Point Estimates

Effect-%	Conc-%	95% LCL	95% UCL
5	> 100	N/A	N/A
10	> 100	N/A	N/A
15	> 100	N/A	N/A
20	> 100	N/A	N/A
25	> 100	N/A	N/A
40	> 100	N/A	N/A
50	> 100	N/A	N/A

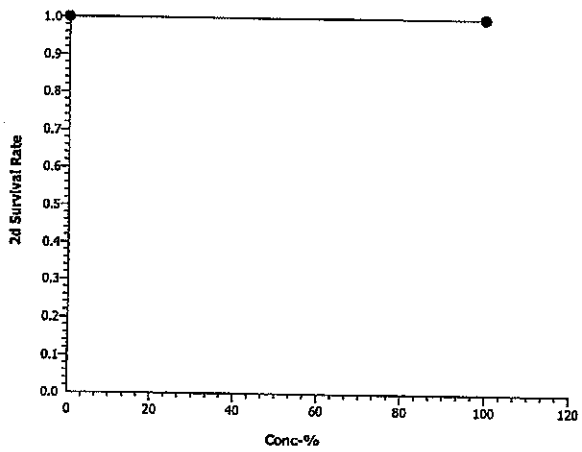
2d Survival Rate Summary

			Calculated Variate(A/B)								
Conc-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**Diff%**	**A**	**B**
0	Lab Water	10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Graphics



CETIS Analytical Report

Report Date: 25 Mar-10 13:18 (p 1 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test

Aquatec Biological Sciences, Inc

Analysis No:	21-0485-7727	**Endpoint:**	6d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 13:18	**Analysis:**	Single 2x2 Contingency Table	**Official Results:**	Yes

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run	100	>100	N/A	1	N/A

Fisher Exact Test

Control	vs	Conc-%	Test Stat	P-Value	Decision(0.05)
Lab Water		100	1	1	Non-Significant Effect

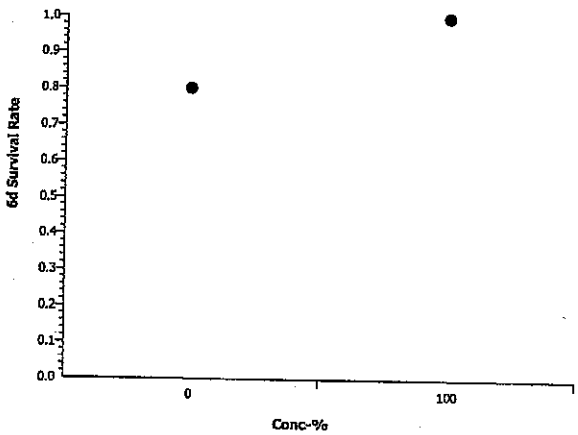
Data Summary

Conc-%	Control Type	No-Resp	Resp	Total
0	Lab Water	8	2	10
100		10	0	10

6d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1	1	1	1	1	1	1	1	0	0
100		1	1	1	1	1	1	1	1	1	1

Graphics



CETIS Analytical Report

Report Date: 25 Mar-10 13:18 (p 2 of 2)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatec Biological Sciences, Inc

Analysis No:	04-1258-7683	**Endpoint:**	2d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 13:18	**Analysis:**	Single 2x2 Contingency Table	**Official Results:**	Yes

Test Run No:	09-1505-8360	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 11:35	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	24 Mar-10 09:40	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	5d 22h	**Source:**	In-House Culture	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 1h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run	100	>100	N/A	1	N/A

Fisher Exact Test

Control	vs	Conc-%	Test Stat	P-Value	Decision(0.05)
Lab Water		100	1	1	Non-Significant Effect

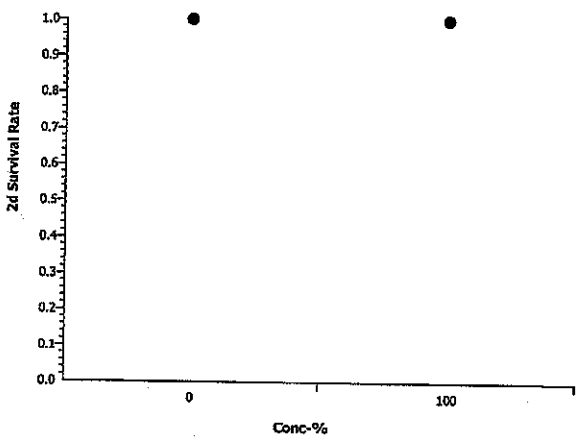
Data Summary

Conc-%	Control Type	No-Resp	Resp	Total
0	Lab Water	10	0	10
100		10	0	10

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Graphics



CETIS Test Data Worksheet

Report Date: 25 Mar-10 13:17 (p 1 of 1)
Link/Link Code: 08-0643-5466/60832

Ceriodaphnia 7-d Survival and Reproduction Test

Aquatec Biological Sciences, Inc

Start Date: 18 Mar-10 11:35
Ending Date: 24 Mar-10 09:40
Sample Date: 10 Mar-10 10:30

Species: Ceriodaphnia dubia
Protocol: EPA/821/R-02-013 (2002)
Material: Surface Water

Sample Code: 1815271710
Sample Source: City of New Bedford KMS
Sample Station:

Conc-%	Code	Rep	Pos	# Exposed	1d Survival	2d Survival	3d Survival	4d Survival	5d Survival	6d Survival	7d Survival	Neonates	Male
0	L	1	7	1		1				1		44	0
0	L	2	10	1		1				0		22	0
0	L	3	11	1		1				1		20	0
0	L	4	5	1		1				1		37	0
0	L	5	2	1		1				1		46	0
0	L	6	13	1		1				1		27	0
0	L	7	12	1		1				1		9	0
0	L	8	8	1		1				1		15	0
0	L	9	18	1		1				0		0	0
0	L	10	15	1		1				1		28	0
100		1	20	1		1				1		46	0
100		2	17	1		1				1		42	0
100		3	6	1		1				1		28	0
100		4	9	1		1				1		43	0
100		5	14	1		1				1		41	0
100		6	4	1		1				1		35	0
100		7	19	1		1				1		27	0
100		8	16	1		1				1		20	0
100		9	3	1		1				1		36	0
100		10	1	1		1				1		36	0

TRC Surface Water Neonate Data SDG: 12246 Test ID: 60832 Mar '10

Day 3 Neonates

	1	2	3	4	5	6	7	8	9	10	Daily Sum
Lab	7	7	3	6	8	5	0	0	0	5	41
100	8	6	1	6	7	3	7	1	4	7	50

Day 4 Neonates

	1	2	3	4	5	6	7	8	9	10	Daily Sum
Lab	0	0	0	0	0	0	2	0	0	0	2
100	12	0	0	0	0	0	0	0	0	7	19

Day 5 Neonates

	1	2	3	4	5	6	7	8	9	10	Daily Sum
Lab	14	10	9	14	15	11	7	5	0	8	93
100	2	13	9	14	10	11	5	4	9	0	77

Day 6 Neonates

	1	2	3	4	5	6	7	8	9	10	Daily Sum
Lab	23	5	8	17	23	11	0	10	0	15	112
100	24	23	18	23	24	21	15	15	23	22	208

Day 7 Neonates

	1	2	3	4	5	6	7	8	9	10	Daily Sum
Lab	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0

Total Neonates per Rep.

Lab	44	22	20	37	46	27	9	15	0	28
100	46	42	28	43	41	35	27	20	36	36

		TOTAL NEONATES	NEONATES PER ORIGINAL FEMALE	NEONATES PER SURVIVING FEMALE
Lab		248	24.8	31.0
	100	354	35.4	35.4

Controls producing 3 broods:

Replicate:	1	2	3	4	5	6	7	8	9	10	
Lab	1	1	1	1	1	1	0	0	0	1	7
RW	1	1	1	1	1	1	1	1	1	1	10

Lab	1	44
Lab	2	22
Lab	3	20
Lab	4	37
Lab	5	46
Lab	6	27
Lab	7	9
Lab	8	15
Lab	9	0
Lab	10	28
100	1	46
100	2	42
100	3	28
100	4	43
100	5	41
100	6	35
100	7	27
100	8	20
100	9	36
100	10	36

3/26/10

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Test ID: 60832 Sample: 40008

Ceriodaphnia dubia Survival and Reproduction Data

Day 0: Date: 3/18/10 Time started (one <24-h neonate/rep): 1135 Initials: DK Sel Lot # 031610 Sel YCT Lot # 031810 YC

Effluent (%)	Repl 1	Repl 2	Repl 3	Repl 4	Repl 5	Repl 6	Repl 7	Repl 8	Repl 9	Repl 10	
Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 1
100%	0	0	0	0	0	0	0	0	0	0	Date/Time/Initials 3/19 Fed? ✓ JG 1450
Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 2
100%	0	0	0	0	0	0	0	0	0	0	Date/Time/Initials 3/20 Fed? ✓ JG 1500
Lab Contr	7	7	3	6	8	5	0	0	0	5	Day 3
100%	8	6	1	6	7	3	7	1	4	7	Date/Time/Initials Fed? 1450 DK 3/21/10
Lab Contr	0	0	0	0	0	0	2	0	0	0	Day 4
100%	12	0	0	0	0	0	0	0	0	7	Date/Time/Initials Fed? 1025 DK 3/22/10
Lab Contr	14	10	9	14	15	11	7	5	D	8	Day 5
100%	2	13	9	14	10	11	5	4	9	0	Date/Time/Initials DK Fed? 1305 3/23/10
Lab Contr	23	5D	8	17	23	11	0	10	—	15	Day 6
100%	24	23	18	23	24	21	15	15	23	22	Date/Time/Initials DK Fed? 0940 3/24/10
Lab Contr									—		Day 7
100%											Date/Time/Initials Fed?

0=original organism surviving, no young # = # young released D=original organism dead *=lab-induced mortality

Reviewed by: 5
Review date: 3/26/10

Documentation of Collection of Ceriodaphnia dubia

Culture ID	Date / Time / Init Cleared of Neonates	Date / Time / Init Neonate Collection	Number of Cups Collected	Fed YC / Selenastrum (Lot #'s)
3/11	3/15/10 1130 ok	3/15/10 1655 ok	12	020910YC/030910Sel
3/12	3/15/10 1145 ok	3/15/10 1700 ok	5	"
3/11	3/17/10 1200 ok	3/17/10 1655 ok	6	020910YC/030910Sel
3/12	3/17/10 1210 ok	3/17/10 1655 ok	5	"
			Used	

Project Description / Test Use: TRC Chronic Cd.

Neonates collected must number at least eight per cup, and be from a healthy adult female.

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Initial Chemistry Data (*Ceriodaphnia dubia* and *Pimephales promelas* chronic tests)

% Effluent	Day:	0	1	2	3	4	5	6
Lab	pH	7.2	7.2	7.2	7.3	7.4	7.2	7.5
Control	DO	7.5	8.2	8.5	8.0	7.5	7.6	7.7
C. dubia	Temp.	24.3	24.4	24.6	24.3	25.6	25.9	24.8
1:1 MHW/LR	Conduct.	205	218	194	189	208	198	194
Lab	pH	7.5	7.4	7.6	7.7	7.6	7.6	7.7
Contr	DO	7.4	8.2	8.3	8.0	7.5	7.6	7.7
P. promelas	Temp.	25.1	24.5	25.0	25.0	25.9	26.0	25.1
MHW	Conduct.	307	308	319	312	317	316	319
100%	pH	6.0	6.5	6.8	6.1	6.4	6.2	6.8
ERC-SW-9	DO	8.6	8.1	8.3	9.5	8.6	8.5	7.7
	Temp.	24.9	24.8	24.9	25.0	25.7	24.9	25.8
	Conduct.	112	110	113	113	112	113	113
	Sample #	40008	40008	40008	40008	40008	40008	40008
2010	Init./Date	3/18 OK	JG 3/19	JG 3/20	3/21 OK	3/22 OK	3/23 OK	3/24 OK

MHW = Laboratory moderately hard water; 1:1 = Mix of MHW and Lamoille River water.

Reviewed by: 3/26/10
Review date:

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Final Chemistry Data (*Ceriodaphnia dubia* chronic test)

% Effluent	Day:	1	2	3	4	5	6	7
Lab	pH	7.2	7.1	7.2	7.2	7.2	7.2	
Control	DO	8.1	8.4	7.9	7.5	7.5	7.7	
C. dubia	Temp.	24.7	24.5	24.0	25.0	25.3	24.3	
1:1 MHW/LR	Conduct.	213	202	200	197	206	204	
100%	pH	6.7	6.9	6.8	6.7	6.7	6.7	
ERC-SW-9	DO	8.0	8.3	7.9	7.4	7.4	7.6	
	Temp.	24.6	24.7	24.5	25.9	25.8	25.0	
	Conduct.	114	115	117	116	117	116	
2010	Init./Date	JG 3/19	JG 3/20	3/21 ok	3/22 ok	3/23 ok	3/24 ok	

Reviewed by: J
Review date: 3/26/10

Fathead Minnow, Pimephales promelas, Larval Survival and Growth Test

CETIS Summary Report

Report Date: 25 Mar-10 16:32 (p 1 of 2)
Link/Link Code: 11-4265-4156/60833

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
00-9889-1070	2d Survival Rate	100	> 100	N/A	1.77%	Wilcoxon Rank Sum Two-Sample Test
11-9068-5153	7d Survival Rate	100	> 100	N/A	4.41%	Wilcoxon Rank Sum Two-Sample Test
17-0560-8741	Mean Dry Biomass-mg	100	> 100	N/A	7.02%	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis No	Endpoint	Effect-%	Conc-%	95% LCL	95% UCL	Method
09-5564-8389	2d Survival Rate	5	> 100	N/A	N/A	Linear Interpolation (ICPIN)
		10	> 100	N/A	N/A	
		15	> 100	N/A	N/A	
		20	> 100	N/A	N/A	
		25	> 100	N/A	N/A	
		40	> 100	N/A	N/A	
		50	> 100	N/A	N/A	
15-5795-3464	Mean Dry Biomass-mg	5	> 100	N/A	N/A	Linear Interpolation (ICPIN)
		10	> 100	N/A	N/A	
		15	> 100	N/A	N/A	
		20	> 100	N/A	N/A	
		25	> 100	N/A	N/A	
		40	> 100	N/A	N/A	
		50	> 100	N/A	N/A	

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
11-9068-5153	7d Survival Rate	Control Resp	0.983333	0.8 - NL	Yes	Passes acceptability criteria
15-5795-3464	Mean Dry Biomass-mg	Control Resp	0.3695	0.25 - NL	Yes	Passes acceptability criteria
17-0560-8741	Mean Dry Biomass-mg	Control Resp	0.3695	0.25 - NL	Yes	Passes acceptability criteria
17-0560-8741	Mean Dry Biomass-mg	PMSD	0.0701774	0.12 - 0.3	Yes	Fails acceptability criteria

2d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	1	1	1	1	1	0	0	0.0%	0.0%
100		4	1	1	1	1	1	0	0	0.0%	0.0%

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	0.983333	0.970886	0.99578	0.933333	1	0.0060858	0.0333333	3.39%	0.0%
100		4	0.985294	0.974312	0.996277	0.941177	1	0.0053698	0.0294118	2.99%	-0.2%

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	0.3695	0.364041	0.374959	0.355333	0.39	0.0026692	0.0146199	3.96%	0.0%
100		4	0.387196	0.378859	0.395534	0.354118	0.401333	0.0040766	0.0223282	5.77%	-4.79%

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatec Biological Sciences, Inc

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	1
100		1	1	1	1

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	0.933333	1	1
100		1	0.941176	1	1

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	0.366667	0.39	0.355333	0.366
100		0.393333	0.354118	0.401333	0.4

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

Analysis No:	00-9889-1070	**Endpoint:**	2d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial	100	>100	N/A	1	1.77%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	P-Value	Decision(5%)
Lab Water		100	18		1	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	7.789E-06	7.789E-06	1	1	0.3559	Non-Significant Effect
Error	4.673E-05	7.789E-06	6			
Total	5.452E-05	1.558E-05	7			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Mod Levene Equality of Varianc	1	13.745	0.3559	Equal Variances
Distribution	Shapiro-Wilk Normality	0.706478		0.0027	Non-normal Distribution

2d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	1	1	1	1	1	0	0	0.0%	0.0%
100		4	1	1	1	1	1	0	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	1.44134	1.44123	1.44145	1.44134	1.44134	0	0	0.0%	0.0%
100		4	1.44331	1.44181	1.44481	1.44134	1.44923	0.0007315	0.0039390	0.27%	-0.14%

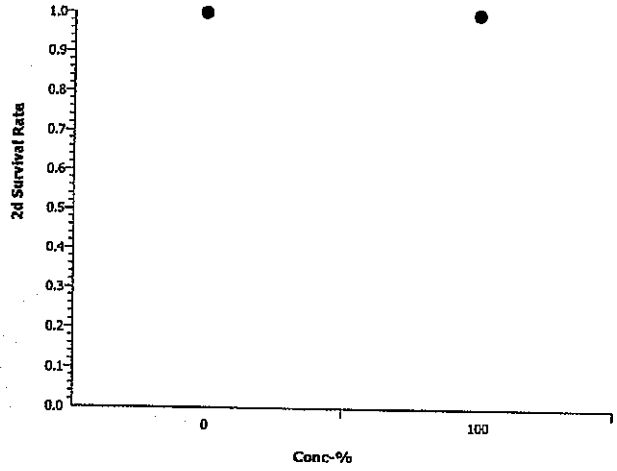
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

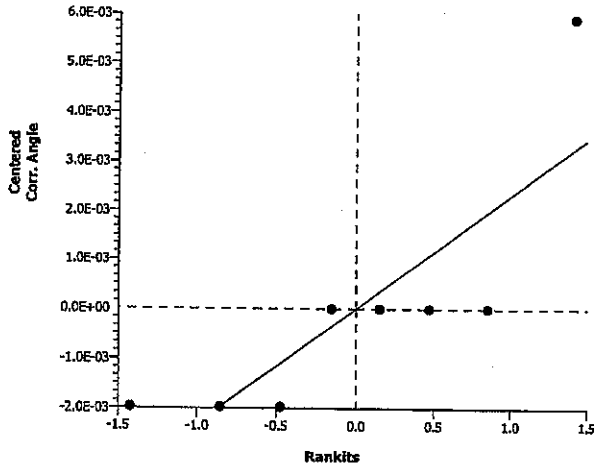
Analysis No: 00-9889-1070 **Endpoint:** 2d Survival Rate **CETIS Version:** CETISv1.6.4
Analyzed: 25 Mar-10 16:31 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	1
100		1	1	1	1

Graphics





CETIS Analytical Report

Report Date: 25 Mar-10 16:32 (p 1 of 4)
Link/Link Code: 11-4265-4156/60833

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

Analysis No:	11-9068-5153	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)		C > T	20000 Trial	100	>100	N/A	1	4.41%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	P-Value	Decision(5%)
Lab Water		100	18.5		1	0.7855	Non-Significant Effect

Test Acceptability

Attribute	Test Stat	Acceptability Limits	Overlap	Decision
Control Resp	0.983333	0.8 - NL	Yes	Passes acceptability criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	3.272E-05	3.272E-05	1	0.0085294	0.9294	Non-Significant Effect
Error	0.0230163	0.0038360	6			
Total	0.0230490	0.0038688	7			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	1.29972	47.4672	0.8345	Equal Variances
Distribution	Shapiro-Wilk Normality	0.607125		0.0002	Non-normal Distribution

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	0.983333	0.970654	0.996013	0.933333	1	0.0061898	0.0333332	3.39%	0.0%
100		4	0.985294	0.974106	0.996482	0.941177	1	0.0054617	0.0294119	2.99%	-0.2%

Angular (Corrected) Transformed Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	1.40841	1.38336	1.43346	1.30964	1.44134	0.0122276	0.0658479	4.68%	0.0%
100		4	1.41246	1.39049	1.43443	1.32582	1.44134	0.0107255	0.0577584	4.09%	-0.29%

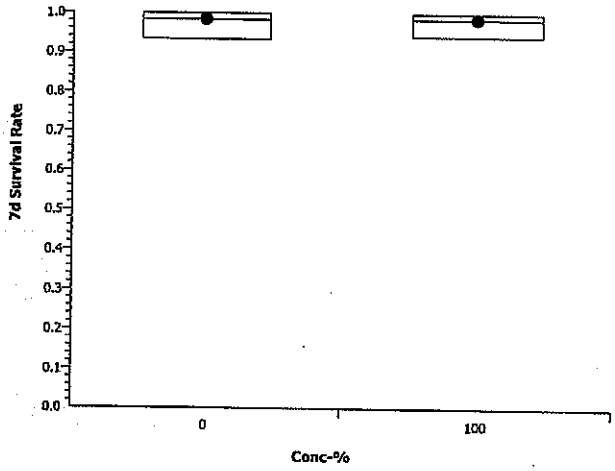
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

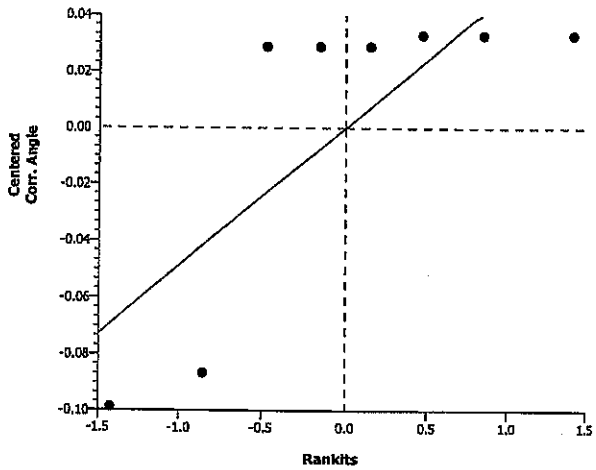
Analysis No:	11-9068-5153	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	0.933333
100		1	1	1	0.941177

Graphics





Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

Analysis No:	17-0560-8741	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Data Transform	Zeta	Alt Hyp	Monte Carlo	NOEL	LOEL	TOEL	TU	PMSD
Untransformed		C > T	Not Run	100	>100	N/A	1	7.02%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	P-Value	Decision(5%)
Lab Water		100	-1.32611	1.94318	0.0259305	0.8835	Non-Significant Effect

Test Acceptability

Attribute	Test Stat	Acceptability Limits	Overlap	Decision
Control Resp	0.3695	0.25 - NL	Yes	Passes acceptability criteria
PMSD	0.0701774	0.12 - 0.3	Yes	Fails acceptability criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(5%)
Between	0.0006263	0.0006263	1	1.75856	0.2331	Non-Significant Effect
Error	0.0021369	0.0003561	6			
Total	0.0027632	0.0009824	7			

ANOVA Assumptions

Attribute	Test	Test Stat	Critical	P-Value	Decision(1%)
Variances	Variance Ratio F	2.33249	47.4672	0.5048	Equal Variances
Distribution	Shapiro-Wilk Normality	0.936413		0.5762	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	0.3695	0.363939	0.375061	0.355333	0.39	0.0027148	0.0146198	3.96%	0.0%
100		4	0.387196	0.378703	0.395689	0.354118	0.401333	0.0041463	0.0223282	5.77%	-4.79%

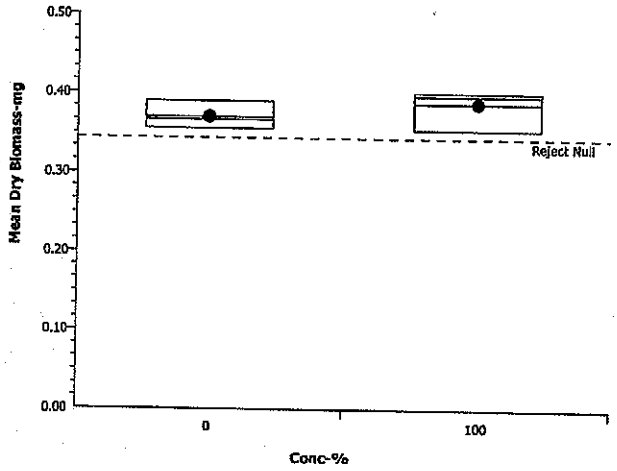
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatec Biological Sciences, Inc**

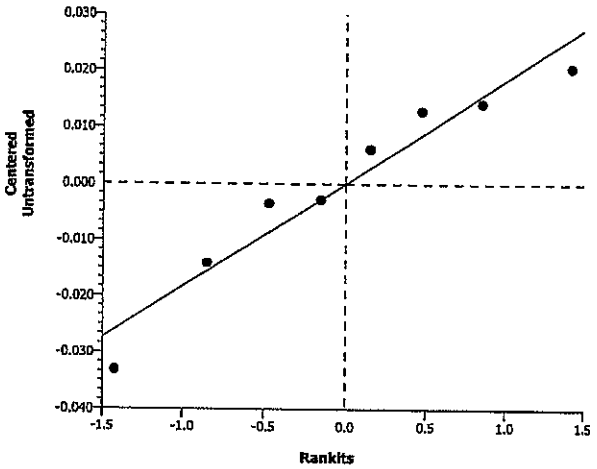
Analysis No:	17-0560-8741	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	0.39	0.366667	0.366	0.355333
100		0.401333	0.4	0.393333	0.354118

Graphics





CETIS Analytical Report

Report Date: 25 Mar-10 16:27 (p 1 of 2)
Link/Link Code: 11-4265-4156/60833

Fathead Minnow 7-d Larval Survival and Growth Test — Aquatec Biological Sciences, Inc

Analysis No:	09-5564-8389	**Endpoint:**	2d Survival Rate	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:27	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X + 1)	Linear	57951	200	Yes	Two-Point Interpolation

Point Estimates

Effect-%	Conc-%	95% LCL	95% UCL
5	> 100	N/A	N/A
10	> 100	N/A	N/A
15	> 100	N/A	N/A
20	> 100	N/A	N/A
25	> 100	N/A	N/A
40	> 100	N/A	N/A
50	> 100	N/A	N/A

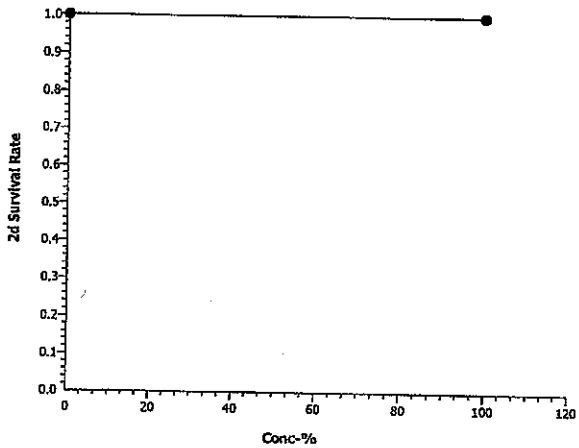
2d Survival Rate Summary

			Calculated Variate(A/B)								
Conc-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**Diff%**	**A**	**B**
0	Lab Water	4	1	1	1	0	0	0.0%	0.0%	60	60
100		4	1	1	1	0	0	0.0%	0.0%	62	62

2d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	1
100		1	1	1	1

Graphics



Analyst:_____ QA: 3/24/10

CETIS Analytical Report

Report Date: 25 Mar-10 16:27 (p 2 of 2)
Link/Link Code: 11-4265-4156/60833

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatec Biological Sciences, Inc

Analysis No:	15-5795-3464	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.6.4
Analyzed:	25 Mar-10 16:27	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Test Run No:	01-0722-3354	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	18 Mar-10 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Not Applicable
Ending Date:	25 Mar-10 09:15	**Species:**	Pimephales promelas	**Brine:**	
Duration:	6d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h

Sample No:	18-1527-1710	**Code:**	1815271710	**Client:**	TRC
Sample Date:	10 Mar-10 10:30	**Material:**	Surface Water	**Project:**	Special Studies
Receive Date:	11 Mar-10 10:20	**Source:**	City of New Bedford KMS (TRC-NewBed)		
Sample Age:	8d 5h (0.3 °C)	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X + 1)	Linear	57951	200	Yes	Two-Point Interpolation

Test Acceptability

Attribute	Test Stat	Acceptability Limits	Overlap	Decision
Control Resp	0.3695	0.25 - NL	Yes	Passes acceptability criteria

Point Estimates

Effect-%	Conc-%	95% LCL	95% UCL
5	> 100	N/A	N/A
10	> 100	N/A	N/A
15	> 100	N/A	N/A
20	> 100	N/A	N/A
25	> 100	N/A	N/A
40	> 100	N/A	N/A
50	> 100	N/A	N/A

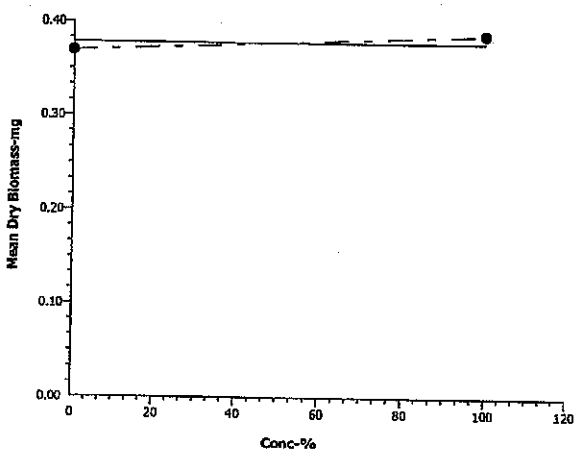
Mean Dry Biomass-mg Summary

			Calculated Variate						
Conc-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Lab Water	4	0.3695	0.355333	0.39	0.0026692	0.0146198	3.96%	0.0%
100		4	0.387196	0.354118	0.401333	0.0040766	0.0223282	5.77%	-4.79%

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	0.366667	0.39	0.355333	0.366
100		0.393333	0.354118	0.401333	0.4

Graphics



Analyst:_____ QA:_____ 3/24/10

CETIS Test Data Worksheet

Report Date: 25 Mar-10 16:27 (p 1 of 1)
Link/Link Code: 11-4265-4156/60833

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatec Biological Sciences, Inc

Start Date: 18 Mar-10 16:00
Ending Date: 25 Mar-10 09:15
Sample Date: 10 Mar-10 10:30

Species: Pimephales promelas
Protocol: EPA/821/R-02-013 (2002)
Material: Surface Water

Sample Code: 1815271710
Sample Source: City of New Bedford KMS
Sample Station:

Conc-%	Code	Rep	Pos	# Exposed	1d Survival	2d Survival	3d Survival	4d Survival	5d Survival	6d Survival	7d Survival	Total Weight-mg	Tare Weight-mg	Pan Count
0	L	1	7	15		15					15	26.53	21.03	
0	L	2	4	15		15					14	26.58	20.73	
0	L	3	8	15		15					15	27.21	21.88	
0	L	4	2	15		15					15	28.03	22.54	
100		1	5	15		15					15	28.5	22.6	
100		2	1	17		17					16	29.29	23.27	
100		3	6	15		15					15	25.88	19.86	
100		4	3	15		15					15	30.47	24.47	

Analyst:_____ QA: J 3/26/10

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Test ID: 60833

Pimephales promelas acute / chronic toxicity test

% Effluent	Day	Day	Day	Day	Day	Day	Day	Day	No. weighed	Initial Boat Wt (mg)	Total Dry Wt (mg)
Repl	0	1	2	3	4	5	6	7			
	Survival Data								Growth Data		
Lab A	15	15	15	15	15	15	15	15	15	21.03	26.53
Control B	15	15	15	15	15	15	15	14	14	20.73	26.58
MHW C	15	15	15	15	15	15	15	15	15	21.88	27.21
D	15	15	15	15	15	15	15	15	15	22.54	28.03
100% A	15	15	15	15	15	15	15	15	15	22.60	28.50
ERC-SW-9 B	JG ~~15~~ 17	17	17	17	17	17	16	16	16	23.27	29.29
C	15	15	15	15	15	15	15	15	15	19.86	25.88
D	15	15	15	15	15	15	15	15	15	24.47	30.47
Sample #	40008	40008	40008	40008				x		Init. 3/24 OK	Init.
I/D/T (2010)	1600 OK 2/18/10	3-19-10 1515 JG	3-20-10 1530 JG	1505 OK 3/21/10	1100 OK 3/22/10	1320 OK 3/23/10	1125 OK 3/24/10	0915 OK 3/25/10	Date/Time/Temp In: 0915 OK 3/25/10 99°C		
Fed AM	X	0900 JG	0840 JG	0900 OK	0850 OK	0900 OK	0850 OK	x	Date/Time/Temp Out: 1615 OK 3/25/10 105°C		
Fed PM	DOO OK	1630 JG	1710 JG	1730 OK	1700 OK	1700 OK	1700 OK	x			

Food (*Artemia*) Lot 051809BS

Reviewed by: 3/26/10
Review date:

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

AQUATIC BIO SYSTEMS ABS INC.

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 3/17/2010

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 3/17/2010

BEGAN FEEDING: N/A

FOOD: N/A

Receiver
3/18/10
Temp: 20.8
pH: 7.6
DO: 11.4
Cond: 420
Added MHW
Fed ✓

Water Chemistry Record:

	Current	Range
TEMPERATURE:	25°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	126 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	95 mg/l	--
pH:	7.73	--

Comments:

Facility Supervisor

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Final Chemistry Data: *Pimephales promelas* chronic test

% Effluent	Day:	1	2	3	4	5	6	7
Lab	pH	7.2	7.0	7.1	7.1	7.0	6.8	7.2
Contr	DO	7.6	7.7	6.7	6.6	6.3	6.1	7.2
P. promelas	Temp.	24.6	24.9	24.2	25.6	25.6	24.3	25.0
MHW	Conduct.	321	316	317	315	315	313	320
100%	pH	6.6	6.6	6.1	6.3	6.2	6.3	6.3
ERC-SW-9	DO	7.4	7.0	5.8	6.2	6.3	6.1	6.6
	Temp.	24.6	25.1	24.2	25.5	25.4	24.3	24.7
	Conduct.	129	115	~~24.2~~ 119	119	116	119	119
2010	Init./Date	JG 3/19	JG 3/20	3/21 OK	3/22 OK	3/23 OK	3/24 OK	3/25 OK

Reviewed by: J
Review date: 3/26

Aquatec Biological Sciences, Inc.

273 Commerce Street
Williston, VT 05495
Tel: (802) 860 - 1638 Fax: (802) 658 - 3189

SDG: 12246
Project: 10009

TRC
Wannalancit Mills
650 Suffolk St
Lowell, MA 01854

Tel: (978) 656-3583
Fax: (978) 453-1995

E-Mail: sheim@trcsolutions.

ALKALINITY AND HARDNESS ANALYSIS

Sample ID:		Sample Date:	Alkalinity: (mg/L)	Hardness: (mg/L)
40008	ERC-SW-9	URFACE WATE 3/17/2010	8.0	14.0

TOTAL RESIDUAL CHLORINE (TRC) ANALYSIS

Sample ID:	Sample Date:	TRC: (mg/L)	Dechlorinated (Y/N)

Reviewed by: _____ Date: _____.

Client: TRC
City of New Bedford Surface Water

SDG: 12246

Sample Identification:

Sample ID	ERC-SW-9
Sample #:	40008

Sample Preparation:

Filtration	60 micron
Date/Initials	3/17/10 OK

Ceriodaphnia dubia **and** ***Pimephales promelas*** **chronic toxicity tests**
Test surface water without dilution

Concentration (%)	Daily Volume (mL)
Laboratory Control (1:1 for *Cd*)	300
Control (MHW for *Pp*)	1000
40008 (ERC-SW-9)	1200

Reviewed by:
Review date: 3/26/10

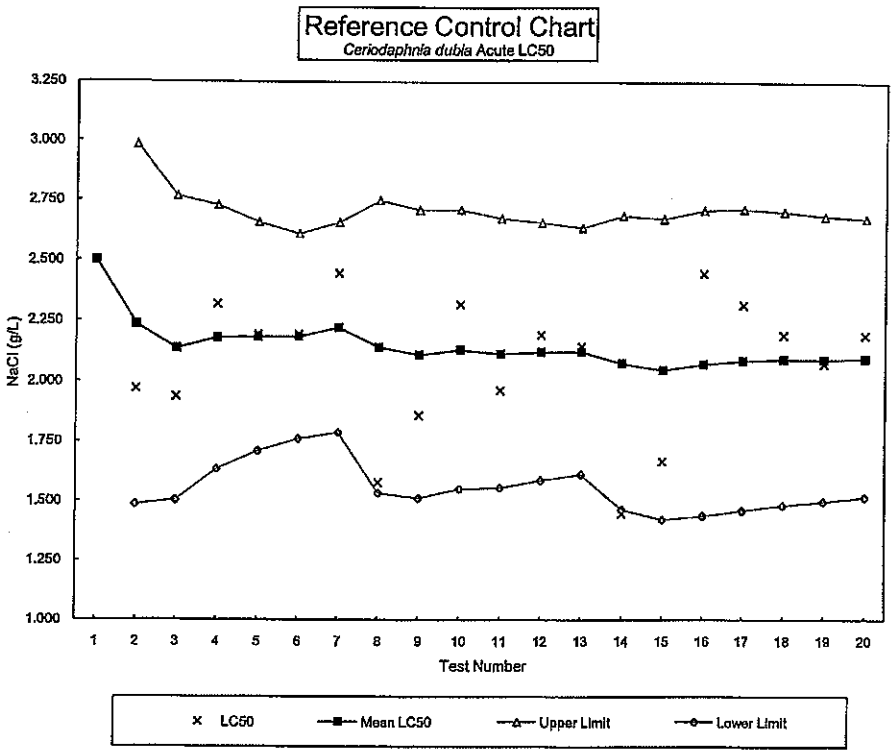
Standard Reference Toxicant Control Charts

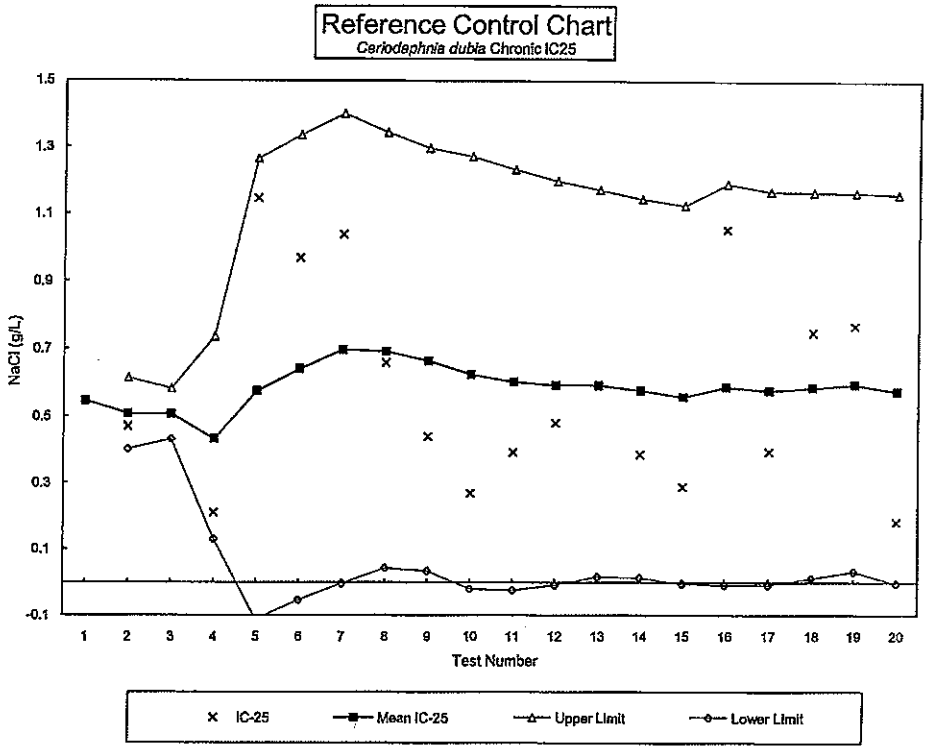
Ceriodaphnia dubia
Reference Control Chart for NaCl Acute Toxicity

Test Number	Test Date	LC50 (g/L)	Mean LC50	Calculated limits Upper	Calculated limits Lower	Organism Source
1	2/12/08-2/18/08	2.500	2.50			Aquatec Biological Sciences
2	3/17/08-3/23/08	1.970	2.24	2.98	1.49	Aquatec Biological Sciences
3	4/8/08-4/14/08	1.938	2.14	2.77	1.50	Aquatec Biological Sciences
4	5/17/08-5/23/08	2.319	2.18	2.73	1.63	Aquatec Biological Sciences
5	6/17/08-6/23/08	2.195	2.18	2.66	1.71	Aquatec Biological Sciences
6	7/23/08-7/29/08	2.195	2.19	2.61	1.76	Aquatec Biological Sciences
7	11/3/08-11/9/08	2.449	2.22	2.66	1.79	Aquatec Biological Sciences
8	12/1/08-12/7/08	1.580	2.14	2.75	1.54	Aquatec Biological Sciences
9	1/28/09-2/4/09	1.861	2.11	2.71	1.51	Aquatec Biological Sciences
10	2/25/09-3/3/09	2.319	2.13	2.71	1.55	Aquatec Biological Sciences
11	3/21/09-3/27/09	1.966	2.12	2.68	1.56	Aquatec Biological Sciences
12	4/27/09-5/3/09	2.195	2.12	2.66	1.59	Aquatec Biological Sciences
13	6/24/09-6/30/09	2.147	2.13	2.64	1.61	Aquatec Biological Sciences
14	7/21/09-7/28/09	1.449	2.08	2.69	1.47	Aquatec Biological Sciences
15	8/18/09-8/24/09	1.670	2.05	2.68	1.43	Aquatec Biological Sciences
16	9/21/09-9/27/09	2.449	2.08	2.71	1.44	Aquatec Biological Sciences
17	10/29/09-11/4/09	2.319	2.09	2.72	1.46	Aquatec Biological Sciences
18	1/15/10-1/21/10	2.195	2.10	2.71	1.49	Aquatec Biological Sciences
19	2/1/10-2/7/10	2.077	2.09	2.69	1.50	Aquatec Biological Sciences
20	3/18/10-3/24/10	2.195	2.10	2.68	1.52	Aquatec Biological Sciences

Ceriodaphnia dubia
Reference Control Chart for NaCl Chronic Toxicity

Test Number	Test Date	IC-25 (g/L)	Mean IC-25	Calculated limits Upper	Calculated limits Lower	Organism Source
1	2/12/08-2/18/08	0.546	0.55			Aquatec Biological Sciences
2	3/17/08-3/23/08	0.471	0.51	0.61	0.40	Aquatec Biological Sciences
3	4/08/08-04/14/0	0.506	0.51	0.58	0.43	Aquatec Biological Sciences
4	5/17/08-5/23/08	0.211	0.43	0.74	0.13	Aquatec Biological Sciences
5	6/17/08-6/23/08	1.146	0.58	1.27	-0.11	Aquatec Biological Sciences
6	7/23/08-7/29/08	0.969	0.64	1.34	-0.05	Aquatec Biological Sciences
7	11/3/08-11/9/08	1.039	0.70	1.40	0.00	Aquatec Biological Sciences
8	12/1/08-12/7/08	0.66	0.69	1.34	0.04	Aquatec Biological Sciences
9	1/28/09-2/4/09	0.441	0.67	1.30	0.03	Aquatec Biological Sciences
10	2/25/09-3/3/09	0.27	0.63	1.27	-0.02	Aquatec Biological Sciences
11	3/21/09-3/27/09	0.394	0.60	1.23	-0.02	Aquatec Biological Sciences
12	4/27/09-5/3/09	0.482	0.59	1.20	-0.01	Aquatec Biological Sciences
13	6/24/09-6/30/09	0.596	0.59	1.17	0.02	Aquatec Biological Sciences
14	7/21/09-7/28/09	0.388	0.58	1.15	0.01	Aquatec Biological Sciences
15	8/18/09-8/24/09	0.29	0.56	1.13	0.00	Aquatec Biological Sciences
16	9/21/09-9/27/09	1.055	0.59	1.19	-0.01	Aquatec Biological Sciences
17	10/29/09-11/4/09	0.397	0.58	1.17	-0.01	Aquatec Biological Sciences
18	1/15/10-1/21/10	0.751	0.59	1.17	0.01	Aquatec Biological Sciences
19	2/1/10-2/7/10	0.771	0.60	1.17	0.03	Aquatec Biological Sciences
20	3/18/10-3/24/10	0.184	0.58	1.16	0.00	Aquatec Biological Sciences

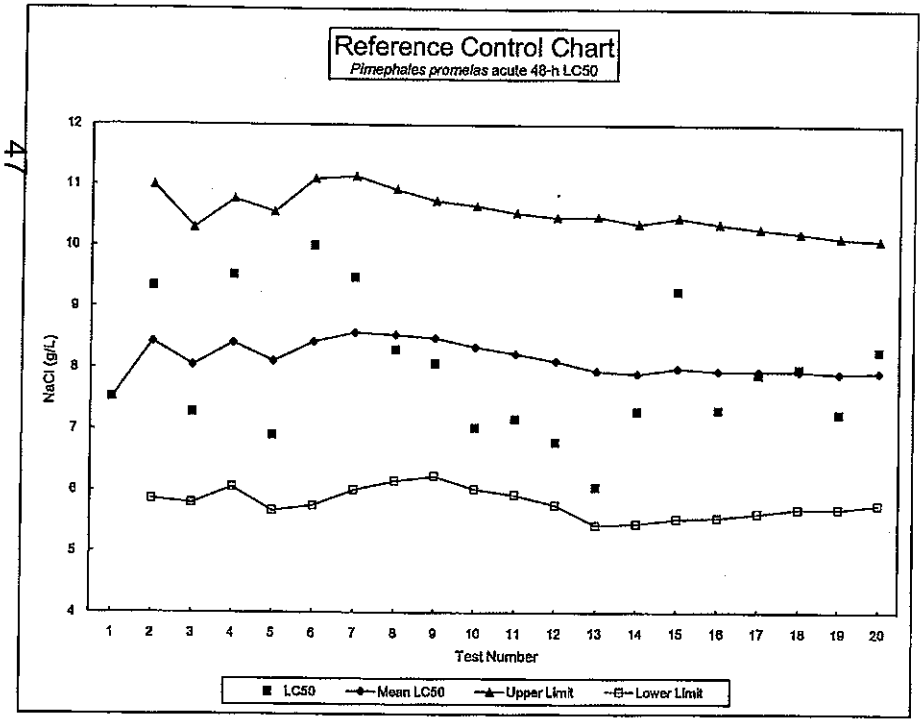


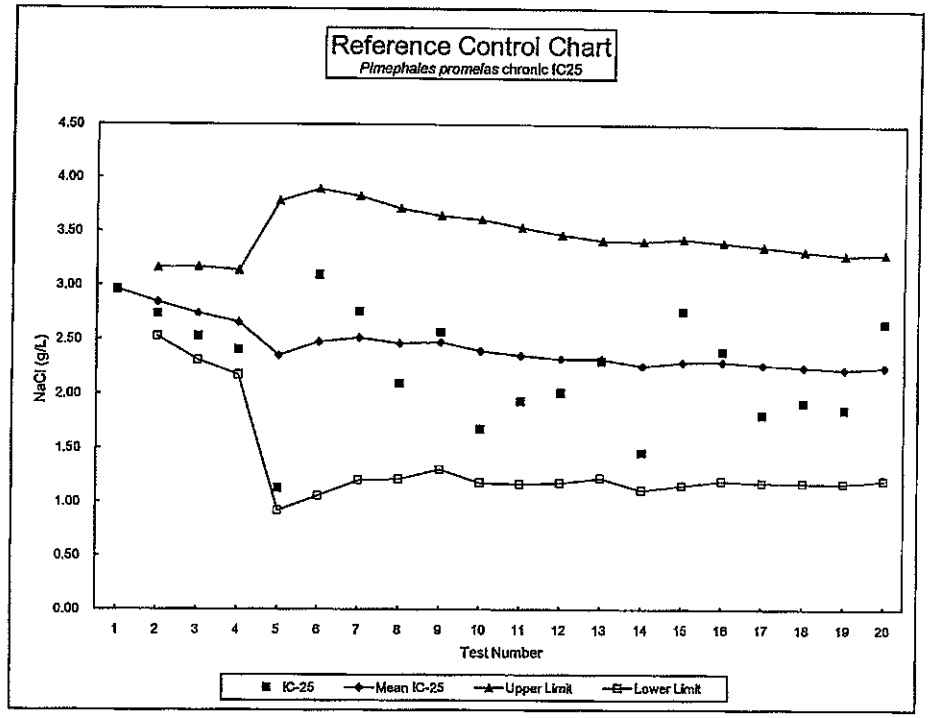


\qaqc\srts\Cd acute chronic SRT

Pimephales promelas acute survival LC50 Control Chart
Reference toxicant: sodium chloride (g/L)

Test Number	Test Date	LC50 (g/L)	Mean LC50	Calculated limits Upper	Lower	Source
1	4/8/08-4/15/08	7.52	7.52			Aquatic Biosystems
2	5/16/08-5/23/08	9.334	8.43	10.99	5.86	Aquatic Biosystems
3	6/17/08-6/24/08	7.278	8.04	10.29	5.80	Aquatic Biosystems
4	7/22/08-7/29/08	9.516	8.41	10.76	6.06	Aquatic Biosystems
5	8/19/08-8/26/08	6.9113	8.11	10.55	5.67	Aquatic Biosystems
6	11/4/08-11/11/08	10	8.43	11.10	5.75	Aquatic Biosystems
7	12/16/08-12/23/08	9.48	8.58	11.14	6.01	Aquatic Biosystems
8	1/20/2009-1/27/09	8.305	8.54	10.93	6.16	Aquatic Biosystems
9	2/17/09-2/24/09	8.082	8.49	10.74	6.24	Aquatic Biosystems
10	4/7/09-4/14/09	7.032	8.35	10.66	6.03	Aquatic Biosystems
11	5/12/09-5/19/09	7.18	8.24	10.54	5.93	Aquatic Biosystems
12	6/2/09-6/9/09	6.804	8.12	10.47	5.77	Aquatic Biosystems
13	7/7/09-7/14/09	6.065	7.96	10.48	5.44	Aquatic Biosystems
14	8/19/2009-8/26/09	7.3	7.91	10.36	5.47	Aquatic Biosystems
15	9/22/09-9/29/09	9.26	8.00	10.46	5.55	Aquatic Biosystems
16	10/30/09-11/6/09	7.33	7.96	10.36	5.56	Aquatic Biosystems
17	12/8/09-12/15/09	7.9	7.96	10.28	5.64	Aquatic Biosystems
18	1/10/10-1/19/10	8	7.96	10.22	5.71	Aquatic Biosystems
19	2/2/10-2/9/10	7.27	7.92	10.14	5.71	Aquatic Biosystems
20	3/16/10-3/23/10	8.287	7.94	10.10	5.78	Aquatic Biosystems



Pimephales promelas chronic survival and growth, IC25 Control Chart
Reference toxicant: sodium chloride (g/L)

Test Number	Test Date	IC-25 (g/L)	Mean IC-25	Calculated limits Upper	Lower	Source
1	4/8/08-4/15/08	2.96	2.96			Aquatic Biosystems
2	5/16/08-5/23/08	2.73	2.85	3.17	2.53	Aquatic Biosystems
3	6/17/08-6/24/08	2.53	2.74	3.17	2.31	Aquatic Biosystems
4	7/22/08-7/29/08	2.41	2.66	3.14	2.17	Aquatic Biosystems
5	8/19/08-8/26/08	1.13	2.35	3.78	0.92	Aquatic Biosystems
6	11/4/08-11/11/08	3.10	2.48	3.89	1.06	Aquatic Biosystems
7	12/16/08-12/23/08	2.76	2.52	3.83	1.21	Aquatic Biosystems
8	1/20/2009-1/27/09	2.10	2.47	3.71	1.22	Aquatic Biosystems
9	2/17/09-2/24/09	2.57	2.48	3.65	1.31	Aquatic Biosystems
10	4/7/09-4/14/09	1.69	2.40	3.61	1.19	Aquatic Biosystems
11	5/12/09-5/19/09	1.94	2.36	3.54	1.17	Aquatic Biosystems
12	6/2/09-6/9/09	2.02	2.33	3.47	1.18	Aquatic Biosystems
13	7/7/09-7/14/09	2.31	2.33	3.42	1.23	Aquatic Biosystems
14	8/19/2009-8/26/09	1.47	2.27	3.41	1.12	Aquatic Biosystems
15	9/22/09-9/29/09	2.77	2.30	3.44	1.16	Aquatic Biosystems
16	10/30/09-11/6/09	2.40	2.31	3.40	1.21	Aquatic Biosystems
17	12/8/09-12/15/09	1.82	2.28	3.37	1.19	Aquatic Biosystems
18	1/10/10-1/19/10	1.93	2.26	3.33	1.19	Aquatic Biosystems
19	2/2/10-2/9/10	1.87	2.24	3.29	1.18	Aquatic Biosystems
20	3/16/10-3/23/10	2.66	2.26	3.30	1.21	Aquatic Biosystems