

Prepared for:
Central Hudson Gas & Electric Company
284 South Avenue, Poughkeepsie, NY 12601

Characterization of the Bioavailability and Toxicity of PAHs in Aquatic Sediments from the Newburgh MGP Site Newburgh, New York

The RETEC Group, Inc.
June 2007
Project No.: CHGE2-19695-400

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Executive Summary

Central Hudson Gas & Electric (CHGE) implemented an assessment of the bioavailability and toxicity of polycyclic aromatic hydrocarbons (PAHs) in surface sediments at CHGE's former manufactured gas plant (MGP) site located on the Hudson River in Newburgh, New York (Newburgh). The primary goal of this project was to generate the data necessary to characterize surface sediments and determine the actual bioavailability and toxicity of PAHs present through a sediment quality triad (SQT) approach. The SQT approach includes co-located measures of: 1) sediment chemistry, 2) sediment toxicity, and 3) benthic macroinvertebrate community structure. Data from the SQT will be used to manage sediments at the Newburgh site. A secondary goal of the project was to build upon the information and database for freshwater sediments that has been initiated by the Sediment Contaminant Bioavailability Alliance (SCBA).

Twenty-nine sediment samples were collected on November 7-10, 2006 from the Hudson River adjacent to the Newburgh site. A subset of 21 samples was selected by CHGE's consultant (ARCADIS BBL) for evaluation of chronic toxicity to two test organisms: 1) the freshwater amphipod *Hyaella azteca* (*H. azteca*); and 2) the midge larvae *Chironomus dilutus* (*C. dilutus*). In addition, the same 21 samples were evaluated for the abundance and diversity of benthic macroinvertebrates. Macroinvertebrates recovered from each sample were sorted, counted, and identified down to the lowest feasible taxonomic level (e.g., genus). ENSR Corporation (The RETEC Group, Inc. [RETEC]) selected a 15-sample subset from the 21-samples for detailed chemical characterization of PAH bioavailability.

This characterization of toxicity and bioavailability of PAHs in aquatic sediments from the Newburgh site provides six main conclusions:

1. PAHs present in surface sediments are not as toxic to benthic aquatic organisms as is currently assumed by the New York State Department of Environmental Conservation (NYSDEC) technical guidance sediment screening values of 4.0 and 44.8 mg/kg. Bulk sediment samples with PAH₁₆ concentrations as high as 231 mg/kg showed no significant reductions in organism survival and growth as demonstrated in laboratory toxicity tests, and no impairment to benthic community structure as demonstrated in the macroinvertebrate survey.
2. The reductions in survival of *H. azteca* associated with sediment samples NB02 and NB03 are not solely related to sediment PAH concentrations.
3. The amphipod *C. dilutus* showed less sensitivity to PAHs than *H. azteca*.
4. Where toxicity is observed in laboratory bioassays using *H. azteca*, there are no in-situ impacts to the benthic macroinvertebrate communities identified at the site. Therefore, the laboratory survival of *H. azteca* is a conservative endpoint that is protective of the indigenous population of benthic macroinvertebrates at the Newburgh site.
5. There is no relationship between the PAH concentration in bulk sediment or sediment pore water and the growth of either *H. azteca* or *C. dilutus* in the Newburgh sediment samples.
6. No correlation among common indices of macroinvertebrate community diversity and richness and either PAH sediment concentrations or laboratory toxicity test results was observed.

1.0 Introduction

Central Hudson Gas & Electric (CHGE) implemented an assessment of the bioavailability and toxicity of polycyclic aromatic hydrocarbons (PAHs) in surface sediments at CHGE's former manufactured gas plant (MGP) site located on the Hudson River in Newburgh, New York (Newburgh). The primary goal of this project was to generate the data necessary to characterize surface sediments and determine the actual bioavailability and toxicity of PAHs present through a sediment quality triad (SQT) approach. The SQT approach includes co-located measures of: 1) sediment chemistry, 2) sediment toxicity, and 3) benthic macroinvertebrate community structure. Data from the SQT will be used to manage sediments at the Newburgh site. A secondary goal of the project was to build upon the information and database for freshwater sediments that has been initiated by the Sediment Contaminant Bioavailability Alliance (SCBA).

This assessment of PAH bioavailability and toxicity was conducted following the Generic Work Plan (RETEC, 2005) with support by the following principle contractors:

- **Dr. Steven B. Hawthorne – Sediment PAH Bioavailability Chemistry**
Energy and Environment Research Center (EERC)
University of North Dakota
Grand Forks, ND
- **Dr. Frank Doherty – Aquatic Toxicity Testing (*H. azteca*)**
AquaTOX Research, Inc. (AquaTOX)
Syracuse, NY
- **Mr. J. Daniel Farrar – Aquatic Toxicity Testing (*C. dilutus*)**
U.S. Army Engineer Research and Development Center (ERDC)
Vicksburg, MS
- **Dr. Phil Downey – Benthic Macroinvertebrate Taxonomy**
Aquatec Biological Sciences, Inc. (Aquatec)
Williston, VT
- **Mr. Kirk Young – General Sediment Chemistry**
Severn Trent Laboratories (STL)
Colchester, VT

A description of the field activities performed at the site, the results of the analytical work performed, and interpretation of the data are presented in the following sections.

2.0 Field activities

Twenty-nine sediment samples were collected from the Hudson River adjacent to the Newburgh MGP site on November 7-10, 2006.

Unless otherwise noted below, the fieldwork was performed using the methods and procedures provided in the Generic Work Plan (RETEC, 2005) and were consistent with methods specified by the United States Environmental Protection Agency (U.S. EPA, 2001) and the American Society for Testing Materials (ASTM, 2000a; ASTM 2000b).

2.1 Sediment sample locations

Sediment sample locations were selected by CHGE's consultant ARCADIS BBL. Figure 2-1 shows the locations of all 29 sediment samples that were collected. Table 2-1 provides the latitude and longitude coordinates of the sediment samples and the water depth at the time of sample collection.

ENSR Corporation (dba The RETEC Group, Inc.[RETEC]) field personnel recorded observations of the physical characteristics of the sediment at each sampling location and observations regarding the physical characteristics of the study area. Information recorded included the presence of fill (if any); aquatic vegetation; sediment color, texture and particle size; and odor and presence of sheens or non-aqueous phase liquids (NAPL) [Table 2-1].

2.2 Field measurements

Water quality was measured in the field by ARCADIS BBL at each sample station location (Table 2-2). Two sets of water quality measurements were taken at each station. One measurement was taken near the water surface, approximately 1 foot below the water depth, and a second measurement was taken near the bottom, approximately 1 foot above the top of the sediment surface. The water quality parameters measured in the field were temperature, dissolved oxygen (DO), conductivity, and pH.

2.3 Sediment sample collection and processing

Approximately 4 gallons of surface sediment (top 6 inches) were collected from each sample station by ARCADIS BBL using a Ponar grab sampler. The sediments were divided into two clean, 5-gallon, plastic buckets. The buckets were labeled with the sample station designation and transported to an on-shore sample preparation area where custody of the samples was transferred to RETEC.

Sediment samples used for benthic invertebrate survey were processed by Aquatec personnel. Sediment samples were passed through a 500 μm sieve. The material that did not pass through the sieve was placed into a glass container with a 70% ethyl alcohol preservative and transported to Aquatec's laboratory.

RETEC was responsible for processing samples for analysis by the participating laboratories. At the on-shore preparation area, sediments were initially screened with a #5-mesh (4-mm openings) screen to remove large objects such as cobbles, sticks, or shells. Samples were then homogenized by mixing to ensure the consistency of samples sent to each laboratory. Following homogenization, the sediment samples were placed into glass jars with Teflon™-lined lids. The jars were then submitted to the laboratories or temporarily stored at 4 °C at RETEC's Ithaca, New York office.

3.0 Sediment analyses

3.1 Sample screening and selection for toxicity testing

All sediment samples were collected in areas previously determined by ARCADIS BBL to exceed 20 mg/kg PAH₁₆. These samples were not screened for PAHs by ARCADIS BBL. However, samples collected from the northern, eastern, and southern edge of the impacted zone were initially screened for concentrations of PAHs by STL of Shelton, CT. ARCADIS BBL then selected a subset of 21 samples from the 29 that were collected for toxicity testing and macroinvertebrate identification. The STL results were provided to RETEC and are shown in Table 3-1.

RETEC selected a 15-sample subset of the 21-sample subset for detailed chemical characterization of PAH bioavailability. The 15 samples were chosen to provide adequate spatial coverage of the site and a range in PAH concentrations.

3.2 Detailed analyses and testing methods

Table 3-2 provides parameters for testing and the laboratories conducting the analysis for the sediment samples. A detailed description of the test methods and rationale is provided in the Generic Work Plan (RETEC, 2005).

4.0 Results and interpretation

Chain of custody (COC) documents and laboratory results are included in Appendices A through F as electronic portable data files (pdf) on compact disc (CD).

4.1 PAH chemistry

The 15 samples selected for detailed characterization were analyzed by EERC for the total extractable and pore water concentrations of the 34 National Oceanographic and Atmospheric Administration (NOAA) PAHs, which include 18 parent and 16 groups of alkylated PAHs, subsequently referred to as PAH₃₄. The 16 U.S. EPA priority pollutant PAHs (PAH₁₆) are a subset of the PAH₃₄. The complete digital laboratory report from EERC is provided in Appendix A.

Bulk sediment PAHs

The mean concentrations of PAH₁₆ in the bulk sediment samples ranged from 27.7 (NB10) to 1,210 (NB20) mg/kg. The field reference samples were determined to have 7.22 (NB11) and 8.18 (NB12) mg/kg PAH₁₆. Mean concentrations of PAH₃₄ in the bulk sediment samples ranged from 65.5 (NB10) to 3,130 (NB20) mg/kg. When expressed in terms of toxic units (TUs) using the U.S. EPA narcosis model for PAH mixtures (U.S. EPA, 2003), the concentrations ranged from 0.8 to 94 (NB20) TU₃₄ (Table 4-1).

The PAH concentrations measured by EERC were typically a factor of 2 greater than those reported by STL (Table 4-2). One sample, NB20, was determined to have 39 times greater PAH concentration by EERC than STL (1,220 versus 31 mg/kg). Historically, EERC has measured higher PAH concentrations than commercial laboratories like STL Shelton. Both the extraction procedures and the recovery of surrogate compounds are considerably different between the two laboratories. The EERC method places a greater emphasis on removal of water prior to extraction and used a more aggressive extraction procedure than the STL method.

PAH₁₆ includes only 16 parent PAH compounds while PAH₃₄ includes the PAH₁₆ compounds plus 16 groups of alkylated PAHs and the parent PAHs benzo(e)pyrene and perylene. Therefore, a ratio of PAH₁₆/PAH₃₄ provides an approximation of the degree of alkylation for PAHs measured in the sediment. The ratio of PAH₁₆/PAH₃₄ for Newburgh sediments was relatively consistent, ranging from 0.26 to 0.49, indicating that the alkylated PAHs represent a significant fraction of the PAHs in many Newburgh sediments (Table 4-1).

Data from eight MGP and aluminum smelter sites have shown that alkylated PAHs contribute a significant fraction (79%) of the toxicity to *Hyalella azteca* (*H. azteca*) (Appendix G). The standard U.S. EPA method 8270 for determination of semi-volatile analytes does not include measurements of alkylated PAHs. Therefore, historical measurements of PAH₁₆ concentrations would inaccurately characterize sediment toxicity because they do not include measurements of alkylated PAHs.

Pore water dissolved PAHs

The mean concentration of dissolved PAH₃₄ in the sediment sample pore water ranged from 0.454 (NB10) to 1,057 (NB20) µg/L. When expressed in terms of TUs using the U.S. EPA narcosis model for PAH mixtures (U.S. EPA, 2003), the pore water concentrations ranged from <0.1 to 67 (NB20) solid phase microextraction (SPME) TU₃₄ (Table 4-3).

4.2 TOC and SOC analyses

Total organic carbon (TOC) and soot carbon (SOC) were measured for the 15 bioavailability samples using a CHN elemental analyzer. SOC is defined as the TOC remaining following pretreatment at 375 °C in a muffle furnace under oxidizing conditions. TOC ranged from 3.11 to 5.49 wt. %. The fraction of TOC comprised of

heat stable SOC (SOC/TOC) ranged from 0.08 to 0.42, indicating varying amounts of anthropogenic carbon (Table 4-4).

4.3 General sediment characteristics

Analyses of sediment grain size, pH, ammonia, and percent solids were performed on the 21 samples that were selected for *H. azteca* and *Chironomus dilutus* (*C. dilutus*) toxicity testing (Table 4-4). The complete digital laboratory reports from STL are provided in Appendix B.

The 21 samples mainly consisted of fine sand, silt, and clay. The field reference samples, NB11 and NB12, were predominantly silt (60.3% and 64.6% silt, respectively) [Table 4-4].

The pH of all sediment samples was circum-neutral, between 6.5 and 7.1. Concentrations of ammonia varied from 42.6 to 284 mg/kg (Table 4-4).

4.4 Characterization of sediment toxicity

The bioavailability and toxicity of PAHs was determined directly on 21 samples by measuring the survival and growth of the aquatic amphipod *H. azteca* following exposure to sediment for 28 days, and the midge larvae *C. dilutus* following exposure to sediment for 20 days (Table 4-5). *C. dilutus* was added to the analytical testing program by the New York State Department of Environmental Conservation (NYSDEC) Fish and Wildlife, with the belief that the nature of its feeding habitat makes it a preferred test species (i.e. *C. dilutus* is a benthic organism that resides within the sediment, while *H. azteca* is an epibenthic detritivore that resides on the sediment-water interface).

The complete digital laboratory reports from AquaTOX and ERDC are provided in Appendices C and D, respectively. The survival and growth of *H. azteca* and *C. dilutus* exposed to the test sediments were compared to both the field reference sediments and laboratory controls using the Comprehensive Environmental Toxicity Information System (CETIS™). CETIS™ is a professional-level toxicity data analysis and database software application written and published by Tidepool Scientific Software (Tidepool Scientific, 2006). The CETIS™ statistical output is provided in Appendix E.

Organism survival

Comparisons of survival among treatments were performed through standard statistical procedures contained in CETIS™. Comparisons of survival among treatments were conducted with the non-parametric Wilcoxon/Bonferroni procedure for *H. azteca* and the Bonferroni Adjusted t procedure for *C. dilutus* (U.S. EPA, 2000).

For *H. azteca*, survival in the two samples of control sediments (a freshwater mud collected from the Jamesville Reservoir in Jamesville, NY) was 100% and 85% ± 17%. Mean survival for the field reference sediments was 63% ± 13% (NB11) and 70% ± 27% (NB12). Significant ($p < 0.05$) reduction in *H. azteca* survival compared to the pooled field reference samples was observed for amphipods exposed to the sediment samples NB03, NB04, NB20, and NB24. Sample NB02, which had a survival of 25% ± 24% was not significantly different from the pooled field reference samples due to its large variance (Table 4-5).

Laboratory toxicity testing for *C. dilutus* was conducted in two batches. The survival of *C. dilutus* in the two samples of control sediments was 72% ± 28% and 90% ± 11%. Mean survival observed for the field reference sediments was 83% ± 6% and 85% ± 12% (NB11), and 75% ± 6% and 85% ± 18% (NB12). Significant ($p < 0.05$) reduction in *C. dilutus* survival compared to the pooled field reference samples was observed for chironomids exposed to the sediment samples NB20 and NB27 (Table 4-5).

The geographic distribution of samples with a significant reduction in survival was localized (Figure 4-1a, 4-1b). *H. azteca* was more sensitive to PAH concentration than *C. dilutus*, with several samples having significantly reduced survival where *C. dilutus* showed no response. However, sample NB27, which had significantly reduced survival for *C. dilutus* (50% ± 20%) had 100% survival for *H. azteca*. Unfortunately, no PAH bioavailability chemistry data were available for this sample.

Organism growth

Comparisons of dry weights among treatments to assess amphipod growth were performed through standard statistical procedures contained in CETIS™. Dry weights among treatments were analyzed using the Bonferroni Adjusted t and Wilcoxon/Bonferroni procedures (U.S. EPA, 2000).

For *H. azteca*, growth in the two samples of laboratory control sediments was 0.20 ± 0.03 and 0.24 ± 0.03 mg dry wt./organism. Mean growth for the field reference samples was 0.22 ± 0.03 (NB11) and 0.18 ± 0.04 (NB12) mg dry wt./organism. Significantly reduced growth ($p < 0.05$) of *H. azteca* compared to the pooled field reference sediments was only observed in amphipods exposed to samples NB02 and NB27 (Table 4-5).

For *C. dilutus*, growth in the two samples of laboratory control sediments was 1.68 ± 0.42 and 1.73 ± 0.58 mg dry wt./organism. Growth in the field reference samples was 1.66 ± 0.36 and 2.22 ± 0.53 mg dry wt./organism for NB11 and 1.45 ± 0.49 and 2.02 ± 0.63 mg dry wt./organism in NB12. Significantly reduced growth ($p < 0.05$) of *C. dilutus* compared to the pooled field reference sediments was not observed in any of the test sediment samples (Table 4-5).

4.5 Evaluating chemical measurements of PAH bioavailability

No chemical measurements of PAH bioavailability were made for samples NB05, NB06, NB07, NB22, NB23, and NB27. However, comparisons of the survival and growth of both *H. azteca* and *C. dilutus* to the chemical measurements of PAHs in bulk sediment and pore water are made below for the 15 samples that were selected for detailed chemical characterization of PAH bioavailability.

Sensitivity and specificity

Sensitivity is the probability that the levels of contaminants in toxic sediments exceed the test threshold. In other words, sensitivity is the extent to which a measurement correctly classifies a toxic sample as toxic (Hennekens, 1987). If a measurement has a high sensitivity (0 being the lowest and 1 being the highest), then it is protective of the environment.

Specificity is the rate at which a test correctly classifies a nontoxic sample as nontoxic (Hennekens, 1987). A high specificity indicates that nontoxic samples were correctly predicted. A low specificity means that resources would be mis-allocated because the mis-classification would trigger a remedial action for sediment samples incorrectly classified as toxic.

Therefore, the optimum model for screening impacted sediments would maximize sensitivity (protective of the environment) and specificity (ensure that remediation resources are spent effectively).

Newburgh sediment PAH₁₆ and organism survival

The lowest PAH₁₆ concentration associated with a significant reduction in *H. azteca* survival was 79.2 mg/kg (NB03 at 13% ± 9.6% survival). However, bulk sediment samples with PAH₁₆ concentrations as high as 231 mg/kg (NB29) showed no significant reductions in *H. azteca* survival. In fact, five of the sediment samples had PAH₁₆ concentrations greater than 100 mg/kg and *H. azteca* survival was ≥ 63% (Figure 4-2a). *C. dilutus* showed a similar lack of correlation to PAH₁₆, with no reduction in survival at sediment PAH concentrations as high as 235 mg/kg (NB24) [Figure 4-2b].

NYSDEC technical guidance sediment screening values of 4.0 mg/kg (Effects Range Low or ERL) and 44.8 mg/kg (Effects Range Median or ERM) [NYSDEC, 1999] do not provide sufficient discrimination between toxic and nontoxic sediments at the Newburgh site (Figure 4-2a). For example, all 15 sediment samples (100%) analyzed from Newburgh exceeded the ERL value, despite the fact that 11 of the 15 (73%) sediment samples clearly had no significant reduction in survival of *H. azteca*. Six of the 10 (60%) sediment samples that exceeded the ERM value had no significant reduction in survival of *H. azteca* (Figure 4-2a).

Data from eight MGP and aluminum smelter sites have shown that extractable PAH measurements do not correlate with toxicity to *H. azteca* (Appendix G). An evaluation of extractable PAH measurements concluded that a similar sediment screening value, the Probable Effects Concentration or PEC (MacDonald et al., 2000), provided good sensitivity (96%) but poor specificity (32%), and had an overall model efficiency of 48% (Hawthorne et al., 2007). Therefore, predictions of toxicity from PAHs in sediments using PAH₁₆ measurements are relatively poor, and in fact are commensurate with the probabilities achieved by tossing a coin (50-50).

SPME pore water TU₃₄ and organism survival

Previous chemical measurements of pore water PAHs collected and analyzed through September 2006 from MGP and aluminum smelter sites (n = 135) demonstrated that toxicity to *H. azteca* was not observed in samples having less than 8.0 SPME pore water TU₃₄. Sediment samples with SPME pore water concentrations between 8.0 and 28 SPME pore water TU₃₄ were unable to be classified as either toxic or nontoxic with 95% confidence, and concentrations greater than 28 SPME pore water TU₃₄ were toxic. SPME pore water TU₃₄ provide good sensitivity (92%) and specificity (89%), and have an overall model efficiency of 90% (Hawthorne et al., 2007; Appendix G).

The measurements of SPME pore water PAH concentrations in the Newburgh sediment samples correctly classified 13 of 15 (87%) samples for *H. azteca* (Figure 4-2a) and 15 of 15 (100%) of samples for *C. dilutus* as being toxic or nontoxic (Figure 4-2b). Sediment samples NB02 and NB03 did not fit the predictions of toxicity to *H. azteca* based on SPME pore water PAH concentrations. However, the low SPME pore water PAH concentration measured in these samples suggests that other factors unrelated to PAHs were responsible for the reductions in amphipod survival. For example, samples with SPME TU₃₄ concentrations an order of magnitude greater than NB03 had 100% survival (Figure 4-2a).

Samples NB02 and NB03 were collected from the vicinity of an outfall which extends southeast from the chlorine tanks of the City of Newburgh Wastewater Treatment Plant. Therefore, based on 150 data points collected from multiple MGP and aluminum smelter sites, the reduction in survival for NB02 and NB03, at the 99% confidence level, is not solely related to PAHs.

Organism growth and PAH chemistry

Growth data were evaluated for a dose response using least square linear regression in the Statistical Analysis System (SAS[®]) [SAS Institute, Cary, NC]. The growth of *H. azteca* was not significantly related to either the concentration of PAH₁₆ ($p = 0.312$) or SPME pore water TU₃₄ ($p = 0.178$) [Figure 4-3a]. The growth of *C. dilutus* was not significantly related to either the concentration of PAH₁₆ ($p = 0.259$) or SPME pore water TU₃₄ ($p = 0.125$) [Figure 4-3b]. Therefore, neither of the measurements of PAH concentrations could explain a significant fraction of the variability in the growth of either *H. azteca* or *C. dilutus*.

Other factors unrelated to PAH concentration appear to control the growth endpoint in Newburgh sediments.

4.6 Benthic macroinvertebrate data

The 21 sediment samples that were selected for toxicity testing were also evaluated for benthic macroinvertebrate communities. Macroinvertebrates recovered from each sample were sorted, counted, and identified down to the lowest feasible taxonomic level (i.e., genus) by Aquatec. Twenty-seven individual taxons were identified in the Newburgh sediment samples (Table 4-6). The complete digital laboratory report from Aquatec is provided in Appendix F.

Calculation of diversity, richness, and pollution tolerance indices

In order to more effectively evaluate the macroinvertebrate data and draw comparisons among samples, organism count data were summarized using common indices of diversity, richness, and pollution tolerance. Shannon's diversity index (Shannon, 1948), Margalef's species richness index (Margalef, 1958), and the New York Tolerance Score (Bode, 2002) were used to evaluate the benthic macroinvertebrate data. These indices were also used by the NYSDEC to evaluate benthic macroinvertebrate data in the Hudson River (NYSDEC, 2003). Shannon's diversity index was computed according to Shannon (1948):

$$H = - \sum_{i=1}^s p_i \log_2 p_i$$

where s is the number of species per sample and p_i is the proportion of total individuals in the i th species. Species richness was computed according to Margalef (1958):

$$SR = \frac{s-1}{\ln(N)}$$

where s is the number of species and N the total number of individuals in a sample. Finally, the NY Tolerance Score was calculated according to Bode (2002):

$$NYTS = \frac{\sum TV_i N_i}{\sum N_i}$$

where TV_i is the pollution tolerance value of the i th species (1 = very intolerant and 10 = highly tolerant) and N_i is the abundance of the i th taxa.

Comparisons between site samples and the field reference

The ranges in Shannon's diversity and Margalef richness indices for the 19 site samples were comparable to the upstream reference samples (Figure 4-4). Surprisingly, the sediment sample with the highest Shannon's diversity index of 3.2 was NB24, which was determined to have a PAH₁₆ concentration of 235 mg/kg, pore water PAH concentration of 41 SPME TU₃₄, and was significantly toxic (survival of 5% ± 10%) to *H. azteca*. These results suggest that PAHs have not had an effect on the diversity and richness of in-stream macroinvertebrates.

The NY tolerance scores for the reference sediments (NB11 = 8.3, NB12 = 9.0) were greater than the range of NY tolerance scores for the 19 site samples (3.9 to 8.3), indicating the dominance of more pollution-tolerant species in the reference samples (Figure 4-4).

The sediment quality triad (SQT)

The survival of *H. azteca* and the dissolved concentration of PAHs in sediment pore water were significantly correlated in Newburgh sediment samples (Figure 4-2a and 4-2b). However, PAH concentrations (either sediment PAH₁₆ or SPME pore water TU₃₄) were not significantly correlated to low diversity or richness and high concentrations of PAHs. As mentioned above, the sediment sample having the highest Shannon diversity index (NB24) was also observed to have relatively high sediment and pore water PAH concentrations. Across 5 orders of magnitude SPME pore water TU₃₄ concentrations (0.01 to 100), there were no trends for either Shannon's Diversity or Margalef's Richness indices. Sediment samples with both very low and high concentrations of dissolved PAHs were determined to have identical diversity and richness indices (Figure 4-4).

Results from Newburgh combined with sediment samples collected from four other MGP sites in New York State show that the three components of the SQT do not agree, but that two of the legs, sediment SPME pore water PAH chemistry and toxicity to *H. azteca*, do correlate (Figure 4-5, Appendix G). For example, the bottom quartile of Shannon diversity scores for 52 sediment samples (< 2.5) are distributed throughout the range of PAH concentrations and percent survival for *H. azteca*. Conversely, the upper quartile of Shannon diversity scores for the sample sediment samples (> 3.1) are measured for some of the highest SPME pore water PAH concentration samples, including one toxic sediment (NB24) collected from Newburgh (Figure 4-5).

An additional result of the SQT evaluation is that a sediment sample determined to be toxic to *H. azteca* in laboratory bioassays (NB24) did not appear to have a negative impact on the in-situ population of sediment dwelling organisms as defined through benthic macroinvertebrate abundance, diversity, richness, or distribution of pollution tolerant species. *H. azteca* is routinely used because it is very sensitive to PAHs and is one of the standard U.S. EPA toxicity test organisms for evaluating the toxicity of freshwater sediments. However, the laboratory survival of *H. azteca* may conclude a conservative endpoint that does not translate to the indigenous population of benthic macroinvertebrates at the Newburgh site.

5.0 Conclusions

This characterization of toxicity and bioavailability of PAHs in aquatic sediments from Newburgh indicates that the PAHs present in sediment samples are not as toxic to benthic aquatic organisms as is currently assumed by the NYSDEC regulatory guidance for screening contaminated sediments. Sediment samples with PAH₁₆ concentrations as high as 231 mg/kg showed no significant reductions in *H. azteca* survival. The reductions in survival of *H. azteca* associated with sediment samples NB02 and NB03 are unrelated solely to PAHs.

C. dilutus was chosen as a secondary test organism for toxicity by the NYSDEC with the belief that the nature of its feeding habitat makes it a preferred test species (i.e. *C. dilutus* is benthic while *H. azteca* is an epibenthic detritivore). The results of this study showed that *C. dilutus* were less sensitive to PAHs than *H. azteca* with respect to the survival endpoint.

Where toxicity is observed in laboratory bioassays using *H. azteca*, there is no in-situ response to the benthic macroinvertebrate communities identified at the site. Therefore, the laboratory survival of *H. azteca* may conclude a conservative endpoint that does not translate to the indigenous population of benthic macroinvertebrates at the Newburgh site.

Evaluation of the benthic macroinvertebrate data for the sediment samples showed that the diversity, richness, and pollution tolerance of macroinvertebrates identified in Newburgh site samples were commensurate with the field reference sample. There were no significant correlations between higher concentrations of PAHs measured by PAH₁₆ or SPME pore water TU₃₄ and lower diversity or richness of the sediments analyzed. In addition, significant reductions in the survival of *H. azteca* did not correlate with macroinvertebrate diversity. The sediment sample with the highest Shannon index of diversity was NB24, which was determined to have a sediment pore water PAH concentration of 41 SPME pore water TU₃₄ and was significantly toxic to *H. azteca*.

6.0 References

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Tables

Table 2-1
Sediment Sample Locations
Central Hudson Gas and Electric Company
Newburgh MGP Site

Sediment Sample Designation	Selected for Toxicity Testing	GPS Latitude ⁽¹⁾	GPS Longitude ⁽¹⁾	Water Depth ⁽²⁾ (feet)	Field Description
NB01	√	41 29.6821	74 00.3472	8.0	Dark brown SILT, some clay, no odor or sheen
NB02	√	41 29.6577	74 00.3310	9.0	Dark brown CLAY, some silt, no odor or sheen
NB03	√	41 29.6566	74 00.3216	10.2	Brown CLAY, some silt, trace odor, no sheen
NB04	√	41 29.6412	74 00.3321	6.3	Brown CLAY and SILT, moderate odor, slight sheen
NB05	√	41 29.6404	74 00.3230	8.2	Brown CLAY and SILT, no odor or sheen
NB06	√	41 29.6242	74 00.3259	11.2	Brown SILT, no odor or sheen
NB07	√	41 29.6068	74 00.3256	11.5	Brown SILT, no odor or sheen
NB08	√	41 29.6243	74 00.3344	10.0	Grey SILT, slight odor, no sheen
NB09	√	41 29.5890	74 00.3621	7.4	Brown SILT, trace clay, trace odor, no sheen
NB10	√	41 29.6091	74 00.3370	8.9	Brown SILT, no odor, trace sheen
NB11	√	41 29.6742	74 00.2010	NA	Brown SILT, no odor, trace sheen
NB12	√	41 29.8014	74 00.2899	NA	Brown SILT, no odor, trace sheen
NB13		41 29.6755	74 00.2965	22.3	Brown silt with CLAY, some cobbles and gravel, no odor or sheen
NB14		41 29.6042	74 00.2982	32.0	Brown SILT, no odor or sheen
NB15		41 29.6838	74 00.3078	18.0	Brown CLAY with silt, some very fine sand, trace gravel, strong odor, slight sheen
NB16		41 29.6839	74 00.2933	28.3	Brown SILT with some clay, no odor or sheen
NB17		41 29.6422	74 00.2915	33.0	Brown SILT with trace clay, no odor or sheen
NB18	√	41 29.6995	74 00.3427	5.7	Brown SILT, some organic debris, no odor, trace sheen
NB19		41 29.6348	74 00.2995	25.0	Brown SILT, some gravel, no odor or sheen
NB20	√	41 29.6262	74 00.3024	NA	Brown SILT, trace clay, trace gravel, coal tar blebs, trace odor, moderate sheen
NB21		41 29.5962	74 00.3088	23.7	Brown SILT, trace gravel, no odor or sheen
NB22	√	41 29.6677	74 00.3239	NA	Brown SILT, trace clay, no odor, trace sheen
NB23	√	41 29.6431	74 00.2995	25.0	Brown CLAY, some silt, no odor, trace sheen
NB24	√	41 29.6357	74 00.3128	12.7	Brown CLAY, some silt, moderate odor, trace sheen
NB25	√	41 29.6279	74 00.3139	12.7	Brown CLAY, some silt, no odor, trace sheen
NB26	√	41 29.6038	74 00.3174	14.4	Brown CLAY, some silt, trace odor and sheen
NB27	√	41 29.6027	74 00.3077	24.4	Brown SILT, some clay, trace odor and sheen
NB28		41 29.6867	74 00.3156	13.9	Brown CLAY, some silt, no odor, moderate sheen
NB29	√	41 29.6932	74 00.3054	17.0	Brown SILT, some clay chunks, organic debris, tiny coal tar blebs, moderate odor, trace sheen

⁽¹⁾GPS latitude and longitude are in NAD 1983 degrees, decimal-minutes

⁽²⁾Sample IDs marked as "NA" for water depth did not have a water depth measurement recorded when the sample was collected.

**Table 2-2
Water Quality Measurements
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sample Station Designation	Water Column Position	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH
NB01	near surface	9.4	9.6	203	6.6
	near bottom	9.5	9.6	204	6.5
NB02	near surface	9.3	9.6	198	6.8
	near bottom	9.4	9.8	200	6.7
NB03	near surface	9.2	9.6	190	7.2
	near bottom	9.2	9.6	189	6.9
NB04	near surface	9.3	9.6	192	6.9
	near bottom	9.3	9.7	192	6.9
NB05	near surface	9.4	9.7	201	7.1
	near bottom	9.3	9.7	196	6.9
NB06	near surface	9.3	9.6	196	7.1
	near bottom	9.4	9.8	197	7.0
NB07	near surface	9.3	9.7	195	7.2
	near bottom	9.4	9.8	198	7.2
NB08	near surface	9.3	9.6	193	7.1
	near bottom	9.3	9.9	192	7.1
NB09	near surface	9.5	9.5	201	7.2
	near bottom	9.5	9.7	199	7.2
NB10	near surface	9.4	9.6	201	7.1
	near bottom	9.3	9.7	200	7.2
NB11	near surface	9.9	9.2	203	7.1
	near bottom	9.8	9.4	202	7.0
NB12	near surface	9.5	9.4	195	7.0
	near bottom	9.6	9.4	197	6.9
NB13	near surface	9.5	9.3	194	7.0
	near bottom	9.6	9.8	200	6.8
NB14	near surface	10.0	9.1	199	7.1
	near bottom	9.7	9.2	194	6.9
NB15	near surface	10.2	9.0	205	7.1
	near bottom	9.8	9.4	193	7.1
NB16	near surface	10.1	9.0	201	7.1
	near bottom	9.8	9.2	194	7.0
NB17	near surface	9.8	8.9	191	7.3
	near bottom	9.6	9.1	188	7.3
NB18	near surface	9.4	9.4	204	7.5
	near bottom	9.4	9.1	203	7.5
NB19	near surface	9.3	9.2	202	7.3
	near bottom	9.3	9.0	210	7.3
NB20	near surface	10.0	10.9	200	6.6
	near bottom	9.6	14.4	205	6.3
NB21	near surface	9.5	9.0	206	7.1
	near bottom	9.4	8.8	203	7.1
NB22	near surface	9.5	9.4	208	7.5
	near bottom	9.6	9.3	238	7.5
NB23	near surface	9.3	9.3	204	7.5
	near bottom	9.3	9.4	202	7.5
NB24	near surface	9.3	9.2	203	7.4
	near bottom	9.3	9.3	201	7.4
NB25	near surface	9.6	9.2	221	7.5
	near bottom	9.3	9.5	205	7.4
NB26	near surface	9.6	9.3	231	7.5
	near bottom	9.5	9.4	224	7.5
NB27	near surface	9.4	9.3	205	7.5
	near bottom	9.2	9.1	202	7.5
NB28	near surface	9.7	9.2	217	7.4
	near bottom	9.6	9.3	208	7.3
NB29	near surface	9.7	9.1	211	7.4
	near bottom	9.6	9.2	217	7.3

NA = not available due to shallow water depth.

Table 3-1
Screening Values from ARCADIS BBL
Central Hudson Gas and Electric Company
Newburgh MGP Site

RETEC Sample ID	NB23	NB24	NB25	NB26	NB27	NB11	NB12	NB20	NB29
ABBL Sample ID	SED-14	SED-15	SED-16	SED-21	SED-22	BKGD #1	BKGD #2	SED-46	SED-50
Benzo(g,h,i)perylene	0.68 J	0.63 B	0.66 B	1.7 B	0.8 B	0.37 J	0.16 J	0.75	3.5
Benzo(k) fluoranthene	0.87	0.99	0.86	2.6	1.0	0.56 J	0.22 J	0.91	4.9
Acenaphthene	3.5	2.0	3.5	5.6	5.1	0.053 J	< 0.9	4.5	8.5
Acenaphthylene	0.28 J	0.24 J	0.45 J	0.95	< 0.7	0.050 J	< 0.9	0.22 J	1.6
Benzo(a)anthracene	1.2	1.4	1.8	7.5	1.8	0.43 J	0.19 J	1.3	8.1
Benzo(a)pyrene	1.3	1.4	1.5	5.0	1.7	0.52 J	0.24 J	1.5	6.9
Benzo(b)fluoranthene	0.69 J	0.7	1.1	2.8	1.2	0.36 J	0.21 J	0.74 J	3.8
1-Methylnaphthalene	0.17 J	0.24 J	0.52 J	0.41 J	0.43 J	< 0.91	< 0.9	0.22 J	3.4
2-Methylnaphthalene	0.11 J	0.19 J	0.47 J	0.74	0.80	< 0.91	< 0.9	0.18 J	0.95
Chrysene	1.2	1.4	1.7	6.6	1.8	0.55 J	0.24 J	1.5	7.8
Dibenz(a,h)anthracene	0.22 J	0.22 JB	0.22 JB	0.57 JB	0.25 JB	< 0.91	< 0.9	< 0.6	< 0.68
Fluoranthene	2.0	2.1	3.9	11	3.1	0.82 J	0.33 J	3	12
Fluorene	2.0	1.3	2.2	4.1	2.3	< 0.91	< 0.9	2.5	4.6
Indeno(1,2,3-cd)pyrene	0.59 J	0.59 JB	0.66 B	1.5 B	0.72	0.29 J	0.14 J	0.59 J	3.5
Naphthalene	0.34 J	0.28 J	0.63	0.92	0.77	< 0.91	< 0.9	0.63	1.3
Phenanthrene	5.1	3.9	7.0	21	7.6	0.44 J	0.14 J	7.5	17 D
Pyrene	2.9	3.0	4.5	13 D	4.6	0.84 J	0.34 J	4.1	17 D
Anthracene	0.67 J	0.91	2.0	7.3	2.0	0.11 J	< 0.9	0.9	6.3
Total PAHs	23.8 J	21.5 JB	33.7 JB	93.3 JB	36.0 JB	5.4 J	2.2 J	31 J	111 D

Notes:

1. Samples were collected by ARCADIS of New York, Inc.
2. Laboratory analysis was completed by Severn Trent Laboratories of Shelton, CT.
3. Samples were analyzed for polynuclear aromatic hydrocarbons using United States Environmental Protection Agency (USEPA) SW-846 Method 8270C.
4. All concentrations reported as parts per million.
5. DUP = Blind Duplicate Sample. The sample ID in parenthesis indicates the parent sample.
6. < = Compound was not detected at a concentration exceeding the presented laboratory detection limit.
7. J = Indicates an estimated concentration. Presented concentration is less than the method detection limit but greater than the instrument detection limit.
8. -- Indicates sample was not analyzed for this compound.

Table 3-2
Analytical Testing Program
Central Hudson Gas and Electric Company
Newburgh MGP Site

Sample Type	Matrix	Parameter	Purpose	Quantity	Laboratory ¹
Field Measurement	Surface Water	Temperature	General environmental quality parameters	29	YSI 6820 Field Meter
		pH		29	
		Dissolved oxygen		29	
		Conductivity		29	
		Salinity		29	
		Turbidity		29	
Bioavailability Characterization	Sediment	Amphipod toxicity (<i>Hyalella azteca</i>) 28-day chronic test	Direct Measurement of PAH bioavailability	22: 19 field samples, 2 reference samples, 1 control sample	AquaTOX
		Midge larvae toxicity (<i>Chironomus dilutus</i>) 20-day chronic test	Direct Measurement of PAH bioavailability	22: 19 field samples, 2 reference samples, 1 control sample	ERDC
Chemical/Physical Characterization	Sediment	Total PAHs [parent & alkylated 34 compounds]	Chemical test for estimating bioavailability	15	EERC
		Soot Organic Carbon (SOC) & Total Organic Carbon (TOC)	Characterization of sediment organic matter	15	EERC
		Total Solids	Potential confounding factors affecting interpretation of toxicity data	15	STL
		Grain size		15	STL
		pH		15	STL
		Ammonia		15	STL
				15	STL
	Pore Water	Total dissolved PAHs [parent & alkylated 34 compounds]	Chemical Test for estimating bioavailability	15	EERC

Note 1. EERC - Energy & Environment Research Center
AquaTOX - AquaTOX Research, Inc., Syracuse, NY
STL - Severn Trent Laboratories, Inc., Burlington, VT
ERDC - U.S. Army Engineer Research and Development Center, Vicksburg, MS

**Table 4-1
Bulk Sediment Total PAH Concentrations
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sediment PAH's (mg/kg)	NB01			NB02			NB03			NB04			NB08			NB09			NB10		
	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N
naphthalene	3.08	2.82	4	1.92	0.04	4	1.83	0.02	4	6.03	0.83	4	4.04	2.83	4	0.72	0.03	4	0.45	0.09	4
2-methylnaphthalene	1.55	1.16	4	1.09	0.03	4	1.55	0.01	4	4.72	0.34	4	2.46	1.77	4	0.38	0.02	4	0.30	0.06	4
1-methylnaphthalene	1.05	0.85	4	0.42	0.02	4	0.78	0.02	4	2.24	0.34	4	1.83	1.44	4	0.31	0.02	4	0.14	0.03	4
C2 naphthalenes	3.87	2.04	4	4.97	0.27	4	6.58	0.25	4	63.0	1.33	4	7.44	2.57	4	1.91	0.16	4	1.13	0.16	4
C3 naphthalenes	2.48	1.08	4	4.22	0.75	4	5.49	0.19	4	39.5	0.56	4	5.37	1.27	4	1.16	0.16	4	0.78	0.08	4
C4 naphthalenes	1.73	0.64	4	3.29	0.86	4	5.03	0.31	4	18.3	1.61	4	4.67	1.20	4	1.12	0.21	4	0.71	0.04	4
acenaphthylene	1.67	0.39	4	1.89	0.40	4	2.31	0.11	4	5.83	0.70	4	4.38	0.73	4	0.88	0.17	4	0.88	0.16	4
acenaphthene	3.15	2.57	4	2.70	0.14	4	2.28	0.03	4	16.6	0.42	4	3.41	1.32	4	1.20	0.20	4	0.30	0.07	4
fluorene	2.36	2.61	4	1.60	0.05	4	1.63	0.04	4	8.49	0.21	4	2.51	0.69	4	0.77	0.12	4	0.28	0.04	4
C1 fluorenes	3.38	2.37	4	3.68	0.78	4	4.01	0.11	4	18.7	0.51	4	7.09	2.70	4	1.04	0.14	4	0.88	0.10	4
C2 fluorenes	2.15	0.84	4	3.76	1.07	4	4.32	0.32	4	14.9	0.39	4	5.36	1.53	4	1.07	0.23	4	0.86	0.03	4
C3 fluorenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenanthrene	16.6	19.0	4	6.77	0.35	4	9.38	0.22	4	34.4	1.67	4	25.0	9.83	4	3.42	1.26	4	2.21	0.45	4
anthracene	9.19	9.30	4	4.45	0.49	4	5.67	0.15	4	22.7	1.96	4	11.7	3.97	4	2.10	0.47	4	1.58	0.21	4
C1 phenanthrenes/anthracenes	11.0	7.98	4	12.8	3.57	4	15.8	0.82	4	51.6	2.26	4	22.8	8.13	4	3.35	0.74	4	2.48	0.32	4
C2 phenanthrenes/anthracenes	19.3	8.64	4	27.0	6.45	4	40.1	2.42	4	93.0	4.69	4	45.5	14.2	4	9.52	2.31	4	6.60	0.41	4
C3 phenanthrenes/anthracenes	9.85	3.81	4	13.4	2.40	4	19.2	1.04	4	39.6	2.03	4	25.5	7.34	4	5.09	1.21	4	4.44	0.26	4
C4 phenanthrenes/anthracenes	1.54	0.62	4	2.27	0.27	4	3.97	0.48	4	7.15	1.56	4	4.07	1.17	4	0.98	0.32	4	0.9	0.04	4
fluoranthene	18.4	18.5	4	7.34	0.84	4	9.5	0.40	4	22.1	1.50	4	27.9	9.85	4	5.19	1.53	4	3.63	0.61	4
pyrene	16.8	15.0	4	9.30	1.64	4	10.5	0.42	4	25.4	1.20	4	24.7	8.44	4	4.92	1.07	4	3.45	0.52	4
C1 fluoranthenes/pyrenes	12.8	6.97	4	13.5	3.36	4	15.0	0.89	4	35.2	2.25	4	24.4	6.23	4	4.65	1.02	4	3.57	0.33	4
benz[a]anthracene	10.4	9.47	4	4.99	0.89	4	5.55	0.20	4	13.9	1.26	4	14.4	4.66	4	2.91	0.75	4	2.04	0.28	4
chrysene	9.87	8.34	4	5.27	0.90	4	6.58	0.27	4	14.6	1.36	4	16.0	5.11	4	3.19	0.78	4	2.37	0.28	4
C1 chrysenes	20.7	14.2	4	15.0	3.19	4	19.0	1.05	4	40.8	3.31	4	36.7	10.7	4	7.64	1.64	4	5.49	0.55	4
C2 chrysenes	10.4	5.58	4	9.43	1.81	4	13.6	0.76	4	24.9	2.15	4	22.5	6.53	4	5.08	1.26	4	3.99	0.49	4
C3 chrysenes	5.47	3.72	4	4.65	0.76	4	7.23	0.52	4	13.2	1.21	4	12.2	3.60	4	ND	ND	ND	2.06	0.21	4
C4 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[b+k]fluoranthene	13.7	12.6	4	5.45	0.74	4	6.94	0.22	4	14.3	1.19	4	19.4	5.96	4	3.98	0.93	4	3.35	0.36	4
benzo[e]pyrene	5.34	4.53	4	2.47	0.41	4	2.77	0.09	4	6.09	0.48	4	7.76	2.37	4	1.56	0.32	4	1.39	0.14	4
benzo[a]pyrene	10.5	9.20	4	4.99	0.96	4	5.78	0.18	4	13.2	0.92	4	15.0	4.53	4	3.05	0.70	4	2.45	0.25	4
perylene	3.11	2.75	4	2.08	0.17	4	2.68	0.13	4	3.61	0.38	4	4.6	1.28	4	1.55	0.21	4	2.06	0.10	4
indeno[1,2,3-cd]pyrene	11.7	11.4	4	4.20	0.64	4	6.80	0.48	4	13.9	1.05	4	17.6	5.56	4	3.69	1.00	4	2.63	0.36	4
dibenz[ah]anthracene	2.70	2.47	4	1.15	0.20	4	1.28	0.08	4	3.48	0.31	4	4.7	1.46	4	0.65	0.14	4	0.63	0.09	4
benzo[ghi]perylene	6.04	5.62	4	2.42	0.38	4	3.17	0.12	4	6.76	0.48	4	8.9	2.86	4	1.77	0.42	4	1.47	0.17	4
PAH ₁₆ (mg/kg)	136	129	4	64.4	8.35	4	79.2	2.61	4	222	12.5	4	200	67	4	38.4	9.19	4	27.7	3.88	4
PAH ₃₄ (mg/kg)	252	195	4	188	34.0	4	246	11.6	4	698	32.0	4	440	141	4	84.8	17.1	4	65.5	7.11	4
Ratio PAH ₁₆ /PAH ₃₄	0.49	0.10	4	0.34	0.02	4	0.32	0.00	4	0.32	0.01	4	0.45	0.01	4	0.45	0.04	4	0.42	0.01	4
Toxic Units (TU ₃₄)	11	8.5	4	7.8	1.4	4	7.9	0.4	4	22	0.9	4	14	4.6	4	2.1	0.4	4	2.6	0.3	4

ND - Non detected

**Table 4-1
Bulk Sediment Total PAH Concentrations
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sediment PAH's (mg/kg)	NB11			NB12			NB18			NB20			NB24			NB25			NB26			NB29		
	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N	Mean	Std Dev.	N
naphthalene	0.13	0.02	4	0.14	0.01	4	2.47	1.40	4	16.7	0.51	4	6.94	0.44	4	1.58	0.11	4	4.15	0.19	4	9.13	1.79	4
2-methylnaphthalene	0.10	0.01	4	0.11	0.01	4	1.51	0.56	4	10.4	0.38	4	4.22	0.30	4	1.46	0.08	4	2.60	0.10	4	9.44	3.24	4
1-methylnaphthalene	0.05	0.00	4	0.06	0.01	4	0.80	0.08	4	3.72	0.24	4	2.16	0.14	4	0.70	0.02	4	1.19	0.03	4	10.4	3.03	4
C2 naphthalenes	0.53	0.03	4	0.61	0.07	4	3.90	0.40	4	270	64.7	4	52.6	4.95	4	6.94	0.18	4	12.6	0.88	4	47.3	13.3	4
C3 naphthalenes	0.44	0.04	4	0.43	0.07	4	2.92	0.40	4	167	39.9	4	40.4	4.21	4	5.43	0.13	4	11.7	1.19	4	23.5	6.5	4
C4 naphthalenes	0.00	0.00	4	0.00	0.00	4	2.83	0.45	4	76.0	17.2	4	21.8	3.64	4	4.37	0.15	4	8.27	0.78	4	9.49	1.01	4
acenaphthylene	0.17	0.01	4	0.18	0.03	4	2.35	0.43	4	22.3	4.10	4	5.25	0.91	4	0.77	0.05	4	2.14	0.15	4	4.47	0.83	4
acenaphthene	0.09	0.02	4	0.10	0.03	4	1.23	0.14	4	103	14.9	4	14.1	1.23	4	2.09	0.09	4	4.28	0.41	4	20.1	5.10	4
fluorene	0.10	0.01	4	0.11	0.01	4	1.14	0.09	4	63.1	9.67	4	9.24	0.91	4	1.44	0.07	4	3.28	0.23	4	9.23	2.78	4
C1 fluorenes	0.28	0.04	4	0.29	0.02	4	2.69	0.40	4	102	22.4	4	23.1	2.91	4	3.26	0.17	4	8.53	0.71	4	15.8	4.45	4
C2 fluorenes	ND	ND	ND	0.36	0.08	4	2.70	0.38	4	68.4	13.7	4	19.5	2.62	4	3.35	0.22	4	8.48	0.73	4	10.5	2.65	4
C3 fluorenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenanthrene	0.59	0.13	4	0.74	0.18	4	9.11	0.66	4	220	25.0	4	35.4	4.08	4	5.70	0.36	4	14.2	0.73	4	36.2	9.57	4
anthracene	0.40	0.05	4	0.43	0.10	4	5.52	0.56	4	191	23.9	4	30.7	3.77	4	4.01	0.23	4	10.9	0.78	4	24.1	6.67	4
C1 phenanthrenes/anthracenes	0.69	0.05	4	0.78	0.21	4	10.0	1.15	4	275	47.9	4	69.6	7.62	4	12.0	0.70	4	32.1	2.73	4	48.7	12.1	4
C2 phenanthrenes/anthracenes	2.75	0.11	4	2.91	0.48	4	26.3	3.20	4	358	67.2	4	116	12.6	4	26.4	1.93	4	65.9	5.31	4	79	16.0	4
C3 phenanthrenes/anthracenes	1.56	0.04	4	1.47	0.19	4	13.0	1.56	4	106	16.2	4	41.4	4.33	4	11.0	0.75	4	23.7	1.49	4	26.6	5.43	4
C4 phenanthrenes/anthracenes	ND	ND	ND	ND	ND	ND	2.29	0.36	4	17.2	2.27	4	7.19	1.02	4	2.20	0.29	4	4.00	0.52	4	3.35	0.38	4
fluoranthene	0.97	0.12	4	1.13	0.25	4	14.1	1.30	4	105	15.8	4	23.0	2.44	4	3.52	0.24	4	11.7	1.05	4	21.8	3.67	4
pyrene	0.90	0.11	4	1.01	0.26	4	13.3	1.35	4	140	31.1	4	30.4	2.26	4	5.06	0.28	4	17.3	1.24	4	26.4	3.86	4
C1 fluoranthenes/pyrenes	0.81	0.06	4	0.87	0.15	4	12.4	1.88	4	195	57.4	4	51	5.72	4	8.16	0.39	4	26.2	1.87	4	36.5	6.85	4
benzo[a]anthracene	0.50	0.06	4	0.60	0.14	4	7.39	0.70	4	65.7	8.92	4	15.5	1.81	4	2.66	0.16	4	8.76	0.75	4	14.1	2.81	4
chrysene	0.65	0.08	4	0.71	0.16	4	8.41	0.70	4	64.9	8.80	4	15.7	2.09	4	2.82	0.16	4	8.80	0.66	4	14.1	2.38	4
C1 chrysenes	1.50	0.11	4	1.66	0.33	4	19.9	2.01	4	148	29.5	4	48.3	6.53	4	9.14	0.56	4	27.4	1.81	4	39.6	7.35	4
C2 chrysenes	ND	ND	ND	ND	ND	ND	11.8	1.36	4	62.3	10.1	4	26.6	4.02	4	5.95	0.40	4	15.1	0.78	4	21.6	3.18	4
C3 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	23.9	3.19	4	ND	ND	ND	2.53	0.19	4	ND	ND	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[b+k]fluoranthene	0.99	0.09	4	1.1	0.2	4	10.6	0.53	4	53.8	7.69	4	13.3	1.58	4	2.25	0.18	4	6.90	0.52	4	13.8	2.31	4
benzo[e]pyrene	0.39	0.03	4	0.4	0.1	4	4.23	0.20	4	23.5	3.16	4	5.66	0.76	4	1.02	0.08	4	3.05	0.23	4	5.38	0.85	4
benzo[a]pyrene	0.58	0.06	4	0.6	0.1	4	8.02	0.71	4	67.7	9.12	4	14.3	1.93	4	2.24	0.17	4	7.82	0.61	4	14.1	2.57	4
perylene	1.78	0.09	4	1.7	0.1	4	3.11	0.27	4	12.7	2.27	4	4.05	0.35	4	2.09	0.13	4	2.90	0.17	4	3.99	0.59	4
indeno[1,2,3-cd]pyrene	0.62	0.09	4	0.7	0.2	4	9.94	1.53	4	53.8	8.21	4	11.9	1.61	4	2.01	0.20	4	6.12	0.50	4	14.7	2.40	4
dibenz[ah]anthracene	0.14	0.02	4	0.2	0.0	4	1.56	0.25	4	14.9	2.26	4	3.03	0.37	4	0.45	0.04	4	1.25	0.07	4	2.64	0.40	4
benzo[ghi]perylene	0.38	0.05	4	0.4	0.1	4	4.89	0.51	4	27.5	4.40	4	5.81	0.75	4	1.01	0.09	4	2.98	0.23	4	6.38	0.95	4
PAH ₁₆ (mg/kg)	7.22	0.87	4	8.18	1.73	4	100	9.30	4	1,210	169	4	235	25.4	4	37.6	2.36	4	111	7.90	4	231	45.8	4
PAH ₃₄ (mg/kg)	18.1	1.41	4	19.8	3.36	4	220	22.8	4	3,130	562	4	768	85.4	4	144	8.46	4	364	26.0	4	622	131	4
Ratio PAH ₁₆ /PAH ₃₄	0.40	0.02	4	0.41	0.02	4	0.45	0.01	4	0.39	0.02	4	0.31	0.00	4	0.26	0.00	4	0.30	0.00	4	0.37	0.01	4
Toxic Units (TU ₃₄)	0.7	0.1	4	0.8	0.1	4	5.7	0.6	4	94	17	4	27	2.9	4	6.6	0.4	4	15	1.0	4	22	4.7	4

ND - Non detected

Table 4-2
Comparison of Bulk Sediment Total PAH Values from ARCADIS BBL and RETEC Analyses
 Central Hudson Gas and Electric Company
 Newburgh MGP Site

RETEC Sample ID	NB24		NB25		NB26		NB11		NB12		NB20		NB29	
ABBL Sample ID	SED-15		SED-16		SED-21		BKGD #1		BKGD #2		SED-46		SED-50	
	ABBL	RETEC	ABBL	RETEC	ABBL	RETEC	ABBL	RETEC	ABBL	RETEC	ABBL	RETEC	ABBL	RETEC
Benzo(g,h,i)perylene	0.63 B	5.81	0.66 B	1.01	1.7 B	2.98	0.37 J	0.38	0.16 J	0.41	0.75	27.5	3.5	6.38
Benzo(k) fluoranthene	0.99	13.3	0.86	2.25	2.6	6.90	0.56 J	0.99	0.22 J	1.07	0.91	53.8	4.9	13.8
Acenaphthene	2.0	14.1	3.5	2.09	5.6	4.28	0.053 J	0.09	< 0.9	0.10	4.5	103	8.5	20.1
Acenaphthylene	0.24 J	5.25	0.45 J	0.77	0.95	2.14	0.050 J	0.17	< 0.9	0.18	0.22 J	22.3	1.6	4.47
Benzo(a)anthracene	1.4	15.5	1.8	2.66	7.5	8.76	0.43 J	0.50	0.19 J	0.60	1.3	65.7	8.1	14.1
Benzo(a)pyrene	1.4	14.3	1.5	2.24	5.0	7.82	0.52 J	0.58	0.24 J	0.65	1.5	67.7	6.9	14.1
Benzo(b)fluoranthene	0.7		1.1		2.8		0.36 J		0.21 J		0.74 J		3.8	
1-Methylnaphthalene	0.24 J	2.16	0.52 J	0.70	0.41 J	1.19	< 0.91	0.05	< 0.9	0.06	0.22 J	3.72	3.4	10.4
2-Methylnaphthalene	0.19 J	4.22	0.47 J	1.46	0.74	2.60	< 0.91	0.10	< 0.9	0.11	0.18 J	10.4	0.95	9.44
Chrysene	1.4	15.7	1.7	2.82	6.6	8.80	0.55 J	0.65	0.24 J	0.71	1.5	64.9	7.8	14.1
Dibenz(a,h)anthracene	0.22 JB	3.03	0.22 JB	0.45	0.57 JB	1.25	< 0.91	0.14	< 0.9	0.17	< 0.6	14.9	< 0.68	2.64
Fluoranthene	2.1	23	3.9	3.52	11	11.7	0.82 J	0.97	0.33 J	1.13	3	105	12	21.8
Fluorene	1.3	9.24	2.2	1.44	4.1	3.28	< 0.91	0.10	< 0.9	0.11	2.5	63.1	4.6	9.23
Indeno(1,2,3-cd)pyrene	0.59 JB	11.9	0.66 B	2.01	1.5 B	6.12	0.29 J	0.62	0.14 J	0.74	0.59 J	53.8	3.5	14.7
Naphthalene	0.28 J	6.94	0.63	1.58	0.92	4.15	< 0.91	0.13	< 0.9	0.14	0.63	16.7	1.3	9.13
Phenanthrene	3.9	35	7.0	5.70	21	14.2	0.44 J	0.59	0.14 J	0.74	7.5	220	17 D	36.2
Pyrene	3.0	30.4	4.5	5.06	13 D	17.3	0.84 J	0.90	0.34 J	1.01	4.1	140	17 D	26.4
Anthracene	0.91	30.7	2.0	4.01	7.3	10.9	0.11 J	0.40	< 0.9	0.43	0.9	191	6.3	24.1
Total PAHs	21.5 JB	241	33.7 JB	39.8	93.3 JB	114	5.4 J	7.37	2.2 J	8.34	31 J	1220	111 D	251

Notes for RETEC Values:

1. RETEC samples include Benzo(k) fluoranthene and Benzo(b) fluoranthene in one analysis.
2. All Concentrations reported as parts per million.
3. Laboratory analysis was completed by the University of North Dakota EERC.

Notes for ABBL Values:

1. Samples were collected by ARCADIS of New York
2. Laboratory analysis was completed by Severn Trent Laboratories of Shelton, CT.
3. Samples were analyzed for polynuclear aromatic hydrocarbons using United States Environmental Protection Agency (USEPA) SW-846 Method 8270C.
4. All concentrations reported as parts per million.
5. < = Compound was not detected at a concentration exceeding the presented laboratory detection limit.
6. J = Indicates an estimated concentration. Presented concentration is less than the method detection limit but greater than the instrument detection limit.

**Table 4-3
Sediment SPME Pore Water PAH Concentrations
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sediment SPME Pore Water PAHs (µg/L)	NB01			NB02			NB03			NB04			NB08			NB09			NB10		
	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N
naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.828	0.076	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-methylnaphthalene	0.069	0.005	4	ND	ND	ND	ND	ND	ND	0.371	0.035	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-methylnaphthalene	0.129	0.005	4	0.059	0.003	4	ND	ND	ND	1.498	0.107	4	ND	ND	ND	0.252	0.033	4	ND	ND	ND
C2 naphthalenes	0.782	0.045	4	3.449	0.131	4	3.03	0.16	4	146.7	17.29	4	1.266	0.035	4	1.131	0.177	4	0.149	0.026	4
C3 naphthalenes	0.859	0.057	4	4.402	0.165	4	4.73	0.41	4	108.2	16.99	4	1.725	0.092	4	0.682	0.152	4	0.093	0.021	4
C4 naphthalenes	0.434	0.146	4	1.604	0.063	4	1.96	0.24	4	23.57	4.156	4	0.833	0.045	4	0.234	0.045	4	ND	ND	ND
acenaphthylene	0.091	0.008	4	0.393	0.017	4	0.37	0.01	4	0.322	0.061	4	ND	ND	ND	0.168	0.029	4	ND	ND	ND
acenaphthene	1.008	0.045	4	3.798	0.121	4	2.79	0.12	4	53.75	4.027	4	0.806	0.022	4	1.447	0.199	4	0.037	0.005	4
fluorene	0.090	0.004	4	0.934	0.030	4	0.45	0.02	4	16.14	1.317	4	0.243	0.008	4	0.319	0.043	4	ND	ND	ND
C1 fluorenes	0.161	0.010	4	0.794	0.042	4	0.79	0.06	4	13.48	1.647	4	0.279	0.016	4	0.173	0.034	4	0.064	0.007	4
C2 fluorenes	0.113	0.029	4	0.494	0.026	4	0.69	0.06	4	6.721	1.095	4	0.244	0.033	4	0.105	0.017	4	0.058	0.005	4
C3 fluorenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenanthrene	0.091	0.003	4	1.066	0.030	4	1.09	0.04	4	22.75	1.860	4	0.403	0.012	4	0.178	0.027	4	ND	ND	ND
anthracene	0.018	0.002	4	0.108	0.004	4	0.13	0.00	4	3.834	0.266	4	0.034	0.003	4	0.025	0.004	4	ND	ND	ND
C1 phenanthrenes/anthracenes	0.150	0.008	4	1.103	0.049	4	1.51	0.10	4	18.62	2.126	4	0.458	0.029	4	0.128	0.023	4	0.052	0.004	4
C2 phenanthrenes/anthracenes	0.052	0.013	4	0.460	0.022	4	0.77	0.09	4	5.928	0.851	4	0.238	0.024	4	0.047	0.008	4	ND	ND	ND
C3 phenanthrenes/anthracenes	ND	ND	ND	0.050	0.012	4	0.18	0.01	4	1.215	0.293	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
fluoranthene	ND	ND	ND	0.214	0.008	4	0.37	0.02	4	2.271	0.229	4	0.127	0.008	4	0.045	0.007	4	ND	ND	ND
pyrene	ND	ND	ND	0.307	0.011	4	0.43	0.02	4	3.364	0.370	4	0.137	0.005	4	0.038	0.006	4	ND	ND	ND
C1 fluoranthenes/pyrenes	0.037	0.002	4	0.169	0.007	4	0.26	0.02	4	2.126	0.279	4	0.082	0.004	4	0.020	0.005	4	ND	ND	ND
benz[a]anthracene	ND	ND	ND	0.013	0.001	4	0.02	0.00	4	0.176	0.038	4	0.006	0.000	4	ND	ND	ND	ND	ND	ND
chrysene	ND	ND	ND	0.014	0.000	4	0.03	0.00	4	0.203	0.043	4	0.009	0.000	4	0.004	0.001	4	0.002	0.000	4
C1 chrysenes	ND	ND	ND	ND	ND	ND	0.00	0.00	4	0.057	0.015	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
C2 chrysenes	0.029	0.006	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.056	0.016	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.068	0.019	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.084	0.023	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.035	0.005	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.005	0.001	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.014	0.004	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
SPME PAH16 (µg/L)	1.301	0.058	4	6.847	0.210	4	5.677	0.238	4	103.8	8.254	4	1.765	0.057	4	2.223	0.314	4	0.039	0.005	4
SPME PAH34 (µg/L)	4.116	0.216	4	19.43	0.697	4	19.61	1.341	4	432.4	52.58	4	6.890	0.293	4	4.995	0.777	4	0.454	0.047	4
SPME Toxic Units (TU ₃₄)	0.4	0.0	4	1.7	0.1	4	2.1	0.2	4	32	4.6	4	0.7	0.0	4	0.3	0.0	4	<0.1	0.0	4

ND - Non detected

**Table 4-3
Sediment SPME Pore Water PAH Concentrations
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sediment SPME Pore Water PAHs (µg/L)	NB11			NB12			NB18			NB20			NB24			NB25			NB26			NB29		
	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N
naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.169	0.135	4	0.625	0.092	4	0.058	0.001	4	0.162	0.017	4	2.537	0.1114	4
2-methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.263	0.024	4	0.124	0.021	4	0.030	0.003	4	0.059	0.003	4	12.33	0.2203	4
1-methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.183	0.156	4	1.172	0.126	4	0.074	0.001	4	0.178	0.010	4	43.60	0.858	4
C2 naphthalenes	0.236	0.006	4	0.270	0.049	4	0.35	0.02	4	304.0	23.10	4	135.2	15.81	4	11.51	0.343	4	34.44	2.492	4	80.05	2.531	4
C3 naphthalenes	0.019	0.007	4	ND	ND	ND	0.20	0.01	4	182.3	15.90	4	129.5	14.56	4	16.19	0.658	4	50.40	4.235	4	40.89	1.328	4
C4 naphthalenes	ND	ND	ND	ND	ND	ND	0.05	0.01	4	29.30	5.945	4	26.15	3.579	4	5.749	0.441	4	12.49	1.751	4	6.169	0.823	4
acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.667	0.097	4	0.292	0.055	4	0.880	0.029	4	2.481	0.137	4	5.407	0.144	4
acenaphthene	ND	ND	ND	ND	ND	ND	0.06	0.00	4	211.5	7.662	4	58.27	4.964	4	6.921	0.065	4	20.98	1.012	4	51.29	0.743	4
fluorene	ND	ND	ND	0.006	0.000	4	0.02	0.00	4	69.21	2.842	4	22.10	2.166	4	1.998	0.014	4	7.493	0.325	4	12.38	0.188	4
C1 fluorenes	0.044	0.004	4	0.044	0.008	4	0.09	0.01	4	32.83	1.285	4	21.19	1.539	4	2.996	0.018	4	10.78	0.621	4	8.070	0.127	4
C2 fluorenes	ND	ND	ND	ND	ND	ND	0.07	0.01	4	12.84	0.737	4	10.62	0.686	4	2.352	0.039	4	6.445	0.197	4	3.178	0.136	4
C3 fluorenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenanthrene	ND	ND	ND	ND	ND	ND	0.05	0.00	4	103.9	4.019	4	32.19	2.838	4	3.383	0.018	4	12.71	0.4846	4	14.94	0.254	4
anthracene	ND	ND	ND	0.003	0.000	4	0.01	0.00	4	15.79	0.719	4	6.851	0.622	4	0.483	0.004	4	2.239	0.108	4	2.871	0.056	4
C1 phenanthrenes/anthracenes	0.021	0.005	4	0.027	0.001	4	0.08	0.01	4	46.05	1.878	4	30.04	2.379	4	4.754	0.044	4	16.87	0.816	4	10.60	0.166	4
C2 phenanthrenes/anthracenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.56	0.711	4	9.151	0.818	4	2.168	0.106	4	6.102	0.347	4	2.594	0.054	4
C3 phenanthrenes/anthracenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.148	0.185	4	1.986	0.186	4	0.608	0.032	4	1.206	0.097	4	0.447	0.021	4
C4 phenanthrenes/anthracenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.085	0.019	4	ND	ND	ND
fluoranthene	ND	ND	ND	0.015	0.001	4	0.03	0.00	4	9.881	0.542	4	4.501	0.450	4	0.621	0.006	4	2.543	0.093	4	1.487	0.027	4
pyrene	ND	ND	ND	ND	ND	ND	0.04	0.00	4	14.50	0.875	4	6.041	0.595	4	0.957	0.012	4	3.829	0.155	4	2.100	0.049	4
C1 fluoranthenes/pyrenes	ND	ND	ND	ND	ND	ND	0.01	0.00	4	5.107	0.394	4	3.660	0.339	4	0.610	0.023	4	2.253	0.096	4	1.084	0.028	4
benz[a]anthracene	ND	ND	ND	ND	ND	ND	0.00	0.00	4	0.595	0.059	4	0.336	0.056	4	0.039	0.001	4	0.170	0.006	4	0.077	0.005	4
chrysene	0.001	0.000	4	0.001	0.000	4	0.00	0.00	4	0.598	0.057	4	0.415	0.070	4	0.053	0.001	4	0.205	0.006	4	0.095	0.005	4
C1 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.109	0.016	4	0.083	0.014	4	0.009	0.001	4	0.032	0.003	4	0.011	0.001	4
C2 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.148	0.018	4	0.103	0.025	4	0.009	0.001	4	0.035	0.002	4	0.016	0.001	4
benzo[e]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.097	0.011	4	0.065	0.017	4	0.008	0.001	4	0.028	0.002	4	0.012	0.001	4
benzo[a]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.177	0.023	4	0.111	0.028	4	0.009	0.001	4	0.037	0.002	4	0.015	0.001	4
perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.044	0.010	4	0.030	0.007	4	0.011	0.002	4	0.018	0.003	4	0.006	0.001	4
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	0.002	4	0.010	0.002	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.027	0.007	4	0.023	0.004	4	ND	ND	ND	0.004	0.001	4	ND	ND	ND
SPME PAH16 (µg/L)	0.001	0.000	4	0.026	0.001	4	0.21	0.01	4	428.1	16.80	4	131.9	11.83	4	15.41	0.134	4	52.88	2.319	4	93.22	1.243	4
SPME PAH34 (µg/L)	0.321	0.006	4	0.368	0.053	4	1.07	0.03	4	1057	63.92	4	500.8	50.10	4	62.48	0.935	4	194.3	12.02	4	302.3	5.604	4
SPME Toxic Units (TU ₃₄)	<0.1	0.0	4	<0.1	0.0	4	0.1	0.0	4	67	4.8	4	41	4.0	4	6.5	0.1	4	19	1.3	4	15	0.3	4

ND - Non detected

**Table 4-4
General Physical and Chemical Characteristics
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sample	NB01	NB02	NB03	NB04	NB05	NB06	NB07	NB08	NB09	NB10	NB11	NB12	NB18	NB20	NB22	NB23	NB24	NB25	NB26	NB27	NB29
Grain Size Data⁽¹⁾																					
Gravel (%)	3.2	21.2	0.0	0.4	0.0	0.0	0.0	0.0	1.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	17.0	0.0	0.0	0.0	13.3
Coarse Sand (%)	3.5	0.8	0.4	0.5	0.2	0.0	0.0	0.3	3.2	0.0	0.7	0.1	1.5	0.7	0.1	0.0	0.0	0.0	0.4	0.3	1.3
Medium Sand (%)	15.7	1.7	0.8	4.1	1.2	0.2	0.1	3.8	5.8	0.5	1.2	0.4	2.0	1.4	0.3	0.4	0.7	0.1	0.7	1.1	3.1
Fine Sand (%)	55.7	13.0	10.2	33.0	14.6	2.1	1.7	47.6	22.8	6.0	7.5	3.0	37.3	14.4	3.8	1.8	8.5	2.1	3.3	18.7	18.6
Silt (%)	13.8	37.6	49.3	31.4	56.3	64.0	60.3	30.6	50.8	60.6	60.3	64.6	38.6	42.4	57.8	47.9	32.5	48.2	50.0	48.3	33.8
Clay (%)	8.1	25.7	39.3	30.5	27.7	33.7	37.9	17.7	16.1	32.9	29.8	32.0	20.6	41.1	38.1	50.0	41.3	49.6	45.6	31.5	29.9
Percent Solids																					
Solids (%)	61.4	41.7	46.9	52.6	39.4	38.8	36.2	49.8	50.1	39.1	36.9	35.4	51.4	51.2	34.9	44.5	63.8	43.5	44.6	50.8	38.8
Organic Carbon																					
Sediment TOC (wt. %)	3.2	3.3	4.3	4.6	NA	NA	NA	4.2	5.5	3.4	3.6	3.4	5.2	5.0	NA	NA	4.2	3.1	3.5	NA	4.3
Sediment Soot C (wt. %)	1.2	0.4	1.0	1.0	NA	NA	NA	1.0	1.6	0.3	0.4	0.3	1.3	2.1	NA	NA	1.2	0.5	0.5	NA	1.2
Ratio Soot C/TOC	0.4	0.1	0.2	0.2	NA	NA	NA	0.2	0.3	0.1	0.1	0.1	0.3	0.4	NA	NA	0.3	0.2	0.2	NA	0.3
Basic Chemistry																					
Ammonia (mg/Kg)	42.6	145	169	200	174	282	240	104	93.5	248	216	284	127	143	173	178	97.7	238	141	186	143
pH	6.9	6.7	6.7	6.5	6.8	6.8	6.7	6.9	7.0	6.9	7.1	7.1	6.8	6.8	6.8	6.7	6.6	6.8	6.6	7	7.1

NA - Not analyzed

Samples highlighted in yellow were selected for biological testing.

⁽¹⁾Sediment samples were field-screened to 4 mm; therefore, the distribution of gravel is unknown.

Gravel is defined as > 2,000 µM

Coarse sand is defined as between 2,000 and 850 µM

Medium sand is defined as between 850 and 425 µM

Fine sand is defined as between 425 and 75 µM

Silt is defined as between 75 and 6.6 µM

Clay is defined as < 6.6 µM

**Table 4-5
H. azteca and C. dilutus Toxicity Test Data – Survival and Growth
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Sample Type	RETEC ID	ABBL ID	Total PAH ₁₆ (mg/kg)	SPME Porewater TU ₃₄	<i>Hyalella azteca</i>								<i>Chironomus dilutus</i>							
					Survival (%)				Growth (mg dry wt./organism)				Survival (%)				Growth (mg dry wt./organism)			
					Sig	Mean ^a	S.D. ^b	N ^c	Sig	Mean	S.D.	N	Sig	Mean	S.D.	N	Sig	Mean	S.D.	N
CONTROL	NB_JAM	NA	NA	NA		100	0.0	4		0.20	0.03	4		72	28	5		1.68	0.42	5
CONTROL	NB_JAM	NA	NA	NA		85	17	4		0.24	0.03	4		90	11	5		1.73	0.58	5
REFERENCE	NB11	BCKGRND01	7.22	<0.1		63	13	4		0.22	0.03	4		83	6	5		1.66	0.36	5
REFERENCE	NB12	BCKGRND02	8.18	<0.1		70	27	4		0.18	0.04	4		75	6	5		1.45	0.49	5
REFERENCE	NB11	BCKGRND01	7.22	<0.1		NA	NA	NA		NA	NA	NA		85	12	5		2.22	0.53	5
REFERENCE	NB12	BCKGRND02	8.18	<0.1		NA	NA	NA		NA	NA	NA		85	18	5		2.02	0.63	5
TEST	NB01	SED29	136	0.4		93	9.6	4		0.22	0.02	4		68	22	5		1.66	0.35	5
TEST	NB02	SED30	64.4	1.7	#	25	24	4	*#	0.11	0.04	4		75	12	5		2.09	0.66	5
TEST	NB03	SED31	79.2	2.1	*#	13	9.6	4	+	0.17	0.14	4		90	11	5		1.68	0.82	5
TEST	NB04	SED32	222	32	*#	0.0	0.0	4	+	0.00	0.00	0		50	33	5		1.36	0.91	4
TEST	NB05	SED33	NA	NA		70	18	4		0.27	0.04	4		87	19	5		1.72	0.51	5
TEST	NB06	SED35	NA	NA		68	33	4		0.26	0.07	4		82	15	5		1.54	0.31	5
TEST	NB07	SED37	NA	NA		63	9.6	4		0.20	0.02	4		73	9	5		1.67	0.23	5
TEST	NB08	SED34	200	0.7		95	5.8	4		0.18	0.02	4		68	27	5		2.14	0.42	5
TEST	NB09	SED38	38.4	0.3		100	0.0	4		0.26	0.05	4		60	26	5		2.38	1.02	5
TEST	NB10	SED36	27.7	<0.1		90	14	4		0.19	0.02	4		72	23	5		1.32	0.35	5
TEST	NB18	SED39	100	0.1		93	9.6	4		0.17	0.01	4		72	21	5		2.17	0.66	5
TEST	NB20	SED46	1210	67	*#	0.0	0.0	4	+	0.00	0.00	0	*#	40	18	5		2.65	0.66	5
TEST	NB22	SED47	NA	NA		100	0.0	4		0.15	0.02	4		85	18	5		2.87	0.38	5
TEST	NB23	SED14	NA	NA		100	0.0	4		0.16	0.02	4		70	5	5		2.75	0.13	5
TEST	NB24	SED15	235	41	*#	5.0	10	4	+	0.09	0.20	4		87	14	5		1.82	0.22	5
TEST	NB25	SED16	37.6	6.5		90	8.2	4		0.17	0.03	4		68	18	5		2.30	0.63	5
TEST	NB26	SED21	111	19	#	63	26	4		0.26	0.10	4		77	16	5		2.45	1.33	5
TEST	NB27	SED22	NA	NA		100	0.0	4	*#	0.12	0.01	4	*#	50	25	5		2.57	1.22	5
TEST	NB29	SED50	231	15		93	9.6	4		0.17	0.05	4		88	7	5		1.68	0.25	4

NA = not available

^a Arithmetic mean

^b Standard deviation

^c Number of replicate beakers per treatment (sample ID)

* Statistically different from the pooled field reference samples NB11 and NB12 ($p < 0.05$)

Statistically different from the laboratory performance control ($p < 0.05$)

+ Significant for survival and therefore not included in statistical analysis of growth.

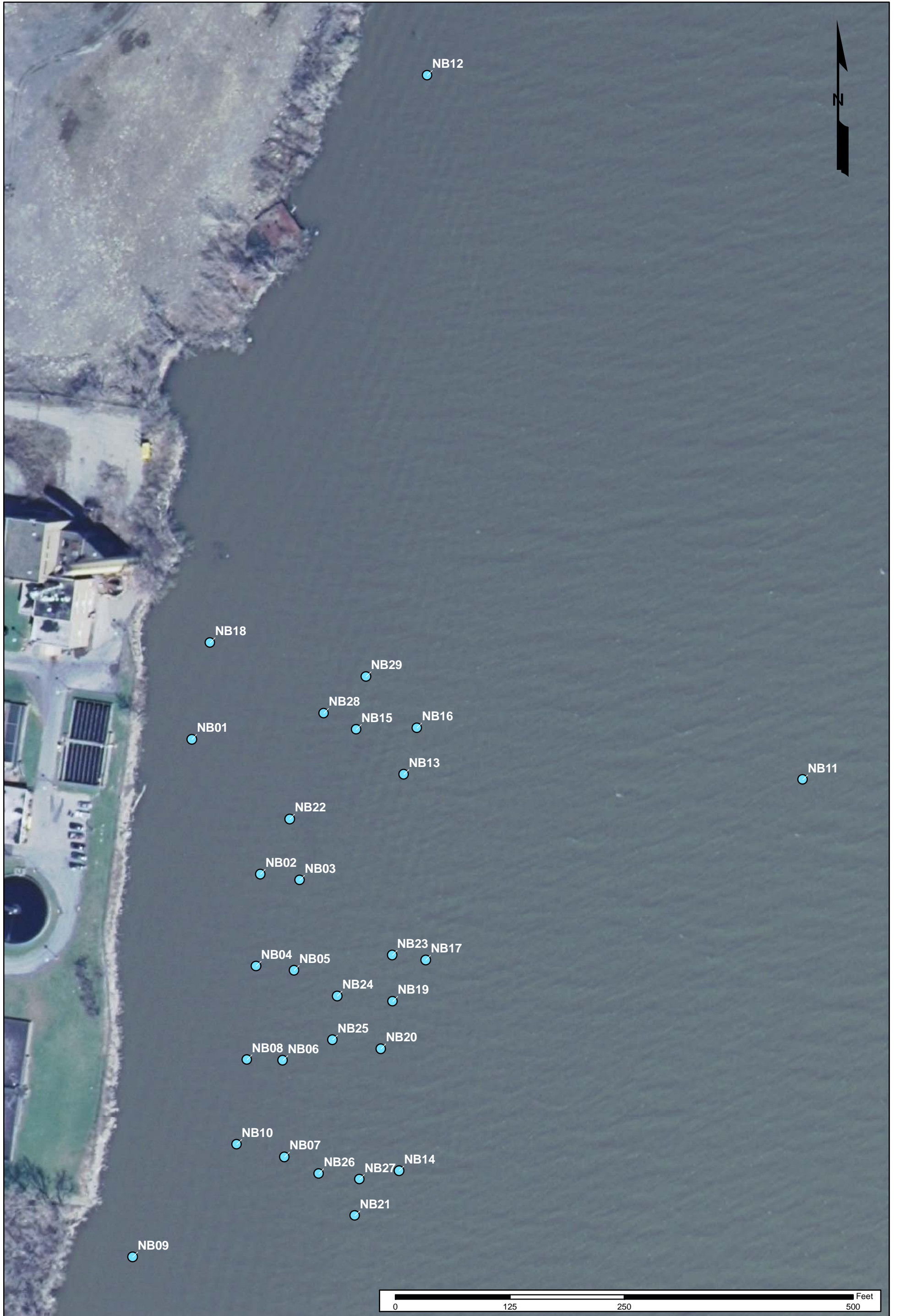
Comparisons of survival and dry weights among treatments were conducted with the Wilcoxon/Bonferroni and Bonferroni Adj. t procedures (U.S. EPA, 2000). Statistical tests for comparison of survival and growth compared to the pooled field reference samples and laboratory control were conducted using CETIS™.

**Table 4-6
Benthic Macroinvertebrate Survey Data
Central Hudson Gas and Electric Company
Newburgh MGP Site**

Class	Order	Family	Subfamily	Tribe	Taxon Identified	NY Tolerance Score	NB01	NB02	NB03	NB04	NB05	NB06	NB07	NB08	NB09	NB10	NB11	NB12	NB18	NB20	NB22	NB23	NB24	NB25	NB26	NB27	NB29
Hirudinea	Rhynchobdellida	Glossiphoniidae			Gloiobdella elongata	8											1										
Oligochaeta	Lumbricina	Lumbricidae			Lumbricidae	6								1													
Oligochaeta	Tubificida	Enchytraeidae			Enchytraeidae	10											1										
Oligochaeta	Tubificida	Naididae			Naididae	8													1		1					1	
Oligochaeta	Tubificida	Tubificidae			Aulodrilus pigueti	7										2											
Oligochaeta	Tubificida	Tubificidae			Ilyodrilus templetoni	10											1										
Oligochaeta	Tubificida	Tubificidae			Limnodrilus hoffmeisteri	10	1					2	2	2	2	1	1	1				1	2		1	1	9
Oligochaeta	Tubificida	Tubificidae			Limnodrilus udekemianus	10																				1	
Oligochaeta	Tubificida	Tubificidae			Quistadrilus multisetosus	10	2							4		3	3		10								
Oligochaeta	Tubificida	Tubificidae			Tubificidae	10	5	1	2		1	10	18	10	7	15	7	13	1	2	6		8	3	11	42	18
Crustacea	Amphipoda	Gammaridae			Gammarus sp.	6				1			1				2					1					
Insecta	Diptera	Ceratopogonidae			Culicoides sp.	10																			4	2	
Insecta	Diptera	Ceratopogonidae			Probezzia sp.	6		1				2	1	1	1	1					1		5		2	1	5
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Chironomini	10										1		1									1
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Chironomus sp.	10			1	4		1	1	5	6	20	10		20	3	1	2	1			1	1
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Cryptochironomus sp.	8		7		6		2	6	13	3	2	3	1	3	3	3	3	12		2	1	9
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Dicrotendipes neomodestus	8																3					
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Polypedilum flavum	6	7	10	9	31	2	5	1	44	1	5			10		1	3	1			1	6
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Polypedilum sp.	6														1					1		
Insecta	Diptera	Chironomidae	Chironominae	Chironomini	Tribelos jucundus	7								2		1											
Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	Coelotanypus sp.	4	3	16	11		21	25	26		16	41	8	3	13	2	17	1	15		16	16	24
Insecta	Diptera	Chironomidae	Tanypodinae	Procladiini	Procladius sp.	9				2	2	1	1		4	11	3	1	8		1		1				2
Insecta	Diptera	Empididae			Empididae	6																			1		
Insecta	Trichoptera	Leptoceridae			Oecetis sp.	5																2					
Pelecypoda	Prionodesmacea	Sphaeriidae			Pisidium sp.	6													1								
Pelecypoda	Prionodesmacea	Sphaeriidae			Sphaerium sp.	6		2	2						2						2		9	1	3	6	1
					Nematoda	10	1	1	3					2	2		3				2	1	2	3	3	1	1

TOTAL ABUNDANCE:	19	38	28	44	26	48	57	84	44	103	43	20	66	12	34	18	56	7	40	75	80
Total Number of Taxa:	8	9	7	7	5	11	12	10	11	13	13	6	10	7	10	14	13	4	10	14	15
Shannon's Diversity Index:	2.7	2.4	2.3	1.6	1.3	2.4	2.5	2.3	2.9	2.8	3.2	1.7	2.8	2.7	2.5	3.1	3.2	1.8	2.6	2.3	3.0
Margalef's Richness Index:	2.2	2.2	1.8	1.6	1.2	2.5	2.6	2.0	2.6	2.5	3.2	1.7	2.1	2.3	2.5	3.7	2.8	1.4	2.4	3.0	3.2
New York Tolerance Score:	6.3	5.5	5.9	6.5	4.4	5.8	5.9	7.4	7.1	6.6	8.3	9.0	7.6	6.9	6.1	3.9	5.1	8.3	6.5	7.8	7.1

Figures



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Merged with ENSR in 2007
 RETEC

Central Hudson Gas & Electric
 Newburgh, NY
 CHGE2-19695-400

**Sediment Sampling Locations
 Newburgh, NY**

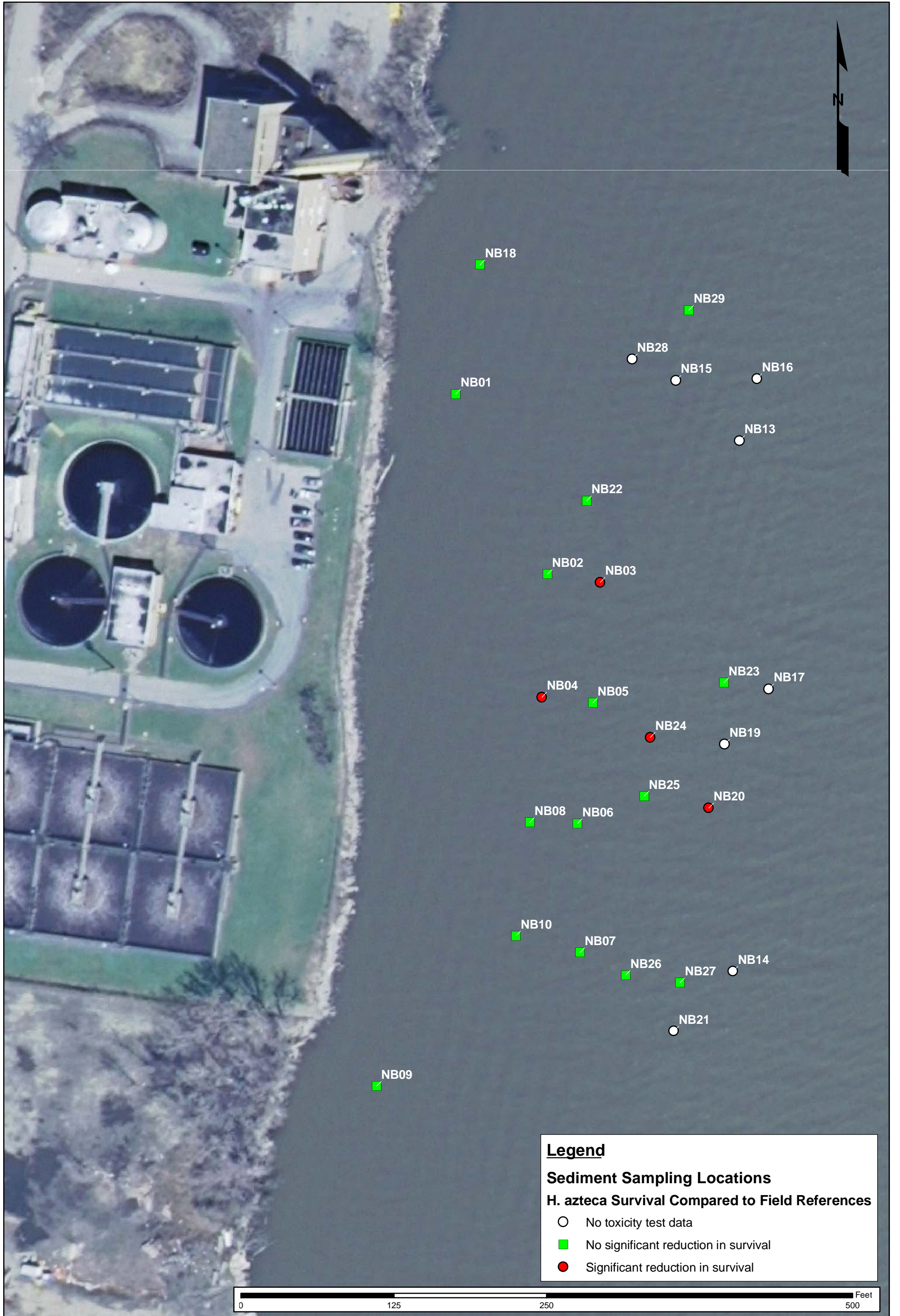
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Revision: 1

FIGURE 2-1

File Path: T:\CentralHud_Newburgh\Projects

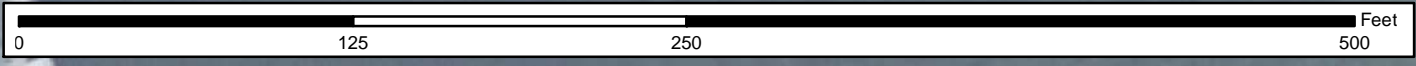


Legend

Sediment Sampling Locations

***H. azteca* Survival Compared to Field References**

- No toxicity test data
- No significant reduction in survival
- Significant reduction in survival



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Merged with ENSR in 2007
RETEC

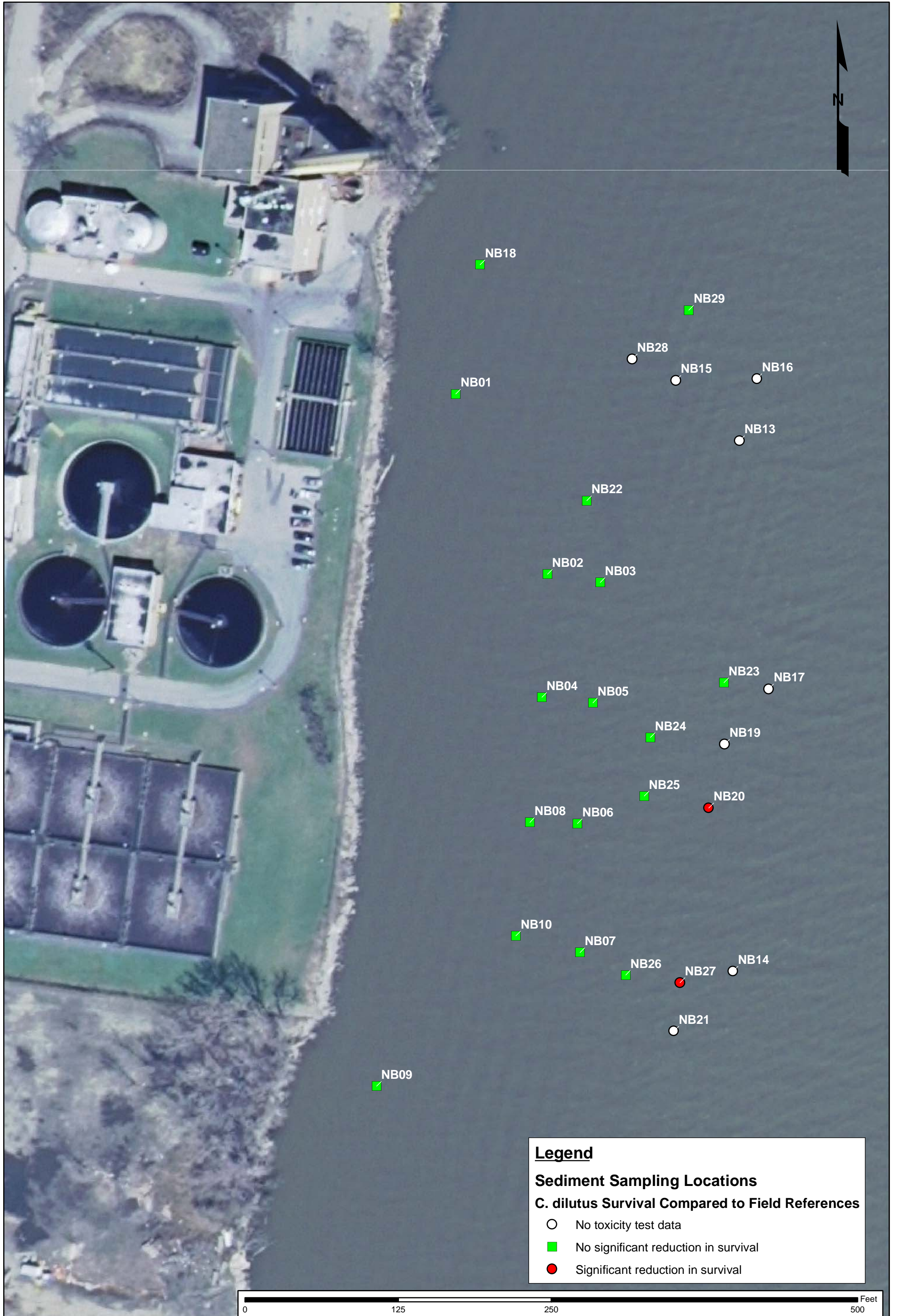
Central Hudson Gas & Electric
Newburgh, NY
CHGE2-19695-400

Hyalella azteca
Toxicity Test Results
SURVIVAL

DATE: 05/11/07 | DWRN: HAJ/lth | Revision: 1

FIGURE 4-1a

File Path: T:\CentralHud_Newburgh\Projects



Confidential
Subject to Attorney-Client Privilege
and/or Work Product Doctrines

ENSR | AECOM

Merged with ENSR in 2007
RETEC

Central Hudson Gas & Electric
Newburgh, NY
CHGE2-19695-400

Chironomus dilutus
Toxicity Test Results
SURVIVAL

DATE: 05/11/07 | DWRN: HAJ/lth | Revision: 1

FIGURE 4-1b

File Path: T:\CentralHud_Newburgh\Projects

Figure 4-2a: *H. azteca* survival (28-day) compared to extractable PAH₁₆, PAH TU₃₄, and SPME pore water TU₃₄ concentrations. Dashed lines represent ± 1 SD for mean control % survival.

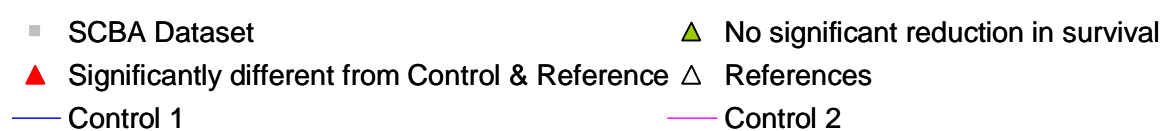
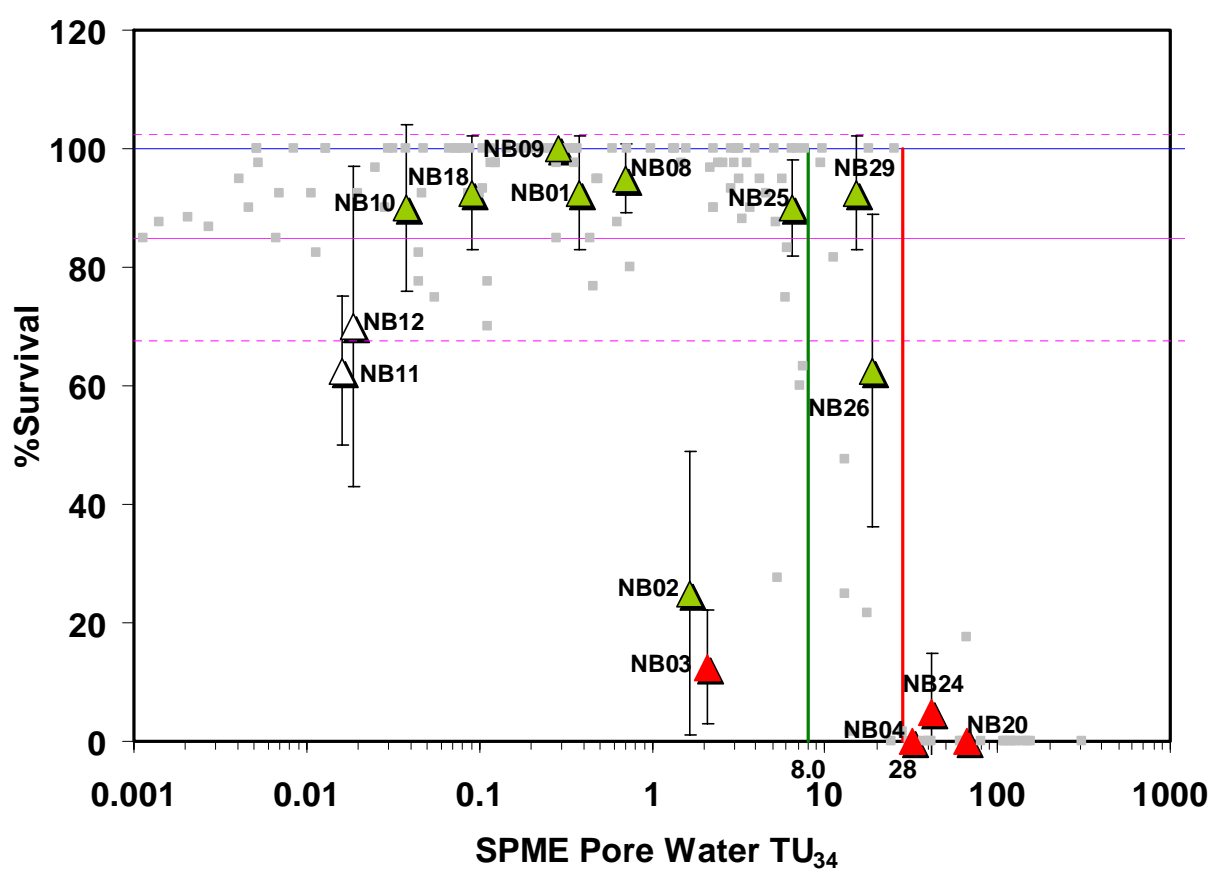
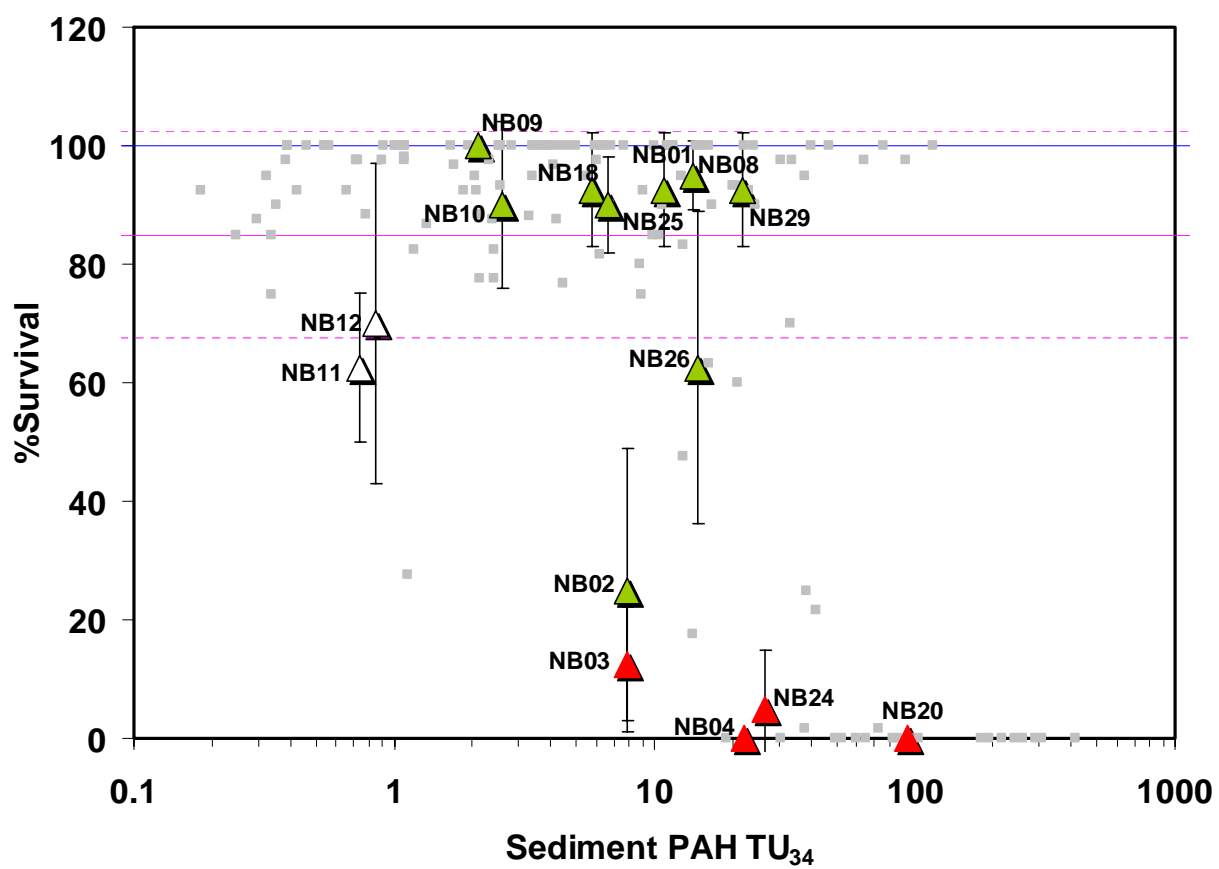
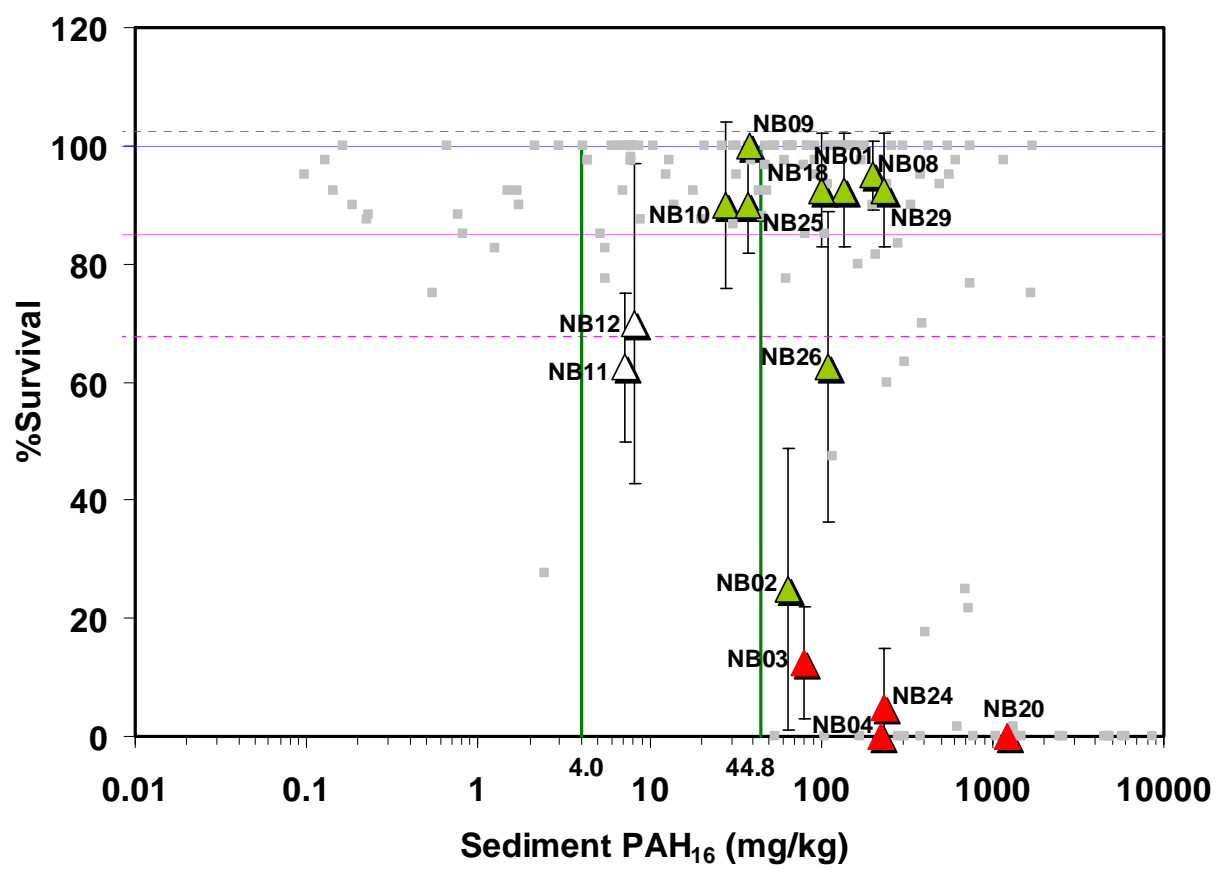
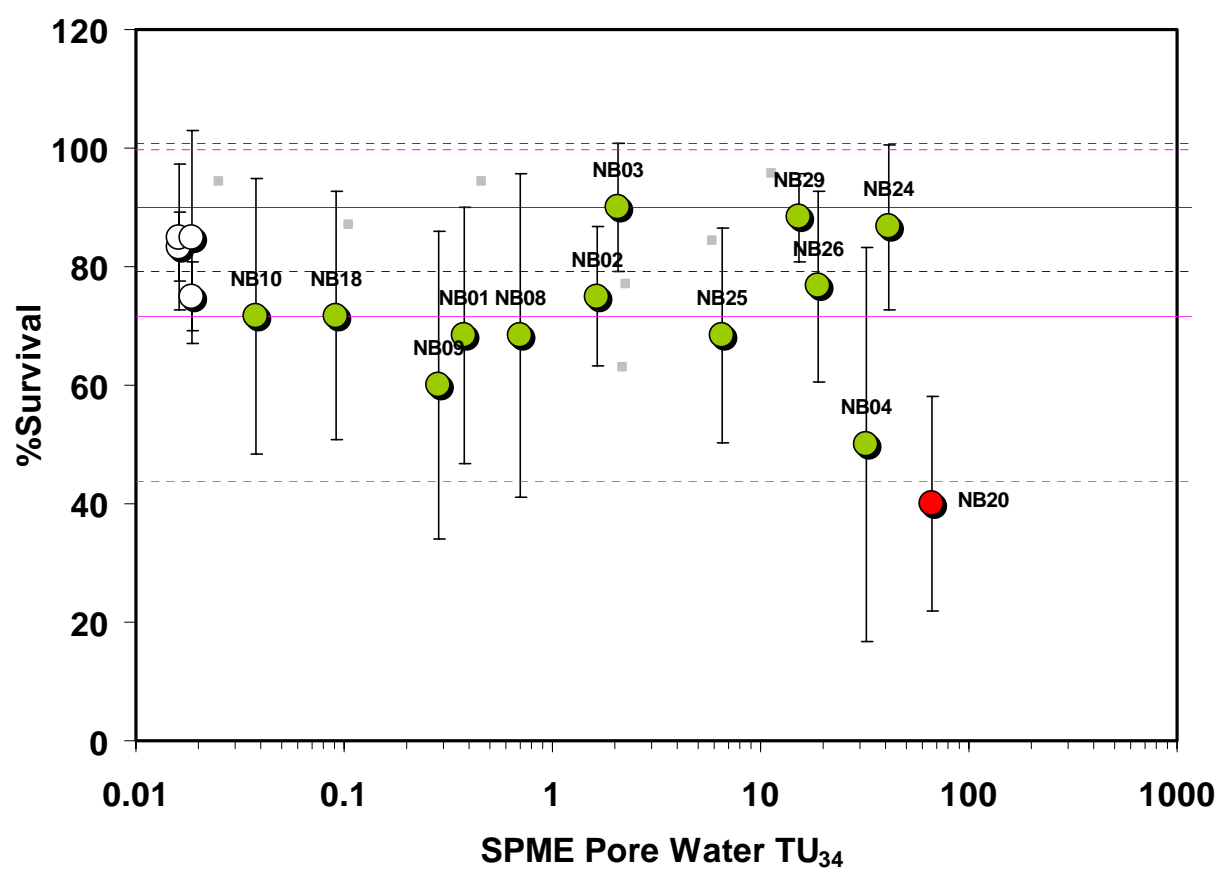
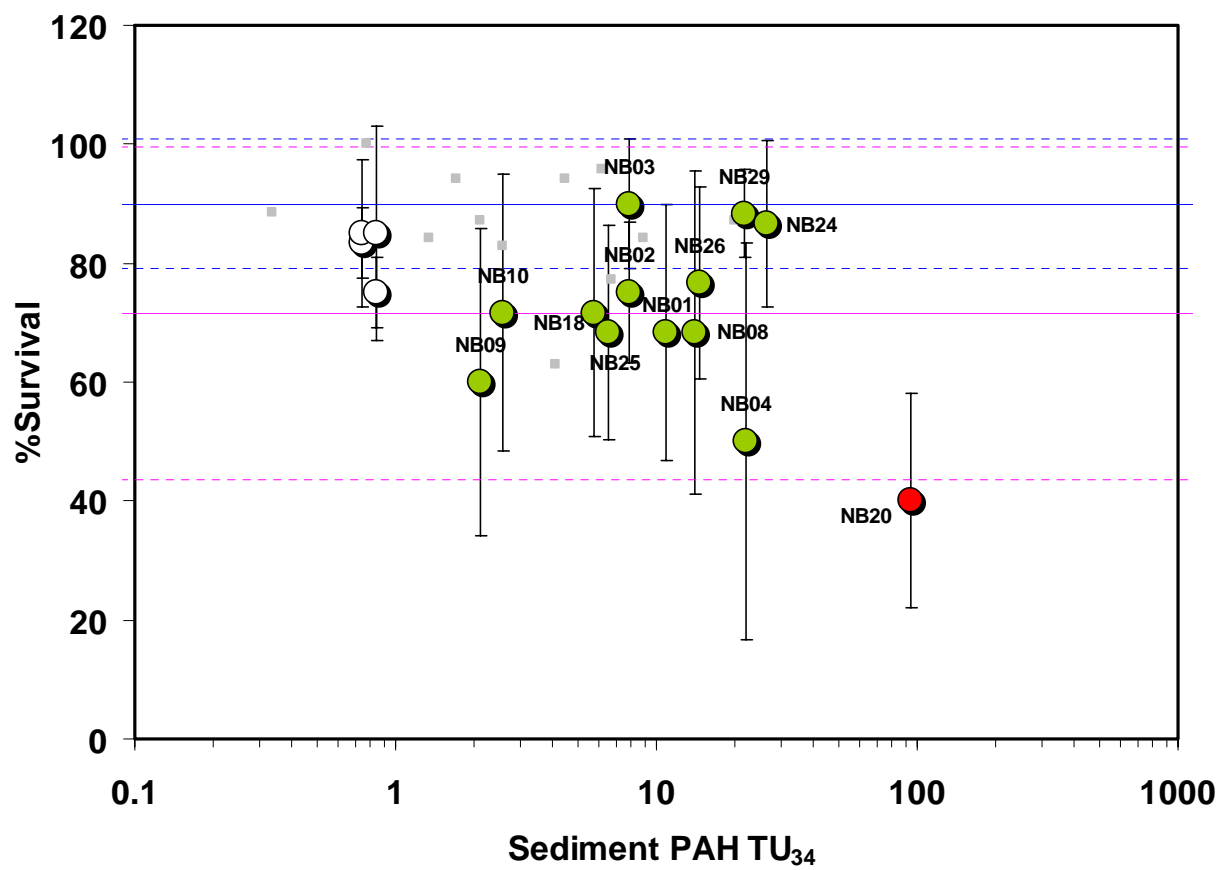
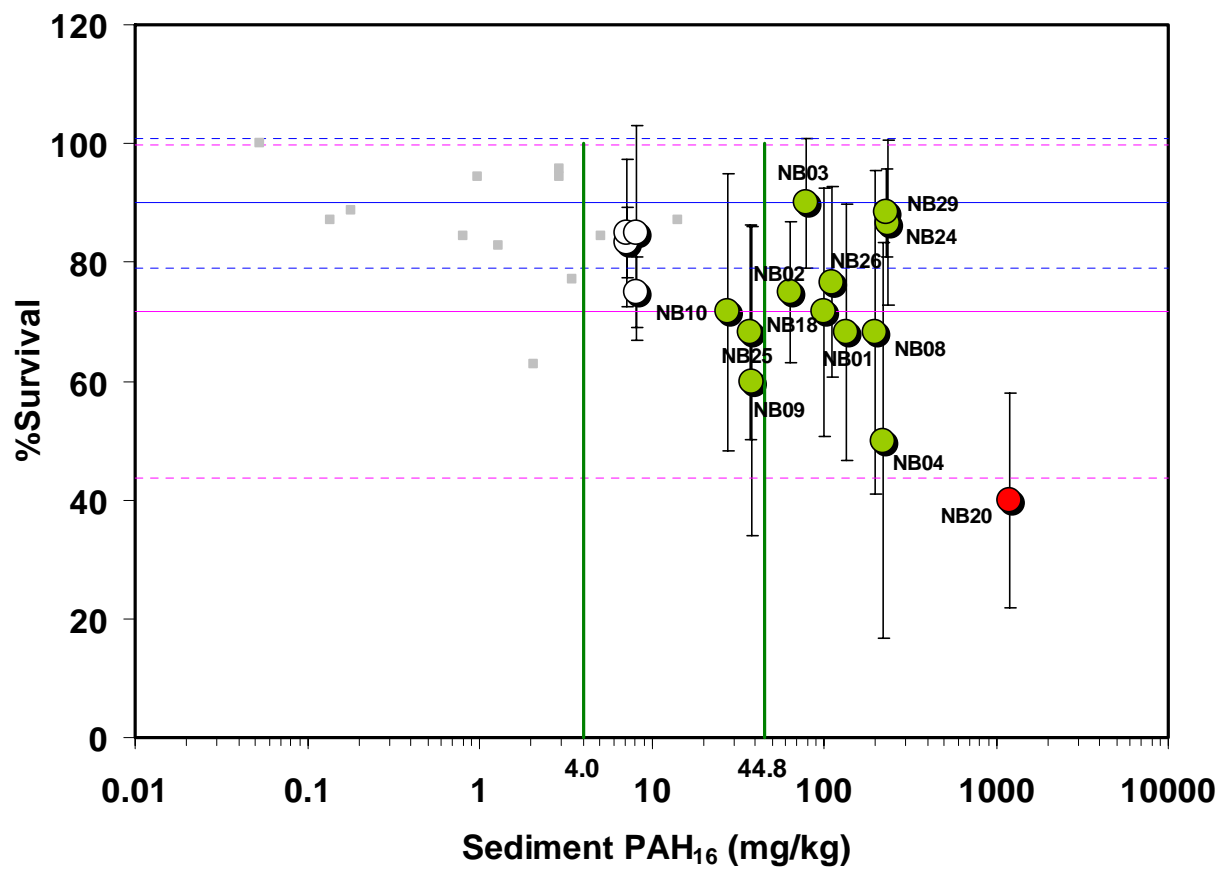
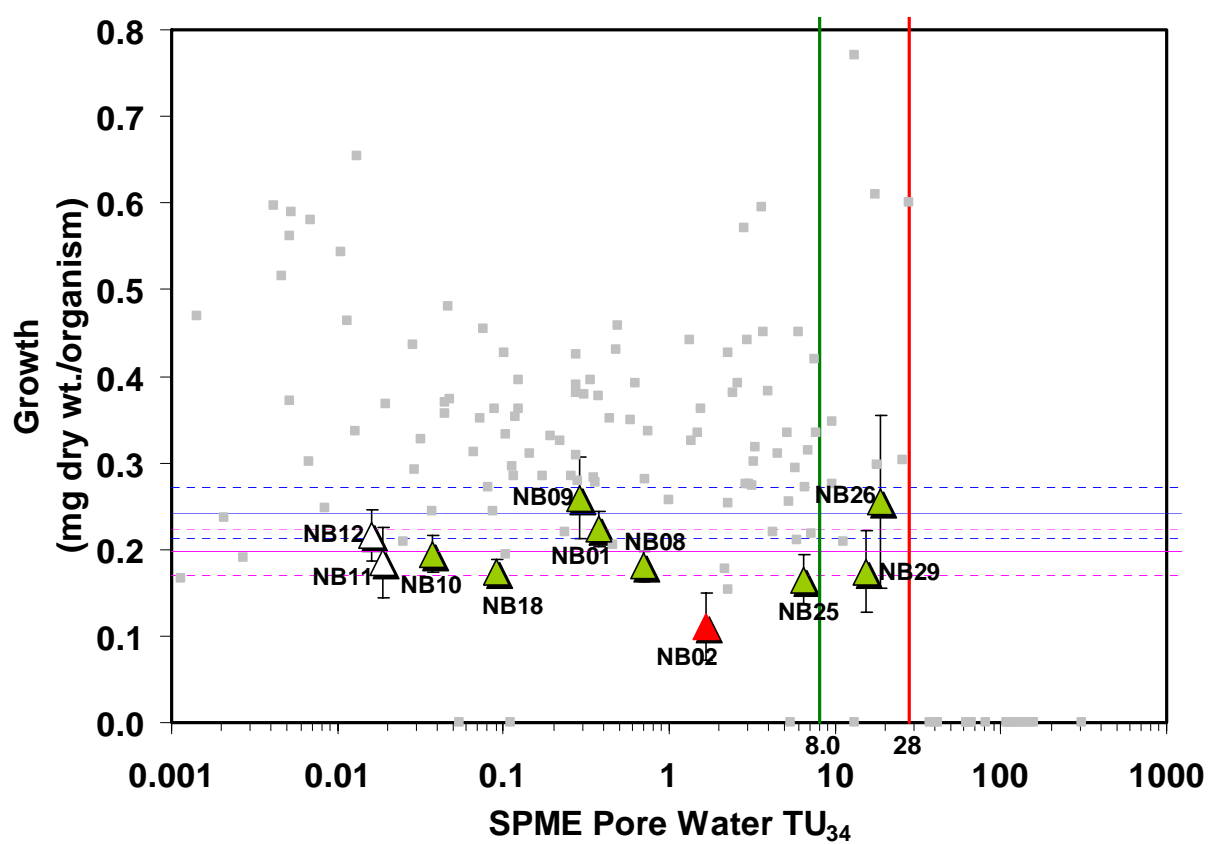
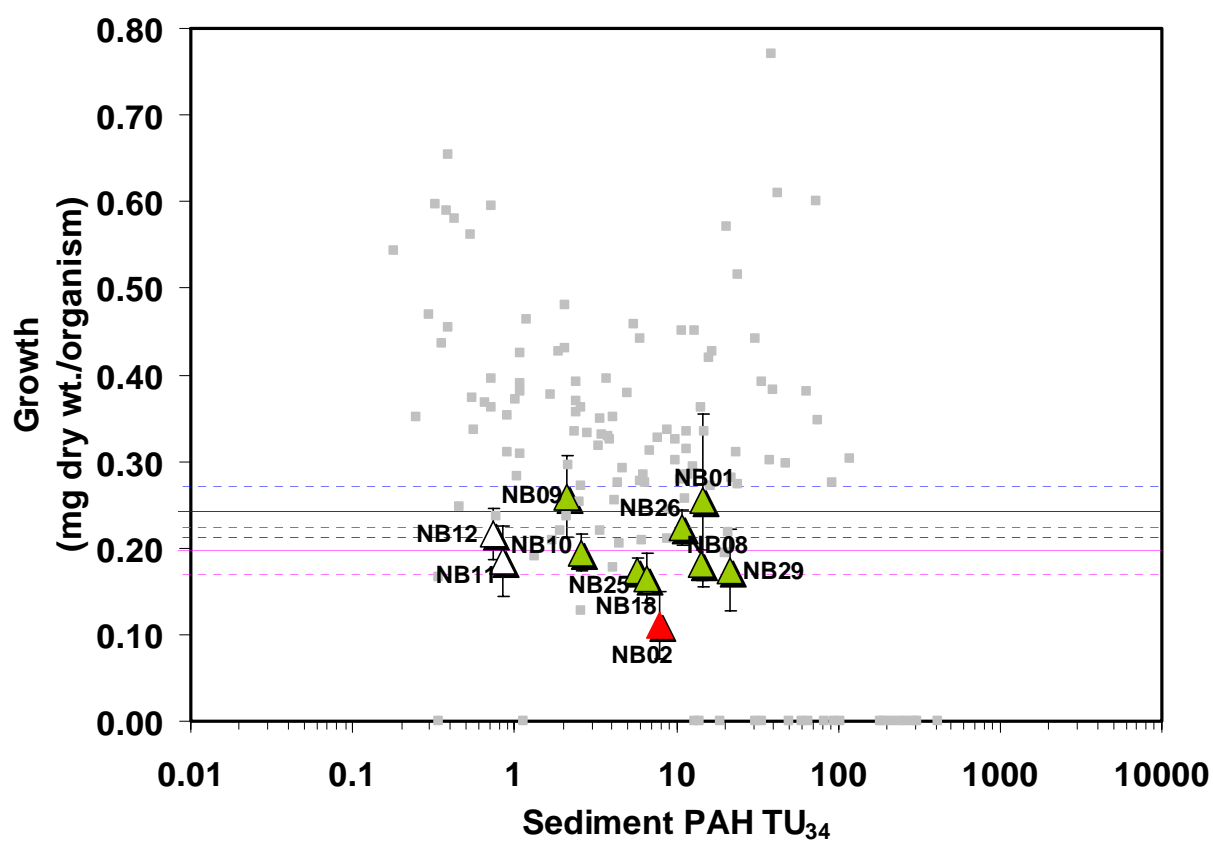
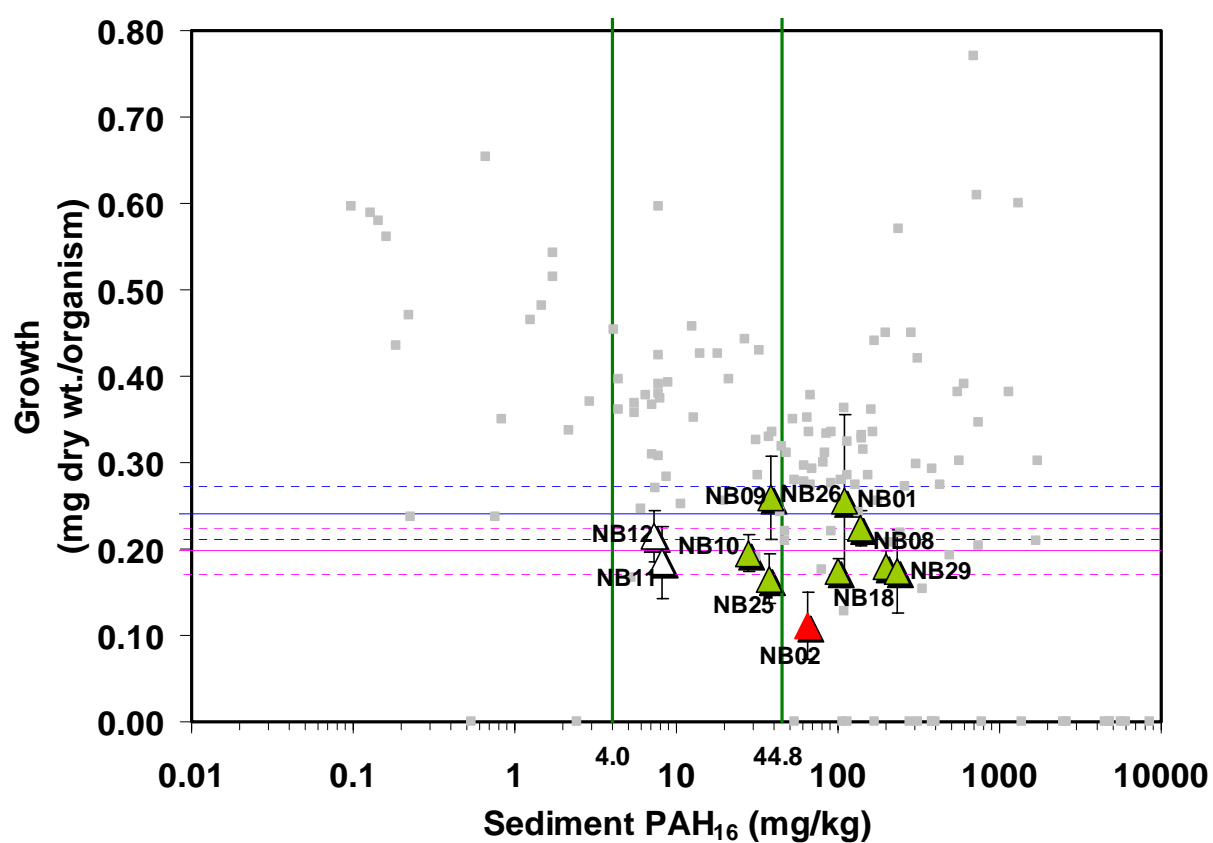


Figure 4-2b: *C. dilutus* survival (20-day) compared to extractable PAH₁₆, PAH TU₃₄, and SPME pore water TU₃₄ concentrations. Dashed lines represent ±1 SD for mean control % survival.



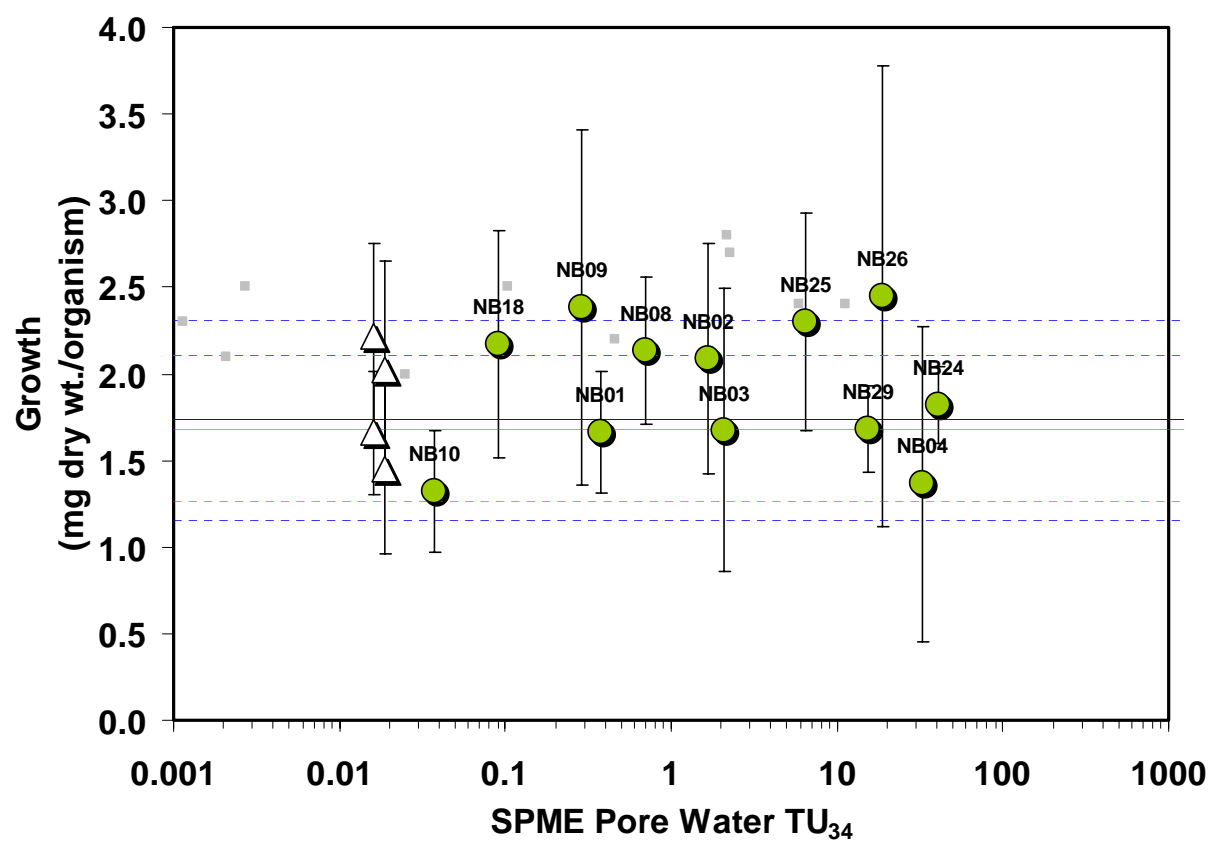
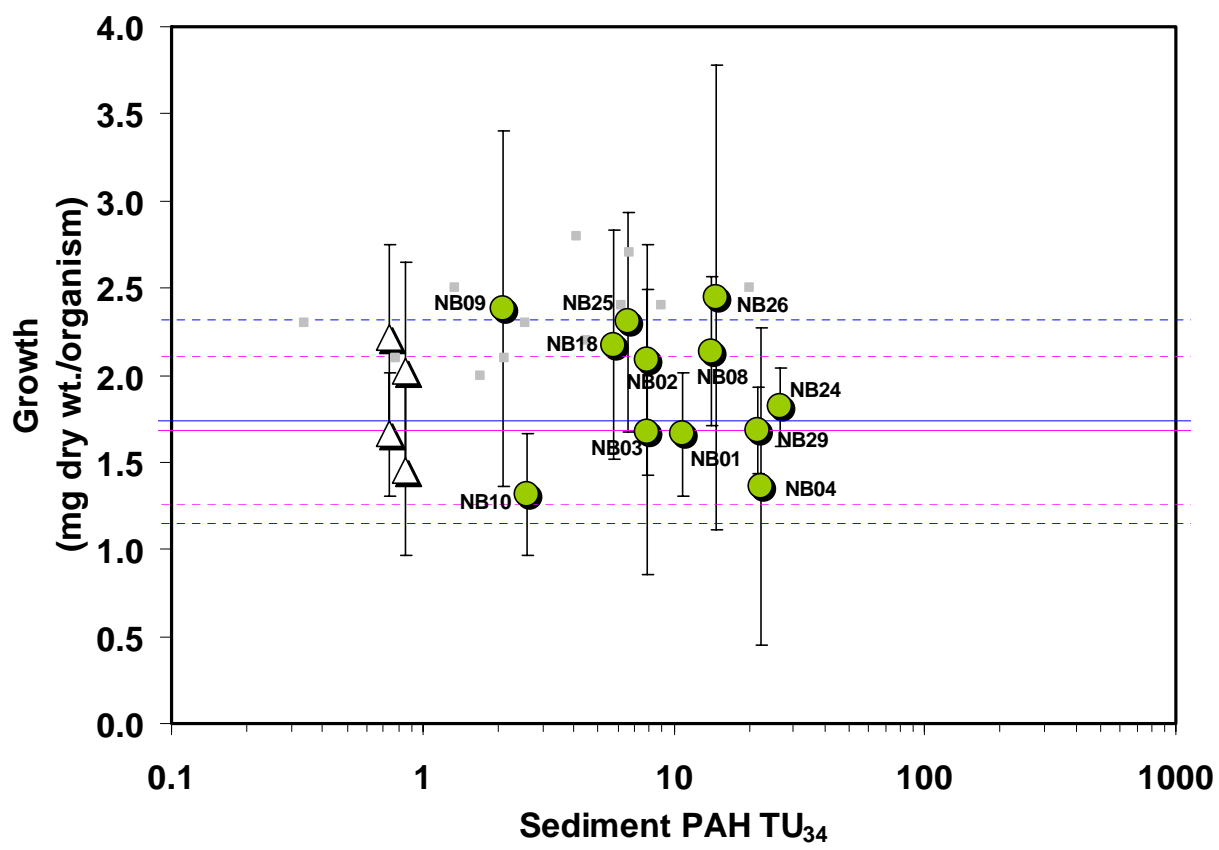
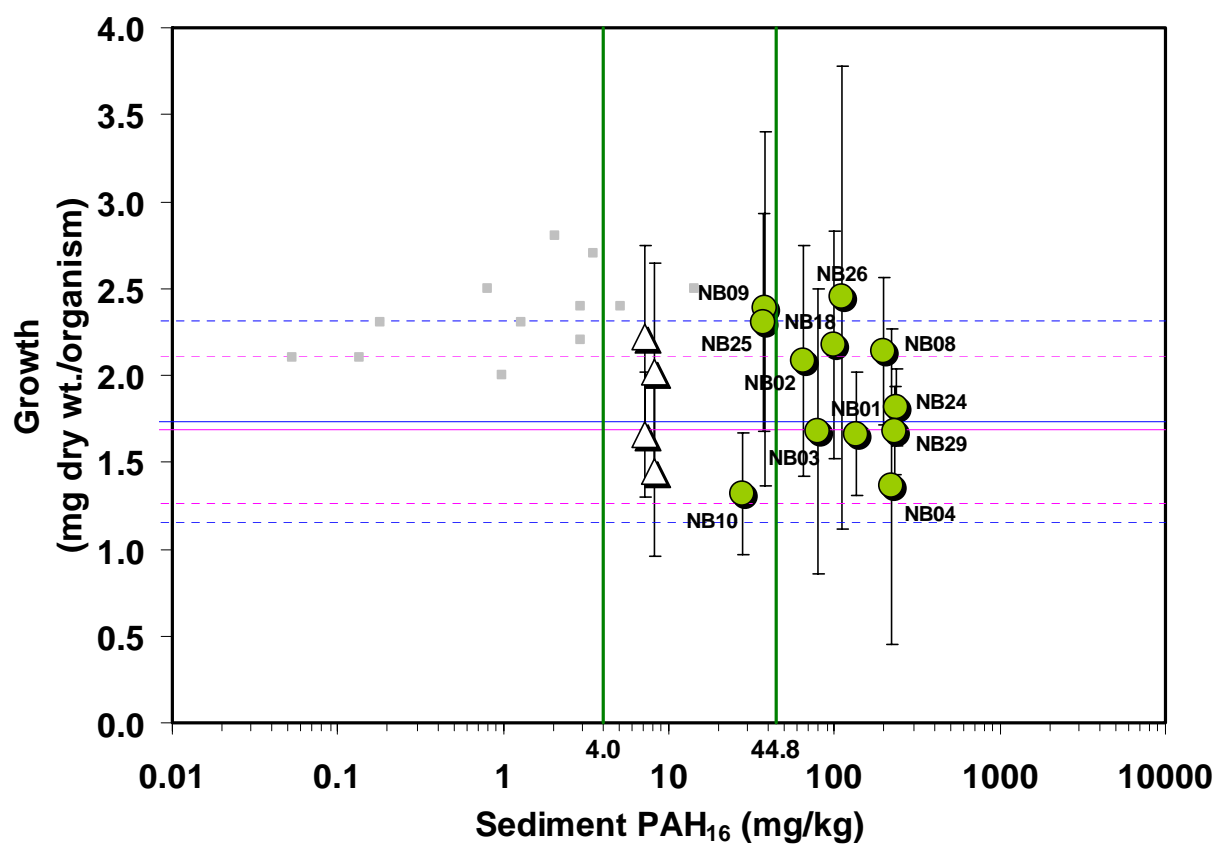
■ SCBA Dataset
 ● No significant reduction in survival
 ● Significant reduction in survival
○ References
 --- Control 1
 --- Control 2

Figure 4-3a: *H. azteca* growth (28-day) compared to extractable PAH₁₆, PAH TU₃₄, and SPME pore water TU₃₄ concentrations in samples not exhibiting reduced survival. Dashed lines represent ± 1 SD for mean control growth.



▲ No significant reduction in growth ▲ Significant from Control & Reference △ Field References
 — Laboratory Control 1 — Laboratory Control 2

Figure 4-3b: *C. dilutus* growth (20-day) compared to total extractable PAH₁₆, PAH TU₃₄, and SPME pore water TU₃₄ concentrations in samples not exhibiting reduced survival. Dashed lines represent ± 1 SD for mean control growth.



■ SCBA Dataset ● No significant reduction in growth
△ References - - - Control 1 — Control 2

Figure 4-4: Summary of benthic macroinvertebrate indices for the Newburgh sediment samples.

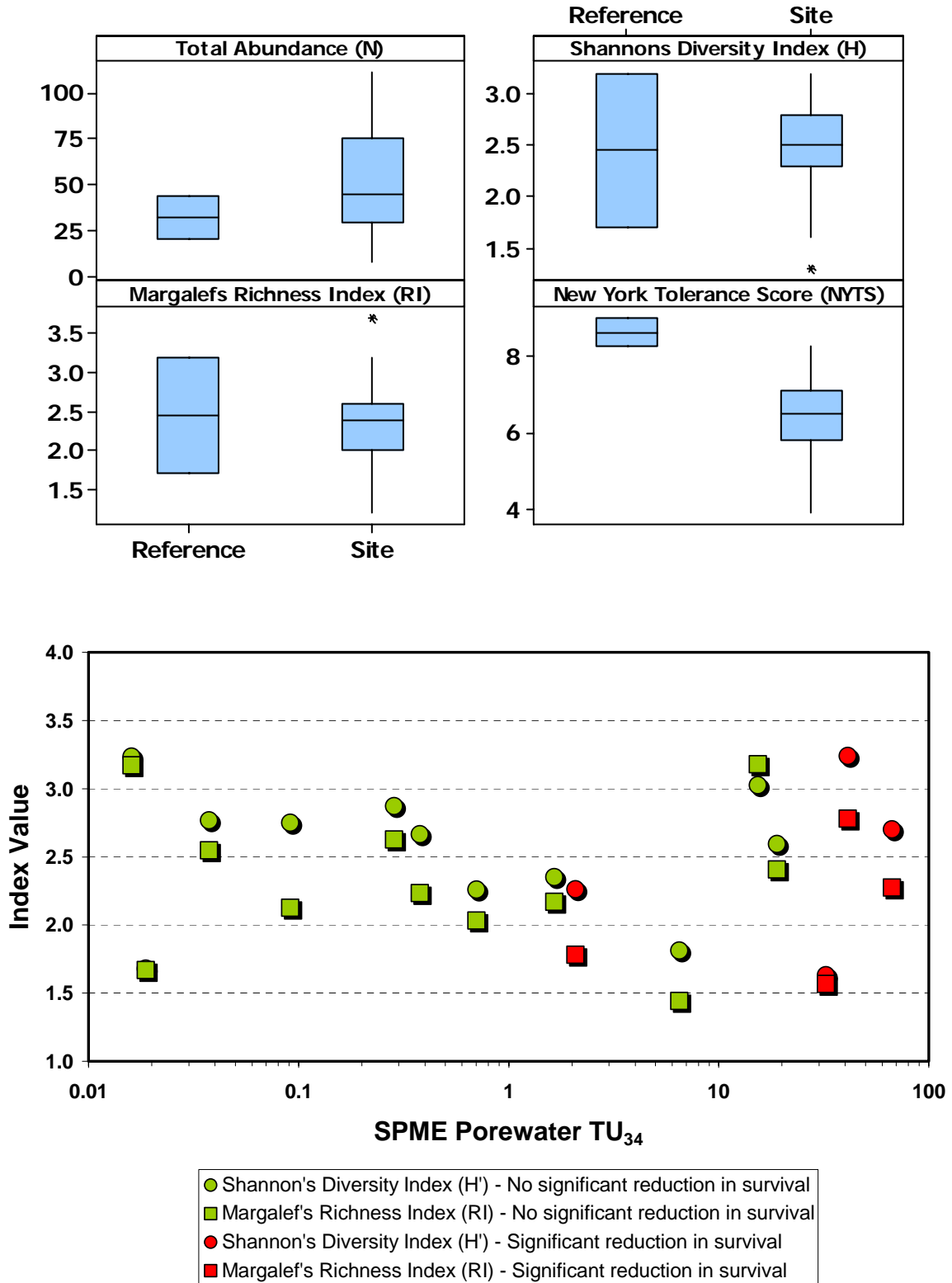
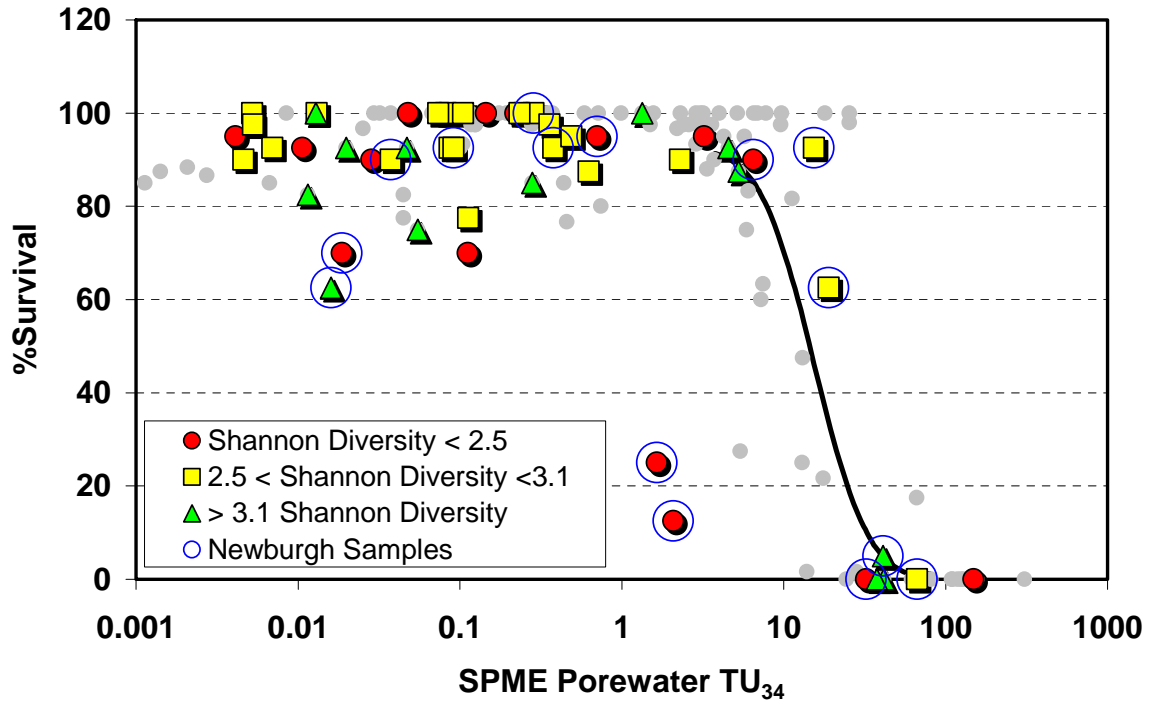


Figure 4-5: Relationship between sediment pore water PAH chemistry, toxicity to *Hyaella azteca*, and benthic macroinvertebrate indices of diversity for sediment samples collected from 5 MGP sites in New York State



Appendix A

University of North Dakota Energy and Environmental Research Center (EERC) Final Report



March 23, 2007

Mr. Nick Azzolina
The RETEC Group, Inc.
1001 W. Seneca St., Suite 204
Ithaca, NY, 14850

Dear Nick,

Enclosed are the results for the sediment samples from the Newburgh site that we received in November, 2006. Electronic copies of the data have been sent separately by email. If you have any questions, please contact me at 701-777-5256.

Best regards,



Steven B. Hawthorne, Ph.D.
Project Manager



Report of Laboratory Analysis

March 23, 2007

Dr. Steven B. Hawthorne
Energy and Environmental Research Center, Campus Box 9018
University of North Dakota, Grand Forks, North Dakota 58201
701-777-5256

Narrative

Twenty nine sediment samples variously labeled NB01 to NB29 were received on November 9, 11, and 14, 2006. All samples were in good condition, and had measured temperatures of 0 to 11 °C, as noted on the attached chain of custody forms. Each sample was subjected to an initial analysis to estimate the “34” PAH concentrations. These data were provided to RETEC on an informal basis, and were used to select 15 sediments for the determination of pore water PAH concentrations, total PAH concentrations, total organic carbon, and soot organic carbon as described in the methods document.

All analyses for reported data met all QA/QC criteria listed in the *Quality Assurance Project Plan (QAPP) for Evaluating PAH Toxicity and Bioavailability in Sediments* and the method specifications listed in the *Generic Sediment Sample Collection and Analysis Work Plan for Evaluating PAH Bioavailability*. All pore water and total PAH analyses were performed in quadruplicate. All extracts met the 70 to 120% recovery criteria and met all QA/QC criteria.

Data qualifiers are listed with each determination, and include “J” (for values estimated below the lowest calibration concentrations), “E” (for values exceeding the highest calibration concentration, and “R” (for values rejected on the basis of the reasons described in the footnotes listed at the bottom of the table).

Chain of Custody Record

NO 0801

The RETEC Group, Inc.
 1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
 (607) 277-5716 Phone • (607) 277-9057 Fax
 www.retec.com



Project Name: Newburgh
 Project Number: CH6E2-19695
 Send Report To: N. Arzulis
 Sampler (Print Name): N. Arzulis
 Address: _____
 Shipper (Print Name): H. Jones
 Shipment Method: EdEx
 Airbill Number: _____
 Laboratory Receiving: EELA

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers
NB01	9c/11c	11/7/01	1455	2
NB02	10c/11c	↓	1600	↓
NB03	9c/8c	11/8/06	0730	↓
NB04	4c/5c	↓	0805	↓
NB05	5c/5c	↓	1100	↓
NB06	3c/3c	↓	1140	↓
NB07	5c/5c	↓	1140	↓

Analysis Requested: _____

Purchase Order #: _____

Comments, Special Instructions, etc. _____

Lab Sample ID (to be completed by lab) _____

Reinquisitioned by: (Signature)	Received by: (Signature)	Date:	Time:	QA/QC Level	Turnaround	Sample Receipt
<u>[Signature]</u>	<u>[Signature]</u>	<u>11/19/06</u>	<u>0935</u>	Level I <input type="checkbox"/>	Routine <input type="checkbox"/>	Total # Containers Received? _____
Reinquisitioned by: (Signature)	Received by: (Signature)	Date:	Time:	Level II <input type="checkbox"/>	24 Hour <input type="checkbox"/>	COC Seals Present? _____
Reinquisitioned by: (Signature)	Received by: (Signature)	Date:	Time:	Level III <input type="checkbox"/>	1 Week <input type="checkbox"/>	COC Seals Intact? _____
Reinquisitioned by: (Signature)	Received by: (Signature)	Date:	Time:	Other <input type="checkbox"/>	Other _____	Received Containers Intact? _____
Reinquisitioned by: (Signature)	Received by: (Signature)	Date:	Time:	Other <input type="checkbox"/>	Other _____	Temperature? _____

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy

Chain of Custody Record

NO 0806

The RETEC Group, Inc.
 1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
 (607) 277-5716 Phone • (607) 277-9057 Fax
 www.retec.com



Page 1 of 1

Project Name: <u>Newburgh</u>		Project Number: <u>CHGE2-19095</u>		Analysis Requested				Purchase Order # _____		Comments, Special Instructions, etc.		Lab Sample ID (to be completed by lab)	
Send Report To: <u>N. Azcolinia</u>		Sampler (Print Name): <u>N. Azcolinia</u>											
Address: <u>1501 W. Seneca St.</u>		Sampler (Print Name): <u>J. Tarr</u>											
<u>Suite 204</u>		Shipment Method: <u>Fed Ex</u>											
<u>Ithaca NY 14850</u>		Airbill Number:											
Phone: <u>607-277-5716</u>		Laboratory Receiving: <u>EERC</u>											
Fax:													
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers									
<u>NB08 1c/1c</u>	<u>11/8/06</u>		<u>sed</u>	<u>2</u>									
<u>NB09 0c/0c</u>													
<u>NB10 0c/0c</u>													
<u>NB11 1c/0c</u>	<u>11/9/06</u>												
<u>NB12 0c/2c</u>													
<u>NB13 1c/1c</u>													
<u>NB14 1c/2c</u>													
<u>NB15 1c/0c</u>													
<u>NB16 2c/2c</u>													
<u>NB17 3c/0c</u>													
Relinquished by: (Signature) <u>[Signature]</u>		Received by: (Signature) <u>[Signature]</u>		Date: <u>11/11/06</u>		Time: <u>12 noon</u>		Sample Custodian Remarks (Completed By Laboratory):					
Relinquished by: (Signature)		Received by: (Signature)		Date:		Time:		Sample Receipt					
Relinquished by: (Signature)		Received by: (Signature)		Date:		Time:		Total # Containers Received?					
								COC Seals Present?					
								COC Seals Intact?					
								Received Containers Intact?					
								Temperature?					

lots of ice left
 No samples were frozen

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PIM/QA/QC Copy

Chain of Custody Record

No 0496

The RETEC Group, Inc.
 1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
 (607) 277-5716 Phone • (607) 277-9057 Fax
 www.retec.com



Project Name: Newburgh
 Send Report to: N. Azzioline
 Address: _____
 Project Number: CHGER-19695
 Sampler (Print Name): N. Azzioline
 Sampler (Print Name): H. Jones
 Shipment Method: Fed EX
 Airbill Number: _____
 Laboratory Receiving: ERIC
 Phone: _____
 Fax: _____

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Analysis Requested
NB18	4c/7c			2	
NB19	5c/4c				
NB20	6c/8c				
NB21	5c/8c				
NB22	5c/6c				
NB23	5c/7c				
NB24	4c/7c				
NB25	6c/6c				
NB26	6c/8c				
NB27	3c/4c				
NB28	2c/4c				
NB29	4c/4c				

Comments, Special Instructions, etc. _____
 Lab Sample ID (to be completed by lab) _____
 Purchase Order #: _____

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	QA/QC Level	Turnaround	Total # Containers Received?	COC Seals Present?	COC Seals Intact?	Received Containers Intact?	Temperature?
<u>[Signature]</u>	<u>[Signature]</u>	<u>11/13/06</u>	<u>0930</u>	Level I <input type="checkbox"/>	Routine <input type="checkbox"/>					
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	Level II <input type="checkbox"/>	24 Hour <input type="checkbox"/>					
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	Level III <input type="checkbox"/>	1 Week <input type="checkbox"/>					
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	Other <input type="checkbox"/>	Other _____					

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy

Energy and Environmental Research Center, GC/MS Lab
University of North Dakota, Campus Box 9018
15 North 23rd Street, Grand Forks, ND 58202
701-777-5000

Newburgh TOC and SOC values

sample	analysis date	mean TOC wt. % (dry)	SD	mean SOC wt. % (dry)	SD
NB 01		3.06	0.07	1.13	0.16
NB 02		3.20	0.08	0.40	0.04
NB 03		4.14	0.07	0.94	0.04
NB 04		4.46	0.33	0.92	0.13
NB 08		4.09	0.19	1.01	0.08
NB 09		5.32	0.35	1.56	0.28
NB 10		3.29	0.02	0.33	0.06
NB 11		3.44	0.07	0.34	0.01
NB 12		3.26	0.13	0.25	0.03
NB 18		5.04	0.14	1.26	0.33
NB 20		4.80	0.15	2.02	0.23
NB 24		4.08	0.06	1.17	0.08
NB 25		3.02	0.07	0.47	0.04
NB 26		3.39	0.11	0.52	0.05
NB 29		4.15	0.07	1.18	0.16

SD based on 3 to 5 individual CHN determinations

Energy and Environmental Research Center, GC/MS Lab
 University of North Dakota, Campus Box 9018
 15 North 23rd Street, Grand Forks, ND 58202
 701-777-5000

EERC ID	71A-1		71A-2		71A-3		71A-4	
RETEC Sample Collection Date	11/7/2016		11/7/2016		11/7/2016		11/7/2016	
EERC Sample Receipt Date	11/9/2006		11/9/2006		11/9/2006		11/9/2006	
EERC Run Date	11/13/2006		11/13/2006		11/13/2006		11/13/2006	
EERC Run Number	2251A03.D		2251A04.D		2251A05.D		2251A06.D	
AQUATOX Sample ID								
Sample Name	NB01		NB01		NB01		NB01	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.500		1.510		1.510		1.510	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	ND		ND		ND		ND	
2-methylnaphthalene	0.064	J	0.075	J	0.069	J	0.067	J
1-methylnaphthalene	0.122	J	0.135	J	0.129	J	0.129	J
C2 naphthalenes	0.820	J	0.820	J	0.756	J	0.732	J
C3 naphthalenes	0.828	J	0.943	J	0.849	J	0.818	J
C4 naphthalenes	0.643	J	0.422	J	0.319	J	0.351	J
acenaphthylene	0.080	J	0.097	J	0.093	J	0.094	J
acenaphthene	0.942	J	1.043	J	1.028	J	1.018	J
fluorene	0.084	J	0.093	J	0.093	J	0.090	J
C1 fluorenes	0.174	J	0.154	J	0.163	J	0.151	J
C2 fluorenes	0.118	J	0.148	J	0.106	J	0.078	J
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	0.091	J	0.094	J	0.092	J	0.087	J
anthracene	0.017	J	0.018	J	0.017	J	0.021	J
C1 phenanthrenes/anthracenes	0.161	J	0.149	J	0.143	J	0.145	J
C2 phenanthrenes/anthracenes	0.064	J	0.060	J	0.050	J	0.035	J
C3 phenanthrenes/anthracenes	ND		ND		ND		ND	
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	ND		ND		ND		ND	
pyrene	ND		ND		ND		ND	
C1 fluoranthenes/pyrenes	0.036	J	0.037	J	0.036	J	0.040	J
benz[a]anthracene	ND		ND		ND		ND	
chrysene	0.003	J	0.003	J	0.004	J	0.003	J
C1 chrysenes	ND		ND		ND		ND	
C2 chrysenes	0.025	J	0.034	J	0.034	J	0.023	J
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	ND		ND		ND		ND	
benzo[e]pyrene	ND		ND		ND		ND	
benzo[a]pyrene	ND		ND		ND		ND	
perylene	ND		ND		ND		ND	
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	ND		ND		ND		ND	

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 University of North Dakota, Campus Box 9018
 15 North 23rd Street, Grand Forks, ND 58202
 701-777-5000

EERC ID	72A-1		72A-2		72A-3		72A-4	
RETEC Sample Collection Date	11/7/2016		11/7/2016		11/7/2016		11/7/2016	
EERC Sample Receipt Date	11/9/2006		11/9/2006		11/9/2006		11/9/2006	
EERC Run Date	11/13/2006		11/13/2006		11/13/2006		11/13/2006	
EERC Run Number	2251A09.D		2251A10.D		2251A11.D		2251A12.D	
AQUATOX Sample ID								
Sample Name	NB02		NB02		NB02		NB02	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.500		1.500		1.500		1.510	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	ND		ND		ND		ND	
2-methylnaphthalene	ND		ND		ND		ND	
1-methylnaphthalene	0.061	J	0.062	J	0.056	J	0.059	J
C2 naphthalenes	3.640		3.426		3.383		3.349	
C3 naphthalenes	4.628	J	4.413	J	4.252	J	4.313	J
C4 naphthalenes	1.696	J	1.586	J	1.558	J	1.574	J
acenaphthylene	0.410	J	0.399	J	0.397	J	0.369	J
acenaphthene	3.976		3.724		3.723		3.769	
fluorene	0.979		0.921		0.913		0.924	
C1 fluorenes	0.854	J	0.766	J	0.766	J	0.791	J
C2 fluorenes	0.528	J	0.471	J	0.498	J	0.479	J
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	1.108	J	1.062	J	1.037	J	1.058	J
anthracene	0.113	J	0.108	J	0.103	J	0.107	J
C1 phenanthrenes/anthracenes	1.168	J	1.100	J	1.048	J	1.096	J
C2 phenanthrenes/anthracenes	0.492	J	0.449	J	0.445	J	0.453	J
C3 phenanthrenes/anthracenes	0.058	J	0.054	J	0.054	J	0.033	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	0.225	J	0.212	J	0.206	J	0.211	J
pyrene	0.320		0.310		0.299		0.299	
C1 fluoranthenes/pyrenes	0.175	J	0.159	J	0.171	J	0.172	J
benz[a]anthracene	0.014	J	0.013	J	0.013	J	0.012	J
chrysene	0.014	J	0.014	J	0.014	J	0.014	J
C1 chrysenes	ND		ND		ND		ND	
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	ND		ND		ND		ND	
benzo[e]pyrene	ND		ND		ND		ND	
benzo[a]pyrene	ND		ND		ND		ND	
perylene	ND		ND		ND		ND	
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	ND		ND		ND		ND	

Energy and Environmental Research Center, GC/MS Lab
 University of North Dakota, Campus Box 9018
 15 North 23rd Street, Grand Forks, ND 58202
 701-777-5000

EERC ID	82A-1	82A-2	82A-3	82A-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2254A15.D	2254A16.D	2254A17.D	2254A18.D
AQUATOX Sample ID				
Sample Name	NB03	NB03	NB03	NB03
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.500	1.510	1.510	1.510
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	2.968	2.850	3.078	3.226
C3 naphthalenes	4.538 J	4.291 J	4.875	5.234
C4 naphthalenes	1.806 J	1.746 J	2.025 J	2.276 J
acenaphthylene	0.378 J	0.356 J	0.367 J	0.391 J
acenaphthene	2.780	2.655	2.764	2.949
fluorene	0.453 J	0.435 J	0.452 J	0.480 J
C1 fluorenes	0.778 J	0.729 J	0.791 J	0.867 J
C2 fluorenes	0.660 J	0.654 J	0.682 J	0.774 J
C3 fluorenes	ND	ND	ND	ND
phenanthrene	1.078 J	1.049 J	1.088 J	1.148 J
anthracene	0.125 J	0.122 J	0.129 J	0.134 J
C1 phenanthrenes/anthracenes	1.465 J	1.428 J	1.494 J	1.645 J
C2 phenanthrenes/anthracenes	0.721 J	0.706 J	0.766 J	0.894 J
C3 phenanthrenes/anthracenes	0.184 J	0.175 J	0.164 J	0.187 J
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	0.360	0.354	0.363	0.393
pyrene	0.424	0.421	0.429	0.463
C1 fluoranthenes/pyrenes	0.250 J	0.253 J	0.259 J	0.288 J
benz[a]anthracene	0.014 J	0.016 J	0.016 J	0.018 J
chrysene	0.024 J	0.025 J	0.026 J	0.029 J
C1 chrysenes	0.002 J	0.002 J	0.002 J	0.003 J
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	73A-1		73A-2		73A-3		73A-4	
RETEC Sample Collection Date	11/8/2006		11/8/2006		11/8/2006		11/8/2006	
EERC Sample Receipt Date	11/9/2006		11/9/2006		11/9/2006		11/9/2006	
EERC Run Date	11/13/2006		11/13/2006		11/13/2006		11/13/2006	
EERC Run Number	2251A15.D		2251A16.D		2251A17.D		2251A18.D	
AQUATOX Sample ID								
Sample Name	NB04		NB04		NB04		NB04	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	0.410		0.410		0.410		0.410	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	0.877	J	0.738	J	0.904	J	0.796	J
2-methylnaphthalene	0.362	J	0.326	J	0.395	J	0.401	J
1-methylnaphthalene	1.512		1.348	J	1.601		1.531	
C2 naphthalenes	143.527		125.494		167.297		150.341	
C3 naphthalenes	103.450		87.386		127.358		114.760	
C4 naphthalenes	22.249		18.396		27.854		25.792	
acenaphthylene	0.325	J	0.241	J	0.390	J	0.332	J
acenaphthene	53.348		48.343		57.735		55.584	
fluorene	15.966		14.355		17.289		16.958	
C1 fluorenes	13.328		11.208		14.718		14.674	
C2 fluorenes	6.351		5.342		7.727		7.462	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	22.304		20.306		24.350		24.031	
anthracene	3.791		3.483		3.964		4.097	
C1 phenanthrenes/anthracenes	18.179		15.786		20.107		20.388	
C2 phenanthrenes/anthracenes	5.724		4.808		6.575		6.604	
C3 phenanthrenes/anthracenes	1.342	J	0.779	J	1.334	J	1.407	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	2.213		1.974		2.486		2.410	
pyrene	3.299		2.869		3.695		3.594	
C1 fluoranthenes/pyrenes	1.997		1.794		2.359		2.356	
benz[a]anthracene	0.158		0.132	J	0.214		0.199	
chrysene	0.185		0.152		0.245		0.231	
C1 chrysenes	0.050	J	0.039	J	0.074	J	0.062	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.042	J	0.043	J	0.074		0.066	
benzo[e]pyrene	0.056	J	0.049	J	0.089		0.079	
benzo[a]pyrene	0.078		0.061		0.081		0.116	
perylene	0.035		0.028	J	0.036		0.040	
indeno[1,2,3-cd]pyrene	0.004		0.005		0.005		0.006	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	0.013	J	0.010	J	0.018		0.016	J

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EERC ID	75A-1	75A-2	75A-3	75A-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Number	2252A09.D	2252A10.D	2252A11.D	2252A12.D
AQUATOX Sample ID				
Sample Name	NB08	NB08	NB08	NB08
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.500	1.500	1.500	1.500
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	1.296 J	1.237 J	1.235 J	1.297 J
C3 naphthalenes	1.813 J	1.692 J	1.611 J	1.783 J
C4 naphthalenes	0.838 J	0.823 J	0.782 J	0.890 J
acenaphthylene	ND	ND	ND	ND
acenaphthene	0.799 J	0.785 J	0.805 J	0.836 J
fluorene	0.239 J	0.240 J	0.237 J	0.255 J
C1 fluorenes	0.273 J	0.269 J	0.271 J	0.303 J
C2 fluorenes	0.263 J	0.249 J	0.196 J	0.268 J
C3 fluorenes	ND	ND	ND	ND
phenanthrene	0.397 J	0.395 J	0.398 J	0.422 J
anthracene	0.031 J	0.035 J	0.032 J	0.037 J
C1 phenanthrenes/anthracenes	0.450 J	0.438 J	0.442 J	0.500 J
C2 phenanthrenes/anthracenes	0.236 J	0.222 J	0.220 J	0.271 J
C3 phenanthrenes/anthracenes	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	0.123 J	0.124 J	0.121 J	0.139 J
pyrene	0.134 J	0.134 J	0.137 J	0.145 J
C1 fluoranthenes/pyrenes	0.083 J	0.079 J	0.080 J	0.087 J
benz[a]anthracene	0.006 J	0.006 J	0.006 J	0.006 J
chrysene	0.009 J	0.009 J	0.009 J	0.010 J
C1 chrysenes	ND	ND	ND	ND
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	83A-1		83A-2		83A-3		83A-4	
RETEC Sample Collection Date	11/8/2006		11/8/2006		11/8/2006		11/8/2006	
EERC Sample Receipt Date	11/11/2006		11/11/2006		11/11/2006		11/11/2006	
EERC Run Date	11/17/2006		11/17/2006		11/17/2006		11/17/2006	
EERC Run Number	2255A03.D		2255A04.D		2255A05.D		2255A06.D	
AQUATOX Sample ID								
Sample Name	NB09		NB09		NB09		NB09	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.510		1.500		1.500		1.510	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	ND		ND		ND		ND	
2-methylnaphthalene	ND		ND		ND		ND	
1-methylnaphthalene	0.283	J	0.210	J	0.243	J	0.273	J
C2 naphthalenes	1.315	J	0.908	J	1.078	J	1.222	J
C3 naphthalenes	0.836	J	0.516	J	0.593	J	0.781	J
C4 naphthalenes	0.302	J	0.218	J	0.205	J	0.211	J
acenaphthylene	0.186	J	0.128	J	0.164	J	0.192	J
acenaphthene	1.637		1.195		1.383		1.572	
fluorene	0.357	J	0.263	J	0.307	J	0.347	J
C1 fluorenes	0.221	J	0.146	J	0.152	J	0.173	J
C2 fluorenes	0.127	J	0.103	J	0.085	J	0.105	J
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	0.207	J	0.145	J	0.168	J	0.192	J
anthracene	0.030	J	0.021	J	0.024	J	0.026	J
C1 phenanthrenes/anthracenes	0.158	J	0.108	J	0.112	J	0.133	J
C2 phenanthrenes/anthracenes	0.058	J	0.043	J	0.040	J	0.047	J
C3 phenanthrenes/anthracenes	ND		ND		ND		ND	
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	0.052	J	0.036	J	0.041	J	0.048	J
pyrene	0.044	J	0.031	J	0.036	J	0.040	J
C1 fluoranthenes/pyrenes	0.023	J	0.015	J	0.018	J	0.025	J
benz[a]anthracene	ND		ND		ND		ND	
chrysene	0.005	J	0.003	J	0.004	J	0.004	J
C1 chrysenes	ND		ND		ND		ND	
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	ND		ND		ND		ND	
benzo[e]pyrene	ND		ND		ND		ND	
benzo[a]pyrene	ND		ND		ND		ND	
perylene	ND		ND		ND		ND	
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	ND		ND		ND		ND	

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EERC ID	74A-1	74A-2	74A-3	74A-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Number	2252A03.D	2252A04.D	2252A05.D	2252A06.D
AQUATOX Sample ID				
Sample Name	NB10	NB10	NB10	NB10
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.520	1.510	1.510	1.520
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	0.153 J	0.140 J	0.181 J	0.120 J
C3 naphthalenes	0.113 J	0.102 J	0.091 J	0.065 J
C4 naphthalenes	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND
acenaphthene	0.042 J	0.037 J	0.031 J	0.038 J
fluorene	ND	ND	ND	ND
C1 fluorenes	0.072 J	0.054 J	0.063 J	0.065 J
C2 fluorenes	0.065 J	0.056 J	0.059 J	0.054 J
C3 fluorenes	ND	ND	ND	ND
phenanthrene	ND	ND	ND	ND
anthracene	ND	ND	ND	ND
C1 phenanthrenes/anthracenes	0.053 J	0.057 J	0.049 J	0.048 J
C2 phenanthrenes/anthracenes	ND	ND	ND	ND
C3 phenanthrenes/anthracenes	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	ND	ND	ND	ND
pyrene	ND	ND	ND	ND
C1 fluoranthenes/pyrenes	ND	ND	ND	ND
benz[a]anthracene	ND	ND	ND	ND
chrysene	0.002 J	0.002 J	0.002 J	0.002 J
C1 chrysenes	ND	ND	ND	ND
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	80A-1	80A-2	80A-3	80A-4
RETEC Sample Collection Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2254A03.D	2254A04.D	2254A05.D	2254A06.D
AQUATOX Sample ID				
Sample Name	NB11	NB11	NB11	NB11
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.500	1.500	1.500	1.510
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	0.242 J	0.239 J	0.233 J	0.230 J
C3 naphthalenes	0.012 J	0.026 J	0.014 J	0.025 J
C4 naphthalenes	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND
acenaphthene	ND	ND	ND	ND
fluorene	ND	ND	ND	ND
C1 fluorenes	0.048 J	0.046 J	0.045 J	0.038 J
C2 fluorenes	ND	ND	ND	ND
C3 fluorenes	ND	ND	ND	ND
phenanthrene	ND	ND	ND	ND
anthracene	ND	ND	ND	ND
C1 phenanthrenes/anthracenes	0.017 J	0.017 J	0.023 J	0.027 J
C2 phenanthrenes/anthracenes	ND	ND	ND	ND
C3 phenanthrenes/anthracenes	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	ND	ND	ND	ND
pyrene	ND	ND	ND	ND
C1 fluoranthenes/pyrenes	ND	ND	ND	ND
benz[a]anthracene	ND	ND	ND	ND
chrysene	0.001 J	0.001 J	0.001 J	0.001 J
C1 chrysenes	ND	ND	ND	ND
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	81A-1	81A-2	81A-3	81A-4
RETEC Sample Collection Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2254A09.D	2254A10.D	2254A11.D	2254A12.D
AQUATOX Sample ID				
Sample Name	NB12	NB12	NB12	NB12
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.500	1.510	1.500	1.500
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	0.341 J	0.236 J	0.239 J	0.266 J
C3 naphthalenes	ND	ND	ND	ND
C4 naphthalenes	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND
acenaphthene	ND	ND	ND	ND
fluorene	0.006 J	0.007 J	0.006 J	0.006 J
C1 fluorenes	0.047 J	0.054 J	0.036 J	0.041 J
C2 fluorenes	ND	ND	ND	ND
C3 fluorenes	ND	ND	ND	ND
phenanthrene	ND	ND	ND	ND
anthracene	0.004 J	0.003 J	0.003 J	0.003 J
C1 phenanthrenes/anthracenes	0.029 J	0.027 J	0.026 J	0.027 J
C2 phenanthrenes/anthracenes	ND	ND	ND	ND
C3 phenanthrenes/anthracenes	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	0.017 J	0.016 J	0.014 J	0.015 J
pyrene	ND	ND	ND	ND
C1 fluoranthenes/pyrenes	ND	ND	ND	ND
benz[a]anthracene	ND	ND	ND	ND
chrysene	0.001 J	0.001 J	0.001 J	0.001 J
C1 chrysenes	ND	ND	ND	ND
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	85A-1	85A-2	85A-3	85A-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/17/2006	11/17/2006	11/17/2006	11/17/2006
EERC Run Number	2255A15.D	2255A16.D	2255A17.D	2255A18.D
AQUATOX Sample ID				
Sample Name	NB18	NB18	NB18	NB18
Treatment	Pore Water	Pore Water	Pore Water	Pore Water
Sample Weight, g	1.510	1.510	1.500	1.500
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ng/g	ng/g	ng/g	ng/g
naphthalene	ND	ND	ND	ND
2-methylnaphthalene	ND	ND	ND	ND
1-methylnaphthalene	ND	ND	ND	ND
C2 naphthalenes	0.362 J	0.343 J	0.332 J	0.367 J
C3 naphthalenes	0.206 J	0.213 J	0.183 J	0.195 J
C4 naphthalenes	0.059 J	0.055 J	0.040 J	0.052 J
acenaphthylene	ND	ND	ND	ND
acenaphthene	0.067 J	0.064 J	0.060 J	0.064 J
fluorene	0.020 J	0.019 J	0.016 J	0.020 J
C1 fluorenes	0.101 J	0.096 J	0.092 J	0.078 J
C2 fluorenes	0.063 J	0.077 J	0.074 J	0.062 J
C3 fluorenes	ND	ND	ND	ND
phenanthrene	0.048 J	0.047 J	0.048 J	0.044 J
anthracene	0.009 J	0.009 J	0.009 J	0.008 J
C1 phenanthrenes/anthracenes	0.082 J	0.075 J	0.093 J	0.078 J
C2 phenanthrenes/anthracenes	ND	ND	ND	ND
C3 phenanthrenes/anthracenes	ND	ND	ND	ND
C4 phenanthrenes/anthracenes	ND	ND	ND	ND
fluoranthene	0.038 J	0.033 J	0.034 J	0.033 J
pyrene	0.036 J	0.035 J	0.037 J	0.034 J
C1 fluoranthenes/pyrenes	0.016 J	0.016 J	0.008 J	0.016 J
benz[a]anthracene	0.002 J	0.002 J	0.002 J	0.002 J
chrysene	0.004 J	0.003 J	0.003 J	0.003 J
C1 chrysenes	ND	ND	ND	ND
C2 chrysenes	ND	ND	ND	ND
C3 chrysenes	ND	ND	ND	ND
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	ND	ND	ND	ND
benzo[e]pyrene	ND	ND	ND	ND
benzo[a]pyrene	ND	ND	ND	ND
perylene	ND	ND	ND	ND
indeno[1,2,3-cd]pyrene	ND	ND	ND	ND
dibenz[ah]anthracene	ND	ND	ND	ND
benzo[ghi]perylene	ND	ND	ND	ND

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EERC ID	79A-1		79A-2		79A-3		79A-4	
RETEC Sample Collection Date	11/10/2006		11/10/2006		11/10/2006		11/10/2006	
EERC Sample Receipt Date	11/14/2006		11/14/2006		11/14/2006		11/14/2006	
EERC Run Date	11/15/2006		11/15/2006		11/15/2006		11/15/2006	
EERC Run Number	2253A15.D		2253A16.D		2253A17.D		2253A18.D	
AQUATOX Sample ID								
Sample Name	NB20		NB20		NB20		NB20	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	0.310		0.310		0.300		0.320	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	1.325	J	1.024	J	1.232	J	1.095	J
2-methylnaphthalene	0.299	J	0.252	J	0.254	J	0.248	J
1-methylnaphthalene	3.319		3.104		3.308		3.001	
C2 naphthalenes	326.135		290.227		320.955		278.834	
C3 naphthalenes	196.256		173.869		195.030		164.119	
C4 naphthalenes	32.634		30.566		33.423		20.564	
acenaphthylene	0.772	J	0.577	J	0.727	J	0.593	J
acenaphthene	215.413		206.924		220.120		203.401	
fluorene	70.336		67.560		72.643		66.303	
C1 fluorenes	33.120		32.154		34.489		31.542	
C2 fluorenes	12.267		13.450		13.503		12.142	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	105.197		100.373		108.943		100.916	
anthracene	16.218		15.142		16.579		15.219	
C1 phenanthrenes/anthracenes	46.373		44.867		48.569		44.397	
C2 phenanthrenes/anthracenes	10.146		10.479		11.591		10.035	
C3 phenanthrenes/anthracenes	1.972	J	2.119	J	2.408	J	2.092	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	10.046		9.371		10.570		9.536	
pyrene	14.659		13.723		15.672		13.960	
C1 fluoranthenes/pyrenes	4.884		5.015		5.688		4.841	
benz[a]anthracene	0.569		0.544		0.679		0.587	
chrysene	0.577		0.548		0.681		0.587	
C1 chrysenes	0.097	J	0.104	J	0.132		0.103	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.140		0.137		0.175		0.142	
benzo[e]pyrene	0.098		0.085		0.112		0.093	
benzo[a]pyrene	0.166		0.160		0.211		0.170	
perylene	0.055		0.048		0.040		0.031	
indeno[1,2,3-cd]pyrene	0.009		0.006		0.012		0.011	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	0.025		0.026		0.037		0.020	

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EERC ID	77A-1		77A-2		77A-3		77A-4	
RETEC Sample Collection Date	11/10/2006		11/10/2006		11/10/2006		11/10/2006	
EERC Sample Receipt Date	11/14/2006		11/14/2006		11/14/2006		11/14/2006	
EERC Run Date	11/15/2006		11/15/2006		11/15/2006		11/15/2006	
EERC Run Number	2253A03.D		2253A04.D		2253A05.D		2253A06.D	
AQUATOX Sample ID								
Sample Name	NB24		NB24		NB24		NB24	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	0.520		0.500		0.500		0.520	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	0.498	J	0.618	J	0.675	J	0.708	J
2-methylnaphthalene	0.097	J	0.119	J	0.139	J	0.143	J
1-methylnaphthalene	0.988	J	1.270	J	1.194	J	1.234	J
C2 naphthalenes	112.452		140.374		138.864		149.052	
C3 naphthalenes	109.536		132.898		131.024		144.465	
C4 naphthalenes	24.045		28.548		22.255		29.765	
acenaphthylene	0.237	J	0.254	J	0.322	J	0.354	J
acenaphthene	50.947		60.452		59.777		61.915	
fluorene	18.950		22.680		22.895		23.884	
C1 fluorenes	18.979		21.568		21.684		22.542	
C2 fluorenes	9.630		11.174		10.709		10.963	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	28.158		32.450		33.481		34.675	
anthracene	5.974		6.926		7.068		7.435	
C1 phenanthrenes/anthracenes	26.610		30.426		31.099		32.026	
C2 phenanthrenes/anthracenes	7.994		9.323		9.364		9.921	
C3 phenanthrenes/anthracenes	1.723	J	2.040	J	2.020	J	2.161	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	3.881		4.459		4.801		4.863	
pyrene	5.211		6.012		6.498		6.443	
C1 fluoranthenes/pyrenes	3.180		3.661		3.918		3.879	
benz[a]anthracene	0.264		0.321		0.383		0.376	
chrysene	0.328		0.389		0.472		0.471	
C1 chrysenes	0.068	J	0.083	J	0.101	J	0.081	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.070		0.098		0.126		0.120	
benzo[e]pyrene	0.044	J	0.059	J	0.081		0.076	
benzo[a]pyrene	0.075		0.104		0.138		0.125	
perylene	0.022	J	0.035		0.026	J	0.037	
indeno[1,2,3-cd]pyrene	0.007		0.009		0.012		0.011	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	0.018		0.022		0.027		0.026	

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EERC ID	84A-1		84A-2		84A-3		84A-4	
RETEC Sample Collection Date	11/10/2006		11/10/2006		11/10/2006		11/10/2006	
EERC Sample Receipt Date	11/14/2006		11/14/2006		11/14/2006		11/14/2006	
EERC Run Date	11/17/2006		11/17/2006		11/17/2006		11/17/2006	
EERC Run Number	2255A09.D		2255A10.D		2255A11.D		2255A12.D	
AQUATOX Sample ID								
Sample Name	NB25		NB25		NB25		NB25	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.510		1.500		1.510		1.500	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	0.057	J	0.058	J	0.057	J	0.059	J
2-methylnaphthalene	0.033	J	0.028	J	0.032	J	0.029	J
1-methylnaphthalene	0.075	J	0.074	J	0.074	J	0.073	J
C2 naphthalenes	11.998		11.263		11.507		11.276	
C3 naphthalenes	16.990		15.531		16.438		15.786	
C4 naphthalenes	5.488	J	5.916		5.305	J	6.287	
acenaphthylene	0.913		0.895	J	0.866	J	0.847	J
acenaphthene	7.010		6.928		6.864		6.883	
fluorene	2.013		2.003		1.979		1.996	
C1 fluorenes	3.020		3.002		2.982		2.981	
C2 fluorenes	2.361		2.401		2.339		2.308	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	3.386		3.401		3.358		3.389	
anthracene	0.482		0.484		0.478		0.488	
C1 phenanthrenes/anthracenes	4.817		4.747		4.738		4.715	
C2 phenanthrenes/anthracenes	2.230	J	2.224	J	2.210	J	2.009	J
C3 phenanthrenes/anthracenes	0.640	J	0.615	J	0.614	J	0.564	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	0.628		0.622		0.616		0.617	
pyrene	0.968		0.964		0.943		0.952	
C1 fluoranthenes/pyrenes	0.625		0.632		0.583		0.598	
benz[a]anthracene	0.041	J	0.039	J	0.038	J	0.039	J
chrysene	0.054	J	0.054	J	0.053	J	0.053	J
C1 chrysenes	0.011	J	0.010	J	0.008	J	0.009	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.009	J	0.009	J	0.009	J	0.011	J
benzo[e]pyrene	0.009	J	0.007	J	0.008	J	0.009	J
benzo[a]pyrene	0.009	J	0.009	J	0.008	J	0.011	J
perylene	0.009	J	0.009	J	0.011	J	0.014	J
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	ND		ND		ND		ND	

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EERC ID	86A-1		86A-2		86A-3		86A-4	
RETEC Sample Collection Date	11/10/2006		11/10/2006		11/10/2006		11/10/2006	
EERC Sample Receipt Date	11/14/2006		11/14/2006		11/14/2006		11/14/2006	
EERC Run Date	11/20/2006		11/20/2006		11/20/2006		11/20/2006	
EERC Run Number	2256A03.D		2256A04.D		2256A05.D		2256A06.D	
AQUATOX Sample ID								
Sample Name	NB26		NB26		NB26		NB26	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.500		1.500		1.500		1.510	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	0.187	J	0.152	J	0.157	J	0.153	J
2-methylnaphthalene	0.063	J	0.061	J	0.056	J	0.057	J
1-methylnaphthalene	0.191	J	0.179	J	0.170	J	0.171	J
C2 naphthalenes	37.373		34.836		34.265		31.303	
C3 naphthalenes	54.936		51.403		50.549		44.726	
C4 naphthalenes	13.032		14.676		11.564		10.682	
acenaphthylene	2.621		2.576		2.346		2.382	
acenaphthene	22.076		21.589		20.020		20.220	
fluorene	7.835		7.701		7.174		7.261	
C1 fluorenes	11.470		11.130		10.212		10.296	
C2 fluorenes	6.628		6.600		6.313		6.241	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	13.131		13.124		12.255		12.324	
anthracene	2.359		2.294		2.121		2.181	
C1 phenanthrenes/anthracenes	17.599		17.544		16.175		16.143	
C2 phenanthrenes/anthracenes	6.389		6.414		5.831		5.773	
C3 phenanthrenes/anthracenes	1.276	J	1.303	J	1.132	J	1.114	J
C4 phenanthrenes/anthracenes	0.112	J	0.084	J	0.075	J	0.070	J
fluoranthene	2.625		2.621		2.484		2.444	
pyrene	3.935		3.988		3.720		3.675	
C1 fluoranthenes/pyrenes	2.295		2.362		2.212		2.142	
benz[a]anthracene	0.176		0.173		0.168		0.162	
chrysene	0.211		0.210		0.200		0.198	
C1 chrysenes	0.028	J	0.035	J	0.033	J	0.032	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.035	J	0.038	J	0.033	J	0.034	J
benzo[e]pyrene	0.029	J	0.029	J	0.030	J	0.024	J
benzo[a]pyrene	0.039	J	0.039	J	0.037	J	0.034	J
perylene	0.018	J	0.022	J	0.015	J	0.016	J
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	0.004	J	0.003	J	0.005	J	0.004	J

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EERC ID	87A-1		87A-2		87A-3		87A-4	
RETEC Sample Collection Date	11/10/2006		11/10/2006		11/10/2006		11/10/2006	
EERC Sample Receipt Date	11/14/2006		11/14/2006		11/14/2006		11/14/2006	
EERC Run Date	11/20/2006		11/20/2006		11/20/2006		11/20/2006	
EERC Run Number	2256A09.D		2256A10.D		2256A11.D		2256A12.D	
AQUATOX Sample ID								
Sample Name	NB29		NB29		NB29		NB29	
Treatment	Pore Water		Pore Water		Pore Water		Pore Water	
Sample Weight, g	1.510		1.500		1.500		1.500	
Matrix	Sediment		Sediment		Sediment		Sediment	
Units	ng/g		ng/g		ng/g		ng/g	
naphthalene	2.498	J	2.646	J	2.607	J	2.399	J
2-methylnaphthalene	12.654		12.287		12.160		12.230	
1-methylnaphthalene	44.819		43.301		42.814		43.476	
C2 naphthalenes	83.103		80.814		77.131		79.160	
C3 naphthalenes	42.370		41.550		39.389		40.247	
C4 naphthalenes	7.155		5.553	J	6.538		5.432	J
acenaphthylene	5.517		5.376		5.216		5.519	
acenaphthene	52.029		50.806		50.514		51.813	
fluorene	12.452		12.278		12.187		12.611	
C1 fluorenes	8.009		8.035		7.979		8.258	
C2 fluorenes	3.000		3.229		3.322		3.161	
C3 fluorenes	ND		ND		ND		ND	
phenanthrene	14.893		14.733		14.816		15.305	
anthracene	2.904		2.829		2.817		2.933	
C1 phenanthrenes/anthracenes	10.481		10.476		10.621		10.829	
C2 phenanthrenes/anthracenes	2.574	J	2.528	J	2.640	J	2.636	J
C3 phenanthrenes/anthracenes	0.437	J	0.425	J	0.472	J	0.455	J
C4 phenanthrenes/anthracenes	ND		ND		ND		ND	
fluoranthene	1.474		1.473		1.474		1.527	
pyrene	2.059		2.078		2.092		2.170	
C1 fluoranthenes/pyrenes	1.056		1.063		1.114		1.102	
benzo[a]anthracene	0.081	J	0.072	J	0.075	J	0.082	J
chrysene	0.098		0.089		0.093		0.100	
C1 chrysenes	0.011	J	0.010	J	0.011	J	0.012	J
C2 chrysenes	ND		ND		ND		ND	
C3 chrysenes	ND		ND		ND		ND	
C4 chrysenes	ND		ND		ND		ND	
benzo[b+k]fluoranthene	0.017	J	0.015	J	0.015	J	0.017	J
benzo[e]pyrene	0.013	J	0.012	J	0.010	J	0.013	J
benzo[a]pyrene	0.015	J	0.015	J	0.015	J	0.016	J
perylene	0.007	J	0.004	J	0.005	J	0.007	J
indeno[1,2,3-cd]pyrene	ND		ND		ND		ND	
dibenz[ah]anthracene	ND		ND		ND		ND	
benzo[ghi]perylene	ND		ND		ND		ND	

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EERC ID	71C-1	71C-2	71C-3	71C-4
RETEC Sample Collection Date	11/7/2006	11/7/2006	11/7/2006	11/7/2006
EERC Sample Receipt Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2615A02.D	2615A03.D	2615A04.D	2615A05.D
AQUATOX Sample ID				
Sample Name	NB01	NB01	NB01	NB01
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	1.14	1.14	1.14	1.14
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	6.782	0.721	1.053	3.773
2-methylnaphthalene	2.744	0.440	0.676	2.342
1-methylnaphthalene	2.127	0.282	0.483	1.324
C2 naphthalenes	6.548	1.767	3.006	4.167
C3 naphthalenes	3.798	1.184	2.631	2.307
C4 naphthalenes	2.345	0.893	2.100	1.584
acenaphthylene	2.148	1.206	1.746	1.565
acenaphthene	6.832	1.004	1.912	2.860
fluorene	6.117	0.441	0.758	2.106
C1 fluorenes	6.754	1.223	2.559	2.994
C2 fluorenes	3.206	1.170	2.288	1.947
C3 fluorenes	ND	ND	ND	ND
phenanthrene	44.272	2.965	5.250	14.108
anthracene	22.682	2.181	4.008	7.888
C1 phenanthrenes/anthracenes	22.318	3.575	8.609	9.602
C2 phenanthrenes/anthracenes	30.307 E	9.420	20.218 E	17.191
C3 phenanthrenes/anthracenes	14.798	5.613	10.131	8.871
C4 phenanthrenes/anthracenes	2.434	0.978	1.363	1.385
fluoranthene	45.273	4.639	8.186	15.530
pyrene	38.571	4.790	9.464	14.250
C1 fluoranthenes/pyrenes	22.378 E	5.667	11.914 E	11.266
benz[a]anthracene	24.148	2.978	5.641	8.801
chrysene	21.980	3.300	5.767	8.438
C1 chrysenes	41.117	8.305	15.472	18.030
C2 chrysenes	18.304	5.249	8.671	9.227
C3 chrysenes	10.862	2.563	3.600	4.847
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	31.930	4.383	6.670	11.644
benzo[e]pyrene	11.934	1.912	2.943	4.584
benzo[a]pyrene	23.929	3.481	5.782	8.994
perylene	7.117	1.118	1.519	2.680
indeno[1,2,3-cd]pyrene	28.247 E	3.356	5.142	9.875
dibenz[ah]anthracene	6.299	0.837	1.367	2.303
benzo[ghi]perylene	14.217	1.918	2.868	5.146
Total NOAA PAHs	533	90	164	101
Total EPA PAHs (16)	323	38	66	42
Surrogate recoveries				
biphenyl-d10	101.6%	98.1%	101.7%	100.9%
benzo[b]fluoranthene-d12	72.0%	75.4%	75.2%	76.4%

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EERC ID	72C-1	72C-2	72C-3	72C-4
RETEC Sample Collection Date	11/7/2006	11/7/2006	11/7/2006	11/7/2006
EERC Sample Receipt Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2615A06.D	2615A07.D	2615A08.D	2615A09.D
AQUATOX Sample ID				
Sample Name	NB02	NB02	NB02	NB02
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.79	0.79	0.79	0.79
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	1.886	1.871	1.961	1.943
2-methylnaphthalene	1.051	1.096	1.096	1.111
1-methylnaphthalene	0.394	0.430	0.436	0.434
C2 naphthalenes	5.236	4.631	4.904	5.123
C3 naphthalenes	5.236	3.511	3.862	4.272
C4 naphthalenes	4.494	2.538	2.863	3.251
acenaphthylene	2.390	1.682	1.488	2.009
acenaphthene	2.872	2.580	2.605	2.750
fluorene	1.659	1.535	1.589	1.624
C1 fluorenes	4.759	3.069	3.157	3.731
C2 fluorenes	5.279	2.974	3.045	3.762
C3 fluorenes	ND	ND	ND	ND
phenanthrene	7.072	6.260	6.902	6.840
anthracene	5.094	4.046	4.099	4.544
C1 phenanthrenes/anthracenes	17.892	9.811	10.934	12.752
C2 phenanthrenes/anthracenes	36.183 E	22.859 E	22.174 E	26.620 E
C3 phenanthrenes/anthracenes	16.730	11.903	11.406	13.525
C4 phenanthrenes/anthracenes	2.417	2.338	1.870	2.467
fluoranthene	8.502	6.529	6.992	7.332
pyrene	11.646	8.102	8.245	9.202
C1 fluoranthenes/pyrenes	18.171 E	11.878 E	10.444 E	13.337 E
benz[a]anthracene	6.228	4.568	4.170	5.010
chrysene	6.530	4.760	4.504	5.298
C1 chrysenes	19.167	13.460	11.771	15.537
C2 chrysenes	11.753	8.135	7.861	9.966
C3 chrysenes	5.607	4.250	3.866	4.871
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	6.404	4.994	4.757	5.639
benzo[e]pyrene	3.009	2.253	2.061	2.575
benzo[a]pyrene	6.207	4.628	3.928	5.205
perylene	2.276	1.979	1.908	2.144
indeno[1,2,3-cd]pyrene	5.021	3.728	3.663	4.389
dibenz[ah]anthracene	1.411	1.006	0.976	1.206
benzo[ghi]perylene	2.921	2.152	2.087	2.515
Total NOAA PAHs	235	166	162	201
Total EPA PAHs (16)	76	58	58	70
Surrogate recoveries				
biphenyl-d10	99.8%	98.1%	101.5%	99.1%
benzo[b]fluoranthene-d12	72.7%	73.9%	75.5%	74.0%

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EERC ID	82C-1	82C-2	82C-3	82C-4
RETEC Sample Collection Date	11/7/2006	11/7/2006	11/7/2006	11/7/2006
EERC Sample Receipt Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Run Date	11/21/2006	11/21/2006	11/21/2006	11/21/2006
EERC Run Number	2616A10.D	2616A11.D	2616A12.D	2616A13.D
AQUATOX Sample ID				
Sample Name	NB03	NB03	NB03	NB03
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.79	0.79	0.79	0.79
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	1.811	1.855	1.826	1.825
2-methylnaphthalene	1.534	1.545	1.552	1.555
1-methylnaphthalene	0.797	0.756	0.779	0.785
C2 naphthalenes	6.441	6.346	6.920	6.625
C3 naphthalenes	5.390	5.314	5.742	5.498
C4 naphthalenes	4.931	4.866	5.494	4.835
acenaphthylene	2.242	2.219	2.473	2.304
acenaphthene	2.300	2.236	2.292	2.285
fluorene	1.678	1.596	1.610	1.625
C1 fluorenes	3.966	3.943	4.175	3.963
C2 fluorenes	4.217	4.008	4.775	4.278
C3 fluorenes	ND	ND	ND	ND
phenanthrene	9.654	9.124	9.412	9.332
anthracene	5.639	5.532	5.880	5.649
C1 phenanthrenes/anthracenes	15.944	14.776	16.755	15.612
C2 phenanthrenes/anthracenes	40.341 E	37.432 E	43.253 E	39.387 E
C3 phenanthrenes/anthracenes	19.324	17.993	20.512	18.965
C4 phenanthrenes/anthracenes	4.600	3.448	3.982	3.835
fluoranthene	9.482	9.050	9.999	9.290
pyrene	10.554	10.119	11.101	10.358
C1 fluoranthenes/pyrenes	14.833 E	14.131 E	16.228 E	14.748 E
benz[a]anthracene	5.521	5.397	5.840	5.437
chrysene	6.525	6.340	6.963	6.473
C1 chrysenes	18.952	17.993	20.501	18.729
C2 chrysenes	13.549	12.839	14.652	13.365
C3 chrysenes	7.052	6.752	7.972	7.149
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	7.116	6.671	7.125	6.830
benzo[e]pyrene	2.861	2.664	2.833	2.736
benzo[a]pyrene	5.747	5.648	6.042	5.676
perylene	2.591	2.595	2.875	2.665
indeno[1,2,3-cd]pyrene	6.474	6.506	7.492	6.721
dibenz[ah]anthracene	1.203	1.252	1.402	1.276
benzo[ghi]perylene	3.097	3.104	3.347	3.134
Total NOAA PAHs	246	234	262	230
Total EPA PAHs (16)	79	77	83	74
Surrogate recoveries				
biphenyl-d10	97.4%	103.1%	104.4%	94.0%
benzo[b]fluoranthene-d12	85.1%	83.0%	85.4%	77.2%

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EERC ID	73C-1	73C-2	73C-3	73C-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Run Date	11/30/2006	11/30/2006	11/30/2006	11/30/2006
EERC Run Number	2618A06.D	2618A07.D	2618A08.D	2618A09.D
AQUATOX Sample ID				
Sample Name	NB04	NB04	NB04	NB04
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	1.03	1.03	1.03	1.03
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	6.815	5.119	5.533	6.655
2-methylnaphthalene	4.692	4.319	5.139	4.714
1-methylnaphthalene	2.184	1.828	2.647	2.312
C2 naphthalenes	61.508 E	62.249 E	64.219 E	64.028 E
C3 naphthalenes	38.723 E	39.733 E	39.415 E	40.035 E
C4 naphthalenes	18.391	19.364	16.028	19.524
acenaphthylene	5.244	6.801	5.401	5.884
acenaphthene	16.133	16.493	16.754	17.126
fluorene	8.183	8.683	8.523	8.557
C1 fluorenes	18.128 E	19.333 E	18.472 E	18.799 E
C2 fluorenes	14.538	15.436	14.765	15.041
C3 fluorenes	ND	ND	ND	ND
phenanthrene	34.436	36.696	32.717	33.914
anthracene	21.197	25.467	21.420	22.589
C1 phenanthrenes/anthracenes	50.479 E	54.920 E	49.861 E	51.338 E
C2 phenanthrenes/anthracenes	89.797 E	99.686 E	89.672 E	92.753 E
C3 phenanthrenes/anthracenes	38.635	42.566	38.004	39.315
C4 phenanthrenes/anthracenes	5.061	8.396	8.276	6.853
fluoranthene	22.616	23.949	20.521	21.359
pyrene	25.735	26.984	24.248	24.813
C1 fluoranthenes/pyrenes	33.749 E	38.449 E	33.611 E	35.067 E
benz[a]anthracene	13.567	15.686	12.763	13.466
chrysene	14.477	16.494	13.274	14.174
C1 chrysenes	40.055	45.330	37.398	40.295
C2 chrysenes	24.557	27.768	22.551	24.631
C3 chrysenes	12.602	14.889	12.131	12.989
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	14.533	15.823	13.009	13.843
benzo[e]pyrene	6.255	6.645	5.521	5.938
benzo[a]pyrene	13.340	14.411	12.225	12.863
perylene	3.628	4.100	3.187	3.532
indeno[1,2,3-cd]pyrene	14.622 E	14.798 E	12.548 E	13.469 E
dibenz[ah]anthracene	3.611	3.811	3.096	3.403
benzo[ghi]perylene	7.180	7.126	6.163	6.587
Total NOAA PAHs	685	743	669	686
Total EPA PAHs (16)	222	238	208	207
Surrogate recoveries				
biphenyl-d10	90.8%	95.3%	90.3%	94.4%
benzo[b]fluoranthene-d12	70.3%	72.4%	70.5%	71.2%

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EERC ID	75C-1	75C-2	75C-3	75C-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2615A14.D	2615A15.D	2615A16.D	2615A17.D
AQUATOX Sample ID				
Sample Name	NB08	NB08	NB08	NB08
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.99	0.99	0.99	0.99
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	1.863	2.609	8.162	3.536
2-methylnaphthalene	1.183	1.448	5.049	2.152
1-methylnaphthalene	0.843	0.972	3.948	1.575
C2 naphthalenes	5.382	6.411	11.198	6.788
C3 naphthalenes	4.123	5.243	7.142	4.972
C4 naphthalenes	3.384	4.702	6.263	4.334
acenaphthylene	3.546	4.845	5.115	4.018
acenaphthene	2.068	3.300	5.231	3.062
fluorene	1.729	2.688	3.367	2.242
C1 fluorenes	4.804	6.168	11.004	6.374
C2 fluorenes	3.987	5.016	7.557	4.896
C3 fluorenes	ND	ND	ND	ND
phenanthrene	16.078	22.661	39.003	22.062
anthracene	7.436	11.737	16.970	10.509
C1 phenanthrenes/anthracenes	15.947	20.004	34.609	20.725
C2 phenanthrenes/anthracenes	33.278	41.051	66.083	41.582
C3 phenanthrenes/anthracenes	19.143	23.539	36.107	23.310
C4 phenanthrenes/anthracenes	3.183	3.583	5.794	3.721
fluoranthene	19.799	24.407	42.241	25.134
pyrene	17.686	21.883	37.006	22.409
C1 fluoranthenes/pyrenes	18.210	23.992	32.972	22.268
benz[a]anthracene	10.260	13.129	21.095	13.109
chrysene	12.098	13.952	23.539	14.607
C1 chrysenes	26.913	34.498	52.020	33.386
C2 chrysenes	16.604	21.026	31.835	20.569
C3 chrysenes	9.050	11.171	17.410	11.290
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	14.577	17.179	28.085	17.708
benzo[e]pyrene	5.816	6.935	11.222	7.074
benzo[a]pyrene	10.851	13.982	21.432	13.619
perylene	3.595	4.164	6.510	4.330
indeno[1,2,3-cd]pyrene	13.199	15.402	25.710	15.980
dibenz[ah]anthracene	3.523	4.222	6.850	4.318
benzo[ghi]perylene	6.763	7.628	13.092	8.048
Total NOAA PAHs	317	400	644	239
Total EPA PAHs (16)	141	180	297	103
Surrogate recoveries				
biphenyl-d10	95.8%	96.6%	96.1%	98.3%
benzo[b]fluoranthene-d12	70.8%	70.2%	74.5%	70.6%

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EERC ID	83C-1	83C-2	83C-3	83C-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/29/2006	11/29/2006	11/29/2006	11/29/2006
EERC Run Number	2617A06.D	2617A07.D	2617A08.D	2617A09.D
AQUATOX Sample ID				
Sample Name	NB09	NB09	NB09	NB09
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.87	0.87	0.87	0.87
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	0.748	0.717	0.668	0.731
2-methylnaphthalene	0.387	0.390	0.347	0.382
1-methylnaphthalene	0.320	0.311	0.285	0.311
C2 naphthalenes	2.090	1.940	1.703	1.904
C3 naphthalenes	1.165	1.347	0.959	1.175
C4 naphthalenes	1.000	1.418	0.962	1.105
acenaphthylene	0.737	1.127	0.836	0.838
acenaphthene	1.459	1.122	0.985	1.237
fluorene	0.917	0.724	0.629	0.797
C1 fluorenes	1.104	1.166	0.841	1.062
C2 fluorenes	1.097	1.348	0.800	1.032
C3 fluorenes	ND	ND	ND	ND
phenanthrene	4.906	2.741	2.070	3.948
anthracene	2.461	2.330	1.422	2.183
C1 phenanthrenes/anthracenes	3.654	3.977	2.283	3.469
C2 phenanthrenes/anthracenes	9.541	12.428	E 6.784	9.307
C3 phenanthrenes/anthracenes	5.037	6.666	3.715	4.926
C4 phenanthrenes/anthracenes	0.858	1.452	0.711	0.911
fluoranthene	6.867	5.135	3.173	5.574
pyrene	6.081	4.842	3.513	5.239
C1 fluoranthenes/pyrenes	5.211	5.539	3.233	4.616
benz[a]anthracene	3.692	3.054	1.879	3.008
chrysene	3.994	3.333	2.126	3.317
C1 chrysenes	8.744	8.800	5.287	7.716
C2 chrysenes	5.879	6.129	3.338	4.981
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	5.006	4.021	2.747	4.158
benzo[e]pyrene	1.924	1.531	1.147	1.633
benzo[a]pyrene	3.856	2.990	2.154	3.195
perylene	1.778	1.572	1.277	1.577
indeno[1,2,3-cd]pyrene	4.982	3.356	2.588	3.817
dibenz[ah]anthracene	0.846	0.598	0.505	0.670
benzo[ghi]perylene	2.311	1.594	1.328	1.845
Total NOAA PAHs	99	94	60	94
Total EPA PAHs (16)	49	38	27	49
Surrogate recoveries				
biphenyl-d10	94.0%	97.6%	95.9%	93.6%
benzo[b]fluoranthene-d12	76.4%	81.8%	80.8%	81.1%

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EERC ID	74C-1	74C-2	74C-3	74C-4
RETEC Sample Collection Date	11/8/2006	11/8/2006	11/8/2006	11/8/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/16/2006	11/16/2006	11/16/2006	11/16/2006
EERC Run Number	2615A10.D	2615A11.D	2615A12.D	2615A13.D
AQUATOX Sample ID				
Sample Name	NB10	NB10	NB10	NB10
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.71	0.71	0.71	0.71
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	0.337	0.516	0.519	0.446
2-methylnaphthalene	0.218	0.312	0.375	0.302
1-methylnaphthalene	0.104	0.142	0.183	0.150
C2 naphthalenes	0.937	1.081	1.333	1.152
C3 naphthalenes	0.656	0.787	0.852	0.813
C4 naphthalenes	0.642	0.718	0.714	0.747
acenaphthylene	0.749	0.792	1.110	0.874
acenaphthene	0.213	0.292	0.367	0.326
fluorene	0.227	0.300	0.312	0.301
C1 fluorenes	0.751	0.888	0.992	0.900
C2 fluorenes	0.871	0.835	0.831	0.886
C3 fluorenes	ND	ND	ND	ND
phenanthrene	1.548	2.316	2.567	2.403
anthracene	1.276	1.628	1.762	1.647
C1 phenanthrenes/anthracenes	2.036	2.514	2.782	2.608
C2 phenanthrenes/anthracenes	5.995	6.771	6.882	6.763
C3 phenanthrenes/anthracenes	4.079	4.541	4.691	4.439
C4 phenanthrenes/anthracenes	0.836	0.926	0.925	0.883
fluoranthene	2.820	3.575	4.277	3.863
pyrene	2.751	3.433	3.976	3.640
C1 fluoranthenes/pyrenes	3.103	3.624	3.873	3.682
benz[a]anthracene	1.666	2.042	2.330	2.127
chrysene	2.026	2.295	2.686	2.463
C1 chrysenes	4.822	5.397	6.171	5.567
C2 chrysenes	3.442	3.886	4.628	4.022
C3 chrysenes	1.819	2.000	2.322	2.099
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	2.888	3.313	3.763	3.440
benzo[e]pyrene	1.224	1.377	1.554	1.419
benzo[a]pyrene	2.121	2.457	2.738	2.496
perylene	1.922	2.088	2.164	2.065
indeno[1,2,3-cd]pyrene	2.152	2.630	3.021	2.701
dibenz[ah]anthracene	0.512	0.638	0.734	0.650
benzo[ghi]perylene	1.256	1.460	1.679	1.489
Total NOAA PAHs	56	66	73	75
Total EPA PAHs (16)	23	28	32	33
Surrogate recoveries				
biphenyl-d10	99.3%	99.4%	101.6%	98.6%
benzo[b]fluoranthene-d12	77.5%	74.6%	74.1%	72.8%

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EERC ID	80C-1	80C-2	80C-3	80C-4
RETEC Sample Collection Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/21/2006	11/21/2006	11/21/2006	11/21/2006
EERC Run Number	2616A02.D	2616A03.D	2616A04.D	2616A05.D
AQUATOX Sample ID				
Sample Name	NB11	NB11	NB11	NB11
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.68	0.68	0.68	0.68
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	0.123	0.118	0.155	0.133
2-methylnaphthalene	0.094	0.101	0.110	0.103
1-methylnaphthalene	0.047 J	0.048 J	0.056 J	0.052 J
C2 naphthalenes	0.507	0.519	0.515	0.566
C3 naphthalenes	0.401	0.408	0.496	0.442
C4 naphthalenes	0.000	0.000	0.000	0.000
acenaphthylene	0.155	0.183	0.169	0.178
acenaphthene	0.081 J	0.079 J	0.119	0.095
fluorene	0.090 J	0.106	0.109	0.109
C1 fluorenes	0.261	0.245	0.333	0.287
C2 fluorenes	0.000	0.000	0.000	0.000
C3 fluorenes	ND	ND	ND	ND
phenanthrene	0.484	0.494	0.759	0.630
anthracene	0.348	0.369	0.449	0.428
C1 phenanthrenes/anthracenes	0.623	0.683	0.730	0.719
C2 phenanthrenes/anthracenes	2.635	2.695	2.883	2.790
C3 phenanthrenes/anthracenes	1.514	1.554	1.606	1.568
C4 phenanthrenes/anthracenes	0.000	0.000	0.000	0.000
fluoranthene	0.907	0.835	1.102	1.026
pyrene	0.793	0.813	1.030	0.954
C1 fluoranthenes/pyrenes	0.721	0.823	0.843	0.865
benz[a]anthracene	0.442	0.467	0.565	0.535
chrysene	0.562	0.610	0.736	0.678
C1 chrysenes	1.377	1.433	1.600	1.577
C2 chrysenes	0.000	0.000	0.000	0.000
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	0.889	0.961	1.089	1.028
benzo[e]pyrene	0.361	0.385	0.418	0.408
benzo[a]pyrene	0.498	0.565	0.641	0.608
perylene	1.708	1.737	1.901	1.794
indeno[1,2,3-cd]pyrene	0.507	0.602	0.713	0.664
dibenz[ah]anthracene	0.124	0.120	0.157	0.143
benzo[ghi]perylene	0.329	0.370	0.442	0.396
Total NOAA PAHs	17	17	20	21
Total EPA PAHs (16)	6	7	8	9
Surrogate recoveries				
biphenyl-d10	100.3%	103.8%	101.4%	99.5%
benzo[b]fluoranthene-d12	97.3%	101.1%	94.1%	91.6%

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EERC ID	81C-1	81C-2	81C-3	81C-4
RETEC Sample Collection Date	11/9/2006	11/9/2006	11/9/2006	11/9/2006
EERC Sample Receipt Date	11/11/2006	11/11/2006	11/11/2006	11/11/2006
EERC Run Date	11/21/2006	11/21/2006	11/21/2006	11/21/2006
EERC Run Number	2616A06.D	2616A07.D	2616A08.D	2616A09.D
AQUATOX Sample ID				
Sample Name	NB12	NB12	NB12	NB12
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.68	0.68	0.68	0.68
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	0.134	0.130	0.127	0.152
2-methylnaphthalene	0.107	0.101	0.107	0.117
1-methylnaphthalene	0.052 J	0.049 J	0.065	0.061
C2 naphthalenes	0.665	0.518	0.638	0.632
C3 naphthalenes	0.510	0.334	0.454	0.435
C4 naphthalenes	0.000	0.000	0.000	0.000
acenaphthylene	0.204	0.142	0.165	0.191
acenaphthene	0.130	0.068 J	0.108	0.103
fluorene	0.120	0.089 J	0.110	0.110
C1 fluorenes	0.314	0.276	0.273	0.299
C2 fluorenes	0.348	0.269	0.457	0.348
C3 fluorenes	ND	ND	ND	ND
phenanthrene	0.961	0.545	0.668	0.797
anthracene	0.546	0.320	0.395	0.458
C1 phenanthrenes/anthracenes	1.062	0.579	0.664	0.798
C2 phenanthrenes/anthracenes	3.579	2.494	2.643	2.910
C3 phenanthrenes/anthracenes	1.734	1.296	1.359	1.485
C4 phenanthrenes/anthracenes	0.000	0.000	0.000	0.000
fluoranthene	1.430	0.897	0.950	1.226
pyrene	1.321	0.719	0.910	1.082
C1 fluoranthenes/pyrenes	1.065	0.699	0.811	0.900
benz[a]anthracene	0.772	0.477	0.504	0.641
chrysene	0.918	0.536	0.647	0.756
C1 chrysenes	2.041	1.236	1.653	1.713
C2 chrysenes	0.000	0.000	0.000	0.000
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	1.319	0.806	1.008	1.140
benzo[e]pyrene	0.512	0.325	0.401	0.446
benzo[a]pyrene	0.809	0.478	0.614	0.688
perylene	1.762	1.634	1.634	1.682
indeno[1,2,3-cd]pyrene	0.933	0.615	0.631	0.799
dibenz[ah]anthracene	0.221	0.149	0.131	0.165
benzo[ghi]perylene	0.485	0.338	0.404	0.432
Total NOAA PAHs	24	16	19	24
Total EPA PAHs (16)	10	6	7	11
Surrogate recoveries				
biphenyl-d10	100.2%	101.7%	100.6%	101.6%
benzo[b]fluoranthene-d12	95.6%	95.6%	98.0%	98.5%

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EERC ID	85C-1	85C-2	85C-3	85C-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/29/2006	11/29/2006	11/29/2006	11/29/2006
EERC Run Number	2617A02.D	2617A03.D	2617A04.D	2617A05.D
AQUATOX Sample ID				
Sample Name	NB18	NB18	NB18	NB18
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.85	0.85	0.85	0.85
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	1.638	1.941	1.734	4.569
2-methylnaphthalene	1.101	1.360	1.245	2.331
1-methylnaphthalene	0.680	0.818	0.809	0.881
C2 naphthalenes	3.307	3.981	4.110	4.182
C3 naphthalenes	2.356	3.032	3.303	3.007
C4 naphthalenes	2.193	3.016	3.245	2.867
acenaphthylene	2.044	2.014	2.947	2.390
acenaphthene	1.039	1.264	1.358	1.273
fluorene	1.011	1.177	1.201	1.186
C1 fluorenes	2.217	2.595	3.193	2.753
C2 fluorenes	2.235	2.651	3.158	2.759
C3 fluorenes	ND	ND	ND	ND
phenanthrene	8.189	9.368	9.738	9.159
anthracene	4.784	5.511	6.150	5.640
C1 phenanthrenes/anthracenes	8.575	9.837	11.366	10.113
C2 phenanthrenes/anthracenes	22.906 E	25.125 E	30.500 E	26.785 E
C3 phenanthrenes/anthracenes	11.786	11.813	15.087	13.282
C4 phenanthrenes/anthracenes	1.960	2.086	2.772	2.336
fluoranthene	12.554	13.920	15.718	14.063
pyrene	11.782	12.901	15.032	13.321
C1 fluoranthenes/pyrenes	10.630 E	11.503 E	14.978 E	12.679 E
benz[a]anthracene	6.712	7.087	8.357	7.410
chrysene	7.805	8.042	9.400	8.403
C1 chrysenes	18.643	18.392	22.775	19.811
C2 chrysenes	11.091	10.536	13.656	11.893
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	10.498	10.041	11.321	10.514
benzo[e]pyrene	4.323	3.983	4.446	4.157
benzo[a]pyrene	7.453	7.585	9.028	8.031
perylene	2.844	2.993	3.465	3.131
indeno[1,2,3-cd]pyrene	8.063 E	9.758 E	11.796 E	10.156 E
dibenz[ah]anthracene	1.251	1.506	1.867	1.602
benzo[ghi]perylene	4.364	4.714	5.575	4.894
Total NOAA PAHs	196	211	249	246
Total EPA PAHs (16)	89	97	111	113
Surrogate recoveries				
biphenyl-d10	98.6%	94.6%	92.5%	95.2%
benzo[b]fluoranthene-d12	91.6%	78.9%	76.1%	77.4%

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EERC ID	79C-1	79C-2	79C-3	79C-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/30/2006	11/30/2006	11/30/2006	11/30/2006
EERC Run Number	2618A10.D	2618A11.D	2618A12.D	2618A13.D
AQUATOX Sample ID				
Sample Name	NB20	NB20	NB20	NB20
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.87	0.87	0.87	0.87
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	17.248	16.099	16.872	16.398
2-methylnaphthalene	11.011	10.181	10.348	10.252
1-methylnaphthalene	3.766	4.045	3.485	3.592
C2 naphthalenes	249.656 E	365.280 E	221.747 E	243.045 E
C3 naphthalenes	157.151 E	225.232 E	135.767 E	149.515 E
C4 naphthalenes	73.429	100.853	62.691	66.930
acenaphthylene	21.409	28.321	19.828	19.606
acenaphthene	99.383 E	125.217 E	94.236 E	94.081
fluorene	61.028	77.335	56.758	57.342
C1 fluorenes	98.889 E	133.896 E	82.884 E	91.077 E
C2 fluorenes	66.473	88.176	57.515	61.238
C3 fluorenes	ND	ND	ND	ND
phenanthrene	207.048 E	256.170 E	215.933 E	200.329
anthracene	195.214 E	223.196 E	171.600 E	174.166
C1 phenanthrenes/anthracenes	270.730 E	344.084 E	238.672 E	247.353 E
C2 phenanthrenes/anthracenes	352.370 E	454.148 E	303.839 E	321.402 E
C3 phenanthrenes/anthracenes	104.536	129.275	94.092	95.994
C4 phenanthrenes/anthracenes	17.463	20.339	15.540	15.521
fluoranthene	99.185	128.030 E	95.481	95.492
pyrene	120.540 E	186.429 E	124.084 E	129.142
C1 fluoranthenes/pyrenes	169.964 E	279.482 E	153.019 E	176.006 E
benzo[a]anthracene	64.208	78.692 E	60.801	59.078
chrysene	64.546	77.436 E	58.880	58.680
C1 chrysenes	132.569	191.773 E	134.002	131.662
C2 chrysenes	60.407	77.093	55.716	56.180
C3 chrysenes	23.875	28.434	21.445	21.919
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	54.678	64.384	48.325	47.924
benzo[e]pyrene	23.912 E	27.778 E	21.312 E	20.925
benzo[a]pyrene	68.449 E	80.298 E	62.130 E	60.012
perylene	11.421	16.095	11.831	11.462
indeno[1,2,3-cd]pyrene	55.752 E	64.667 E	47.377 E	47.545 E
dibenz[ah]anthracene	15.522	17.894	12.977	13.371
benzo[ghi]perylene	27.854 E	33.523 E	24.125 E	24.305
Total NOAA PAHs	3000	3954	2733	1599
Total EPA PAHs (16)	1172	1458	1109	651
Surrogate recoveries				
biphenyl-d10	86.6%	81.8%	88.2%	88.9%
benzo[b]fluoranthene-d12	76.5%	70.7%	80.5%	73.0%

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EERC ID	77C-1	77C-2	77C-3	77C-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/30/2006	11/30/2006	11/30/2006	11/30/2006
EERC Run Number	2618A02.D	2618A03.D	2618A04.D	2618A05.D
AQUATOX Sample ID				
Sample Name	NB24	NB24	NB24	NB24
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	1.04	1.04	1.04	1.04
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	6.485	6.747	7.507	7.039
2-methylnaphthalene	3.939	4.051	4.619	4.282
1-methylnaphthalene	2.023	2.092	2.336	2.185
C2 naphthalenes	50.516	47.461	59.086	53.442
C3 naphthalenes	37.793 E	36.603 E	46.005 E	41.082 E
C4 naphthalenes	20.433	17.863	26.479	22.464
acenaphthylene	4.289	4.916	6.450	5.344
acenaphthene	13.777	12.615	15.589	14.230
fluorene	9.099	8.147	10.349	9.384
C1 fluorenes	20.942 E	20.779 E	26.987 E	23.662 E
C2 fluorenes	17.027	18.027	22.979	19.995
C3 fluorenes	ND	ND	ND	ND
phenanthrene	34.822	30.481	40.432	35.851
anthracene	28.869	27.043	35.748	31.309
C1 phenanthrenes/anthracenes	65.212 E	62.683 E	79.881 E	70.814 E
C2 phenanthrenes/anthracenes	105.154 E	107.821 E	132.970 E	118.573 E
C3 phenanthrenes/anthracenes	38.537	37.735	47.236	42.102
C4 phenanthrenes/anthracenes	6.213	6.648	8.536	7.370
fluoranthene	21.354	20.936	26.257	23.469
pyrene	27.930	29.277	33.072	31.289
C1 fluoranthenes/pyrenes	43.006 E	50.166 E	56.663 E	52.499 E
benz[a]anthracene	14.189	14.100	17.962	15.711
chrysene	13.856	14.404	18.507	15.989
C1 chrysenes	42.124	44.887	57.122	48.925
C2 chrysenes	22.367	24.997	31.874	27.082
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	12.224	12.061	15.478	13.452
benzo[e]pyrene	5.177	5.039	6.707	5.705
benzo[a]pyrene	12.929	12.861	16.980	14.448
perylene	3.885	3.761	4.552	3.987
indeno[1,2,3-cd]pyrene	10.300 E	11.197 E	14.062 E	12.175 E
dibenz[ah]anthracene	2.695	2.806	3.533	3.104
benzo[ghi]perylene	5.156	5.371	6.830	5.901
Total NOAA PAHs	702	704	883	843
Total EPA PAHs (16)	218	213	269	255
Surrogate recoveries				
biphenyl-d10	95.0%	95.6%	92.2%	93.3%
benzo[b]fluoranthene-d12	77.7%	72.9%	70.7%	70.9%

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EERC ID	84C-1	84C-2	84C-3	84C-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/21/2006	11/21/2006	11/21/2006	11/21/2006
EERC Run Number	2616A14.D	2616A15.D	2616A16.D	2616A17.D
AQUATOX Sample ID				
Sample Name	NB25	NB25	NB25	NB25
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.95	0.95	0.95	0.95
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	1.665	1.427	1.643	1.591
2-methylnaphthalene	1.519	1.351	1.518	1.464
1-methylnaphthalene	0.728	0.668	0.708	0.707
C2 naphthalenes	7.022	6.672	7.049	7.022
C3 naphthalenes	5.454	5.248	5.526	5.511
C4 naphthalenes	4.531	4.197	4.303	4.438
acenaphthylene	0.804	0.703	0.759	0.809
acenaphthene	2.106	1.953	2.155	2.127
fluorene	1.466	1.335	1.492	1.466
C1 fluorenes	3.384	3.002	3.318	3.331
C2 fluorenes	3.462	3.018	3.516	3.390
C3 fluorenes	ND	ND	ND	ND
phenanthrene	5.750	5.179	5.934	5.921
anthracene	4.084	3.670	4.119	4.160
C1 phenanthrenes/anthracenes	12.380	10.978	12.441	12.264
C2 phenanthrenes/anthracenes	27.407	E 23.522	E 27.652	E 26.960
C3 phenanthrenes/anthracenes	11.643	9.904	11.208	11.123
C4 phenanthrenes/anthracenes	2.411	1.763	2.266	2.341
fluoranthene	3.532	3.184	3.608	3.762
pyrene	5.122	4.652	5.189	5.292
C1 fluoranthenes/pyrenes	8.389	7.573	8.287	8.377
benz[a]anthracene	2.684	2.425	2.754	2.792
chrysene	2.838	2.593	2.893	2.960
C1 chrysenes	9.370	8.303	9.445	9.459
C2 chrysenes	6.177	5.356	6.098	6.175
C3 chrysenes	2.434	2.312	2.712	2.649
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	2.251	2.005	2.315	2.435
benzo[e]pyrene	1.021	0.908	1.057	1.086
benzo[a]pyrene	2.235	2.003	2.296	2.416
perylene	2.091	1.905	2.199	2.164
indeno[1,2,3-cd]pyrene	1.907	1.793	2.086	2.243
dibenz[ah]anthracene	0.451	0.398	0.480	0.486
benzo[ghi]perylene	0.969	0.904	1.061	1.101
Total NOAA PAHs	147	131	148	166
Total EPA PAHs (16)	38	34	39	47
Surrogate recoveries				
biphenyl-d10	100.4%	93.0%	94.7%	100.9%
benzo[b]fluoranthene-d12	82.3%	78.4%	82.2%	85.9%

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EERC ID	86C-1	86C-2	86C-3	86C-4	
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006	
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006	
EERC Run Date	11/29/2006	11/29/2006	11/29/2006	11/29/2006	
EERC Run Number	2617A10.D	2617A11.D	2617A12.D	2617A13.D	
AQUATOX Sample ID					
Sample Name	NB26	NB26	NB26	NB26	
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet	
Sample Weight, g	0.87	0.87	0.87	0.87	
Matrix	Sediment	Sediment	Sediment	Sediment	
Units	ug/g	ug/g	ug/g	ug/g	
naphthalene	4.257	4.245	3.863	4.253	
2-methylnaphthalene	2.676	2.613	2.447	2.651	
1-methylnaphthalene	1.198	1.209	1.147	1.215	
C2 naphthalenes	12.810	13.083	11.272	13.134	
C3 naphthalenes	12.404	12.093	9.885	12.242	
C4 naphthalenes	8.142	9.181	7.297	8.464	
acenaphthylene	2.224	2.250	1.926	2.177	
acenaphthene	4.461	4.511	3.668	4.476	
fluorene	3.438	3.324	2.944	3.426	
C1 fluorenes	9.141	8.594	7.521	8.861	E
C2 fluorenes	9.191	8.490	7.468	8.779	
C3 fluorenes	ND	ND	ND	ND	
phenanthrene	14.842	13.897	13.317	14.749	
anthracene	11.558	10.921	9.762	11.223	
C1 phenanthrenes/anthracenes	34.719	32.082	28.372	33.400	E
C2 phenanthrenes/anthracenes	70.807	65.942	58.533	68.421	E
C3 phenanthrenes/anthracenes	24.624	24.474	21.485	24.213	
C4 phenanthrenes/anthracenes	3.310	4.549	3.956	4.192	
fluoranthene	12.922	11.634	10.376	12.002	
pyrene	18.661	17.294	15.679	17.697	
C1 fluoranthenes/pyrenes	28.030	26.275	23.629	26.912	E
benz[a]anthracene	9.607	8.686	7.792	8.949	
chrysene	9.546	8.721	7.958	8.971	
C1 chrysenes	29.407	27.374	25.008	27.685	
C2 chrysenes	15.897	15.157	14.031	15.308	
C3 chrysenes	0.000	0.000	0.000	0.000	
C4 chrysenes	ND	ND	ND	ND	
benzo[b+k]fluoranthene	7.484	6.880	6.215	7.015	
benzo[e]pyrene	3.307	3.052	2.744	3.087	
benzo[a]pyrene	8.418	7.922	6.971	7.972	
perylene	2.981	3.007	2.644	2.950	
indeno[1,2,3-cd]pyrene	6.404	6.403	5.374	6.284	
dibenz[ah]anthracene	1.280	1.314	1.149	1.252	
benzo[ghi]perylene	3.164	3.079	2.647	3.036	
Total NOAA PAHs	387	368	327	418	
Total EPA PAHs (16)	118	111	100	125	
Surrogate recoveries					
biphenyl-d10	77.5%	89.8%	73.3%	79.8%	
benzo[b]fluoranthene-d12	80.1%	79.3%	76.1%	76.0%	

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EERC ID	87C-1	87C-2	87C-3	87C-4
RETEC Sample Collection Date	11/10/2006	11/10/2006	11/10/2006	11/10/2006
EERC Sample Receipt Date	11/14/2006	11/14/2006	11/14/2006	11/14/2006
EERC Run Date	11/29/2006	11/29/2006	11/29/2006	11/29/2006
EERC Run Number	2617A14.D	2617A15.D	2617A16.D	2617A17.D
AQUATOX Sample ID				
Sample Name	NB29	NB29	NB29	NB29
Treatment	Soxhlet	Soxhlet	Soxhlet	Soxhlet
Sample Weight, g	0.79	0.79	0.79	0.79
Matrix	Sediment	Sediment	Sediment	Sediment
Units	ug/g	ug/g	ug/g	ug/g
naphthalene	11.463	7.183	8.511	9.344
2-methylnaphthalene	14.122	7.041	7.486	9.130
1-methylnaphthalene	14.769	8.211	8.525	10.001
C2 naphthalenes	66.720 E	38.187	38.917	45.367
C3 naphthalenes	32.961 E	19.037	19.498	22.471
C4 naphthalenes	10.953	8.765	9.379	8.867
acenaphthylene	5.697	4.082	3.931	4.153
acenaphthene	27.506	16.629	16.827	19.356
fluorene	13.268	7.196	7.649	8.803
C1 fluorenes	22.265 E	12.371 E	13.545 E	14.894 E
C2 fluorenes	14.369	8.239	9.678	9.901
C3 fluorenes	ND	ND	ND	ND
phenanthrene	50.013	28.238	32.044	34.403
anthracene	33.792	18.954	20.758	22.702
C1 phenanthrenes/anthracenes	66.446 E	39.708 E	42.446 E	46.124
C2 phenanthrenes/anthracenes	102.133 E	65.722 E	72.858 E	74.113 E
C3 phenanthrenes/anthracenes	34.352	21.698	25.512	24.790
C4 phenanthrenes/anthracenes	3.796	2.880	3.452	3.261
fluoranthene	25.889	17.429	23.530	20.526
pyrene	31.425	22.290	27.068	24.919
C1 fluoranthenes/pyrenes	46.419 E	30.683 E	34.956 E	34.031 E
benz[a]anthracene	17.765	11.077	14.412	13.075
chrysene	17.100	11.520	14.750	13.170
C1 chrysenes	49.634	32.344	39.784	36.671
C2 chrysenes	25.754	18.375	22.174	20.067
C3 chrysenes	0.000	0.000	0.000	0.000
C4 chrysenes	ND	ND	ND	ND
benzo[b+k]fluoranthene	16.253	11.113	15.082	12.712
benzo[e]pyrene	6.381	4.448	5.743	4.964
benzo[a]pyrene	17.627	11.664	14.163	12.927
perylene	4.694	3.340	4.213	3.714
indeno[1,2,3-cd]pyrene	17.012 E	11.913 E	16.283 E	13.427 E
dibenz[ah]anthracene	2.996	2.188	2.956	2.410
benzo[ghi]perylene	7.382	5.341	6.957	5.857
Total NOAA PAHs	811	508	583	443
Total EPA PAHs (16)	295	187	225	164
Surrogate recoveries				
biphenyl-d10	94.0%	94.4%	94.3%	93.5%
benzo[b]fluoranthene-d12	76.8%	74.1%	75.1%	76.3%

Pore Water and Sediment Detection Limits

CAS Numbers	PAHs	Method	Pore Water Target Detection Limits ¹ (ug/L)	Pore Water Actual Detection Limits ³ (ug/L)	Sediment Target Detection Limits ^{1,2} (mg/Kg dry wt)	Sediment Actual Detection Limits ³ (mg/Kg dry wt)
91-20-3	Naphthalene	GC/MS	5.7	0.500	0.11	0.001
91-57-6	2-Methylnaphthalene	GC/MS	2.4	0.200	0.13	0.001
90-12-0	1-Methylnaphthalene	GC/MS	2.4	0.200	0.13	0.001
	C2 naphthalenes	GC/MS	0.89	0.600	0.15	0.005
	C3 naphthalenes	GC/MS	0.33	0.300	0.17	0.010
	C4 naphthalenes	GC/MS	0.12	0.050	0.19	0.010
208-96-8	Acenaphthylene	GC/MS	9.0	0.100	0.13	0.001
83-32-9	Acenaphthene	GC/MS	1.6	0.050	0.14	0.001
86-73-7	Fluorene	GC/MS	1.2	0.050	0.16	0.001
	C1 fluorenes	GC/MS	0.41	0.100	0.18	0.005
	C2 fluorenes	GC/MS	0.16	0.100	0.20	0.01
	C3 fluorenes	GC/MS	0.06	0.050	0.23	0.030
85-01-8	Phenanthrene	GC/MS	0.56	0.200	0.18	0.001
120-12-7	Anthracene	GC/MS	0.61	0.050	0.17	0.001
	C1 phenanthrenes/anthracenes	GC/MS	0.22	0.200	0.20	0.005
	C2 phenanthrenes/anthracenes	GC/MS	0.09	0.050	0.22	0.010
	C3 phenanthrenes/anthracenes	GC/MS	0.04	0.020	0.24	0.020
	C4 phenanthrenes/anthracenes	GC/MS	0.02	0.020	0.27	0.030
206-44-0	Fluoranthene	GC/MS	0.21	0.040	0.21	0.001
129-00-0	Pyrene	GC/MS	0.30	0.040	0.21	0.001
	C1 pyrene/fluoranthenes	GC/MS	0.14	0.050	0.23	0.005
56-55-3	Benz(a)anthracene	GC/MS	0.066	0.010	0.25	0.002
218-01-9	Chrysene	GC/MS	0.060	0.010	0.25	0.002
	C1 benz(a)anthracene/chrysenes	GC/MS	0.025	0.020	0.27	0.010
	C2 benz(a)anthracene/chrysenes	GC/MS	0.014	0.008	0.30	0.030
	C3 benz(a)anthracene/chrysenes	GC/MS	0.005	0.008	0.33	0.050
	C4 benz(a)anthracene/chrysenes	GC/MS	0.002	0.008	0.36	0.080
205-99-2 207-08-9	Benzo(b & k)fluoranthene ⁴	GC/MS	0.019	0.010	0.29	0.002
50-32-8	Benzo(a)pyrene	GC/MS	0.028	0.005	0.28	0.002
192-97-2	Benzo(e)pyrene	GC/MS	0.026	0.005	0.28	0.002
198-55-0	Perylene	GC/MS	0.026	0.005	0.28	0.002
193-39-5	Indeno(1,2,3-cd)pyrene	GC/MS	0.008	0.002	0.33	0.002
53-70-3	Dibenz(a,h)anthracene	GC/MS	0.008	0.002	0.33	0.002
191-24-2	Benzo(g,h,i)perylene	GC/MS	0.013	0.002	0.32	0.002

Notes:

- (1) Target detection limits for both sediment and pore water are 1/34th of the concentration of each individual PAH that corresponds to one toxic unit as described in U. S. EPA (2003) *Equilibrium Partitioning Sediment Guidelines (ESGs) for the Protection of Benthic Organisms*
- (2) Sediment target detection limits were estimated assuming 1.0 % total organic carbon. Actual laboratory detection limit for sediments and pore water are based on previous research studies.
- (3) Benzo[b]fluoranthene and benzo[k]fluoranthene are reported as their sum because of insufficient chromatographic resolution.

Appendix B

Severn Trent Laboratory (STL) Laboratory Report

STL Burlington
Colchester, Vermont

Sample Data Summary
Package

SDG: 117694

STL Burlington
 208 South Park Drive, Suite 1
 Colchester, VT 05446

Tel: 802 655 1203 Fax: 802 655 1248
 www.stl-inc.com

December 15, 2006

Mr. Joseph Kreitinger
 The Retec Group
 1001 West Seneca Street
 Suite 204
 Ithica, NY 14850

Re: Laboratory Project No. 26000
Case: NEWBURGH; SDG: 117694

Dear Mr. Kreitinger:

Enclosed are the analytical results for the samples that were received by STL Burlington on November 27th, 2006. Laboratory identification numbers were assigned, and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/27/06 ETR No: 117694			
690563A	NB01	11/07/06	SEDIMENT
690564A	NB02	11/07/06	SEDIMENT
690565A	NB03	11/07/06	SEDIMENT
690566A	NB04	11/08/06	SEDIMENT
690567A	NB05	11/08/06	SEDIMENT
690568A	NB06	11/08/06	SEDIMENT
690569A	NB07	11/08/06	SEDIMENT
691104A	NB08	11/08/06	SEDIMENT
691105A	NB09	11/08/06	SEDIMENT
691106A	NB10	11/08/06	SEDIMENT
691107A	NB11	11/09/06	SEDIMENT
691108A	NB12	11/09/06	SEDIMENT
691114A	NB18	11/10/06	SEDIMENT
691116A	NB20	11/10/06	SEDIMENT
691118A	NB22	11/10/06	SEDIMENT
691119A	NB23	11/10/06	SEDIMENT
691120A	NB24	11/10/06	SEDIMENT
691121A	NB25	11/10/06	SEDIMENT
691122A	NB26	11/10/06	SEDIMENT
691123A	NB27	11/10/06	SEDIMENT
691125A	NB29	11/10/06	SEDIMENT


Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

A determination of grain size was performed on each sample by ASTM D422. Additionally, the samples were analyzed for ammonia nitrogen by USEPA Method 350.2, and for pH by SW846 Method 9045. Laboratory control samples were analyzed in association with the samples, and there was an acceptable performance demonstrated in each those analyses.

The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 655-1203.

Sincerely,



Jeff Davin
Project Manager

Enclosure

STL Burlington Data Qualifier Definitions

Organic

- U: Compound analyzed but not detected at a concentration above the reporting limit.
- J: Estimated value.
- N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.
- P: SW-846: Greater than 40% difference for detected concentrations between two GC columns. Unless otherwise specified the higher of the two values is reported on the Form I.
- CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.
- C: Pesticide result whose identification has been confirmed by GC/MS.
- B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.
- E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.
- D: Concentrations identified from analysis of the sample at a secondary dilution.
- A: Tentatively identified compound is a suspected aldol condensation product.
- X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

- E: Reported value is estimated due to the presence of interference.
- N: Matrix spike sample recovery is not within control limits.
- * Duplicate sample analysis is not within control limits.
- B: The result reported is less than the reporting limit but greater than the instrument detection limit.
- U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

- P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

Chain of Custody Record

No 0807

The RETEC Group, Inc.
 1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
 (607) 277-5716 Phone • (607) 277-9057 Fax
 www.retec.com



Project Name: <i>Newburgh</i>		Project Number: <i>CHGEZ-19695</i>		Analysis Requested		Purchase Order #:		Page <u>1</u> of <u>2</u>	
Send Report To: <i>N. Azolina</i>		Sampler (Print Name): <i>N. Azolina</i>							
Address: <i>1001 W. Seneca St.</i>		Sampler (Print Name): <i>H. Jones</i>							
<i>Suite 204</i>		Shipment Method: <i>Fed Ex</i>							
<i>Ithaca, NY 14850</i>		Airbill Number:							
Phone: <i>607-277-5710</i>		Laboratory Receiving: <i>STL</i>							
Fax:									
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)			
<i>NB08</i>	<i>11/8/06</i>		<i>Soil</i>	<i>2</i>	<i># archive only</i>				
<i>NB09</i>	<i>↓</i>				<i>with RETEC</i>				
<i>NB10</i>					<i>emails work.</i>				
<i>NB11</i>	<i>11/9/06</i>								
<i>NB12</i>									
<i>NB13</i>									
<i>NB14</i>									
<i>NB15</i>									
<i>NB16</i>									
<i>NB17</i>									
<i>NB18</i>	<i>11/16/06</i>								
<i>NB19</i>									
<i>NB20</i>									
<i>NB21</i>									
<i>NB22</i>									
<i>NB23</i>									
<i>NB24</i>									
Relinquished by: (Signature)	Received by: (Signature)	Date:	Sample Custodian Remarks (Completed By Laboratory):		Turnaround		Sample Receipt		
<i>[Signature]</i>	<i>[Signature]</i>	<i>11/13/06</i>			<input type="checkbox"/> Routine <input type="checkbox"/> 24 Hour <input type="checkbox"/> 1 Week <input type="checkbox"/> Other		Total # Containers Received? COC Seals Present? COC Seals Intact? Received Containers Intact? Temperature?		
Relinquished by: (Signature)	Received by: (Signature)	Date:							
Relinquished by: (Signature)	Received by: (Signature)	Date:							

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy

COPY - ORIGINAL ON FILE EPC # 117463 FIR # 117463

Chain of Custody Record

No 0497

The RETEC Group, Inc.
1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
(607) 277-5716 Phone • (607) 277-9057 Fax
www.retec.com



Project Name: <i>Newburgh</i>		Project Number: <i>CHGE2-19695</i>		Analysis Requested		Purchase Order #:		Page <i>2</i> of <i>2</i>	
Send Report To: <i>N. Arzola</i>		Sampler (Print Name): <i>N. Arzola</i>				Comments, Special Instructions, etc.		Lab Sample ID (to be completed by lab)	
Address:		Sampler (Print Name): <i>H. Jones</i>							
Phone:		Shipment Method: <i>Feed Exp</i>							
Fax:		Laboratory Receiving: <i>SIC</i>		Airbill Number:		Total # Containers Received?		COC Seals Present?	
Field Sample ID		Sample Date		Sample Time		Sample Matrix		Number of Containers	
<i>NB25</i>		<i>11/16/06</i>		<i>↓</i>		<i>sed</i>		<i>2</i>	
<i>NB26</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>	
<i>NB27</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>	
<i>NB28</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>	
<i>NB29</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>		<i>↓</i>	

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
<i>[Signature]</i>	<i>[Signature]</i>	<i>11-14-06</i>	<i>10:15</i>
<i>[Signature]</i>	<i>[Signature]</i>		
<i>[Signature]</i>	<i>[Signature]</i>		

QA/QC Level	Turnaround
Level I <input type="checkbox"/>	Routine <input type="checkbox"/>
Level II <input type="checkbox"/>	24 Hour <input type="checkbox"/>
Level III <input type="checkbox"/>	1 Week <input type="checkbox"/>
Other <input type="checkbox"/>	Other <input type="checkbox"/>

Received by: (Signature)	Received by: (Signature)	Received by: (Signature)
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
Date:	Date:	Date:

COPY - ORIGINAL ON FILE
 SDC # 117463 ETR # 117462

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy

Chain of Custody Record

No. 0800

The RETEC Group, Inc.
1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
(607) 277-5716 Phone • (607) 277-9057 Fax
www.retec.com



Project Name: Newburgh Report To: N. Azzoline Address: 1001 W. Seneca St Suite 204 Ithaca, NY 14850 Phone: (607) 277-5716 Fax: _____	Project Number: CHGE2-19695 Sampler (Print Name): N. Azzoline Sampler (Print Name): H. Jones Shipment Method: Fed Ex Airbill Number: _____ Laboratory Receiving: STL	Analysis Requested _____ Purchase Order #: _____ Comments, Special Instructions, etc. _____ Lab Sample ID (to be completed by lab) _____	Page 1 of 11		
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Sample Custodian Remarks (Completed By Laboratory):
NB 01	11/7/06	1405	sediment	2	*archive only until RETEC e-mail work.
NB 02	11/7/06	1455	"	"	
NB 03	11/7/06	1600	"	"	
NB 04	11/8/06	0730	"	"	
NB 05	11/8/06	0805	"	"	
NB 06	11/8/06	1100	"	"	
NB 07	11/8/06	1140	"	"	
Relinquished by: (Signature) _____ Date: 11/9/06 Time: 10:10 Relinquished by: (Signature) _____ Date: _____ Time: _____ Relinquished by: (Signature) _____ Date: _____ Time: _____					Sample Receipt Total # Containers Received? _____ COC Seals Present? <input type="checkbox"/> COC Seals Intact? <input type="checkbox"/> Received Containers Intact? <input type="checkbox"/> Temperature? _____

Chain of Custody Record

No 0807

The RETEC Group, Inc.
1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
(607) 277-5716 Phone • (607) 277-9657 Fax
www.retec.com



Project Name: <i>Newburgh</i>		Project Number: <i>CHGEZ-19695</i>		Analysis Requested			
Send Report To: <i>N. Azolina</i>		Sampler (Print Name): <i>N. Azolina</i>		Purchase Order #:			
Address: <i>1001 W. Seneca St.</i>		Sampler (Print Name): <i>H. Jones</i>		Comments, Special Instructions, etc.			
<i>Suite 204</i>		<i>J. Koch</i>		* archive only with RETEC emails work.			
<i>Ithaca, NY 14850</i>		<i>Fed Ex</i>					
Phone: <i>607-277-5716</i>		Laboratory Receiving: <i>STL</i>		Lab Sample ID (to be completed by lab)			
Fax:							
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	QA/QC Level	Turnaround	Sample Receipt
<i>NB08</i>	<i>11/8/06</i>		<i>seal</i>	<i>2</i>	Level I <input type="checkbox"/>	Routine <input type="checkbox"/>	Total # Containers Received?
<i>NB09</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>	Level II <input type="checkbox"/>	24 Hour <input type="checkbox"/>	COC Seals Present?
<i>NB10</i>	<i>11/9/06</i>		<i>↓</i>	<i>↓</i>	Level III <input type="checkbox"/>	1 Week <input type="checkbox"/>	COC Seals Intact?
<i>NB11</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>	Other <input type="checkbox"/>	Other _____	Received Containers Intact?
<i>NB12</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			Temperature?
<i>NB13</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB14</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB15</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB16</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB17</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB18</i>	<i>11/10/06</i>		<i>↓</i>	<i>↓</i>			
<i>NB19</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB20</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB21</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB22</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB23</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
<i>NB24</i>	<i>↓</i>		<i>↓</i>	<i>↓</i>			
Relinquished by: (Signature) <i>[Signature]</i>		Received by: (Signature) <i>[Signature]</i>		Date: <i>11-14-06</i>		Time: <i>105</i>	
Relinquished by: (Signature) <i>[Signature]</i>		Received by: (Signature) <i>[Signature]</i>		Date: <i>11-13-06</i>		Time: <i>105</i>	
Relinquished by: (Signature) <i>[Signature]</i>		Received by: (Signature) <i>[Signature]</i>		Date: <i>11-13-06</i>		Time: <i>105</i>	

Chain of Custody Record

No 0497

The RETEC Group, Inc.
1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
(607) 277-5716 Phone • (607) 277-9057 Fax
www.retec.com



Project Name: Newburgh Project Number: CHG E2-19695
 Send Report To: N. Arzoline Sampler (Print Name): N. Arzoline
 Address: _____ Sampler (Print Name): H. Jones
 Shipment Method: Fed Ex Airbill Number: _____
 Laboratory Receiving: STC

Analysis Requested

Purchase Order #: _____

Comments, Special Instructions, etc.

Lab Sample ID (to be completed by lab)

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers
<u>NB25</u>	<u>11/01/06</u>		<u>sed</u>	<u>2</u>
<u>NB26</u>				
<u>NB27</u>				
<u>NB28</u>				
<u>NB29</u>				

Relinquished by: (Signature) [Signature] Date: 11-14-06 Time: 1015
 Relinquished by: (Signature) [Signature] Date: _____ Time: _____
 Relinquished by: (Signature) _____ Date: _____ Time: _____

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level
 Level I Level II Level III Other

Turnaround
 Routine 24 Hour 1 Week Other _____

Sample Receipt
 Total # Containers Received? _____
 COC Seals Present? _____
 COC Seals Intact? _____
 Received Containers Intact? _____
 Temperature? _____

Chain of Custody Record

No 0800

The RETEC Group, Inc.
1001 W. Seneca Street, Suite 204 • Ithaca, NY 14850-3342
(607) 277-5716 Phone • (607) 277-9057 Fax
www.retec.com



Project Name: Newburgh		Project Number: CHGE2-19695		Analysis Requested		Purchase Order #:		Lab Sample ID (to be completed by lab)							
Client Report To: N. Azzoline		Sampler (Print Name): N. Azzoline													
Address: 1001 W. Seneca St		Sampler (Print Name): H. Jones													
Suite 204		Shipment Method: Fed Ex													
Ithaca, NY 14850		Airbill Number:													
Phone: (607) 277-5716		Laboratory Receiving: STL													
Fax:															
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Comments, Special Instructions, etc.	QA/QC Level	Turnaround	Total # Containers Received?	COC Seals Present?	COC Seals Intact?	Received Containers Intact?	Temperature?			
NB 01	11/7/06	1405	sediment	2	*archive only										
NB 02	11/7/06	1455	"	"	unpl RETEC										
NB 03	11/7/06	1600	"	"	e-mail work.										
NB 04	11/8/06	0730	"	"											
NB 05	11/8/06	0805	"	"											
NB 06	11/8/06	1100	"	"											
NB 07	11/8/06	1140	"	"											
Relinquished by: (Signature)		Received by: (Signature)		Date: 11/9/06		Time: 1040		Level I <input type="checkbox"/>		Level II <input type="checkbox"/>		Level III <input type="checkbox"/>		Other <input type="checkbox"/>	
Relinquished by: (Signature)		Received by: (Signature)		Date:		Time:		Level I <input type="checkbox"/>		Level II <input type="checkbox"/>		Level III <input type="checkbox"/>		Other <input type="checkbox"/>	
Relinquished by: (Signature)		Received by: (Signature)		Date:		Time:		Level I <input type="checkbox"/>		Level II <input type="checkbox"/>		Level III <input type="checkbox"/>		Other <input type="checkbox"/>	

COPY - ORIGINAL ON FILE 117394

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy



Sample Data Summary Package - Wet Chemistry

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB01

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690563A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 61.4

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	8.1	42.6	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.9	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		61.4	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB02

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690564A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 41.7

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	10.9	145	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.7	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		41.7	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB03

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690565A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 46.9

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	9.9	169	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.7	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		46.9	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB04

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690566A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 52.6

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	2	17.6	200	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.5	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		52.6	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB05

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690567A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 39.4

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	11.0	174	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		39.4	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB06

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690568A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 38.8

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	2	24.3	282	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		38.8	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB07

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 690569A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 36.2

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	12.2	240	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.7	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		36.2	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB08

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691104A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 49.8

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	9.2	104	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.9	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		49.8	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB09

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691105A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 50.1

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	10.1	93.5	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	7.0	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		50.1	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB10

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691106A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 39.1

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	13.1	248	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.9	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		39.1	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB11

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691107A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 36.9

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	13.4	216	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	7.1	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		36.9	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB12

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691108A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 35.4

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	2	26.9	284	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	7.1	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		35.4	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB18

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691114A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 51.4

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	9.5	127	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		51.4	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB20

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691116A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 51.2

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	8.4	143	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		51.2	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB22

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691118A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 34.9

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	13.0	173	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		34.9	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB23

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691119A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 44.5

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	10.3	178	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.7	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		44.5	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB24

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691120A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 63.8

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	1	7.8	97.7	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.6	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		63.8	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB25

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691121A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 43.5

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/07/06	BLKNH120706A	mg/Kg	1	42.6	238	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.8	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		43.5	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB26

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691122A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 44.6

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/07/06	BLKNH120706A	mg/Kg	1	53.4	141	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	6.6	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		44.6	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB27

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691123A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 50.8

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/07/06	BLKNH120706A	mg/Kg	1	30.8	186	
9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	1	0.0	7.0	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		50.8	

WET CHEMISTRY

Sample Report Summary

Client Sample No.

NB29

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Lab Sample ID: 691125A

Matrix: SEDIMENT

Client: RETEC2

Date Received: 11/27/06

% Solids: 38.8

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
350.2	Ammonia-Nitrogen	12/07/06	BLKNH120706A	mg/Kg	1	44.4	143	
9045	Soil pH (std. units)	12/01/06	BLKPH120106B	pH Units	1	0.0	7.1	
IN623	Solids, Percent	12/01/06	N/A	%	1.0		38.8	

WET CHEMISTRY

Method Blank Report Summary

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVT

Case No.: NEWBURGH

Matrix: SOIL

Client: RETEC2

% Solids:

Lab Sample ID	Method	Parameter	Conc.	Units	Qual.	DF	RL	Analytical Run Date	Analytical Batch
BLKNH120406A	350.2	Ammonia-Nitrogen	5.0	mg/Kg	U	1	5.0	12/04/06	BLKNH120406A
BLKNH120706A	350.2	Ammonia-Nitrogen	5.0	mg/Kg	U	1	5.0	12/07/06	BLKNH120706A
BLKPH120106A	9045	Soil pH (std. units)	6.6	pH Units		1	0.0	12/01/06	BLKPH120106A
BLKPH120106B	9045	Soil pH (std. units)	6.5	pH Units		1	0.0	12/01/06	BLKPH120106B

WET CHEMISTRY

Laboratory Control Sample Report Summary

Lab Name: STL BURLINGTON

Contract: WO (110106)

SDG No.: 117694

Lab Code: STLVLT

Case No.: NEWBURGH

Matrix: SOIL

Client: RETEC2

% Solids:

Lab Sample ID	Method	Parameter	Analytical Run Date	Analytical Batch	Units	LCS Conc.	True Value	% Rec.	Control Limit
LCSNH120406A	350.2	Ammonia-Nitrogen	12/04/06	BLKNH120406A	mg/Kg	39.6	40.0	99	85-115
LCSNH120706A	350.2	Ammonia-Nitrogen	12/07/06	BLKNH120706A	mg/Kg	35.6	40.0	89	85-115
LCSPH120106A	9045	Soil pH (std. units)	12/01/06	BLKPH120106A	pH Units	6.0	6.0	100	99-101
LCSPH120106B	9045	Soil pH (std. units)	12/01/06	BLKPH120106B	pH Units	6.0	6.0	100	99-101



Sample Data Summary Package - Geotechnical

Particle Size of Soils by ASTM D422

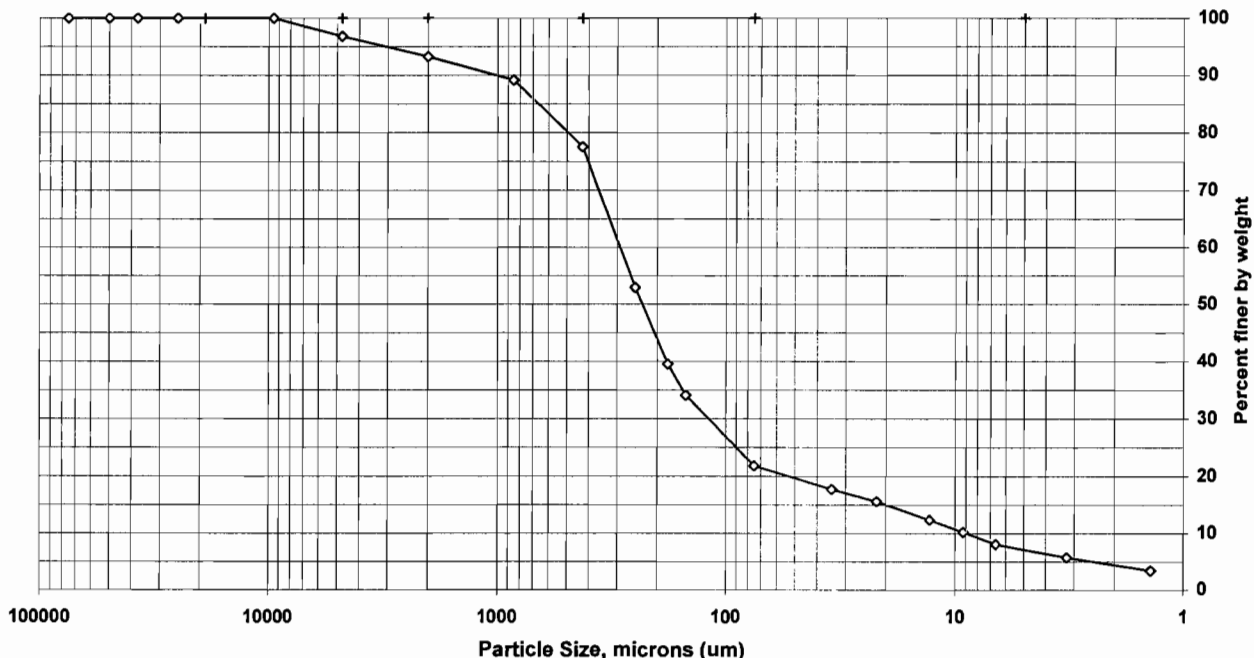
Client Code: RETEC2
 Sample ID: NB01
 Lab ID: 690563A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 64.3%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: 9.5 mm

Non-soil material: shell, plant
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	96.8	3.2
#10	2000	93.3	3.5
#20	850	89.2	4.1
#40	425	77.6	11.6
#60	250	52.9	24.6
#80	180	39.6	13.3
#100	150	34.1	5.4
#200	75	21.8	12.3
Hydrometer	34.5	17.7	4.1
	22.0	15.6	2.1
	12.9	12.4	3.2
	9.2	10.2	2.1
	6.6	8.1	2.1
	3.2	5.7	2.3
V	1.4	3.4	2.3

Soil Classification	Percent of Total Sample
Gravel	3.2
Sand	75.0
Coarse Sand	3.5
Medium Sand	15.7
Fine Sand	55.7
Silt	13.8
Clay	8.1

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

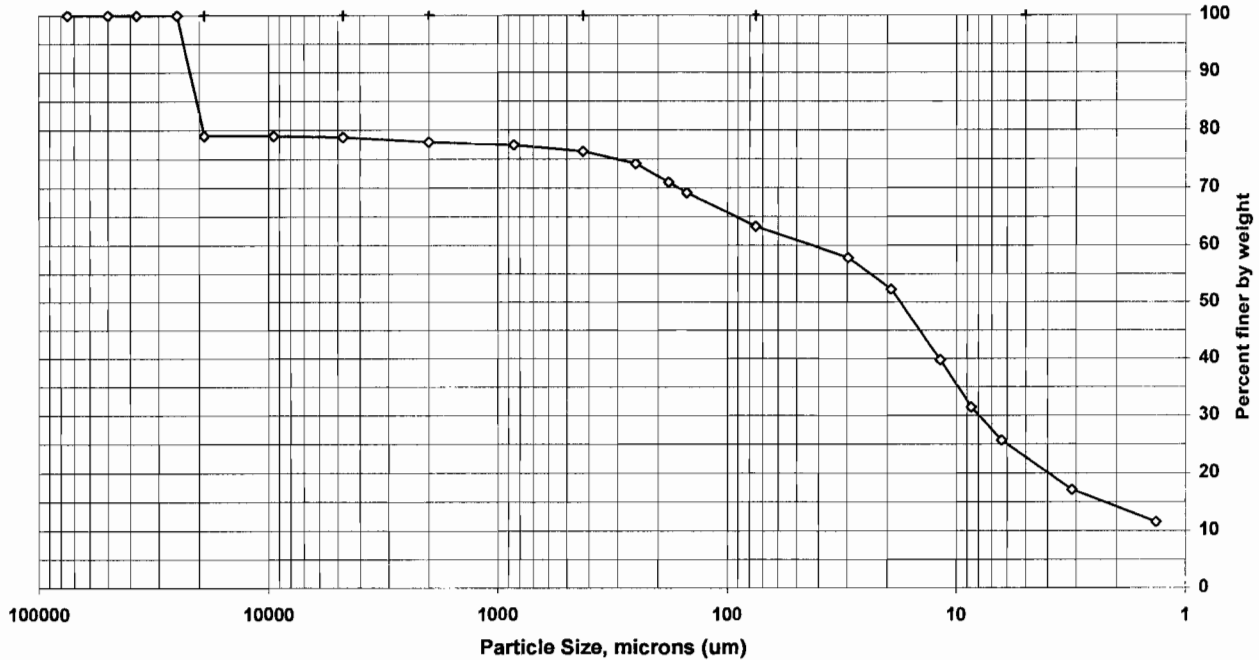
Client Code: RETEC2
 Sample ID: NB02
 Lab ID: 690564A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 47.3%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: 25 mm

Non-soil material: shell, plant
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	79.0	21.0
3/8 inch	9500	79.0	0.0
#4	4750	78.8	0.2
#10	2000	78.0	0.8
#20	850	77.4	0.5
#40	425	76.3	1.1
#60	250	74.2	2.1
#80	180	70.9	3.3
#100	150	69.1	1.8
#200	75	63.3	5.8
Hydrometer	29.7	57.8	5.5
	19.3	52.3	5.6
	11.7	39.8	12.5
	8.6	31.5	8.3
	6.3	25.7	5.8
	3.1	17.1	8.6
V	1.3	11.6	5.6

Soil Classification	Percent of Total Sample
Gravel	21.2
Sand	15.5
Coarse Sand	0.8
Medium Sand	1.7
Fine Sand	13.0
Silt	37.6
Clay	25.7

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

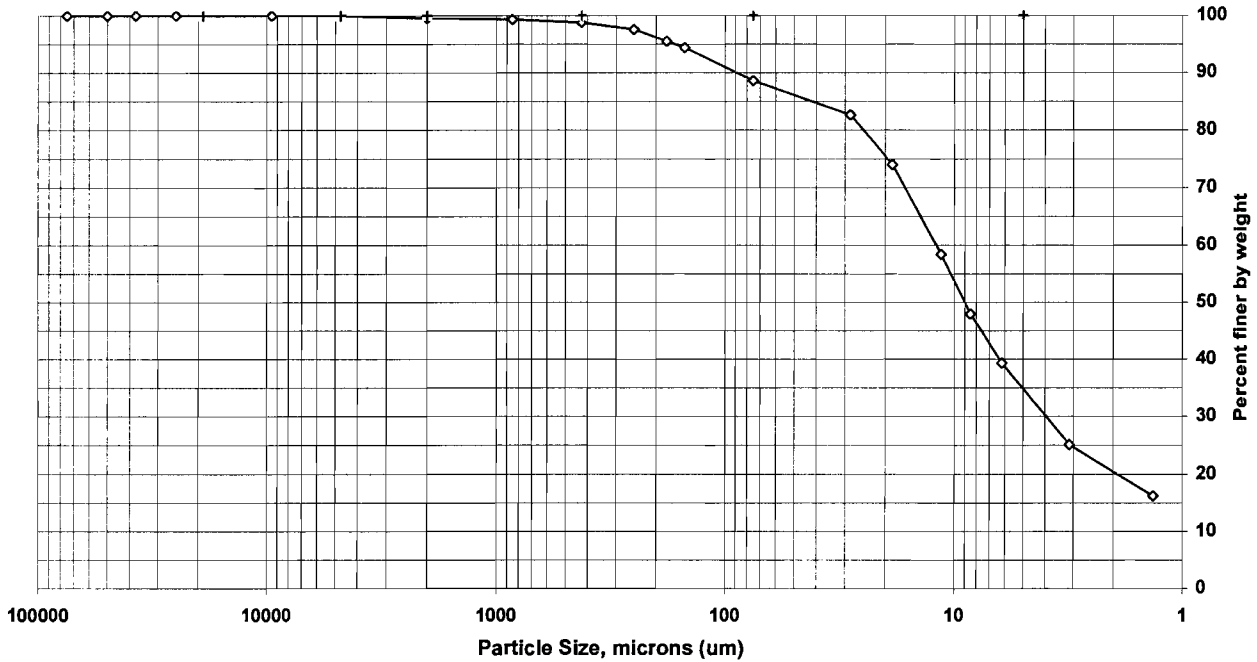
Client Code: RETEC2
 Sample ID: NB03
 Lab ID: 690565A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 42.5%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Crs sand

Non-soil material: plant
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.6	0.4
#20	850	99.3	0.3
#40	425	98.8	0.5
#60	250	97.5	1.3
#80	180	95.5	2.0
#100	150	94.4	1.2
#200	75	88.6	5.7
Hydrometer	28.5	82.7	5.9
	18.7	74.0	8.7
	11.4	58.4	15.6
	8.5	48.0	10.4
	6.2	39.3	8.7
	3.1	25.2	14.2
V	1.3	16.2	9.0

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	11.4
Coarse Sand	0.4
Medium Sand	0.8
Fine Sand	10.2
Silt	49.3
Clay	39.3

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

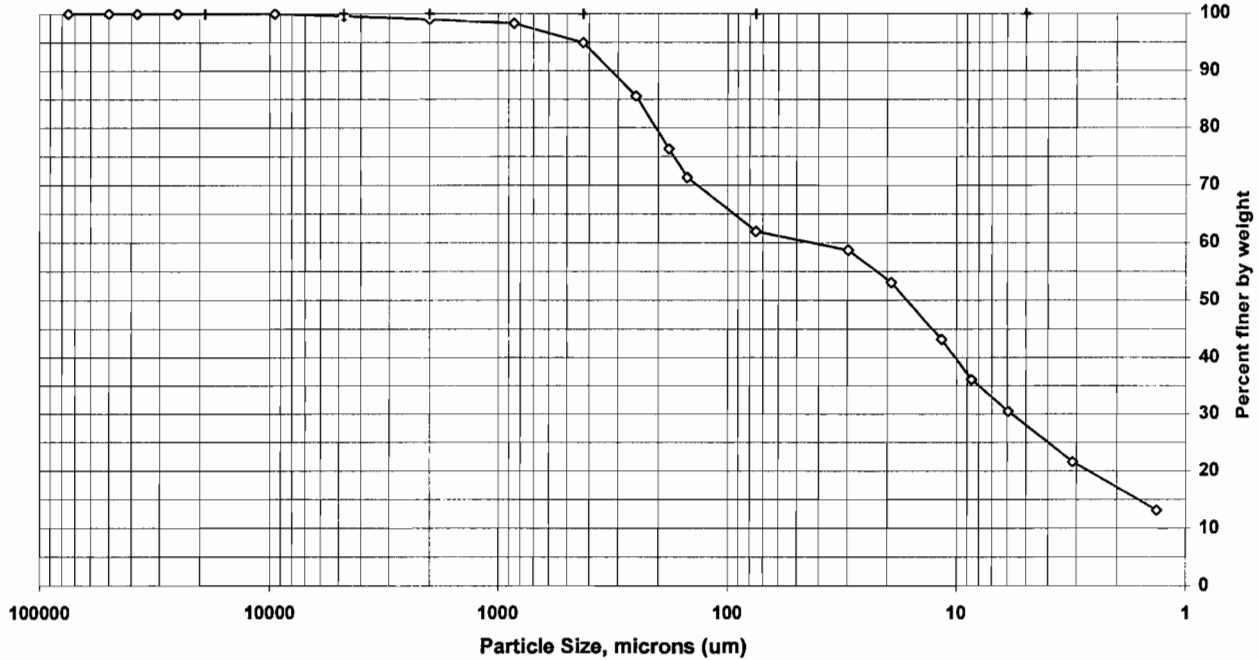
Client Code: RETEC2
 Sample ID: NB04
 Lab ID: 690566A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 54.0%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: 9.5 mm

Non-soil material: plant
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.6	0.4
#10	2000	99.1	0.5
#20	850	98.3	0.8
#40	425	94.9	3.4
#60	250	85.6	9.4
#80	180	76.3	9.3
#100	150	71.3	4.9
#200	75	62.0	9.4
Hydrometer	29.7	58.7	3.2
	19.3	53.1	5.6
	11.6	43.2	9.9
	8.6	36.2	7.0
	6.0	30.5	5.6
	3.1	21.6	8.9
V	1.3	13.2	8.5

Soil Classification	Percent of Total Sample
Gravel	0.4
Sand	37.6
Coarse Sand	0.5
Medium Sand	4.1
Fine Sand	33.0
Silt	31.4
Clay	30.5

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

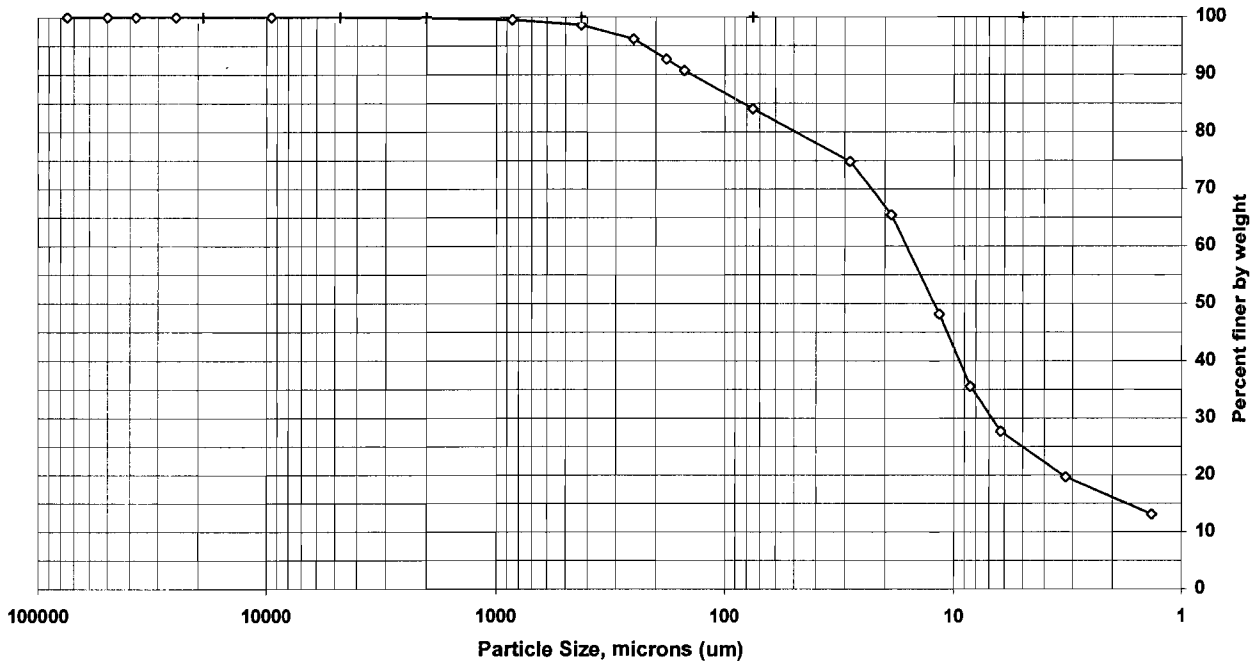
Client Code: RETEC2
 Sample ID: NB05
 Lab ID: 690567A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 40.8%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Crs sand

Non-soil material: plant
 Shape (> #10): subrounded
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	99.5	0.3
#40	425	98.7	0.9
#60	250	96.2	2.5
#80	180	92.7	3.5
#100	150	90.7	2.0
#200	75	84.1	6.6
Hydrometer	28.5	74.8	9.2
	18.8	65.4	9.4
	11.6	48.1	17.3
	8.4	35.6	12.6
	6.2	27.7	7.8
	3.2	19.6	8.1
V	1.4	13.1	6.5

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	15.9
Coarse Sand	0.2
Medium Sand	1.2
Fine Sand	14.6
Silt	56.3
Clay	27.7

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

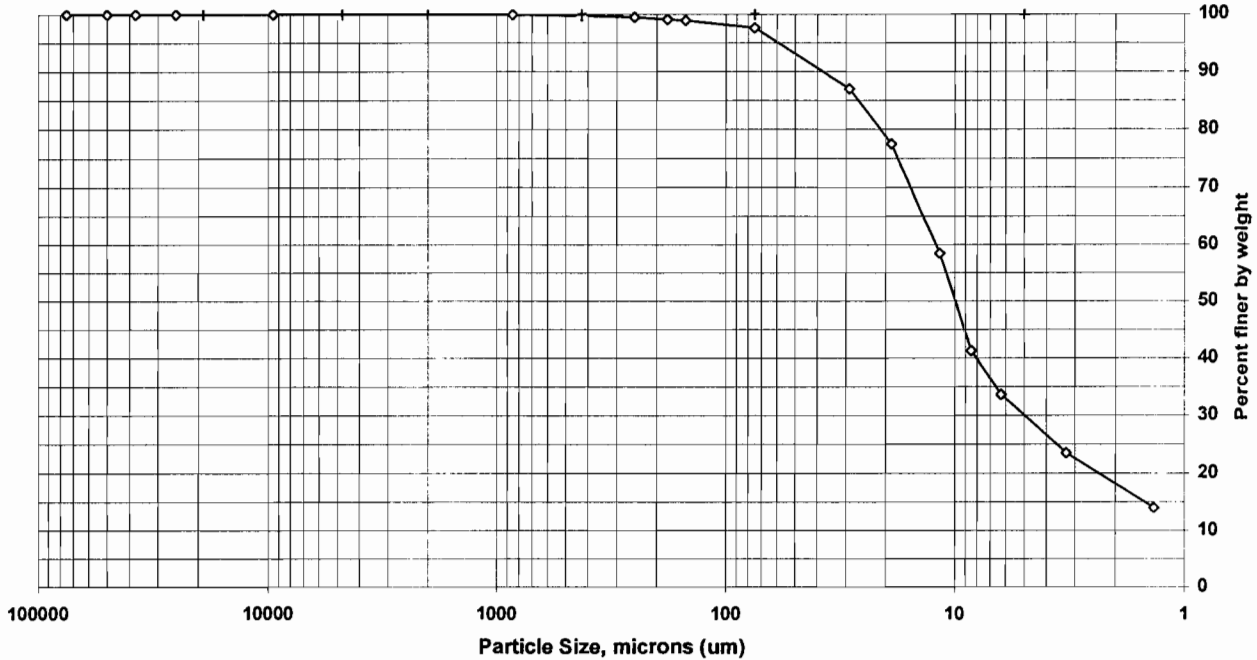
Client Code: RETEC2
 Sample ID: NB06
 Lab ID: 690568A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 38.5%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Med sand

Non-soil material: n/a
 Shape (> #10): n/a
 Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.8	0.2
#60	250	99.5	0.3
#80	180	99.1	0.4
#100	150	98.9	0.2
#200	75	97.7	1.3
Hydrometer	28.9	87.0	10.6
	18.9	77.5	9.5
	11.6	58.4	19.1
	8.5	41.3	17.2
	6.3	33.7	7.6
	3.3	23.5	10.2
V	1.4	14.0	9.5

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	2.3
Coarse Sand	0.0
Medium Sand	0.2
Fine Sand	2.1
Silt	64.0
Clay	33.7

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

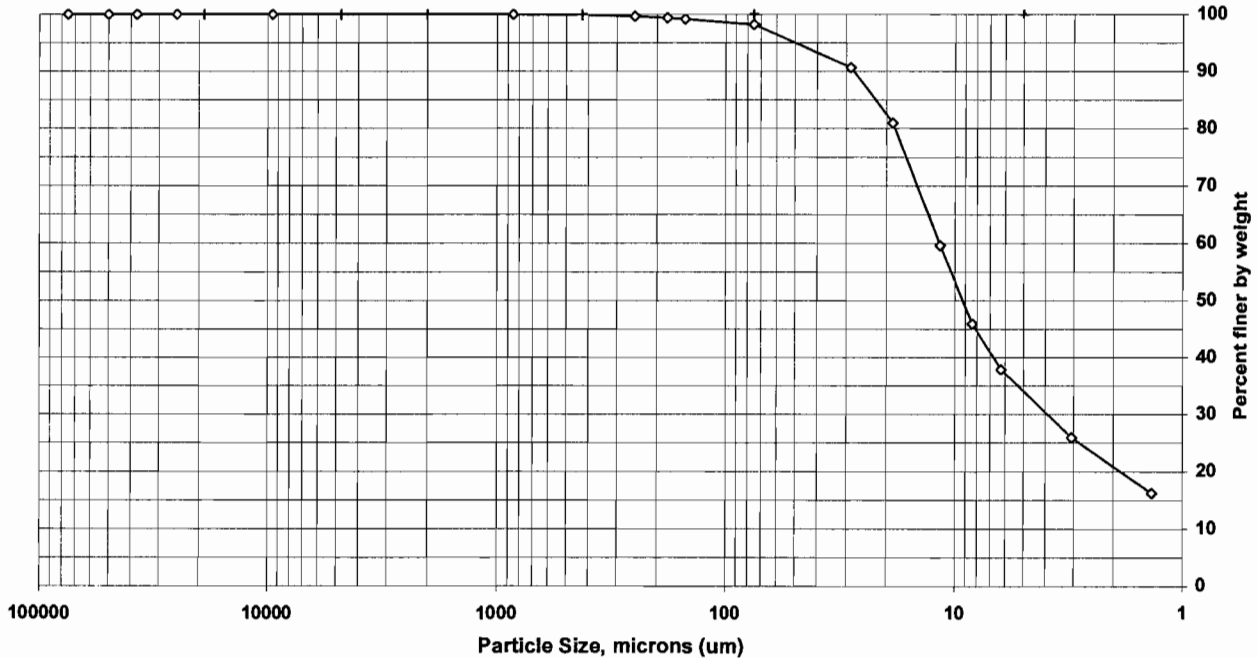
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 Sample ID: NB07
 Lab ID: 690569A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 36.7%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Med sand

Non-soil material: n/a
 Shape (> #10): n/a
 Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	100.0	0.0
#40	425	99.9	0.1
#60	250	99.7	0.2
#80	180	99.4	0.3
#100	150	99.2	0.2
#200	75	98.2	1.0
Hydrometer	28.7	90.7	7.5
	18.8	80.9	9.7
	11.6	59.6	21.4
	8.4	46.0	13.6
	6.3	37.9	8.1
	3.1	25.9	12.0
V	1.4	16.2	9.7

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	1.8
Coarse Sand	0.0
Medium Sand	0.1
Fine Sand	1.7
Silt	60.3
Clay	37.9

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with
 a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

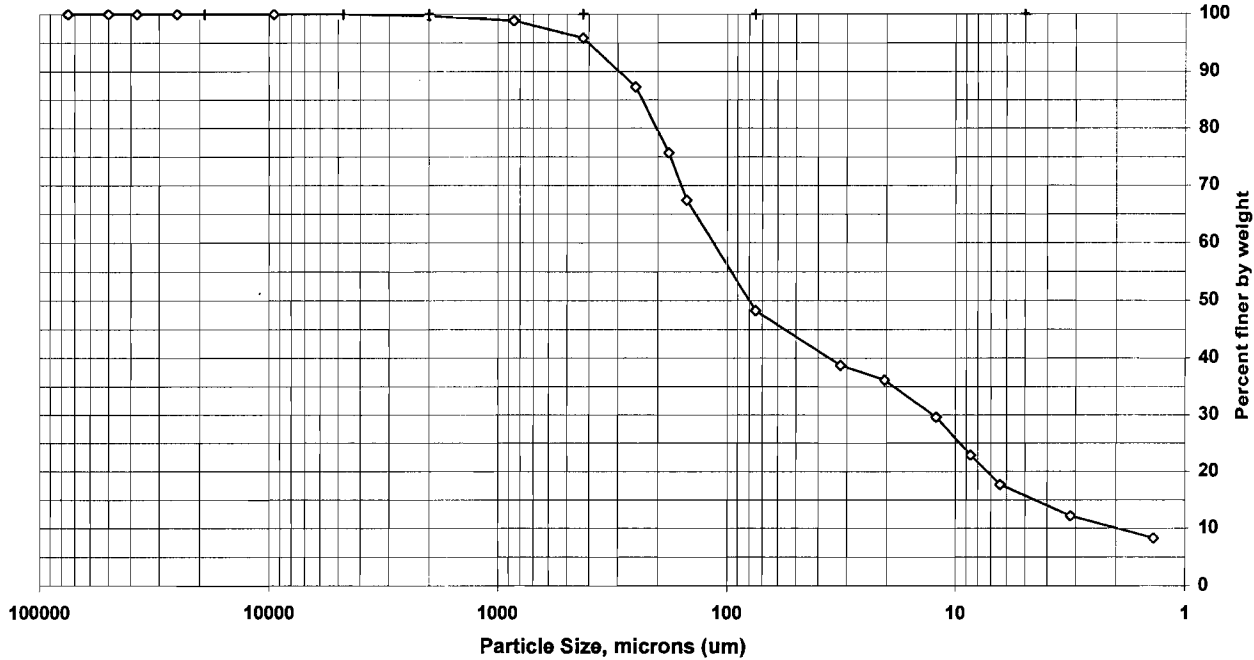
Client Code: RETEC2
 Sample ID: NB08
 Lab ID: 691104A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 52.6%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Crs sand

Non-soil material: plant,shell
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.7	0.3
#20	850	98.8	0.8
#40	425	95.8	3.0
#60	250	87.3	8.5
#80	180	75.7	11.6
#100	150	67.4	8.3
#200	75	48.3	19.1
Hydrometer	32.0	38.8	9.5
	20.5	36.2	2.6
	12.1	29.6	6.5
	8.6	22.9	6.8
	6.4	17.7	5.2
	3.2	12.2	5.4
V	1.4	8.3	3.9

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	51.7
Coarse Sand	0.3
Medium Sand	3.8
Fine Sand	47.6
Silt	30.6
Clay	17.7

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

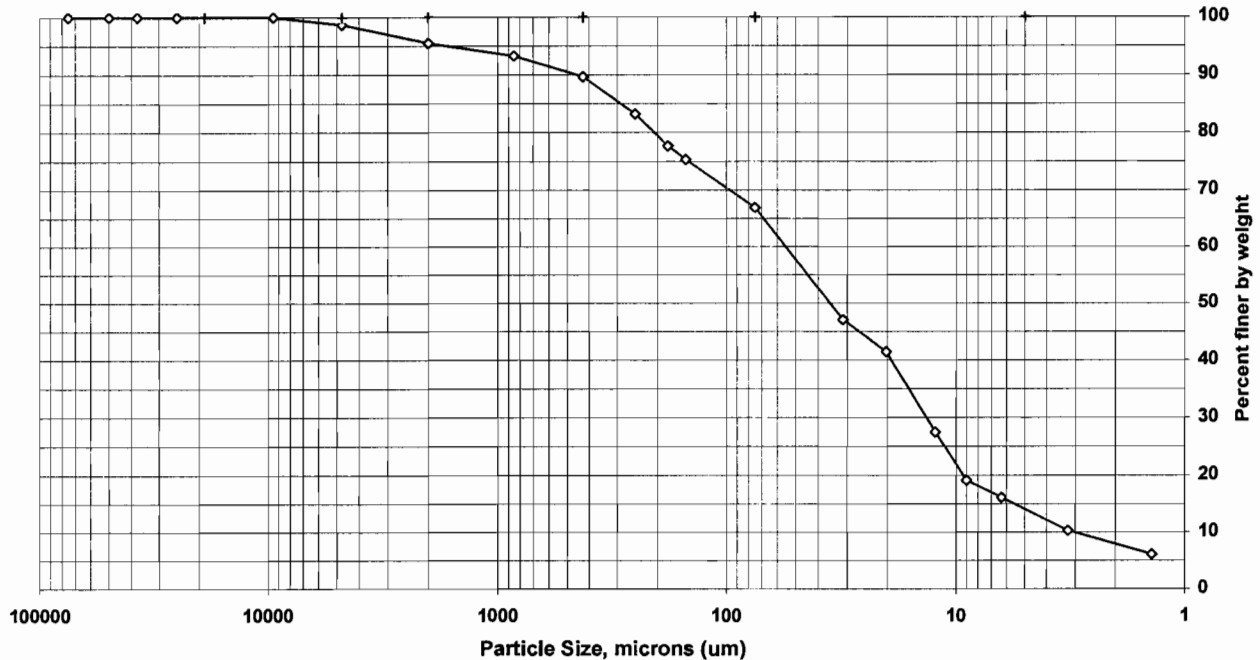
Client Code: RETEC2
 Sample ID: NB09
 Lab ID: 691105A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 45.8%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: 9.5 mm

Non-soil material: plant, shell
 Shape (> #10): subangular
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.7	1.3
#10	2000	95.5	3.2
#20	850	93.3	2.2
#40	425	89.7	3.6
#60	250	83.2	6.5
#80	180	77.7	5.5
#100	150	75.3	2.4
#200	75	66.9	8.4
Hydrometer	31.2	47.1	19.8
	20.2	41.5	5.6
	12.3	27.5	14.0
	9.0	19.1	8.4
	6.3	16.1	3.0
	3.2	10.3	5.8
V	1.4	6.1	4.2

Soil Classification	Percent of Total Sample
Gravel	1.3
Sand	31.8
Coarse Sand	3.2
Medium Sand	5.8
Fine Sand	22.8
Silt	50.8
Clay	16.1

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with
 a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

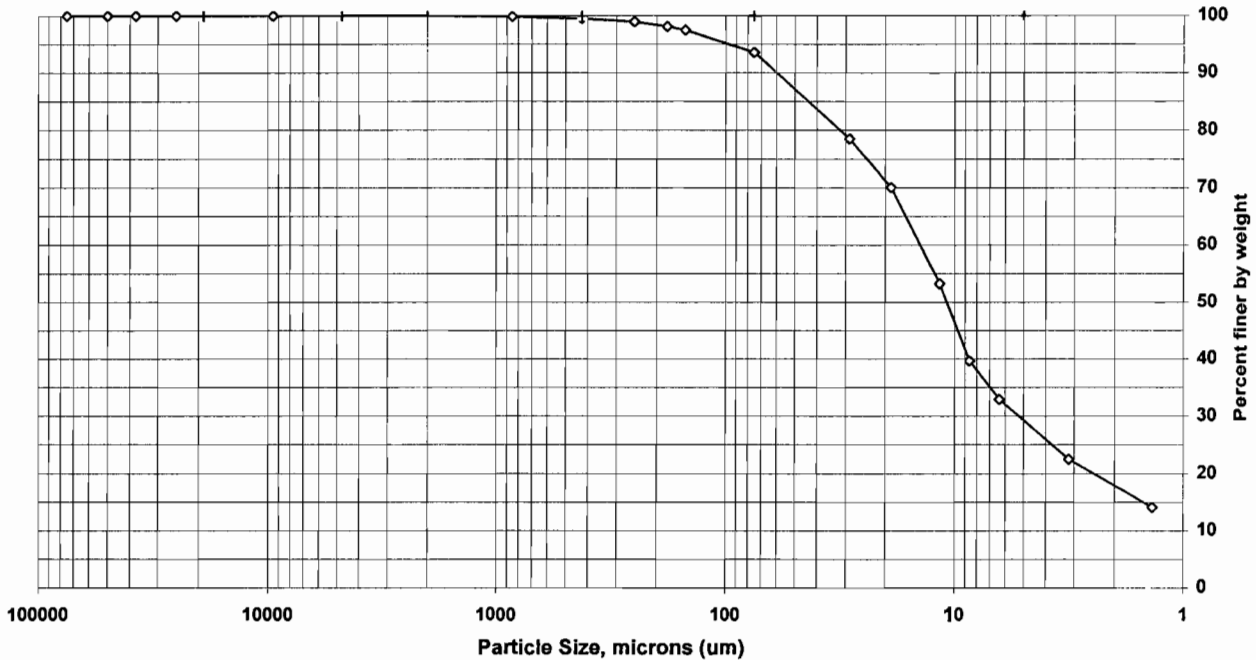
Client Code: RETEC2
 Sample ID: NB10
 Lab ID: 691106A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 37.9%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Crs sand

Non-soil material: plant, shell
 Shape (> #10): n/a
 Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.5	0.4
#60	250	98.9	0.6
#80	180	98.1	0.8
#100	150	97.5	0.6
#200	75	93.5	3.9
Hydrometer	28.9	78.5	15.0
	18.9	70.1	8.4
	11.6	53.2	16.8
	8.6	39.7	13.6
	6.4	32.9	6.8
	3.2	22.5	10.4
V	1.4	14.1	8.4

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	6.5
Coarse Sand	0.0
Medium Sand	0.5
Fine Sand	6.0
Silt	60.6
Clay	32.9

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

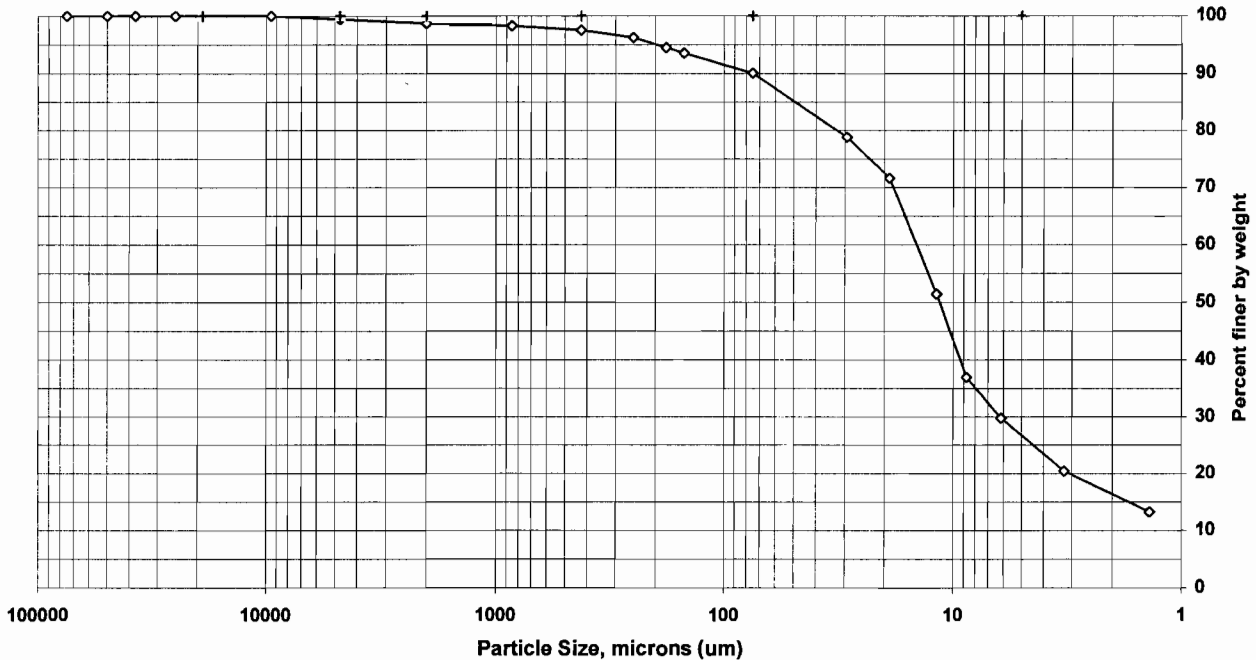
Client Code: RETEC2
 Sample ID: NB11
 Lab ID: 691107A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 35.7%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: 9.5 mm

Non-soil material: plant,shell
 Shape (> #10): subrounded
 Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.4	0.6
#10	2000	98.7	0.7
#20	850	98.2	0.4
#40	425	97.5	0.7
#60	250	96.2	1.3
#80	180	94.5	1.7
#100	150	93.5	1.0
#200	75	90.0	3.5
Hydrometer	29.3	78.8	11.2
	19.0	71.6	7.2
	11.8	51.4	20.2
	8.7	37.0	14.4
	6.1	29.8	7.2
	3.2	20.5	9.3
V	1.4	13.2	7.2

Soil Classification	Percent of Total Sample
Gravel	0.6
Sand	9.4
Coarse Sand	0.7
Medium Sand	1.2
Fine Sand	7.5
Silt	60.3
Clay	29.8

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

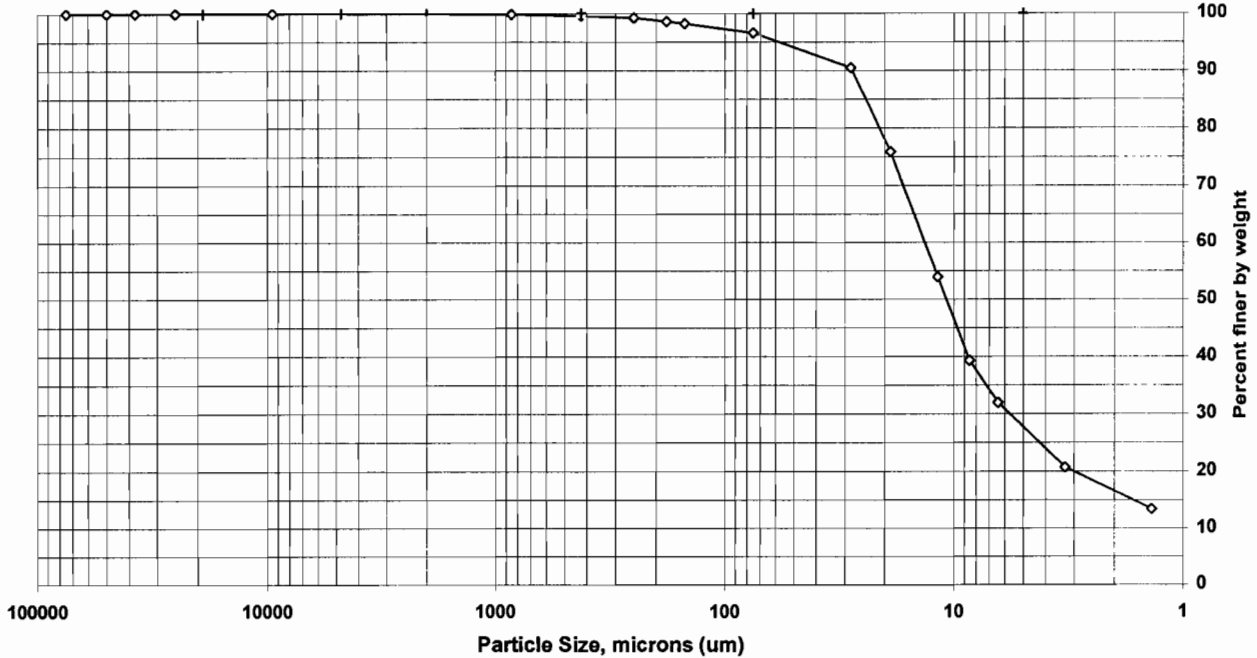
Client Code: RETEC2
 Sample ID: NB12
 Lab ID: 691108A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/12/2006

Percent Solids: 34.2%
 Specific Gravity: 2.650 (assumed)
 Maximum Particle Size: Crs sand

Non-soil material: plant,shell
 Shape (> #10): n/a
 Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	99.8	0.1
#40	425	99.6	0.3
#60	250	99.2	0.4
#80	180	98.6	0.6
#100	150	98.2	0.4
#200	75	96.6	1.6
Hydrometer	28.2	90.5	6.1
	18.9	75.9	14.6
	11.8	53.9	21.9
	8.5	39.3	14.6
	6.4	32.0	7.3
	3.3	20.7	11.3
V	1.4	13.4	7.3

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	3.4
Coarse Sand	0.1
Medium Sand	0.4
Fine Sand	3.0
Silt	64.6
Clay	32.0

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

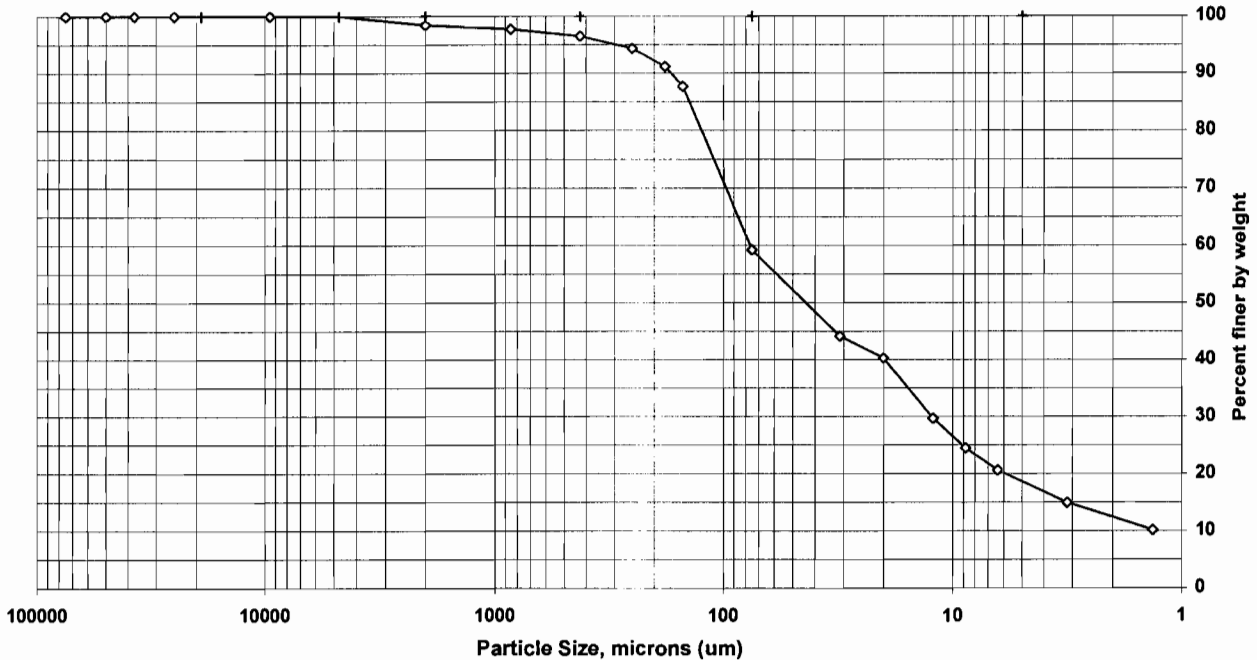
Client Code: RETEC2
 Sample ID: NB18
 Lab ID: 691114A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 46.3%
 Specific Gravity: 2.650
 Maximum Particle Size: Crs sand

Non-soil material: wood
 Shape (> #10): na
 Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	98.5	1.5
#20	850	97.7	0.8
#40	425	96.5	1.2
#60	250	94.3	2.2
#80	180	91.2	3.1
#100	150	87.7	3.5
#200	75	59.2	28.5
Hydrometer	31.2	44.2	15.0
	20.1	40.3	3.9
	12.2	29.7	10.6
	8.8	24.5	5.2
	6.4	20.6	3.9
	3.2	14.9	5.6
V	1.3	10.2	4.8

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	40.8
Coarse Sand	1.5
Medium Sand	2.0
Fine Sand	37.3
Silt	38.6
Clay	20.6

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

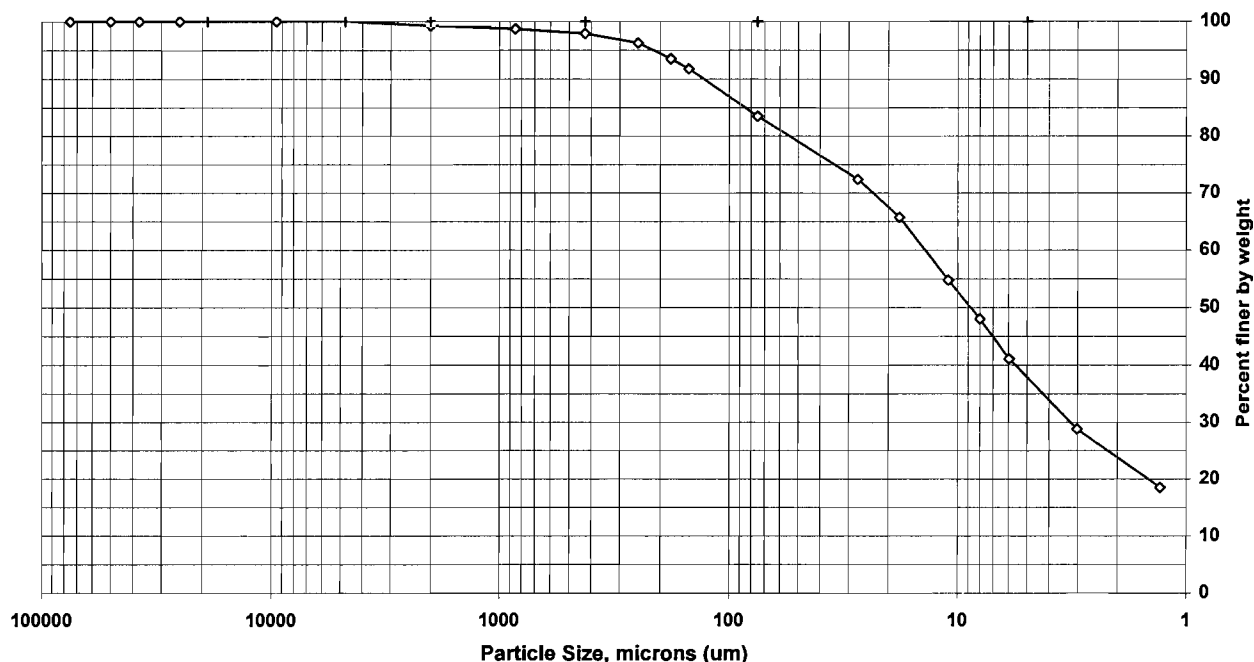
Client Code: RETEC2
 Sample ID: NB20
 Lab ID: 691116A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 48.8%
 Specific Gravity: 2.650
 Maximum Particle Size: Crs sand

Non-soil material: wood
 Shape (> #10): na
 Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.3	0.7
#20	850	98.7	0.6
#40	425	97.9	0.8
#60	250	96.3	1.6
#80	180	93.6	2.7
#100	150	91.8	1.8
#200	75	83.5	8.3
Hydrometer	27.3	72.4	11.1
	17.9	65.7	6.7
	11.0	54.7	10.9
	8.0	48.0	6.7
	6.0	41.1	6.9
	3.0	28.8	12.3
V	1.3	18.5	10.3

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	16.5
Coarse Sand	0.7
Medium Sand	1.4
Fine Sand	14.4
Silt	42.4
Clay	41.1

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

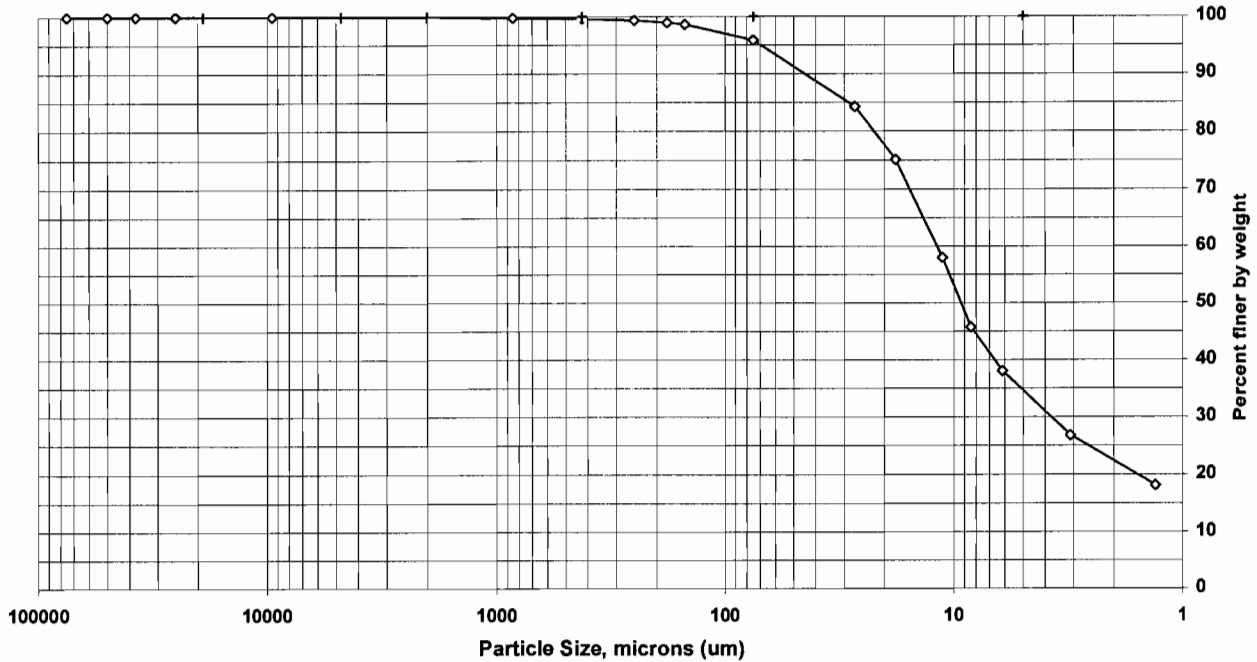
Client Code: RETEC2
Sample ID: NB22
Lab ID: 691118A

SDG: 117694
ETR(s): 117694

Date Received: 11/27/2006
Start Date: 12/6/2006
End Date: 12/13/2006

Percent Solids: 38.3%
Specific Gravity: 2.650
Maximum Particle Size: Crs sand

Non-soil material: wood
Shape (> #10): na
Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	99.8	0.2
#40	425	99.6	0.2
#60	250	99.4	0.2
#80	180	98.9	0.4
#100	150	98.6	0.3
#200	75	95.8	2.7
Hydrometer	27.1	84.3	11.5
	17.9	75.1	9.2
	11.2	58.0	17.1
	8.4	45.7	12.3
	6.1	38.1	7.7
	3.1	26.8	11.2
V	1.3	18.1	8.7

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	4.2
Coarse Sand	0.1
Medium Sand	0.3
Fine Sand	3.8
Silt	57.8
Clay	38.1

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

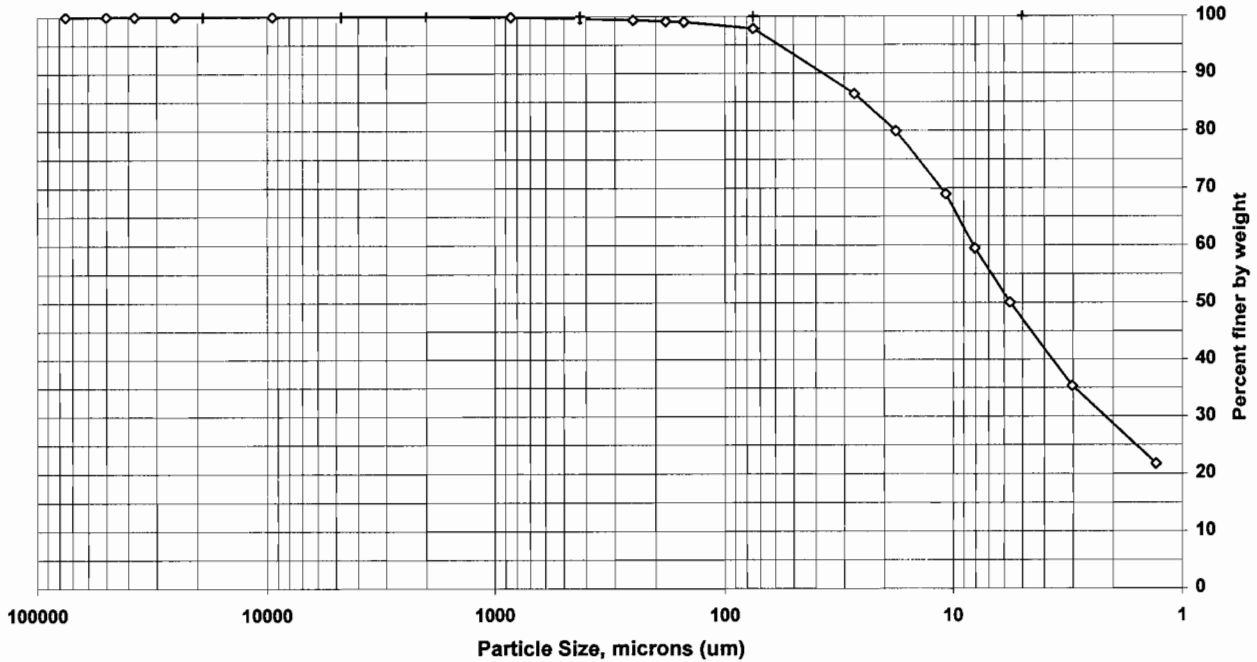
Client Code: RETEC2
 Sample ID: NB23
 Lab ID: 691119A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 48.4%
 Specific Gravity: 2.650
 Maximum Particle Size: Med sand

Non-soil material: na
 Shape (> #10): na
 Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	99.6	0.2
#60	250	99.4	0.3
#80	180	99.2	0.2
#100	150	99.0	0.1
#200	75	97.9	1.2
Hydrometer	27.1	86.4	11.4
	17.8	79.9	6.5
	10.8	68.9	11.0
	8.1	59.5	9.4
	5.7	50.0	9.4
	3.0	35.4	14.7
V	1.3	21.7	13.6

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	2.1
Coarse Sand	0.0
Medium Sand	0.4
Fine Sand	1.8
Silt	47.9
Clay	50.0

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with
 a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

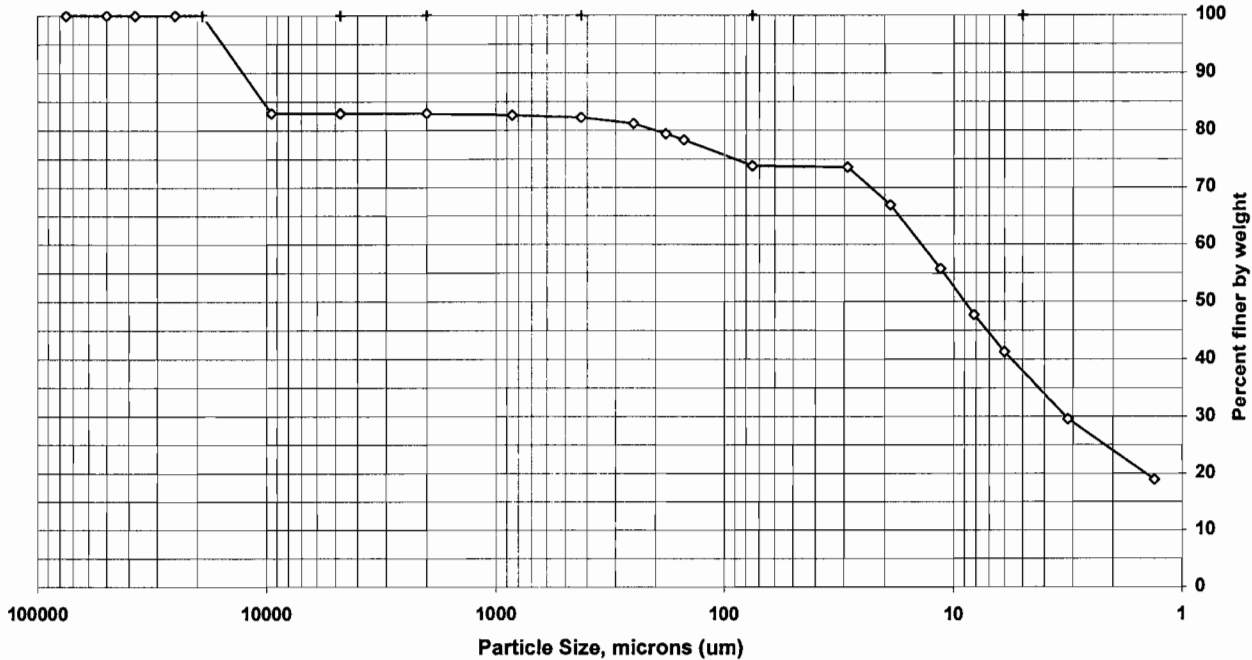
Client Code: RETEC2
 Sample ID: NB24
 Lab ID: 691120A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 50.3%
 Specific Gravity: 2.650
 Maximum Particle Size: 19 mm

Non-soil material: na
 Shape (> #10): angular
 Hardness (> #10): brittle



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	83.0	17.0
#4	4750	83.0	0.0
#10	2000	83.0	0.0
#20	850	82.7	0.3
#40	425	82.3	0.4
#60	250	81.2	1.1
#80	180	79.4	1.8
#100	150	78.3	1.1
#200	75	73.8	4.5
Hydrometer	28.9	73.6	0.2
	18.9	66.9	6.7
	11.4	55.7	11.2
	8.2	47.7	8.0
	6.0	41.3	6.4
	3.1	29.6	11.7
V	1.3	18.9	10.7

Soil Classification	Percent of Total Sample
Gravel	17.0
Sand	9.2
Coarse Sand	0.0
Medium Sand	0.7
Fine Sand	8.5
Silt	32.5
Clay	41.3

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

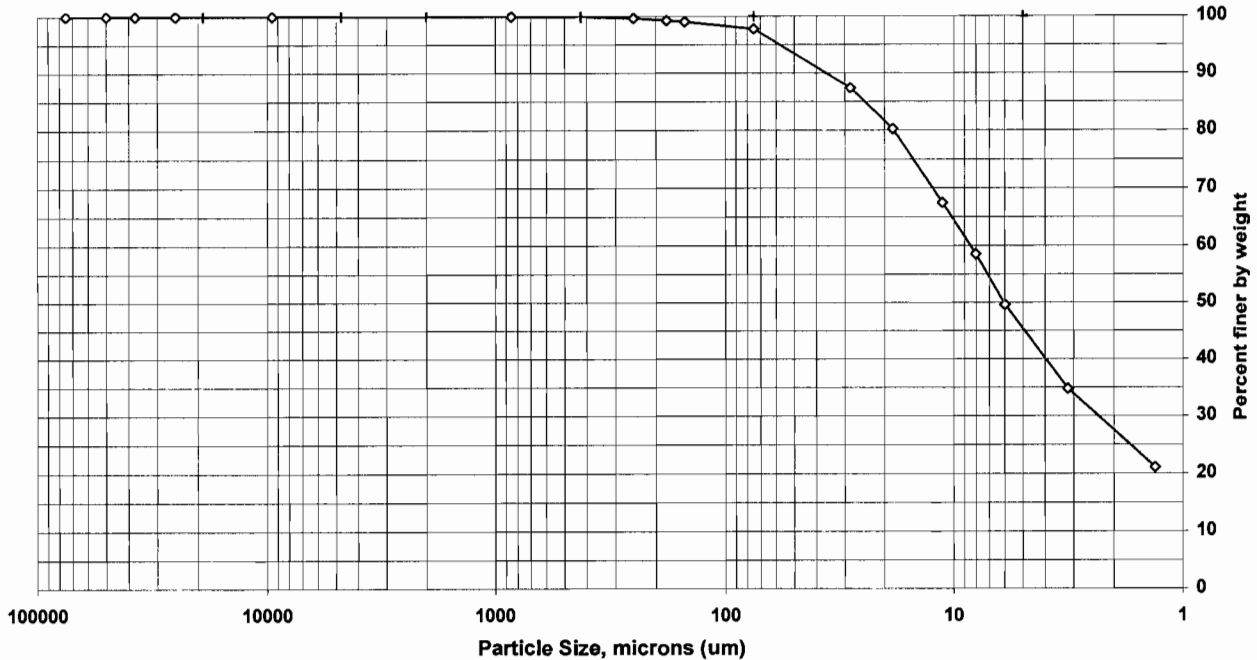
Client Code: RETEC2
 Sample ID: NB25
 Lab ID: 691121A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 49.3%
 Specific Gravity: 2.650
 Maximum Particle Size: Crs sand

Non-soil material: wood, glass
 Shape (> #10): na
 Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.0
#40	425	99.9	0.0
#60	250	99.6	0.2
#80	180	99.3	0.4
#100	150	99.0	0.3
#200	75	97.8	1.2
Hydrometer	28.3	87.4	10.4
	18.4	80.2	7.1
	11.2	67.5	12.8
	8.0	58.5	8.9
	6.0	49.6	8.9
	3.2	34.8	14.9
V	1.3	21.1	13.7

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	2.2
Coarse Sand	0.0
Medium Sand	0.1
Fine Sand	2.1
Silt	48.2
Clay	49.6

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with
 a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

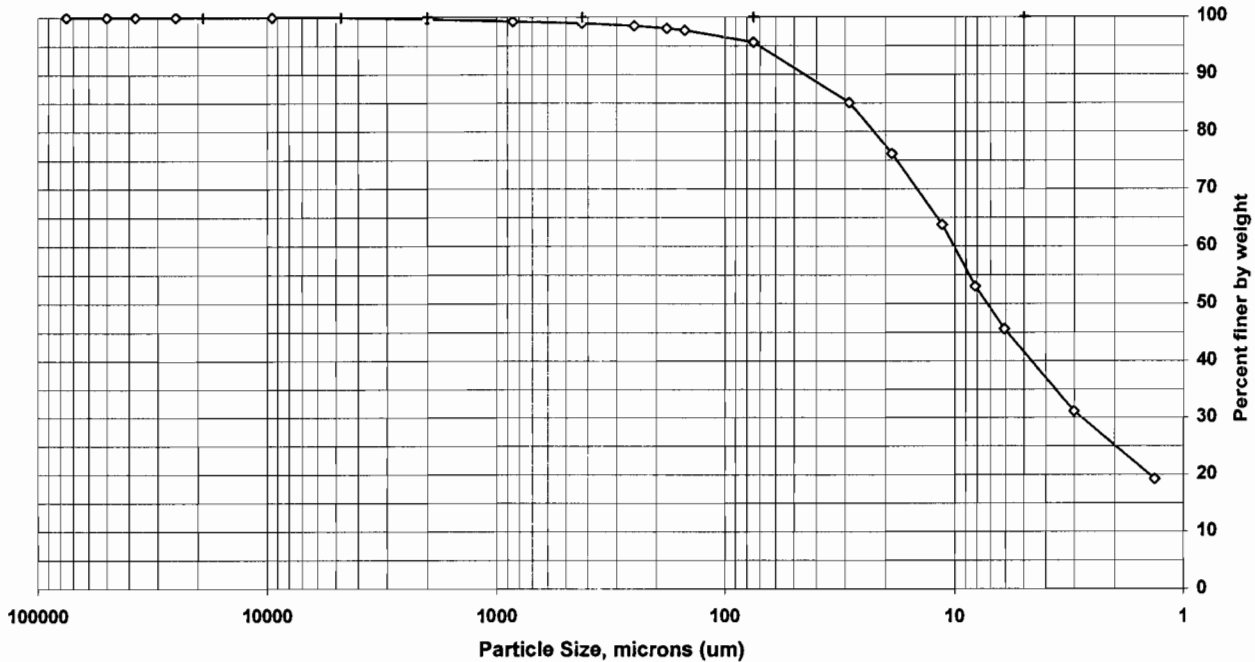
Client Code: RETEC2
 Sample ID: NB26
 Lab ID: 691122A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 50.7%
 Specific Gravity: 2.650
 Maximum Particle Size: Crs sand

Non-soil material: wood
 Shape (> #10): na
 Hardness (> #10): na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.6	0.4
#20	850	99.2	0.4
#40	425	98.9	0.3
#60	250	98.5	0.4
#80	180	98.0	0.5
#100	150	97.7	0.4
#200	75	95.6	2.0
Hydrometer	28.7	85.1	10.6
	18.8	76.2	8.9
	11.3	63.7	12.4
	8.2	53.1	10.7
	6.1	45.6	7.4
	3.0	31.1	14.5
V	1.3	19.3	11.9

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	4.4
Coarse Sand	0.4
Medium Sand	0.7
Fine Sand	3.3
Silt	50.0
Clay	45.6

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

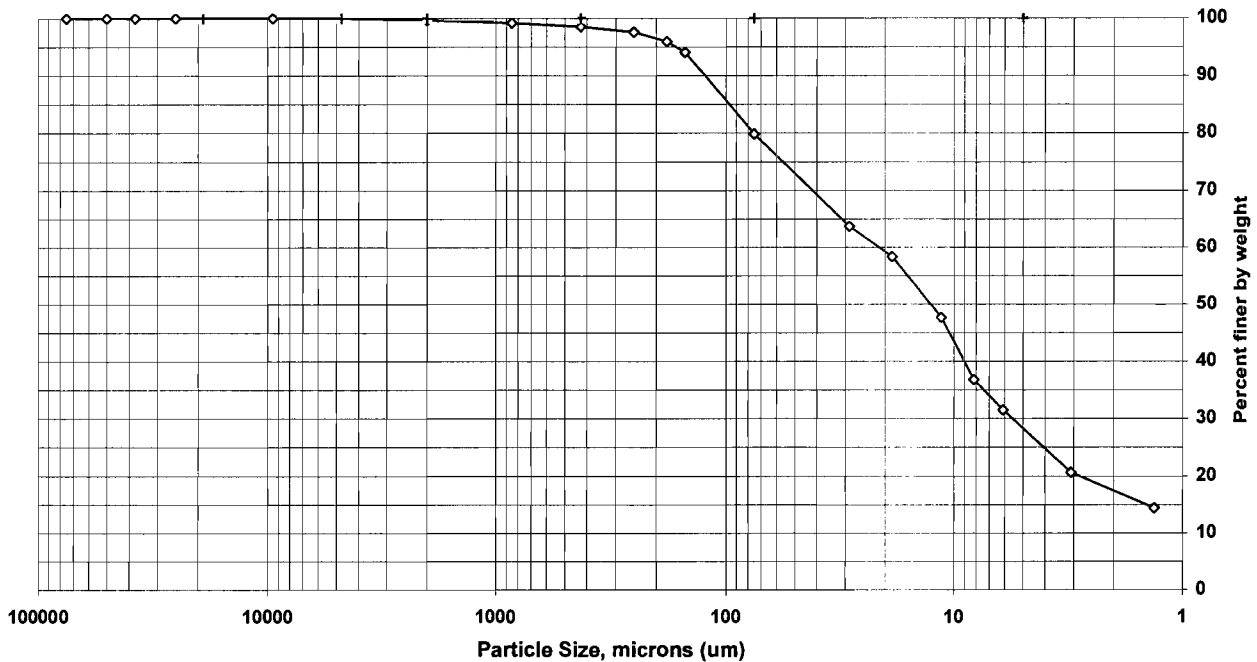
Client Code: RETEC2
 Sample ID: NB27
 Lab ID: 691123A

SDG: 117694
 ETR(s): 117694

Date Received: 11/27/2006
 Start Date: 12/6/2006
 End Date: 12/13/2006

Percent Solids: 46.6%
 Specific Gravity: 2.650
 Maximum Particle Size: Crs sand

Non-soil material: wood
 Shape (> #10): angular
 Hardness (> #10): brittle



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.7	0.3
#20	850	99.2	0.5
#40	425	98.5	0.6
#60	250	97.6	0.9
#80	180	95.9	1.6
#100	150	94.0	1.9
#200	75	79.8	14.2
Hydrometer	28.7	63.7	16.1
	18.7	58.4	5.3
	11.3	47.7	10.7
	8.2	36.8	10.9
	6.1	31.5	5.3
	3.1	20.6	10.9
V	1.3	14.4	6.2

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	20.2
Coarse Sand	0.3
Medium Sand	1.1
Fine Sand	18.7
Silt	48.3
Clay	31.5

Preparation Method: **D2217**
 Dispersion Device: Mechanical mixer with a metal paddle.
 Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

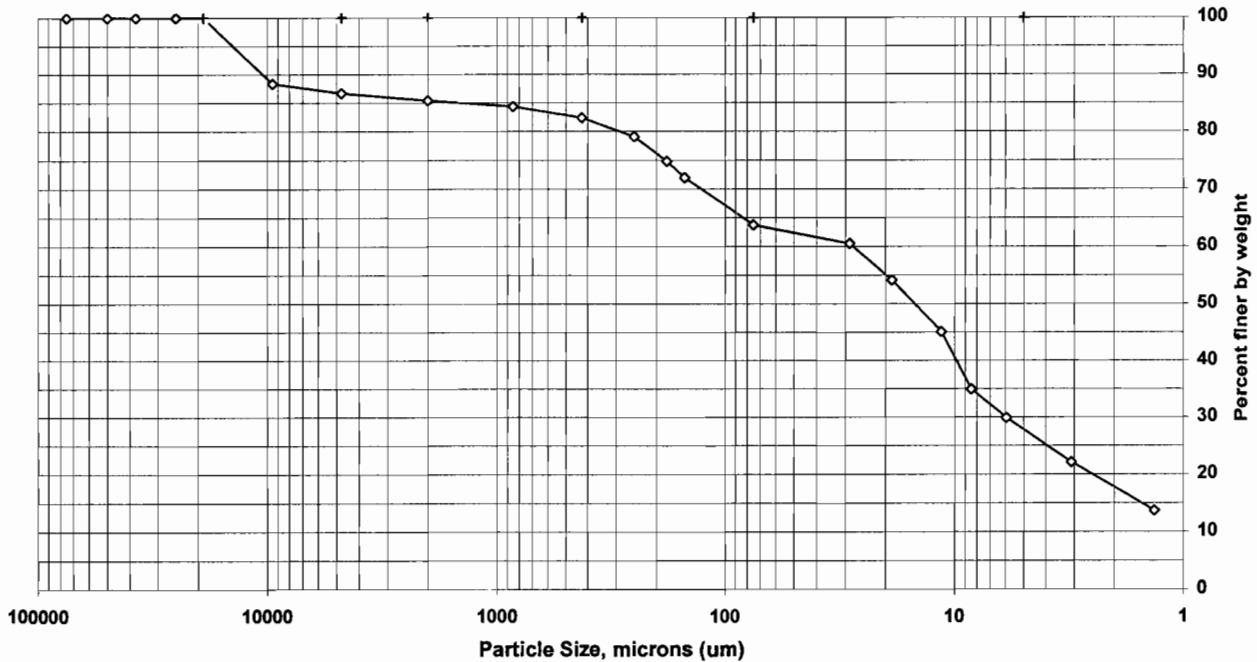
Client Code: RETEC2
Sample ID: NB29
Lab ID: 691125A

SDG: 117694
ETR(s): 117694

Date Received: 11/27/2006
Start Date: 12/6/2006
End Date: 12/13/2006

Percent Solids: 42.3%
Specific Gravity: 2.650
Maximum Particle Size: 19 mm

Non-soil material: wood,leaves
Shape (> #10): angular
Hardness (> #10): brittle



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	88.4	11.6
#4	4750	86.7	1.7
#10	2000	85.4	1.3
#20	850	84.3	1.1
#40	425	82.4	2.0
#60	250	79.0	3.3
#80	180	74.8	4.3
#100	150	72.0	2.8
#200	75	63.8	8.2
Hydrometer	28.7	60.5	3.3
	18.8	54.2	6.3
	11.4	45.1	9.1
	8.4	35.0	10.1
	6.0	29.9	5.1
	3.1	22.1	7.8
V	1.5	13.7	8.4

Soil Classification	Percent of Total Sample
Gravel	13.3
Sand	23.0
Coarse Sand	1.3
Medium Sand	3.1
Fine Sand	18.6
Silt	33.8
Clay	29.9

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

Appendix C

AquaTOX Research, Inc. (AquaTOX) Final Report

CHRONIC TOXICITY ASSESSMENT OF AQUATIC SEDIMENTS COLLECTED
FROM THE HUDSON RIVER AT NEWBURGH, NY USING THE FRESHWATER
AMPHIPOD, HYALELLA AZTECA

Study Conducted for:

The RETEC Group, Inc.
1001 W. Seneca St.
Ithaca, NY 14850-3329

Attn: Mr. Nick Azzolina

Study Conducted by:

AquaTox Research, Inc.
1201 East Fayette Street
Syracuse, NY 13210

February 2007

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ABSTRACT

The freshwater amphipod, *Hyalella azteca*, was used to assess the chronic toxicity of sediments collected from the Hudson River adjacent to the former manufactured gas plant (MGP) site in Newburgh, NY. The test design entailed the exposure of four (4) replicates of 10 amphipods each to 100 ml of control, reference and test sample sediment in 300 ml beakers for 28 days in accordance with standard protocols. Survival and dry weights of amphipods in each replicate were determined at the end of 28-day sediment exposure tests. Chemical analyses of fresh and aged overlying water were performed at regular intervals over the course of the test. Samples were split into two batches for testing. Samples labeled NB18 through NB29 were tested from November 21 through December 19, 2006. Samples labeled NB01 through NB12 were tested from December 5, 2006 through January 2, 2007.

There were significant reductions in the number of amphipods recovered from samples NB02, NB03, NB04, NB20, NB24 and NB26 with mean recoveries of $\leq 63\%$ within each treatment. All samples for which there was not a significant reduction in recovery in comparison with their respective control treatments exhibited $\geq 63\%$ recovery at the end of the 28-day sediment exposure phase. Control treatments for the two batches exhibited 100 and 85% recoveries, respectively. Reference treatments for the two batches exhibited 63 and 70% recoveries, respectively.

Mean dry weights of amphipods per organism recovered from control, reference and test samples ranged from a high of 0.269 mg for the test sample NB05 to a low of 0.125 mg for NB27. NB27 represented the only sample for which there was a significant difference in growth as compared to its respective laboratory control.

Standard chemical parameters of fresh overlying water exhibited little to no trends over the course of each of the 28-day tests. Mean values for dissolved oxygen, pH, conductivity, alkalinity and hardness of fresh diluted Butternut Creek water determined on a weekly basis were relatively constant as expressed through coefficients of variation (CVs) not exceeding 5.8%.

Mean dissolved oxygen levels for aged overlying water exceeded 4.9 mg/L for all samples in both test groups. Initial total ammonia levels ranged from 0.54 to 2.54 mg/L declining to <0.5 mg/L within the first week of testing. Aged overlying water pH levels exhibited fairly linear trends within treatments with an absolute range of <0.5 units (7.33-7.81) over the course of both tests. Alkalinity concentrations tended to exhibit the greatest variability among all samples at the start of each test with an initial overall absolute range of 115 to 197 mg/L narrowing to 124 to 147 mg/L by the conclusion of the tests. Conductivity measures also exhibited the greatest variability at the start of both tests (287 to 398 $\mu\text{mhos/cm}$) compared to the end of each test (314 to 335 $\mu\text{mhos/cm}$). Hardness levels of aged overlying water were slightly more variable over the course of each test with a total absolute range of 124 to 184 mg/L. Mean water temperatures from individual holding tanks in a single common water bath ranged from 23.0 ± 0.4 and $23.5 \pm 0.4^\circ\text{C}$ with coefficients of variation of $<2.0\%$.

INTRODUCTION

The objective of the tests described in this report was to assess the chronic toxicity of sediments collected from the Hudson River adjacent to the former manufactured gas plant (MGP) site in Newburgh, NY to the freshwater amphipod, Hyalella azteca, over a 28-day sediment exposure period in accordance with a standard published protocol (USEPA, 2000). Testing was conducted at the request of Mr. Nick Azzolina of The RETEC Group, Inc. in Ithaca, NY under RETEC Project No. CHGE2-19695. Personnel from AquaTox Research, Inc. (ARI) in Syracuse, NY conducted the testing under the direction of Dr. Francis G. Doherty.

MATERIALS AND METHODS

Test Samples

Several liters of sediment were collected from each sampling location at Newburgh, NY from November 7 through 10, 2006. Initial shipments of various combinations of samples were delivered to the ARI facility on November 9, 10 and 14, 2006. A follow-up shipment of samples was delivered to the ARI facility on December 1, 2006. Samples were refrigerated upon receipt. Sediment collected from a local reservoir in Jamesville, NY in May 2004 and September 2005 was used for control treatments. Jamesville Reservoir sediment was passed through a 2-mm mesh sieve and refrigerated immediately following collection.

Hyalella azteca Holding and Culture Approach

Amphipods (H. azteca) used in chronic testing activities were obtained from test organism suppliers. Testing initiated on November 21, 2006 utilized amphipods obtained from Environmental Consulting & Testing (Superior, WI). Approximately 1,000 amphipods were received as 3-day old juveniles on November 17, 2006 (assigned Lot No. HA1106/016) and used in the test initiated on November 21. Testing initiated on December 5, 2006 utilized amphipods obtained from Aquatic Biosystems Inc. (Fort Collins, CO). Approximately 1,000 amphipods were received as 1- to 3-day old juveniles on December 1, 2006 (assigned Lot No. HA1206/018) and used in the test initiated on December 5. Both groups of amphipods were acclimated to a temperature of ~23°C for four days and fed a mixture of YCT (Yeast-Cerophyl-Trout Chow) and cultures of green algae (Selenastrum capricornutum) during holding prior to the start of a test.

Sediment Test Procedures

All tests were initiated by first transferring approximately 100 ml of control (Jamesville Reservoir), reference (NB11 and NB12) and test sediments (NB01-10 and NB18-29) to each of four replicate 300 ml beakers per sample and covered with approximately 150 ml of DIW-diluted stream water (Butternut Creek, Dewitt, NY) 24 hours prior to the introduction of test organisms. Test beakers were held in covered, vented water bath holding tanks for 24 hours at a temperature ranging from 22 to 24°C prior to the addition of test organisms. Ten 7-day old amphipods were

transferred to each replicate beaker to initiate a test. Each beaker received 0.95 ml YCT daily as a supplemental food source. Amphipods in test beakers experienced a photoperiod of 16L:8D at an illuminance of approximately 500 lux.

At least 100 ml of overlying water was poured off and renewed once daily for the duration of the 28-day sediment exposure period. Overlying water temperature in one beaker from each waterbath was determined daily. Chemistry of aged overlying water was measured either daily (dissolved oxygen) or intermittently (total ammonia, conductivity, pH, alkalinity and hardness). Chemistry of fresh diluted Butternut Creek water used to renew aged overlying water was measured weekly.

Amphipods were harvested from sediments after 28 days by rinsing sediment through a stainless steel sieve with a mesh size of 710 μm (USA Standard Test Sieve No. 25) with moderately hard, reconstituted water (MHRW). The sieve was transferred to a shallow glass dish containing MHRW and placed on a light box to collect surviving amphipods. Harvested amphipods from each replicate beaker were transferred to pre-weighed aluminum pans within hours of collection for drying at $\sim 50^{\circ}\text{C}$ for 24 hours in order to determine dry weight. Tests were conducted in accordance with procedures outlined in Test Method 100.4 (USEPA, 2000) for a 28-day sediment exposure period. The test was terminated after 28 days at which time the surviving amphipods were harvested, counted and weighed. An extended 14-day reproductive phase using an observation period in clean water was not conducted.

Statistical Analyses

Comparisons of survival and dry weights among treatments were performed through standard statistical procedures contained in TOXSTAT V3.5 (WEST and Gulley, 1996). Comparisons of survival among treatments were conducted with arc sine square root transformed values subjected to the non-parametric Steel's Many-One Rank Test. Dry weights among treatments not exhibiting significant reductions in survival were analyzed using the parametric Dunnett's-Test.

RESULTS - TOXICITY

Survival (11/21-12/19/06)

There were three test samples (NB20, NB24 and NB26) for which there was a significant reduction in survival (0, 5, and 63%, respectively mean recovered per treatment) compared with the control (JAM) treatment (100% recovery). The remaining test treatments generated recovery rates of $\geq 90\%$ (Figure 1, Appendices A and C).

Growth (11/21-12/19/06)

Mean dry weights of amphipods recovered from the control and test site sediment samples (excluding samples for which there was a significant reduction in survival) ranged from a high of 0.197 mg (JAM Control) to a low of 0.125 mg. Dry weights of amphipods held in NB27 (0.125 mg) were significantly lower ($\alpha = 0.05$) than that obtained from amphipods exposed to the control sediment (0.197 mg) (Figure 2, Appendices A and C).

Survival (12/5/06-1/2/07)

There were three test samples (NB02, NB03 and NB04) from the second test batch for which there was a significant reduction in survival (25, 13, and 0%, respectively mean recovered per treatment) compared with the control (JAM) treatment (85% recovery). The remaining test treatments generated recovery rates of $\geq 63\%$ and were not significantly different from the control (Figure 3, Appendices B and D).

Growth (12/5/06-1/2/07)

Mean dry weights of amphipods recovered from the control, reference and test site sediment samples (excluding samples for which there was a significant reduction in survival) ranged from a high of 0.269 mg (NB05) to a low of 0.181 mg. There were no test or reference samples for which dry weight of amphipods in those treatments were significantly less than that obtained from amphipods exposed to the control sediment (0.242 mg) (Figure 4, Appendices B and D).

RESULTS – WATER CHEMISTRY

Fresh Overlying Water (Both Tests)

Standard chemical parameters of fresh diluted Butternut Creek water exhibited little to no trends over the course of the 28-day test (Appendices A and B). Variability of measured values for pH and dissolved oxygen varied by no more than 5.1% as expressed through the coefficient of determination (CV). Mean dissolved oxygen concentrations ranged from 7.1 to 8.1 mg/L while pH levels varied by less than 0.3 units (7.77-8.02 units). Conductivity, alkalinity and hardness levels exhibited similar levels of variability (CV $\leq 6.2\%$) with absolute ranges of 282-317 umhos/cm, 125-144 mg/L and 140-152 mg/L, respectively.

Aged Overlying Water (11/21-12/19/06)

Individual water temperature measurements ranged from 22.0 to 24.5°C with means of 23.0 \pm 0.4 and 23.5 \pm 0.4°C for individual waterbath holding tanks (Appendix A). Dissolved oxygen levels of aged overlying water ranged from a daily low of 5.7 to a high of 7.3 mg/L. Dissolved oxygen levels within each treatment varied in a manner similar to that observed among all of the treatments as the test progressed through the 28-day exposure period (Figure 5, Appendix A). Total ammonia levels ranged from 0.82 to 1.59 mg/L at the start of the 28-day and declined thereafter in all sediments. The majority of all samples exhibited total ammonia levels of ≤ 0.33 mg/L from Day 7 through Day 28 (Figure 6, Appendix A).

The pH levels of all samples varied by no more than one half unit with an overall absolute range of 7.33 to 7.77 units. Trends within each treatment (sample) exhibited relatively constant pH levels throughout the 28-day test (Appendix A). Alkalinity, conductivity and hardness all exhibited similar patterns over the 28-day test with greater absolute variability among treatments at the start of the test with relatively narrow absolute variability at the conclusion of the test. Alkalinity concentrations exhibited an overall absolute range of 120 to 197 mg/L at the start of the test that narrowed to 124 to 146 mg/L at the end of the test. Similarly, conductivity measures ranged from 298-398 umhos/cm at the start of the test compared to 314 to 335 umhos/cm at the end of the test. Hardness levels of aged overlying water were slightly more variable over the course of the test with initial and final absolute ranges of 128 to 184 and 144 to 160 mg/L, respectively (Appendix A).

Aged Overlying Water (12/5/06-1/2/07)

Individual water temperature measurements ranged from 22.5 to 24.1°C with means of 23.2 ± 0.4 and 23.3 ± 0.4 °C for individual water bath holding tanks (Appendix B). Dissolved oxygen levels of aged overlying water ranged from a daily low of 5.3 to a high of 7.4 mg/L except for levels observed for NB09. Dissolved oxygen levels for this sample ranged from 4.9 to 6.7 mg/L. Dissolved oxygen levels varied similarly among all treatments throughout the 28-day exposure period (Figure 7, Appendix B). Total ammonia levels ranged from 0.54 to 2.54 mg/L at the start of the 28-day and declined thereafter in all sediments. All samples exhibited total ammonia levels of ≤ 0.31 mg/L from Day 8 through Day 28 (Figure 8, Appendix B).

The pH levels of all samples varied by no more than one half unit with an overall absolute range of 7.33 to 7.64 units except for NB09 which peaked at 7.81 on Day 15. Trends within each treatment (sample) exhibited relatively constant pH levels throughout the 28-day test (Appendix B). Alkalinity, conductivity and hardness all exhibited similar patterns over the 28-day test with greater absolute variability among treatments generally at the start of the test with relatively narrow absolute variability at the conclusion of the test. Alkalinity concentrations exhibited an overall absolute range of 115 to 173 mg/L at the start of the test that narrowed to 129 to 147 mg/L at the end of the test. Similarly, conductivity measures ranged from 287-368 umhos/cm at the start of the test compared to 317 to 336 umhos/cm at the end of the test. Hardness levels of aged overlying water were slightly more variable over the course of the test with initial and final absolute ranges of 124 to 168 and 140 to 156 mg/L, respectively (Appendix B).

LITERATURE CITED

USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Second Edition. Office of Research and Development, Washington, DC. EPA/600/R-99/064.

WEST, Inc. and D.D. Gulley. 1996. TOXSTAT V3.5. Western EcoSystems Technology, Inc., Cheyenne, WY.

Figure 1. Recovery of amphipods, *Hyaella azteca*, exposed to control (JAM) and test (NB18-29) sample sediments from the Newburgh collection sites for 28 days.

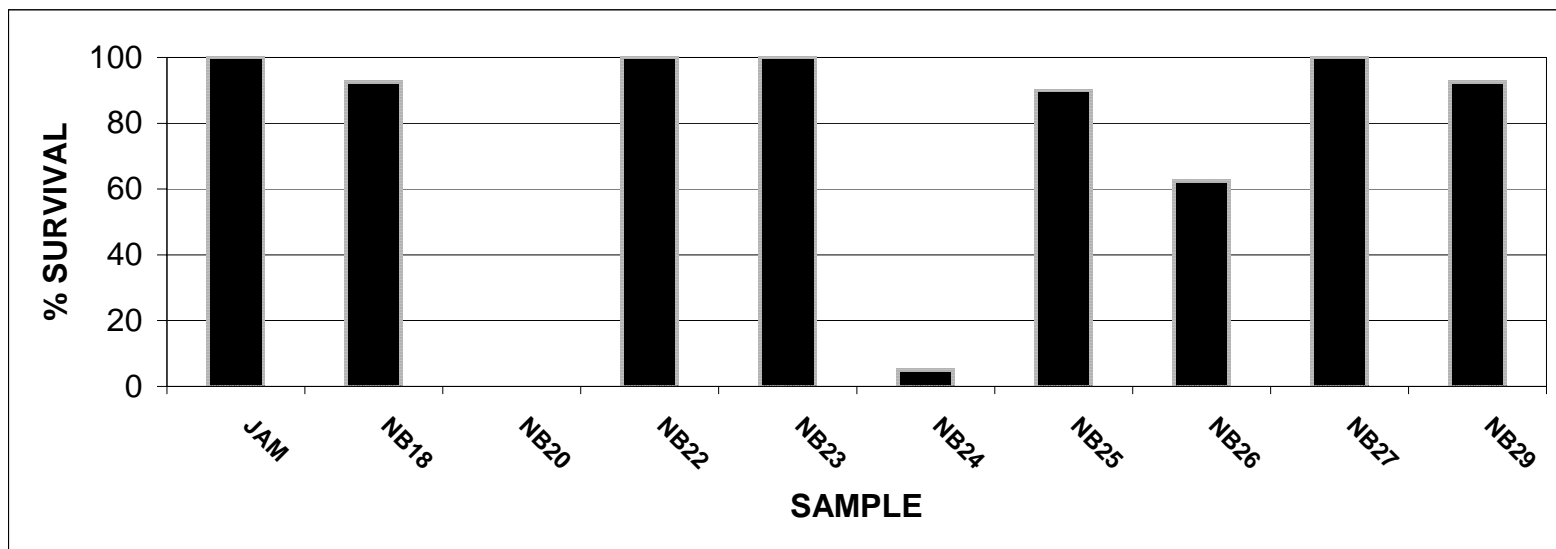


Figure 2. Dry weights of recovered amphipods, *Hyaella azteca*, exposed to control (JAM) and test (NB18-29) sample sediments from the Newburgh collection site for 28 days.

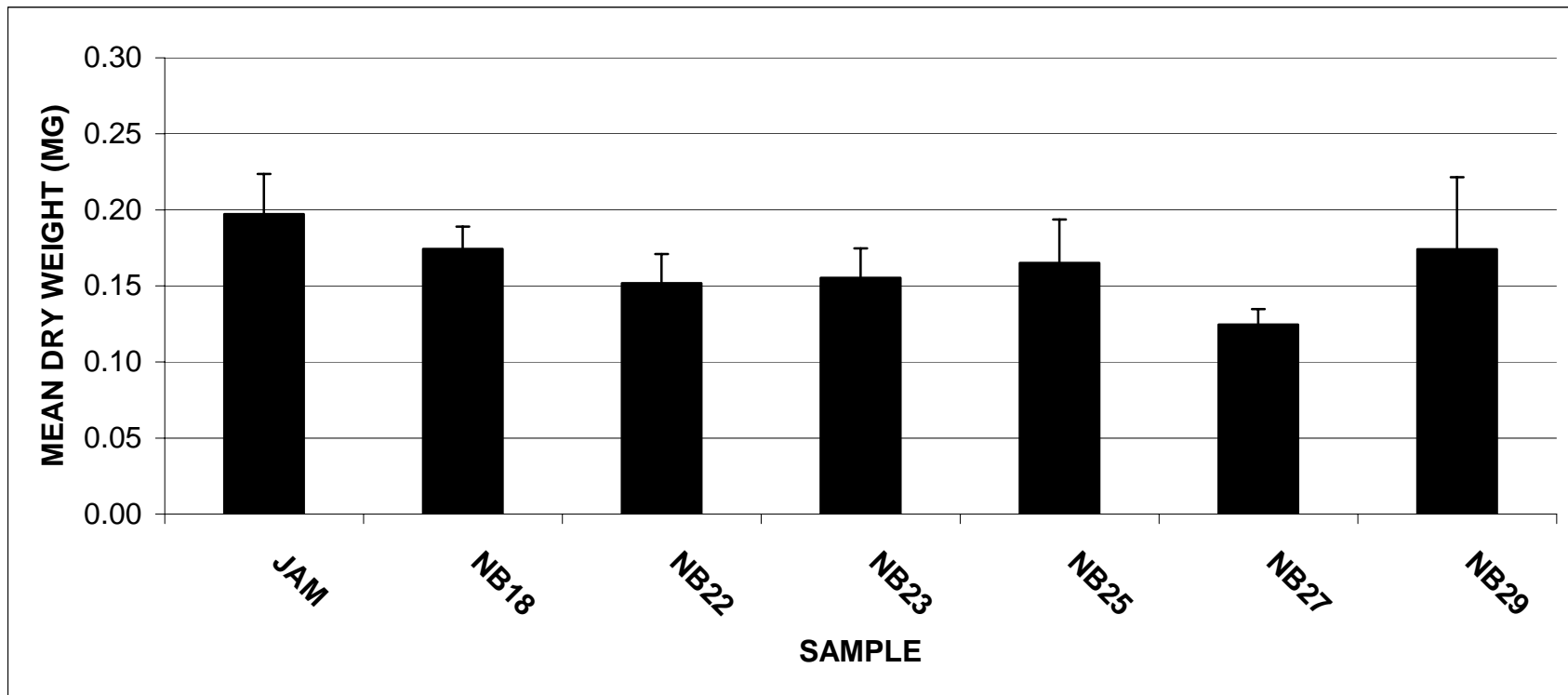


Figure 3. Recovery of amphipods, *Hyalella azteca*, exposed to control (JAM), reference (NB11 and 12) and test (NB01-10) sample sediments from the Newburgh collection sites for 28 days.

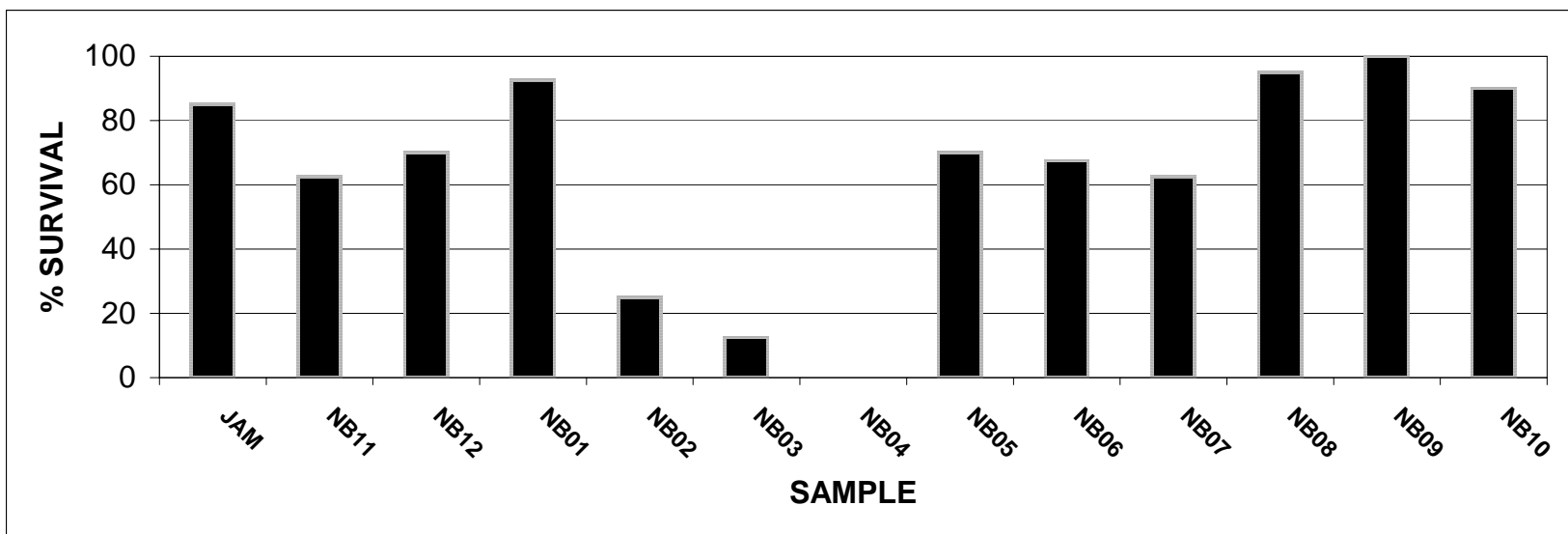


Figure 4. Dry weights of recovered amphipods, *Hyalella azteca*, exposed to control (JAM), reference (NB11 and 12) and test (NB01-10) sample sediments from the Newburgh collection site for 28 days.

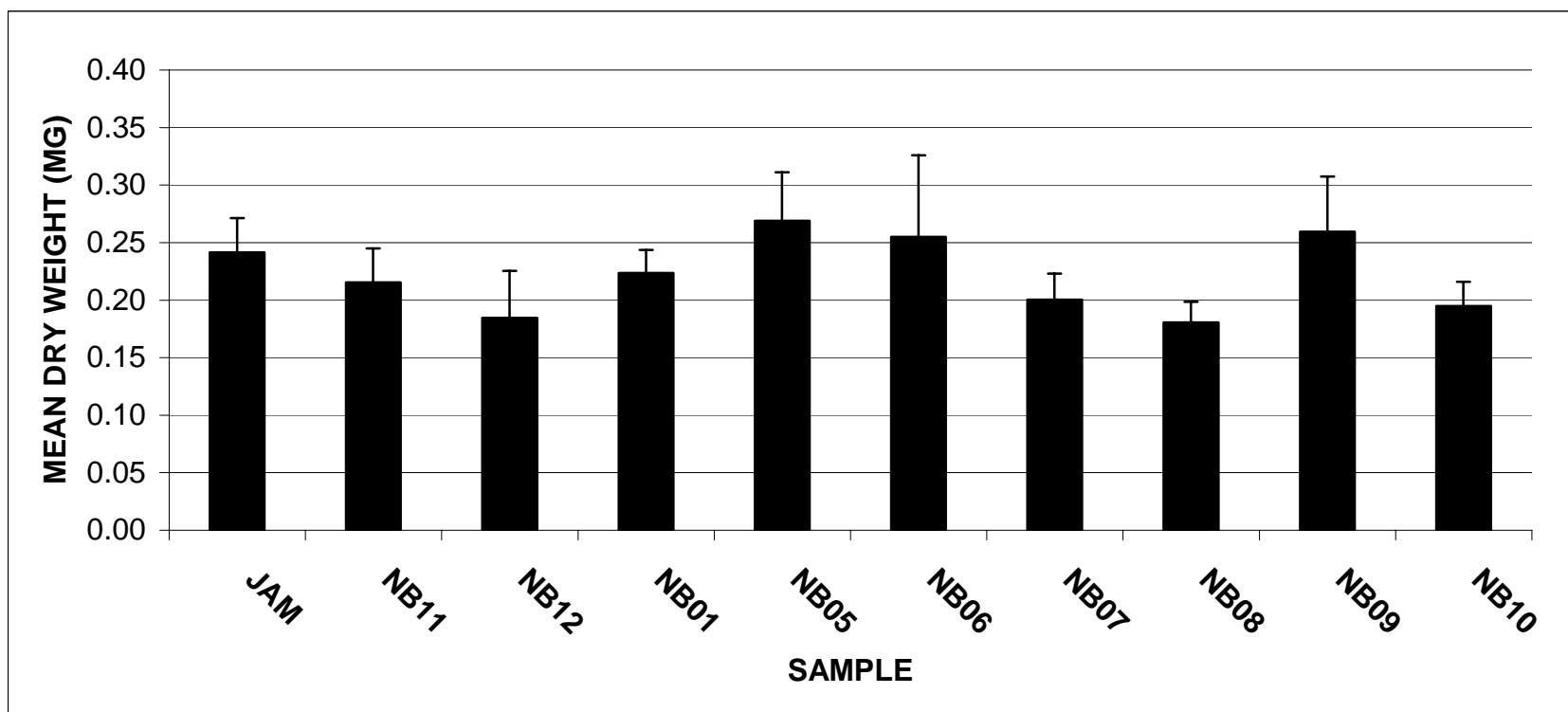


Figure 5. Dissolved oxygen trends of aged overlying water in tests exposing the freshwater amphipod, *Hyaella azteca*, to sediment from control (JAM) and test (NB18-29) sample sediments from the Newburgh collection site for 28 days.

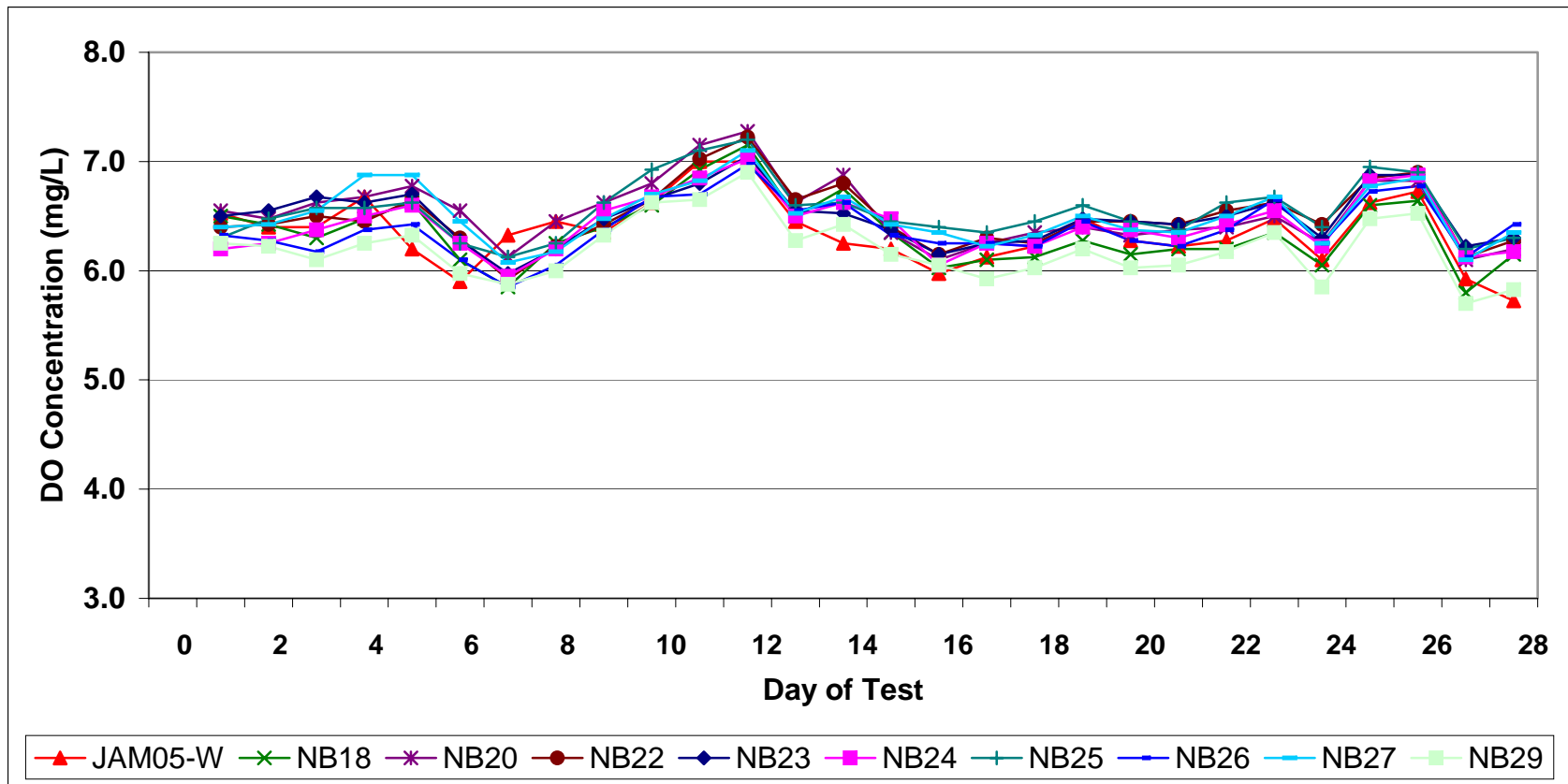


Figure 6. Total ammonia trends of aged overlying water in tests exposing the freshwater amphipod, *Hyalella azteca*, to sediment from control (JAM) and test (NB18-29) sample sediments from the Newburgh collection site for 28 days.

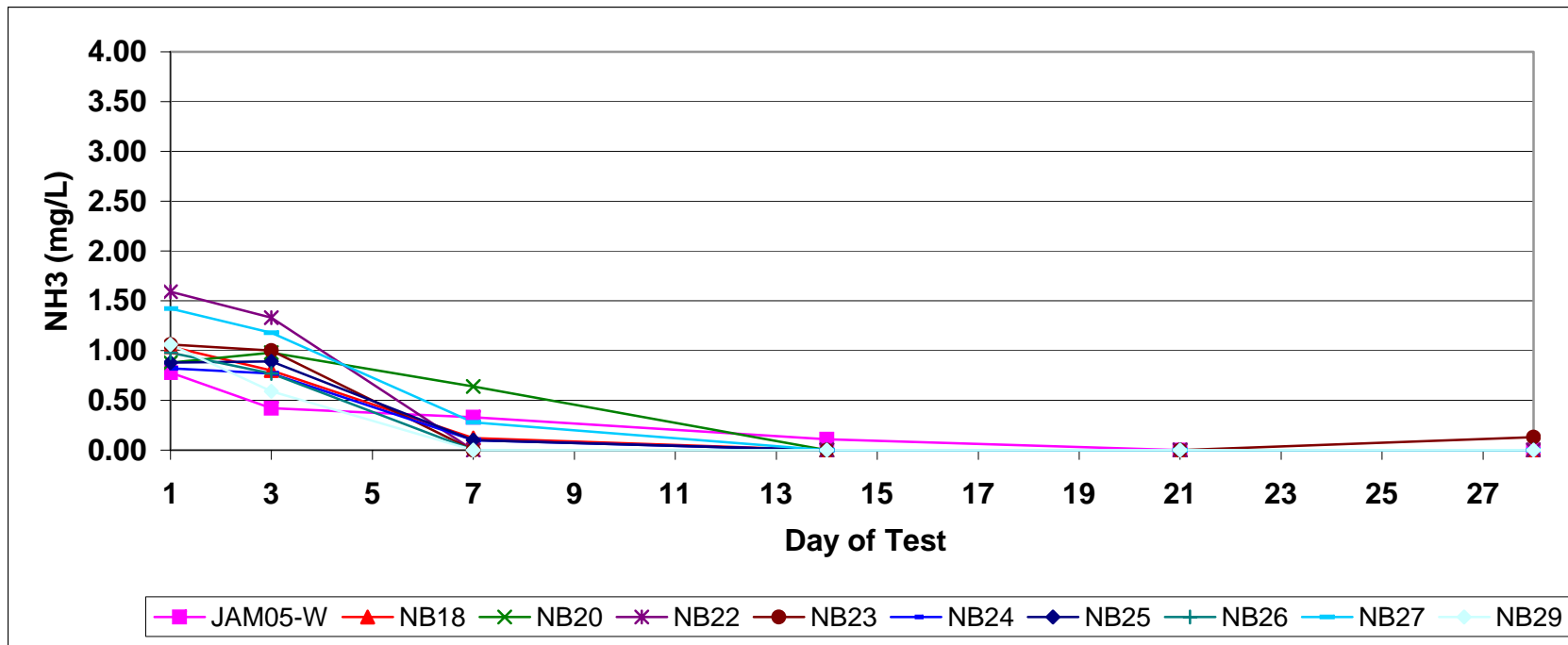


Figure 7. Dissolved oxygen trends of aged overlying water in tests exposing the freshwater amphipod, *Hyalella azteca*, to sediment from control (JAM), reference (NB11 and 12) and test (NB01-10) sample sediments from the Newburgh collection site for 28 days.

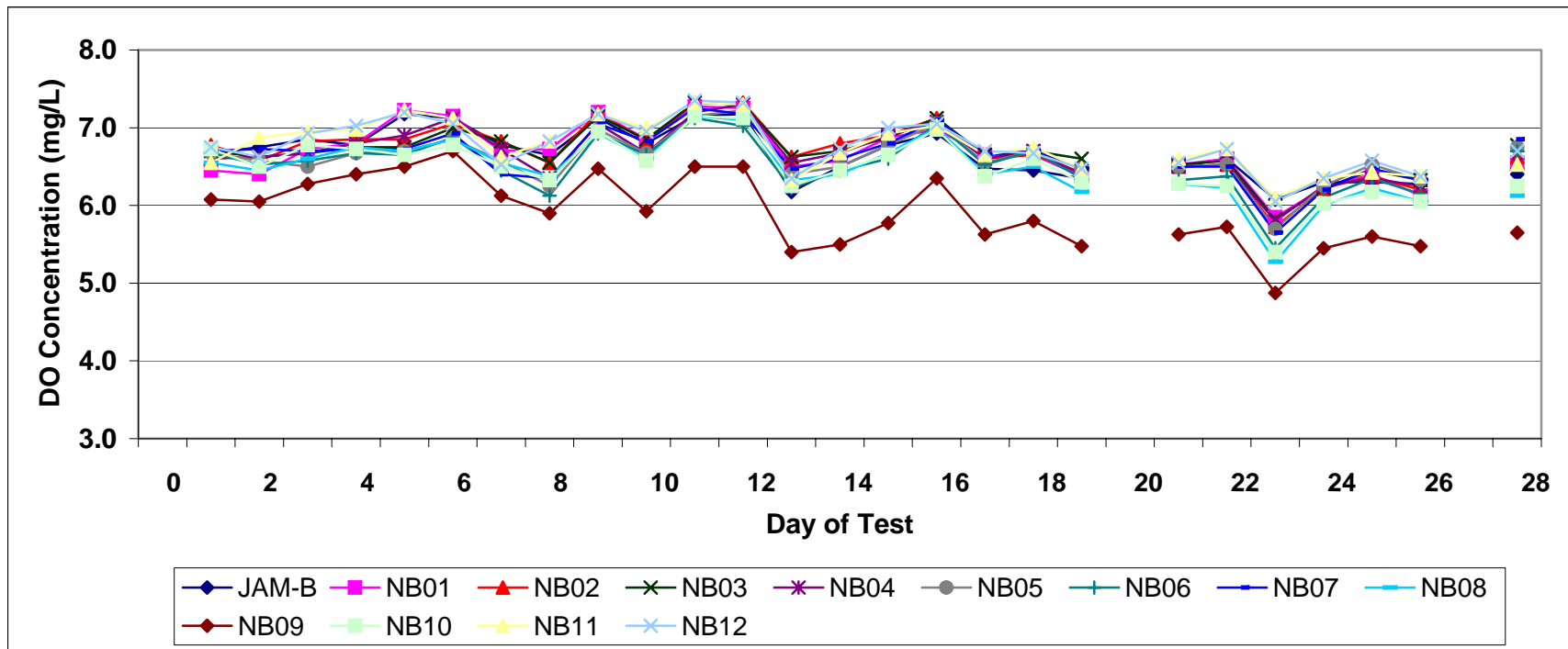
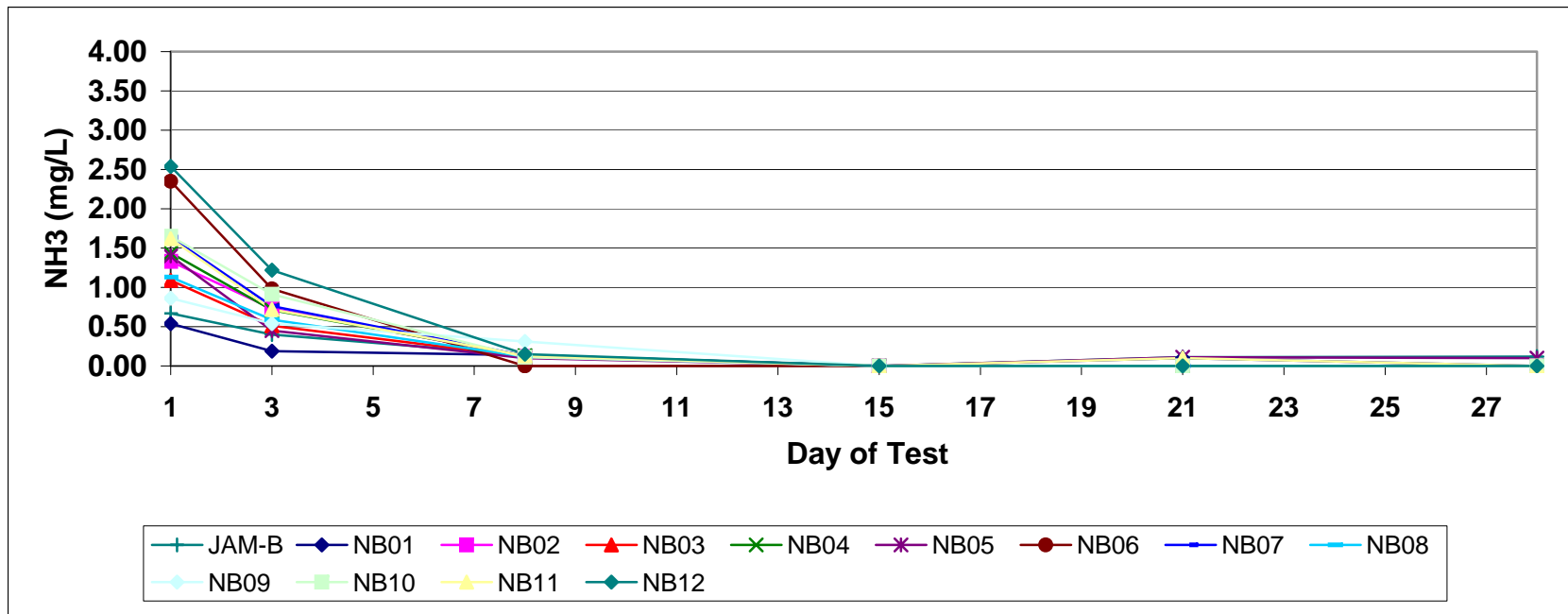


Figure 8. Total ammonia trends of aged overlying water in tests exposing the freshwater amphipod, *Hyalella azteca*, to sediment from control (JAM), reference (NB11 and 12) and test (NB01-10) sample sediments from the Newburgh collection site for 28 days.



STUDY SUMMARY AND APPROVAL SHEET

Study Title **CHRONIC TOXICITY ASSESSMENT OF AQUATIC
SEDIMENTS COLLECTED FROM THE HUDSON RIVER AT
NEWBURGH, NY USING THE FRESHWATER AMPHIPOD,
HYALELLA AZTECA**

Study Conducted For The RETEC Group, Inc.
 1001 W. Seneca St.
 Ithaca, NY 14850-3329

Study Conducted By AquaTox Research, Inc.
 1201 East Fayette Street
 Syracuse, NY 13210

Test Period November, 2006 through January, 2007

ARI Project No. P201-10

RETEC Project No.: CHGE2-19695

Testing Supervised and
Report Prepared By Francis G. Doherty 2/26/07
 Francis G. Doherty, Ph.D. Date
 Aquatic Toxicologist

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APPENDIX A

Biological and Water Chemistry Data from Chronic Sediment Toxicity Tests with Hyalella azteca on A Primary Set of Samples from the Newburgh Manufactured Gas Plant Site at Newburgh, NY Conducted from November 21 through December 19, 2006

HYALELLA AZTECA SURVIVAL AND DRY WEIGHT - NEWBURGH SITE

DATE	SAMPLE	TYPE	% SURVIVAL				MEAN	SD	SIG
			REP #1	REP #2	REP #3	REP #4			
12/19/2006	JAM	CONTROL	100	100	100	100	100	0.0	
12/19/2006	NB18	TEST	80	90	100	100	93	9.6	ns
12/19/2006	NB20	TEST	0	0	0	0	0	0.0	*
12/19/2006	NB22	TEST	100	100	100	100	100	0.0	ns
12/19/2006	NB23	TEST	100	100	100	100	100	0.0	ns
12/19/2006	NB24	TEST	0	0	0	20	5	10.0	*
12/19/2006	NB25	TEST	100	90	90	80	90	8.2	ns
12/19/2006	NB26	TEST	40	90	80	40	63	26.3	*
12/19/2006	NB27	TEST	100	100	100	100	100	0.0	ns
12/19/2006	NB29	TEST	90	80	100	100	93	9.6	ns

DATE	SAMPLE	TYPE	DRY WEIGHT (MG)				MEAN	SD	CV	SIG
			REP #1	REP #2	REP #3	REP #4				
12/19/2006	JAM	CONTROL	0.179	0.173	0.207	0.230	0.197	0.026	13.4	
12/19/2006	NB18	TEST	0.192	0.178	0.157	0.170	0.174	0.015	8.4	ns
12/19/2006	NB22	TEST	0.143	0.129	0.165	0.170	0.152	0.019	12.6	ns
12/19/2006	NB23	TEST	0.172	0.148	0.131	0.170	0.155	0.019	12.5	ns
12/19/2006	NB25	TEST	0.153	0.201	0.134	0.172	0.165	0.029	17.3	ns
12/19/2006	NB27	TEST	0.123	0.115	0.139	0.121	0.125	0.010	8.2	*
12/19/2006	NB29	TEST	0.166	0.243	0.149	0.138	0.174	0.047	27.3	ns

CHEMISTRY OF FRESH OVERLYING CONTROL WATER - NEWBURGH TESTS

Date	pH	DO	Cond	Alk	Hard
11/21/2006	7.82	7.1	298	125	148
11/28/2006	7.77	7.6	299	130	148
12/5/2006	8.02	7.9	297	130	140
12/12/2006	7.86	7.9	317	139	148
12/19/2006	7.93	8.1	314	144	152
MEAN	7.88	7.7	305	134	147
SD	0.10	0.4	10	8	4
CV	1.2	5.1	3.2	5.8	3.0

OVERLYING WATER TEMPERATURE (°C) FROM CONTROL BEAKERS - NEWBURGH TESTS

Date	Temp	Date	Temp
11/21/2006		11/21/2006	
11/22/2006	22.8	11/22/2006	23.4
11/23/2006	23.2	11/23/2006	23.5
11/24/2006	23.3	11/24/2006	23.7
11/25/2006	23.0	11/25/2006	23.4
11/26/2006	23.2	11/26/2006	23.9
11/27/2006	23.4	11/27/2006	24.0
11/28/2006	24.4	11/28/2006	24.5
11/29/2006	22.5	11/29/2006	22.9
11/30/2006	23.2	11/30/2006	23.5
12/1/2006	23.1	12/1/2006	23.3
12/2/2006	22.0	12/2/2006	22.4
12/3/2006	22.8	12/3/2006	23.4
12/4/2006	22.8	12/4/2006	23.4
12/5/2006	22.7	12/5/2006	23.5
12/6/2006	22.3	12/6/2006	23.0
12/7/2006	22.6	12/7/2006	23.3
12/8/2006	22.6	12/8/2006	23.0
12/9/2006	22.8	12/9/2006	23.5
12/10/2006	22.7	12/10/2006	23.5
12/11/2006	23.0	12/11/2006	23.7
12/12/2006	23.4	12/12/2006	24.0
12/13/2006	23.4	12/13/2006	23.9
12/14/2006	23.2	12/14/2006	23.7
12/15/2006	22.9	12/15/2006	23.5
12/16/2006	22.5	12/16/2006	23.1
12/17/2006	22.6	12/17/2006	23.1
12/18/2006	23.2	12/18/2006	23.8
12/19/2006	23.0	12/19/2006	23.5
Mean	23.0	23.5	23.5
SD	0.45	0.41	0.41
CV	2.0	1.7	1.7

SEDIMENT OVERLYING WATER DISSOLVED OXYGEN LEVELS

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM05-W	HA	11/21/2006	0					6.6	0.1
JAM05-W	HA	11/22/2006	1	6.6	6.5	6.5	6.6	6.5	0.1
JAM05-W	HA	11/23/2006	2	6.6	6.4	6.5	6.6	6.4	0.0
JAM05-W	HA	11/24/2006	3	6.4	6.4	6.4	6.4	6.4	0.1
JAM05-W	HA	11/25/2006	4	6.5	6.3	6.4	6.4	6.7	0.0
JAM05-W	HA	11/26/2006	5	6.7	6.6	6.7	6.7	6.2	0.1
JAM05-W	HA	11/27/2006	6	6.3	6.1	6.3	6.1	5.9	0.3
JAM05-W	HA	11/28/2006	7	6.3	5.8	5.9	5.6	6.3	0.2
JAM05-W	HA	11/29/2006	8	6.6	6.2	6.4	6.1	6.5	0.2
JAM05-W	HA	11/30/2006	9	6.7	6.4	6.4	6.3	6.4	0.1
JAM05-W	HA	12/1/2006	10	6.4	6.4	6.4	6.2	6.6	0.2
JAM05-W	HA	12/2/2006	11	6.8	6.7	6.6	6.4	7.0	0.1
JAM05-W	HA	12/3/2006	12	7.2	7.0	6.9	6.9	7.0	0.1
JAM05-W	HA	12/4/2006	13	6.6	6.4	6.5	6.3	6.5	0.1
JAM05-W	HA	12/5/2006	14	6.4	6.3	6.1	6.2	6.3	0.1
JAM05-W	HA	12/6/2006	15	6.4	6.1	6.2	6.1	6.2	0.1
JAM05-W	HA	12/7/2006	16	6.2	5.9	6.0	5.8	6.0	0.2
JAM05-W	HA	12/8/2006	17	6.4	6.0	6.1	6.0	6.1	0.2
JAM05-W	HA	12/9/2006	18	6.4	6.1	6.2	6.2	6.2	0.1
JAM05-W	HA	12/10/2006	19	6.6	6.4	6.5	6.4	6.5	0.1
JAM05-W	HA	12/11/2006	20	6.4	6.2	6.3	6.2	6.3	0.1
JAM05-W	HA	12/12/2006	21	6.4	6.2	6.2	6.1	6.2	0.1
JAM05-W	HA	12/13/2006	22	6.4	6.1	6.2	6.4	6.3	0.1
JAM05-W	HA	12/14/2006	23	6.5	6.4	6.5	6.5	6.5	0.1
JAM05-W	HA	12/15/2006	24	6.2	5.9	6.1	6.2	6.1	0.1
JAM05-W	HA	12/16/2006	25	6.6	6.3	6.8	6.8	6.6	0.2
JAM05-W	HA	12/17/2006	26	6.7	6.4	6.8	7.0	6.7	0.2
JAM05-W	HA	12/18/2006	27	6.1	5.9	5.7	6.0	5.9	0.2
JAM05-W	HA	12/19/2006	28	5.6	5.3	5.8	6.2	5.7	0.4

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB18	HA	11/21/2006	0					#DIV/0!	#DIV/0!
NB18	HA	11/22/2006	1	6.5	6.6	6.5	6.4	6.5	0.1
NB18	HA	11/23/2006	2	6.4	6.5	6.4	6.4	6.4	0.0
NB18	HA	11/24/2006	3	6.2	6.4	6.3	6.3	6.3	0.1
NB18	HA	11/25/2006	4	6.5	6.5	6.4	6.5	6.5	0.1
NB18	HA	11/26/2006	5	6.6	6.6	6.6	6.7	6.6	0.1
NB18	HA	11/27/2006	6	6.0	6.1	6.1	6.2	6.1	0.1
NB18	HA	11/28/2006	7	5.8	5.9	5.8	5.9	5.9	0.1
NB18	HA	11/29/2006	8	6.1	6.3	6.2	6.4	6.3	0.1
NB18	HA	11/30/2006	9	6.3	6.4	6.4	6.5	6.4	0.1
NB18	HA	12/1/2006	10	6.4	6.5	6.5	7.0	6.6	0.3
NB18	HA	12/2/2006	11	6.7	6.8	6.8	7.4	6.9	0.3

NB18	HA	12/3/2006	12	7.0	7.1	7.1	7.4	7.2	0.2
NB18	HA	12/4/2006	13	6.3	6.4	6.5	6.8	6.5	0.2
NB18	HA	12/5/2006	14	6.8	6.8	6.6	6.8	6.8	0.1
NB18	HA	12/6/2006	15	6.3	6.3	6.3	6.5	6.4	0.1
NB18	HA	12/7/2006	16	6.0	6.0	6.0	6.1	6.0	0.0
NB18	HA	12/8/2006	17	6.0	6.2	6.0	6.2	6.1	0.1
NB18	HA	12/9/2006	18	6.0	6.1	6.0	6.4	6.1	0.2
NB18	HA	12/10/2006	19	6.2	6.3	6.2	6.4	6.3	0.1
NB18	HA	12/11/2006	20	6.0	6.2	6.0	6.4	6.2	0.2
NB18	HA	12/12/2006	21	6.1	6.2	6.1	6.4	6.2	0.1
NB18	HA	12/13/2006	22	6.0	6.3	6.1	6.4	6.2	0.2
NB18	HA	12/14/2006	23	6.2	6.4	6.3	6.5	6.4	0.1
NB18	HA	12/15/2006	24	5.8	6.1	6.0	6.3	6.1	0.2
NB18	HA	12/16/2006	25	6.5	6.6	6.5	6.8	6.6	0.1
NB18	HA	12/17/2006	26	6.5	6.7	6.6	6.8	6.6	0.1
NB18	HA	12/18/2006	27	5.6	5.9	5.7	6.0	5.8	0.2
NB18	HA	12/19/2006	28	6.0	6.2	6.1	6.3	6.2	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB20	HA	11/21/2006	0						
NB20	HA	11/22/2006	1	6.3	6.7	6.6	6.6	6.6	0.2
NB20	HA	11/23/2006	2	6.3	6.5	6.5	6.6	6.5	0.1
NB20	HA	11/24/2006	3	6.7	6.7	6.6	6.5	6.6	0.1
NB20	HA	11/25/2006	4	6.8	6.8	6.5	6.6	6.7	0.1
NB20	HA	11/26/2006	5	6.8	6.8	6.8	6.7	6.8	0.0
NB20	HA	11/27/2006	6	6.6	6.6	6.4	6.6	6.6	0.1
NB20	HA	11/28/2006	7	6.1	6.1	6.1	6.2	6.1	0.1
NB20	HA	11/29/2006	8	6.5	6.6	6.2	6.5	6.5	0.2
NB20	HA	11/30/2006	9	6.7	6.8	6.4	6.6	6.6	0.2
NB20	HA	12/1/2006	10	6.8	7.0	6.6	6.8	6.8	0.2
NB20	HA	12/2/2006	11	7.1	7.3	7.1	7.1	7.2	0.1
NB20	HA	12/3/2006	12	7.2	7.3	7.3	7.3	7.3	0.0
NB20	HA	12/4/2006	13	6.6	6.6	6.6	6.7	6.6	0.1
NB20	HA	12/5/2006	14	6.8	6.9	6.8	7.0	6.9	0.1
NB20	HA	12/6/2006	15	6.3	6.3	6.2	6.6	6.4	0.2
NB20	HA	12/7/2006	16	6.2	6.1	5.9	6.2	6.1	0.1
NB20	HA	12/8/2006	17	6.3	6.1	6.1	6.5	6.3	0.2
NB20	HA	12/9/2006	18	6.3	6.3	6.2	6.6	6.4	0.2
NB20	HA	12/10/2006	19	6.5	6.4	6.2	6.5	6.4	0.1
NB20	HA	12/11/2006	20	6.4	6.3	6.2	6.4	6.3	0.1
NB20	HA	12/12/2006	21	6.4	6.3	6.3	6.5	6.4	0.1
NB20	HA	12/13/2006	22	6.3	6.4	6.4	6.5	6.4	0.1
NB20	HA	12/14/2006	23	6.5	6.5	6.4	6.6	6.5	0.1
NB20	HA	12/15/2006	24	6.2	6.2	6.2	6.4	6.3	0.1
NB20	HA	12/16/2006	25	6.7	6.8	6.8	7.0	6.8	0.1
NB20	HA	12/17/2006	26	6.6	7.0	6.8	6.9	6.8	0.2
NB20	HA	12/18/2006	27	5.8	6.3	6.0	6.3	6.1	0.2
NB20	HA	12/19/2006	28	5.9	6.4	6.1	6.4	6.2	0.2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB22	HA	11/21/2006	0						
NB22	HA	11/22/2006	1	6.4	6.4	6.4	6.4	6.4	0.0
NB22	HA	11/23/2006	2	6.5	6.4	6.4	6.4	6.4	0.0
NB22	HA	11/24/2006	3	6.6	6.5	6.5	6.4	6.5	0.1
NB22	HA	11/25/2006	4	6.6	6.4	6.5	6.3	6.5	0.1
NB22	HA	11/26/2006	5	6.7	6.7	6.7	6.5	6.7	0.1
NB22	HA	11/27/2006	6	6.3	6.5	6.2	6.2	6.3	0.1
NB22	HA	11/28/2006	7	6.0	6.1	5.7	5.9	5.9	0.2
NB22	HA	11/29/2006	8	6.3	6.3	6.1	6.2	6.2	0.1
NB22	HA	11/30/2006	9	6.5	6.5	6.3	6.4	6.4	0.1
NB22	HA	12/1/2006	10	6.6	6.7	6.6	6.7	6.7	0.1
NB22	HA	12/2/2006	11	7.0	7.0	6.9	7.2	7.0	0.1
NB22	HA	12/3/2006	12	7.3	7.2	7.0	7.4	7.2	0.2
NB22	HA	12/4/2006	13	6.7	6.7	6.6	6.6	6.7	0.1
NB22	HA	12/5/2006	14	6.9	6.9	6.7	6.7	6.8	0.1
NB22	HA	12/6/2006	15	6.3	6.5	6.4	6.4	6.4	0.1
NB22	HA	12/7/2006	16	6.2	6.3	6.1	6.0	6.2	0.1
NB22	HA	12/8/2006	17	6.3	6.4	6.3	6.2	6.3	0.1
NB22	HA	12/9/2006	18	6.3	6.4	6.2	6.1	6.3	0.1
NB22	HA	12/10/2006	19	6.5	6.5	6.4	6.4	6.5	0.1
NB22	HA	12/11/2006	20	6.5	6.5	6.4	6.4	6.5	0.1
NB22	HA	12/12/2006	21	6.4	6.5	6.4	6.4	6.4	0.0
NB22	HA	12/13/2006	22	6.5	6.6	6.6	6.5	6.6	0.1
NB22	HA	12/14/2006	23	6.6	6.7	6.6	6.6	6.6	0.0
NB22	HA	12/15/2006	24	6.4	6.5	6.4	6.4	6.4	0.0
NB22	HA	12/16/2006	25	6.8	6.9	6.9	6.8	6.9	0.1
NB22	HA	12/17/2006	26	6.8	7.0	6.9	6.9	6.9	0.1
NB22	HA	12/18/2006	27	5.9	6.3	6.2	6.1	6.1	0.2
NB22	HA	12/19/2006	28	6.1	6.5	6.2	6.3	6.3	0.2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB23	HA	11/21/2006	0						
NB23	HA	11/22/2006	1	6.5	6.5	6.5	6.5	6.5	0.0
NB23	HA	11/23/2006	2	6.4	6.6	6.6	6.6	6.6	0.1
NB23	HA	11/24/2006	3	6.7	6.7	6.6	6.7	6.7	0.1
NB23	HA	11/25/2006	4	6.7	6.7	6.5	6.6	6.6	0.1
NB23	HA	11/26/2006	5	6.6	6.7	6.7	6.8	6.7	0.1
NB23	HA	11/27/2006	6	6.2	6.4	6.2	6.3	6.3	0.1
NB23	HA	11/28/2006	7	5.9	6.1	5.9	6.0	6.0	0.1
NB23	HA	11/29/2006	8	6.1	6.2	6.2	6.3	6.2	0.1
NB23	HA	11/30/2006	9	6.5	6.5	6.4	6.5	6.5	0.1
NB23	HA	12/1/2006	10	6.6	6.6	6.7	6.7	6.7	0.1
NB23	HA	12/2/2006	11	6.7	6.7	6.8	7.0	6.8	0.1
NB23	HA	12/3/2006	12	6.9	7.1	7.1	7.1	7.1	0.1

NB23	HA	12/4/2006	13	6.5	6.6	6.6	6.5	6.6	0.1
NB23	HA	12/5/2006	14	6.4	6.6	6.5	6.6	6.5	0.1
NB23	HA	12/6/2006	15	6.2	6.4	6.5	6.4	6.4	0.1
NB23	HA	12/7/2006	16	6.0	6.1	6.2	6.3	6.2	0.1
NB23	HA	12/8/2006	17	6.2	6.2	6.2	6.4	6.3	0.1
NB23	HA	12/9/2006	18	6.1	6.2	6.4	6.4	6.3	0.1
NB23	HA	12/10/2006	19	6.4	6.4	6.5	6.6	6.5	0.1
NB23	HA	12/11/2006	20	6.4	6.4	6.5	6.5	6.5	0.1
NB23	HA	12/12/2006	21	6.3	6.4	6.5	6.5	6.4	0.1
NB23	HA	12/13/2006	22	6.4	6.4	6.6	6.6	6.5	0.1
NB23	HA	12/14/2006	23	6.5	6.6	6.7	6.7	6.6	0.1
NB23	HA	12/15/2006	24	6.1	6.2	6.4	6.5	6.3	0.2
NB23	HA	12/16/2006	25	6.7	6.8	7.0	7.0	6.9	0.1
NB23	HA	12/17/2006	26	6.7	6.8	7.0	7.0	6.9	0.1
NB23	HA	12/18/2006	27	6.1	6.2	6.3	6.3	6.2	0.1
NB23	HA	12/19/2006	28	6.1	6.2	6.5	6.4	6.3	0.2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB24	HA	11/21/2006	0						
NB24	HA	11/22/2006	1	6.2	6.2	6.3	6.1	6.2	0.1
NB24	HA	11/23/2006	2	6.4	6.2	6.3	6.1	6.3	0.1
NB24	HA	11/24/2006	3	6.4	6.4	6.4	6.3	6.4	0.0
NB24	HA	11/25/2006	4	6.7	6.5	6.5	6.3	6.5	0.2
NB24	HA	11/26/2006	5	6.7	6.6	6.7	6.4	6.6	0.1
NB24	HA	11/27/2006	6	6.4	6.2	6.4	6.0	6.3	0.2
NB24	HA	11/28/2006	7	6.1	5.9	5.8	6.0	6.0	0.1
NB24	HA	11/29/2006	8	6.2	6.2	6.1	6.3	6.2	0.1
NB24	HA	11/30/2006	9	6.5	6.6	6.4	6.7	6.6	0.1
NB24	HA	12/1/2006	10	6.6	6.7	6.6	6.8	6.7	0.1
NB24	HA	12/2/2006	11	6.8	6.7	6.9	7.0	6.9	0.1
NB24	HA	12/3/2006	12	7.1	6.9	7.1	7.0	7.0	0.1
NB24	HA	12/4/2006	13	6.5	6.4	6.6	6.5	6.5	0.1
NB24	HA	12/5/2006	14	6.7	6.6	6.7	6.5	6.6	0.1
NB24	HA	12/6/2006	15	6.4	6.3	6.5	6.7	6.5	0.2
NB24	HA	12/7/2006	16	6.1	6.0	6.1	6.0	6.1	0.1
NB24	HA	12/8/2006	17	6.2	6.2	6.4	6.2	6.3	0.1
NB24	HA	12/9/2006	18	6.1	6.2	6.4	6.2	6.2	0.1
NB24	HA	12/10/2006	19	6.3	6.4	6.5	6.4	6.4	0.1
NB24	HA	12/11/2006	20	6.3	6.4	6.4	6.4	6.4	0.1
NB24	HA	12/12/2006	21	6.2	6.4	6.4	6.2	6.3	0.1
NB24	HA	12/13/2006	22	6.5	6.4	6.5	6.3	6.4	0.1
NB24	HA	12/14/2006	23	6.5	6.5	6.6	6.6	6.6	0.1
NB24	HA	12/15/2006	24	6.2	6.2	6.3	6.2	6.2	0.1
NB24	HA	12/16/2006	25	6.8	6.8	6.9	6.8	6.8	0.0
NB24	HA	12/17/2006	26	6.9	6.8	6.9	6.9	6.9	0.1
NB24	HA	12/18/2006	27	6.2	6.1	6.1	6.1	6.1	0.0
NB24	HA	12/19/2006	28	6.3	6.1	6.2	6.1	6.2	0.1

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN #DIV/0!	SD
				01	02	03	04		
NB25	HA	11/21/2006	0					6.3	0.1
NB25	HA	11/22/2006	1	6.3	6.4	6.3	6.2	6.5	0.1
NB25	HA	11/23/2006	2	6.6	6.6	6.3	6.4	6.6	0.1
NB25	HA	11/24/2006	3	6.7	6.7	6.4	6.5	6.6	0.1
NB25	HA	11/25/2006	4	6.7	6.7	6.4	6.5	6.6	0.1
NB25	HA	11/26/2006	5	6.6	6.7	6.5	6.7	6.6	0.1
NB25	HA	11/27/2006	6	6.3	6.4	6.1	6.2	6.3	0.1
NB25	HA	11/28/2006	7	6.1	6.2	6.0	6.2	6.1	0.1
NB25	HA	11/29/2006	8	6.1	6.2	6.2	6.5	6.3	0.2
NB25	HA	11/30/2006	9	6.5	6.5	6.6	6.9	6.6	0.2
NB25	HA	12/1/2006	10	6.8	6.9	6.9	7.1	6.9	0.1
NB25	HA	12/2/2006	11	6.9	7.1	7.1	7.3	7.1	0.2
NB25	HA	12/3/2006	12	7.1	7.3	7.2	7.2	7.2	0.1
NB25	HA	12/4/2006	13	6.6	6.7	6.6	6.5	6.6	0.1
NB25	HA	12/5/2006	14	6.6	6.8	6.6	6.5	6.6	0.1
NB25	HA	12/6/2006	15	6.5	6.6	6.4	6.3	6.5	0.1
NB25	HA	12/7/2006	16	6.6	6.5	6.3	6.2	6.4	0.2
NB25	HA	12/8/2006	17	6.5	6.5	6.3	6.1	6.4	0.2
NB25	HA	12/9/2006	18	6.5	6.5	6.4	6.4	6.5	0.1
NB25	HA	12/10/2006	19	6.7	6.7	6.5	6.5	6.6	0.1
NB25	HA	12/11/2006	20	6.6	6.5	6.3	6.4	6.5	0.1
NB25	HA	12/12/2006	21	6.5	6.4	6.3	6.3	6.4	0.1
NB25	HA	12/13/2006	22	6.7	6.7	6.5	6.6	6.6	0.1
NB25	HA	12/14/2006	23	6.7	6.7	6.6	6.7	6.7	0.1
NB25	HA	12/15/2006	24	6.4	6.4	6.4	6.4	6.4	0.0
NB25	HA	12/16/2006	25	7.0	7.0	6.8	7.0	7.0	0.1
NB25	HA	12/17/2006	26	7.0	6.9	6.8	6.9	6.9	0.1
NB25	HA	12/18/2006	27	6.3	6.2	6.1	6.2	6.2	0.1
NB25	HA	12/19/2006	28	6.4	6.3	6.2		6.3	0.1

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB26	HA	11/21/2006	0					6.3	0.1
NB26	HA	11/22/2006	1	6.2	6.5	6.3	6.3	6.3	0.1
NB26	HA	11/23/2006	2	6.2	6.4	6.3	6.2	6.2	0.1
NB26	HA	11/24/2006	3	6.2	6.3	6.0	6.2	6.2	0.1
NB26	HA	11/25/2006	4	6.4	6.4	6.2	6.5	6.4	0.1
NB26	HA	11/26/2006	5	6.4	6.5	6.3	6.5	6.4	0.1
NB26	HA	11/27/2006	6	6.1	6.2	6.0	6.1	6.1	0.1
NB26	HA	11/28/2006	7	5.8	5.9	5.8	5.9	5.9	0.1
NB26	HA	11/29/2006	8	6.0	6.0	6.0	6.2	6.1	0.1
NB26	HA	11/30/2006	9	6.3	6.4	6.3	6.5	6.4	0.1
NB26	HA	12/1/2006	10	6.6	6.7	6.6	6.8	6.7	0.1
NB26	HA	12/2/2006	11	6.7	6.7	6.7	6.7	6.7	0.0
NB26	HA	12/3/2006	12	6.9	7.1	7.0	6.9	7.0	0.1
NB26	HA	12/4/2006	13	6.4	6.6	6.5	6.7	6.6	0.1

NB26	HA	12/5/2006	14	6.5	6.7	6.6	6.7	6.6	0.1
NB26	HA	12/6/2006	15	6.2	6.3	6.3	6.5	6.3	0.1
NB26	HA	12/7/2006	16	6.0	6.3	6.2	6.5	6.3	0.2
NB26	HA	12/8/2006	17	6.1	6.1	6.2	6.6	6.3	0.2
NB26	HA	12/9/2006	18	6.0	6.1	6.3	6.5	6.2	0.2
NB26	HA	12/10/2006	19	6.4	6.4	6.4	6.6	6.5	0.1
NB26	HA	12/11/2006	20	6.1	6.2	6.3	6.5	6.3	0.2
NB26	HA	12/12/2006	21	6.0	6.2	6.3	6.4	6.2	0.2
NB26	HA	12/13/2006	22	6.3	6.4	6.3	6.5	6.4	0.1
NB26	HA	12/14/2006	23	6.7	6.6	6.6	6.7	6.7	0.1
NB26	HA	12/15/2006	24	6.2	6.2	6.3	6.3	6.3	0.1
NB26	HA	12/16/2006	25	6.7	6.7	6.7	6.8	6.7	0.0
NB26	HA	12/17/2006	26	6.7	6.8	6.7	6.9	6.8	0.1
NB26	HA	12/18/2006	27	6.1	6.1	6.2	6.1	6.1	0.0
NB26	HA	12/19/2006	28	6.6	6.4	6.3	6.4	6.4	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB27	HA	11/21/2006	0						
NB27	HA	11/22/2006	1	6.5	6.4	6.3	6.4	6.4	0.1
NB27	HA	11/23/2006	2	6.5	6.5	6.3	6.4	6.4	0.1
NB27	HA	11/24/2006	3	6.7	6.6	6.5	6.4	6.6	0.1
NB27	HA	11/25/2006	4	7.1	6.9	6.7	6.8	6.9	0.2
NB27	HA	11/26/2006	5	6.9	7.0	6.8	6.8	6.9	0.1
NB27	HA	11/27/2006	6	6.6	6.5	6.3	6.4	6.5	0.1
NB27	HA	11/28/2006	7	6.2	6.0	6.0	6.1	6.1	0.1
NB27	HA	11/29/2006	8	6.2	6.2	6.1	6.2	6.2	0.1
NB27	HA	11/30/2006	9	6.6	6.4	6.4	6.5	6.5	0.1
NB27	HA	12/1/2006	10	6.8	6.7	6.6	6.7	6.7	0.1
NB27	HA	12/2/2006	11	6.9	6.9	6.7	6.8	6.8	0.1
NB27	HA	12/3/2006	12	7.2	7.1	7.0	7.1	7.1	0.1
NB27	HA	12/4/2006	13	6.6	6.6	6.5	6.4	6.5	0.1
NB27	HA	12/5/2006	14	6.7	6.6	6.6	6.8	6.7	0.1
NB27	HA	12/6/2006	15	6.4	6.4	6.3	6.6	6.4	0.1
NB27	HA	12/7/2006	16	6.4	6.4	6.3	6.3	6.4	0.1
NB27	HA	12/8/2006	17	6.4	6.2	6.1	6.2	6.2	0.1
NB27	HA	12/9/2006	18	6.4	6.3	6.2	6.4	6.3	0.1
NB27	HA	12/10/2006	19	6.6	6.5	6.4	6.5	6.5	0.1
NB27	HA	12/11/2006	20	6.6	6.3	6.2	6.4	6.4	0.2
NB27	HA	12/12/2006	21	6.6	6.3	6.1	6.4	6.4	0.2
NB27	HA	12/13/2006	22	6.6	6.5	6.4	6.5	6.5	0.1
NB27	HA	12/14/2006	23	6.8	6.6	6.6	6.7	6.7	0.1
NB27	HA	12/15/2006	24	6.4	6.2	6.2	6.2	6.3	0.1
NB27	HA	12/16/2006	25	7.0	6.7	6.7	6.7	6.8	0.2
NB27	HA	12/17/2006	26	7.0	6.8	6.9	6.7	6.9	0.1
NB27	HA	12/18/2006	27	6.2	5.9	6.2	6.1	6.1	0.1
NB27	HA	12/19/2006	28	6.4	6.1	6.4	6.5	6.4	0.2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN #DIV/0!	SD #DIV/0!
				01	02	03	04		
NB29	HA	11/21/2006	0						
NB29	HA	11/22/2006	1	6.5	6.2	6.1	6.2	6.3	0.2
NB29	HA	11/23/2006	2	6.4	6.2	6.2	6.1	6.2	0.1
NB29	HA	11/24/2006	3	6.2	6.2	6.0	6.0	6.1	0.1
NB29	HA	11/25/2006	4	6.4	6.3	6.1	6.2	6.3	0.1
NB29	HA	11/26/2006	5	6.5	6.5	6.3	6.0	6.3	0.2
NB29	HA	11/27/2006	6	6.1	6.1	5.8	5.9	6.0	0.2
NB29	HA	11/28/2006	7	6.0	6.0	5.7	5.8	5.9	0.1
NB29	HA	11/29/2006	8	6.1	6.2	5.9	5.8	6.0	0.2
NB29	HA	11/30/2006	9	6.5	6.4	6.2	6.2	6.3	0.1
NB29	HA	12/1/2006	10	6.6	6.7	6.6	6.6	6.6	0.0
NB29	HA	12/2/2006	11	6.7	6.8	6.6	6.5	6.7	0.1
NB29	HA	12/3/2006	12	7.0	7.1	6.8	6.7	6.9	0.2
NB29	HA	12/4/2006	13	6.4	6.5	6.2	6.0	6.3	0.2
NB29	HA	12/5/2006	14	6.5	6.5	6.5	6.2	6.4	0.1
NB29	HA	12/6/2006	15	6.2	6.3	6.1	6.0	6.2	0.1
NB29	HA	12/7/2006	16	6.1	6.2	5.9	6.0	6.1	0.1
NB29	HA	12/8/2006	17	6.0	6.0	5.8	5.9	5.9	0.1
NB29	HA	12/9/2006	18	6.0	6.1	6.0	6.0	6.0	0.0
NB29	HA	12/10/2006	19	6.3	6.3	6.1	6.1	6.2	0.1
NB29	HA	12/11/2006	20	6.1	6.0	6.0	6.0	6.0	0.0
NB29	HA	12/12/2006	21	6.3	6.0	5.9	6.0	6.1	0.2
NB29	HA	12/13/2006	22	6.5	6.1	6.0	6.1	6.2	0.2
NB29	HA	12/14/2006	23	6.6	6.4	6.1	6.3	6.4	0.2
NB29	HA	12/15/2006	24	6.2	5.9	5.7	5.6	5.9	0.3
NB29	HA	12/16/2006	25	6.8	6.6	6.1	6.4	6.5	0.3
NB29	HA	12/17/2006	26	6.8	6.6	6.3	6.4	6.5	0.2
NB29	HA	12/18/2006	27	5.9	5.9	5.4	5.6	5.7	0.2
NB29	HA	12/19/2006	28	6.1	6.0	5.5	5.7	5.8	0.3

**SEDIMENT OVERLYING WATER AMMONIA
LEVELS**

Sample	Species	Date	Day	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
JAM05-W	HA	11/22/2006	1		0.78			0.78
JAM05-W	HA	11/24/2006	3			0.42		0.42
JAM05-W	HA	11/28/2006	7				0.33	0.33
JAM05-W	HA	12/5/2006	14	0.11				0.11
JAM05-W	HA	12/12/2006	21		<0.10			<0.10
JAM05-W	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	Day	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB18	HA	11/22/2006	1		1.04			1.04
NB18	HA	11/24/2006	3			0.80		0.80
NB18	HA	11/28/2006	7				0.12	0.12
NB18	HA	12/5/2006	14	<0.10				<0.10
NB18	HA	12/12/2006	21		<0.10			<0.10
NB18	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB20	HA	11/22/2006	1		0.88			0.88
NB20	HA	11/24/2006	3			0.98		0.98
NB20	HA	11/28/2006	7				0.64	0.64
NB20	HA	12/5/2006	14	<0.10				<0.10
NB20	HA	12/12/2006	21		<0.10			<0.10
NB20	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB22	HA	11/22/2006	1		1.59			1.59
NB22	HA	11/24/2006	3			1.33		1.33
NB22	HA	11/28/2006	7				<0.10	<0.10
NB22	HA	12/5/2006	14	<0.10				<0.10
NB22	HA	12/12/2006	21		<0.10			<0.10
NB22	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB23	HA	11/22/2006	1		1.06			1.06
NB23	HA	11/24/2006	3			1.00		1.00
NB23	HA	11/28/2006	7				<0.10	<0.10
NB23	HA	12/5/2006	14	<0.10				<0.10
NB23	HA	12/12/2006	21		<0.10			<0.10
NB23	HA	12/19/2006	28				0.13	0.13

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB24	HA	11/22/2006	1		0.82			0.82
NB24	HA	11/24/2006	3			0.77		0.77
NB24	HA	11/28/2006	7				0.10	0.10
NB24	HA	12/5/2006	14	<0.10				<0.10
NB24	HA	12/12/2006	21		<0.10			<0.10
NB24	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB25	HA	11/22/2006	1		0.88			0.88
NB25	HA	11/24/2006	3			0.89		0.89
NB25	HA	11/28/2006	7				0.10	0.10
NB25	HA	12/5/2006	14	<0.10				<0.10
NB25	HA	12/12/2006	21		<0.10			<0.10
NB25	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB26	HA	11/22/2006	1		0.98			0.98
NB26	HA	11/24/2006	3			0.77		0.77
NB26	HA	11/28/2006	7				<0.10	<0.10
NB26	HA	12/5/2006	14	<0.10				<0.10
NB26	HA	12/12/2006	21		<0.10			<0.10
NB26	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB27	HA	11/22/2006	1		1.42			1.42
NB27	HA	11/24/2006	3			1.18		1.18
NB27	HA	11/28/2006	7				0.28	0.28
NB27	HA	12/5/2006	14	<0.10				<0.10
NB27	HA	12/12/2006	21		<0.10			<0.10
NB27	HA	12/19/2006	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB29	HA	11/22/2006	1		1.03			1.06
NB29	HA	11/24/2006	3			0.59		0.59
NB29	HA	11/28/2006	7				<0.10	<0.10
NB29	HA	12/5/2006	14	<0.10				<0.10
NB29	HA	12/12/2006	21		<0.10			<0.10
NB29	HA	12/19/2006	28			<0.10		<0.10

SEDIMENT OVERLYING WATER Ph LEVELS

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM05-W	HA	11/22/2006	1	7.57	7.56	7.58	7.60	7.58	0.02
JAM05-W	HA	11/24/2006	3	7.52	7.51	7.54	7.58	7.54	0.03
JAM05-W	HA	11/28/2006	7	7.54	7.52	7.55	7.56	7.54	0.02
JAM05-W	HA	12/5/2006	14	7.77	7.72	7.77	7.79	7.76	0.03
JAM05-W	HA	12/12/2006	21	7.76	7.79	7.73	7.68	7.74	0.05
JAM05-W	HA	12/19/2006	28	7.43	7.44	7.47	7.55	7.47	0.05

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB18	HA	11/22/2006	1	7.44	7.48	7.48	7.49	7.47	0.02
NB18	HA	11/24/2006	3	7.45	7.47	7.48	7.49	7.47	0.02
NB18	HA	11/28/2006	7	7.41	7.46	7.46	7.48	7.45	0.03
NB18	HA	12/5/2006	14	7.53	7.62	7.56	7.59	7.58	0.04
NB18	HA	12/12/2006	21	7.68	7.72	7.82	7.85	7.77	0.08
NB18	HA	12/19/2006	28	7.36	7.33	7.33	7.42	7.36	0.04

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB20	HA	11/22/2006	1	7.53	7.58	7.59	7.60	7.58	0.03
NB20	HA	11/24/2006	3	7.36	7.44	7.47	7.50	7.44	0.06
NB20	HA	11/28/2006	7	7.43	7.49	7.46	7.51	7.47	0.03
NB20	HA	12/5/2006	14	7.50	7.52	7.52	7.58	7.53	0.03
NB20	HA	12/12/2006	21	7.57	7.61	7.64	7.65	7.62	0.04
NB20	HA	12/19/2006	28	7.33	7.38	7.38	7.40	7.37	0.03

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB22	HA	11/22/2006	1	7.47	7.49	7.50	7.49	7.49	0.01
NB22	HA	11/24/2006	3	7.44	7.43	7.44	7.44	7.44	0.00
NB22	HA	11/28/2006	7	7.47	7.47	7.46	7.48	7.47	0.01
NB22	HA	12/5/2006	14	7.55	7.58	7.58	7.60	7.58	0.02
NB22	HA	12/12/2006	21	7.68	7.67	7.70	7.73	7.70	0.03
NB22	HA	12/19/2006	28	7.41	7.45	7.47	7.46	7.45	0.03

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB23	HA	11/22/2006	1	7.51	7.53	7.55	7.56	7.54	0.02
NB23	HA	11/24/2006	3	7.53	7.57	7.56	7.59	7.56	0.03
NB23	HA	11/28/2006	7	7.46	7.52	7.51	7.55	7.51	0.04
NB23	HA	12/5/2006	14	7.28	7.33	7.34	7.38	7.33	0.04
NB23	HA	12/12/2006	21	7.42	7.48	7.53	7.55	7.50	0.06
NB23	HA	12/19/2006	28	7.24	7.33	7.36	7.36	7.32	0.06

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB24	HA	11/22/2006	1	7.47	7.50	7.51	7.51	7.50	0.02
NB24	HA	11/24/2006	3	7.59	7.60	7.62	7.60	7.60	0.01
NB24	HA	11/28/2006	7	7.57	7.55	7.55	7.57	7.56	0.01
NB24	HA	12/5/2006	14	7.42	7.44	7.50	7.49	7.46	0.04
NB24	HA	12/12/2006	21	7.48	7.55	7.58	7.59	7.55	0.05
NB24	HA	12/19/2006	28	7.45	7.48	7.50	7.49	7.48	0.02

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB25	HA	11/22/2006	1	7.53	7.56	7.58	7.56	7.56	0.02
NB25	HA	11/24/2006	3	7.32	7.35	7.38	7.40	7.36	0.03
NB25	HA	11/28/2006	7	7.28	7.33	7.32	7.37	7.33	0.04
NB25	HA	12/5/2006	14	7.46	7.53	7.52	7.53	7.51	0.03
NB25	HA	12/12/2006	21	7.48	7.54	7.54	7.55	7.53	0.03
NB25	HA	12/19/2006	28	7.44	7.48	7.47		7.46	0.02

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB26	HA	11/22/2006	1	7.47	7.53	7.54	7.55	7.52	0.04
NB26	HA	11/24/2006	3	7.42	7.46	7.44	7.48	7.45	0.03
NB26	HA	11/28/2006	7	7.38	7.43	7.44	7.48	7.43	0.04
NB26	HA	12/5/2006	14	7.26	7.29	7.34	7.41	7.33	0.07
NB26	HA	12/12/2006	21	7.40	7.47	7.52	7.54	7.48	0.06
NB26	HA	12/19/2006	28	7.28	7.35	7.35	7.36	7.34	0.04

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB27	HA	11/22/2006	1	7.62	7.64	7.63	7.62	7.63	0.01
NB27	HA	11/24/2006	3	7.59	7.59	7.57	7.59	7.59	0.01
NB27	HA	11/28/2006	7	7.57	7.55	7.55	7.58	7.56	0.02
NB27	HA	12/5/2006	14	7.49	7.51	7.56	7.58	7.54	0.04
NB27	HA	12/12/2006	21	7.49	7.50	7.52	7.60	7.53	0.05
NB27	HA	12/19/2006	28	7.39	7.39	7.44	7.45	7.42	0.03

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB29	HA	11/22/2006	1	7.62	7.62	7.61	7.61	7.62	0.01
NB29	HA	11/24/2006	3	7.53	7.57	7.56	7.56	7.56	0.02
NB29	HA	11/28/2006	7	7.57	7.59	7.57	7.59	7.58	0.01
NB29	HA	12/5/2006	14	7.62	7.63	7.68	7.66	7.65	0.03
NB29	HA	12/12/2006	21	7.45	7.53	7.51	7.55	7.51	0.04
NB29	HA	12/19/2006	28	7.39	7.46	7.46	7.43	7.44	0.03

SEDIMENT OVERLYING WATER CONDUCTIVITY LEVELS

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM05-W	HA	11/22/2006	1	399	400	398	395	398	2
JAM05-W	HA	11/24/2006	3	358	362	367	370	364	5
JAM05-W	HA	11/28/2006	7	351	352	356	359	355	4
JAM05-W	HA	12/5/2006	14	327	328	336	336	332	5
JAM05-W	HA	12/12/2006	21	337	340	339	339	339	1
JAM05-W	HA	12/19/2006	28	327	327	326	328	327	1

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB18	HA	11/22/2006	1	311	315	316	317	315	3
NB18	HA	11/24/2006	3	309	313	316	311	312	3
NB18	HA	11/28/2006	7	314	318	321	317	318	3
NB18	HA	12/5/2006	14	314	320	317	314	316	3
NB18	HA	12/12/2006	21	334	333	336	335	335	1
NB18	HA	12/19/2006	28	320	320	329	328	324	5

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB20	HA	11/22/2006	1	296	312	312	314	309	8
NB20	HA	11/24/2006	3	308	311	312	313	311	2
NB20	HA	11/28/2006	7	313	317	318	316	316	2
NB20	HA	12/5/2006	14	306	310	311	307	309	2
NB20	HA	12/12/2006	21	323	326	325	323	324	2
NB20	HA	12/19/2006	28	309	315	317	315	314	3

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB22	HA	11/22/2006	1	314	317	333	333	324	10
NB22	HA	11/24/2006	3	312	312	316	318	315	3
NB22	HA	11/28/2006	7	309	306	312	313	310	3
NB22	HA	12/5/2006	14	305	306	310	309	308	2
NB22	HA	12/12/2006	21	329	327	328	328	328	1
NB22	HA	12/19/2006	28	314	316	320	323	318	4

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB23	HA	11/22/2006	1	295	301	297	300	298	3
NB23	HA	11/24/2006	3	311	315	313	315	314	2
NB23	HA	11/28/2006	7	315	319	317	319	318	2
NB23	HA	12/5/2006	14	310	314	311	308	311	3
NB23	HA	12/12/2006	21	324	328	326		326	2
NB23	HA	12/19/2006	28	330	328	325	324	327	3

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB24	HA	11/22/2006	1	290	295	289	296	293	4
NB24	HA	11/24/2006	3	308	312	310	319	312	5
NB24	HA	11/28/2006	7	316	317	315	313	315	2
NB24	HA	12/5/2006	14	308	314	312	305	310	4
NB24	HA	12/12/2006	21	327	330	328	323	327	3
NB24	HA	12/19/2006	28	323	329	325	325	326	3

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB25	HA	11/22/2006	1	303	303	302	295	301	4
NB25	HA	11/24/2006	3	322	320	321	317	320	2
NB25	HA	11/28/2006	7	321	319	321	318	320	2
NB25	HA	12/5/2006	14	312	314	312	309	312	2
NB25	HA	12/12/2006	21	329	328	326	326	327	2
NB25	HA	12/19/2006	28	323	324	322		323	1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB26	HA	11/22/2006	1	300	311	313	310	309	6
NB26	HA	11/24/2006	3	321	324	320	313	320	5
NB26	HA	11/28/2006	7	318	320	319	312	317	4
NB26	HA	12/5/2006	14	311	314	310	302	309	5
NB26	HA	12/12/2006	21	326	330	326	321	326	4
NB26	HA	12/19/2006	28	321	329	323	316	322	5

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB27	HA	11/22/2006	1	328	330	328	324	328	3
NB27	HA	11/24/2006	3	327	329	327	320	326	4
NB27	HA	11/28/2006	7	318	323	318	313	318	4
NB27	HA	12/5/2006	14	309	315	314	312	313	3
NB27	HA	12/12/2006	21	334	328	326	326	329	4
NB27	HA	12/19/2006	28	322	322	320	321	321	1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB29	HA	11/22/2006	1	330	328	335	333	332	3
NB29	HA	11/24/2006	3	329	327	328	324	327	2
NB29	HA	11/28/2006	7	326	321	321	320	322	3
NB29	HA	12/5/2006	14	324	319	325	323	323	3
NB29	HA	12/12/2006	21	345	332	332	332	335	7
NB29	HA	12/19/2006	28	343	328	328	327	332	8

SEDIMENT OVERLYING WATER ALKALINITY LEVELS

Sample	Species	Date	Day	Replicate (Beaker) ID #				ALK
				01	02	03	04	
JAM05-W	HA	11/22/2006	1	197				197
JAM05-W	HA	11/24/2006	3		154			154
JAM05-W	HA	11/28/2006	7			158		158
JAM05-W	HA	12/5/2006	14				158	158
JAM05-W	HA	12/12/2006	21	158				158
JAM05-W	HA	12/19/2006	28		147			147

Sample	Species	Date	Day	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB18	HA	11/22/2006	1	130				130
NB18	HA	11/24/2006	3		130			130
NB18	HA	11/28/2006	7			134		134
NB18	HA	12/5/2006	14				139	139
NB18	HA	12/12/2006	21	144				144
NB18	HA	12/19/2006	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB20	HA	11/22/2006	1	120				120
NB20	HA	11/24/2006	3		125			125
NB20	HA	11/28/2006	7			125		125
NB20	HA	12/5/2006	14				139	139
NB20	HA	12/12/2006	21	139				139
NB20	HA	12/19/2006	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB22	HA	11/22/2006	1	130				130
NB22	HA	11/24/2006	3		120			120
NB22	HA	11/28/2006	7			149		149
NB22	HA	12/5/2006	14				144	144
NB22	HA	12/12/2006	21	144				144
NB22	HA	12/19/2006	28		129			129

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB23	HA	11/22/2006	1	120				120
NB23	HA	11/24/2006	3		125			125
NB23	HA	11/28/2006	7			125		125
NB23	HA	12/5/2006	14				134	134
NB23	HA	12/12/2006	21	144				144
NB23	HA	12/19/2006	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB24	HA	11/22/2006	1	120				120
NB24	HA	11/24/2006	3		120			120
NB24	HA	11/28/2006	7			125		125
NB24	HA	12/5/2006	14				139	139
NB24	HA	12/12/2006	21	139				139
NB24	HA	12/19/2006	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB25	HA	11/22/2006	1	125				125
NB25	HA	11/24/2006	3		125			125
NB25	HA	11/28/2006	7			125		125
NB25	HA	12/5/2006	14				139	139
NB25	HA	12/12/2006	21	144				144
NB25	HA	12/19/2006	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB26	HA	11/22/2006	1	120				120
NB26	HA	11/24/2006	3		125			125
NB26	HA	11/28/2006	7			130		130
NB26	HA	12/5/2006	14				134	134
NB26	HA	12/12/2006	21	134				134
NB26	HA	12/19/2006	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB27	HA	11/22/2006	1	134				134
NB27	HA	11/24/2006	3		130			130
NB27	HA	11/28/2006	7			125		125
NB27	HA	12/5/2006	14				130	130
NB27	HA	12/12/2006	21	139				139
NB27	HA	12/19/2006	28		124			124

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB29	HA	11/22/2006	1	144				144
NB29	HA	11/24/2006	3		134			134
NB29	HA	11/28/2006	7			134		134
NB29	HA	12/5/2006	14				139	139
NB29	HA	12/12/2006	21	154				154
NB29	HA	12/19/2006	28		143			143

SEDIMENT OVERLYING WATER HARDNESS LEVELS

Sample	Species	Date	Day	Replicate (Beaker) ID #				HARD
				01	02	03	04	
JAM05-W	HA	11/22/2006	1	184				184
JAM05-W	HA	11/24/2006	3		176			176
JAM05-W	HA	11/28/2006	7			168		168
JAM05-W	HA	12/5/2006	14				164	164
JAM05-W	HA	12/12/2006	21	164				164
JAM05-W	HA	12/19/2006	28		152			152

Sample	Species	Date	Day	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB18	HA	11/22/2006	1	140				140
NB18	HA	11/24/2006	3		144			144
NB18	HA	11/28/2006	7			152		152
NB18	HA	12/5/2006	14				152	152
NB18	HA	12/12/2006	21	156				156
NB18	HA	12/19/2006	28		148			148

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB20	HA	11/22/2006	1	128				128
NB20	HA	11/24/2006	3		132			132
NB20	HA	11/28/2006	7			144		144
NB20	HA	12/5/2006	14				124	124
NB20	HA	12/12/2006	21	148				148
NB20	HA	12/19/2006	28		144			144

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB22	HA	11/22/2006	1	156				156
NB22	HA	11/24/2006	3		140			140
NB22	HA	11/28/2006	7			144		144
NB22	HA	12/5/2006	14				144	144
NB22	HA	12/12/2006	21	152				152
NB22	HA	12/19/2006	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB23	HA	11/22/2006	1	128				128
NB23	HA	11/24/2006	3		140			140
NB23	HA	11/28/2006	7			144		144
NB23	HA	12/5/2006	14				148	148
NB23	HA	12/12/2006	21	156				156
NB23	HA	12/19/2006	28		156			156

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB24	HA	11/22/2006	1	128				128
NB24	HA	11/24/2006	3		140			140
NB24	HA	11/28/2006	7			144		144
NB24	HA	12/5/2006	14				152	152
NB24	HA	12/12/2006	21	152				152
NB24	HA	12/19/2006	28		144			144

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB25	HA	11/22/2006	1	136				136
NB25	HA	11/24/2006	3		144			144
NB25	HA	11/28/2006	7			144		144
NB25	HA	12/5/2006	14				148	148
NB25	HA	12/12/2006	21	152				152
NB25	HA	12/19/2006	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB26	HA	11/22/2006	1	136				136
NB26	HA	11/24/2006	3		144			144
NB26	HA	11/28/2006	7			144		144
NB26	HA	12/5/2006	14				144	144
NB26	HA	12/12/2006	21	152				152
NB26	HA	12/19/2006	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB27	HA	11/22/2006	1	140				140
NB27	HA	11/24/2006	3		144			144
NB27	HA	11/28/2006	7			148		148
NB27	HA	12/5/2006	14				144	144
NB27	HA	12/12/2006	21	152				152
NB27	HA	12/19/2006	28		144			144

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB29	HA	11/22/2006	1	144				144
NB29	HA	11/24/2006	3		152			152
NB29	HA	11/28/2006	7			144		144
NB29	HA	12/5/2006	14				152	152
NB29	HA	12/12/2006	21	156				156
NB29	HA	12/19/2006	28		148			148

APPENDIX B

Biological and Water Chemistry Data from Chronic Sediment Toxicity Tests with *Hyalella azteca* on a Secondary Set of Samples from the Newburgh Manufactured Gas Plant Site at Newburgh, NY Conducted from December 5, 2006 Through January 2, 2007

DATE	SAMPLE	TYPE	% SURVIVAL				MEAN	SD	SIG
			REP #1	REP #2	REP #3	REP #4			
1/2/2007	JAM	CONTROL	70	100	100	70	85	17.3	
1/2/2007	NB11	REFERENCE	80	60	60	50	63	12.6	ns
1/2/2007	NB12	REFERENCE	80	90	80	30	70	27.1	ns
1/2/2007	NB01	TEST	100	100	80	90	93	9.6	ns
1/2/2007	NB02	TEST	60	10	10	20	25	23.8	*
1/2/2007	NB03	TEST	20	20	10	0	13	9.6	*
1/2/2007	NB04	TEST	0	0	0	0	0	0.0	*
1/2/2007	NB05	TEST	60	90	80	50	70	18.3	ns
1/2/2007	NB06	TEST	100	30	90	50	68	33.0	ns
1/2/2007	NB07	TEST	70	50	60	70	63	9.6	ns
1/2/2007	NB08	TEST	100	100	90	90	95	5.8	ns
1/2/2007	NB09	TEST	100	100	100	100	100	0.0	ns
1/2/2007	NB10	TEST	100	90	70	100	90	14.1	ns

DATE	SAMPLE	TYPE	DRY WEIGHT (MG)				MEAN	SD	CV	SIG
			REP #1	REP #2	REP #3	REP #4				
1/2/2007	JAM	CONTROL	0.251	0.197	0.261	0.257	0.242	0.030	12.4	
1/2/2007	NB11	REFERENCE	0.230	0.245	0.177	0.210	0.216	0.029	13.6	ns
1/2/2007	NB12	REFERENCE	0.181	0.164	0.150	0.243	0.185	0.041	22.2	ns
1/2/2007	NB01	TEST	0.202	0.234	0.212	0.246	0.224	0.020	9.0	ns
1/2/2007	NB05	TEST	0.322	0.219	0.271	0.264	0.269	0.042	15.7	ns
1/2/2007	NB06	TEST	0.207	0.360	0.219	0.234	0.255	0.071	27.8	ns
1/2/2007	NB07	TEST	0.187	0.178	0.228	0.209	0.201	0.022	11.2	ns
1/2/2007	NB08	TEST	0.170	0.188	0.162	0.202	0.181	0.018	10.0	ns
1/2/2007	NB09	TEST	0.210	0.233	0.318	0.277	0.260	0.048	18.5	ns
1/2/2007	NB10	TEST	0.175	0.180	0.221	0.203	0.195	0.021	11.0	ns

CHEMISTRY OF FRESH OVERLYING CONTROL WATER - NEWBURGH TESTS

Date	pH	DO	Cond	Alk	Hard
12/5/2006	8.02	7.9	297	130	140
12/12/2006	7.86	7.9	317	139	148
12/19/2006	7.93	8.1	314	144	152
12/26/2006	7.94	8.0	282	130	132
MEAN	7.94	8.0	303	136	143
SD	0.07	0.1	16	7	9
CV	0.8	1.2	5.4	5.1	6.2

OVERLYING WATER TEMPERATURE (°C) FROM CONTROL BEAKERS - NEWBURGH TESTS

Date	Temp	Date	Temp
12/5/2006	23.0	12/5/2006	23.0
12/6/2006	22.7	12/6/2006	22.8
12/7/2006	23.2	12/7/2006	23.1
12/8/2006	22.9	12/8/2006	22.8
12/9/2006	23.0	12/9/2006	22.8
12/10/2006	23.0	12/10/2006	22.9
12/11/2006	23.3	12/11/2006	23.2
12/12/2006	23.8	12/12/2006	23.4
12/13/2006	23.7	12/13/2006	23.3
12/14/2006	23.6	12/14/2006	23.2
12/15/2006	23.6	12/15/2006	23.3
12/16/2006	23.4	12/16/2006	23.0
12/17/2006	23.6	12/17/2006	23.0
12/18/2006	24.1	12/18/2006	23.5
12/19/2006	24.0	12/19/2006	23.0
12/20/2006	23.4	12/20/2006	22.5
12/21/2006	22.5	12/21/2006	23.1
12/22/2006	22.5	12/22/2006	23.3
12/23/2006	23.1	12/23/2006	23.7
12/24/2006	22.8	12/24/2006	23.5
12/25/2006	22.9	12/25/2006	23.7
12/26/2006	23.0	12/26/2006	23.8
12/27/2006	23.7	12/27/2006	24.1
12/28/2006	22.9	12/28/2006	23.4
12/29/2006	23.6	12/29/2006	23.9
12/30/2006	23.3	12/30/2006	23.6
12/31/2006	23.0	12/31/2006	23.6
1/1/2007	23.1	1/1/2007	23.6
1/2/2007	22.8	1/2/2007	23.1
Mean	23.2	23.3	23.3
SD	0.43	0.38	0.38
CV	1.8	1.6	1.6

SEDIMENT OVERLYING WATER DISSOLVED OXYGEN LEVELS

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM-B	HA	12/5/2006	0						
JAM-B	HA	12/6/2006	1	6.8	6.7	6.7	6.5	6.7	0.1
JAM-B	HA	12/7/2006	2	6.8	6.7	6.7	6.8	6.8	0.1
JAM-B	HA	12/8/2006	3	7.0	6.9	6.8	6.7	6.9	0.1
JAM-B	HA	12/9/2006	4	6.9	6.8	6.8	6.6	6.8	0.1
JAM-B	HA	12/10/2006	5	7.2	7.1	7.2	7.2	7.2	0.1
JAM-B	HA	12/11/2006	6	7.2	7.1	7.1	7.1	7.1	0.0
JAM-B	HA	12/12/2006	7	6.9	6.7	6.7	6.8	6.8	0.1
JAM-B	HA	12/13/2006	8	6.6	6.5	6.8	6.7	6.7	0.1
JAM-B	HA	12/14/2006	9	7.2	7.0	7.1	7.2	7.1	0.1
JAM-B	HA	12/15/2006	10	6.9	6.7	6.8	6.8	6.8	0.1
JAM-B	HA	12/16/2006	11	7.2	7.1	7.1	7.2	7.2	0.1
JAM-B	HA	12/17/2006	12	7.2	7.2	7.1	7.2	7.2	0.1
JAM-B	HA	12/18/2006	13	6.2	6.3	6.2	6.0	6.2	0.1
JAM-B	HA	12/19/2006	14	6.7	6.5	6.5	6.3	6.5	0.2
JAM-B	HA	12/20/2006	15	6.9	6.7	6.8	6.7	6.8	0.1
JAM-B	HA	12/21/2006	16	7.0	6.9	6.9	6.9	6.9	0.0
JAM-B	HA	12/22/2006	17	6.6	6.3	6.5	6.5	6.5	0.1
JAM-B	HA	12/23/2006	18	6.6	6.2	6.5	6.5	6.5	0.2
JAM-B	HA	12/24/2006	19	6.4	6.2	6.4	6.4	6.4	0.1
JAM-B	HA	12/25/2006	20						
JAM-B	HA	12/26/2006	21	6.5	6.5	6.5	6.5	6.5	0.0
JAM-B	HA	12/27/2006	22	6.5	6.8	6.6	6.5	6.6	0.1
JAM-B	HA	12/28/2006	23	6.1	6.1	6.0	6.1	6.1	0.1
JAM-B	HA	12/29/2006	24	6.4	6.3	6.2	6.3	6.3	0.1
JAM-B	HA	12/30/2006	25	6.5	6.3	6.1	6.3	6.3	0.2
JAM-B	HA	12/31/2006	26	6.3	6.3	6.2	6.3	6.3	0.0
JAM-B	HA	1/1/2007	27						
JAM-B	HA	1/2/2007	28	6.7	6.2	6.3	6.4	6.4	0.2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB01	HA	12/5/2006	0						
NB01	HA	12/6/2006	1	6.5	6.4	6.5	6.4	6.5	0.1
NB01	HA	12/7/2006	2	6.6	6.4	6.3	6.3	6.4	0.1
NB01	HA	12/8/2006	3	6.7	6.6	6.7	6.9	6.7	0.1
NB01	HA	12/9/2006	4	6.7	6.8	6.8	6.9	6.8	0.1
NB01	HA	12/10/2006	5	7.2	7.2	7.2	7.3	7.2	0.0
NB01	HA	12/11/2006	6	7.1	7.1	7.2	7.2	7.2	0.1
NB01	HA	12/12/2006	7	6.6	6.7	6.7	6.8	6.7	0.1
NB01	HA	12/13/2006	8	6.7	6.7	6.7	6.8	6.7	0.0
NB01	HA	12/14/2006	9	7.1	7.2	7.2	7.3	7.2	0.1
NB01	HA	12/15/2006	10	6.8	6.8	6.9	6.9	6.9	0.1
NB01	HA	12/16/2006	11	7.2	7.2	7.3	7.4	7.3	0.1

NB01	HA	12/17/2006	12	7.2	7.2	7.3	7.3	7.3	0.1
NB01	HA	12/18/2006	13	6.5	6.5	6.5	6.5	6.5	0.0
NB01	HA	12/19/2006	14	6.6	6.6	6.6	6.5	6.6	0.1
NB01	HA	12/20/2006	15	6.9	6.9	6.8	6.9	6.9	0.1
NB01	HA	12/21/2006	16	6.9	7.0	6.9	7.1	7.0	0.1
NB01	HA	12/22/2006	17	6.6	6.7	6.6	6.7	6.7	0.1
NB01	HA	12/23/2006	18	6.5	6.7	6.6	6.8	6.7	0.1
NB01	HA	12/24/2006	19	6.2	6.4	6.4	6.5	6.4	0.1
NB01	HA	12/25/2006	20						
NB01	HA	12/26/2006	21	6.5	6.5	6.6	6.5	6.5	0.0
NB01	HA	12/27/2006	22	6.5	6.6	6.7	6.6	6.6	0.1
NB01	HA	12/28/2006	23	5.7	5.9	5.9	5.9	5.9	0.1
NB01	HA	12/29/2006	24	6.1	6.2	6.3	6.3	6.2	0.1
NB01	HA	12/30/2006	25	6.3	6.4	6.5	6.4	6.4	0.1
NB01	HA	12/31/2006	26	6.0	6.1	6.2	6.2	6.1	0.1
NB01	HA	1/1/2007	27						
NB01	HA	1/2/2007	28	6.5	6.5	6.6	6.5	6.5	0.0

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB02	HA	12/5/2006	0						
NB02	HA	12/6/2006	1	6.8	6.7	6.8	6.8	6.8	0.0
NB02	HA	12/7/2006	2	6.6	6.5	6.7	6.5	6.6	0.1
NB02	HA	12/8/2006	3	6.8	6.8	6.9	6.8	6.8	0.0
NB02	HA	12/9/2006	4	6.9	6.8	6.9	6.8	6.9	0.1
NB02	HA	12/10/2006	5	6.8	6.8	6.9	6.9	6.9	0.1
NB02	HA	12/11/2006	6	7.1	7.1	7.0	7.0	7.1	0.1
NB02	HA	12/12/2006	7	7.0	6.8	6.7	6.8	6.8	0.1
NB02	HA	12/13/2006	8	6.6	6.6	6.4	6.6	6.6	0.1
NB02	HA	12/14/2006	9	7.3	7.2	7.1	7.2	7.2	0.1
NB02	HA	12/15/2006	10	6.9	6.8	6.8	6.8	6.8	0.0
NB02	HA	12/16/2006	11	7.4	7.3	7.3	7.3	7.3	0.0
NB02	HA	12/17/2006	12	7.4	7.2	7.3	7.4	7.3	0.1
NB02	HA	12/18/2006	13	6.7	6.4	6.6	6.8	6.6	0.2
NB02	HA	12/19/2006	14	7.0	6.4	6.8	7.0	6.8	0.3
NB02	HA	12/20/2006	15	7.0	6.6	6.9	7.1	6.9	0.2
NB02	HA	12/21/2006	16	7.2	6.9	7.2	7.2	7.1	0.2
NB02	HA	12/22/2006	17	6.7	6.4	6.6	6.7	6.6	0.1
NB02	HA	12/23/2006	18	6.7	6.5	6.6	6.8	6.7	0.1
NB02	HA	12/24/2006	19	6.5	6.4	6.3	6.5	6.4	0.1
NB02	HA	12/25/2006	20						
NB02	HA	12/26/2006	21	6.5	6.5	6.5	6.5	6.5	0.0
NB02	HA	12/27/2006	22	6.5	6.5	6.5	6.6	6.5	0.0
NB02	HA	12/28/2006	23	5.8	5.6	5.7	5.8	5.7	0.1
NB02	HA	12/29/2006	24	6.2	6.1	6.2	6.4	6.2	0.1
NB02	HA	12/30/2006	25	6.4	6.2	6.4	6.5	6.4	0.1
NB02	HA	12/31/2006	26	6.3	6.0	6.2	6.3	6.2	0.1
NB02	HA	1/1/2007	27						
NB02	HA	1/2/2007	28	6.7	6.6	6.5	6.7	6.6	0.1

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB03	HA	12/5/2006	0						
NB03	HA	12/6/2006	1	6.8	6.5	6.8	6.7	6.7	0.1
NB03	HA	12/7/2006	2	6.8	6.5	6.6	6.6	6.6	0.1
NB03	HA	12/8/2006	3	6.8	6.6	6.6	6.7	6.7	0.1
NB03	HA	12/9/2006	4	6.8	6.7	6.8	6.7	6.8	0.1
NB03	HA	12/10/2006	5	6.8	6.8	6.7	6.7	6.8	0.1
NB03	HA	12/11/2006	6	7.0	7.1	6.9	7.0	7.0	0.1
NB03	HA	12/12/2006	7	6.7	6.9	6.8	6.9	6.8	0.1
NB03	HA	12/13/2006	8	6.6	6.7	6.4	6.5	6.6	0.1
NB03	HA	12/14/2006	9	7.1	7.2	7.1	7.2	7.2	0.1
NB03	HA	12/15/2006	10	6.9	6.8	6.8	6.9	6.9	0.1
NB03	HA	12/16/2006	11	7.3	7.3	7.3	7.4	7.3	0.1
NB03	HA	12/17/2006	12	7.3	7.3	7.3	7.3	7.3	0.0
NB03	HA	12/18/2006	13	6.7	6.6	6.6	6.6	6.6	0.0
NB03	HA	12/19/2006	14	6.6	6.8	6.7	6.7	6.7	0.1
NB03	HA	12/20/2006	15	6.9	6.9	6.9	6.8	6.9	0.0
NB03	HA	12/21/2006	16	7.1	7.2	7.1	7.1	7.1	0.0
NB03	HA	12/22/2006	17	6.6	6.7	6.7	6.6	6.7	0.1
NB03	HA	12/23/2006	18	6.8	6.7	6.6	6.7	6.7	0.1
NB03	HA	12/24/2006	19	6.6	6.6	6.5	6.7	6.6	0.1
NB03	HA	12/25/2006	20						
NB03	HA	12/26/2006	21	6.5	6.6	6.5	6.5	6.5	0.0
NB03	HA	12/27/2006	22	6.6	6.6	6.5	6.6	6.6	0.1
NB03	HA	12/28/2006	23	5.9	5.7	5.7	6.0	5.8	0.2
NB03	HA	12/29/2006	24	6.4	6.3	6.2	6.0	6.2	0.2
NB03	HA	12/30/2006	25	6.4	6.4	6.4	6.6	6.5	0.1
NB03	HA	12/31/2006	26	6.2	6.3	6.3	6.5	6.3	0.1
NB03	HA	1/1/2007	27						
NB03	HA	1/2/2007	28	6.7	6.8	6.7	6.9	6.8	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB04	HA	12/5/2006	0						
NB04	HA	12/6/2006	1	6.7	6.6	6.5	6.6	6.6	0.1
NB04	HA	12/7/2006	2	6.6	6.7	6.7	6.5	6.6	0.1
NB04	HA	12/8/2006	3	6.7	6.6	6.6	6.8	6.7	0.1
NB04	HA	12/9/2006	4	6.9	6.8	6.7	6.8	6.8	0.1
NB04	HA	12/10/2006	5	7.0	6.9	6.8	6.9	6.9	0.1
NB04	HA	12/11/2006	6	7.2	7.0	7.1	7.2	7.1	0.1
NB04	HA	12/12/2006	7	6.8	6.7	6.7	6.7	6.7	0.0
NB04	HA	12/13/2006	8	6.4	6.3	6.4	6.3	6.4	0.1
NB04	HA	12/14/2006	9	7.0	7.0	7.0	7.2	7.1	0.1
NB04	HA	12/15/2006	10	6.6	6.7	6.6	6.8	6.7	0.1
NB04	HA	12/16/2006	11	7.2	7.2	7.2	7.2	7.2	0.0
NB04	HA	12/17/2006	12	7.3	7.3	7.3	7.3	7.3	0.0

NB04	HA	12/18/2006	13	6.6	6.6	6.5	6.5	6.6	0.1
NB04	HA	12/19/2006	14	6.7	6.7	6.7	6.6	6.7	0.0
NB04	HA	12/20/2006	15	6.9	7.0	6.9	6.8	6.9	0.1
NB04	HA	12/21/2006	16	7.1	7.2	7.0	7.0	7.1	0.1
NB04	HA	12/22/2006	17	6.5	6.7	6.5	6.7	6.6	0.1
NB04	HA	12/23/2006	18	6.7	6.8	6.6	6.7	6.7	0.1
NB04	HA	12/24/2006	19	6.3	6.5	6.3	6.5	6.4	0.1
NB04	HA	12/25/2006	20						
NB04	HA	12/26/2006	21	6.3	6.6	6.4	6.7	6.5	0.2
NB04	HA	12/27/2006	22	6.4	6.6	6.4	6.7	6.5	0.2
NB04	HA	12/28/2006	23	5.7	5.7	5.8	6.0	5.8	0.1
NB04	HA	12/29/2006	24	6.1	6.2	6.2	6.5	6.3	0.2
NB04	HA	12/30/2006	25	6.2	6.3	6.3	6.6	6.4	0.2
NB04	HA	12/31/2006	26	6.1	6.2	6.2	6.5	6.3	0.2
NB04	HA	1/1/2007	27						
NB04	HA	1/2/2007	28	6.4	6.6	6.5	6.7	6.6	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB05	HA	12/5/2006	0						
NB05	HA	12/6/2006	1	6.7	6.8	6.6	6.6	6.7	0.1
NB05	HA	12/7/2006	2	6.6	6.6	6.6	6.5	6.6	0.1
NB05	HA	12/8/2006	3	6.5	6.4	6.6	6.5	6.5	0.1
NB05	HA	12/9/2006	4	6.6	6.7	6.7	6.7	6.7	0.0
NB05	HA	12/10/2006	5	6.6	6.7	6.7	6.8	6.7	0.1
NB05	HA	12/11/2006	6	6.8	6.8	6.9	6.9	6.9	0.1
NB05	HA	12/12/2006	7	6.6	6.5	6.7	6.5	6.6	0.1
NB05	HA	12/13/2006	8	6.5	6.1	6.3	6.1	6.3	0.2
NB05	HA	12/14/2006	9	7.0	6.9	7.0	7.0	7.0	0.1
NB05	HA	12/15/2006	10	6.7	6.6	6.7	6.7	6.7	0.0
NB05	HA	12/16/2006	11	7.1	7.1	7.2	7.2	7.2	0.1
NB05	HA	12/17/2006	12	7.2	7.1	7.4	7.2	7.2	0.1
NB05	HA	12/18/2006	13	6.5	6.3	6.4	6.4	6.4	0.1
NB05	HA	12/19/2006	14	6.5	6.4	6.6	6.5	6.5	0.1
NB05	HA	12/20/2006	15	6.7	6.8	6.8	6.8	6.8	0.0
NB05	HA	12/21/2006	16	7.1	7.1	7.0	7.0	7.1	0.1
NB05	HA	12/22/2006	17	6.6	6.6	6.5	6.5	6.6	0.1
NB05	HA	12/23/2006	18	6.7	6.7	6.7	6.7	6.7	0.0
NB05	HA	12/24/2006	19	6.5	6.5	6.5	6.4	6.5	0.1
NB05	HA	12/25/2006	20						
NB05	HA	12/26/2006	21	6.5	6.5	6.5	6.5	6.5	0.0
NB05	HA	12/27/2006	22	6.5	6.6	6.5	6.5	6.5	0.0
NB05	HA	12/28/2006	23	5.8	5.7	5.7	5.6	5.7	0.1
NB05	HA	12/29/2006	24	6.3	6.3	6.3	6.1	6.3	0.1
NB05	HA	12/30/2006	25	6.6	6.5	6.5	6.5	6.5	0.0
NB05	HA	12/31/2006	26	6.4	6.3	6.3	6.3	6.3	0.0
NB05	HA	1/1/2007	27						
NB05	HA	1/2/2007	28	6.8	6.8	6.7	6.7	6.8	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB06	HA	12/5/2006	0						
NB06	HA	12/6/2006	1	6.7	6.7	6.6	6.7	6.7	0.1
NB06	HA	12/7/2006	2	6.6	6.5	6.5	6.5	6.5	0.0
NB06	HA	12/8/2006	3	6.7	6.5	6.5	6.6	6.6	0.1
NB06	HA	12/9/2006	4	6.8	6.6	6.6	6.7	6.7	0.1
NB06	HA	12/10/2006	5	6.8	6.6	6.5	6.7	6.7	0.1
NB06	HA	12/11/2006	6	7.0	6.9	6.8	6.8	6.9	0.1
NB06	HA	12/12/2006	7	6.5	6.5	6.4	6.4	6.5	0.1
NB06	HA	12/13/2006	8	6.3	6.0	6.1	6.1	6.1	0.1
NB06	HA	12/14/2006	9	6.9	6.9	6.9	7.0	6.9	0.0
NB06	HA	12/15/2006	10	6.7	6.6	6.5	6.8	6.7	0.1
NB06	HA	12/16/2006	11	7.1	7.1	7.1	7.2	7.1	0.1
NB06	HA	12/17/2006	12	7.0	7.0	7.0	7.1	7.0	0.0
NB06	HA	12/18/2006	13	6.2	6.3	6.0	6.4	6.2	0.2
NB06	HA	12/19/2006	14	6.4	6.4	6.4	6.6	6.5	0.1
NB06	HA	12/20/2006	15	6.6	6.6	6.5	6.7	6.6	0.1
NB06	HA	12/21/2006	16	7.0	7.1	7.0	7.1	7.1	0.1
NB06	HA	12/22/2006	17	6.5	6.6	6.5	6.5	6.5	0.0
NB06	HA	12/23/2006	18	6.7	6.8	6.7	6.6	6.7	0.1
NB06	HA	12/24/2006	19	6.4	6.4	6.3	6.3	6.4	0.1
NB06	HA	12/25/2006	20						
NB06	HA	12/26/2006	21	6.4	6.4	6.3	6.2	6.3	0.1
NB06	HA	12/27/2006	22	6.4	6.5	6.4	6.2	6.4	0.1
NB06	HA	12/28/2006	23	5.6	5.5	5.5	5.2	5.5	0.2
NB06	HA	12/29/2006	24	6.2	6.2	6.1	5.9	6.1	0.1
NB06	HA	12/30/2006	25	6.4	6.3	6.4	6.3	6.4	0.1
NB06	HA	12/31/2006	26	6.2	6.1	6.3	6.0	6.2	0.1
NB06	HA	1/1/2007	27						
NB06	HA	1/2/2007	28	6.8	6.6	6.8	6.6	6.7	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB07	HA	12/5/2006	0						
NB07	HA	12/6/2006	1	6.6	6.8	6.7	6.7	6.7	0.1
NB07	HA	12/7/2006	2	6.8	6.7	6.7	6.7	6.7	0.0
NB07	HA	12/8/2006	3	6.7	6.7	6.7	6.7	6.7	0.0
NB07	HA	12/9/2006	4	6.7	6.7	6.7	6.8	6.7	0.0
NB07	HA	12/10/2006	5	6.7	6.7	6.7	6.8	6.7	0.0
NB07	HA	12/11/2006	6	6.9	7.0	6.8	7.0	6.9	0.1
NB07	HA	12/12/2006	7	6.5	6.4	6.3	6.4	6.4	0.1
NB07	HA	12/13/2006	8	6.2	6.6	6.2	6.4	6.4	0.2
NB07	HA	12/14/2006	9	6.9	7.2	7.0	7.1	7.1	0.1
NB07	HA	12/15/2006	10	6.8	6.9	6.8	6.8	6.8	0.0
NB07	HA	12/16/2006	11	7.2	7.3	7.2	7.3	7.3	0.1
NB07	HA	12/17/2006	12	7.1	7.2	7.2	7.2	7.2	0.1
NB07	HA	12/18/2006	13	6.5	6.5	6.5	6.4	6.5	0.1

NB07	HA	12/19/2006	14	6.6	6.7	6.5	6.6	6.6	0.1
NB07	HA	12/20/2006	15	6.7	6.8	6.8	6.9	6.8	0.1
NB07	HA	12/21/2006	16	7.1	7.1	7.0	7.2	7.1	0.1
NB07	HA	12/22/2006	17	6.7	6.6	6.6	6.7	6.7	0.1
NB07	HA	12/23/2006	18	6.6	6.7	6.7	6.8	6.7	0.1
NB07	HA	12/24/2006	19	6.5	6.5	6.4	6.5	6.5	0.1
NB07	HA	12/25/2006	20						
NB07	HA	12/26/2006	21	6.6	6.4	6.4	6.6	6.5	0.1
NB07	HA	12/27/2006	22	6.5	6.5	6.4	6.6	6.5	0.1
NB07	HA	12/28/2006	23	5.7	5.6	5.6	5.7	5.7	0.1
NB07	HA	12/29/2006	24	6.3	6.2	6.1	6.2	6.2	0.1
NB07	HA	12/30/2006	25	6.6	6.4	6.4	6.5	6.5	0.1
NB07	HA	12/31/2006	26	6.4	6.2	6.3	6.4	6.3	0.1
NB07	HA	1/1/2007	27						
NB07	HA	1/2/2007	28	6.9	6.8	6.8	6.9	6.9	0.1

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB08	HA	12/5/2006	0						
NB08	HA	12/6/2006	1	6.9	6.5	6.4	6.4	6.6	0.2
NB08	HA	12/7/2006	2	6.5	6.6	6.3	6.4	6.5	0.1
NB08	HA	12/8/2006	3	6.7	6.6	6.5	6.6	6.6	0.1
NB08	HA	12/9/2006	4	6.8	6.7	6.7	6.8	6.8	0.1
NB08	HA	12/10/2006	5	6.8	6.6	6.7	6.7	6.7	0.1
NB08	HA	12/11/2006	6	6.9	6.9	6.8	6.8	6.9	0.1
NB08	HA	12/12/2006	7	6.6	6.6	6.5	6.5	6.6	0.1
NB08	HA	12/13/2006	8	6.6	6.3	6.3	6.3	6.4	0.1
NB08	HA	12/14/2006	9	7.0	7.0	6.8	6.9	6.9	0.1
NB08	HA	12/15/2006	10	6.8	6.6	6.5	6.5	6.6	0.1
NB08	HA	12/16/2006	11	7.2	7.2	7.0	7.2	7.2	0.1
NB08	HA	12/17/2006	12	7.1	7.1	7.0	7.2	7.1	0.1
NB08	HA	12/18/2006	13	6.3	6.5	6.1	6.4	6.3	0.2
NB08	HA	12/19/2006	14	6.4	6.5	6.2	6.5	6.4	0.1
NB08	HA	12/20/2006	15	6.7	6.7	6.5	6.8	6.7	0.1
NB08	HA	12/21/2006	16	7.1	6.9	6.9	7.1	7.0	0.1
NB08	HA	12/22/2006	17	6.5	6.4	6.3	6.4	6.4	0.1
NB08	HA	12/23/2006	18	6.7	6.4	6.4	6.5	6.5	0.1
NB08	HA	12/24/2006	19	6.4	6.1	6.0	6.2	6.2	0.2
NB08	HA	12/25/2006	20						
NB08	HA	12/26/2006	21	6.4	6.2	6.2	6.3	6.3	0.1
NB08	HA	12/27/2006	22	6.3	6.3	6.1	6.2	6.2	0.1
NB08	HA	12/28/2006	23	5.4	5.4	5.1	5.2	5.3	0.2
NB08	HA	12/29/2006	24	6.1	6.1	5.8	6.0	6.0	0.1
NB08	HA	12/30/2006	25	6.4	6.3	6.0	6.2	6.2	0.2
NB08	HA	12/31/2006	26	6.2	6.1	5.9	6.0	6.1	0.1
NB08	HA	1/1/2007	27						
NB08	HA	1/2/2007	28	6.4	6.2	5.9	6.0	6.1	0.2

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB09	HA	12/5/2006	0						
NB09	HA	12/6/2006	1	6.2	6.1	6.1	5.9	6.1	0.1
NB09	HA	12/7/2006	2	6.1	6.2	5.9	6.0	6.1	0.1
NB09	HA	12/8/2006	3	6.4	6.3	6.1	6.3	6.3	0.1
NB09	HA	12/9/2006	4	6.5	6.4	6.4	6.3	6.4	0.1
NB09	HA	12/10/2006	5	6.6	6.5	6.5	6.4	6.5	0.1
NB09	HA	12/11/2006	6	6.8	6.7	6.7	6.6	6.7	0.1
NB09	HA	12/12/2006	7	6.2	6.2	6.0	6.1	6.1	0.1
NB09	HA	12/13/2006	8	6.0	5.9	5.8	5.9	5.9	0.1
NB09	HA	12/14/2006	9	6.6	6.5	6.4	6.4	6.5	0.1
NB09	HA	12/15/2006	10	6.1	6.0	5.7	5.9	5.9	0.2
NB09	HA	12/16/2006	11	6.6	6.6	6.4	6.4	6.5	0.1
NB09	HA	12/17/2006	12	6.6	6.6	6.3	6.5	6.5	0.1
NB09	HA	12/18/2006	13	5.6	5.6	5.1	5.3	5.4	0.2
NB09	HA	12/19/2006	14	5.5	5.7	5.4	5.4	5.5	0.1
NB09	HA	12/20/2006	15	5.8	5.9	5.6	5.8	5.8	0.1
NB09	HA	12/21/2006	16	6.5	6.4	6.2	6.3	6.4	0.1
NB09	HA	12/22/2006	17	5.8	5.8	5.4	5.5	5.6	0.2
NB09	HA	12/23/2006	18	5.9	6.0	5.6	5.7	5.8	0.2
NB09	HA	12/24/2006	19	5.6	5.6	5.2	5.5	5.5	0.2
NB09	HA	12/25/2006	20						
NB09	HA	12/26/2006	21	5.7	5.7	5.5	5.6	5.6	0.1
NB09	HA	12/27/2006	22	6.1	5.7	5.4	5.7	5.7	0.3
NB09	HA	12/28/2006	23	5.0	4.9	4.8	4.8	4.9	0.1
NB09	HA	12/29/2006	24	5.6	5.5	5.4	5.3	5.5	0.1
NB09	HA	12/30/2006	25	5.7	5.7	5.5	5.5	5.6	0.1
NB09	HA	12/31/2006	26	5.7	5.3	5.5	5.4	5.5	0.2
NB09	HA	1/1/2007	27						
NB09	HA	1/2/2007	28	5.7	5.6	5.7	5.6	5.7	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB10	HA	12/5/2006	0						
NB10	HA	12/6/2006	1	6.7	6.7	6.7	6.8	6.7	0.0
NB10	HA	12/7/2006	2	6.5	6.5	6.5	6.5	6.5	0.0
NB10	HA	12/8/2006	3	6.8	6.8	6.7	6.8	6.8	0.0
NB10	HA	12/9/2006	4	6.8	6.7	6.7	6.7	6.7	0.0
NB10	HA	12/10/2006	5	6.7	6.6	6.7	6.6	6.7	0.1
NB10	HA	12/11/2006	6	6.7	6.8	6.8	6.8	6.8	0.0
NB10	HA	12/12/2006	7	6.5	6.5	6.5	6.5	6.5	0.0
NB10	HA	12/13/2006	8	6.2	6.3	6.4	6.4	6.3	0.1
NB10	HA	12/14/2006	9	6.8	7.0	7.0	7.0	7.0	0.1
NB10	HA	12/15/2006	10	6.6	6.6	6.6	6.5	6.6	0.1
NB10	HA	12/16/2006	11	7.2	7.1	7.2	7.1	7.2	0.1
NB10	HA	12/17/2006	12	7.1	7.1	7.2	7.1	7.1	0.0
NB10	HA	12/18/2006	13	6.3	6.2	6.3	6.2	6.3	0.1
NB10	HA	12/19/2006	14	6.4	6.5	6.5	6.4	6.5	0.1

NB10	HA	12/20/2006	15	6.6	6.6	6.7	6.7	6.7	0.1
NB10	HA	12/21/2006	16	7.0	6.9	7.0	7.0	7.0	0.1
NB10	HA	12/22/2006	17	6.4	6.4	6.4	6.3	6.4	0.0
NB10	HA	12/23/2006	18	6.7	6.6	6.6	6.5	6.6	0.1
NB10	HA	12/24/2006	19	6.5	6.4	6.2	6.1	6.3	0.2
NB10	HA	12/25/2006	20						
NB10	HA	12/26/2006	21	6.2	6.4	6.3	6.2	6.3	0.1
NB10	HA	12/27/2006	22	6.3	6.4	6.2	6.1	6.3	0.1
NB10	HA	12/28/2006	23	5.5	5.3	5.4	5.4	5.4	0.1
NB10	HA	12/29/2006	24	6.1	6.0	6.0	6.0	6.0	0.0
NB10	HA	12/30/2006	25	6.3	6.2	6.1	6.1	6.2	0.1
NB10	HA	12/31/2006	26	6.2	6.1	5.9	6.0	6.1	0.1
NB10	HA	1/1/2007	27						
NB10	HA	1/2/2007	28	6.3	6.3	6.1	6.3	6.3	0.1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB11	HA	12/5/2006	0						
NB11	HA	12/6/2006	1	6.6	6.6	6.6	6.4	6.6	0.1
NB11	HA	12/7/2006	2	7.0	6.9	6.9	6.7	6.9	0.1
NB11	HA	12/8/2006	3	7.0	6.9	7.0	6.9	7.0	0.1
NB11	HA	12/9/2006	4	7.0	7.0	7.0	6.9	7.0	0.1
NB11	HA	12/10/2006	5	7.3	7.3	7.2	7.1	7.2	0.1
NB11	HA	12/11/2006	6	7.2	7.3	7.0	7.0	7.1	0.1
NB11	HA	12/12/2006	7	6.6	6.7	6.7	6.5	6.6	0.1
NB11	HA	12/13/2006	8	6.8	7.0	6.7	6.8	6.8	0.1
NB11	HA	12/14/2006	9	7.1	7.3	7.1	7.2	7.2	0.1
NB11	HA	12/15/2006	10	7.0	7.2	7.0	6.8	7.0	0.2
NB11	HA	12/16/2006	11	7.3	7.5	7.2	7.3	7.3	0.1
NB11	HA	12/17/2006	12	7.2	7.4	7.3	7.3	7.3	0.1
NB11	HA	12/18/2006	13	6.2	6.4	6.5	6.2	6.3	0.1
NB11	HA	12/19/2006	14	6.6	6.8	6.7	6.6	6.7	0.1
NB11	HA	12/20/2006	15	6.9	7.1	7.0	6.7	6.9	0.2
NB11	HA	12/21/2006	16	6.9	7.1	7.1	7.0	7.0	0.1
NB11	HA	12/22/2006	17	6.6	6.7	6.7	6.6	6.7	0.1
NB11	HA	12/23/2006	18	6.8	6.8	6.7	6.7	6.8	0.1
NB11	HA	12/24/2006	19	6.4	6.5	6.6	6.4	6.5	0.1
NB11	HA	12/25/2006	20						
NB11	HA	12/26/2006	21	6.6	6.6	6.6	6.6	6.6	0.0
NB11	HA	12/27/2006	22	6.8	6.8	6.8	6.5	6.7	0.1
NB11	HA	12/28/2006	23	6.2	6.2	6.1	5.9	6.1	0.1
NB11	HA	12/29/2006	24	6.4	6.4	6.4	6.2	6.4	0.1
NB11	HA	12/30/2006	25	6.5	6.4	6.5	6.3	6.4	0.1
NB11	HA	12/31/2006	26	6.4	6.4	6.5	6.2	6.4	0.1
NB11	HA	1/1/2007	27						
NB11	HA	1/2/2007	28	6.7	6.7	6.6	6.1	6.5	0.3

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB12	HA	12/5/2006	0						
NB12	HA	12/6/2006	1	6.9	6.7	6.7	6.7	6.8	0.1
NB12	HA	12/7/2006	2	6.7	6.6	6.6	6.6	6.6	0.0
NB12	HA	12/8/2006	3	6.9	6.9	6.9	7.0	6.9	0.0
NB12	HA	12/9/2006	4	7.1	7.0	6.9	7.1	7.0	0.1
NB12	HA	12/10/2006	5	7.3	7.2	7.1	7.2	7.2	0.1
NB12	HA	12/11/2006	6	7.1	7.1	6.9	7.1	7.1	0.1
NB12	HA	12/12/2006	7	6.6	6.6	6.4	6.5	6.5	0.1
NB12	HA	12/13/2006	8	7.0	7.0	6.8	6.5	6.8	0.2
NB12	HA	12/14/2006	9	7.2	7.3	7.1	7.1	7.2	0.1
NB12	HA	12/15/2006	10	7.1	7.0	6.9	6.8	7.0	0.1
NB12	HA	12/16/2006	11	7.4	7.4	7.2	7.4	7.4	0.1
NB12	HA	12/17/2006	12	7.4	7.3	7.2	7.4	7.3	0.1
NB12	HA	12/18/2006	13	6.5	6.3	6.3	6.3	6.4	0.1
NB12	HA	12/19/2006	14	6.9	6.7	6.6	6.7	6.7	0.1
NB12	HA	12/20/2006	15	7.1	7.0	6.9	7.0	7.0	0.1
NB12	HA	12/21/2006	16	7.1	7.1	6.9	7.1	7.1	0.1
NB12	HA	12/22/2006	17	6.8	6.7	6.6	6.7	6.7	0.1
NB12	HA	12/23/2006	18	6.7	6.7	6.6	6.7	6.7	0.1
NB12	HA	12/24/2006	19	6.6	6.6	6.3	6.4	6.5	0.1
NB12	HA	12/25/2006	20						
NB12	HA	12/26/2006	21	6.7	6.6	6.5	6.4	6.6	0.1
NB12	HA	12/27/2006	22	6.9	6.8	6.6	6.6	6.7	0.2
NB12	HA	12/28/2006	23	6.2	6.1	5.9	6.0	6.1	0.1
NB12	HA	12/29/2006	24	6.4	6.3	6.2	6.5	6.4	0.1
NB12	HA	12/30/2006	25	6.5	6.6	6.4	6.8	6.6	0.2
NB12	HA	12/31/2006	26	6.3	6.4	6.3	6.5	6.4	0.1
NB12	HA	1/1/2007	27						
NB12	HA	1/2/2007	28	6.9	6.8	6.4	6.7	6.7	0.2

**SEDIMENT OVERLYING WATER AMMONIA
LEVELS**

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
JAM-B	HA	12/6/2006	1		0.67			0.67
JAM-B	HA	12/8/2006	3			0.40		0.40
JAM-B	HA	12/13/2006	8				0.14	0.14
JAM-B	HA	12/20/2006	15	<0.10				<0.10
JAM-B	HA	12/26/2006	21		0.11			0.11
JAM-B	HA	1/2/2007	28			0.12		0.12

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB01	HA	12/6/2006	1		0.54			0.54
NB01	HA	12/8/2006	3			0.19		0.19
NB01	HA	12/13/2006	8				0.14	0.14
NB01	HA	12/20/2006	15	<0.10				<0.10
NB01	HA	12/26/2006	21		0.10			0.10
NB01	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	Day	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB02	HA	12/6/2006	1		1.33			1.33
NB02	HA	12/8/2006	3			0.73		0.73
NB02	HA	12/13/2006	8				0.12	0.12
NB02	HA	12/20/2006	15	<0.10				<0.10
NB02	HA	12/26/2006	21		<0.10			<0.10
NB02	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	Day	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB03	HA	12/6/2006	1		1.09			1.09
NB03	HA	12/8/2006	3			0.51		0.51
NB03	HA	12/13/2006	8				0.12	0.12
NB03	HA	12/20/2006	15	<0.10				<0.10
NB03	HA	12/26/2006	21		<0.10			<0.10
NB03	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB04	HA	12/6/2006	1		1.44			1.44
NB04	HA	12/8/2006	3			0.71		0.71
NB04	HA	12/13/2006	8				0.13	0.13
NB04	HA	12/20/2006	15	<0.10				<0.10
NB04	HA	12/26/2006	21		<0.10			<0.10
NB04	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB05	HA	12/6/2006	1		1.40			1.40
NB05	HA	12/8/2006	3			0.45		0.45
NB05	HA	12/13/2006	8				0.10	0.10
NB05	HA	12/20/2006	15	<0.10				<0.10
NB05	HA	12/26/2006	21		0.11			0.11
NB05	HA	1/2/2007	28			0.10		0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB06	HA	12/6/2006	1		2.35			2.35
NB06	HA	12/8/2006	3			0.98		0.98
NB06	HA	12/13/2006	8				<0.10	<0.10
NB06	HA	12/20/2006	15	<0.10				<0.10
NB06	HA	12/26/2006	21		<0.10			<0.10
NB06	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB07	HA	12/6/2006	1		1.64			1.64
NB07	HA	12/8/2006	3			0.76		0.76
NB07	HA	12/13/2006	8				0.13	0.13
NB07	HA	12/20/2006	15	<0.10				<0.10
NB07	HA	12/26/2006	21		<0.10			<0.10
NB07	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB08	HA	12/6/2006	1		1.13			1.13
NB08	HA	12/8/2006	3			0.59		0.59
NB08	HA	12/13/2006	8				0.12	0.12
NB08	HA	12/20/2006	15	<0.10				<0.10
NB08	HA	12/26/2006	21		<0.10			<0.10
NB08	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB09	HA	12/6/2006	1		0.86			0.86
NB09	HA	12/8/2006	3			0.54		0.54
NB09	HA	12/13/2006	8				0.31	0.31
NB09	HA	12/20/2006	15	<0.10				<0.10
NB09	HA	12/26/2006	21		<0.10			<0.10
NB09	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB10	HA	12/6/2006	1		1.65			1.65
NB10	HA	12/8/2006	3			0.91		0.91
NB10	HA	12/13/2006	8				0.11	0.11
NB10	HA	12/20/2006	15	<0.10				<0.10
NB10	HA	12/26/2006	21		<0.10			<0.10
NB10	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB11	HA	12/6/2006	1		1.62			1.62
NB11	HA	12/8/2006	3			0.72		0.72
NB11	HA	12/13/2006	8				0.13	0.13
NB11	HA	12/20/2006	15	<0.10				<0.10
NB11	HA	12/26/2006	21		0.10			0.10
NB11	HA	1/2/2007	28			<0.10		<0.10

Sample	Species	Date	DAY	Replicate (Beaker) ID #				AMMONIA
				01	02	03	04	
NB12	HA	12/6/2006	1		2.54			2.54
NB12	HA	12/8/2006	3			1.22		1.22
NB12	HA	12/13/2006	8				0.15	0.15
NB12	HA	12/20/2006	15	<0.10				<0.10
NB12	HA	12/26/2006	21		<0.10			<0.10
NB12	HA	1/2/2007	28			<0.10		<0.10

SEDIMENT OVERLYING WATER Ph LEVELS

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM-B	HA	12/6/2006	1	7.41	7.43	7.47	7.45	7.44	0.03
JAM-B	HA	12/8/2006	3	7.40	7.42	7.43	7.45	7.43	0.02
JAM-B	HA	12/13/2006	8	7.45	7.46	7.49	7.51	7.48	0.03
JAM-B	HA	12/20/2006	15	7.52	7.58	7.55	7.61	7.57	0.04
JAM-B	HA	12/26/2006	21	7.48	7.51	7.65	7.62	7.57	0.08
JAM-B	HA	1/2/2007	28	7.33	7.44	7.54	7.48	7.45	0.09

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB01	HA	12/6/2006	1	7.40	7.40	7.38	7.42	7.40	0.02
NB01	HA	12/8/2006	3	7.35	7.32	7.37	7.41	7.36	0.04
NB01	HA	12/13/2006	8	7.33	7.39	7.47	7.51	7.43	0.08
NB01	HA	12/20/2006	15	7.55	7.58	7.60	7.63	7.59	0.03
NB01	HA	12/26/2006	21	7.53	7.58	7.61	7.63	7.59	0.04
NB01	HA	1/2/2007	28	7.46	7.58	7.63	7.64	7.58	0.08

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB02	HA	12/6/2006	1	7.35	7.33	7.37	7.38	7.36	0.02
NB02	HA	12/8/2006	3	7.34	7.38	7.43	7.44	7.40	0.05
NB02	HA	12/13/2006	8	7.38	7.42	7.41	7.47	7.42	0.04
NB02	HA	12/20/2006	15	7.44	7.50	7.58	7.63	7.54	0.08
NB02	HA	12/26/2006	21	7.37	7.46	7.50	7.53	7.47	0.07
NB02	HA	1/2/2007	28	7.48	7.51	7.52	7.56	7.52	0.03

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB03	HA	12/6/2006	1	7.41	7.37	7.40	7.46	7.41	0.04
NB03	HA	12/8/2006	3	7.38	7.40	7.42	7.45	7.41	0.03
NB03	HA	12/13/2006	8	7.43	7.47	7.45	7.49	7.46	0.03
NB03	HA	12/20/2006	15	7.53	7.60	7.62	7.62	7.59	0.04
NB03	HA	12/26/2006	21	7.51	7.54	7.57	7.58	7.55	0.03
NB03	HA	1/2/2007	28	7.52	7.55	7.57	7.58	7.56	0.03

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB04	HA	12/6/2006	1	7.38	7.40	7.42	7.44	7.41	0.03
NB04	HA	12/8/2006	3	7.28	7.33	7.31	7.38	7.33	0.04
NB04	HA	12/13/2006	8	7.36	7.41	7.45	7.47	7.42	0.05
NB04	HA	12/20/2006	15	7.51	7.57	7.62	7.62	7.58	0.05
NB04	HA	12/26/2006	21	7.42	7.51	7.57	7.62	7.53	0.09
NB04	HA	1/2/2007	28	7.39	7.41	7.46	7.52	7.45	0.06

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB05	HA	12/6/2006	1	7.33	7.35	7.36	7.37	7.35	0.02
NB05	HA	12/8/2006	3	7.34	7.37	7.39	7.42	7.38	0.03
NB05	HA	12/13/2006	8	7.34	7.35	7.41	7.40	7.38	0.04
NB05	HA	12/20/2006	15	7.59	7.60	7.66	7.65	7.63	0.04
NB05	HA	12/26/2006	21	7.56	7.62	7.63	7.65	7.62	0.04
NB05	HA	1/2/2007	28	7.52	7.56	7.57	7.54	7.55	0.02

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB06	HA	12/6/2006	1	7.36	7.40	7.38	7.42	7.39	0.03
NB06	HA	12/8/2006	3	7.36	7.39	7.40	7.43	7.40	0.03
NB06	HA	12/13/2006	8	7.42	7.41	7.44	7.45	7.43	0.02
NB06	HA	12/20/2006	15	7.45	7.55	7.58	7.62	7.55	0.07
NB06	HA	12/26/2006	21	7.53	7.52	7.52	7.61	7.55	0.04
NB06	HA	1/2/2007	28	7.49	7.55	7.55	7.62	7.55	0.05

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB07	HA	12/6/2006	1	7.42	7.45	7.44	7.46	7.44	0.02
NB07	HA	12/8/2006	3	7.23	7.38	7.35	7.39	7.34	0.07
NB07	HA	12/13/2006	8	7.46	7.55	7.48	7.52	7.50	0.04
NB07	HA	12/20/2006	15	7.53	7.58	7.60	7.63	7.59	0.04
NB07	HA	12/26/2006	21	7.55	7.57	7.59	7.66	7.59	0.05
NB07	HA	1/2/2007	28	7.52	7.55	7.60	7.63	7.58	0.05

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB08	HA	12/6/2006	1	7.30	7.30	7.31	7.32	7.31	0.01
NB08	HA	12/8/2006	3	7.38	7.39	7.40	7.43	7.40	0.02
NB08	HA	12/13/2006	8	7.33	7.38	7.41	7.45	7.39	0.05
NB08	HA	12/20/2006	15	7.58	7.65	7.64	7.67	7.64	0.04
NB08	HA	12/26/2006	21	7.54	7.58	7.60	7.63	7.59	0.04
NB08	HA	1/2/2007	28	7.39	7.52	7.46	7.50	7.47	0.06

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB09	HA	12/6/2006	1	7.30	7.33	7.35	7.34	7.33	0.02
NB09	HA	12/8/2006	3	7.36	7.39	7.40	7.43	7.40	0.03
NB09	HA	12/13/2006	8	7.48	7.49	7.55	7.59	7.53	0.05
NB09	HA	12/20/2006	15	7.73	7.75	7.86	7.88	7.81	0.08
NB09	HA	12/26/2006	21	7.64	7.71	7.69	7.73	7.69	0.04
NB09	HA	1/2/2007	28	7.43	7.53	7.49	7.51	7.49	0.04

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB10	HA	12/6/2006	1	7.40	7.44	7.43	7.43	7.43	0.02
NB10	HA	12/8/2006	3	7.40	7.44	7.46	7.49	7.45	0.04
NB10	HA	12/13/2006	8	7.42	7.47	7.51	7.53	7.48	0.05
NB10	HA	12/20/2006	15	7.38	7.48	7.54	7.61	7.50	0.10
NB10	HA	12/26/2006	21	7.53	7.62	7.64	7.66	7.61	0.06
NB10	HA	1/2/2007	28	7.57	7.58	7.60	7.59	7.59	0.01

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB11	HA	12/6/2006	1	7.38	7.38	7.41	7.35	7.38	0.02
NB11	HA	12/8/2006	3	7.35	7.38	7.41	7.39	7.38	0.02
NB11	HA	12/13/2006	8	7.41	7.47	7.43	7.45	7.44	0.03
NB11	HA	12/20/2006	15	7.52	7.58	7.60	7.57	7.57	0.03
NB11	HA	12/26/2006	21	7.45	7.53	7.58	7.58	7.54	0.06
NB11	HA	1/2/2007	28	7.45	7.44	7.48	7.49	7.47	0.02

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB12	HA	12/6/2006	1	7.63	7.56	7.56	7.57	7.58	0.03
NB12	HA	12/8/2006	3	7.42	7.43	7.45	7.48	7.45	0.03
NB12	HA	12/13/2006	8	7.52	7.55	7.54	7.51	7.53	0.02
NB12	HA	12/20/2006	15	7.54	7.56	7.57	7.59	7.57	0.02
NB12	HA	12/26/2006	21	7.43	7.46	7.50	7.52	7.48	0.04
NB12	HA	1/2/2007	28	7.48	7.52	7.47	7.54	7.50	0.03

SEDIMENT OVERLYING WATER CONDUCTIVITY LEVELS

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
JAM-B	HA	12/6/2006	1	364	360	382	370	369	10
JAM-B	HA	12/8/2006	3	346	338	360	348	348	9
JAM-B	HA	12/13/2006	8	341	331	342	330	336	6
JAM-B	HA	12/20/2006	15	330	319	323	317	322	6
JAM-B	HA	12/26/2006	21	345	331	336	335	337	6
JAM-B	HA	1/2/2007	28	337	332	343	334	337	5

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB01	HA	12/6/2006	1	330	292	301	297	305	17
NB01	HA	12/8/2006	3	316	307	308	305	309	5
NB01	HA	12/13/2006	8	330	317	327	322	324	6
NB01	HA	12/20/2006	15	309	306	313	310	310	3
NB01	HA	12/26/2006	21	320	324	324	328	324	3
NB01	HA	1/2/2007	28	340	333	334	337	336	3

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB02	HA	12/6/2006	1	311	295	303	290	300	9
NB02	HA	12/8/2006	3	311	307	314	303	309	5
NB02	HA	12/13/2006	8	320	313	324	315	318	5
NB02	HA	12/20/2006	15	318	304	314	307	311	6
NB02	HA	12/26/2006	21	322	312	312	314	315	5
NB02	HA	1/2/2007	28	320	322	325	327	324	3

Sample	Species	Date	Day	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB03	HA	12/6/2006	1	294	297	301	291	296	4
NB03	HA	12/8/2006	3	310	307	311	299	307	5
NB03	HA	12/13/2006	8	320	313	324	314	318	5
NB03	HA	12/20/2006	15	309	307	313	309	310	3
NB03	HA	12/26/2006	21	307	307	309	309	308	1
NB03	HA	1/2/2007	28	317	319	319	318	318	1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB04	HA	12/6/2006	1	297	298	304	299	300	3
NB04	HA	12/8/2006	3	321	313	312	307	313	6
NB04	HA	12/13/2006	8	319	313	320	314	317	4
NB04	HA	12/20/2006	15	307	305	308	307	307	1
NB04	HA	12/26/2006	21	305	306	313	310	309	4
NB04	HA	1/2/2007	28	318	320	326	324	322	4

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB05	HA	12/6/2006	1	291	298	290	294	293	4
NB05	HA	12/8/2006	3	299	312	304	306	305	5
NB05	HA	12/13/2006	8	317	317	314	316	316	1
NB05	HA	12/20/2006	15	305	309	309	312	309	3
NB05	HA	12/26/2006	21	312	314	313	311	313	1
NB05	HA	1/2/2007	28	333	338	335	333	335	2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB06	HA	12/6/2006	1	320	314	322	325	320	5
NB06	HA	12/8/2006	3	316	309	317	322	316	5
NB06	HA	12/13/2006	8	313	313	317	320	316	3
NB06	HA	12/20/2006	15	319	310	312	314	314	4
NB06	HA	12/26/2006	21	319	312	313	314	315	3
NB06	HA	1/2/2007	28	335	332	335	336	335	2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB07	HA	12/6/2006	1	295	299	290	296	295	4
NB07	HA	12/8/2006	3	315	313	311	316	314	2
NB07	HA	12/13/2006	8	312	316	317	321	317	4
NB07	HA	12/20/2006	15	305	307	315	323	313	8
NB07	HA	12/26/2006	21	309	309	305	305	307	2
NB07	HA	1/2/2007	28	329	331	330	331	330	1

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB08	HA	12/6/2006	1	293	282	291	282	287	6
NB08	HA	12/8/2006	3	300	303	299	297	300	3
NB08	HA	12/13/2006	8	323	311	311	311	314	6
NB08	HA	12/20/2006	15	317	320	321	317	319	2
NB08	HA	12/26/2006	21	310	311	309	305	309	3
NB08	HA	1/2/2007	28	338	330	326	321	329	7

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB09	HA	12/6/2006	1	295	299	303	304	300	4
NB09	HA	12/8/2006	3	304	306	313	313	309	5
NB09	HA	12/13/2006	8	317	318	323	325	321	4
NB09	HA	12/20/2006	15	332	333	342	342	337	6
NB09	HA	12/26/2006	21	326	323	325	323	324	2
NB09	HA	1/2/2007	28	333	338	334	335	335	2

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB10	HA	12/6/2006	1	305	304	303	317	307	7
NB10	HA	12/8/2006	3	308	308	307	311	309	2
NB10	HA	12/13/2006	8	312	312	314	316	314	2
NB10	HA	12/20/2006	15	324	317	320	322	321	3
NB10	HA	12/26/2006	21	310	306	306	310	308	2
NB10	HA	1/2/2007	28	331	325	324	324	326	3

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB11	HA	12/6/2006	1	298	304	294	289	296	6
NB11	HA	12/8/2006	3	317	313	317	316	316	2
NB11	HA	12/13/2006	8	326	324	330	315	324	6
NB11	HA	12/20/2006	15	318	309	319	309	314	6
NB11	HA	12/26/2006	21	320	321	322	327	323	3
NB11	HA	1/2/2007	28	319	317	320	326	321	4

Sample	Species	Date	DAY	Replicate (Beaker) ID #				MEAN	SD
				01	02	03	04		
NB12	HA	12/6/2006	1	366	371	371	364	368	4
NB12	HA	12/8/2006	3	323	336	334	335	332	6
NB12	HA	12/13/2006	8	330	328	323	322	326	4
NB12	HA	12/20/2006	15	315	307	306	305	308	5
NB12	HA	12/26/2006	21	318	322	323	324	322	3
NB12	HA	1/2/2007	28	311	318	319	321	317	4

SEDIMENT OVERLYING WATER ALKALINITY LEVELS

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
JAM-B	HA	12/6/2006	1	173				173
JAM-B	HA	12/8/2006	3		187			187
JAM-B	HA	12/13/2006	8			158		158
JAM-B	HA	12/20/2006	15				143	143
JAM-B	HA	12/26/2006	21	147				147
JAM-B	HA	1/2/2007	28		147			147

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB01	HA	12/6/2006	1	120				120
NB01	HA	12/8/2006	3		130			130
NB01	HA	12/13/2006	8			139		139
NB01	HA	12/20/2006	15				133	133
NB01	HA	12/26/2006	21	138				138
NB01	HA	1/2/2007	28		147			147

Sample	Species	Date	Day	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB02	HA	12/6/2006	1	130				130
NB02	HA	12/8/2006	3		130			130
NB02	HA	12/13/2006	8			139		139
NB02	HA	12/20/2006	15				129	129
NB02	HA	12/26/2006	21	143				143
NB02	HA	1/2/2007	28		133			133

Sample	Species	Date	Day	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB03	HA	12/6/2006	1	120				120
NB03	HA	12/8/2006	3		130			130
NB03	HA	12/13/2006	8			130		130
NB03	HA	12/20/2006	15				129	129
NB03	HA	12/26/2006	21	133				133
NB03	HA	1/2/2007	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB04	HA	12/6/2006	1	115				115
NB04	HA	12/8/2006	3		125			125
NB04	HA	12/13/2006	8			144		144
NB04	HA	12/20/2006	15				129	129
NB04	HA	12/26/2006	21	138				138
NB04	HA	1/2/2007	28		129			129

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB05	HA	12/6/2006	1	115				115
NB05	HA	12/8/2006	3		130			130
NB05	HA	12/13/2006	8			139		139
NB05	HA	12/20/2006	15				129	129
NB05	HA	12/26/2006	21	133				133
NB05	HA	1/2/2007	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB06	HA	12/6/2006	1	139				139
NB06	HA	12/8/2006	3		130			130
NB06	HA	12/13/2006	8			134		134
NB06	HA	12/20/2006	15				133	133
NB06	HA	12/26/2006	21	138				138
NB06	HA	1/2/2007	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB07	HA	12/6/2006	1	120				120
NB07	HA	12/8/2006	3		125			125
NB07	HA	12/13/2006	8			134		134
NB07	HA	12/20/2006	15				138	138
NB07	HA	12/26/2006	21	133				133
NB07	HA	1/2/2007	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB08	HA	12/6/2006	1	125				125
NB08	HA	12/8/2006	3		130			130
NB08	HA	12/13/2006	8			134		134
NB08	HA	12/20/2006	15				133	133
NB08	HA	12/26/2006	21	133				133
NB08	HA	1/2/2007	28		143			143

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB09	HA	12/6/2006	1	125				125
NB09	HA	12/8/2006	3		134			134
NB09	HA	12/13/2006	8			144		144
NB09	HA	12/20/2006	15				152	152
NB09	HA	12/26/2006	21	143				143
NB09	HA	1/2/2007	28		143			143

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB10	HA	12/6/2006	1	130				130
NB10	HA	12/8/2006	3		130			130
NB10	HA	12/13/2006	8			130		130
NB10	HA	12/20/2006	15				133	133
NB10	HA	12/26/2006	21	138				138
NB10	HA	1/2/2007	28		133			133

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB11	HA	12/6/2006	1	125				125
NB11	HA	12/8/2006	3		134			134
NB11	HA	12/13/2006	8			139		139
NB11	HA	12/20/2006	15				129	129
NB11	HA	12/26/2006	21	138				138
NB11	HA	1/2/2007	28		138			138

Sample	Species	Date	DAY	Replicate (Beaker) ID #				ALK
				01	02	03	04	
NB12	HA	12/6/2006	1	158				158
NB12	HA	12/8/2006	3		149			149
NB12	HA	12/13/2006	8			139		139
NB12	HA	12/20/2006	15				129	129
NB12	HA	12/26/2006	21	133				133
NB12	HA	1/2/2007	28		138			138

SEDIMENT OVERLYING WATER HARDNESS LEVELS

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
JAM-B	HA	12/6/2006	1	168				168
JAM-B	HA	12/8/2006	3		172			172
JAM-B	HA	12/13/2006	8			160		160
JAM-B	HA	12/20/2006	15				148	148
JAM-B	HA	12/26/2006	21	156				156
JAM-B	HA	1/2/2007	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB01	HA	12/6/2006	1	140				140
NB01	HA	12/8/2006	3		136			136
NB01	HA	12/13/2006	8			156		156
NB01	HA	12/20/2006	15				148	148
NB01	HA	12/26/2006	21	160				160
NB01	HA	1/2/2007	28		156			156

Sample	Species	Date	Day	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB02	HA	12/6/2006	1	140				140
NB02	HA	12/8/2006	3		140			140
NB02	HA	12/13/2006	8			144		144
NB02	HA	12/20/2006	15				144	144
NB02	HA	12/26/2006	21	156				156
NB02	HA	1/2/2007	28		156			156

Sample	Species	Date	Day	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB03	HA	12/6/2006	1	136				136
NB03	HA	12/8/2006	3		140			140
NB03	HA	12/13/2006	8			144		144
NB03	HA	12/20/2006	15				144	144
NB03	HA	12/26/2006	21	144				144
NB03	HA	1/2/2007	28		148			148

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB04	HA	12/6/2006	1	136				136
NB04	HA	12/8/2006	3		140			140
NB04	HA	12/13/2006	8			148		148
NB04	HA	12/20/2006	15				144	144
NB04	HA	12/26/2006	21	136				136
NB04	HA	1/2/2007	28		140			140

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB05	HA	12/6/2006	1	124				124
NB05	HA	12/8/2006	3		132			132
NB05	HA	12/13/2006	8			148		148
NB05	HA	12/20/2006	15				148	148
NB05	HA	12/26/2006	21	144				144
NB05	HA	1/2/2007	28		156			156

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB06	HA	12/6/2006	1	140				140
NB06	HA	12/8/2006	3		136			136
NB06	HA	12/13/2006	8			148		148
NB06	HA	12/20/2006	15				144	144
NB06	HA	12/26/2006	21	140				140
NB06	HA	1/2/2007	28		156			156

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB07	HA	12/6/2006	1	128				128
NB07	HA	12/8/2006	3		136			136
NB07	HA	12/13/2006	8			144		144
NB07	HA	12/20/2006	15				148	148
NB07	HA	12/26/2006	21	140				140
NB07	HA	1/2/2007	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB08	HA	12/6/2006	1	136				136
NB08	HA	12/8/2006	3		128			128
NB08	HA	12/13/2006	8			136		136
NB08	HA	12/20/2006	15				148	148
NB08	HA	12/26/2006	21	140				140
NB08	HA	1/2/2007	28		156			156

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB09	HA	12/6/2006	1	136				136
NB09	HA	12/8/2006	3		136			136
NB09	HA	12/13/2006	8			144		144
NB09	HA	12/20/2006	15				160	160
NB09	HA	12/26/2006	21	148				148
NB09	HA	1/2/2007	28		152			152

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB10	HA	12/6/2006	1	136				136
NB10	HA	12/8/2006	3		148			148
NB10	HA	12/13/2006	8			156		156
NB10	HA	12/20/2006	15				152	152
NB10	HA	12/26/2006	21	140				140
NB10	HA	1/2/2007	28		156			156

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB11	HA	12/6/2006	1	132				132
NB11	HA	12/8/2006	3		140			140
NB11	HA	12/13/2006	8			148		148
NB11	HA	12/20/2006	15				144	144
NB11	HA	12/26/2006	21	148				148
NB11	HA	1/2/2007	28		140			140

Sample	Species	Date	DAY	Replicate (Beaker) ID #				HARD
				01	02	03	04	
NB12	HA	12/6/2006	1	148				148
NB12	HA	12/8/2006	3		144			144
NB12	HA	12/13/2006	8			144		144
NB12	HA	12/20/2006	15				140	140
NB12	HA	12/26/2006	21	140				140
NB12	HA	1/2/2007	28		140			140

APPENDIX C

Statistical Analysis Output from Chronic Sediment Toxicity Tests Assessing Survival and Growth of Hyalella azteca Exposed to a Primary Set of Samples from the Newburgh Manufactured Gas Plant Site at Newburgh, NY in Tests Conducted from November 21 through December 19, 2006

APPENDIX D

Statistical Analysis Output from Chronic Sediment Toxicity Tests Assessing Survival and Growth of Hyalella azteca Exposed to a Secondary Set of Samples from the Newburgh Manufactured Gas Plant Site at Newburgh, NY in Tests Conducted from December 5, 2006 Through January 2, 2007

Appendix D

U.S. Army Engineering Research and Development Center (ERDC) Final Report

CERDC-EP-R

7 March 2007

MEMORANDUM FOR: Mr. Nick Azzolina/RETEC

SUBJECT: Chronic Sediment Toxicity Data for Newburgh Sediment Exposed *Chironomus dilutus* (formerly *Chironomus tentans*)

1. The following is an abbreviated summary of the results from the 20-d *Chironomus dilutus* chronic study conducted with Newburgh sediments. All data has passed QA/QC review and are considered final.

Please contact me if you have any questions regarding the data or methods utilized in conducting the studies.

J. Daniel Farrar, M.S.
Research Biologist

Study Summary

Methods

The *C. dilutus* 20-d study was conducted following the methods described in “Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates” (EPA/600/R-99/064, 2000). Only the survival and growth endpoints were evaluated. Due to the number of sediments tested, the study was conducted in two phases. Phase I included sediments NB-1 through NB-10. Phase II Included NB-18, NB-20, NB-22 through NB-27 and NB-29. Reference sediments (NB-11 and NB-12) and a performance control were also evaluated in each study phase.

Statistical analyses. Statistical analyses were conducted for both studies following the methods described in “Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates” and in “Evaluation of Dredged Material Proposed for Discharge in the Waters of the U.S.–Testing Manual” (EPA/823/B-98/004, 1998).

C. dilutus survival. All treatments that were not greater than 10% different from the reference were removed from the data set prior to analysis. In addition, the performance control was also removed from the analysis. Analyses were conducted using one-way ANOVA for phase I and Kruskal-Wallis one-way ANOVA on Ranks (non-parametric) for phase II followed by Dunnett’s mean comparison to the reference sediments.

C. dilutus mass. The performance control was removed from the data set prior to analysis. Analyses were conducted using one-way ANOVA for phase I and Kruskal-Wallis one-way ANOVA on Ranks for phase II followed by Dunnett’s mean comparison to the reference sediments.

Results

Performance metrics were met with mean control survival exceeding 70% (Tables 5 and 7). Water quality parameters fell within required ranges for both study phases (Tables 1 and 2). A summary of water quality conditions is provided at the bottom of each table. Survival was significantly lower for NB-20 relative to the NB-11 and NB-12 reference sediments. Although no additional effects on survival were detected, mean survival in sediments NB-04 and NB-27 was 25-35% lower than survival observed in the reference sediments. The failure to detect a statistical difference is likely related to the higher variability in survival observed in these sediments. No statistical differences from reference sediments were detected for the growth endpoint in phase I or phase II of the study (Tables 6 and 8). Phase I and Phase II individual replicate survival and biomass data are provided in Tables 3 and 4, respectively.

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
Control	A	12/13/2006	7.96	8.4	80	140	23.4	360	1
Control	B	12/13/2006	8.00	8.5			23.5	360	
Control	C	12/13/2006	8.33	8.6			23.4	370	
Control	D	12/13/2006	8.23	8.5			23.6	380	
Control	E	12/13/2006	8.17	8.6			23.7	350	
NB-01	A	12/13/2006	7.89	7.8	120	108	23.8	320	2
NB-01	B	12/13/2006	8.08	8.4			23.7	310	
NB-01	C	12/13/2006	8.09	8.5			23.8	320	
NB-01	D	12/13/2006	8.20	8.5			23.7	300	
NB-01	E	12/13/2006	8.11	8.4			23.4	320	
NB-02	A	12/13/2006	8.05	7.2	120	110	23.4	320	3
NB-02	B	12/13/2006	7.77	7.4			23.5	310	
NB-02	C	12/13/2006	8.21	8.6			23.6	290	
NB-02	D	12/13/2006	8.10	7.9			23.4	320	
NB-02	E	12/13/2006	8.22	8.5			23.4	300	
NB-03	A	12/13/2006	8.09	8.3	110	110	23.4	320	2
NB-03	B	12/13/2006	7.99	8.2			23.7	310	
NB-03	C	12/13/2006	7.95	7.2			23.6	310	
NB-03	D	12/13/2006	8.13	8.4			23.5	320	
NB-03	E	12/13/2006	7.66	5.9			23.7	340	
NB-04	A	12/13/2006	8.08	8.1	100	100	23.5	310	2
NB-04	B	12/13/2006	8.11	8.2			23.8	290	
NB-04	C	12/13/2006	7.48	8.6			23.8	320	
NB-04	D	12/13/2006	8.22	8.4			23.4	320	
NB-04	E	12/13/2006	8.05	8.4			23.5	290	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-05	A	12/13/2006	8.13	8.4	135	130	23.6	290	4
NB-05	B	12/13/2006	8.12	8.3			23.6	350	
NB-05	C	12/13/2006	7.98	8.3			23.7	340	
NB-05	D	12/13/2006	7.74	5.8			23.8	330	
NB-05	E	12/13/2006	8.09	8.2			23.8	450	
NB-06	A	12/13/2006	8.11	8.3	135	136	23.8	370	5
NB-06	B	12/13/2006	8.13	8.4			23.7	390	
NB-06	C	12/13/2006	8.06	8.3			23.8	390	
NB-06	D	12/13/2006	8.25	8.5			23.7	390	
NB-06	E	12/13/2006	8.31	8.7			23.5	400	
NB-07	A	12/13/2006	8.13	8.4	110	104	23.7	330	7
NB-07	B	12/13/2006	8.15	8.4			23.7	340	
NB-07	C	12/13/2006	8.20	8.0			23.4	330	
NB-07	D	12/13/2006	8.17	8.4			23.4	340	
NB-07	E	12/13/2006	8.24	8.4			23.4	360	
NB-08	A	12/13/2006	8.32	8.7	120	108	23.4	330	3
NB-08	B	12/13/2006	8.02	8.5			23.5	250	
NB-08	C	12/13/2006	8.21	8.6			23.6	320	
NB-08	D	12/13/2006	8.17	8.3			23.4	310	
NB-08	E	12/13/2006	8.30	8.6			23.6	290	
NB-09	A	12/13/2006	8.21	8.5	80	104	23.6	320	3
NB-09	B	12/13/2006	8.15	8.2			23.6	320	
NB-09	C	12/13/2006	7.96	7.8			23.6	320	
NB-09	D	12/13/2006	8.04	8.1			23.4	360	
NB-09	E	12/13/2006	8.29	8.5			23.6	340	
NB-10	A	12/13/2006	8.21	8.2	120	104	23.4	370	7
NB-10	B	12/13/2006	8.00	8.4			23.6	350	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-10	C	12/13/2006	8.24	8.4			23.6	350	
NB-10	D	12/13/2006	8.05	8.3			23.6	410	
NB-10	E	12/13/2006	8.26	8.6			23.6	360	
NB-11	A	12/13/2006	8.12	8.3	90	128	23.4	390	6
NB-11	B	12/13/2006	8.07	8.4			23.6	370	
NB-11	C	12/13/2006	8.18	8.6			23.5	380	
NB-11	D	12/13/2006	8.18	8.6			23.6	360	
NB-11	E	12/13/2006	8.19	8.3			23.4	380	
NB-12	A	12/13/2006	7.73	7.1	120	125	23.4	470	5
NB-12	B	12/13/2006	8.35	8.4			23.6	530	
NB-12	C	12/13/2006	8.28	8.3			23.5	450	
NB-12	D	12/13/2006	8.48	8.5			23.6	550	
NB-12	E	12/13/2006	8.35	7.9			23.4	580	
Control	A	12/15/2006	7.95	5.8			22.7	400	
NB-01	A	12/15/2006	8.01	5.1			22.8	380	
NB-02	A	12/15/2006	8.11	7.0			22.7	380	
NB-03	A	12/15/2006	8.05	6.9			22.6	370	
NB-04	A	12/15/2006	8.16	7.3			22.9	350	
NB-05	A	12/15/2006	8.08	7.0			22.6	360	
NB-06	A	12/15/2006	8.12	7.1			22.8	400	
NB-07	A	12/15/2006	8.40	7.3			22.6	580	
NB-08	A	12/15/2006	8.13	7.2			23	360	
NB-09	A	12/15/2006	8.27	8.0			23	480	
NB-10	A	12/15/2006	8.25	8.2			22.9	380	
NB-11	A	12/15/2006	7.96	6.7			22.6	390	
NB-12	A	12/15/2006	8.10	7.5			23	420	
Control	B	12/18/2006	8.64	8.7			23.2	470	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-01	B	12/18/2006	8.18	8.6			23.2	330	
NB-02	B	12/18/2006	8.15	8.4			23.2	460	
NB-03	B	12/18/2006	8.14	8.4			23.2	430	
NB-04	B	12/18/2006	8.16	8.5			23.2	360	
NB-05	B	12/18/2006	8.23	8.2			23.2	350	
NB-06	B	12/18/2006	8.13	7.9			23.2	380	
NB-07	B	12/18/2006	8.16	8.0			23.2	400	
NB-08	B	12/18/2006	8.19	8.0			23.2	340	
NB-09	B	12/18/2006	8.90	8.1			23.2	380	
NB-10	B	12/18/2006	8.83	8.0			23.2	450	
NB-11	B	12/18/2006	8.05	8.0			23.2	380	
NB-12	B	12/18/2006	8.69	7.9			23.2	460	
Control	C	12/20/2006	8.22	8.8			22.5	330	
NB-01	C	12/20/2006	7.48	8.1			22.5	320	
NB-02	C	12/20/2006	7.77	8.8			22.5	300	
NB-03	C	12/20/2006	7.97	8.7			22.5	290	
NB-04	C	12/20/2006	8.01	8.7			22.5	280	
NB-05	C	12/20/2006	8.06	8.6			22.5	310	
NB-06	C	12/20/2006	8.07	8.6			22.5	310	
NB-07	C	12/20/2006	8.33	8.7			22.5	330	
NB-08	C	12/20/2006	8.30	8.7			22.5	310	
NB-09	C	12/20/2006	8.36	8.7			22.5	310	
NB-10	C	12/20/2006	8.26	8.8			22.5	330	
NB-11	C	12/20/2006	8.23	8.8			22.5	300	
NB-12	C	12/20/2006	8.25	8.9			22.5	330	
Control	D	12/22/2006	7.35	8.5			22.5	400	
NB-01	D	12/22/2006	7.88	7.9			22.5	320	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-02	D	12/22/2006	8.32	7.7			22.5	360	
NB-03	D	12/22/2006	8.17	7.6			22.5	330	
NB-04	D	12/22/2006	8.20	7.9			22.5	330	
NB-05	D	12/22/2006	8.06	8.0			22.5	300	
NB-06	D	12/22/2006	8.06	8.0			22.5	300	
NB-07	D	12/22/2006	7.93	7.9			22.5	310	
NB-08	D	12/22/2006	8.04	7.5			22.5	320	
NB-09	D	12/22/2006	7.92	7.5			22.5	320	
NB-10	D	12/22/2006	8.07	8.3			22.5	320	
NB-11	D	12/22/2006	7.89	7.5			22.5	310	
NB-12	D	12/22/2006	7.87	7.2			22.5	310	
Control	E	12/26/2006	7.79	7.4			22.5	320	
NB-01	E	12/26/2006	8.00	8.1			22.5	300	
NB-02	E	12/26/2006	7.83	7.8			22.5	290	
NB-03	E	12/26/2006	7.52	7.5			22.5	270	
NB-04	E	12/26/2006	7.85	7.6			22.5	270	
NB-05	E	12/26/2006	8.12	8.4			22.5	290	
NB-06	E	12/26/2006	8.14	8.0			22.5	280	
NB-07	E	12/26/2006	7.19	5.5			22.5	280	
NB-08	E	12/26/2006	8.01	8.0			22.5	280	
NB-09	E	12/26/2006	8.13	7.9			22.5	300	
NB-10	E	12/26/2006	8.00	8.1			22.5	280	
NB-11	E	12/26/2006	7.91	7.3			22.5	290	
NB-12	E	12/26/2006	8.12	8.3			22.5	300	
Control	A	12/27/2006	7.70	7.2			22.5	310	
NB-01	A	12/27/2006	8.03	8.0			22.5	300	
NB-02	A	12/27/2006	7.80	7.6			22.5	320	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-03	A	12/27/2006	7.81	7.7			22.5	270	
NB-04	A	12/27/2006	7.36	7.5			22.5	300	
NB-05	A	12/27/2006	7.89	7.2			22.5	310	
NB-06	A	12/27/2006	7.98	8.0			22.5	280	
NB-07	A	12/27/2006	7.61	7.5			22.5	280	
NB-08	A	12/27/2006	7.80	7.2			22.5	280	
NB-09	A	12/27/2006	7.76	7.7			22.5	290	
NB-10	A	12/27/2006	7.87	6.8			22.5	290	
NB-11	A	12/27/2006	7.88	7.3			22.5	290	
NB-12	A	12/27/2006	8.09	8.0			22.5	300	
Control	A	1/2/2007	8.00	7.2	108	148	22.7	380	1
Control	B	1/2/2007	8.25	8.0	108	128	22.7	370	1
Control	C	1/2/2007	7.87	6.8	108	134	22.6	360	1
Control	D	1/2/2007	8.16	8.0			22.7	320	
Control	E	1/2/2007	8.09	7.7			22.6	370	
NB-01	A	1/2/2007	7.67	5.9	100	120	22.6	350	1
NB-01	B	1/2/2007	7.68	6.8	90	122	22.7	360	1
NB-01	C	1/2/2007	7.97	7.7	80	120	22.6	320	1
NB-01	D	1/2/2007	7.64	5.7			22.7	350	
NB-01	E	1/2/2007	7.80	5.8			22.6	350	
NB-02	A	1/2/2007	8.10	5.8	105	128	22.7	410	1
NB-02	B	1/2/2007	7.51	5.5	80	120	22.7	350	1
NB-02	C	1/2/2007	7.73	6.4	100	112	22.7	370	1
NB-02	D	1/2/2007	7.77	6.8			22.6	340	
NB-02	E	1/2/2007	7.90	7.0			22.6	360	
NB-03	A	1/2/2007	7.65	6.1	85	120	22.7	340	1
NB-03	B	1/2/2007	7.63	5.8	90	116	22.7	340	1

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-03	C	1/2/2007	7.66	6.2	90	120	22.7	340	1
NB-03	D	1/2/2007	7.67	6.2			22.7	340	
NB-03	E	1/2/2007	7.89	6.7			22.7	310	
NB-04	A	1/2/2007	7.98	7.3	80	104	22.6	330	1
NB-04	B	1/2/2007	7.79	6.7	80	108	22.6	330	1
NB-04	C	1/2/2007	8.00	6.4	90	116	22.7	340	1
NB-04	D	1/2/2007	7.67	6.3			22.6	320	
NB-04	E	1/2/2007	7.73	6.1			22.7	320	
NB-05	A	1/2/2007	7.83	6.8	90	108	22.7	360	1
NB-05	B	1/2/2007	8.06	7.1	80	104	22.7	330	1
NB-05	C	1/2/2007	7.98	7.0	90	116	22.6	320	1
NB-05	D	1/2/2007	7.76	6.5			22.7	340	
NB-05	E	1/2/2007	7.73	6.2			22.7	330	
NB-06	A	1/2/2007	7.83	6.4	90	116	22.7	360	1
NB-06	B	1/2/2007	7.79	6.3	80	104	22.7	330	1
NB-06	C	1/2/2007	7.87	7.0	80	100	22.6	320	1
NB-06	D	1/2/2007	7.80	6.3			22.7	340	
NB-06	E	1/2/2007	7.96	7.5			22.7	330	
NB-07	A	1/2/2007	7.96	6.9	80	80	22.7	330	1
NB-07	B	1/2/2007	7.84	6.2	80	84	22.7	340	1
NB-07	C	1/2/2007	7.80	6.0	90	80	22.6	350	1
NB-07	D	1/2/2007	7.77	6.0			22.6	320	
NB-07	E	1/2/2007	7.67	5.7			22.6	340	
NB-08	A	1/2/2007	7.63	5.9	90	108	22.6	350	1
NB-08	B	1/2/2007	7.70	6.4	95	112	22.6	340	1
NB-08	C	1/2/2007	7.72	6.2	90	116	22.7	360	1
NB-08	D	1/2/2007	7.79	5.6			22.6	370	

Table 1. Phase I Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm CaCO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)	
NB-08	E	1/2/2007	7.82	5.7			22.6	420		
NB-09	A	1/2/2007	7.75	6.3	100	124	22.7	400	1	
NB-09	B	1/2/2007	7.85	6.0	105	132	22.7	420	1	
NB-09	C	1/2/2007	7.88	5.9	100	128	22.7	390	1	
NB-09	D	1/2/2007	8.04	7.2			22.7	350		
NB-09	E	1/2/2007	7.91	5.7			22.6	380		
NB-10	A	1/2/2007	8.35	6.3	80	124	22.7	400	1	
NB-10	B	1/2/2007	7.75	6.3	75	120	22.7	360	1	
NB-10	C	1/2/2007	7.86	6.7	75	104	22.7	350	1	
NB-10	D	1/2/2007	8.05	7.1			22.6	320		
NB-10	E	1/2/2007	7.91	6.3			22.7	350		
NB-11	A	1/2/2007	7.87	6.1	75	108	22.7	330	1	
NB-11	B	1/2/2007	7.86	6.2	80	104	22.7	340	1	
NB-11	C	1/2/2007	7.77	5.9	80	112	22.6	370	1	
NB-11	D	1/2/2007	7.72	5.9			22.7	340		
NB-11	E	1/2/2007	7.71	5.7			22.7	320		
NB-12	A	1/2/2007	7.71	5.4	90	128	22.6	340	1	
NB-12	B	1/2/2007	7.61	5.9	95	108	22.6	330	1	
NB-12	C	1/2/2007	7.73	5.8	90	116	22.7	340	1	
NB-12	D	1/2/2007	7.58	5.7			22.6	380		
NB-12	E	1/2/2007	7.70	5.2			22.6	330		
			Min	7.19	5.1	75	80	22.5	250	1
			Max	8.90	8.9	135	148	23.8	580	7
			Mean	8.00	7.5	95	115	22.9	346	2
			StdDev	0.25	1.0	16	14	0.5	52	2

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (μS)	Ammonia (ppm)
Control	A	1/17/2007	8.21	7.4	80	140	22.5	360	2
Control	B	1/17/2007	8.24	7.4			22.5	380	
Control	C	1/17/2007	8.12	7.1			22.5	380	
Control	D	1/17/2007	8.30	7.4			22.5	370	
Control	E	1/17/2007	8.35	7.5			22.5	420	
NB-11	A	1/17/2007	8.31	7.4	80	140	22.5	420	2
NB-11	B	1/17/2007	8.23	7.5			22.5	370	
NB-11	C	1/17/2007	8.22	7.4			22.5	400	
NB-11	D	1/17/2007	8.20	7.4			22.5	370	
NB-11	E	1/17/2007	8.12	7.3			22.5	390	
NB-12	A	1/17/2007	8.28	6.3	100	140	22.5	500	3
NB-12	B	1/17/2007	8.01	6.0			22.5	520	
NB-12	C	1/17/2007	7.74	6.9			22.5	490	
NB-12	D	1/17/2007	8.25	7.3			22.5	500	
NB-12	E	1/17/2007	8.39	7.3			22.5	480	
NB-18	A	1/17/2007	8.28	6.4	64	110	22.5	360	2
NB-18	B	1/17/2007	7.91	7.1			22.5	320	
NB-18	C	1/17/2007	8.04	7.2			22.5	360	
NB-18	D	1/17/2007	8.03	7.4			22.5	340	
NB-18	E	1/17/2007	8.16	7.3			22.5	330	
NB-20	A	1/17/2007	8.30	7.3	80	120	21.7	410	1
NB-20	B	1/17/2007	8.23	7.3			21.8	320	
NB-20	C	1/17/2007	8.12	7.3			21.8	310	
NB-20	D	1/17/2007	7.88	6.3			22.0	300	
NB-20	E	1/17/2007	7.94	6.8			21.9	310	
NB-22	A	1/17/2007	8.09	7.2	70	128	21.5	420	1
NB-22	B	1/17/2007	7.82	6.1			22.0	350	

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-22	C	1/17/2007	7.98	7.0			21.8	350	
NB-22	D	1/17/2007	7.87	6.4			21.7	410	
NB-22	E	1/17/2007	8.05	7.0			22.0	360	
NB-23	A	1/17/2007	8.11	7.5	50	100	21.9	280	2
NB-23	B	1/17/2007	8.17	7.4			21.7	410	
NB-23	C	1/17/2007	8.21	7.3			21.7	410	
NB-23	D	1/17/2007	8.15	7.4			21.8	290	
NB-23	E	1/17/2007	7.89	6.9			21.8	310	
NB-24	A	1/17/2007	8.34	7.5	64	145	21.7	410	1
NB-24	B	1/17/2007	8.26	7.3			21.6	410	
NB-24	C	1/17/2007	8.22	7.2			21.5	410	
NB-24	D	1/17/2007	8.08	7.1			21.7	410	
NB-24	E	1/17/2007	8.08	7.3			21.8	320	
NB-25	A	1/17/2007	8.26	7.4	80	124	21.5	410	1
NB-25	B	1/17/2007	7.72	5.8			21.9	320	
NB-25	C	1/17/2007	8.05	7.3			21.8	340	
NB-25	D	1/17/2007	8.09	7.4			21.8	310	
NB-25	E	1/17/2007	8.05	7.3			21.8	310	
NB-26	A	1/17/2007	8.22	7.4	80	124	21.6	400	1
NB-26	B	1/17/2007	8.08	7.1			21.6	400	
NB-26	C	1/17/2007	7.95	7.1			21.8	310	
NB-26	D	1/17/2007	7.90	7.2			21.8	310	
NB-26	E	1/17/2007	7.95	7.3			21.8	310	
NB-27	A	1/17/2007	8.26	7.5	60	120	21.6	420	2
NB-27	B	1/17/2007	8.25	7.4			21.5	420	
NB-27	C	1/17/2007	8.00	6.3			21.6	350	
NB-27	D	1/17/2007	8.12	7.2			21.7	360	

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (μS)	Ammonia (ppm)
NB-27	E	1/17/2007	8.13	7.4			21.8	360	
NB-29	A	1/17/2007	8.29	7.2	60	120	21.9	330	2
NB-29	B	1/17/2007	8.13	7.2			21.8	350	
NB-29	C	1/17/2007	8.20	7.5			21.8	330	
NB-29	D	1/17/2007	7.98	7.0			21.8	310	
NB-29	E	1/17/2007	8.16	7.4			22.0	300	
Control	A	1/22/2007	7.85	6.6			22.5	280	
NB-11	A	1/22/2007	7.98	6.6			22.5	280	
NB-12	A	1/22/2007	7.84	5.2			22.5	280	
NB-18	A	1/22/2007	7.34	6.0			22.5	270	
NB-20	A	1/22/2007	7.61	6.8			22.5	250	
NB-22	A	1/22/2007	7.63	6.3			22.5	270	
NB-23	A	1/22/2007	7.68	6.4			22.5	280	
NB-24	A	1/22/2007	7.82	7.3			22.5	270	
NB-25	A	1/22/2007	7.76	6.3			22.5	280	
NB-26	A	1/22/2007	7.77	6.1			22.4	260	
NB-27	A	1/22/2007	7.57	6.1			22.4	270	
NB-29	A	1/22/2007	7.88	6.2			22.4	270	
Control	A	1/24/2007	7.81	6.6			22.4	280	
NB-11	B	1/24/2007	7.86	6.5			22.4	280	
NB-12	B	1/24/2007	7.85	5.3			22.5	280	
NB-18	B	1/24/2007	7.67	6.0			22.5	270	
NB-20	B	1/24/2007	7.61	6.4			22.5	250	
NB-22	B	1/24/2007	7.63	6.8			22.5	280	
NB-23	B	1/24/2007	7.68	6.3			22.5	280	
NB-24	B	1/24/2007	7.82	7.3			22.5	270	
NB-25	B	1/24/2007	7.73	6.4			22.5	280	

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (μS)	Ammonia (ppm)
NB-26	B	1/24/2007	7.52	6.1			22.5	280	
NB-27	B	1/24/2007	7.61	6.2			22.5	280	
NB-29	B	1/24/2007	7.81	6.2			22.5	270	
Control	B	1/26/2007	7.79	6.6			22.5	280	
NB-11	B	1/26/2007	7.83	6.6			22.5	270	
NB-12	C	1/26/2007	7.81	5.5			22.5	280	
NB-18	C	1/26/2007	7.70	6.1			22.5	280	
NB-20	C	1/26/2007	7.65	6.4			22.5	270	
NB-22	C	1/26/2007	7.69	6.8			22.5	280	
NB-23	C	1/26/2007	7.75	6.5			22.5	280	
NB-24	C	1/26/2007	7.58	6.4			22.5	270	
NB-25	C	1/26/2007	7.63	6.2			22.5	280	
NB-26	C	1/26/2007	7.60	6.1			22.5	280	
NB-27	C	1/26/2007	7.67	6.2			22.5	280	
NB-29	C	1/26/2007	7.80	6.2			22.5	280	
Control	C	1/29/2007	8.28	9.0			22.5	320	
NB-11	C	1/29/2007	8.26	9.0			22.4	300	
NB-12	C	1/29/2007	8.62	8.7			22.5	280	
NB-18	D	1/29/2007	9.12	8.6			22.5	460	
NB-20	D	1/29/2007	8.22	9.0			22.5	280	
NB-22	D	1/29/2007	8.99	8.8			22.5	380	
NB-23	D	1/29/2007	8.18	8.9			22.4	270	
NB-24	D	1/29/2007	8.11	8.9			22.5	290	
NB-25	D	1/29/2007	8.48	8.9			22.5	220	
NB-26	D	1/29/2007	8.28	8.7			22.5	310	
NB-27	D	1/29/2007	8.60	7.7			22.5	300	
NB-29	D	1/29/2007	8.56	8.9			22.5	320	

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
Control	D	1/31/2007	8.28	9.0			22.5	370	
NB-11	D	1/31/2007	8.33	9.1			22.5	340	
NB-12	D	1/31/2007	8.24	9.1			22.5	340	
NB-18	D	1/31/2007	8.57	8.8			22.5	360	
NB-20	E	1/31/2007	8.17	9.1			22.5	320	
NB-22	E	1/31/2007	8.42	8.8			22.5	280	
NB-23	E	1/31/2007	8.43	8.9			22.5	330	
NB-24	E	1/31/2007	8.25	8.6			22.5	320	
NB-25	E	1/31/2007	8.43	8.8			22.5	340	
NB-26	E	1/31/2007	8.38	8.9			22.5	330	
NB-27	E	1/31/2007	8.67	8.7			22.5	360	
NB-29	E	1/31/2007	8.67	8.8			22.5	330	
Control	E	2/2/2007	7.96	8.2			22.5	370	
NB-11	E	2/2/2007	8.16	8.5			22.5	330	
NB-12	E	2/2/2007	8.19	8.6			22.5	320	
NB-18	E	2/2/2007	8.57	8.3			22.5	320	
NB-20	E	2/2/2007	7.63	8.2			22.5	320	
NB-22	A	2/2/2007	8.18	8.6			22.5	320	
NB-23	A	2/2/2007	8.73	8.1			22.5	340	
NB-24	A	2/2/2007	8.36	8.4			22.5	320	
NB-25	A	2/2/2007	8.37	8.4			22.5	330	
NB-26	A	2/2/2007	8.15	8.5			22.5	330	
NB-27	A	2/2/2007	8.48	8.0			22.5	310	
NB-29	A	2/2/2007	8.61	8.2			22.5	360	
Control	A	2/6/2007	8.17	8.1	80	140	22.3	320	1
Control	B	2/6/2007	8.23	8.1	80	130	22.3	330	1
Control	C	2/6/2007	8.22	8.5	80	130	22.3	340	1

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
Control	D	2/6/2007	8.29	8.5			22.3	330	
Control	E	2/6/2007	8.14	8.2			22.3	390	
NB-11	A	2/6/2007	8.36	8.4	80	140	22.3	380	1
NB-11	B	2/6/2007	8.19	8.2	100	140	22.4	370	1
NB-11	C	2/6/2007	8.24	8.1	80	140	22.3	360	1
NB-11	D	2/6/2007	8.22	8.1			22.3	400	
NB-11	E	2/6/2007	8.22	8.2			22.3	390	
NB-12	A	2/6/2007	7.99	8.1	100	150	22.3	400	1
NB-12	B	2/6/2007	7.98	8.1	80	150	22.3	490	1
NB-12	C	2/6/2007	7.78	8.1	100	140	22.3	350	1
NB-12	D	2/6/2007	8.02	8.2			22.2	340	
NB-12	E	2/6/2007	8.01	8.1			22.3	380	
NB-18	A	2/6/2007	8.22	8.1	64	110	22.3	270	1
NB-18	B	2/6/2007	8.21	8.2	80	130	22.3	250	1
NB-18	C	2/6/2007	8.23	8.2	80	120	22.3	380	1
NB-18	D	2/6/2007	8.25	8.1			22.3	290	
NB-18	E	2/6/2007	8.28	8.1			22.3	310	
NB-20	A	2/6/2007	8.22	8.2	80	120	22.3	320	1
NB-20	B	2/6/2007	8.15	8.1	80	140	22.3	350	1
NB-20	C	2/6/2007	8.14	8.0	100	140	22.3	330	1
NB-20	D	2/6/2007	8.06	8.2			22.3	320	
NB-20	E	2/6/2007	8.22	8.3			22.3	400	
NB-22	A	2/6/2007	8.21	8.2	70	128	22.3	320	1
NB-22	B	2/6/2007	8.08	8.2	80	130	22.3	320	1
NB-22	C	2/6/2007	8.15	8.3	100	130	22.3	350	1
NB-22	D	2/6/2007	8.14	8.2			22.3	350	
NB-22	E	2/6/2007	8.19	8.2			22.2	340	

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-23	A	2/6/2007	8.25	8.2	50	100	22.3	310	1
NB-23	B	2/6/2007	8.23	8.2	80	120	22.3	350	1
NB-23	C	2/6/2007	8.21	8.2	70	120	22.3	340	1
NB-23	D	2/6/2007	8.25	8.3			22.3	340	
NB-23	E	2/6/2007	8.21	8.2			22.3	330	
NB-24	A	2/6/2007	8.27	8.2	60	140	22.3	320	1
NB-24	B	2/6/2007	8.23	8.2	70	130	22.3	390	1
NB-24	C	2/6/2007	8.21	8.2	70	140	22.3	410	1
NB-24	D	2/6/2007	8.04	8.2			22.3	380	
NB-24	E	2/6/2007	8.12	8.2			22.3	370	
NB-25	A	2/6/2007	8.21	8.3	80	120	22.3	370	1
NB-25	B	2/6/2007	8.22	8.3	80	120	22.3	390	1
NB-25	C	2/6/2007	8.14	8.2	80	120	22.2	380	1
NB-25	D	2/6/2007	8.13	8.3			22.3	360	
NB-25	E	2/6/2007	8.12	8.3			22.3	290	
NB-26	A	2/6/2007	8.27	8.2	80	120	22.3	380	1
NB-26	B	2/6/2007	8.21	8.2	80	120	22.2	380	1
NB-26	C	2/6/2007	8.25	8.2	70	120	22.3	370	1
NB-26	D	2/6/2007	8.11	8.3			22.3	350	
NB-26	E	2/6/2007	8.21	8.3			22.3	370	
NB-27	A	2/6/2007	8.09	8.3	70	130	22.3	320	1
NB-27	B	2/6/2007	8.18	8.2	80	140	22.3	390	1
NB-27	C	2/6/2007	8.26	8.2	80	130	22.3	390	1
NB-27	D	2/6/2007	8.21	8.1			22.3	340	
NB-27	E	2/6/2007	8.22	8.2			22.3	330	
NB-29	A	2/6/2007	8.21	8.2	80	130	22.3	350	1
NB-29	B	2/6/2007	8.22	8.2	80	140	22.4	350	1

Table 2. Phase II Water Quality

Sediment	Replicate	Date	pH	D.O. (mg/L)	Hardness (ppm CaCO₃)	Alkalinity (ppm Ca CO₃)	Temperature (°C)	Conductivity (µS)	Ammonia (ppm)
NB-29	C	2/6/2007	8.12	8.3	80	140	22.3	320	1
NB-29	D	2/6/2007	8.29	8.3			22.3	320	
NB-29	E	2/6/2007	8.20	8.1			22.3	390	
		Min	7.34	5.2	50	100	21.5	220	1
		Max	9.12	9.1	100	150	22.5	520	3
		Mean	8.11	7.6	78	129	22.3	338	1
		StdDev	0.27	0.9	12	12	0.3	54	0.4

Table 3. Phase I Endpoint Data

Sediment	Replicate	Survival	% Survival	# Animals Weighed	Pan Weight (g)	Pan & Animal Dry weight (g)	Pan & Animal Ash weight (g)	Animal Individual Dry Weight (mg)	Animal Individual Ash Weight (mg)	Individual Ash-free Dry Weight (mg)
Control	A	12	100%	12	0.051	0.082	0.057	2.60	0.50	2.10
Control	B	9	75%	6	0.050	0.065	0.055	2.43	0.73	1.70
Control	C	9	75%	3	0.055	0.063	0.056	2.63	0.53	2.10
Control	D	3	25%	1	0.053	0.055	0.054	2.50	1.20	1.30
Control	E	10	83%	9	0.051	0.066	0.055	1.66	0.43	1.22
NB-01	A	11	92%	5	0.049	0.059	0.053	2.06	0.72	1.34
NB-01	B	8	67%	2	0.053	0.057	0.054	1.85	0.60	1.25
NB-01	C	4	33%	3	0.049	0.056	0.051	2.30	0.57	1.73
NB-01	D	9	75%	8	0.046	0.068	0.051	2.65	0.63	2.03
NB-01	E	9	75%	3	0.043	0.051	0.045	2.63	0.67	1.97
NB-02	A	7	58%	7	0.039	0.051	0.041	1.70	0.34	1.36
NB-02	B	10	83%	10	0.045	0.071	0.051	2.66	0.67	1.99
NB-02	C	10	83%	6	0.043	0.061	0.045	3.15	0.47	2.68
NB-02	D	8	67%	4	0.044	0.058	0.047	3.63	0.78	2.85
NB-02	E	10	83%	10	0.045	0.065	0.049	2.02	0.47	1.55
NB-03	A	10	83%	10	0.048	0.066	0.052	1.83	0.41	1.42
NB-03	B	9	75%	9	0.044	0.063	0.048	2.17	0.43	1.73
NB-03	C	12	100%	12	0.057	0.100	0.063	3.53	0.49	3.03
NB-03	D	12	100%	11	0.057	0.076	0.062	1.73	0.41	1.32
NB-03	E	11	92%	7	0.063	0.071	0.065	1.20	0.33	0.87
NB-04	A	7	58%	6	0.061	0.072	0.064	1.97	0.53	1.43
NB-04	B	7	58%	6	0.064	0.081	0.067	2.87	0.52	2.35
NB-04	C	0	0%	0	N/A	N/A	N/A	N/A	N/A	N/A
NB-04	D	11	92%	11	0.062	0.084	0.067	1.98	0.46	1.52
NB-04	E	5	42%	4	0.057	0.061	0.057	1.05	0.03	1.03
NB-05	A	12	100%	9	0.074	0.091	0.077	1.97	0.37	1.60
NB-05	B	7	58%	7	0.075	0.087	0.079	1.80	0.57	1.23
NB-05	C	9	75%	9	0.069	0.089	0.074	2.20	0.51	1.69
NB-05	D	12	100%	12	0.071	0.097	0.079	2.13	0.60	1.53
NB-05	E	12	100%	9	0.080	0.107	0.084	3.08	0.50	2.58
NB-06	A	12	100%	12	0.074	0.094	0.081	1.67	0.52	1.15
NB-06	B	10	83%	10	0.072	0.094	0.076	2.21	0.44	1.77
NB-06	C	8	67%	7	0.073	0.090	0.079	2.41	0.87	1.54
NB-06	D	8	67%	6	0.077	0.092	0.080	2.52	0.60	1.92
NB-06	E	11	92%	11	0.056	0.078	0.064	2.02	0.69	1.33
NB-07	A	10	83%	10	0.054	0.076	0.063	2.15	0.84	1.31
NB-07	B	8	67%	8	0.059	0.077	0.063	2.28	0.46	1.81
NB-07	C	8	67%	7	0.060	0.076	0.062	2.27	0.36	1.91
NB-07	D	8	67%	7	0.057	0.071	0.060	2.04	0.34	1.70
NB-07	E	10	83%	6	0.060	0.072	0.063	2.08	0.45	1.63
NB-08	A	11	92%	9	0.061	0.083	0.067	2.40	0.64	1.76
NB-08	B	5	42%	5	0.063	0.079	0.066	3.02	0.42	2.60
NB-08	C	12	100%	12	0.063	0.100	0.069	3.08	0.48	2.59
NB-08	D	8	67%	5	0.075	0.087	0.077	2.40	0.46	1.94
NB-08	E	5	42%	3	0.064	0.071	0.065	2.33	0.53	1.80
NB-09	A	11	92%	11	0.061	0.080	0.064	1.72	0.29	1.43
NB-09	B	4	33%	4	0.063	0.071	0.065	2.20	0.53	1.68
NB-09	C	6	50%	4	0.062	0.074	0.065	2.95	0.68	2.28
NB-09	D	10	83%	8	0.062	0.097	0.064	4.33	0.29	4.04
NB-09	E	5	42%	3	0.065	0.074	0.066	2.90	0.40	2.50
NB-10	A	10	83%	8	0.053	0.068	0.057	1.96	0.49	1.48
NB-10	B	10	83%	8	0.061	0.074	0.063	1.59	0.28	1.31
NB-10	C	4	33%	4	0.075	0.082	0.076	1.93	0.38	1.55
NB-10	D	11	92%	11	0.076	0.087	0.079	1.00	0.28	0.72
NB-10	E	8	67%	5	0.072	0.082	0.074	1.94	0.40	1.54
NB-11	A	11	92%	10	0.063	0.088	0.069	2.57	0.63	1.94
NB-11	B	10	83%	10	0.060	0.085	0.066	2.50	0.55	1.95
NB-11	C	9	75%	9	0.066	0.086	0.071	2.29	0.53	1.76
NB-11	D	10	83%	7	0.067	0.077	0.070	1.40	0.31	1.09
NB-11	E	10	83%	10	0.069	0.089	0.073	1.97	0.40	1.57
NB-12	A	8	67%	7	0.068	0.082	0.070	2.06	0.34	1.71
NB-12	B	9	75%	9	0.059	0.070	0.060	1.26	0.18	1.08
NB-12	C	9	75%	9	0.057	0.081	0.062	2.67	0.57	2.10
NB-12	D	9	75%	9	0.060	0.071	0.063	1.19	0.31	0.88
NB-12	E	10	83%	8	0.052	0.078	0.066	3.24	1.75	1.49

Table 4. Phase II Endpoint Data

Sediment	Replicate	Survival	% Survival	# Animals Weighed	Pan Weight (g)	Pan & Animal Dry weight (g)	Pan & Animal Ash weight (g)	Individual Ash-free Dry Weight (mg)	Animal Individual Ash Weight (mg)	Individual Ash-free Dry Weight (mg)
Control	A	12	100%	12	0.041	0.059	0.052	1.50	0.92	0.58
Control	B	12	100%	10	0.042	0.058	0.048	1.60	0.60	1.00
Control	C	11	92%	10	0.046	0.064	0.054	1.80	0.80	1.00
Control	D	10	83%	10	0.049	0.060	0.051	1.10	0.20	0.90
Control	E	9	75%	6	0.051	0.067	0.059	2.67	1.33	1.33
NB-11	A	10	83%	6	0.047	0.060	0.054	2.17	1.17	1.00
NB-11	B	11	92%	3	0.044	0.053	0.048	3.00	1.33	1.67
NB-11	C	12	100%	12	0.041	0.059	0.047	1.50	0.50	1.00
NB-11	D	8	67%	4	0.044	0.053	0.049	2.25	1.25	1.00
NB-11	E	10	83%	6	0.044	0.057	0.049	2.17	0.83	1.33
NB-12	A	9	75%	9	0.049	0.067	0.057	2.00	0.89	1.11
NB-12	B	12	100%	11	0.055	0.074	0.065	1.73	0.91	0.82
NB-12	C	12	100%	12	0.051	0.076	0.061	2.08	0.83	1.25
NB-12	D	11	92%	11	0.052	0.085	0.065	3.00	1.18	1.82
NB-12	E	7	58%	7	0.048	0.057	0.054	1.29	0.86	0.43
NB-18	A	12	100%	11	0.047	0.060	0.053	1.18	0.55	0.64
NB-18	B	8	67%	2	0.044	0.050	0.047	3.00	1.50	1.50
NB-18	C	9	75%	6	0.050	0.063	0.055	2.17	0.83	1.33
NB-18	D	9	75%	8	0.051	0.068	0.058	2.13	0.88	1.25
NB-18	E	5	42%	5	0.055	0.067	0.060	2.40	1.00	1.40
NB-20	A	8	67%	8	0.047	0.062	0.054	1.88	0.88	1.00
NB-20	B	4	33%	4	0.055	0.068	0.062	3.25	1.75	1.50
NB-20	C	5	42%	5	0.056	0.073	0.067	3.40	2.20	1.20
NB-20	D	2	17%	2	0.048	0.053	0.050	2.50	1.00	1.50
NB-20	E	5	42%	5	0.055	0.066	0.061	2.20	1.20	1.00
NB-22	A	12	100%	12	0.054	0.093	0.074	3.25	1.67	1.58
NB-22	B	7	58%	4	0.060	0.073	0.066	3.25	1.50	1.75
NB-22	C	11	92%	11	0.052	0.080	0.064	2.55	1.09	1.45
NB-22	D	12	100%	7	0.050	0.070	0.060	2.86	1.43	1.43
NB-22	E	9	75%	7	0.059	0.076	0.067	2.43	1.14	1.29
NB-23	A	8	67%	8	0.059	0.080	0.070	2.63	1.38	1.25
NB-23	B	8	67%	8	0.066	0.089	0.077	2.88	1.38	1.50
NB-23	C	9	75%	8	0.057	0.078	0.068	2.63	1.38	1.25
NB-23	D	9	75%	9	0.050	0.076	0.064	2.89	1.56	1.33
NB-23	E	8	67%	8	0.052	0.074	0.062	2.75	1.25	1.50
NB-24	A	12	100%	12	0.056	0.076	0.072	1.67	1.33	0.33
NB-24	B	12	100%	12	0.052	0.072	0.064	1.67	1.00	0.67
NB-24	C	10	83%	10	0.050	0.072	0.060	2.20	1.00	1.20
NB-24	D	8	67%	8	0.054	0.068	0.064	1.75	1.25	0.50
NB-24	E	10	83%	10	0.057	0.075	0.066	1.80	0.90	0.90
NB-25	A	9	75%	9	0.055	0.074	0.062	2.11	0.78	1.33
NB-25	B	6	50%	6	0.059	0.074	0.065	2.50	1.00	1.50
NB-25	C	11	92%	11	0.056	0.073	0.066	1.55	0.91	0.64
NB-25	D	9	75%	9	0.054	0.073	0.064	2.11	1.11	1.00
NB-25	E	6	50%	4	0.052	0.065	0.059	3.25	1.75	1.50
NB-26	A	10	83%	10	0.052	0.071	0.064	1.90	1.20	0.70
NB-26	B	8	67%	7	0.052	0.064	0.059	1.71	1.00	0.71
NB-26	C	7	58%	5	0.051	0.075	0.061	4.80	2.00	2.80
NB-26	D	9	75%	8	0.050	0.063	0.054	1.63	0.50	1.13
NB-26	E	12	100%	10	0.056	0.078	0.063	2.20	0.70	1.50
NB-27	A	9	75%	9	0.050	0.063	0.055	1.44	0.56	0.89
NB-27	B	9	75%	9	0.050	0.068	0.061	2.00	1.22	0.78
NB-27	C	5	42%	5	0.047	0.063	0.052	3.20	1.00	2.20
NB-27	D	5	42%	5	0.048	0.070	0.053	4.40	1.00	3.40
NB-27	E	2	17%	5	0.047	0.056	0.052	1.80	1.00	0.80
NB-29	A	11	92%	11	0.047	0.066	0.060	1.73	1.18	0.55
NB-29	B	10	83%	Animals not weighed due to mortality after collection			N/A	N/A	N/A	N/A
NB-29	C	10	83%	9	0.055	0.073	0.061	2.00	0.67	1.33
NB-29	D	10	83%	5	0.054	0.061	0.059	1.40	1.00	0.40
NB-29	E	12	100%	5	0.053	0.061	0.056	1.60	0.60	1.00

Table 5. *Chironomus Dilutus* percent survival following 20-d exposure (Phase I)

Sediment	Mean	S.D.	S.E.	C.V.	n
Control	71.7%	28.0%	12.5%	39.1%	5
NB-01	68.3%	21.6%	9.6%	31.6%	5
NB-02	75.0%	11.8%	5.3%	15.7%	5
NB-03	90.0%	10.9%	4.9%	12.1%	5
NB-04	50.0%	33.3%	14.9%	66.7%	5
NB-05	86.7%	19.2%	8.6%	22.1%	5
NB-06	81.7%	14.9%	6.7%	18.3%	5
NB-07	73.3%	9.1%	4.1%	12.4%	5
NB-08	68.3%	27.3%	12.2%	39.9%	5
NB-09	60.0%	26.0%	11.6%	43.3%	5
NB-10	71.7%	23.3%	10.4%	32.5%	5
NB-11	83.3%	5.9%	2.6%	7.1%	5
NB-12	75.0%	5.9%	2.6%	7.9%	5

Table 6. *Chironomus Dilutus* individual dry weight following 20-d exposure (Phase I)

Sediment	Mean	S.D.	S.E.	C.V.	n
Control	1.68	0.42	0.19	25.0%	5
NB-01	1.66	0.35	0.16	21.3%	5
NB-02	2.09	0.66	0.30	31.9%	5
NB-03	1.68	0.82	0.37	48.9%	5
NB-04	1.36	0.91	0.41	66.6%	4
NB-05	1.72	0.51	0.23	29.4%	5
NB-06	1.54	0.31	0.14	20.3%	5
NB-07	1.67	0.23	0.10	13.7%	5
NB-08	2.14	0.42	0.19	19.8%	5
NB-09	2.38	1.02	0.46	42.9%	5
NB-10	1.32	0.35	0.16	26.5%	5
NB-11	1.66	0.36	0.16	21.5%	5
NB-12	1.45	0.49	0.22	33.7%	5

* Significantly different from NB-11 reference sediment (Dunnett's Means Comparison; $\alpha=0.05$)

Significantly different from NB-12 reference sediment (Dunnett's Means Comparison; $\alpha=0.05$)

Table 7. *Chironomus Dilutus* percent survival following 20-d exposure (Phase II)

Sediment		Mean	S.D.	S.E.	C.V.	n
Control		90.0%	10.9%	4.9%	12.1%	5
NB-11		85.0%	12.4%	5.5%	14.5%	5
NB-12		85.0%	18.1%	8.1%	21.3%	5
NB-18		71.7%	20.9%	9.4%	29.2%	5
NB-20	* #	40.0%	18.1%	8.1%	45.2%	5
NB-22		85.0%	18.1%	8.1%	21.3%	5
NB-23		70.0%	4.6%	2.0%	6.5%	5
NB-24		86.7%	13.9%	6.2%	16.1%	5
NB-25		68.3%	18.1%	8.1%	26.4%	5
NB-26		76.7%	16.0%	7.2%	20.9%	5
NB-27		50.0%	25.0%	11.2%	50.0%	5
NB-29		88.3%	7.5%	3.3%	8.4%	5

Table 8. *Chironomus Dilutus* individual dry weight following 20-d exposure (Phase II)

Sediment		Mean	S.D.	S.E.	C.V.	n
Control		1.73	0.58	0.26	33.5%	5
NB-11		2.22	0.53	0.24	24.0%	5
NB-12		2.02	0.63	0.28	31.2%	5
NB-18		2.17	0.66	0.29	30.2%	5
NB-20		2.65	0.66	0.30	25.0%	5
NB-22		2.87	0.38	0.17	13.4%	5
NB-23		2.75	0.13	0.06	4.7%	5
NB-24		1.82	0.22	0.10	12.2%	5
NB-25		2.30	0.63	0.28	27.3%	5
NB-26		2.45	1.33	0.60	54.5%	5
NB-27		2.57	1.22	0.54	47.4%	5
NB-29		1.68	0.25	0.11	14.9%	4

* Significantly different from NB-11 reference sediment (Dunnett's Means Comparison; $\alpha=0.05$)

Significantly different from NB-12 reference sediment (Dunnett's Means Comparison; $\alpha=0.05$)

Appendix E

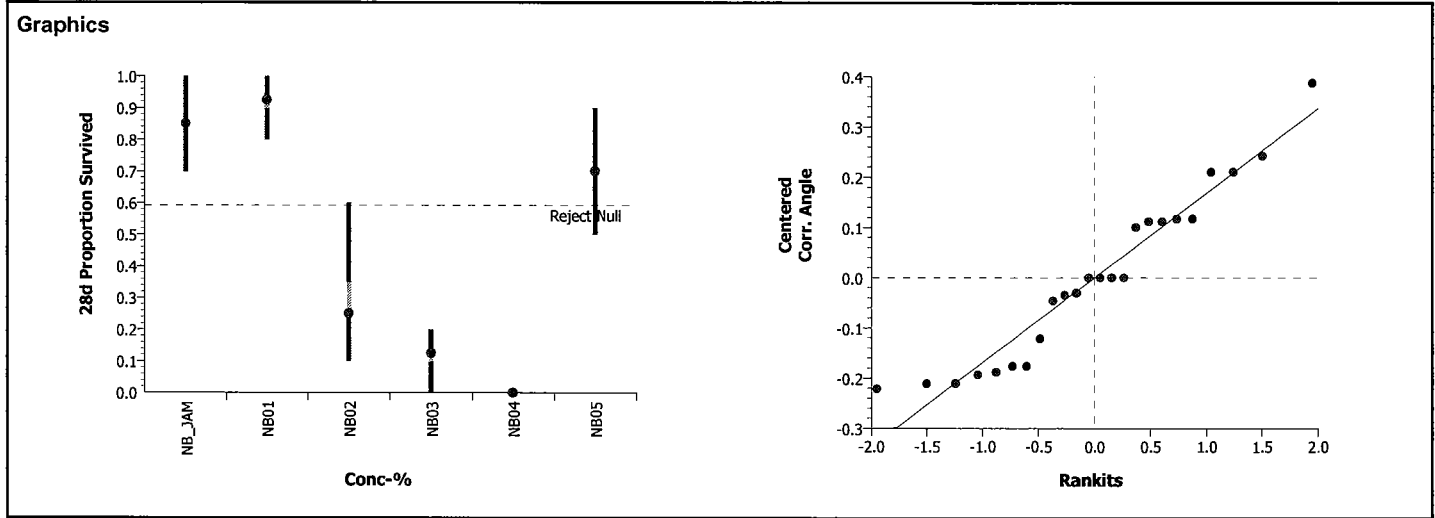
Comprehensive Environmental Toxicity Information System (CETIS) Statistical Analysis Report

CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
28d Proportion Survived	Comparison		05-5441-9590	05-5441-9590	24 Jan-07 2:43 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Dunnett's Multiple Comparison	C > T	Angular (Corrected)					N/A	30.37%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_JAM		NB01	-0.6949	2.40711	0.9620	0.32378	Non-Significant Effect			
		NB02	5.22846	2.40711	0.0002	0.32378	Significant Effect			
		NB03	6.31649	2.40711	0.0000	0.32378	Significant Effect			
		NB04	7.75264	2.40711	0.0000	0.32378	Significant Effect			
		NB05	1.44725	2.40711	0.2453	0.32378	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	4.553305	0.910661	5	25.17	0.00000	Significant Effect				
Error	0.6513444	0.0361858	18							
Total	5.20464903	0.9468468	23							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Modified Levene	2.16526	4.24788	0.10383	Equal Variances					
Distribution	Shapiro-Wilk W	0.93562		0.13020	Normal Distribution					
Data Summary										
Conc-%	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_JAM	4	0.85000	0.70000	1.00000	0.17321	1.20159	0.99116	1.41202	0.24298	
NB01	4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695	
NB02	4	0.25000	0.10000	0.60000	0.23805	0.49831	0.32175	0.88608	0.26703	
NB03	4	0.12500	0.00000	0.20000	0.09574	0.35196	0.15878	0.46365	0.14512	
NB04	4	0.00000	0.00000	0.00000	0.00000	0.15878	0.15878	0.15878	0.00001	
NB05	4	0.70000	0.50000	0.90000	0.18257	1.00692	0.78540	1.24905	0.21004	

CETIS Analysis Detail

Data Detail										
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_JAM	0.70000	1.00000	1.00000	0.70000						
NB01	1.00000	1.00000	0.80000	0.90000						
NB02	0.60000	0.10000	0.10000	0.20000						
NB03	0.20000	0.20000	0.10000	0.00000						
NB04	0.00000	0.00000	0.00000	0.00000						
NB05	0.60000	0.90000	0.80000	0.50000						

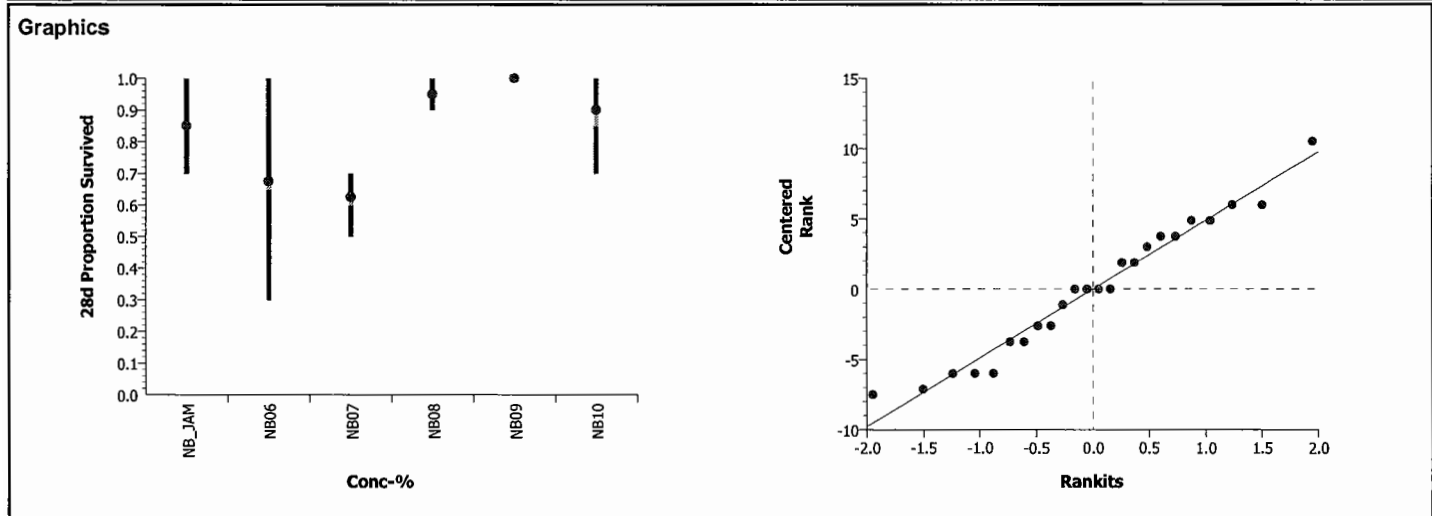


CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test										Retec, Inc.
Endpoint	Analysis Type			Sample Link	Control Link	Date Analyzed	Version			
28d Proportion Survived	Comparison			05-5441-9590	05-5441-9590	24 Jan-07 2:44 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Steel Many-One Rank	C > T	Rank					N/A	34.59%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)			
NB_JAM		NB06	15	10	0.4761	2	Non-Significant Effect			
		NB07	12	10	0.1424	1	Non-Significant Effect			
		NB08	20	10	0.9516	2	Non-Significant Effect			
		NB09	22	10	0.9908	2	Non-Significant Effect			
		NB10	19	10	0.9054	3	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	0.7403509	0.1480702	5	3.31	0.02714	Significant Effect				
Error	0.8057405	0.0447634	18							
Total	1.54609138	0.1928335	23							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Modified Levene	10.24935	4.24788	0.00009	Unequal Variances					
Distribution	Shapiro-Wilk W	0.98343		0.94972	Normal Distribution					
Data Summary										
Conc-%	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_JAM	4	0.85000	0.70000	1.00000	0.17321	13	7	19	6.9282	
NB06	4	0.67500	0.30000	1.00000	0.33040	8.5	1	19	8.3964	
NB07	4	0.62500	0.50000	0.70000	0.09574	5.125	2.5	7	2.25	
NB08	4	0.95000	0.90000	1.00000	0.05773	15.25	11.5	19	4.3301	
NB09	4	1.00000	1.00000	1.00000	0.00000	19	19	19	0	
NB10	4	0.90000	0.70000	1.00000	0.14142	14.125	7	19	5.9214	

CETIS Analysis Detail

Data Detail										
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_JAM	0.70000	1.00000	1.00000	0.70000						
NB06	1.00000	0.30000	0.90000	0.50000						
NB07	0.70000	0.50000	0.60000	0.70000						
NB08	1.00000	1.00000	0.90000	0.90000						
NB09	1.00000	1.00000	1.00000	1.00000						
NB10	1.00000	0.90000	0.70000	1.00000						



CETIS Analysis Detail

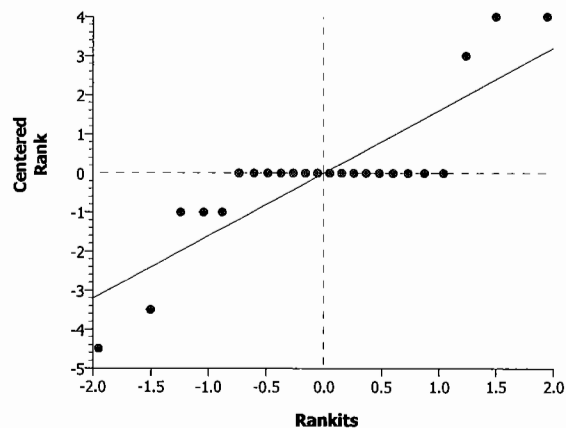
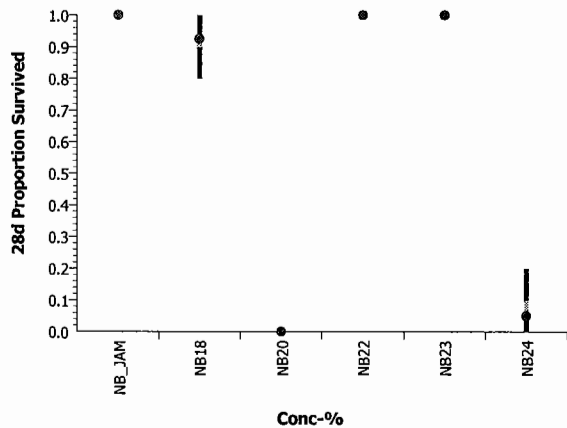
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test							Retec, Inc.		
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version			
28d Proportion Survived	Comparison		04-8967-9838	04-8967-9838	24 Jan-07 2:12 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Steel Many-One Rank	C > T	Rank					N/A	9.07%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)		
NB_JAM		NB18	14	10	0.3451	1	Non-Significant Effect		
		NB20	10	10	0.0417	0	Significant Effect		
		NB22	18	10	0.8333	1	Non-Significant Effect		
		NB23	18	10	0.8333	1	Non-Significant Effect		
		NB24	10	10	0.0417	0	Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	7.55308	1.510616	5	202.17	0.00000	Significant Effect			
Error	0.1344935	0.0074719	18						
Total	7.6875736	1.5180879	23						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Variances	Modified Levene	2.25298	4.24788	0.09323	Equal Variances				
Distribution	Shapiro-Wilk W	0.76515		0.00008	Non-normal Distribution				
Data Summary									
Conc-%	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_JAM	4	1.00000	1.00000	1.00000	0.00000	17.5	17.5	17.5	0
NB18	4	0.92500	0.80000	1.00000	0.09574	13.5	9	17.5	4.6368
NB20	4	0.00000	0.00000	0.00000	0.00000	4	4	4	0
NB22	4	1.00000	1.00000	1.00000	0.00000	17.5	17.5	17.5	0
NB23	4	1.00000	1.00000	1.00000	0.00000	17.5	17.5	17.5	0
NB24	4	0.05000	0.00000	0.20000	0.10000	5	4	8	2

CETIS Analysis Detail

Data Detail

Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_JAM	1.00000	1.00000	1.00000	1.00000						
NB18	0.80000	0.90000	1.00000	1.00000						
NB20	0.00000	0.00000	0.00000	0.00000						
NB22	1.00000	1.00000	1.00000	1.00000						
NB23	1.00000	1.00000	1.00000	1.00000						
NB24	0.00000	0.00000	0.00000	0.20000						

Graphics



CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test Retec, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
28d Proportion Survived	Comparison	04-8967-9838	04-8967-9838	24 Jan-07 2:12 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD
Steel Many-One Rank	C > T	Rank					N/A	16.52%

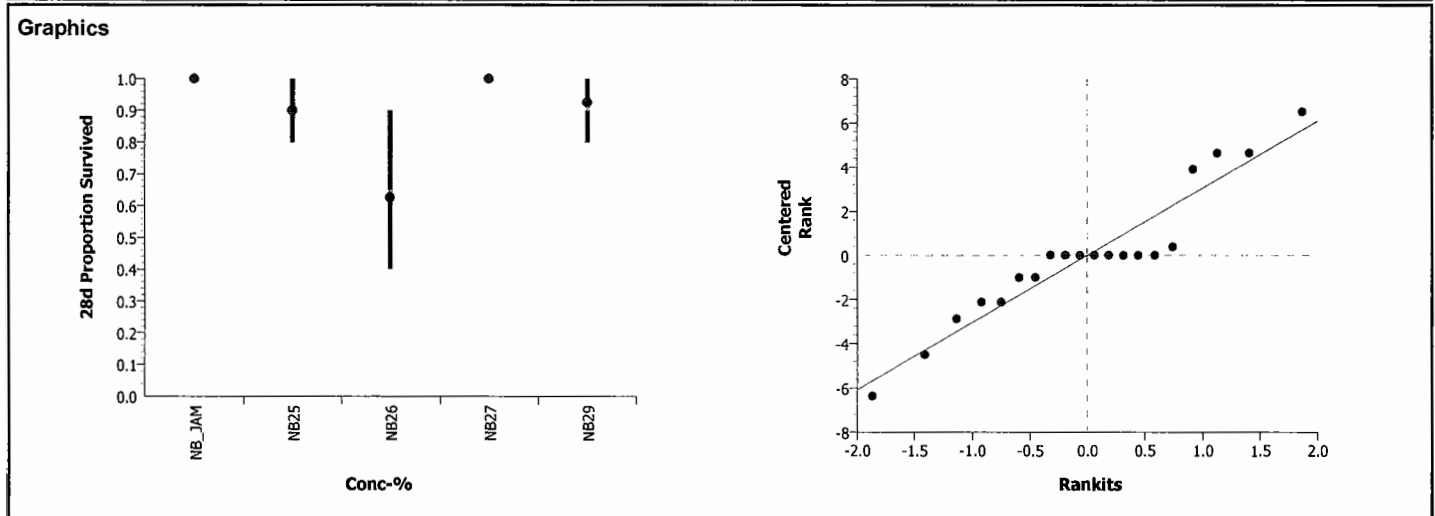
Group Comparisons							
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)
NB_JAM		NB25	12	10	0.1228	1	Non-Significant Effect
		NB26	10	10	0.0350	0	Significant Effect
		NB27	18	10	0.8000	1	Non-Significant Effect
		NB29	14	10	0.3081	1	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.6217881	0.155447	4	6.39	0.00329	Significant Effect
Error	0.3648578	0.0243239	15			
Total	0.98664588	0.1797709	19			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Modified Levene	11.64205	4.89321	0.00017	Unequal Variances	
Distribution	Shapiro-Wilk W	0.90664		0.05501	Normal Distribution	

Data Summary	Conc-%	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
	NB_JAM	4	1.00000	1.00000	1.00000	0.00000	15	15	15	0
	NB25	4	0.90000	0.80000	1.00000	0.08165	8.5	4	15	4.6368
	NB26	4	0.62500	0.40000	0.90000	0.26300	3.625	1.5	7.5	2.8395
	NB27	4	1.00000	1.00000	1.00000	0.00000	15	15	15	0
	NB29	4	0.92500	0.80000	1.00000	0.09574	10.375	4	15	5.5283

Data Detail										
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_JAM	1.00000	1.00000	1.00000	1.00000						
NB25	1.00000	0.90000	0.90000	0.80000						
NB26	0.40000	0.90000	0.80000	0.40000						
NB27	1.00000	1.00000	1.00000	1.00000						
NB29	0.90000	0.80000	1.00000	1.00000						



CETIS Analysis Detail

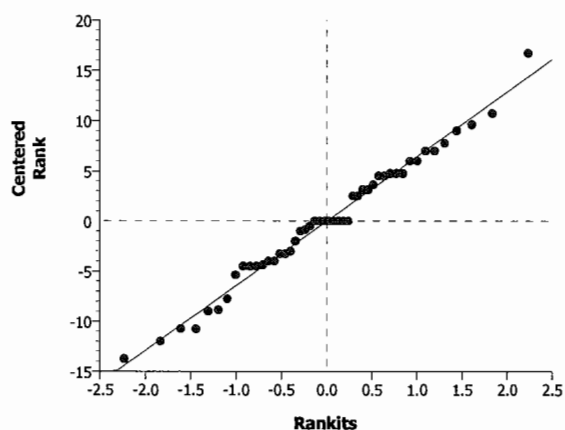
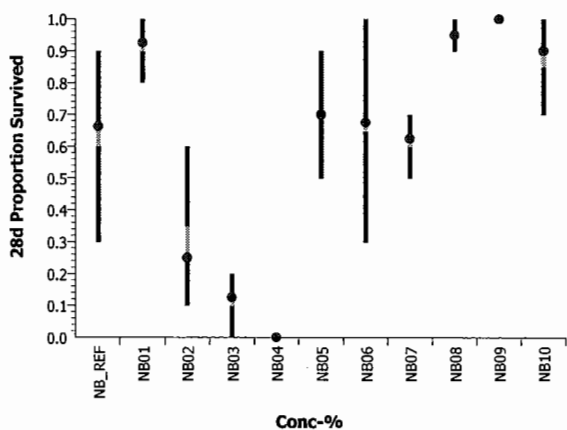
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test						Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version			
28d Proportion Survived	Comparison		05-5441-9590	05-5441-9590	24 Jan-07 2:44 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Wilcoxon/Bonferroni	C > T	Rank					N/A	46.79%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)		
NB_REF		NB01	39		1.0000	2	Non-Significant Effect		
		NB02	13		0.1273	1	Non-Significant Effect		
		NB03	10		0.0182	0	Significant Effect		
		NB04	10		0.0182	0	Significant Effect		
		NB05	27.5		1.0000	4	Non-Significant Effect		
		NB06	27.5		1.0000	3	Non-Significant Effect		
		NB07	22.5		1.0000	2	Non-Significant Effect		
		NB08	41		1.0000	1	Non-Significant Effect		
		NB09	42		1.0000	0	Non-Significant Effect		
		NB10	37.5		1.0000	1	Non-Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	7.074088	0.7074088	10	18.21	0.00000	Significant Effect			
Error	1.437338	0.038847	37						
Total	8.51142573	0.7462558	47						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Variances	Modified Levene	3.50270	2.84305	0.00251	Unequal Variances				
Distribution	Shapiro-Wilk W	0.98110		0.62499	Normal Distribution				
Data Summary									
Conc-%	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_REF	8	0.66250	0.30000	0.90000	0.19955	23.25	12.5	34	7.3679
NB01	4	0.92500	0.80000	1.00000	0.09574	37	28	43	7.3485
NB02	4	0.25000	0.10000	0.60000	0.23805	11	7	20	6.1644
NB03	4	0.12500	0.00000	0.20000	0.09574	7.5	3	10	3.3166
NB04	4	0.00000	0.00000	0.00000	0.00000	3	3	3	0
NB05	4	0.70000	0.50000	0.90000	0.18257	24.375	15.5	34	8.2399
NB06	4	0.67500	0.30000	1.00000	0.33040	26.25	12.5	43	14.666
NB07	4	0.62500	0.50000	0.70000	0.09574	20.875	15.5	24	4.0492
NB08	4	0.95000	0.90000	1.00000	0.05773	38.5	34	43	5.1962
NB09	4	1.00000	1.00000	1.00000	0.00000	43	43	43	0
NB10	4	0.90000	0.70000	1.00000	0.14142	36	24	43	9.0554

CETIS Analysis Detail

Data Detail

Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.80000	0.60000	0.60000	0.50000	0.80000	0.90000	0.80000	0.30000		
NB01	1.00000	1.00000	0.80000	0.90000						
NB02	0.60000	0.10000	0.10000	0.20000						
NB03	0.20000	0.20000	0.10000	0.00000						
NB04	0.00000	0.00000	0.00000	0.00000						
NB05	0.60000	0.90000	0.80000	0.50000						
NB06	1.00000	0.30000	0.90000	0.50000						
NB07	0.70000	0.50000	0.60000	0.70000						
NB08	1.00000	1.00000	0.90000	0.90000						
NB09	1.00000	1.00000	1.00000	1.00000						
NB10	1.00000	0.90000	0.70000	1.00000						

Graphics

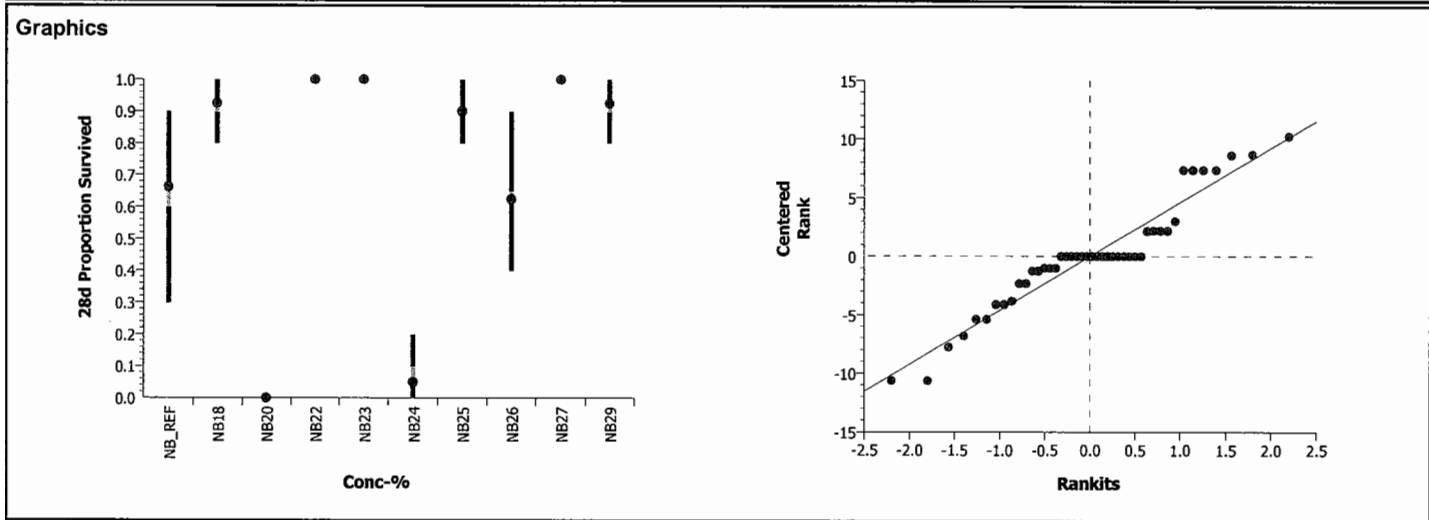


CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
28d Proportion Survived	Comparison		04-8967-9838	04-8967-9838	24 Jan-07 2:11 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Wilcoxon/Bonferroni	C > T	Rank					N/A	36.48%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)			
NB_REF		NB18	39		1.0000	2	Non-Significant Effect			
		NB20	10		0.0162	0	Significant Effect			
		NB22	42		1.0000	0	Non-Significant Effect			
		NB23	42		1.0000	0	Non-Significant Effect			
		NB24	10		0.0162	0	Significant Effect			
		NB25	38.5		1.0000	2	Non-Significant Effect			
		NB26	25		1.0000	2	Non-Significant Effect			
		NB27	42		1.0000	0	Non-Significant Effect			
		NB29	39		1.0000	2	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	8.153056	0.9058952	9	36.94	0.00000	Significant Effect				
Error	0.8338501	0.024525	34							
Total	8.98690623	0.9304202	43							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Modified Levene	5.01659	2.98103	0.00025	Unequal Variances					
Distribution	Shapiro-Wilk W	0.94401		0.03307	Normal Distribution					
Data Summary										
Conc-%	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_REF	8	0.66250	0.30000	0.90000	0.19955	15.813	9	24.5	4.8028	
NB18	4	0.92500	0.80000	1.00000	0.09574	28.625	18	36	8.9198	
NB20	4	0.00000	0.00000	0.00000	0.00000	4	4	4	0	
NB22	4	1.00000	1.00000	1.00000	0.00000	36	36	36	0	
NB23	4	1.00000	1.00000	1.00000	0.00000	36	36	36	0	
NB24	4	0.05000	0.00000	0.20000	0.10000	5	4	8	2	
NB25	4	0.90000	0.80000	1.00000	0.08165	25.75	18	36	7.4889	
NB26	4	0.62500	0.40000	0.90000	0.26300	15.875	10.5	24.5	6.75	
NB27	4	1.00000	1.00000	1.00000	0.00000	36	36	36	0	
NB29	4	0.92500	0.80000	1.00000	0.09574	28.625	18	36	8.9198	

CETIS Analysis Detail

Data Detail										
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.80000	0.60000	0.60000	0.50000	0.80000	0.90000	0.80000	0.30000		
NB18	0.80000	0.90000	1.00000	1.00000						
NB20	0.00000	0.00000	0.00000	0.00000						
NB22	1.00000	1.00000	1.00000	1.00000						
NB23	1.00000	1.00000	1.00000	1.00000						
NB24	0.00000	0.00000	0.00000	0.20000						
NB25	1.00000	0.90000	0.90000	0.80000						
NB26	0.40000	0.90000	0.80000	0.40000						
NB27	1.00000	1.00000	1.00000	1.00000						
NB29	0.90000	0.80000	1.00000	1.00000						

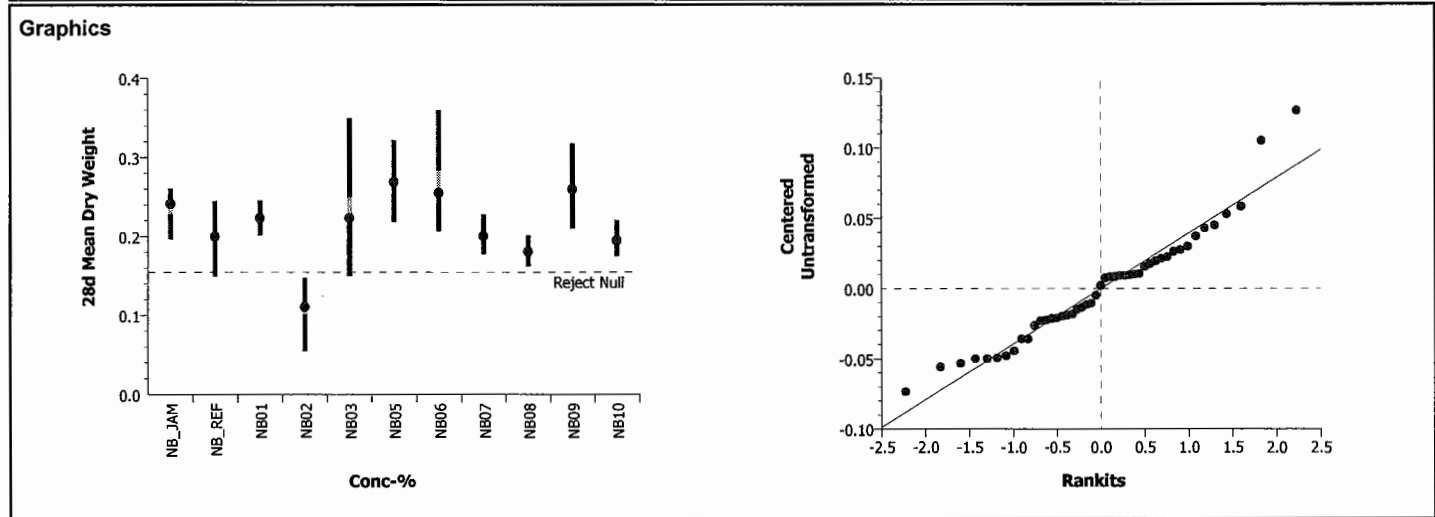


CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test										Retec, Inc.
Endpoint	Analysis Type			Sample Link	Control Link	Date Analyzed	Version			
28d Mean Dry Weight	Comparison			05-5441-9590	05-5441-9590	24 Jan-07 2:44 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Bonferroni Adj t	C > T	Untransformed					N/A	35.99%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_JAM		NB_REF	1.49949	2.71949	0.7123	0.07526	Non-Significant Effect			
		NB01	0.56324	2.71949	1.0000	0.08691	Non-Significant Effect			
		NB02	4.09135	2.71949	0.0012	0.08691	Significant Effect			
		NB03	0.52629	2.71949	1.0000	0.09387	Non-Significant Effect			
		NB05	-0.8605	2.71949	1.0000	0.08691	Non-Significant Effect			
		NB06	-0.4224	2.71949	1.0000	0.08691	Non-Significant Effect			
		NB07	1.28295	2.71949	1.0000	0.08691	Non-Significant Effect			
		NB08	1.90877	2.71949	0.3214	0.08691	Non-Significant Effect			
		NB09	-0.5632	2.71949	1.0000	0.08691	Non-Significant Effect			
		NB10	1.46287	2.71949	0.7609	0.08691	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	0.0816138	0.0081614	10	4.00	0.00099	Significant Effect				
Error	0.0735332	0.0020426	36							
Total	0.15514698	0.010204	46							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	16.94976	23.20925	0.07548	Equal Variances					
Distribution	Shapiro-Wilk W	0.94893		0.03934	Normal Distribution					
Data Summary										
Conc-%	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_JAM	4	0.24150	0.19700	0.26100	0.02995					
NB_REF	8	0.20000	0.15000	0.24500	0.03696					
NB01	4	0.22350	0.20200	0.24600	0.02009					
NB02	4	0.11075	0.05500	0.14800	0.03944					
NB03	3	0.22333	0.15000	0.35000	0.11015					
NB05	4	0.26900	0.21900	0.32200	0.04218					
NB06	4	0.25500	0.20700	0.36000	0.07087					
NB07	4	0.20050	0.17800	0.22800	0.02249					
NB08	4	0.18050	0.16200	0.20200	0.01799					
NB09	4	0.25950	0.21000	0.31800	0.04789					
NB10	4	0.19475	0.17500	0.22100	0.02133					

CETIS Analysis Detail

Data Detail											
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	
NB_JAM	0.25100	0.19700	0.26100	0.25700							
NB_REF	0.23000	0.24500	0.17700	0.21000	0.18100	0.16400	0.15000	0.24300			
NB01	0.20200	0.23400	0.21200	0.24600							
NB02	0.14800	0.12000	0.12000	0.05500							
NB03	0.17000	0.15000	0.35000								
NB05	0.32200	0.21900	0.27100	0.26400							
NB06	0.20700	0.36000	0.21900	0.23400							
NB07	0.18700	0.17800	0.22800	0.20900							
NB08	0.17000	0.18800	0.16200	0.20200							
NB09	0.21000	0.23300	0.31800	0.27700							
NB10	0.17500	0.18000	0.22100	0.20300							

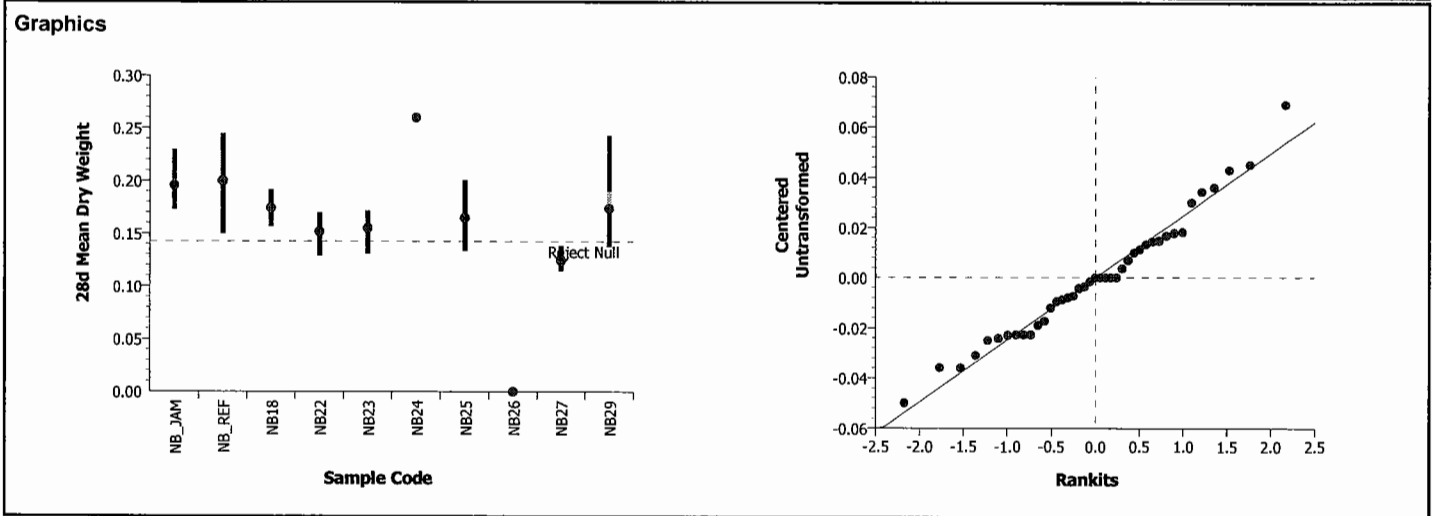


CETIS Analysis Detail

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test						Retec, Inc.			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
28d Mean Dry Weight	Comparison	04-8967-9838	04-8967-9838	24 Jan-07 2:48 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Bonferroni Adj t	C > T	Untransformed					N/A	27.31%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)		
NB_JAM		NB_REF	-0.2479	2.70072	1.0000	0.0463	Non-Significant Effect		
		NB18	1.08618	2.70072	1.0000	0.05346	Non-Significant Effect		
		NB22	2.22289	2.70072	0.1514	0.05346	Non-Significant Effect		
		NB23	2.04606	2.70072	0.2219	0.05346	Non-Significant Effect		
		NB24	-2.0529	2.70072	1.0000	0.08452	Non-Significant Effect		
		NB25	1.55349	2.70072	0.5871	0.05346	Non-Significant Effect		
		NB26	9.88931	2.70072	0.0000	0.05346	Significant Effect		
		NB27	3.59956	2.70072	0.0049	0.05346	Significant Effect		
		NB29	1.09881	2.70072	1.0000	0.05346	Non-Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	0.1369475	0.0152164	9	19.42	0.00000	Significant Effect			
Error	0.024292	0.0007836	31						
Total	0.16123951	0.0160000	40						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Distribution	Shapiro-Wilk W	0.97662		0.55035	Normal Distribution				
Data Summary									
Sample Code	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_JAM	4	0.19575	0.17300	0.23000	0.02790				
NB_REF	8	0.20000	0.15000	0.24500	0.03696				
NB18	4	0.17425	0.15700	0.19200	0.01466				
NB22	4	0.15175	0.12900	0.17000	0.01917				
NB23	4	0.15525	0.13100	0.17200	0.01948				
NB24	1	0.26000	0.26000	0.26000					
NB25	4	0.16500	0.13400	0.20100	0.02858				
NB26	4	0.00000	0.00000	0.00000	0.00000				
NB27	4	0.12450	0.11500	0.13900	0.01025				
NB29	4	0.17400	0.13800	0.24300	0.04742				

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_JAM	0.17300	0.17300	0.20700	0.23000						
NB_REF	0.23000	0.24500	0.17700	0.21000	0.18100	0.16400	0.15000	0.24300		
NB18	0.19200	0.17800	0.15700	0.17000						
NB22	0.14300	0.12900	0.16500	0.17000						
NB23	0.17200	0.14800	0.13100	0.17000						
NB24	0.26000									
NB25	0.15300	0.20100	0.13400	0.17200						
NB26	0.00000	0.00000	0.00000	0.00000						
NB27	0.12300	0.11500	0.13900	0.12100						
NB29	0.16600	0.24300	0.14900	0.13800						



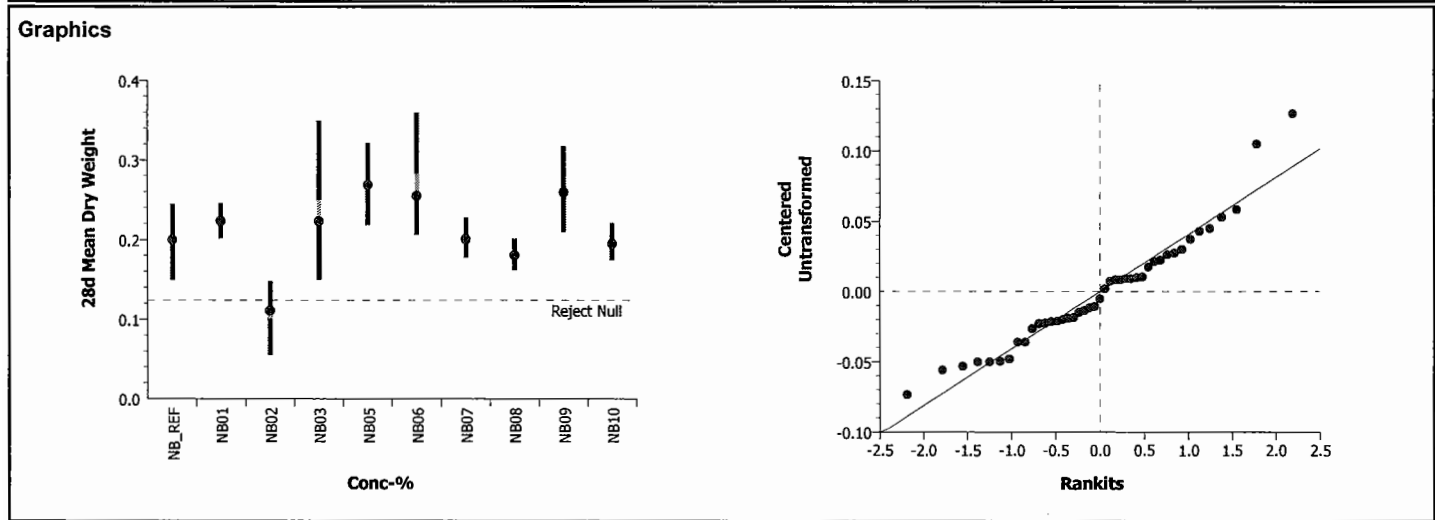
CETIS Analysis Detail

Comparisons: Page 1 of 2
 Report Date: 24 Jan-07 2:45 PM
 Analysis: 18-8286-6182

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test						Retec, Inc.			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
28d Mean Dry Weight	Comparison	05-5441-9590	05-5441-9590	24 Jan-07 2:45 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Bonferroni Adj t	C > T	Untransformed					N/A	38.17%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)		
NB_REF		NB01	-0.8283	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB02	3.14560	2.69039	0.0157	0.07633	Significant Effect		
		NB03	-0.7439	2.69039	1.0000	0.08439	Non-Significant Effect		
		NB05	-2.4319	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB06	-1.9385	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB07	-0.0176	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB08	0.68727	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB09	-2.0971	2.69039	1.0000	0.07633	Non-Significant Effect		
		NB10	0.18504	2.69039	1.0000	0.07633	Non-Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	0.0780573	0.0086730	9	4.04	0.00146	Significant Effect			
Error	0.0708422	0.0021467	33						
Total	0.14889944	0.0108198	42						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Variances	Bartlett	16.19735	21.66599	0.06287	Equal Variances				
Distribution	Shapiro-Wilk W	0.94793		0.05010	Normal Distribution				
Data Summary									
Conc-%	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_REF	8	0.20000	0.15000	0.24500	0.03696				
NB01	4	0.22350	0.20200	0.24600	0.02009				
NB02	4	0.11075	0.05500	0.14800	0.03944				
NB03	3	0.22333	0.15000	0.35000	0.11015				
NB05	4	0.26900	0.21900	0.32200	0.04218				
NB06	4	0.25500	0.20700	0.36000	0.07087				
NB07	4	0.20050	0.17800	0.22800	0.02249				
NB08	4	0.18050	0.16200	0.20200	0.01799				
NB09	4	0.25950	0.21000	0.31800	0.04789				
NB10	4	0.19475	0.17500	0.22100	0.02133				

CETIS Analysis Detail

Data Detail										
Conc-%	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.23000	0.24500	0.17700	0.21000	0.18100	0.16400	0.15000	0.24300		
NB01	0.20200	0.23400	0.21200	0.24600						
NB02	0.14800	0.12000	0.12000	0.05500						
NB03	0.17000	0.15000	0.35000							
NB05	0.32200	0.21900	0.27100	0.26400						
NB06	0.20700	0.36000	0.21900	0.23400						
NB07	0.18700	0.17800	0.22800	0.20900						
NB08	0.17000	0.18800	0.16200	0.20200						
NB09	0.21000	0.23300	0.31800	0.27700						
NB10	0.17500	0.18000	0.22100	0.20300						



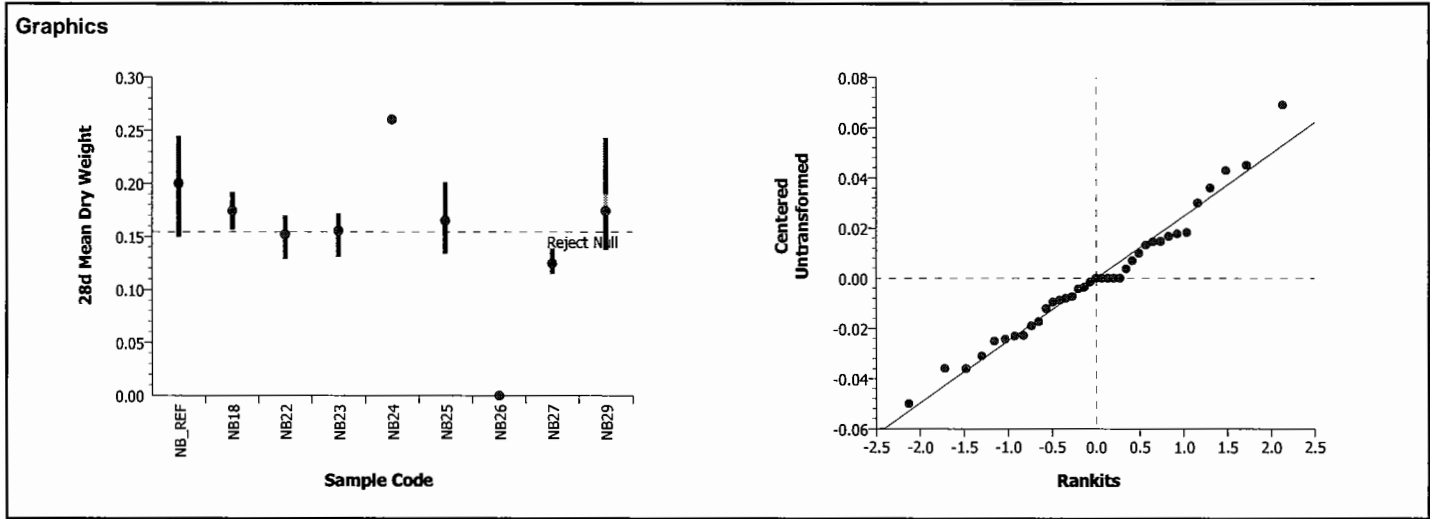
CETIS Analysis Detail

Comparisons: Page 1 of 2
 Report Date: 24 Jan-07 2:48 PM
 Analysis: 04-6465-7643

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test						Retec, Inc.			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
28d Mean Dry Weight	Comparison	04-8967-9838	04-8967-9838	24 Jan-07 2:48 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Bonferroni Adj t	C > T	Untransformed					N/A	22.89%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)		
NB_REF		NB18	1.50159	2.66948	0.5776	0.04578	Non-Significant Effect		
		NB22	2.81366	2.66948	0.0354	0.04578	Significant Effect		
		NB23	2.60956	2.66948	0.0576	0.04578	Non-Significant Effect		
		NB24	-2.0201	2.66948	1.0000	0.07929	Non-Significant Effect		
		NB25	2.041	2.66948	0.2031	0.04578	Non-Significant Effect		
		NB26	11.6628	2.66948	0.0000	0.04578	Significant Effect		
		NB27	4.40272	2.66948	0.0006	0.04578	Significant Effect		
		NB29	1.51617	2.66948	0.5627	0.04578	Non-Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	0.1301657	0.0162707	8	20.75	0.00000	Significant Effect			
Error	0.0219573	0.0007842	28						
Total	0.15212292	0.0170549	36						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Distribution	Shapiro-Wilk W	0.97477		0.55197	Normal Distribution				
Data Summary									
Sample Code	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_REF	8	0.20000	0.15000	0.24500	0.03696				
NB18	4	0.17425	0.15700	0.19200	0.01466				
NB22	4	0.15175	0.12900	0.17000	0.01917				
NB23	4	0.15525	0.13100	0.17200	0.01948				
NB24	1	0.26000	0.26000	0.26000					
NB25	4	0.16500	0.13400	0.20100	0.02858				
NB26	4	0.00000	0.00000	0.00000	0.00000				
NB27	4	0.12450	0.11500	0.13900	0.01025				
NB29	4	0.17400	0.13800	0.24300	0.04742				

CETIS Analysis Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.23000	0.24500	0.17700	0.21000	0.18100	0.16400	0.15000	0.24300		
NB18	0.19200	0.17800	0.15700	0.17000						
NB22	0.14300	0.12900	0.16500	0.17000						
NB23	0.17200	0.14800	0.13100	0.17000						
NB24	0.26000									
NB25	0.15300	0.20100	0.13400	0.17200						
NB26	0.00000	0.00000	0.00000	0.00000						
NB27	0.12300	0.11500	0.13900	0.12100						
NB29	0.16600	0.24300	0.14900	0.13800						

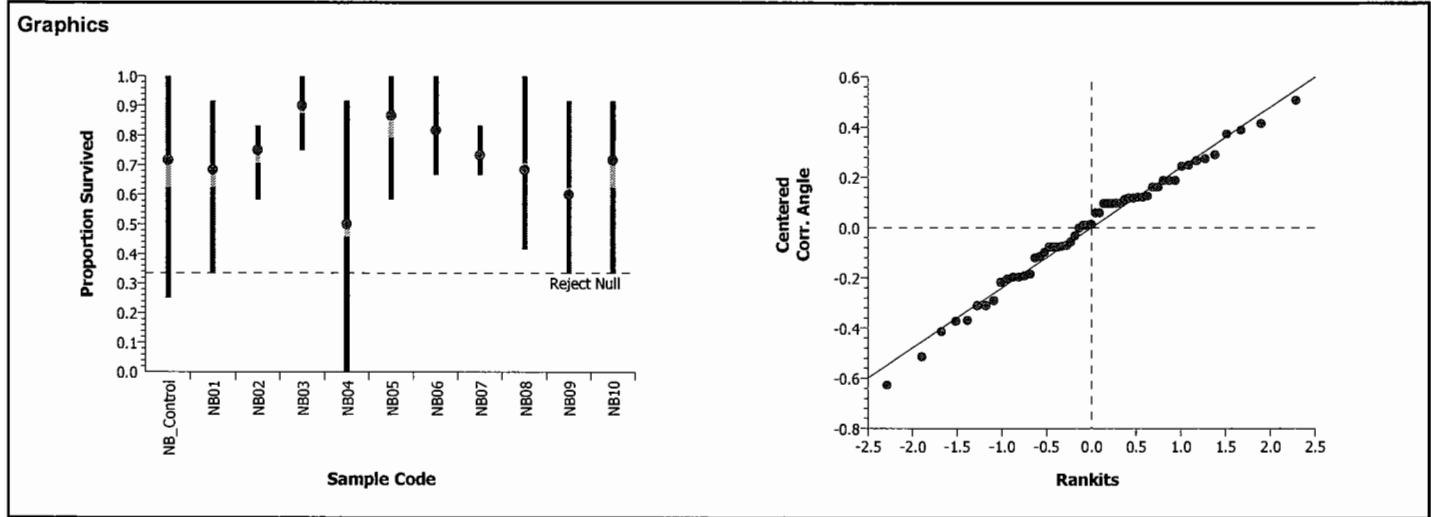


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Proportion Survived	Comparison		15-3479-8610	15-3479-8610	16 Mar-07 10:26 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Dunnett's Multiple Comparison	C > T	Angular (Corrected)					N/A	53.28%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_Control		NB01	0.30140	2.53159	0.8319	0.42175	Non-Significant Effect			
		NB02	-0.0973	2.53159	0.9273	0.42175	Non-Significant Effect			
		NB03	-1.3603	2.53159	0.9986	0.42175	Non-Significant Effect			
		NB04	1.59847	2.53159	0.2726	0.42175	Non-Significant Effect			
		NB05	-1.2005	2.53159	0.9975	0.42175	Non-Significant Effect			
		NB06	-0.685	2.53159	0.9853	0.42175	Non-Significant Effect			
		NB07	0.0333	2.53159	0.9021	0.42175	Non-Significant Effect			
		NB08	0.15803	2.53159	0.8727	0.42175	Non-Significant Effect			
		NB09	0.79646	2.53159	0.6378	0.42175	Non-Significant Effect			
		NB10	0.05394	2.53159	0.8976	0.42175	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	0.9804061	0.0980406	10	1.41	0.20641	Non-Significant Effect				
Error	3.052983	0.069386	44							
Total	4.03338939	0.1674266	54							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	10.28235	23.20925	0.41608	Equal Variances					
Distribution	Shapiro-Wilk W	0.98493		0.71809	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_Control	5	0.71667	0.25000	1.00000	0.28013	1.03884	0.52360	1.42595	0.32706	
NB01	5	0.68333	0.33333	0.91667	0.21570	0.98863	0.61548	1.27795	0.24027	
NB02	5	0.75000	0.58333	0.83333	0.11785	1.05504	0.86912	1.15026	0.13390	
NB03	5	0.90000	0.75000	1.00000	0.10865	1.26546	1.04720	1.42595	0.16777	
NB04	5	0.50000	0.00000	0.91667	0.33333	0.77254	0.14484	1.27795	0.41022	
NB05	5	0.86667	0.58333	1.00000	0.19185	1.23884	0.86912	1.42595	0.26384	
NB06	5	0.81667	0.66667	1.00000	0.14907	1.15296	0.95532	1.42595	0.20511	
NB07	5	0.73333	0.66667	0.83333	0.09129	1.03329	0.95532	1.15026	0.10678	
NB08	5	0.68333	0.41667	1.00000	0.27259	1.01251	0.70167	1.42595	0.33087	
NB09	5	0.60000	0.33333	0.91667	0.25954	0.90615	0.61548	1.27795	0.29099	
NB10	5	0.71667	0.33333	0.91667	0.23274	1.02985	0.61548	1.27795	0.25875	

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_Control	1.00000	0.75000	0.75000	0.25000	0.83333					
NB01	0.91667	0.66667	0.33333	0.75000	0.75000					
NB02	0.58333	0.83333	0.83333	0.66667	0.83333					
NB03	0.83333	0.75000	1.00000	1.00000	0.91667					
NB04	0.58333	0.58333	0.00000	0.91667	0.41667					
NB05	1.00000	0.58333	0.75000	1.00000	1.00000					
NB06	1.00000	0.83333	0.66667	0.66667	0.91667					
NB07	0.83333	0.66667	0.66667	0.66667	0.83333					
NB08	0.91667	0.41667	1.00000	0.66667	0.41667					
NB09	0.91667	0.33333	0.50000	0.83333	0.41667					
NB10	0.83333	0.83333	0.33333	0.91667	0.66667					



CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test	Retec, Inc.
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	15-3479-8610	15-3479-8610	16 Mar-07 10:27 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD
Bonferroni Adj t	C > T	Angular (Corrected)					N/A	40.32%

Group Comparisons							
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)
NB_REF		NB01	0.88437	2.67995	1.0000	0.3445	Non-Significant Effect
		NB02	0.3677	2.67995	1.0000	0.3445	Non-Significant Effect
		NB03	-1.2692	2.67995	1.0000	0.3445	Non-Significant Effect
		NB04	2.56538	2.67995	0.0671	0.3445	Non-Significant Effect
		NB05	-1.0621	2.67995	1.0000	0.3445	Non-Significant Effect
		NB06	-0.3940	2.67995	1.0000	0.3445	Non-Significant Effect
		NB07	0.53690	2.67995	1.0000	0.3445	Non-Significant Effect
		NB08	0.69856	2.67995	1.0000	0.3445	Non-Significant Effect
		NB09	1.52598	2.67995	0.6672	0.3445	Non-Significant Effect
		NB10	0.56366	2.67995	1.0000	0.3445	Non-Significant Effect

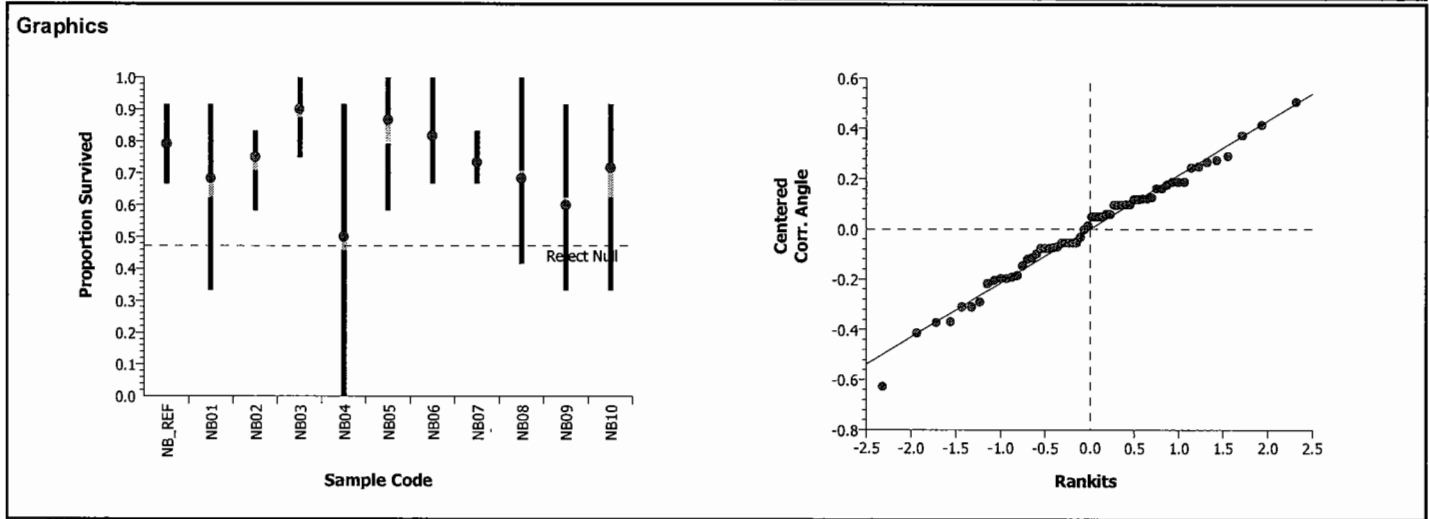
ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.007071	0.1007071	10	1.83	0.08011	Non-Significant Effect
Error	2.698904	0.0550797	49			
Total	3.70597410	0.1557867	59			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Bartlett	19.19596	23.20925	0.03784	Equal Variances
Distribution	Shapiro-Wilk W	0.98743		0.79420	Normal Distribution

Data Summary									
Sample Code	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_REF	10	0.79167	0.66667	0.91667	0.07082	1.10231	0.95532	1.27795	0.09056
NB01	5	0.68333	0.33333	0.91667	0.21570	0.98863	0.61548	1.27795	0.24027
NB02	5	0.75000	0.58333	0.83333	0.11785	1.05504	0.86912	1.15026	0.13390
NB03	5	0.90000	0.75000	1.00000	0.10865	1.26546	1.04720	1.42595	0.16777
NB04	5	0.50000	0.00000	0.91667	0.33333	0.77254	0.14484	1.27795	0.41022
NB05	5	0.86667	0.58333	1.00000	0.19185	1.23884	0.86912	1.42595	0.26384
NB06	5	0.81667	0.66667	1.00000	0.14907	1.15296	0.95532	1.42595	0.20511
NB07	5	0.73333	0.66667	0.83333	0.09129	1.03329	0.95532	1.15026	0.10678
NB08	5	0.68333	0.41667	1.00000	0.27259	1.01251	0.70167	1.42595	0.33087
NB09	5	0.60000	0.33333	0.91667	0.25954	0.90615	0.61548	1.27795	0.29099
NB10	5	0.71667	0.33333	0.91667	0.23274	1.02985	0.61548	1.27795	0.25875

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.91667	0.83333	0.75000	0.83333	0.83333	0.66667	0.75000	0.75000	0.75000	0.83333
NB01	0.91667	0.66667	0.33333	0.75000	0.75000					
NB02	0.58333	0.83333	0.83333	0.66667	0.83333					
NB03	0.83333	0.75000	1.00000	1.00000	0.91667					
NB04	0.58333	0.58333	0.00000	0.91667	0.41667					
NB05	1.00000	0.58333	0.75000	1.00000	1.00000					
NB06	1.00000	0.83333	0.66667	0.66667	0.91667					
NB07	0.83333	0.66667	0.66667	0.66667	0.83333					
NB08	0.91667	0.41667	1.00000	0.66667	0.41667					
NB09	0.91667	0.33333	0.50000	0.83333	0.41667					
NB10	0.83333	0.83333	0.33333	0.91667	0.66667					

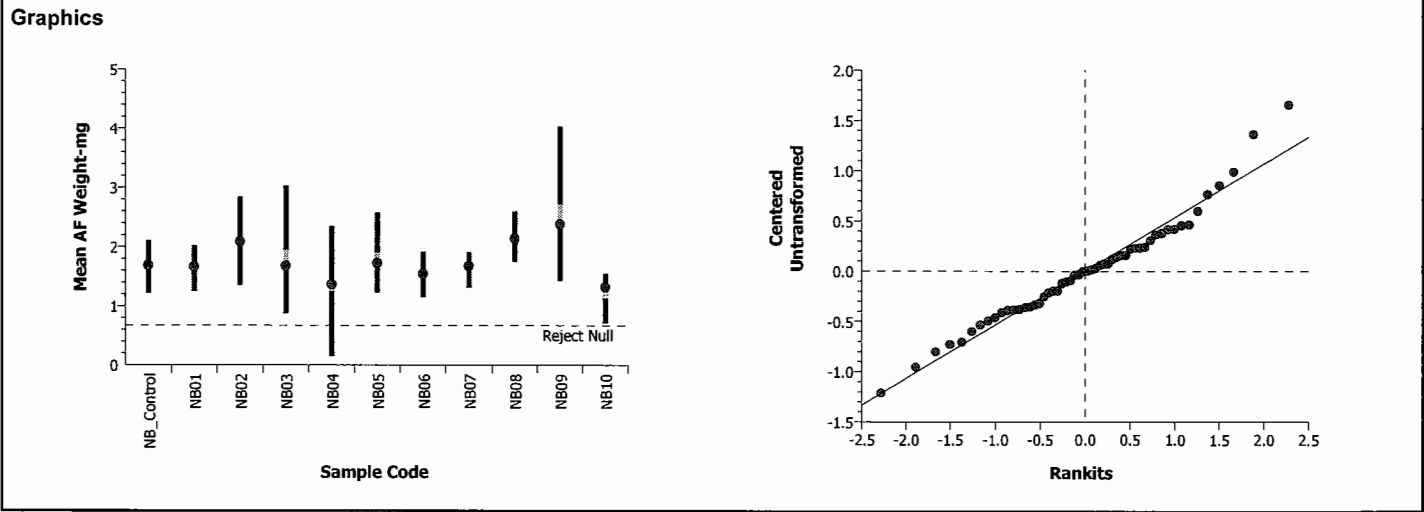


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Mean AF Weight-mg	Comparison		15-3479-8610	15-3479-8610	16 Mar-07 10:26 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Bonferroni Adj t	C > T	Untransformed					N/A	60.07%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_Control		NB01	0.05844	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB02	-1.0682	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB03	0.02580	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB04	0.80857	2.69510	1.0000	1.0735	Non-Significant Effect			
		NB05	-0.1035	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB06	0.38235	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB07	0.02908	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB08	-1.205	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB09	-1.8587	2.69510	1.0000	1.01210	Non-Significant Effect			
		NB10	0.9741	2.69510	1.0000	1.01210	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	5.180231	0.5180231	10	1.47	0.18417	Non-Significant Effect				
Error	15.16028	0.3525646	43							
Total	20.3405089	0.8705877	53							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	15.90748	23.20925	0.10231	Equal Variances					
Distribution	Shapiro-Wilk W	0.97089		0.21090	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_Control	5	1.68494	1.22222	2.10250	0.42105					
NB01	5	1.66300	1.25000	2.02500	0.35465					
NB02	5	2.08610	1.35714	2.85000	0.66488					
NB03	5	1.67526	0.87143	3.03333	0.81953					
NB04	4	1.36288	0.15000	2.35000	0.90822					
NB05	5	1.72383	1.22857	2.57778	0.50766					
NB06	5	1.54136	1.15000	1.91667	0.31310					
NB07	5	1.67402	1.31000	1.91429	0.23008					
NB08	5	2.13744	1.75556	2.60000	0.42396					
NB09	5	2.38295	1.42727	4.03750	1.02193					
NB10	5	1.31914	0.71818	1.55000	0.34913					

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_Control	2.10250	1.70000	2.10000	1.30000	1.22222					
NB01	1.34000	1.25000	1.73333	2.02500	1.96667					
NB02	1.35714	1.99000	2.68333	2.85000	1.55000					
NB03	1.42000	1.73333	3.03333	1.31818	0.87143					
NB04	1.43333	2.35000	1.51818	0.15000						
NB05	1.59889	1.22857	1.68889	1.52500	2.57778					
NB06	1.15000	1.77000	1.54286	1.91667	1.32727					
NB07	1.31000	1.81250	1.91429	1.70000	1.63333					
NB08	1.75556	2.60000	2.59167	1.94000	1.80000					
NB09	1.42727	1.67500	2.27500	4.03750	2.50000					
NB10	1.47500	1.31250	1.55000	0.71818	1.54000					

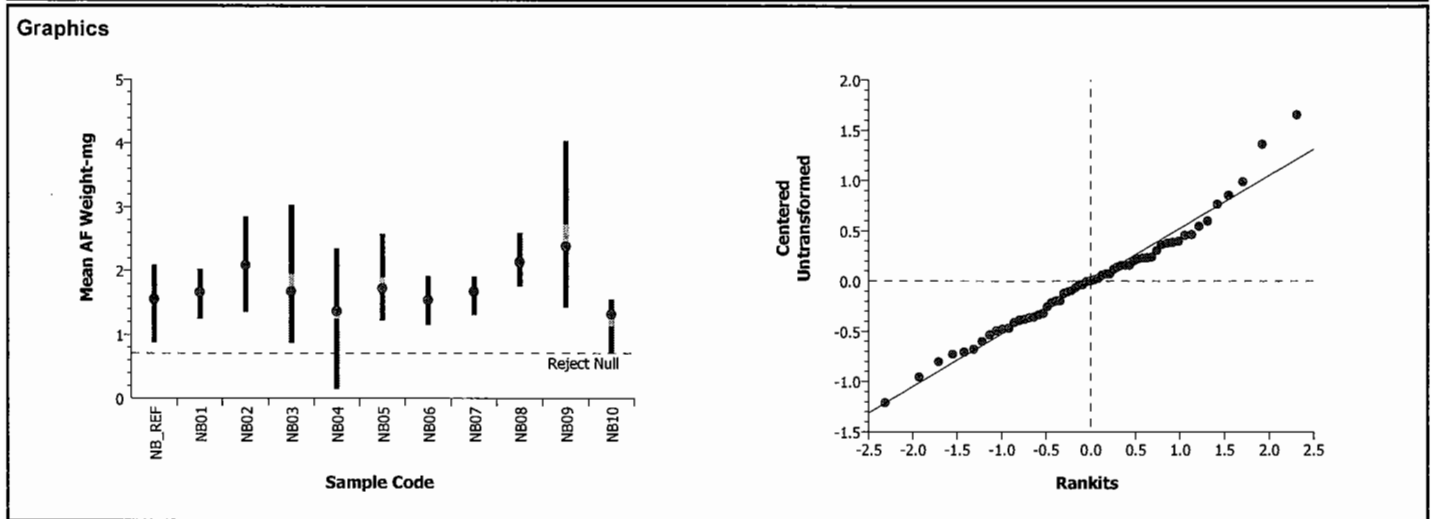


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Mean AF Weight-mg	Comparison		15-3479-8610	15-3479-8610	16 Mar-07 10:26 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Bonferroni Adj t	C > T	Untransformed					N/A	54.57%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_REF		NB01	-0.3385	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB02	-1.6752	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB03	-0.3772	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB04	0.56448	2.68220	1.0000	0.91699	Non-Significant Effect			
		NB05	-0.5307	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB06	0.04582	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB07	-0.3733	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB08	-1.8374	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB09	-2.6131	2.68220	1.0000	0.84897	Non-Significant Effect			
		NB10	0.74790	2.68220	1.0000	0.84897	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	5.513401	0.5513401	10	1.65	0.12082	Non-Significant Effect				
Error	16.02938	0.3339453	48							
Total	21.5427780	0.8852854	58							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	16.82904	23.20925	0.07823	Equal Variances					
Distribution	Shapiro-Wilk W	0.97424		0.24310	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_REF	10	1.55586	0.87778	2.10000	0.41876					
NB01	5	1.66300	1.25000	2.02500	0.35465					
NB02	5	2.08610	1.35714	2.85000	0.66488					
NB03	5	1.67526	0.87143	3.03333	0.81953					
NB04	4	1.36288	0.15000	2.35000	0.90822					
NB05	5	1.72383	1.22857	2.57778	0.50766					
NB06	5	1.54136	1.15000	1.91667	0.31310					
NB07	5	1.67402	1.31000	1.91429	0.23008					
NB08	5	2.13744	1.75556	2.60000	0.42396					
NB09	5	2.38295	1.42727	4.03750	1.02193					
NB10	5	1.31914	0.71818	1.55000	0.34913					

CETIS Analysis Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	1.94000	1.95000	1.75556	1.08571	1.57000	1.71429	1.07778	2.10000	0.87778	1.48750
NB01	1.34000	1.25000	1.73333	2.02500	1.96667					
NB02	1.35714	1.99000	2.68333	2.85000	1.55000					
NB03	1.42000	1.73333	3.03333	1.31818	0.87143					
NB04	1.43333	2.35000	1.51818	0.15000						
NB05	1.59889	1.22857	1.68889	1.52500	2.57778					
NB06	1.15000	1.77000	1.54286	1.91667	1.32727					
NB07	1.31000	1.81250	1.91429	1.70000	1.63333					
NB08	1.75556	2.60000	2.59167	1.94000	1.80000					
NB09	1.42727	1.67500	2.27500	4.03750	2.50000					
NB10	1.47500	1.31250	1.55000	0.71818	1.54000					

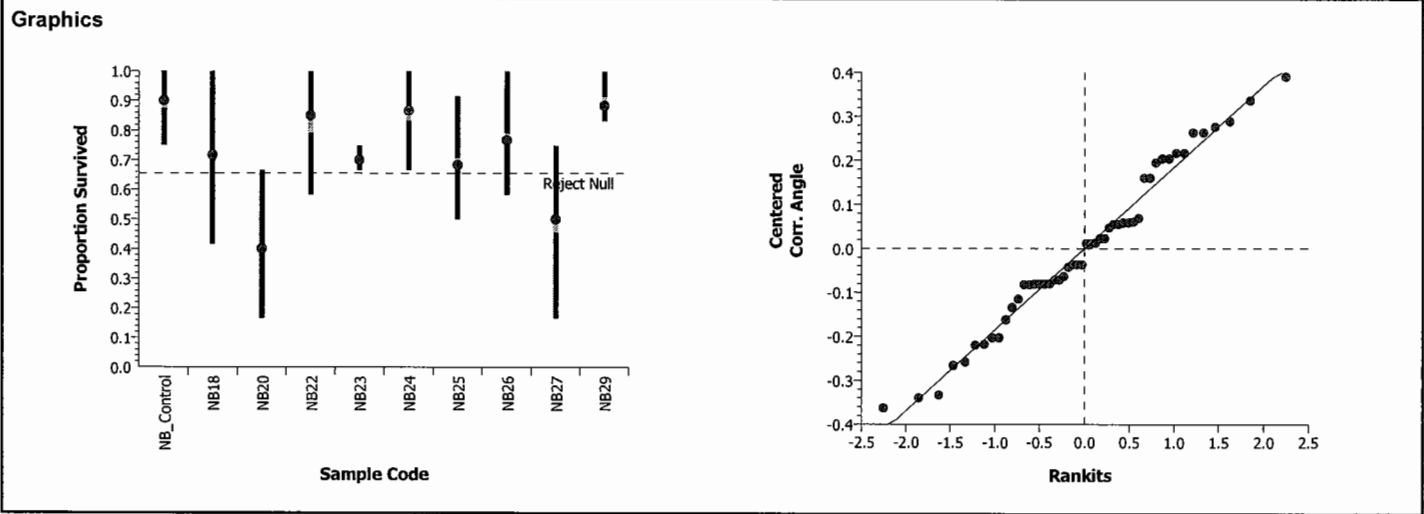


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Proportion Survived	Comparison		18-4803-3034	18-4803-3034	16 Mar-07 10:32 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Dunnett's Multiple Comparison	C > T	Angular (Corrected)					N/A	27.16%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_Control		NB18	1.79099	2.50627	0.1937	0.32185	Non-Significant Effect			
		NB20	4.56733	2.50627	0.0002	0.32185	Significant Effect			
		NB22	0.43785	2.50627	0.7711	0.32185	Non-Significant Effect			
		NB23	2.12894	2.50627	0.1074	0.32185	Non-Significant Effect			
		NB24	0.34196	2.50627	0.8052	0.32185	Non-Significant Effect			
		NB25	2.15573	2.50627	0.1021	0.32185	Non-Significant Effect			
		NB26	1.36969	2.50627	0.3523	0.32185	Non-Significant Effect			
		NB27	3.75187	2.50627	0.0021	0.32185	Significant Effect			
		NB29	0.26885	2.50627	0.8290	0.32185	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	1.75737	0.1952633	9	4.74	0.00026	Significant Effect				
Error	1.649123	0.0412281	40							
Total	3.40649259	0.2364914	49							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	9.93992	21.66599	0.35537	Equal Variances					
Distribution	Shapiro-Wilk W	0.97755		0.45374	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_Control	5	0.90000	0.75000	1.00000	0.10865	1.26546	1.04720	1.42595	0.16777	
NB18	5	0.71667	0.41667	1.00000	0.20917	1.03547	0.70167	1.42595	0.26009	
NB20	5	0.40000	0.16667	0.66667	0.18066	0.67894	0.42053	0.95532	0.19250	
NB22	5	0.85000	0.58333	1.00000	0.18066	1.20924	0.86912	1.42595	0.24525	
NB23	5	0.70000	0.66667	0.75000	0.04564	0.99207	0.95532	1.04720	0.05033	
NB24	5	0.86667	0.66667	1.00000	0.13944	1.22155	0.95532	1.42595	0.20286	
NB25	5	0.68333	0.50000	0.91667	0.18066	0.98863	0.78540	1.27795	0.20807	
NB26	5	0.76667	0.58333	1.00000	0.16029	1.08957	0.86912	1.42595	0.21521	
NB27	5	0.50000	0.16667	0.75000	0.25000	0.78366	0.42053	1.04720	0.26656	
NB29	5	0.88333	0.83333	1.00000	0.07454	1.23094	1.15026	1.42595	0.12224	

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_Control	1.00000	1.00000	0.91667	0.83333	0.75000					
NB18	1.00000	0.66667	0.75000	0.75000	0.41667					
NB20	0.66667	0.33333	0.41667	0.16667	0.41667					
NB22	1.00000	0.58333	0.91667	1.00000	0.75000					
NB23	0.66667	0.66667	0.75000	0.75000	0.66667					
NB24	1.00000	1.00000	0.83333	0.66667	0.83333					
NB25	0.75000	0.50000	0.91667	0.75000	0.50000					
NB26	0.83333	0.66667	0.58333	0.75000	1.00000					
NB27	0.75000	0.75000	0.41667	0.41667	0.16667					
NB29	0.91667	0.83333	0.83333	0.83333	1.00000					

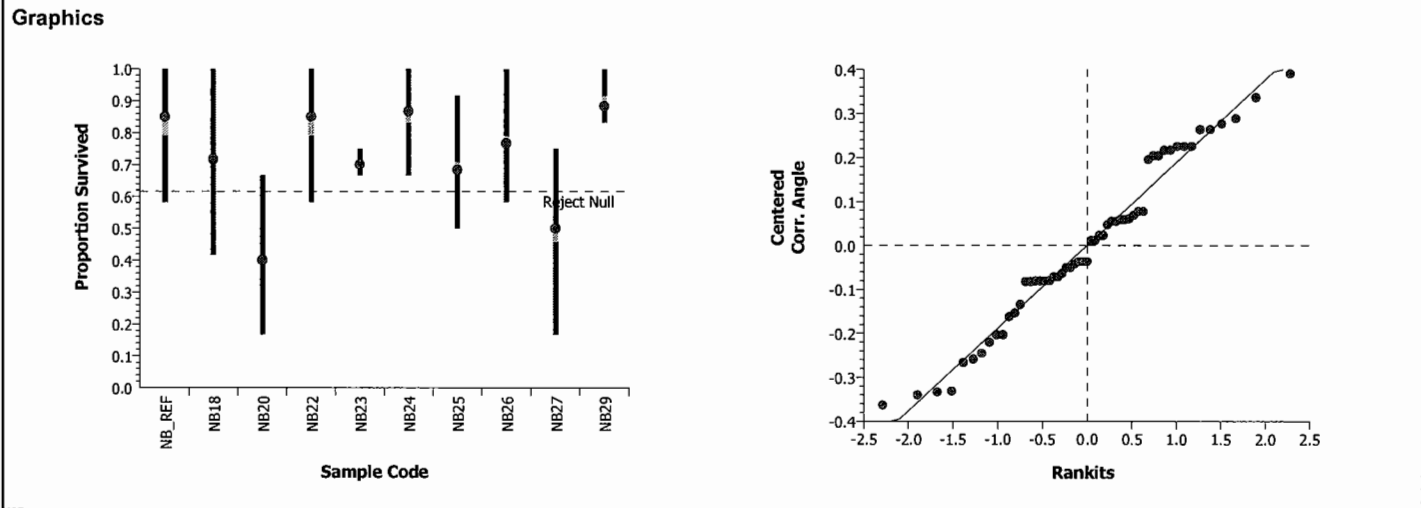


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Proportion Survived	Comparison		18-4803-3034	18-4803-3034	16 Mar-07 10:32 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Bonferroni Adj t	C > T	Angular (Corrected)					N/A	27.52%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_REF		NB18	1.46737	2.64847	0.6715	0.29804	Non-Significant Effect			
		NB20	4.63565	2.64847	0.0001	0.29804	Significant Effect			
		NB22	-0.0768	2.64847	1.0000	0.29804	Non-Significant Effect			
		NB23	1.85302	2.64847	0.3170	0.29804	Non-Significant Effect			
		NB24	-0.1862	2.64847	1.0000	0.29804	Non-Significant Effect			
		NB25	1.88359	2.64847	0.2974	0.29804	Non-Significant Effect			
		NB26	0.98659	2.64847	1.0000	0.29804	Non-Significant Effect			
		NB27	3.70507	2.64847	0.0026	0.29804	Significant Effect			
		NB29	-0.2697	2.64847	1.0000	0.29804	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	1.749038	0.1943376	9	4.60	0.00024	Significant Effect				
Error	1.899502	0.0422112	45							
Total	3.64854062	0.2365488	54							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	9.73934	21.66599	0.37200	Equal Variances					
Distribution	Shapiro-Wilk W	0.97118		0.20794	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_REF	10	0.85000	0.58333	1.00000	0.14593	1.20059	0.86912	1.42595	0.20082	
NB18	5	0.71667	0.41667	1.00000	0.20917	1.03547	0.70167	1.42595	0.26009	
NB20	5	0.40000	0.16667	0.66667	0.18066	0.67894	0.42053	0.95532	0.19250	
NB22	5	0.85000	0.58333	1.00000	0.18066	1.20924	0.86912	1.42595	0.24525	
NB23	5	0.70000	0.66667	0.75000	0.04564	0.99207	0.95532	1.04720	0.05033	
NB24	5	0.86667	0.66667	1.00000	0.13944	1.22155	0.95532	1.42595	0.20286	
NB25	5	0.68333	0.50000	0.91667	0.18066	0.98863	0.78540	1.27795	0.20807	
NB26	5	0.76667	0.58333	1.00000	0.16029	1.08957	0.86912	1.42595	0.21521	
NB27	5	0.50000	0.16667	0.75000	0.25000	0.78366	0.42053	1.04720	0.26656	
NB29	5	0.88333	0.83333	1.00000	0.07454	1.23094	1.15026	1.42595	0.12224	

CETIS Analysis Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	0.83333	0.91667	1.00000	0.66667	0.83333	0.75000	1.00000	1.00000	0.91667	0.58333
NB18	1.00000	0.66667	0.75000	0.75000	0.41667					
NB20	0.66667	0.33333	0.41667	0.16667	0.41667					
NB22	1.00000	0.58333	0.91667	1.00000	0.75000					
NB23	0.66667	0.66667	0.75000	0.75000	0.66667					
NB24	1.00000	1.00000	0.83333	0.66667	0.83333					
NB25	0.75000	0.50000	0.91667	0.75000	0.50000					
NB26	0.83333	0.66667	0.58333	0.75000	1.00000					
NB27	0.75000	0.75000	0.41667	0.41667	0.16667					
NB29	0.91667	0.83333	0.83333	0.83333	1.00000					



CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test Retec, Inc.

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean AF Weight-mg	Comparison	18-4803-3034	18-4803-3034	16 Mar-07 10:33 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD
Dunnett's Multiple Comparison	C > T	Untransformed					N/A	36.93%

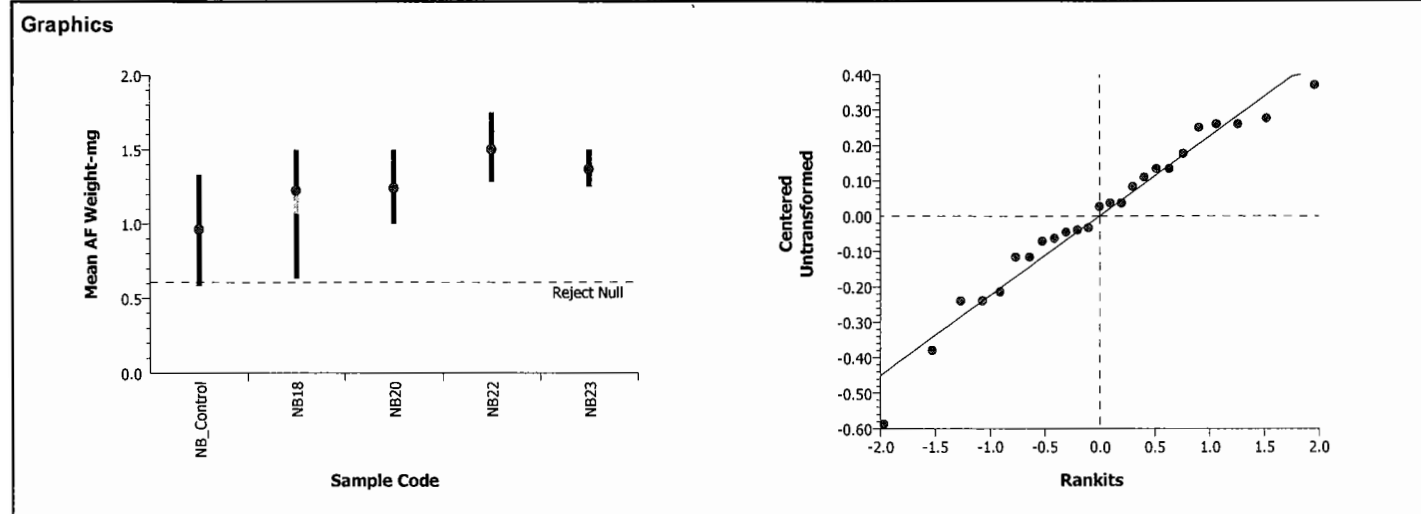
Group Comparisons							
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)
NB_Control		NB18	-1.6882	2.30451	0.9965	0.35575	Non-Significant Effect
		NB20	-1.7922	2.30451	0.9974	0.35575	Non-Significant Effect
		NB22	-3.4793	2.30451	1.0000	0.35575	Non-Significant Effect
		NB23	-2.6128	2.30451	0.9998	0.35575	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.7944546	0.1986136	4	3.33	0.03022	Significant Effect
Error	1.191517	0.0595759	20			
Total	1.98597181	0.2581895	24			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Bartlett	3.88212	13.27670	0.42219	Equal Variances	
Distribution	Shapiro-Wilk W	0.96432		0.50691	Normal Distribution	

Data Summary	Sample Code	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
	NB_Control	5	0.96333	0.58333	1.33333	0.26833				
	NB18	5	1.22394	0.63636	1.50000	0.34099				
	NB20	5	1.24000	1.00000	1.50000	0.25100				
	NB22	5	1.50043	1.28571	1.75000	0.17502				
	NB23	5	1.36667	1.25000	1.50000	0.12638				

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_Control	0.58333	1.00000	1.00000	0.90000	1.33333					
NB18	0.63636	1.50000	1.33333	1.25000	1.40000					
NB20	1.00000	1.50000	1.20000	1.50000	1.00000					
NB22	1.58333	1.75000	1.45455	1.42857	1.28571					
NB23	1.25000	1.50000	1.25000	1.33333	1.50000					

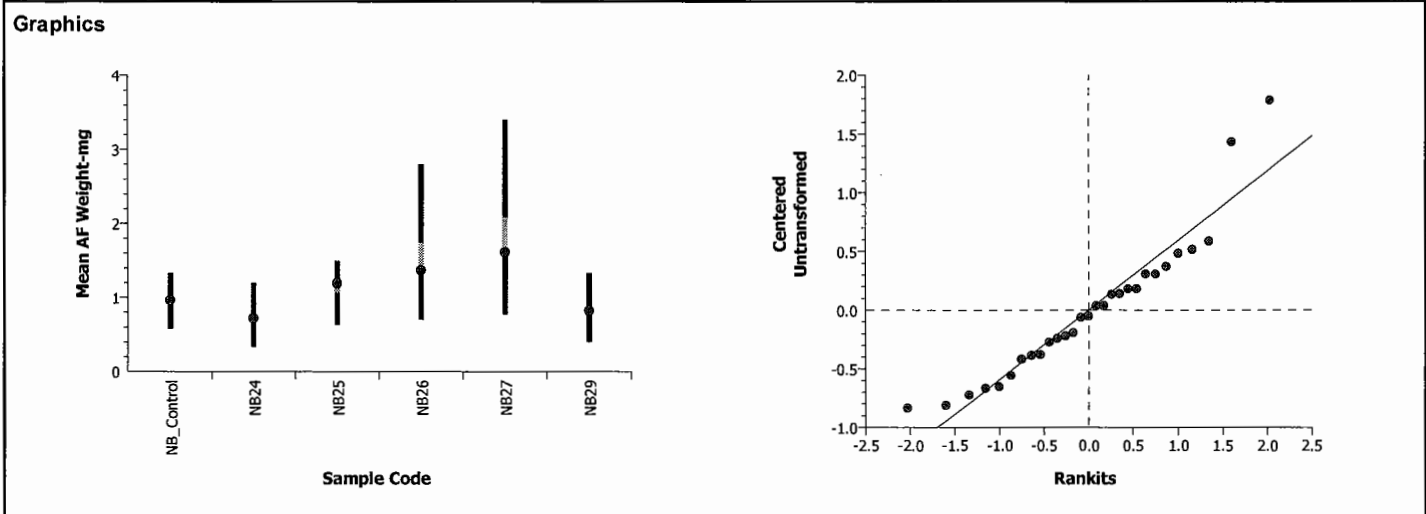


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test							Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Mean AF Weight-mg	Comparison		18-4803-3034	18-4803-3034	16 Mar-07 10:33 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD		
Bonferroni Adj t	C > T	Untransformed					N/A	116.36%		
Group Comparisons										
Sample	vs	Sample	Statistic	Critical	P-Value	MSD	Decision(0.05)			
NB_Control		NB24	0.57560	2.49987	1.0000	1.05681	Non-Significant Effect			
		NB25	-0.5455	2.49987	1.0000	1.05681	Non-Significant Effect			
		NB26	-0.9569	2.49987	1.0000	1.05681	Non-Significant Effect			
		NB27	-1.5376	2.49987	1.0000	1.05681	Non-Significant Effect			
		NB29	0.32034	2.49987	1.0000	1.12091	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	2.834554	0.5669107	5	1.27	0.31090	Non-Significant Effect				
Error	10.27602	0.4467837	23							
Total	13.1105785	1.0136944	28							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Bartlett	12.28715	15.08627	0.03106	Equal Variances					
Distribution	Shapiro-Wilk W	0.91342		0.02084	Normal Distribution					
Data Summary										
Sample Code	Count	Original Data				Transformed Data				
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
NB_Control	5	0.96333	0.58333	1.33333	0.26833					
NB24	5	0.72000	0.33333	1.20000	0.34042					
NB25	5	1.19394	0.63636	1.50000	0.37259					
NB26	5	1.36786	0.70000	2.80000	0.86612					
NB27	5	1.61333	0.77778	3.40000	1.16413					
NB29	4	0.81970	0.40000	1.33333	0.42727					

CETIS Analysis Detail

Data Detail										
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_Control	0.58333	1.00000	1.00000	0.90000	1.33333					
NB24	0.33333	0.66667	1.20000	0.50000	0.90000					
NB25	1.33333	1.50000	0.63636	1.00000	1.50000					
NB26	0.70000	0.71429	2.80000	1.12500	1.50000					
NB27	0.88889	0.77778	2.20000	3.40000	0.80000					
NB29	0.54545	1.33333	0.40000	1.00000						

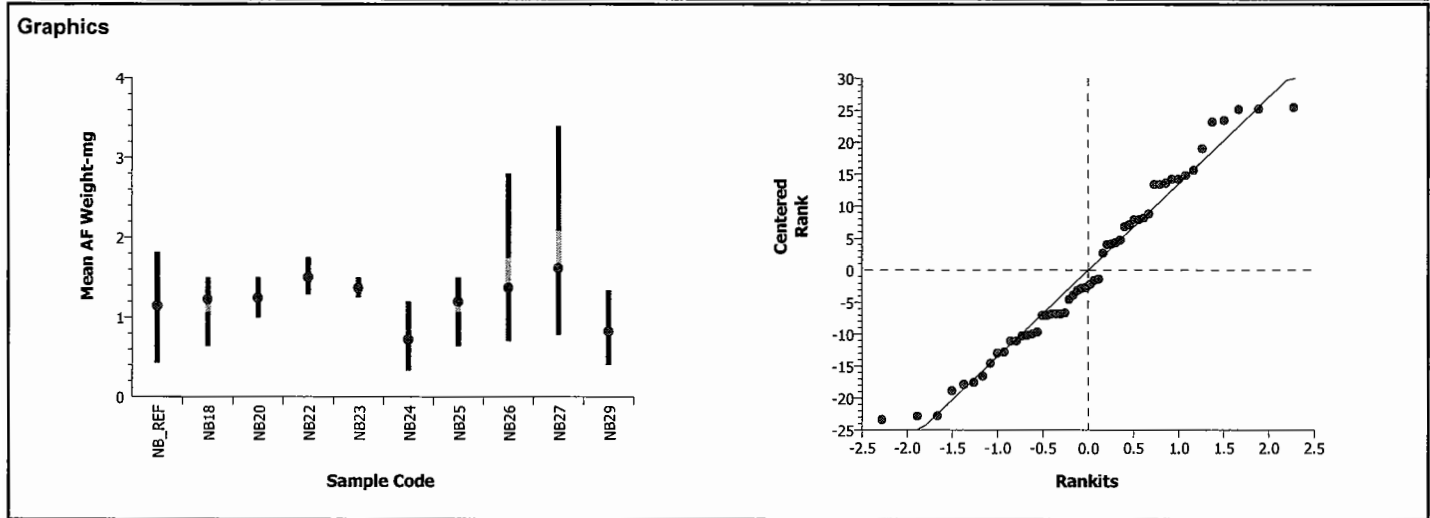


CETIS Analysis Detail

Chironomus 21-d Survival and Growth Sediment Test						Retec, Inc.			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version			
Mean AF Weight-mg	Comparison		18-4803-3034	18-4803-3034	16 Mar-07 10:33 AM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	TOEL	Toxic Units	PMSD	
Wilcoxon/Bonferroni	C > T	Rank					N/A	72.71%	
Group Comparisons									
Sample	vs	Sample	Statistic	Critical	P-Value	Ties	Decision(0.05)		
NB_REF		NB18	46		1.0000	2	Non-Significant Effect		
		NB20	44		1.0000	1	Non-Significant Effect		
		NB22	55		1.0000	0	Non-Significant Effect		
		NB23	51.5		1.0000	2	Non-Significant Effect		
		NB24	25		0.3010	0	Non-Significant Effect		
		NB25	43		1.0000	2	Non-Significant Effect		
		NB26	41		1.0000	0	Non-Significant Effect		
		NB27	39		1.0000	0	Non-Significant Effect		
		NB29	22		1.0000	2	Non-Significant Effect		
ANOVA Table									
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	3.33994	0.3711045	9	1.32	0.25320	Non-Significant Effect			
Error	12.34759	0.2806271	44						
Total	15.6875327	0.6517316	53						
ANOVA Assumptions									
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)				
Variances	Bartlett	29.54254	21.66599	0.00052	Unequal Variances				
Distribution	Shapiro-Wilk W	0.91303		0.00082	Non-normal Distribution				
Data Summary									
Sample Code	Count	Original Data				Transformed Data			
		Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
NB_REF	10	1.14260	0.42857	1.81818	0.40222	25.85	3	51	15.1951
NB18	5	1.22394	0.63636	1.50000	0.34099	29.9	6.5	43.5	14.1572
NB20	5	1.24000	1.00000	1.50000	0.25100	30.1	19	43.5	12.517
NB22	5	1.50043	1.28571	1.75000	0.17502	41.2	31	50	7.79102
NB23	5	1.36667	1.25000	1.50000	0.12638	35.6	28.5	43.5	7.55315
NB24	5	0.72000	0.33333	1.20000	0.34042	10.7	1	25.5	9.79541
NB25	5	1.19394	0.63636	1.50000	0.37259	29.3	6.5	43.5	16.2119
NB26	5	1.36786	0.70000	2.80000	0.86612	27.9	9	53	19.7876
NB27	5	1.61333	0.77778	3.40000	1.16413	28.6	11	54	22.3114
NB29	4	0.81970	0.40000	1.33333	0.42727	15	2	34	14.6742

CETIS Analysis Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
NB_REF	1.00000	1.66667	1.00000	1.00000	1.33333	1.11111	0.81818	1.25000	1.81818	0.42857
NB18	0.63636	1.50000	1.33333	1.25000	1.40000					
NB20	1.00000	1.50000	1.20000	1.50000	1.00000					
NB22	1.58333	1.75000	1.45455	1.42857	1.28571					
NB23	1.25000	1.50000	1.25000	1.33333	1.50000					
NB24	0.33333	0.66667	1.20000	0.50000	0.90000					
NB25	1.33333	1.50000	0.63636	1.00000	1.50000					
NB26	0.70000	0.71429	2.80000	1.12500	1.50000					
NB27	0.88889	0.77778	2.20000	3.40000	0.80000					
NB29	0.54545	1.33333	0.40000	1.00000						



Appendix F

Aquatec Biological Sciences, Inc. (Aquatec) Final Report



Aquatec Biological Sciences



Ecology



Environmental
Toxicology



Natural Resource
Assessments



Microbiology

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Reference: Hudson River, Newburgh, NY

Laboratory Sample ID : 33950
Client Sample ID : NB-01 (SED 29)
Remarks :

Date/Time Sample Collected : 11/7/06 @ 2:45:00 PM
Sampling Area (M2): : 0.0929
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							1	11
Annelida	Oligochaeta	Tubificida	Tubificidae				5	54
						<i>Limnodrilus hoffmeisteri</i>	1	11
						<i>Quistadrilus multisetosus</i>	2	22
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Chironomus decorus</i>	3	32
						<i>Cryptochironomus fulvus</i>	1	11
						<i>Polypedilum flavum</i>	7	75
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	3	32
Sub-Total:							23	248
Grand Total:							23	248

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33951	Date/Time Sample Collected : 11/7/06 @ 3:45:00 PM
Client Sample ID : NB-02 (SED 30)	Sampling Area (M2): : 0.0929
Remarks :	Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							1	11
Annelida	Oligochaeta	Tubificida	Tubificidae				1	11
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	2	22
		Veneroida	Tellinidae			<i>Macoma tenta</i>	1	11
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	1	11
			Chironomidae	Chironominae	Chironomini	<i>Chironomus decorus</i>	1	11
						<i>Cryptochironomus sp.</i>	7	75
						<i>Polypedilum flavum</i>	10	108
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	16	172
Sub-Total:							40	431
Grand Total:							40	431

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33952 Date/Time Sample Collected : 11/7/06 @ 4:30:00 PM
Client Sample ID : NB-03 (SED 31) Sampling Area (M2): : 0.0929
Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							3	32
Annelida	Oligochaeta	Tubificida	Tubificidae				2	22
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	2	22
		Veneroida	Tellinidae			<i>Macoma tenta</i>	1	11
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1	11
						<i>Polypedilum flavum</i>	9	97
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	11	118
Sub-Total:							29	312
Grand Total:							29	312

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33953 Date/Time Sample Collected : 11/8/06 @ 9:00:00 AM
 Client Sample ID : NB-04 (SED 32) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Annelida	Polychaeta	Spionida	Spionidae			<i>Spiophanes sp.</i>	1	11
Mollusca	Pelecypoda	Veneroida	Tellinidae			<i>Macoma tenta</i>	1	11
Arthropoda	Crustacea	Amphipoda	Gammaridae			<i>Gammarus sp.</i>	1	11
						<i>Chironomus sp.</i>	4	43
	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Cryptochironomus sp.</i>	6	65
						<i>Polypedilum flavum</i>	31	334
			Tanypodinae	Procladiini	<i>Procladius sp.</i>	2	22	
Sub-Total:							46	495
Grand Total:							46	495

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33955
Client Sample ID : NB-06 (SED 35)
Remarks :
Date/Time Sample Collected : 11/8/06 @ 12:15:00 P
Sampling Area (M2): : 0.0929
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Annelida	Oligochaeta	Tubificida	Tubificidae				10	108
						<i>Limnodrilus hoffmeisteri</i>	2	22
Arthropoda	Crustacea	Amphipoda	Corophiidae			<i>Corophium sp.</i>	1	11
	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	2	22
			Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1	11
						<i>Cryptochironomus sp.</i>	2	22
						<i>Harnischia sp.</i>	1	11
						<i>Lauterborniella agrayloides</i>	1	11
						<i>Polypedilum flavum</i>	5	54
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	25	269
					Procladiini	<i>Procladius sp.</i>	1	11
Sub-Total:							51	549
Grand Total:							51	549

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33956
 Client Sample ID : NB-07 (SED 37)
 Remarks :
 Date/Time Sample Collected : 11/8/06 @ 12:35:00 P
 Sampling Area (M2): : 0.0929
 Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)				
Annelida	Oligochaeta	Tubificida	Tubificidae				18	194				
						<i>Limnodrilus hoffmeisteri</i>	2	22				
				Mollusca	Pelecypoda	Veneroida	Tellinidae		<i>Macoma tenta</i>	3	32	
				Arthropoda	Crustacea	Amphipoda	Gammaridae		<i>Gammarus sp.</i>	1	11	
								Insecta	Diptera	Ceratopogonidae		<i>Probezzia sp.</i>
							Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1	11
									<i>Cryptochironomus sp.</i>	6	65	
									<i>Lauterborniella agrayloides</i>	5	54	
									<i>Microchironomus caelum</i>	1	11	
									<i>Polypedilum flavum</i>	1	11	
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	26	280				
					Procladiini	<i>Procladius sp.</i>	1	11				
Sub-Total:							66	710				
Nematoda							4	43				
Annelida	Oligochaeta	Tubificida	Tubificidae				3	32				
Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae			<i>Amnicola grana</i>	1	11				
	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	4	43				
Sub-Total:							12	129				
Grand Total:							78	840				

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33957 **Date/Time Sample Collected : 11/8/06 @ 4:15:00 PM**
Client Sample ID : NB-08 (SED 34) **Sampling Area (M2): : 0.0929**
Remarks : **Sampling Depth (m) : Not Reported**

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							2	22
Annelida	Oligochaeta	Lumbricina	Lumbricidae				1	11
			Tubificidae				10	108
			<i>Limnodrilus hoffmeisteri</i>				2	22
			<i>Quistadrilus multisetosus</i>				4	43
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	1	11
			Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	5	54
						<i>Cryptochironomus sp.</i>	13	140
						<i>Polypedilum flavum</i>	44	474
						<i>Tribelos jucundus</i>	2	22
Sub-Total:							84	904
Grand Total:							84	904

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33958 Date/Time Sample Collected : 11/8/06 @ 5:15:00 PM
 Client Sample ID : NB-09 (SED 38) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							2	22
Annelida	Oligochaeta	Tubificida	Tubificidae				7	75
						<i>Limnodrilus hoffmeisteri</i>	2	22
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	2	22
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	1	11
			Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	6	65
						<i>Cryptochironomus sp.</i>	3	32
						<i>Lauterborniella agrayloides</i>	1	11
						<i>Polypedilum flavum</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	16	172
					Procladiini	<i>Procladius sp.</i>	4	43
						Sub-Total:	45	484
						Grand Total:	45	484

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33960 Date/Time Sample Collected : 11/9/06 @ 10:15:00 A
 Client Sample ID : NB-11-Background 1 Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							3	32
Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae			<i>Gloiobdella elongata</i>	1	11
	Oligochaeta	Tubificida	Enchytraeidae				1	11
			Tubificidae				7	75
						<i>Ilyodrilus templetoni</i>	1	11
						<i>Limnodrilus hoffmeisteri</i>	1	11
						<i>Quistadrilus multisetosus</i>	3	32
Arthropoda	Crustacea	Amphipoda	Gammaridae			<i>Gammarus sp.</i>	2	22
	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	10	108
						<i>Cryptochironomus sp.</i>	3	32
						<i>Lauterborniella agrayloides</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	8	86
					Procladiini	<i>Procladius sp.</i>	3	32
Sub-Total:							44	474
Grand Total:							44	474

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33961	Date/Time Sample Collected : 11/9/06 @ 10:50:00 A
Client Sample ID : NB-12-Background 2	Sampling Area (M2): : 0.0929
Remarks :	Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	# per Sq. Meter)
Annelida	Oligochaeta	Tubificida	Tubificidae				13	140
						<i>Limnodrilus hoffmeisteri</i>	1	11
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini		1	11
						<i>Cryptochironomus sp.</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	3	32
					Procladiini	<i>Procladius sp.</i>	1	11
						Sub-Total:	20	215
						Grand Total:	20	215

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33967 Date/Time Sample Collected : 11/10/06 @ 10:00:00 A
 Client Sample ID : NB-18 (SED 39) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Annelida	Oligochaeta	Tubificida	Tubificidae				1	11
						<i>Quistadrilus multisetosus</i>	10	108
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Pisidium sp.</i>	1	11
Arthropoda	Crustacea	Isopoda	Idoteidae			<i>Chiridotea sp.</i>	1	11
	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	20	215
<i>Cryptochironomus sp.</i>						3	32	
<i>Lauterborniella agrayloides</i>						2	22	
<i>Polypedilum flavum</i>						10	108	
			Tanypodinae		Coelotanypodini	<i>Coelotanypus sp.</i>	13	140
					Procladiini	<i>Procladius sp.</i>	8	86
Sub-Total:							69	743
Grand Total:							69	743

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Date : 2/23/07
BTR No. : 10022
Project No. : 06091
No. of Samples : 29
Date Received : 11/20/06

Laboratory Sample ID : 33971
Client Sample ID : NB-22 (SED 47)
Remarks :

Date/Time Sample Collected : 11/10/06 @ 1:00:00 P
Sampling Area (M2): : 0.0929
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							2	22
Annelida	Oligochaeta	Tubificida	Tubificidae				6	65
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	2	22
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	1	11
				Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1
						<i>Cryptochironomus sp.</i>	3	32
						<i>Harnischia sp.</i>	1	11
						<i>Polypedilum flavum</i>	1	11
						Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>
				Procladiini	<i>Procladius sp.</i>	1	11	
Sub-Total:							35	377
Grand Total:							35	377

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33972 Date/Time Sample Collected : 11/10/06 @ 1:20:00 P
 Client Sample ID : NB-23 (SED 14) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	# per Sq. Meter
Nematoda							1	11
Annelida	Oligochaeta	Lumbriculida	Lumbriculidae				1	11
		Tubificida	Naididae				1	11
			Tubificidae			<i>Limnodrilus hoffmeisteri</i>	1	11
Arthropoda	Crustacea	Amphipoda	Corophiidae			<i>Corophium sp.</i>	13	140
			Gammaridae			<i>Gammarus sp.</i>	1	11
		Isopoda					1	11
			Anthuridae			<i>Cyathura polita</i>	1	11
	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	2	22
						<i>Cryptochironomus sp.</i>	3	32
						<i>Dicrotendipes neomodestus</i>	3	32
						<i>Polypedilum flavum</i>	3	32
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	1	11
		Trichoptera	Leptoceridae			<i>Oecetis sp.</i>	2	22
Sub-Total:							34	366
Grand Total:							34	366

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33973 Date/Time Sample Collected : 11/10/06 @ 2:30:00 P
 Client Sample ID : NB-24 (SED 15) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							2	22
Annelida	Oligochaeta	Tubificida	Tubificidae				8	86
						<i>Limnodrilus hoffmeisteri</i>	2	22
Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae			<i>Amnicola grana</i>	9	97
	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	9	97
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	5	54
			Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1	11
						<i>Cryptochironomus sp.</i>	12	129
						<i>Harnischia sp.</i>	2	22
						<i>Lauterborniella agrayloides</i>	8	86
						<i>Polypedilum flavum</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	15	161
					Procladiini	<i>Procladius sp.</i>	1	11
Sub-Total:							75	807
Annelida	Oligochaeta	Tubificida	Tubificidae				1	11
Sub-Total:							1	11
Grand Total:							76	818

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 Suite 204
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 Reference: Hudson River, Newburgh, NY

Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33974 Date/Time Sample Collected : 11/10/06 @ 2:45:00 P
 Client Sample ID : NB-25 (SED 16) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							3	32
Annelida	Oligochaeta	Tubificida	Tubificidae				3	32
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	1	11
Arthropoda	Crustacea	Amphipoda	Corophiidae			<i>Corophium sp.</i>	1	11
Sub-Total:							8	86
Grand Total:							8	86

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Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33975 Date/Time Sample Collected : 11/10/06 @ 3:00:00 P
 Client Sample ID : NB-26 (SED 21) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							3	32
Annelida	Oligochaeta	Tubificida	Tubificidae				11	118
						<i>Limnodrilus hoffmeisteri</i>	1	11
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	3	32
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Probezzia sp.</i>	2	22
			Chironomidae	Chironominae	Chironomini	<i>Cryptochironomus sp.</i>	2	22
						<i>Lauterborniella agrayloides</i>	2	22
						<i>Polypedilum sp.</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	16	172
			Empididae				1	11
Sub-Total:							42	452
Annelida	Oligochaeta	Tubificida	Tubificidae				3	32
Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae			<i>Amnicola grana</i>	8	86
	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	4	43
		Veneroida	Dreissenidae			<i>Dreissena polymorpha</i>	1	11
Sub-Total:							16	172
Grand Total:							58	624

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 Reference: Hudson River, Newburgh, NY

Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33976
 Client Sample ID : NB-27 (SED 22)
 Remarks :
 Date/Time Sample Collected : 11/10/06 @ 3:20:00 P
 Sampling Area (M2): : 0.0929
 Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							1	11
Annelida	Oligochaeta	Lumbriculida	Lumbriculidae				1	11
		Tubificida	Tubificidae				42	452
						<i>Limnodrilus hoffmeisteri</i>	1	11
						<i>Limnodrilus udekemianus</i>	1	11
Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae			<i>Amnicola grana</i>	2	22
	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	6	65
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Culicoides sp.</i>	4	43
						<i>Probezzia sp.</i>	1	11
			Chironomidae	Chironominae	Chironomini	<i>Chironomus sp.</i>	1	11
						<i>Cryptochironomus sp.</i>	1	11
						<i>Lauterborniella agrayloides</i>	2	22
						<i>Polypedilum flavum</i>	1	11
				Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>	16	172
Sub-Total:							80	861
Annelida	Oligochaeta	Tubificida	Tubificidae				4	43
Mollusca	Gastropoda	Basommatophora	Lymnaeidae			<i>Fosseria sp.</i>	1	11
	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	2	22
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae			1	11
Sub-Total:							8	86
Grand Total:							88	947

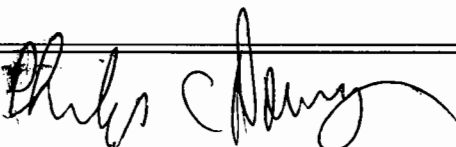
Nick Azzolina
 RETEC Group, Inc.
 1001 W. Seneca Street
 Suite 204
 Ithaca, NY 14850-3342
 Reference: Hudson River, Newburgh, NY

Date : 2/23/07
 BTR No. : 10022
 Project No. : 06091
 No. of Samples : 29
 Date Received : 11/20/06

Laboratory Sample ID : 33978 Date/Time Sample Collected : 11/10/06 @ 4:30:00 P
 Client Sample ID : NB-29 (SED 50) Sampling Area (M2): : 0.0929
 Remarks : Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted	(# per Sq. Meter)
Nematoda							1	11
Annelida	Oligochaeta	Tubificida	Naididae				1	11
			Tubificidae				18	194
					<i>Limnodrilus hoffmeisteri</i>	9	97	
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			<i>Sphaerium sp.</i>	1	11
Arthropoda	Insecta	Diptera	Ceratopogonidae			<i>Culicoides sp.</i>	2	22
						<i>Probezzia sp.</i>	5	54
				Chironomidae	Chironominae	Chironomini	1	11
						<i>Chironomus sp.</i>	1	11
						<i>Cryptochironomus sp.</i>	9	97
						<i>Harnischia sp.</i>	1	11
						<i>Lauterborniella agrayloides</i>	1	11
						<i>Polypedilum flavum</i>	6	65
						Tanypodinae	Coelotanypodini	<i>Coelotanypus sp.</i>
			Procladiini	<i>Procladius sp.</i>	2	22		
Sub-Total:							82	883
Grand Total:							82	883

Submitted By:



Appendix G

Environmental Energy Alliance of New York (EEANY) January 18, 2007 Presentations on Understanding PAH Bioavailability in Sediments

Understanding PAH Bioavailability in Sediments

EEANY/NGA
18 Jan 2007

*Dave Nakles, PhD, and Nick Azzolina,
The RETEC Group, Inc.*



Sediment Bioavailability Assessment Program Goals

- ◆ **Establish why similar concentrations of PAHs in sediments and soils differ in survival to *Hyalella azteca***
- ◆ **Develop chemical tests that predict PAH bioavailability and survival to *H. azteca***

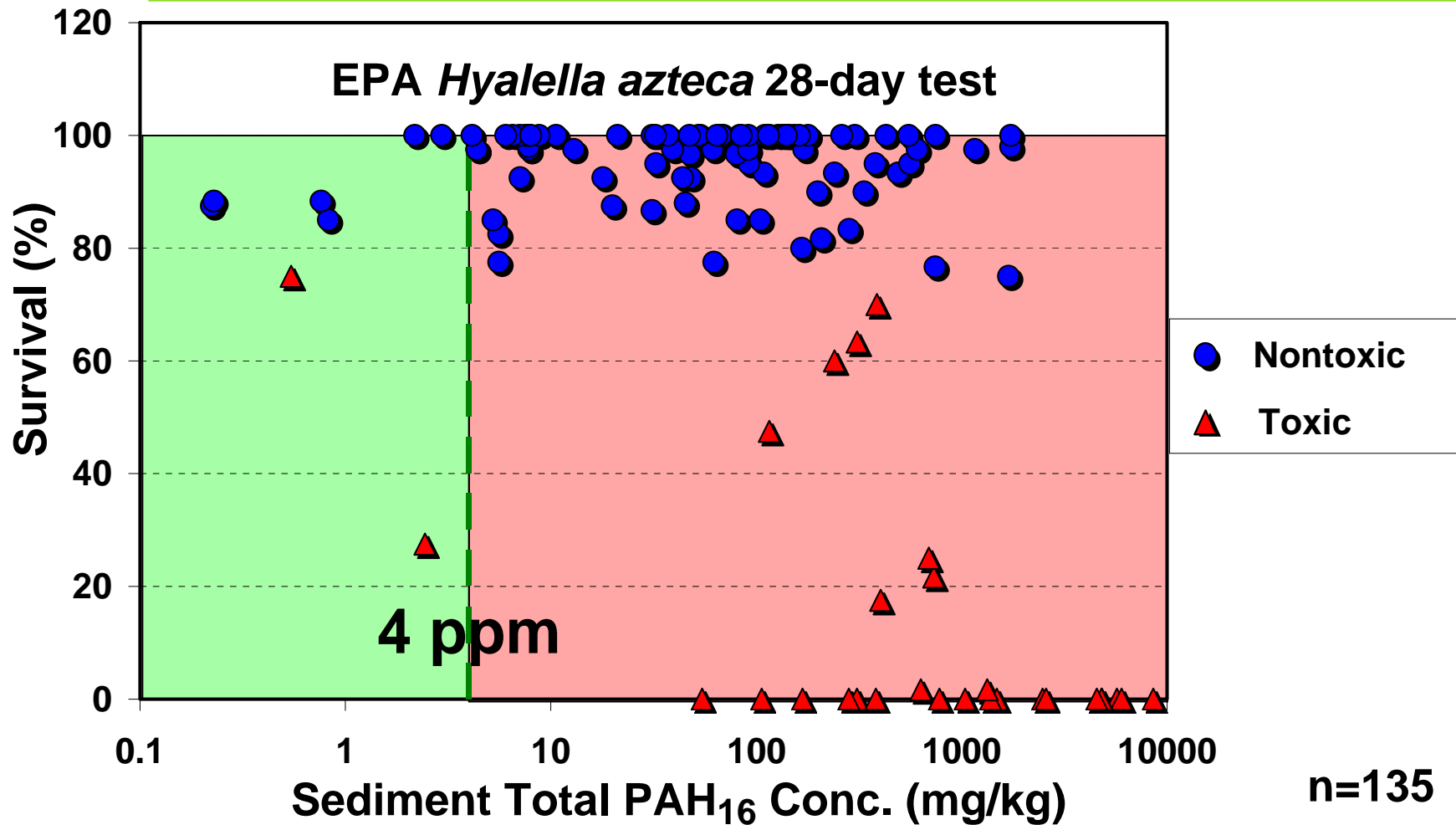
Take Home Messages

- 
- ◆ PAH chemistry and EPA's Equilibrium Partitioning Model predict how PAHs will be distributed in **sediments**, **water** and **biota**



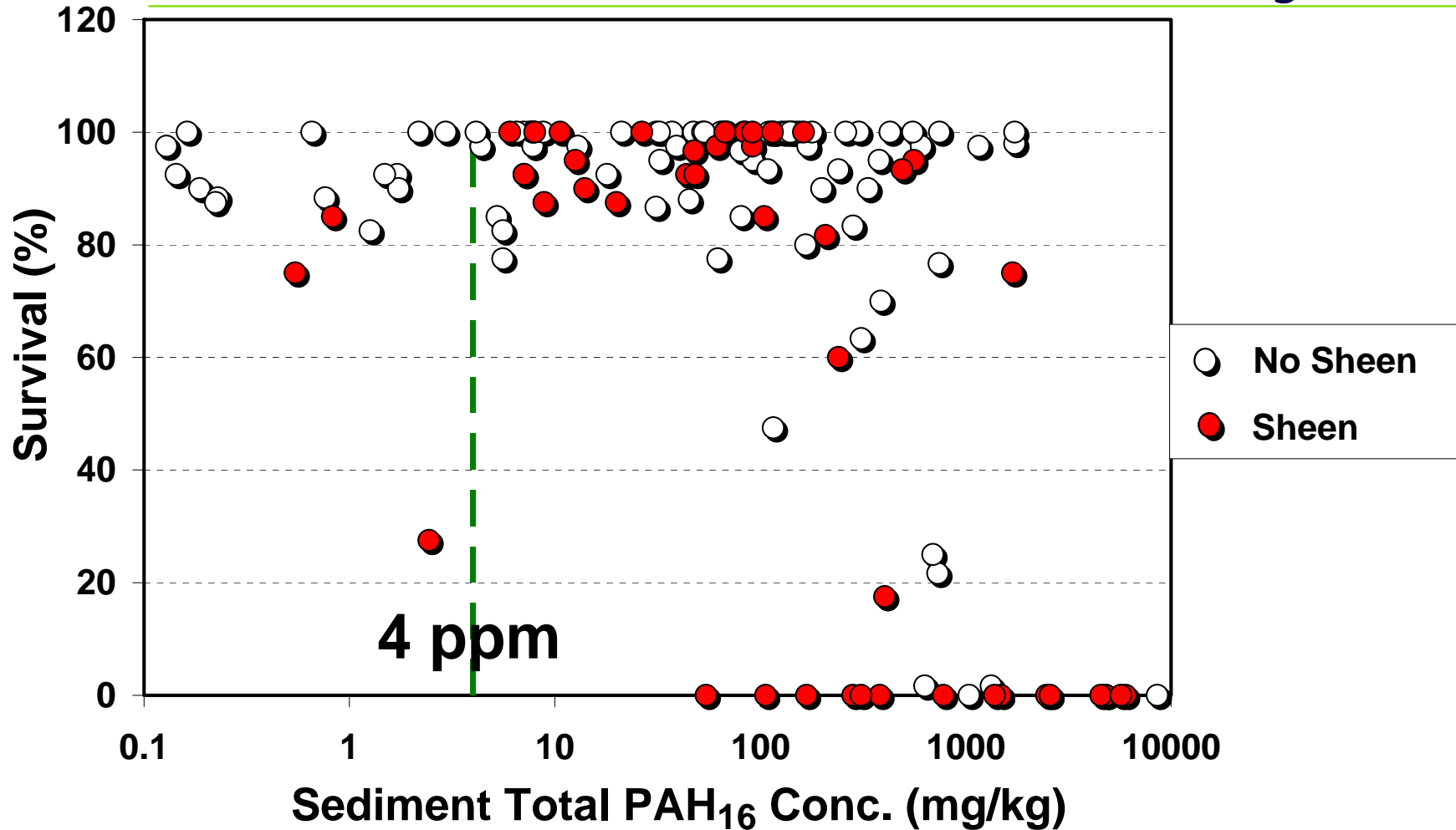
- ◆ EPA's Hydrocarbon Narcosis Model then predicts the [PAH] that is toxic to laboratory test organisms

Total [PAH₁₆] DOES NOT Predict Toxicity

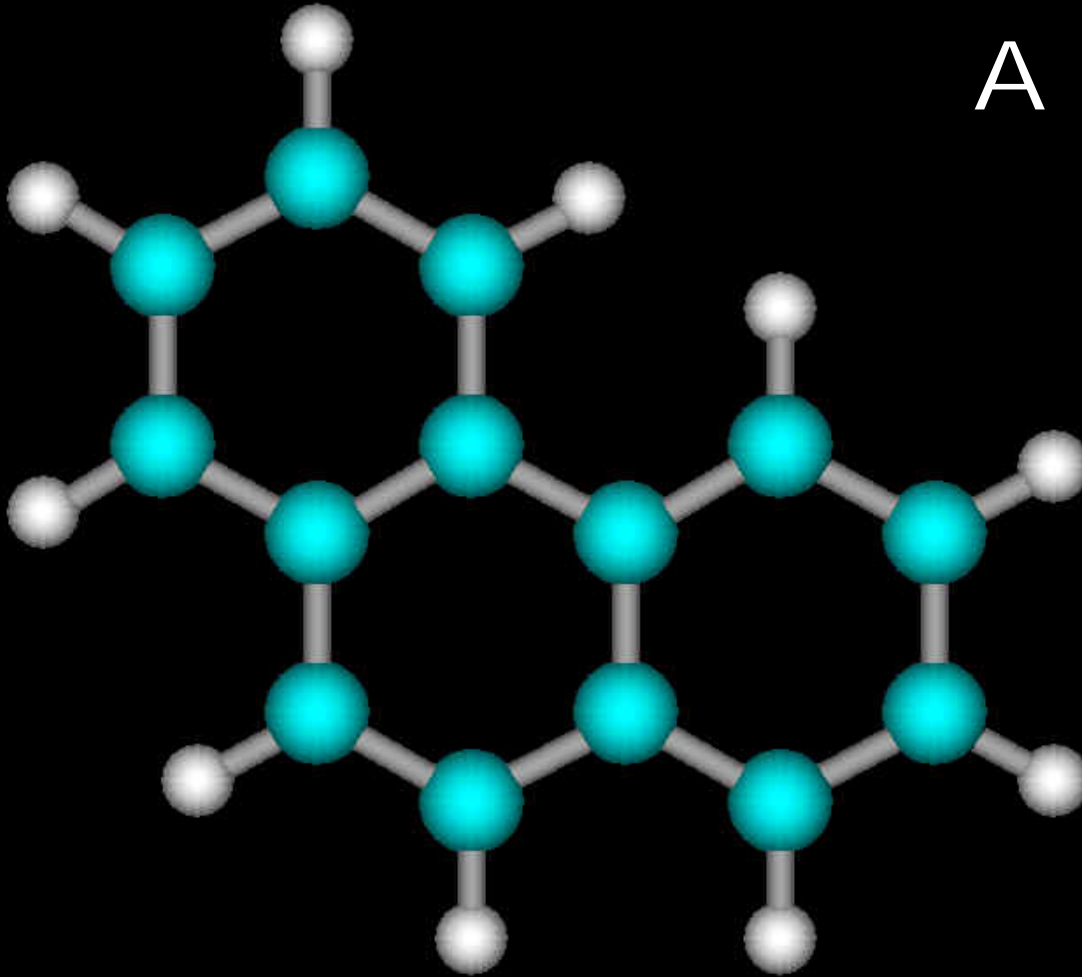


Sheens

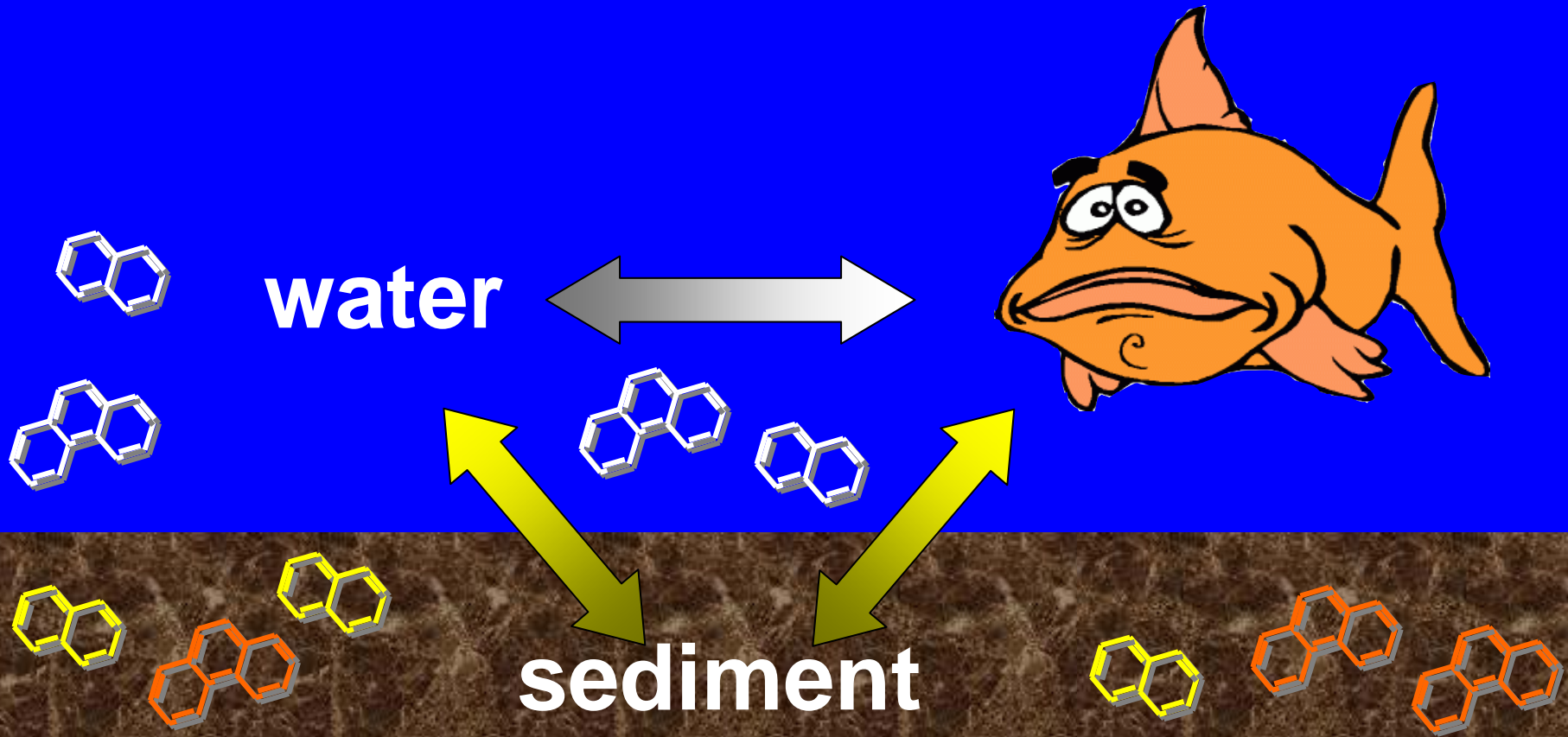
DO NOT Correlate with Toxicity



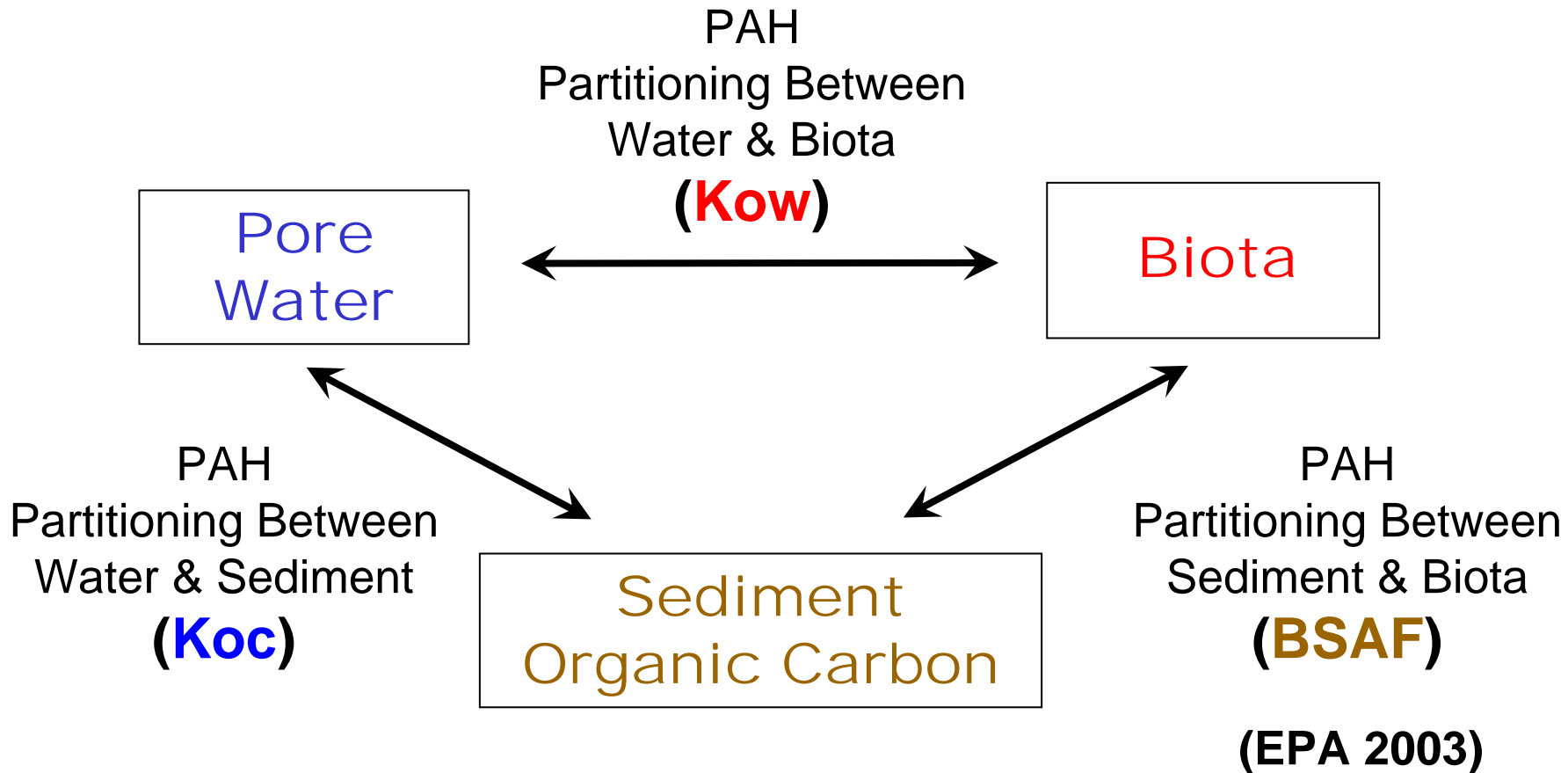
PAH Chemistry - A primer



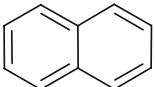
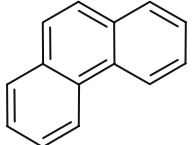
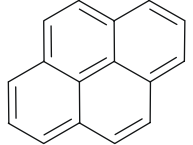
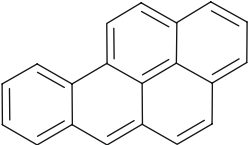
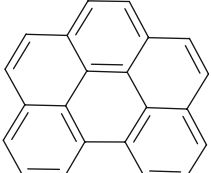
Equilibrium Partitioning (EqP)



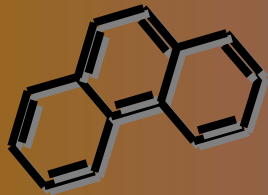
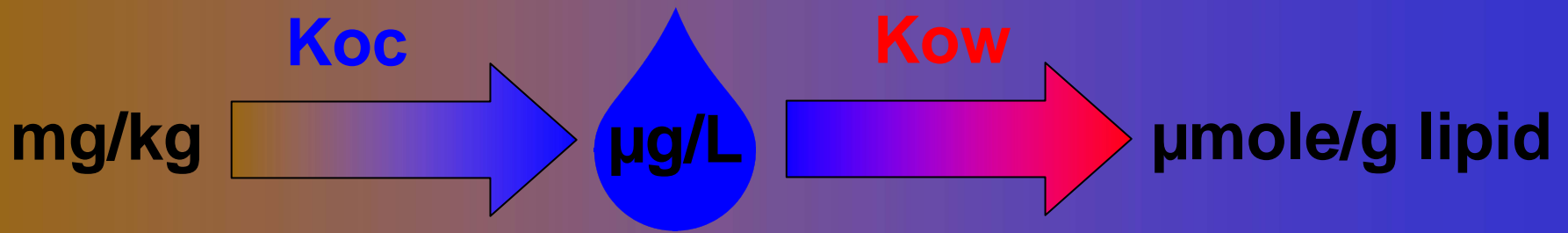
Organic Carbon Controls Bioavailability of PAHs



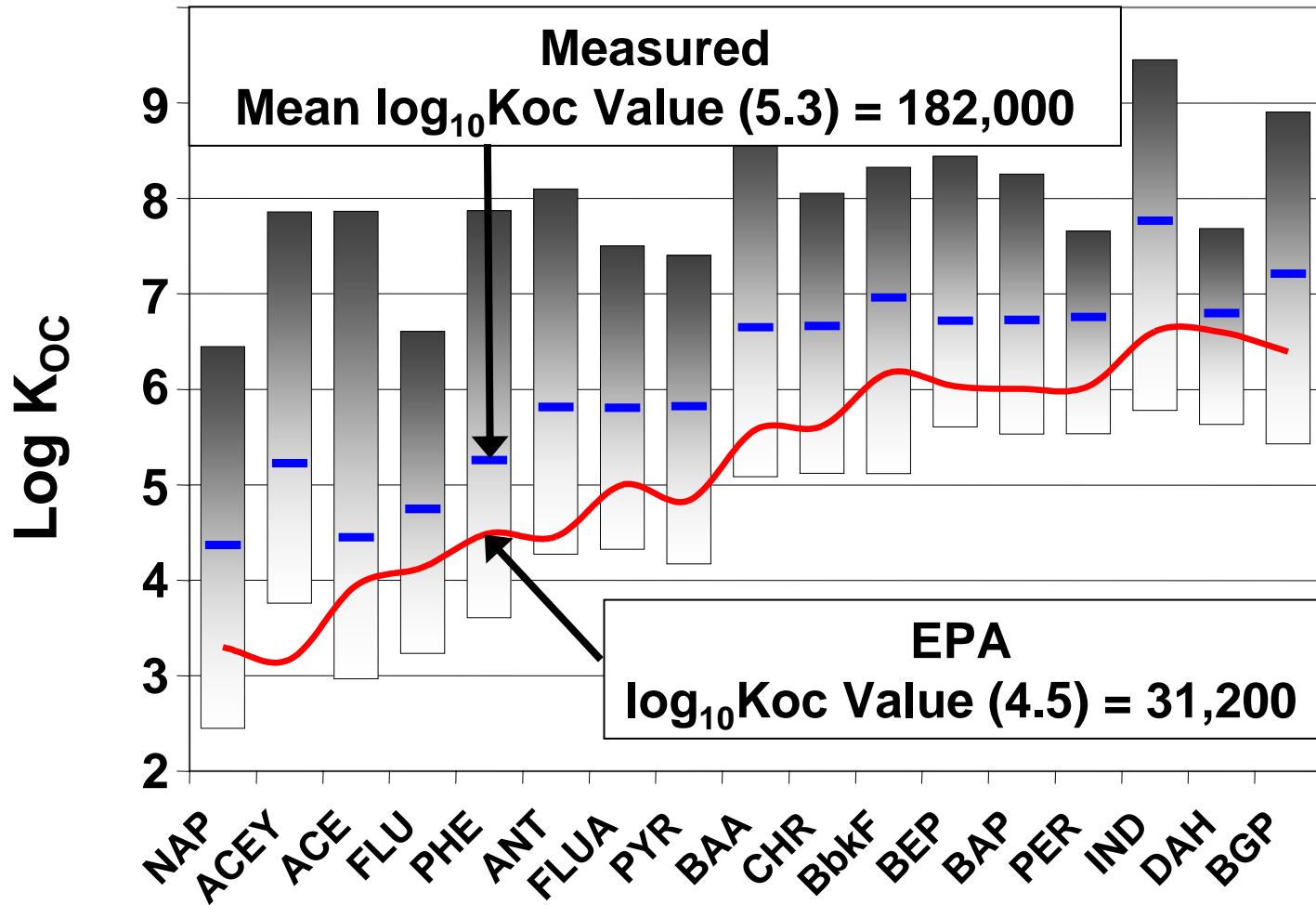
Chemical and Physical Properties of PAHs are Related to Ring Number

PAH	Structure	Mol. Wt. (g/mole)	Solubility ($\mu\text{g/L}$)	K_{oc}	$\log K_{oc}$
Naphthalene		128	31,000	1,990	3.3
Phenanthrene		178	1100	31,200	4.5
Pyrene		202	132	69,000	4.8
Benzo[a]pyrene		252	3.8	1,007,000	6.0
Benzo[g,h,i]perylene		276	0.26	2,500,000	6.4

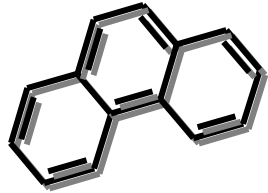
EPA's EqP from Sediment to Water to Organism



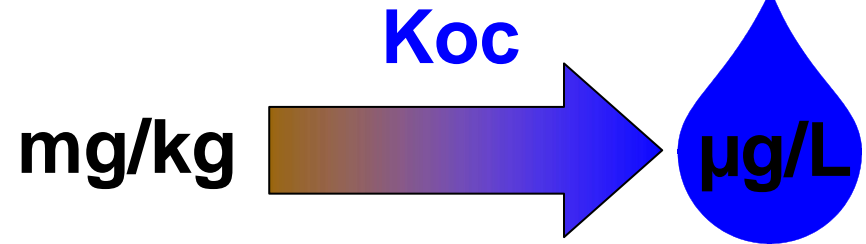
Actual Koc Increases by 1000-fold in MGP Sediments



EqP Sediment to Water



100 mg/kg PHE
1% TOC

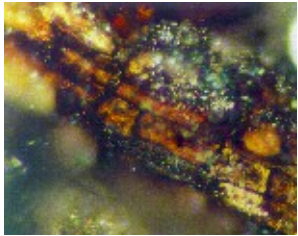


$$\frac{100 \text{ mg/kg}}{1\% \text{ TOC}} \times \frac{1 \text{ mg/L}}{31,200 \text{ mg/kg}} \times \frac{1,000 \text{ } \mu\text{g/L}}{1 \text{ mg/L}} = 320 \text{ } \mu\text{g/L}$$

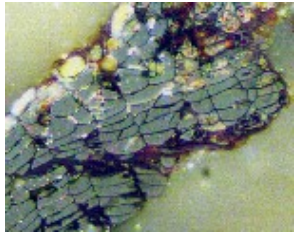
(Koc)

$$\frac{100 \text{ mg/kg}}{1\% \text{ TOC}} \times \frac{1 \text{ mg/L}}{182,000 \text{ mg/kg}} \times \frac{1,000 \text{ } \mu\text{g/L}}{1 \text{ mg/L}} = 55 \text{ } \mu\text{g/L}$$

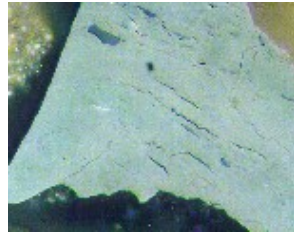
New York River Sediments Contain **Natural** and **Anthropogenic** Carbon



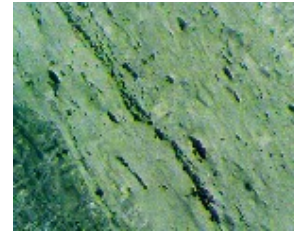
wood



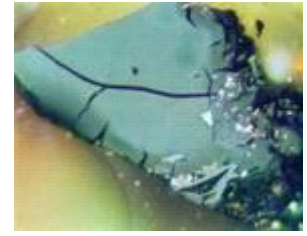
lignite



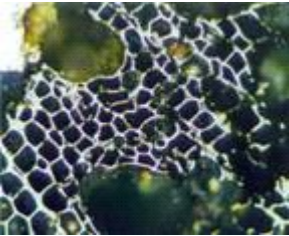
bituminous
coal



anthracite coal



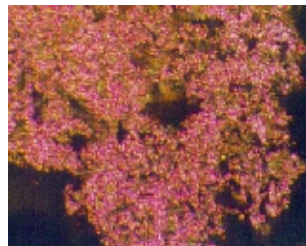
oxidized coal



charcoal



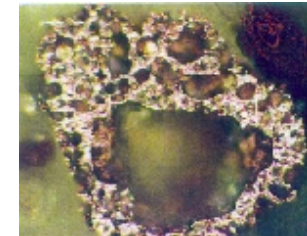
coke



soot carbon



coal tar pitch



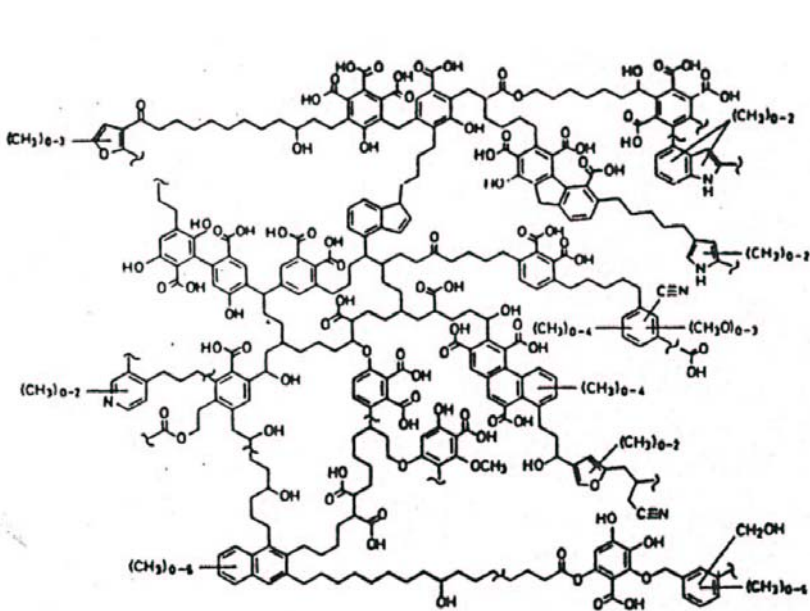
cenosphere

PAH binding (K_{oc}**) is very different for different types of carbon**

(U. Ghosh et al., 2003)

Chemistry of Organic Carbon

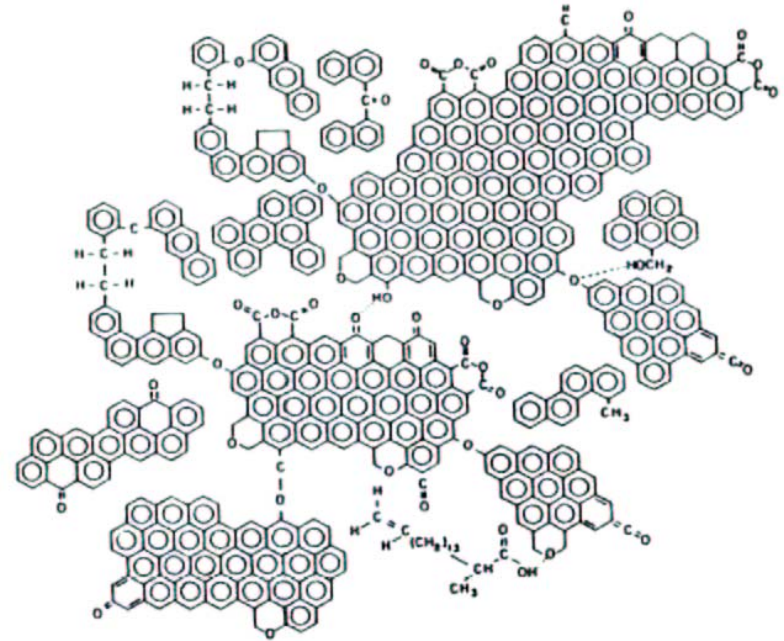
Anthropogenic carbon binds PAHs more tightly



Natural Organic Carbon

More hydrogen

More oxygen

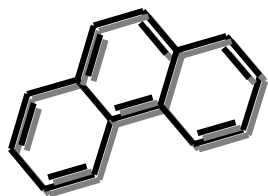


Anthropogenic Carbon

Less hydrogen

More aromatic

EPA's EqP Water to Biota(Lipid)



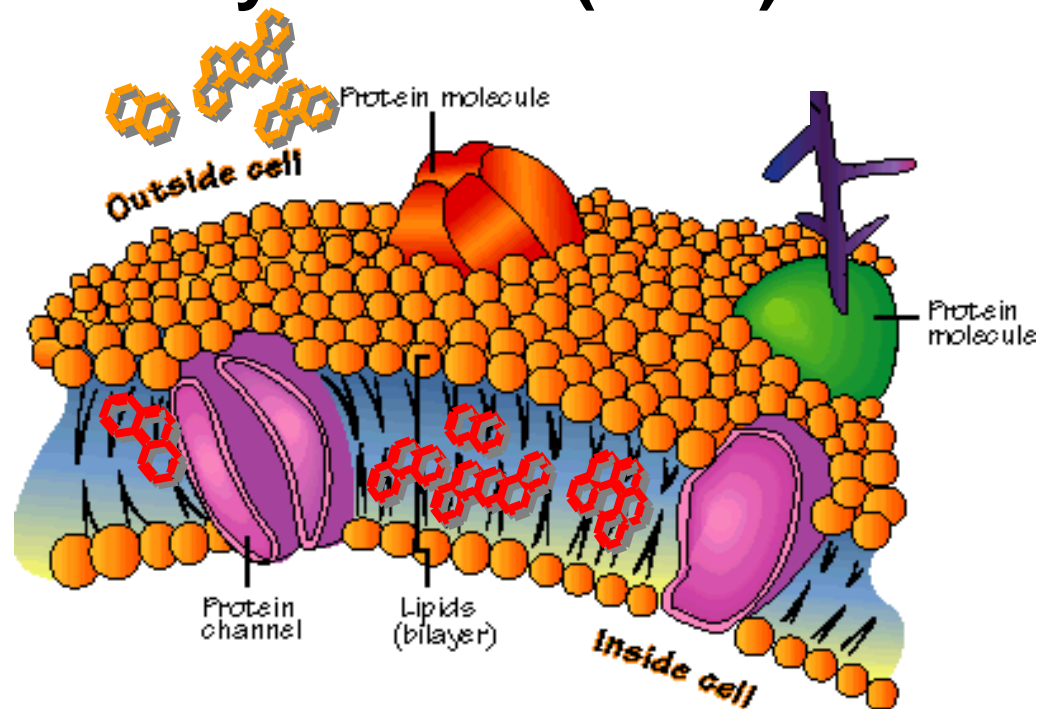
$\mu\text{g/L}$ $\xrightarrow{\text{Kow}}$ $\mu\text{mole/g lipid}$

$$320 \mu\text{g/L} \times \frac{1 \text{ mole}}{178,000 \mu\text{g}} \times K_{ow} = 67 \mu\text{mole/g lipid}$$

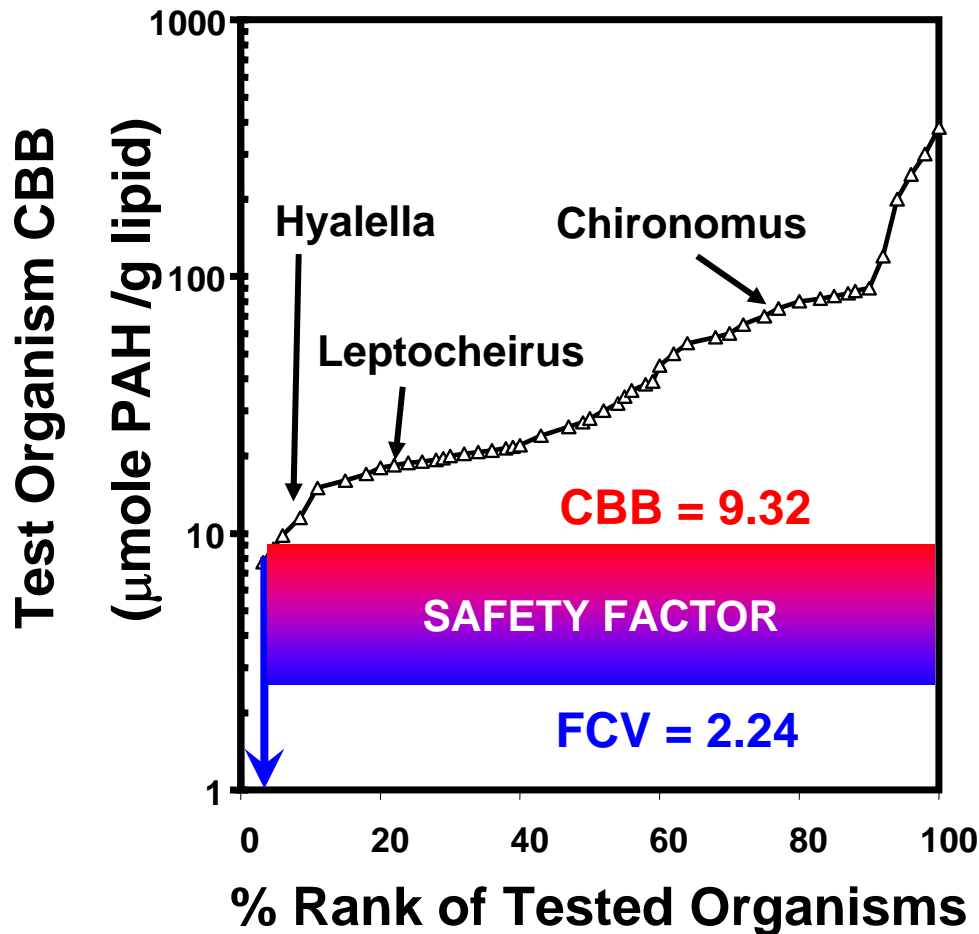
$$55 \mu\text{g/L} \times \frac{1 \text{ mole}}{178,000 \mu\text{g}} \times K_{ow} = 11 \mu\text{mole/g lipid}$$

EPA Hydrocarbon Narcosis Model

- ◆ Narcosis occurs when the internal concentration in test organism lipid exceeds the critical body burden (CBB).



EPA Toxicity of PAHs to Aquatic Organisms



◆ CBB = acute toxicity for 95% of EPA tested organisms

◆ Acute/Chronic Toxicity = 4.16

◆ Final Chronic Value (FCV)
= $9.32 \div 4.16$
= 2.24 $\mu\text{mole PAH/g lipid}$

◆ FCV is protective for chronic toxicity

(U.S. EPA 2003)

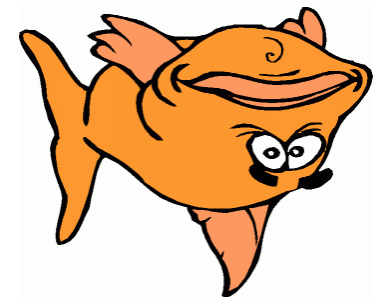
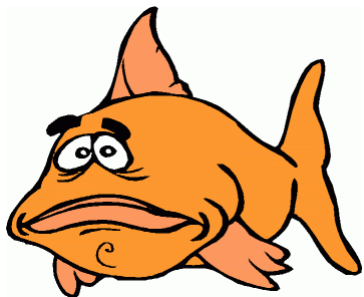
From $\mu\text{mole/g}$ lipid to Toxic Units (TUs)

2.24 $\mu\text{mole PAH}_{34}/\text{g}$ lipid = 1.0 TU

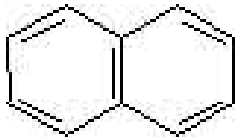
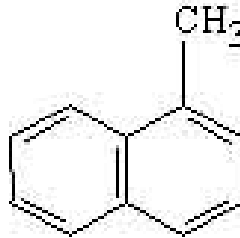
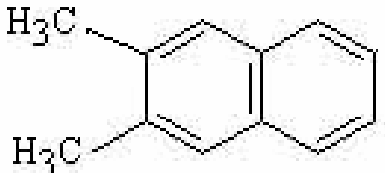
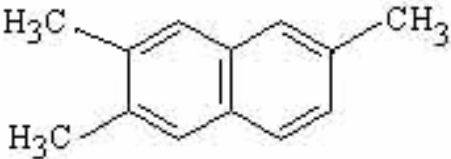
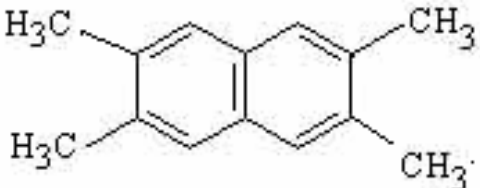
EPA Narcosis Model Proposed Framework

< 1.0 TU
Likely Nontoxic

> 1.0 TU
Potentially Toxic

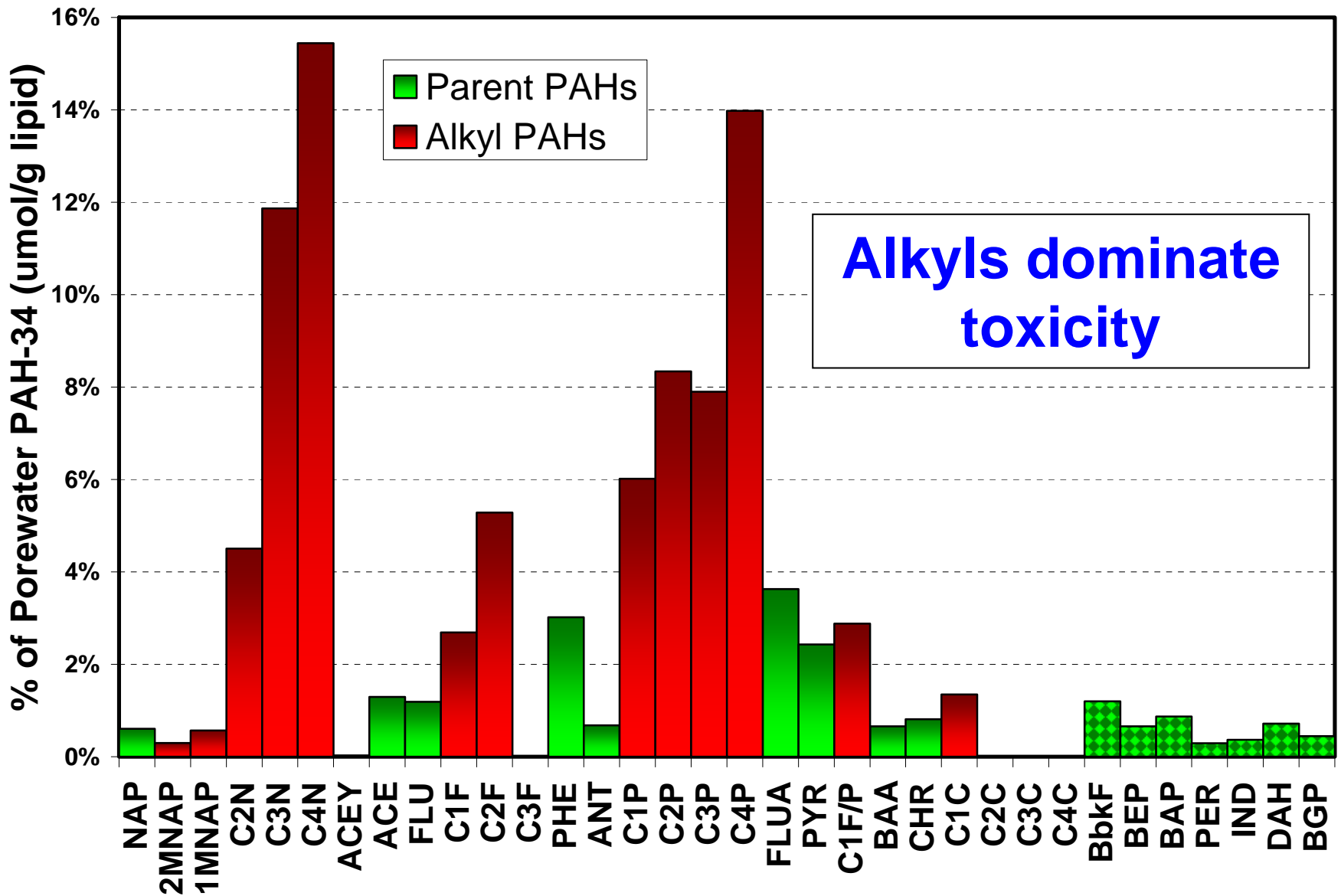


PAHs are a Complex Mixture of Parent and Alkylated PAHs

PAH	Number of Isomers	Chemical Structures
Naphthalene	1	 Parent
Alkylated		
C1- naphthalenes	2	
C2- naphthalenes	12	
C3- naphthalenes	>27	
C4- naphthalenes	>70	

Standard EPA 8270 Method: Does Not Measure Alkyl PAHs!!!!

- ◆ **EPA 16 priority pollutant PAHs (PAH₁₆)**
 - ◆ **Parent compounds only**
- ◆ **NOAA 34 PAHs (PAH₃₄)**
 - ◆ **18 parent compounds plus**
 - ◆ **16 groups of alkylated compounds**
 - ◆ **Represents hundreds of PAHs**



Majority of Toxicity is Associated with Alkyl PAHs

Site Name	Parent PAHs	Alkyl PAHs
Utica	15%	85%
Hudson	15%	85%
Plattsburgh	17%	83%
Troy	37%	63%
Average	21%	79%

Majority of Toxicity from 2- to 4-Ring PAHs

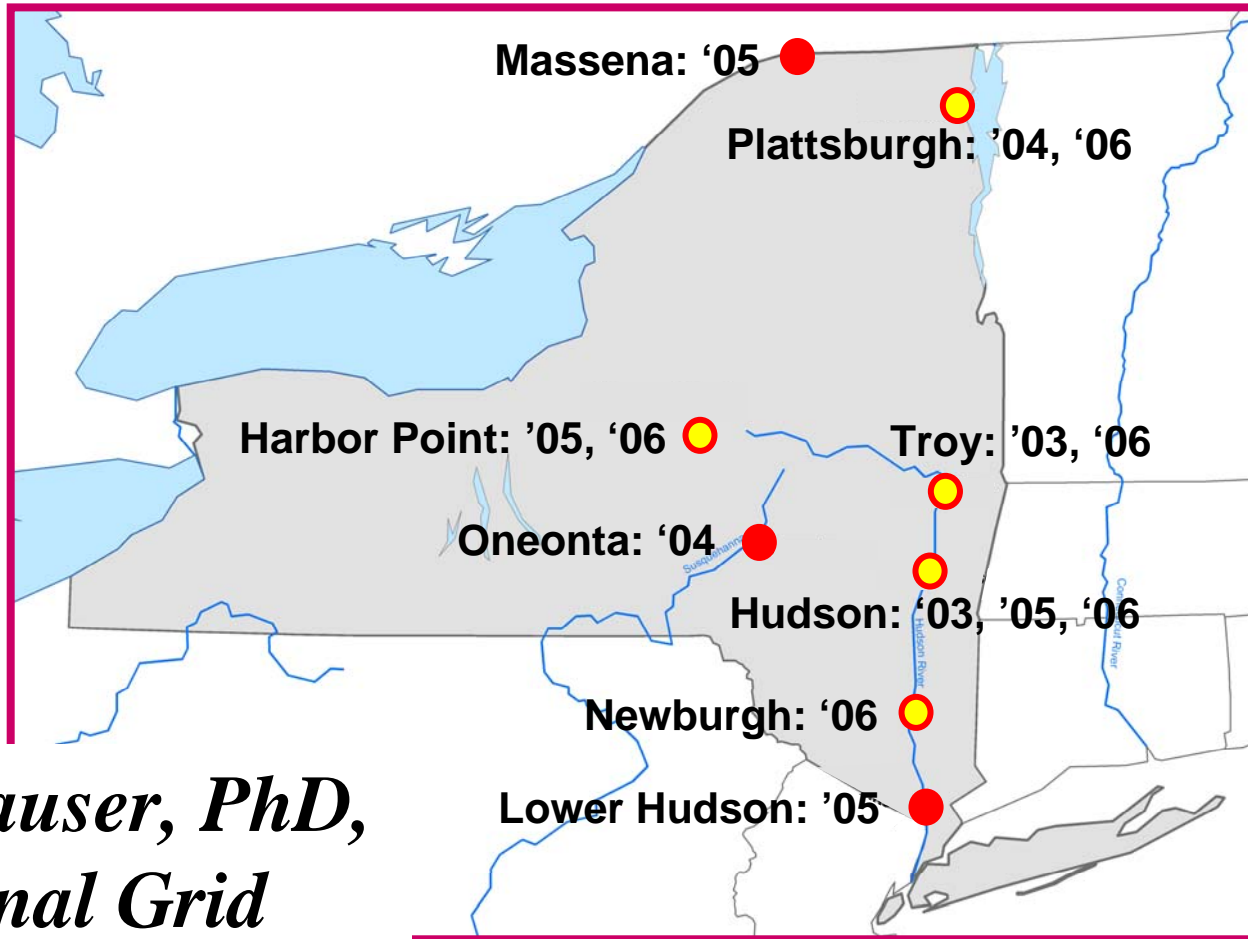
Site Name	2- to 4-Ring Parent	2- to 4-Ring Alkyl	5- to 6-Ring Parent
Utica	12%	85%	4%
Hudson	12%	85%	3%
Plattsburgh	13%	83%	4%
Troy	35%	63%	2%
Average	18%	79%	3%



Summary

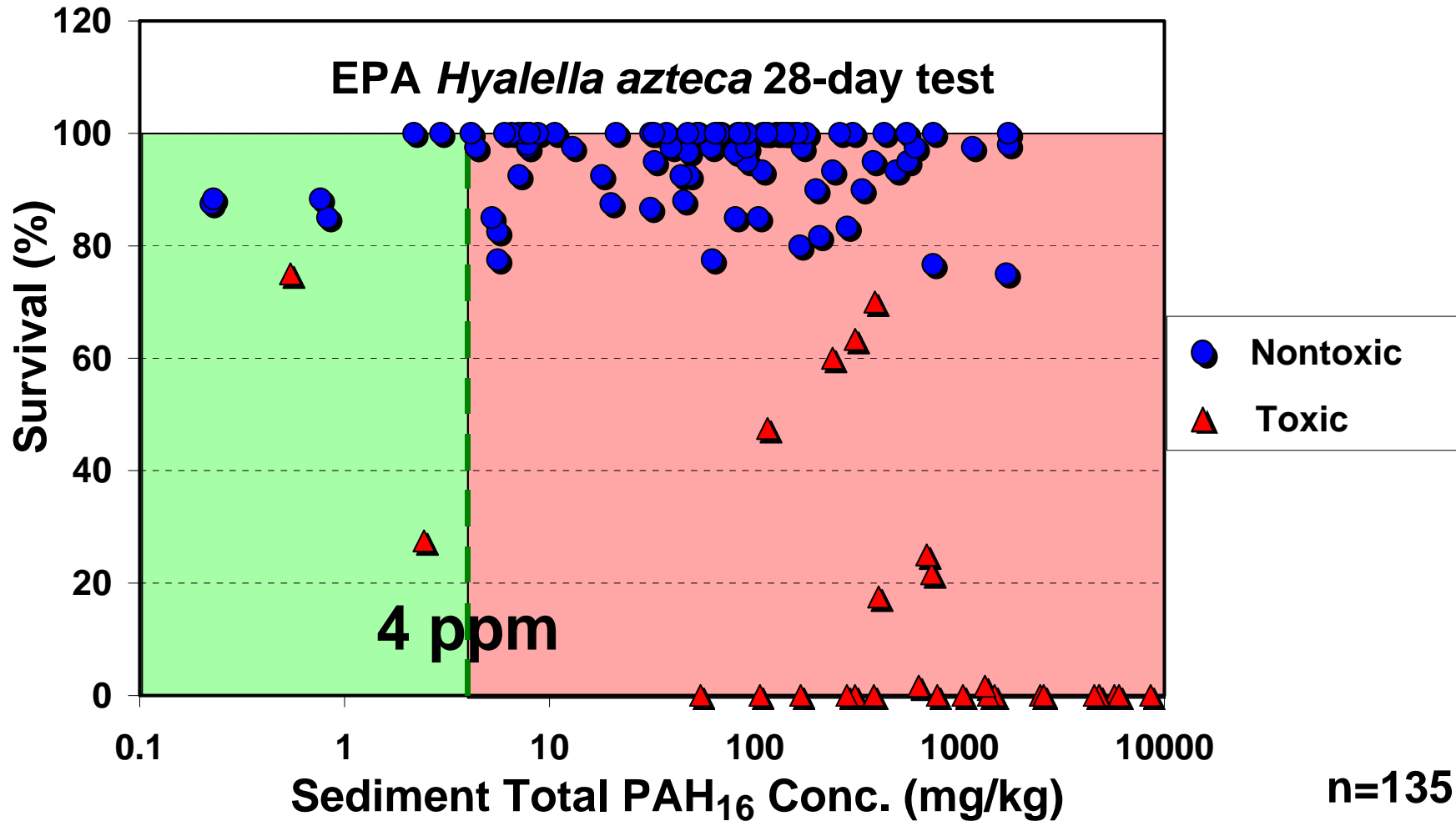
- ◆ **Type and amount of organic carbon is important to understanding PAH bioavailability**
- ◆ **It is important to measure the alkyated [PAH] to accurately predict toxicity**

SCBA Case Studies: 2003-2006



*Ed Neuhauser, PhD,
National Grid*

Total [PAH₁₆] DOES NOT Predict Toxicity



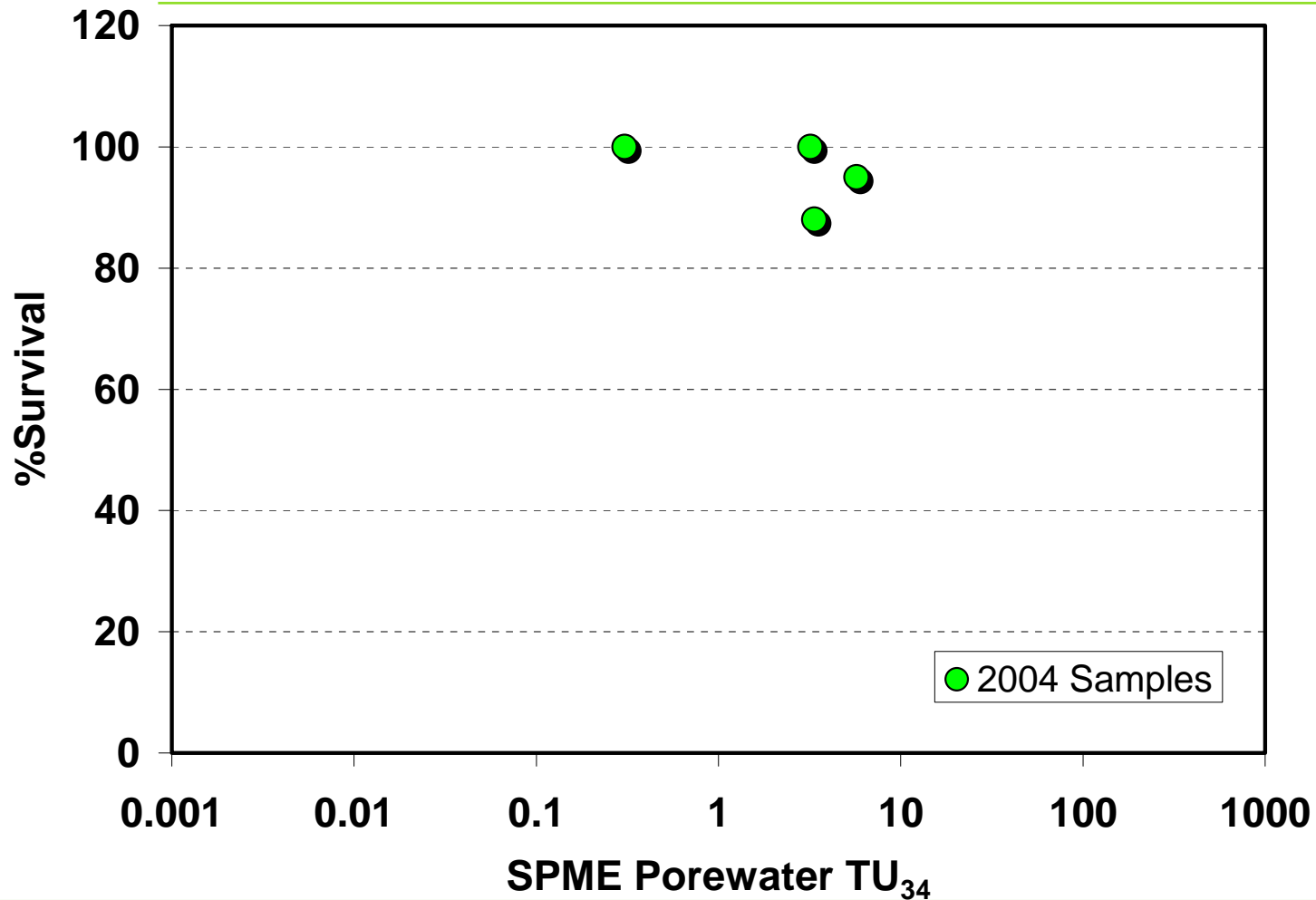
● Toxic

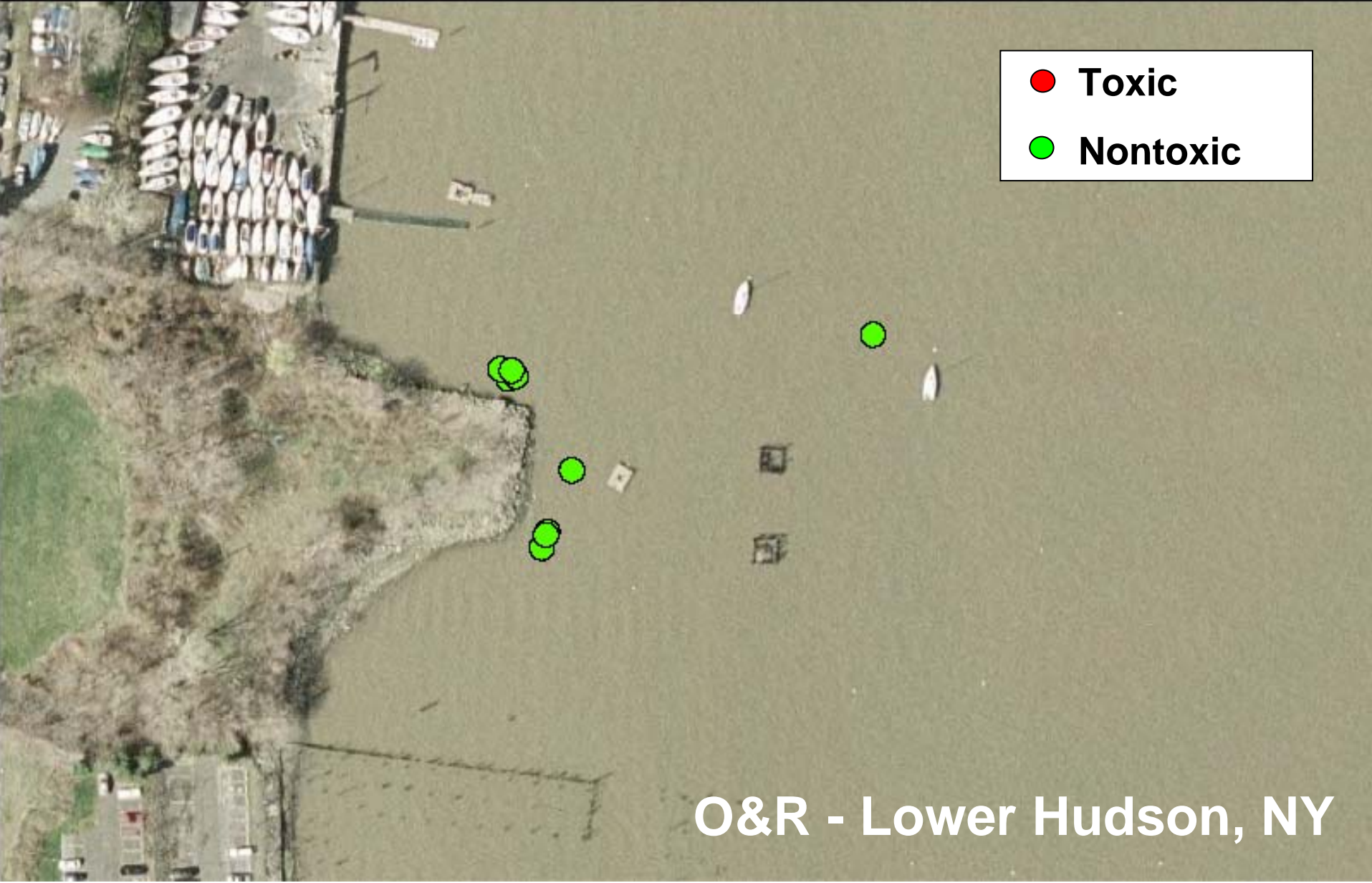
● Nontoxic

NYSEG - Oneonta, NY



Oneonta Case Study



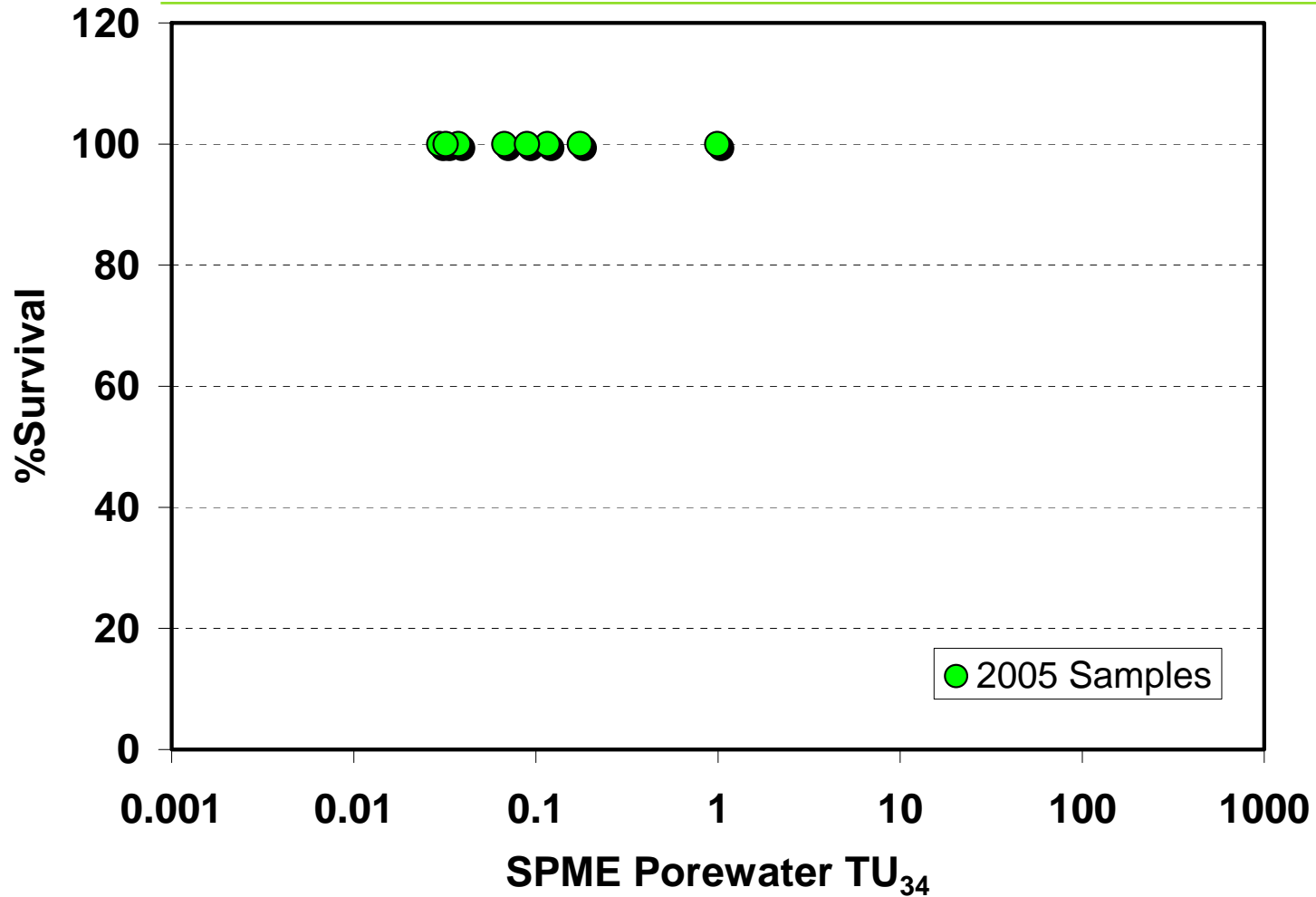


- Toxic
- Nontoxic

O&R - Lower Hudson, NY

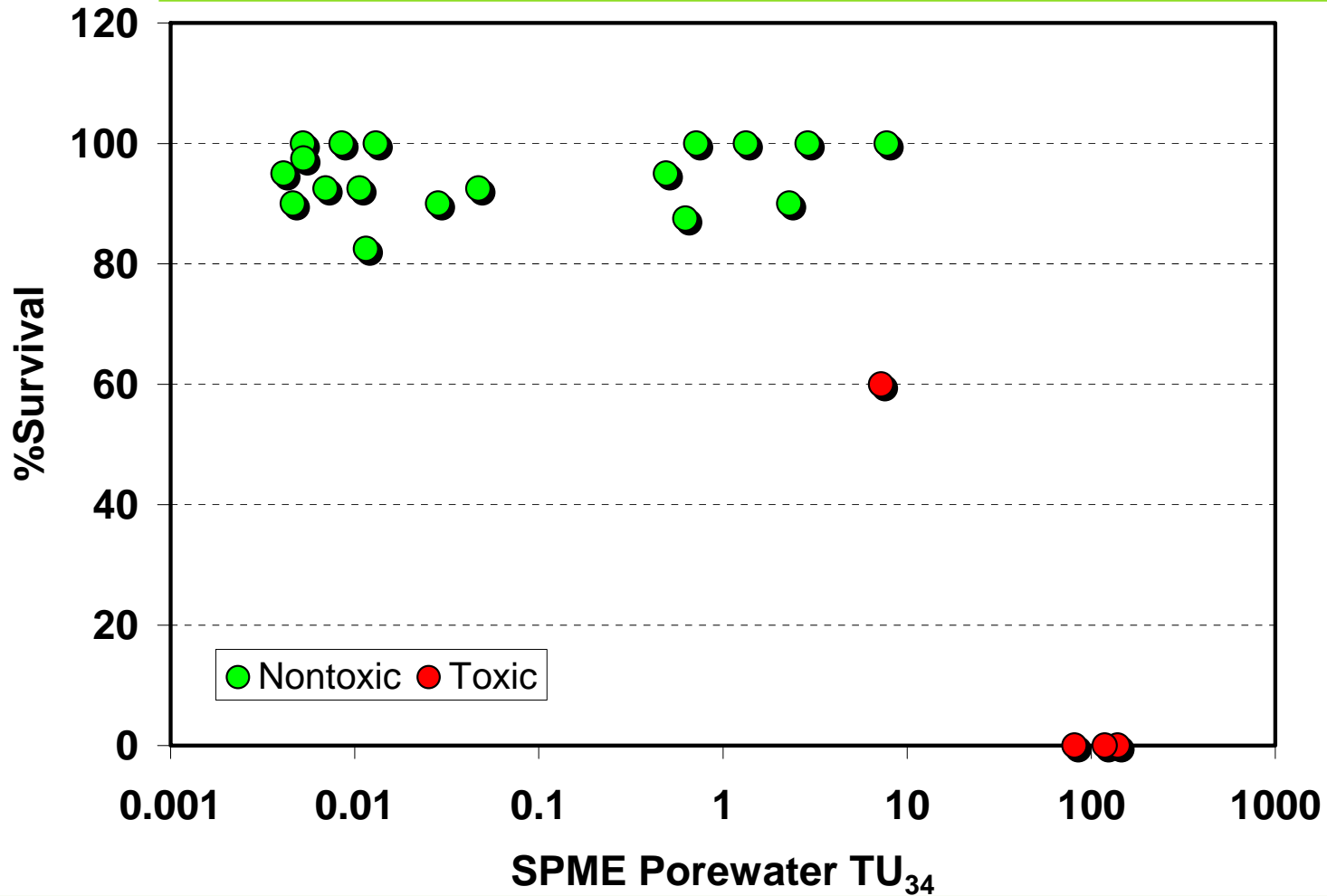


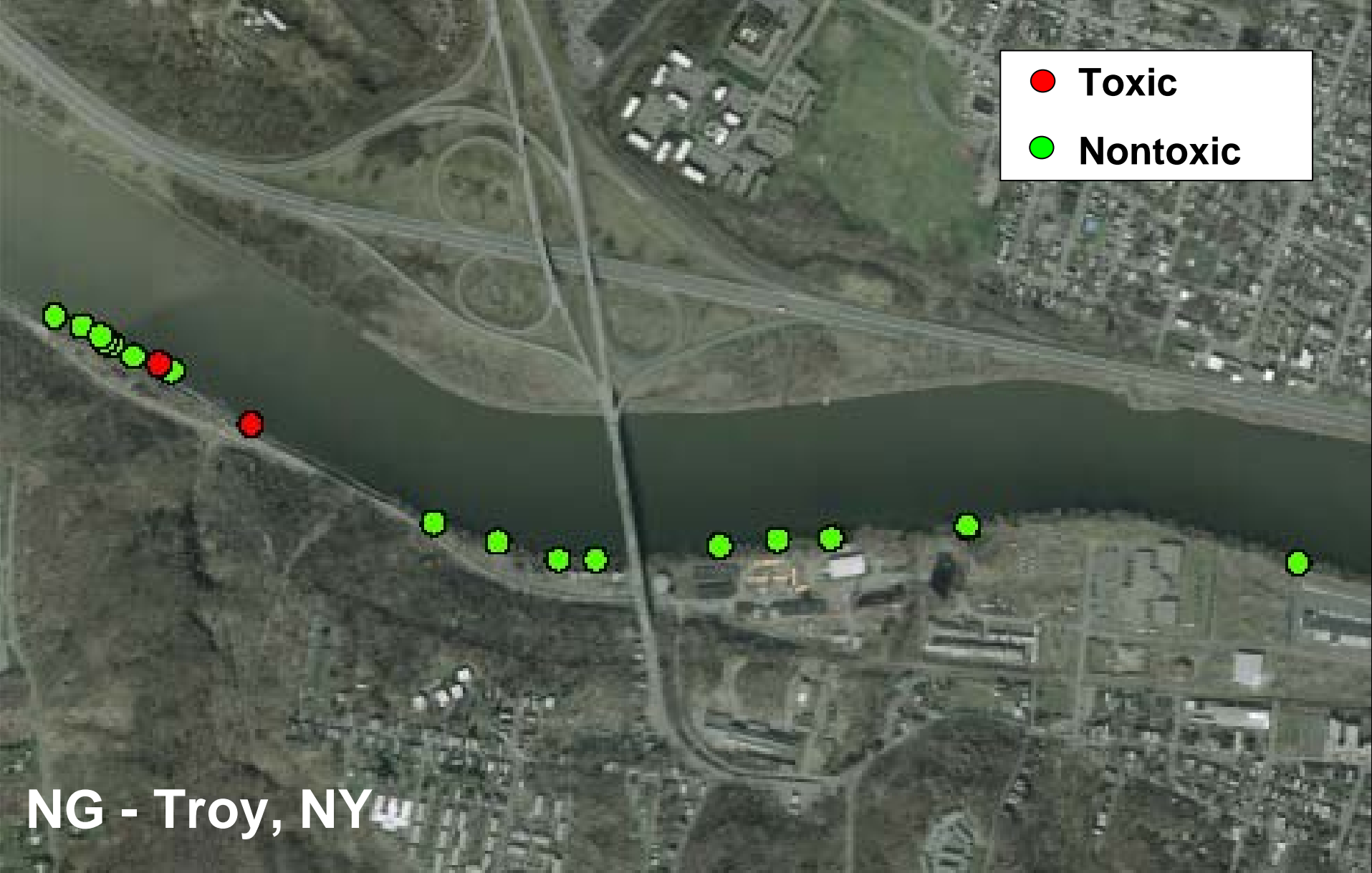
Lower Hudson Case Study





Plattsburgh Case Studies



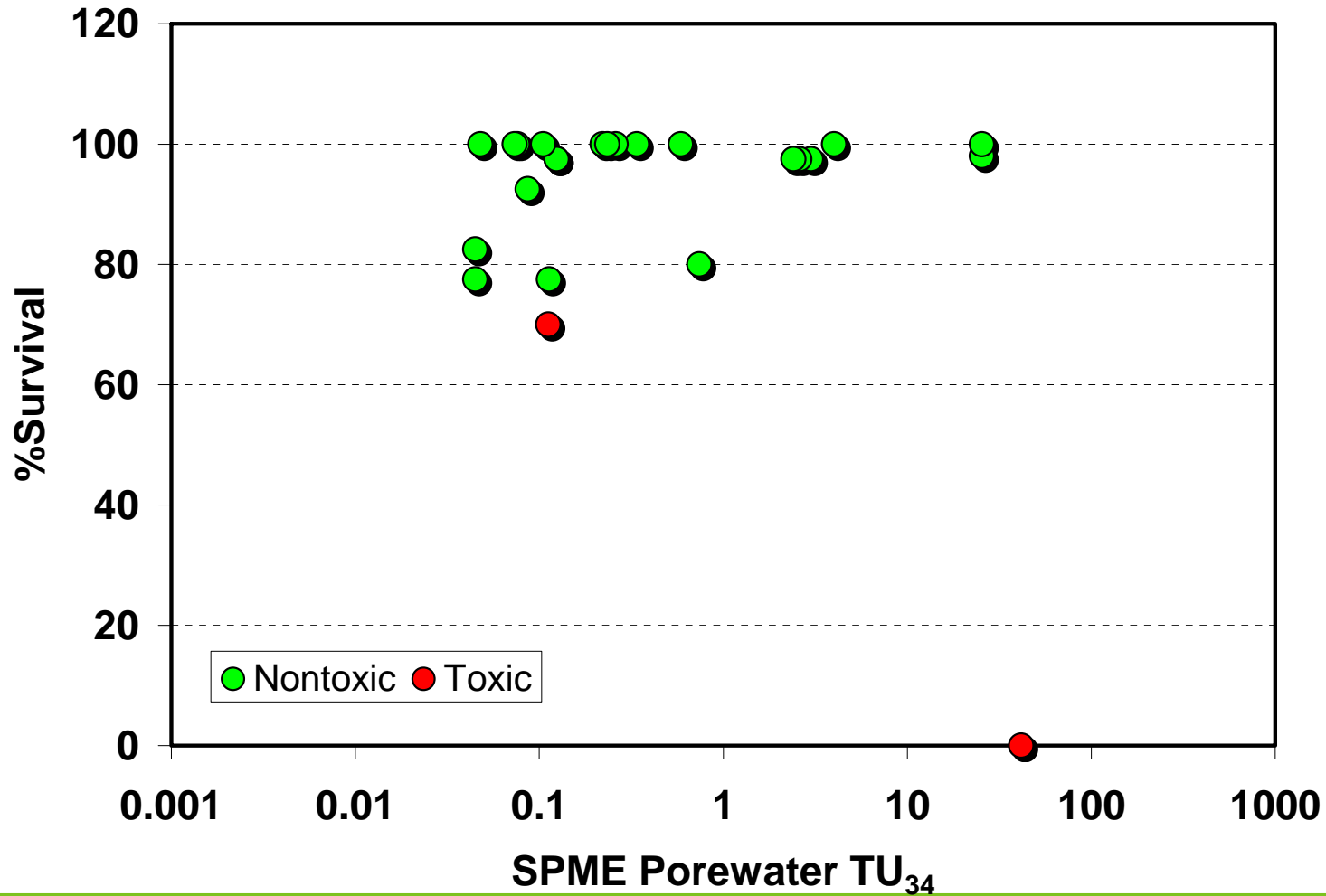


- Toxic
- Nontoxic

NG - Troy, NY



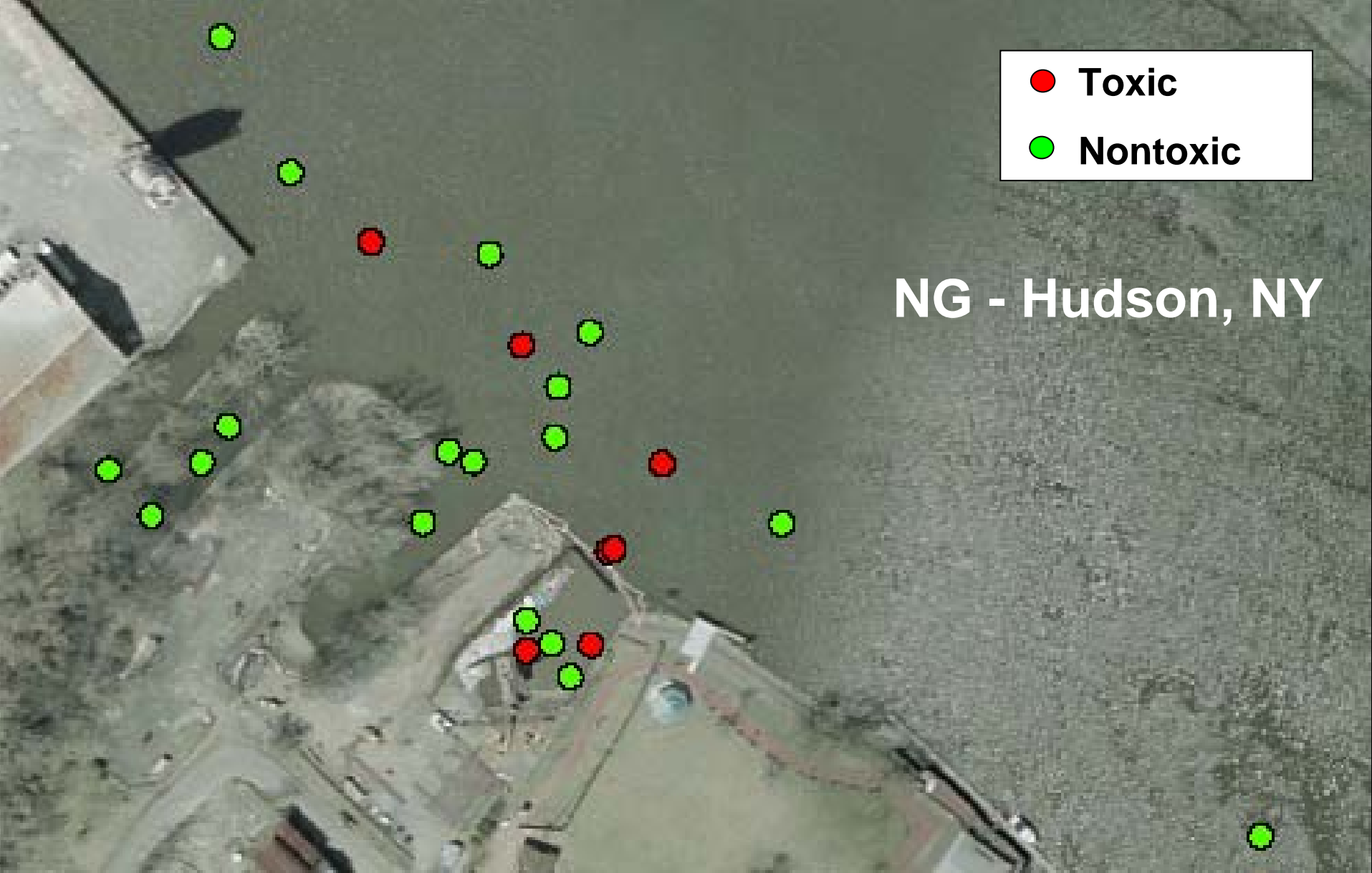
Troy Case Studies



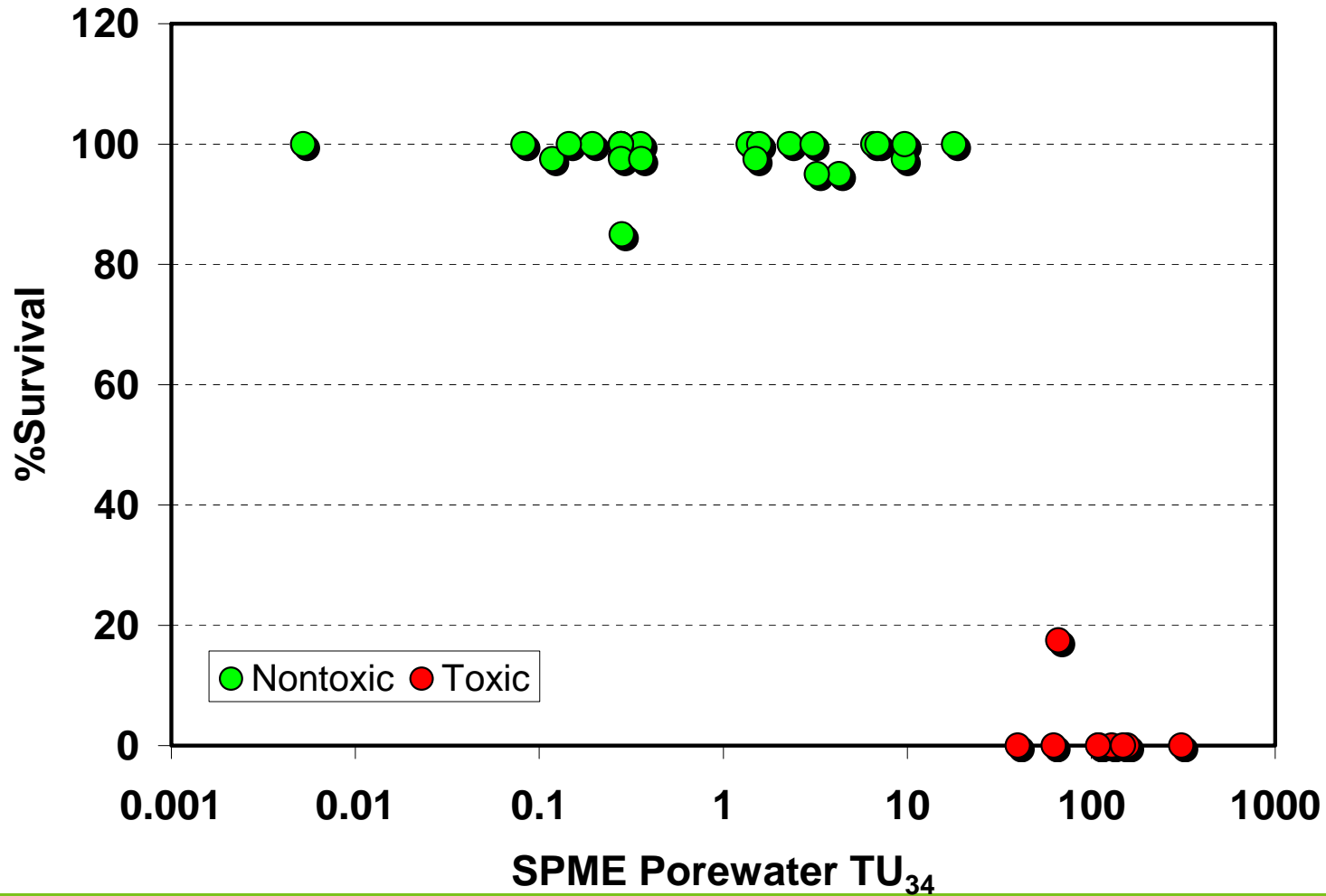
● Toxic

● Nontoxic

NG - Hudson, NY



Hudson Case Studies

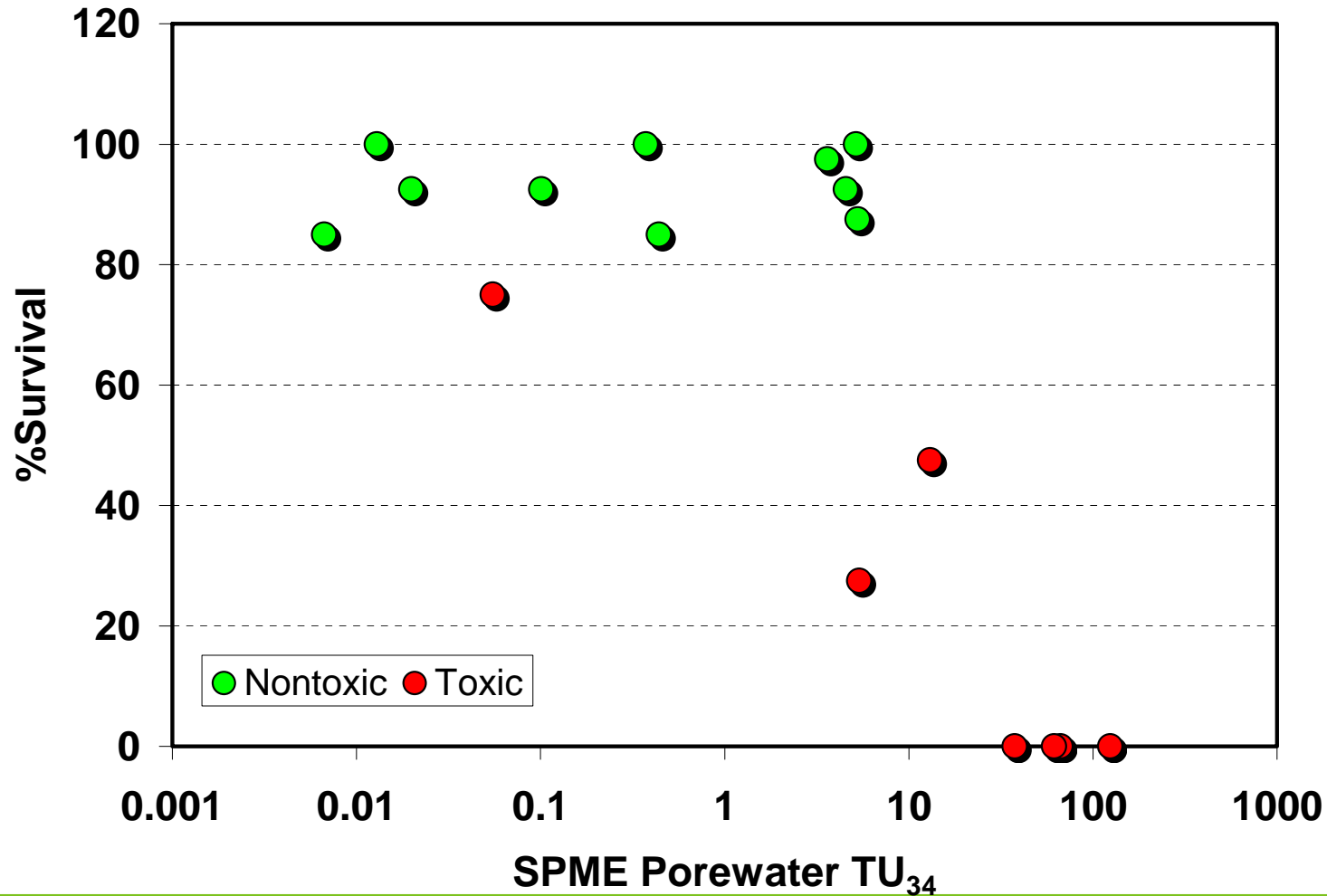


NG - Utica, NY

● Toxic
● Nontoxic



Utica Case Studies



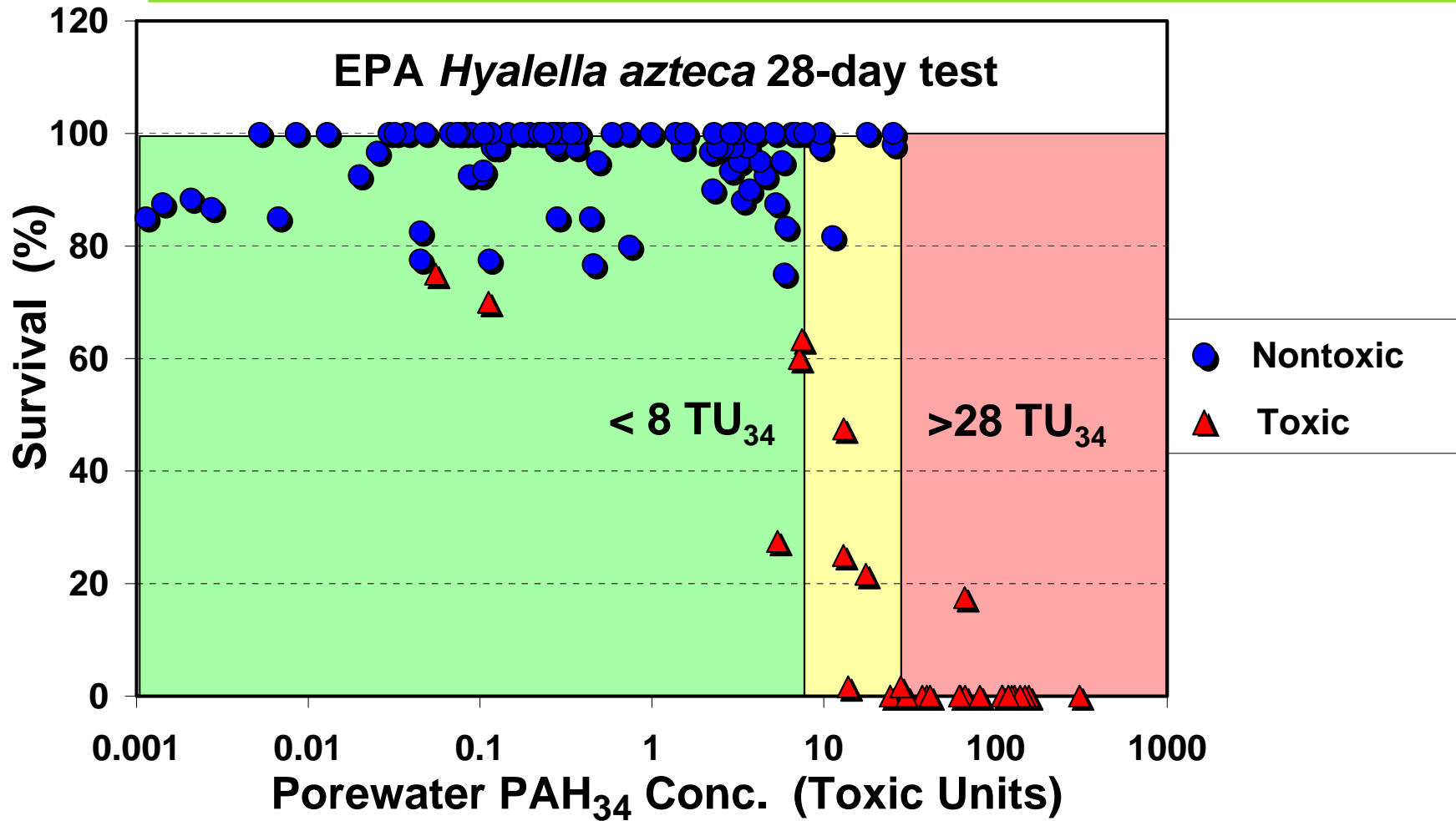
Tying it all Together

Case Study Conclusions



SCBA Method

DOES Predict *H. azteca* Survival



SCBA Method Provides the Best Overall Model

Characterization Method	Prediction Efficiencies		Overall Efficiency (%)
	Sensitivity	Specificity	
22.8 mg/kg PAH ₁₆ (PEC)	96%	32%	48%
Porewater PAH ₃₄ (μmole/g lipid)	92%	89%	90%

- ◆ **Sensitivity = Correctly classify nontoxic**
- ◆ **Specificity = Correctly classify toxic**

- ◆ **Ability to correctly classify toxic and nontoxic sediment samples is 90%.**

Value of SCBA Initiative – Information for Better Remedial Decision-Making

- ◆ **Ensure protection of human health and the environment**
- ◆ **Prioritize how resources are spent**
- ◆ **Expedite site closure: Reduce time and costs**



Sediment Quality Triad: Methodology & Results

EEANY/NGA
18 Jan 2007

Nick Azzolina, The RETEC Group, Inc.
Edward Neuhauser, PhD, National Grid



NYSDEC Regulatory Question: Is the EPA's Sediment Quality Triad Useful?

Sediment Chemistry

(SPME)

Toxicity
Testing

(H. azteca)



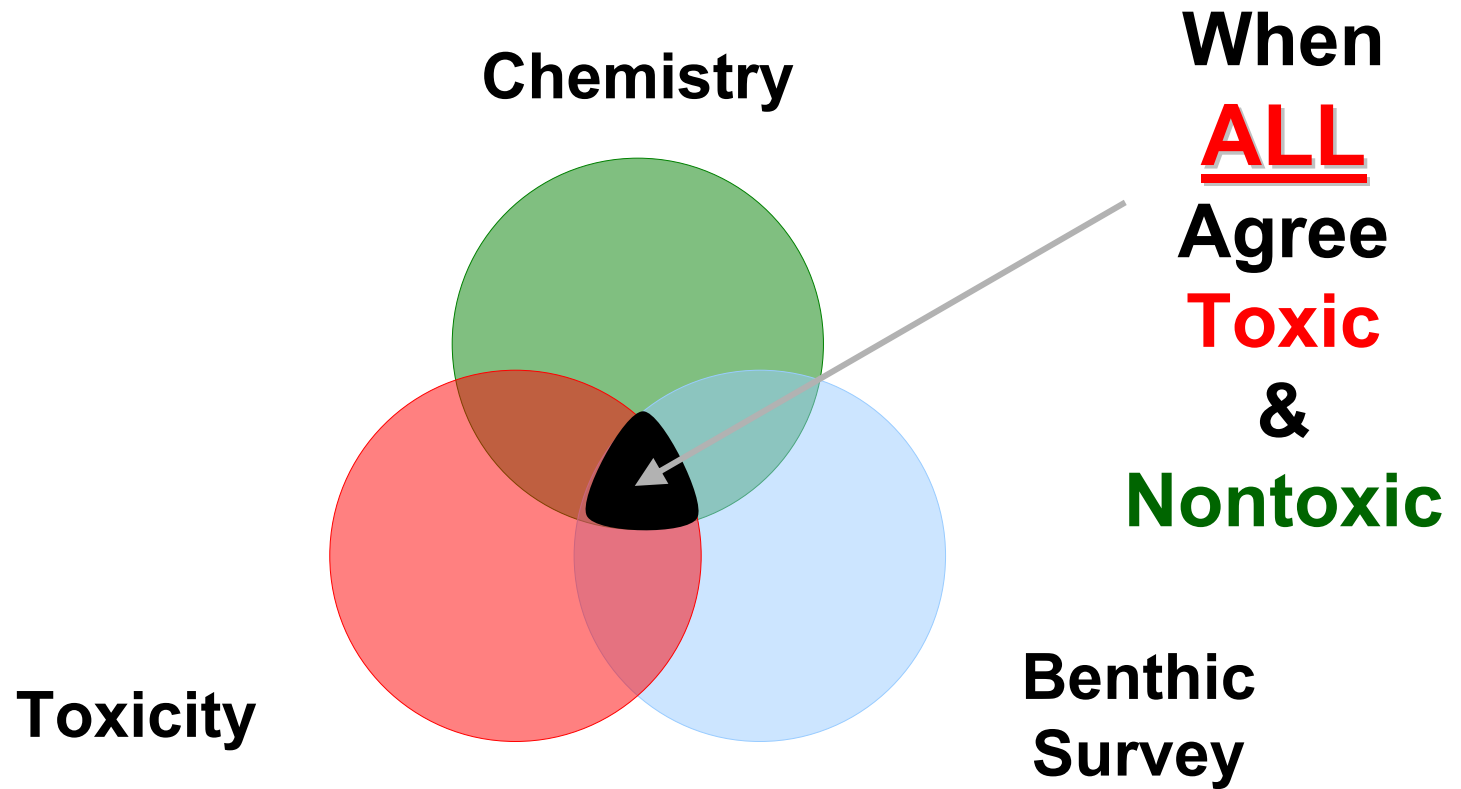
Benthic
Survey

(added in 2006)

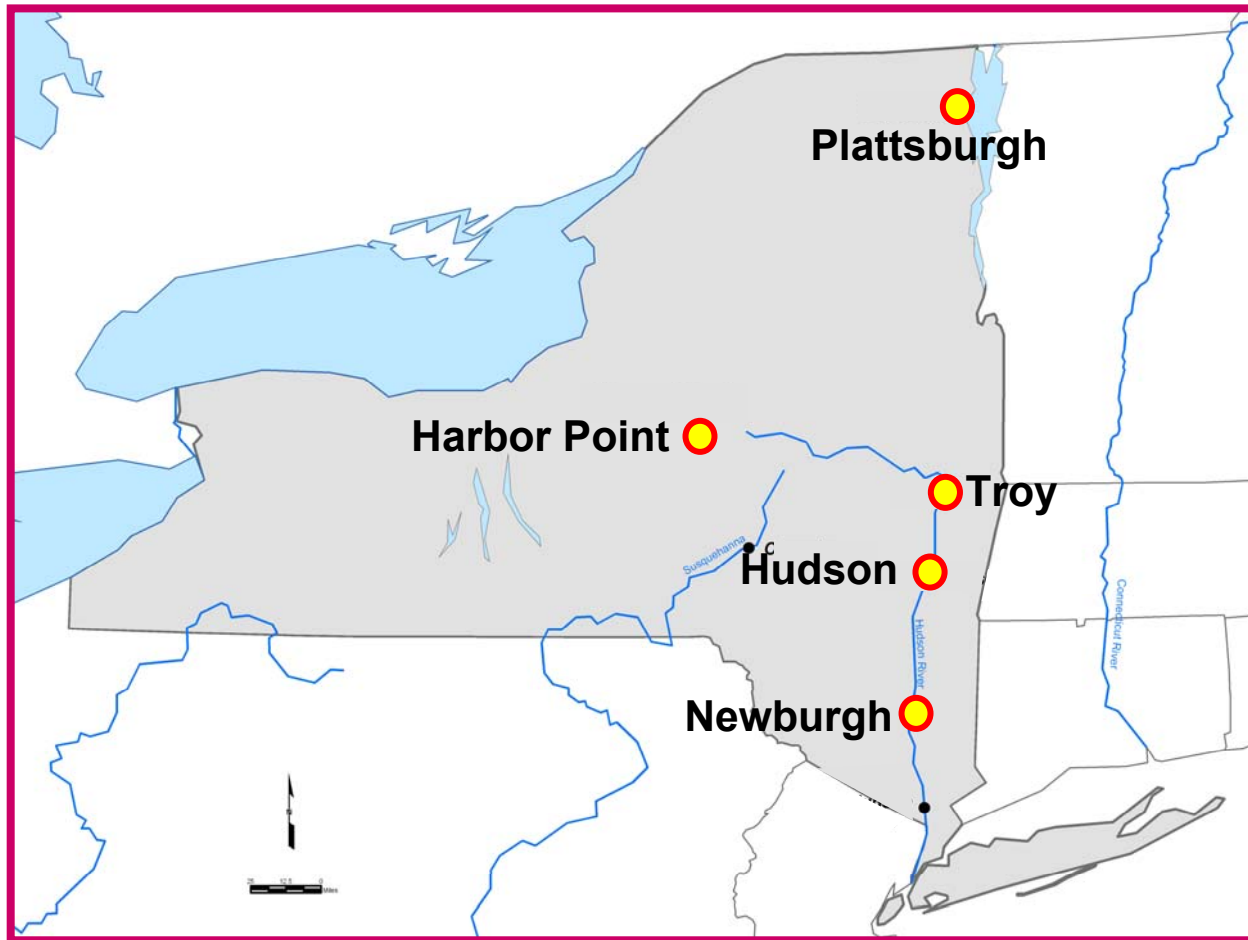
SQT Evaluation

- ◆ **Chemistry testing**
 - ◆ High and low total [PAH]
 - ◆ High and low SPME porewater [PAH]
- ◆ **Toxicity testing**
 - ◆ *Hyalella azteca* 28-day toxicity test
- ◆ **Benthic survey testing**
 - ◆ Reference and site samples
 - ◆ Indices of diversity, richness and tolerance

When is the Sediment Quality Triad Valid?



2006 SQT Case Studies



- Site
- Reference



NYSEG – Plattsburgh, NY

- Site
- Reference
- Toxic



NG – Troy, NY





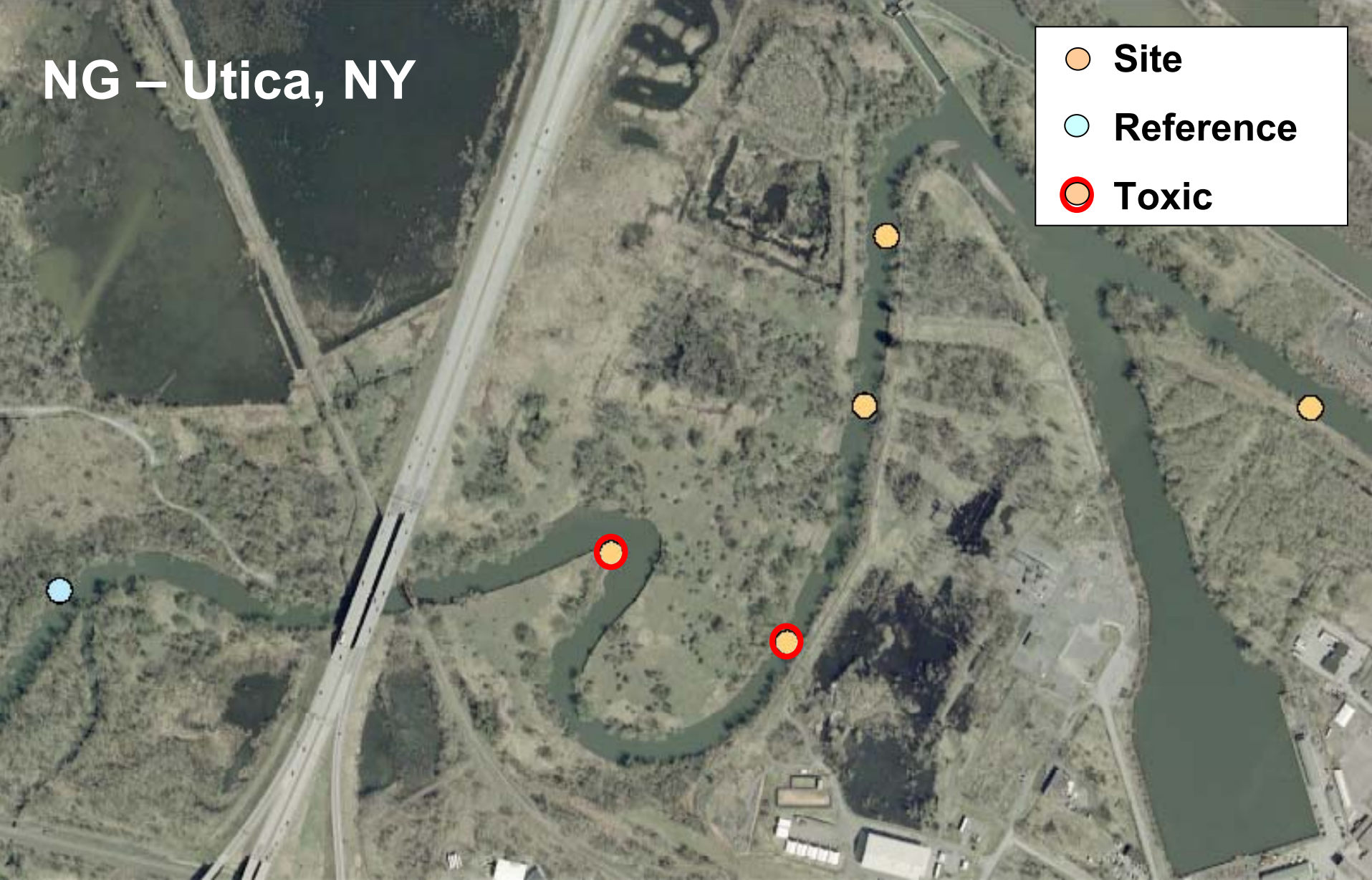
- Site
- Reference
- Toxic

NG – Hudson, NY



NG – Utica, NY

- Site
- Reference
- Toxic



Shannon and Margalef Indices

- ◆ **Shannon = Diversity**

- Relative abundance of organisms at a site

- ◆ **Margalef = Richness**

- Total # of taxons

**The more mature and stable a community is,
the greater the diversity and richness it will have.**

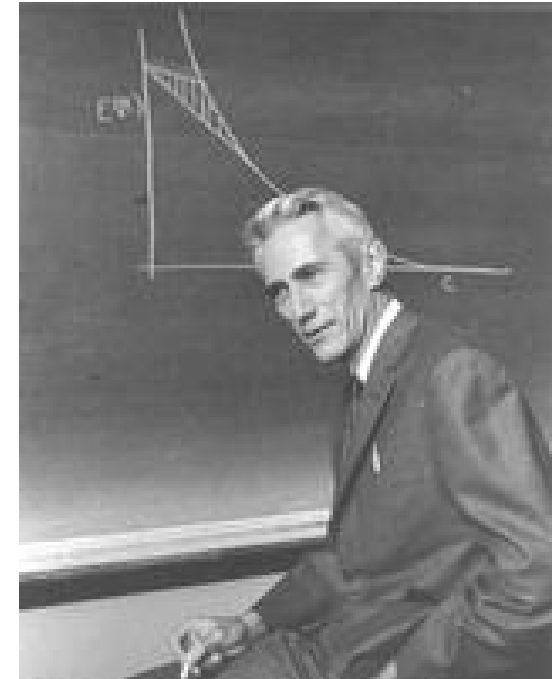
NYSDEC, 2003



Shannon Index of Diversity

$$SI = - \sum_{i=1}^S p_i \log_2 p_i$$

- ◆ Shannon, C (1948) *A Mathematical Theory of Communication*
- Bell Labs
- ◆ S = Number of species per sample
- ◆ p_i = the proportion of total individuals in the i^{th} species



Total Organism Abundance - HD43

TAXON IDENTIFIED	COUNT
<i>Rheotanytarsus sp.</i>	1
<i>Polypedilum sp.</i>	83
<i>Glyptotendipes sp.</i>	1
<i>Dicrotendipes neomodestus</i>	4
<i>Conchapelopia sp.</i>	7
<i>Chironomid pupa</i>	1
<i>Chironomidae</i>	1
.	.
.	.
.	.
<i>Tubificidae</i>	27
<i>Naididae</i>	1
<i>Placobdella sp.</i>	1
<i>Nematoda</i>	2
<i>Planariidae</i>	5
TOTAL:	206



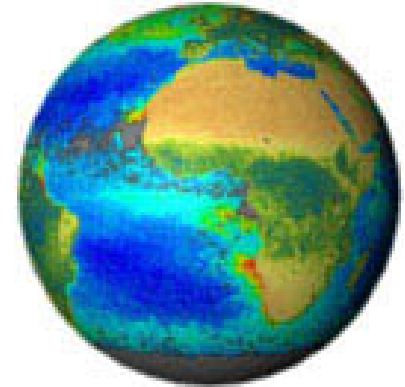
Shannon – An Example (HD48)

<u>SPECIES</u>	#	p_i	$p_i * \log_2 p_i$
<i>Tanytarsini</i>	1	.09	-0.31
<i>Limnodrilus hoffmeisteri</i>	4	.36	-0.53
<i>Tubificidae</i>	6	.54	-0.47
<hr/>			
	11	1.0	-1.31

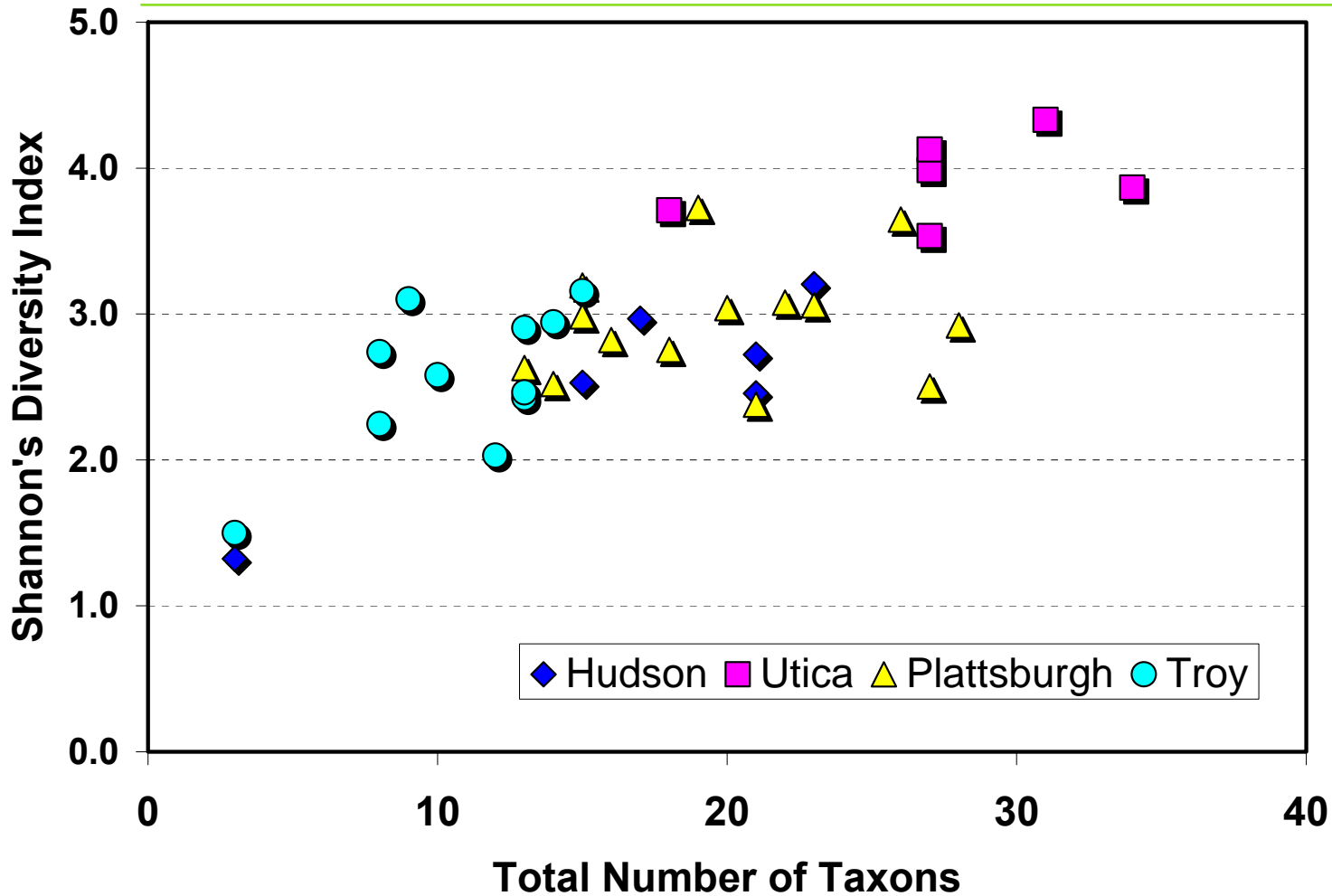
Shannon's Index of Diversity: What Does it REALLY Mean?

- ◆ **Low # of *species* \approx Low Shannon's Index**
- ◆ **High # of *species* \approx High Shannon's Index**
- ◆ **Total # of individuals is meaningless**
- ◆ **Distribution of the # of individuals is important:**
 - Dominance of 2 or 3 species yields **low** Shannon's Index
 - Broad percentage of individual species yields **high** Shannon's Index

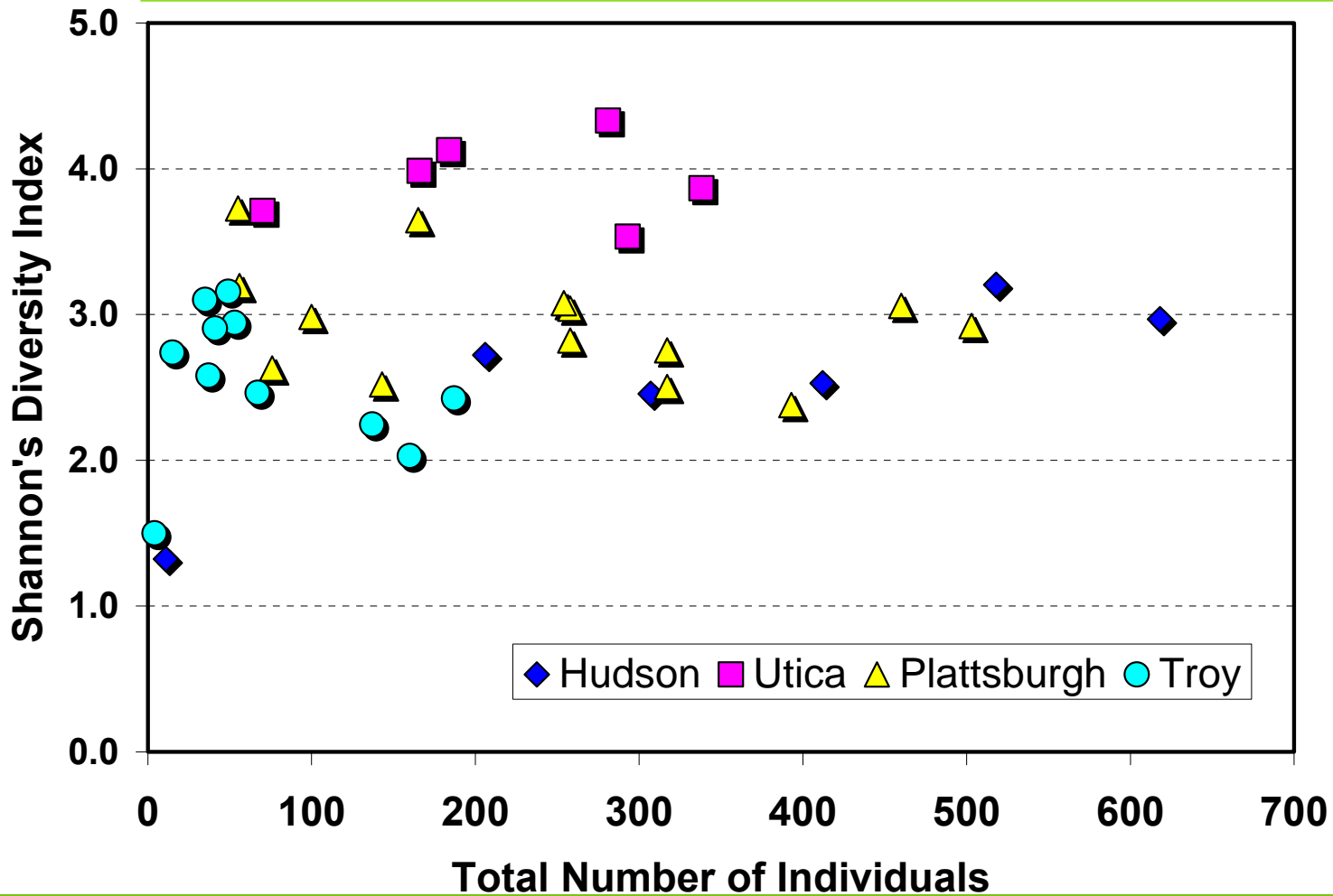
Ecological Relevance!



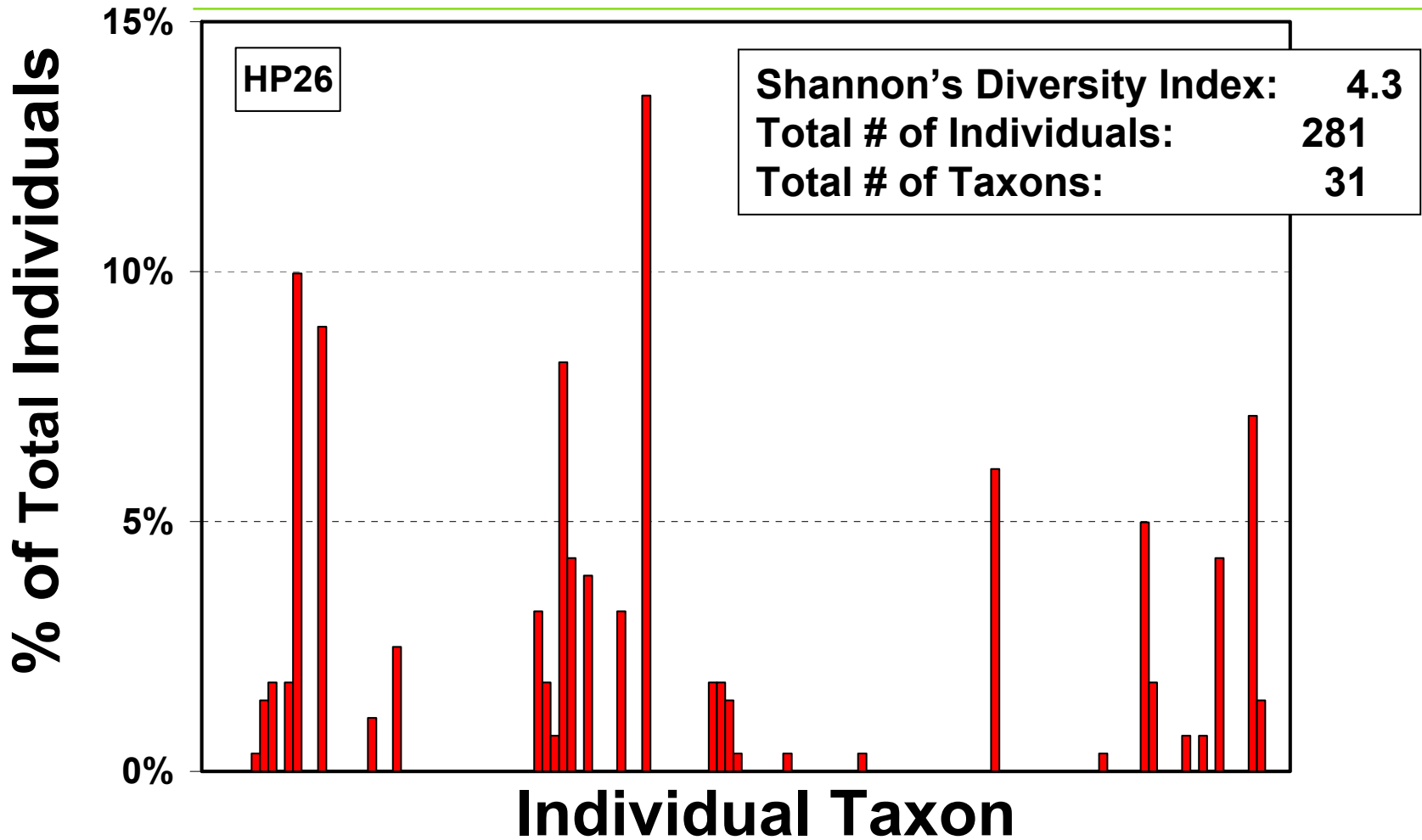
Shannon's Index: Correlated with the # of Taxons



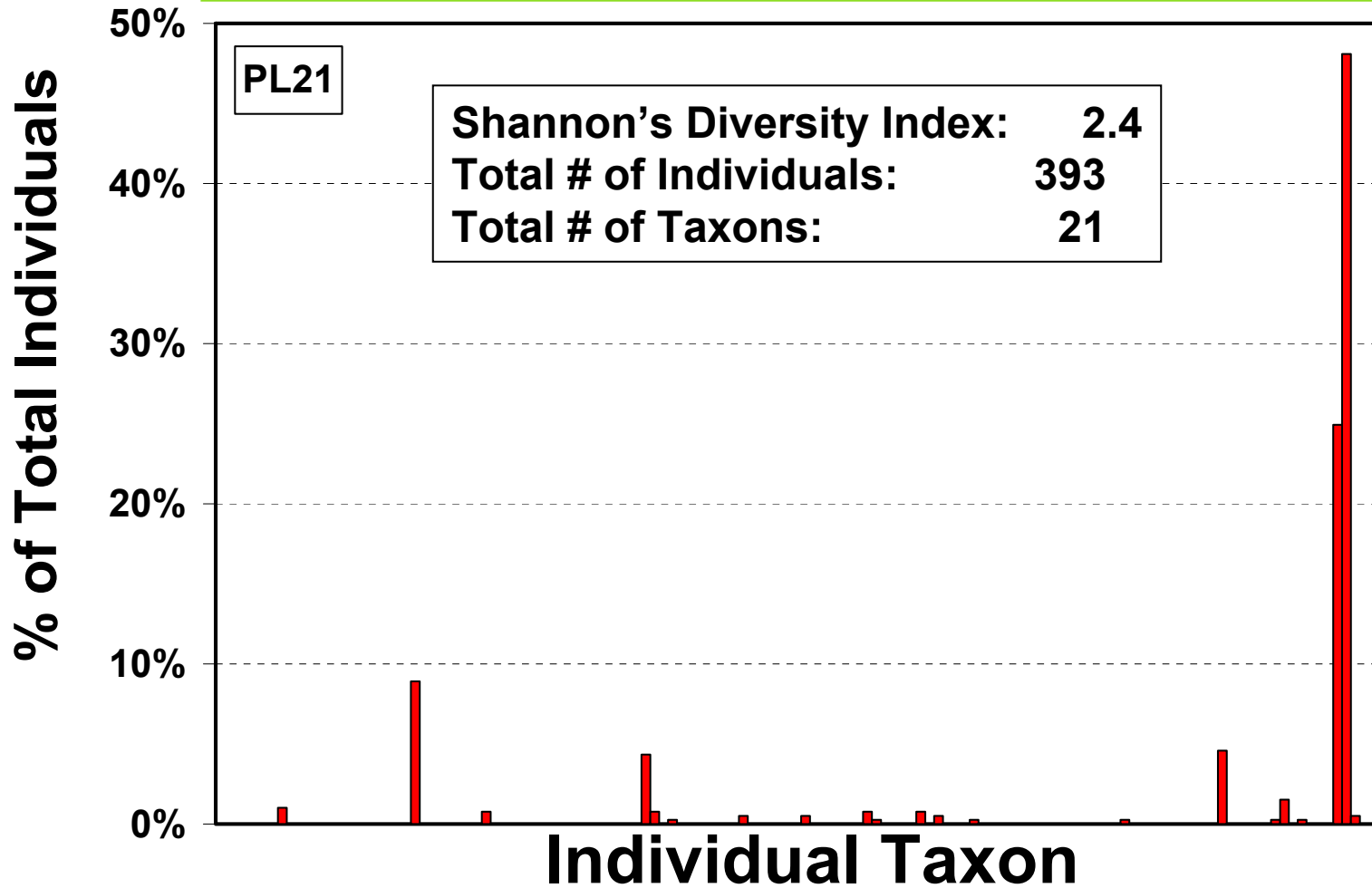
Shannon's Index: Total # Individuals is Meaningless



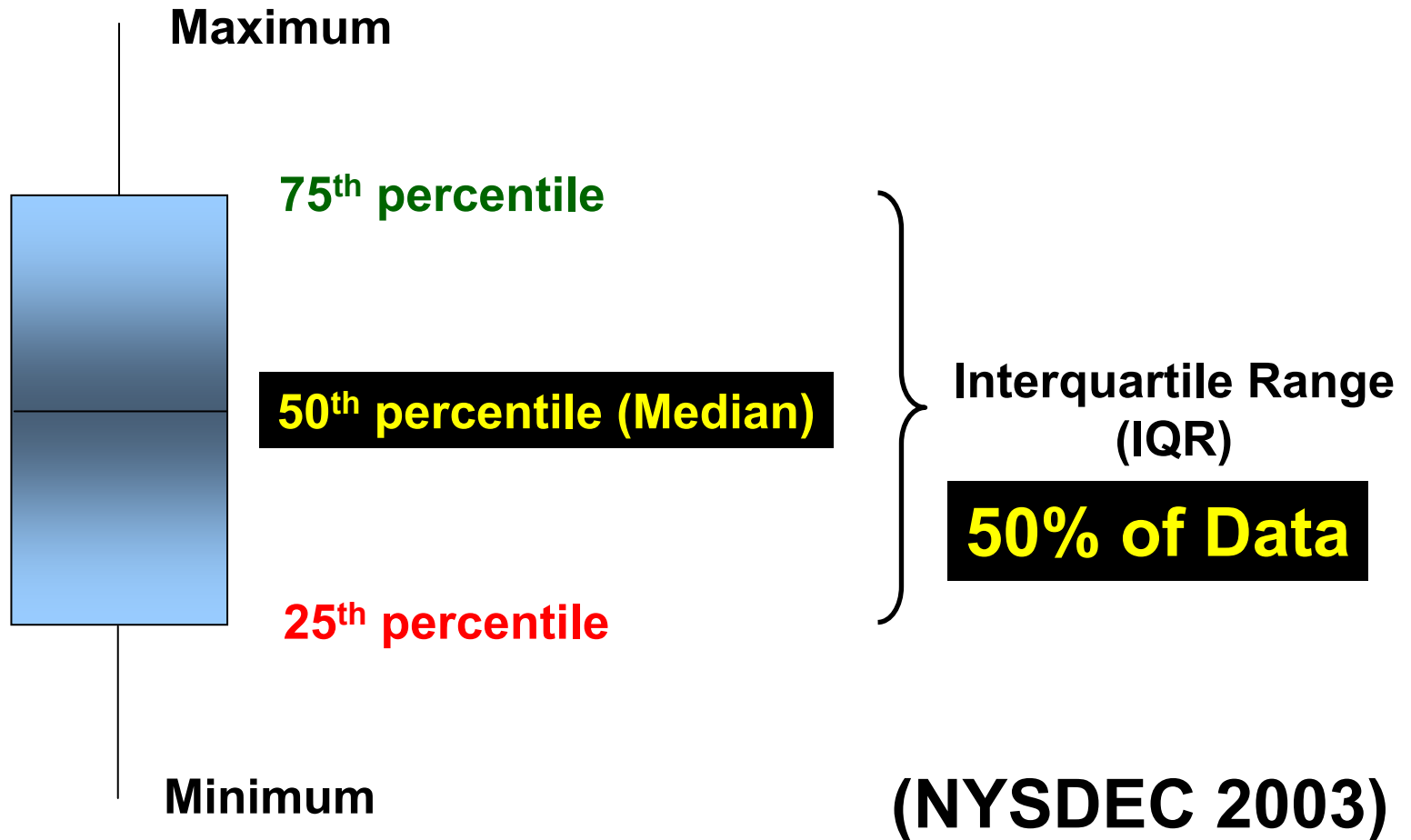
Shannon's Index: Its All in the Proportions...



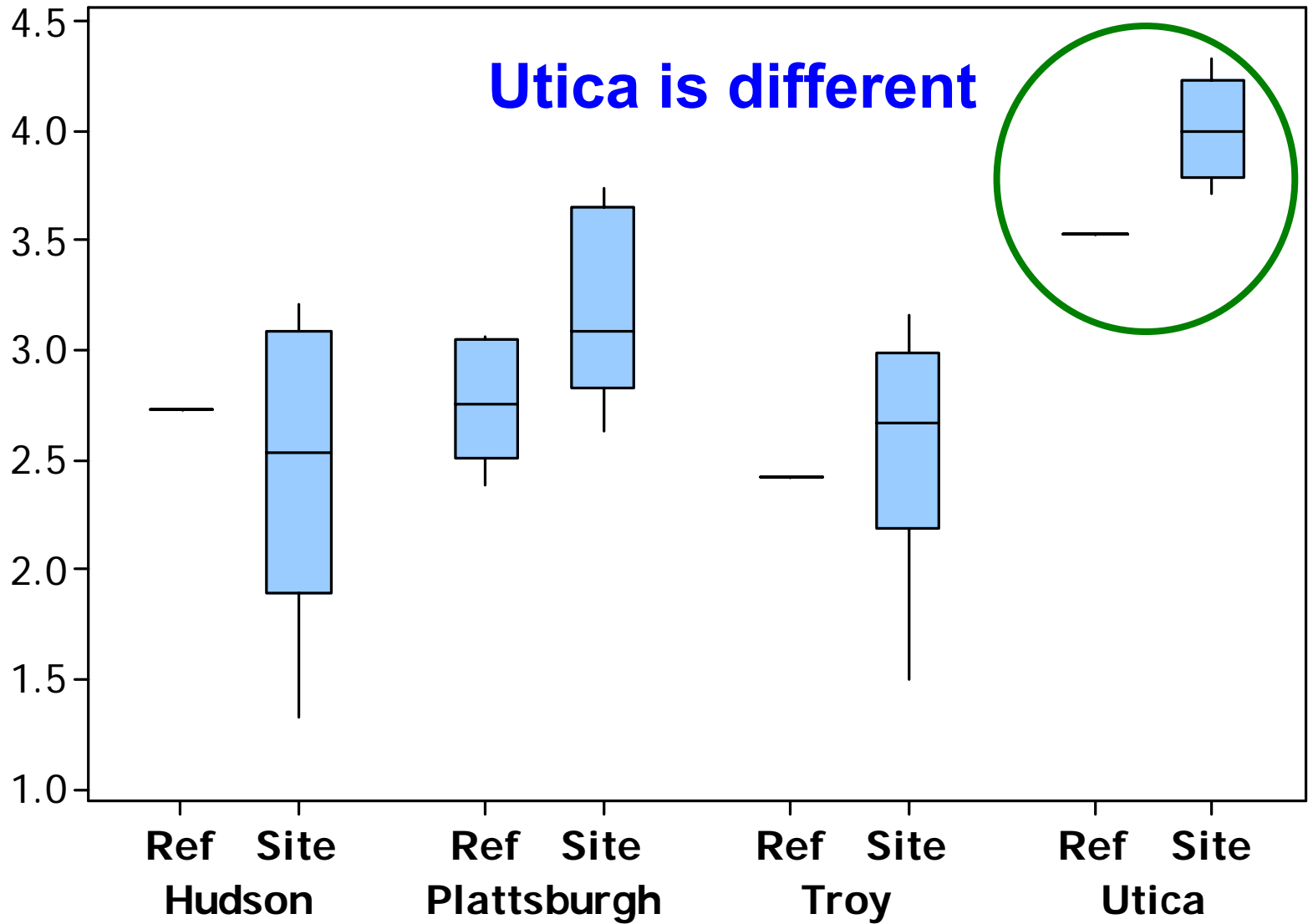
Shannon's Index: Its All in the Proportions...



Graphical Data Analysis - Boxplot



Shannon's Diversity Index



Margalef Species Richness Index (SR)

$$SR = \frac{s - 1}{\ln(N)}$$

- ◆ Margalef, R. (1958) *Information Theory in Ecology*
- ◆ Professor Emeritus of Ecology at the University of Barcelona, Spain
- ◆ S = Number of species per sample
- ◆ N = the total number of individuals in a sample

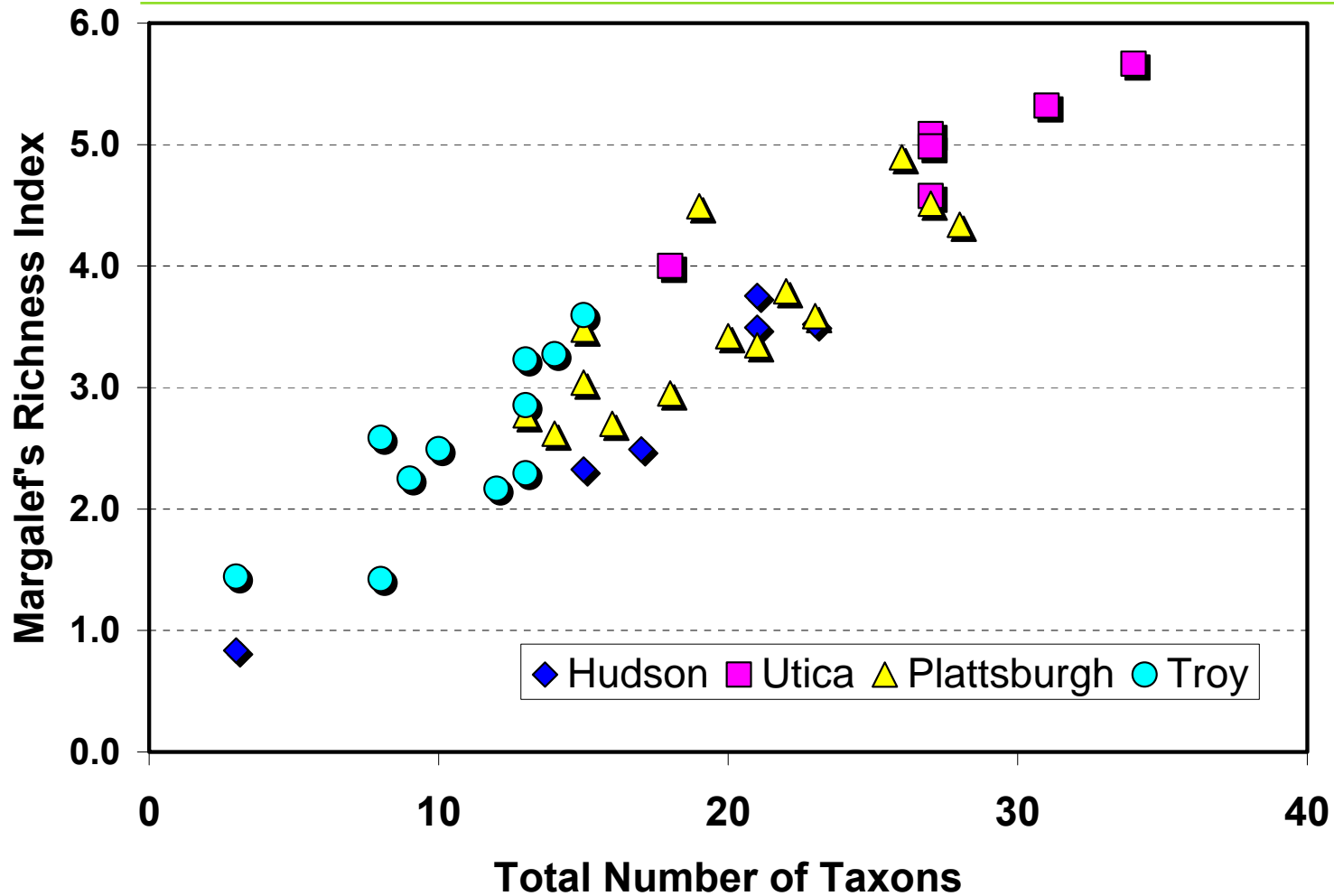


Margalef – An Example (HD48)

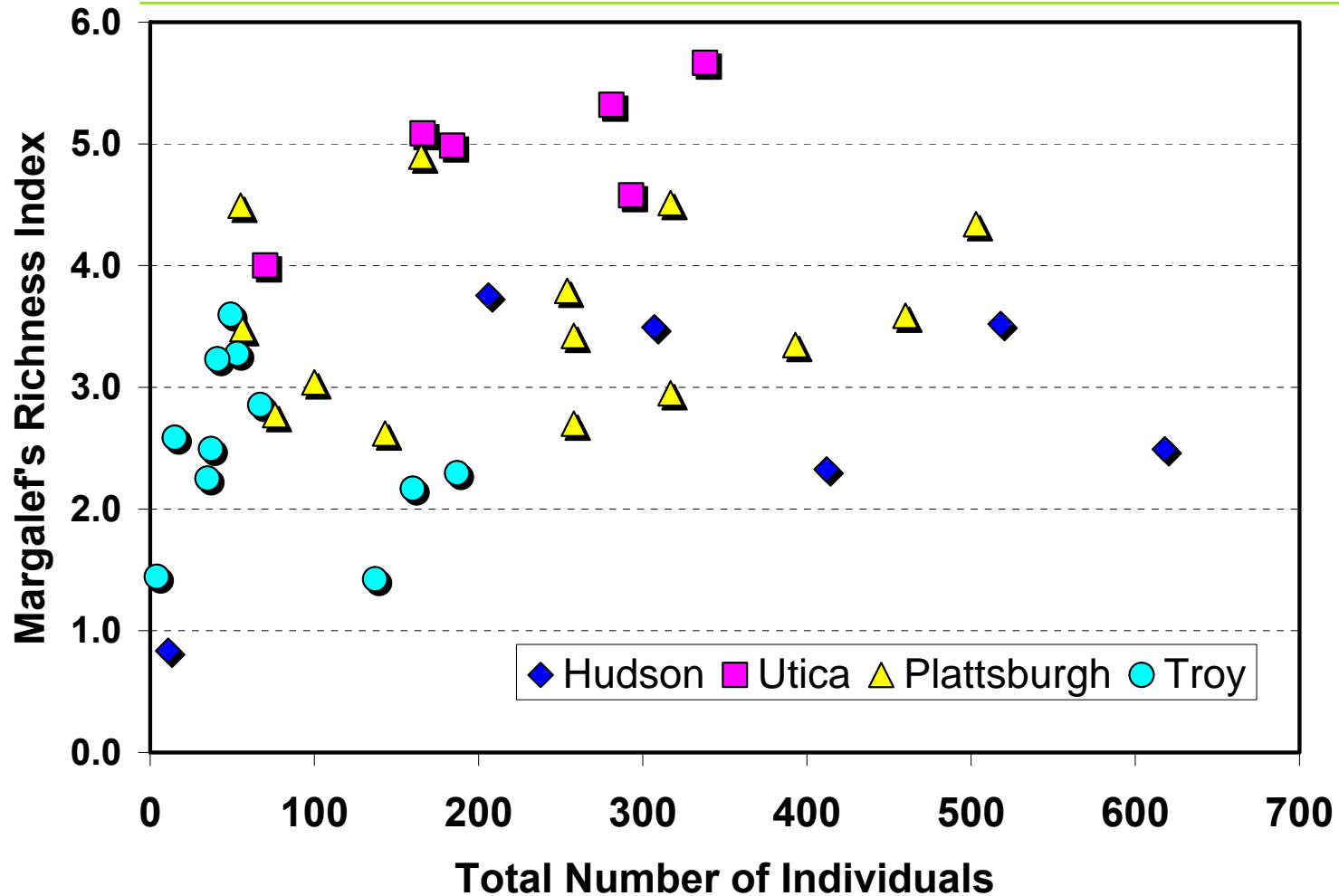
<u>Taxon</u>	#	# of Taxons = 3
<i>Tanytarsini sp.</i>	1	
<i>Limnodrilus hoffmeisteri</i>	4	$\frac{3-1}{\ln(11)}$ = 0.8
<i>Tubificidae sp.</i>	6	
	<hr/>	
	11	

Low # Taxons = Low Margalef

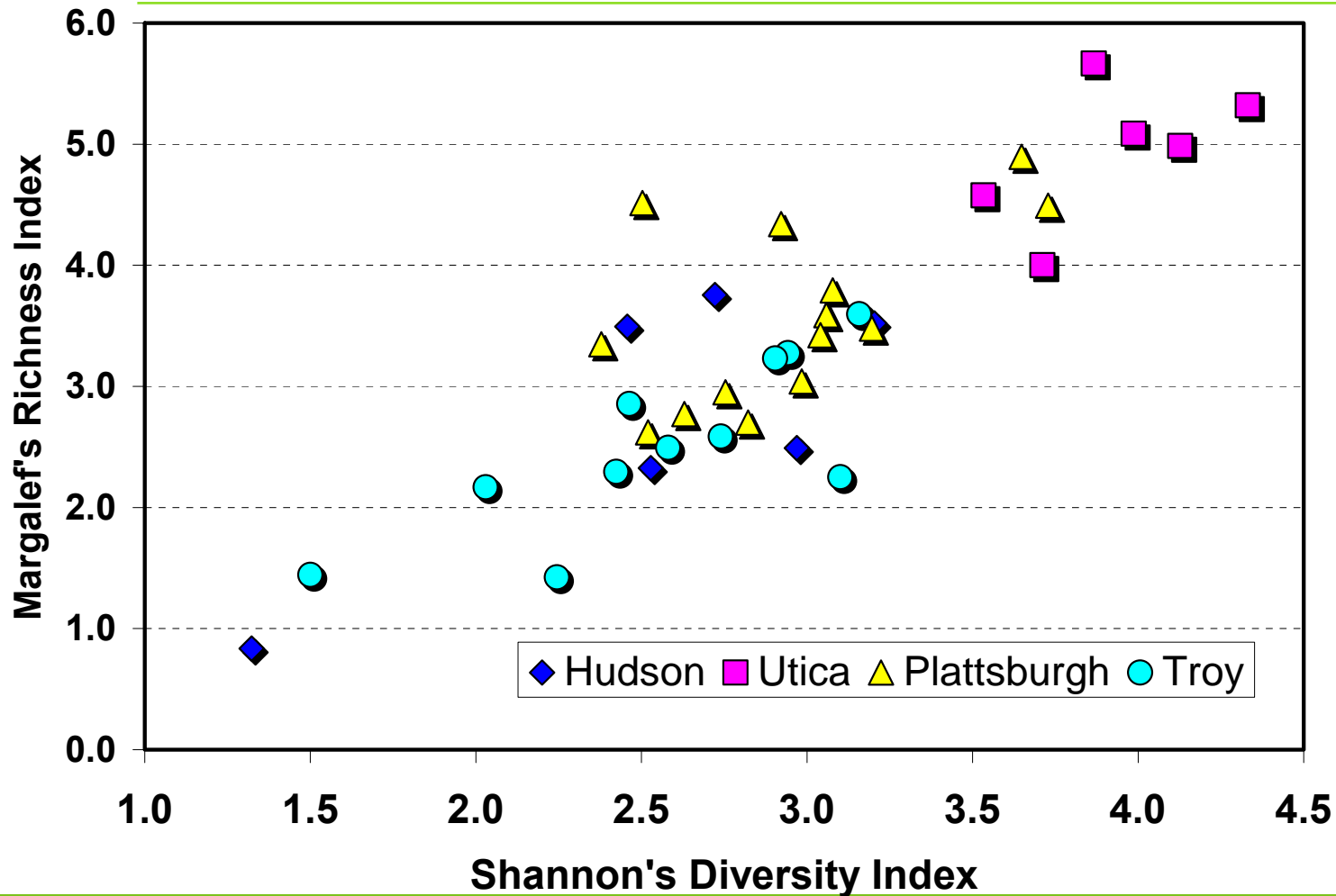
Margalef's Index: Correlated with the # of Taxons



Margalef's Index: Total # of Individuals is Meaningless



Shannon vs. Margalef: The Two are Highly Correlated



Biotic Indices: NY Tolerance Score

$$NYTS = \frac{\sum TV_i N_i}{\sum N_i}$$

- ◆ Bode , R.W. (2002) NYSDEC: *Quality Assurance Work Plan for Biological Stream Monitoring in New York State*
- ◆ Hilsenhoff, W.L. (1988) *Rapid field assessment of organic pollution with a family-level biotic index*
- ◆ TV_i = pollution tolerance value of the i th taxa
 - Range from 1 (very intolerant) to 10 (highly tolerant)
- ◆ N_i = the abundance of the i th taxa

Different Taxons = Different Tolerance

Order-Trichoptera (Caddisflies)
NY Tolerance = 1,2



Order-Ephemeroptera (Mayflies)
NY Tolerance = 1,2

Different Taxons = Different Tolerance

Order- Coleoptera (Water Beetles)
NY Tolerance = 4,5,6



Order-Diptera (Crane Flies)
NY Tolerance = 3,4

Different Taxons = Different Tolerance

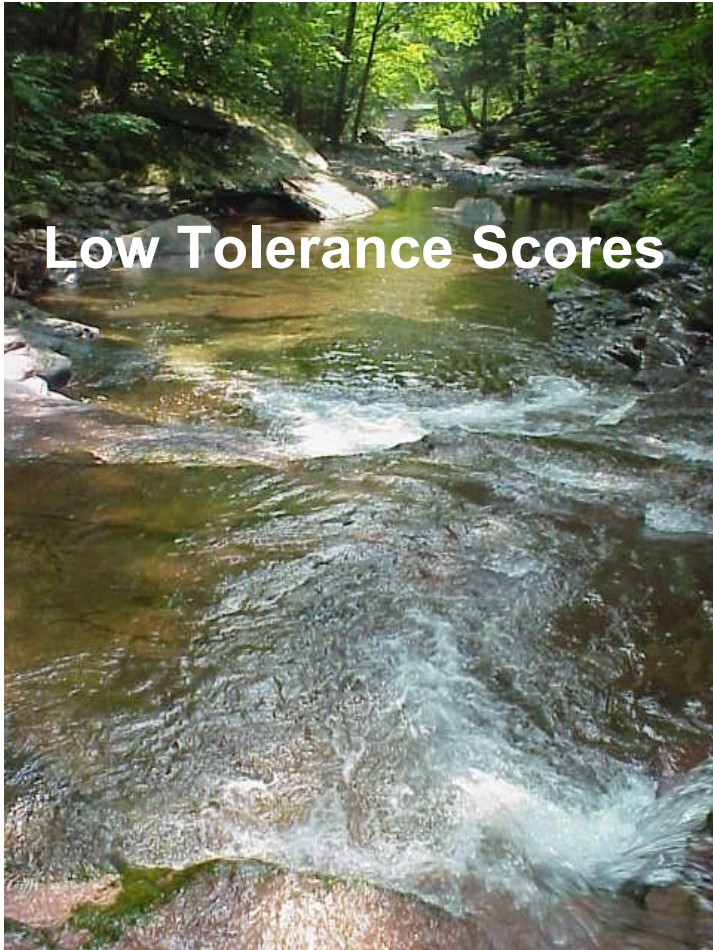


Order-Tubificida (Tubifex worms)
NY Tolerance = 10

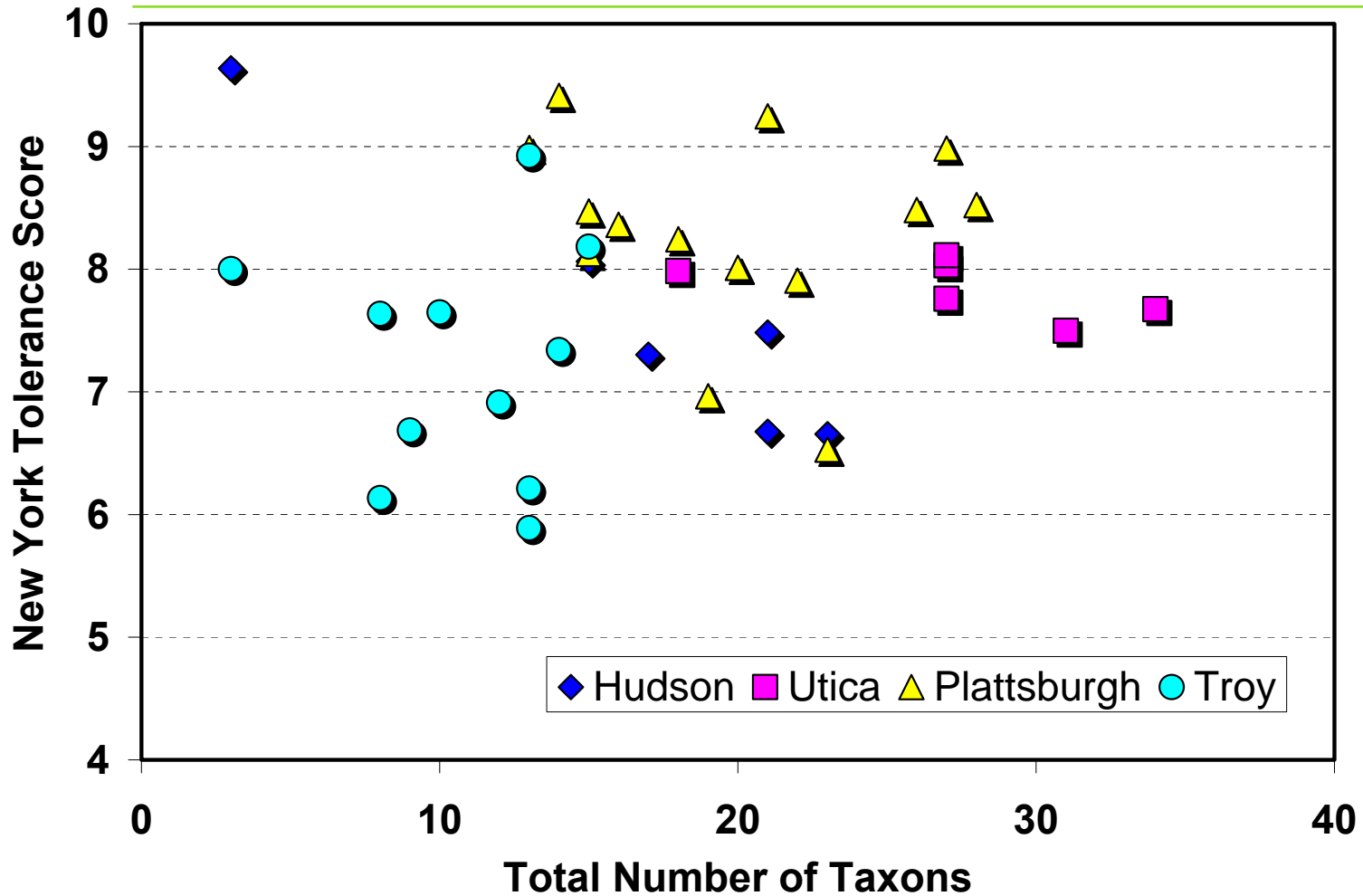


Order-Basommatophora (*Snails*)
NY Tolerance = 6 - 8

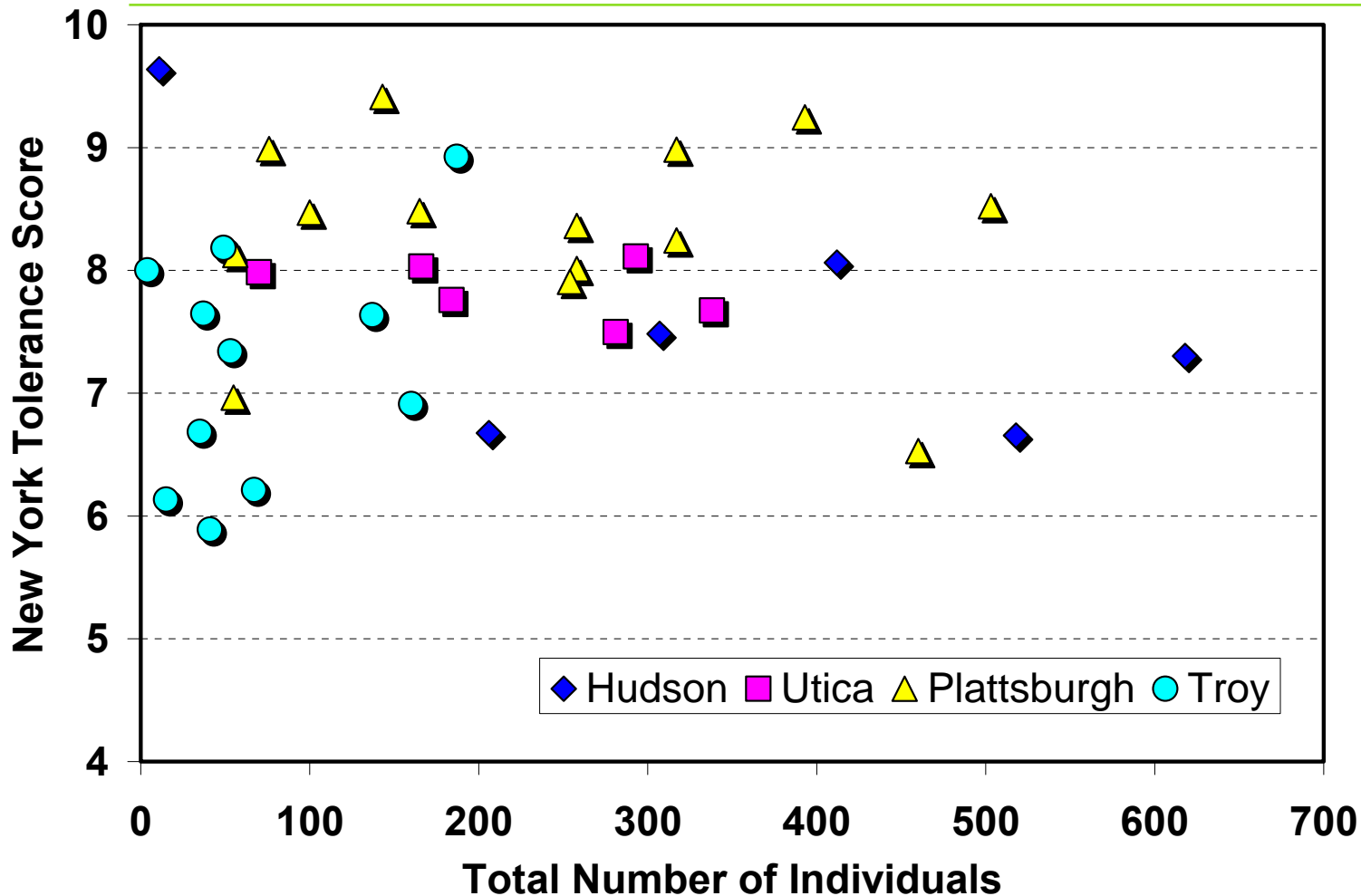
Stream Geomorphology Strongly Influences Tolerance Scores



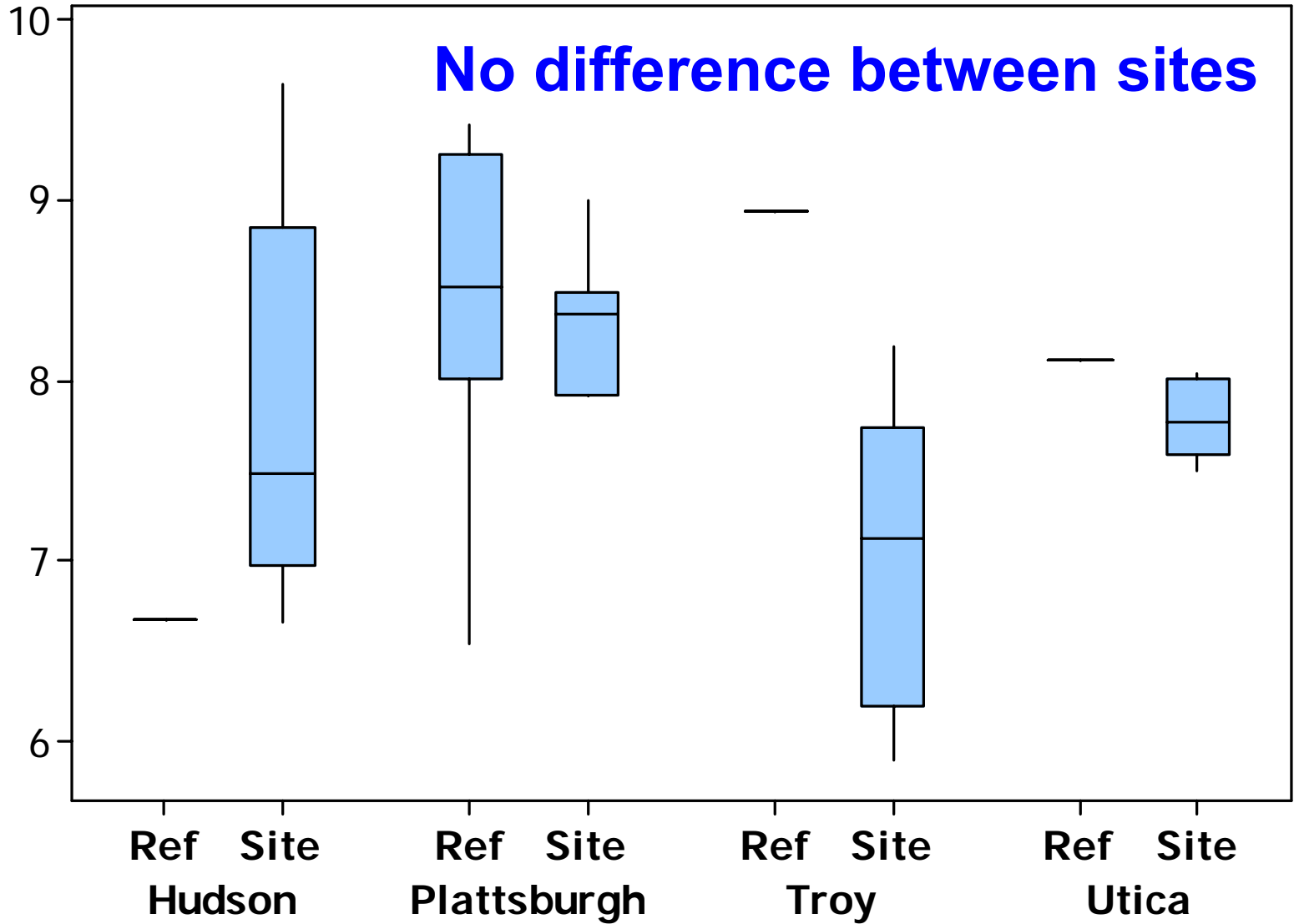
NY Tolerance Score: Not Related to the # of Taxons



NY Tolerance Score: Not Related to the # of Individuals



New York Tolerance Score



Assessment of the Impact of Contaminated Sediments

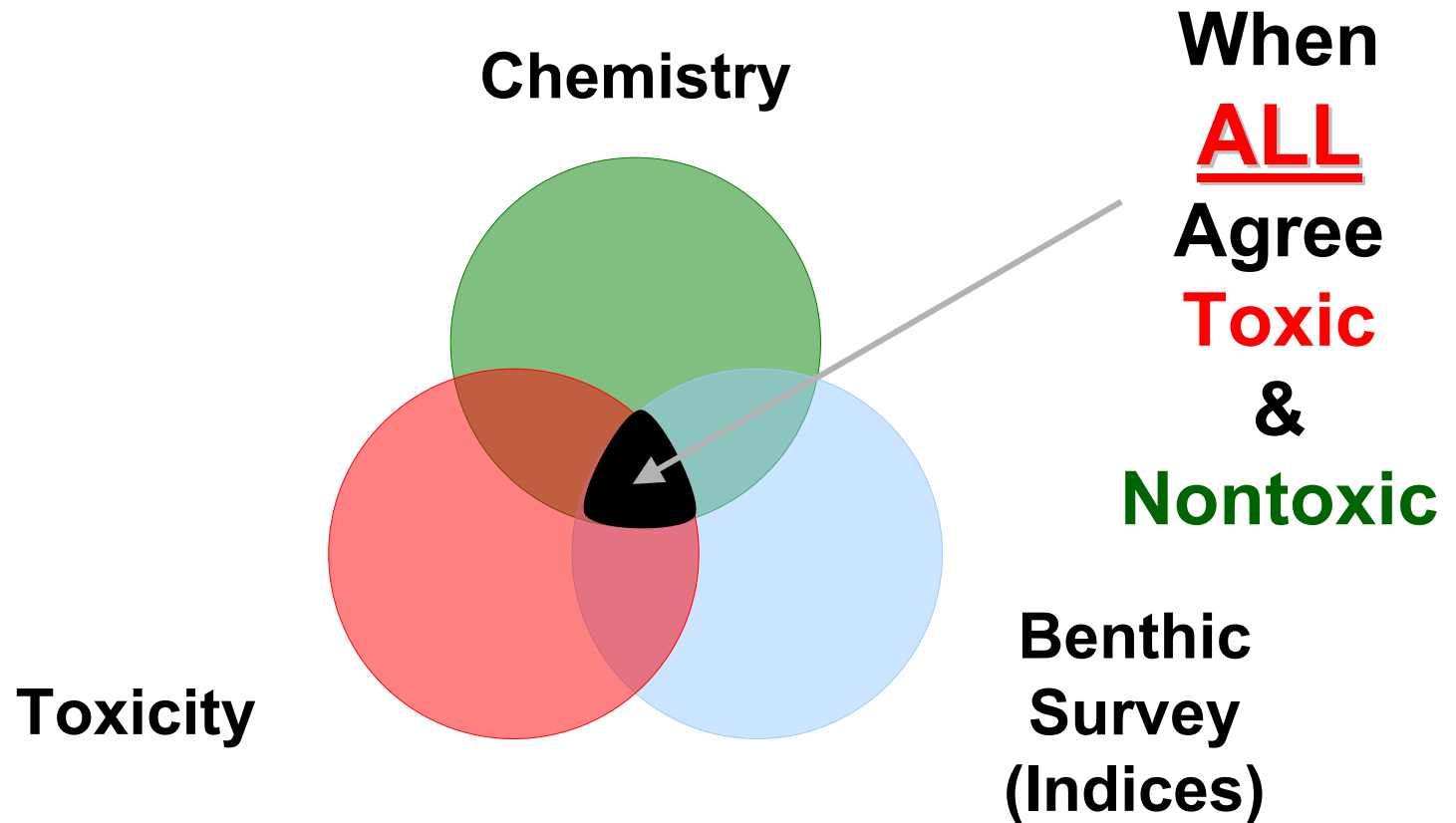
Possible outcome	Sediment Chemistry	Toxicity Test	Benthic Community	Possible Conclusions
1	+	+	+	Impact highly likely
2	-	-	-	Impact highly unlikely
3	+	-	-	Impact unlikely
4	-	+	-	Impacts possible
5	-	-	+	Impacts unlikely
6	+	+	-	Impact likely
7	-	+	+	Impact likely
8	+	-	+	Impact likely

+ indicates classified as affected
 - Indicates classified as unaffected

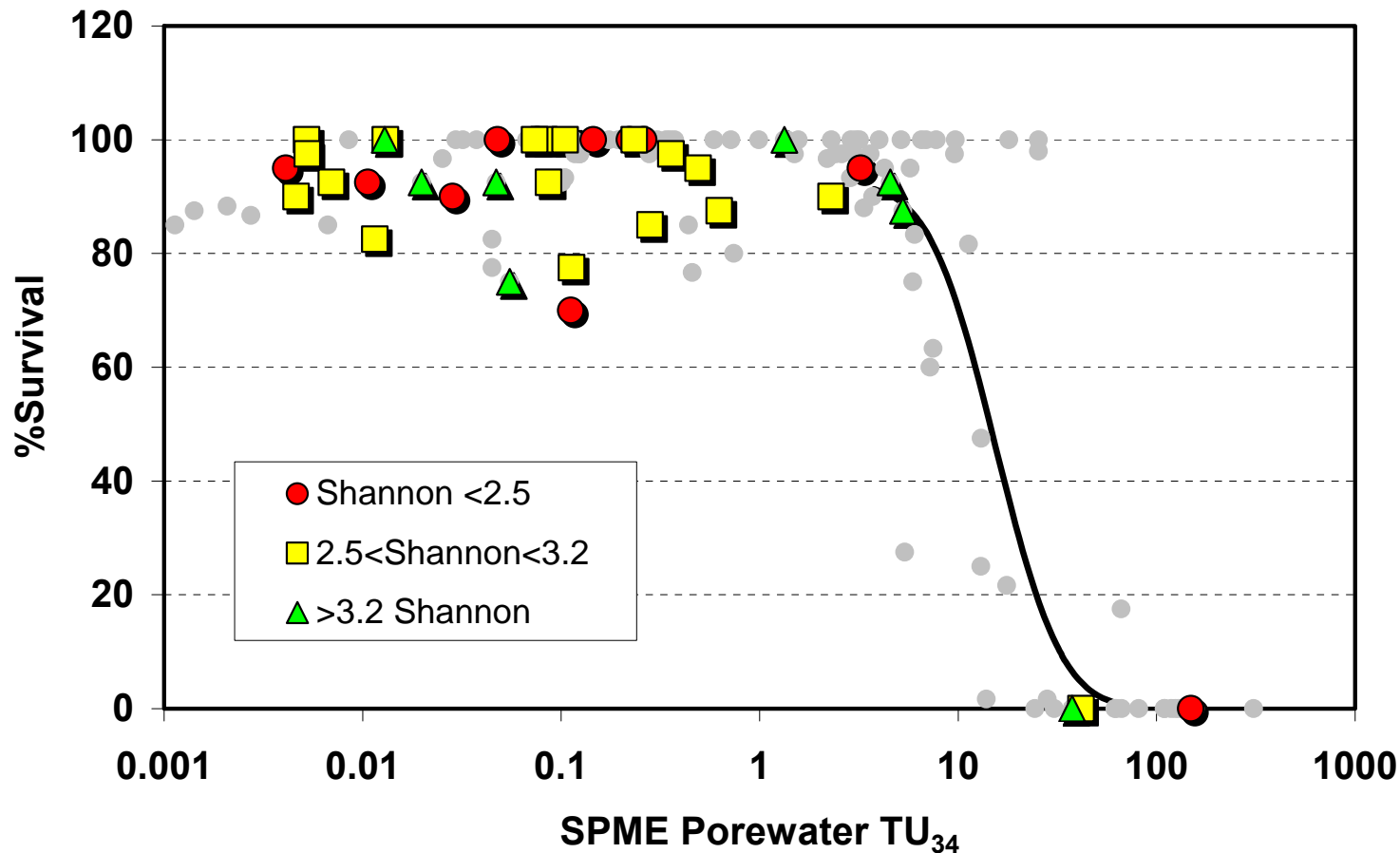
Source: EPA (2002)



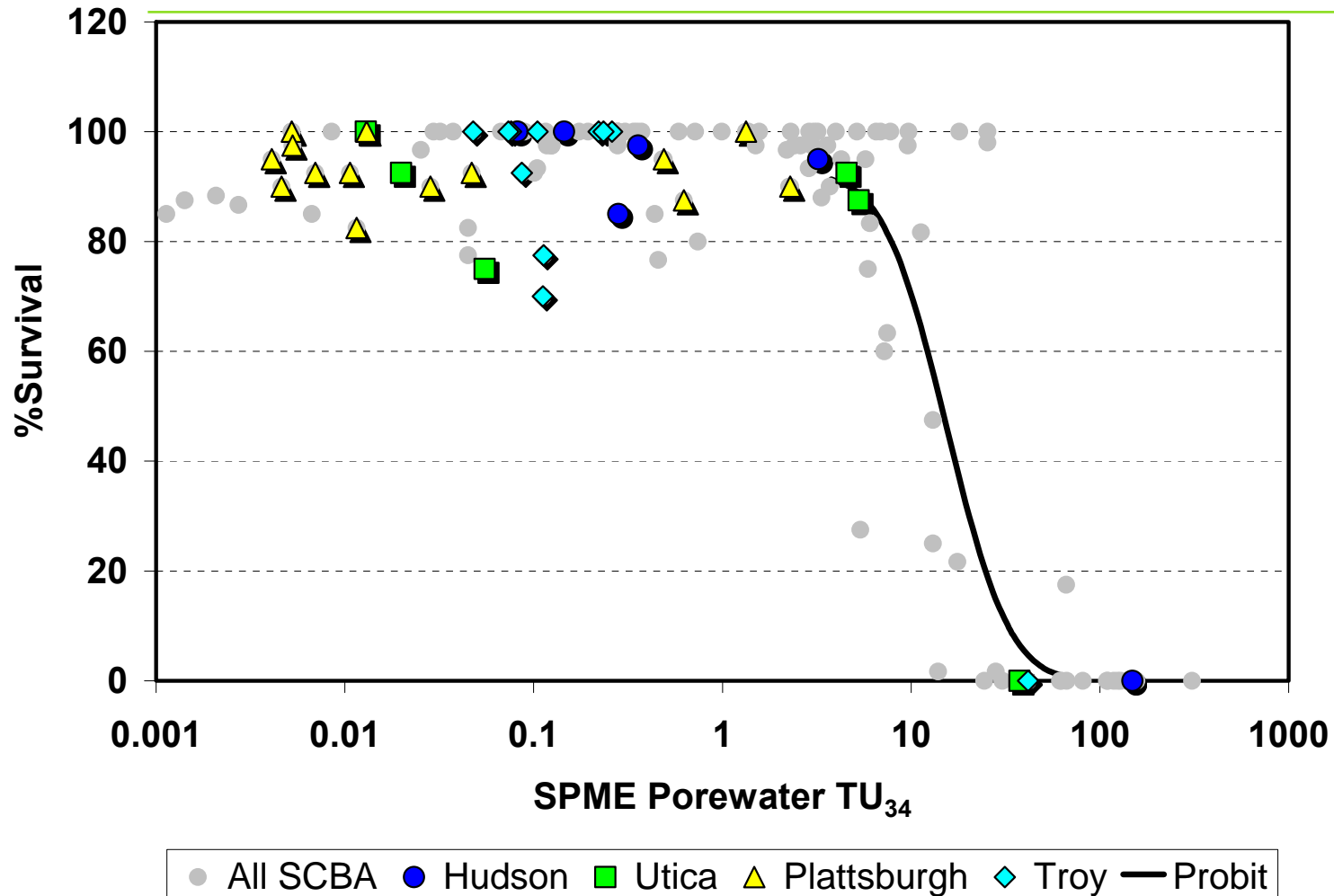
When is the Sediment Quality Triad Valid?



Diversity Indices, Chemistry and Toxicity: No Relationship



Chemistry and Toxicity: Good Relationship



Case Study Conclusions

- ◆ **Benthic survey (indices), chemistry, and toxicity show no relationship.**
- ◆ **Chemistry and toxicity show a good relationship.**
- ◆ **Need to compare SCBA SQT results to previous SQT studies**