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May 18, 2017

Office of Environmental Measurement and Evaluation
US EPA - Region I
11 Technology Drive
North Chelmsford, Massachusetts 01863

To: Mr. Bart Hoskins, EPA TOCOR

TDF No. 1258A
Task Order No. 06
Task No. 01

Subject: Review and interpretation of the sediment toxicity testing results and the sediment analytical chemistry data obtained for the Troy Mills Landfill Superfund site, Troy, NH.

Dear Mr. Hoskins,

The Environmental Protection Agency (EPA) requested that the Environmental Services Assistance Team (ESAT) evaluate two complementary datasets obtained from the Troy Mills Landfill Superfund Site located in Troy, NH, as follows:

- The toxicity data from the amphipod *Hyalella azteca* and the chironomid fly *Chironomus dilutus* exposed for 10 days to seven sediment samples collected in October 2016 from local groundwater seeps by Rockwood Brook (three samples), the forested wetland (two samples), and local reference locations (two samples).

- The analytical chemistry data for the sediment samples collected from the site both in August and October of 2016 to evaluate the nature and extent of contamination by metals and Bis(2-ethylhexyl)phthalate (BEHP).

The purpose of this task is to provide recommendations for monitoring future releases of BEHP and/or metals based on interpreting the available sediment toxicity data and analytical chemistry data.

The Technical Direction Form (TDF) requested the following elements in the deliverable:

- An evaluation of the likelihood of population-level effects to the Benthic Macroinvertebrate (BMI) community in Rockwood Brook and the forested wetland.
- A summary and interpretation of the sediment analytical chemistry data for the samples collected in August and October 2016.
- Recommendations on a future monitoring program of sediment chemical analyses to determine if current risks are stable or increasing.

The major findings of the review are as follows:

1. Sediment toxicity testing results

The sediment toxicity tests identified effects on survival and biomass in both test species only in sediment sample SW-Leach A-01. This sample was collected from an orange-colored seep which supplies most of the surface water flowing through the forested wetland. Significant effects

were not observed in either test species exposed to the remaining four site sediment samples. Based on this first line of evidence, it was concluded that the conditions in Rockwood Brook sediments are unlikely to result in population-level effects to the local BMI community from exposure to seepage, whereas the sediment sample collected from where orange-colored seep water originates at location SW-Leach A-01 caused measurable effects.

2. Sediment analytical chemistry data results

The sediment analytical chemistry data did not identify any particular analyte to explain the toxicity measured in sediment sample SW-Leach A-01. This toxicity, while real, appears to result from unknown causes. It is plausible, but unproven, that the toxic response may be associated with specific physical-chemical conditions (e.g., iron floc) prevailing at the seep itself.

The lack of an obvious chemical signature in the four remaining site sediment samples collected from the forested wetland area and Rockwood Brook, and the two reference samples, corroborated the toxicity test results. Based on this second line of evidence, it was concluded that the conditions in the sediment samples collected from the three Rockwood Brook seeps and seep FW-01 in the forested wetland are unlikely to result in population-level effects to the local BMI community.

3. Recommended monitoring program of sediment chemical analyses

The TDF requested that ESAT develop a monitoring program based only on periodic sediment chemical analyses. Only sediment sample SW-Leach A-01 was toxic. The location from where this sample was collected is the main “source” for the orange-colored water that flows through the forested wetland. That location makes it a logical choice for future monitoring. Yet, the chemical analysis did not identify any analytes that may be responsible for the observed toxic responses.

The lack of an obvious cause for the toxicity in SW-Leach A-01 represents a dilemma for proposing a defensible sediment monitoring program. ESAT discussed this issue with the task order contracting officer representative to try to develop a workable solution. After reviewing all the data, it was concluded that the sediment toxicity at this location was real but could not be linked to any of the measured analytes. In addition, future sampling at location SW-Leach A-01 would not resolve the current disconnect between chemistry and toxicity. As such, it was determined that a sediment chemistry monitoring program could not be developed given the existing conditions at sample location SW-Leach A-01.

The task was authorized on April 17, 2017 under TDF No. 1258. EPA modified the TDF on April 26, 2017 (TDF No. 1258A) requesting to include a map of the August and October 2016 sampling locations and to attach a copy of the Troy Mills sediment toxicity test report as an appendix.

Do not hesitate to contact me at (617)918-8669 or (207)883-4780 with questions or comments.

Sincerely,

Stanislas Pauwels

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Review and interpretation of the sediment toxicity testing results
and the sediment analytical chemistry data
for the Troy Mills Landfill Superfund Site, Troy, NH.

TDF No. 1258A
Task Order No. 06
Task No. 01

Submitted to:

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May 18, 2017

EPA Contract EP-W-13-021

1.0 GENERAL INTRODUCTION

1.1 Task Description

The Environmental Protection Agency (EPA) requested that the Environmental Services Assistance Team (ESAT) evaluate two complementary datasets obtained from the Troy Mills Landfill Superfund Site located in Troy, NH (the site), as follows:

- The toxic response data by juveniles of the amphipod *Hyalella azteca* and the chironomid fly *Chironomus dilutus* exposed for 10 days to seven sediment samples collected from seeps at Rockwood Brook, the forested wetland, and other locations at the site in October 2016.

- The analytical chemistry data for the sediment samples collected from the site in August and October of 2016 to evaluate the nature and extent of contamination by metals and Bis(2-ethylhexyl)phthalate (BEHP).

The purpose of the task is to prepare recommendations to monitor future releases of metals and BEHP at one or more of the seeps by interpreting the August and October 2016 sediment toxicity data and analytical chemistry.

The Technical Direction Form (TDF) requested the following elements in the deliverable:

- An evaluation of the likelihood of adverse population-level effects to the Benthic Macroinvertebrate (BMI) community in Rockwood Brook and the forested wetland based on the October 2016 toxicity test results.

- A summary and interpretation of the analytical chemistry data for the sediment samples collected at the site in August and October 2016.

- Recommendations for a monitoring program based on sediment chemical analyses to determine if current risks are stable or increasing.

EPA modified the TDF on April 26, 2017 (TDF No. 1258A). The Agency moved the completion date from April 27, 2017 to May 18, 2017. It requested that the final deliverable include (a) a map showing the August 2016 and October 2016 sediment sampling locations, and (b) a copy of the sediment toxicity test report and the chemical analyses data as appendices to the technical memorandum. For completeness and future reference, ESAT also included a table to this deliverable with the available Global Positioning System (GPS) coordinates for the August and October 2016 sediment sampling locations.

1.2 Site History

The Site is located in Troy, NH. Troy Mills Inc. (TMI) manufactured acrylic fabric at this facility and generated hazardous wastes which were stored in over 7,000 55-gallon drums. TMI disposed of these drums in a nearby solid-waste landfill starting in 1967. These drums contained plasticizers, including BEHP, and mineral spirits that included benzene, di-bromo-3-chloropropane, dichloroethene, methyl ethyl ketone, methylene chloride, naphthalene, toluene, and other petroleum-based solvents. Additional drummed waste consisted of pigments, surplus mixes, and tank residuals of vinyl resins, paint resins and top-coating products. TMI ceased its disposal operations in December 2001.

The Site underwent a remedial investigation/feasibility study. This effort resulted in several removal and cleanup actions by EPA and the New Hampshire Department of Environmental Services. Interceptor trenches were installed in September-October 2001 to capture a Light Non-Aqueous Phase Liquid (LNAPL) plume. All the drums were excavated from the landfill and removed for proper off-site

disposal. The former landfill area was covered with a permeable soil cap. Multiple wells were installed around the former landfill to help monitor for groundwater quality.

Orange staining and orange flock are visible at several locations downgradient from the landfill cap. An ecological survey conducted in 2004 observed intense orange staining at the leachate culvert with the bright-orange leachate flowing downgradient through the forested wetland. The coloring is believed to originate from precipitation of metals at several groundwater seeps further upgradient or may be transported from the LNAPL collection area (i.e., the interceptor trenches).

The aquatic habitats of concern at the Site consist of Rockwood Brook and the Rockwood Brook Wetland Study Area. The brook flows south to north and continues to Sand Dam Pond, which is a recreational area located about one mile north of the Site. The brook was surveyed in 2004 and found to be quick-flowing and sandy with an occasional occurrence of silt or cobbles. It is between 1.0 to 2.5 feet deep and consists of about 25% pools and 75% riffles. No aquatic vegetation was observed in the stream, likely due to the high flow rate. Backwater areas creating pooled habitats were also observed.

The wetland area covers about 1.5 acres, and is located between the former drum disposal area and Rockwood Brook. The soils in the marsh next to Rockwood Brook are saturated with water and support common wetland vegetation, such as alder, wool grass, and ferns. White pines and eastern hemlock (amongst others) grow in the upland forested wetland further upgradient. The marsh next to Rockwood Brook was flooded in the past due to beaver activity. The 2016 site visits showed that the beaver dam in that area had been breached, allowing the ponded area behind it to drain and leave behind the current marshy habitat.

This technical memorandum is organized as follows: Section 2 reviews and interprets the sediment toxicity test data for the October 2016 samples, Section 3.0 reviews and interprets the analytical chemistry data for the August and October 2016 sediment samples, Section 4.0 discusses a monitoring program, Section 5.0 provides a summary and conclusions, and Section 6.0 lists the references.

1.3 List of acronyms

BEHP	bis(2-ethylhexyl)phthalate
BMI	benthic macroinvertebrate
EPA	Environmental Protection Agency
EqP	equilibrium partitioning
ESAT	environmental services assistance team
FW	forested wetland
GPS	global positioning system
HQ	hazard quotient
MDL	method detection limit
LNAPL	light non-aqueous phase liquid
mg/kg	milligram per kilogram
NERL	New England Regional Laboratory
ORNL	Oak Ridge National Laboratory
RB	Rockwood Brook
RSV	refinement screening value
TDF	technical direction form
TMI	Troy Mills Incorporated
TOC	total organic carbon
µg/L	microgram per liter

2.0 POTENTIAL EFFECTS OF THE SEDIMENT CONTAMINANTS ON THE BENTHIC INVERTEBRATE COMMUNITY

2.1 Introduction

EPA visited the site on August 17, 2016 to collect sediment samples from targeted seeps next to Rockwood Brook, in the forested wetland, and from several potential reference locations. The purpose of that preliminary effort was to obtain sediment samples with a wide range of contaminant levels for chemical analyses at the New England Regional Laboratory (NERL) in North Chelmsford, MA. EPA used the results of those analyses to identify specific locations at the site that might provide a range of sediment contaminant levels to help generate a rough dose-response toxicity curve. Based on an evaluation of those initial analytical data, the Agency returned to the site on October 28, 2016 to collect a new batch of sediment samples from five site locations and two reference locations for toxicity testing and chemical analyses.

2.2 Review of the sediment toxicity test results

Appendix 1 provides a copy of the sediment toxicity report. **Figures 1 and 2** at the end of this technical memorandum show the August and October 2016 sediment sampling locations, respectively, whereas **Attachments 1.1 and 1.2** provide the GPS coordinates for both sampling efforts. Table 1 in **Appendix 1** describes each location sampled for sediment in October 2016.

The October 2016 effort targeted sediments from (a) two reference locations, one in the forested wetland (i.e., FW-ref) and one in Rockwood Brook (i.e., RB-ref), and (b) five seeps (i.e., SW-Leach A-01, SW-Leach A-02, FW-01, RB-02, RB-03). SW-Leach A-01 represents the source of orange-stained seep water which flows downgradient through the forested wetland. The four remaining seeps were located right next to Rockwood Brook (RB-02, RB-03, and SW-Leach A-02) or in the forested wetland itself (FW-01). The Rockwood Brook seep locations can be expected to become part of the stream during high-flow events. Location FW-01 in the forested wetland could become part of the stream system again if beavers were to rebuild the old dam further downgradient in the future.

All seven sediment samples collected in October 2016 were returned to the NERL for chemical analyses and testing. The sediment toxicity tests used juveniles of two commonly-used benthic invertebrate test species, namely the amphipod *H. azteca* and the midge fly *C. dilutus*. The organisms were exposed separately to the seven sediment samples for 10 days under controlled laboratory conditions. The toxicity endpoints of interest were survival (both species), dry-weight biomass (*H. azteca*), and ash-free biomass (*C. dilutus*).

The statistical analysis of the *H. azteca* and *C. dilutus* survival and biomass data from the five site sediment samples compared to their respective reference samples showed a significant effect on both endpoints only in the organisms exposed to sediment sample SW-Leach A-01. No significant effect on survival or biomass was noted for organisms of either species in the remaining four site samples when compared to their reference samples.

The results of the *C. dilutus* test should be interpreted with some caution due to the unexpected presence of predatory species in several of the test vessels. An empty caddisfly casing, and no surviving test organisms, was found in replicate 2 of reference sample RB-ref. A live damselfly larva was also found in replicate 5 of sample RB-ref; only 30% of the test organisms survived. In addition, a live caddisfly larva was found in replicate 1 and a live damselfly larva was found in replicate 2 of sample SW-Leach A-02. No test organisms survived in those two replicates (see Tables 2 and 4 in **Appendix 1** for details).

The available toxicity data show that the conditions in sediment sample SW-Leach A-01 resulted in a significant response to both test species when compared to that observed in its reference sample,

whereas the conditions in the remaining four site sediment samples did not elicit a significant response to survival or biomass in either species.

Note that the toxicity testing results could not be used to generate the requested dose-response curve because none of the five site samples resulted in 100% mortality, which is a prerequisite for deriving such a curve.

Based on the toxicity test results, it is concluded that the current conditions in Rockwood Brook are unlikely to result in population-level effects to the local BMI community from exposure to seepage containing metals or BEHP. Exposure to sediment collected at seep SW-Leach A-01 located at the head of the forested wetland is expected to have population-level effects on the BMI community that may be present in this wetland.

3.0 SUMMARY OF THE 2016 SEDIMENT ANALYTICAL DATA

3.1 Introduction

The two sets of sediment samples collected by EPA from the site in August and October of 2016 were analyzed for heavy metals and BEHP. Mercury was analyzed in the August, but not in the October, samples. The Agency determined, after reviewing the August 2016 analytical data, that mercury was not a concern at this site and therefore would not be analyzed in the subsequent set of sediment samples.

Appendix 2 and **Appendix 3** to this technical memorandum provide the raw analytical data for the August and October 2016 sediment sampling events, respectively. This information was augmented by calculating Hazard Quotients (HQs) for each analyte to help place the chemical concentrations into a broader ecotoxicological context. This approach converted the raw analytical data into HQs by dividing the measured concentrations, or one half the detection limit if an analyte was not present above its Method Detection Limit (MDL), by the Refinement Screening Values (RSVs) presented in Table 2a of EPA (2015).

RSVs are considered low-effect sediment benchmarks used in Step 3.a of a baseline ecological risk assessment. Hence, they are less conservative than the no-effect screening benchmarks typically used in screening-level ecological risk assessments. This approach is appropriate given the state of the Troy Mills site, i.e., post-remediation and under long-term observation. EPA (2015) did not include RSVs for cobalt, vanadium, and BEHP. The benchmark for cobalt used in the current assessment is the "ecological screening value" (i.e., a no-effect screening level) presented in EPA (2015), whereas the benchmark for vanadium is a no-effect screening value developed by Thompson *et al*. (2005). The benchmark for BEHP is discussed in the next subsection.

An HQ below 1.0 shows that the exposure concentration falls below the benchmark and that ecological risk is unlikely. An HQ above 1.0 shows that the exposure concentration exceeds the benchmark and that a potential for ecological risk may be present. The more an HQ exceeds 1, the higher a potential for risk is assumed to the present. Note, however, that the increase in risk should not be assumed to be linear.

All the HQs for each sediment sample were summed to generate a combined number called "total risk" to help with the data interpretation and risk discussion below. Summing the sample-specific HQs in no way implies that risk is expected to be additive across the various analytes. Instead, this mathematical approach is used only as a simple and convenient tool to represent each sediment location at the site by a single standardized summed value. This number can then be directly compared against the "total risk" calculated for all the other sampling locations instead of having to evaluate the analytical data by looking at individual chemical concentrations or HQs.

3.2 Ecotoxicity of BEHP

EPA identified BEHP as a potential site-related contaminant. However, the data interpretation under the current TDF identified a major source of uncertainty with the two sediment benchmarks published for this analyte: EPA Region 4 recommends a screening benchmark of 0.182 mg/kg (and a refinement benchmark of 2.65 mg/kg), whereas the Oak Ridge National Laboratory (ORNL) recommends a screening benchmark of 890 mg/kg. Both benchmarks come from reputable sources but differ by over four orders of magnitude. Using the lower benchmark of 0.182 mg/kg would identify the potential for toxicity from BEHP in several of the sediment samples collected from the site, particularly in sample SW-Leach A-01 ([BEHP] = 56 mg/kg, resulting in an HQ of 308), whereas using the higher benchmark of 890 mg/kg would show that none of the measured concentrations of BEHP in sediment are of concern, including in sample SW-Leach A-01.

Sources for the BEHP sediment ESVs

The EPA Region 4 BEHP sediment no-effect benchmark of 0.182 mg/kg was derived based on the "narcotic mode of action" (EPA, 2015) but does not appear to account for the Total Organic Carbon (TOC) content of the sediment. The available information in EPA (2015) is also unclear exactly how this value was derived.

The BEHP sediment benchmark of 890 mg/kg published by ORNL (Jones *et al*., 1997) was developed using the Equilibrium Partitioning (EqP) approach for non-ionic organic compounds developed by EPA (EPA, 1993). Calculating a sediment benchmark using the EqP approach requires the following three input variables: a chronic surface water criterion (µg/L), a sediment-water partitioning coefficient (K_d; L/kg), and a measured or assumed sediment TOC. The ORNL sediment benchmark of 890 mg/kg for BEHP is normalized to a sediment TOC of 1%. This benchmark would increase by a factor of 5 if the sediment TOC equaled 5% instead of the standard 1%. Conversely, this benchmark would decrease by a factor of 2 if the sediment TOC equaled 0.5% instead of the standard 1%. As an aside, the TOC levels were not measured in any of the August or October 2016 sediment samples collected at the Try Mill site.

ESAT reviewed the supporting evidence for the two BEHP sediment benchmarks. After consultation with the Agency, it was decided that ESAT would perform a focused literature search on the toxicity of BEHP in sediment to provide more supporting information to help select the correct benchmark for use in the analytical data evaluation.

Selection of the BEHP sediment benchmark for use in the evaluation

The result of the literature search identified many published papers on the toxicity of BEHP to aquatic organisms (*i.e.*, invertebrates, fish, amphibians) exposed to this compound in surface water. With a few exceptions, the general consensus was that BEHP is not toxic to aquatic organisms up to its natural maximum water solubility of 3 µg/L (e.g., Rhodes *et al*., 1995; Staples *et al*., 1997; Call *et al.*, 2001a).

ESAT only found two published papers that discussed the toxicity of BEHP to BMI in sediment. Both papers showed that BEHP is not toxic to BMIs even at high concentrations:

- Brown *et al.* (1996) exposed larvae of the midge *Chironomus riparius* for 28 days to natural river sediment spiked with 100, 1000, and 10000 mg/kg BEHP. The authors did not observe a significant reduction in the % emergence in any of the three exposure concentrations at the end of the exposure period.

- Call *et al*. (2001b) evaluated the effects of seven phthalate plasticizers (including BEHP) to the freshwater amphipod *Hyalella azteca* and the midge *C. tentans* exposed to spiked sediment samples (TOC = 4.8%) for 10 days. BEHP was tested at a single sediment concentration of

between 2,100 and 3,200 mg/kg dry weight. The authors reported no effect on survival or growth in either species. They remarked that these results were consistent with predictions derived from water-only tests and the EqP theory.

Finally, Naito *et al.* (2006) used the EqP approach to derive a no-effect sediment benchmark for BEHP equal to 615 mg/kg (based on 5% TOC) using the EqP approach and conservatively assuming a surface water toxicity threshold at the maximum water solubility of 3 µg/L.

Based on this body of evidence, ESAT concluded that the EPA R4 sediment benchmark of 0.182 mg/kg for BEHP was unrealistically low and instead selected the ORNL value of 890 mg/kg for use in the evaluation presented in the next subsection.

3.3 Evaluation of the sediment analytical chemistry data

As explained in Section 2.1 above, the sediment concentration data were used to calculate HQs to support an ecotoxicological evaluation. **Appendices 2 and 3** provide the raw analytical data, the HQs and the "total risk" for each location at the site sampled in August and October of 2016, respectively. **Attachment 2** summarizes the HQs and "total risks" across the sampling locations and dates. This information can be interpreted as follows:

- The "total risk" for the two sediment reference samples collected in August and October 2016 ranged between 3.3 and 5.0.
- Except for FW-01 in August 2016 and SW-Leach A-01 on both sampling dates, the "total risk" for all the other sediment samples generally fell within the range observed in the two reference samples.
- The "total risk" was similar in the sediment samples collected in August and October 2016, except for samples FW-01 and SW-Leach A-01 in which "total risk" roughly decreased by half between those two dates. The decrease in risk appears to be mainly associated with drops in the concentrations of barium, iron, manganese, silver and/or vanadium. Note, however, that silver was not detected in SW-Leach A-01 in either the August or October 2016 sediment sample; instead the HQs for this metal were derived using one-half the MDL and are therefore uncertain.
- Except for a handful of analytes in sample SW-Leach A-01 collected in August 2016, the vast majority of the HQs fall below 1.0, with none exceeding 2.0. This general pattern suggests a low likelihood of sediment toxicity from the measured analytes in all the sediment samples collected from the site in October 2016.

As summarized in Section 2.2 above, sample SW-Leach A-01 was the only one of the five site sediment samples collected in October 2016 which showed significant toxicity to both benthic test species. The information summarized in **Attachment 2** does not identify any obvious analyte that may have caused this toxicity. The exceedances above 1.0 of the individual HQs in this sample are small, with none surpassing 1.8. ESAT's past experience with previous sediment toxicity tests at other sites does not suggest that these few minor exceedances would, by themselves, be responsible for the toxic response measured in this sample. The exact reason for the toxicity in sediment sample SW-Leach A-01 is unknown and cannot be resolved based on the available analytical chemistry data. It appears plausible, but unproven, that the observed toxic effects may be associated with specific physical-chemical conditions prevailing at the seep itself (e.g., severe iron floc).

4.0 RECOMMENDATION FOR A MONITORING PROGRAM

The TDF requested that ESAT recommend a simplified monitoring program based only on periodic sediment chemical analyses. The information discussed in Section 2.0 and 3.0 above, and summarized in **Attachment 2**, established that only sediment sample SW-Leach A-01 collected in October 2016 was toxic

to the two benthic invertebrate species used in the test. The location from where this sample was collected (by the culvert under the road) serves as the most important source for the water that then flows through the forested wetland. That location would be the logical choice for future monitoring. Yet, the chemical analysis of this sample for metals and BEHP did not identify any analytes that might plausibly be responsible for the observed effects.

The lack of an obvious cause behind the toxicity in SW-Leach A-01 represents a serious dilemma with proposing a defensible future sediment monitoring program. After all, such a program requires a clear analytical trigger point that would be used to decide on the need for further action (e.g., additional sampling; renewed toxicity testing; remedial action implementation). The fact that the sediment sample collected at SW-Leach A-01 in October 2016 caused an obvious toxic response that could not be linked to one or more Superfund-regulated analytes greatly limits the scope of any future monitoring program at this site.

ESAT discussed this issue at length with the Task Order Contracting Officer Representative (TOCOR) in an attempt to develop a workable solution. The conclusions of that discussion were as follows: (a) the forested wetland consists of several shallow pools that provide small patches of marginal aquatic habitat within an existing stand of pines, (b) the water and the substrate in these pools are colored bright orange as a result of iron precipitation, (c) discharge from the seep at sampling location SW-Leach A-01 and additional smaller seeps in the forested wetland do not appear to reach the emergent marshy area located further downgradient next to Rockwood Brook, and (d) none of the analytes measured in the October 2016 SW-Leach A-01 sediment sample can explain the observed toxicity to the benthic invertebrate species.

The sediment toxicity observed at this location, while real, cannot be readily linked to the measured analytes. In addition, future sampling at location SW-Leach A-01 appears unlikely to resolve the current disconnect between chemistry and toxicity. It also appears that the toxicity may be linked to seep-related physical-chemical conditions instead of specific analytes regulated under Superfund. As such, it was determined that a defensible sediment analytical chemistry monitoring program could not be developed given the existing conditions at sample location SW-Leach A-01.

5.0 SUMMARY AND CONCLUSION

EPA tasked ESAT with evaluating two complementary datasets obtained from the Troy Mills Landfill Superfund Site, as follows: (a) the toxicity data of seven sediment samples collected in October 2016 from seeps by Rockwood Brook and the forested wetland to evaluate the potential effects of exposure to metals and BEHP on *H. azteca* and *C. dilutus*, and (b) the analytical chemistry data for the sediment samples collected in August and October of 2016 from the site. The TDF requested that ESAT interpret these two independent lines of evidence and recommend a monitoring program of sediment chemical analyses to determine if current risks may be stable or increasing in the future.

- **Sediment toxicity testing results**

  The sediment toxicity tests identified a significant effect on survival and biomass in both benthic invertebrate species exposed to sample SW-Leach A-01 collected in October 2016. This sample was collected from a seep not directly associated with either the forested wetland area or Rockwood Brook, and also does not represent viable BMI habitat. Significant effects were not observed in either test species exposed to the remaining four site sediment samples. Based on this first line of evidence, it was concluded that the current conditions in Rockwood Brook are unlikely to result in population-level effects to the local BMI community from exposure to seepage from the site. However, conditions in the forested wetland, as represented by sample SW-Leach A-01, might impact the local BMI population in that habitat.

- **Sediment analytical chemistry data results**

  The sediment analytical chemistry data did not identify any particular analyte that could plausibly explain the severe level of toxicity measured by the two test species exposed to sediment sample SW-Leach A-01 collected in October 2016. The observed toxicity, while real, appears to result from unknown causes. It seems plausible, but unproven, that the toxic response may be associated with specific physical-chemical conditions prevailing at the seep itself (e.g., iron floc).

  The lack of an obvious chemical signature in the four remaining site sediment samples collected from the forested wetland area and Rockwood Brook, and the two reference samples, corroborated the toxicity test results. Based on this second line of evidence, it was concluded that the existing levels of metals and BEHP in sediment collected at seeps associated with Rockwood Brook and the forested wetland are unlikely to result in population-level effects to the local BMI community from exposure to seepage from the site.

- **Recommended monitoring program of sediment chemical analyses**

  The TDF requested that ESAT develop a monitoring program based on periodic sediment chemical analyses. Only sediment sample SW-Leach A-01 was toxic. The location from where this sample was collected is the main source for the orange-colored water that flows through the forested wetland. That location makes it a logical choice for future monitoring. Yet, the chemical analysis did not identify any specific analytes responsible for the observed toxicity.

  The lack of an obvious cause for the toxicity in SW-Leach A-01 represents a dilemma for proposing a defensible sediment monitoring program. ESAT discussed this issue with TOCOR to try to develop a workable solution. After reviewing all the data, it was concluded that the sediment toxicity at this location was real but could not be linked to any of the measured analytes in the sediment sample. In addition, future sampling at location SW-Leach A-01 would not help resolve the current disconnect between chemistry and toxicity. As such, it was determined that a sediment chemistry monitoring program could not be developed given the existing conditions at sample location SW-Leach A-01.

6.0 REFERENCES

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FIGURES

Figure 1: August 17, 2016 sediment sampling locations, Troy Mills Landfill Superfund Site, Troy Mills, NH

Sample	Coordinates
FW Ref	42° 48.145'N, 72° 11.307'W
RB Ref	42° 48.218'N, 72° 11.292'W
RB 01	42° 48.201'N, 72° 11.276'W
RB 02	42° 48.215'N, 72° 11.272'W
RB 03	42° 48.258'N, 72° 11.284'W
RB 04	42° 48.264'N, 72° 11.277'W
RB 05	42° 48.269'N, 72° 11.270'W
FW 01	42° 48.169'N, 72° 11.284'W
SW Leach A-01	42° 48.170'N, 72° 11.246'W
SW Leach B-01	42° 48.250'N, 72° 11.279'W

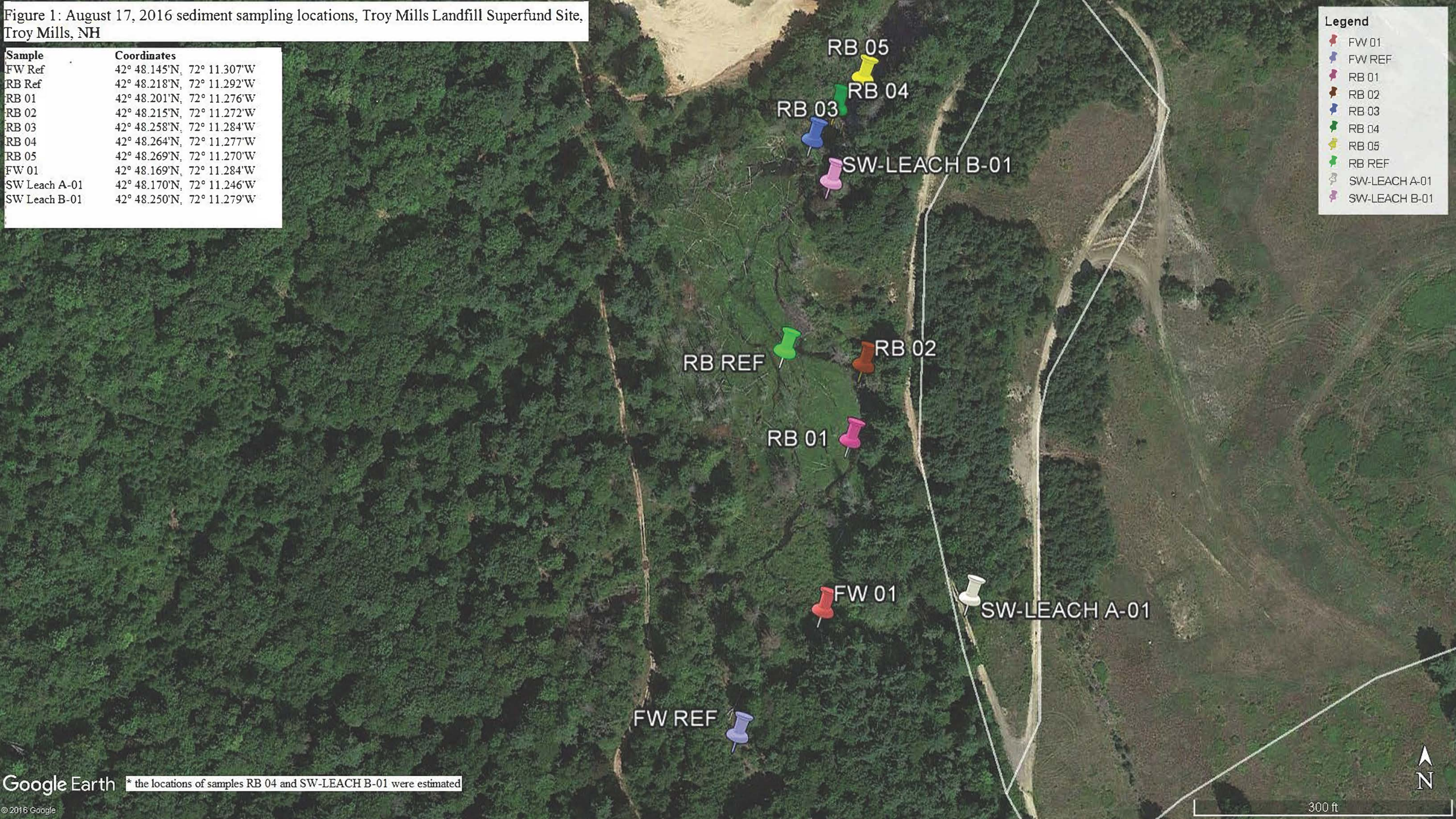
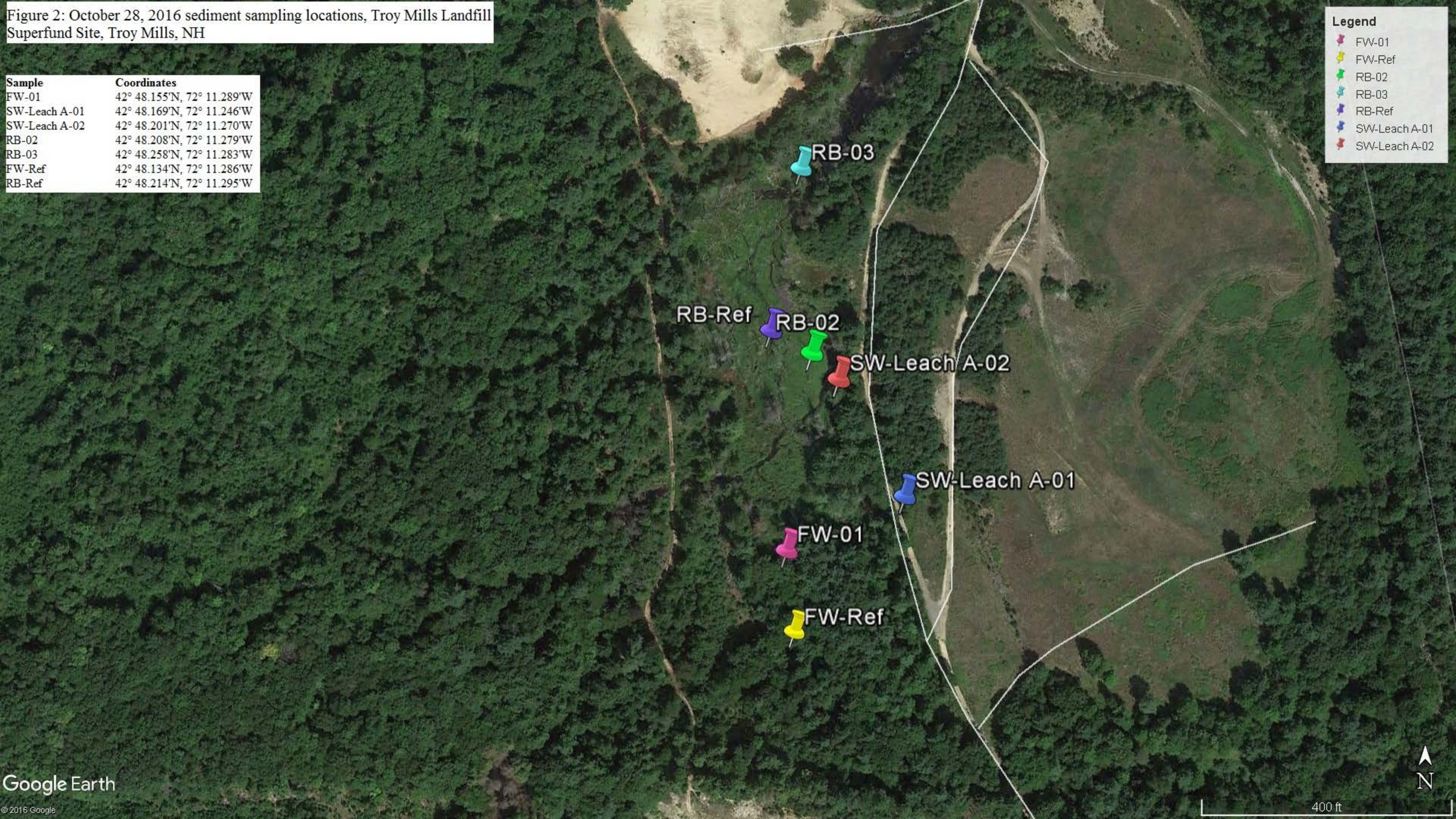


Figure 2: October 28, 2016 sediment sampling locations, Troy Mills Landfill Superfund Site, Troy Mills, NH

Sample	Coordinates
FW-01	42° 48.155'N, 72° 11.289'W
SW-Leach A-01	42° 48.169'N, 72° 11.246'W
SW-Leach A-02	42° 48.201'N, 72° 11.270'W
RB-02	42° 48.208'N, 72° 11.279'W
RB-03	42° 48.258'N, 72° 11.283'W
FW-Ref	42° 48.134'N, 72° 11.286'W
RB-Ref	42° 48.214'N, 72° 11.295'W



ATTACHMENTS

Attachment 1.1: GPS coordinates for the August 17, 2016 sediment sampling effort, Troy Mills Landfill Superfund Site, Troy Mills, NH		
Sample location	**GPS Coordinates**	
FW-Ref	42°48.145'N	72°11.307'W
RB-Ref	42°48.218'N	72°11.292'W
RB-01	42°48.201'N	72°11.276'W
RB-02	42°48.215'N	72°11.272'W
RB-03	42°48.258'N	72°11.284'W
RB-04	42°48.264'N	72°11.277'W
RB-05	42°48.269'N	72°11.270'W
FW-01	42°48.169'N	72°11.284'W
SW-Leach A-01	42°48.170'N	72°11.246'W
SW-Leach B-01	42°48.250'N	72°11.279'W

Attachment 1.2: GPS coordinates for the October 28, 2016 sediment sampling effort, Troy Mills Landfill Superfund Site, Troy Mills, NH		
Sample location	**GPS Coordinates**	
FW-01	42°48.155'N	72°11.289'W
SW-Leach A-01	42°48.169'N	72°11.246'W
SW-Leach A-02	42°48.201'N	72°11.270'W
RB-02	42°48.208'N	72°11.279'W
RB-03	42°48.258'N	72°11.283'W
FW-Ref	42°48.134'N	72°11.286'W
RB-Ref	42°48.217'N	72°11.295'W

Attachment 2: Summary of the hazard quotients and "total risks" in the sediment samples collected from 11 locations at the Troy Mill Landfill Superfund site in August and October 2016																						
	FW-ref		RB-ref		FW-01		RB-01		RB-02		RB-03		RB-04		RB-05		SW-Leach A-01		SW-Leach A-02		SW-Leach B-01	
Analyte	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016	Aug 2016	Oct 2016
Aluminum	0.2	0.1	0.2	0.2	0.3	0.2	0.2	--	0.2	0.2	0.2	0.3	0.2	--	0.1	--	0.1	0.2	--	0.2	0.2	--
Antimony	0.0	0.1	0.1	0.1	0.1	0.1	0.1	--	0.0	0.1	0.1	0.1	0.1	--	0.0	--	0.6	0.4	--	0.1	0.0	--
Arsenic	0.2	0.1	0.1	0.1	0.3	0.1	0.0	--	0.1	0.1	0.1	0.1	0.1	--	0.0	--	0.9	0.2	--	0.1	0.1	--
Barium	**1.1**	0.8	**1.3**	**1.1**	**2.0**	**1.2**	**1.0**	--	0.9	0.98	**1.3**	**1.4**	0.8	--	0.5	--	**3.7**	**1.8**	--	**1.2**	0.8	--
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	0.1	0.1	0.1	0.1	0.2	0.1	0.1	--	0.1	0.1	0.1	0.1	0.1	--	0.1	--	**1.4**	0.5	--	0.1	0.1	--
Chromium	0.1	0.1	0.1	0.1	0.2	0.1	0.1	--	0.1	0.1	0.1	0.2	0.1	--	0.1	--	0.1	0.2	--	0.1	0.1	--
Cobalt	0.1	0.1	0.1	0.1	0.4	0.2	0.1	--	0.1	0.1	0.2	0.3	0.3	--	0.1	--	0.3	0.1	--	**1.1**	0.1	--
Copper	0.1	0.1	0.1	0.1	0.2	0.1	0.1	--	0.1	0.1	0.1	0.1	0.1	--	0.0	--	0.1	0.2	--	0.1	0.1	--
Iron	0.3	0.2	0.4	0.4	**1.4**	0.5	0.3	--	0.2	0.2	0.4	0.4	0.4	--	0.2	--	**9.5**	**1.8**	--	0.7	0.5	--
Lead	0.4	0.1	0.2	0.1	0.3	0.2	0.1	--	0.1	0.1	0.2	0.2	0.1	--	0.1	--	0.1	0.0	--	0.1	0.1	--
Manganese	0.2	0.2	0.2	0.3	**1.6**	0.5	0.3	--	0.1	0.1	0.5	0.5	0.4	--	0.2	--	**1.1**	0.8	--	**1.1**	0.4	--
Mercury	0.2	--	0.1	--	0.3	--	0.1	--	0.1	--	0.1	--	0.0	--	0.0	--	0.1	--	--	--	0.1	--
Nickel	0.2	0.1	0.2	0.2	0.4	0.2	0.2	--	0.2	0.2	0.2	0.3	0.2	--	0.1	--	0.3	0.3	--	0.2	0.1	--
Selenium	0.1	0.1	0.1	0.1	0.2	0.1	0.1	--	0.1	0.1	0.1	0.1	0.1	--	0.1	--	**1.4**	0.5	--	0.1	0.1	--
Silver	0.3	0.3	0.3	0.3	0.5	0.3	0.3	--	0.2	0.3	0.3	0.3	0.3	--	0.2	--	**3.2**	**1.2**	--	0.2	0.3	--
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	**1.2**	0.5	**1.2**	0.9	**1.5**	0.96	0.8	--	0.8	0.8	**1.0**	**1.1**	0.9	--	0.4	--	**3.1**	**1.4**	--	0.9	0.8	--
Zinc	0.2	0.1	0.1	0.1	0.3	0.2	0.1	--	0.2	0.8	0.2	0.2	0.1	--	0.1	--	0.1	0.2	--	0.1	0.1	--
BEHP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0	--	0.0	--	0.0	0.1	--	0.0	0.0	--
"total risk"	**5.0**	**3.3**	**4.9**	**4.3**	**10.1**	**5.2**	**4.1**	--	**3.5**	**4.5**	**5.3**	**5.7**	**4.3**	--	**2.3**	--	**26.0**	**10.0**	--	**6.4**	**4.0**	--
Toxicity?	--	no	--	no	--	no	--	--	--	no	--	no	--	--	--	--	--	**yes**	--	no	--	--

APPENDICES

APPENDIX 1

TOXICITY TEST REPORT FOR SEDIMENT SAMPLES COLLECTED ON October 2016 FROM THE TROY MILLS LANDFILL SUPERFUND SITE, TROY MILLS, NH

Results for 10-Day Sediment Toxicity Tests Using *H. azteca* and *C. dilutus*
Troy Mills Landfill Superfund Site
Troy, NH

Submitted to the:

Task Order Contracting Officer Representative
Office of Environmental Measurement and Evaluation
USEPA - New England Regional Laboratory
11 Technology Drive
North Chelmsford, Massachusetts 01863

Submitted by:

ESAT - Region I
EP-W-13-021

TechLaw, Inc.
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TDF No. 1144
Task Order No. 06
Task No. 04

March 3, 2017

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1.0 INTRODUCTION

This report describes the toxicity testing results of 7 sediment samples that were collected from two general areas (Rockwood Brook and Rockwood Brook Wetland Study Area, WSA) and two specific surface water seeps (SW-Leach A-01 and SW-Leach A-02) at the Troy Mills Landfill Superfund Site (the Site) in Troy, NH. Two reference sediment samples were also collected, one associated with each general sampling area, the Forested Wetland and Rockwood Brook.

Troy Mills, Inc. (TMI) manufactured acrylic fabric at its facility. TMI disposed of around 7,670 drums in the 2-acre landfill dating back to 1967. TMI ceased disposal operations in December 2001. The site is bordered to the north by an inactive but regulated 8-acre solid-waste landfill. The solid-waste landfill is not part of the Superfund site. The ecological habitats of concern at the site are Rockwood Brook and the Rockwood Brook WSA. The latter is located to the northwest of the TMI between the former drum disposal area and Rockwood Brook. The soils in the WSA are water-saturated and support wetland plants. Beavers constructed a dam across from the access road to a gravel pit downstream from the Site which resulted in a beaver pond located directly downstream from the confluence of the West Branch and East Branch of Rockwood Brook. The United States Environmental Protection Agency (EPA) noted during an August 17, 2016 site visit that this beaver dam had been breached, draining the beaver pond and revealing groundwater seeps in the wetland area. Two channels currently run through this area; the first one occurs along the eastern edge of the former beaver pond closer to the site, whereas the second one occurs in the middle of the former beaver pond and is farther from the site. Orange staining and orange floc are visible at the leachate culvert, the point of discharge from the Troy Mills landfill, and into the wetland area. Iron floc was also noted during the site visit by EPA on August 17, 2016.

The 7 sediment samples from the Site and reference locations were collected on October 28, 2016. The Environmental Services Assistance Team (ESAT) assisted with the sampling conducted by the EPA New England Regional Laboratory (NERL) out of North Chelmsford, MA. All sediment samples were delivered to the NERL and were kept at 4°C until test initiation. An aliquot sample was collected and submitted to the NERL Chemistry section for analysis of metals and BNAs.

1.2 Technical Direction Forms

The EPA issued Technical Direction Form (TDF) No. 1144 on October 18, 2016. The TDF requested that ESAT perform a two-species bulk sediment toxicity test on 7 samples collected from the Troy Mills Landfill Superfund Site. The TDF instructed that split samples would be collected and submitted to the NERL Chemistry section for analysis of metals and BNAs.

2.0 STUDY OBJECTIVES

As requested under the TDF, ESAT helped EPA collect 7 sediment samples on October 28th, 2016 and transported them to the NERL for toxicity testing and chemical analyses. The samples were collected according to the Standard Operating Procedure (SOP) for sediment collection (EPA 2016). ESAT used samples collected for biological toxicity testing in a 10-day aquatic toxicity test using juveniles of the benthic freshwater amphipod, *Hyalella azteca*, and larvae of the midge fly, *Chironomus dilutus*.

The objective was to determine if responses by the test organisms exposed to Site sediment samples collected from Rockwood Brook and the WSA differed significantly from the responses measured in the two reference sediment samples. The WSA and Rockwood Brook were evaluated to determine the current extent of contaminated sediment and whether some areas may need to be re-assessed for ecological risk to benthic invertebrates. A laboratory control sample was included in the toxicity test to verify that the organisms were heathy and that the test passed Test Acceptability Criteria (TAC) specified by (EPA 2002).

The toxicity endpoints measured at the end of the 10-day exposure period consisted of survival and biomass for *H. azteca* and survival and ash-free biomass for *C. dilutus*. Survival was determined by counting the number of live organisms in each replicate at the end of the test. Biomass was obtained by weighing the surviving organisms in each replicate and dividing that weight by the number of organisms introduced at the start of the test (i.e., 10). The *H.*

azteca biomass was based on the dry weight of the surviving organisms, whereas the *C. dilutus* biomass was based on the ash-free dry weight of the surviving organisms.

3.0 MATERIALS & METHODS

3.1 Sediment Sample Collection Locations

Table 1 lists sediment sample location information, collection dates, and sample IDs for all collected samples.

Rockwood Brook

Rockwood Brook is located to the northwest of TMI. The "lower access road" runs along the western side of the landfill and divides the landfill area from the wetland. Three main channels of Rockwood Brook, all flowing south to north, were sampled for sediment. The most southern branch, called the "Rockwood Eastern Branch", flows parallel to the access road and through the forested wetland. It eventually joins the main branch of the Rockwood Brook to the north and enters the southern point of the former beaver pond which is not forested. The brook then branches into two separate channels, one to the west and one to the east. The east channel of the brook flows along the eastern boarder of wetland closer to the site and is directly fed by the staining seeps from TMI flowing under the access road. The west channel flows parallel down the center of the former beaver pond and does not come into contact with any seeps and shows no visual signs of contamination from TMI.

WSA

The Rockwood Brook WSA is located to the south of the former beaver pond. It is a forested wetland area where the eastern branch of Rockwood Brook flows through before connecting with the main branch and splitting into the east and west channels in the former beaver pond.

Appendix A provides the chain-of-custody records for all the sediment samples. **Appendix E** provides the site sample locations map

3.2 Toxicity Testing Methods

Two Parallel 10-day sediment toxicity tests were run using juveniles of the freshwater amphipod, *H. azteca*, and larvae of the midge-fly, *C. dilutus*.

The tests started on November 8, 2016 and ended on November 18, 2016. They followed the procedures presented in (EPA 2014). The test chambers consisted of 300-ml glass beakers with Nitex-covered notched openings and cheesecloth attached to the outside to allow for a flow-through system. Eight replicates per species were used for each sediment sample. Artificial sediment, consisting of a prescribed mixture of fine sand, medium sand, ASP 400 (kaolin), calcium carbonate, alpha cellulose and humic acid was used for the laboratory control (EPA 2014). Each test chamber received about 100 ml of lab control or site sediment and was placed into the Sediment Toxicity Testing System (STTS) at the NERL one day before the test organisms were added. Following the introduction of sediments, one renewal cycle was run in the STTS to fill the test vessels with overlying water, which consisted of 90 mg $CaCO_3$/L Hardness Process Water (HPW). The vessels were left to sit overnight undisturbed. The overlying water was tested for conductivity, pH and Dissolved Oxygen (DO) before the test organisms were introduced. The hardness and alkalinity of each new batch of water used during the test was checked to verify that the concentrations of these two parameters fell within an acceptable range (i.e., hardness around 90 mg/L and alkalinity between 60 and 70 mg/L).

Ten second-to-third instar larval stage *C. dilutus* (age 11-12 days) were randomly introduced to each test chamber for the midge test. Ten juvenile *H. azteca* that had been sieved through a #60 sieve three days prior to the test were introduced into each test chamber for the amphipod test. Healthy and active organisms were chosen and carefully transferred, keeping each one completely submerged in water from the holding tray to the test chamber. The test chamber temperatures were kept at 23± 1°C with a 16:8-hour light/dark cycle using cool-white fluorescent lights for the duration of the toxicity tests. Water renewals initially occurred once daily using the automatic renewal system associated with the STTS. The renewal cycle for the test banks containing the *C. dilutus* was adjusted to twelve hour intervals during the test when measured DO levels fell below 4.0 mg/L.

Each *H. azteca* replicate was fed 1.0 ml of a Yeast-Alfalfa-Fish flake chow mixture (YAF) daily after the

morning renewals. Each *C. dilutus* replicate was fed 1.5 ml of 4 g/L Tet-Shake daily after the morning renewals. Water flow, renewal time, light intensity, and the minimum and maximum temperatures were recorded daily in the STTS monitoring log. The C. *dilutus* beakers were fed only 0.75 mL Tet-shake on days 3 and 6 and 1.0 mL on days 4 and 5 of testing due to low DO values in sample SW-Leach A-02 (3.97 mg/L).

Temperature, pH, DO, conductivity, hardness, alkalinity, and ammonia were measured in a composite sample of overlying water from the eight replicates for each sample location at the start of the test (day 0) and recorded in the Biology Chemistry log book. Temperature, pH, DO, and conductivity were measured each subsequent morning throughout the exposure period in composite samples of overlying water obtained from each sample station and each test species. Temperature, pH, DO, and conductivity were also measured in composite samples of overlying water for each sample station and test species at the end of the 10-day exposure period. **Appendix B** and **Appendix C** present the water chemistry data for the *H. azteca* and *C.dilutus* tests, respectively. These data are further discussed in **Section 4.1**.

The renewal cycle was ended on day 10 of the tests. The surviving test organisms were retrieved from each beaker, rinsed with deionized water to remove any debris and placed on small pre-weighed, pre-labeled aluminum pans. The surviving number of organisms from each replicate was obtained from each pan and recorded on bench sheets. The organisms in the pans were dried overnight at 100^{o}C and then weighed to obtain dry weights. The *C. dilutus* were then ashed for an additional 2 hours at 550^{o} C in a muffle furnace in order to obtain an Ash-Free Dry Weight (AFDW) for each replicate. The combined dry weights of the organisms in each replicate were recorded in the Biology Laboratory Organism Weight Logbook. **Appendix D** provides all the laboratory bench sheets.

3.3 Statistical Analysis Methods

Statistical analyses of the survival and biomass data for both test species were conducted using CETIS ® (Comprehensive Environmental Toxicity Information System) v. 1.8.7.16 according to the EPA decision tree in (EPA 2000). The survival and biomass data from each species were analyzed separately.

Appendix D provides the CETIS ® statistical print-outs. Biomass for *C. dilutus* was calculated by dividing AFDW by the number of introduced organisms per replicate at the end of the test and reported as the average sample Ash-Free Dry Biomass (AFDB). Biomass for *H. azteca* was calculated by dividing the dry weights by the number of introduced organisms per replicate at the end of the test. Final dry weights were divided by the number of introduced organisms and reported as the average sample dry biomass.

4.0 RESULTS

4.1 Sediment Toxicity Test Overlying Water Chemistry

H. azteca

The conditions in the test vessels met the performance criteria for daily overlying water chemistry requirements (EPA 2000), as indicated in **Appendix B**. The overlying water temperatures, as measured during the daily chemistry checks, deviated no greater than ±1ºC from 23ºC, ranging between 22.01°C and 23.54°C during the 10-day test period.

Conditions of the STTS banks were maintained according to SOP (EPA 2014). Instances occurred when the STTS bank temperatures deviated out of the 23ºC±1ºC range. On days 1 and 2, the *H. azteca* banks read just below 22.0°C for the minimum temperatures, adjustments were applied and the banks stayed within range for the remainder of the test. The maximum bank temperatures remained within range throughout the test. The range of temperatures recorded were 21.6 ºC to 23.4 ºC. The specific temperatures are available in the STTS Monitoring Logbook.

Day 0 (initial water chemistry) NH_3 concentrations in all *H. azteca* samples were non-detect (ND) at <1.0mg NH_3/L. The NH_3 concentrations on Day 10 (final water chemistry) in all of the exposure chambers were also ND. Ammonia criteria calculations were not performed because all levels were ND.

C.dilutus

The conditions in the test vessels met the performance criteria for daily overlying water chemistry requirements (EPA 2000), as indicated in **Appendix B**. The overlying water temperatures, as measured during the daily chemistry checks, deviated no greater than ±1ºC from 23ºC, ranging between 22.03°C and 23.42°C during the 10-day test period.

Conditions of the STTS banks were maintained according to SOP (EPA 2014). Instances occurred when the STTS bank temperatures deviated out of the 23ºC±1ºC range. The *C. dilutus* banks read just below 22.0°C for the minimum temperatures on all test days besides on day 9, the minimum had risen to 22.2 ºC. The maximum bank temperatures remained within range throughout the test. The range of temperatures recorded were 21.5 ºC to 23.1 ºC. The specific temperatures are available in the STTS Monitoring Logbook.

Day 0 (initial water chemistry) NH_3 concentrations in all *C. dilutus* exposure chambers were ND at <1.0mg NH_3/L. The NH_3 concentrations on Day 10 (final water chemistry) in all of the exposure chambers were also ND. Ammonia criteria calculations were not performed because all levels were ND.

4.2 *H. azteca* Survival & Biomass

The two endpoints for the *H. azteca* test consisted of survival and average dry biomass after 10 days of exposure. The minimum TAC for survival in the laboratory control organisms equals 80% (EPA 2000). The test met this TAC with a control survival of 97.5%.

CETIS first ran separate Analysis of Variance (ANOVA) tests to evaluate the distribution and variance of the two survival datasets, i.e. HA FW-Ref, H SW-Leach A-01 and HA FW-01, plus HA RB-Ref, HA RB-02, HA RB-03, and H SW-Leach A-02. It then further explored the outcome by using the Dunnett Multiple Comparison Test (for HA FW-Ref vs. HA FW-01 and H SW-Leach A-01) and the Steel Many-One Rank Sum Test (for HA RB-Ref vs. the three remaining site samples) to identify any site samples showing significant survival effects.

Table 2 presents the survival data, whereas **Figure 1** summarizes the outcome of the statistical analyses. The lowest average survival in SW- Leach A-01 (71.253%) was significantly lower compared to its reference FW-Ref (92.5%). The average survival in the four remaining site samples did not differ significantly from that observed in their respective reference samples.

CETIS first ran separate Analysis of Variance (ANOVA) tests to evaluate the distribution and variance of the two biomass datasets, i.e. HA FW-Ref, H SW-Leach A-01 and HA FW-01, plus HA RB-Ref, HA RB-02, HA RB-03, and H SW-Leach A-02. It then further explored the outcome by using the Dunnett Multiple Comparison Test to identify any site samples showing significant survival effects.

Table 3 presents the biomass data, whereas **Figure 2** summarizes the outcome of the statistical analyses. Average biomass in the organisms exposed to SW- Leach A-01 was significantly lower compared to that measured in its reference FW-Ref. The average biomass in the four remaining site samples did not differ significantly from that observed in their respective reference samples.

4.3 *C. dilutus* Survival & Biomass

The endpoints for the *C. dilutus* test consisted of survival and AFDB after 10 days of exposure. (EPA 2000) specifies that the minimum TAC for survival in the laboratory control organisms equals 70%. The test met this TAC with a control survival of 97.14%.

CETIS first ran separate ANOVAs to evaluate the distribution and variance of the two survival datasets, i.e. Cdi FW-Ref, C SW-Leach A-01 and Cdi FW-01, plus Cdi RB-Ref, Cdi RB-02, Cdi RB-03, and C SW-Leach A-02. It then further explored the outcome by using the Dunnett Multiple Comparison Test (for Cdi FW-Ref vs. Cdi FW-01 and C SW-Leach A-01) and the Wilcoxon/Bonferroni Adj Test (for Cdi RB-Ref vs. the three remaining site samples) to identify any site samples showing significant survival effects.

Table 4 presents the survival data, whereas **Figure 3** summarizes the outcome of the statistical tests. The lowest average survival in SW- Leach A-01 (22.5%) was significantly lower compared to its reference FW-Ref (90.0%). The average survival in the organisms exposed to the four remaining site samples did not differ significantly from that observed in their respective reference samples. As explained in Section 5 (Discussion), however, part of the reason for the lack of significant effect may be due to the low survival (52.86%) caused by predation measured in reference sample Cdi RB-Ref.

The minimum TAC for growth in *C. dilutus* is 0.48mg of the mean AFDW per surviving organism to occur in the control organisms at the end of the 10-day exposure period (EPA 2000). The test met this TAC.

CETIS first ran separate ANOVAs to evaluate the distribution and variance of the two biomass datasets, i.e. Cdi FW-Ref, C SW-Leach A-01 and Cdi FW-01, plus Cdi RB-Ref, Cdi RB-02, Cdi RB-03, and C SW-Leach A-02. It then further explored the outcome by using the Bonferroni Adjusted *t*-Test to identify any site samples showing significant biomass effects.

Table 5 provides the average AFDB data, whereas **Figure 4** summarizes the outcome of the statistical tests. AFDB in the organisms exposed to SW- Leach A-01 was significantly lower compared to that measured in the site reference FW-Ref. The average AFDB in the organisms exposed to the remaining four site samples did not differ significantly from that observed in their respective reference samples. As explained in Section 5 (Discussion), however, part of the reason for the lack of significant effect may be due to low survival from predation observed in reference sample Cdi RB-Ref and several other samples.

5.0 DISCUSSION

5.1 *H. azteca* Survival and Biomass

The average survival in the two reference locations equaled 92.5% (HA FW-Ref) and 96.25% (HA RB-Ref). Only one of the five site samples, HA SW-Leach A-01 had a significantly lower average survival compared to its reference sample (HA FW-Ref).

The average dry biomass in the two reference locations equaled 0.098 mg (HA FW-Ref) and 0.094 mg (HA RB-Ref). CETIS used the Dunnett Multiple Comparison Test (for HA FW-Ref vs. HA FW-01 and H SW-Leach A-01) and the Steel Many-One Rank Sum Test (for HA RB-Ref vs. the three remaining site samples) to identify any site samples showing significant effects. Organisms exposed to SW- Leach A-01 showed a significant difference in growth when compared to FW-Ref. No other significant difference was observed in the average dry biomass of the four remaining site samples compared to their associated reference samples. The lowest and highest average dry biomass in the five site samples occurred in H SW-Leach A-01 (0.057mg) and HA RB-03 (0.108mg), respectively.

5.2 *C. dilutus* Survival and Biomass

The average survival in the two reference locations equaled 90% (Cdi FW-Ref) and 52.86% (Cdi RB-Ref). The lowest percent survival was observed in Cdi SW-Leach A-01 (22.5%) while the highest percent survival occurred in Cdi FW-Ref (90%). Only one of the five site samples, Cdi SW-Leach A-01 had a significantly lower average survival compared to its reference sample (HA FW-Ref).

The average AFDW in the two reference locations equaled 1.222 mg (Cdi FW-Ref) and 0.760 mg (Cdi RB-Ref). CETIS used the Bonferroni Adjusted *t*-Test to identify any site samples showing significant biomass effects.

Only one of the five site samples, Cdi SW-Leach A-01 had a significantly lower AFDB compared to its reference sample (HA FW-Ref).

The reference locations had an average biomass of 1.222 mg (FW-Ref) and 0.760 mg (RB-Ref). Sample SW-Leach A-01 had the overall lowest biomass (0.257 mg) and FW-Ref had the highest biomass (1.222 mg).

In sample SW-Leach A-02, a caddis fly was found in replicate 1 and an odonate larvae was found in replicate 2. RB-Ref replicate 2 contained an empty caddis fly casing and had no surviving organisms at test completion. In RB-Ref replicate 6, a large odonate larvae was found and only 3 of the test organisms survived. The low survival in these

sample replicates could be contributed to the presence of a potential predator species but cannot be known for sure, and for this reason the results of the *C. dilutus* test should be used with caution. Initially, RB-Ref replicate 6 was used in the statistical analysis but was later removed to see if a decreased amount of predation in the reference sample could affect the statistical outcome. The results of the statistics showed no difference. The data point was left out of the statistical analysis in the final report.

Several replicates (Cdi Control Rep 4, Cdi RB-03 rep 4, C SW-Leach A-01 rep 1 and C SW-Leach A-01 rep 5) were removed from the *C. dilutus* biomass statistical analysis (Appendix D) due to pan disturbances in the final ash free weight weighing process. Since the final AFDB for these pans could not be accurately determined, they were removed from the statistical analysis. The issues occurred after survival counts had been determined, so the survival statistics are unaffected.

6.0 REFERENCES

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EPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA/600/R-99/064, March, 2000.

EPA. 2013. EIASOP-INGMETALSPREP8. Standard Operating Procedure: Sample Preparation Methods for Metals Analysis, Revision 8; 8/07/2013.

EPA. 2014. ECASOP. Standard Operating Procedure for Static Bulk Sediment Toxicity Testing. Revision 6; 3/18/14.

EPA. 2015. ECASOP CETIS6. Standard Operating Procedure Toxicity Testing Method Using CETIS Version 1.8.7.16. Revision 6; 11/13/2015.

EPA. 2016. EIASOP-SOILSAMPLING4. Standard Operating Procedure for Soil, Sediment, and Solid Waste Sampling; Revision 4; 2/01/2016.

TABLES

Table 1: Sediment toxicity tests sample locations	
Sample ID (Collection Date)	**Location information**
WSA	
FW-Ref (10/28/2016)	*Reference for Forested Wetland*- A distinct seep of groundwater located upgradient from the source of contamination and upstream of potential seeps in the forested wetland.
FW-01 (10/28/2016)	A seep located in the forested wetland upgradient of SW-Leach-A01 and downgradient of monitoring well MW-A28. This seep is located at the edge of a more open sedge area and a braided stream with pools. This area is visibly stained with floc from the seeps. The sediment sample was collected at the first sign of heavy floc.
SW-Leach A-01 (10/28/2016)	Historical sampling location next to the road. Leach-A01 is a long-recognized seep which has generated a preferential flow pathway for groundwater discharge due to the culvert under the upper access road. This seep is large. Orange precipitation from this seep meanders through a few pooled areas, and eventually shows up at the border of the forested wetland and the emergent wetland. The sediment sample was collected at a point very near the initial discharge.
Rockwood Brook	
RB-Ref (10/28/2016)	*Reference for Rock Brook*- Located in the middle of the wetland in a distinct channel away from the seeps. This is the western channel that runs through the former beaver pond farther from the site. The channel has no visible staining or flock from groundwater discharges.
RB-02 (10/28/2016)	A seep located upstream to the breached beaver dam and near historical location Sed-03/SW-3. It is also located downstream of SW-Leach-A02
RB-03 (10/28/2016)	A seep with floc located upstream of the breached beaver dam and downstream of Leach-B01, where SW/SE33 enters Rockwood Brook.
SW-Leach A-02 (10/28/2016)	Located along the eastern channel of Rockwood Brook that runs close to the site, where a second seep appears to flow into what used to be the beaver pond. The sediment sample was collected at the edge of the wetland at the lower end of the seep, where a clear line of the end of the flock was noted.

Table 2. Summary of *H. azteca* survival

Replicate	HA Lab Control	HA FW-Ref	HA RB-Ref	HA FW-01	HA RB-02	HA RB-03	H SW-Leach A-01	H SW-Leach A-02
1	100.0	80.0	90.0	100.0	100.0	80.0	80.0	100.0
2	100.0	80.0	100.0	100.0	100.0	100.0	60.0	90.0
3	90.0	90.0	100.0	100.0	80.0	100.0	60.0	100.0
4	100.0	100.0	100.0	90.0	90.0	100.0	100.0	100.0
5	100.0	100.0	80.0	80.0	40.0	100.0	100.0	100.0
6	100.0	100.0	100.0	80.0	90.0	100.0	60.0	90.0
7	100.0	90.0	100.0	100.0	100.0	100.0	50.0	90.0
8	90.0	100.0	100.0	100.0	100.0	90.0	60.0	90.0
Average Survival (%)	**97.50**	**92.50**	**96.25**	**93.75**	**87.50**	**96.25**	**71.25**	**95.00**
Standard Deviation (%)	**4.6**	**8.9**	**7.4**	**9.2**	**20.5**	**7.4**	**19.6**	**5.3**

Table 3. Summary of *H. Azteca* dry biomass

Replicate	HA Lab Control	HA FW-Ref	HA RB-Ref	HA FW-01	HA RB-02	HA RB-03	H SW-Leach A-01	H SW-Leach A-02
1	0.068	0.085	0.076	0.109	0.113	0.079	0.079	0.09901
2	0.068	0.073	0.108	0.089	0.113	0.117	0.037	0.088
3	0.067	0.12	0.099	0.099	0.072	0.103	0.06	0.09301
4	0.067	0.117	0.11	0.083	0.09701	0.127	0.069	0.081
5	0.082	0.095	0.062	0.076	0.046	0.112	0.067	0.083
6	0.090	0.11	0.121	0.11	0.118	0.095	0.05	0.113
7	0.085	0.08	0.089	0.124	0.097	0.102	0.049	0.073
8	0.09199	0.103	0.08401	0.104	0.122	0.135	0.049	0.086
Average Dry Biomass (mg)	**0.07737**	**0.09788**	**0.09363**	**0.09925**	**0.09725**	**0.10875**	**0.05750**	**0.08950**
Standard Deviation (mg)	**0.01098**	**0.01749**	**0.01956**	**0.01584**	**0.02620**	**0.01794**	**0.01369**	**0.01228**

Table 4. Summary of *C. dilutus* Survival

Replicate	Cdi Lab Control	Cdi FW-Ref	Cdi RB-Ref	Cdi FW-01	Cdi RB-02	Cdi RB-03	C SW-Leach A-01	C SW-Leach A-02
1	100.0	90.0	100.0	90.0	90.0	70.0	0.0	0.0
2	100.0	80.0	0.0	90.0	10.0	50.0	30.0	0.0
3	100.0	80.0	60.0	100.0	80.0	90.0	70.0	90.0
4	90.0	90.0	100.0	100.0	80.0	20.0	20.0	90.0
5	100.0	100.0	30.0	80.0	90.0	50.0	20.0	90.0
6	80.0	100.0	-	100.0	90.0	70.0	10.0	90.0
7	100.0	90.0	80.0	70.0	80.0	50.0	10.0	50.0
8	100.0	90.0	0.0	10.0	50.0	90.0	20.0	90.0
Average Survival (%)	**96.25**	**90.00**	**52.86**	**80.00**	**71.25**	**61.25**	**22.50**	**62.50**
Standard Deviation (%)	**7.4**	**7.6**	**41.1**	**30.2**	**28.0**	**23.6**	**21.2**	**41.0**

(-) indicates no data, data point was left out of statistical analysis

Table 5. Summary of *C. dilutus* AFDB

Replicate	Cdi Lab Control	Cdi FW-Ref	Cdi RB-Ref	Cdi FW-01	Cdi RB-02	Cdi RB-03	C SW-Leach A-01	C SW-Leach A-02
1	1.240	1.264	1.331	1.223	0.860	0.788	0.000	0.000
2	1.163	1.197	0.000	1.287	0.131	0.644	0.578	0.000
3	1.301	1.330	0.782	1.379	0.722	0.928	0.787	1.039
4	-	1.279	1.229	1.316	0.691	-	-	1.089
5	1.257	1.281	0.613	1.161	0.917	0.455	-	1.050
6	1.222	1.349	-	1.231	0.748	0.665	0.078	0.670
7	1.313	1.206	1.366	1.060	0.921	0.644	0.038	0.464
8	1.228	0.872	0.000	0.097	0.347	1.039	0.061	0.711
Average Ash-free Dry Biomass (mg)	**1.246**	**1.222**	**0.760**	**1.094**	**0.667**	**0.738**	**0.257**	**0.628**
Standard Deviation (mg)	**0.1**	**0.2**	**0.6**	**0.4**	**0.3**	**0.2**	**0.3**	**0.4**

(-) indicates no data, data point was left out of statistical analysis

FIGURES

Figure 1. Outcome of the statistical analyses of the *H. azteca* survival data

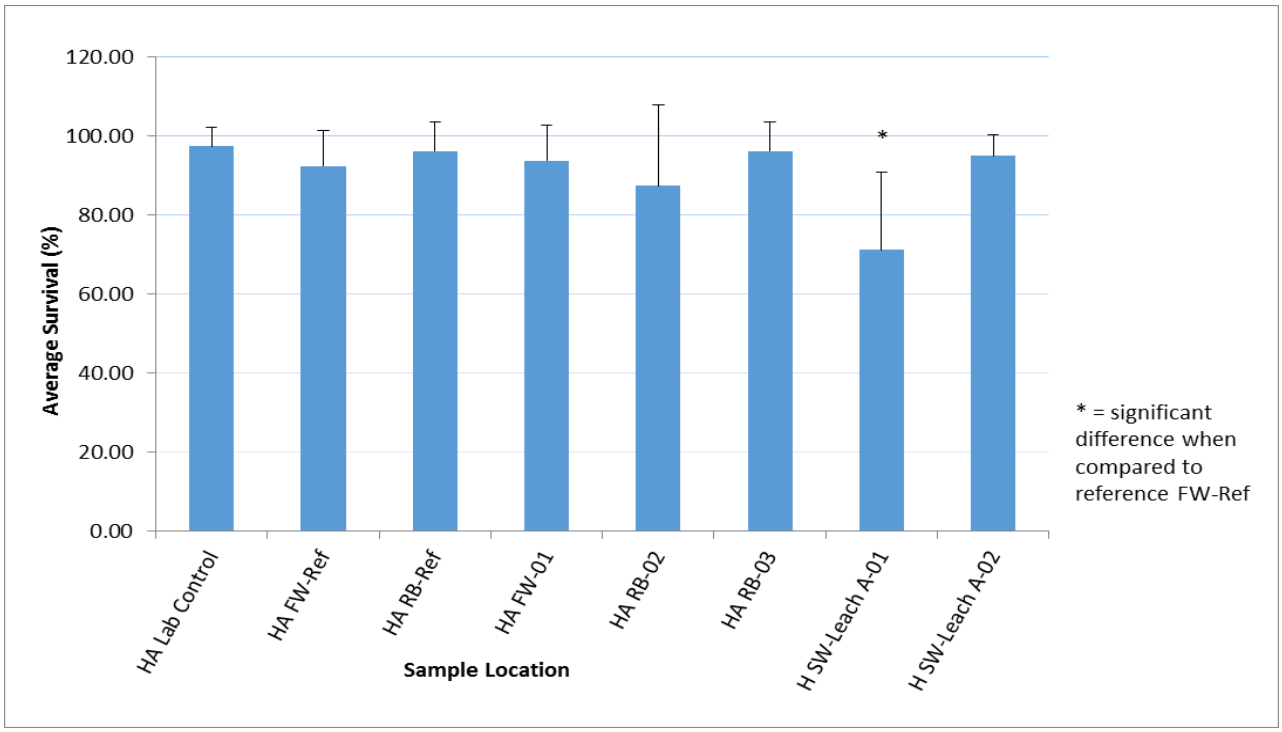


Figure 2. Outcome of the statistical analyses of the *H. azteca* average dry biomass data

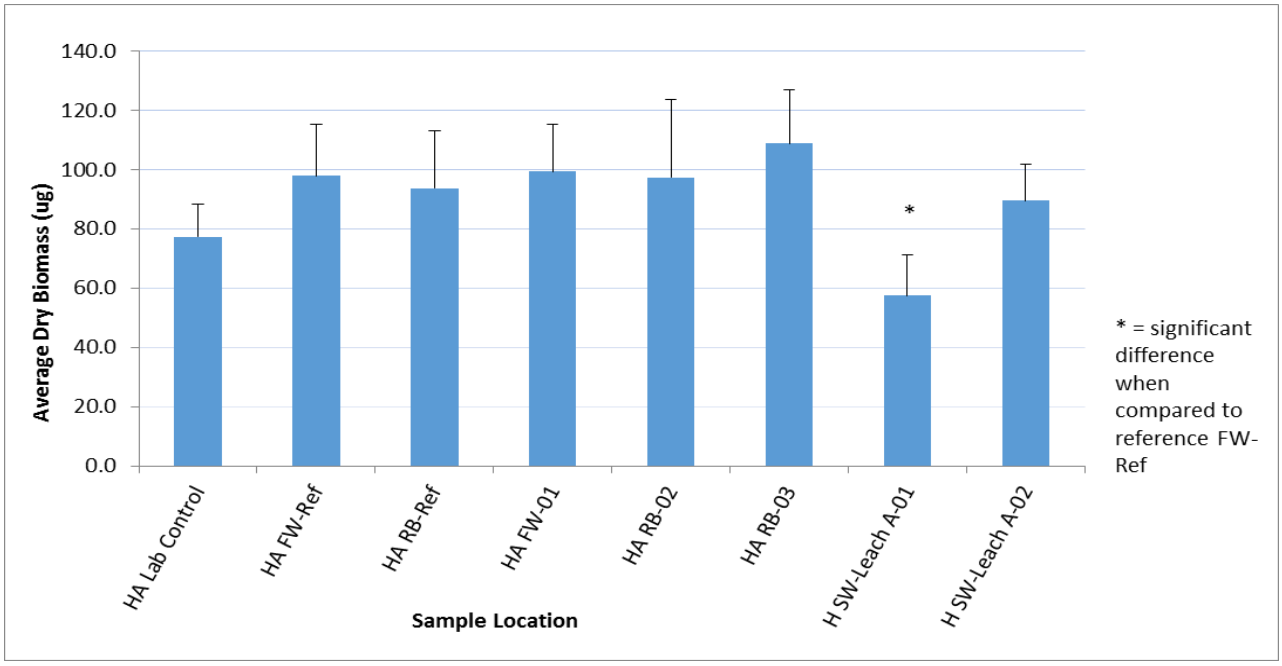


Figure 3. Outcome of the statistical analyses of the *C. dilutus* survival data

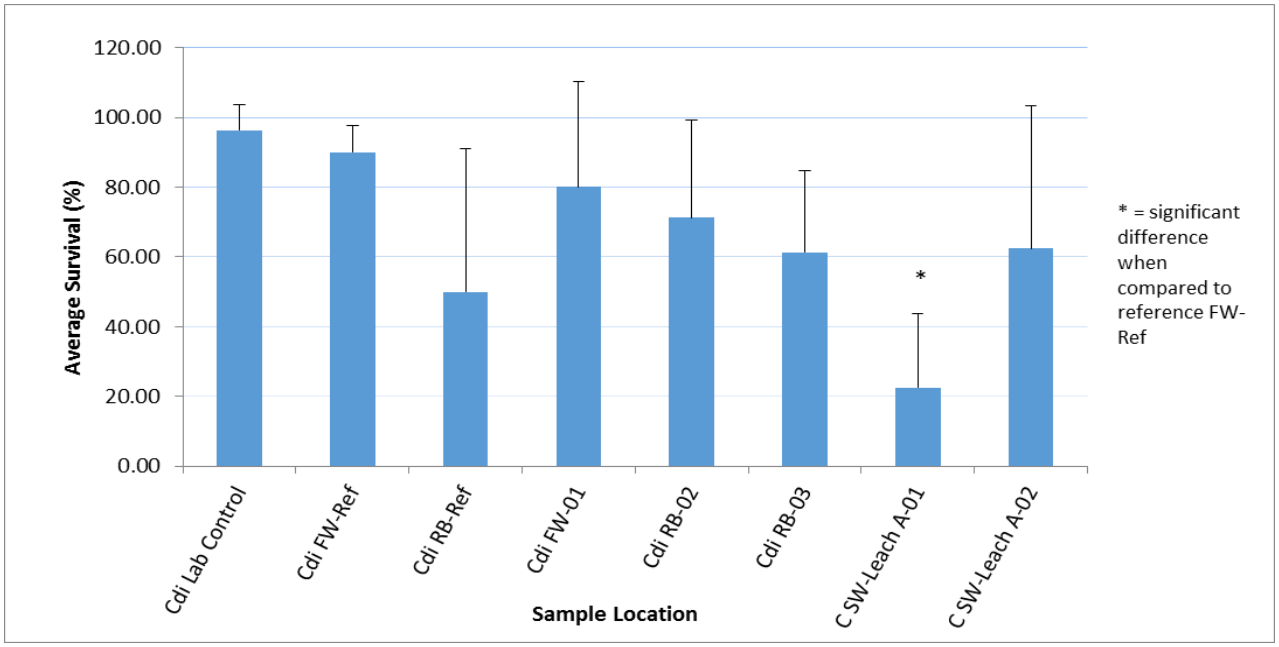
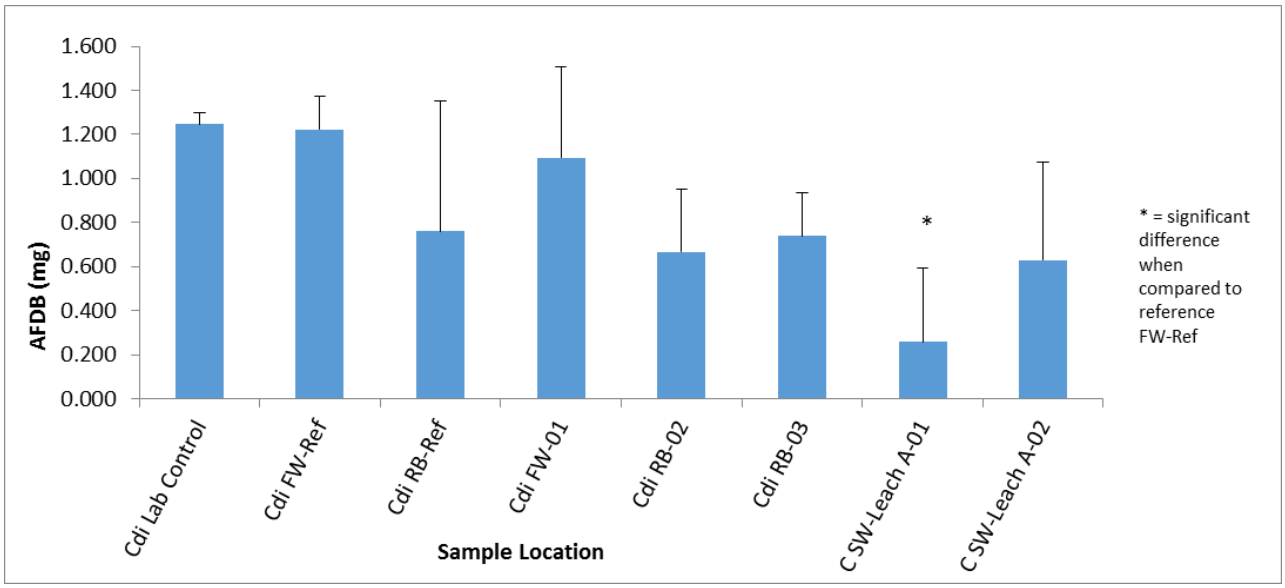


Figure 4. Outcome of the statistical analyses of the *C. dilutus* average AFDB



APPENDIX A

Chain-of-Custody Records

ENVIRONMENTAL PROTECTION AGENCY

REGION 1

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
16100036	Troy Mills

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Tox Test	$BNALS	#METMS_PE	$BNAW			REMARKS
SW-Leach A-01	10/28/16	1215		X	SED-16-SW-Leach A-01	3	✓	✓	✓				
RB-03	10/28/16	1300		X	SED-16-RB03	5	✓	✓	✓				2 duplicate containers
RB-REF	10/28/16	1430		X	SED-16-RB-REF	3	✓	✓	✓				
SW-Leach A-02	10/28/16	1400		X	SED-16-SW-Leach A-02	3	✓	✓	✓				
FW-01	10/28/16	1100		X	SED-16-FW-01	3	✓	✓	✓				
FW-REF	10/28/16	1030		X	SED-16-FW-REF	3	✓	✓	✓				
RB-02	10/28/16	1325		X	SED-16-RB-02	3	✓	✓	✓				
RIN-16-BNA	10/28/16	1425		X	RIN-16-BNA	2				✓			containers labeled 1of2 and 2of2
RIN-16-METALS	10/28/16	1425		X	RIN-16-METALS	1			✓				
BTL-16-BNA	10/28/16	1755		X	BTL-16-BNA	1				✓			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	10/31/16 8:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
		GSAT	10/31/16 08:00	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Appendix B

Summary of Overlying Water Toxicity Test Chemistry (H. azteca)

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
H. azteca

H. azteca Sediment Toxicity 10-Day Exposure Test: Troy Mills Inc.

***H. azteca* 10-day Exposure Test Initial Chemistry–Day 0 (11/8/16)**							
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**	**Hardness (mg/L $CaCO_3$)**	**Alkalinity (mg/L $CaCO_3$)**	**Total Ammonia (mg/L NH_3)**
Ha Control	442	8.14	7.46	22.91	104	76	ND
Ha FW-Ref	335	7.35	6.46	22.98	76	48.5	ND
Ha RB-Ref	342	7.13	6.27	22.68	72	45	ND
Ha FW-01	353	7.25	6.59	22.72	80	49	ND
Ha RB-02	373	7.35	6.89	22.66	84	53	ND
Ha RB-03	345	7.22	6.83	22.73	72	43.5	ND
Ha SW-Leach A-01	388	7.25	6.24	22.66	96	64	ND
Ha SW-Leach A-02	405	7.18	6.26	22.69	100	74	ND

* ND = Not Detected (<1.0 mg/L)

***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 1 (11/9/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	377	7.95	6.51	22.75
Ha FW-Ref	335	7.40	6.38	22.78
Ha RB-Ref	332	7.12	5.51	22.54
Ha FW-01	370	7.22	6.30	22.27
Ha RB-02	350	7.28	6.26	22.30
Ha RB-03	307	7.19	5.43	22.29
Ha SW-Leach A-01	335	7.18	5.64	22.35
Ha SW-Leach A-02	408	7.18	5.26	22.59
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 2 (11/10/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	376	7.90	7.09	22.01
Ha FW-Ref	328	7.33	6.07	22.04
Ha RB-Ref	332	7.23	5.81	22.31
Ha FW-01	365	7.29	6.77	22.03
Ha RB-02	328	7.30	6.36	22.10
Ha RB-03	297	7.23	5.66	22.47
Ha SW-Leach A-01	332	7.27	5.83	22.25
Ha SW-Leach A-02	397	7.21	4.68	22.12
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 3 (11/11/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	403	7.78	5.97	22.87
Ha FW-Ref	340	7.35	5.46	22.76
Ha RB-Ref	341	7.19	5.31	22.64
Ha FW-01	390	7.34	5.79	22.92
Ha RB-02	349	7.30	5.68	22.77
Ha RB-03	316	7.29	5.80	22.82
Ha SW-Leach A-01	339	7.29	5.42	22.77
Ha SW-Leach A-02	416	7.31	5.29	22.84

Prepared by: CO 2/3/17
Reviewed By: ZZ 2/3/17

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
H. azteca

***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 4 (11/12/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	394	7.73	6.03	22.43
Ha FW-Ref	342	7.37	5.89	22.39
Ha RB-Ref	346	7.26	5.65	22.66
Ha FW-01	393	7.34	5.68	22.42
Ha RB-02	355	7.38	6.22	22.61
Ha RB-03	320	7.31	5.92	22.47
Ha SW-Leach A-01	339	7.37	6.33	22.61
Ha SW-Leach A-02	417	7.28	5.31	22.78
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 5 (11/13/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	441	7.73	5.54	22.05
Ha FW-Ref	388	7.50	5.66	22.41
Ha RB-Ref	369	7.27	5.25	22.50
Ha FW-01	386	7.42	5.72	22.66
Ha RB-02	385	7.45	5.83	22.12
Ha RB-03	373	7.34	5.60	22.17
Ha SW-Leach A-01	390	7.40	5.45	22.44
Ha SW-Leach A-02	404	7.27	4.49	22.29
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 6 (11/14/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	441	7.71	5.25	22.19
Ha FW-Ref	395	7.43	5.67	22.23
Ha RB-Ref	385	7.32	5.39	22.30
Ha FW-01	390	7.44	5.65	22.81
Ha RB-02	391	7.47	5.93	22.35
Ha RB-03	383	7.34	5.37	22.39
Ha SW-Leach A-01	398	7.44	5.66	22.48
Ha SW-Leach A-02	411	7.29	4.58	22.53
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 7 (11/15/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	426	7.64	5.21	22.10
Ha FW-Ref	384	7.38	5.58	22.08
Ha RB-Ref	374	7.33	5.86	22.36
Ha FW-01	385	7.39	5.32	22.53
Ha RB-02	384	7.41	5.80	22.03
Ha RB-03	374	7.32	5.48	22.14
Ha SW-Leach A-01	386	7.39	5.71	22.15
Ha SW-Leach A-02	395	7.21	4.26	22.26

Prepared by: CO 2/3/17
Reviewed By: ZZ 2/3/17

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
H. azteca

***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 8 (11/16/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	422	7.64	5.16	22.75
Ha FW-Ref	384	7.45	5.47	22.91
Ha RB-Ref	374	7.33	5.50	23.09
Ha FW-01	382	7.42	5.70	23.31
Ha RB-02	380	7.41	5.77	22.98
Ha RB-03	375	7.39	5.70	23.23
Ha SW-Leach A-01	387	7.44	4.98	23.48
Ha SW-Leach A-02	395	7.26	4.58	23.54
***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 9 (11/17/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Ha Control	421	7.62	5.56	22.79
Ha FW-Ref	384	7.43	5.77	22.78
Ha RB-Ref	375	7.36	5.87	22.87
Ha FW-01	383	7.48	6.08	22.66
Ha RB-02	381	7.44	6.17	22.77
Ha RB-03	378	7.37	5.91	23.20
Ha SW-Leach A-01	387	7.41	5.78	22.83
Ha SW-Leach A-02	393	7.21	4.40	22.87

***H. azteca* 10-Day Exposure Test Waste Chemistry-Day 10 (11/18/16)**					
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**	**Total Ammonia (ppm NH_3)**
Ha Control	418	7.58	5.90	22.68	ND
Ha FW-Ref	387	7.38	6.10	22.70	ND
Ha RB-Ref	378	7.27	5.63	22.80	ND
Ha FW-01	387	7.40	6.11	22.84	ND
Ha RB-02	381	7.36	6.05	22.61	ND
Ha RB-03	378	7.31	5.84	22.71	ND
Ha SW-Leach A-01	387	7.41	6.14	22.85	ND
Ha SW-Leach A-02	393	7.18	4.29	22.94	ND

* ND = Not Detected (<1.0 mg/L)

Prepared by: CO 2/3/17
Reviewed By: ZZ 2/3/17

APPENDIX C

Summary of Overlying Water Toxicity Test Chemistry (C. dilutus)

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
C. dilutus

C dilutus Sediment Toxicity 10-Day Exposure Test: Troy Mills Inc.

***C. dilutus* 10-day Exposure Test Initial Chemistry–Day 0 (11/8/16)**							
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**	**Hardness (mg/L $CaCO_3$)**	**Alkalinity (mg/L $CaCO_3$)**	**Total Ammonia (mg/L NH_3)**
Cdi Control	444	8.14	7.81	22.58	104	76	ND
Cdi FW-Ref	351	7.35	6.76	22.61	76	48.5	ND
Cdi RB-Ref	345	7.19	6.79	22.73	72	45	ND
Cdi FW-01	355	7.29	6.90	22.53	80	49	ND
Cdi RB-02	377	7.36	7.21	22.59	84	53	ND
Cdi RB-03	345	7.26	6.95	22.65	72	43.5	ND
Cdi SW-Leach A-01	386	7.28	6.36	22.69	96	64	ND
Cdi SW-Leach A-02	405	7.22	6.37	22.65	100	74	ND

* ND = Not Detected (<1.0 mg/L)

***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 1 (11/9/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	454	7.65	5.90	22.30
Cdi FW-Ref	385	7.18	5.16	22.49
Cdi RB-Ref	379	7.06	4.79	22.10
Cdi FW-01	382	7.13	4.66	22.29
Cdi RB-02	401	7.22	5.63	22.31
Cdi RB-03	374	7.11	4.88	22.20
Cdi SW-Leach A-01	408	7.16	4.05	22.28
Cdi SW-Leach A-02	422	7.12	3.97	22.45
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 2 (11/10/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	460	7.95	6.25	22.38
Cdi FW-Ref	382	7.20	5.13	22.68
Cdi RB-Ref	372	7.05	4.74	22.15
Cdi FW-01	376	7.13	5.09	22.08
Cdi RB-02	394	7.29	5.78	22.35
Cdi RB-03	374	7.22	5.60	22.21
Cdi SW-Leach A-01	412	7.28	5.63	22.23
Cdi SW-Leach A-02	413	7.15	4.29	22.12
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 3 (11/11/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	479	7.77	5.92	22.77
Cdi FW-Ref	399	7.21	4.95	22.71
Cdi RB-Ref	385	7.09	4.77	22.82
Cdi FW-01	394	7.13	4.39	22.65
Cdi RB-02	408	7.27	5.50	22.80
Cdi RB-03	393	7.20	5.01	22.83
Cdi SW-Leach A-01	427	7.32	5.46	22.87
Cdi SW-Leach A-02	433	7.16	4.15	22.95

Prepared by: CO 1/31/17
Reviewed By: ZZ 2/3/17

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
C. dilutus

***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 4 (11/12/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	490	7.75	5.86	22.86
Cdi FW-Ref	409	7.26	5.17	22.80
Cdi RB-Ref	392	7.13	5.16	22.88
Cdi FW-01	402	7.21	4.98	22.72
Cdi RB-02	414	7.37	6.12	22.92
Cdi RB-03	397	7.26	5.57	22.69
Cdi SW-Leach A-01	430	7.43	6.09	22.90
Cdi SW-Leach A-02	433	7.26	4.87	22.97
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 5 (11/13/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	419	7.67	5.15	22.75
Cdi FW-Ref	387	7.31	4.52	22.76
Cdi RB-Ref	377	7.19	4.81	22.15
Cdi FW-01	385	7.24	4.10	22.16
Cdi RB-02	389	7.43	5.25	22.16
Cdi RB-03	385	7.29	5.13	22.69
Cdi SW-Leach A-01	399	7.46	4.76	22.55
Cdi SW-Leach A-02	401	7.22	4.40	22.18
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 6 (11/14/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	406	7.65	5.67	22.77
Cdi FW-Ref	380	7.28	5.21	22.63
Cdi RB-Ref	373	7.18	4.90	22.03
Cdi FW-01	378	7.32	4.96	22.27
Cdi RB-02	385	7.51	6.12	22.14
Cdi RB-03	376	7.41	5.86	22.29
Cdi SW-Leach A-01	389	7.53	6.08	22.53
Cdi SW-Leach A-02	392	7.29	4.61	22.71
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 7 (11/15/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	410	7.50	5.26	22.37
Cdi FW-Ref	379	7.19	4.55	22.19
Cdi RB-Ref	374	7.11	4.31	22.38
Cdi FW-01	380	7.20	4.51	22.49
Cdi RB-02	383	7.36	5.55	22.10
Cdi RB-03	380	7.28	4.93	22.05
Cdi SW-Leach A-01	392	7.47	5.81	22.09
Cdi SW-Leach A-02	394	7.20	4.38	22.30

Prepared by: CO 1/31/17
Reviewed By: ZZ 2/3/17

Troy Mills -- Troy, NH
Sediment Toxicity Test Chemistry
C. dilutus

***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 8 (11/16/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	406	7.51	5.08	23.38
Cdi FW-Ref	381	7.22	4.30	23.21
Cdi RB-Ref	374	7.19	4.66	23.25
Cdi FW-01	379	7.27	6.36	23.28
Cdi RB-02	383	7.33	5.19	23.14
Cdi RB-03	377	7.28	4.84	23.23
Cdi SW-Leach A-01	389	7.47	5.61	23.31
Cdi SW-Leach A-02	391	7.23	5.45	23.42
***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 9 (11/17/16)**				
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**
Cdi Control	409	7.52	5.09	22.96
Cdi FW-Ref	384	7.23	4.25	22.89
Cdi RB-Ref	377	7.22	4.69	22.78
Cdi FW-01	381	7.28	4.61	22.66
Cdi RB-02	384	7.34	5.17	22.75
Cdi RB-03	380	7.26	4.63	22.64
Cdi SW-Leach A-01	390	7.49	6.12	22.74
Cdi SW-Leach A-02	393	7.20	3.80	22.94

***C. dilutus* 10-Day Exposure Test Waste Chemistry-Day 10 (11/18/16)**					
Sample ID	**Conductivity (µmhos/cm)**	**pH**	**DO (mg/L)**	**Temperature (˚C)**	**Total Ammonia (ppm NH_3)**
Cdi Control	410	7.47	5.44	22.96	ND
Cdi FW-Ref	390	7.21	4.48	22.88	ND
Cdi RB-Ref	377	7.18	4.76	22.82	ND
Cdi FW-01	382	7.23	5.07	22.95	ND
Cdi RB-02	385	7.29	5.49	22.71	ND
Cdi RB-03	384	7.23	4.96	22.79	ND
Cdi SW-Leach A-01	393	7.47	6.54	22.84	ND
Cdi SW-Leach A-02	390	7.17	4.29	22.96	ND

* ND = Not Detected (<1.0 mg/L)

Prepared by: CO 1/31/17
Reviewed By: ZZ 2/3/17

APPENDIX D

Bench Sheets and Statistical Test Print-outs

BULK 10-DAY SEDIMENT TOXICITY TEST					STTS 2014
PN# 16100036 For Site: Troy Mills					
Start Date: 11/8/2016 End Date: 11/18/2016					
Species: H. azteca					
Sample ID	Rep	Pos	# Survival	Initials	Notes/Observations
HA Lab Control	1	63	10	MF	
HA Lab Control	2	54	10	MF	
HA Lab Control	3	7	9	CO	
HA Lab Control	4	30	10	MF	
HA Lab Control	5	38	10	MF	
HA Lab Control	6	13	10	MF	
HA Lab Control	7	52	10	BH	
HA Lab Control	8	49	9	MF	
HA FW-Ref	1	35	8	CO	
HA FW-Ref	2	44	8	CO	
HA FW-Ref	3	57	9	BH	
HA FW-Ref	4	27	10	MF	
HA FW-Ref	5	2	10	CO	
HA FW-Ref	6	5	10	MF	
HA FW-Ref	7	45	9	BH	
HA FW-Ref	8	46	10	BH	
HA RB-Ref	1	47	9	CO	
HA RB-Ref	2	40	10	BH	
HA RB-Ref	3	62	10	BH	
HA RB-Ref	4	24	10	MF	
HA RB-Ref	5	17	8	BH	
HA RB-Ref	6	21	10	MF	
HA RB-Ref	7	36	10	MF	
HA RB-Ref	8	9	10	BH	
HA FW-01	1	12	10	BH	
HA FW-01	2	18	10	CO	
HA FW-01	3	31	10	CO	
HA FW-01	4	56	9	CO	
HA FW-01	5	11	8	MF	
HA FW-01	6	22	8	CO	
HA FW-01	7	20	10	BH	
HA FW-01	8	4	10	CO	

BULK 10-DAY SEDIMENT TOXICITY TEST STTS 2014

PN# 16100036 For Site: Troy Mills

Start Date: 11/8/2016 End Date: 11/18/2016

Species: H. azteca

Sample ID	Rep	Pos	# Survival	Initials	Notes/Observations
HA RB-02	1	3	10	CO	
HA RB-02	2	28	10	CO	
HA RB-02	3	53	8	CO	
HA RB-02	4	58	9	BH	
HA RB-02	5	42	4	MF	
HA RB-02	6	29	9	BH	
HA RB-02	7	51	10	CO	
HA RB-02	8	32	10	MF	
HA RB-03	1	60	8	[illegible]	
HA RB-03	2	55	10	MR	
HA RB-03	3	37	10	BH	
HA RB-03	4	59	10	MR	
HA RB-03	5	41	10	MF	
HA RB-03	6	19	10	CO	
HA RB-03	7	23	10	BH	
HA RB-03	8	33	9	MF	
H SW-Leach A-01	1	16	8	MF	
H SW-Leach A-01	2	50	6	[illegible]	
H SW-Leach A-01	3	34	6	BH	
H SW-Leach A-01	4	61	10	MF	
H SW-Leach A-01	5	64	10	MF	
H SW-Leach A-01	6	39	6	CO	
H SW-Leach A-01	7	8	5	BH	
H SW-Leach A-01	8	48	6	BH	
H SW-Leach A-02	1	6	10	CO	
H SW-Leach A-02	2	26	9	MF	
H SW-Leach A-02	3	1	10	MF	
H SW-Leach A-02	4	25	10	BH	
H SW-Leach A-02	5	14	10	BH	
H SW-Leach A-02	6	15	9	MF	
H SW-Leach A-02	7	10	9	BH	
H SW-Leach A-02	8	43	9	CO	

BULK 10-DAY SEDIMENT TOXICITY TEST STTS 2014

PN# 16100036 For Site: Troy Mills

Start Date: 11/8/2016 End Date: 11/18/2016

Species: C. dilutus

Sample ID	Rep	Pos	# Survival	Initials	Notes/Observations
Cdi Lab Control	1	15	10	[illegible]	
Cdi Lab Control	2	38	10	ZZ	
Cdi Lab Control	3	14	10	MR	
Cdi Lab Control	4	33	9	MR	
Cdi Lab Control	5	55	10	ZZ	
Cdi Lab Control	6	10	8	MR	
Cdi Lab Control	7	19	10	MR	
Cdi Lab Control	8	43	10	MR	
Cdi FW-Ref	1	34	9	[illegible]	
Cdi FW-Ref	2	53	8	ZZ	
Cdi FW-Ref	3	2	8	ZZ	2 sets of 2 worms were stuck together
Cdi FW-Ref	4	62	9	MR	
Cdi FW-Ref	5	49	10	[illegible]	
Cdi FW-Ref	6	7	10	MR	
Cdi FW-Ref	7	63	9	[illegible]	
Cdi FW-Ref	8	60	9	ZZ	
Cdi RB-Ref	1	20	10	MR	
Cdi RB-Ref	2	5	0	MF	1 Empty Caddis Fly casing
Cdi RB-Ref	3	45	6	ZZ	
Cdi RB-Ref	4	16	10	MR	
Cdi RB-Ref	5	47	3	MR	
Cdi RB-Ref	6	35	3	MR	large insect larvae found
Cdi RB-Ref	7	22	8	MR	
Cdi RB-Ref	8	23	0	ZZ/MF	1 Dead C. dilutus floating
Cdi FW-01	1	17	9	[illegible]	
Cdi FW-01	2	18	9	MR	
Cdi FW-01	3	31	10	ZZ	
Cdi FW-01	4	32	10	[illegible]	
Cdi FW-01	5	11	8	[illegible]	
Cdi FW-01	6	12	10	MR	
Cdi FW-01	7	50	7	[illegible]	
Cdi FW-01	8	30	02	[illegible]	

Cdi FW-Ref Rep 8 #60 and Cdi Leach A-01 Rep 2 #39 had large discrepancies between survival # on bench sheet and pan count after weighing. #60 had 4 too few dilutus and #39 had 4 too many. Possible explanation: the dilutus somehow moved (pan bumped, cart jostle during transport, desiccator bumped etc.) from #60 pan to #39 pan. Pan #60 was above pan #39 in the desiccator, and the size of the extra dilutus in #39 (much larger than the other 3 in the pan).

BULK 10-DAY SEDIMENT TOXICITY TEST **STTS 2014**

PN# 16100036 For Site: Troy Mills

Start Date: 11/8/2016 End Date: 11/18/2016

Species: C. dilutus

Sample ID	Rep	Pos	# Survival	Initials	Notes/Observations
Cdi RB-02	1	64	9	MF	
Cdi RB-02	2	9	1	ZZ	confirmed 1 dead organism
Cdi RB-02	3	58	8	[illegible]	
Cdi RB-02	4	4	8	[illegible]	
Cdi RB-02	5	44	9	[illegible]	
Cdi RB-02	6	3	9	[illegible]	
Cdi RB-02	7	27	8	CO	
Cdi RB-02	8	48	5	[illegible]	
Cdi RB-03	1	21	7	[illegible]	
Cdi RB-03	2	56	5	[illegible]	
Cdi RB-03	3	26	9	[illegible]	
Cdi RB-03	4	37	8	[illegible]	
Cdi RB-03	5	28	5	[illegible]	
Cdi RB-03	6	13	7	[illegible]	
Cdi RB-03	7	6	5	[illegible]	
Cdi RB-03	8	36	9	[illegible]	
C SW-Leach A-01	1	1	0	MF	
C SW-Leach A-01	2	39	3	ZZ	
C SW-Leach A-01	3	29	7	MR	
C SW-Leach A-01	4	51	2	MR	
C SW-Leach A-01	5	8	2	[illegible]	
C SW-Leach A-01	6	46	1	MR	
C SW-Leach A-01	7	57	1	[illegible]	
C SW-Leach A-01	8	40	2	MF	
C SW-Leach A-02	1	25	0	MR	1 dea Caddis Fly found
C SW-Leach A-02	2	61	0	MR	1 ordinate larvae found
C SW-Leach A-02	3	59	9	[illegible]	
C SW-Leach A-02	4	24	9	ZZ	1 dilutus pupa
C SW-Leach A-02	5	41	9	[illegible]	Three worms
C SW-Leach A-02	6	54	9	[illegible]	
C SW-Leach A-02	7	52	5	[illegible]	
C SW-Leach A-02	8	42	9	[illegible]	

CETIS Test Data Worksheet

Hyalella 10-d Survival and Growth Sediment Test — U.S. EPA Region I Lab

Start Date:	08 Nov-16	**Species:**	Hyalella azteca	**Sample Code:**	HA Lab Control
End Date:		**Protocol:**	EPA/600/R-99/064 (2000)	**Sample Source:**	In house
Sample Date:	28 Oct-16	**Material:**	Lab Control	**Sample Station:**	HA Control

Batch Notes: 2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm	Notes
HA Lab Control	1	63	10	10	1017.77	1017.09	10		
HA Lab Control	2	54	10	10	1003.62	1002.94	10		
HA Lab Control	3	7	10	9	1013.37	1012.7	9		
HA Lab Control	4	30	10	10	1017.36	1016.69	10		
HA Lab Control	5	38	10	10	1021.75	1020.93	10		
HA Lab Control	6	13	10	10	1001.22	1000.32	10		
HA Lab Control	7	52	10	10	1038.53	1037.68	9		
HA Lab Control	8	49	10	9	1048.96	1048.04	9		
HA FW-Ref	1	35	10	8	994.75	993.9	8		
HA FW-Ref	2	44	10	8	1053.07	1052.34	8		
HA FW-Ref	3	57	10	9	1061.34	1060.14	8		
HA FW-Ref	4	27	10	10	1010.03	1008.86	10		
HA FW-Ref	5	2	10	10	1024.25	1023.3	10		
HA FW-Ref	6	5	10	10	1021.63	1020.53	10		
HA FW-Ref	7	45	10	9	1027.24	1026.44	9		
HA FW-Ref	8	46	10	10	1027.02	1025.99	10		
HA RB-Ref	1	47	10	9	977.26	976.5	9		
HA RB-Ref	2	40	10	10	1031.07	1029.99	10		
HA RB-Ref	3	62	10	10	1026.19	1025.2	10		
HA RB-Ref	4	24	10	10	1023.14	1022.04	10		
HA RB-Ref	5	17	10	8	1029.76	1029.14	8		
HA RB-Ref	6	21	10	10	1009.26	1008.05	10		
HA RB-Ref	7	36	10	10	1021.66	1020.77	10		
HA RB-Ref	8	9	10	10	1050.18	1049.34	10		
HA FW-01	1	12	10	10	1014.71	1013.62	10		
HA FW-01	2	18	10	10	1020.39	1019.5	10		
HA FW-01	3	31	10	10	983.44	982.45	10		
HA FW-01	4	56	10	9	999.19	998.36	9		
HA FW-01	5	11	10	8	1020.21	1019.45	8		
HA FW-01	6	22	10	8	991.08	989.98	8		
HA FW-01	7	20	10	10	969.89	968.65	10		
HA FW-01	8	4	10	10	969.72	968.68	10		

CETIS Test Data Worksheet

Report Date: 10 Jan-17 14:34 (p 2 of 2)
Test Code: 6-0637-9979/1116HATROYCSED

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Tare Weight-mg	Pan Count	Mean Length-mm	Notes
HA RB-02	1	3	10	10	1014.89	1013.76	10		
HA RB-02	2	28	10	10	994.71	993.58	10		
HA RB-02	3	53	10	8	988.07	987.35	8		
HA RB-02	4	58	10	9	1064.42	1063.45	9		
HA RB-02	5	42	10	4	1018.7	1018.24	4		
HA RB-02	6	29	10	9	1030.21	1029.03	9		
HA RB-02	7	51	10	10	1010.82	1009.85	10		
HA RB-02	8	32	10	10	1023.34	1022.12	10		
HA RB-03	1	60	10	8	1015.56	1014.77	8		
HA RB-03	2	55	10	10	1008.26	1007.09	10		
HA RB-03	3	37	10	10	986.17	985.14	10		
HA RB-03	4	59	10	10	992.24	990.97	10		
HA RB-03	5	41	10	10	989.55	988.43	10		
HA RB-03	6	19	10	10	1015.36	1014.41	10		
HA RB-03	7	23	10	10	1045.52	1044.5	10		
HA RB-03	8	33	10	9	1015.62	1014.27	9		
H SW-Leach A-01	1	16	10	8	1017.41	1016.62	8		
H SW-Leach A-01	2	50	10	6	1036.87	1036.5	6		
H SW-Leach A-01	3	34	10	6	1015.59	1014.99	6		
H SW-Leach A-01	4	61	10	10	1015.25	1014.56	10		
H SW-Leach A-01	5	64	10	10	1021.86	1021.19	10		
H SW-Leach A-01	6	39	10	6	1014.11	1013.61	6		
H SW-Leach A-01	7	8	10	5	1005.13	1004.64	5		
H SW-Leach A-01	8	48	10	6	1022.63	1022.14	6		
H SW-Leach A-02	1	6	10	10	1027.81	1026.82	10		
H SW-Leach A-02	2	26	10	9	981.52	980.64	9		
H SW-Leach A-02	3	1	10	10	989.28	988.35	10		
H SW-Leach A-02	4	25	10	10	990.73	989.92	10		
H SW-Leach A-02	5	14	10	10	983.99	983.16	10		
H SW-Leach A-02	6	15	10	9	961.61	960.48	9		
H SW-Leach A-02	7	10	10	9	1011.68	1010.95	9		
H SW-Leach A-02	8	43	10	9	1048.44	1047.58	9		

CETIS Analytical Report

U.S. EPA Region I Lab

Hyalella 10-d Survival and Growth Sediment Test

Analysis ID:	04-0717-1785	Endpoint:	Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:14	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes
Batch ID:	17-6236-5666	Test Type:	Survival-Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Hyalella azteca	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample Notes
HA FW-Ref	2016 Troy Mills Sed Tox Test - H. azteca
HA FW-01	2016 Troy Mills Sed Tox Test - H. azteca
H SW-Leach A-01	2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
HA FW-Ref	05-6737-7348	28 Oct-16		11d 0h	EPA Region I	Troy Mills
HA FW-01	08-6061-8510	28 Oct-16		11d 0h		
H SW-Leach A-01	00-2057-0158	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
HA FW-Ref	Site Sediment	Troy Mills Landfill	HA FW-Ref		
HA FW-01	Site Sediment	Troy Mills Landfill	HA FW-01		
H SW-Leach A-01	Site Sediment	Troy Mills Landfill	HA SW-Leach A-01		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.3%	

Dunnett Multiple Comparison Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
HA FW-Ref		HA FW-01	-0.2219	2.022	0.186	14	0.7489	CDF	Non-Significant Effect
		H SW-Leach A-01	2.859	2.022	0.186	14	0.0088	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3980753	0.1990376	2	5.905	0.0092	Significant Effect
Error	0.7078395	0.03370664	21			
Total	1.105915		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.376	9.21	0.1849	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8935	0.884	0.0157	Normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA FW-Ref	8	0.925	0.8509	0.9991	0.95	0.8	1	0.03134	9.58%	0.0%
HA FW-01	8	0.9375	0.8609	1	1	0.8	1	0.03239	9.77%	-1.35%
H SW-Leach A-01	8	0.7125	0.5487	0.8763	0.6	0.5	1	0.06928	27.5%	22.97%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA FW-Ref	8	1.295	1.181	1.409	1.331	1.107	1.412	0.0481	10.51%	0.0%
HA FW-01	8	1.315	1.198	1.433	1.412	1.107	1.412	0.04961	10.67%	-1.57%
H SW-Leach A-01	8	1.033	0.8229	1.242	0.8861	0.7854	1.412	0.08869	24.29%	20.27%

Analyst: ZZ QA: CO

Hyalella 10-d Survival and Growth Sediment Test

U.S. EPA Region I Lab

Analysis ID: 04-0717-1785 Endpoint: Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:14 Analysis: Parametric-Control vs Treatments Official Results: Yes

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA FW-Ref	0.8	0.8	0.9	1	1	1	0.9	1
HA FW-01	1	1	1	0.9	0.8	0.8	1	1
H SW-Leach A-01	0.8	0.6	0.6	1	1	0.6	0.5	0.6

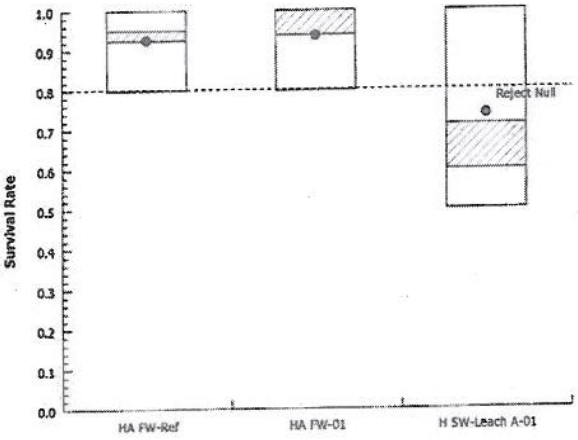
Angular (Corrected) Transformed Detail

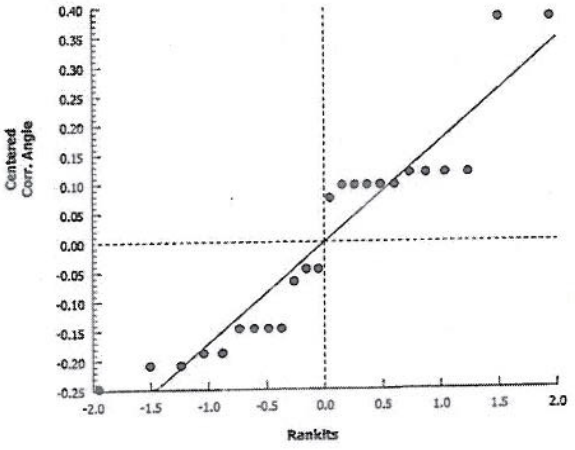
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA FW-Ref	1.107	1.107	1.249	1.412	1.412	1.412	1.249	1.412
HA FW-01	1.412	1.412	1.412	1.249	1.107	1.107	1.412	1.412
H SW-Leach A-01	1.107	0.8861	0.8861	1.412	1.412	0.8861	0.7854	0.8861

Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA FW-Ref	8/10	8/10	9/10	10/10	10/10	10/10	9/10	10/10
HA FW-01	10/10	10/10	10/10	9/10	8/10	8/10	10/10	10/10
H SW-Leach A-01	8/10	6/10	6/10	10/10	10/10	6/10	5/10	6/10

Graphics





CETIS Analytical Report

U.S. EPA Region I Lab

Hyalella 10-d Survival and Growth Sediment Test

Analysis ID:	14-1359-5150	Endpoint:	Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:14	Analysis:	Nonparametric-Control vs Treatments	Official Results:	Yes
Batch ID:	17-6236-5666	Test Type:	Survival-Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Hyalella azteca	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample Notes
HA RB-Ref	2016 Troy Mills Sed Tox Test - H. azteca
HA RB-02	2016 Troy Mills Sed Tox Test - H. azteca
HA RB-03	2016 Troy Mills Sed Tox Test - H. azteca
H SW-Leach A-02	2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
HA RB-Ref	14-8487-5507	28 Oct-16		11d 0h	EPA Region I	Troy Mills
HA RB-02	08-9266-2963	28 Oct-16		11d 0h		
HA RB-03	08-4604-6141	28 Oct-16		11d 0h		
H SW-Leach A-02	16-6814-8225	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
HA RB-Ref	Site Sediment	Troy Mills Landfill	HA RB-Ref		
HA RB-02	Site Sediment	Troy Mills Landfill	HA RB-02		
HA RB-03	Site Sediment	Troy Mills Landfill	HA RB-03		
H SW-Leach A-02	Site Sediment	Troy Mills Landfill	HA SW-Leach A-02		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.8%	

Steel Many-One Rank Sum Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
HA RB-Ref		HA RB-02	59.5	48	3	14	0.3667	Asymp	Non-Significant Effect
		HA RB-03	68	48	3	14	0.7500	Asymp	Non-Significant Effect
		H SW-Leach A-02	62	48	2	14	0.4826	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06723899	0.02241299	3	0.9204	0.4438	Non-Significant Effect
Error	0.681875	0.02435268	28			
Total	0.749114		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	9.501	11.34	0.0233	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7956	0.9081	<0.0001	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA RB-Ref	8	0.9625	0.9003	1	1	0.8	1	0.02631	7.73%	0.0%
HA RB-02	8	0.875	0.7034	1	0.95	0.4	1	0.07258	23.46%	9.09%
HA RB-03	8	0.9625	0.9003	1	1	0.8	1	0.02631	7.73%	0.0%
H SW-Leach A-02	8	0.95	0.9053	0.9947	0.95	0.9	1	0.0189	5.63%	1.3%

Analyst: ZC QA: CO

Hyalella 10-d Survival and Growth Sediment Test

U.S. EPA Region I Lab

Analysis ID: 14-1359-5150 Endpoint: Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:14 Analysis: Nonparametric-Control vs Treatments Official Results: Yes

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA RB-Ref	8	1.354	1.258	1.449	1.412	1.107	1.412	0.04056	8.48%	0.0%
HA RB-02	8	1.242	1.032	1.453	1.331	0.6847	1.412	0.08909	20.28%	8.22%
HA RB-03	8	1.354	1.258	1.449	1.412	1.107	1.412	0.04056	8.48%	0.0%
H SW-Leach A-02	8	1.331	1.258	1.403	1.331	1.249	1.412	0.0308	6.55%	1.7%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA RB-Ref	0.9	1	1	1	0.8	1	1	1
HA RB-02	1	1	0.8	0.9	0.4	0.9	1	1
HA RB-03	0.8	1	1	1	1	1	1	0.9
H SW-Leach A-02	1	0.9	1	1	1	0.9	0.9	0.9

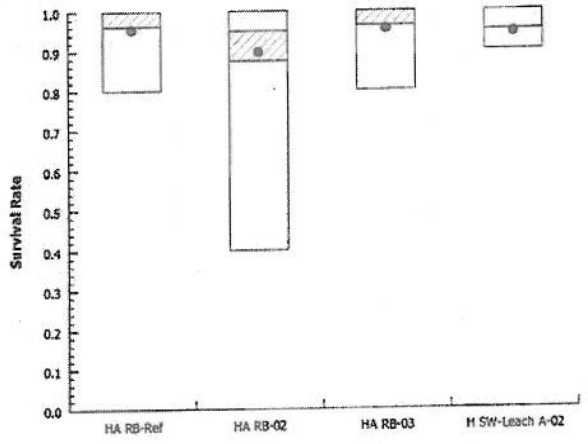
Angular (Corrected) Transformed Detail

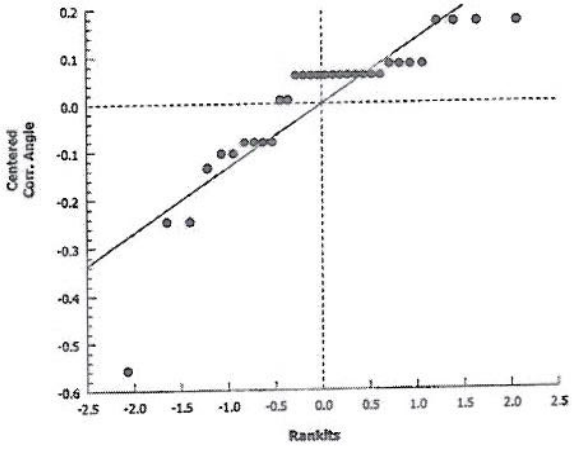
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA RB-Ref	1.249	1.412	1.412	1.412	1.107	1.412	1.412	1.412
HA RB-02	1.412	1.412	1.107	1.249	0.6847	1.249	1.412	1.412
HA RB-03	1.107	1.412	1.412	1.412	1.412	1.412	1.412	1.249
H SW-Leach A-02	1.412	1.249	1.412	1.412	1.412	1.249	1.249	1.249

Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA RB-Ref	9/10	10/10	10/10	10/10	8/10	10/10	10/10	10/10
HA RB-02	10/10	10/10	8/10	9/10	4/10	9/10	10/10	10/10
HA RB-03	8/10	10/10	10/10	10/10	10/10	10/10	10/10	9/10
H SW-Leach A-02	10/10	9/10	10/10	10/10	10/10	9/10	9/10	9/10

Graphics





Analyst: ZZ QA: CB

CETIS Analytical Report

U.S. EPA Region I Lab

Hyalella 10-d Survival and Growth Sediment Test

Analysis ID:	19-9350-9499	Endpoint:	Mean Dry Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:14	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes
Batch ID:	17-6236-5666	Test Type:	Survival-Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Hyalella azteca	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample Notes
HA FW-Ref	2016 Troy Mills Sed Tox Test - H. azteca
HA FW-01	2016 Troy Mills Sed Tox Test - H. azteca
H SW-Leach A-01	2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
HA FW-Ref	05-6737-7348	28 Oct-16		11d 0h	EPA Region I	Troy Mills
HA FW-01	08-6061-8510	28 Oct-16		11d 0h		
H SW-Leach A-01	00-2057-0158	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
HA FW-Ref	Site Sediment	Troy Mills Landfill	HA FW-Ref		
HA FW-01	Site Sediment	Troy Mills Landfill	HA FW-01		
H SW-Leach A-01	Site Sediment	Troy Mills Landfill	HA SW-Leach A-01		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	16.3%	

Dunnett Multiple Comparison Test

Sample Code	vs Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
HA FW-Ref	HA FW-01	-0.1747	2.022	0.016	14	0.7324	CDF	Non-Significant Effect
	H SW-Leach A-01	5.128	2.022	0.016	14	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009000611	0.004500305	2	18.15	<0.0001	Significant Effect
Error	0.005208158	0.0002480075	21			
Total	0.01420877		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.3913	9.21	0.8223	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9576	0.884	0.3927	Normal Distribution

Mean Dry Biomass-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA FW-Ref	8	0.09788	0.08325	0.1125	0.099	0.073	0.12	0.006183	17.87%	0.0%
HA FW-01	8	0.09925	0.08601	0.1125	0.1015	0.076	0.124	0.005599	15.96%	-1.41%
H SW-Leach A-01	8	0.0575	0.04605	0.06894	0.055	0.037	0.079	0.00484	23.81%	41.25%

Mean Dry Biomass-mg Detail

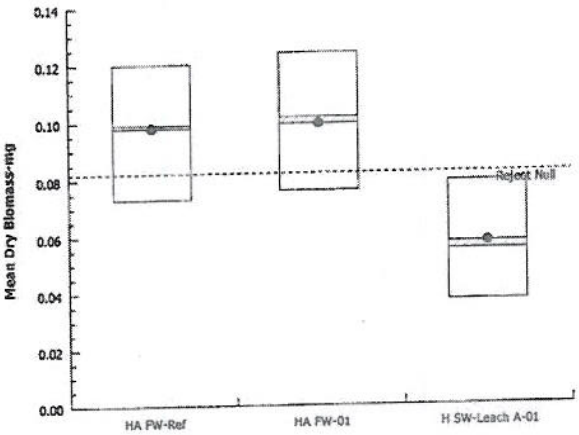
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA FW-Ref	0.085	0.073	0.12	0.117	0.095	0.11	0.08	0.103
HA FW-01	0.109	0.089	0.099	0.083	0.076	0.11	0.124	0.104
H SW-Leach A-01	0.079	0.037	0.06	0.069	0.067	0.05	0.049	0.049

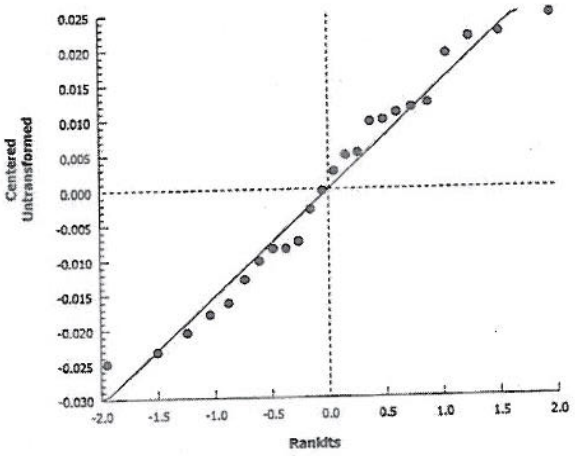
Analyst: ZZ QA: (0

Hyalella 10-d Survival and Growth Sediment Test

Analysis ID: 19-9350-9499 Endpoint: Mean Dry Biomass-mg CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:14 Analysis: Parametric-Control vs Treatments Official Results: Yes

Graphics





Analyst: ZZ QA: CO

CETIS Analytical Report

U.S. EPA Region I Lab

Hyalella 10-d Survival and Growth Sediment Test

Analysis ID:	20-3426-5568	Endpoint:	Mean Dry Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:14	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes
Batch ID:	17-6236-5666	Test Type:	Survival-Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Hyalella azteca	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample Notes
HA RB-Ref	2016 Troy Mills Sed Tox Test - H. azteca
HA RB-02	2016 Troy Mills Sed Tox Test - H. azteca
HA RB-03	2016 Troy Mills Sed Tox Test - H. azteca
H SW-Leach A-02	2016 Troy Mills Sed Tox Test - H. azteca

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
HA RB-Ref	14-8487-5507	28 Oct-16		11d 0h	EPA Region I	Troy Mills
HA RB-02	08-9266-2963	28 Oct-16		11d 0h		
HA RB-03	08-4604-6141	28 Oct-16		11d 0h		
H SW-Leach A-02	16-6814-8225	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
HA RB-Ref	Site Sediment	Troy Mills Landfill	HA RB-Ref		
HA RB-02	Site Sediment	Troy Mills Landfill	HA RB-02		
HA RB-03	Site Sediment	Troy Mills Landfill	HA RB-03		
H SW-Leach A-02	Site Sediment	Troy Mills Landfill	HA SW-Leach A-02		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.6%	

Dunnett Multiple Comparison Test

Sample Code	vs Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
HA RB-Ref	HA RB-02	-0.3694	2.154	0.021	14	0.8629	CDF	Non-Significant Effect
	HA RB-03	-1.541	2.154	0.021	14	0.9912	CDF	Non-Significant Effect
	H SW-Leach A-02	0.4201	2.154	0.021	14	0.5788	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0016432	0.0005477334	3	1.421	0.2574	Non-Significant Effect
Error	0.01079071	0.0003853825	28			
Total	0.01243391		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.621	11.34	0.3055	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9589	0.9081	0.2554	Normal Distribution

Mean Dry Biomass-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
HA RB-Ref	8	0.09363	0.07727	0.11	0.094	0.062	0.121	0.006915	20.89%	0.0%
HA RB-02	8	0.09725	0.07535	0.1192	0.105	0.046	0.122	0.009261	26.93%	-3.87%
HA RB-03	8	0.1087	0.09375	0.1237	0.1075	0.079	0.135	0.006344	16.5%	-16.15%
H SW-Leach A-02	8	0.0895	0.07923	0.09977	0.087	0.073	0.113	0.004343	13.73%	4.4%

U.S. EPA Region I Lab

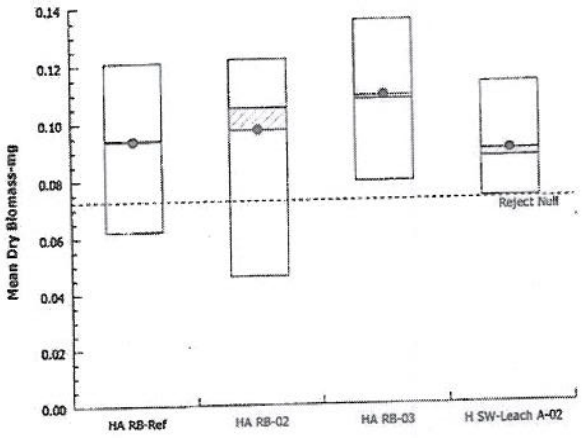
Hyalella 10-d Survival and Growth Sediment Test

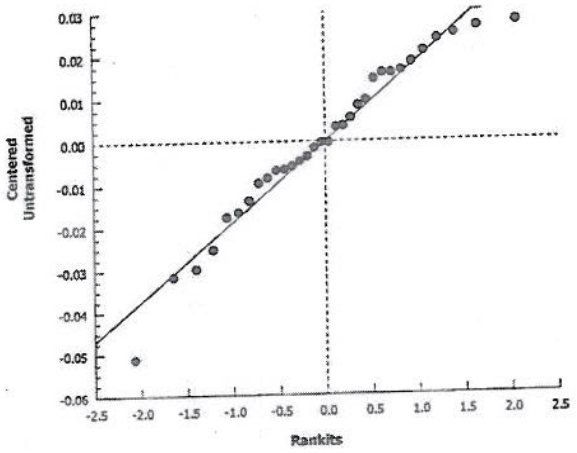
Analysis ID: 20-3426-5568 Endpoint: Mean Dry Biomass-mg CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:14 Analysis: Parametric-Control vs Treatments Official Results: Yes

Mean Dry Biomass-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
HA RB-Ref	0.076	0.108	0.099	0.11	0.062	0.121	0.089	0.08401
HA RB-02	0.113	0.113	0.072	0.09701	0.046	0.118	0.097	0.122
HA RB-03	0.079	0.117	0.103	0.127	0.112	0.095	0.102	0.135
H SW-Leach A-02	0.09901	0.088	0.09301	0.081	0.083	0.113	0.073	0.086

Graphics





Analyst: ZZ QA: CO

CETIS Test Data Worksheet

U.S. EPA Region I Lab

Chironomus 10-d Survival and Growth Sediment Test

Start Date: 08 Nov-16
End Date:
Sample Date: 28 Oct-16

Species: Chironomus dilutus (Midge)
Protocol: EPA/600/R-99/064 (2000)
Material: Lab Control

Sample Code: Cdi Lab Control
Sample Source: In house
Sample Station: Cdi Control

Batch Notes: 2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
Cdi Lab Control	1	14	10	10	1050.75	1038.35	9		
Cdi Lab Control	2	58	10	10	1032.71	1021.08	10		
Cdi Lab Control	3	40	10	10	1023.15	1010.14	10		
Cdi Lab Control	4	23	10	9	1026.06		9		
Cdi Lab Control	5	18	10	10	1008.58	996.01	10		
Cdi Lab Control	6	28	10	8	1067.53	1055.31	8		
Cdi Lab Control	7	32	10	10	1054.93	1041.8	10		
Cdi Lab Control	8	19	10	10	1045.46	1033.18	10		
Cdi FW-Ref	1	25	10	9	1050.25	1037.61	9		
Cdi FW-Ref	2	11	10	8	1034.05	1022.08	8		
Cdi FW-Ref	3	34	10	8	968.6	955.3	8		
Cdi FW-Ref	4	39	10	9	1009.82	997.03	9		
Cdi FW-Ref	5	2	10	10	1051.52	1038.71	9		
Cdi FW-Ref	6	38	10	10	1023.13	1009.64	10		
Cdi FW-Ref	7	36	10	9	1025.96	1013.9	9		
Cdi FW-Ref	8	56	10	9	1012.87	1004.15	5		
Cdi RB-Ref	1	41	10	10	1039.83	1026.52	10		
Cdi RB-Ref	2	21	10	0	0	0	0		
Cdi RB-Ref	3	61	10	6	1019.86	1012.04	6		
Cdi RB-Ref	4	8	10	10	1049.19	1036.9	10		
Cdi RB-Ref	5	50	10	3	1009	1002.87	3		
Cdi RB-Ref	6	52	10						
Cdi RB-Ref	7	51	10	8	1010.82	997.16	8		
Cdi RB-Ref	8	9	10	0	0	0	0		
Cdi FW-01	1	49	10	9	1017.69	1005.46	9		
Cdi FW-01	2	64	10	9	1035.62	1022.75	9		
Cdi FW-01	3	10	10	10	1020.98	1007.19	10		
Cdi FW-01	4	45	10	10	1013.02	999.86	10		
Cdi FW-01	5	26	10	8	1042.66	1031.05	8		
Cdi FW-01	6	12	10	10	991.08	978.77	10		
Cdi FW-01	7	20	10	7	1029.9	1019.3	7		
Cdi FW-01	8	1	10	1	1013.16	1012.19	1		

CETIS Test Data Worksheet

Sample Code	Rep	Pos	# Exposed	# Survived	Total Weight-mg	Ashed Weight-mg	Pan Count	Mean Length-mm	Notes
Cdi RB-02	1	37	10	9	1035.4	1026.8	9		
Cdi RB-02	2	22	10	1	1032.26	1030.95	1		
Cdi RB-02	3	3	10	8	1009.31	1002.09	8		
Cdi RB-02	4	63	10	8	1026.16	1019.25	8		
Cdi RB-02	5	24	10	9	1014.66	1005.49	9		
Cdi RB-02	6	55	10	9	1010.18	1002.7	9		
Cdi RB-02	7	16	10	8	1027.82	1018.61	8		
Cdi RB-02	8	60	10	5	1015.48	1012.01	5		
Cdi RB-03	1	5	10	7	1016.32	1008.44	7		
Cdi RB-03	2	54	10	5	1055.26	1048.82	5		
Cdi RB-03	3	33	10	9	1022.2	1012.92	9		
Cdi RB-03	4	17	10	2	1002.17		2		
Cdi RB-03	5	57	10	5	984.85	980.3	5		
Cdi RB-03	6	53	10	7	1017.88	1011.23	7		
Cdi RB-03	7	62	10	5	1024.5	1018.06	5		
Cdi RB-03	8	46	10	9	1007.05	996.66	9		
C SW-Leach A-01	1	13	10	0	0	0	0		
C SW-Leach A-01	2	29	10	3	1039	1033.22	7		
C SW-Leach A-01	3	30	10	7	1047.86	1039.99	7		
C SW-Leach A-01	4	27	10	2	1026.85		2		
C SW-Leach A-01	5	42	10	2	1017.59		2		
C SW-Leach A-01	6	4	10	1	970.44	969.66	1		
C SW-Leach A-01	7	44	10	1	950.46	950.08	1		
C SW-Leach A-01	8	48	10	2	1038.32	1037.71	2		
C SW-Leach A-02	1	59	10	0	0	0	0		
C SW-Leach A-02	2	47	10	0	0	0	0		
C SW-Leach A-02	3	15	10	9	1019.49	1009.1	9		
C SW-Leach A-02	4	35	10	9	1034.25	1023.36	9		
C SW-Leach A-02	5	43	10	9	1035.42	1024.92	9		
C SW-Leach A-02	6	7	10	9	1045.71	1039.01	8		
C SW-Leach A-02	7	31	10	5	1026.4	1021.76	5		
C SW-Leach A-02	8	6	10	9	989.12	982.01	9		

CETIS Analytical Report

U.S. EPA Region I Lab

Chironomus 10-d Survival and Growth Sediment Test

Analysis ID:	06-7885-1711	Endpoint:	Mean AF Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:03	Analysis:	Parametric-Multiple Comparison	Official Results:	Yes
Batch ID:	19-0937-4625	Test Type:	Survival-AF Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Chironomus dilutus (Midge)	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample Notes
Cdi FW-Ref	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi FW-01	2016 Troy Mills Sed Tox Test - C. dilutus
C SW-Leach A-01	2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cdi FW-Ref	05-5825-6602	28 Oct-16		11d 0h	EPA Region I	Troy Mills
Cdi FW-01	03-1201-4475	28 Oct-16		11d 0h		
C SW-Leach A-01	18-2151-0801	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cdi FW-Ref	Site Sediment	Troy Mills Landfill	Cdi FW-Ref		
Cdi FW-01	Site Sediment	Troy Mills Landfill	Cdi FW-01		
C SW-Leach A-01	Site Sediment	Troy Mills Landfill	Cdi SW-Leach A-01		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	29.5%	

Bonferroni Adj t Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Cdi FW-Ref		Cdi FW-01	0.803	2.093	0.334	14	0.4319	CDF	Non-Significant Effect
		C SW-Leach A-01	5.607	2.093	0.360	12	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.609898	1.804949	2	17.76	<0.0001	Significant Effect
Error	1.930905	0.1016266	19			
Total	5.540802		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.803	9.21	0.0549	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8771	0.8757	0.0107	Normal Distribution

Mean AF Biomass-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi FW-Ref	8	1.222	1.096	1.349	1.271	0.872	1.349	0.0534	12.36%	0.0%
Cdi FW-01	8	1.094	0.7477	1.441	1.227	0.097	1.379	0.1466	37.88%	10.47%
C SW-Leach A-01	6	0.257	-0.09683	0.6108	0.0695	0	0.787	0.1376	131.2%	78.97%

Mean AF Biomass-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi FW-Ref	1.264	1.197	1.33	1.279	1.281	1.349	1.206	0.872
Cdi FW-01	1.223	1.287	1.379	1.316	1.161	1.231	1.06	0.097
C SW-Leach A-01	0	0.578	0.787	0.078	0.038	0.061		

Analyst: ZZ QA: CO

Chironomus 10-d Survival and Growth Sediment Test
U.S. EPA Region I Lab

Analysis ID: 06-7885-1711 Endpoint: Mean AF Biomass-mg CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:03 Analysis: Parametric-Multiple Comparison Official Results: Yes

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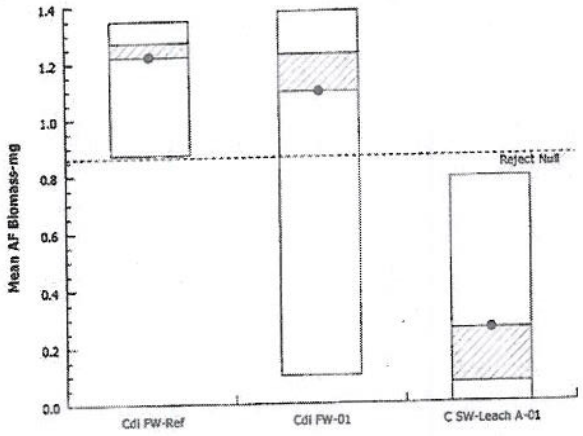
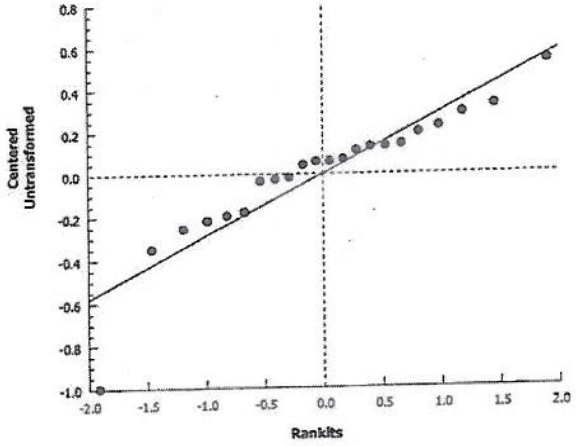




Analyst: ZZ QA: CO

CETIS Analytical Report

U.S. EPA Region I Lab

Chironomus 10-d Survival and Growth Sediment Test

Analysis ID:	14-6225-4818	Endpoint:	Mean AF Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:09	Analysis:	Parametric-Multiple Comparison	Official Results:	Yes
Batch ID:	19-0937-4625	Test Type:	Survival-AF Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Chironomus dilutus (Midge)	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample Notes
Cdi RB-Ref	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi RB-02	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi RB-03	2016 Troy Mills Sed Tox Test - C. dilutus
C SW-Leach A-02	2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cdi RB-Ref	18-1639-4271	28 Oct-16		11d 0h	EPA Region I	Troy Mills
Cdi RB-02	10-1616-5779	28 Oct-16		11d 0h		
Cdi RB-03	10-8352-1382	28 Oct-16		11d 0h		
C SW-Leach A-02	00-0498-9718	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cdi RB-Ref	Site Sediment	Troy Mills Landfill	Cdi RB-Ref		
Cdi RB-02	Site Sediment	Troy Mills Landfill	Cdi RB-02		
Cdi RB-03	Site Sediment	Troy Mills Landfill	Cdi RB-03		
C SW-Leach A-02	Site Sediment	Troy Mills Landfill	Cdi SW-Leach A-02		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	62.0%	

Bonferroni Adj t Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Cdi RB-Ref		Cdi RB-02	0.4435	2.247	0.471	13	0.9917	CDF	Non-Significant Effect
		Cdi RB-03	0.1042	2.247	0.487	12	1.0000	CDF	Non-Significant Effect
		C SW-Leach A-02	0.6306	2.247	0.471	13	0.8007	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0846529	0.02821763	3	0.1718	0.9145	Non-Significant Effect
Error	4.270769	0.1642604	26			
Total	4.355422		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.372	11.34	0.0609	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9488	0.9031	0.1572	Normal Distribution

Mean AF Biomass-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi RB-Ref	7	0.7601	0.2142	1.306	0.782	0	1.366	0.2231	77.65%	0.0%
Cdi RB-02	8	0.6671	0.4298	0.9045	0.735	0.131	0.921	0.1004	42.55%	12.24%
Cdi RB-03	7	0.7376	0.5556	0.9195	0.665	0.455	1.039	0.07437	26.68%	2.97%
C SW-Leach A-02	8	0.6279	0.2562	0.9996	0.6905	0	1.089	0.1572	70.81%	17.4%

Analyst: ZZ QA: CO

Chironomus 10-d Survival and Growth Sediment Test

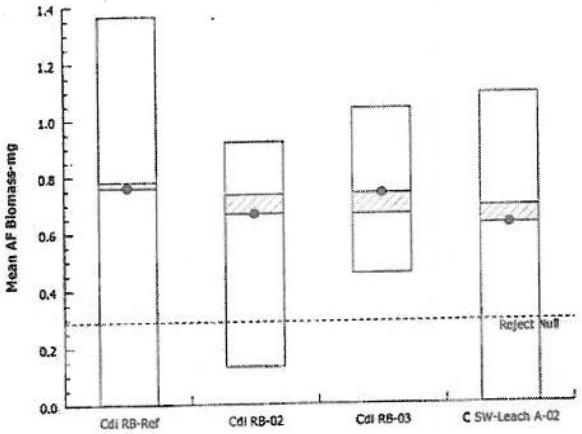
U.S. EPA Region I Lab

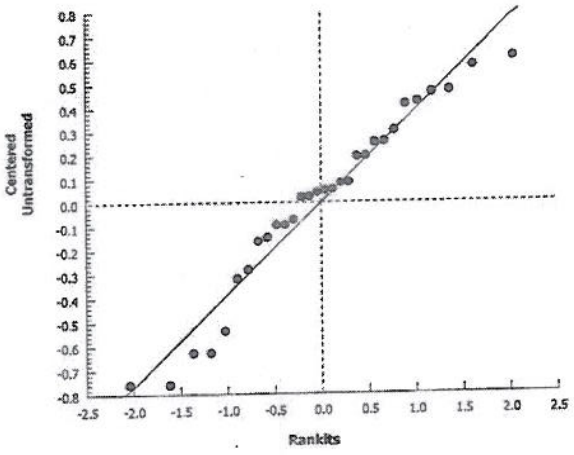
Analysis ID: 14-6225-4818 Endpoint: Mean AF Biomass-mg CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:09 Analysis: Parametric-Multiple Comparison Official Results: Yes

Mean AF Biomass-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi RB-Ref	1.331	0	0.782	1.229	0.613	1.366	0	
Cdi RB-02	0.86	0.131	0.722	0.691	0.917	0.748	0.921	0.347
Cdi RB-03	0.788	0.644	0.928	0.455	0.665	0.644	1.039	
C SW-Leach A-02	0	0	1.039	1.089	1.05	0.67	0.464	0.711

Graphics





Analyst: ZZ QA: CO

CETIS Analytical Report

U.S. EPA Region I Lab

Chironomus 10-d Survival and Growth Sediment Test

Analysis ID:	04-4733-5554	Endpoint:	Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	09 Mar-17 15:03	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes
Batch ID:	19-0937-4625	Test Type:	Survival-AF Growth	Analyst:	
Start Date:	08 Nov-16	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	Not Applicable
Ending Date:		Species:	Chironomus dilutus (Midge)	Brine:	
Duration:	NA	Source:	In-House Culture	Age:	

Batch Note: 2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample Notes
Cdi FW-Ref	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi FW-01	2016 Troy Mills Sed Tox Test - C. dilutus
C SW-Leach A-01	2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cdi FW-Ref	05-5825-6602	28 Oct-16		11d 0h	EPA Region I	Troy Mills
Cdi FW-01	03-1201-4475	28 Oct-16		11d 0h		
C SW-Leach A-01	18-2151-0801	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cdi FW-Ref	Site Sediment	Troy Mills Landfill	Cdi FW-Ref		
Cdi FW-01	Site Sediment	Troy Mills Landfill	Cdi FW-01		
C SW-Leach A-01	Site Sediment	Troy Mills Landfill	Cdi SW-Leach A-01		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	22.5%	

Dunnett Multiple Comparison Test

Sample Code	vs Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Cdi FW-Ref	Cdi FW-01	0.8358	2.022	0.266	14	0.3206	CDF	Non-Significant Effect
	C SW-Leach A-01	5.953	2.022	0.266	14	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.881167	1.440584	2	20.78	<0.0001	Significant Effect
Error	1.456104	0.06933827	21			
Total	4.337271		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.406	9.21	0.0247	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.885	0.884	0.0105	Normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi FW-Ref	8	0.9	0.8368	0.9632	0.9	0.8	1	0.02673	8.4%	0.0%
Cdi FW-01	8	0.8	0.5472	1	0.9	0.1	1	0.1069	37.8%	11.11%
C SW-Leach A-01	8	0.225	0.04765	0.4023	0.2	0	0.7	0.075	94.28%	75.0%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi FW-Ref	8	1.254	1.158	1.351	1.249	1.107	1.412	0.04079	9.2%	0.0%
Cdi FW-01	8	1.144	0.8382	1.45	1.249	0.3218	1.412	0.1294	32.0%	8.77%
C SW-Leach A-01	8	0.4705	0.2646	0.6764	0.4636	0.1588	0.9912	0.08707	52.34%	62.49%

Analyst: ZZ QA: CO

Chironomus 10-d Survival and Growth Sediment Test
U.S. EPA Region I Lab

Analysis ID: 04-4733-5554 Endpoint: Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:03 Analysis: Parametric-Control vs Treatments Official Results: Yes

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi FW-Ref	0.9	0.8	0.8	0.9	1	1	0.9	0.9
Cdi FW-01	0.9	0.9	1	1	0.8	1	0.7	0.1
C SW-Leach A-01	0	0.3	0.7	0.2	0.2	0.1	0.1	0.2

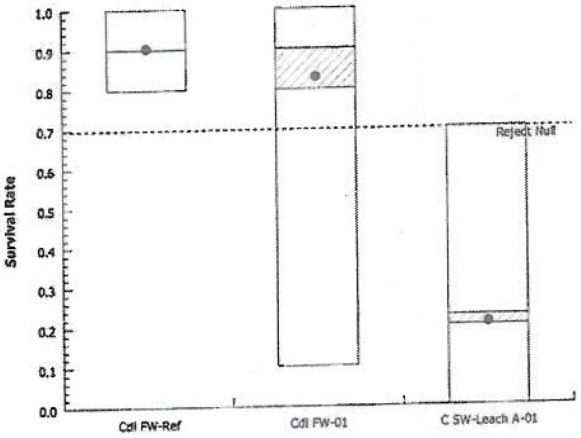
Angular (Corrected) Transformed Detail

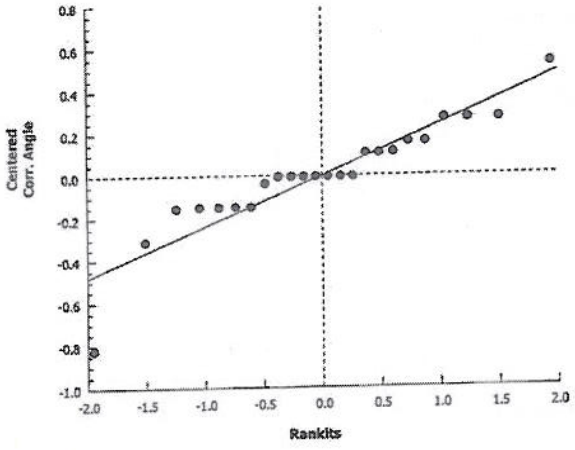
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi FW-Ref	1.249	1.107	1.107	1.249	1.412	1.412	1.249	1.249
Cdi FW-01	1.249	1.249	1.412	1.412	1.107	1.412	0.9912	0.3218
C SW-Leach A-01	0.1588	0.5796	0.9912	0.4636	0.4636	0.3218	0.3218	0.4636

Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi FW-Ref	9/10	8/10	8/10	9/10	10/10	10/10	9/10	9/10
Cdi FW-01	9/10	9/10	10/10	10/10	8/10	10/10	7/10	1/10
C SW-Leach A-01	0/10	3/10	7/10	2/10	2/10	1/10	1/10	2/10

Graphics





CETIS Analytical Report

U.S. EPA Region I Lab

Chironomus 10-d Survival and Growth Sediment Test

Analysis ID:	13-6323-6653	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	09 Mar-17 15:09	**Analysis:**	Nonparametric-Multiple Comparison	**Official Results:**	Yes
Batch ID:	19-0937-4625	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	08 Nov-16	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:		**Species:**	Chironomus dilutus (Midge)	**Brine:**	
Duration:	NA	**Source:**	In-House Culture	**Age:**	

Batch Note: 2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample Notes
Cdi RB-Ref	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi RB-02	2016 Troy Mills Sed Tox Test - C. dilutus
Cdi RB-03	2016 Troy Mills Sed Tox Test - C. dilutus
C SW-Leach A-02	2016 Troy Mills Sed Tox Test - C. dilutus

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cdi RB-Ref	18-1639-4271	28 Oct-16		11d 0h	EPA Region I	Troy Mills
Cdi RB-02	10-1616-5779	28 Oct-16		11d 0h		
Cdi RB-03	10-8352-1382	28 Oct-16		11d 0h		
C SW-Leach A-02	00-0498-9718	28 Oct-16		11d 0h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cdi RB-Ref	Site Sediment	Troy Mills Landfill	Cdi RB-Ref		
Cdi RB-02	Site Sediment	Troy Mills Landfill	Cdi RB-02		
Cdi RB-03	Site Sediment	Troy Mills Landfill	Cdi RB-03		
C SW-Leach A-02	Site Sediment	Troy Mills Landfill	Cdi SW-Leach A-02		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	79.6%	

Wilcoxon/Bonferroni Adj Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Cdi RB-Ref		Cdi RB-02	69.5	NA	1	13	1.0000	Exact	Non-Significant Effect
		Cdi RB-03	65	NA	0	13	1.0000	Exact	Non-Significant Effect
		C SW-Leach A-02	66	NA	1	13	1.0000	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1588315	0.05294383	3	0.3074	0.8198	Non-Significant Effect
Error	4.64982	0.1722155	27			
Total	4.808651		30			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.107	11.34	0.2502	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9029	0.9056	0.0085	Non-normal Distribution

Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi RB-Ref	7	0.5286	0.1265	0.9307	0.6	0	1	0.1643	82.26%	0.0%
Cdi RB-02	8	0.7125	0.4784	0.9466	0.8	0.1	0.9	0.09899	39.3%	-34.8%
Cdi RB-03	8	0.6125	0.4155	0.8095	0.6	0.2	0.9	0.08332	38.48%	-15.88%
C SW-Leach A-02	8	0.625	0.2825	0.9675	0.9	0	0.9	0.1449	65.55%	-18.24%

Analyst: ZZ QA: CO

Chironomus 10-d Survival and Growth Sediment Test

U.S. EPA Region I Lab

Analysis ID: 13-6323-6653 Endpoint: Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 09 Mar-17 15:09 Analysis: Nonparametric-Multiple Comparison Official Results: Yes

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cdi RB-Ref	7	0.8164	0.3212	1.312	0.8861	0.1588	1.412	0.2024	65.58%	0.0%
Cdi RB-02	8	1.022	0.7533	1.291	1.107	0.3218	1.249	0.1136	31.44%	-25.19%
Cdi RB-03	8	0.9125	0.6916	1.133	0.8883	0.4636	1.249	0.09343	28.96%	-11.78%
C SW-Leach A-02	8	0.9185	0.5043	1.333	1.249	0.1588	1.249	0.1752	53.94%	-12.52%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi RB-Ref	1	0	0.6	1	0.3	0.8	0	
Cdi RB-02	0.9	0.1	0.8	0.8	0.9	0.9	0.8	0.5
Cdi RB-03	0.7	0.5	0.9	0.2	0.5	0.7	0.5	0.9
C SW-Leach A-02	0	0	0.9	0.9	0.9	0.9	0.5	0.9

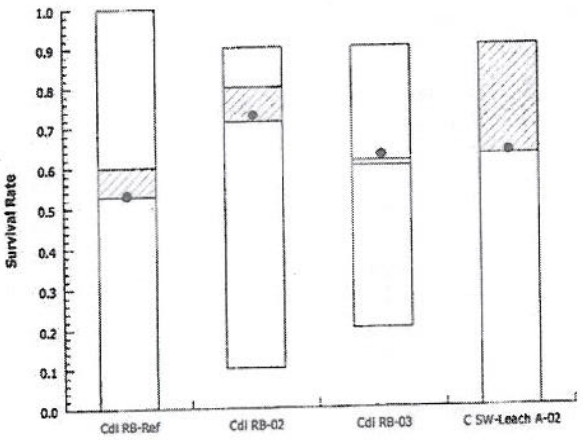
Angular (Corrected) Transformed Detail

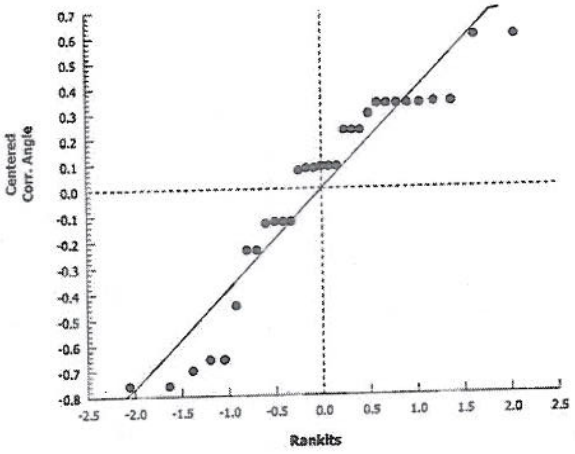
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi RB-Ref	1.412	0.1588	0.8861	1.412	0.5796	1.107	0.1588	
Cdi RB-02	1.249	0.3218	1.107	1.107	1.249	1.249	1.107	0.7854
Cdi RB-03	0.9912	0.7854	1.249	0.4636	0.7854	0.9912	0.7854	1.249
C SW-Leach A-02	0.1588	0.1588	1.249	1.249	1.249	1.249	0.7854	1.249

Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Cdi RB-Ref	10/10	0/10	6/10	10/10	3/10	8/10	0/10	
Cdi RB-02	9/10	1/10	8/10	8/10	9/10	9/10	8/10	5/10
Cdi RB-03	7/10	5/10	9/10	2/10	5/10	7/10	5/10	9/10
C SW-Leach A-02	0/10	0/10	9/10	9/10	9/10	9/10	5/10	9/10

Graphics



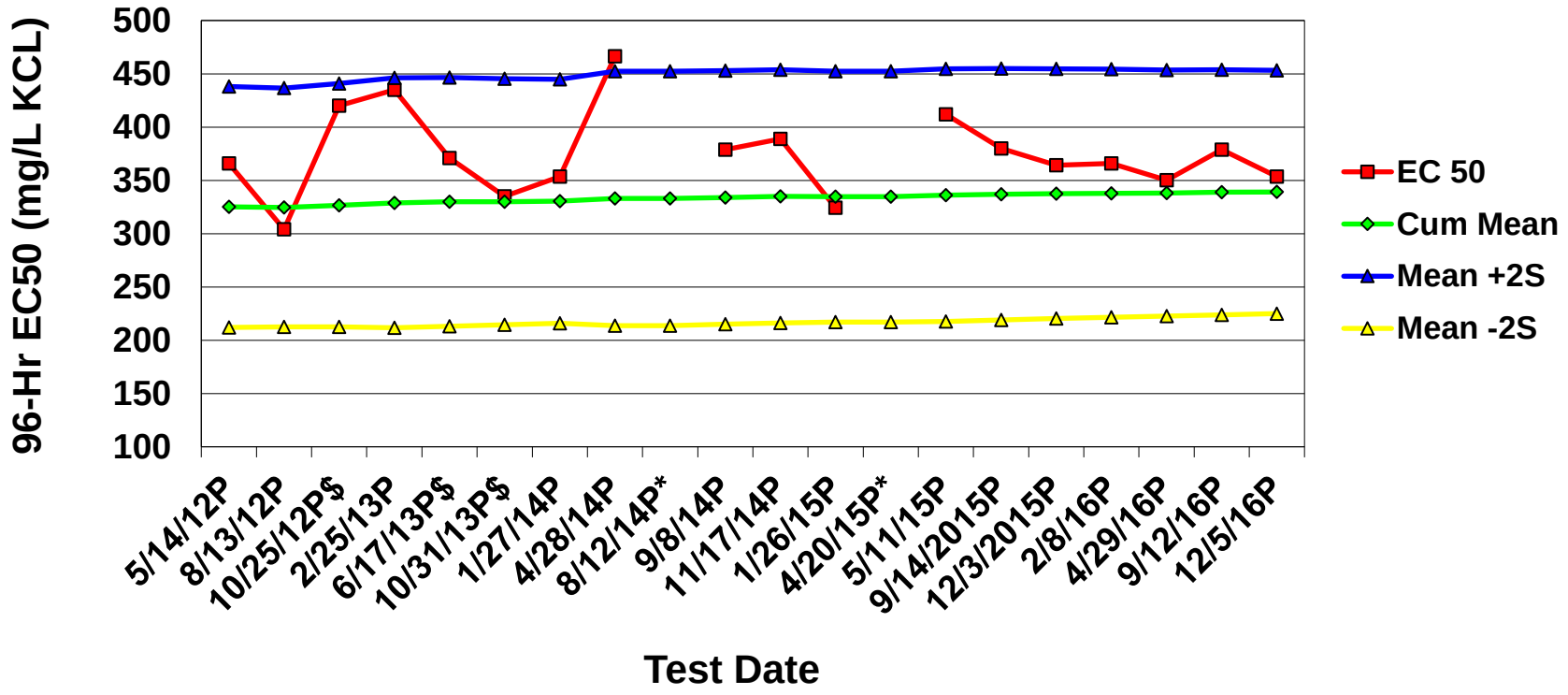


Analyst: ZZ QA: CO

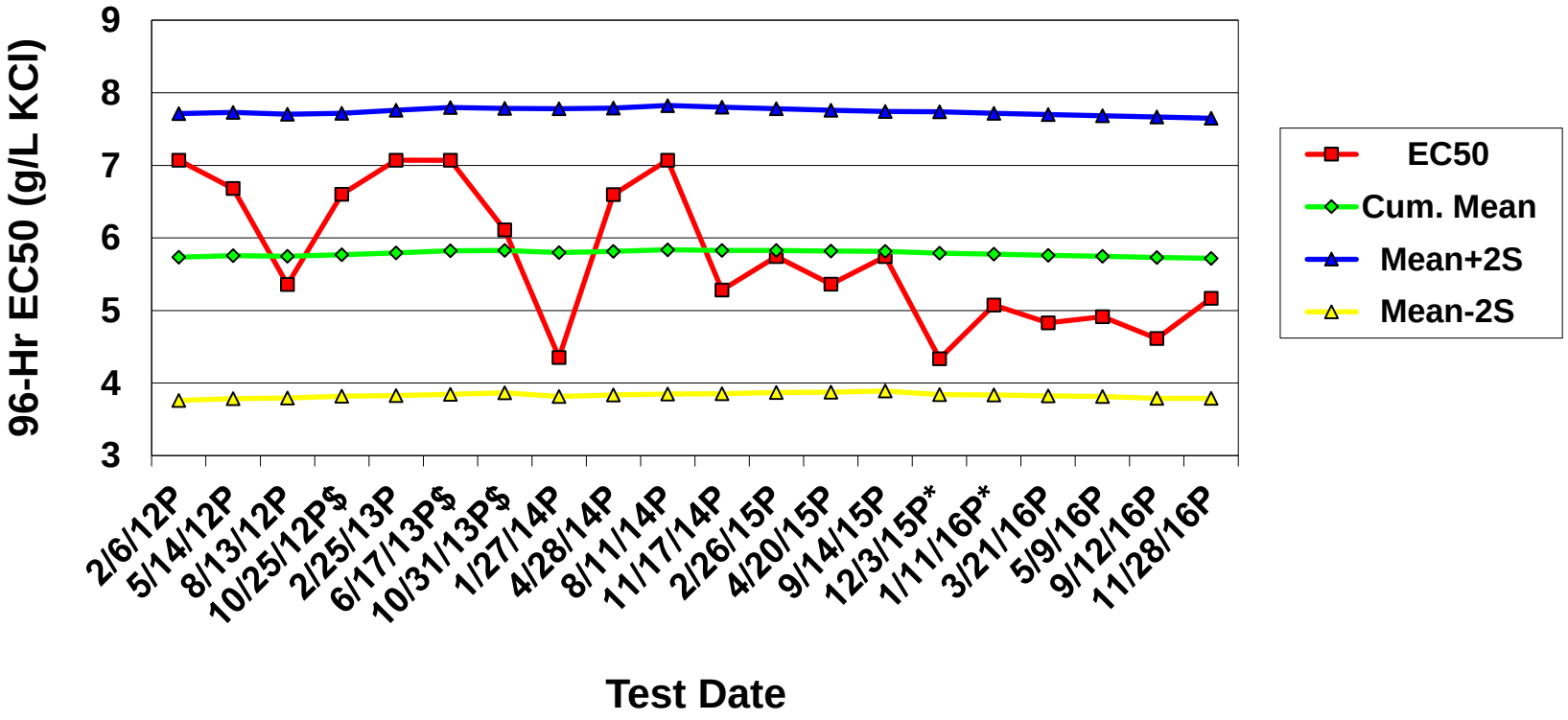
APPENDIX E

Control Charts

H. azteca 96-Hour EC50 Ref. Tox. Control Chart

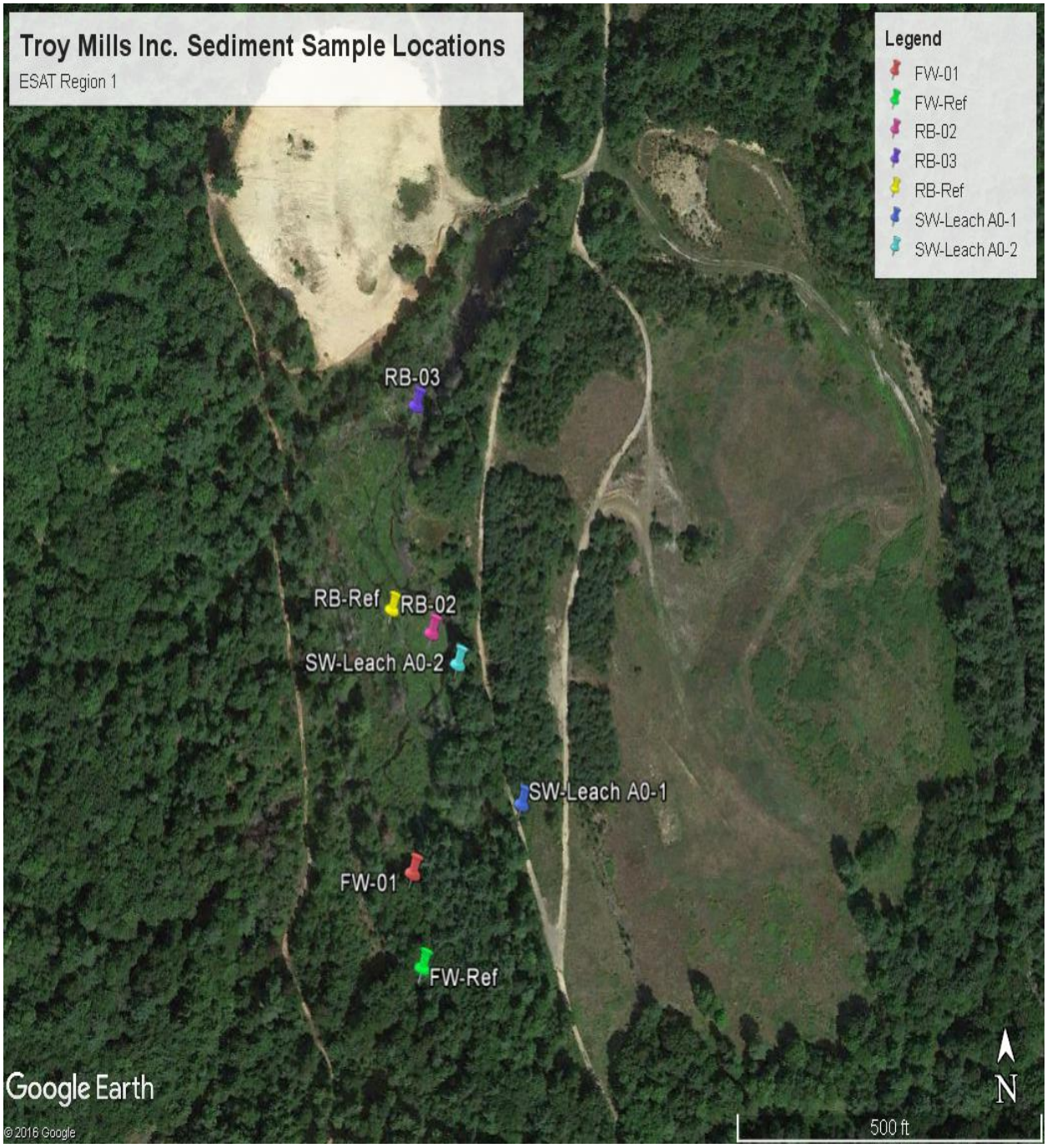


C. dilutus 96-Hour EC50 Ref. Tox. Control Chart



APPENDIX F

Sampling Map


Troy Mills Inc. Sediment Sample Locations
ESAT Region 1
Legend
FW-01
FW-Ref
RB-02
RB-03
RB-Ref
SW-Leach A0-1
SW-Leach A0-2
RB-03
RB-Ref
RB-02
SW-Leach A0-2
SW-Leach A0-1
FW-01
FW-Ref
Google Earth
© 2016 Google
N
500 ft

APPENDIX 2

ANALYTICAL CHEMISTRY DATA, HAZARD QUOTIENTS, AND "TOTAL RISKS"
FOR THE SEDIMENT SAMPLES COLLECTED IN AUGUST 2016
FROM THE TROY MILL LANDFILL SUPERFUND SITE, TROY MILLS, NH

Appendix 2: August 2016 sediment analytical data for the Troy Mills Landfill Superfund site								
Sample ID	**Analyte**	**Units**	**Result**	**MDL**		**Exposure**	**RSV**	**HQ**
FW-ref	Aluminum	mg/Kg	11000	13		11000	58000	0.2
FW-ref	Antimony	mg/Kg	ND	2.4	U	1.2	25.0	0.0
FW-ref	Arsenic	mg/Kg	5.0	2.4		5.0	33	0.2
FW-ref	Barium	mg/Kg	65	2.4		65	60	**1.1**
FW-ref	Beryllium	mg/Kg	0.98	0.95		0.98	NA	--
FW-ref	Cadmium	mg/Kg	ND	1.2	U	0.6	5.0	0.1
FW-ref	Chromium	mg/Kg	12	2.4		12	111	0.1
FW-ref	Cobalt	mg/Kg	7.4	2.4		7.4	50	0.1
FW-ref	Copper	mg/Kg	18	2.4		18	149	0.1
FW-ref	Iron	mg/Kg	11000	4.8		11000	40000	0.3
FW-ref	Lead	mg/Kg	45	2.4		45	128	0.4
FW-ref	Manganese	mg/Kg	270	2.4	J	270	1100	0.2
FW-ref	Mercury	mg/Kg	0.22	0.066		0.22	1.1	0.2
FW-ref	Nickel	mg/Kg	10	2.4		10	48.4	0.2
FW-ref	Selenium	mg/Kg	ND	4.8	U	2.4	20	0.1
FW-ref	Silver	mg/Kg	ND	1.2	U	0.6	2.2	0.3
FW-ref	Thallium	mg/Kg	ND	4.8	U	2.4	NA	--
FW-ref	Vanadium	mg/Kg	32	2.4		32	27.3	**1.2**
FW-ref	Zinc	mg/Kg	72	2.4		72	459	0.2
FW-ref	BEHP	mg/Kg	ND	0.353	U	0.177	890	0.0
							"total risk"	**5.0**
FW-01	Aluminum	mg/Kg	16000	24		16000	58000	0.3
FW-01	Antimony	mg/Kg	ND	4.3	U	2.15	25.0	0.1
FW-01	Arsenic	mg/Kg	11	4.3		11	33	0.3
FW-01	Barium	mg/Kg	120	4.3		120	60	**2.0**
FW-01	Beryllium	mg/Kg	ND	1.7	U	0.85	NA	--
FW-01	Cadmium	mg/Kg	ND	2.2	U	1.1	5.0	0.2
FW-01	Chromium	mg/Kg	17	4.3		17	111	0.2
FW-01	Cobalt	mg/Kg	19	4.3		19	50	0.4
FW-01	Copper	mg/Kg	23	4.3		23	149	0.2
FW-01	Iron	mg/Kg	55000	8.7		55000	40000	**1.4**
FW-01	Lead	mg/Kg	42	4.3		42	128	0.3
FW-01	Manganese	mg/Kg	1800	4.3		1800	1100	**1.6**
FW-01	Mercury	mg/Kg	0.3	0.12		0.3	1.1	0.3
FW-01	Nickel	mg/Kg	21	4.3		21	48.4	0.4
FW-01	Selenium	mg/Kg	ND	8.7	U	4.35	20	0.2
FW-01	Silver	mg/Kg	ND	2.2	U	1.1	2.2	0.5
FW-01	Thallium	mg/Kg	ND	8.7	U	4.35	NA	--
FW-01	Vanadium	mg/Kg	40	4.3		40	27.3	**1.5**
FW-01	Zinc	mg/Kg	120	4.3		120	459	0.26
FW-01	BEHP	mg/Kg	ND	0.49	U	0.245	890	0.0
							"total risk"	**10.1**

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 2 (cont'd): August 2016 sediment analytical data for the Troy Mills Landfill Superfund site								
Sample ID	**Analyte**	**Units**	**Result**	**MDL**		**Exposure**	**RSV**	**HQ**
SW-Leach A-01	Aluminum	mg/Kg	5500	160		5500	58000	0.1
SW-Leach A-01	Antimony	mg/Kg	ND	29	U	14.5	25.0	0.6
SW-Leach A-01	Arsenic	mg/Kg	31	29		31	33	0.9
SW-Leach A-01	Barium	mg/Kg	220	29		220	60	**3.7**
SW-Leach A-01	Beryllium	mg/Kg	ND	11	U	5.5	NA	--
SW-Leach A-01	Cadmium	mg/Kg	ND	14	U	7.0	5.0	**1.4**
SW-Leach A-01	Chromium	mg/Kg	ND	29	U	14.5	111	0.1
SW-Leach A-01	Cobalt	mg/Kg	ND	29	U	14.5	50	0.3
SW-Leach A-01	Copper	mg/Kg	ND	29	U	14.5	149	0.1
SW-Leach A-01	Iron	mg/Kg	380000	57		380000	40000	**9.5**
SW-Leach A-01	Lead	mg/Kg	ND	29	U	14.5	128	0.1
SW-Leach A-01	Manganese	mg/Kg	1200	29		1200	1100	**1.1**
SW-Leach A-01	Mercury	mg/Kg	ND	0.11	U	0.055	1.1	0.1
SW-Leach A-01	Nickel	mg/Kg	ND	29	U	14.5	48.4	0.3
SW-Leach A-01	Selenium	mg/Kg	ND	57	U	28.5	20	**1.4**
SW-Leach A-01	Silver	mg/Kg	ND	14	U	7.0	2.2	**3.2**
SW-Leach A-01	Thallium	mg/Kg	ND	57	U	28.5	NA	--
SW-Leach A-01	Vanadium	mg/Kg	85	29		85	27.3	**3.1**
SW-Leach A-01	Zinc	mg/Kg	33	29		33	459	0.1
SW-Leach A-01	BEHP	mg/Kg	2.3	0.508		2.3	890	0.0
							"total risk"	**26.0**
SW-Leach B-01	Aluminum	mg/Kg	12000	13		12000	58000	0.2
SW-Leach B-01	Antimony	mg/Kg	ND	2.3	U	1.15	25.0	0.0
SW-Leach B-01	Arsenic	mg/Kg	3.0	2.3		3.0	33	0.1
SW-Leach B-01	Barium	mg/Kg	46	2.3		46	60	0.8
SW-Leach B-01	Beryllium	mg/Kg	ND	0.93	U	0.47	NA	--
SW-Leach B-01	Cadmium	mg/Kg	ND	1.2	U	0.6	5.0	0.1
SW-Leach B-01	Chromium	mg/Kg	10	2.3		10	111	0.1
SW-Leach B-01	Cobalt	mg/Kg	6.3	2.3		6.3	50	0.1
SW-Leach B-01	Copper	mg/Kg	10	2.3		10	149	0.1
SW-Leach B-01	Iron	mg/Kg	19000	4.6		19000	40000	0.5
SW-Leach B-01	Lead	mg/Kg	14	2.3		14	128	0.1
SW-Leach B-01	Manganese	mg/Kg	420	2.3		420	1100	0.4
SW-Leach B-01	Mercury	mg/Kg	0.082	0.044		0.082	1.1	0.1
SW-Leach B-01	Nickel	mg/Kg	6.7	2.3		6.7	48.4	0.1
SW-Leach B-01	Selenium	mg/Kg	ND	4.6	U	2.3	20	0.1
SW-Leach B-01	Silver	mg/Kg	ND	1.2	U	0.6	2.2	0.3
SW-Leach B-01	Thallium	mg/Kg	ND	4.6	U	2.3	NA	--
SW-Leach B-01	Vanadium	mg/Kg	23	2.3		23	27.3	0.8
SW-Leach B-01	Zinc	mg/Kg	51	2.3		51	459	0.1
SW-Leach B-01	BEHP	mg/Kg	ND	0.182	U	0.091	890	0.0
							"total risk"	**4.0**

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 2 (cont'd): August 2016 sediment analytical data for the Troy Mills Landfill Superfund site								
Sample ID	**Analyte**	**Units**	**Result**	**MDL**		**Exposure**	**RSV**	**HQ**
RB-ref	Aluminum	mg/Kg	13000	14		13000	58000	0.2
RB-ref	Antimony	mg/Kg	ND	2.5	U	1.25	25.0	0.1
RB-ref	Arsenic	mg/Kg	3.3	2.5		3.3	33	0.1
RB-ref	Barium	mg/Kg	75	2.5		75	60	**1.3**
RB-ref	Beryllium	mg/Kg	ND	1.0	U	0.5	NA	--
RB-ref	Cadmium	mg/Kg	ND	1.2	U	0.6	5.0	0.1
RB-ref	Chromium	mg/Kg	15	2.5		15	111	0.1
RB-ref	Cobalt	mg/Kg	7.3	2.5		7.3	50	0.1
RB-ref	Copper	mg/Kg	16	2.5		16	149	0.1
RB-ref	Iron	mg/Kg	16000	5.0		16000	40000	0.4
RB-ref	Lead	mg/Kg	20	2.5		20	128	0.2
RB-ref	Manganese	mg/Kg	210	2.5		210	1100	0.2
RB-ref	Mercury	mg/Kg	0.087	0.053		0.087	1.1	0.1
RB-ref	Nickel	mg/Kg	12	2.5		12	48.4	0.2
RB-ref	Selenium	mg/Kg	ND	5.0	U	2.5	20	0.1
RB-ref	Silver	mg/Kg	ND	1.2	U	0.6	2.2	0.3
RB-ref	Thallium	mg/Kg	ND	5.0	U	2.5	NA	--
RB-ref	Vanadium	mg/Kg	32	2.5		32	27.3	**1.2**
RB-ref	Zinc	mg/Kg	51	2.5		51	459	0.1
RB-ref	BEHP	mg/Kg	ND	0.258	U	0.129	890	0.0
							"total risk"	**4.9**
RB-01	Aluminum	mg/Kg	9600	15		9600	58000	0.2
RB-01	Antimony	mg/Kg	ND	2.7	U	1.35	25.0	0.1
RB-01	Arsenic	mg/Kg	ND	2.7	U	1.35	33	0.0
RB-01	Barium	mg/Kg	60	2.7		60	60	**1.0**
RB-01	Beryllium	mg/Kg	ND	1.1	U	0.55	NA	--
RB-01	Cadmium	mg/Kg	ND	1.4	U	0.7	5.0	0.1
RB-01	Chromium	mg/Kg	12	2.7		12	111	0.1
RB-01	Cobalt	mg/Kg	7.2	2.7		7.2	50	0.1
RB-01	Copper	mg/Kg	12	2.7		12	149	0.1
RB-01	Iron	mg/Kg	11000	5.4		11000	40000	0.3
RB-01	Lead	mg/Kg	17	2.7		17	128	0.1
RB-01	Manganese	mg/Kg	330	2.7		330	1100	0.3
RB-01	Mercury	mg/Kg	0.085	0.052		0.085	1.1	0.1
RB-01	Nickel	mg/Kg	8.6	2.7		8.6	48.4	0.2
RB-01	Selenium	mg/Kg	ND	5.4	U	2.7	20	0.1
RB-01	Silver	mg/Kg	ND	1.4	U	0.7	2.2	0.3
RB-01	Thallium	mg/Kg	ND	5.4	U	2.7	NA	--
RB-01	Vanadium	mg/Kg	23	2.7		23	27.3	0.8
RB-01	Zinc	mg/Kg	44	2.7		44	459	0.1
RB-01	BEHP	mg/Kg	ND	0.242	U	0.121	890	0.0
							"total risk"	**4.1**

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 2 (cont'd): August 2016 sediment analytical data for the Troy Mills Landfill Superfund site								
Sample ID	**Analyte**	**Units**	**Result**	**MDL**		**Exposure**	**RSV**	**HQ**
RB-02	Aluminum	mg/Kg	9000	11		9000	58000	0.2
RB-02	Antimony	mg/Kg	ND	2.0	U	1.0	25.0	0.0
RB-02	Arsenic	mg/Kg	2.2	2.0		2.2	33	0.1
RB-02	Barium	mg/Kg	56	2.0		56	60	0.9
RB-02	Beryllium	mg/Kg	ND	0.8	U	0.4	NA	--
RB-02	Cadmium	mg/Kg	ND	1.0	U	0.5	5.0	0.1
RB-02	Chromium	mg/Kg	12	2.0		12	111	0.1
RB-02	Cobalt	mg/Kg	6.7	2.0		6.7	50	0.1
RB-02	Copper	mg/Kg	11	2.0		11	149	0.1
RB-02	Iron	mg/Kg	8700	4.0		8700	40000	0.2
RB-02	Lead	mg/Kg	14	2.0		14	128	0.1
RB-02	Manganese	mg/Kg	120	2.0		120	1100	0.1
RB-02	Mercury	mg/Kg	0.073	0.049		0.073	1.1	0.1
RB-02	Nickel	mg/Kg	7.9	2.0		7.9	48.4	0.2
RB-02	Selenium	mg/Kg	ND	4.0	U	2.0	20	0.1
RB-02	Silver	mg/Kg	ND	1.0	U	0.5	2.2	0.2
RB-02	Thallium	mg/Kg	ND	4.0	U	2.0	NA	--
RB-02	Vanadium	mg/Kg	21	2.0		21	27.3	0.8
RB-02	Zinc	mg/Kg	80	2.0		80	459	0.2
RB-02	BEHP	mg/Kg	0.31	0.181		0.31	890	0.0
							"total risk"	**3.5**
RB-03	Aluminum	mg/Kg	13000	14		13000	58000	0.2
RB-03	Antimony	mg/Kg	ND	2.6	U	1.3	25.0	0.1
RB-03	Arsenic	mg/Kg	3.6	2.6		3.6	33	0.1
RB-03	Barium	mg/Kg	77	2.6		77	60	**1.3**
RB-03	Beryllium	mg/Kg	ND	1.0	U	0.5	NA	--
RB-03	Cadmium	mg/Kg	ND	1.3	U	0.65	5.0	0.1
RB-03	Chromium	mg/Kg	14	2.6		14	111	0.1
RB-03	Cobalt	mg/Kg	12	2.6		12	50	0.2
RB-03	Copper	mg/Kg	16	2.6		16	149	0.1
RB-03	Iron	mg/Kg	15000	5.1		15000	40000	0.4
RB-03	Lead	mg/Kg	22	2.6		22	128	0.2
RB-03	Manganese	mg/Kg	500	2.6		500	1100	0.5
RB-03	Mercury	mg/Kg	0.13	0.077		0.13	1.1	0.1
RB-03	Nickel	mg/Kg	12	2.6		12	48.4	0.2
RB-03	Selenium	mg/Kg	ND	5.1	U	2.55	20	0.1
RB-03	Silver	mg/Kg	ND	1.3	U	0.65	2.2	0.3
RB-03	Thallium	mg/Kg	ND	5.1	U	2.55	NA	--
RB-03	Vanadium	mg/Kg	28	2.6		28	27.3	**1.0**
RB-03	Zinc	mg/Kg	84	2.6		84	459	0.2
RB-03	BEHP	mg/Kg	0.24	0.252	L	0.24	890	0.0
							"total risk"	**5.3**

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 2 (cont'd): August 2016 sediment analytical data for the Troy Mills Landfill Superfund site								
Sample ID	**Analyte**	**Units**	**Result**	**MDL**		**Exposure**	**RSV**	**HQ**
RB-04	Aluminum	mg/Kg	11000	14		11000	58000	0.2
RB-04	Antimony	mg/Kg	ND	2.6	U	1.3	25.0	0.1
RB-04	Arsenic	mg/Kg	3.0	2.6		3.0	33	0.1
RB-04	Barium	mg/Kg	50	2.6		50	60	0.8
RB-04	Beryllium	mg/Kg	ND	1.0	U	0.5	NA	--
RB-04	Cadmium	mg/Kg	ND	1.3	U	0.65	5.0	0.1
RB-04	Chromium	mg/Kg	11	2.6		11	111	0.1
RB-04	Cobalt	mg/Kg	13	2.6		13	50	0.3
RB-04	Copper	mg/Kg	11	2.6		11	149	0.1
RB-04	Iron	mg/Kg	14000	5.1		14000	40000	0.4
RB-04	Lead	mg/Kg	16	2.6		16	128	0.1
RB-04	Manganese	mg/Kg	480	2.6		480	1100	0.4
RB-04	Mercury	mg/Kg	0.052	0.041		0.052	1.1	0.0
RB-04	Nickel	mg/Kg	9.2	2.6		9.2	48.4	0.2
RB-04	Selenium	mg/Kg	ND	5.1	U	2.55	20	0.1
RB-04	Silver	mg/Kg	ND	1.3	U	0.65	2.2	0.3
RB-04	Thallium	mg/Kg	ND	5.1	U	2.55	NA	--
RB-04	Vanadium	mg/Kg	24	2.6		24	27.3	0.9
RB-04	Zinc	mg/Kg	65	2.6		65	459	0.1
RB-04	BEHP	mg/Kg	ND	0.201	U	0.1	890	0.0
							"total risk"	**4.3**
RB-05	Aluminum	mg/Kg	5300	11		5300	58000	0.1
RB-05	Antimony	mg/Kg	ND	2.1	U	1.05	25.0	0.0
RB-05	Arsenic	mg/Kg	ND	2.1	U	1.05	33	0.0
RB-05	Barium	mg/Kg	28	2.1		28	60	0.5
RB-05	Beryllium	mg/Kg	ND	0.83	U	0.415	NA	--
RB-05	Cadmium	mg/Kg	ND	1.0	U	0.5	5.0	0.1
RB-05	Chromium	mg/Kg	7.2	2.1		7.2	111	0.1
RB-05	Cobalt	mg/Kg	4.4	2.1		4.4	50	0.1
RB-05	Copper	mg/Kg	5.6	2.1		5.6	149	0.0
RB-05	Iron	mg/Kg	6500	4.2		6500	40000	0.2
RB-05	Lead	mg/Kg	7.4	2.1		7.4	128	0.1
RB-05	Manganese	mg/Kg	210	2.1		210	1100	0.2
RB-05	Mercury	mg/Kg	0.039	0.038		0.039	1.1	0.0
RB-05	Nickel	mg/Kg	5.1	2.1		5.1	48.4	0.1
RB-05	Selenium	mg/Kg	ND	4.2	U	2.1	20	0.1
RB-05	Silver	mg/Kg	ND	1.0	U	0.5	2.2	0.2
RB-05	Thallium	mg/Kg	ND	4.2	U	2.1	NA	--
RB-05	Vanadium	mg/Kg	12	2.1		12	27.3	0.4
RB-05	Zinc	mg/Kg	28	2.1		28	459	0.1
RB-05	BEHP	mg/Kg	ND	0.142	U	0.071	890	0.0
							"total risk"	**2.3**

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

APPENDIX 3

ANALYTICAL CHEMISTRY DATA, HAZARD QUOTIENTS, AND "TOTAL RISKS"
FOR THE SEDIMENT SAMPLES COLLECTED IN OCTOBER 2016
FROM THE TROY MILL LANDFILL SUPERFUND SITE, TROY MILLS, NH

Appendix 3: October 2016 sediment analytical data from the Troy Mills Landfill Superfund site								
Sample location	**Analytes**	**Units**	**Results**	**MDL**	**Exposure**		**RSV**	**HQ**
FW-ref	Aluminum	mg/Kg	6100	15	6100		58000	0.1
FW-ref	Antimony	mg/Kg	ND	5.3	2.65	U	25.0	0.1
FW-ref	Arsenic	mg/Kg	3.0	2.6	3.0		33	0.1
FW-ref	Barium	mg/Kg	50	2.6	50		60	0.8
FW-ref	Beryllium	mg/Kg	ND	1.1	0.55	U	NA	--
FW-ref	Cadmium	mg/Kg	ND	1.3	0.65	U	5.0	0.1
FW-ref	Chromium	mg/Kg	7.3	2.6	7.3		111	0.1
FW-ref	Cobalt	mg/Kg	6.6	2.6	6.6		50	0.1
FW-ref	Copper	mg/Kg	8.7	2.6	8.7		149	0.1
FW-ref	Iron	mg/Kg	9100	5.3	9100		40000	0.2
FW-ref	Lead	mg/Kg	16	2.6	16		128	0.1
FW-ref	Manganese	mg/Kg	270	2.6	270		1100	0.2
FW-ref	Mercury[a]	mg/Kg	--	--	--		1.1	--
FW-ref	Nickel	mg/Kg	6.8	2.6	6.8		48.4	0.1
FW-ref	Selenium	mg/Kg	ND	5.3	2.65	U	20	0.1
FW-ref	Silver	mg/Kg	ND	1.3	0.65	U	2.2	0.3
FW-ref	Thallium	mg/Kg	ND	5.3	2.65	U	NA	--
FW-ref	Vanadium	mg/Kg	14	2.6	14		27.3	0.5
FW-ref	Zinc	mg/Kg	54	2.6	54		459	0.1
FW-ref	BEHP	mg/Kg	0.402	0.206	0.402		890	0.0
							"total risk"	**3.3**
RB-ref	Aluminum	mg/Kg	11000	14	11000		58000	0.2
RB-ref	Antimony	mg/Kg	ND	5.0	2.5	U	25.0	0.1
RB-ref	Arsenic	mg/Kg	3.6	2.5	3.6		33	0.1
RB-ref	Barium	mg/Kg	66	2.5	66		60	**1.1**
RB-ref	Beryllium	mg/Kg	ND	1.0	0.5	U	NA	--
RB-ref	Cadmium	mg/Kg	ND	1.2	0.6	U	5.0	0.1
RB-ref	Chromium	mg/Kg	13	2.5	13		111	0.1
RB-ref	Cobalt	mg/Kg	7.0	2.5	7.0		50	0.1
RB-ref	Copper	mg/Kg	11	2.5	11		149	0.1
RB-ref	Iron	mg/Kg	14000	5.0	14000		40000	0.4
RB-ref	Lead	mg/Kg	16	2.5	16		128	0.1
RB-ref	Manganese	mg/Kg	300	2.5	300		1100	0.3
RB-ref	Mercury[a]	mg/Kg	--	--	--		1.1	--
RB-ref	Nickel	mg/Kg	10	2.5	10		48.4	0.2
RB-ref	Selenium	mg/Kg	ND	5.0	2.5	U	20	0.1
RB-ref	Silver	mg/Kg	ND	1.2	0.6	U	2.2	0.3
RB-ref	Thallium	mg/Kg	ND	5.0	2.5	U	NA	--
RB-ref	Vanadium	mg/Kg	24	2.5	24		27.3	0.9
RB-ref	Zinc	mg/Kg	45	2.5	45		459	0.1
RB-ref	BEHP	mg/Kg	ND	0.275	0.138	U	890	0.0
							"total risk"	**4.3**

[a] mercury was not analyzed in the sediment samples collected in October 2016

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 3 (cont'd): October 2016 sediment analytical data from the Troy Mills Landfill Superfund site								
Sample location	**Analytes**	**Units**	**Results**	**MDL**	**Exposure**		**RSV**	**HQ**
FW-01	Aluminum	mg/Kg	11000	16	11000		58000	0.2
FW-01	Antimony	mg/Kg	ND	5.7	2.85	U	25.0	0.1
FW-01	Arsenic	mg/Kg	4.8	2.9	4.8		33	0.1
FW-01	Barium	mg/Kg	74	2.9	74		60	**1.2**
FW-01	Beryllium	mg/Kg	ND	1.1	0.55	U	NA	--
FW-01	Cadmium	mg/Kg	ND	1.4	0.7	U	5.0	0.1
FW-01	Chromium	mg/Kg	13	2.9	13		111	0.1
FW-01	Cobalt	mg/Kg	9.5	2.9	9.5		50	0.2
FW-01	Copper	mg/Kg	14	2.9	14		149	0.1
FW-01	Iron	mg/Kg	19000	5.7	19000		40000	0.5
FW-01	Lead	mg/Kg	28	2.9	28		128	0.2
FW-01	Manganese	mg/Kg	530	2.9	530		1100	0.5
FW-01	Mercury[a]	mg/Kg	--	--	--		1.1	--
FW-01	Nickel	mg/Kg	12	2.9	12		48.4	0.2
FW-01	Selenium	mg/Kg	ND	5.7	2.85	U	20	0.1
FW-01	Silver	mg/Kg	ND	1.4	0.7	U	2.2	0.3
FW-01	Thallium	mg/Kg	ND	5.7	2.85	U	NA	--
FW-01	Vanadium	mg/Kg	26	2.9	26		27.3	1.0
FW-01	Zinc	mg/Kg	73	2.9	73		459	0.2
FW-01	BHEP	mg/Kg	ND	0.278	0.139	U	890	0.0
							"total risk"	**5.2**
RB-02	Aluminum	mg/Kg	9600	12	9600		58000	0.2
RB-02	Antimony	mg/Kg	ND	4.2	2.1	U	25.0	0.1
RB-02	Arsenic	mg/Kg	3.0	2.1	3.0		33	0.1
RB-02	Barium	mg/Kg	59	2.1	59		60	1.0
RB-02	Beryllium	mg/Kg	ND	0.85	0.425	U	NA	--
RB-02	Cadmium	mg/Kg	ND	1.1	0.55	U	5.0	0.1
RB-02	Chromium	mg/Kg	13	2.1	13		111	0.1
RB-02	Cobalt	mg/Kg	6.5	2.1	6.5		50	0.1
RB-02	Copper	mg/Kg	12	2.1	12		149	0.1
RB-02	Iron	mg/Kg	9500	4.2	9500		40000	0.2
RB-02	Lead	mg/Kg	14	2.1	14		128	0.1
RB-02	Manganese	mg/Kg	94	2.1	94		1100	0.1
RB-02	Mercury[a]	mg/Kg	--	--	--		1.1	--
RB-02	Nickel	mg/Kg	11	2.1	11		48.4	0.2
RB-02	Selenium	mg/Kg	ND	4.2	2.1	U	20	0.1
RB-02	Silver	mg/Kg	ND	1.1	0.55	U	2.2	0.3
RB-02	Thallium	mg/Kg	ND	4.2	2.1	U	NA	--
RB-02	Vanadium	mg/Kg	23	2.1	23		27.3	0.8
RB-02	Zinc	mg/Kg	390	2.1	390		459	0.8
RB-02	BEHP	mg/Kg	1.47	0.0025	1.47		890	0.0
							"total risk"	**4.5**

[a] mercury was not analyzed in the sediment samples collected in October 2016

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 3 (cont'd): October 2016 sediment analytical data from the Troy Mills Landfill Superfund site								
Sample location	**Analytes**	**Units**	**Results**	**MDL**	**Exposure**		**RSV**	**HQ**
RB-03	Aluminum	mg/Kg	15000	16	15000		58000	0.3
RB-03	Antimony	mg/Kg	ND	5.7	2.85		25.0	0.1
RB-03	Arsenic	mg/Kg	4.3	2.9	4.3		33	0.1
RB-03	Barium	mg/Kg	81	2.9	81		60	**1.4**
RB-03	Beryllium	mg/Kg	ND	1.1	0.55		NA	--
RB-03	Cadmium	mg/Kg	ND	1.4	0.7		5.0	0.1
RB-03	Chromium	mg/Kg	17	2.9	17		111	0.2
RB-03	Cobalt	mg/Kg	13	2.9	13		50	0.3
RB-03	Copper	mg/Kg	18	2.9	18		149	0.1
RB-03	Iron	mg/Kg	15000	5.7	15000		40000	0.4
RB-03	Lead	mg/Kg	25	2.9	25		128	0.2
RB-03	Manganese	mg/Kg	580	2.9	580		1100	0.5
RB-03	Mercury[a]	mg/Kg	--	--	--		1.1	--
RB-03	Nickel	mg/Kg	14	2.9	14		48.4	0.3
RB-03	Selenium	mg/Kg	ND	5.7	2.85		20	0.1
RB-03	Silver	mg/Kg	ND	1.4	0.7		2.2	0.3
RB-03	Thallium	mg/Kg	ND	5.7	2.85		NA	--
RB-03	Vanadium	mg/Kg	31	2.9	31		27.3	**1.1**
RB-03	Zinc	mg/Kg	110	2.9	110		459	0.2
RB-03	BEHP	mg/Kg	ND	0.272	0.136		890	0.0
							"total risk"	**5.7**
SW-Leach A-01	Aluminum	mg/Kg	12000	58	12000		58000	0.2
SW-Leach A-01	Antimony	mg/Kg	ND	21	10.5	U	25.0	0.4
SW-Leach A-01	Arsenic	mg/Kg	ND	11	5.5	U	33	0.2
SW-Leach A-01	Barium	mg/Kg	110	11	110		60	**1.8**
SW-Leach A-01	Beryllium	mg/Kg	ND	4.2	2.1	U	NA	--
SW-Leach A-01	Cadmium	mg/Kg	ND	5.3	2.65	U	5.0	0.5
SW-Leach A-01	Chromium	mg/Kg	19	11	19		111	0.2
SW-Leach A-01	Cobalt	mg/Kg	ND	11	5.5	U	50	0.1
SW-Leach A-01	Copper	mg/Kg	26	11	26		149	0.2
SW-Leach A-01	Iron	mg/Kg	72000	21	72000		40000	**1.8**
SW-Leach A-01	Lead	mg/Kg	ND	11	5.5	U	128	0.0
SW-Leach A-01	Manganese	mg/Kg	930	11	930		1100	0.8
SW-Leach A-01	Mercury[a]	mg/Kg	--	--	--		1.1	--
SW-Leach A-01	Nickel	mg/Kg	16	11	16		48.4	0.3
SW-Leach A-01	Selenium	mg/Kg	ND	21	10.5	U	20	0.5
SW-Leach A-01	Silver	mg/Kg	ND	5.3	2.65	U	2.2	**1.2**
SW-Leach A-01	Thallium	mg/Kg	ND	21	10.5	U	NA	--
SW-Leach A-01	Vanadium	mg/Kg	39	11	39		27.3	**1.4**
SW-Leach A-01	Zinc	mg/Kg	70	11	70		459	0.2
SW-Leach A-01	BEHP	mg/Kg	59	1.66	59		890	0.1
							"total risk"	**10.0**

[a] mercury was not analyzed in the sediment samples collected in October 2016

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value

Appendix 3 (cont'd): October 2016 sediment analytical data from the Troy Mills Landfill Superfund site								
Sample location	**Analytes**	**Units**	**Results**	**MDL**	**Exposure**		**RSV**	**HQ**
SW-Leach A-02	Aluminum	mg/Kg	12000	11	12000		58000	0.2
SW-Leach A-02	Antimony	mg/Kg	ND	4.0	2.0	U	25.0	0.1
SW-Leach A-02	Arsenic	mg/Kg	4.4	2.0	4.4		33	0.1
SW-Leach A-02	Barium	mg/Kg	70	2.0	70		60	**1.2**
SW-Leach A-02	Beryllium	mg/Kg	ND	0.8	0.4	U	NA	--
SW-Leach A-02	Cadmium	mg/Kg	ND	1.0	0.5	U	5.0	0.1
SW-Leach A-02	Chromium	mg/Kg	13	2.0	13		111	0.1
SW-Leach A-02	Cobalt	mg/Kg	53	2.0	53		50	**1.1**
SW-Leach A-02	Copper	mg/Kg	15	2.0	15		149	0.1
SW-Leach A-02	Iron	mg/Kg	26000	4.0	26000		40000	0.7
SW-Leach A-02	Lead	mg/Kg	18	2.0	18		128	0.1
SW-Leach A-02	Manganese	mg/Kg	1200	2.0	1200		1100	**1.1**
SW-Leach A-02	Mercury[a]	mg/Kg	--	--	--		1.1	--
SW-Leach A-02	Nickel	mg/Kg	12	2.0	12		48.4	0.2
SW-Leach A-02	Selenium	mg/Kg	ND	4.0	2.0	U	20	0.1
SW-Leach A-02	Silver	mg/Kg	ND	1.0	0.5	U	2.2	0.2
SW-Leach A-02	Thallium	mg/Kg	ND	4.0	2.0	U	NA	--
SW-Leach A-02	Vanadium	mg/Kg	25	2.0	25		27.3	0.9
SW-Leach A-02	Zinc	mg/Kg	51	2.0	51		459	0.1
SW-Leach A-02	BEHP	mg/Kg	1.1	0.205	1.1		890	0.0
							"total risk"	**6.4**

[a] mercury was not analyzed in the sediment samples collected in October 2016

BEHP = bis(2-ethylhexyl)phthalate; FW = forested wetland; HQ = hazard quotient; MDL = method detection limit; ND = not detected; RB = Rockwood Brook; RSV = refinement screening value