Forest Glen Subdivision Superfund Site

Data Report for East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study

Niagara Falls, New York

Prepared for the

National Oceanic and Atmospheric Administration

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Prepared by

RIDOLFI Inc.

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LIST OF ABBREVIATIONS AND INITIALIZATIONS

ARI	Analytical Resources, Inc.
Axys	Axys Analytical Services, Ltd.
COC	contaminant of concern
DDT	dichlorodiphenyltrichloroethane
dioxins/furans	polychlorinated dibenzo-p-dioxins and dibenzofurans
dYCT	digested yeast, Cerophyl®, and trout chow
EVS	EVS Environment Consultants Limited
Forest Glen site	Forest Glen Subdivision Superfund site
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
µg/kg	micrograms per kilogram (parts per billion)
mg/kg	milligrams per kilogram (parts per million)
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pg/g	picograms per gram (parts per billion)
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
Ridolfi	RIDOLFI Inc.
SVOC	semivolatile organic compound
TAL	Target Analyte List
TEQ	toxicity equivalency
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

This report describes a screening-level characterization of contamination in sediment in East Gill Creek, Gill Creek, and Hyde Park Lake downstream of the Forest Glen Subdivision Superfund site (Forest Glen) in Niagara, New York. The field investigation conducted in September 2005 followed the approved Field Sampling Plan (Ridolfi, 2005a) and included sampling of sediment for chemical contaminant, toxicity, and bioaccumulation analyses. The sampling event was conducted by employees of the National Oceanic and Atmospheric Administration (NOAA), RS Information Services, Inc., and RIDOLFI Inc. (Ridolfi).

This section describes the Forest Glen site and the purpose of this supplemental characterization study.

1.1 Site Description and Background

The Forest Glen site is located in the City of Niagara Falls, New York, and the Town of Niagara, New York (Figure 1). The site is approximately 39 acres in area, including an 11-acre former mobile home subdivision. Prior to its development, the site was primarily a wooded wetland. From the 1950s through the 1970s, industrial waste was disposed of at the site without regulation. In the 1960s, the land was cleared. In the 1970s, low-lying areas were filled and the mobile home subdivision was developed.

In 1980, the Niagara County Health Department discovered that, as a result of the unregulated waste disposal prior to the residential development, soil at the site was contaminated with a phenolic resin (USEPA 1999). During other initial site investigations, polycyclic aromatic hydrocarbons (PAHs) and other semivolatile organic compounds (SVOCs) were detected at the site (USEPA 1999). As a result of these investigations, New York State Department of Environmental Conservation (NYDEC) requested that the U.S. Environmental Protection Agency (USEPA) include the site on the National Priorities List (NPL). The Forest Glen site was subsequently placed on the NPL on November 21, 1989.

Four potentially responsible parties were involved in environmental investigations, studies, and remedial actions at the site: Goodyear Tire and Rubber Company (Goodyear), Niagara Falls

USA Camp Site, Inc., and two individuals. Between 1990 and 1992, the residential community at the site was closed and 153 people were permanently relocated. In 2001, Goodyear reached a settlement with the USEPA and the natural resource trustees (trustees) to resolve liability at the Forest Glen site in exchange for site remediation, restoration of injured resources, and associated past costs. Remediation of soil and groundwater has since been conducted at the site. In 2004, contaminated soil was excavated, consolidated at the site, and capped with an engineered cover. Groundwater remediation consists of a long-term pump and treat system that was installed in the capped area. The site has been redeveloped as a commercial facility (USEPA 2005).

As a condition of the settlement with Goodyear, NOAA, one of the trustees, received funds for additional characterization of the area downstream of the Forest Glen site.

1.2 Purpose and Objectives of the Characterization Study

The purpose of this characterization study was to determine whether hazardous substances from the Forest Glen site have migrated downstream of the site and, if so, whether they pose risks to ecological receptors. This was accomplished by collecting sediment samples from East Gill Creek, Gill Creek, and Hyde Park Lake and submitting them for laboratory analysis for contaminants of concern (COCs), as well as for bioassay testing for toxicity and bioaccumulation tests. East Gill Creek is the creek nearest the site and is the sample area most likely to be impacted by contamination at the site. Gill Creek is approximately 0.5 km (0.3 mi) west of the site and is not as likely to be impacted by the site. Both Gill Creek and East Gill Creek drain into Hyde Park Lake; contamination in Hyde Park Lake may have come from either of the creeks or from other non-site related sources around the perimeter of the lake.

Chemical analyses of the samples collected from East Gill Creek and Hyde Park Lake addressed the potential for contaminant migration and retention in sediment downstream of the Forest Glen site. The Gill Creek samples are meant to represent ambient conditions in the area outside of the influence of the site and were therefore designated in the field as reference or background samples. The reference samples are meant to provide an indication of other potential sources of contaminants to Hyde Park Lake. The sample locations, COCs, and field sampling methods are

described in Sections 2.1, 2.2, and 2.3, respectively. The physical (i.e., conventional) and chemical analytical results are discussed in Sections 3.2 and 3.3.

Laboratory bioassay toxicity and bioaccumulation testing were also conducted to provide information on the potential toxicity of contaminant mixtures in the sediment and to evaluate the potential for bioavailable contaminants to accumulate in benthic invertebrates. Sections 2.5 and 2.6 describe the test procedures used in the bioassay testing for toxicity and bioaccumulation tests. Sections 3.4 and 3.5 provide the bioassay and bioaccumulation test results.

2.0 STUDY DESCRIPTION AND METHODS

This section describes sample locations, the methods used to collect and process the samples, and the sample analyses.

2.1 Sample Locations

During the rainy season, East Gill Creek flows through the Forest Glen site before entering a culvert to flow under railroad tracks that serve as the site boundary (Figure 1). Sediment samples were collected downstream of the site in East Gill Creek from six locations, specifically, HP-09, and EG-01 through EG-05. Sampling order followed the reverse of the expected contaminant gradient; therefore, the farthest downstream sample was collected first. A sheen was present on the water surface at sample location EG-03, which was adjacent to the road. Upstream of EG-03, East Gill Creek was dry and a section was lined with concrete. Sample EG-04 was collected approximately 100 ft upstream of the location proposed in the Field Sampling Plan, because the concrete lined section of the creek could not be sampled (Ridolfi 2005a). At sample locations EG-04 and EG-05, water was not present in the creek and the creek channel was filled with cattails and reeds. Samples EG-04 and EG-05 were collected from non-vegetated areas of the creek channel where the ground was wet. The Field Sampling Plan also called for sampling at location EG-06, which was northeast of sample EG-05; however, a sample was not collected at this location because East Gill Creek was dry and a distinct creek channel could not be identified. The water depth in East Gill Creek ranged from 7 feet near Hyde Park Lake to a dry channel at the sample station nearest the Forest Glen site.

Sediment samples were collected in Hyde Park Lake from eight locations, specifically, HP-01 through HP-08. The location of sample HP-09, which was designated in the Field Sampling Plan to be collected from Hyde Park Lake, was relocated to further characterize the depositional areas in East Gill Creek.

Sediment samples were collected in Gill Creek from three locations, specifically, GC-01 through GC-03. The water depth in Gill Creek ranged from 6 feet near Hyde Park Lake to 1 foot in the middle section of the creek.

Samples were collected from Gill Creek to represent reference or background conditions, i.e., the area not impacted by the site. These samples were collected to provide information regarding other possible sources of contamination to Hyde Park Lake.

Sample locations in East Gill Creek, Gill Creek, and Hyde Park are shown on Figure 1. Horizontal coordinates and other descriptive sample information are summarized in Table 1.

2.2 Contaminants of Concern

Previous investigations indicated that soils at the Forest Glen site had been contaminated with PAHs and other SVOCs. As the site had previously been used for unregulated waste disposal, sampling and analyses for this characterization study were expanded to include metals, pesticides, polychlorinated biphenyls (PCBs), PAHs, and polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) as contaminants of concern (COCs).

2.3 Summary of Field Methods

2.3.1 Sample Collection

Sediment samples were collected from 17 stations: eight in Hyde Park Lake, six in East Gill Creek, and three in Gill Creek. All samples from Hyde Park Lake (HP-01 through HP-08) and three samples taken near the creeks' confluence with Hyde Park Lake (HP-09 and EG-01 from East Gill Creek and GC-01 from Gill Creek) were collected from a flat-bottomed aluminum rowboat. Samples from the upper sections of East Gill Creek (EG-02 through EG-05) and Gill Creek (GC-02 and GC-03) were collected by wading into the water. Field duplicate samples were collected at sample locations EG-02 and EG-03 and are identified as EG-09 (duplicate of EG-03) and EG-10 (duplicate of EG-02).

The field crew collected the sediment samples according to the procedures outlined in the Field Sampling Plan (Ridolfi 2005a). Samples HP-01 through HP-09, EG-01, and GC-01 were collected from the rowboat using a "petite Ponar", which is capable of reaching a penetration depth of approximately 4 inches. Duplicate grab samples were collected as close as possible to the location of the initial sample so that the necessary sample volume could be obtained.

Samples EG-02 through EG-05, GC-02, and GC-03 were collected by wading into the water and using a stainless steel spoon or a disposable polyethylene scoop to obtain the sample.

For all sampling methods, all retained sediment was placed directly into a stainless steel container and homogenized using a stainless steel spoon. Aliquots of sediment were then transferred to the appropriate pre-cleaned and pre-labeled sample containers. Non-disposable sampling equipment was decontaminated between each sample location according to the procedures described in the Field Sampling Plan (Ridolfi, 2005a).

2.3.2 Field Data

Weather conditions and general conditions of the streams, including estimated width, depth, and flow, bottom characteristics, and surrounding habitat, were noted for each sample location on field data sheets. Horizontal coordinates of the sample stations were collected using a global positioning system unit; for backup, the coordinates also were recorded on the field data sheets. Field data sheets are included in Appendix A. Digital photographs were taken of each sample location. Selected photographs are provided in Appendix B.

2.4 Sediment Chemical Analyses

Chemical analyses for the following COCs were performed on the sediment samples by Analytical Resources, Inc. (ARI) of Seattle, Washington:

- USEPA Target Analyte List (TAL) metals;
- PAHs;
- Organochlorine pesticides; and
- PCBs (as Aroclors).

In addition, the following conventional parameters were also measured by ARI:

- Total organic carbon (TOC);
- Grain size; and
- Percent moisture.

Sediment sample analyses for dioxins/furans were performed by Axys Analytical Services, Ltd. (Axys) of Sidney, British Columbia.

The results of the physical and chemical analyses are summarized in Sections 3.1 and 3.2.

2.5 Bioassay Testing for Toxicity

Sediment bioassay testing for toxicity was performed by EVS Environment Consultants Limited (EVS) of North Vancouver, British Columbia, within approximately six weeks of the sample collection date. The toxicity testing was conducted using site sediments and the organisms *Hyalella azteca* and *Chironomus tentans*.

The 10-day *Chironomus tentans* and 28-day *Hyalella azteca* whole-sediment static renewal toxicity tests were performed on 10 randomly selected sediment samples. Figure 1 and Table 1 indicate which samples were subjected to toxicity testing. Each of the 10 samples was tested using nine replicates (eight for toxicity and one for water quality). The endpoints for the toxicity tests were growth and survival. The 10-day *Chironomus tentans* toxicity tests were conducted according to the USEPA 100.2 protocol (USEPA 2000). Because a standard USEPA protocol was not available for the 28-day *Hyalella azteca* toxicity tests, the tests were conducted according to a modified USEPA 100.4 protocol used for 42-day *Hyalella azteca* toxicity tests (USEPA 2000). Modifications to the USEPA 100.4 protocol are described below:

- Overlying water was renewed three times during the test rather than twice daily.
- Aeration was provided throughout the test.
- The test was terminated at 28 days rather than at 42 days.

- Reproduction was not assessed.
- The feeding regime was 1.5 mL of digested yeast, Cerophyl®, and trout chow (dYCT) per day instead of 1 mL of dYCT per day.

The negative control sediment was a 50:50 mix of silica sand (grit 30) and sediment from Yaquina Bay, Oregon, which has been used for toxicity tests using the marine invertebrate *Eohaustorius estuarius*, rather than 100 percent silica sand. The sediment was washed until the salinity was completely removed and was sieved to less than 500 µm.

Results of the toxicity tests are summarized in Section 3.3.

2.6 Bioaccumulation Tests

Bioaccumulation tests were performed by EVS according to USEPA 100.3 protocols (USEPA 2000) using site sediments and the freshwater oligochaete *Lumbriculus variegatus* to assess the bioaccumulation of contaminants in site sediments in a laboratory setting. Laboratory bioaccumulation tests using *Lumbriculus variegatus* can be extrapolated to the field with a reasonable degree of certainty for dichlorodiphenyltrichloroethane (DDT), PAHs, PCBs, and dioxins/furans (Oliver 1987; Ankley et al. 1992; Brunson et al. 1998; Lyytikainen et al. 2003; Ingersoll et al. 2003).

Figure 1 and Table 1 indicate which samples were subjected to bioaccumulation testing. Prior to initiating the bioaccumulation test, a four-day toxicity test was performed on the samples. This toxicity test was conducted to confirm that the sediment samples did not cause more than 50 percent mortality of the test organisms. The organisms were then exposed to the test sediments for 28 days in a static-renewal system. Each sample was tested using four replicates.

After 28 days, the organisms were recovered from the sediment, frozen, and shipped to ARI for chemical analyses. Results of the bioaccumulation tests are summarized in Section 3.4.

2.7 Quality Control Summary

The quality of the chemical data was evaluated both by the laboratory and independently, as specified in the approved Quality Assurance Project Plan (QAPP) (Ridolfi 2005b). The independent validation of laboratory data packages was performed by Validata, LLC, of Seattle, Washington. The chemistry and bioassay data validation reports are included as Appendix C.

Laboratory chemistry results were either accepted as received from the laboratory (i.e., unqualified) or were qualified. No chemistry results were rejected. Unqualified results are considered valid with respect to the specified procedures and quality assurance/quality control (QA/QC) measures and may be used as intended. Results qualified with a UJ flag or J flag are considered usable with the understanding that the values are qualified as estimates. The chemistry data validation report (Appendix C) defines the data qualifiers.

The principal measures associated with chemical data quality are precision, accuracy, representativeness, completeness, and comparability. An evaluation of each of these measures determined that overall analytical performance and data quality are acceptable.

The quality of the bioassay and bioaccumulation test data was evaluated by the laboratory, as specified in the QAPP. The laboratory QA/QC analyses are included in the bioassay and bioaccumulation laboratory reports in Appendix D. The 10-day *Chironomus tentans* bioassay test for toxicity met all criteria for test validity described in the USEPA (2000) methods. The laboratory control for the 28-day *Hyalella azteca* bioassay test for toxicity did not meet the test validity criterion of 80 percent survival; the results are therefore considered invalid and are not summarized in this report or used in the characterization study. The 28-day *Lumbriculus variegatus* bioaccumulation test met all criteria for test validity outlined in the USEPA (2000) methods.

3.0 RESULTS

Seventeen primary and two field duplicate sediment samples were collected from East Gill Creek (samples EG-01 through EG-05, HP-09, and duplicates EG-09 and EG-10), Gill Creek (samples GC-01 through GC-03), and Hyde Park Lake (samples HP-01 through HP-08) and analyzed for the COCs. The 10-day *Chironomus tentans* and 28-day *Hyalella azteca* bioassay tests for toxicity were performed on 10 of the samples, and the 28-day *Lumbriculus variegates* bioaccumulation test was performed on three of the samples. The sediment chemistry results, the toxicity test results, and the bioaccumulation test results are summarized below. In this discussion, the sediment chemistry results are compared to freshwater sediment screening guidelines compiled from a variety of sources and considered to be conservatively protective of aquatic life. The screening guidelines and the sources of the guidelines are provided in Table 2. Summary statistics for the sediment chemistry data are presented in Table 3. The sediment chemistry results are reported on a dry weight basis and the bioaccumulation results are reported on a wet weight basis.

3.1 Screening Guidelines

Sediment quality guidelines from several different sources were used to screen the analytical data from this study as no comprehensive list of effects guidelines has been developed for all potential contaminants of concern. Both a low guideline and a high guideline were selected when available. The consensus-based threshold effect concentrations (TECs) and probable effect concentrations (PECs) for freshwater ecosystems (MacDonald et al., 2000a) served as the primary sediment quality guidelines for screening the contaminants sampled at the Forest Glen site. The TEC values identify concentrations below which adverse effects on sediment-dwelling organisms are not expected to occur. The PEC values identify concentrations above which adverse effects on sediment-dwelling organisms are likely. Sediment quality guideline values were selected from other sources where no freshwater consensus values were available for the contaminant being evaluated. As the various guideline values selected for use in this screening were developed using differing methodologies and differing definitions regarding “low” and “high” effects values, consideration should be given to these differences when evaluating the

Site data. Table 2 lists the sediment quality guideline values and sources selected for evaluating each contaminant sampled under this investigation.

3.2 Physical Characteristics

Results of the conventional analyses (TOC, grain size, moisture content, and total solids) are presented in Table 4 and summarized briefly below.

East Gill Creek sediment samples EG-01, EG-03, EG-04, EG-05, and HP-09 were composed mostly of silt and clay, with a small percentage of sand. Sample EG-02 contained approximately 50 percent sand, 35 percent fine material (silt and clay), and 12 percent gravel. The TOC content of the East Gill Creek samples ranged from 1.24 percent (EG-01) to 4.46 percent (EG-04).

Gill Creek sediment samples GC-01 and GC-02 were mostly clay and silt, with a small amount of sand. Sample GC-03 was composed mostly of sand, with approximately 20 percent clay and silt and less than 10 percent gravel. The TOC content of the Gill Creek samples ranged from 2.96 percent (GC-01) to 4.51 percent (GC-03).

All of the samples collected from Hyde Park Lake were composed of mostly clay and silt. The TOC content of the eight Hyde Park Lake samples ranged from 1.51 percent (HP-06) to 2.31 percent (HP-05).

3.3 Sediment Chemistry Results

3.3.1 Dioxins/Furans

Seventeen primary sediment samples and two field duplicate samples were analyzed for dioxins/furans. The dioxin/furan chemistry results are summarized in Table 5. Except for 1,2,3,7,8,9-HXCDF, all of the dioxin/furan congeners were detected at concentrations above the method reporting limit in all of the samples. The congener 1,2,3,7,8,9-HXCDF was detected in 15 of the 17 primary samples. The analytical laboratory calculated the toxicity equivalency (TEQ) value of the mixture of dioxins/furans that were detected in each sample. The TEQs exceeded the screening guideline in all of the samples. The maximum TEQ, which was in EG-

04 from East Gill Creek, was at a concentration that exceeded the screening guideline by more than one order of magnitude. Samples from Gill Creek and Hyde Park Lake also had TEQs that exceeded the screening guideline by more than one order of magnitude. Although the maximum TEQ was identified in a sample from East Gill Creek, exceedances of the screening guideline in Gill Creek samples indicate there may be an ambient level of dioxin contamination in the area. The Forest Glen site was not suspected to be a source of dioxins during the remedial investigation.

3.3.2 Pesticides

Seventeen primary sediment samples and two field duplicate samples were analyzed for 21 pesticides. The pesticide chemistry results are summarized in Table 6. Beta-BHC, the only detected pesticide compound, was detected in primary samples EG-02, EG-03, EG-04, and EG-05 from East Gill Creek. The maximum concentration of beta-BHC, which was detected in sample EG-05, exceeded the low guideline by a factor of two. None of the detected pesticide concentrations exceeded the high guidelines.

3.3.3 Polychlorinated Biphenyls

Seventeen primary sediment samples and two field duplicate samples were analyzed for PCBs as Aroclors. The PCB chemistry results are summarized in Table 7. PCBs were detected and reported as various Aroclors. Concentrations in East Gill Creek and Gill Creek samples were similar, possibly indicating multiple sources of PCBs, differential weathering, or both.

Total PCB concentrations did not exceed the guidelines in any of the samples. Aroclors 1254 and 1260 were the only Aroclors reported in the sediment samples. PCBs were reported as Aroclor 1254 in all of the samples.

3.3.4 Polycyclic Aromatic Hydrocarbons

Seventeen primary sediment samples and two field duplicate samples were analyzed for PAHs. The PAH chemistry results are summarized in Table 8. Pyrene was detected at concentrations greater than the low guideline in all of the samples except for EG-02. Benzo(a)anthracene, benzo(a)pyrene, and chrysene were detected in all of the samples except EG-02 and GC-03 at

concentrations in excess of the low guideline. Acenaphthene and acenaphthylene were detected in 14 of the primary samples at concentrations greater than the low guideline.

The maximum concentrations of the LPAHs 2-methlynaphthalene, acenaphthene, anthracene, fluorene, and phenanthrene were detected in both the primary sample and the field duplicate sample collected at sample location EG-03 in East Gill Creek. The concentration of acenaphthene at sample location EG-03 exceeded the low guideline by at least one order of magnitude. Fluorene was detected in sample EG-03 and the associated field duplicate at a concentration seven times greater than the low guideline and slightly greater than the high guideline. The concentrations of 2-methylnaphthalene, anthracene, and phenanthrene detected in EG-03 exceeded the low screening guidelines by more than a factor of two. The association of the sheen on the water and/or the proximity to the road may be related to the higher concentrations of certain PAHs observed at this location. The maximum concentration of acenaphthylene, which was detected in sample EG-05, exceeded the low screening guideline by a factor of 5.5. Maximum concentrations of dibenzofuran and fluorene in samples from East Gill Creek were more than an order of magnitude greater than the maximum concentrations detected in samples from Gill Creek and Hyde Park Lake.

Total LPAHs exceeded the low guideline in all samples except for EG-02. The maximum total LPAH concentration was detected in sample EG-03 at one order of magnitude greater than the low guideline.

The maximum concentrations of the HPAHs, except for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene, were detected in samples GC-01 or GC-02 from Gill Creek and exceeded the low guideline by a factor of between two and seven. In general, the maximum concentrations of HPAHs detected in Gill Creek samples were approximately twice the maximum concentrations detected in East Gill Creek and Hyde Park Lake samples.

The maximum concentrations of benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were detected in sample HP-01 from Hyde Park Lake. The maximum concentration of indeno(1,2,3-cd)pyrene slightly exceeded the low screening guideline. No screening guideline is available for comparison to the maximum concentration of benzo(g,h,i)perylene.

Total HPAH concentrations were greater than the low guideline in all of the samples. The maximum total HPAH concentration was detected in sample GC-02 at one order of magnitude greater than the low guideline.

3.3.5 Trace Elements

Seventeen primary sediment samples and two field duplicate samples were analyzed for 23 trace elements on the USEPA's TAL. The results of the trace element analyses are presented in Table 9. Cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc were all detected at concentrations in excess of at least the low screening guidelines.

Zinc was detected in all of the samples at concentrations greater than the low guideline. Zinc concentrations in EG-04, EG-05, GC-01, GC-02, and HP-08 also exceeded the high guideline. The maximum zinc concentration, which was detected at sample station GC-01, exceeded the low guideline by a factor of five. Samples EG-04 and GC-02 had similar concentrations of zinc.

Lead and mercury were detected at concentrations in excess of the low screening guidelines in 16 of the 17 primary sediment samples. The maximum lead concentration, which was detected in East Gill Creek sample EG-04, exceeded the low guideline by a factor of three; the concentration of lead in sample EG-03 was similar. The maximum concentration of mercury, which was detected in sample HP-07 from Hyde Park Lake, exceeded the low guideline by a factor of 5.5. Concentrations of mercury in samples from East Gill Creek exceeded the low guideline by factors of as much as three.

Nickel was detected in 14 of the 17 primary samples at concentrations in excess of the low guideline. The maximum concentrations of nickel were detected in Hyde Park Lake sample HP-02 and in East Gill Creek sample EG-04, both at concentrations that exceeded the low guideline by almost a factor of two.

Manganese was detected in 13 of the 17 primary samples at concentrations greater than the low guideline. Manganese concentrations in EG-04 and GC-03 also exceeded the high guideline. The maximum manganese concentration, which was detected in EG-04, exceeded the low guideline by approximately a factor of three and slightly exceeded the high guideline.

Copper was detected above the low screening guideline in 11 of the primary samples. The maximum concentration of copper, which was detected in sample EG-04 from East Gill Creek, slightly exceeded the low guideline. Copper concentrations in samples from Gill Creek and Hyde Park Lake also slightly exceeded the low guideline.

Chromium was detected at concentrations in excess of the low guideline in 8 of the 17 primary sediment samples. The greatest chromium concentrations, which were detected in samples EG-04 and EG-05 from East Gill Creek, were three times greater than the low guideline and slightly greater than the high guideline. The maximum concentration of chromium in Hyde Park Lake sediment samples slightly exceeded the low guideline.

3.4 Bioassay Testing for Toxicity Results

3.4.1 10-Day *Chironomus tentans* Toxicity Test

The results of the 10-day *Chironomus tentans* toxicity tests are summarized in Table 10. The laboratory report for the 10-day *Chironomus tentans* toxicity tests is included in Appendix D.

Samples EG-01 and EG-03 from East Gill Creek exhibited percent survivals that were lower than and statistically different from the laboratory control, indicating potential toxicity. Sample EG-03 had a statistically different average individual dry weight and ash-free dry weight than the laboratory control. None of the other sediment samples subjected to this test exhibited survival or growth results that were statistically different from the laboratory control.

3.4.2 28-Day *Hyalella azteca* Toxicity Test

The 28-day *Hyalella azteca* toxicity test was considered invalid because the laboratory control sample did not meet the test validity criteria of 80 percent survival. Therefore, the test results were not finalized, are not included in this report, and were not used in the characterization study.

3.5 Bioaccumulation Test Results

Bioaccumulation tests were performed with the test organism *Lumbriculus variegatus* on sediment collected at sample stations HP-03, EG-05, and GC-01 and on a laboratory control sediment sample. The laboratory exposure report for the bioaccumulation tests is included in Appendix D. The organisms remaining in the test tanks after 28 days were frozen and sent to ARI for chemical analysis. Based on a review of the previously completed sediment chemistry results and in light of the limited organism sample mass, the samples were analyzed for PAHs only.

The tissue chemistry results are summarized in Table 11. The PAHs benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, and fluoranthene were detected in tissue samples associated with sediments from all three of the locations tested, while indeno(1,2,3-cd)pyrene, benzo(a)anthracene, and pyrene were detected in tissue samples associated with sediments from one or two of the locations. PAHs were not detected above the method reporting limit in the tissue samples from organisms exposed to the laboratory control sediment.

Table 11 also compares individual PAH concentrations in tissue to individual PAH concentrations in sediment to derive a ratio of tissue-to-sediment concentration for each detected PAH in each test sample. These ratios ranged from 0.024 to 0.15. A lower ratio may indicate that the particular PAH is less bioavailable. PAH concentrations in the tissues and the ratios of tissue-to-sediment concentration did not differ substantially among the tested locations.

4.0 CONCLUSIONS

Sediment samples were collected from depositional areas of East Gill Creek, Gill Creek, and Hyde Park Lake and analyzed for a wide range of constituents to determine whether contamination from the Forest Glen site has migrated into downstream sediment. The observed concentrations of PAHs, PCBs, pesticides, trace elements, and dioxins/furans in the sediment samples were compared to sediment screening guidelines. Bioassay testing for toxicity and a bioaccumulation test were conducted on several of the samples to provide preliminary information regarding the toxicity and bioavailability to aquatic life of possible contamination in sediment from East Gill Creek, Gill Creek, and Hyde Park Lake.

All of the PAHs, PCB Aroclors 1254 and 1260, dioxins/furans, and several trace elements were detected above screening guidelines in sediment from all three of the sampling areas. However, the observed concentrations of these substances in the sediments did not exhibit a distinct pattern of contamination that could be associated with releases from the Forest Glen site. As all locations, including the reference stations, are similarly contaminated, there is no conclusive evidence that the contaminants present are associated with the Forest Glen site.

While the 10-day *Chironomus tentans* toxicity tests indicated that sediments from sample locations EG-01 and EG-03 are toxic, none of the substances measured in the sediments was clearly associated with that toxicity.

Similarly, the bioaccumulation test indicates that PAHs in the sediments are bioavailable to benthic organisms, but the tissue concentrations are similar among all locations and are not clearly associated with releases from the site.

5.0 REFERENCES

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TABLES

Table 1. Sample Identification, Description, Coordinates, and Analyses Performed

Sampling Area	Coordinates		Sample Identification	Water Depth (ft)	Comments	Date Collected	Time Collected	Analyses Performed		
	Latitude North (Dec. Deg.)	Longitude West (Dec. Deg.)						Sediment Chemistry[a]	Toxicity[b]	Bioaccumulation[c]
Hyde Park Lake	43.09604	-79.02334	HP-01	8		9/12/2005	15:53	X	X	
	43.09710	-79.02303	HP-02	7		9/12/2005	16:37	X		
	43.09901	-79.02493	HP-03	6		9/12/2005	17:11	X	X	X
	43.09982	-79.02321	HP-04	7		9/12/2005	18:05	X	X	
	43.10066	-79.02206	HP-05	6		9/13/2005	9:40	X		
	43.10155	-79.02237	HP-06	7		9/13/2005	10:10	X		
	43.10294	-79.02261	HP-07	6		9/13/2005	10:26	X		
	43.10284	-79.02090	HP-08	7		9/13/2005	10:52	X	X	
East Gill Creek	43.10533	-79.01958	EG-01	6	Organic material present throughout sample (leaf litter, branches)	9/13/2005	12:12	X	X	
	43.10633	-79.01781	EG-02	1		9/14/2005	13:30	X		
	43.10689	-79.01546	EG-03	1	Organic sheen on water surface. Sample was collected adjacent to a road	9/14/2005	13:10	X	X	
	43.10890	-79.01052	EG-04	0	Stream channel was dry and had cattails and reeds growing in it	9/14/2005	14:00	X	X	
	43.10944	-79.00890	EG-05	0	Stream channel was dry and had cattails and reeds growing in it	9/14/2005	10:30	X	X	X
	43.10689	-79.01546	EG-09	1	Field split sample of EG-03	9/14/2005	17:55	X		
	43.10633	-79.01781	EG-10	1	Field split sample of EG-02	9/14/2005	18:30	X		
	43.10403	-79.02010	HP-09	7		9/13/2005	11:50	X		
Gill Creek	43.10517	-79.02265	GC-01[d]	6	Organic material present throughout sample (leaf litter, branches)	9/13/2005	12:52	X	X	X
	43.10980	-79.01746	GC-02[d]	1-2	Organic material present throughout sample (leaf litter, branches)	9/14/2005	9:00	X		
	43.11306	-79.01186	GC-03[d]	2-3		9/14/2005	9:30	X	X	
NA	NA	NA	RI-01	NA	Rinsate	9/13/2005	11:23	X		
NA	NA	NA	RI-02	NA	Rinsate	9/14/2005	13:30	X		

NOTES:

[a] Chemistry analyses include trace elements, pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and dioxins/furans

[b] Toxicity tests performed include a 10-day *Chironomus tentans* and a 28-day *Hyalella azteca*

[c] Bioaccumulation test performed was a 28-day *Lumbriculus variegatus*

[d] Reference sample location

NA: not applicable

Table 2. Sediment Screening Guidelines

Analyte	Screening Guidelines		
	Low Guideline	**Medium Guideline**	**High Guideline**
Dioxins/Furans (pg/g)			
2,3,7,8-TCDD	--	--	--
1,2,3,7,8-PECDD	--	--	--
1,2,3,4,7,8-HXCDD	--	--	--
1,2,3,6,7,8-HXCDD	--	--	--
1,2,3,7,8,9-HXCDD	--	--	--
1,2,3,4,6,7,8-HPCDD	--	--	--
OCDD	--	--	--
2,3,7,8-TCDF	--	--	--
1,2,3,7,8-PECDF	--	--	--
2,3,4,7,8-PECDF	--	--	--
1,2,3,4,7,8-HXCDF	--	--	--
1,2,3,6,7,8-HXCDF	--	--	--
1,2,3,7,8,9-HXCDF	--	--	--
2,3,4,6,7,8-HXCDF	--	--	--
1,2,3,4,6,7,8-HPCDF	--	--	--
1,2,3,4,7,8,9-HPCDF	--	--	--
OCDF	--	--	--
TOTAL (TEQ ND=0)	0.85[a]	--	--
TOTAL (TEQ ND=1/2 MRL)	0.85[a]	--	--
Pesticides (ug/Kg)			
4,4'-DDD	4.88[b]	--	28[c]
4,4'-DDE	3.16[b]	--	31.3[c]
4,4'-DDT	4.16[b]	--	62.9[c]
Aldrin	2[d]	--	--
alpha Chlordane	--	--	--
alpha-BHC	6[d]	--	--
beta-BHC	5[d]	--	--
delta-BHC	--	--	--
Dieldrin	1.9[d]	--	61.8[c]
Endosulfan I	0.3[e]	--	--
Endosulfan II	0.3[e]	--	--
Endosulfan Sulfate	--	--	--
Endrin	2.22[b]	--	207[c]
Endrin Aldehyde	--	--	--
Endrin Ketone	--	--	--
gamma Chlordane	--	--	--
gamma-BHC (Lindane)	2.37[b]	--	4.99[c]
Heptachlor	0.60[a]	--	--
Heptachlor Epoxide	2.47[b]	--	16.0[c]
Methoxychlor	6[e]	--	--
Toxaphene	0.1[a]	--	--
Polychlorinated Biphenyls (ug/Kg)			
Aroclor 1016	--	--	--
Aroclor 1221	--	--	--
Aroclor 1232	--	--	--
Aroclor 1242	--	--	--
Aroclor 1248	--	--	--
Aroclor 1254	--	--	--
Aroclor 1260	--	--	--
Total PCBs	--	340[f]	1600[g]

Table 2. Sediment Screening Guidelines

Analyte	Screening Guidelines		
	Low Guideline	**Medium Guideline**	**High Guideline**
Polycyclic Aromatic Hydrocarbons (ug/Kg)			
High-Molecular-Weight PAHs (HPAHs)			
Benzo(a)anthracene	108[b]	--	1,050[c]
Benzo(a)pyrene	150[b]	--	1,450[c]
Benzo(b)fluoranthene	--	--	--
Benzo(g,h,i)perylene	170[d]	--	--
Benzo(k)fluoranthene	240[d]	--	--
Chrysene	166[b]	--	1,290[c]
Dibenz(a,h)anthracene	33[b]	--	--
Fluoranthene	423[b]	--	2,230[c]
Indeno(1,2,3-cd)pyrene	200[d]	--	--
Pyrene	195[b]	--	1,520[c]
Total HPAH (ND = 0)	192.95[h]	--	--
Total HPAH (ND = 1/2 MRL)	192.95[h]	--	--
Low-Molecular-Weight PAHs (LPAHs)			
2-Methylnaphthalene	20.2[a]	--	--
Acenaphthene	6.71[a]	--	--
Acenaphthylene	5.87[a]	--	--
Anthracene	57.2[b]	--	845[c]
Fluorene	77.4[b]	--	536[c]
Naphthalene	176[b]	--	561[c]
Phenanthrene	204[b]	--	1170[c]
Total LPAH (ND = 0)	76.42[h]	--	--
Total LPAH (ND = 1/2 MRL)	76.42[h]	--	--
Miscellaneous semi-volatile organic compounds (SVOCs)			
Dibenzofuran	--	--	--
Trace Elements (mg/Kg)			
Aluminum	--	--	--
Antimony	2.0[i]	--	25.0[j]
Arsenic	9.79[b]	--	33.0[c]
Barium	--	--	--
Beryllium	--	--	--
Cadmium	0.99[b]	--	4.98[c]
Calcium	--	--	--
Chromium	43.4[b]	--	111[c]
Cobalt	--	--	--
Copper	31.6[b]	--	149[c]
Iron	--	--	--
Lead	35.8[b]	--	128[c]
Magnesium	--	--	--
Manganese	460.0[i]	--	1,100[j]
Mercury	0.18[b]	--	1.06[c]
Nickel	22.7[b]	--	48.6[c]
Potassium	--	--	--
Selenium	--	--	--
Silver	1.0[i]	--	2.2[j]
Sodium	--	--	--
Thallium	--	--	--
Vanadium	--	--	--
Zinc	121[b]	--	459[c]

NOTES:

[a] Interim Sediment Quality Guideline (ISQG), expressed as toxicity equivalency (TEQ) units per WHO, 1998 toxicity equivalency factors (TEF) for fish (Canadian Council of Ministers of the Environment, 2003)
[b] Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000a)
[c] Consensus-based Probable Effect Concentration (PEC) (MacDonald et al., 2000a)
[d] Lowest Effect Level (LEL)(Ontario Ministry of the Environment, 1993)
[e] Benthic Aquatic Life Chronic Toxicity (assuming 1% TOC) (NYSDEC, 1999)
[f] Consensus-based midrange effect concentration (MEC) for freshwater ecosystems (MacDonald et al., 2000b)
[g] Consensus-based extreme effect concentration (EEC) for freshwater ecosystems (MacDonald et al., 2000b)
[h] Threshold Effects Limit (TEL) (USEPA, 1996)
[i] Lowest Effect Level (LEL) (NYSDEC, 1999)
[j] Severe Effect Level (SEL) (NYSDEC, 1999)

Table 3. Data Summary for the Forest Glen Sediment Samples

Analyte	# Detects (19 analyzed)	Range of Detected Concentrations	Station Location of Max Detect	Avg Detected Concentration	# Detections Exceeding Screening Guidelines[a]	Range of MRL for NonDetects
Dioxins/Furans (pg/g)						
2,3,7,8-TCDD	19	0.543-10	EG-04	2.5	--	-
1,2,3,7,8-PECDD	19	0.472-4.79	EG-04	2.25	--	-
1,2,3,4,7,8-HXCDD	19	0.587-6.81	EG-03	3.26	--	-
1,2,3,6,7,8-HXCDD	19	1.7-26.6	EG-04	9.66	--	-
1,2,3,7,8,9-HXCDD	19	1.56-19.5	EG-04	9	--	-
1,2,3,4,6,7,8-HPCDD	19	32.4-471	EG-09	180	--	-
OCDD	19	1410-10500	HP-09	5270	--	-
2,3,7,8-TCDF	19	0.895-36.1	HP-07	7.42	--	-
1,2,3,7,8-PECDF	19	0.665-14.4	HP-07	4.28	--	-
2,3,4,7,8-PECDF	19	0.717-13.9	HP-07	4.6	--	-
1,2,3,4,7,8-HXCDF	19	1.73-27.6	EG-04	11.3	--	-
1,2,3,6,7,8-HXCDF	19	0.905-14.1	EG-04	5.34	--	-
1,2,3,7,8,9-HXCDF	16	0.416-1.74	EG-05	0.42	--	0.16-0.54
2,3,4,6,7,8-HXCDF	19	0.633-9.01	EG-04	3.3	--	-
1,2,3,4,6,7,8-HPCDF	19	8.97-164	EG-04	55.9	--	-
1,2,3,4,7,8,9-HPCDF	19	0.893-24.1	EG-03	7	--	-
OCDF	19	25-617	EG-09	166	--	-
TOTAL (TEQ ND=0)	19	2.84-36.4	EG-04	15.2	19	-
TOTAL (TEQ ND=1/2 MRL)	19	2.84-36.4	EG-04	15.2	19	-
Pesticides (ug/Kg)						
4,4'-DDD	0	---	---	---	0	1.9-13
4,4'-DDE	0	---	---	---	0	1.9-5.2
4,4'-DDT	0	---	---	---	0	1.9-5.2
Aldrin	0	---	---	---	0	0.97-2.6
alpha Chlordane	0	---	---	---	--	0.97-2.6
alpha-BHC	0	---	---	---	0	0.97-3.6
beta-BHC	6	2.9-12	EG-05	4.67	6	0.98-2.6
delta-BHC	0	---	---	---	--	0.97-3
Dieldrin	0	---	---	---	0	1.9-5.2
Endosulfan I	0	---	---	---	0	0.97-2.6
Endosulfan II	0	---	---	---	0	1.9-5.2
Endosulfan Sulfate	0	---	---	---	--	1.9-5.2
Endrin	0	---	---	---	0	1.9-5.2
Endrin Aldehyde	0	---	---	---	--	1.9-5.2
Endrin Ketone	0	---	---	---	--	1.9-5.2
gamma Chlordane	0	---	---	---	--	0.97-2.6
gamma-BHC (Lindane)	0	---	---	---	0	0.97-2.6
Heptachlor	0	---	---	---	0	0.97-2.6
Heptachlor Epoxide	0	---	---	---	0	0.97-2.6
Methoxychlor	0	---	---	---	0	9.7-26
Toxaphene	0	---	---	---	0	97-260
Polychlorinated Biphenyls (ug/Kg)						
Aroclor 1016	0	---	---	---	--	7.8-210
Aroclor 1221	0	---	---	---	--	7.8-210
Aroclor 1232	0	---	---	---	--	7.8-210
Aroclor 1242	0	---	---	---	--	7.8-210
Aroclor 1248	0	---	---	---	---	7.8-210
Aroclor 1254	19	7.7-260	HP-02	33	1	-
Aroclor 1260	14	5.9-39	EG-04	16.5	0	7.8-210
Polycyclic Aromatic Hydrocarbons (ug/Kg)						
2-Methylnaphthalene	18	11-68	EG-09	21.3	6	20-20
Acenaphthene	16	6.6-150	EG-03	31	15	6.4-20
Acenaphthylene	15	8.3-33	EG-05	19.8	15	6.5-34
Anthracene	18	15-120	EG-03	41	4	6.5-6.5
Benzo(a)anthracene	19	25-500	GC-02	196	18	-
Benzo(a)pyrene	19	38-630	GC-01	281	19	-
Benzo(b)fluoranthene	19	90-1200	GC-02	457	19	-
Benzo(g,h,i)perylene	19	21-200	HP-01	112	--	-
Benzo(k)fluoranthene	19	56-830	GC-02	342	19	-
Chrysene	19	55-720	GC-02	319	18	-
Dibenz(a,h)anthracene	16	7.7-65	GC-01	40.7	16	6.5-34
Dibenzofuran	17	7.7-230	EG-09	37.5	--	6.5-20
Fluoranthene	19	78-1300	GC-02	500	18	-
Fluorene	17	11-560	EG-03	81.5	5	6.5-20
Indeno(1,2,3-cd)pyrene	19	24-240	HP-01	148	19	-
Naphthalene	16	9-64	EG-09	16.2	0	6.5-32
Phenanthrene	19	30-860	EG-09	216	18	-
Pyrene	19	84-1400	GC-02	453	19	-
Trace Elements (mg/Kg)						
Aluminum	19	11500-31100	HP-01	21400	7	-
Antimony	0	---	---	---	0	8-20
Arsenic	19	3.3-5.5	GC-03	4.15	0	-
Barium	19	64.2-601	GC-03	143	--	-
Beryllium	19	0.6-1.3	HP-02	0.932	--	-
Cadmium	19	0.5-1.2	EG-03	0.821	13	-
Calcium	19	12500-76200	GC-03	36200	--	-
Chromium	19	19-147	EG-04	50.8	18	-
Cobalt	19	7.3-16.3	HP-01	12.8	--	-
Copper	19	16.6-46.1	EG-04	32	19	-
Iron	19	19500-39500	HP-01	29000	17	-
Lead	19	35-117	EG-04	54.3	19	-
Magnesium	19	8640-35700	EG-03	17200	--	-
Manganese	19	369-1330	EG-04	585	14	-
Mercury	19	0.12-1.0	HP-07	0.436	18	-
Nickel	19	15-41	HP-02	28.5	17	-
Potassium	19	1850-5940	HP-02	3890	--	-
Selenium	1	0.8-0.8	EG-04	0.8	--	0.6-2
Silver	1	0.7-0.7	EG-03	0.7	0	0.5-1
Sodium	19	170-680	EG-05	329	--	-
Thallium	1	0.4-0.4	EG-04	0.4	--	0.3-0.6
Vanadium	19	24.7-51.5	HP-02	37.9	--	-
Zinc	19	163-649	GC-01	385	19	-

NOTES:

MRL: Method Reporting Limit
ND: Analyte was not detected
TEQ: Toxicity equivalency related to toxicity of 2,3,7,8-TCDD
[a] Screening guidelines are presented in Tables 4 through 8
--- : Analyte was not detected

-- : Screening guidelines are not available
- : Analyte was detected above the method reporting limit in every sample
pg/g : picograms per gram or parts per trillion
mg/kg : milligrams per kilogram or parts per million
ug/Kg : micrograms per gram or parts per billion

Table 4. Conventional Parameters and Grain Size Results for Sediment Samples

Sample Area	East Gill Creek								Gill Creek			Hyde Park Lake							
Sample ID	**EG-01**	**EG-02**	**EG-03**	**EG-04**	**EG-05**	**EG-09 (FD of EG-03)**	**EG-10 (FD of EG-02)**	**HP-09**	**GC-01[a]**	**GC-02[a]**	**GC-03[a]**	**HP-01**	**HP-02**	**HP-03**	**HP-04**	**HP-05**	**HP-06**	**HP-07**	**HP-08**
Conventionals (%)																			
Moisture Content[b]	120.4	61.59	84.00	65.13	108.6	69.28	61.37	137.3	133.6	242.9	36.37	177.6	169.1	145.5	152.3	158.6	144.2	134.6	131.9
Total Organic Carbon	1.24	3.1	2.09	4.46	3.64	2.31	2.18	1.84	2.96	4.49	4.51	1.68	2.04	1.59	1.8	2.31	1.51	1.64	1.92
Total Solids	46.0	58.4	55.7	61.3	51.2	53.0	56.5	41.0	43.2	29.8	72.0	35.0	37.0	41.1	38.2	38.2	40.2	42.4	42.6
Grain Size (%)																			
Clay	33.2	17.4	43.2	49.4	46.3	47.2	18.6	45.9	29.2	27.3	9.4	64.8	62.8	55.3	54.5	56.2	52.9	45	41.5
Silt	64.2	19.4	45.1	43.1	45.2	43.9	18.8	53.7	68.2	56.9	12.6	34.7	36.7	44.4	44.8	43.5	47	54.7	58
Fine sand	2.3	14.3	5.6	6.1	6.5	3.5	12.2	0.3	2.2	11.2	9.4	0.3	0.4	0.1	0.4	0.4	0.1	0.1	0.4
Medium sand	0.2	21.2	3.8	1.2	1.2	2.2	20.5	0	0.3	3.5	35.1	0.2	0.3	0	0.2	0	0	0	0.2
Coarse Sand	0	16.2	1.8	0	0.7	1.5	14.9	0	0	0.7	26.2	0	0	0	0	0	0	0	0
Gravel	0	11.5	0.4	0	0.1	2	15	0	0	0.3	7.2	0	0	0	0	0	0	0	0

NOTES:

[a] Reference sample location

[b] Moisture content is calculated as the (weight of total sample - weight of solid portion of sample)/weight of solid

FD: Field duplicate sample

Table 5. Dioxin/Furan Analytical Data for Sediment Samples (pg/g dry weight)

Analyte	Sample Area	East Gill Creek								Gill Creek			Hyde Park Lake							
	Sample ID / Screening Guideline	EG-01	EG-02	EG-03	EG-04	EG-05	HP-09	EG-09 (FD of EG-03)	EG-10 (FD of EG-02)	GC-01[a]	GC-02[a]	GC-03[a]	HP-01	HP-02	HP-03	HP-04	HP-05	HP-06	HP-07	HP-08
2,3,7,8-TCDD	--	**1.48 J**	**0.543 J**	**3.23 J**	**10 J**	**4.25 J**	**1.46 J**	**3.34 J**	**0.637 J**	**4.62 J**	**3.59 J**	**1.81 J**	**1.53 J**	**1.36 J**	**1.26 J**	**1.29 J**	**1.64 J**	**1.52 J**	**1.71 J**	**2.14 J**
1,2,3,7,8-PECDD	--	**1.68 J**	**0.472 J**	**3.01 J**	**4.79 J**	**3.25 J**	**2.05 J**	**3.08 J**	**0.531 J**	**3.41 J**	**2.26 J**	**2.5 J**	**2.06 J**	**2.12 J**	**1.76 J**	**1.78 J**	**2.05 J**	**1.81 J**	**1.82 J**	**2.32 J**
1,2,3,4,7,8-HXCDD	--	**2.22 J**	**0.587 J**	**6.81 J**	**6.51 J**	**4.23 J**	**3.04 J**	**6.79 J**	**0.623 J**	**4.82 J**	**2.53 J**	**1.79 J**	**2.98 J**	**3.12 J**	**2.21 J**	**2.64 J**	**2.73 J**	**2.7 J**	**2.51 J**	**3.01 J**
1,2,3,6,7,8-HXCDD	--	**5.79 J**	**1.7 J**	**17.6 J**	**26.6 J**	**14.4 J**	**6.86 J**	**18.4 J**	**2.2 J**	**13 J**	**9.92 J**	**8.29 J**	**8.09 J**	**7.68 J**	**5.78 J**	**6.73 J**	**8.06 J**	**6.97 J**	**6.9 J**	**8.62 J**
1,2,3,7,8,9-HXCDD	--	**6.63 J**	**1.56 J**	**11.5 J**	**19.5 J**	**11.3 J**	**8.2 J**	**11.7 J**	**1.9 J**	**12.4 J**	**7.42 J**	**5.62 J**	**9.24 J**	**8.89 J**	**6.51 J**	**7.38 J**	**8.63 J**	**7.33 J**	**7.57 J**	**8.81 J**
1,2,3,4,6,7,8-HPCDD	--	**142 J**	**32.4 J**	**416 J**	**343 J**	**221 J**	**173 J**	**471 J**	**39.3 J**	**191 J**	**134 J**	**71.5 J**	**194 J**	**169 J**	**124 J**	**141 J**	**174 J**	**148 J**	**164 J**	**159 J**
OCDD	--	**8,570 J**	**1,640 J**	**3,950 J**	**2,490 J**	**2,180 J**	**10,500 J**	**4,490 J**	**1,790 J**	**3,530 J**	**2,030 J**	**1,410 J**	**8,360 J**	**8,120 J**	**5,150 J**	**6,130 J**	**7,600 J**	**6,430 J**	**9,840 J**	**5,840 J**
2,3,7,8-TCDF	--	**3.83 J**	**0.895 J**	**3.08 J**	**9.56 J**	**4.95 J**	**5.17 J**	**3.4 J**	**1.54 J**	**6.65 J**	**4.17 J**	**1.66 J**	**6.57 J**	**5.59 J**	**6.08 J**	**5.55 J**	**7.82 J**	**9.31 J**	**36.1 J**	**19 J**
1,2,3,7,8-PECDF	--	**2.34 J**	**0.665 J**	**2.9 J**	**6.73 J**	**4.27 J**	**3.31 J**	**2.64 J**	**0.701 J**	**4.48 J**	**3.82 J**	**1.32 J**	**3.62 J**	**3.57 J**	**3.62 J**	**3.42 J**	**4.74 J**	**4.69 J**	**14.4 J**	**10.1 J**
2,3,4,7,8-PECDF	--	**2.73 J**	**0.717 J**	**2.5 J**	**8.7 J**	**5.17 J**	**3.81 J**	**2.6 J**	**0.876 J**	**5.73 J**	**3.98 J**	**2.25 J**	**4.25 J**	**4.2 J**	**3.53 J**	**3.59 J**	**4.66 J**	**4.98 J**	**13.9 J**	**9.9 J**
1,2,3,4,7,8-HXCDF	--	**5.59 J**	**2.03 J**	**13.5 J**	**27.6 J**	**14.3 J**	**7.32 J**	**13.5 J**	**1.73 J**	**13.8 J**	**13.5 J**	**4.87 J**	**11.6 J**	**12 J**	**7.09 J**	**7.63 J**	**10.4 J**	**9.45 J**	**21 J**	**18.5 J**
1,2,3,6,7,8-HXCDF	--	**3.48 J**	**0.905 J**	**4.32 J**	**14.1 J**	**7.41 J**	**4.65 J**	**4.7 J**	**1.02 J**	**8.48 J**	**5.72 J**	**3.39 J**	**4.67 J**	**5.04 J**	**3.84 J**	**4.12 J**	**5.17 J**	**4.88 J**	**7.43 J**	**8.14 J**
1,2,3,7,8,9-HXCDF	--	**0.206 J**	**0.085 J**	**0.416 J**	**0.804 J**	**1.74 J**	**0.24 J**	**0.499 J**	0.16 UJ	**0.446 J**	**0.386 J**	**0.182 J**	0.514 UJ	0.54 UJ	**0.222 J**	**0.268 J**	**0.349 J**	**0.296 J**	**0.504 J**	**0.553 J**
2,3,4,6,7,8-HXCDF	--	**2.27 J**	**0.633 J**	**2.85 J**	**9.01 J**	**5.03 J**	**2.86 J**	**3.34 J**	**0.705 J**	**4.86 J**	**3.55 J**	**2.73 J**	**3.01 J**	**3.62 J**	**2.49 J**	**2.69 J**	**3.14 J**	**2.85 J**	**3.37 J**	**4.08 J**
1,2,3,4,6,7,8-HPCDF	--	**31.6 J**	**8.97 J**	**100 J**	**164 J**	**82.8 J**	**37 J**	**122 J**	**9.83 J**	**104 J**	**53.3 J**	**17.7 J**	**43.6 J**	**42.8 J**	**30.2 J**	**36.2 J**	**44.9 J**	**38.2 J**	**43.1 J**	**51.4 J**
1,2,3,4,7,8,9-HPCDF	--	**3.05 J**	**0.893 J**	**24.1 J**	**15.4 J**	**7.75 J**	**3.75 J**	**23.9 J**	**1.23 J**	**6.68 J**	**6.15 J**	**2.18 J**	**4.83 J**	**4.58 J**	**3.64 J**	**3.94 J**	**5.18 J**	**4.39 J**	**5.56 J**	**6.5 J**
OCDF	--	**85.2 J**	**25 J**	**444 J**	**424 J**	**196 J**	**88.9 J**	**617 J**	**30.1 J**	**180 J**	**167 J**	**42.4 J**	**113 J**	**109 J**	**83.8 J**	**101 J**	**126 J**	**100 J**	**89.6 J**	**135 J**
TOTAL (TEQ[b] ND=0)	0.85[c]	**10.3**	**2.84**	**19.5**	**36.4**	**20.0**	**12.6**	**20.8**	**3.30**	**21.0**	**14.9**	**9.41**	**13.8**	**13.3**	**10.5**	**11.2**	**13.9**	**13.0**	**22.9**	**19.8**
TOTAL (TEQ[b] ND=1/2 MRL)	0.85[c]	**10.3**	**2.84**	**19.5**	**36.4**	**20.0**	**12.6**	**20.8**	**3.31**	**21.0**	**14.9**	**9.41**	**13.8**	**13.4**	**10.5**	**11.2**	**13.9**	**13.0**	**22.9**	**19.8**

NOTES:

[a] Reference sample location

[b] The TEQ was calculated using the WHO toxic equivalency factor (TEFs) which relates the toxicity of inidividual congeners to 2,3,7,8-TCDD

[c] Interim Sediment Quality Guideline (ISQG), expressed as toxicity equivalency (TEQ) units per WHO, 1998 toxicity equivalency factors (TEF) for fish (Canadian Council of Ministers of the Environment, 2003)

Bold and underlined values were detected at concentrations greater than the screening guideline

Bold values were present above the method reporting limit

MRL: Method reporting limit

FD: Field duplicate sample

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND: Analyte was not detected

pg/g: picograms per gram or parts per trillion (ppt)

TEQ: Toxicity equivalency

UJ: The analyte was not detected above the method reporting limit. However, the reported method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

Table 6. Pesticide Analytical Data for Sediment Samples (ug/kg dry weight)

Analyte	Sample Area		East Gill Creek								Gill Creek			Hyde Park Lake							
	Sample ID																				
	Screening Guideline																				
	Low Guideline	High Guideline	EG-01	EG-02	EG-03	EG-04	EG-05	HP-09	EG-09 (FD of EG-03)	EG-10 (FD of EG-02)	GC-01[a]	GC-02[a]	GC-03[a]	HP-01	HP-02	HP-03	HP-04	HP-05	HP-06	HP-07	HP-08
4,4'-DDD	4.88[b]	28[c]	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	13 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDE	3.16[b]	31.3[c]	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	3.4 UJ	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDT	4.16[b]	62.9[c]	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Aldrin	2[d]	--	0.98 U	0.97 U	0.97 U	0.98 U	0.99 U	0.98 U	0.97 U	0.98 U	0.99 U	0.99 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
alpha Chlordane	--	--	0.98 U	0.97 UJ	0.97 UJ	0.98 UJ	0.99 UJ	0.98 U	0.97 UJ	0.98 UJ	0.99 UJ	0.99 UJ	0.98 UJ	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
alpha-BHC	6[d]	--	0.98 U	0.97 U	0.97 U	3.6 U	0.99 U	0.98 U	0.97 U	0.98 U	0.99 U	0.99 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
beta-BHC	5[d]	--	0.98 U	**2.9**	**3.3**	**3.8**	**12**	0.98 U	**3.0**	**3.0**	0.99 U	0.99 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
delta-BHC	--	--	0.98 U	0.97 U	0.97 U	0.98 U	0.99 U	0.98 U	3 U	0.98 U	0.99 U	1.8 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
Dieldrin	1.90[d]	61.8[c]	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	1.9 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan I	0.3[e]	--	0.98 U	0.97 UJ	0.97 UJ	0.98 UJ	0.99 UJ	0.98 U	0.97 UJ	0.98 UJ	0.99 UJ	0.99 UJ	0.98 UJ	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
Endosulfan II	0.3[e]	--	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan Sulfate	--	--	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin	2.22[b]	207[c]	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin Aldehyde	--	--	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin Ketone	--	--	2 U	1.9 U	2 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 U	2 U	2 U	5.2 U	2 U	2 U	2 U	2 U	2 U	2 U
gamma Chlordane	--	--	0.98 U	0.97 UJ	0.97 UJ	0.98 UJ	0.99 UJ	0.98 U	0.97 UJ	0.98 UJ	0.99 UJ	0.99 UJ	0.98 UJ	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
gamma-BHC (Lindane)	2.37[b]	4.99[c]	0.98 U	0.97 U	0.97 U	0.98 U	0.99 U	0.98 U	0.97 U	0.98 U	0.99 U	0.99 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
Heptachlor	0.60[f]	--	0.98 U	0.97 U	0.97 U	0.98 U	0.99 U	0.98 U	0.97 U	0.98 U	0.99 U	0.99 U	0.98 U	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
Heptachlor Epoxide	2.47[b]	16.0[c]	0.98 U	0.97 UJ	0.97 UJ	0.98 UJ	0.99 UJ	0.98 U	0.97 UJ	0.98 UJ	0.99 UJ	0.99 UJ	0.98 UJ	0.99 U	2.6 U	0.98 U	0.98 U	0.98 U	0.98 U	1 U	0.98 U
Methoxychlor	6[e]	--	9.8 U	9.7 U	9.7 U	9.8 U	9.9 U	9.8 U	9.7 U	9.8 U	9.9 U	9.9 U	9.8 U	9.9 U	26 U	9.8 U	9.8 U	9.8 U	9.8 U	10 U	9.8 U
Toxaphene	0.1[f]	--	98 U	97 U	97 U	98 U	99 U	98 U	97 U	98 U	99 U	99 U	98 U	99 U	260 U	98 U	98 U	98 U	98 U	100 U	98 U

NOTES:

[a] Reference sample location

[b] Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000a)

[c] Consensus-based Probable Effect Concentration (PEC) (MacDonald et al., 2000a)

[d] Lowest Effect Level (LEL)(Ontario Ministry of the Environment, 1993)

[e] Benthic Aquatic Life Chronic Toxicity (assuming 1% TOC) (NYSDEC, 1999)

[f] Interim Sediment Quality Guideline (ISQG) (Canadian Council of Ministers of the Environment, 2003)

Bold and underlined values were detected at concentrations greater than the low screening guideline

Bold values were present above the method reporting limit

FD: Field duplicate sample

U: The analyte was analyzed for, but was not detected above the method reporting limit.

UJ: The analyte was not detected above the method reporting limit. However, the method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

ug/kg: micrograms per kilogram or parts per billion (ppb)

Table 7. PCB Analytical Data for Sediment Samples (ug/kg dry weight)

Analyte	Screening Guidelines		East Gill Creek								Gill Creek			Hyde Park Lake							
	Medium Guideline[b]	High Guideline[c]	EG-01	EG-02	EG-03	EG-04	EG-05	HP-09	EG-09 (FD of EG-03)	EG-10 (FD of EG-02)	GC-01[a]	GC-02[a]	GC-03[a]	HP-01	HP-02	HP-03	HP-04	HP-05	HP-06	HP-07	HP-08
Aroclor 1016	--	--	7.9 UJ	7.8 UJ	7.9 UJ	7.8 UJ	8 UJ	7.9 UJ	7.8 UJ	8 UJ	8 UJ	8 UJ	7.9 UJ	8 U	210 U	8 U	7.9 U	7.9 U	7.9 UJ	8 U	7.9 U
Aroclor 1221	--	--	7.9 U	7.8 U	7.9 U	7.8 U	8 U	24 U	7.8 UJ	8 UJ	8 U	8 U	7.9 U	16 U	210 U	8 U	7.9 U	7.9 U	16 UJ	8 U	7.9 U
Aroclor 1232	--	--	7.9 U	7.8 U	12 U	7.8 U	8.8 U	7.9 U	7.8 UJ	8 UJ	9.6 U	8 U	7.9 U	8 U	210 U	8 U	7.9 U	7.9 U	12 UJ	8 U	7.9 U
Aroclor 1242	--	--	7.9 U	7.8 U	7.9 U	7.8 U	8 U	7.9 U	7.8 UJ	8 UJ	8 U	8 U	7.9 U	8 U	210 U	8 U	7.9 U	7.9 U	7.9 UJ	8 U	7.9 U
Aroclor 1248	--	--	7.9 U	7.8 U	7.9 U	7.8 U	8 U	7.9 U	7.8 UJ	8 UJ	8 U	8 U	7.9 U	16 U	210 U	8 U	7.9 U	7.9 U	7.9 UJ	8 U	7.9 U
Aroclor 1254	--	--	**15**	**7.7 J**	**22**	**50 J**	**35**	**12**	**21 J**	**9.9 J**	**32 J**	**32**	**17 J**	**22**	**260**	**14**	**13**	**13**	**24 J**	**9.5 J**	**17**
Aroclor 1260	--	--	**9 J**	7.8 UJ	32 UJ	**39 J**	**21 J**	**9.3 J**	31 UJ	**5.9 J**	**29 J**	**26 J**	24 UJ	**14**	210 U	**11**	**13 J**	**9.7**	**24 J**	**6.8 J**	**13**
Total PCBs[d]	340	1,600	**24**	**7.7**	**22**	**89**	**56**	**21.3**	**21**	**15.8**	**61**	**58**	**17**	**36**	**260**	**25**	**26**	**22.7**	**48**	**16.3**	**30**

NOTES:

[a] Reference sample location

[b] Consensus-based midrange effect concentration (MEC) for freshwater ecosystems (MacDonald et al., 2000b)

[c] Consensus-based extreme effect concentration (EEC) for freshwater ecosystems (MacDonald et al., 2000b)

[d] When calculating the Total PCB value non detected concentrations were considered equal to zero

Bold values were present above the method reporting limit

FD: Field duplicate sample

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U: The analyte was analyzed for, but was not detected above the method reporting limit.

UJ: The analyte was not detected above the method reporting limit. However, the method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

ug/kg: micrograms per kilogram or parts per billion (ppb)

Table 8. PAH Analytical Data for Sediment Samples (ug/kg dry weight)

Analyte	Sample Area		East Gill Creek								Gill Creek			Hyde Park Lake							
	Sample ID		EG-01	EG-02	EG-03	EG-04	EG-05	HP-09	EG-09 (FD of EG-03)	EG-10 (FD of EG-02)	GC-01[a]	GC-02[a]	GC-03[a]	HP-01	HP-02	HP-03	HP-04	HP-05	HP-06	HP-07	HP-08
	Screening Guideline																				
	Low Guideline	High Guideline																			
High-Molecular-Weight PAHs (HPAHs)																					
Benzo(a)anthracene	108[b]	1,050[c]	**110**	**25**	**300**	**240**	**220**	**120**	**180**	**46**	**440**	**500**	**75**	**160**	**180**	**150**	**190**	**180**	**190**	**150**	**260**
Benzo(a)pyrene	150[b]	1,450[c]	**160**	**38**	**340**	**350**	**370**	**180**	**220**	**55**	**630**	**620**	**97**	**260**	**280**	**240**	**290**	**280**	**310**	**220**	**400**
Benzo(b)fluoranthene	--	--	**270**	**90**	**510**	**620**	**740**	**310**	**430**	**110**	**1,100**	**1,200**	**190**	**360**	**410**	**350**	**400**	**410**	**440**	**350**	**600**
Benzo(g,h,i)perylene	170[d]	--	**54**	**21 J**	**130 J**	**150 J**	**170 J**	**63**	**98 J**	**24 J**	**150**	**140**	**53 J**	**200**	**160**	**130**	**130**	**120**	**120**	**86**	**120**
Benzo(k)fluoranthene	240[d]	--	**190**	**56**	**410**	**450**	**530**	**220**	**310**	**86**	**820**	**830**	**120**	**260**	**320**	**240**	**330**	**310**	**350**	**250**	**480**
Chrysene	166[b]	1,290[c]	**200**	**55**	**540**	**380**	**400**	**190**	**380**	**78**	**700**	**720**	**140**	**250**	**260**	**210**	**280**	**270**	**300**	**230**	**420**
Dibenz(a,h)anthracene	33[b]	--	**18**	6.5 UJ	32 UJ	**52 J**	**47 J**	**26**	34 UJ	**7.7 J**	**65**	**61**	**16 J**	**50**	**53**	**41**	**44**	**49**	**44**	**32**	**45**
Fluoranthene	423[b]	2,230[c]	**290**	**78**	**820**	**540**	**580**	**300**	**530**	**120**	**1,100**	**1,300**	**220**	**410**	**440**	**360**	**460**	**440**	**490**	**360**	**680**
Indeno(1,2,3-cd)pyrene	200[d]	--	**75**	**24 J**	**130 J**	**170 J**	**220 J**	**96**	**120 J**	**26 J**	**220**	**210**	**44 J**	**240**	**220**	**170**	**190**	**180**	**170**	**130**	**180**
Pyrene	195[b]	1,520[c]	**230**	**84**	**950**	**630**	**610**	**250**	**600**	**140**	**1,300**	**1,400**	**210**	**360**	**370**	**310**	**390**	**370**	**400**	**310**	**520**
Total HPAH (ND = 0)	192.95[e]	--	**1,597**	**471**	**4,130**	**3,582**	**3,887**	**1,755**	**2,868**	**692.7**	**6,525**	**6,981**	**1,165**	**2,550**	**2,693**	**2,201**	**2,704**	**2,609**	**2,814**	**2,118**	**3,705**
Total HPAH (ND = 1/2 MRL)	192.95[e]	--	**1,597**	**474**	**4,146**	**3,582**	**3,887**	**1,755**	**2,885**	**692.7**	**6,525**	**6,981**	**1,165**	**2,550**	**2,693**	**2,201**	**2,704**	**2,609**	**2,814**	**2,118**	**3,705**
Low-Molecular-Weight PAHs (LPAHs)																					
2-Methylnaphthalene	20.2[f]	--	**13**	**11**	**57**	**22**	20 U	**12**	**68**	**14**	**23**	**24**	**26**	**12**	**13**	**12**	**14**	**13**	**14**	**19**	**17**
Acenaphthene	6.71[f]	--	**12**	6.5 U	**150**	**29**	20 U	**9.9**	**130**	6.4 U	**28**	**30**	**6.6**	**11**	**13**	**11**	**13**	**12**	**14**	**9.1**	**18**
Acenaphthylene	5.87[f]	--	**8.3**	6.5 U	32 U	**31**	**33**	**9.9**	34 U	**11**	**23**	**32**	6.6 U	**21**	**22**	**16**	**20**	**19**	**19**	**13**	**19**
Anthracene	57.2[b]	845[c]	**20**	6.5 U	**120**	**46**	**35**	**19**	**100**	**15**	**67**	**85**	**15**	**23**	**26**	**23**	**30**	**26**	**28**	**22**	**38**
Fluorene	77.4[b]	536[c]	**15**	6.5 U	**560**	**19**	20 U	**12**	**550**	**17**	**33**	**36**	**11**	**17**	**16**	**14**	**17**	**17**	**16**	**14**	**22**
Naphthalene	176[b]	561[c]	**9.6**	6.5 U	32 U	**23**	20 U	**9.2**	**64**	**9**	**20**	**21**	**18**	**10**	**9**	**9.7**	**10**	**11**	**10**	**13**	**13**
Phenanthrene	204[b]	1170[c]	**110**	**30**	**820**	**220**	**220**	**86**	**860**	**66**	**320**	**360**	**97**	**100**	**110**	**94**	**120**	**110**	**120**	**96**	**160**
Total LPAH (ND = 0)	76.42[e]	--	**187.9**	**41**	**1,707**	**390**	**288**	**158**	**1,772**	**132**	**514**	**588**	**173.6**	**194**	**209**	**179.7**	**224**	**208**	**221**	**186.1**	**287**
Total LPAH (ND = 1/2 MRL)	76.42[e]	--	**187.9**	**57.25**	**1,739**	**390**	**328**	**158**	**1,806**	**135.2**	**514**	**588**	**176.9**	**194**	**209**	**179.7**	**224**	**208**	**221**	**186.1**	**287**
Miscellaneous semi-volatile organic compounds (SVOCs)																					
Dibenzofuran	--	--	**8.3**	6.5 U	**220**	**15**	20 U	**7.9**	**230**	**7.7**	**20**	**22**	**12**	**11**	**12**	**11**	**12**	**11**	**12**	**12**	**14**

NOTES:

[a] Reference sample location

[b] Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000a)

[c] Consensus-based Probable Effect Concentration (PEC) (MacDonald et al., 2000a)

[d] Lowest Effect Level (LEL)(Ontario Ministry of the Environment, 1993)

[e] Threshold Effects Limit (TEL) (USEPA, 1996)

[f] Interim Sediment Quality Guideline (ISQG) (Canadian Council of Ministers of the Environment, 2003)

Bold and underlined values were detected at concentrations greater than the low screening guideline

Values outlined with a dark border were detected at concentrations greater than the high and low screening guidelines

Bold values were present above the method reporting limit

FD: Field duplicate sample

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

MRL: Method Reporting limit

ND: Analyte was not detected

U: The analyte was analyzed for, but was not detected above the method reporting limit.

ug/kg : micrograms per kilogram or parts per billion (ppb)

UJ: The analyte was not detected above the method reporting limit. However, the method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

Table 9. Trace Element Analytical Data for Sediment Samples (mg/kg dry weight)

Analyte	Sample Area		East Gill Creek								Gill Creek			Hyde Park Lake							
	Sample ID		EG-01	EG-02	EG-03	EG-04	EG-05	HP-09	EG-09 (FD of EG-03)	EG-10 (FD of EG-02)	GC-01[a]	GC-02[a]	GC-03[a]	HP-01	HP-02	HP-03	HP-04	HP-05	HP-06	HP-07	HP-08
	Screening Guidelines																				
	Low Guidelines	High Guidelines																			
Aluminum	--	--	**16,200**	**15,500**	**17,700**	**26,300**	**25,700**	**23,000**	**13,500**	**11,500**	**17,500**	**15,200**	**11,500**	**31,100**	**30,900**	**24,300**	**27,600**	**27,400**	**25,800**	**22,300**	**23,800**
Antimony	2.0[b]	25.0[c]	10 UJ	8 UJ	9 UJ	8 UJ	10 UJ	10 UJ	8 UJ	8 UJ	10 UJ	20 UJ	20 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Arsenic	9.79[d]	33.0[e]	**3.3**	**3.8**	**4**	**5.5**	**4.5**	**3.5**	**3.5**	**3.6**	**4.2**	**4.1**	**5.5**	**4.7**	**4.6**	**4.1**	**4.3**	**4.1**	**3.9**	**3.5**	**4.1**
Barium	--	--	**84.9**	**96**	**96.6**	**164**	**142**	**112**	**76.2**	**64.2**	**104**	**94**	**601**	**161**	**157**	**127**	**145**	**141**	**129**	**115**	**124**
Beryllium	--	--	**0.7**	**0.8**	**0.8**	**1.2**	**1.1**	**1**	**0.6**	**0.6**	**0.7**	**0.7**	**0.8**	**1.3**	**1.3**	**1**	**1.1**	**1.1**	**1**	**0.9**	**1**
Cadmium	0.99[d]	4.98[e]	**0.6 J**	**0.6 J**	**1.2 J**	**1 J**	**0.9 J**	**0.7 J**	**1 J**	**0.5 J**	**1.1 J**	**1.1 J**	**1 J**	**0.7 J**	**0.7 J**	**0.6 J**	**0.9 J**	**0.7 J**	**0.8 J**	**0.6 J**	**0.9 J**
Calcium	--	--	**31,400**	**39,900**	**75,900**	**12,500**	**34,400**	**25,300**	**64,900**	**50,100**	**35,300**	**29,400**	**76,200**	**31,500**	**32,200**	**30,200**	**30,100**	**23,700**	**22,800**	**16,400**	**26,200**
Chromium	43.4[d]	111[e]	**42**	**34.2**	**37.8**	**147**	**133**	**48**	**31.4**	**32.1**	**40**	**36**	**19**	**50**	**53**	**42**	**47**	**46**	**43**	**39**	**45**
Cobalt	--	--	**10.2**	**10.7**	**9**	**16.1**	**14.7**	**13.4**	**7.3**	**10.1**	**10.8**	**10**	**15**	**16.3**	**16**	**14**	**15.2**	**15**	**14**	**12.3**	**13.3**
Copper	31.6[d]	149[e]	**23.9**	**18.7**	**30.1**	**46.1**	**38.6**	**30.7**	**25.3**	**17.3**	**37.5**	**35.5**	**16.6**	**39**	**39.8**	**33**	**37.9**	**35.4**	**34.6**	**31.3**	**36.9**
Iron	--	--	**21,700**	**23,500**	**22,700**	**34,700**	**34,700**	**29,600**	**19,500**	**19,800**	**23,300**	**21,300**	**31,500**	**39,500**	**37,600**	**31,900**	**35,300**	**34,700**	**31,900**	**27,500**	**29,900**
Lead	35.8[d]	128[e]	**37**	**40**	**107**	**117**	**70**	**38**	**92**	**50**	**56**	**49**	**35**	**42**	**44**	**39**	**40**	**40**	**42**	**45**	**48**
Magnesium	--	--	**15,100**	**20,100**	**35,700**	**10,800**	**19,400**	**11,700**	**30,600**	**27,000**	**15,900**	**14,100**	**33,800**	**12,600**	**13,100**	**11,500**	**13,200**	**11,300**	**11,000**	**8,640**	**12,000**
Manganese	460.0[b]	1,100[c]	**420**	**486**	**523**	**1,330**	**648**	**487**	**415**	**612**	**421**	**369**	**1,180**	**583**	**592**	**547**	**577**	**535**	**506**	**399**	**492**
Mercury	0.18[d]	1.06[e]	**0.31**	**0.24**	**0.6**	**0.66**	**0.4**	**0.33**	**0.51**	**0.23**	**0.5**	**0.3**	**0.12**	**0.4**	**0.4**	**0.31**	**0.4**	**0.38**	**0.5**	**1.0**	**0.7**
Nickel	22.7[d]	48.6[e]	**23**	**19**	**21**	**40**	**34**	**31**	**17**	**15**	**26**	**23**	**16**	**39**	**41**	**32**	**37**	**35**	**32**	**28**	**32**
Potassium	--	--	**2,850**	**2,970**	**3,880**	**4,310**	**4,280**	**4,180**	**2,850**	**1,850**	**3,060**	**2,930**	**2,090**	**5,740**	**5,940**	**4,330**	**4,920**	**4,790**	**4,670**	**3,930**	**4,340**
Selenium	--	--	1 U	0.8 U	1 U	**0.8**	1 U	1 U	0.9 U	0.9 U	1 U	2 U	0.6 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Silver	1.0[b]	2.2[c]	0.6 U	0.5 U	**0.7**	0.5 U	0.6 U	0.7 U	0.5 U	0.5 U	0.7 U	1 U	1 U	0.8 U	0.8 U	0.7 U	0.8 U	0.7 U	0.7 U	0.7 U	0.7 U
Sodium	--	--	**220**	**270**	**630**	**520**	**680**	**270**	**540**	**250**	**210**	**220**	**170**	**330**	**350**	**260**	**300**	**290**	**260**	**230**	**260**
Thallium	--	--	0.4 U	0.3 U	0.4 U	**0.4**	0.4 U	0.5 U	0.4 U	0.4 U	0.5 U	0.6 U	0.3 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U
Vanadium	--	--	**28.9**	**31.1**	**32.7**	**45.9**	**44.4**	**39.1**	**25.4**	**24.7**	**30.9**	**29**	**31**	**51.4**	**51.5**	**41.5**	**46.2**	**45.3**	**43.1**	**37.1**	**41.1**
Zinc	121[d]	459[e]	**257**	**209**	**389**	**622**	**463**	**307**	**352**	**163**	**649**	**617**	**326**	**357**	**366**	**298**	**383**	**377**	**393**	**319**	**485**

NOTES:

[a] Reference sample location

[b] Lowest Effect Level (LEL) (NYSDEC, 1999)

[c] Severe Effect Level (SEL) (NYSDEC, 1999)

[d] Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000a)

[e] Consensus-based Probable Effect Concentration (PEC) (MacDonald et al., 2000a)

Bold and underlined values were detected at concentrations greater than the screening guideline

Values outlined with a dark border were detected at concentrations greater than the high and low screening guidelines

Bold values were present above the method reporting limit

FD: Field duplicate sample

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

mg/kg: milligrams per kilograms or parts per million (ppm)

U: The analyte was analyzed for, but was not detected above the method reporting limit.

UJ: The analyte was not detected above the method reporting limit. However, the method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

Table 10. 10-day *Chironomus tentans* Toxicity Test Results

Sample Area	Sample ID	Survival (%) Mean ± SD	Average Individual Dry Weight (mg) Mean ± SD	Ash-free Dry Weight (mg) Mean ± SD
Laboratory	**Control**	97.5 ± 4.6	1.30 ± 0.21	0.64 ± 0.14
East Gill Creek	**EG-01**	77.5 ± 17.5 [a]	2.92 ± 0.52	1.51 ± 0.28
	EG-03	0.0 ± 0.0 [a]	0.00 ± 0.00 [a]	0.00 ± 0.00 [a]
	EG-04	91.4 ± 6.9	1.61 ± 0.29	0.69 ± 0.19
	EG-05	80.0 ± 26.2	2.41 ± 0.45	0.93 ± 0.38
Gill Creek	**GC-01** [b]	84.3 ± 17.2	2.58 ± 0.38	1.16 ± 0.28
	GC-03 [b]	88.8 ± 8.4	2.73 ± 0.35	1.17 ± 0.17
Hyde Park Lake	**HP-01**	87.5 ± 10.4	1.75 ± 0.49	0.75 ± 0.27
	HP-03	86.2 ± 13.0	2.03 ± 0.39	0.96 ± 0.17
	HP-04	85.0 ± 10.7	2.09 ± 0.28	0.91 ± 0.19
	HP-08	88.6 ± 10.7	2.45 ± 0.37	1.16 ± 0.27

NOTES:

SD: standard deviation

[a] significant difference ($p \leq 0.05$) relative to the laboratory control based on statistical analysis

[b] reference sample location

Table 11. Analytical Data for Bioaccumulation Tissue Samples (ug/kg wet weight)

Sample Area / Sample ID / Analyte	East Gill Creek EG-05	Gill Creek GC-01[a]	Hyde Park Lake HP-03	EVS Laboratory Control	Tissue conc./ Sediment conc. EG-05	Tissue conc./ Sediment conc. GC-01[a]	Tissue conc./ Sediment conc. HP-03
2-Methylnaphthalene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Acenaphthene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Acenaphthylene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Anthracene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Benzo(a)anthracene	28 UJ	**22 J**	24 UJ	63 UJ	--	0.05	--
Benzo(a)pyrene	**17 J**	**28 J**	**17 J**	63 UJ	0.046	0.044	0.071
Benzo(b)fluoranthene	**39 J**	**54 J**	**41 J**	63 UJ	0.053	0.055	0.12
Benzo(g,h,i)perylene	**22 J**	**22 J**	**15 J**	63 UJ	0.13	0.15	0.12
Benzo(k)fluoranthene	**22 J**	**48 J**	**29 J**	63 UJ	0.041	0.063	0.12
Chrysene	**30 J**	**74 J**	**19 J**	63 UJ	0.075	0.1	0.09
Dibenz(a,h)anthracene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Dibenzofuran	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Fluoranthene	**14 J**	**67 J**	**29 J**	63 UJ	0.024	0.061	0.081
Fluorene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Indeno(1,2,3-cd)pyrene	**14 J**	**15 J**	24 UJ	63 UJ	0.064	0.068	--
Naphthalene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Phenanthrene	28 UJ	22 UJ	24 UJ	63 UJ	--	--	--
Pyrene	28 UJ	**65 J**	**32 J**	63 UJ	--	0.074	0.1

NOTES:

[a] Reference sample location

Bold values indicate analyte was detected

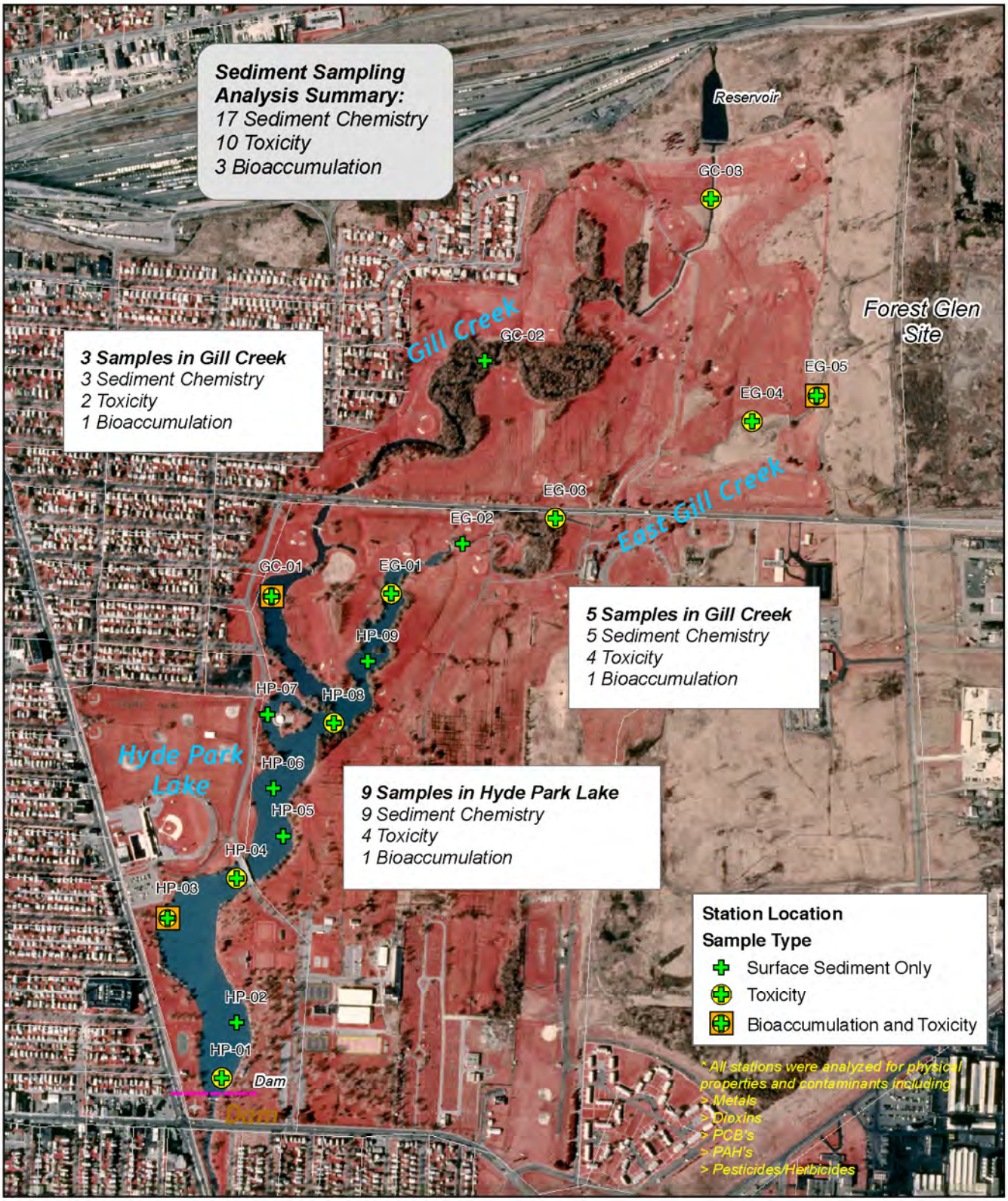
U: The analyte was analyzed for, but was not detected above the reported method reporting limit.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ: The analyte was not detected above the method reporting limit. However, the method reporting limit is approximate and may or may not represent the actual method reporting limit necessary to accurately and precisely measure the analyte in the sample.

-- : Analyte was not detected in tissue sample

FIGURES



NOTES
Coordinate System & Grid:
UTM Zone 18 Meters NAD83
Orthophoto: NYGIS 2002
Hydrology digitized by NOAA CPRD based on DRG, DOQQ
Sediment Chemistry at all locations
Bioaccumulation will be co-located with toxicity

0 250 500 Meters
0 1,000 2,000 Feet

FOREST GLEN 09.12-15.2005
Figure 1. SEDIMENT SAMPLING STATION LOCATIONS

NOAA CPRD: BDS 09/20/2005
c:\gis\projects\ForestGlen\arc_projects\fg_base_090805.mxd

APPENDIX A

Field Data Sheets

(Appendices are on attached CD as .pdf files.)

Field Data Collection Sheet

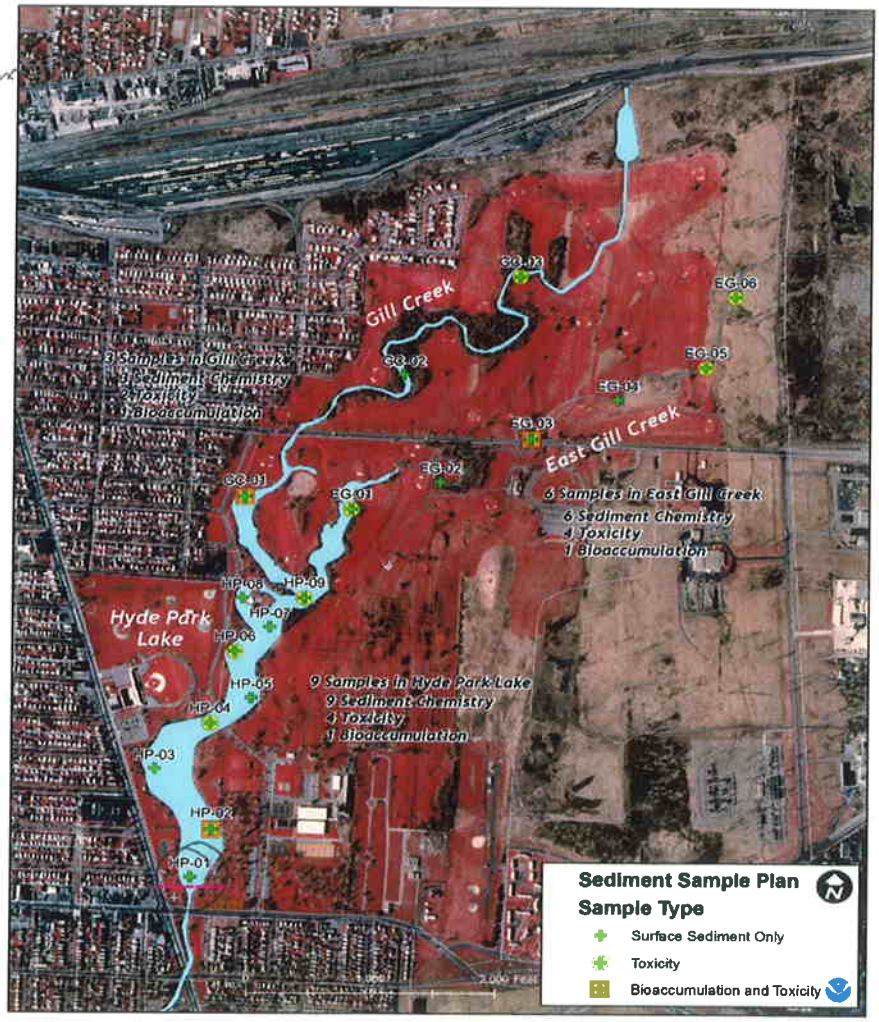
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson, Jen Lawton — on-land sample prep; Ben Shorr, Megan Hilgart — Boat crew
Section/Reach:	HP		
Date:	9/12/05		
Time:	1553 (3:53pm)		
Sampling Equipment:	Ponar		
Weather Conditions (sunny, cloudy, rainy, etc.):	Sunny	**Photographs (file name or time):**	
Sample ID:	HP-01	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	Hyde Park Lake	**Chemistry**	☒
Latitude (dec. deg.):	N 43.09604	**Bioassays**	☒
Longitude (dec. deg.):	~~N 43~~ W -79.02334	**Bioaccumulation**	☐
Depth (m):	8 ~~15~~ ft		

Other Notes:
water is Murky

Collection location sketch and description:

- Approx 80ft ~~fr~~ upstream of HP dam
- Sampled from NYDEC 10' "John boat"
- Deviated from design analyses – Sediment & Toxicity

Mark sample locations on map



Field Data Collection Sheet

Project: Forest Glen Site, New York	**Personnel:** LAND (Rebecca Arenson, Jen Lawton; BOAT (Ben Shorr, Megan Hilgart
Section/Reach: HYDE PARK LAKE	
Date: 09/12/05	
Time: 4:37 pm (1637)	
Sampling Equipment: PETITE PONAR	
Weather Conditions (sunny, cloudy, rainy, etc.): sunny	**Photographs (file name or time):**
Sample ID: HP - 02	**Tests Requested** / **(Check each)** / **Volume Collected**
Sample Location: ~~HP-02~~ HYDE PARK LAKE	**Chemistry** only ☒
Latitude (dec. deg.): 43.09710	**Bioassays** ☐
Longitude (dec. deg.): -79.02303	**Bioaccumulation** ☐
Depth (m): 7'	

Other Notes:

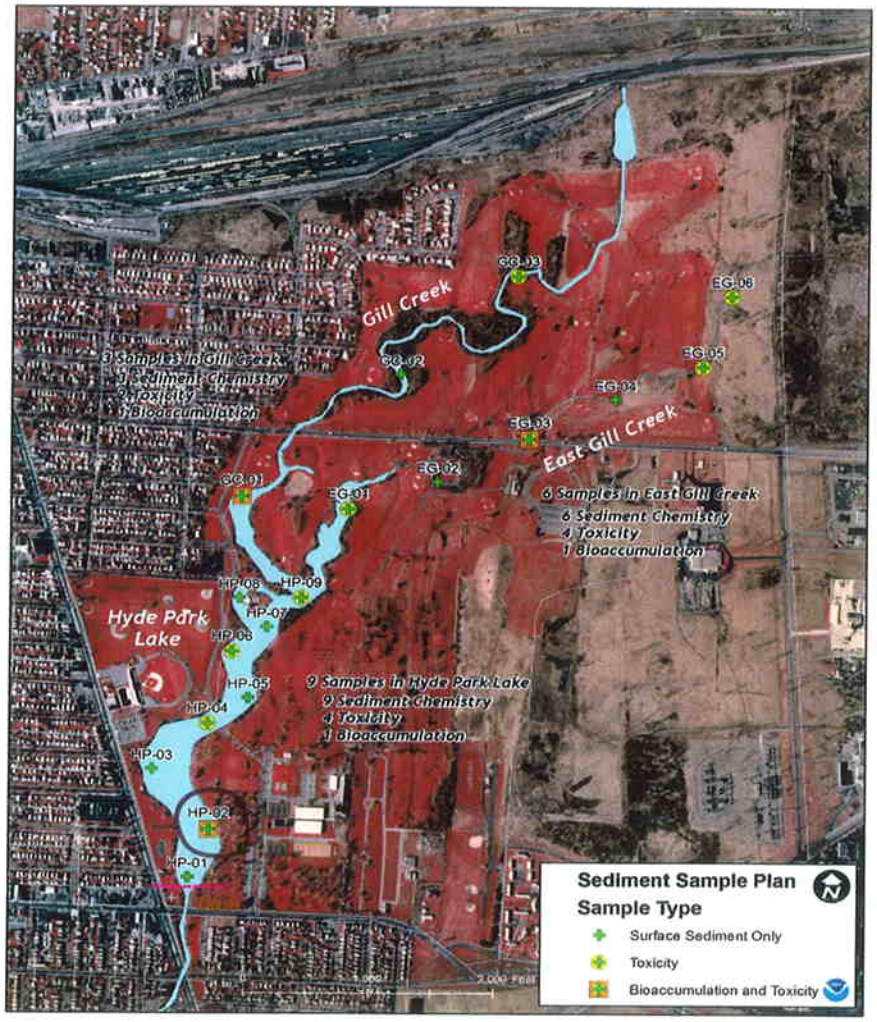
water still murky.

Collection location sketch and description:

~40' off East bank

* Chemistry only / switched from initial plan.

Mark sample locations on map



Field Data Collection Sheet

Project: Forest Glen Site, New York	**Personnel:** sample prep. Rebecca Arenson, Jen Lawton; Boating Ben Shorr, Megan Hilgart
Section/Reach: HYDE PARK LAKE	
Date: 09/12/05	
Time: 5:11 (17:11)	
Sampling Equipment: PONAR	
Weather Conditions (sunny, cloudy, rainy, etc.): Sunny, 80°	**Photographs (file name or time):**
Sample ID: HP-03	
Sample Location: HYDE PARK LAKE	
Latitude (dec. deg.): 43.09901	
Longitude (dec. deg.): 79.02493	
Depth (m): 6'	

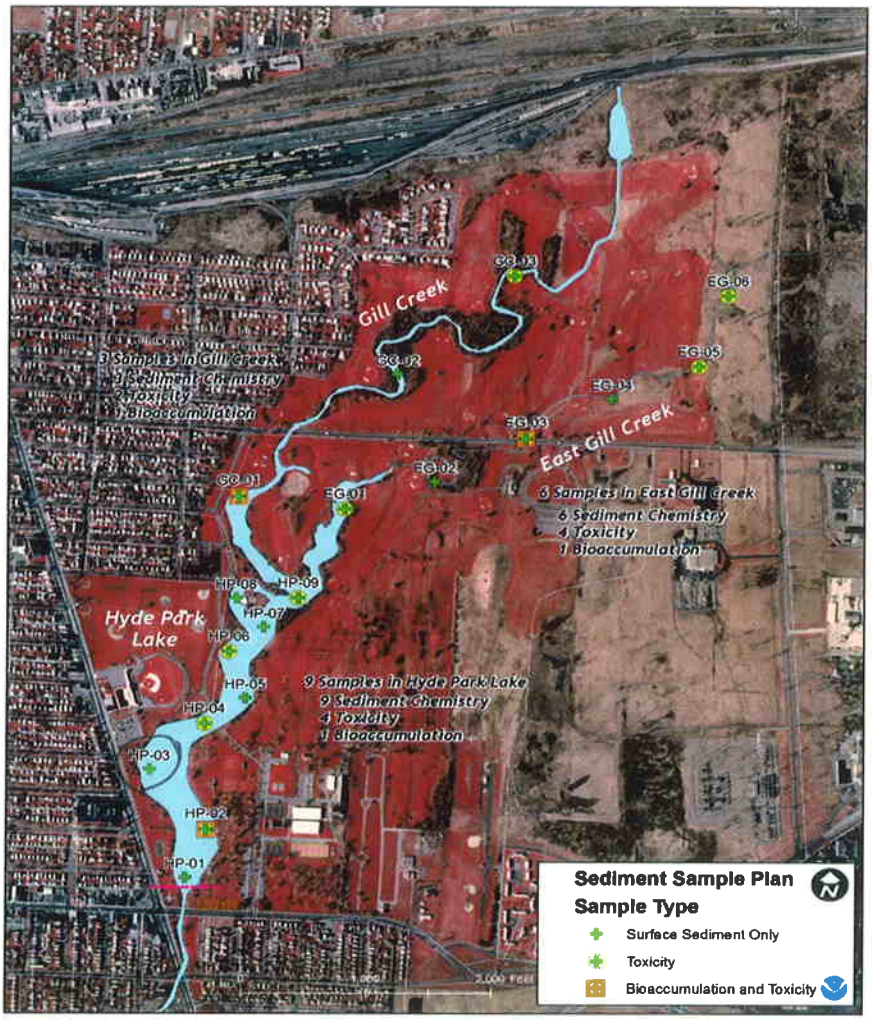
Tests Requested	(Check each)	Volume Collected
Chemistry	☒	is sufficient
Bioassays	☒	is ok
Bioaccumulation	☒	is very good.

Other Notes: fine, smelly, organic, grey mud

Collection location sketch and description:

- deviated from planned analyses – sed/tox/bioaccum

Mark sample locations on map

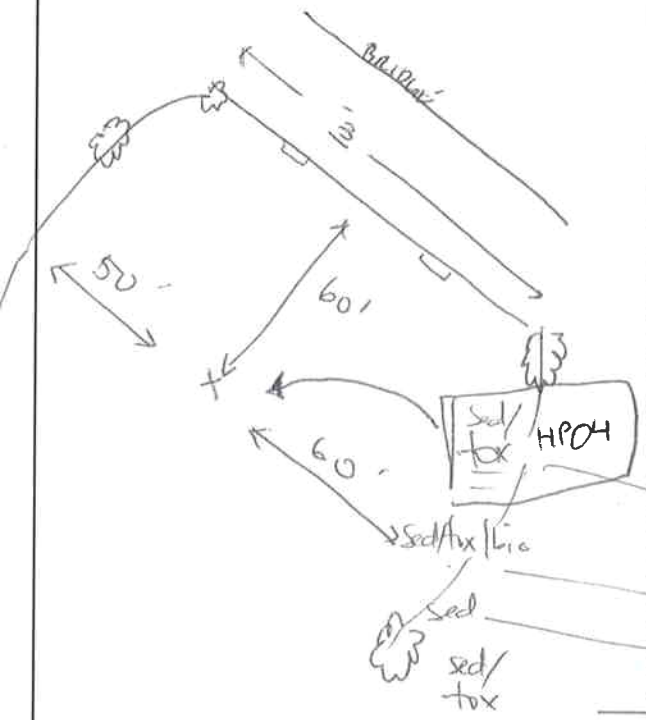


Field Data Collection Sheet

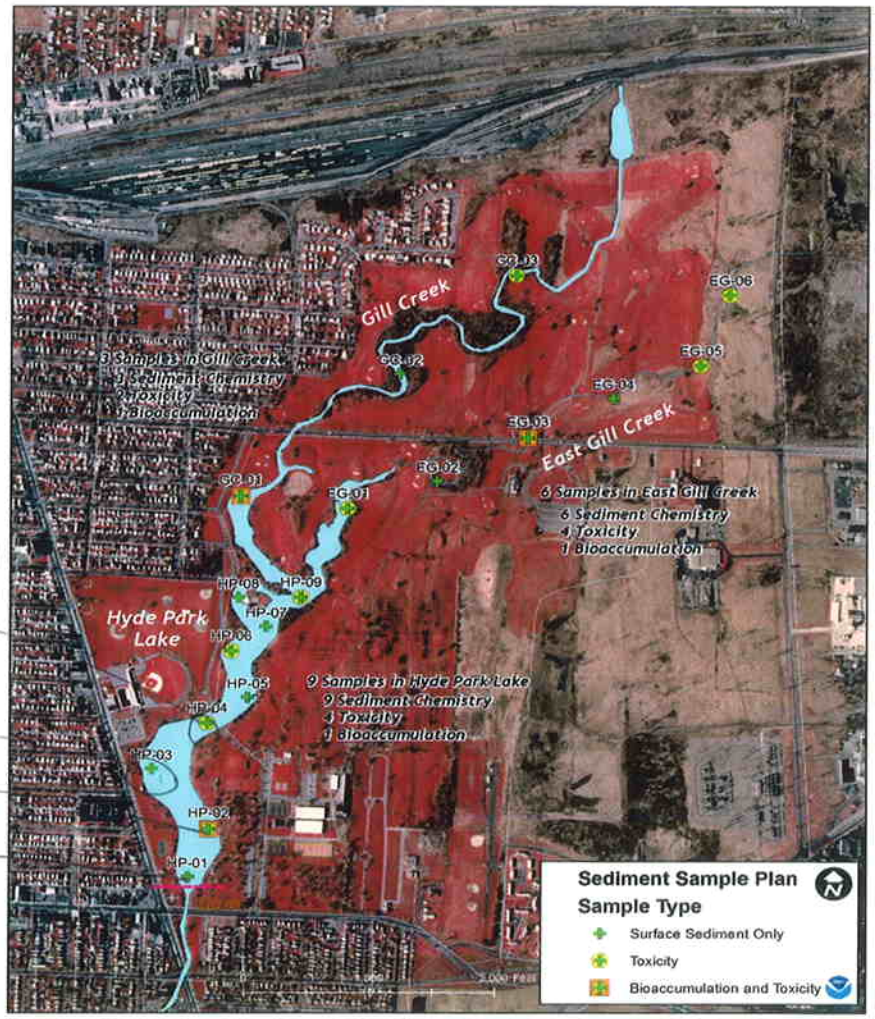
Project: Forest Glen Site, New York	**Personnel:** Rebecca Arenson, Jen Lawton (sample prep on dock), Ben Shorr, Megan Hilgart (Yachting)
Section/Reach: HP Lake	
Date: 09/12/05 MONDAY	
Time: 6:05 (1805)	
Sampling Equipment: PETITE PONAR	
Weather Conditions (sunny, cloudy, rainy, etc.): Partly sunny, wind 7-10 knts	**Photographs (file name or time):**
Sample ID: HP-04	**Tests Requested** / **(Check each)** / **Volume Collected**
Sample Location: H.P. Lake	**Chemistry** ☒
Latitude (dec. deg.): FORGOT GPS - LOCATION FROM DOQQ OR DRG	**Bioassays** ☒
Longitude (dec. deg.):	**Bioaccumulation** ☐
Depth (m): 7'	

Other Notes:

Collection location sketch and description:



Mark sample locations on map



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach:	Hyde Park		Jen Lawton
Date:	9/13/05		Ben Shorr
Time:	0940		Megan Hilgart

Sampling Equipment: Ponar

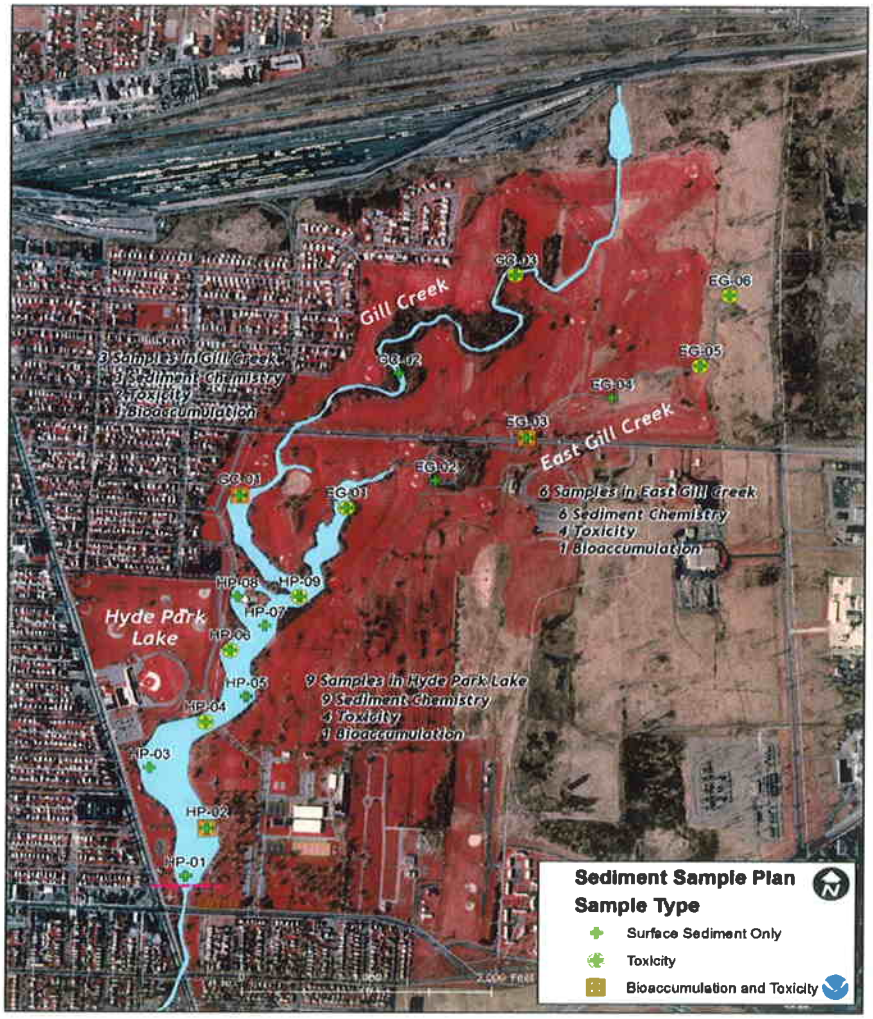
Weather Conditions (sunny, cloudy, rainy, etc.): Sunny	**Photographs (file name or time):**

Sample ID: HP-05	**Tests Requested**	**(Check each)**	**Volume Collected**
Sample Location: Hyde Park	**Chemistry**	☒	
Latitude (dec. deg.): N 43.100066	**Bioassays**	☐	
Longitude (dec. deg.): W -79.02206	**Bioaccumulation**	☐	
Depth (m): 6'			

Other Notes:

Collection location sketch and description:

Mark sample locations on map



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach:	HYDE PARK LAKE		Jen Lawton
Date:	09/13/05		Ben Shorr
Time:	10:10		Megan Hilgart

Sampling Equipment: petite Ponar

Weather Conditions (sunny, cloudy, rainy, etc.):

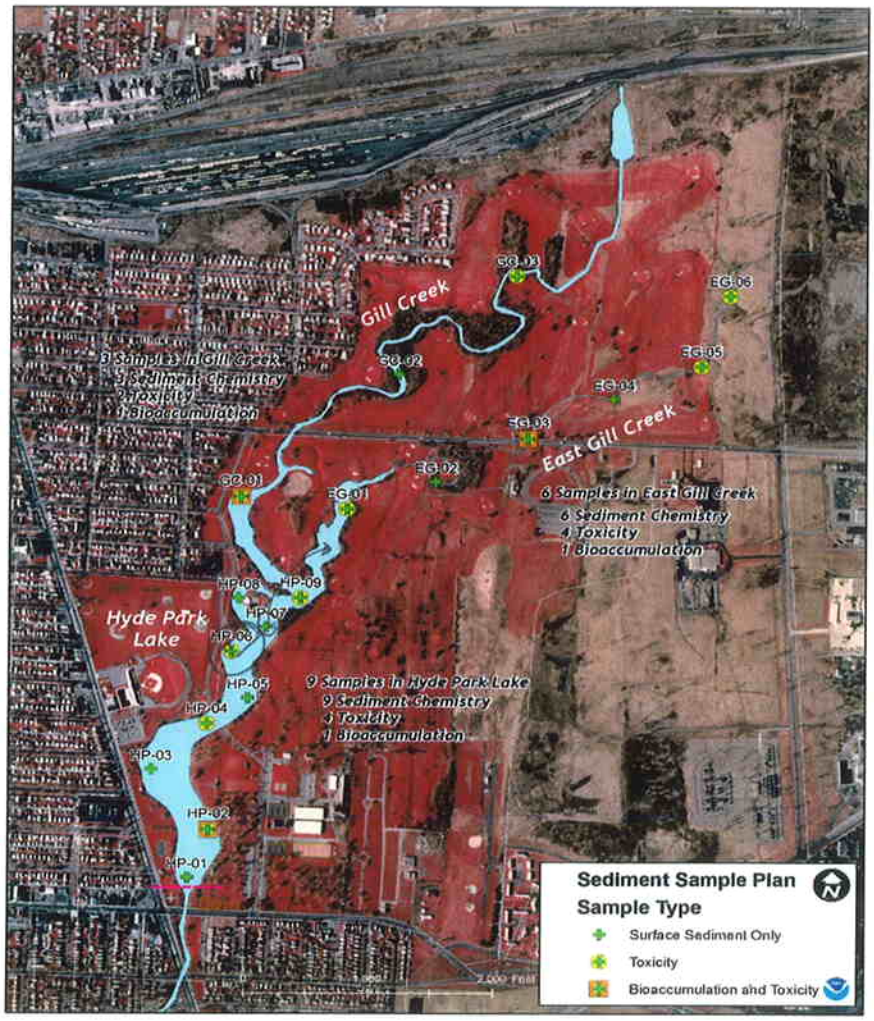
Photographs (file name or time):

Sample ID: HP-06	**Tests Requested**	**(Check each)**	**Volume Collected**
Sample Location: HP Lake	**Chemistry**	☒	
Latitude (dec. deg.): 43.10155	**Bioassays**	☒	
Longitude (dec. deg.): -79.02237	**Bioaccumulation**	☐	
Depth (m): ~~1~~ 7'			

Other Notes: changed to sediment only

Collection location sketch and description:

Mark sample locations on map



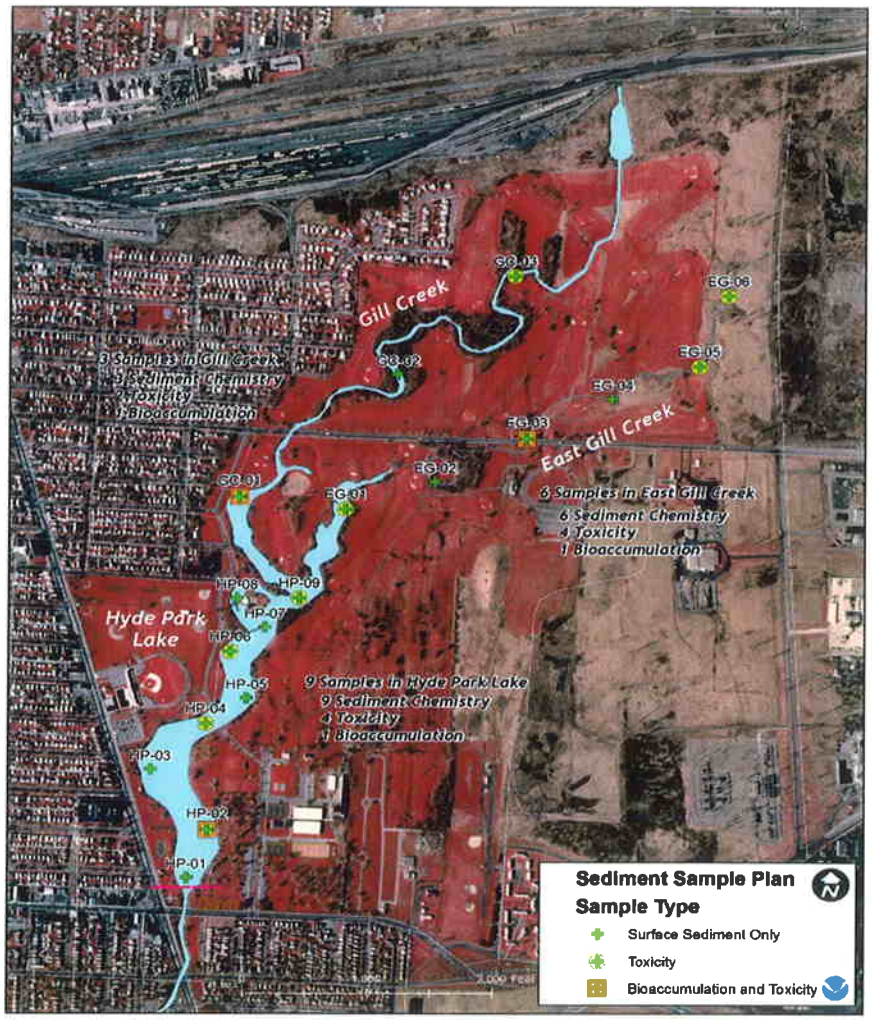
Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach:	HYDE PARK LAKE		
Date:	09/13/05		
Time:	10:26 am		
Sampling Equipment:			
Weather Conditions (sunny, cloudy, rainy, etc.):	sunny & 80°	**Photographs (file name or time):**	
Sample ID:	HP-07	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	HYDE PARK LAKE	**Chemistry**	☒
Latitude (dec. deg.):	43.10294	**Bioassays**	☐
Longitude (dec. deg.):	79.02261	**Bioaccumulation**	☐
Depth (~~m~~ ft):	6'		
Other Notes:			

Collection location sketch and description:

HP-07 LOCATION SHIFTED TO HP-08

Mark sample locations on map

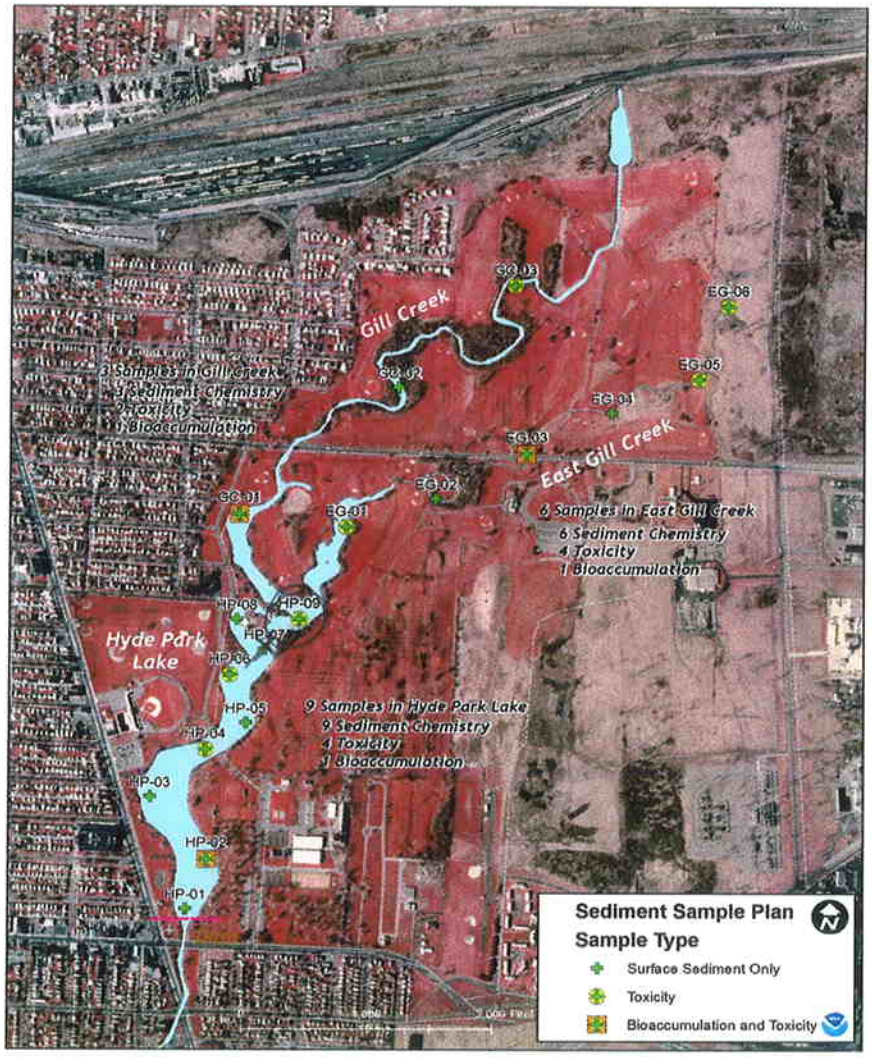


Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach	HYDE PARK LAKE		
Date:	09/13/05		
Time:	1052		
Sampling Equipment:	Petite Ponar		
Weather Conditions (sunny, cloudy, rainy, etc.):	Sunny	**Photographs (file name or time):**	
Sample ID:	HP -08	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	HP Lake	**Chemistry**	☒
Latitude (dec. deg.):	N43.10284	**Bioassays**	☒
Longitude (dec. deg.):	W079.02090	**Bioaccumulation**	☐
Depth (m):	7'		

Other Notes: GPS reading @ 1112

Collection location sketch and description: *Mark sample locations on map*



Field Data Collection Sheet

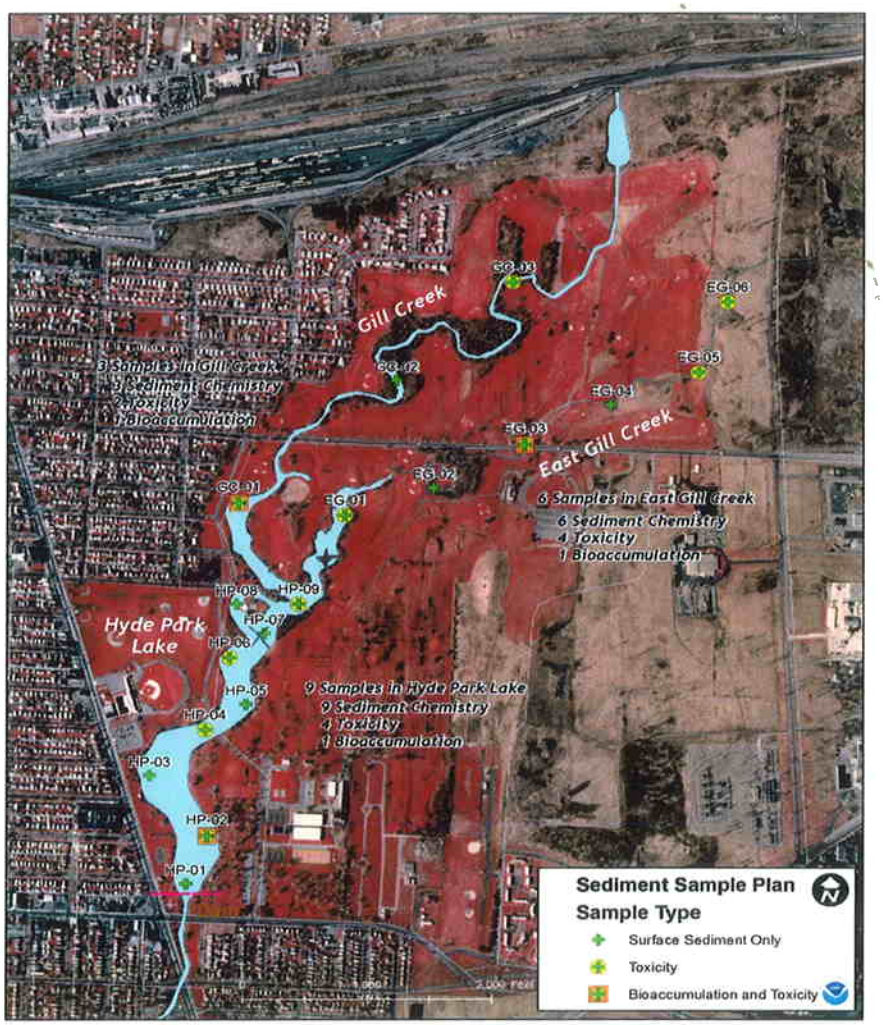
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach:	HYDE PARK LAKE / EAST GILL CREEK		Jen Lawton
Date:	09.13.05		Ben Shorr
Time:	11:50		Megan Hilgart
Sampling Equipment:	Petite Ponar		
Weather Conditions (sunny, cloudy, rainy, etc.):		**Photographs (file name or time):**	
Sample ID:	~~HP-09~~ HP09	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:		**Chemistry**	☒
Latitude (dec. deg.):	43.10403	**Bioassays**	☐
Longitude (dec. deg.):	-79.02010	**Bioaccumulation**	☐
Depth (m):	ft.		

Other Notes: * on East Gill Creek / Hyde Park Lake

Collection location sketch and description:

Mark sample locations on map

* changed location
* still sed chem only and labeled HP09 for simplicity



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach:	East Gill Creek		Jen Lawton
Date:	9/13/05		Ben Shorr
Time:	1212		Megan Hilgart

Sampling Equipment: Ponar

Weather Conditions (sunny, cloudy, rainy, etc.): Sunny

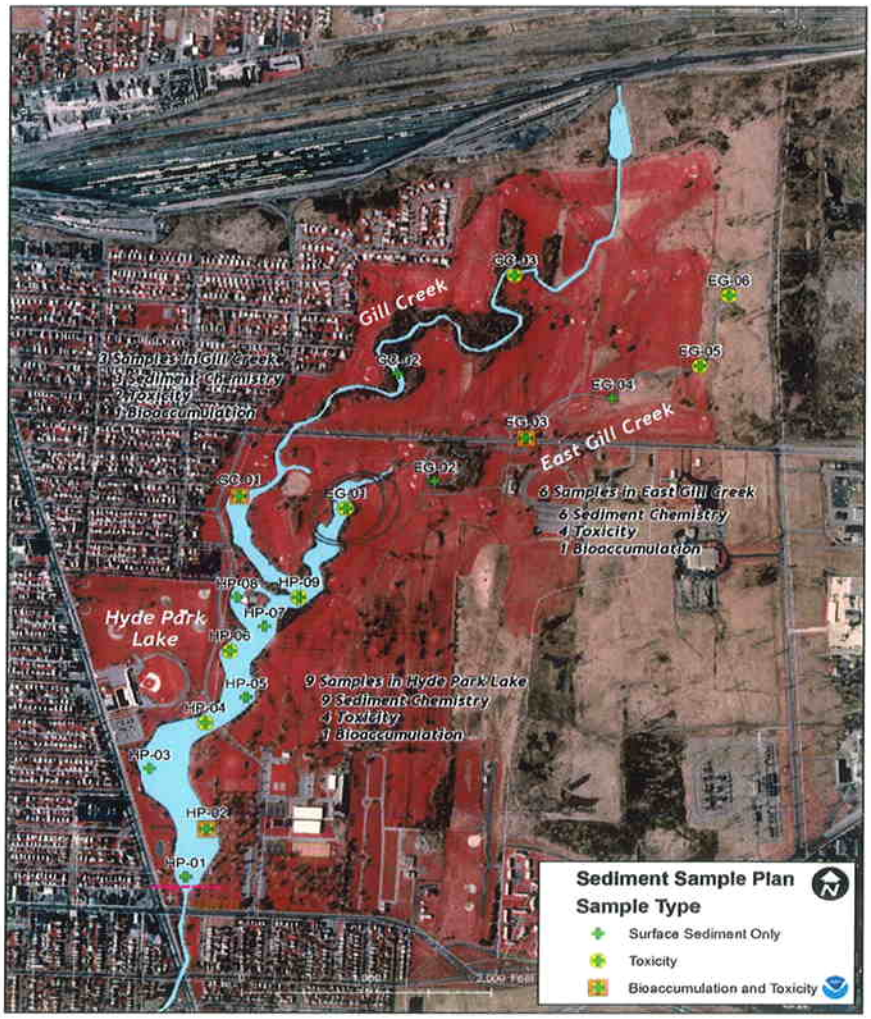
Photographs (file name or time):

Sample ID:	EG-01	**Tests Requested**	**(Check each)**	**Volume Collected**
Sample Location:	East Gill Creek	**Chemistry**	☒	
Latitude (dec. deg.):	N43.10533	**Bioassays**	☒	
Longitude (dec. deg.):	W79.01958	**Bioaccumulation**	☐	
Depth (m):	6'			

Other Notes: Frequent organic material (leaves)

Collection location sketch and description:

Mark sample locations on map



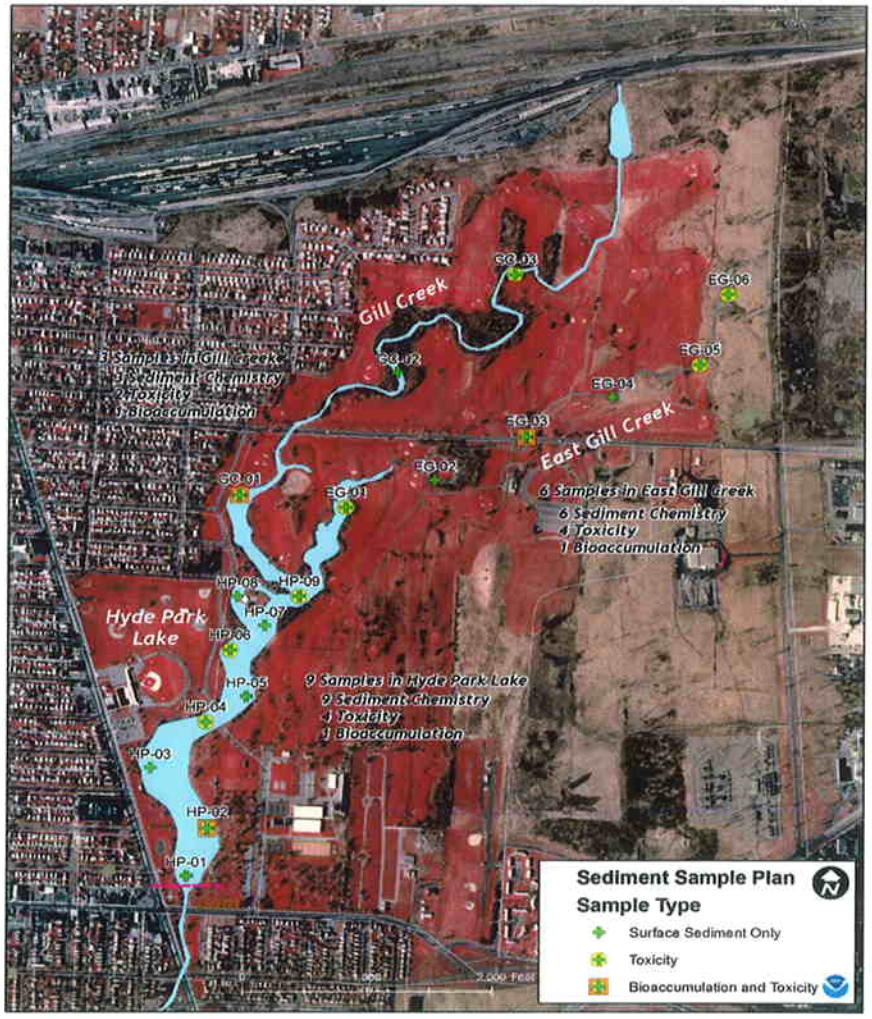
Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach:	GC - Gill Creek		Jen Lawton
Date:	9/13/05		Ben Shorr
Time:	1252		Megan Hilgart
Sampling Equipment:	Ponar		
Weather Conditions (sunny, cloudy, rainy, etc.):	Sunny	**Photographs (file name or time):**	
Sample ID:	GC-01	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	Gill Creek	**Chemistry**	☒
Latitude (dec. deg.):	~~N 43.10493~~ N 43.10517	**Bioassays**	☒
Longitude (dec. deg.):	~~W 79.02246~~ W079.02265	**Bioaccumulation**	☒
Depth (m):	6'		

Other Notes: Frequent organic material (leaf litter)

Collection location sketch and description:

Mark sample locations on map



Field Data Collection Sheet

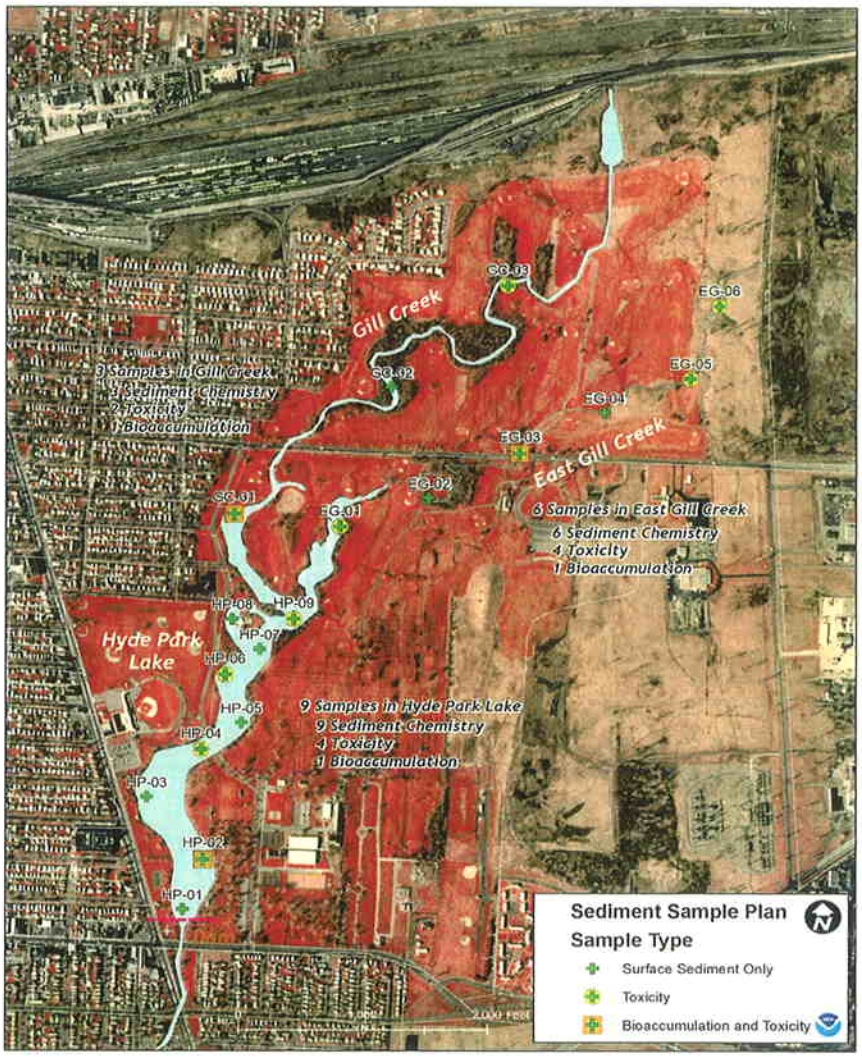
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach			
Date:	09/14/05		
Time:	1:30 (1330)		
Sampling Equipment:	hand shovel		
Weather Conditions (sunny, cloudy, rainy, etc.):	sunny / cloudy	**Photographs (file name or time):**	
Sample ID:	EG-02	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	East Gill Creek	**Chemistry**	☒
Latitude (dec. deg.):	43.10633	**Bioassays**	☒ No Chem only
Longitude (dec. deg.):	79.01781	**Bioaccumulation**	☐
Depth (m):	(4) 1'		

Other Notes:
10' wide stream. bank rip-rapped

Collection location sketch and description:

Mark sample locations on map

south of porter rd.,
between the 5 & 9th holes



Field Data Collection Sheet

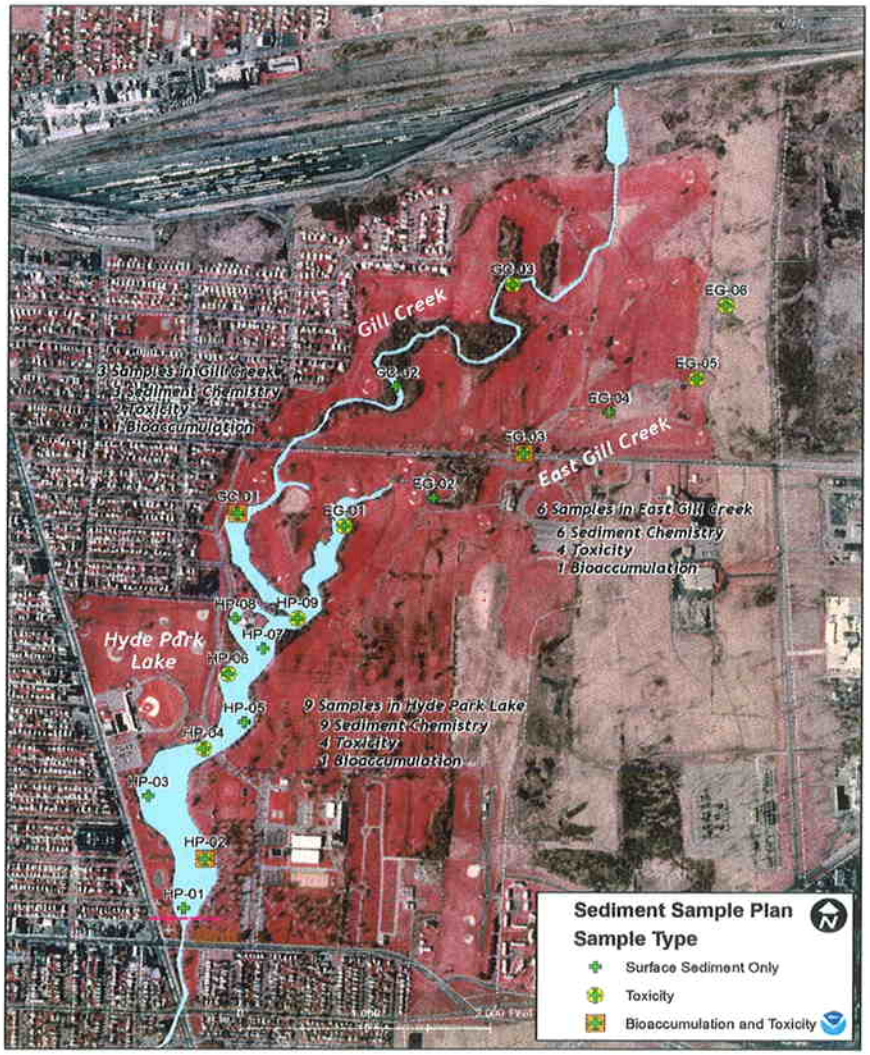
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach	East Gill Creek		
Date:	09/14/05		
Time:	1:10 pm (1310)		
Sampling Equipment:	hand shovel		
Weather Conditions (sunny, cloudy, rainy, etc.):		**Photographs (file name or time):**	
Sample ID:	EG-03	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	East Gill Creek just So. of Porter	**Chemistry**	☒
Latitude (dec. deg.):	43.10689	**Bioassays**	☒
Longitude (dec. deg.):	79.01546	**Bioaccumulation**	☐
Depth (m):	1'		

Other Notes:

Collection location sketch and description:

Just south of Porter Rd.
very organic, sheen on surface of water.
15' wide stream

Mark sample locations on map



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach	East Gill Creek		
Date:	09/14/05		
Time:	200 (1400)		
Sampling Equipment:	hand trowel		
Weather Conditions (sunny, cloudy, rainy, etc.):	sunny kind of.	**Photographs (file name or time):**	
Sample ID:	EG04	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:		**Chemistry**	☒
Latitude (dec. deg.):	43.10890	**Bioassays**	☒
Longitude (dec. deg.):	79 01052	**Bioaccumulation**	☐
Depth (m):	0		

Other Notes: phragmites, cattail band 15' wide, ~~mostly~~ dry mud. worms and bugs

Collection location sketch and description:

- actually nearby the planned location
- pictures: @ 1413

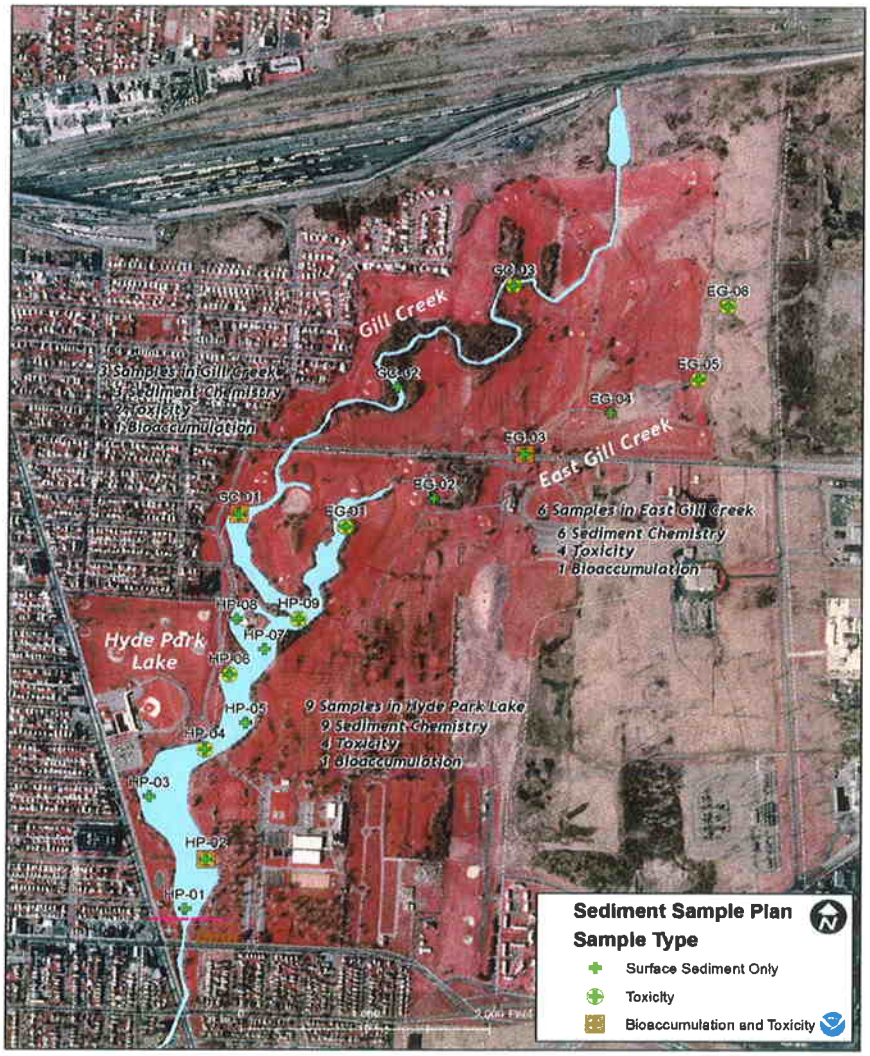
0608.JPG → 0609 @ EG-04

0610 → actual sample location

- near EG-05 looking E.

0612 :

Mark sample locations on map



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach	East Gill Creek		Jen Lawton
Date:	09/14/05		Ben Shorr
Time:	1030		Megan Hilgart
Sampling Equipment:	Hand Shovel		
Weather Conditions (sunny, cloudy, rainy, etc.):		**Photographs (file name or time):**	
Sample ID:	EG05	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	East Gill Creek (East of crossing)	**Chemistry**	☒
Latitude (dec. deg.):	43.10944	**Bioassays**	☒
Longitude (dec. deg.):	79.00890	**Bioaccumulation**	☒
Depth (m):	0		

Other Notes:

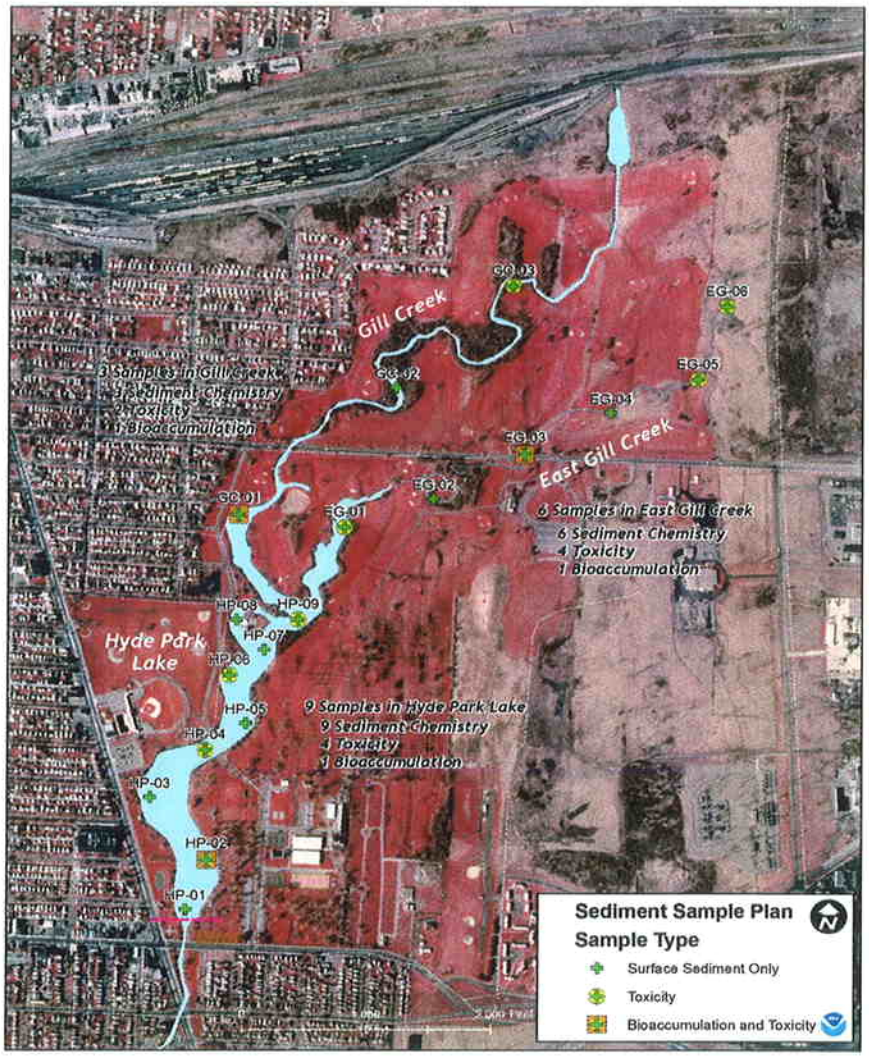
Collection location sketch and description:

Mark sample locations on map

GPS: 5009 @ Bridge on East Gill Creek

5010 @ EG05

Lots of REEDS - No water



Field Data Collection Sheet

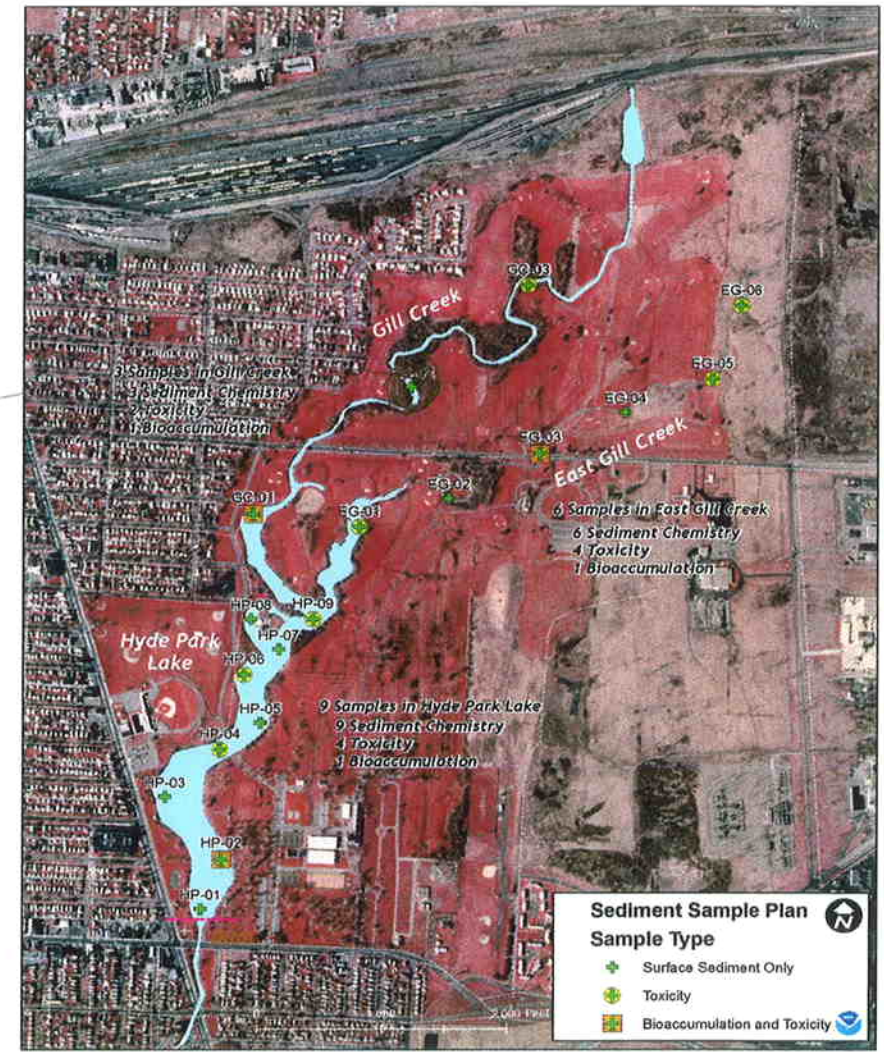
Project: Forest Glen Site, New York	**Personnel:** Rebecca Arenson, Jen Lawton, Ben Shorr, Megan Hilgart (sample prep: Rebecca Arenson, Jen Lawton; in stream: Ben Shorr, Megan Hilgart)
Section/Reach GILL CREEK	
Date: 09/14/05	
Time: 9:00 am	
Sampling Equipment: HAND SHOVEL	
Weather Conditions (sunny, cloudy, rainy, etc.): Sunny 80	**Photographs (file name or time):**
Sample ID: GC-02	**Tests Requested** (Check each) / **Volume Collected**
Sample Location: GILL CREEK	**Chemistry** ☒
Latitude (dec. deg.): 43.11030	**Bioassays** ☐
Longitude (dec. deg.): 79.01797	**Bioaccumulation** ☐
Depth (m): 1-2'	

Other Notes:
River width ≈ 20' bank height 2-4 ft.

Collection location sketch and description:

- ON GOLF COURSE
- ~~25' OFF CREEK~~
- ~ 75' OFF GPS LOCATION
- Frequent organic material (leaf litter, branches)
- LOTS OF MOSQUITOES

Mark sample locations on map



Field Data Collection Sheet

Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach	GILL CREEK	sample prep	Jen Lawton
Date:	09/14/05		Ben Shorr
Time:	930	in stream	Megan Hilgart

Sampling Equipment: hand shovel

Weather Conditions (sunny, cloudy, rainy, etc.): sunny, 80	**Photographs (file name or time):**

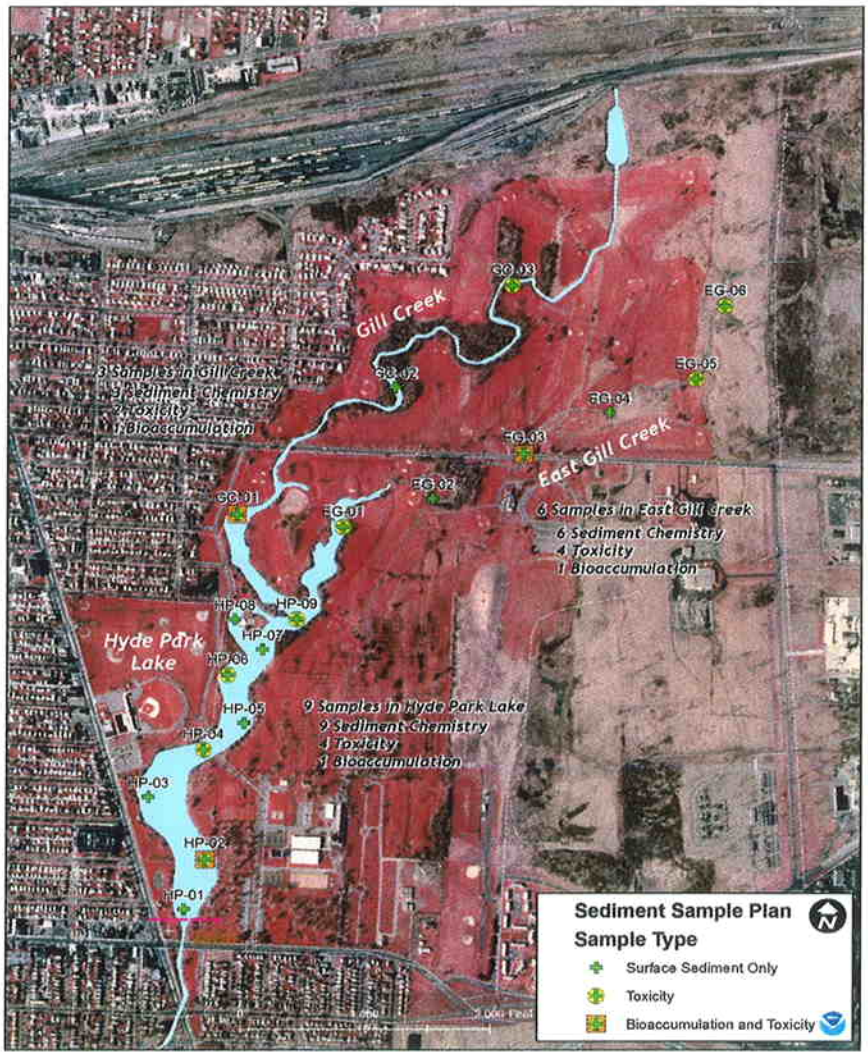
Sample ID: GC-03	**Tests Requested**	**(Check each)**	**Volume Collected**
Sample Location: GILL CREEK	**Chemistry**	☒	OK
Latitude (dec. deg.): 43.11306	**Bioassays**	☒	OK
Longitude (dec. deg.): 79.01186	**Bioaccumulation**	☐	
Depth (m): (ft) 2-3'			

Other Notes: GPS location: 500'S

Collection location sketch and description:

- Below holding pond.
- less fines - more gravel
- some aquatic vegetation (grasses)
surface "scum" and tires

Mark sample locations on map



Field Data Collection Sheet

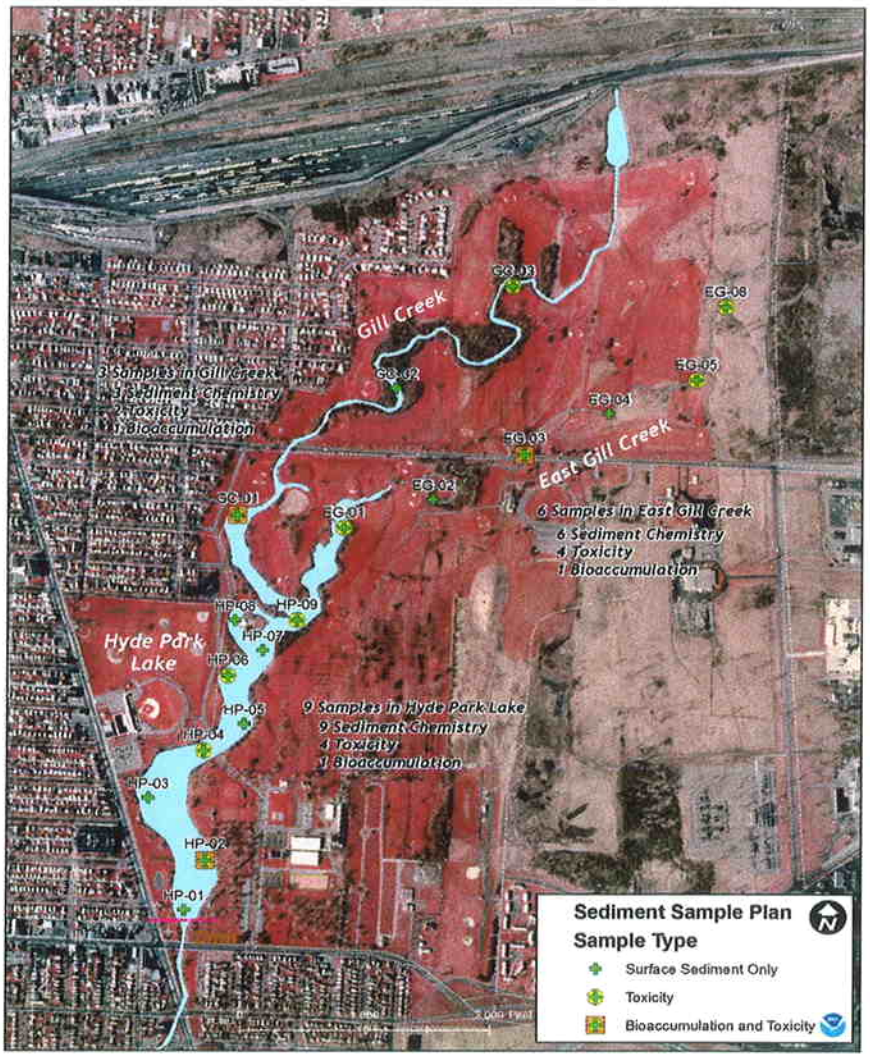
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson
Section/Reach	East Gill Creek		Jen Lawton
Date:	09/14/05		Ben Shorr
Time:	5:55 pm (1755)		Megan Hilgart
Sampling Equipment:	hand shovel		
Weather Conditions (sunny, cloudy, rainy, etc.):	cloudy. rain soon	**Photographs (file name or time):**	
Sample ID:	EG-09	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:		**Chemistry**	☒
Latitude (dec. deg.):	43.10689	**Bioassays**	☐
Longitude (dec. deg.):	79.01546	**Bioaccumulation**	☐
Depth (m):	( )		

Other Notes:

DUPE FOR EG-03

Collection location sketch and description:

Mark sample locations on map



Field Data Collection Sheet

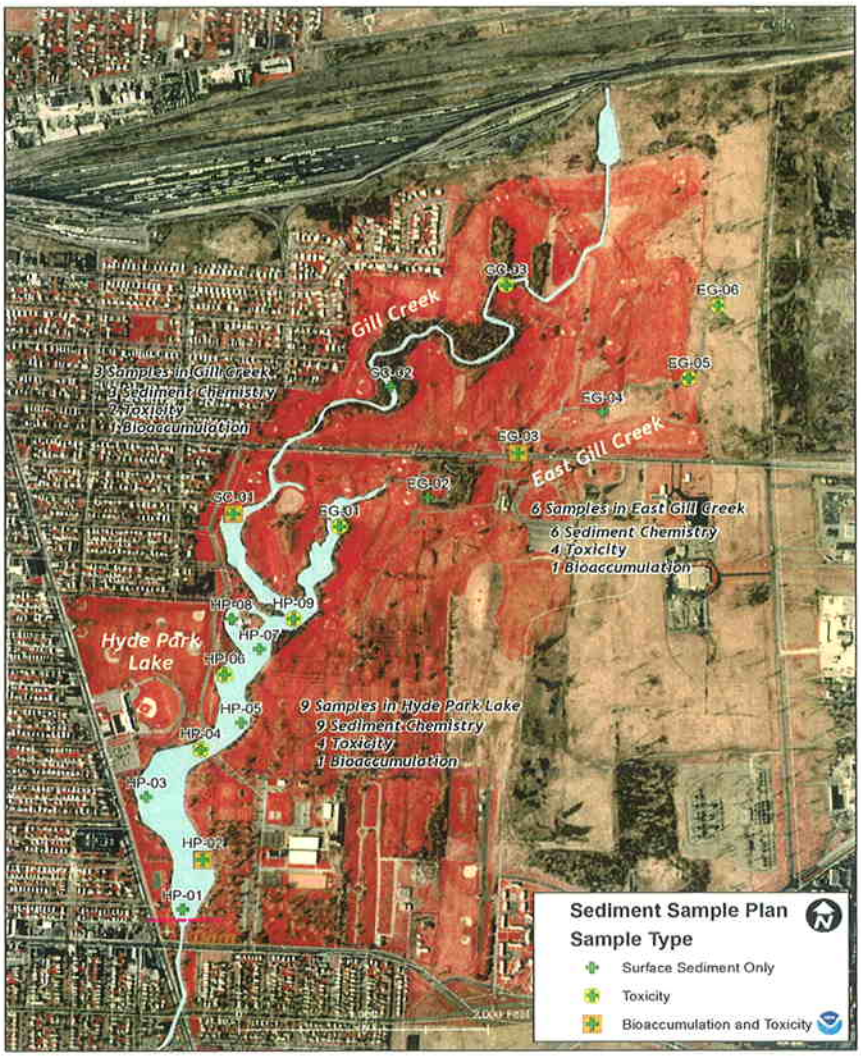
Project:	Forest Glen Site, New York	**Personnel:**	Rebecca Arenson Jen Lawton Ben Shorr Megan Hilgart
Section/Reach			
Date:	9/14/05		
Time:	6:30		
Sampling Equipment:	HAND SHOVEL		
Weather Conditions (sunny, cloudy, rainy, etc.):	Sunnyish	**Photographs (file name or time):**	
Sample ID:	EG-10	**Tests Requested**	**(Check each)** / **Volume Collected**
Sample Location:	East Gill Creek	**Chemistry**	☒
Latitude (dec. deg.):	43.10633	**Bioassays**	☐
Longitude (dec. deg.):	79.01781	**Bioaccumulation**	☐
Depth (~~m~~):	1 ft		

Other Notes:

Collection location sketch and description:

Mark sample locations on map

DUPE FOR EG-02



APPENDIX B

Photographs

(Appendices are on attached CD as .pdf files.)

Photo 1. Sampling with petite ponar in Hyde Park Lake near sample location HP-01.

Photo 2. Gill Creek near sample location GC-02.

Photo 3. Gill Creek in Hyde Park Golf Course near sample location GC-03.

Photo 4. East Gill Creek near sample location EG-05.

Photo 5. Sampling at East Gill Creek at sample location EG-03.

APPENDIX C

Data Validation Reports

(Appendices are on attached CD as .pdf files.)

LABORATORY ANALYTICAL DATA VALIDATION REPORT

East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study

Sediment and Water Samples

Prepared for

RIDOLFI Inc.

Prepared by

Validata, LLC.

December 2005

1.0 INTRODUCTION

This report summarizes the validation of analytical results generated from field sampling in 2005, in support of the Forest Glen Subdivision Superfund Site Project, Niagara County, New York. Sampling and analyses were performed according to the *Field Sampling Plan for the East Gill Creek, Gill Creek, And Hyde Park Lake Characterization Study* (Ridolfi Inc. and NOAA, 2005) and the *Quality Assurance Project Plan (QAPP) for the East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study* (Ridolfi Inc. and NOAA, 2005).

The criteria applied for this validation are consistent with U.S. EPA SW-846 analytical methods, laboratory established criteria, and the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (*Functional Guidelines*), (U.S. EPA, 1999), *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (*Functional Guidelines*), (U.S. EPA, 2004b) and *U.S. EPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (*Functional Guidelines*), (U.S. EPA, 2002). Data qualifiers applied to sample results for this validation are in accordance with the *Functional Guidelines*; qualifiers applied are summarized below:

U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ: The analyte was not detected above the sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

In certain cases, the following flags were used by the lab:

Y – The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
E – The concentration exceeded the instrument calibration range.
P – The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interferences.
D – Dilution data, as reported for the polychlorinated dibenzodioxins and dibenzofurans (PCDDs/PCDFs).
K – Identifies a PCDD/PCDF target that could not be confirmed by virtue of not satisfying all method required criteria; the reported value may be interpreted as an estimated maximum analyte concentration.
L – Suffix code for PCDDs/PCDFs indicating the extract was given extra cleanup and reanalyzed.
W – Suffix code for PCDDs/PCDFs indicating the extract was diluted and reanalyzed.

2.0 TOTAL ORGANIC CARBON – Plumb 1981

Total Organic Carbon determinations were performed by Analytical Resources, Inc. (ARI) of Seattle, Washington, in accordance with the requirements of the QAPP.

Nineteen sediment samples were analyzed for total organic carbon. The laboratory provided U.S. EPA CLP style deliverables.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory data deliverables were complete. The samples were received at temperatures ranging from 6.2° C to 15° C. The recommended temperature of 4° ± 2° C was not met, however, since the samples are a solid matrix, no data were qualified due to the elevated cooler temperature. Sample integrity was considered maintained. The samples were analyzed within 28 days of collection.

Duplicate Analysis: Sample HP-01 was analyzed in duplicate per the laboratory SOP. The relative percent differences for the duplicate (%RPD) analyses was 15%, and was considered acceptable.

Result Quantitation and Reported Detection/Quantitation Limits: The laboratory bench sheets were reviewed for transcription errors; no errors noted.

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable.

Overall Assessment: All deliverables required by the project are present and data packages are complete. Sample conditions and holding times are considered acceptable. The duplicate analysis was within specification. Total organic carbon determination (quantitation) and method reporting limits are deemed sufficient. Overall analytical performance is considered acceptable, and data quality is sufficient for project use.

3.0 PESTICIDES – U.S. EPA SW-846, Method 8081A.

Pesticides analyses were performed by Analytical Resources, Inc. (ARI) of Seattle, Washington, in accordance with the requirements of the QAPP. The samples were analyzed using EPA SW-846 method 8081A.

Nineteen sediment and two water samples were analyzed for pesticides. The laboratory provided U.S. EPA CLP style deliverables.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory

data deliverables were complete. The samples were received at temperatures ranging from 6.2° C to 15° C. The recommended temperature of 4° ± 2° C was not met, however, since the samples are a solid matrix, with the exception of the rinsate blanks, no data were qualified due to the elevated cooler temperature. Sample integrity was considered maintained. Maximum holding times for extractables are specified as 14 /40 days (sample / extract maximum holding times) and 7 / 40 days for solids and waters, respectively. All extraction and analysis holding times were met.

Instrument Performance: The breakdown of 4,4'-DDT and endrin were evaluated at the beginning of every 12-hour shift and after the analysis of ten samples using a standard that contained 4,4'-DDT and endrin. The percent breakdown of the two compounds was <20%, and is acceptable. The laboratory case narrative noted one breakdown was unacceptable, however, upon review of the data, this was not found to be true.

Initial Calibration: Initial five point calibrations were performed for all pesticides, with varying concentrations depending on the compound. Retention windows were defined along with calibration factors for each compound at each calibration concentration. The relative standard deviations for the calibration factors in the initial calibrations were <20% per method 8081, demonstrating acceptable linearity.

Continuing Calibration: Per method 8081, calibration verification was performed every 12 hours. Calibration standards were injected after the analysis of ten samples and at the end of each analytical sequence. The average percent differences of the calibration verification solution were <15% and the individual compounds were <25% with the exception of one closing calibration, as noted in the laboratory case narrative. The samples were rerun with similar results. The original data were then reported, resulting in estimated qualification of heptachlor epoxide, endosulfan I, dieldrin, 4,4’-DDE, 4,4’-DDT, gamma-chlordane and alpha-chlordane for samples GC-01, GC-02, GC-03, EG-02, EG-03, EG-04, EG-05, EG-09 and EG-10.

Blanks: Method blanks were analyzed for each analytical group. Method blanks show no detections of target analytes above reporting limits.

Two rinsate samples were collected, RI-01 and RI-02. No target compounds were detected in the samples.

Internal Standards: Internal Standards were added to each sample: compounds 1-bromo-2-nitrobenzene, and hexabromobiphenyl. The response criteria being within limits of -50 to 100% of the area were met.

Surrogate Compound Performance: Surrogate compounds tetrachloro-m-xylene and decachlorobiphenyl were added to each sample prior to analysis to assess analytical performance on each sample. Acceptance limits were 11-108%R for tetrachlorometaxylene and 18-128%R for decachlorobiphenyl. All surrogate recoveries are within limits.

Matrix Spike/Matrix Spike Duplicate Analyses: Matrix spike and matrix spike duplicate analyses was performed on sample GC-03. All target compounds were spiked at a concentration of 19.5/19.6 or 9.74/9.78 ppb. The acceptance limits are as follows:

Compound	Acceptance Limits (%R) Water	Acceptance Limits (%R) Sediment
g-bhc	15-131	21-124
Heptachlor	50-119	21-132
Aldrin	54-110	23-135
Dieldrin	53-127	17-158
Endrin	62-145	12-166
4,4'-DDT	42-125	12-160

All MS/MSD recoveries were acceptable.

Laboratory Control Samples: One spiked blank (LCS) and one spiked blank pair (LCS/LCSD) were analyzed. The acceptance limits are as follows:

Compound	Acceptance Limits (%R) Water	Acceptance Limits (%R) Sediment
g-bhc	45-11	42-111
Heptachlor	44-106	38-122
Aldrin	37-111	37-120
Dieldrin	52-121	48-125
Endrin	49-127	47-133
4,4'-DDT	45-128	42-140

All LCS recoveries were acceptable.

Target Compound Identification and Reporting Limits: The compounds reported are within established retention time windows. The laboratory reported several compounds with a Y qualifier, indicating the method detection limit is elevated because matrix interference prevented adequate resolution of the target compound at the reporting limit.

System Performance: System and analytical performance was evaluated by the breakdown of 4,4'-DDT in addition to a review of chromatograms and quantitation reports. No problems identified during review of the raw data. No abrupt baseline shifts were identified during chromatogram review.

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable.

Overall Assessment: All deliverables required by the project are present and data packages are complete. Recommended sample holding times and conditions were met. Calibration

requirements were met and acceptable with the exception of qualified data as noted above. The internal standard criteria were met. The matrix spike and LCS/LCSD results are acceptable. Method blanks show no detection of target analytes. Compound identification and quantitation are acceptable as qualified. Overall analytical performance is considered acceptable, and data quality is sufficient for project use.

4.0 POLYCHLORINATED BIPHENYLS – U.S. EPA SW-846, Method 8082.

Polychlorinated biphenyls (PCBs) analyses were performed by Analytical Resources, Inc. (ARI) of Seattle, Washington, in accordance with the requirements of the QAPP. The samples were analyzed for PCBs using EPA SW-846 method 8082.

Nineteen sediment and two water samples were analyzed for PCBs. The laboratory provided U.S. EPA CLP style deliverables for all sample delivery groups.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory data deliverables were complete. The samples were received at temperatures ranging from 6.2° C to 15° C. The recommended temperature of 4° ± 2° C was not met, however, since the samples are a solid matrix, no data were qualified due to the elevated cooler temperature. Sample integrity was considered maintained. Maximum holding times for extractables are specified as 14 /40 days (sample / extract maximum holding times) and 7 / 40 days for solids and waters, respectively. All holding time criteria were met.

Initial Calibration: Initial five point calibrations were performed for Aroclors 1016 and 1260 at 20, 100, 250, 500 and 1000 ppb. Single standards of each of the other Aroclors were also analyzed at 500 ppb. Calibration factors for each Aroclor were established. The percent relative standard deviations for the calibration factors in the initial calibrations were <20%, demonstrating acceptable linearity.

Continuing Calibration: Calibration verification was performed every 12 hours or every 10 samples. Five hundred ppb standards were injected at the required frequency and at the end of each analytical sequence. The percent difference for the continuing calibrations were <15%, with the following exceptions:

AR1260 and AR1016 for the continuing calibration analyzed on 9/29/05, which resulted in estimated qualification of AR1260 and AR1016 for HP-09, EG-01, GC-01, GC-02, GC-03, EG-02, EG-03, EG-04, EG-05, EG-09 and AR1260 for EG-10.

Blanks: Method blanks were analyzed for each analytical group. Method blanks show no detections of target analytes above reporting limits.

Two rinsate samples were collected, RI-01 and RI-02. No target compounds were detected in the samples.

Surrogate Compound Performance: Surrogate compounds decachlorobiphenyl and tetrachlorometaxylene were added to each sample prior to analysis to assess analytical performance on each sample. Acceptance limits for the analyses are as follows:

Compound	Acceptance Limits (%R) Water	Acceptance Limits (%R) Sediment
decachlorobiphenyl	25-134	30-164
tetrachlorometaxylene	25-118	26-143

All surrogate recoveries are acceptable with the exception of decachlorobiphenyl for HP-06 and EG-09, resulting in estimated qualification of all compounds for these two samples.

Internal Standards: Internal Standards were added to each sample: compounds 1-bromo-2-nitrobenzene, and hexabromobiphenyl. The response criteria being within limits of -50 to 100% of the area were met with the exception of low response for internal standard 1-bromo-2-nitrobenzene for sample EG-10, resulting in estimated qualification of all compounds.

Matrix Spike/Matrix Spike Duplicate Analyses: Matrix spike and matrix spike duplicate analyses were performed on EG-10. Analyte spike concentrations for Aroclors 1016 and 1260 are 200 µg/kg. Results were acceptable.

Laboratory Control Samples: LCS samples were analyzed with acceptable results. The acceptance windows for the analysis are as follows:

Compound	Acceptance Limits (%R) Water	Acceptance Limits (%R) Sediment
Aroclor 1016	28-120	27-135
Aroclor 1260	28-120	27-135

Target Compound Identification and Reporting Limits: There were no problems noted during review of the chromatograms. The relative percent difference is greater than 40% between the two analytical columns (primary and confirmation) for several compounds. As a result, the following results are qualified as estimated:

Sample	Compound	Qualification
HP-04, HP-06	AR1260	J
GC-01, GC-03, EG-04	AR1254	J

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable.

System Performance: The chromatograms were reviewed for baseline shifts, Aroclor patterns and general instrument response. No problems were identified during review of the raw data.

Overall Assessment: All deliverables required by the project are present and data packages are complete. Recommended sample holding times and conditions were met. Initial and continuing calibration requirements were acceptable with exceptions noted above. Method blanks show no presence of target analytes. Compound identification and quantitation is acceptable. The percent difference between the primary and confirmation column for detected compounds was acceptable, with noted exceptions. Raw data show no indications of system performance degradation. The MS/MSD and LCS recoveries were acceptable. The internal standard recoveries were acceptable with noted exceptions. Overall analytical performance is considered acceptable, and data quality is sufficient for project use.

5.0 METALS ANALYSES – U.S. EPA SW-846 Methods.

Metals analyses were performed by Analytical Resources, Inc. (ARI) of Seattle, Washington in accordance with the requirements of the QAPP. All samples were analyzed according to the U.S. EPA referenced methods. Aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, vanadium and zinc were analyzed by the Inductively Coupled Plasma–Atomic Emission Spectrometry method (ICP–AES, Method 6010B). Arsenic, lead, selenium and thallium were analyzed by the Inductively Coupled Plasma–Mass Spectrometry method (ICP-MS, Method 200.8). Mercury was analyzed by the Cold Vapor Atomic Absorption method (CVAA, Method 7471A).

Nineteen sediment and two water samples were analyzed for metals. The laboratory provided U.S. EPA CLP style deliverables for all sample delivery groups.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory data deliverables were complete. The samples were received at temperatures ranging from 6.2° C to 15° C. The recommended temperature of 4° ± 2° C was not met; however, since the samples are a solid matrix, no data were qualified due to the elevated cooler temperature. Sample integrity was considered maintained. All analyses were performed within the recommended holding times – mercury 28 days; other metals 180 days.

Initial Calibration: The laboratory performed initial instrumental calibrations daily using at least the minimum required number of data points to establish the analytical curve for each method: a blank and one standard for ICP analyses and a blank and five standards for mercury analyses. Correlation coefficients for all mercury initial calibrations are ≥ 0.995, as required.

Initial Calibration Verification: The laboratory performed initial calibration verification checks (ICVs) immediately after initial instrumental calibrations during all ICP and mercury

analytical sequences, as required. All ICV recoveries are within acceptance limits (90–110% for ICP and 80–120% for mercury). A spot check of ICV recoveries shows no calculation errors.

Continuing Calibration Verification: The laboratory analyzed continuing calibration verification standards (CCVs) at the required frequency for all ICP and mercury analytical sequences (at the beginning and end of each run; at a frequency of ≥ 10% or every two hours, whichever is more frequent). All CCV recoveries are within acceptance limits (90–110% for ICP and 80–120% for mercury). A spot check of CCV recoveries shows no calculation errors.

Blanks: Initial calibration blanks (ICBs) were analyzed immediately after ICVs, and continuing calibration blanks (CCBs) were analyzed immediately after CCVs during all ICP and mercury analytical sequences, as required. The CLP *Functional Guidelines* require that positive sample results less than 5 times the amount in any blank be qualified as "U" (quantitation limit). All positive sample results associated with blank positive results are greater than 5 times the amount in an associated calibration blank.

Preparation blanks were analyzed for all target analytes at the required frequency (one per matrix per preparation batch). The CLP *Functional Guidelines* require that positive sample results less than 5 times the amount in the preparation blank be qualified as "U" (quantitation limit). The preparation blank contained zinc at 1 mg/kg, however, all positive sample results associated with the blank are greater than 5 times the amount reported in the preparation blank.

Two rinsate samples were collected, RI-01 and RI-02. Sodium was detected at low levels, not sufficiently elevated to warrant data qualification.

Interference Check Samples: ICP interference check solutions (ICS) were analyzed for the target analytes at the beginning of each ICP analytical run, as required by the method. Recoveries for all required target analytes in all check samples are within acceptance limits (80–120%). A spot check of ICS recoveries shows no calculation errors.

Laboratory Control Samples: One laboratory control sample (LCS) was analyzed with acceptable results. A spot check of LCS recoveries shows no calculation errors.

Duplicate Sample Analyses: One laboratory duplicate sample was analyzed for the target analytes at the required frequency (at least one sample per preparation batch). Acceptance limits applied in this evaluation of duplicate sample analyses are in accordance with the requirements of the U.S. EPA *Functional Guidelines* (results ≥5X the reporting limit, ≤20% Relative Percent Difference (RPD); results <5X the reporting limit ±1X the reporting limit). Results of all duplicate analyses meet these criteria with the exception of the duplicate analysis for cadmium, which resulted in J/UJ qualification of cadmium for all sediment samples. A comparison of raw data and reporting forms shows no transcription errors. A recalculation of RPDs shows no calculation errors.

Matrix Spike Sample Analyses: One water sample (RI-01) and one sediment sample (HP-01) were analyzed for matrix spike analyses. Samples were spiked at CLP–specified concentrations. CLP acceptance limits for matrix spike recovery are 75–125% and are applicable only to those samples in which the sample concentration does not exceed four times the spike concentration. Matrix spike recoveries are acceptable with the following exceptions:

Spike Sample	Compound	Qualification
HP-01	Antimony	J/UJ

All samples in the related SDGs were qualified as estimated (J) in accordance with the *Functional Guidelines*. A comparison of raw data and reporting forms shows no transcription errors. A recalculation of recoveries shows no calculation errors.

ICP Serial Dilution: Although not required by Method 6010B, at least one sample was serially diluted and analyzed. Results greater than 50x IDL agree within 10%D (Difference).

Reported Detection/Quantitation Limits: Reported quantitation limits were acceptable. There were no transcription errors identified.

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable with the exception of pair EG-02/EG-10 for potassium (46% RPD).

Overall Assessment: All deliverables required by the project are present and data packages are complete. All analyses meet recommended sample holding times. Initial and continuing calibration verification standards and blanks are acceptable. The ICB/CCBs did not contain target analytes. The preparation blank contained zinc, however, associated results are greater than 5 times the blank results and are acceptable. Recoveries for interference check samples and laboratory control samples are acceptable. Laboratory duplicate sample analyses are acceptable with exceptions noted above. Antimony recovery in matrix spike sample resulted in data qualification as noted above. Reported quantitation or lower reporting limits are acceptable. Field replicates precision was acceptable with the exception of potassium; no data were qualified. Overall analytical performance is considered acceptable and the data quality is sufficient for project use.

6.0 SEMIVOLATILE ORGANICS ANALYSES – U.S. EPA SW-846, Method 8270D

Semivolatile organics analyses using Selective Ion Monitoring were performed by Analytical Resources, Inc. (ARI) of Seattle, Washington using Method 8270D**.**

Nineteen sediment samples and two water samples were analyzed for semivolatile organics, as summarized below: The laboratory provided U.S. EPA CLP style deliverables for all sample delivery groups.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory data deliverables were complete. The samples were received at temperatures ranging from 6.2° C to 15° C. The recommended temperature of 4± 2° C was not met, however, since the samples are a solid matrix, no data were qualified due to the elevated cooler temperature. Sample integrity was considered maintained. Maximum holding times for extractables were specified as 14 /40 days (sample / extract maximum holding times) and 7 / 40 days for solids and waters, respectively, at 4° C (±2° C). All extraction and analytical holding times were met.

GC/MS Tuning: GC/MS tune performance was checked using decafluorotriphenylphosphine (DFTPP) prior to all initial calibrations runs and all subsequent sample analytical runs. All sample analyses were performed within 12 hours of DFTPP analyses. All ion abundances and relative ion abundances met Functional Guidelines acceptance criteria. Review of mass spectral plots and associated mass listings supplied with the raw data, and transcription of mass data to Form V (GC/MS Tuning and Mass Calibration) showed no inconsistencies. No errors were identified during spot checks of calculations.

Initial Calibration: Initial multipoint calibrations were performed at 10, 50, 100, 200, 500 and 1000 ppb for all target compounds and surrogate compounds. The USEPA CLP *Functional Guidelines* specify that Average Relative Response Factors (Average RRFs) must be ≥0.05, and selected analytes must meet additional minimum RRF and maximum %RSD criteria (>30%). Average RRFs and %RSDs for all TCL compounds in all initial calibrations showed compliance with technical requirements.

Continuing Calibration: Continuing calibrations were performed for all TCL compounds at 25 µg/mL. The USEPA CLP *Functional Guidelines* specifies that RRFs must be ≥0.05, and compounds must meet a maximum percent difference (%D) criteria (≤25%). All RRFs and %Ds were in compliance.

Blanks: Analytical method blanks were analyzed at least once for each analytical group and matrix, as specified. Method blank results were acceptable.

Two rinsate samples were collected, RI-01 and RI-02. No target compounds were detected in the samples.

Surrogate Compound Performance: Surrogate compounds were added to each sample prior to analysis to assess analytical performance on each sample. Surrogate compounds and associated performance criteria for the analysis of TCL analytes were those specified in U.S. EPA Method SW-846 8270. Surrogate compound recovery specifications were as follows:

Compound	Acceptance Range (%) Water	Acceptance Range (%) Sediment
d10-2-Methylnaphthalene	29-112	27-106
D14-Dibenzo(a,h)anthracene	10-133	10-123

The U.S. EPA criteria for data qualification required more than one surrogate of a compound class to be outside specification (neutrals vs. acids). All surrogate recoveries were acceptable.

Matrix Spike/Matrix Spike Duplicate Analyses: Matrix spike (MS) and matrix spike duplicate (MSD) analysis was performed on water sample GC-03. Analyte spike concentration was 199 ppb. MS/MSD compounds and associated performance criteria for the analysis of TCL analytes were those specified in U.S. EPA Method SW-846 8270. Spike compound recovery specifications were:

Compound	Acceptance Range (%) Water	Acceptance Range (%) Sediment
Phenanthrene	32-130	16-145
Benzo(k)fluoranthene	10-124	10-166
Chrysene	33-135	10-156

The recoveries (%R) for the matrix spike analyses were acceptable.

Laboratory Control Samples: Laboratory control samples (LCSs) were analyzed per batch for the samples. LCS recovery specifications were as follows:

Compound	Acceptance Range (%) Water	Acceptance Range (%) Sediment
Phenanthrene	49-122	50-103
Benzo(k)fluoranthene	42-114	47-110
Chrysene	53-128	57-121

The LCS results were compared to the above criteria. The LCS concentrations were 300 ppb. LCS performance indicates the analytical systems were in control. All LCS recoveries were acceptable.

Internal Standards Performance: Five internal standards were added at a concentration of 20 ng/µL to all sample extracts prior to analyses, including quality control samples. Retention times (RT) for all internal standards were within method specified acceptance limits in all samples (±30 seconds). Internal standard areas were within method specified acceptance limits (0.5 to 2 times the 12-hour calibration standard area) for all samples with the following exceptions:

Internal Standard	Compounds	Sample	Qualification
Perylene-d12	Indeno(1,2,3cd)pyrene , dibenz(a,h)anthracene, Benzo(g,h,i)perylene	GC-03, EG-02, EG-03, EG-04, EG-05, EG-09, EG-10, GC-01Dil, GC-02Dil	J/UJ

TCL Compound Identification: Relative retention times (RRTs) for all reported TCL compounds were within the method specified acceptance limits (±0.06 RRT units). Mass spectra generally show good comparison with library reference spectra. Compounds reported above the calibration range were flagged by the laboratory with an 'E' and further qualified as J during data validation to indicate the reported concentration is considered estimated. The samples containing an E qualifier were analyzed at dilutions to bring the elevated concentrations into range of the instrumentation. The following samples were qualified for the calibration range exceedance:

Sample	Compounds	Qualification
GC-01, GC-02	Fluoranthene, pyrene, chrysene, benzo(b)fluoranthene , benzo(k)fluoranthene	J
HP-08	Fluoranthene	J

Compound Quantitation and Reported Detection / Quantitation Limits: The detection limits were acceptable as reported. There were no problems noted.

System Performance: Raw data showed no indication of degradation of system performance during or between analytical runs. Reconstructed ion chromatograms (RICs) showed no abrupt shifts in baseline, high background levels, excessive baseline rise with increased temperature, or other indications of system performance degradation.

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable with the exceptions as follows:

EG-02/EG-10: all compounds.
EG-03/EG-09: all compounds.

Overall Assessment: All deliverables required by the project were present and data packages were complete. The holding time criteria were met. GC/MS tuning requirements were met. Initial and continuing calibration requirements were acceptable. Internal standard (IS) performance was acceptable with exceptions noted above. Surrogate performance was acceptable. Compound identification and quantitation were acceptable with exceptions noted above. Raw data showed no indications of system performance degradation. Field replicates did not compare, however, data were not qualified based on the results of the comparison. Overall analytical performance was considered acceptable, and data quality sufficient for project use.

7.0 DIOXINS/FURANS – U.S. EPA Method 1613 Revision B.

Polychlorinated dibenzodioxins and dibenzofurans (PCDDs/PCDFs) analyses were performed by AXYS Analytical Services, Inc., of Sydney, British Columbia, Canada, in accordance with the requirements of the QAPP. The samples were analyzed for PCDDs/PCDFs by EPA Method 1613B.

Twenty sediment and two water samples were analyzed for PCDDs/PCDFs. The laboratory provided U.S. EPA CLP style deliverables for all sample delivery groups.

Sample Documentation, Custody and Holding Conditions / Times: All samples were handled and delivered to the laboratory according to chain-of-custody procedure. Laboratory data deliverables were complete. The laboratory noted on the sample receiving record that samples HP-06, HP-07 and HP-09 did not have the sample collection time written on the sample container. No action was taken since the sample time was documented on the chain-of-custody form. Also noted on the receiving record was a note that sample RI-02 consisted of two bottles whereas the custody documentation listed one bottle. An additional note indicated the water sample containers were too full to adequately freeze, therefore, water samples (RI-01 and RI-02) were stored in a refrigerator until extraction. The samples were received at 16° C, which is above the required shipping and storage requirement of 4° ±2° C. Per EPA guidance for PCDD/PCDF validation (EPA 2005), all the sample results were qualified as estimated (U or UJ). Maximum holding times for extractables were specified as 30 days/1 year (sample / extract maximum holding times) for both solids and waters, all extraction and analytical holding times were met.

Initial Calibration: Initial five point calibrations consisting of seventeen compounds and sixteen labeled compounds were performed, with the response ratios calculated and the %RSD reported. The percent relative standard deviations for the calibration factors in the initial calibrations were <30%, demonstrating acceptable linearity.

GC Resolution Criteria: The separation criteria of ≤25% valley measurement between compounds 2,3,7,8-TCDF and 2,3,4,7-TCDF was met.

Calibration Verification: Calibration verification was performed at the proper frequency and the standards, labeled standards and cleanup standard concentrations and ion abundance ratios were within the established limits. The relative retention times were within the QC limits established by the laboratory for standards and labeled standards.

Ongoing Precision and Accuracy: Three ongoing precision and accuracy (OPR) samples were analyzed per sample batch. Seventeen compounds and sixteen labeled compounds were analyzed at concentrations ranging from 10 to 100 ng/mL. The percent recoveries were within the laboratory established limits.

Blanks: Three procedural blanks were analyzed for each analytical group. The blanks contained low levels of target compounds, which were compared to the associated laboratory data. No sediment data were qualified for blanks since the concentrations in the samples were sufficiently elevated as compared to the blank concentrations. The water samples were qualified as 'U' for the following compounds for the indicated samples, due to blank contamination:

Sample RI-01 for 1,2,3,4,6,7,8-HPCDD, OCDD and OCDF.
Sample RI-02 for 1,2,3,4,6,7,8-HPCDD, OCDD and hepta-dioxin.

Labeled Compound Performance: Labeled compound performance was reviewed. The concentrations of the compounds were either 2000 or 4000 pg and the recoveries and the ion abundance ratios and RRTs were acceptable.

Laboratory Duplicates: Duplicate analysis was performed on sample EG-05. All compound relative percent differences were less than 35%, indicating acceptable analytical precision.

Target Compound Identification and Reporting Limits: The laboratory noted the following:

For sample GC-03, diphenylether interference and poor chromatography were noted, therefore additional cleanup and dilution prior to reanalysis was conducted.

For samples EG-02, EG-05, EG-10, poor chromatography was noted, therefore a dilution was made prior to reanalysis.

For samples EG-03, EG-04 and EG-09, interference and poor chromatography were noted, therefore additional cleanup and dilution prior to reanalysis was conducted.

For sample RI-01, a 'K' qualifier was reported by the laboratory for 1,2,3,4,6,7,8-HPCDD, OCDD and OCDF which indicated a peak was detected but did not meet the quantification criteria, the result represents the maximum possible concentration. These compounds were additionally qualified as estimated 'J' during data validation to indicate the maximum criteria. The compounds were additionally qualified as 'U' for blank contamination.

For sample RI-02, a 'K' qualifier was reported by the laboratory for OCDD, which indicated a peak was detected but did not meet the quantification criteria, the result represents the maximum possible concentration. This compound was additionally qualified as estimated 'J' during data validation to indicate the maximum criteria. The compound was additionally qualified as 'U' for blank contamination.

Small dilutions were also made for the following samples to bring the OCDD into range of the calibration: HP-01, HP-02, HP-03, HP-04, HP-05, HP-06, HP-07, HP-08, HP-09 and EG-01.

Field Replicates: Field replicate pairs EG-02/EG-10 and EG-03/EG-09 were submitted for the project. Results were comparable.

System Performance: The chromatograms were reviewed for baseline shifts, general instrument response and missed peaks. No anomalies were noted.

Overall Assessment: All deliverables required by the project are present and data packages are complete. Recommended sample holding times and conditions were met with the exception of receipt temperature, for which all results were qualified. Initial and continuing calibration requirements were acceptable. Method blanks show trace levels of target analytes for the sediment samples with no action taken, while slightly higher levels were detected for the water samples which resulted in qualification of associated samples. Compound identification and quantitation is acceptable. Raw data show no indications of system anomalies. The laboratory duplicate criteria were met. The OPR samples recovered in limits. Overall analytical performance is considered acceptable, and data quality is sufficient for project use.

8.0 References

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LABORATORY ANALYTICAL DATA VALIDATION REPORT

East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study

Tissue Samples

Prepared for

RIDOLFI Inc.

Prepared by

Validata, LLC.

January 2006

1.0 INTRODUCTION

This report summarizes the validation of analytical results generated from a bioaccumulation study in 2005, in support of the Forest Glen Subdivision Superfund Site Project, Niagara County, New York. The bioaccumulation study was performed according to the *Field Sampling Plan for the East Gill Creek, Gill Creek, And Hyde Park Lake Characterization Study* (Ridolfi Inc. and NOAA, 2005) and the *Quality Assurance Project Plan (QAPP) for the East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study* (Ridolfi Inc. and NOAA, 2005). The study was conducted by EVS Environment Consultants Limited of North Vancouver, B.C. EVS shipped frozen tissue samples derived from the study to Analytical Resources, Inc. (ARI) in Seattle, Washington for chemical analysis.

The criteria applied for this validation are consistent with U.S. EPA SW-846 analytical methods, laboratory established criteria, and the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (*Functional Guidelines*), (U.S. EPA, 1999). Data qualifiers applied to sample results for this validation are in accordance with the *Functional Guidelines*; qualifiers applied are summarized below:

U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ: The analyte was not detected above the sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

In certain cases, the following flags were used by the lab:

Y – The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
E – The concentration exceeded the instrument calibration range.
P – The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interferences.

2.0 SEMIVOLATILE ORGANICS ANALYSES – U.S. EPA SW-846, Method 8270D

Semivolatile organics analyses using Selective Ion Monitoring were performed by ARI using Method 8270D**.**

Four tissue samples were analyzed for semivolatile organics, as summarized below: The laboratory provided U.S. EPA CLP style deliverables for all sample delivery groups.

Sample Documentation, Custody and Holding Conditions / Times: A custody document was not included in the shipment with the samples. Custody documentation was filled out upon

receipt at the laboratory. Since there was no custody documentation provided with the samples during shipment to ARI, all results are qualified as estimated. The sediment samples which contained the tissue subsamples were collected on 9/14/05. The tissue samples were frozen on November 29, 2005 and remained frozen until being shipped overnight on 12/21/05 to ARI Laboratory. Laboratory data deliverables were complete. The samples were received at a temperature of 2.8° C. Maximum holding times for extractables were specified as 14 /40 days (sample / extract maximum holding times) and 7 / 40 days for solids and waters, respectively, at 4° C (±2° C). All extraction and analytical holding times were met.

GC/MS Tuning: GC/MS tune performance was checked using decafluorotriphenylphosphine (DFTPP) prior to all initial calibrations runs and all subsequent sample analytical runs. All sample analyses were performed within 12 hours of DFTPP analyses. All ion abundances and relative ion abundances met Functional Guidelines acceptance criteria. Review of mass spectral plots and associated mass listings supplied with the raw data, and transcription of mass data to Form V (GC/MS Tuning and Mass Calibration) showed no inconsistencies. No errors were identified during spot checks of calculations.

Initial Calibration: Initial multipoint calibrations were performed at 10, 50, 100, 200, 500 and 1000 ppb for all target compounds and surrogate compounds. The USEPA CLP *Functional Guidelines* specify that Average Relative Response Factors (Average RRFs) must be ≥0.05, and selected analytes must meet additional minimum RRF and maximum %RSD criteria (>30%). Average RRFs and %RSDs for all TCL compounds in all initial calibrations showed compliance with technical requirements.

Continuing Calibration: Continuing calibration was performed for all TCL compounds at 25 µg/mL. The USEPA CLP *Functional Guidelines* specifies that RRFs must be ≥0.05, and compounds must meet a maximum percent difference (%D) criteria (≤25%). All RRFs and %Ds were in compliance.

Blanks: An analytical method blank was analyzed for the each analytical group and matrix, as specified. Method blank results were acceptable.

Surrogate Compound Performance: Surrogate compounds were added to each sample prior to analysis to assess analytical performance on each sample. Surrogate compounds and associated performance criteria for the analysis of TCL analytes were those specified in U.S. EPA Method SW-846 8270. Surrogate compound recovery specifications were as follows:

Compound	Acceptance Range (%) Tissue
d10-2-Methylnaphthalene	30-160
D14-Dibenzo(a,h)anthracene	30-160

The U.S. EPA criteria for data qualification required more than one surrogate of a compound class to be outside specification (neutrals vs. acids). All surrogate recoveries were acceptable.

Matrix Spike/Matrix Spike Duplicate Analyses: Matrix spike (MS) and matrix spike duplicate (MSD) analysis was not performed for this sample set. An LCS pair was analyzed, as shown below.

Laboratory Control Samples: Laboratory control samples (LCSs) were analyzed per batch for the samples. LCS recovery specifications were as follows:

Compound	Acceptance Range (%) Tissue
Phenanthrene	50-103
Benzo(k)fluoranthene	47-110
Chrysene	57-121

The LCS results were compared to the above criteria. The LCS concentrations were 300 ppb. LCS performance indicates the analytical systems were in control. All LCS recoveries were acceptable.

Internal Standards Performance: Five internal standards were added at a concentration of 20 ng/µL to all sample extracts prior to analyses, including quality control samples. Retention times (RT) for all internal standards were within method specified acceptance limits in all samples (±30 seconds). Internal standard areas were within method specified acceptance limits (0.5 to 2 times the 12-hour calibration standard area) for all samples.

TCL Compound Identification: Relative retention times (RRTs) for all reported TCL compounds were within the method specified acceptance limits (±0.06 RRT units). Mass spectra generally show good comparison with library reference spectra.

Compound Quantitation and Reported Detection / Quantitation Limits: The detection limits were acceptable as reported. There were no problems noted.

System Performance: Raw data showed no indication of degradation of system performance during or between analytical runs. Reconstructed ion chromatograms (RICs) showed no abrupt shifts in baseline, high background levels, excessive baseline rise with increased temperature, or other indications of system performance degradation.

Field Replicates: There were no field replicates submitted for the project.

Overall Assessment: All deliverables required by the project were present and data packages were complete, with the exception that the samples were not shipped to the laboratory under chain of custody. Because of this, all sample results were qualified as estimated. The holding time criteria were met. GC/MS tuning requirements were met. Initial and continuing calibration requirements were acceptable. Internal standard (IS) performance was acceptable. Matrix spike analysis was not performed, however, an LCS/LCSD were analyzed with acceptable results to demonstrate laboratory accuracy and precision. Surrogate performance was acceptable.

Compound identification and quantitation were acceptable. Raw data showed no indications of system performance degradation. Field replicates were not collected for the data set. Overall analytical performance was considered acceptable, and data quality sufficient for project use.

7.0 REFERENCES

RIDOLF Inc. and National Oceanic and Atmospheric Administration (Ridolfi and NOAA). 2005. Quality Assurance Project Plan For The East Gill Creek, Gill Creek, And Hyde Park Lake Characterization Study, Forest Glen Subdivision Superfund Site Niagara County, New York. Prepared for NOAA. Prepared by RIDOLFI Inc. and NOAA. September.

RIDOLF Inc. and National Oceanic and Atmospheric Administration (Ridolfi and NOAA). 2005. Field Sampling Plan For The East Gill Creek, Gill Creek, and Hyde Park Lake Characterization Study, Forest Glen Subdivision Superfund Site Niagara County, New York. Prepared for NOAA. Prepared by RIDOLFI Inc. and NOAA. September.

U.S. Environmental Protection Agency (USEPA). 1996. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

U.S. Environmental Protection Agency (USEPA). 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA540/R-99/008. October.

APPENDIX D

Bioassay and Bioaccumulation Laboratory Reports

(Appendices are on attached CD as .pdf files.)

January 2006

LABORATORY REPORT

Ridolfi Inc.
Freshwater Toxicity Testing Program

September 2005 Samples

PREPARED FOR:

Ridolfi Inc.

Seattle, WA

PREPARED BY:

Golder Associates

FRESHWATER TOXICITY TESTING PROGRAM

SEPTEMBER 2005 SAMPLES

LABORATORY REPORT
BIOACCUMULATION TEST

Prepared for

Ridolfi Inc.
1011 Western Ave. Suite 1006
Seattle, WA
USA 98104

Prepared by

EVS Environment Consultants (A Member of the Golder Group of Companies)
195 Pemberton Avenue
North Vancouver, BC
Canada V7P 2R4

Golder Project No.

05-1424-014

January 23, 2006

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1.0 INTRODUCTION

Ten freshwater sediment samples were collected for toxicity testing on September 12, 13 and 14, 2005 and were received at the EVS-Golder North Vancouver, BC Laboratory on September 16 and 20, 2005. The samples were collected in 4L plastic containers and transported in coolers with ice packs. The samples were stored in the dark at 4°C prior to testing.

Toxicity testing on the samples was performed using the static-renewal 10-d freshwater midge (*Chironomus tentans)* and a 28-d freshwater amphipod (*Hyalella azteca*) survival and growth toxicity tests. Results of these analyses have been previously reported. Three of the samples were also tested with the 28-d *Lumbriculus variegatus* bioaccumulation test. This report describes the methods and results of the *Lumbriculus variegatus* test. The raw data and statistical analyses are provided in Appendix I. Chemical analysis data and chain-of-custody forms are found in Appendices II and III.

2.0 METHODS

2.1 METHODS SUMMARY

The 28-d *Lumbriculus variegates* bioaccumulation test for sediments was conducted using methods presented by the United States Environment Protection Agency (2000).

Prior to performing the bioaccumulation test, sample toxicity was assessed by performing a 4-d sediment toxicity screening tests. Toxic samples (samples that cause greater than 50% mortality in exposed test organisms) are not tested using the bioaccumulation test due to the associated low tissue recovery.

Adult *Lumbriculus variegatus* were exposed to test sediments for 4 days in a static-renewal system. The test was monitored for temperature and dissolved oxygen daily, and for pH and conductivity at test initiation and termination. The toxicity test methods for the 4-d sediment toxicity screening test are summarized in Table 1.

At test termination, the organisms were recovered from the sediments and final survival was determined.

Table 1: Summary Of Test Conditions For The 4-D *Lumbriculus Variegatus* Toxicity Screening Test

4-D SURVIVAL TEST CONDITIONS	
Organism source	Aquatic Research Organisms, Hampton, NH.
Acclimation	1 day prior to testing at 23 ± 1°C.
Organisms age	Adult
Sample holding time	44d-46d
Test vessel	300 ml glass beakers
Test volumes	100 ml of test sample; 175 ml of overlying water.
Control/dilution water	Moderately hard reconstituted dechlorinated water (80 – 100 mg/L as $CaCO_3$); used within 4 weeks.
No. of test concentrations	Undiluted (100%) sample, plus a negative (clean) control.
No. of replicates	4 replicates per treatment and 1 WQ jar; 10 organisms per replicate.
Feeding regime	None.
Measurements	Temperature and dissolved oxygen daily, pH and conductivity at test initiation and termination; overlying water ammonia, hardness, and alkalinity at test initiation and termination.
Aeration	None.
Water renewal	75% water renewal for any day in which DO falls below 4 mg/L.
Lighting	Overhead full spectrum fluorescent lights; 500 – 1000 lux at water surface.
Photoperiod	16:8 (light:dark).
Test temperature	23 ± 1°C.
Endpoints	Biomass
Test validity	Biomass of *L. variegatus* should not be significantly reduced in test sediment relative to the control.
Reference Toxicant	96-h water only test with copper initiated October 10, 2005; current result (96-h LC50 and 95% confidence limits) = 121 (106 - 138) µg/L Cu; control chart warning limits (mean ± 2SD) = 118 ± 57 µg/L Cu.

The 28-d *Lumbriculus variegatus* bioaccumulation test for sediments was conducted on each non-toxic sediment sample, as determined from the preliminary 4-d screening test. The 28-d bioaccumulation test methods are summarized in Table 2.

Adult *Lumbriculus variegatus* were exposed to test sediments for 28 days in a static-renewal system. The test was monitored for temperature and dissolved oxygen daily, and for pH and conductivity at test initiation and termination. The organisms were not fed throughout the duration of the test. Overlying ammonia, sulphides, hardness and alkalinity was measured on each sample at test termination. All analyses were performed by ALS Environmental, Vancouver, BC, following methods outlined by the American Public Health Association (APHA, 1998).

At test termination, the organisms were recovered from the sediments and final tissue wet weight was determined. Approximately 5 g of *Lumbriculus* tissue was transferred to a plastic bag and frozen. At the request of the client, frozen tissues were shipped to Analytical Resources Inc., Tukwila, WA, on December 19, 2005 for chemical testing..

Table 2: Summary Of Test Conditions For The 28-D *Lumbriculus Variegatus* Bioaccumulation Test

28-D SURVIVAL TEST CONDITIONS	
Organism source	Aquatic Research Organisms, Hampton, NH.
Acclimation	1 day prior to testing at 23 ± 1°C.
Organisms age	Adult
Sample holding time	30-32d
Test vessel	6L glass aquaria
Test volumes	1L of test sample; 4L of overlying water.
Control/dilution water	Moderately hard reconstituted dechlorinated water (80 – 100 mg/L as $CaCO_3$); used within 4 weeks.
No. of test concentrations	Undiluted (100%) sample, plus a negative (clean) control.
No. of replicates	4 replicates per treatment and 1 WQ tank; 5g of organisms per replicate.
Feeding regime	None.
Measurements	Temperature and dissolved oxygen daily, pH and conductivity at test initiation and termination; overlying water ammonia, hardness, and alkalinity at test initiation and termination.
Aeration	None.
Water renewal	75% water renewal for any day in which DO falls below 4 mg/L.
Lighting	Overhead full spectrum fluorescent lights; 500 – 1000 lux at water surface.
Photoperiod	16:8 (light:dark).
Test temperature	23 ± 1°C.
Endpoints	Survival, and test organism behaviour.
Test validity	Numbers of *L. variegatus* should not be significantly reduced in test sediment relative to the control.
Reference Toxicant	96-h water only test with copper initiated October 10, 2005; current result (96-h LC50 and 95% confidence limits) = 121 (106 - 138) µg/L Cu; control chart warning limits (mean ± 2SD) = 118 ± 57 µg/L Cu.

2.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This study followed a comprehensive QA/QC Program to ensure full documentation and minimize possible errors in computation and reporting of results. The following general QA/QC guidelines were applied in this test: use of negative controls, use of positive controls, replication, instrument calibration, water quality maintenance and record-keeping, and use of standard operating procedures (SOPs). To ensure that the generated data and reporting met quality standards, all data was reviewed by a member of our QA/QC Committee prior to reporting the results.

Toxicity testing was carried out in accordance with applicable test methodologies and/or standards of practice. Our liability is limited solely to the cost of re-testing in the event of non-compliance with such test specifications or standards of practice. Golder/EVS accepts no responsibility or liability for the interpretation or use of these testing results by others, nor for any delay, loss, damage or interruptions of testing, collection, preparation, and delivery of samples or test results resulting from events or circumstances beyond our control.

Table 3: Summary Of Reference Toxicant Test Conditions

***LUMBRICULUS VARIEGATUS* 96-h REFERENCE TOXICANT TEST CONDITIONS**	
Reference toxicant	Copper Sulphate ($CuSO_4$).
No. of replicates	Three replicates of 200 mL test solution.
Concentrations	56, 100, 180, 240, and 320 ug/L Cu^{2+}, plus moderately hard water negative control.
Feeding regime	None
Aeration	None.
Photoperiod	16:8 (light:dark).
Temperature	23 ± 1°C.
Endpoint	LC50.
Test validity	LC50 estimate within two standard deviations of the laboratory mean; ≥ 90% mean control survival.

3.0 RESULTS

A summary of results for the *Lumbriculus variegatus* toxicity screening test are provided in Table 4. Total ammonia and sulphide values for the bioaccumulation test are provided in Table 5. Raw data and statistical analyses are provided in Appendix I.

3.1 *LUMBRICULUS VARIEGATUS* TOXICITY TEST RESULTS

The 4-d *Lumbriculus variegatus* toxicity screening test showed no significant toxicity in each of the tested samples relative to the negative control.

Tissue mass removed from each sample was approximately 5 grams for the 28-d bioaccumulation test.

Table 4: Summary Of Results For The 4-D Survival Toxicity Test For *Lumbriculus Variegatus*

Sample Concentration (% v/v)	HP-03 Survival[1] (%)	GC-01 Survival[1] (%)	E6-05 Survival[1] (%)
Negative Control (Rep 1)	100	100	100
Negative Control (Rep 2)	90	90	90
Negative Control (Rep 3)	90	90	90
Negative Control (Rep 4)	100	100	100
100% (Rep 1)	60	90	90
100% (Rep 2)	80	100	70
100% (Rep 3)	100	90	80
100% (Rep 4)	90	90	100

[1] 10 organisms per replicate, one set of negative controls was used as a shared control.

Table 5: Summary Of Total Ammonia And Total Sulphide Values for the 28-D Bioaccumulation Test For *Lumbriculus variegatus*

SAMPLE ID	OVERLYING WATER AMMONIA (MG/L N)		OVERLYING WATER SULPHIDES (MG/L S)	
	DAY 0	Day 28	DAY 0	DAY 28
Negative Control	NT	0.08	NT	<0.02
HP-03	NT	0.05	NT	<0.02
GC-01	NT	0.11	NT	<0.02
EG-05	NT	0.08	NT	<0.02

NT indicates not tested.

3.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The 4-d *Lumbriculus variegatus* sediment toxicity screening tests and the 28-d bioaccumulation test met all specified test protocol criteria for test validity outlined in USEPA (2000), with the following exceptions. Due to a laboratory error, the overlying ammonia, sulphides, hardness and alkalinity were not measured at test initiation. Water quality measurements were all within recommended ranges except for some lower than recommended temperatures observed during the 28-d bioaccumulation test. Tests were also conducted without renewal of overlying water, with the effects of low dissolved oxygen content prevented by performing water renewal for any sample in which the daily dissolved oxygen content was measured below 4.0 mg/L.

These minor test deviations, including lower than recommended test temperature, did not appear to have affected the outcome of the test as each tested sample did not have a significant reduction in tissue biomass collected at the conclusion of the test relative to the control.

Tissue mass recovered was less than initial (approximately 5 grams from each sample) due to the difficulty in collecting the organisms during the tissue recovery period and cleaning procedure at test termination

The reference toxicant test met all passing criteria as specified by USEPA (2000). Point estimates for the tests were within two standard deviations of the laboratory mean, indicating that the tests were within acceptable limits of variability.

3.3 CLOSURE

We trust that this study is now complete, and we would like to thank you for providing us with the opportunity to perform this work.

Thank you for your interest in Golder Associates North Vancouver Laboratory. If you have and questions or require any additional information, please contact the undersigned, at (604) 904-6046.

Yours very truly,

GOLDER ASSOCIATES LTD.

Clifton Samoiloff, B.Sc.
Client Services Manager

Reviewed by:

Julianna Kalocai, M.Sc., R.P.Bio.
Quality Assurance Supervisor

CMS/lba
05-1424-014
O:\DATA\FINAL\2005\1424\05-1424-014\RPT-0125_06 RIDOLFI INC-LAB REPORT BIOACCUMULATION TEST SEPT 05 SAMPLES.DOC

4.0 REFERENCES

APHA (American Public Health Association). 1998. Standard Methods for the Examination of Water and Wastewater. 20th edition. American Public Health Association, American Water Works Association and Water Environment Federation, Washington, DC.

Tidepool Scientific Software. 1994. TOXCALC: Comprehensive Toxicity Data Analysis and Database Software, Version 5.0.23. Tidepool Scientific Software, McKinleyville, CA. 80 pp.

USEPA (United States Environmental Protection Agency). 2000. Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates. 2nd Edition. United States Environmental Protection Agency, Office of Research and Development, Duluth, MN. EPA/600/R-99/064. March 2000.

APPENDIX I

Raw Data:
4-d *Lumbriculus variegatus* Sediment Toxicity Screening Test and 28-d Bioaccumulation Test

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
FRESHWATER SEDIMENT BIOACCUMULATION STUDY DATA SUMMARY

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Lab Analysts: NH
Test Type/Duration: 28d bioaccumulation
Test Initiation Date: Oct. 28/05
Test Termination Date: Nov. 25/05

SAMPLE

Identification: EG-05
Amount Received: 4X4L
Date Collected: Sept. 14/05
Date Received: Sept. 16/05
Other:

TEST SPECIES INFORMATION

Organism: Lumbriculus variegatus
Source: ARO, Hampton NH
Date Received: Oct. 28/05
Reference Toxicant: Cu
Current Reference Toxicant Result: 121 ug/L (106-138)
96-h LC50 (and 95% CL): ~~95.5ug/L (80.7-112.9)~~ NH
Reference Toxicant Warning Limits (mean ± 2SD) and CV
~~96.5ug/L ± 127.3 CV = 66%~~ NH
117.9ug/L ± 57.0 CV = 24%

DILUTION/CONTROL WATER (initial water quality)

Water Type: MHW
Temperature (°C): 22
pH: 7.4
Dissolved Oxygen (mg/L): 8.4
Conductivity (µS/cm): 367
Other: Hardness: 82 mg/L Alk: 48 mg/L

TEST CONDITIONS

Temperature Range (°C): 19.0 - 21.0
pH Range: 6.8 - 7.9
Dissolved Oxygen Range (mg/L): 3.9 - 7.0
Conductivity (µS/cm): 536 - 1002
Photoperiod (L:D h): 16L/8D
Other:

BIOACCUMULATION RESULTS

Data Verified By: Galfi
Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – WATER QUALITY DATA

Client: Ridolfi
Lab Project No.: ~~0500401~~ 05-1427-014
Lab Work Order No.: 0500404

Sample ID: E6-05
Date Collected: Sept. 14/2005
Test Initiation Date/Time: Oct. 12, 2005 15:00
Test Species/Source: Lumbriculus / ARO

Concentration	Temperature (°C)						pH					
	0	24	48		72	96	0	24	48		72	96
100%	23	22	22	22	23	23.0	6.73	6.71	6.99	7.25	7.39	7.4
Tech. Initials	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Concentration	Dissolved Oxygen (mg/L)						Conductivity (µS/cm)			
	0	24	48		72	96	0	48		96
100%	5.3	5.7	5.2	4.8	4.5	4.7	542			867
Tech. Initials	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]

WQ Instruments Used: Temp. calibrated Hg thermo pH II-A-030302 DO II-A-3 Cond. II-A-030303

Comments

Test Set Up By [illegible] Data Verified By [illegible] Date Verified Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – SURVIVAL DATA

Client Ridolfi 05-1424-014 Sample ID E6-05
Lab Project No. ~~0500701~~ ~~0500401~~ Test Species/Source Lumbriculus / ARD
Lab Work Order No. 0500404 Test Initiation Date/Time Oct. 12/05 15:00
No. of Organisms/Volume 10/Jar

Concentration	Rep.	Number of Survivors (24 – 96 h)				Comments
		24	48	72	96	
100%	A	10			8	In rep 4 3 org. crawling on the sediment surface.
	B	10			7	
	C	10			8	
	D	10			10	
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
Technician Initials		[illegible]			[illegible]	

Sample Description
Data Verified By [illegible] Date Verified Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
FRESHWATER SEDIMENT BIOACCUMULATION STUDY DATA SUMMARY

Client: Rudolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Lab Analysts: M
Test Type/Duration: 28d Bioaccumulation
Test Initiation Date: Oct. 28/05
Test Termination Date: Nov. 25/05

SAMPLE

Identification: HP-03
Amount Received: 4x4L
Date Collected: Sept. 12/05
Date Received: Sept. 16/05
Other:

TEST SPECIES INFORMATION

Organism: Lumbriculus variegatus
Source: ARO, Hampton, NH
Date Received: Oct. 26/05
Reference Toxicant: ~~Nov. 25/05~~ M Cu
Current Reference Toxicant Result: 121.2 (106-138) ug/L
96-h LC50 (and 95% CL): ~~95.5 ug/L (80.7-112.9)~~ M
Reference Toxicant Warning Limits (mean ± 2SD) and CV: ~~96.5 ug/L ± 127.3 CV = 66%~~ M
117.9 ug/L ± 57.0 CV = 24%

DILUTION/CONTROL WATER (initial water quality)

Water Type: MHW
Temperature (°C): 22
pH: 7.4
Dissolved Oxygen (mg/L): 8.4
Conductivity (µS/cm): 367
Other: Hard: 82 mg/L Alk: 48 mg/L

TEST CONDITIONS

Temperature Range (°C): 18.0-21.0
pH Range: 6.6-8.2
Dissolved Oxygen Range (mg/L): 1.6-6.8
Conductivity (µS/cm): 435-816
Photoperiod (L:D h): 16L/8D
Other:

BIOACCUMULATION RESULTS

Data Verified By: [illegible]
Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – WATER QUALITY DATA

Client: Ridolfi
Lab Project No: ~~050040t~~ 05-1424-04
Lab Work Order No.: 050040t

Sample ID: HP-03
Date Collected: Sept. 12, 2005
Test Initiation Date/Time: Oct. 12, 2005 15:00
Test Species/Source: Lumbriculus / ARO

Concentration	Temperature (°C) 0	24	48		72	96	pH 0	24	48		72	96
100%	23	23	23		23	23.0	7.25	7.31	7.27		7.39	7.4
Tech. Initials												

Concentration	Dissolved Oxygen (mg/L) 0	24	48		72	96	Conductivity (µS/cm) 0	48		96
100%	6.1	6.3	5.6		5.0	5.0	440			561
Tech. Initials										

WQ Instruments Used: Temp. calibrated Hg thermo pH II-A-030302 DO II-A-3 Cond. II-A-030303

Comments

Test Set Up By: Data Verified By: Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – SURVIVAL DATA

Client: Rudolfi
Lab Project No.: ~~0500707~~ 05-1427-014
Lab Work Order No.: 0500707

Sample ID: HP-03
Test Species/Source: Lumbriculus / ARO
Test Initiation Date/Time: Oct. 12/05 15:00
No. of Organisms/Volume: 10/jar

Concentration	Rep.	Number of Survivors (24 – 96 h)				Comments
		24	48	72	96	
100%	A	10			6	
	B	10			8	
	C	10			10	
	D	10			9	
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
Technician Initials		[illegible]			[illegible]	

Sample Description:
Data Verified By: [illegible]
Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
FRESHWATER SEDIMENT BIOACCUMULATION STUDY DATA SUMMARY

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Lab Analysts: CM
Test Type/Duration: 28d bioaccumulation
Test Initiation Date: Oct. 28/05
Test Termination Date: Nov. 25/05

SAMPLE

Identification: GC-01
Amount Received: 4x4L
Date Collected: Sept. 13/05
Date Received: Sept. 16/05
Other:

TEST SPECIES INFORMATION

Organism: Lumbriculus variegatus
Source: ARO, Hampton, NH
Date Received: Oct. 28/05
Reference Toxicant: Cu
Current Reference Toxicant Result: 121 ug/L (106-133)
96-h LC50 (and 95% CL): ~~95.5ug/L (80.7-112.7)~~ CM
Reference Toxicant Warning Limits (mean ± 2SD) and CV
~~96.5ug/L ±127.3 CV=66%~~ CM
117.9ug/L ± 57.0 CV = 27%

DILUTION/CONTROL WATER (initial water quality)

Water Type: MHW
Temperature (°C): 22
pH: 7.4
Dissolved Oxygen (mg/L): 8.4
Conductivity (µS/cm): 367
Other: Hardness: 82 mg/L Alk: 48 mg/L

TEST CONDITIONS

Temperature Range (°C): 18.0 - 21.0
pH Range: 6.9 - 7.8
Dissolved Oxygen Range (mg/L): 2.8 - 6.8
Conductivity (µS/cm): 436 - 646
Photoperiod (L:D h): 16L/8D
Other:

BIOACCUMULATION RESULTS

Data Verified By: [illegible]
Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – WATER QUALITY DATA

Client: Ridolfi
Lab Project No.: ~~0500404~~ 05-1424-014
Lab Work Order No.: 0500404

Sample ID: GC-01
Date Collected: Sept. 13/05
Test Initiation Date/Time: Oct. 12, 2005 15.00
Test Species/Source: Lumbriculus / ARO

Concentration	Temperature (°C)						pH					
	0	24	48		72	96	0	24	48		72	96
100%	23	23	23		23	23.0	6.71	6.91	7.22		7.41	7.3
Tech. Initials												

Concentration	Dissolved Oxygen (mg/L)						Conductivity (µS/cm)			
	0	24	48		72	96	0	48		96
100%	4.3	4.4	4.4		4.3	4.4	440			371
Tech. Initials										

WQ Instruments Used: Temp. calibrated Hg thermo pH II-A-030302 DO II-A-3 Cond. II-A-030303

Comments

Test Set Up By: Data Verified By: Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – SURVIVAL DATA

Client: Ridolfi
Lab Project No.: ~~0500401~~ 05-1424-014
Lab Work Order No.: 0500401

Sample ID: GC-01, 2005/557
Test Species/Source: $ Lumbriculus/ARO
Test Initiation Date/Time: Oct. 12/05 15:00
No. of Organisms/Volume: 10/jar

Concentration	Rep.	Number of Survivors (24 – 96 h) 24	48	72	96	Comments
100% GC-01	A	10			9	
	B	10			10	
	C	10			9	
	D	10			9	
~~2005/557~~	A				10	
	B				10	
	C				9	
	D				10	
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
Technician Initials						

Sample Description: _____
Data Verified By: [illegible] Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
FRESHWATER SEDIMENT BIOACCUMULATION STUDY DATA SUMMARY

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Lab Analysts: [illegible]
Test Type/Duration: 28d bioaccumulation
Test Initiation Date: Oct. 28/05
Test Termination Date: Nov. 25/05

SAMPLE

Identification: Control
Amount Received: In House
Date Collected: Prepared Sept. 12/05
Date Received: —
Other: 70% sand
20% clay
10% peat

TEST SPECIES INFORMATION

Organism: Lumbriculus variegatus
Source: ARO, Hampton, NH
Date Received: Oct. 26/05
Reference Toxicant: ~~Nov. 25/05~~ [illegible] Cu
Current Reference Toxicant Result: 12 ug/L (106-138)
96-h LC50 (and 95% CL): ~~95.5 ug/L (80.7-113.3)~~ [illegible]
Reference Toxicant Warning Limits (mean ± 2SD) and CV:
~~96.5 ug/L ± 127.3 CV = 66%~~ [illegible]
117.9 ug/L ± 57.0 CV = 24%

DILUTION/CONTROL WATER (initial water quality)

Water Type: MHW
Temperature (°C): 22
pH: 7.4
Dissolved Oxygen (mg/L): 8.4
Conductivity (µS/cm): 367
Other: Hardness: 82 mg/L Alk: 48 mg/L

TEST CONDITIONS

Temperature Range (°C): 18.5 - 21.0
pH Range: 6.7 - 7.9
Dissolved Oxygen Range (mg/L): 2.0 - ~~9.2~~ 8.2
Conductivity (µS/cm): 353 - 546
Photoperiod (L:D h): 16L/8D
Other:

BIOACCUMULATION RESULTS

Data Verified By: [illegible]
Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – WATER QUALITY DATA

Client: Ridolfi
Lab Project No.: ~~500701~~ 05-1421-017
Lab Work Order No.: 500707

Sample ID: Control
Date Collected: –
Test Initiation Date/Time: Oct. 12, 2005 15:00
Test Species/Source: Lumbriculus / ARD

Concentration	Temperature (°C)						pH					
	0	24	48		72	96	0	24	48		72	96
100%	23	23	23		23	23	6.51	6.97	7.34		7.51	7.3
Tech. Initials	CH	CH	CH		CH	CH	CH	CH	CH		CH	CH

Concentration	Dissolved Oxygen (mg/L)						Conductivity (µS/cm)			
	0	24	48		72	96	0	48		96
100%	6.6	6.7	6.6		6.8	6.8	361			415
Tech. Initials	CH	CH	CH		CH	CH	CH			CH

WQ Instruments Used: Temp. Calibrated Hg Thermo pH II-A-030302 DO II-A-3 Cond. II-A-030303

Comments

Test Set Up By: CH Data Verified By: Qualitek Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
96-h FRESHWATER ACUTE TOXICITY TEST – SURVIVAL DATA

Client: Rldolfi
Lab Project No.: ~~05004A~~ 05-1429-014
Lab Work Order No.: 0500404

Sample ID: Control
Test Species/Source: Lumbriculus / ARO
Test Initiation Date/Time: Oct. 12/05 15:00
No. of Organisms/Volume: 10/jar

Concentration	Rep.	Number of Survivors (24 – 96 h) 24	48	72	96	Comments
100%	A	10			10	24-72 hour counts are visible organisms
	B	10			9	
	C	10			9	
	D	10			10	
	A				~~6~~ 7	
	B				~~8~~	
	C				~~6~~	
	D				~~9~~	
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
	A					
	B					
	C					
	D					
Technician Initials		[illegible]			[illegible]	

Sample Description: _____
Data Verified By: [illegible] Date Verified: Jan-25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi
Lab Project No.: 05-1424-04
Lab Work Order No.: 500404

Test Initiation Date (Day 0): Oct. 28/05
Test Termination Date (Day 28): Nov. 25/05
Test Species: Lumbriculus variegatus

Sample ID	Temperature (°C) – Day 0 to 14														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
HP-03	21.0	21.0	20.0	21.0	21.0	20.0	19.0	20.0	18.0	20.0	18.0	19.0	18.0	19.0	18.5
GC-01	21.0	20.0	20.0	21.0	21.0	20.0	19.0	20.0	18.0	20.0	18.0	18.0	18.0	19.0	18.5
EG-05	21.0	21.0	20.0	21.0	21.0	20.0	19.0	20.0	19.0	20.0	19.0	19.0	19.0	20.0	19.0
control	21.0	21.0	20.0	21.0	21.0	20.5	20.0	20.0	20.0	19.0	20.0	19.0	19.0	20.0	19.5
Technician Initials	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	SRC	[illegible]	SRB/MFB	[illegible]	MFB	MFB	SRB/MFB

WQ Instruments Used: Temp. Calibrated Hg Thermometer

Comments

Data Verified By: [illegible]

Date Verified: Jan. 25/06

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October 12, 2005

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi

Lab Project No.: 05-1424-014

Lab Work Order No.: 500404

Test Initiation Date (Day 0): Oct. 28/05

Test Termination Date (Day 28): Nov. 25/05

Test Species: Lumbriculus variegatus

Sample ID	Temperature (°C) – Day 15 to 28													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
HP-03	18.5	18.5	18.5	19.0	18.5	18.5	20.0	19.5	20.0	20.0	20.0	20.0	20.0	20.0
GC-01	18.5	18.5	18.5	19.0	18.5	18.5	20.0	19.5	20.0	20.0	20.0	20.0	20.0	20.0
EG-05	19.0	19.5	19.5	19.0	19.5	19.5	20.0	19.5	20.0	19.0	20.0	20.0	20.0	21.0
Control	19.5	20.0	20.0	20.0	20.0	20.0	20.0	19.5	20.0	19.0	20.0	20.0	20.0	21.0
Technician Initials	MFB	MFB	MFB	[illegible]	MFB	MFB	[illegible]	[illegible]	[illegible]	[illegible]	SXB	[illegible]	SXB	[illegible]

WQ Instruments Used: Temp. Calibrated Hg Thermometer

Comments

Data Verified By: [illegible]

Date Verified: Jan. 25/06

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Test Initiation Date (Day 0): Oct. 28/05
Test Termination Date (Day 28): Nov. 25/05
Test Species: Lumbriculus variegatus

Sample ID	Dissolved Oxygen (mg/L) – Day 0 to 14														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
HP-03	6.8	4.6	4.6	4.7	2.5*	1.6*	4.2	5.3	2.5*	4.2	4.4	4.3	3.0*	3.6*	4.4
GC-01	6.8	4.4	4.4	4.7	3.2*	2.8*	4.4	4.1	3.5*	4.4	4.8	4.5	4.0*	4.4	4.4
EG-05	7.0	5.2	4.8	4.6	3.9*	4.2	4.4	4.3	4.1	4.2	5.8	4.7	5.5	5.0	5.1
Control	6.8	4.2	2.0	5.1*	6.1	7.6	7.6	7.5	7.4	6.8	7.6	6.9	7.6	7.4	7.9
Technician Initials	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	SRS	SRS	SXB/[illegible]	[illegible]	MFB	MFB	SXB/MFB

* 70% water renewal

* 80% water renewal

WQ Instruments Used: DO ~~Calibrated Hg thermometer~~ II-A-3 [illegible]

Comments

Data Verified By: [illegible]

Date Verified: Jan. 25/06

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October 12, 2005

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Test Initiation Date (Day 0): Oct. 28/05
Test Termination Date (Day 28): Nov. 25/05
Test Species: Lumbriculus Variegatus

Sample ID	Dissolved Oxygen (mg/L) – Day 15 to 28													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
HP-03	4.0*	5.4	5.4	5.4	6.2	5.6	5.2	4.2	4.8	4.8	4.8	4.8	5.0	5.0
GC-01	3.8*	4.2	4.5	4.8	4.6	4.8	5.2	4.4	5.4	4.8	4.6	4.8	5.2	4.6
EG-05	4.6	4.9	5.0	5.2	4.8	4.6	4.6	4.2	5.4	5.0	4.9	5.2	5.4	4.8
Control	7.0	7.9	8.2	8.0	8.0	8.0	7.8	6.2	7.6	7.8	7.4	7.8	7.7	7.6
Technician Initials	MFB	MFB	MFB	"	MFB	MFB	"	"	"	[illegible]	SAB	"	SAB	"

WQ Instruments Used: DO II-A-3
Comments: * water changed (80%) on all reps.
Data Verified By: [illegible]
Date Verified: Jan. 25/06

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October 12, 2005

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi
Lab Project No.: 05-1424-014
Lab Work Order No.: 500404

Test Initiation Date (Day 0): Oct. 28/05
Test Termination Date (Day 28): Nov. 25/05
Test Species: Lumbriculus variegatus

Sample ID	DAY 16	DAY 17	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			pH – Day 0 to 28															
HP-03	8.0	8.1	7.4	6.6	7.3	7.4	7.3	7.4	7.4	7.4	- -			7.3	7.6	7.8	7.5	7.8
GC-01	7.6	7.6	7.4	6.9	7.1	6.9	7.0	7.3	7.4	7.4	—			7.4	7.6	7.6	7.3	7.5
EG-05	7.5	7.4	7.3	6.8	7.3	7.2	7.1	7.4	7.4	7.3	7.4			7.5	7.8	7.7	7.3	7.5
Control	7.8	7.4	7.2	6.7	6.9	7.0	6.9	7.2	7.5	7.4	~~7.4~~			7.4	7.4	7.7	7.4	7.3
	SKB MFB	MFB																
20	22	23	24	25	26	27	28		SAMPLE ID									
8.2	8.2	8.0	8.1	7.9	7.8	7.9	7.9		HP-03									
7.8	7.8	7.7	7.7	7.5	7.4	7.5	7.4		GC-01									
7.8	7.9	7.6	7.9	7.6	7.6	7.7	7.3		EG-05									
7.8	7.7	7.5	7.9	7.4	7.3	7.2	7.4		Control									
MFB	~	~	MFB	SKB	~	SKB	~											
Technician Initials			~	~	~	CG	CG	~	~	CG	SKB			CG	MFB	MFB	SKB ~~MFB~~	

18: 7.7, 7.3, 7.4, 7.0, ~

19: 8.1, 7.7, 7.7, 7.7, MFB

WQ Instruments Used: pH II-A-0303d DAY 16 ~~8.0~~ MFB

Comments

Data Verified By: Galph

Date Verified: Jan. 25/06

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October 12, 2005

GOLDER ASSOCIATES-NORTH VANCOUVER LABORATORY
28-d FRESHWATER SEDIMENT BIOACCUMULATION TEST - DAILY WATER QUALITY MONITORING

Client: Ridolfi
Lab Project No.: 05-1427-014
Lab Work Order No.: 500707

Test Initiation Date (Day 0): Oct. 28/05
Test Termination Date (Day 28): Nov. 25/05
Test Species: Lumbriculus variegatus

Sample ID	Conductivity (µS/cm) – Day 0 to 28														
	0	1	2	3	14	15	16	17	18	19	20	21	22	23	14
HP-03	435	487	564	725	461	526	455	542	549	607	716	652	732	807	461
GC-01	426	484	543	592	468	508	421	479	482	521	597	568	640	646	468
EG-05	536	622	730	873	790	814	810	857	820	850	921	867	915	~~790~~ 819	790
Control	353	395	454	387	429	439	442	457	448	458	491	476	507	526	429
	24	25	26	27	28	~~SAMPLE ID~~									
HP-03	778	715	816	722	728										
GC-01	642	587	619	580	614										
EG-05	1002	839	907	813	851										
CONTROL	546	459	471	457	471										
		SXB	~	SXB	~										
Technician Initials	[illegible]	~	~	~	SXB/MFB	MFB	MFB	MFB	~	MFB	MFB	~	~	~	SXB

WQ Instruments Used: Salinity II-A-030304

Comments

Data Verified By: [illegible]

Date Verified: Jan. 25/06

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October 12, 2005

APPENDIX II

Chemical Analysis Data

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	**October 28, 2005**
ALS File No.	**W5866**
Report On:	**Ridolfi Inc./ 0500401** **Water Analysis**
Report To:	**EVS-Golder Associates Ltd.** **195 Pemberton Ave** **North Vancouver, BC** **V7P 2R4**
Attention:	**Mr. Clifton Samoiloff**
Received:	**October 12, 2005**

ALS ENVIRONMENTAL
per:

Leanne Harris

Leanne Harris, B.Sc. - Project Chemist
Heather A. Ross-Easton, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W5866

RESULTS OF ANALYSIS - Water

Sample ID			GC-01	HP-03	E6-05	Control
Sample Date			05-09-13	05-09-12	05-09-14	
Sample Time			12:52	17:11	10:30	
ALS ID			*1*	*2*	*3*	*4*
Physical Tests						
Conductivity	(uS/cm)		447	444	601	375
Hardness	CaCO3		148	147	168	118
Dissolved Anions						
Alkalinity-Total		CaCO3	133	112	139	84.6
Nutrients						
Ammonia Nitrogen		N	3.08	1.08	0.0280	0.220
Dissolved Metals						
Calcium	D-Ca		37.0	36.5	42.7	22.0
Magnesium	D-Mg		13.6	13.6	14.9	15.2

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W5866

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - High, 4GK116							
Total Metals							
Calcium T-Ca		51.2	50.0	mg/L	0.05	471204	a
Magnesium T-Mg		50.3	50.0	mg/L	0.1	471204	a
SPEX Minerals, 17-15M, 17-16M							
Dissolved Anions							
Alkalinity-Total	CaCO3	106	108	mg/L	1	469644	b
Alkalinity-Total	CaCO3	108	108	mg/L	1	470287	b
SPEX Minerals (10xD), 17-15M, 17-16M							
Dissolved Anions							
Alkalinity-Total	CaCO3	11.0	10.8	mg/L	2	469643	b
Alkalinity-Total	CaCO3	10.6	10.8	mg/L	2	470286	b
QC Plus, Y-QCP06B068							
Physical Tests							
Conductivity	(uS/cm)	1120	1180	mg/L	0.01	470147	c
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.15	6.29	mg/L	0.005	471784	b
Ammonia Nitrogen	N	6.45	6.29	mg/L	0.005	472014	b

Methods:
a = ICPOES
b = Colourimetry
c = Meter

A Campbell Brothers Limited Company

File No. W5866

Appendix 1 - QUALITY CONTROL - Spikes

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Anions							
Alkalinity-Total	CaCO3	236	250	mg/L	2	469645	a
Alkalinity-Total	CaCO3	254	250	mg/L	2	470288	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W5866

Appendix 1 - QUALITY CONTROL - Blanks

Water

			Result	Target	Units	DL	ALSQC#	Method
Physical Tests								
Conductivity		(uS/cm)	<2	<2	uS/cm	2	470140	a
Dissolved Anions								
Alkalinity-Total		CaCO3	<2.0	<2.0	mg/L	2	469642	b
Alkalinity-Total		CaCO3	<2.0	<2.0	mg/L	2	470285	b
Nutrients								
Ammonia Nitrogen		N	<0.005	<0.005	mg/L	0.005	471783	b
Ammonia Nitrogen		N	<0.005	<0.005	mg/L	0.005	472013	b
Dissolved Metals								
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	470504	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	470505	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	470506	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471407	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471408	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471409	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471410	c
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471492	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471493	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471494	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	471495	d
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	470504	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	470505	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	470506	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	471407	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	471408	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	471409	c
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	471410	c
Magnesium	D-Mg		<0.050	<0.050	mg/L	0.05	471492	d
Magnesium	D-Mg		<0.050	<0.050	mg/L	0.05	471493	d
Magnesium	D-Mg		<0.050	<0.050	mg/L	0.05	471494	d
Magnesium	D-Mg		<0.050	<0.050	mg/L	0.05	471495	d

Methods:
a = Meter
b = Colourimetry
c = ICPOES
d = ICPMS

A Campbell Brothers Limited Company

File No. W5866

Appendix 2 - DETECTION LIMITS - Water

			Detection Limit	
Physical Tests				
Conductivity	(uS/cm)		2.0	uS/cm
Hardness	CaCO3		0.54	mg/L
Dissolved Anions				
Alkalinity-Total		CaCO3	2.0	mg/L
Nutrients				
Ammonia Nitrogen		N	0.0050	mg/L
Dissolved Metals				
Calcium	D-Ca		0.050	mg/L
Magnesium	D-Mg		0.10	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

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Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Conductivity in Water

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Alkalinity in Water by Colourimetry

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

Recommended Holding Time:
Sample: 14 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Ammonia in Water by Colourimetry

This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.

Recommended Holding Time:
Sample: 1 day
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma -

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Appendix 3 - METHODOLOGY - Continued

mass spectrometry (EPA Method 6020).

Recommended Holding Time:
Sample: 6 months
Reference: EPA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	December 3, 2005
ALS File No.	W8150
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Mr. Clifton Samoiloff**
Received:	November 29, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W8150

RESULTS OF ANALYSIS

	Ammonia Nitrogen N	Sulphide S
Water		
CONTROL 2005 Nov 25 *ALS ID 1*	0.082	<0.020
HP-03 2005 Nov 25 *ALS ID 2*	0.054	<0.020
EG-05 2005 Nov 25 *ALS ID 3*	0.084	<0.020
GC-01 2005 Nov 25 *ALS ID 4*	0.109	<0.020
20051557 2005 Nov 25 *ALS ID 5*	0.056	<0.020

These samples are identified as Day 28, overlying.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W8150

Appendix 1 - QUALITY CONTROL - Replicates

Water		20051557	20051557
		05-11-25	QC # 477725
Nutrients			
Ammonia Nitrogen	N	0.056	0.054
Inorganic Parameters			
Sulphide	S	<0.020	<0.020

These samples are identified as Day 28, overlying.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W8150

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.17	6.29	mg/L	0.02	477865	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W8150

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	478101	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W8150

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	477864	a
Inorganic Parameters							
Sulphide	S	<0.02	<0.02	mg/L	0.02	478102	b

Methods:
a = Electrode
b = Colourimetry

A Campbell Brothers Limited Company

File No. W8150

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.020	mg/L
Inorganic Parameters			
Sulphide	S	0.020	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

APPENDIX III

Chain-of-Custody Forms

CHAIN-OF-CUSTODY / TEST REQUEST FORM

№ 0903

Golder Associates
195 Pemberton Avenue
North Vancouver, B.C.
Canada V7P 2R4
Tel: 604-986-4331
Fax: 604-662-8548
www.golder.com

Client Name: Ridolf, Inc.
Address: 1011 Western Ave, Suite 1006, Seattle, WA 98104
Client Contact: Colin Wagoner
Phone: 206-682-7294
Fax: 206-682-5008
Sampled by: MH, BS, JL, RA
Ship to:
Attn.:
Shipping Date: 9/15/05

1 Collection Date (DD/MMM/YYYY)	1 Time (24-h clock)	Sample Identification	2 Type of Each Sample	Material Safety Data Sheet Attached? (✓)	Sample Collection Method G=grab C=composite	Number of Sample Containers x Volume of Sample Containers (1 x 20L)	3 Sample Container Type by Code	Test(s) Requested: 28-day Hyalella azteca	10-day Chironomus tentans	28-day Lumbriculus v.			4 Sample Notes (preserved, saltwater, freshwater, may contain sewage...)
~~12/Sep/2005~~ ~~09/12/10~~	1553	HP-01	SED		C	4L	P	X	X				freshwater ✓
	~~1637~~	~~HP-02~~			C		P	mH					
	1711	HP-03			C	16L	P	X	X	X			freshwater ✓
	1805	HP-04			C	4L	P	X	X				freshwater
13/Sep/2005	1052	HP-08			C	4L	P	X	X				freshwater ✓
	1212	EG-01			C	4L	P	X	X				freshwater ✓
	1252	GC-01			C	16L	P	X	X	X			freshwater ✓
14/Sep/2005	0930	GC-03			C	4L	P	X	X				freshwater
	1330	EG-02			C	4L	P	X	X				~~FS~~ freshwater *
	1310	EG-03			C	4L	P	X	X				✓

PO/Reference No.: 4725
Project Title: Forest Glen
Results Needed By: Standard turnaround

Comments/Instructions: * no sample collected as confirmed by Megan Hilgart

1) Released by: Megan Nilgard Date: 9/15/05
Company: Ridolfi, Inc. Time: 8:25 a.
Courier Name: Fedex

2) Released by: Date:
Company: Time:
Courier Name:

1) Received by: SAF Date: 16 Sept 05
Company: Golder Time: 14:45

1) Received by: Date:
Company: Time:

Shaded area to be completed by Golder Laboratory upon sample receipt.
Golder Project No.: 0500401/402/404
Golder Work Order No.:
Condition Upon Receipt: Good
Receipt Sample Temp. (°C): 16.3

1 For composite effluent or water samples, the sample collection date/time is the **end** of the compositing period.
2 Receiving Water (RW): Effluent (E); Elutriate (ELU); Sediment (SED); Chemical (CHEM); Stormwater (SW); Other (Please Specify)
3 Collapsible Carboy (CC); glass jar (GJ); Jerry Can (JC); Plastic HDPE (P); Other (Please Specify)
4 Please note any conditions the lab should be aware of for safety and storage concerns

Please see instructions for completion on back of form

Distribution of copies:
White, Yellow — accompany the shipment
Pink — kept by consignor (e.g. shipper)
Yellow — kept by consignee (e.g. receiver)
White — returned to consignor by consignee

Revision Date: November 22, 2004

CHAIN-OF-CUSTODY / TEST REQUEST FORM

Golder Associates

195 Pemberton Avenue
North Vancouver, B.C.
Canada V7P 2R4

Tel: 604-986-4331
Fax: 604-662-8548
www.golder.com

№ 0905

Client Name: Ridolfi, Inc.
Address: 1011 Western Ave, Suite 1006
Seattle, WA 98104
Client Contact: Colin Wagoner
Phone: 206-682-7294
Fax: 206-682-5008
Sampled by: MH, BS, JL, RA
Ship to:
Attn.:
Shipping Date: 9/15/05

1 Collection Date (DD/MMM/YYYY)	1 Time (24-h clock)	Sample Identification	2 Type of Each Sample	Material Safety Data Sheet Attached? (✓)	Sample Collection Method G=grab C=composite	Number of Sample Containers x Volume of Sample Containers (1 x 20L)	3 Sample Container Type by Code	Test(s) Requested: 28-day Hyalella azteca	10-day Chironomus tentans	28-day Lumbriculus v.			4 Sample Notes (preserved, saltwater, freshwater, may contain sewage...)
14/Sep/2005	1400	EG-04	SED		C	4L	P	X	X				freshwater ✓
↓	1030	EG-05	↓		C	16L	P	X	X	X			freshwater - 1 kg
													sample was lost during transport and arrived separately on Sept 20, 2005
													(20 Sept 05 17.7°C 11:05 SAP)

PO/Reference No.: 4725
Project Title: Forest Glen
Results Needed By: Standard turnaround

Comments/Instructions:

1) Released by: Megan Hilgendorf
Company: Ridolfi, Inc
Courier Name: Fedex
Date: 9/15/05
Time: 8:25 am

2) Released by:
Company:
Courier Name:
Date:
Time:

1) Received by: SAP
Company: Golder
Date: 16 Sept 05
Time: 14:45

1) Received by:
Company:
Date:
Time:

Shaded area to be completed by Golder Laboratory upon sample receipt.

Golder Project No.: 0500401 / 402 / 404
Golder Work Order No.:
Condition Upon Receipt: Good
Receipt Sample Temp. (°C): 16.3

1 For composite effluent or water samples, the sample collection date/time is the **end** of the compositing period.
2 Receiving Water (RW): Effluent (E); Elutriate (ELU); Sediment (SED); Chemical (CHEM); Stormwater (SW); Other (Please Specify)
3 Collapsible Carboy (CC); glass jar (GJ); Jerry Can (JC); Plastic HDPE (P); Other (Please Specify)
4 Please note any conditions the lab should be aware of for safety and storage concerns

Please see instructions for completion on back of form

Distribution of copies:
White, Yellow — accompany the shipment
Pink — kept by consignor (e.g. shipper)
Yellow — kept by consignee (e.g. receiver)
White — returned to consignor by consignee

Revision Date: November 22, 2004

Golder Associates Ltd.

195 Pemberton Avenue
North Vancouver, British Columbia, Canada V7P 2R4
Telephone 604-986-4331
Fax 604-662-8548

Golder Associates

E/05/0525
05-1424-014

December 12, 2005

Ridolfi Inc.
1011 Western Ave. Suite 1006
Seattle, WA
USA 98104

Attention: Ms. Megan Hilgart

RE: TOXICITY TEST RESULTS FOR THE FRESHWATER SEDIMENT SAMPLES COLLECTED SEPTEMBER 12-14, 2005

Dear Ms. Higart:

We are pleased to provide you with the final report for the 10-day freshwater midge (*Chironomus tentans)* survival and growth toxicity test performed on the sediment samples collected September 12-14, 2005.

A detailed report describing the test methods and results is attached. The report also includes appendices containing raw data, statistical analyses, and chain-of-custody form. Should you have any questions or comments regarding this report, please do not hesitate to contact the undersigned or Edmund Canaria, Laboratory Manager, at 604-986-4331.

Yours very truly,

GOLDER ASSOCIATES LTD.

for

Rachel DeWynter, B.Sc.
Bioassay Team Leader

Reviewed By:

Edmund C. Canaria, R.P.Bio, B.Sc.
Laboratory Manager

Attachment
RSD/ECC/lba
O:\DATA\FINAL\2005\1424\05-1424-014\LET-1212_05 RIDOLFI INC-TOX TEST FRESHWATER SEDIMENT COLLECTED SEPT 12 TO 14 2005.DOC

Toxicity testing was carried out in accordance with applicable test methodologies and/or standards of practice. Our liability is limited solely to the cost of re-testing in the event of non-compliance with such test specifications or standards of practice. Golder accepts no responsibility or liability for the interpretation or use of these testing results by others, nor for any delay, loss, damage or interruptions of testing, collection, preparation, and delivery of samples or test results resulting from events or circumstances beyond our control.

50 BEST EMPLOYERS IN CANADA 2005

50 BEST MANAGED COMPANIES

December 2005

Laboratory Report

Ridolfi Inc.
Freshwater Toxicity Testing Program

September 2005 Samples

PREPARED FOR:

Ridolfi Inc.
Seattle, WA

PREPARED BY:

EVS environment consultants

A Member of the Golder Group of Companies

FRESHWATER TOXICITY TESTING PROGRAM

SEPTEMBER 2005 SAMPLES

LABORATORY REPORT

Prepared for

Ridolfi Inc.
1011 Western Ave. Suite 1006
Seattle, WA
USA 98104

Prepared by

EVS Environment Consultants (A Member of the Golder Group of Companies)
195 Pemberton Avenue
North Vancouver, BC
Canada V7P 2R4

Golder Project No.

05-1424-014

December 2005

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1.0 INTRODUCTION

Ten freshwater sediment samples were collected for toxicity testing on September 12, 13 and 14, 2005 and were received at the EVS-Golder North Vancouver, BC Laboratory on September 16 and 20, 2005. The samples were collected in 4L plastic containers and transported in coolers with ice packs. The samples were stored in the dark at 4°C prior to testing.

Toxicity testing on the samples was performed using the static-renewal 10-d freshwater midge (*Chironomus tentans)* and a 28-d freshwater amphipod (*Hyalella azteca*) survival and growth toxicity tests. The negative control performance in the 28-d amphipod test did not meet test validity criteria for survival and therefore the results from this test are not included in this report. Three of the samples were also tested with the 28-d *Lumbriculus variegatus* bioaccumulation test. The results of this test are not included in this report but will be provided in a separate report.

This report describes the methods and results of the *Chironomus tentans* test. The raw data and statistical analyses are provided in Appendix I. Chemical analysis data and chain-of-custody forms are found in Appendices II and III.

2.0 METHODS

2.1 METHODS SUMMARY

The 10-d *Chironomus tentans* sediment toxicity test was conducted following EVS Environment Consultants Standard Operating Procedure (SOP). These methods are based on procedures presented by the United States Environment Protection Agency (USEPA, 2000) and the American Society for Testing Materials International (ASTM International, 2004) and ASTM (2000). The toxicity test methods are summarized in Table 1.

C. tentans were exposed to test sediments for 10 days in a static-renewal system. The test was monitored for temperature and dissolved oxygen daily, and for pH and conductivity at test initiation and termination. The organisms were given 1.5 mL of 4.0 g/L blended TetraMin™ fish food to each test vessel daily.

At test termination, the organisms were recovered from the sediments and final survival was determined. Surviving organisms were dried in an oven at 60°C for 24 h, desiccated, and weighed to determine dry weights. Any *C. tentans* beginning to pupate were included in the survival data but excluded from dry weight calculations. After measuring dry weights, *C. tentans* were transferred to a muffle furnace at 550°C for 2 h, desiccated, and weighed to determine ash-free dry weights.

Overlying ammonia, sulphides, hardness and alkalinity were measured on each sample at test initiation and termination. Interstitial ammonia and interstitial sulphide were also measured on each sample at test initiation and termination. The ammonia and sulphide analyses were performed by ALS Environmental, Vancouver, BC, following methods outlined by the American Public Health Association (APHA, 1998).

2.2 STATISTICAL ANALYSIS

Statistical analyses for all tests were conducted using the computer software program TOXCALC (version 5.0.23; Tidepool Scientific Software, 1994).

2.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This study followed a comprehensive QA/QC Program to ensure full documentation and minimize possible errors in computation and reporting of results. The following general QA/QC guidelines were applied in this test: use of negative controls, use of positive controls, replication, instrument calibration, water quality maintenance and record-keeping, and use of standard operating procedures (SOPs). To ensure that the generated

data and reporting met quality standards, all data and statistical analyses were reviewed by a member of our QA/QC Committee prior to reporting the results.

Toxicity testing was carried out in accordance with applicable test methodologies and/or standards of practice. Our liability is limited solely to the cost of re-testing in the event of non-compliance with such test specifications or standards of practice. Golder/EVS accepts no responsibility or liability for the interpretation or use of these testing results by others, nor for any delay, loss, damage or interruptions of testing, collection, preparation, and delivery of samples or test results resulting from events or circumstances beyond our control.

Table 1: Summary of exposure conditions for the 10-d *C. tentans* sediment toxicity test.

10-d SEDIMENT TEST CONDITIONS	
Organism source	Aquatic Bio Systems Inc., Fort Collins, CO.
Acclimation	2 days prior to testing at 23 ± 1°C.
Organisms age	Third instar larvae.
Headcapsule width	0.24 – 0.36 mm.
Sample holding time	30-32 days.
Test vessel	375-mL glass jars; 100 mL sediment; 175 mL overlying dilution/control water.
Dilution water	Moderately hard reconstituted dechlorinated water (80 – 100 mg/L as $CaCO_3$); used within 4 weeks.
Negative control	Silica sand (#30 grit).
No. of replicates	8 replicates per treatment; 10 organisms per replicate.
Feeding regime	1.5 mL of 4.0 g/L blended TetraMin™ fish food per beaker daily.
Measurements	Temperature and dissolved oxygen daily, pH and conductivity at test initiation and termination; overlying ammonia and sulphides on Days 0 and 10; interstitial ammonia and sulphides on day 0; overlying hardness and alkalinity on Days 0 and 10.
Aeration	None.
Water renewal	None.
Lighting	Overhead full spectrum fluorescent lights; 500 – 1000 lux at water surface.
Photoperiod	16:8 (light:dark).
Test temperature	23 ± 1°C.
Endpoints	Survival; average individual dry weight; ash-free dry weight.
Test validity	≥ 70% mean control survival, ≥ 0.6 mg/chironomid mean individual control dry weight; ≥ 0.48 mg/chironomid mean ash-free control dry weight.

Table 2: Summary of reference toxicant test conditions.

C. TENTANS 96-h REFERENCE TOXICANT TEST CONDITIONS	
Reference toxicant	Potassium chloride (KCl).
No. of replicates	Three replicates of 200 mL test solution.
Concentrations	1.25, 2.5, 5.0, 10.0, and 20.0 g/L KCl, plus moderately hard water negative control.
Feeding regime	1.25 mL of 4.0 g/L blended TetraMin™ fish food per beaker at 0 and 48 h.
Aeration	None.
Photoperiod	16:8 (light:dark).
Temperature	23 ± 1°C.
Endpoint	LC50.
Test validity	LC50 estimate within two standard deviations of the laboratory mean; ≥ 90% mean control survival.

3.0 RESULTS

A summary of results for the *Chironomus tentans* toxicity test are provided in Table 3. Total ammonia and sulphide values are provided in Table 4. Raw data and statistical analyses are provided in Appendix I.

3.1 10-D MIDGE (*CHIRONOMUS TENTANS*) TOXICITY TEST RESULTS

The 10-d *C. tentans* toxicity test showed mean negative control survival, individual dry weight and ash-free dry weight values of 97.5%, 1.30 mg and 0.64 mg, respectively.

Sample EG-01 showed a statistically significant survival response relative to the negative control ($p \leq 0.05$), but showed no statistically significant response to either mean individual or ash free dry weight endpoints. Sample EG-03 showed complete mortality in all replicates.

All other samples showed no significant response to any of the endpoints tested relative to the negative control ($p \leq 0.05$).

3.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The 10-d *C. tentans* sediment toxicity test met all specified negative control criteria for test validity outlined in the Environmental Protection Agency (2000) protocol. Water quality measurements were all within recommended ranges except on the day of test termination when several replicates were measured to have dissolved oxygen that were below the minimum level of 2.5 mg/L. However, this deviation did not appear to have affected the outcome of the test as replicates with noted low dissolved oxygen levels had full or high survival. It was also discovered at test termination that a replicate from both samples HP-08 and EG-04 had no organisms and most likely had no organisms added at test initiation. Both replicates were excluded from statistical analysis. A replicate of sample GC-01 was damaged during testing and was unrecoverable and therefore, this replicate was excluded from statistical analysis.

The reference toxicant tests for both species met all passing criteria as specified by Environmental Protection Agency (2000). Point estimates for the tests were within two standard deviations of the laboratory mean, indicating that the tests were within acceptable limits of variability.

Table 3: Summary of results for the 10-d *C. tentans* sediment toxicity test.

SAMPLE ID	SURVIVAL (%) MEAN ± SD1	AVERAGE INDIVIDUAL DRY WEIGHT (MG) MEAN ± SD1	ASH-FREE DRY WEIGHT (MG) MEAN ± SD1
Negative Control	97.5 ± 4.6	1.30 ± 0.21	0.64 ± 0.14
HP-01	87.5 ± 10.4	1.75 ± 0.49	0.75 ± 0.27
HP-03	86.2 ± 13.0	2.03 ± 0.39	0.96 ± 0.17
HP-04	85.0 ± 10.7	2.09 ± 0.28	0.91 ± 0.19
HP-08	88.6 ± 10.7	2.45 ± 0.37	1.16 ± 0.27
EG-01	77.5 ± 17.5 *	2.92 ± 0.52	1.51 ± 0.28
GC-01	84.3 ± 17.2	2.58 ± 0.38	1.16 ± 0.28
GC-03	88.8 ± 8.4	2.73 ± 0.35	1.17 ± 0.17
EG-03	0.0 ± 0.0 *	0.00 ± 0.00 *	0.00 ± 0.00 *
EG-04	91.4 ± 6.9	1.61 ± 0.29	0.69 ± 0.19
EG-05	80.0 ± 26.2	2.41 ± 0.45	0.93 ± 0.38

[1] n = 8 replicates per treatment; 10 chironomids per replicate.

* Indicates significant difference ($p \leq 0.05$) relative to the negative control based on statistical analysis.

Table 4: Summary of total ammonia and sulphide values for the 10-d *C. tentans* sediment toxicity test.

Sample ID	Overlying Water Ammonia (mg/L N)		Interstitial Water Ammonia (mg/L N)		Overlying Water Sulphides (mg/L S)		Interstitial Water Sulphides (mg/L S)		Bulk Ammonia (mg/L N)	Bulk Sulphides (mg/L S)
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day -1	Day -1
Negative Control	<0.02	1.18	<0.02	1.49	<0.02	<0.02	<0.10	<0.04	na	na
HP-01	1.29	1.46	3.49	2.50	<0.02	<0.02	<0.10	<0.10	5.92	<0.02
HP-03	0.705	1.20	2.32	2.44	<0.02	0.025	<0.10	<0.02	2.63	<0.02
HP-04	1.04	1.56	3.72	2.05	<0.02	<0.02	0.13	<0.04	4.60	<0.02
HP-08	1.72	1.66	3.32	4.19	<0.02	<0.02	<0.20	<0.10	6.64	<0.02
GC-01	2.04	2.25	7.56	5.46	<0.02	<0.02	<0.04	<0.04	8.54	<0.02
GC-03	1.35	1.48	5.63	4.80	<0.02	<0.02	<0.04	<0.02	5.70	<0.02
EG-01	2.09	2.18	8.85	4.52	<0.02	0.025	<0.04	<0.04	9.19	<0.02
EG-03	0.56	1.45	1.99	6.44	<0.02	<0.02	<0.10	<0.04	2.24	<0.02
EG-04	<0.02	0.70	0.31	0.72	<0.02	<0.02	<0.04	<0.04	-[1]	-[1]
EG-05	0.106	1.35	0.69	0.66	<0.02	<0.02	<0.04	0.048	0.27	0.27

[1] No pore water was present.

4.0 REFERENCES

APHA (American Public Health Association). 1998. Standard Methods for the Examination of Water and Wastewater. 20th edition. American Public Health Association, American Water Works Association and Water Environment Federation, Washington, DC.

ASTM (American Society for Testing and Materials) International. 2004. Standard test methods for measuring the toxicity of sediment-associated contaminates with fresh water invertebrates. Method 1706-00. In 2004 annual book of ASTM standards, Volume 11.05. ASTM International, West Conshohocken, PA.

ASTM (American Society for Testing and Materials). 2000. Standard test methods for measuring the toxicity of sediment-associated contaminates with fresh water invertebrates. Method 1706-95B. In 2000 ASTM annual book of standards, Volume 11.05. American Society for Testing and Materials, Philadelphia, PA.

Tidepool Scientific Software. 1994. TOXCALC: Comprehensive Toxicity Data Analysis and Database Software, Version 5.0.23. Tidepool Scientific Software, McKinleyville, CA. 80 pp.

USEPA (United States Environmental Protection Agency). 2000. Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates. 2nd Edition. United States Environmental Protection Agency, Office of Research and Development, Duluth, MN. EPA/600/R-99/064. March 2000.

APPENDIX I

Raw Data and Statistical Analyses:
10-d *Chironomus tentans* Sediment Toxicity Test

05-1424-014
0500402
December 2005

EVS ENVIRONMENT CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client: Ridolfi, Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

EVS Analysts: KN, MJG, AXF, LOC, SXB
Test Type/Duration: 10d Freshwater sediment tox. test (static renewal ~~ASTM~~ USEPA)
Test Initiation Date: Oct 14/2005

SAMPLE

Identification: Various
Amount Received: 10 X 4 L
Date Collected: Sept 12 - Sept 14, 2005
Date Received: Sept 16/2005

TEST SPECIES INFORMATION

Organism: C. tentans
Source/Date Received: Oct 12/2005 ABS
Age on day 0: ~10 days
Reference Toxicant: KCl
Current Reference Toxicant Result
Reference Toxicant Test Date: Oct 14/2005
96-h LC50 (and 95% CL): 6.0 (5.4-6.7) g/L KCl
Reference Toxicant Warning Limits (mean ± 2SD) and CV
5.4 ± 3.3 g/L KCl ; %CV = 30

TEST CONDITIONS

Temperature Range (°C): 22.0 - 23.0
pH Range: 6.4 - 7.4
Dissolved Oxygen Range (mg/L): 1.6 - 8.0
Conductivity Range (µS/cm): 366 - 684
Hardness Range (mg/L as $CaCO_3$): 80 - 144
Alkalinity Range (mg/L as $CaCO_3$): 56 - 118
Total Ammonia Ranges (mg/L N)
Bulk: ~~<0.020~~ 0.270 - 9.19
IW: Start (Day 0) <0.2 - 1.85 End 0.66 - 6.44
OW: Start (Day 0) <0.02 - 2.09 End 0.70 - 2.25
Photoperiod (L:D h): 16:8
Overlying Water Renewed? Yes (twice daily)
Aeration Provided? (give rate): NO
Other: —

DILUTION/CONTROL WATER (initial water quality)

Water Type: MHW (Oct 13)
Temperature (°C): 22.0
pH: 7.5
Dissolved Oxygen (mg/L): 8.7
Conductivity (µS/cm): 361
Hardness (mg/L as $CaCO_3$): 96
Alkalinity (mg/L as $CaCO_3$): 60
Other: —

Total Sulphides (mg/L): <0.02 (Day 0) (Overlying) <0.02-0.025 (day 10 Overlying)
IW (Day 0): <0.04-0.3 (Day 10): <0.04 - <0.4

REFER TO ATTACHED TABLE(S) FOR SUMMARY OF RESULTS

Comments:

Data Verified By: Ralph K
Date Verified: Dec. 8/05

Client	Ridolfi	**Species**	*Chironomus tentans*
Project No.	05-1424-014	**Initiation Date**	14-Oct-05
WO No.	0500402		

Summary of Results for the 10-d Freshwater Midge Sediment Toxicity Test

Sample ID	Survival (%) (Mean ± SD)[1]	Average Individual Dry Weight (mg) (Mean ± SD)[1]	Ash Free Dry Weight (mg) (Mean ± SD)[1]
Negative Control	97.5 ± 4.6	1.30 ± 0.21	0.64 ± 0.14
HP-01	87.5 ± 10.4	1.75 ± 0.49	0.75 ± 0.27
HP-03	86.2 ± 13.0	2.03 ± 0.39	0.96 ± 0.17
HP-04	85.0 ± 10.7	2.09 ± 0.28	0.91 ± 0.19
HP-08	88.6 ± 10.7	2.45 ± 0.37	1.16 ± 0.27
EG-01	77.5 ± 17.5 *	2.92 ± 0.52	1.51 ± 0.28
GC-01	84.3 ± 17.2	2.58 ± 0.38	1.16 ± 0.28
GC-03	88.8 ± 8.4	2.73 ± 0.35	1.17 ± 0.17
EG-03	0.0 ± 0.0 *	0.00 ± 0.00 *	0.00 ± 0.00 *
EG-04	91.4 ± 6.9	1.61 ± 0.29	0.69 ± 0.19
EG-05	80.0 ± 26.2	2.41 ± 0.45	0.93 ± 0.38

[1] n = 8 replicates per treatment; 10 chironomids per replicate.

* Indicates significant difference ($p \leq 0.05$) relative to the control based on statistical analysis or data observation.

Cgalpik
Dec-8/05

EVS ENVIRONMENT CONSULTANTS
10-d FRESHWATER SEDIMENT TOXICITY TEST – DAILY WATER QUALITY MONITORING

Client: Ridolfi Inc
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Initiation Date/Time (Day 0): Oct 14/2005
Test Termination Date (Day 10): Oct 24/2005
Test Species: C. tentans
~~Source/Age on Day 0~~ Head Capsule Size (0.33 - 0.45) mm / ABS

Sample ID	Temperature (°C)											pH	
	0	1	2	3	4	5	6	7	8	9	10	0	10
Control	22.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.4	6.4
HP-01	22.0	22.5	22.5	22.0	22.5	22.0	22.0	22.0	22.0	22.0	22.0	7.0	6.5
HP-03	22.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.2	6.4
HP-04	22.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.3	6.8
HP-08	22.0	22.5	23.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.2	6.6
EG-01	22.0	22.5	23.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.4	6.7
GC-01	22.0	22.5	23.0	22.0	22.5	22.0	22.0	22.0	22.0	22.0	22.0	7.2	6.7
GC-03	22.0	22.5	23.0	22.0	22.5	22.0	22.0	22.0	22.0	22.0	22.0	7.3	6.7
EG-03	22.0	22.5	23.0	22.0	22.5	22.0	22.0	22.0	22.0	22.0	22.0	7.2	7.0
EG-04	22.0	22.5	23.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.4	6.9
EG-05	22.0	22.5	23.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.3	6.8
Technician Initials	AXF	[illegible]	[illegible]	AXF	AXF	AXF	AXF	AXF	SAB	SAB	ML	AXF	ML

WQ Instruments Used: Temperature Calibrated Hg Thermometer pH II - A - 030301

Comments

Data Verified By [illegible] Date Verified Dec-7/05

EVS ENVIRONMENT CONSULTANTS
10-d FRESHWATER SEDIMENT TOXICITY TEST – DAILY WATER QUALITY MONITORING

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Initiation Date/Time (Day 0): Oct 14/2005
Test Termination Date (Day 10): Oct 24/2005
Test Species: C. tentans
~~Source/Age on Day 0~~ Head Capsule Size: 0.33 - 0.45 / ARS

Sample ID	Dissolved Oxygen (mg/L)											Conductivity (µS/cm)	
	0	1	2	3	4	5	6	7	8	9	10	0	10
Control	8.0	4.8	4.6	5.2	5.2	3.8	4.0	4.2	4.5	4.1	3.8	366	375
HP-01	5.2	4.0	3.6	3.4	3.5	3.6	3.2	3.6	3.6	4.0	3.5	501	413
HP-03	5.8	4.2	4.2	5.2	5.0	3.4	3.3	3.8	3.5	3.0	1.8	494	380
HP-04	5.8	4.6	4.4	3.8	4.0	3.3	3.3	3.6	3.6	3.1	3.2	463	423
HP-08	5.6	4.5	4.5	3.6	3.7	4.0	3.6	3.6	3.4	3.0	2.2	495	371
EG-01	5.7	4.5	5.0	4.2	4.8	4.0	3.2	3.4	3.5	2.6	2.5	483	443
GC-01	5.6	5.0	3.8	3.8	3.6	3.3	3.1	3.2	3.2	3.0	3.6	451	399
GC-03	5.4	3.6	5.2	4.6	4.2	3.4	3.3	3.4	3.2	4.2	3.0	429	408
EG-03	4.8	4.2	4.6	4.4	4.4	3.4	4.4	3.8	4.0	3.6	2.8	684	458
EG-04	4.9	4.4	4.1	4.2	4.2	3.3	4.2	4.0	3.3	3.6	2.8	494	407
EG-05	5.0	4.6	4.8	4.6	4.4	3.6	4.4	3.8	3.6	2.8	1.7	601	466
Technician Initials	AXF	[illegible]	[illegible]	AXF	AXF	AXF	AXF	AXF	SXB	SXB	AXF/ML	AXF	ML

WQ Instruments Used: DO II-A-20 Conductivity II-A-0501

Comments

Data Verified By: [signature] Date Verified: Dec. 6/05

EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species/Test Type: C. tentans 10-d F.W tox. test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 24/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
Control	A	1	10	0	10	0	ML	22.0	6.8	378	4.2
	B	2	10	0	10	0	ML	22.0	6.8	388	3.4
	C	3	10	0	10	0	ML	22.0	6.8	381	4.2
	D	4	10	0	10	0	ML	22.0	6.8	372	3.6
	E	5	9	0	9	1	ML	22.0	6.8	381	3.4
	F	6	10	0	10	0	ML	22.0	6.8	385	3.7
	G	7	9	0	ML ~~10~~ 9	1	ML	22.0	6.8	380	2.8
	H	8	10	0	10	0	ML	22.0	6.8	379	4.0
HP-01	A	9	8	1	9	1	"	22.0	6.9	432	3.8
	B	10	10	0	10	0	"	22.0	7.0	421	3.8
	C	11	8	0	8	2	"	22.0	7.0	416	3.8
	D	12	9	0	9	1	"	22.0	7.0	427	3.8
	E	13	9	1	10	0	"	22.0	7.0	408	4.0
	F	14	10	0	10	0	"	22.0	7.0	415	3.5
	G	15	9	0	9	1	"	22.0	7.0	423	2.6
						Technician Initials		ML	ML	ML	ML

WQ Instruments Used: Temp. (Calibrated Hg) thermometer pH II-A-030301 Cond./Sal. II-A-0501 DO II-A-20

Data Verified By: Quality Date Verified: Dec. 7/05

EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species/Test Type: C. tentans 10d F.W. toxicity test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 24/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
	H	16	7	0	7	3	[illegible]	22.0	7.1	417	2.4
HP-03	A	17	9	0	9	1	[illegible]	22.0	7.0	423	2.6
	B	18	8	0	8	2		22.0	7.2	429	2.8
	C	19	9	1	10	0		22.0	7.2	411	3.4
	D	20	6	0	6	4		22.0	7.2	418	2.8
	E	21	8	0	8	2		22.0	7.2	433	4.9
	F	22	10	0	10	0		22.0	7.2	431	3.0
	G	23	10	0	10	0		22.0	7.2	424	2.6
	H	24	9	0	9	1		22.0	7.2	411	3.2
HP-04	A	25	8	0	8	2	[illegible]	22.0	7.0	427	2.2
	B	26	8	0	8	2	alFB	22.0	7.1	424	3.4
	C	27	10	0	10	0	MFB	22.0	7.1	425	2.8
	D	28	9	0	9	1	MG	22.0	7.1	411	2.6
	E	29	8	0	8	2	MG	22.0	7.1	409	2.8
	F	30	8	0	8	2	[illegible]	22.0	7.1	406	3.2
							Technician Initials	MG	MG	MG	MG

WQ Instruments Used: Temp. Calibrated by Thermometer pH II-A-030301 Cond./Sal. II-A-0501 DO II-A-20

Data Verified By: [illegible] Date Verified: Dec. 7/05

① checked by TXS

EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species/Test Type: C. tentans 10d. F.W. toxicity test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 25/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
	G	31	10	0	10	0	[illegible]	22.0	7.2	446	2.2
	H	32	7 ②	0	7	3	MFB	22.0	7.1	424	2.8
HP-08	A	33	9	0	9	1	[illegible]	22.5	7.0	440	2.6
	B	34	9	0	9	1		22.0	7.1	429	2.8
	C	35	9	0	9	1		22.0	7.1	411	3.2
	D	36	~~7~~ 10 ①	0	10	10		22.0	7.2	413	3.8
	E	37	7 ②	0	7	3		22.0	7.2	427	3.0
	F	38	8	0	8	2		22.0	7.2	453	2.6
	G	39	10	0	10	0		22.5	7.2	449	3.2
	H	40	10	0	10	0		22.0	7.1	474	2.8
EG-01	A	41	8	0	8	2		22.0	6.9	408	3.3
	B	42	9	0	9	1		22.5	7.1	426	2.4
	C	43	8	0	8	2		22.0	7.1	434	2.6
	D	44	5 ①	0	5	5		22.0	7.1	439	3.2
	E	45	9	0	9	1		22.0	7.1	441	2.2
						Technician Initials		MLC	MLC	MLC	MLC

① checked by LOC

WQ Instruments Used: Temp. Calibrated Hg thermometer. pH II-A-030301 Cond/Sal. II-A-0501 DO II-A-20

Data Verified By: [illegible] Date Verified: Dec. 7/05

② checked by MLC
① checked by TXS [illegible] is sealed

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EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species/Test Type: C. tentans 10-d F.W. toxicity test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 24/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
	F	46	9	0	9	1	u	22.5	7.1	449	2.8
	G	47	5 ①	0	5	5	u	22.0	7.2	406	3.4
	H	48	9	0	9	1	u	22.0	7.1	425	2.2
GC-01	A	49	9	0	9	1	SXB	22.0	7.1	440	2.6
	B	50	7	0	7	3	SXB ①	22.0	7.1	444	2.6
	C	51	7	0	7	3	SXB ②	22.0	7.1	442	2.4
	D	52	10	0	10	0	SXB	22.5	7.1	423	2.6
	E	53	10	0	10	0	SXB	22.0	7.1	424	2.2
	F	54	10	0	10	0	SXB	22.0	7.1	440	2.2
	G	55	—	—	—	—	—	~~22.0~~ MTL	~~7.1~~ MTL	—	—
	H	56	6	0	6	4	SXB ③	22.0	7.1	437	2.4
GC-03	A	57	9	0	9	1	MTL	22.5	7.2	413	2.0
	B	58	8	0	~~7~~ 8 MTL	2	MTL	22.5	7.3	420	2.8
	C	59	10	0	10	0	MTL	22.0	7.3	414	3.0
	D	60	9	0	9	1	MTL	22.0	7.3	423	2.4
						Technician Initials		MTL	MTL	MTL	MTL

WQ Instruments Used: Temp: Calibrated Hg Thermometer pH II-A-030301 Cond./Sal. II-A-0501 DO II-A-20

Data Verified By: Qualify Date Verified: Dec. 7/05

① checked by MJG ② checked by LOC ③ checked by JRS

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EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 05004102

Test Species/Test Type: C. tentans 10-d F.W toxicity test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 24/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
	E	61	⊛9	0	⊛9	1	MV	22.5	7.3	436	1.6
	F	62	8	0	8	2	MV	22.0	7.4	393	3.2
	G	63	**8	0	**8	2	MV	23.0	7.2	436	2.6
	H	64	10	0	10	0	MV	22.5	7.3	421	2.8
EG-03	A	65	0 ⊙	0	0	10	~	22.0	7.2	476	3.0
	B	66	0 ⊙	0	0	10	~	22.0	7.2	450	2.4
	C	67	0 ⊙	0	0	10	~	22.5	7.3	442	3.0
	D	68	0 ⊙	0	0	10	~	22.0	7.3	460	2.6
	E	69	0 ⊙	0	0	10	~	22.0	7.3	452	2.0
	F	70	0 ⊙	0	0	10	~	22.5	7.3	454	3.2
	G	71	0 ⊙	0	0	10	~	22.5	7.3	451	2.6
	H	72	0 ⊙	0	0	10	~	22.0	7.3	433	3.4
EG-04	A	73	8	0	8	2	⊿	22.0	7.2	434	2.8
	B	74	10	0	10	0	⊿	22.0	7.2	438	2.4
	C	75	9	0	9	1	⊿	22.0	7.2	430	3.6
						Technician Initials		MV	MV	MV	MV

WQ Instruments Used: Temp. Calibrated Hg thermometer pH II-A-030301 Cond./Sal. II-A-050101 DO II-A-20
Data Verified By: Qualifiy Date Verified: Dec. 7/05

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⊙ counted by JxS
⊛ 2 pupated
** 1 pupated

EVS ENVIRONMENT CONSULTANTS
SEDIMENT TOXICITY TESTS – SURVIVAL AND FINAL WATER QUALITY DATA

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species/Test Type: C. tentans 10-d F.W toxicity test
Test Initiation Date (Day 0): Oct 14/2005
Test Termination Date: Oct 24/2005

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
	D	76	9 SXB	SXB	SXB ~~7~~ ②	SXB	SXB	22.5	7.2	~~MLL~~ 426	4.0
	E	77	9	0	9	1	SXB	22.0	7.2	431	2.8
	F	78	9	0	9	1	SXB	22.5	7.2	432	2.2
	G	79	10	0	10	0	SXB	22.0	7.2	435	2.8
	H	80	9	0	9	1	SXB	22.0	7.2	442	2.2
EG-05	A	81	10	0	10	0	MY	22.0	7.1	442	3.4
	B	82	8	0	8	2		22.0	7.2	448	2.4
	C	83	10	0	10	0		22.0	7.2	467	2.6
	D	84	2 ①	0	2	8		22.0	7.2	481	3.0
	E	85	10	0	10	0		22.0	7.1	484	4.0
	F	86	8	0	8	2		22.0	7.1	520	2.8
	G	87	8	0	8	2		22.0	7.2	457	2.6
	H	88	8	0	8	2		22.0	7.1	502	4.4
							Technician Initials	MLL	MLL	MLL	MLL

① Checked by AKN
② ~~No~~ No mark indicating seeding (missed)

WQ Instruments Used: Temp. Calibrated by thermometer pH II-A-030301 Cond./Sal. II-A-0501 DO II-A-20

Data Verified By: Galli

Date Verified: Dec. 7/05

EVS ENVIRONMENT CONSULTANTS

Sediment Toxicity Tests - Dry Weight Data

CLIENT: Ridolfi
PROJECT #: 05-1424-014
WORK ORDER # 0500402
BALANCE TYPE Sartorius BP211D

TEST TYPE: 10-d Freshwater Sediment
TEST SPECIES: *Chironomus tentans*
TEST INITIATION DATE 14-Oct-05

Pan No.	Rep	Sample ID	Survival At Start	Number of Survivors	Number Weighed	Pan weight (mg)	Final Weight (mg) Pan + Biomass	Ash Free Weight (mg) Pan + Biomass	Organism Dry Weight	Organism Ash Free Dry Weight	Tech'n Initials	Comments
1	A	Control	10	10	10	948.48	961.84	955.59	13.36	7.11	MEL	
2	B		10	10	10	944.45	958.73	951.81	14.28	7.36	MEL	
3	C		10	10	10	943.53	954.82	948.70	11.29	5.17	MEL	
4	D		10	10	10	947.00	959.65	952.17	12.65	5.17	MEL	
5	E		10	9	9	942.50	954.48	947.28	11.98	4.78	MEL	
6	F		10	10	10	949.57	959.97	954.84	10.40	5.27	MEL	
7	G		10	9	9	952.81	968.19	960.95	15.38	8.14	MEL	
8	H		10	10	10	948.31	960.24	954.71	11.93	6.40	MEL	
9	A	HP-01	10	8	8	1092.32	1109.61	1100.31	17.29	7.99	MEL	
10	B		10	10	10	1091.10	1114.39	1101.14	23.29	10.04	MEL	
11	C		10	8	8	1109.08	1119.33	1113.14	10.25	4.06	MEL	
12	D		10	9	9	1104.17	1122.14	1111.75	17.97	7.58	MEL	
13	E		10	9	9	1103.25	1113.62	1106.88	10.37	3.63	MEL	
14	F		10	10	10	1108.69	1124.52	1114.85	15.83	6.16	MEL	
15	G		10	9	9	1104.10	1115.36	1108.56	11.26	4.46	MEL	
16	H		10	7	7	1087.45	1103.26	1095.14	15.81	7.69	MEL	
17	A	HP-03	10	9	9	1108.14	1127.65	1117.15	19.51	9.01	MEL	
18	B		10	8	8	1110.53	1128.45	1118.73	17.92	8.20	MEL	
19	C		10	9	9	1091.59	1108.96	1099.56	17.37	7.97	MEL	
20	D		10	6	6	1088.86	1101.49	1094.95	12.63	6.09	MEL	
21	E		10	8	8	1101.18	1123.25	1111.23	22.07	10.05	MEL	
22	F		10	10	10	1112.98	1131.63	1122.49	18.65	9.51	MEL	
23	G		10	10	10	1112.05	1128.59	1120.94	16.54	8.89	MEL	
24	H		10	9	9	1114.95	1128.39	1120.71	13.44	5.76	MEL	
25	A	HP-04	10	8	8	1113.51	1132.43	1121.77	18.92	8.26	MEL	
26	B		10	8	8	1092.75	1109.66	1100.46	16.91	7.71	MEL	
27	C		10	10	9	1045.70	1064.01	1053.67	18.31	7.97	MEL	one organism lost in transfe
28	D		10	9	9	1042.22	1056.01	1047.24	13.79	5.02	MEL	
29	E		10	8	8	1049.31	1067.94	1058.32	18.63	9.01	MEL	
30	F		10	8	8	1048.71	1064.63	1054.56	15.92	5.85	MEL	
31	G		10	10	10	1050.70	1070.84	1061.05	20.14	10.35	MEL	
32	H		10	7	7	1050.86	1067.53	1057.73	16.67	6.87	MEL	
33	A	HP-08	10	9	9	1058.59	1079.46	1068.33	20.87	9.74	MEL	
34	B		10	9	9	1050.65	1067.90	1058.35	17.25	7.70	MEL	
35	C		10	9	9	1053.12	1073.59	1061.88	20.47	8.76	MEL	
36	D		10	0	0	1052.49	0.00	0.00	0.00	0.00	MEL	mis-seeded-excluded
37	E		10	7	7	1056.80	1078.40	1068.54	21.60	11.74	MEL	
38	F		10	8	8	1048.56	1070.42	1058.75	21.86	10.19	MEL	
39	G		10	10	10	1051.63	1076.52	1064.08	24.89	12.45	MEL	
40	H		10	10	10	1053.57	1077.05	1063.45	23.48	9.88	MEL	
41	A	EG-01	10	8	8	1059.58	1078.67	1068.35	19.09	8.77	MEL	
42	B		10	9	9	1111.09	1134.94	1123.73	23.85	12.64	MEL	
43	C		10	8	8	1110.59	1138.26	1123.89	27.67	13.30	MEL	
44	D		10	5	5	1111.95	1130.03	1121.15	18.08	9.20	MEL	
45	E		10	9	9	1107.66	1136.37	1123.58	28.71	15.92	MEL	
46	F		10	9	9	1109.07	1137.84	1124.24	28.77	15.17	MEL	
47	G		10	5	5	1106.17	1119.87	1113.35	13.70	7.18	MEL	
48	H		10	9	9	1109.35	1128.58	1119.76	19.23	10.41	MEL	
49	A	GC-01	10	9	9	1107.51	1128.91	1116.98	21.40	9.47	MEL	
50	B		10	7	7	1108.43	1127.85	1116.80	19.42	8.37	MEL	
51	C		10	7	7	1113.54	1136.79	1125.22	23.25	11.68	MEL	
52	D		10	10	10	1110.77	1134.08	1123.84	23.31	13.07	MEL	
53	E		10	10	10	1112.32	1134.62	1120.63	22.30	8.31	MEL	
54	F		10	10	10	1107.05	1130.38	1116.21	23.33	9.16	MEL	
55	G		10	0	0	1104.89	0.00	0.00	0.00	0.00	MEL	broken jar during test- excluded
56	H		10	6	6	1104.75	1120.91	1111.47	16.16	6.72	MEL	
57	A	GC-03	10	9	9	1107.19	1130.70	1118.07	23.51	10.88	MEL	
58	B		10	8	8	1105.12	1126.47	1113.64	21.35	8.52	MEL	
59	C		10	10	10	1108.32	1130.83	1117.30	22.51	8.98	MEL	
60	D		10	9	9	1102.04	1126.23	1112.36	24.19	10.32	MEL	
61	E		10	9	7	1107.54	1130.89	1115.99	23.35	8.45	MEL	2 pupated
62	F		10	8	8	1105.01	1124.16	1113.69	19.15	8.68	MEL	
63	G		10	8	7	1097.99	1119.26	1107.59	21.27	9.60	MEL	1 pupated
64	H		10	10	10	1108.30	1137.08	1122.40	28.78	14.10	MEL	
65	A	EG-03	10	0	0	1100.08	0.00	0.00	0.00	0.00	MEL	
66	B		10	0	0	1109.11	0.00	0.00	0.00	0.00	MEL	
67	C		10	0	0	1104.60	0.00	0.00	0.00	0.00	MEL	
68	D		10	0	0	1105.65	0.00	0.00	0.00	0.00	MEL	
69	E		10	0	0	1108.66	0.00	0.00	0.00	0.00	MEL	
70	F		10	0	0	1103.33	0.00	0.00	0.00	0.00	MEL	
71	G		10	0	0	1098.33	0.00	0.00	0.00	0.00	MEL	
72	H		10	0	0	1108.64	0.00	0.00	0.00	0.00	MEL	
73	A	EG-04	10	8	8	1103.57	1120.52	1110.01	16.95	6.44	MEL	
74	B		10	10	10	1104.99	1121.46	1112.72	16.47	7.73	MEL	
75	C		10	9	9	1113.61	1127.20	1121.15	13.59	7.54	MEL	
76	D		0	0	0	1111.10	0.00	0.00	0.00	0.00	MEL	mis-seeded-excluded
77	E		10	9	8	1109.16	1119.62	1111.82	10.46	2.66	MEL	
78	F		10	9	9	1103.05	1116.89	1109.60	13.84	6.55	MEL	
79	G		10	10	10	1117.22	1130.24	1122.44	13.02	5.22	MEL	
80	H		10	9	9	1109.11	1125.70	1116.78	16.59	7.67	MEL	

QA/QC review: [illegible] Dec 8/05

Pan No.	Rep	Sample ID	Survival At Start	Number of Survivors	Number Weighed	Pan weight (mg)	Final Weight (mg) Pan + Biomass	Ash Free Weight (mg) Pan + Biomass	Organism Dry Weight	Organism Ash Free Dry Weight	Tech'n Initials	Comments
81	A	EG-05	10	10	10	1114.71	1136.78	1122.55	22.07	7.84	MEL	
82	B		10	8	8	1102.60	1122.20	1112.07	19.60	9.47	MEL	
83	C		10	10	10	1113.59	1136.28	1123.85	22.69	10.26	MEL	
84	D		10	2	2	1104.14	1110.75	1107.51	6.61	3.37	MEL	
85	E		10	10	10	1108.46	1125.30	1115.07	16.84	6.61	MEL	
86	F		10	8	8	1109.69	1128.70	1116.70	19.01	7.01	MEL	
87	G		10	8	8	1102.25	1122.20	1108.88	19.95	6.63	MEL	
88	H		10	8	8	1106.87	1126.74	1110.15	19.87	3.28	MEL	
5	(d)	Control	10	9	9	942.50	953.98	947.22	11.48	4.72	MEL	
23	(d)	HP-03	10	10	10	1112.05	1128.60	1121.02	16.55	8.97	MEL	
26	(d)	HP-04	10	8	8	1092.75	1109.61	1100.02	16.86	7.27	MEL	
35	(d)	HP-08	10	9	9	1053.12	1073.62	1061.32	20.50	8.20	MEL	
46	(d)	EG-01	10	9	9	1109.07	1137.77	1124.13	28.70	15.06	MEL	
57	(d)	GC-03	10	9	9	1107.19	1131.10	1118.22	23.91	11.03	MEL	
59	(d)	GC-03	10	10	10	1108.32	1130.87	1118.11	22.55	9.79	MEL	
74	(d)	EG-04	10	10	10	1104.99	1121.37	1112.98	16.38	7.99	MEL	
80	(d)	EG-04	10	9	9	1109.11	1125.55	1116.12	16.44	7.01	MEL	
88	(d)	EG-05	10	8	8	1106.87	1127.06	1109.98	20.19	3.11	MEL	

(d) - duplicate; pan reweighed after being placed in the oven and desiccated a second time.

QA/QC review: Gail Fitch
Dec 8/05

Test: CH-Chironomid Survival and Growth Test
Species: CT-Chironomus tentans
Sample ID: VARIOUS
Start Date: 10/14/2005 End Date: 10/24/2005

Test ID: 0500402a
Protocol: EPA00-Freshwater Sediment Toxicity and bioaccumulation
Sample Type: SEDIMENT2-Freshwater
Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Survival Start	Survival Day 10	# of Chironomids Weighed	Pan Weight (mg)	Dry Weights (Pan + Chironomids (mg))
	1	1	Control	10	10	10	948.48	961.84
	2	2	Control	10	10	10	944.45	958.73
	3	3	Control	10	10	10	943.53	954.82
	4	4	Control	10	10	10	947	959.65
	5	5	Control	10	9	9	942.5	954.48
	6	6	Control	10	10	10	949.57	959.97
	7	7	Control	10	9	9	952.81	968.19
	8	8	Control	10	10	10	948.31	960.24
	9	1	HP-01	10	8	8	1092.32	1109.61
	10	2	HP-01	10	10	10	1091.1	1114.39
	11	3	HP-01	10	8	8	1109.08	1119.33
	12	4	HP-01	10	9	9	1104.17	1122.14
	13	5	HP-01	10	9	9	1103.25	1113.62
	14	6	HP-01	10	10	10	1108.69	1124.52
	15	7	HP-01	10	9	9	1104.1	1115.36
	16	8	HP-01	10	7	7	1087.45	1103.26
	17	1	HP-03	10	9	9	1108.14	1127.65
	18	2	HP-03	10	8	8	1110.53	1128.45
	19	3	HP-03	10	9	9	1091.59	1108.96
	20	4	HP-03	10	6	6	1088.86	1101.49
	21	5	HP-03	10	8	8	1101.18	1123.25
	22	6	HP-03	10	10	10	1112.98	1131.63
	23	7	HP-03	10	10	10	1112.05	1128.59
	24	8	HP-03	10	9	9	1114.95	1128.39
	25	1	HP-04	10	8	8	1113.51	1132.43
	26	2	HP-04	10	8	8	1092.75	1109.66
	27	3	HP-04	10	10	9	1045.7	1064.01
	28	4	HP-04	10	9	9	1042.22	1056.01
	29	5	HP-04	10	8	8	1049.31	1067.94
	30	6	HP-04	10	8	8	1048.71	1064.63
	31	7	HP-04	10	10	10	1050.7	1070.84
	32	8	HP-04	10	7	7	1050.86	1067.53
	33	1	HP-08	10	9	9	1058.59	1079.46
	34	2	HP-08	10	9	9	1050.65	1067.9
	35	3	HP-08	10	9	9	1053.12	1073.59
	36	4	HP-08	10	7	7	1056.8	1078.4
	37	5	HP-08	10	8	8	1048.56	1070.42
	38	6	HP-08	10	10	10	1051.63	1076.52
	39	7	HP-08	10	10	10	1053.57	1077.05
	40	1	EG-01	10	8	8	1059.58	1078.67
	41	2	EG-01	10	9	9	1111.09	1134.94
	42	3	EG-01	10	8	8	1110.59	1138.26
	43	4	EG-01	10	5	5	1111.95	1130.03
	44	5	EG-01	10	9	9	1107.66	1136.37
	45	6	EG-01	10	9	9	1109.07	1137.84
	46	7	EG-01	10	5	5	1106.17	1119.87
	47	8	EG-01	10	9	9	1109.35	1128.58
	48	1	GC-01	10	9	9	1107.51	1128.91
	49	2	GC-01	10	7	7	1108.43	1127.85
	50	3	GC-01	10	7	7	1113.54	1136.79
	51	4	GC-01	10	10	10	1110.77	1134.08
	52	5	GC-01	10	10	10	1112.32	1134.62
	53	6	GC-01	10	10	10	1107.05	1130.38
	54	7	GC-01	10	6	6	1104.75	1120.91
	55	1	GC-03	10	9	9	1107.19	1130.7
	56	2	GC-03	10	8	8	1105.12	1126.47
	57	3	GC-03	10	10	10	1108.32	1130.83
	58	4	GC-03	10	9	9	1102.04	1126.23
	59	5	GC-03	10	9	7	1107.54	1130.89
	60	6	GC-03	10	8	8	1105.01	1124.16
	61	7	GC-03	10	8	7	1097.99	1119.26
	62	8	GC-03	10	10	10	1108.3	1137.08
	63	1	EG-03	10	0	0	1100.08	0
	64	2	EG-03	10	0	0	1109.11	0
	65	3	EG-03	10	0	0	1104.6	0
	66	4	EG-03	10	0	0	1105.65	0
	67	5	EG-03	10	0	0	1108.66	0
	68	6	EG-03	10	0	0	1103.33	0
	69	7	EG-03	10	0	0	1098.33	0
	70	8	EG-03	10	0	0	1108.64	0
	71	1	EG-04	10	8	8	1103.57	1120.52
	72	2	EG-04	10	10	10	1104.99	1121.46
	73	3	EG-04	10	9	9	1113.61	1127.2
	74	4	EG-04	10	9	8	1109.16	1119.62
	75	5	EG-04	10	9	9	1103.05	1116.89
	76	6	EG-04	10	10	10	1117.22	1130.24
	77	7	EG-04	10	9	9	1109.11	1125.7
	78	1	EG-05	10	10	10	1114.71	1136.78
	79	2	EG-05	10	8	8	1102.6	1122.2
	80	3	EG-05	10	10	10	1113.59	1136.28
	81	4	EG-05	10	2	2	1104.14	1110.75
	82	5	EG-05	10	10	10	1108.46	1125.3
	83	6	EG-05	10	8	8	1109.69	1128.7
	84	7	EG-05	10	8	8	1102.25	1122.2
	85	8	EG-05	10	8	8	1106.87	1126.74

Comments: Ridolfi; 05-1424-014; 0500402

ToxCalc 5.0

Reviewed by [illegible] Dec-8/05

Test: CH-Chironomid Survival and Growth Test
Species: CT-Chironomus tentans
Sample ID: VARIOUS
Start Date: 10/14/2005 End Date: 10/24/2005

Test ID: 0500402b
Protocol: EPA00-Freshwater Sediment Toxicity and bioaccumulation
Sample Type: SEDIMENT2-Freshwater
Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Survival Start	Survival Day 10	# of Chironomids Weighed	Pan Weight (mg)	A.F. Dry Weights (Pan + Chironomids (mg))
	1	1	Control	10	10	10	948.48	955.59
	2	2	Control	10	10	10	944.45	951.81
	3	3	Control	10	10	10	943.53	948.7
	4	4	Control	10	10	10	947	952.17
	5	5	Control	10	9	9	942.5	947.28
	6	6	Control	10	10	10	949.57	954.84
	7	7	Control	10	9	9	952.81	960.95
	8	8	Control	10	10	10	948.31	954.71
	9	1	HP-01	10	8	8	1092.32	1100.31
	10	2	HP-01	10	10	10	1091.1	1101.14
	11	3	HP-01	10	8	8	1109.08	1113.14
	12	4	HP-01	10	9	9	1104.17	1111.75
	13	5	HP-01	10	9	9	1103.25	1106.88
	14	6	HP-01	10	10	10	1108.69	1114.85
	15	7	HP-01	10	9	9	1104.1	1108.56
	16	8	HP-01	10	7	7	1087.45	1095.14
	17	1	HP-03	10	9	9	1108.14	1117.15
	18	2	HP-03	10	8	8	1110.53	1118.73
	19	3	HP-03	10	9	9	1091.59	1099.56
	20	4	HP-03	10	6	6	1088.86	1094.95
	21	5	HP-03	10	8	8	1101.18	1111.23
	22	6	HP-03	10	10	10	1112.98	1122.49
	23	7	HP-03	10	10	10	1112.05	1120.94
	24	8	HP-03	10	9	9	1114.95	1120.71
	25	1	HP-04	10	8	8	1113.51	1121.77
	26	2	HP-04	10	8	8	1092.75	1100.46
	27	3	HP-04	10	10	9	1045.7	1053.67
	28	4	HP-04	10	9	9	1042.22	1047.24
	29	5	HP-04	10	8	8	1049.31	1058.32
	30	6	HP-04	10	8	8	1048.71	1054.56
	31	7	HP-04	10	10	10	1050.7	1061.05
	32	8	HP-04	10	7	7	1050.86	1057.73
	33	1	HP-08	10	9	9	1058.59	1068.33
	34	2	HP-08	10	9	9	1050.65	1058.35
	35	3	HP-08	10	9	9	1053.12	1061.88
	36	4	HP-08	10	7	7	1056.8	1068.54
	37	5	HP-08	10	8	8	1048.56	1058.75
	38	6	HP-08	10	10	10	1051.63	1064.08
	39	7	HP-08	10	10	10	1053.57	1063.45
	40	1	EG-01	10	8	8	1059.58	1068.35
	41	2	EG-01	10	9	9	1111.09	1123.73
	42	3	EG-01	10	8	8	1110.59	1123.89
	43	4	EG-01	10	5	5	1111.95	1121.15
	44	5	EG-01	10	9	9	1107.66	1123.58
	45	6	EG-01	10	9	9	1109.07	1124.24
	46	7	EG-01	10	5	5	1106.17	1113.35
	47	8	EG-01	10	9	9	1109.35	1119.76
	48	1	GC-01	10	9	9	1107.51	1116.98
	49	2	GC-01	10	7	7	1108.43	1116.8
	50	3	GC-01	10	7	7	1113.54	1125.22
	51	4	GC-01	10	10	10	1110.77	1123.84
	52	5	GC-01	10	10	10	1112.32	1120.63
	53	6	GC-01	10	10	10	1107.05	1116.21
	54	7	GC-01	10	6	6	1104.75	1111.47
	55	1	GC-03	10	9	9	1107.19	1118.07
	56	2	GC-03	10	8	8	1105.12	1113.64
	57	3	GC-03	10	10	10	1108.32	1117.3
	58	4	GC-03	10	9	9	1102.04	1112.36
	59	5	GC-03	10	9	7	1107.54	1115.99
	60	6	GC-03	10	8	8	1105.01	1113.69
	61	7	GC-03	10	8	7	1097.99	1107.59
	62	8	GC-03	10	10	10	1108.3	1122.4
	63	1	EG-03	10	0	0	1100.08	0
	64	2	EG-03	10	0	0	1109.11	0
	65	3	EG-03	10	0	0	1104.6	0
	66	4	EG-03	10	0	0	1105.65	0
	67	5	EG-03	10	0	0	1108.66	0
	68	6	EG-03	10	0	0	1103.33	0
	69	7	EG-03	10	0	0	1098.33	0
	70	8	EG-03	10	0	0	1108.64	0
	71	1	EG-04	10	8	8	1103.57	1110.01
	72	2	EG-04	10	10	10	1104.99	1112.72
	73	3	EG-04	10	9	9	1113.61	1121.15
	74	4	EG-04	10	9	8	1109.16	1111.82
	75	5	EG-04	10	9	9	1103.05	1109.6
	76	6	EG-04	10	10	10	1117.22	1122.44
	77	7	EG-04	10	9	9	1109.11	1116.78
	78	1	EG-05	10	10	10	1114.71	1122.55
	79	2	EG-05	10	8	8	1102.6	1112.07
	80	3	EG-05	10	10	10	1113.59	1123.85
	81	4	EG-05	10	2	2	1104.14	1107.51
	82	5	EG-05	10	10	10	1108.46	1115.07
	83	6	EG-05	10	8	8	1109.69	1116.7
	84	7	EG-05	10	8	8	1102.25	1108.88
	85	8	EG-05	10	8	8	1106.87	1110.15

Comments: Ridolfi; 05-1424-014; 0500402

ToxCalc 5.0

Reviewed by [illegible] Dec 8/05

Chironomid Survival and Growth Test-Survival

Start Date:	10/14/2005	Test ID:	0500402a	Sample ID:	VARIOUS
End Date:	10/24/2005	Lab ID:	BCEVS-EVS Environment Cc	Sample Type:	SEDIMENT2-Freshwater
Sample Date:		Protocol:	EPA00-Freshwater Sediment	Test Species:	CT-Chironomus tentans
Comments:	Ridolfi; 05-1424-014; 0500402				

Conc-	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	0.9000	1.0000
HP-01	0.8000	1.0000	0.8000	0.9000	0.9000	1.0000	0.9000	0.7000
HP-03	0.9000	0.8000	0.9000	0.6000	0.8000	1.0000	1.0000	0.9000
HP-04	0.8000	0.8000	1.0000	0.9000	0.8000	0.8000	1.0000	0.7000
HP-08	0.9000	0.9000	0.9000	0.7000	0.8000	1.0000	1.0000	
EG-01	0.8000	0.9000	0.8000	0.5000	0.9000	0.9000	0.5000	0.9000
GC-01	0.9000	0.7000	0.7000	1.0000	1.0000	1.0000	0.6000	
GC-03	0.9000	0.8000	1.0000	0.9000	0.9000	0.8000	0.8000	1.0000
EG-03	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EG-04	0.8000	1.0000	0.9000	0.9000	0.9000	1.0000	0.9000	
EG-05	1.0000	0.8000	1.0000	0.2000	1.0000	0.8000	0.8000	0.8000

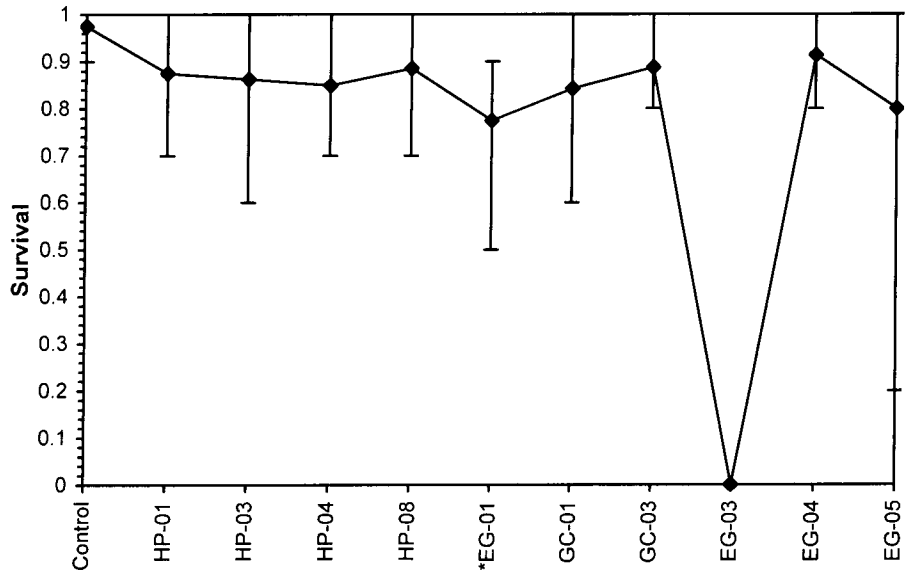
			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-	Mean	SD	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9750	0.0463	1.3713	1.2490	1.4120	5.501	8		
HP-01	0.8750	0.1035	1.2221	0.9912	1.4120	12.140	8	49.00	44.00
HP-03	0.8625	0.1302	1.2089	0.8861	1.4120	14.404	8	49.00	44.00
HP-04	0.8500	0.1069	1.1866	0.9912	1.4120	13.093	8	47.00	44.00
HP-08	0.8857	0.1069	1.2385	0.9912	1.4120	12.289	7	41.00	34.00
*EG-01	0.7750	0.1753	1.0977	0.7854	1.2490	18.443	8	40.00	44.00
GC-01	0.8429	0.1718	1.1934	0.8861	1.4120	19.434	7	44.00	34.00
GC-03	0.8875	0.0835	1.2366	1.1071	1.4120	10.242	8	49.00	44.00
EG-03	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	8		
EG-04	0.9143	0.0690	1.2753	1.1071	1.4120	8.373	7	42.00	34.00
EG-05	0.8000	0.2619	1.1410	0.4636	1.4120	27.390	8	51.00	44.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.8523	1.035	-0.8977	2.1101
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

Wilcoxon Rank Sum Test indicates significant differences

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: Dec. 8/05

Chironomid Survival and Growth Test-Dry Weight

Start Date:	10/14/2005	Test ID:	0500402a	Sample ID:	VARIOUS
End Date:	10/24/2005	Lab ID:	BCEVS-EVS Environment Cc	Sample Type:	SEDIMENT2-Freshwater
Sample Date:		Protocol:	EPA00-Freshwater Sediment	Test Species:	CT-Chironomus tentans
Comments:	Ridolfi; 05-1424-014; 0500402				

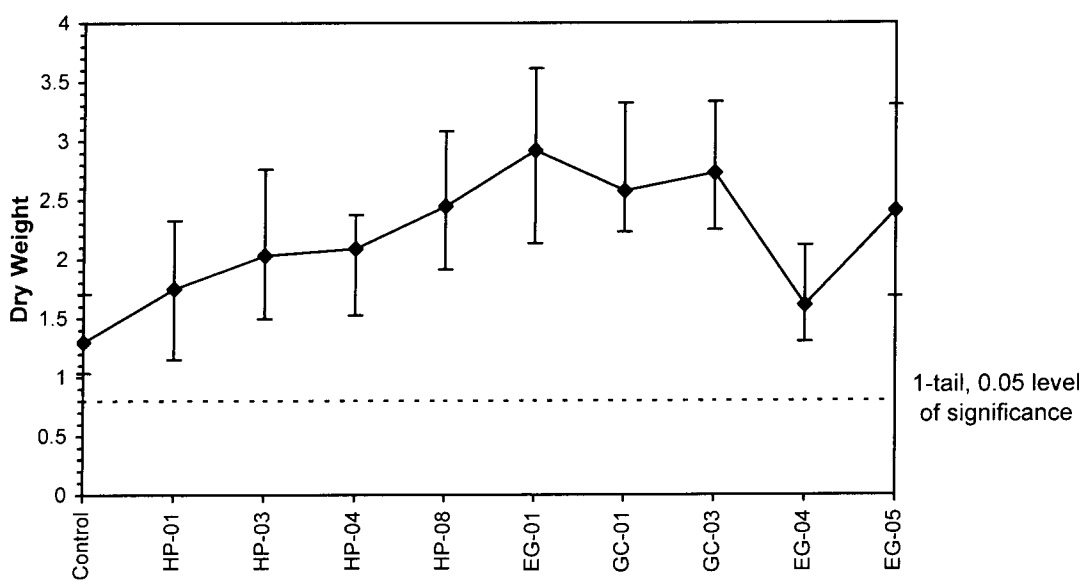
Conc-	1	2	3	4	5	6	7	8
Control	1.3360	1.4280	1.1290	1.2650	1.3311	1.0400	1.7089	1.1930
HP-01	2.1613	2.3290	1.2813	1.9967	1.1522	1.5830	1.2511	2.2586
HP-03	2.1678	2.2400	1.9300	2.1050	2.7587	1.8650	1.6540	1.4933
HP-04	2.3650	2.1138	2.0344	1.5322	2.3288	1.9900	2.0140	2.3814
HP-08	2.3189	1.9167	2.2744	3.0857	2.7325	2.4890	2.3480	
EG-01	2.3863	2.6500	3.4588	3.6160	3.1900	3.1967	2.7400	2.1367
GC-01	2.3778	2.7743	3.3214	2.3310	2.2300	2.3330	2.6933	
GC-03	2.6122	2.6688	2.2510	2.6878	3.3357	2.3938	3.0386	2.8780
EG-04	2.1188	1.6470	1.5100	1.3075	1.5378	1.3020	1.8433	
EG-05	2.2070	2.4500	2.2690	3.3050	1.6840	2.3763	2.4938	2.4838

			Transform: Untransformed						1-Tailed	
Conc-	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	1.3039	0.2054	1.3039	1.0400	1.7089	15.751	8			
HP-01	1.7516	0.4896	1.7516	1.1522	2.3290	27.949	8	-2.318	2.612	0.5044
HP-03	2.0267	0.3903	2.0267	1.4933	2.7587	19.257	8	-3.743	2.612	0.5044
HP-04	2.0949	0.2798	2.0949	1.5322	2.3814	13.355	8	-4.096	2.612	0.5044
HP-08	2.4522	0.3715	2.4522	1.9167	3.0857	15.152	7	-5.744	2.612	0.5221
EG-01	2.9218	0.5248	2.9218	2.1367	3.6160	17.961	8	-8.377	2.612	0.5044
GC-01	2.5801	0.3844	2.5801	2.2300	3.3214	14.900	7	-6.384	2.612	0.5221
GC-03	2.7332	0.3476	2.7332	2.2510	3.3357	12.718	8	-7.401	2.612	0.5044
EG-04	1.6095	0.2933	1.6095	1.3020	2.1188	18.225	7	-1.529	2.612	0.5221
EG-05	2.4086	0.4479	2.4086	1.6840	3.3050	18.596	8	-5.720	2.612	0.5044

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.60259	1.035	0.25485	-0.1731
Bartlett's Test indicates equal variances (p = 0.50)	8.37478	21.666		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test indicates no significant differences	0.50439	0.38684	2.11519	0.1492	1.7E-12	9, 67

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: Galfitch Dec. 8/05

Chironomid Survival and Growth Test- Ash Free Dry Weight

Start Date:	10/14/2005	Test ID:	0500402b	Sample ID:	VARIOUS
End Date:	10/24/2005	Lab ID:	BCEVS-EVS Environment Cc	Sample Type:	SEDIMENT2-Freshwater
Sample Date:		Protocol:	EPA00-Freshwater Sediment	Test Species:	CT-Chironomus tentans
Comments:	Ridolfi; 05-1424-014; 0500402				

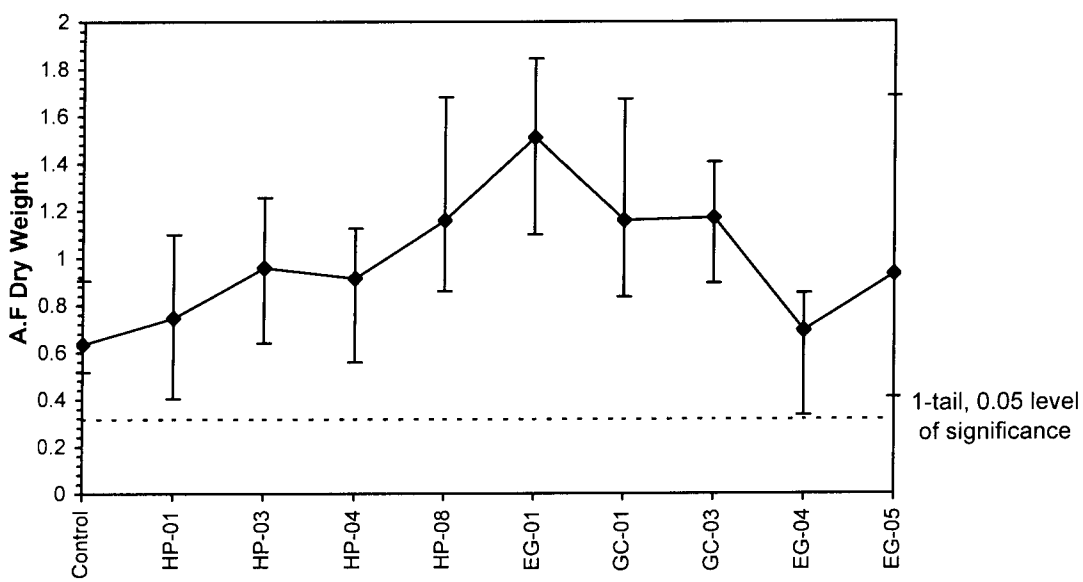
Conc-	1	2	3	4	5	6	7	8
Control	0.7110	0.7360	0.5170	0.5170	0.5311	0.5270	0.9044	0.6400
HP-01	0.9988	1.0040	0.5075	0.8422	0.4033	0.6160	0.4956	1.0986
HP-03	1.0011	1.0250	0.8856	1.0150	1.2562	0.9510	0.8890	0.6400
HP-04	1.0325	0.9638	0.8856	0.5578	1.1263	0.7312	1.0350	0.9814
HP-08	1.0822	0.8556	0.9733	1.6771	1.2738	1.2450	0.9880	
EG-01	1.0963	1.4044	1.6625	1.8400	1.7689	1.6856	1.4360	1.1567
GC-01	1.0522	1.1957	1.6686	1.3070	0.8310	0.9160	1.1200	
GC-03	1.2089	1.0650	0.8980	1.1467	1.2071	1.0850	1.3714	1.4100
EG-04	0.8050	0.7730	0.8378	0.3325	0.7278	0.5220	0.8522	
EG-05	0.7840	1.1838	1.0260	1.6850	0.6610	0.8762	0.8288	0.4100

			Transform: Untransformed						1-Tailed	
Conc-	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.6354	0.1409	0.6354	0.5170	0.9044	22.168	8			
HP-01	0.7457	0.2720	0.7457	0.4033	1.0986	36.475	8	-0.902	2.612	0.3192
HP-03	0.9579	0.1731	0.9579	0.6400	1.2562	18.071	8	-2.638	2.612	0.3192
HP-04	0.9142	0.1859	0.9142	0.5578	1.1263	20.333	8	-2.280	2.612	0.3192
HP-08	1.1564	0.2741	1.1564	0.8556	1.6771	23.699	7	-4.118	2.612	0.3304
EG-01	1.5063	0.2784	1.5063	1.0963	1.8400	18.482	8	-7.124	2.612	0.3192
GC-01	1.1558	0.2776	1.1558	0.8310	1.6686	24.019	7	-4.113	2.612	0.3304
GC-03	1.1740	0.1664	1.1740	0.8980	1.4100	14.170	8	-4.406	2.612	0.3192
EG-04	0.6929	0.1939	0.6929	0.3325	0.8522	27.989	7	-0.454	2.612	0.3304
EG-05	0.9318	0.3819	0.9318	0.4100	1.6850	40.981	8	-2.425	2.612	0.3192

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.46594	1.035	0.39846	0.75141
Bartlett's Test indicates equal variances (p = 0.24)	11.4692	21.666		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test indicates no significant differences	0.31923	0.50237	0.55231	0.05976	5.8E-09	9, 67

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: Dec. 8/05

EVS ENVIRONMENT CONSULTANTS
SEDIMENT DESCRIPTION AND CHARACTERIZATION

Client: Ridolfi Inc.
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

Test Species: Various
Test Type/Duration: Various
Day 0: Various.

Sample ID	Colour	Grain Size	Smell	Shells/ Debris	Interstitial Salinity (ppt)	Other Observations	Tech. Initial
HP-01	Brown/Grey	clay	H_2S	[illegible]	0		MG/SAB
HP-03	Brown/Grey	Clay	none	none	0		MT/SAB
HP-04	Brown/Grey	clay	none	none	0		MT/SAB
HP-08	Grey	clay	none	none	1		[illegible]
EG-01	Brown/Grey	clay silty	none	some wood chips	1		[illegible]
GC-01	Grey	silty	none	none	[illegible]		[illegible]
GC-03	grey	silty	none	brown/black gravels.	1		[illegible]
EG-03	grey	clay	hydrocarbons	none.	1		MT
EG-04	brown	clay	none	some roots	NA	No pore water, just soil, with earth worms	[illegible]
EG-05	brown	clay silty	none	some roots and wood chips	5	only ½ ml of pore water in the bucket.	[illegible]

Be descriptive when you characterize the sediments. Colour and grain size information must be complete. If the sediment has an odour, describe the type of smell. Note any shells or debris that are present. Be sure to record anything else in the Observations section.

Data Verified By: Ralph [illegible]
Date Verified: Dec. 7/05

Day 0

EVS ENVIRONMENT CONSULTANTS
WATER QUALITY DATA FOR CALCULATION OF UNIONIZED AMMONIA
(to be used when total ammonia analyses are performed by an outside laboratory)

Client: Rudolf Inc.

EVS Project No.: 05-1424-014

EVS Work Order No.: 0500426

Test Type: 10d Fw Toxicity Test

Test Species: C tentans

Contract Laboratory: -

Contract Laboratory Reference No.: -

Overlying Water ☐

Interstitial Water ☑

Sample ID	Date Subsampled	Date Submitted for Analysis	Sample pH[1]	Sample Salinity (ppt)[1]	Tech. Init.
CONTROL	Oct. 14/05	Oct 14/05	7.0	0	REH
GC-01	↓	↓	7.7	0	REH
GC-03			10.0	0	REH
EG-03			7.0	0	REH
HP-04			7.0	0	REH
HP-01			7.0	0	REH
HP-08			6.4	0	REH
EG-04			6.9	0	REH
EG-05			8.3	0	REH
EG-01			7.2	0	REH
HP-03	↓	↓	8.4	0	REH

1. Temperature, pH and salinity (if applicable) are required to calculate unionized ammonia concentration; use temperature of test conditions.

Day 10

EVS ENVIRONMENT CONSULTANTS
WATER QUALITY DATA FOR CALCULATION OF UNIONIZED AMMONIA
(to be used when total ammonia analyses are performed by an outside laboratory)

Client: Ridolfi
EVS Project No.: 05-1424
EVS Work Order No.: 0500
Test Type: 10d FW toxicity test
Test Species: C. tentans
Contract Laboratory:
Contract Laboratory Reference No.:

Overlying Water ☐
Interstitial Water ☑

Sample ID	Date Subsampled	Date Submitted for Analysis	Sample pH[1]	Sample Salinity (ppt)[1]	Tech. Init.
Control	0ct 24 05	Oct 24 05	7.1	0	RLA
HP-01	↓	↓	7.0	0	RLA
HP-03			7.0	0	RLA
HP-04			7.0	0	RLA
HP-08			6.8	0	RLA
GC-01			6.8	0	RLA
GC-03			6.8	0	RLA
EG-01			7.3	0	RLA
EG-03			6.7	0	RLA
EG-04			7.0	0	RLA
EG-05	↓	↓	7.1	0	RLA

1. Temperature, pH and salinity (if applicable) are required to calculate unionized ammonia concentration; use temperature of test conditions.

EVS ENVIRONMENT CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client: Ridolfi Inc
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402

EVS Analysts: JXS, AXF, SXB
Test Type/Duration: ~~10d Foo toxicity test~~ 96r KCl Reftox
Test Initiation Date: Oct. 14, 2005

SAMPLE

Identification: KCl
Amount ~~Received~~ Prep'd: 2L
Date ~~Collected~~ Prep'd: Oct 14, 2005
Date Received: NA

TEST SPECIES INFORMATION

Organisms: C tentans
Source/Date Received: ABS / Oct 12 2005
Age (on Day 0): 10 days
Reference Toxicant: KCl
Current Reference Toxicant Result
Reference Toxicant Test Date: Oct 14, 2005
96-h LC50 (and 95% CL): 6.0 (5.4-6.7) g/L
Reference Toxicant Warning Limits (mean ± 2SD) and CV
5.4 ± 3.3 g/L ; CV = 30%

TEST CONDITIONS

Temperature Range (°C): 22.0-23.0
pH Range: 7.2-8.0
Dissolved Oxygen Range (mg/L): 5.2-8.5
Conductivity Range (μmhos/cm): 373-30100
Hardness Range (mg/L as $CaCO_3$): NA
Alkalinity Range (mg/L as $CaCO_3$): NA
Ammonia Type and Ranges (mg/L N): —
Start (Day 0): — End: —
Photoperiod (L:D h): 16:8
Overlying Water Renewed?: No
Aeration Provided? (give rate): Yes (2-3 bubbles/sec)
Other: —

DILUTION/CONTROL WATER (initial water quality)

Water Type: Moderately Hard H_2O (day 0)
Temperature (°C): 22.0
pH: 7.6
Dissolved Oxygen (mg/L): 8.5
Conductivity (μmhos/cm): 373
Hardness (mg/L as $CaCO_3$): 96
Alkalinity (mg/L as $CaCO_3$): 60
Other: —

g/L KCl Sample ID	Mean ± SD	
	Survival (%)	Individual Dry Weight (mg)
Control	100 ± 0	
1.25	100 ± 0	
2.5	100 ± 0	
5.0	77 ± 15	
10.0	0 ± 0	
20.0	0 ± 0	

Data Verified By: [illegible]
Date Verified: Dec. 8/05

EVS ENVIRONMENT CONSULTANTS
FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: Ridolfi Inc
EVS Project No.: 05-1424-014
EVS Work Order No.: 0500402
Test Initiation Date: Oct 14/2005

Reference Toxicant: KCl
EVS Stock ID/Preparation Date: KCl - Oct 14/05
Test Species: C. tentans
Head Capsule Width ~~Source/Age~~ on Day 0: (0.33 - 0.45) mm
No. Organisms/Test Volume: 10 / 200 mL.

Concentration g/L KCl	Number of Survivors (24 to 96 h)				Dissolved Oxygen (mg/L)		Temperature (°C)					pH		Conductivity (µS/cm)	
	24	48	72	96	0	96	0	24	48	72	96	0	96	0	96
CTL	10	10	10	10	8.5	5.5	22.0	23.0	23.0	22.5	23.0	7.6	7.2	373	399
	10	10	10	10											
	10	10	10	10											
1.25	10	10	10	10	8.4	5.6	22.0	23.0	22.5	22.5	23.0	7.9	7.3	2730	2520
	10	10	10	10											
	10	10	10	10											
2.5	10	10	10	10	SXB ~~8.5~~	5.4	22.0	23.0	22.5	22.5	22.5	7.9	7.4	5450	5460
	10	10	10	10	8.4										
	10	10	10	10											
5.0	10	10	10	8	SXB ~~8.5~~	5.2	22.0	23.0	22.5	22.5	22.5	8.0	7.4	10070	9870
	10	10	10	9	8.2										
	10	10	10	~~10~~ 6											
10.0	8	6	5	0	SXB ~~8.5~~	5.2	22.0	23.0	22.5	22.5	22.5	8.0	7.4	14120	14620
	8	6	5	0	8.1										
	7	5	2	0											
20.0	0	—	—	—	SXB ~~8.5~~	5.4	22.0	23.0	22.5	22.5	22.5	8.0	7.5	30100	29200
	0	—	—	—	7.9										
	0	—	—	—											
Technician Initials	[illegible]	[illegible]	MJS/AXF	[illegible]	SXB	[illegible]	SXB	[illegible]	[illegible]	AXF	[illegible]	SXB	[illegible]	SXB	[illegible]

Sample Description: clear stock solution
WQ Instruments Used: Temp. Calibrated Hg Thermometer pH II-A-0301 DO II-A-20 Cond. II-A-0501
Comments:

Test Set Up By: JXS Data Verified By: [illegible] Date Verified: Dec. 8/05

Test: MR-Midge Acute Reftox	Test ID: RTCTKCL34
Species: CT-Chironomus tentans	Protocol: EPS1/RM/32-EC 97 (Chironomid)
Sample ID: REF-Ref Toxicant	Sample Type: KCL-Potassium chloride
Start Date: 10/14/2005 End Date: 10/18/2005	Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	0-h	96-h	Notes
	1	1	D-Control	10	10	
	2	2	D-Control	10	10	
	3	3	D-Control	10	10	
	4	1	1.250	10	10	
	5	2	1.250	10	10	
	6	3	1.250	10	10	
	7	1	2.500	10	10	
	8	2	2.500	10	10	
	9	3	2.500	10	10	
	10	1	5.000	10	8	
	11	2	5.000	10	9	
	12	3	5.000	10	6	
	13	1	10.000	10	0	
	14	2	10.000	10	0	
	15	3	10.000	10	0	
	16	1	20.000	10	0	
	17	2	20.000	10	0	
	18	3	20.000	10	0	

Comments: Ridolfi Inc 05-1424-014 (0500402)

Midge Acute Reftox-96-h

Start Date:	10/14/2005	Test ID:	RTCTKCL34	Sample ID:	REF-Ref Toxicant
End Date:	10/18/2005	Lab ID:	BCEVS-EVS Environment Ce	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPS1/RM/32-EC 97 (Chirono	Test Species:	CT-Chironomus tentans
Comments:	Ridolfi Inc 05-1424-014 (0500402)				

Conc-g/L	1	2	3
D-Control	1.0000	1.0000	1.0000
1.25	1.0000	1.0000	1.0000
2.5	1.0000	1.0000	1.0000
5	0.8000	0.9000	0.6000
10	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000

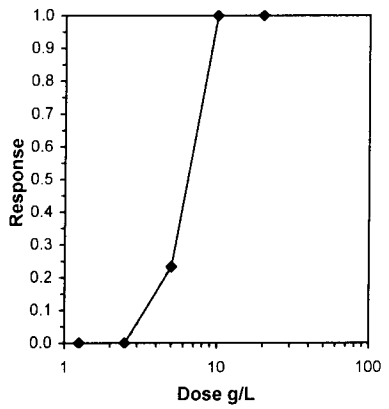
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-g/L	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
D-Control	1.0000	0.0000	1.4120	1.4120	1.4120	0.000	3				0	30
1.25	1.0000	0.0000	1.4120	1.4120	1.4120	0.000	3	0.000	2.420	0.1807	0	30
2.5	1.0000	0.0000	1.4120	1.4120	1.4120	0.000	3	0.000	2.420	0.1807	0	30
*5	0.7667	0.1528	1.0808	0.8861	1.2490	16.925	3	4.436	2.420	0.1807	7	30
10	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3				30	30
20	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3				30	30

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.64342	0.805	-0.5964	5.5
Equality of variance cannot be confirmed				

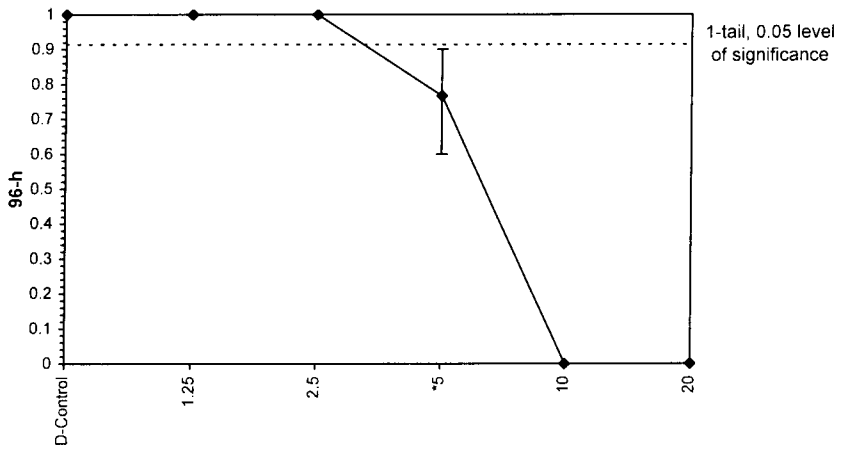
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	2.5	5	3.53553		0.0859	0.0881	0.0823	0.00836	0.00463	3, 8

Trimmed Spearman-Karber

Trim Level	EC50	95% CL		
0.0%	6.0151	5.4045	6.6948	
5.0%	6.1223	5.4223	6.9127	
10.0%	6.2188	5.3796	7.1889	
20.0%	6.3510	5.0065	8.0567	
Auto-0.0%	6.0151	5.4045	6.6948	g/L KCL



Dose-Response Plot



ToxCalc v5.0.23

Reviewed by [illegible] Dec 8/05

APPENDIX II

Chemical Analysis Data

COC ✓

OCT 2 8 2005

ALS Environmental

Bulk. NTS.

CERTIFICATE OF ANALYSIS

Date:	October 24, 2005
ALS File No.	W6025
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 14, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W6025

RESULTS OF ANALYSIS

	Ammonia Nitrogen N	Sulphide S
Water		
HP-01 2005 Oct 13 *ALS ID 1*	5.92	<0.020
HP-03 2005 Oct 13 *ALS ID 2*	2.63	<0.020
HP-04 2005 Oct 13 *ALS ID 3*	4.60	<0.020
HP-08 2005 Oct 13 *ALS ID 4*	6.64	<0.020
EG-01 2005 Oct 13 *ALS ID 5*	9.19	<0.020
GC-01 2005 Oct 13 *ALS ID 6*	8.54	<0.020
GC-03 2005 Oct 13 *ALS ID 7*	5.70	<0.020
EG-03 2005 Oct 13 *ALS ID 8*	2.24	<0.020
EG-05 2005 Oct 13 *ALS ID 9*	0.270	0.027

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples were identified as Bulk.

A Campbell Brothers Limited Company

File No. W6025

Appendix 1 - QUALITY CONTROL - Replicates

Water		GC-03	GC-03
		05-10-13	QC # 469821
Nutrients			
Ammonia Nitrogen	N	5.70	5.79
Inorganic Parameters			
Sulphide	S	<0.020	<0.020

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples were identified as Bulk.

A Campbell Brothers Limited Company

File No. W6025

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.00	6.29	mg/L	0.02	470545	a
Ammonia Nitrogen	N	6.07	6.29	mg/L	0.02	470546	a
Ammonia Nitrogen	N	5.96	6.29	mg/L	0.02	470746	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W6025

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	470705	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W6025

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470543	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470544	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470745	a
Inorganic Parameters							
Sulphide	S	<0.02	<0.02	mg/L	0.02	470704	b

Methods:
a = Electrode
b = Colourimetry

A Campbell Brothers Limited Company

File No. W6025

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.020	mg/L
Inorganic Parameters			
Sulphide	S	0.020	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

COC ✓

Interstitials
Ridofi
Chiron
Day 0.

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	November 1, 2005
ALS File No.	W5986
Report On:	Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 14, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

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File No. W5986

REMARKS

The detection limits for Ammonia and Sulphide have been increased for some of the samples reported in the following data tables due to sample matrix interferences and limited sample volume.

A Campbell Brothers Limited Company

File No. W5986

RESULTS OF ANALYSIS

	Ammonia Nitrogen N	Sulphide S
Water		
CONTROL 2005 Oct 14 *ALS ID 1*	<0.20	<0.10
EG-01 2005 Oct 14 *ALS ID 2*	8.85	<0.040
EG-05 2005 Oct 14 *ALS ID 3*	0.69	<0.040
EG-04 2005 Oct 14 *ALS ID 4*	0.31	<0.040
HP-04 2005 Oct 14 *ALS ID 5*	3.72	0.13
HP-01 2005 Oct 14 *ALS ID 6*	3.49	<0.10
HP-03 2005 Oct 14 *ALS ID 7*	2.32	<0.10
HP-08 2005 Oct 14 *ALS ID 8*	3.32	<0.20
GC-01 2005 Oct 14 *ALS ID 9*	7.56	<0.040
GC-03 2005 Oct 14 *ALS ID 10*	5.63	<0.040
EG-03 2005 Oct 14 *ALS ID 11*	1.99	<0.10

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W5986

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.04	6.29	mg/L	0.02	472417	a
Ammonia Nitrogen	N	5.92	6.29	mg/L	0.02	472418	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W5986

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	470705	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W5986

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	472415	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	472416	a
Inorganic Parameters							
Sulphide	S	<0.02	<0.02	mg/L	0.02	470704	b

Methods:
a = Electrode
b = Colourimetry

A Campbell Brothers Limited Company

File No. W5986

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.20	mg/L
Inorganic Parameters			
Sulphide	S	0.040	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

COC ✓

ALS Environmental

Overs
Day 0

CERTIFICATE OF ANALYSIS

Date:	October 24, 2005
ALS File No.	W6026
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 14, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

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1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W6026

RESULTS OF ANALYSIS

	Sulphide S
Water	
CONTROL 2005 Oct 14 *ALS ID 1*	<0.020
HP-01 Over S 2005 Oct 14 *ALS ID 2*	<0.020
HP-03 Over S 2005 Oct 14 *ALS ID 3*	<0.020
HP-04 Over S 2005 Oct 14 *ALS ID 4*	<0.020
HP-08 Over S 2005 Oct 14 *ALS ID 5*	<0.020
EG-01 Over S 2005 Oct 14 *ALS ID 6*	<0.020
GC-01 Over S 2005 Oct 14 *ALS ID 7*	<0.020
GC-03 Over S 2005 Oct 14 *ALS ID 8*	<0.020
EG-03 Over S 2005 Oct 14 *ALS ID 9*	<0.020
EG-04 Over S 2005 Oct 14 *ALS ID 10*	<0.020
EG-05 Over S 2005 Oct 14 *ALS ID 11*	<0.020

Day 0, 10 day Chironomid Tests.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6026

Appendix 1 - QUALITY CONTROL - Replicates

Water	EG-03 Over S 05-10-14	EG-03 Over S QC # 469820
Inorganic Parameters		
Sulphide S	<0.020	<0.020

Day 0, 10 day Chironomid Tests.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6026

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	470705	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W6026

Appendix 1 - QUALITY CONTROL - Blanks

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	<0.02	<0.02	mg/L	0.02	470704	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W6026

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Inorganic Parameters			
Sulphide	S	0.020	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

COCV

ALS Environmental

Day 0
Over N

CERTIFICATE OF ANALYSIS

Date:	October 24, 2005
ALS File No.	W6027
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 14, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W6027

RESULTS OF ANALYSIS

	Ammonia Nitrogen N
Water	
EG-04 Over N 2005 Oct 14 *ALS ID 1*	<0.020
CONTROL Over N 2005 Oct 14 *ALS ID 2*	<0.020
HP-01 Over N 2005 Oct 14 *ALS ID 3*	1.29
HP-03 Over N 2005 Oct 14 *ALS ID 4*	0.705
HP-04 Over N 2005 Oct 14 *ALS ID 5*	1.04
HP-08 Over N 2005 Oct 14 *ALS ID 6*	1.72
EG-01 Over N 2005 Oct 14 *ALS ID 7*	2.09
GC-01 Over N 2005 Oct 14 *ALS ID 8*	2.04
GC-03 Over N 2005 Oct 14 *ALS ID 9*	1.35
EG-03 Over N 2005 Oct 14 *ALS ID 10*	0.560
EG-05 Over N 2005 Oct 14 *ALS ID 11*	0.106

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples were identified as Day 0, 10 day Chironimid.

A Campbell Brothers Limited Company

File No. W6027

Appendix 1 - QUALITY CONTROL - Replicates

Water		EG-03 Over N 05-10-14	EG-03 Over N QC # 469831
Nutrients			
Ammonia Nitrogen	N	0.560	0.606

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples were identified as Day 0, 10 day Chironimid.

A Campbell Brothers Limited Company

File No. W6027

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.00	6.29	mg/L	0.02	470545	a
Ammonia Nitrogen	N	6.07	6.29	mg/L	0.02	470546	a
Ammonia Nitrogen	N	5.96	6.29	mg/L	0.02	470746	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W6027

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470543	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470544	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	470745	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W6027

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.020	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

COC ✓

Day 10
Ridolfi
Int NtS

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	November 4, 2005
ALS File No.	W6546
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 26, 2005

ALS ENVIRONMENTAL
per:

Leanne Harris

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Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W6546

REMARKS

Please note that the detection limit for Sulphide has been increased for some of the samples reported in the following data tables due to sample matrix interferences.

A Campbell Brothers Limited Company

File No. W6546

RESULTS OF ANALYSIS

	Ammonia Nitrogen N	Sulphide S
Water		
CONTROL -Int 2005 Oct 24 *ALS ID 1*	1.49	<0.040
GC01 -Int 2005 Oct 24 *ALS ID 2*	5.46	<0.040
GC03 -Int 2005 Oct 24 *ALS ID 3*	4.80	<0.20
HP01 -Int 2005 Oct 24 *ALS ID 4*	2.50	<0.10
HP03 -Int 2005 Oct 24 *ALS ID 5*	2.44	<0.20
HP04 -Int 2005 Oct 24 *ALS ID 6*	2.05	<0.40
HP08 -Int 2005 Oct 24 *ALS ID 7*	4.19	<0.10
EG01 -Int 2005 Oct 24 *ALS ID 8*	4.52	<0.40
EG03 -Int 2005 Oct 24 *ALS ID 9*	6.44	<0.40
EG04 -Int 2005 Oct 24 *ALS ID 10*	0.72	<0.040
EG05 -Int 2005 Oct 24 *ALS ID 11*	0.66	0.048

Remarks regarding the analyses appear at the beginning of this report.
These samples are identified as Day 10, 10 day Chironamids.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6546

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.97	6.29	mg/L	0.02	473184	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W6546

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	472152	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W6546

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	473183	a
Inorganic Parameters							
Sulphide	S	<0.02	<0.02	mg/L	0.02	472153	b

Methods:
a = Electrode
b = Colourimetry

A Campbell Brothers Limited Company

File No. W6546

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.20	mg/L
Inorganic Parameters			
Sulphide	S	0.040	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

Ridolfi
Chironomids
Day 10
Over N
+S

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	November 8, 2005
ALS File No.	W6417
Report On:	05-1424-014 Water Analysis
Report To:	**EVS-Golder Associates Ltd.** 195 Pemberton Ave North Vancouver, BC V7P 2R4
Attention:	**Ms. Ann-Marie Norris**
Received:	October 24, 2005

ALS ENVIRONMENTAL
per:

Heather A. Ross-Easton, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

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1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. W6417

RESULTS OF ANALYSIS

	Ammonia Nitrogen N	Sulphide S
Water		
CONTROL OVER N 2005 Oct 24 *ALS ID 1*	1.18	-
HP-01 OVER N 2005 Oct 24 *ALS ID 2*	1.46	-
HP-03 OVER N 2005 Oct 24 *ALS ID 3*	1.20	-
HP-04 OVER N 2005 Oct 24 *ALS ID 4*	1.56	-
HP-08 OVER N 2005 Oct 24 *ALS ID 5*	1.66	-
GC-01 OVER N 2005 Oct 24 *ALS ID 6*	2.25	-
GC-03 OVER N 2005 Oct 24 *ALS ID 7*	1.48	-
EG-01 OVER N 2005 Oct 24 *ALS ID 8*	2.18	-
EG-03 OVER N 2005 Oct 24 *ALS ID 9*	1.45	-
EG-04 OVER N 2005 Oct 24 *ALS ID 10*	0.700	-
EG-05 OVER N 2005 Oct 24 *ALS ID 11*	1.35	-
CONTROL OVER S 2005 Oct 24 *ALS ID 12*	-	<0.020
HP-01 OVER S 2005 Oct 24 *ALS ID 13*	-	<0.020
HP-03 OVER S 2005 Oct 24 *ALS ID 14*	-	0.025
HP-04 OVER S 2005 Oct 24 *ALS ID 15*	-	<0.020
HP-08 OVER S 2005 Oct 24 *ALS ID 16*	-	<0.020
GC-01 OVER S 2005 Oct 24 *ALS ID 17*	-	<0.020
GC-03 OVER S 2005 Oct 24 *ALS ID 18*	-	<0.020
EG-01 OVER S 2005 Oct 24 *ALS ID 19*	-	0.025
EG-03 OVER S 2005 Oct 24 *ALS ID 20*	-	<0.020

These samples are identified as Day 10, 10 day Chironomid.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6417

RESULTS OF ANALYSIS

	Sulphide S
Water	
EG-04 OVER S 2005 Oct 24 *ALS ID 21*	<0.020
EG-05 OVER S 2005 Oct 24 *ALS ID 22*	<0.020

These samples are identified as Day 10, 10 day Chironomid.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6417

Appendix 1 - QUALITY CONTROL - Replicates

Water		HP-08 OVER N 05-10-24	HP-08 OVER N QC # 471201	HP-03 OVER S 05-10-24	HP-03 OVER S QC # 471202
Nutrients					
Ammonia Nitrogen	N	1.66	1.59	-	-
Inorganic Parameters					
Sulphide	S	-	-	0.025	<0.020

These samples are identified as Day 10, 10 day Chironomid.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. W6417

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 17-3N							
Nutrients							
Ammonia Nitrogen	N	6.20	6.29	mg/L	0.02	473752	a
Ammonia Nitrogen	N	6.84	6.29	mg/L	0.02	473753	a

Methods:
a = Electrode

A Campbell Brothers Limited Company

File No. W6417

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Inorganic Parameters						
Sulphide S	0.95	1.00	mg/L	0.02	472152	a

Methods:
a = Colourimetry

A Campbell Brothers Limited Company

File No. W6417

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Nutrients							
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	473750	a
Ammonia Nitrogen	N	<0.02	<0.02	mg/L	0.02	473751	a
Inorganic Parameters							
Sulphide	S	<0.02	<0.02	mg/L	0.02	472153	b

Methods:
a = Electrode
b = Colourimetry

A Campbell Brothers Limited Company

File No. W6417

Appendix 2 - DETECTION LIMITS - Water

		Detection Limit	
Nutrients			
Ammonia Nitrogen	N	0.020	mg/L
Inorganic Parameters			
Sulphide	S	0.020	mg/L

DLs indicated are the Minimum (Lowest) Reported Detection Limits for this work order.
The DL achieved for any given sample may differ from these values.

A Campbell Brothers Limited Company

Appendix 3 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Sulphide in Water

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

Recommended Holding Time:
Sample: 7 days
Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

This Certificate Of Analysis shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

APPENDIX III

Chain-of-Custody Forms

CHAIN-OF-CUSTODY / TEST REQUEST FORM

No 0903

Golder Associates
195 Pemberton Avenue
North Vancouver, B.C.
Canada V7P 2R4
Tel: 604-986-4331
Fax: 604-662-8548
www.golder.com

Client Name: Ridolf, Inc.
Address: 1011 Western Ave, Suite 1004, Seattle, WA 98104
Client Contact: Colin Wagoner
Phone: 206-682-7294
Fax: 206-682-5008
Sampled by: MH, BS, JL, RA
Ship to:
Attn.:
Shipping Date: 9/15/05

1 Collection Date (DD/MMM/YYYY)	1 Time (24-h clock)	Sample Identification	2 Type of Each Sample	Material Safety Data Sheet Attached? (✓)	Sample Collection Method G=grab C=composite	Number of Sample Containers x Volume of Sample Containers (1 x 20L)	3 Sample Container Type by Code	Test(s) Requested: 28-day Hyalella azteca	10-day Chironomus tentans	28-day Lumbriculus v.			4 Sample Notes (preserved, saltwater, freshwater, may contain sewage...)
~~12/Sep/2005~~ ~~09/12/10~~	1553	HP-01	SED		C	4L	P	X	X				freshwater ✓
	~~1637~~	~~HP-02~~			C		P	MH					
	1711	HP-03			C	16L	P	X	X	X			freshwater ✓
	1805	HP-04			C	4L	P	X	X				freshwater ✓
13/Sep/2005	1052	HP-08			C	4L	P	X	X				freshwater ✓
	1212	EG-01			C	4L	P	X	X				freshwater ✓
	1252	GC-01			C	16L	P	X	X	X			freshwater ✓
14/Sep/2005	0930	GC-03			C	4L	P	X	X				freshwater ✓
	1330	EG-02			C	4L	P	X	X				~~FS~~ freshwater *
	1310	EG-03			C	4L	P	X	X				✓

PO/Reference No.: 4725
Project Title: Forest Glen
Results Needed By: Standard turnaround

Comments/Instructions: * no sample collected as confirmed by Megan Hilgart

1) Released by: Megan C. Hilgart Date: 9/15/05
Company: Ridolfi, Inc. Time: 8:25a
Courier Name: Fedex

2) Released by: Date:
Company: Time:
Courier Name:

1) Received by: JAP Date: 16 Sept 05
Company: Golder Time: 11:45

1) Received by: Date:
Company: Time:

Shaded area to be completed by Golder Laboratory upon sample receipt.
Golder Project No.: 0500401 / 402 / 404
Golder Work Order No.:
Condition Upon Receipt: Good
Receipt Sample Temp. (°C): 16.3

1 For composite effluent or water samples, the sample collection date/time is the **end** of the compositing period.
2 Receiving Water (RW): Effluent (E); Elutriate (ELU); Sediment (SED); Chemical (CHEM); Stormwater (SW); Other (Please Specify)
3 Collapsible Carboy (CC); glass jar (GJ); Jerry Can (JC); Plastic HDPE (P); Other (Please Specify)
4 Please note any conditions the lab should be aware of for safety and storage concerns

Distribution of copies:
White, Yellow – accompany the shipment
Pink – kept by consignor (e.g. shipper)
Yellow – kept by consignee (e.g. receiver)
White – returned to consignor by consignee

Please see instructions for completion on back of form

Revision Date: November 22, 2004

CHAIN-OF-CUSTODY / TEST REQUEST FORM

№ 0905

Golder Associates
195 Pemberton Avenue
North Vancouver, B.C.
Canada V7P 2R4
Tel: 604-986-4331
Fax: 604-662-8548
www.golder.com

Client Name: Ridolfi, Inc.
Address: 1011 Western Ave, Suite 1006, Seattle, WA 98104
Client Contact: Colin Wagoner
Phone: 206-682 7294
Fax: 206-682 5008
Sampled by: MH, BS, JL, RA
Ship to:
Attn.:
Shipping Date: 9/15/05

1 Collection Date (DD/MMM/YYYY)	1 Time (24-h clock)	Sample Identification	2 Type of Each Sample	Material Safety Data Sheet Attached? (✓)	Sample Collection Method G=grab C=composite	Number of Sample Containers x Volume of Sample Containers (1 x 20L)	3 Sample Container Type by Code	Test(s) Requested: 28-day Hyalella azteca	10-day Chironomus tentans	28-day Lumbriculus v.			4 Sample Notes (preserved, saltwater, freshwater, may contain sewage...)
14/Sep/2005	1400	EG-04	SED		C	4L	P	X	X				freshwater ✓
↓	1030	EG-05	↓		C	16L	P	X	X	X			freshwater – this sample was lost during shipment and arrived separately on Sept 20, 2005 (20 Sept 05 11:05 17.7°C JAP)

PO/Reference No.: 4725
Project Title: Forest Glen
Results Needed By: Standard turnaround

Comments/Instructions:

1) Released by: Megan C Regont Date: 9/15/05
Company: Ridolfi, Inc. Time: 8:25a
Courier Name: Fedex

2) Released by: Date:
Company: Time:
Courier Name:

1) Received by: JAP Date: 16 Sept 05
Company: Golder Time: 14:45

1) Received by: Date:
Company: Time:

Shaded area to be completed by Golder Laboratory upon sample receipt.
Golder Project No.: 0500401 / 402 / 404
Golder Work Order No.:
Condition Upon Receipt: Good
Receipt Sample Temp. (°C): 13

1 For composite effluent or water samples, the sample collection date/time is the **end** of the compositing period.
2 Receiving Water (RW): Effluent (E); Elutriate (ELU); Sediment (SED); Chemical (CHEM); Stormwater (SW); Other (Please Specify)
3 Collapsible Carboy (CC); glass jar (GJ); Jerry Can (JC); Plastic HDPE (P); Other (Please Specify)
4 [illegible] conditions [illegible] should be aware of for safety and storage concerns

Please see instructions for completion on back of form

Distribution of copies:
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Yellow – kept by consignee (e.g. receiver)
White – returned to consignor by consignee

Revision Date: November 22, 2004