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ECOLOGICAL RISK ASSESSMENT
QUANTA RESOURCES SITE
EDGEWATER, NEW JERSEY
AUGUST 2000

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1.0 INTRODUCTION

1.1 Site Background

The Quanta Resources Site is located on the western bank of the Hudson River in Edgewater, New Jersey (NJ). From prior to 1930 until 1974, a coal tar roofing facility was located on the property. From 1974 through 1981, the property was utilized as a waste oil reprocessing facility, until the New Jersey Department of Environmental Protection (NJDEP) halted activities after high levels of polychlorinated biphenyls (PCBs) were detected in the oil (GeoSyntec 1999). As a result of these activities, there is subsurface soil contamination and visible contamination of sediment in the intertidal zone of the Hudson River.

1.2 Site Description

This investigation focused on the tidal flat adjacent to the Quanta Resources Site (Figure 1). The tidal flat extends eastward in the Hudson River and is bordered to west by a concrete bulkhead. A boom is located on the tidal flat approximately 125 feet from the bulkhead. The sediment is comprised primarily of brown/black silt and organic detritus, which is typical of a tidal flat. Each sampling location within the tidal flat exhibited similar physical characteristics. Sheens and organic contamination were visible throughout the study area during low tide, accompanied by a distinct coal tar/creosote type odor. During high tide, the study area is covered with approximately three feet of water that extends to the bulkhead. Photographs of the individual sample locations and the general study area can be found in Appendix A.

1.3 Purpose and Scope of Work

The purpose of this investigation was to conduct an ecological risk assessment using site-specific data. A work plan was prepared which outlined the technical approach and number of samples necessary to satisfy the data quality objectives. Sediment was collected and analyzed for contaminants of concern (COC). Toxicity tests were also conducted on sediment samples. Lastly, a survey of the benthic macroinvertebrate community was conducted. The results of these analyses were used to determine the risk to biota utilizing the site.

2.0 PROBLEM FORMULATION

This risk assessment was designed to evaluate the potential threats to ecological receptors from exposure to contaminants present on site. The development of this risk assessment followed the guidance established in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (U.S. EPA 1997).

2.1 Baseline Risk Evaluation

Using data obtained during the Remedial Site Investigation (RSI) and previous investigations conducted at the Quanta Resources Site, a baseline human health/ecological risk evaluation was conducted to identify the COCs. The primary COCs for the Quanta Resources Site retained through that investigation are coal tar and it's related compounds [i.e., polynuclear aromatic hydrocarbons (PAHs)] (GeoSyntec 1999).

2.2 Exposure Characterization

The objective of the exposure characterization is to determine the media and pathways through which receptors may be exposed to site contaminants. Potential exposure pathways depend on habitats and receptors present on site, extent and magnitude of contamination, and environmental fate and transport of COCs. The area of concern at the Quanta Resources Site is the tidal flat and associated sediments.

2.3 Hazard Characterization/Toxicity Assessment

The purpose of the hazard characterization/ toxicity assessment is to provide a general overview of the toxic mechanisms, fate and transport, bioavailability, and bioaccumulation potential observed for each contaminant (or group of contaminants such as PAHs) of concern. In this ecological risk assessment, it will be concluded that a "potential risk" exists if significant toxicity is observed in the toxicity tests, and/or significant impacts are observed in the benthic community structure.

2.3.1 PAHs

Polynuclear aromatic hydrocarbons (a component of the Base, Neutral, and Acid [BNAs] extractables analysis) consist of hydrogen and carbon in the form of two or more fused benzene rings. There are numerous PAH compounds, each differing in the number and arrangement of benzene rings. The low molecular weight PAHs (2 - 3 rings) tend to be more acutely toxic, while higher molecular weight compounds (4 - 7 rings) tend to be carcinogenic, teratogenic, or mutagenic to a number of receptors (Eisler 1987).

In general, PAHs show little tendency to biomagnify in food chains despite their high lipid solubility. This is thought to be because most organisms rapidly metabolize and excrete PAH compounds. Where assimilation of ingested PAHs has been demonstrated, metabolism and excretion were rapid (Neff 1982a,b).

The toxicity associated with PAHs may not be due to the initial compound, but rather to metabolized intermediates. The majority of the enzymatic activity associated with the metabolism of PAH compounds takes place in the liver (Fourman 1989). The first step in the metabolic process is the oxidation of PAHs by cytochrome P 450 enzyme systems. The metabolic by-products go through a series of reactions, ultimately forming diol-epoxides and phenol-oxides, which are believed to be carcinogenic intermediates of PAHs (Stein et al. 1990). These compounds have the ability to form DNA adducts by covalently bonding with genetic material.

In a study to establish safe levels of PAH compounds for fish, levels as low as 1.0 mg/kg total sediment PAHs increased mixed-function oxygenase levels and fat content of the liver (Payne et al. 1988). Many PAHs have been shown to adversely affect host tumoricidal activities, resulting in tumor formation. Varanasi et al. (1989) found that fish collected from locations with total sediment PAHs as high as 8.7 mg/kg, had significantly greater incidence of DNA adducts than fish collected from relatively uncontaminated environments. The formation of such adducts is a precursor to the formation of tumors. Martin (1980) found that ingestion of PAH-contaminated food at a rate of 30 mg/kg body weight (BW)/day of benzo(a)pyrene for nine days caused 100 percent mortality to channel catfish (*Ictalurus punctatus*) fingerlings. Lower doses (3 mg/kg BW/day) were observed to cause 88 percent mortality in 14 days. Most fish exhibited "spiraling" behavior before death.

PAHs are also potent immunotoxic compounds, suppressing humoral and cell-mediated immune response. It appears that PAH compounds that are carcinogenic are also immunosuppressive (Peakall 1993). In most situations where environmental PAH pollution is observed, the PAHs are present in complex mixtures that vary from one sampling site to the next. Consequently, understanding the toxicity of PAHs is extremely difficult under normal field conditions.

2.4 Assessment Endpoints

Assessment endpoints are defined as an explicit expression of the environmental value that is to be protected. The function of the assessment endpoints is to clearly communicate what is being evaluated in the risk assessment and thereby focus the risk assessment efforts. Within this ecological risk assessment, four assessment endpoints were identified. It should be noted that these four endpoints may not represent an exhaustive compilation of appropriate assessment endpoints for any future ecological risk evaluations. In addition, site specific data were not generated in this investigation such that two of the identified assessment endpoints could not be evaluated at this time. This ecological risk assessment focuses on the aquatic (tidal flat) portion of the site. A variety of organisms may utilize the site for feeding, reproduction, and as a refuge from predators. The following four assessment endpoints were identified for the aquatic portion of the Quanta Resources Site:

2.4.1 Assessment Endpoint No. 1: Viable Tidal Flat Community Structure and Tidal Flat Community Functioning

The functioning of a tidal flat has a direct impact on the health of the entire ecosystem associated with the tidal flat. The tidal flat provides exclusive habitat and refuge for many species. Small fish move into the shallows as a refuge from predatory fish. Tidal falts function as nurseries for estuarine organisms, provide food and refuge from predators, and play an important role in energy flow, nutrient cycling, and organic matter processing. Biota utilizing the tidal flat often rely extensively on the resources (i.e., forage) available during high tide when fish move to the tidal flat to feed on the resident community. At low tide, birds and some mammals move onto the tidal flat to feed.

Alteration of the community structure can result in a loss of forage species which can result in a loss of the functionality of the system in supporting the growth and development of other members of the tidal flat community. For example, if large invertebrates are absent from the tidal flat, there may be effectively no food for foraging birds at low tide or larger fishes at high tide.

2.4.2 Assessment Endpoint No. 2: Tidal Flat Nursery and Refuge Functioning

Tidal flats function as nursery and refuge areas for small and developing aquatic organisms. These organisms may include developing and growing fishes and young fishes migrating to coastal bays. In addition, many other young and developing organisms utilize tidal flats for refuge or protection from predators or avoidance of adverse environmental conditions (i.e., moving into quite waters to rest). Examples of species in the Hudson River system which use tidal flats for their nursery function and as a migration pathway are American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), and blue crabs (*Callinectes sapidus*).

2.4.3 Assessment Endpoint No. 3: Viable piscivorus bird community

Piscivorus birds are upper trophic level organisms that feed primarily on fish and invertebrates. This assessment endpoint focuses on those avian species which would utilize the tidal flat for feeding, and are important in the maintenance of a balanced ecosystem and in the nutrient and energy cycles between aquatic and terrestrial systems. Since nutrients and energy are limiting factors in the production of an ecosystem. the transfer of energy from an aquatic to a terrestrial system is essential.

Piscivorus birds are upper trophic level predators, and would be susceptible to exposure to contaminants which bioaccumulate in prey organisms. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, birds that consume fish have the potential for exposure and accumulation of large concentrations of contaminants in their tissues.

2.4.4 Assessment Endpoint No. 4: Viable Omnivorous Mammal Community

Omnivorous mammals are important members of a balanced ecosystem. They play a role in the regulation of fish populations, and remove sick or dying animals thereby limiting the spread of diseases to other organisms. Foraging behavior of omnivorous mammals represent a pathway by which nutrients and energy are transferred from aquatic to terrestrial ecosystems.

In many urban and/or suburban ecosystems, these organisms typically represent upper trophic levels and therefore, for contaminants that biomagnify, would be receiving the greatest doses of contaminants from their forage. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, mammals that consume fish have the potential for exposure and accumulation of large concentrations of contaminants in their tissues.

2.5 Testable Hypotheses

The testable hypotheses are specific risk questions that are based on the assessment endpoints. Based on the mechanism of contaminant toxicity, the number of exposure pathways that may exist for an assessment endpoint, or other factors, there may be more than one question for each assessment endpoint.

2.5.1 Assessment Endpoint No. 1: Viable Tidal Flat Community Structure and Tidal Flat Community Functioning

Are levels of site contaminants in sediment sufficient to cause adverse alterations to the structure and/or function of the tidal flat community?

2.5.2 Assessment Endpoint No. 2: Tidal Flat Nursery and Refuge Functioning

Are levels of site contaminants in sediment sufficient to cause adverse alterations to the nursery/refuge function of the tidal flat including migrations pathways for fish?

2.5.3 Assessment Endpoint 3: Viable Piscivorus Bird Community

Are levels of site contaminants in sediment sufficient to cause adverse toxic effects or reproductive impairment to piscivorus bird species utilizing the tidal flat?

2.5.4 Assessment Endpoint 4: Viable Omnivorous Mammal Community

Are levels of site contaminants in sediment sufficient to cause adverse toxic effects or reproductive impairment to omnivorous mammal species utilizing the tidal flat?

2.6 Measurement Endpoints

Measurement endpoints are quantifiable ecological characteristics that are related to the valued characteristics selected as assessment endpoints. Measurement endpoints should be linked to the assessment endpoints by the mechanism of toxicity and the route of exposure. Measurement endpoints are used to derive a quantitative estimate of potential effects, and to form a basis for extrapolation to the assessment endpoints.

Measurement endpoints were selected on the basis of the presence of receptors on the site, the presence of a complete exposure pathway, and the sensitivity of the receptor to the contaminants. The following measurement endpoints were selected to represent exposure pathways and assessment endpoints identified for the site.

2.6.1 Measurement Endpoints for Assessment Endpoint 1

Viable Tidal Flat Community Structure and Tidal Flat Community Functioning To evaluate the tidal flat community structure and functioning a benthic invertebrate survey, a 14-day solid-phase toxicity test using the amphipod *(Leptocheirus plumulosus)*, and a 7-day solid phase flow through toxicity test using the silverside minnow *(Menidia beryllina)* were conducted. The benthic survey indicates the number of individuals and diversity of the benthic community and identifies functional groups which are present. Toxicity tests provide information on the direct toxicity of sediment to representative vertebrate and invertebrate species. Details of the test design and implementation may be found in Appendix B.

2.6.2 Measurement Endpoints for Assessment Endpoint 2

Tidal Flat Nursery and Refuge Functioning To evaluate the fish and shellfish nursery/refuge function of the tidal flat, including migration pathways for fish, a benthic invertebrate survey, a 14-day solid-phase toxicity test using the amphipod *(L. plumulosus)*, and a 7-day solid phase flow through toxicity test using the silverside minnow *(M. beryllina)* were conducted. The benthic survey indicates the number of individuals and diversity of the benthic community and identifies functional groups which are present. Toxicity tests provide information on the direct toxicity of sediment to representative vertebrate and invertebrate species.

2.6.3 Measurement Endpoint for Assessment Endpoint 3

Viable Piscivorus Bird Community Evaluations could not be preformed because resident organisms were not available for collection and residue analysis of site contaminants.

2.6.4 Measurement Endpoint for Assessment Endpoint 4

Viable Omnivorous Mammal Community Evaluations could not be preformed because resident organisms were not available for collection and residue analysis of site contaminants.

2.7 Conceptual Model

The conceptual model uses contaminant and habitat characteristics to identify exposure pathways that will be evaluated by the selected measurement endpoints. For this risk assessment, the toxicity of contaminants in the sediment were evaluated using toxicity tests and a benthic invertebrate evaluation. Terrestrial and aquatic receptor species may be exposed by feeding on organisms that have accumulated contaminants in their tissues, or being directly exposed to sediment. Higher trophic level receptors may also be exposed via incidental ingestion of sediment and water. The following pathways will be evaluated in this risk assessment:

I. Tidal flat

a) Direct contact with sediment
b) Direct contact with water
c) Ingestion of tidal flat biota
d) Incidental ingestion of sediment
e) Incidental ingestion of water

II. Tidal flat used as a nursery/refuge

a) Direct contact with sediment
b) Direct contact with water
c) Ingestion of tidal flat biota
d) Incidental ingestion of sediment
e) Incidental ingestion of water

III. Piscivorus bird

a) Ingestion of fish
b) Incidental ingestion of sediment
c) Incidental ingestion of water

IV. Omnivorous mammal

a) Ingestion of fish/shellfish
b) Incidental ingestion of sediment
c) Incidental ingestion of water

3.0 ASSUMPTIONS

The following assumptions were made to conduct this study:

- Food chain exposure models were not calculated for piscivorus birds and omnivorous mammals because resident organisms were not available for collection and residue analysis. It was assumed, since they would be exposed to site sediments that these receptors were at risk if significant adverse effects were noted in the toxicity evaluations and/or the benthic community survey.

- Although food chain exposure models were not calculated, contaminants were assumed to be 100 percent bioavailable to organisms utilizing the tidal flat.

4.0 METHODS

4.1 Site Reconnaissance

A site reconnaissance was conducted on 16 March, 2000. Tidal amplitude was evaluated, and areas with visible contamination were identified. During the site visit, sediment was collected and placed into a 2- gallon bucket and allowed to settle. The supernatant was decanted into a container and brought back to the Response, Engineering, and Analytical Contract (REAC) Biology Laboratory. Using a hydrometer, the salinity of the supernatant was measured to assure that the organisms used in the toxicity tests would be acclimated to the site specific salinity.

4.2 Sediment Sampling

Sediment samples were collected in accordance with ERTC/REAC Standard Operating Procedure (SOP) #2016 *Sediment Sampling*. To minimize disturbance of sediment and as a safety precaution, sheets of plywood were placed on the sediment surface before walking to the sampling locations during low tide. Samples were collected with a decontaminated stainless steel trowel and placed in a stainless steel bucket. The samples were thoroughly homogenized, and aliquots for chemical analyses and toxicity testing were removed and placed directly into labeled containers. Sample aliquots submitted for Volatile Organic Compound (VOC) analysis were removed from the bucket prior to homogenization.

Sediment was collected from six locations within the intertidal zone (Figure 1). At two of these locations (Locations 2 and 4), samples were collected from both the surface and sub-surface for a total of eight samples. Sub-surface samples were collected at a depth of approximately six to twelve inches after the collocated surface sample was collected. Four of the sampling locations were located in the center of the tidal flat, along a transect extending in an easterly direction perpendicular to the river, with the eastern location situated on the eastern side of the boom. The remaining two locations (Locations 1 and 3) were along the northern and southern boundaries of the site in the vicinity of apparent discharge points. Surface and sub-surface samples were numbered according to where they were collected with the sub-surface sample numbers followed by "Sub"(e.g. 2 & 2-Sub). Similarities between sample locations were evaluated by a principal components analysis of total PAHs, TOC, and sediment grain size distribution.

Sediment samples were analyzed for BNAs, VOCs, Target Analyte List (TAL) Metals, Pesticides/Polychlorinated Biphenyls (Pest/PCBs), Oil Characterization, Total Organic Carbon (TOC), and grain size.

4.3 Benthic Macroinvertebrate Collection and Processing

The benthic macroinvertebrate community was sampled at the sample locations described previously. Protocol appropriate to the habitat encountered was used as described in: EPA 841-B-99-002, *Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition*; EPA/444/4-89-001, *Rapid Bioassessment for Use in Streams and Rivers*; EPA/600/4-90/030, *Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters*; and EPA 670/4-73-001, *Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents*.

Sediment samples for benthic community analysis were collected using acetate sleeves 7.6 centimeters (cm) wide, and 15 cm in length. Six replicate samples were collected from each location to determine the spatial variability of the community. Samples were collected by pushing the core into the sediment, gently rotating the core to shear off the sediment, and then slowly withdrawing

the core from the sediment. If the sediment did not remain in the acetate sleeve, a plastic cap or gloved hand was placed on the top of the sleeve. The sleeve was pulled out of the sediment while the suction, maintained by the plastic cap or hand, held the sediment in place. Once collected, samples were placed in a 0.5 millimeter (mm) mesh sieve. The sieve was gently agitated to allow finer silt and clay particles to pass through. The remaining material was placed into a labeled sample jar, and preserved in a ten percent formalin solution. Upon receipt at the laboratory, rose bengal stain was added to each of the samples to facilitate sorting, and the samples were allowed to stand for at least 24 hours. Samples were then transferred into a 70 percent isopropyl alcohol solution until they were sorted.

To sort the benthic macroinvertebrates, the samples were rinsed in clean water and all organisms were picked from the debris. Organisms were identified to the lowest practical taxonomic level, enumerated, and recorded in a log book. Capitellid polychaetes were identified to the family level because of the complications and uncertainty associated with identification to lower taxonomic levels (Fredette 1982; Grassle et al. 1987; Warren 1991). Oligochaetes were not identified below the class level because of the amount of time and effort required for lower taxonomic levels. Furthermore, studies have shown that identification of benthic macroinvertebrates to the family level may be sufficient for community assessment (Warwick 1988a,b; Gray et al. 1990; Ferraro and Cole 1990; Somerfield and Clark 1995; Drake et al. 1999). Benthic macroinvertebrate community structure was evaluated utilizing several community measures including community composition, number of taxa, number of individuals, the Shannon-Weiner diversity index (Shannon and Weaver 1963), and Pielou's evenness index (Pielou 1966). Similarities in benthic macroinvertebrate assemblages between replicates and between locations were evaluated by performing a cluster analysis on standardized data using average linkage (SAS Users Guide 1990).

4.4 Toxicity Test Evaluations

4.4.1 *Leptocheirus plumulosus*

The toxicity of sediment to invertebrates was evaluated using a modified version (14-day) of the standard 10-day, acute test using the amphipod, *L. plumulosus* (ASTM 1999). *L. plumulosus* is a representative estuarine benthic macroinvertebrate for the area. Prior to initiation of the 14-day test, a series of 96-hour screening assays was performed to determine whether a series of dilutions would be required to assess toxicity. Sediment from two locations was diluted to 1 percent, 10 percent, 50 percent, and 100 percent site sediment using clean control sediment. Test endpoints included survival, growth, and reburial (Appendix B).

4.4.2 *Menidia beryllina*

The toxicity of sediment to fish was evaluated using a modified version of a 7-day, solid phase, flow through toxicity test with the silverside minnow, *M. beryllina* (U.S. EPA 1991, Klemm 1994). Although *M. beryllina* are not considered to be benthic fish, they were used as a representative estuarine fish. Fish were exposed to flowing laboratory salt water, over a layer of site sediment. Test endpoints included survival and growth (Appendix B).

4.5 Sampling Equipment Decontamination

The sampling equipment was decontaminated prior and subsequent to sampling each station per ERTC/REAC SOP #2006, *Sampling Equipment Decontamination*. The following numerical sequence was used:

1 physical removal
2 nonphosphate detergent wash
3 potable water rinse
4 10% nitric acid rinse
5 distilled water rinse
6 acetone rinse
7 distilled water rinse
8 air dry

4.6 Sample Documentation and Packaging

Sample documentation was completed per the following ERTC/REAC SOPs:

ERTC/REAC SOP #2002, *Sample Documentation*
ERTC/REAC SOP #4005, *Chain of Custody Procedures*

Sample packaging and shipment were conducted in accordance with the following ERTC/REAC SOP:

ERTC/REAC SOP #2004, *Sample Packaging and Shipment*

5.0 RESULTS AND DISCUSSION

Physical and chemical analysis of sediment samples were conducted at the ERTC/REAC Laboratory in Edison, NJ or at the GPL Laboratory in Gaitersburg, Maryland. Toxicity evaluations were conducted at Toxikon Corporation in Jupiter, Florida. Physical and chemical results are presented in Appendices C, D, and E. Toxicity evaluation reports are presented in Appendix B.

5.1 Results of the Physical and Chemical Analysis of Sediment

5.1.1 Base, Neutral, and Acid Extractable Compounds

Sediment samples collected from site were analyzed for BNAs (Table 1). A total of twenty-three BNA compounds were detected in the study area. Location 1 (including the duplicate) had the highest concentrations of all BNA compounds with the exception of di-n-butylphthalate at Location 4 where it was detected at the highest concentration. At several locations, many of the BNAs were not detected at their respective detection limits with the exception of Location 1 which only had two BNAs (4-methylphenol; diethylphthalate) below their detection limit. The highest concentration of any BNA detected was naphthalene at Location 1, where a concentration of 110,000 ug/kg was detected (270,000 ug/kg in the duplicate sample). Concentrations of naphthalene at other locations were either not detected or below their respective detection limits.

In most instances, the concentrations of BNAs detected decreased as the distance from Location 1 and the bulkhead increased. This suggests that there is a current and active release of the above mentioned compounds onto the tidal flat in close proximity to Location 1. These compounds are then dispersed via tide and/or are eventually biodegraded with increased distance from Location 1 and the bulkhead.

5.1.2 Volatile Organic Compounds

Sediment samples collected from site were analyzed for VOCs (Table 2). Concentrations of naphthalene ranged from 31,000 ug/kg at Location 1 (duplicate) to non-detect at Locations 4-Sub, 5, and 6. At location 2, p-isopropyltoluene was detected at a concentration of 74 ug/kg, and was not detected in any other sample. Acetone was detected in seven samples, but was also detected in the soil and methanol blanks. 2-butanone ranged from 110 ug/kg at Location 4 to non-detect at Location 1.

As expected, Location 1 had the highest concentrations of naphthalene mimicking the results of the BNA analysis. Although significantly lower than the BNA results (due to a different extraction procedure), concentrations of naphthalene were detected at other locations along the bulkhead, and were not detected at Locations 5 and 6. This suggests that there is a current and active release of the above mentioned compounds onto the tidal flat in close proximity to Location 1. These compounds are then dispersed via tide and/or are eventually biodegraded with increased distance from Location 1 and the bulkhead.

5.1.3 Pesticides/Polychlorinated Biphenyls

Sediment samples collected from site were analyzed for pesticides/PCBs (Table 3). Endosulfan II was detected at Location 1 (duplicate) at a concentration of 9.7 ug/kg, and was not detected in any other sample. Concentrations of Endosulfan sulfate ranged from 31 ug/kg (Location 1 duplicate) to non-detect (Locations 4, 5, and 6). 4, 4'-DDT concentrations ranged from 28 ug/kg (Location 1) to non-detect (Locations 2, 3, 4-Sub, 5, and 6). Concentrations of gamma-Chlordane ranged from 79 ug/kg (Location 1) to non-detect (Location 6), but was detected at all other locations at concentrations above its respective detection limit. No other pesticides or PCBs were detected in any other sample. Complete analytical reports for pesticides/PCBs analysis are presented in Appendix C.

In general, Location 1 had the highest concentrations of any pesticide detected. It is also observed that concentrations of pesticides detected at other locations decreased as the distance from Location 1 and the bulkhead increased. This suggests that there is a current and active release of the above mentioned compounds onto the tidal flat in close proximity to Location 1.

5.1.4 Oil Characterization

Sediment samples collected from site were subjected to oil characterization which included the determination of Total Petroleum Hydrocarbons (TPH) (Table 4). Concentrations of TPH ranged from 3,000 mg/kg at Location 1 to 570 mg/kg at Location 6. The results indicate that Location 1 was contaminated with "fresh" coal tar meaning it exhibited no signs of weathering. This is based on the presence of lighter PAH compounds (e.g., naphthalenes; fluorenes; dibenzothiophenes) detected that would have normally been quickly lost through evaporation. All other sample locations exhibited lower concentrations of PAHs which was probably due to natural biodegradation or evaporative weathering of the coal tar, and their proximity to the suspected point of discharge (Location 1). The most severe weathering of PAH compounds occurred at the two furthest locations from the bulkhead at Locations 5 and 6. Here, the lighter PAHs were detected below their respected detection limits, and all of the heavier PAHs were detected at low concentrations. All samples except from Location 1 were identified as biodegraded coal tar substances. Complete analytical reports for Oil Characterization analysis are presented in Appendix D.

As expected, the concentration of coal tar and PAHs associated either through it's composition or weathering decreased as the distance from the bulkhead and Location 1 increased. This suggests that there is a current and active release of the above mentioned compounds onto the tidal flat in close proximity to Location 1. These compounds are then dispersed via tide and/or are eventually biodegraded with increased distance from Location 1 and the bulkhead.

5.1.5 Target Analyte List Metals

Sediment samples collected from site were analyzed for TAL metals (Table 5). Every TAL metal was detected in at least one sediment sample with the exceptions of selenium and thallium which were not detected in any sample. Similar to the organic contamination, but to a much lesser degree, metals were detected at higher concentrations at Location 1, with lower concentrations at Locations 5 and 6. Complete analytical reports for TAL metal analysis are presented in Appendix C.

As in the above mentioned compounds, the trend of a decrease in the concentrations of contaminants decrease with an increasing distance from Location 1 and the bulkhead is clearly demonstrated when comparing the data.

5.1.6 Total Organic Carbon and Grain Size

Sediment samples collected from the site were analyzed for TOC and grain size (Table 6). The TOC ranged from 11,000 mg/kg at Location 2 to 22,000 mg/kg at Location 1. Complete TOC results can be found in Appendix B.

The grain size distribution was similar at all locations. The samples consisted of silt (greater than 71 percent). Percentages of clay ranged from 10.82 percent to 25.48 percent, and sand ranged from 0.41 percent to 3.46 percent. Complete grain size results are presented in Appendix E.

5.2 Comparison of Results to Sediment Screening Guidelines

The NJDEP has established guidelines for the evaluation of sediment quality to be used in the ecological risk assessment process associated with contaminated sites under the jurisdiction of the Site Remediation Program (NJ DEP 1989). The guidelines were developed by the NJ DEP using the references cited in N.J.A.C. 7:26E-3.11 and are used to conduct screening level ecological risk assessments. The guidelines for metals, VOCs, BNAs, PCBs, and pesticides are summarized in Tables 7, 8, 9, and 10, respectively. Currently there are no sediment screening values for total petroleum hydrocarbons.

The guidelines are presented as effects range-low (ER-L) and effects range-medium (ER-M) values (Long et al. 1995). The ER-L represents a concentration at which adverse benthic impacts are found in approximately 10 percent of the studies evaluated. Water column species and wildlife are also at potential risk via biomagnification (food chain toxicity) if site-related concentrations of PCBs, organochlorine pesticides, or mercury in sediment are at or above the ER-L. Other known biomagnifers without NOAA screening numbers (dioxins, furans, other chlorinated organics, and selenium) warrant case-by-case evaluation. The ER-M is not a baseline ecological evaluation screening value, however contamination greater than the ER-M value indicates adverse benthic impacts in more than 50 percent of studies evaluated. A concentration between the ER-L and ER-M therefore indicates an expected impact frequency between 10 and 50 percent.

Guidelines for metals and organic compounds were compared to the values detected in sediment collected from the site. Occurrences in excess of the guidelines were flagged and suggest that the site represents a potential ecological risk.

5.2.1 Base, Neutral, and Acid Extractable Compounds

The concentrations of all BNAs for which guidelines exist were in excess of the ER-L values at all sample locations where the compound was detected (Table 11). The concentrations of most BNAs for which guidelines exist were in excess of the ER-M values at sample Locations 1, 2, 2-Sub, 3, and 4 (Table 12).

5.2.2 Volatile Organic Compounds

No NJ DEP guidelines exist for VOCs detected in the sediment collected from the Quanta Resources Site.

5.2.3 Pesticides/Polychlorinated Biphenyls

The concentrations of DDT and chlordane were in excess of the ER-L values at all sample locations where these pesticides were detected (Table 13). The concentrations were less than the ER-M values at all locations.

5.2.4 Target Analyte List Metals

The concentrations of arsenic, copper, lead, mercury, nickel, silver, and zinc were in excess of the ER-L values at all sample locations (Table 14). The concentration of cadmium was in excess of the ER-L values at Locations 1 and 2-Sub. The concentrations of mercury was in excess of the ER-M values at all sample locations (Table 15). The concentration of silver was in excess of the ER-M values at location 1, 2-Sub, and 4-Sub.

5.3 Results of the Solid Phase Toxicity Evaluations

Leptocheirus plumulosus: Sediment from six of the eight sample locations (Locations 2, 2-Sub, 4, 4-Sub, 5, and 6) exhibited no significant adverse effect on the survival of *L. plumulosus*.

There was a significant reduction in survival of *L. plumulosus* exposed to sediment from sample Location 1 and Location 3, as compared to the laboratory control. Sediment from Location 3 was tested as whole sediment, while sediment from Location 1 was diluted with clean control sediment to concentrations of 1 percent, 10 percent, 50 percent, and 100 percent site sediment.

A sediment dilution series was utilized based on the results of a 96 hour range finding screen. Screens were performed at the U.S. EPA/ERTC's request, since the appearance and odor associated with two of the eight sediment samples (Location 1 and Location 2) indicated a high probability of organism mortality. The results of the screen performed for sediment from Location 2 did not indicate toxicity after 96 hours. However, the results of the screen performed for Location 1 indicated that *L. plumulosus* would probably not survive in whole sediment for 14 days. Therefore, the sediment from Location 1 was diluted with clean control sediment prior to performance of the definitive 14-day test.

The dilution series of sediment from Location 1 was used to determine approximately how toxic the contaminants are. If only whole sediment was tested, and all of the exposed organisms died, it would be obvious that the sediment was toxic. However, the concentration of contaminants that would

cause toxic effects would not be known. By diluting the sediment into a series of concentrations, it was possible to derive an approximate lethal concentration (LC_{50}) at which half of the exposed organisms could be expected to die. The LC_{50} to *L. plumulosus* for sediment from Location 1 was determined to be approximately 17 percent sediment (see Appendix B for statistical analysis).

The results of *L. plumulosus* 14-day survival are summarized in Table 16. The full report of toxicity testing can be found in Appendix B.

Growth of test organisms is a sensitive sub-lethal endpoint. If a sample is not acutely toxic, it may still cause adverse effects over the long term. *L. plumulosus* growth (measured as dry weight) was significantly lower in the organisms exposed to all of the site sediments than in those exposed to the control sediment. Since there was significant mortality observed in the sediment from Location 3, and in the 100 percent, 50 percent, and 10 percent concentrations of sediment from Location 1, these exposures were not analyzed for adverse effects in growth (i.e., when a sediment is acutely toxic, its effects on growth are largely irrelevant).

The results of *L. plumulosus* 14-day growth are summarized in Table 16. The full report of toxicity testing can be found in Appendix B.

Amphipod's ability to rebury themselves after being removed from the sediment is also a sensitive sub-lethal endpoint. If an amphipod cannot rebury itself, it is easy prey for fish or other predators. After the 14 day exposure period, all exposed *L. plumulosus* were removed from the test sediment, and placed into a container with clean water and clean control sediment to determine reburial. Percent reburial of test organisms that had been exposed to sediment from Location 2-Sub was significantly lower than percent reburial of the control organisms. Though reburial was also significantly impaired in organisms exposed to sediment from Location 3, this sediment had already been shown to be acutely toxic, and reburial was not a concern.

The results of *L. plumulosus* reburial are summarized in Table 16. The full report of toxicity testing can be found in Appendix B.

An upstream "clean" reference area was not available for these assays, due to the urban/industrial land use surrounding the site. However, sediment was obtained by the laboratory from a "clean" collection site (Middletown, RI) and was used as a laboratory control.

Menidia beryllina: Sediment from seven of the eight sampling locations (Locations 2, 2-Sub, 3, 4, 4 subsurface, 5, and 6) exhibited no adverse effect on the survival of *M. beryllina*.

There was a significant reduction in survival of test organisms exposed to sediment from Location 1 as compared to the control sediment. All of the test organisms exposed to sediment from Location 1 were dead prior to test termination.

Growth (measured as dry weight) of *M. beryllina* exposed to sediment from Location 4 subsurface was significantly lower than growth observed in the control sediment. Location 1 was not included in the growth analysis because of significant mortality.

An upstream "clean" reference area was not available for these assays, due to the urban/industrial land use surrounding the site. However, sediment was obtained by the laboratory from a "clean" collection site (Middletown, RI) and was used as a laboratory control.

The results of the *M. beryllina* 7-day survival and growth toxicity test are summarized in Table 16. The full report of toxicity testing can be found in Appendix B.

5.4 Results of the Benthic Macroinvertebrate Survey

A benthic macroinvertebrate survey of the site was conducted to assess community condition (Table 17). A total of 14 taxa were collected consisting primarily of nemerteans, oligochaetes, polychaetes, amphipods, isopods, and bivalves. Nematodes and copepods were also collected. However, these organisms are generally considered to be meiofauna, and the few specimens collected were not considered to be representative of actual abundances at the site. Therefore, nematodes and copepods were eliminated from further analysis. The number of taxa in the study area ranged from six at Location 3 to twelve at Location 5. Shifts in the number of taxa collected were the result of a loss of the rare or infrequently collected taxa. The numerically dominant taxa were typically collected from every location in the study area. Taxa collected frequently and in high numbers consisted primarily of oligochaete worms and some polychaete worms.

The largest number of taxa collected were polychaetous annelids, with eight polychaete species total. Oligochaetes numerically dominated the samples, accounting for 82.4 to 94.4 percent of organisms collected. Other taxa were collected relatively infrequently and in small numbers. After annelids, bivalves and arthropods were second in terms of numerical dominance, each accounting for 0.07 to 2.6 percent of the total numbers of individuals collected from each location. These were followed by nemerteans, which accounted for 0 to 4.3 percent of total numbers of individuals collected from each location. All species collected were typical of both disturbed and undisturbed Mid-Atlantic estuarine environments (e.g. Dean and Haskin 1964; Boesch 1973; Watling 1975; McCall 1978; Zajac and Witlatch 1982; Franz and Harris 1988; Steimle and Caracciolo-Ward 1989).

Lower diversity is generally an indication of impacted conditions. The Shannon-Weiner diversity index (Shannon and Weaver 1963), which measures the number of individuals of each species with respect to total individuals at a Location, ranged from 0.304 at Location 4 to 0.827 at location 5. This was substantially lower than the mean diversity of 2.3 for New York Harbor (Adams et al 1998). Locations 5 and 6, which were furthest from the bulkhead had the highest diversity, indicating a lower degree of dominance by one or two species. Locations 1, 2, 3 and 4 had relatively low diversity. Diversity at the latter locations was half that at locations 5 and 6, and indicated a higher degree of dominance. The Shannon-Weiner diversity index should be interpreted with caution, because the same index value can be obtained for low abundances and numbers of species as well as high abundances and numbers of species. However, the former would be more characteristic of impacted conditions.

Pielou's species evenness index (Pielou 1966) at the site ranged from 0.030 at Location 4 to 0.081 at Location 6. Overall, evenness in the distribution of individuals among species was low at the site. However, evenness was greatest at Locations 5 and 6 and lowest at Locations 2 and 4, potentially indicated that environmental condition were more deteriorated at Locations 2 and 4.

Macroinvertebrate abundances ranged from 153 individuals at Location 6 to 1385 individuals at Location 4. None of the samples had extremely high densities of organisms, therefore numbers of individuals in each core were not determined from subsamples. Highest organism abundances were observed at Locations 2 and 4 (1253 and 1385 individuals respectively). Lowest organism abundances were observed at Locations 1 and 6 (167 and 153 individuals respectively). Intermediate organism abundances were observed at Locations 3 and 5 (856 and 302 individuals respectively). Variations in the numbers of individuals collected between locations were controlled by oligochaetes. Organism densities at the Quanta Resources Site ranged from 33,730 organisms/m^2 at Location 6 to 305,335 organisms/m^2 at Location 4. Densities at Locations 1, 5, and 6 were comparable to those at other locations in New York Harbor, but those at Locations 2, 3, and 4 were an order of magnitude higher (Adams et al. 1998). In cases of organic enrichment, which may be associated with petroleum hydrocarbon contamination, there will be an increase in abundances and/or biomass at moderate

levels of contamination, and a decrease in abundances and/or biomass associated with extreme impact (Pearson and Rosenberg 1978; Sanders et al. 1980). Benthic macroinvertebrate densities were, however, comparable to those throughout the Mid-Atlantic region (Orth et al. 1991).

The community sampled at the Quanta Resources Site was intertidal, and organism assemblages higher in the tidal zone are generally more stressed due to habitat. Therefore, community composition is different, consisting of more stress tolerant species. At the Quanta Resources Site, changes in the intertidal community due to tidal exposure were not observed for two reasons. First, the most inshore samples collected were along the bulkhead, which was located within several feet of the natural high tide line. Therefore, there was not a large difference in the amount of exposure between Locations 1, 2, and 3 and the deeper Locations 4, 5, and 6. Secondly, unlike sandier sediments, the pore water and temperature of the mud flat sediments is relatively constant, and tidal exposure does not have an excessively large effect on the benthic macroinvertebrate community. The community was actually very similar to subtidal communities.

No samples for this study were collected from a comparable reference location. Therefore, in the absence of a suitable reference, assessment of community condition was determined based on previous studies. Conclusions are subjective, and are based on the large amount of supporting evidence from previous studies.

Communities which have been affected by pollution often exhibit a decrease in numbers of taxa present, while the abundances of a few tolerant species increase (Word et al. 1977; Pearson and Rosenberg 1978). The numbers of taxa collected at the Quanta Resources Site were comparable to the numbers of taxa collected at other highly impacted locations in New York Harbor, such as Newark Bay and Jamaica Bay. In Newark Bay, the average number of species collected per VanVeen grab was 14.1, and the average number of species collected from Jamaica Bay was 17.7 (Adams et al. 1998). The sampling device and habitat sampled were not truly comparable to those at the Quanta Resources Site. However, in the absence of more comparable data, it could be seen that numbers of taxa at Quanta Resources Site were similar to other impacted sites. Also, the community lacked equilibrium species, and was dominated entirely by opportunistic and pollution-tolerant taxa (McCall 1977; Adams 1998). Opportunists are organisms which reproduce quickly to exploit an available resource, and reproduce in great numbers to establish a population. They have relatively short life cycles, and will die quicky either due to their short life cycle, exhaustion of resources, or pollution effects. Their populations persist, however, because they reproduce frequently (Sanders et al. 1980). The absence of equilibrium species in the samples, however, may be due in part to the small sample size and low occurrence of these organisms in the mud flat. Samples were dominated by oligochaetes, and changes in total abundances at each location were controlled by oligochaetes. This dominance by a single, opportunistic, pollution-tolerant species is typical of impacted communities.

Disturbed benthic macroinvertebrate communities generally consist of small, sedentary, opportunistic species, which are mostly shallow-dwelling deposit-feeders which inhabit the sediment (McCall 1977; Pearson and Rosenberg 1978; Word 1979). None of the organisms collected were relatively large, either because of their naturally small size or because there were no older organisms in the populations. The community was dominated by surface-dwelling organisms, most of which were deposit-feeders (Word 1980), with the exception of the nemerteans *Cyathura polita*, and *Neanthes succinea*, which are omnivorous (Coe 1943; Burbanck 1962; Fauchald and Jumars 1979), and *Eteone heteropoda*, which is carnivorous (Fauchald and Jumars 1979). With the exception of *N. succinea*, *Leitoscoloplos* spp., nemerteans and *C. polita*, most organisms were also sedentary (Coe 1943; Burbanck 1962; Fauchald and Jumars 1979; Word 1980). The opportunistic species included *Streblospio benedicti*, the Capitellids, and the oligochaetes (McCall 1977; Sanders et al. 1980).

All of the species collected are generally considered to be pollution-tolerant (Farell, unpublished). *Leitoscoloplos* spp. was the most sensitive organism in the community. However, the dominant organisms, the oligochaetes, are considered to be pollution tolerant (Adams 1998).

Based on species and numbers of individuals collected at each location, a cluster analysis grouped Locations 6 and 3 together as being most similar, followed by grouping Locations 2 and 4. These two clusters were then combined , and then Location 1 was added in. Location 5 was the last location to be joined to the cluster, being the least similar to other locations. This was slightly different from the principal components analysis which grouped Locations 2, 4 and 6 together as being similar, but indicated that Location 3 was very dissimilar in the physical properties analyzed. Furthermore, the principal components analysis indicated that the physical properties at Location 1 were the most dissimilar of all sample locations. In terms of species composition and abundances, Location 2 and 4 were very similar, followed by Location 3. They were also most similar in terms of total PAHs, although PAHs at Location 3 were higher. Location 5 was less similar in species composition and abundances, but was not much different from Locations 2, 4, and 3 in terms of physical properties. The least similar locations in terms of species composition and abundances, were Locations 1 and 6. Location 1 had the highest total PAHs, and Location 6 had the lowest PAHs. Both had similar numbers of oligochaetes, but Location 1 had more ampharetid polychaetes, and Location 6 had more capitellid polychaetes. It is not unusual for a cluster analysis to group assemblages which are highly similar, but not most similar, because once clusters are formed, they are not broken. However, none of the patterns of species distributions and abundances could be correlated with physical properties of the sample locations (Appendix F).

Benthic macroinvertebrates serve as an important function for carbon transfer to higher trophic levels (Diaz and Schaffner 1990). Shallow-dwelling organisms which inhabit the sediment, such as those found at the Quanta Resources Site, are more available to benthic-feeding fish and invertebrates. When benthic macroinvertebrates accumulate contaminants in their tissues or contain contaminated sediment in their guts, contaminants can accumulate at higher trophic levels, or benthic-feeding organisms can become more exposed to contaminants through their food items (Gaston and Young 1992).

Many benthic-feeding fish and invertebrates are generalists, and will feed on any available prey item. However, others are specialists, and when the diversity of potential prey items is low, resource availability may be low. This may cause some more motile species which use mud flats as a foraging ground or refuge to leave the area because the mud flat quality is low.

Functional diversity of the benthic macroinvertebrate community can also affect contaminant availability (Diaz and Schaffner 1990). When the community is dominated by sub-surface deposit-feeders, contaminants will become more stabilized. Sediments to which contaminants are bound become pelletized as they pass through the organisms' guts, and are then less susceptible to resuspension. The contaminants are also less susceptible to biodegradation, though. The cores of the sediment pellets are anaerobic, and most contaminant degradation processes are aerobic. Aerobic processes are also faster than anaerobic processes. Surface deposit-feeders tend to resuspend sediments and their associated contaminants, as their mode of feeding is to sweep or burrow through the sediment surface as they ingest sediments. The community on site is mostly a combination of surface and sub-surface deposit-feeders, but the numerically dominant organisms at the site are sub-surface deposit-feeders. Therefore, contaminants at the site are most likely being stabilized and are probably less susceptible to microbial degradation.

In summary, the benthic macroinvertebrate community is impacted throughout the study area. All species collected are short lived shallow-dwelling organisms which is a indicator of impacted habitats. Most of these organisms are opportunists, and are relatively pollution tolerant. In addition,

there is a dominance of deposit feeders which is also characteristic of impacted environments. The dominant organism is a sub-surface deposit feeder which is most likely stabilizing contaminants at the site, making them less available for microbial degradation. Finally, the diversity of food items at the Quanta Resources Site is low, and there is a high risk that contaminants which accumulate in the benthic macroinvertebrates will be passed on to higher trophic levels.

6.0 RISK CHARACTERIZATION

6.1 Assessment Endpoint No. 1 - Viable Tidal Flat Community Structure and Tidal Flat Community Functioning

Sediment samples were collected from site and evaluated using *L. plumulosus* toxicity tests. There was a significant negative impact in the percent survival of *L. plumulosus* exposed to Location 1 sediment using the following dilutions to control sediment: 10 percent; 50 percent; and 100 percent, and at Location 3 when compared to the laboratory control. Based on the dilution series using Location 1 sediment, an LC_{50} of approximately 17 percent was derived. The percent growth of *L. plumulosus* was significantly impacted following exposure to site sediments. The percent growth was less than the laboratory control at all locations. There was a significant impact in the percent reburial of test organisms exposed to site sediment from Location 3 and Location 2-Sub when compared to the laboratory control. Percent reburial analysis was not performed using 50 percent and 100 percent dilutions of Location 1 sediment because of significant mortality in test organisms. In general, all responses follow a trend with levels of COCs detected.

Sediment samples were collected from site and evaluated using *M. beryllina* toxicity tests. There was a significant negative impact in the percent survival of *M. beryllina* exposed to Location 1 sediment when compared to the laboratory control sediment. Percent growth was significantly impacted in *M. beryllina* exposed to sediment from Location 4-Sub. In general, all responses follow a trend with levels of COCs detected.

A benthic macroinvertebrate survey was conducted at the six sample locations within the tidal flat. The benthic macroinvertebrate community is impacted throughout the study area. All species collected are indicative of impacted environments. Finally, the diversity of food items in the study area is low, and there is a high risk that contaminants which accumulate in the macroinvertebrates will be passed on to higher trophic levels.

6.2. Assessment Endpoint No. 2 - Tidal Flat Nursery and Refuge Functioning

Sediment samples were collected from site and evaluated using *L. plumulosus* toxicity tests. There was a significant negative impact in the percent survival of *L. plumulosus* exposed to Location 1 sediment using the following dilutions to control sediment: 10 percent; 50 percent; and 100 percent, and at Location 3 when compared to the laboratory control. Based on the dilution series using Location 1 sediment an LC_{50} of approximately 17 percent was derived. The percent growth of *L. plumulosus* was significantly impacted following exposure to site sediments. The percent growth was less than the laboratory control at all locations. There was a significant impact in the percent reburial of test organisms exposed to site sediment from Location 3 and Location 2-Sub when compared to the laboratory control. Percent reburial analysis was not performed using 50 percent and 100 percent dilutions of Location 1 sediment because of significant mortality in test organisms. In general, all responses follow a trend with levels of COCs detected.

Sediment samples were collected from site and evaluated using *M. beryllina* toxicity tests. There was a significant negative impact in the percent survival of *M. beryllina* exposed to Location 1 sediment when compared to the laboratory control sediment. Percent growth was significantly impacted in *M. beryllina* exposed to sediment from Location 4-Sub. In general, all responses follow a trend with levels of COCs detected.

A benthic macroinvertebrate survey was conducted at the six sample locations within the tidal flat. The benthic macroinvertebrate community is impacted throughout the study area. All species collected are indicative of impacted environments. Finally, the diversity of food items in the study area is low, and there is a high risk that contaminants which accumulate in the macroinvertebrates will be passed on to higher trophic levels.

6.3 Assessment Endpoint No. 3 - Viable Piscivorus Bird Community

Food chain exposure models were not calculated because resident organisms were not available for collection and residue analysis. However, based on the conceptual model, piscivorus birds may be at risk to site contaminants based on the benthic macroinvertebrate survey, and observed toxicity in toxicity test organisms exposed to site sediments.

6.4 Assessment Endpoint No. 4 - Viable Omnivorous Mammal Community

Food chain exposure models were not calculated because resident organisms were not available for collection and residue analysis. However, based on the conceptual model omnivorous mammals may be at risk to site contaminants based on the benthic macroinvertebrate survey, and observed toxicity in toxicity test organisms exposed to site sediments.

7.0 UNCERTAINTY

There is inherent uncertainty within the risk assessment process, however, a knowledge of the cause and the nature of these uncertainties will allow the data to be used in the site management process. Sources of uncertainty fall into several areas including analytical and sampling design, assumptions, natural variability, error, and insufficient knowledge. An understanding of how each of these sources is addressed in the risk assessment is integral to the interpretation of the risk assessment.

Error can be introduced by use of invalid assumptions in the conceptual model. Conservative assumptions were made in light of the uncertainty associated with the risk assessment process. This was done to minimize the possibility of concluding that no risk is present when a threat actually does exist (e.g., elimination of false negatives).

Sediment and benthos samples were collected during low tide with no overlying water present. The result, is that collocated surface water samples were not collected, thus a comparison could not be made between concentrations of COCs in sediment and surface water. By not sampling surface water during high tide a clear representation of the concentrations of contaminants being dispersed into the water column by the mixing processes associated with tidal flats (e.g., tide; wind; and waves) cannot be made. Even if surface water was collected, this mixing effect is never consistent, and it would be difficult to get an accurate depiction of the concentration of contaminants being dispersed into the water column. In addition, the study area is surrounded by an urban-industrial landscape and any water samples collected could have potentially carried in other contaminants from those surrounding areas.

The sampling and chemical analyses were conducted to support an ecological risk assessment. The analytical results were compared to the toxicological and ecological data and used to determine the concentration at which receptor species would be adversely impaired. The data were also used to develop a preliminary

concept of the distribution of contamination. The study design, including the selection of sampling locations, the number of samples, and the analytical parameters was based on site specific data and existing information. The former Quanta Resources facility was located adjacent to the study area, and it is unclear whether the migration of contaminants from the site to the tidal flat was caused by spill over from barges and/or leaking storage tanks in which the contaminants have migrated underground. It was assumed that the bulkhead and the area near Location 1 were the primary point of discharge onto the tidal flat and the deposition and concentration of contaminants decreased with increasing distance from the bulkhead. Existing information indicates that the distribution of contaminants follows this trend, however the small sample size collected in the current study coupled with the hydrology of the area suggests that concentrations in excess of the maximum detected in this study may exist.

Uncertainty associated with the sediment toxicity evaluation includes extrapolation from laboratory to field, variability in test protocol, and differential species sensitivity. The laboratory studies used in this investigation evaluate contaminant effects on a single species, thereby making it difficult to extrapolate to the community or ecosystem level. In addition, field conditions and environmental factors often complicate the interpretation. Finally, although laboratory toxicity assessments allow test variables, such as exposure, to be controlled, standardized protocols are not universally followed. Endemic organisms may react differently to contaminants than surrogate test species and error may be introduced in cases where related species are substituted for the actual receptors. To reduce the uncertainty associated with these factors, surrogate species used in the toxicity tests are chosen to be representative of endemic species so that adverse effects observed in the laboratory can be directly extrapolated to the field as best as possible.

Another source of uncertainty related to toxicity testing stems from the cause of the observed mortality. Mortality may be due to a number of factors including the contaminants, grain size, organic carbon content, matrix characteristics, organism viability and health, and life cycle factors. Since the test protocol and conditions are aimed at providing the test species with optimal conditions for growth and survival, mortality or other abnormalities can be attributable to contaminants with a high degree of certainty. Control replicates using sediment collected by the testing laboratory from an area of known environmental quality are run in parallel with samples collected from the site. Mortality or other abnormalities observed in the control sediment indicate that conditions are not entirely suitable for the survival and growth of the test species and mortality observed in the site sediment cannot be attributed entirely to contaminants. However, if acceptable survival in the control is observed, it is assumed that mortality observed in the sediment collected from the study area is due to contaminants.

Organisms use their environment unevenly, and differential area use based on habitat quality is a source of uncertainty in the macroinvertebrate field survey. This may be the case in this assessment, since the study area is somewhat degraded, and is surrounded by an urban-industrial landscape. In addition, natural variability is an inherent characteristic of ecological systems and there is a limit to our understanding of the population dynamics of most species and the community interactions which exist between species. This limitation is fundamental to the interpretation of measurement endpoints as they relate to the assessment endpoints.

8.0 CONCLUSIONS

8.1 Assessment Endpoint No. 1 -Viable Tidal Flat Community Structure and Tidal Flat Community Functioning

8.1.1 Measurement Endpoint 1: Benthic Macroinvertebrate Survey

Based on the results of the benthic macroinvertebrate survey, the benthic community is impacted throughout the study area. All species collected are short-lived, shallow-dwelling organisms which is an indicator of impacted habitats. Most of these organisms are

opportunists and are relatively pollution tolerant. In addition, there is a dominance of deposit feeders which is also characteristic of impacted environments. The dominant organism is a sub-surface deposit feeder which is most likely stabilizing contaminants at the site, making them less available for microbial degradation. Finally, the diversity of food items found on site is low and there is a high risk that contaminants which accumulate in the benthic macroinvertebrates will be passed on to higher trophic levels.

8.1.2 Measurement Endpoint 2: *L. plumulosus* and *M. beryllina* Toxicity Tests

Based on the *L. plumulosus* and *M. beryllina* toxicity tests, exposure to site sediments primarily in the vicinity of Location 1 and the bulkhead pose a risk to organisms utilizing the tidal flat. Dilution series toxicity tests using sediment collected from Location 1 produced an estimated LC_{50} of 17 percent.

8.2 Assessment Endpoint No. 2 - Tidal Flat Nursery and Refuge Functioning

8.2.1 Measurement Endpoint 1: Benthic Macroinvertebrate Survey

Based on the results of the benthic macroinvertebrate survey, the benthic community is impacted throughout the study area. All species collected are short lived shallow-dwelling organisms which is an indicator of impacted habitats. Most of these organisms are opportunists and are relatively pollution tolerant. In addition, there is a dominance of deposit feeders which is also characteristic of impacted environments. The dominant organism is a sub-surface deposit feeder which is most likely stabilizing contaminants at the site, making them less available for microbial degradation. Finally, the diversity of food items found on site is low and there is a high risk that contaminants which accumulate in the benthic macroinvertebrates will be passed on to higher trophic levels.

8.2.2 Measurement Endpoint 2 : *L. plumulosus* and *M. beryllina* Toxicity Tests

Based on the *L. plumulosus* and *M. beryllina* toxicity tests, exposure to site sediments primarily in the vicinity of Location 1, and the bulkhead pose a risk to organisms utilizing the tidal flat. Dilution series toxicity tests using sediment collected from Location 1 produced an estimated LC_{50} of 17 percent.

8.3 Assessment Endpoint No. 3 - Viable Piscivorus Bird Community

Food chain exposure models were not calculated because resident organisms were not available for collection and residue analysis. However, piscivorus birds may be at risk to site contaminants based on the benthic macroinvertebrate survey, and observed toxicity in toxicity test organisms exposed to site sediments. When foraging on the tidal flat, piscivorus birds may be exposed to contaminants through the incidental ingestion of sediment and water and/or by preying on estuarine organisms which might have accumulated contaminants in their tissue.

8.4 Assessment Endpoint No. 4 - Viable Omnivorous Mammal Community

Food chain exposure models were not calculated because resident organisms were not available for collection and residue analysis. However, omnivorous mammals may be at risk to site contaminants based on the benthic macroinvertebrate survey, and observed toxicity in toxicity test organisms exposed to site sediments. When foraging on the tidal flat, omnivorous mammals may be exposed to contaminants through the incidental ingestion of sediment and water and/or by preying on estuarine organisms which might have accumulated contaminants in their tissue.

9.0 SITE WIDE CONCLUSION

Based on results of this risk assessment, contaminants detected in the sediment at the Quanta Resources Site pose a risk to the structure of tidal flat communities utilizing the site. Alterations in the community structure, including the loss of species, can result in a loss of the functionality of the system in supporting the growth and development of other members of the tidal flat community.

Based on this risk assessment, fish and shellfish which utilize the tidal flat exclusively for its functionality as a nursery and/or refuge are at risk from site COCs. Young fish exposed to the area may either die or become more available to predators by avoiding the tidal flat in general. By avoiding the heavily contaminated areas near the bulkhead and other areas of cover they will be more susceptible to predation. In worse case, organisms would avoid the tidal flat as a whole leaving them even more susceptible to predation in the river channel. In addition, organisms exposed to site sediments may bioaccumulate contaminants in their tissue. If these organisms are preyed upon, the contaminants may biomagnify in higher trophic level predator species.
Based on the data collected, there appears to be a current and active release of COCs along the base of the bulkhead and sample Location 1.

Nearly all inorganic benchmarks were exceeded in sediment collected from the Quanta Resources Site. The sediment concentrations detected at the site exceeded the guidelines for the following metals: arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc.

Nearly all organic benchmarks were exceeded in sediment collected from the Quanta Resources site. The sediment concentrations detected at the site exceeded the guidelines for the following organic compounds: naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(g,h,i)perylene, total PAHs, DDT, and chlordane.

Overall, the data obtained through this study show that the tidal flat is impacted, and that the survival, growth, and reproduction of organisms which inhabit and/or utilize the tidal flat are at risk from contaminants currently present in the sediment.

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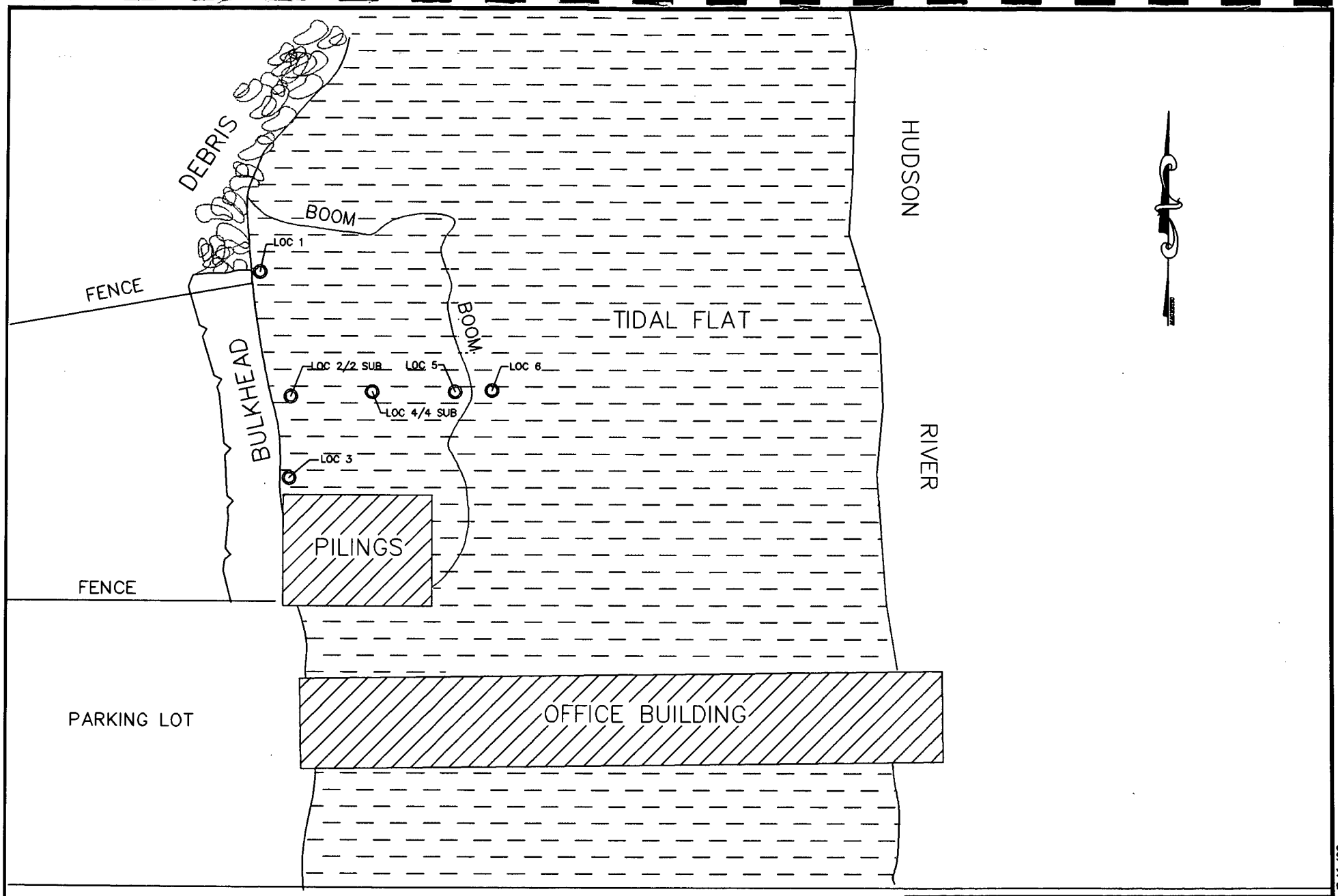
Figures



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RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C99-223
W.O.# R1A00133

FIGURE 1
SAMPLE LOCATIONS
QUANTA RESOURCES SITE
EDGEWATER, NEW JERSEY
AUGUST 2000

133_SITE MAP.DWG 7/6/00

Tables

Table 1. Base, Neutral, and Acid Extractables Detected in Sediment
Quanta Resources Site
Edgewater, New Jersey
August 2000

	Location 1	Location 1 Dup	Location 2	Location 2 Sub	Location 3	Location 4	Location 4 Sub	Location 5	Location 6
Compound	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)
4-Methylphenol	400 J	730 J	U (2600)	U (2400)	U (2500)	U (2600)	U (2300)	U (2300)	U (2700)
Naphthalene	110000	270000	570 J	190 J	1100 J	1700 J	U (2300)	130 J	U (2700)
2-Methylnaphthalene	31000	160000	U (2600)	U (2400)	370 J	690 J	U (2300)	U (2300)	U (2700)
Acenaphthylene	4600	12000	1000 J	370 J	1500 J	570 J	210 J	U (2300)	U (2700)
Acenaphthene	26000	95000	1800 J	840 J	2600	1500 J	150 J	110 J	U (2700)
Dibenzofuran	20000	42000	760 J	520 J	740 J	730 J	U (2300)	U (2300)	U (2700)
Fluorene	26000	91000	1500 J	660 J	1400 J	1300 J	U (2300)	U (2300)	U (2700)
Diethylphthalate	300 J	1400 J	450 J	460 J	550 J	580 J	390 J	640 J	320 J
Phenanthrene	74000	190000	7600	2200 J	7100	5300	740 J	410 J	700 J
Anthracene	16000	38000	2100 J	580 J	2500	1300 J	260 J	130 J	190 J
Carbazole	4400	12000	290 J	U (2400)	330 J	290 J	U (2300)	U (2300)	U (2700)
Di-n-butylphthalate	2100 J	6900	6000	5900	4700	7600	4600	5300	1200 J
Fluoranthene	78000	190000	19000	7200	28000	12000	3700	1600 J	1900 J
Pyrene	27000	100000	10000	4600	15000	6400	2100 J	1100 J	970 J
Benzo(a)anthracene	21000	64000	7900	2900	12000	4900	1400 J	630 J	790 J
Chrysene	16000	42000	6300	2500	9600	3700	1100 J	500 J	600 J
Bis(2-Ethylhexyl)phthalate	1200 J	2800	1000 J	550 J	820 J	850 J	680 J	850 J	800 J
Benzo(b)fluoranthene	17000	52000	7900	4100	12000	5500	1700 J	780 J	780 J
Benzo(k)fluoranthene	9000	22000	3800	920 J	4700	1800 J	470 J	U (2300)	U (2700)
Benzo(a)pyrene	16000	49000	7700	3000	10000	4500	1400 J	700 J	710 J
Indeno(1,2,3-cd)pyrene	9200	26000	4500	2100 J	6600	2400 J	920 J	U (2300)	U (2700)
Dibenzo(a,h)anthracene	2700	7000	U (2600)	680 J	2000 J	U (2600)	U (2300)	U (2300)	U (2700)
Benzo(g,h,i)perylene	11000	28000	5200	2400 J	7600	2600	1000 J	U (2300)	U (2700)

ug/kg = micrograms per kilogram
Dup = Duplicate sample
Sub = Sub-surface sample
U = not detected at indicated vlue
J = denotes estimated value

Table 2. Volatile Organic Compounds Detected in Sediment
Quanta Resources Site
Edgewater, New Jersey
August 2000

	Location 1	Location 1 Dup	Location 2	Location 2 Sub	Location 3	Location 4	Location 4 Sub	Location 5	Location 6
Compound	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)
p-Isopropytoluene	U (660)	U (660)	U (2.6)	U (2.5)	U (26)	U (26)	U (2.3)	U (2.5)	U (2.8)
Naphthalene	30000	31000	6.3 J	3.7 J	1800	2700	U (9.1)	U (10)	11
1,3-Dichlorobenzene	U (660)	U (660)	74	U (2.5)	U (26)	U (26)	U (2.3)	U (2.5)	U (2.8)
Acetone	U (5300)	2400 J	47	39	180 J	U (210)	27	36	29
2-Butanone	U (2600)	U (2600)	8.3 J	10	97 J	110	7.9 J	9.1 J	6.8 J

ug/kg = micrograms per kilogram
Dup = Duplicate sample
Sub = Sub-surface sample
U = not detected at indicated value
J = denotes estimated value

Table 3. Pesticides/Polychlorinated Biphenyls Detected in Sediment
Quanta Resources Site
Edgewater, NJ
August 2000

	Location 1	Location 1 Dup	Location 2	Location 2 Sub	Location 3	Location 4	Location 4 Sub	Location 5	Location 6
Compound	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)	Conc. (ug/kg)
Endosulfan II	U (8.4)	9.7	U (8.4)	U (7.9)	U (8.1)	U (8.3)	U (7.7)	U (7.7)	U (8.9)
Endosulfan sulfate	24	31	4.6 J	14	7.1 J	U (8.3)	3.0 J	U (7.7)	U (8.9)
4, 4' -DDT	28	24	U (8.4)	5.8 J	U (8.1)	4.3 J	U (7.7)	U (7.7)	U (8.9)
gamma-Chlordane	79	72	12	31	33	34	26	24	U (4.6)
Aroclor 1016	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)
Aroclor 1221	U (510)	U (540)	U (510)	U (480)	U (490)	U (500)	U (470)	U (470)	U (540)
Aroclor 1232	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)
Aroclor 1242	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)
Aroclor 1248	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)
Aroclor 1254	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)
Aroclor 1260	U (250)	U (270)	U (260)	U (240)	U (250)	U (250)	U (230)	U (230)	U (270)

ug/kg = micrograms per kilogram
Dup = Duplicate sample
Sub = Sub-surface sample
U = not detected at indicated value
J = denotes estimated value

Table 4. Total Petroleum Hydrocarbons Detected in Sediment
Quanta Resources Site
Edgewater, New Jersey
August 2000

Location	Conc. mg/kg
Location 1	2400 J
Location 1 Dup	3000 J
Location 2	880
Location 2 Sub	1800 J
Location 3	2200 J
Location 4	800
Location 4 Sub	860
Location 5	670 J
Locaiton 6	570 J

mg/kg = milligrams per kilogram
J = denotes estimated value

Table 5. TAL Metals Detected in Sediment
Quanta Resources Site
Edgewater, NJ
August 2000

	Location 1	Location 1 Dup	Location 2	Location 2 Sub	Location 3	Location 4	Location 4 Sub	Location 5	Location 6
Metal	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)	Conc. (mg/kg)
Aluminum	16700	16000	15000	16600	14700	15500	16000	15000	17000
Antimony	2.3	1.8	U (1.2)	U (1.1)	0.92	U (1.1)	U (0.87)	U (1.2)	1.6
Arsenic	17.2	19.3	13.3	18.2	15.6	14.1	16.9	12.8	13.9
Barium	70.8	71.4	68.9	77	72.4	70.5	71	65.3	72.9
Beryllium	1.0	1.1	0.91	0.98	0.84	0.94	0.93	0.92	1.0
Cadmium	0.45	0.82	0.57	0.86	0.63	0.38	0.64	0.46	0.36
Calcium	4210	4450	4020	4040	4390	4160	3940	3790	4320
Chromium	80.3	84.7	69.9	83.6	68.9	71.8	80.3	68.1	74.6
Cobalt	12.1	12	10.6	11.8	10.6	11.2	11.3	10.8	12.4
Copper	101	115	90.6	109	94.1	91.5	103	83.3	89.8
Iron	35300	36200	30900	33300	30900	31700	32200	30000	33900
Lead	113	116	95.6	118	103	98.2	111	90.8	98.1
Magnesium	8110	8270	7400	8020	7660	7770	7720	7190	8120
Manganese	746	705	538	462	502	575	505	542	672
Mercury	1.7	1.8	1.5	1.7	1.9	1.4	1.8	1.5	1.4
Nickel	33.7	34.4	32.9	37.8	35.9	34	35.9	30.9	33.7
Potassium	3450	3370	3060	3370	2860	3190	3150	3040	3340
Selenium	U (1.5)	U (1.6)	U (1.5)	U (1.4)	U (1.1)	U (1.4)	U (1.1)	U (1.5)	U (1.4)
Silver	4.0	4.7	3.3	4.0	3.2	3.4	3.9	3.2	3.3
Sodium	6020	6190	5310	6000	5160	6040	5500	4520	5160
Thallium	U (2.3)	U (2.5)	U (2.3)	U (2.1)	U (1.7)	U (2.1)	U (1.6)	U (2.3)	U (2.2)
Vanadium	39.9	40.2	34.7	40	34.6	36.2	38.1	34.2	38.6
Zinc	214	237	198	240	213	201	219	185	202

mg/kg = milligrams per kilogram
Dup = Duplicate sample
Sub = Sub-surface sample
U = not detected at indicated value
J = denotes estimated value

Table 6. Grain Size and Total Organic Carbon Detected in Sediment
Quanta Resources Site
Edgewater, New Jersey
August 2000

	Location 1	Location 2	Location 2 Sub	Location 3	Location 4	Location 4 Sub	Location 5	Location 6
TOC (mg/kg)	22000	11000	15000	17000	16000	15000	16000	14000
Percent sand	3.46	1.05	1.03	1.79	0.6	0.76	0.36	0.41
Percent silt	71.06	78.93	87.72	87.39	75.24	83.71	82.49	75.77
Percent clay	25.48	20.02	11.25	10.82	24.16	15.53	17.15	23.82

mg/kg = milligrams per kilogram

Table 7. New Jersey Estuarine and Marine Sediment Screening Guidelines[1]
for Volatile Organic Compounds
Quanta Resources Site
Edgewater, NJ
Augsut 2000

Values presented as mg/kg, dry weight @ 1% TOC

Compound	Effects Range	
	Chronic Value	$Log_{10}K_{ow}$
Benzene	0.34	1.69 - 2.12
Ethylbenzene	1.4	3.05 - 3.15
Tetrachloroethylene	0.45	2.1 - 2.9
Toluene	2.5	2.11 - 2.80
Trichloroethylene	1.6	2.29 -3.3
Xylene	>0.12	2.77 - 3.2

1 NJ DEP 1998
mg/kg = milligrams per kilogram

Table 8. New Jersey Estuarine and Marine Sediment Screening Guidelines[1]
for Metals
Quanta Resources Site
Edgewater, NJ
August 2000

Values presented as mg/kg, dry weight

Metal	Effects Range	
	Low	Medium
Arsenic	8.2	70
Cadmium	1.2	9.6
Chromium	81	370
Copper	34	270
Lead	47	218
Mercury	0.15	0.71
Nickel	21	52
Silver	1	3.7
Zinc	150	410

1 NJ DEP 1998
mg/kg = milligrams per kilogram

Table 9. New Jersey Estuarine and Marine Sediment Screening Guidelines[1]
for Polynuclear Aromatic Hydrocarbon Compounds
Quanta Resources Site
Edgewater, NJ
August 2000

Values presented as mg/kg, dry weight

Compound	Effects Range	
	Low	Medium
Naphthalene	0.16	2.1
2-Methylnaphthalene	0.07	0.67
Acenaphthylene	0.044	0.64
Acenaphthene	0.016	0.5
Fluorene	0.019	0.54
Phenanthrene	0.24	1.5
Anthracene	0.085	1.1
Fluoranthene	0.6	5.1
Pyrene	0.665	2.6
Benzo(a)anthracene	0.261	1.6
Chrysene	0.384	2.8
Benzo(k)fluoranthene	0.24	1340
Benzo(a)pyrene	0.43	1.6
Indeno(1,2,3-cd)pyrene	0.2	320
Dibenzo(a,h)anthracene	0.063	0.26
Benzo(g,h,i)perylene	0.17	320
Total PAH	4	45

1 NJ DEP 1998
mg/kg = milligrams per kilogram

Table 10. New Jersey Estuarine and Marine Sediment Screening Guidelines[1]
for Pesticides and Polychlorinated Biphenyls
Quanta Resources Site
Edgewater, NJ
August 2000

Values presented as mg/kg, dry weight

Compound	Effects Range	
	Low	Medium
Aldrin	0.002	8
Benzohexachloride (BHC)	0.003	12
Chlordane	0.007	6
DDT (total)	0.0016	0.046
pp'-DDE	0.0022	0.027
Dieldrin	0.002	91
Endrin	0.003	130
Hexachlorobenzene (HCB)	0.02	24
Heptachlor epoxide	0.005	5
Mirex	0.007	130
Aroclor 1016	0.007	53
Aroclor 1248	0.03	150
Aroclor 1254	0.06	34
Aroclor 1260	0.005	24
PCB (total)	0.023	0.18

1 NJ DEP 1998
mg/kg = milligrams per kilogram

Table 11. Base, Neutral, and Acid Extractable Organic Compounds Detected in Sediment for Which a New Jersey Estuarine and Marine Sediment Screening Guideline[1] Exists
Quanta Resources Site
Edgewater, New Jersey
August 2000

Values reported as ug/kg; shaded values are in excess of the effects range - low guideline

Compound	Location								
	1	1 (Duplicate)	2	2 (Subsurface)	3	4	4 (Subsurface)	5	6
Naphthalene	110000	270000	570 J	190 J	1100 J	1700 J	U (2300)	130 J	U (2700)
2-Methylnaphthalene	31000	160000	U (2600)	U (2400)	370 J	690 J	U (2300)	U (2300)	U (2700)
Acenaphthylene	4600	12000	1000 J	370 J	1500 J	570 J	210 J	U (2300)	U (2700)
Acenaphthene	26000	95000	1800 J	840 J	2600	1500 J	150 J	110 J	U (2700)
Fluorene	26000	91000	1500 J	660 J	1400 J	1300 J	U (2300)	U (2300)	U (2700)
Phenanthrene	74000	190000	7600	2200 J	7100	5300	740 J	410 J	700 J
Anthracene	16000	38000	2100 J	580 J	2500	1300 J	260 J	130 J	190 J
Fluoranthene	78000	190000	19000	7200	28000	12000	3700	1600 J	1900 J
Pyrene	27000	100000	10000	4600	15000	6400	2100 J	1100 J	970 J
Benzo(a)anthracene	21000	64000	7900	2900	12000	4900	1400 J	630 J	790 J
Chrysene	16000	42000	6300	2500	9600	3700	1100 J	500 J	600 J
Benzo(k)fluoranthene	9000	22000	3800	920 J	4700	1800 J	470 J	U (2300)	U (2700)
Benzo(a)pyrene	16000	49000	7700	3000	10000	4500	1400 J	700 J	710 J
Indeno(1,2,3-cd)pyrene	9200	26000	4500	2100 J	6600	2400 J	920 J	U (2300)	U (2700)
Dibenzo(a,h)anthracene	2700	7000	U (2600)	680 J	2000 J	U (2600)	U (2300)	U (2300)	U (2700)
Benzo(g,h,i)perylene	11000	28000	5200	2400 J	7600	2600	1000 J	U (2300)	U (2700)
Total PAHs	518900	1490000	87920	35760	125140	57180	15150	6090	6640

1 NJ DEP 1998
ug/kg = micrograms per kilogram
U = not detected at indicated value
J = estimated value

Table 12. Base, Neutral, and Acid Extractable Organic Compounds Detected in Sediment for Which a New Jersey Estuarine and Marine Sediment Screening Guideline[1] Exists
Quanta Resources Site
Edgewater, New Jersey
August 2000

Values reported as ug/kg; shaded values are in excess of the effects range - medium guideline

Compound	Location								
	1	1 (Dup)	2	2 (Subsurface)	3	4	4 (Subsurface)	5	6
Naphthalene	110000	270000	570 J	190 J	1100 J	1700 J	U (2300)	130 J	U (2700)
2-Methylnaphthalene	31000	160000	U (2600)	U (2400)	370 J	690 J	U (2300)	U (2300)	U (2700)
Acenaphthylene	4600	12000	1000 J	370 J	1500 J	570 J	210 J	U (2300)	U (2700)
Acenaphthene	26000	95000	1800 J	840 J	2600	1500 J	150 J	110 J	U (2700)
Fluorene	26000	91000	1500 J	660 J	1400 J	1300 J	U (2300)	U (2300)	U (2700)
Phenanthrene	74000	190000	7600	2200 J	7100	6300	740 J	410 J	700 J
Anthracene	16000	38000	2100 J	580 J	2500	1300 J	260 J	130 J	190 J
Fluoranthene	78000	190000	19000	7200	28000	12000	3700	1600 J	1900 J
Pyrene	27000	100000	10000	4600	15000	6400	2100 J	1100 J	970 J
Benzo(a)anthracene	21000	64000	7900	2900	12000	4900	1400 J	630 J	790 J
Chrysene	16000	42000	6300	2500	9600	3700	1100 J	500 J	600 J
Benzo(k)fluoranthene	9000	22000	3800	920 J	4700	1800 J	470 J	U (2300)	U (2700)
Benzo(a)pyrene	16000	49000	7700	3000	10000	4500	1400 J	700 J	710 J
Indeno(1,2,3-cd)pyrene	9200	26000	4500	2100 J	6600	2400 J	920 J	U (2300)	U (2700)
Dibenzo(a,h)anthracene	2700	7000	U (2600)	680 J	2000 J	U (2600)	U (2300)	U (2300)	U (2700)
Benzo(g,h,i)perylene	11000	28000	5200	2400 J	7600	2600	1000 J	U (2300)	U (2700)
Total PAHs	518900	1490000	87920	35760	125140	57180	15150	6090	6640

1 NJ DEP 1998
ug/kg = micrograms per kilogram
U = not detected at indicated value
J = estimated value

Table 13. Pesticides and Polychlorinated Biphenyls Detected in Sediment
for Which a New Jersey Estuarine and Marine Sediment Screening Guideline[1] Exists
Quanta Resources Site
Edgewater, New Jersey
August 2000

Values reported as ug/kg; shaded values are in excess of the effects range - low guideline

Compound	Location								
	1	1 (Duplicate)	2	2 (Subsurface)	3	4	4 (Subsurface)	5	6
4, 4' -DDT	28	24	U (8.4)	5.8 J	U (8.1)	4.3 J	U (7.7)	U (7.7)	U (8.9)
gamma-Chlordane	79	72	12	31	33	34	26	24	U (4.6)

1 NJ DEP 1998
ug/kg = micrograms per kilogram
U = not detected at indicated value
J = estimated value

Table 14. Target Analyte List Metals Detected in Sediment
for Which a New Jersey Estuarine and Marine Sediment Screening Guideline[1] Exists
Quanta Resources Site
Edgewater, New Jersey
August 2000

Values reported as mg/kg; shaded values are in excess of the effects range - low guideline

Metal	Location								
	1	1 (Dup)	2	2 (Subsurface)	3	4	4 (Subsurface)	5	6
Arsenic	17.2	19.3	13.3	18.2	15.6	14.1	16.9	12.8	13.9
Cadmium	0.45	0.82	0.57	0.86	0.63	0.38	0.64	0.46	0.36
Chromium	80.3	84.7	69.9	83.6	68.9	71.8	80.3	68.1	74.6
Copper	101	115	90.6	109	94.1	91.5	103	83.3	89.8
Lead	113	116	95.6	118	103	98.2	111	90.8	98.1
Mercury	1.7	1.8	1.5	1.7	1.9	1.4	1.8	1.5	1.4
Nickel	33.7	34.4	32.9	37.8	35.9	34	35.9	30.9	33.7
Silver	4.0	4.7	3.3	4.0	3.2	3.4	3.9	3.2	3.3
Zinc	214	237	198	240	213	201	219	185	202

1 NJ DEP 1998
mg/kg = milligrams per kilogram
U = not detected at indicated value
J = estimated value

Table 15. Target Analyte List Metals Detected in Sediment
for Which a New Jersey Estuarine and Marine Sediment Screening Guideline[1] Exists
Quanta Resources Site
Edgewater, New Jersey
August 2000

Values reported as mg/kg; shaded values are in excess of the effects range - medium guideline

Metal	Location								
	1	1 (Dup)	2	2 (Subsurface)	3	4	4 (Subsurface)	5	6
Arsenic	17.2	19.3	13.3	18.2	15.6	14.1	16.9	12.8	13.9
Cadmium	0.45	0.82	0.57	0.86	0.63	0.38	0.64	0.46	0.36
Chromium	80.3	84.7	69.9	83.6	68.9	71.8	80.3	68.1	74.6
Copper	101	115	90.6	109	94.1	91.5	103	83.3	89.8
Lead	113	116	95.6	118	103	98.2	111	90.8	98.1
Mercury	1.7	1.8	1.5	1.7	1.9	1.4	1.8	1.5	1.4
Nickel	33.7	34.4	32.9	37.8	35.9	34	35.9	30.9	33.7
Silver	4.0	4.7	3.3	4.0	3.2	3.4	3.9	3.2	3.3
Zinc	214	237	198	240	213	201	219	185	202

1 NJ DEP 1998
mg/kg = milligrams per kilogram
U = not detected at indicated value
J = estimated value

Table 16. *L. plumulosus* and *M. beryllina* Toxicity Test Results
Quanta Resources Site
Edgewater, New Jersey
August 2000

	L. plumulosus			*M. beryllina*	
	% Survival	Mean Growth (weight) mg	% Reburial	% Survival	Mean Growth (weight) mg
Control (water)	NA	NA	NA	98	1.92
Control (sediment)	99	0.900	100	98	1.84
Location 1 (1% site sediment)	100	0.838*	100	NA	NA
Location 1 (10% site sediment)	83*	0.672*	100	NA	NA
Location 1 (50% site sediment)	2*	0.475*	NI	NA	NA
Location 1 (100% site sediment	1*	0.400*	NI	0*	NM
Location 2 surface	98	0.724*	99	100	1.99
Location 2 sub-surface	94	0.507*	66*	100	1.80
Location 3	69*	0.550*	28*	92	1.88
Location 4 surface	96	0.679*	100	90	1.84
Location 4 sub-surface	98	0.545*	100	100	1.60*
Location 5	99	0.635*	100	94	1.75
Location 6	98	0.692*	99	100	1.72

mg - milligrams
* Significantly different when compared to laboratory control
NA - not applicable
NM - organisms not measured (0% survival)
NI - not included in statistical analysis because of significant mortality

Table 17. Results of the Benthic Macroinvertebrate Survey
and Indices Calculated
Quanta Resources Site
Edgewater, New Jersey
August 2000

Phylum	Class	Sub-class	Order	Family	Genus species	Locations					
						1	2	3	4	5	6
Nematoda						2	1	1	0	0	0
Nemertinea						0	0	0	3	13	2
Annelida	Oligochaeta					152	1162	786	1307	249	126
	Polychaeta			Ampharetidae	*Asabellides oculata*	9	0	4	4	0	1
				Capitellidae		0	18	0	6	2	7
				Nereidae	*Neanthes succinea*	0	3	1	1	13	6
				Orbinidae	*Leitoscoloplos sp.*	0	2	0	2	1	0
				Phyllodocidae	*Eteone heteropoda*	1	14	10	23	6	2
				Spionidae	*Polydora ligni*	1	0	0	0	0	0
					Scolecolepides viridis	0	1	0	0	4	0
					Streblospio benedicti	2	52	49	34	4	1
Arthropoda		Copepoda				7	2	3	3	4	2
			Amphipoda	Gammaridea		0	0	0	1	1	0
			Isopoda		*Cyathura polita*	0	0	0	0	4	4
Molluska	Bivalvia			Tellinidae	*Macoma balthica*	1	0	2	0	4	3
					Telina agilis	1	1	0	4	1	1
Total Taxa not including Nematodes and Copepods						7	8	6	10	12	10
Total Individuals not including Nematodes and Copepods						167	1253	852	1385	302	153
Shannon Diversity not including Nematodes and Copepods						0.419	0.349	0.338	0.304	0.827	0.812
Evenness not including Nematodes and Copepods						0.060	0.044	0.056	0.030	0.069	0.081

APPENDIX A
Site Photographs
Quanta Resources Site
Edgewater, NJ
August 2000

Photo 1. Sample Location 1 with benthic macroinvertebrate sampling cores in sediment. Product accompanied with a heavy sheen was present throughout the general area.

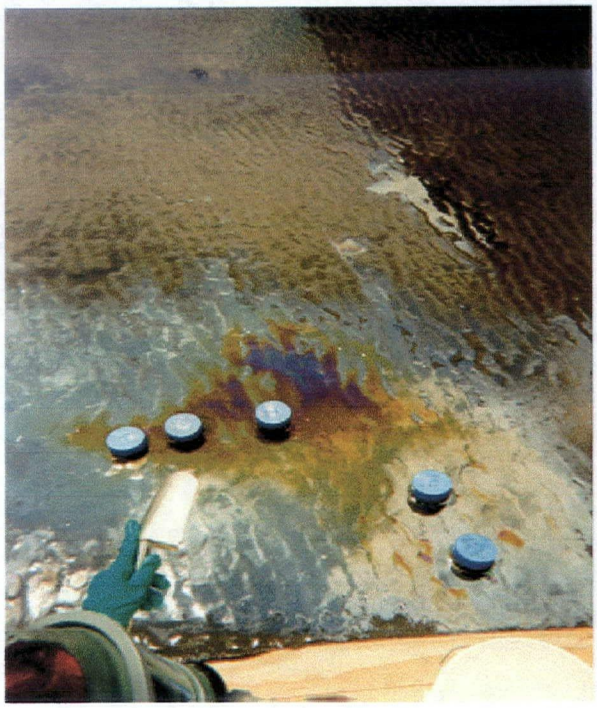


Photo 2. Sample Location 2 with benthic macroinvertebrate sampling cores in sediment.

Photo 3. Sample Location 3 with benthic macroinvertebrate sampling cores in sediment. Similar to Location 1, a heavy sheen and product were present throughout the general area.

Photo 4. Sample Location 4 with benthic macroinvertebrate sampling cores in sediment.

Photo 5. Sample Location 5 with benthic macroinvertebrate sampling cores in sediment prior to be being capped. The boom can be seen in the background.

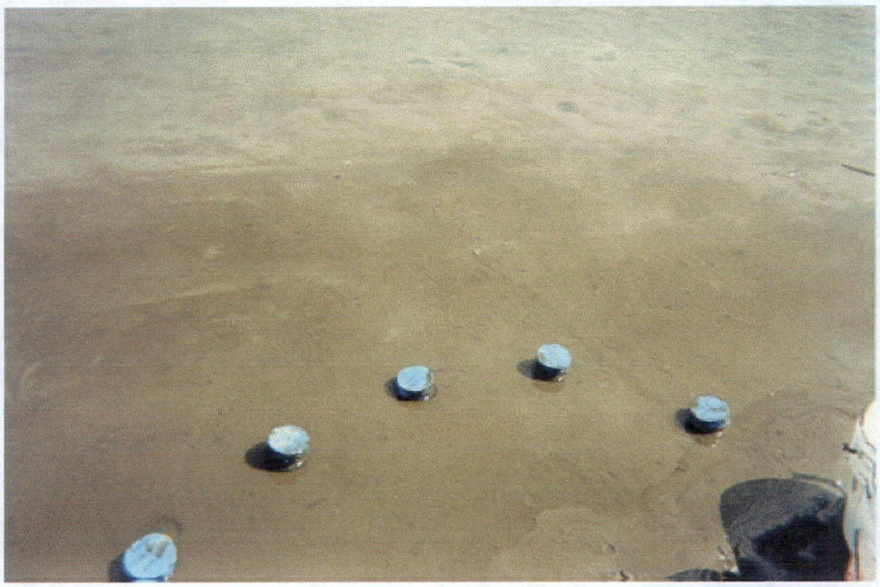


Photo 6. Sample Location 6 with benthic macroinvertebrate sampling cores in sediment.

Photo 7. Field team member collecting sediment and benthic macroinvertebrates at sample Location 6. Representative samples were collected on the eastern (readers right) side of the boom.

Photo 8. Field team member taking Global Postioning System (GPS) readings at sample Location 2/2 sub-surface. In the background, an additional team is collecting sediment from Location 5.

Photo 9. Sheens were observed throughout the study area during low tide.

Photo 10. Heavy sheens, and product were observed at several locations within close proximity to the bulkhead.

Photo 11. Field team member collecting sediment at Location 2/2 sub-surface. Sediment was placed directly into a stainless steel tub (above), and homogenized prior to being placed in jars.

Photo 12. Due to the physical nature of the sediment, a sampling platform was constructed to access sample locations, and was used as safety precaution for field team members. Sheens can be observed in the foreground.

Photo 13. Study area during high tide after field work was completed showing the bulkhead (foreground) and boom (background).

APPENDIX B
Final Toxicity Test Reports
Quanta Resources Site
Edgewater, NJ
August 2000

TOXIKON

Dan Cooke
Lockheed Martin
Environmental Services REAC
2890 Woodbridge Ave, Building 209
Edison, NJ 08837-3679

August 1, 2000

Dear Dan:

Enclosed are the revised copies of the *Menidia* and *Leptocheirus* reports. As per your letter on July 11, the following revisions have been made.

1. The "statement of truth and accuracy" was integrated into each report.

2. The SRT information for the *Menidia* test was addressed in greater detail thus explaining the need to run a second SRT with the same lot of testing animals as the 7-day study.

3. The slight temperature deviation from the targeted range of 20 +/- 1 °C was addressed and explained in the text of each report.

4. And finally, a header was added to page 11 of the *Leptocheirus* report. Additionally, the animal receipt log for the amphipods is correct in that the animals used for culturing the specific lot used in the test was harvested from this parent group of animals acquired in 1997.

If you have any further questions or concerns, please feel free to contact me at your convenience.

Sincerely,

Scott A. Glover

Scott A. Glover
Senior Aquatic Toxicologist

106 Coastal Way, Jupiter, FL 33477, TEL (561) 575-2477 FAX (561) 575-2497

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

Scott Glover
Toxikon Corporation
106 Coastal Way
Jupiter, Florida 33477

July 11, 2000

Dear Scott,

Enclosed are your original raw data sheets for the Quanta Resources toxicity tests. Please include copies in the final reports, and keep the originals in your files. The comments from my 12 June letter were satisfactorily addressed in the 16 June revised reports. However, after reviewing the raw data, I have a few other concerns.

1. The "statement of truth and accuracy" should be integrated into each report, following the title page.

2. The test protocol required concurrent standard reference toxicant (SRT) testing, initiated on the same day, with the same batch of test organisms. The *Menidia* assay was initiated on 10 May, but the SRT wasn't initiated until 14 May. In addition, the SRT test fell outside (>2 standard deviations from the mean) of the laboratory's established control chart. Another SRT test was initiated on 18 May (the day after Quanta testing was completed). Though it fell within the laboratory control chart, it was initiated with a new batch of organisms, and therefore was not relevant to the Quanta assays.

The test protocol listed test acceptability criteria, stating that the concurrent SRT must fall within the laboratory established control chart. Please explain the delay in SRT initiation, and provide justification for Lockheed Martin to accept this data.

3. The protocols for both tests required temperatures of 20 ± 1°C. However, both tests were performed at less than 19°C (even after including the temperature correction factors listed on your data sheets). Please note this in the final report, and explain.

4. The *Leptocheirus* report does not have a header on page 11, and the animal receipt log is from 1997.

Please process final reports at your earliest convenience. If you have questions, call me at (732) 321-4202. I can also be reached at daniel.w.cooke@lmco.com.

Sincerely,

Daniel Cooke
Senior Aquatic Toxicologist

c: G. Molnar
J. Johnson

WA# R1A00133

CERTIFIED COPY
8-01-00
DATE
SG
INITIALS

14-DAY ACUTE FLOW THROUGH SEDIMENT BIOASSAY UTILIZING SEDIMENT COLLECTED FROM THE QUANTA RESOURCES SITE ON THE AMPHIPOD, *Leptocheirus plumulosus*

Prepared for:

Lockheed Martin Technology Services Group
Environmental Services Group REAC
2890 Woodbridge Avenue, Building 209 Annex
Edison, NJ 08837-3679

Prepared by:

Toxikon Corporation
106 Coastal Way
Jupiter, Florida 33477

Project No. 0005012

Authors: Scott A. Glover, B.A.
Walter Ellenberg, Ph. D.

June 2000

STATEMENT OF TRUTH AND ACCURACY

Title: **14-Day Acute Flow Through Sediment Bioassay Utilizing Sediment Collected From The Quanta Resources Site On The Amphipod,** ***Leptocheirus plumulosus***

In signing this statement, I certify that to the best of my knowledge, the information contained in the attached report and data pack is true and accurately reflects the work performed by Toxikon Corporation.

Walt J Ellenberg 7-31-00

Walter J. Ellenberg, Ph.D. Date
Manager of Aquatic Toxicology
Toxikon Corporation

Jill Schwab 07-31-00

Jill Schwab Date
Quality Assurance Officer
Toxikon Corporation

CERTIFIED COPY

SG 7-31-00

INITIALS DATE

1.0 INTRODUCTION

A 14-day flow through sediment bioassay test was conducted at Toxikon Corporation, Jupiter, Florida, to determine the toxicity of sediment samples collected from the Quanta Resources site. Toxicity determinations were conducted using 14-day exposures of the amphipod, *Leptocheirus plumulosus*, to sediments. Seven of the eight testing sediments were tested as screen (100 % site sediment) tests. One of the testing sediments, Loc 1 (Sed B) was tested at definitive testing concentrations of 1.0, 10, 50, and 100 % site sediment. The criterion for effect in the amphipod test was survival, growth via dry weight, and reburial.

2.0 MATERIALS AND METHODS

2.1 Test Sediments

Lockheed Martin collected the testing sediment samples on May 02, 2000 from the Quanta Resources site. Chain-of-custody documentation was included with the testing sediment samples and all custody seals were intact upon arrival at the laboratory. Sediment log-in records can be found in Appendix A. All sediment samples utilized in the 14-day test are described below.

Sample ID	Salinity (‰)	Sediment Type	Sediment Color	Arrival Temp. (°C)	Ammonia (mg/kg)
Loc 2 sub (Sed A)	10	Silt	Black	10.3	89
Loc 1 (Sed B)	10	Silt	Black	11.4	170
Loc 3 (Sed C)	10	Silt	Black	10.4	92
Loc 2 (Sed D)	8	Silt	Black	9.6	84
Loc 6 (Sed E)	8	Silt	Black	11.0	48
Loc 5 (Sed F)	8	Silt	Black	11.9	33
Loc 4 (Sed G)	8	Silt	Black	9.4	37
Loc 4 sub (Sed H)	10	Silt	Black/Brown	9.6	43

Federal Express delivered the sediments to the Toxikon Jupiter facility on May 04, 2000. Sediment samples were logged in and immediately stored in a Baxter Cryofridge set to maintain a target temperature of 4°C. Sediment samples were received in plastic 2-gallon buckets; one per sample site. The sediment from each location was homogenized and large debris, such as rocks and shells, were removed from each sediment sample prior to testing.

2.11 Control Sediment

Chris McManis of Eastern Aquatic BioSupply (Middletown, RI) collected the control sediment used for the 14-day acute test on May 05, 2000. The sediment was received in six 1-gallon plastic buckets. The control sediment was logged in and stored in the same cooling unit as the testing sediments. Prior to test initiation the control sediment was wet sieved through a successive series of stainless steel mesh sieves (sizes 1.0, 0.5, and 0.25- mm). The sediment passing through the 0.25-mm sieve was used as the control sediment. The sediment was allowed to settle for approximately 24 hours prior to adjusting the salinity to 10 parts per thousand (‰) with dilution water designated for use in the test. A sample of the control sediment was collected and sent to Lockheed Martin for analysis of contaminants of concern (PAH's and coal tar).

2.2 Test Organisms

2.2.1 *Leptocheirus plumulosus*

The burrowing amphipod, *L. plumulosus*, was used as the testing animal for the 14-day acute sediment bioassay. The test animals were collected from in-house cultures reared at the Toxikon aquaculture facility. The animal cultures are identified and monitored by the lab aquaculturist, Matthew Bolt. The *Leptocheirus* cultures are maintained in the laboratory at a salinity of 20 ‰, a photoperiod of 16 hours light and 8 hours darkness, and a temperature of 20 +/- 2 °C. The animals were acclimated to testing parameters for a period of 15 days prior to test initiation. Cultured animals were maintained on a diet of GORP (a slurry composed of 48 % TetraMin®, 24 % dehydrated cereal leaves, 24 % Alfalfa, and 4 % Neonovum) during the holding period. No diseases/treatments were observed and/or required during this period. The animals appeared to be in good health at test initiation. Data for animal holding can be found in Appendix C.

According to the ASTM guideline, the required size range for the test animal population ranges from 3 to 5 mm (measured along the dorsal surface from the base of the first antenna to the end of the third pleon) and is composed of immature, mixed-sex animals. Animals from the *Leptocheirus* cultures were sorted by gently sieving the animals through two stainless steel sieves of different mesh size. Animals were successively passed through a 1.0-mm mesh sieve and a 0.710-mm sieve. The animals that were retained on the 0.710-mm sieve (>2000 animals) were collected and used as the test population.

A total of 20 amphipods were culled from the test animal population and measured to ensure that they met the proper size range required for testing. A Wild M3C dissecting scope coupled with a calibrated ocular micrometer was used to determine the mean length of the 20 culled animals. The mean length calculated to be 3.6 mm with a range of 2.5 to 4.6 mm (see Appendix B). This mean length is within the defined ASTM size range of 3-5 mm. Several mature males and gravid females were observed in the test animal population and were not used to initiate the test. Following isolation, the testing animal population was maintained in the dilution water until test initiation.

A 96-hour, water-only, reference toxicity test was initiated with the same lot of testing animals as the 14-day acute test in order to evaluate the health of the test organisms. The animals were exposed to the reference toxicant cadmium chloride (Sigma Lot No. 17H3734). The results of this test indicated that the control animal survival was acceptable, yielding 0 % mortality. Five concentrations (0.32, 0.63, 1.25, 2.5, and 5.0 mg Cd/L) were used as the reference test treatments. Treatment 1 yielded 0 % mortality while treatments 2, 3 and 4 yielded mortalities of 5, 35, and 80 %, respectively. Treatment 5 yielded 100 % mortality. A 96-hour LC_{50} (the toxicant concentration that is lethal to 50 % of the testing population) was calculated to be 1.5 mg Cd/L. This concentration is an acceptable indicator of the health of the testing organisms according to the ASTM guideline as well as past data generated at Toxikon Corporation (Jupiter Facility) for this species. Reference toxicity raw data and laboratory control charts for *L. plumulosus* can be found in Appendix C.

2.3 Dilution Water

The overlying test water utilized in this study was obtained directly from the laboratory's salt water well. This water was passed through a 5.0 µm string wound Omni Filter (Omni Corporation, Hammond, IN) and the salinity was adjusted with laboratory freshwater to 10 ‰. A current analysis of these two waters can be found in Appendix D. All dilution water was vigorously aerated prior to use in the bioassay study.

2.4 Test Methods

Methods for the sediment bioassay test of *L. plumulosus* followed those outlined in the Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods; 1999 Annual Book of ASTM Standards Section 11, Volume 11.05, E 1367-99.

A preliminary 96-hour range-finding test was initiated with two of the Quanta Resource's site sediments to establish potential definitive testing concentrations. Sed A (Loc 1 Sub) and Sed B (Loc 1) were tested at site sediment concentrations of 0.1, 1.0, 10, and 100 %. The site sediment was diluted with laboratory control sediment by weight to achieve the testing concentrations. One replicate was used for each of the testing concentrations and a total of 10 amphipods was initiated to each test chamber. Sed A (Loc 1 Sub) produced a 70 % testing animal survival and 100 % reburial at the highest testing concentration or 100 % site sediment. In comparison, the Sed B (Loc 1) 100 % treatment produced a 50 % survival and 0 % reburial with the living animals inactive and lying on surface of the sediment. An LC_{50} was incalculable due to the absence of greater than 50 % mortality in any test treatment. On May 11, Lockheed Martin was contacted with the results of the range-finding tests, and to confirm the use of site sediment concentrations of 1.0, 10, 50, and 100 % for the Sed B (Loc 1) site and to initiate the Sed A (Loc 1 Sub)

site as a screen test along with the remaining six testing sediments. All range-finding test observations were recorded in the study log data sheets, which can be found in Appendix B.

The definitive test was initiated on May 15 (Day –1) by adding approximately 2 centimeters (cm) of sediment to one of the replicate chambers for the control and test sediments, respectively. The weight of the first replicate was measured and recorded in the study log for each sediment, including the control. The remaining replicate chambers were filled with the respective sediments by weight. This technique of sediment addition is more accurate as compared to depth. A total of eight replicate chambers were prepared for each test sediment and control.

Following the addition of the sediment to the test chambers, dilution water (10 ‰) was added to each 1-L glass test chamber to a pre-marked 1000-mL total volume (approximately 800 mL of overlying water in each test chamber). All test chambers were placed into a recirculating waterbath set to maintain a target temperature range of 20 ± 1°C. The replicates were positioned on a plastic grid in the waterbath to allow ample water flow around each chamber for temperature regulation.

In order to determine the levels of total ammonia associated with each test sediment, samples of the overlying water were collected for analysis. Overlying water samples were collected as a composite of the replicate test chambers for each sediment immediately prior to animal addition on Day 0 and on Days 7 and 14 of the test. The results of the ammonia analysis are located in Table 4. Additionally, total organic carbon (TOC) and total volatile solid (TVS) samples for each respective test sediment were analyzed. The results for these analyses are located in Table 5.

Test animals were added to each test chamber on May 16 (Day 0). Twenty test organisms were added to each test chamber for a total of 160 organisms per test and control sediments (8 replicate test chambers per site). The animals in each replicate test chamber were not fed during the entirety of the 14-day exposure. Overhead illumination was provided by fluorescent lights set to maintain a 16/8 hour (light/dark) photoperiod.

Throughout the study, observations of mortality and sublethal effects were collected daily. Water quality (dissolved oxygen, pH, and temperature) was collected on Day 0 of the test from each test chamber. Additionally, the salinity was collected on Day 0 from one replicate test chamber for each testing sediment and control. Daily dissolved oxygen and pH data were collected on each replicate test chamber for each testing sediment and control. A minimum/maximum temperature logger was used to monitor the temperature of the waterbath. The thermometer sensor was positioned in a dummy test chamber to record the diurnal temperature of the waterbath system. Final observations of the test organisms were recorded on Day 14.

A flow-through system was used to renew the overlying water to each replicate test chamber. The flow through system was calibrated to deliver a minimum of two volume turnovers per test chamber per day (2 X 800 mL = 1600 mL). The actual calculated turnover rate was 2.2 volume additions per test chamber per day. Water quality (pH, dissolved oxygen, salinity, and temperature) of the renewal water was collected daily. The dilution water was continually aerated prior to each renewal event.

2.5 Statistical Analysis

Statistical analyses were conducted following the decision tree for analysis of survival, growth (via dry weight), and reburial data utilizing the statistical program Toxcalc, Version 5.0. The survival data was transformed using the one-tailed arcsine-square root transformation. Statistical comparison of each testing sediment sample was made to the control tested concurrently with the testing sediments. The statistical comparison for survival data used in this study included Kolmogorov D Test for normal distribution, and Wilcoxon Rank Sum Test for significant differences. A Trimmed Spearman-Karber Method was used to calculate the 14-day LC_{50} value and its confidence limits for the definitive test run on Sed B (Loc 1).

The growth endpoint of the test examined the comparison of the dry weight of the control replicates as compared to the eight testing sediments. The statistical comparison for growth data used in this study included, Kolmogorov D Test for normal distribution, Bartlett's test for equality of variances, and Dunnett's Test for significant differences.

The reburial endpoint of the test examined the ability of the control animals to rebury in clean control sediment as compared to the reburial ability of the animals exposed to each testing sediment. The statistical comparison for reburial data used in this study included, Kolmogorov D Test for normal distribution, and Steel's Many-One Rank Test for significant differences.

It should be noted that testing sediment Sed B (Loc 1) 50% and 100 % concentrations were not included in the analyses of growth and reburial data because the significant mortality of these concentrations reduced the number of replicates to less than the minimum of three required for statistical comparisons against the control replicates.

3.0 RESULTS AND DISCUSSION

Survival of *L. plumulosus* in the control sediment and each test sediment replicate are provided in Table 1. Amphipod survival in the control sediment replicates was 99 %. The eight testing sediments (Sed A through Sed H) yielded between 1 and 100 % survival. Testing sites Sed C (Loc 3) and Sed A (Loc 1) 10, 50, and 100 % concentrations were the only two site sediments that produced statistically significant differences in animal survival as compared to the control animal survival. The remaining six testing sediments had no statistically significant

difference in survival when compared to the control replicates. The estimated 14-day LC_{50} value for the definitive test conducted on Sed B (Loc 1) calculated to be 16.7 % with confidence limits of 14.8 to 18.8 %.

The growth portion of the experiment compared the dry weight of the animals exposed to the control sediment to the dry weight of the animals exposed to each of the eight testing sediments. Dry weight data for each replicate test chamber can be found in Table 2. Each of the eight testing sediments utilized in this study produced a statistically significant difference in dry weight when compared to the dry weight of the control animals.

The reburial endpoint of the test examined the ability of the control animals to rebury in clean control sediment as compared to the ability of the animals to rebury that were exposed to each testing sediment. Testing animals were allowed a maximum of five minutes to rebury into the fresh control sediment. The animals collected from the control replicates as well as the animals exposed to testing sediments Sed F (Loc 5), Sed G (Loc 4), Sed H (Loc 4 Sub), and Sed B (Loc 1) 1 % and 10 % dilutions, produced 100 % reburial. Animals exposed to testing sediments Sed D (Loc 2) and Sed E (Loc 6) produced 99 % reburial. The only statistically significant difference in reburial when compared to the control animals was in Sed A (Loc 2 Sub) and Sed C (Loc 3) sites which yielded 66 % and 28 % reburial, respectively. Results for animal reburial in each replicate test chamber can be found in Table 6.

Water quality measurement ranges are provided in Table 3. All replicate measurements are provided in the raw data sheets in Appendix B. The overlying water temperatures were collected from each replicate test chamber on Day 0 of the test. No deviations from the targeted range of 20 $\pm$ 1°C (actual temperatures ranged from 19.0 to 20.5°C) occurred on this day. The daily diurnal temperature of the water bath unit, as collected with a Radio Shack Digital min/max thermometer, had an adjusted range of 18.1 to 19.1°C. This temperature deviation of –0.9°C was gradual and should not have effected the test results. The "dummy" test chamber used for the min/max thermometer readings was placed at the head end of the water table, which is generally cooler due to its closer proximity to the entry point of the prechilled water. This would account for the slightly lower temperatures (< 1 °C) recorded by the min/max thermometer from the targeted temperature of 20 $\pm$ 1 °C.

Dissolved oxygen (DO) concentrations in all test chambers remained above 60 % saturation for the duration of the 14-day study except for two minor excursions. On Day 1, Sed H replicate H had a DO saturation of 37 % or 3.1 mg/L at 10 ‰ and a temperature of 20.6 °C. Upon further investigation, it was observed that the dilution water renewal line had become clogged. The line was immediately replaced and the saturation level increased to an acceptable level. On Day 4 of the test, control replicate E had a DO saturation of 54 % or 4.6 mg/L at 10 ‰ and a temperature of 19.1 °C. It was observed that the dilution water renewal line had fallen out of the test chamber. The line was immediately replaced and the saturation level increased to an acceptable level. These two minor excursions in DO saturation levels should not have affected the results of the test.

The salinities of the test replicates remained at 10 ‰ for the entirety of the study. The pH of the control and testing sediments ranged between 7.1 and 8.2 for the duration of the 14-day test. The total alkalinity of the dilution water was collected on Day 0 and yielded a concentration of 86 mg/L as $CaCO_3$. Overlying water ammonia samples were collected on Days 0, 7, and 14 of the test. Total ammonia concentrations of the overlying water ranged between 0.16 to 1.4 mg/L on the initial day of the test (Table 3). Day 7 ammonia samples ranged between no detection (detection limit of 0.05 mg/L) to 0.40 mg/L. And Day 14 ammonia samples ranged between no detection to 0.22 mg/L. According to the USEPA Inland Testing Manual, ammonia concentrations less than 60 mg/L are acceptable in *Leptocheirus* studies to avoid its consideration as a contaminant (EPA-823-B-98-004; 1998). All raw data collected during the 14-day amphipod test can be found in Appendix B.

The toxicity test was concluded on May 30 (Day 14). The contents of each test chamber were wet sieved through a 0.5-mm stainless steel sieve to catch, collect, and record the number of surviving animals. Each of the live animals was then carefully transferred into a plastic container holding approximately 1-cm of clean control sediment with dilution water. All living animals from each replicate were allowed a maximum of five minutes to rebury into the clean sediment. Observations on animal reburial for each replicate were recorded in the study log. After the reburial observations, the animals from each replicate were resieved (0.5-mm sieve), rinsed with laboratory grade deionized water, transferred into a tared aluminum weigh boat, and place into a drying oven set at 60 °C. The animals were allowed to dry overnight and were then placed into a dessicator to cool before recording of the final dry weights.

In summation, the Quanta Resources site sediments that produced a toxic effect in survival to the testing amphipod, *Leptocheirus plumulosus*, were Sed C (Loc 3) and Sed B (Loc 1) 10, 50, and 100 %. The estimated LC_{50} values for the definitive test conducted on Sed B (Loc 1) calculated to be 16.7 % with confidence limits of 14.8 to 18.8 %. Additionally, each of the eight testing sediments utilized in this study produced a statistically significant sublethal effect in growth via dry weight when compared to the control animals' dry weight. The reburial endpoint of the experiment indicated that testing sediments Sed A (Loc 2 Sub) and Sed C (Loc 3) produced significant differences in ability to rebury when compared to the control replicates.

REFERENCES

1999 Annual Book of ASTM Standards Section 11, Volume 11.05: Standard Guideline for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods, E 1367-99.

EPA/USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.-Testing Manual. EPA-823-B-98-004, Washington, D.C.

Table 1. Survival of *Leptocheirus plumulosus* During a 14-Day Exposure to Sediment Samples Collected from the Quanta Resources Site

	Number Alive* (mean % Survival)								
Sample ID [a]	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	
Control Sediment	20	20	19	20	20	20	20	20	(99)
Sed A (Loc 2 Sub)	19	19	19	19	16	20	20	19	(94)
Sed C (Loc 3)[b]	16	12	16	17	11	17	10	11	(69)
Sed D (Loc 2)	20	19	20	20	20	17	20	20	(98)
Sed E (Loc 6)	20	20	20	20	19	20	20	18	(98)
Sed F (Loc 5)	20	20	20	20	18	20	20	20	(99)
Sed G (Loc 4)	20	20	20	20	20	19	15	19	(96)
Sed H (Loc 4 Sub)	20	19	19	20	20	19	20	20	(98)
Sed B (Loc 1) 1%	20	20	20	20	20	20	20	20	(100)
Sed B (Loc 1) 10%[b]	18	18	16	17	18	17	18	11	(83)
Sed B (Loc 1) 50%[b]	0	0	0	0	1	2	0	0	(2)
Sed B (Loc 1) 100%[b]	1	0	0	0	0	0	0	0	(1)

* Animals that were not found during test termination were considered dead.

[a] Initial animal density for each replicate was 20 animals.

[b] Note that these testing sediments produced a statistically significant difference in survival when compared to the survival of the control animals.

Table 2. Growth of *Leptocheirus plumulosus* During a 14-Day Exposure to Sediment Samples Collected from the Quanta Resources Site

	Growth via Dry Weight, mg/animal (mean dry weight)								
Sample ID	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	
Control Sediment	0.890	0.875	0.947	0.915	0.925	0.845	0.930	0.870	(0.900)
Sed A (Loc 2 Sub)[a]	0.500	0.500	0.505	0.489	0.488	0.490	0.530	0.553	(0.507)
Sed C (Loc 3)[a]	0.581	0.533	0.581	0.535	0.491	0.594	0.620	0.464	(0.550)
Sed D (Loc 2)[a]	0.720	0.753	0.720	0.685	0.680	0.753	0.758	0.720	(0.724)
Sed E (Loc 6)[a]	0.725	0.700	0.745	0.610	0.763	0.560	0.690	0.744	(0.692)
Sed F (Loc 5)[a]	0.630	0.575	0.675	0.630	0.600	0.630	0.640	0.700	(0.635)
Sed G (Loc 4)[a]	0.635	0.665	0.745	0.655	0.650	0.742	0.653	0.689	(0.679)
Sed H (Loc 4 Sub)[a]	0.550	0.605	0.558	0.515	0.560	0.574	0.505	0.495	(0.545)
Sed B (Loc 1) 1%[a]	0.790	0.840	0.875	0.770	0.890	0.855	0.795	0.885	(0.838)
Sed B (Loc 1) 10%[a]	0.650	0.661	0.631	0.706	0.661	0.641	0.756	0.673	(0.672)
Sed B (Loc 1) 50%[b]	NA	NA	NA	NA	0.600	0.350	NA	NA	(0.475)
Sed B (Loc 1) 100%[b]	0.400	NA	NA	NA	NA	NA	NA	NA	(0.400)

NA-indicates that this replicate produced 100 % mortality thus no dry weight data is available

[a] Produced a statistically significant difference in dry weight when compared to the control animals dry weight.

[b] Testing sediments that were not included in the dry weight analysis because of significant mortality reduced the number of replicate test chambers to below the minimum of three required for statistical analysis.

Table 3. Water Quality Ranges During a 14-Day Exposure of *Leptocheirus plumulosus* to Sediment Samples Collected from the Quanta Resources Site

ID	Temperature* (°C)	pH	DO (mg/L)	Salinity (‰)
Control Sediment	19.7-20.1	7.1-7.8	4.6-7.6	10
Sed A (Loc 2 Sub)	19.3-20.0	7.1-8.0	5.9-7.4	10
Sed C (Loc 3)	19.0-20.4	7.1-8.0	5.8-7.3	10
Sed D (Loc 2)	19.1-19.9	7.2-8.1	5.6-7.5	10
Sed E (Loc 6)	19.3-20.3	7.2-8.1	5.8-7.2	10
Sed F (Loc 5)	19.2-19.9	7.5-8.1	5.6-7.4	10
Sed G (Loc 4)	19.1-20.2	7.2-8.1	5.8-7.2	10
Sed H (Loc 4 Sub)	19.5-20.4	7.2-8.2	3.1-7.3	10
Sed B (Loc 1) 1%	19.2-20.4	7.2-8.1	6.2-7.5	10
Sed B (Loc 1) 10%	19.5-20.5	7.2-8.1	6.2-7.7	10
Sed B (Loc 1) 50%	19.5-20.2	7.2-8.1	6.3-7.7	10
Sed B (Loc 1) 100%	19.5-19.9	7.2-8.1	6.1-7.4	10

* Temperatures were collected from each replicate test chamber on Day 0 of the test.

Table 4. Total Ammonia Concentrations During a 14-Day Exposure of *Leptocheirus plumulosus* to Collected Sediment Samples Collected from the Quanta Resources Site

Sample ID*	Total Ammonia Concentration (mg/L)		
	Day 0	Day 7	Day 14
Control Sediment	0.32	0.40	0.081
Sed A (Loc 2 Sub)	0.72	0.38	0.061
Sed C (Loc 3)	0.61	0.26	0.063
Sed D (Loc 2)	0.44	0.066	0.058
Sed E (Loc 6)	0.43	ND	ND
Sed F (Loc 5)	0.27	ND	ND
Sed G (Loc 4)	0.34	ND	0.051
Sed H (Loc 4 Sub)	0.59	0.058	ND
Sed B (Loc 1) 1%	0.16	0.12	0.077
Sed B (Loc 1) 10%	0.38	0.15	0.078
Sed B (Loc 1) 50%	0.89	0.20	0.16
Sed B (Loc 1) 100%	1.4	0.26	0.22

*Note that ammonia samples were collected as a composite of the replicate test chambers for each test sediment and the laboratory control sediment.

ND = below the detection limit of 0.050 mg/L

Table 5. Total Organic Carbon and Total Volatile Solid Analyses of Sediment Samples Collected from the Quanta Resources Site

Sample ID*	Total Organic Carbon (mg/kg)	Total Volatile Solids (wt, %)
Sed A (Loc 2 Sub)	15,000	10
Sed C (Loc 3)	17,000	11
Sed D (Loc 2)	11,000	9.7
Sed E (Loc 6)	14,000	8.3
Sed F (Loc 5)	16,000	7.8
Sed G (Loc 4)	16,000	8.7
Sed H (Loc 4 Sub)	15,000	8.4
Sed B (Loc 1)	22,000	13

*Note that both TOC and TVS samples were sampled by Lockheed Martin and accompanied the testing sediment samples to be used in the bioassay testing.

Table 6. Reburial of *Leptocheirus plumulosus* During a 14-Day Exposure to Sediment Samples Collected from the Quanta Resources Site

	Reburial Data, % (mean reburial, %)								
Sample ID	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	
Control Sediment	100	100	100	100	100	100	100	100	(100)
Sed A (Loc 2 Sub)[a]	58	63	100	89	56	65	40	53	(66)
Sed C (Loc 3)[a]	19	25	19	65	18	24	10	45	(28)
Sed D (Loc 2)	100	95	100	100	100	100	100	100	(99)
Sed E (Loc 6)	95	100	100	100	100	100	100	100	(99)
Sed F (Loc 5)	100	100	100	100	100	100	100	100	(100)
Sed G (Loc 4)	100	100	100	100	100	100	100	100	(100)
Sed H (Loc 4 Sub)	100	100	100	100	100	100	100	100	(100)
Sed B (Loc 1) 1%	100	100	100	100	100	100	100	100	(100)
Sed B (Loc 1) 10%	100	100	100	100	100	100	100	100	(100)

[a] Produced a statistically significant difference in reburial when compared to the control animals.

Note that testing sediment Sed B (Loc 1) 50 % and 100% concentrations were not included in the reburial analysis because of significant mortality reduced the number of replicate test chambers to below the minimum of three required for statistical analysis.

Survival

Start Date:	05/10/2000	Test ID:	5012	Sample ID:	Quanta Resources
End Date:	05/17/2000	Lab ID:	TC-Toxikon Corporation Jup	Sample Type:	SED-Sediment
Sample Date:		Protocol:	EPA503/8-91/001 and 600/4	Test Species:	Menidia beryllina
Comments:	Menidia 7-day sediment bioassay				

Conc-%	1	2	3	4	5
Cont.Sed.	1.0000	1.0000	1.0000	1.0000	0.9000
ContWa.Only	1.0000	1.0000	1.0000	0.9000	1.0000
Sed A	1.0000	1.0000	1.0000	1.0000	1.0000
Sed B	0.0000	0.0000	0.0000	0.0000	0.0000
Sed C	0.8000	0.8000	1.0000	1.0000	1.0000
Sed D	1.0000	1.0000	1.0000	1.0000	1.0000
Sed E	1.0000	1.0000	1.0000	1.0000	1.0000
Sed F	1.0000	0.9000	0.9000	0.9000	1.0000
Sed G	0.8000	0.9000	0.9000	1.0000	0.9000
Sed H	1.0000	1.0000	1.0000	1.0000	1.0000

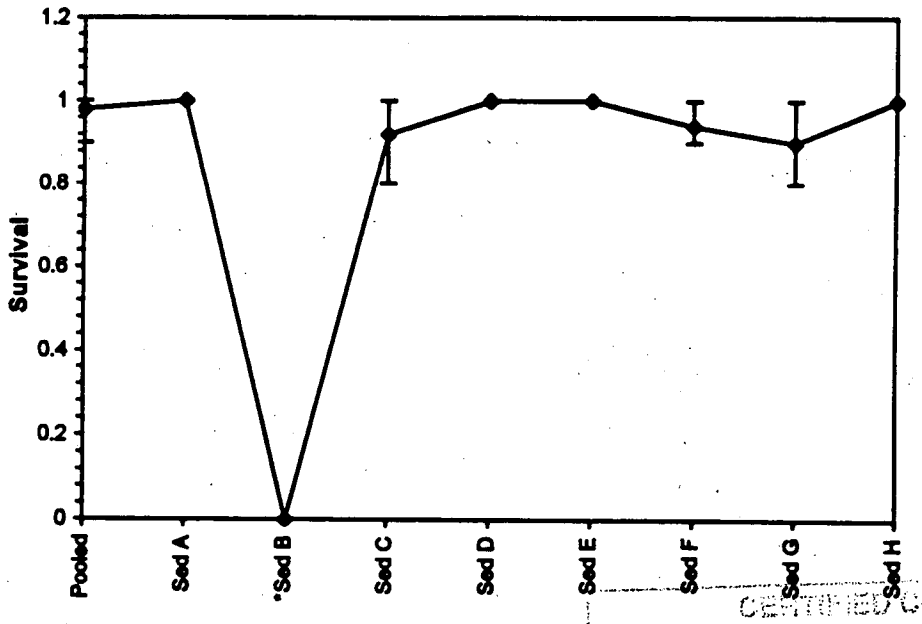
			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Pooled	0.9800	1.0000	1.3794	1.2490	1.4120	4.981	10		
Sed A	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00
*Sed B	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	19.00
Sed C	0.9200	0.9388	1.2929	1.1071	1.4260	13.120	5	37.00	19.00
Sed D	1.0000	1.0204	1.4135	1.4120	1.4195	0.236	5	49.00	19.00
Sed E	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00
Sed F	0.9400	0.9592	1.3142	1.2490	1.4120	6.792	5	30.00	19.00
Sed G	0.9000	0.9184	1.2533	1.1071	1.4120	8.613	5	24.00	19.00
Sed H	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.83614	0.93	-0.5912	1.78558
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 1.00)	0	2.30601		

Hypothesis Test (1-tail, 0.05)

Wilcoxon Rank Sum Test indicates significant differences

Dose-Response Plot



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SG 6-13-00
INITIALS DATE

ToxCalc v5.0

Reviewed by: SG

-Growth

Start Date:	05/10/2000	Test ID:	5012	Sample ID:	Quanta Resources
End Date:	05/17/2000	Lab ID:	TC-Toxikon Corporation Jup	Sample Type:	SED-Sediment
Sample Date:		Protocol:	EPA 503/8-91/001 and 600/	Test Species:	MB-Menidia beryllina
Comments:	Menidia 7-day sediment bioassay (growth)				

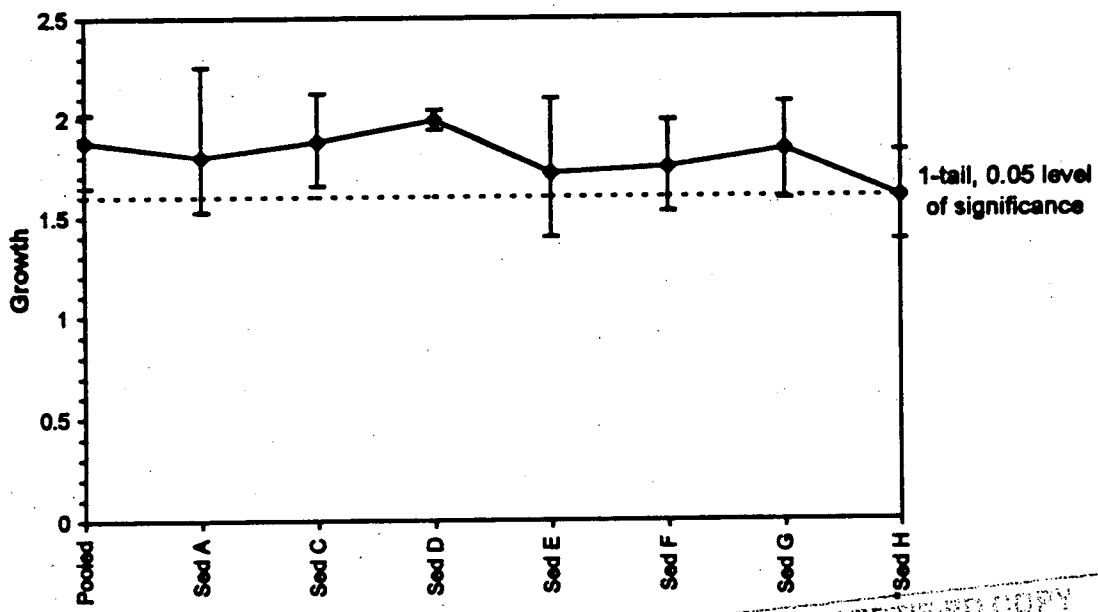
Conc-	1	2	3	4	5
Con. Sed	1.9200	1.6500	1.8200	1.9300	1.8700
ont.Wa.Only	1.9500	2.0000	2.0200	2.0000	1.6500
Sed A	1.7600	1.5300	1.7300	2.2600	1.7400
Sed C	1.7400	2.1300	1.7700	1.6600	2.1200
Sed D	1.9900	1.9900	2.0400	1.9400	2.0000
Sed E	1.9900	1.5000	1.4000	1.6200	2.1000
Sed F	1.6700	1.5300	1.6700	1.9900	1.9000
Sed G	2.0800	1.5900	1.6800	1.8800	1.9800
Sed H	1.8300	1.5300	1.5900	1.3800	1.6600

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Pooled	1.8810	1.0000	1.8810	1.6500	2.0200	7.239	10			
Sed A	1.8040	0.9591	1.8040	1.5300	2.2600	15.041	5	0.707	2.571	0.2800
Sed C	1.8840	1.0016	1.8840	1.6600	2.1300	11.872	5	-0.028	2.571	0.2800
Sed D	1.9920	1.0590	1.9920	1.9400	2.0400	1.789	5	-1.019	2.571	0.2800
Sed E	1.7220	0.9155	1.7220	1.4000	2.1000	17.854	5	1.460	2.571	0.2800
Sed F	1.7520	0.9314	1.7520	1.5300	1.9900	10.727	5	1.185	2.571	0.2800
Sed G	1.8420	0.9793	1.8420	1.5900	2.0800	11.089	5	0.358	2.571	0.2800
*Sed H	1.5980	0.8495	1.5980	1.3800	1.8300	10.372	5	2.599	2.571	0.2800

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96682	0.926	0.38447	-0.2958
Bartlett's Test indicates equal variances (p = 0.05)	14.1089	18.4753		
The control means are not significantly different (p = 0.35)	0.99838	2.30601		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test indicates significant differences	0.28002	0.14887	0.07522	0.03953	0.09698	7, 37

Dose-Response Plot



CERTIFIED COPY
SC 6-13-00
INITIALS DATE

ToxCalc v5.0

Reviewed by: SC

End Date: 05/30/2000 Lab ID: TC-Toxikon Corporation Jup Sample Type: SED-Sediment
Sample Date: Protocol: ASTM 1367 Test Species: LP-Leptocheirus plumulosus
Comments: Lepto. 14-day Reburial

Conc-	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed A	0.5789	0.6316	1.0000	0.8947	0.5625	0.6500	0.4000	0.5263
Sed C	0.1875	0.2500	0.1875	0.6471	0.1818	0.2353	0.1000	0.4545
Sed D	1.0000	0.9474	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed E	0.9500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed Ff	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed G	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed H	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed B 1.0%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sed B 10 %	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

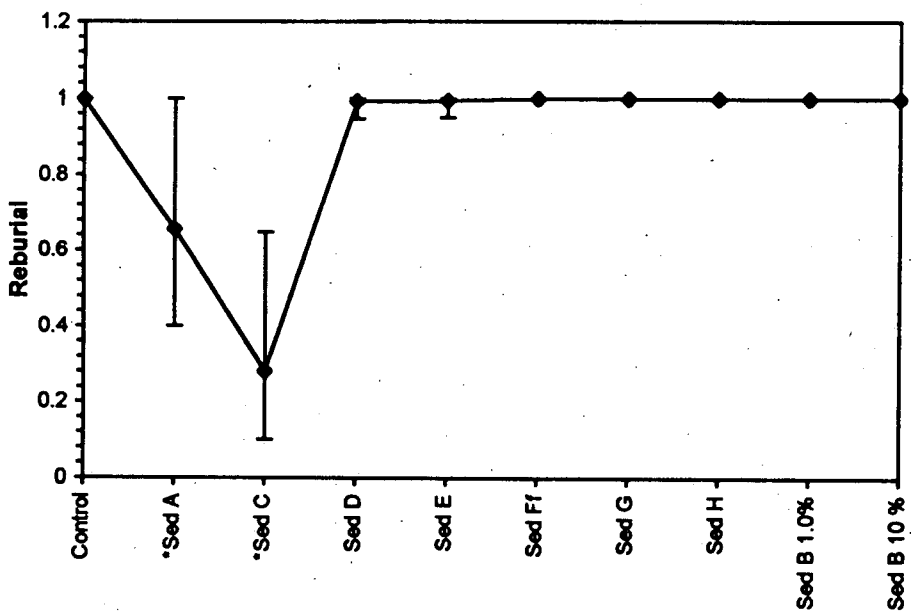
			Transform: Untransformed					Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8		
*Sed A	0.6555	0.6555	0.6555	0.4000	1.0000	30.127	8	40.00	44.00
*Sed C	0.2805	0.2805	0.2805	0.1000	0.6471	64.242	8	36.00	44.00
Sed D	0.9934	0.9934	0.9934	0.9474	1.0000	1.873	8	64.00	44.00
Sed E	0.9938	0.9938	0.9938	0.9500	1.0000	1.779	8	64.00	44.00
Sed Ff	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	68.00	44.00
Sed G	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	68.00	44.00
Sed H	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	68.00	44.00
Sed B 1.0%	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	68.00	44.00
Sed B 10 %	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	68.00	44.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	3.76707	1.035	2.03988	11.0304
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

Steel's Many-One Rank Test indicates significant differences

Dose-Response Plot



 ToxCalc v5.0 Reviewed by: SC

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: May 15,2 TEST NUMBER: 0005012 DURATION: 14 D
TOXICANT : Quanta Resources Sediment
SPECIES: Leptocheirus plumulosu

RAW DATA:

Concentration (%)	Number Exposed	Mortalities
.00	160	1
1.00	160	0
10.00	160	27
50.00	160	157
100.00	160	159

SPEARMAN-KARBER TRIM: .63%

SPEARMAN-KARBER ESTIMATES: LC50: 16.65
95% LOWER CONFIDENCE: 14.78
95% UPPER CONFIDENCE: 18.76

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

APPENDIX A

SEDIMENT RAW DATA

0005012

REAC, Edison, NJ
732 (908) 321-4200
EPA Contract ~~68-C4-0022~~ 69-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
~~REW~~ Lockheed Contact: John Johnson Phone: (732) 321-4200

No: 02079

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	tox test Explosives	tox test M. beryllium		
	A19685	LOC2	SD	5/2/00	1	2gal / 4°C	X	X		
	A19686	LOC3	SD	5/2/00	1	2gal 4°C	X	X		

Special Instructions:

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
[illegible]	G. Mohr	5/3/00	[illegible]	5/04/00	1025						

FORM #4

8/94

REAC, Edison, NJ
132 (~~908~~) 321-4200
EPA Contract ~~68-C4-0022~~
64-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resource
Project Number: R1A00133
~~REW~~ Lockheed Contact: John Johnson Phone: (733) 321-4200

No: 02069

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	tox test L. plumulosus	tox test M. beryllina		
	A19727	LOC4	SD	5/2/00	1	2gal/4°C	X	X		
	A19728	LOC4SUB	SD	5/2/00	1	2gal/4°C	X	X		

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
oil/analysis	G. Molner	5/3/00	Sarita Wan	5-04-00	1025						

FORM #4

8/94

★ U.S. GPO: 1994-383-015

~~0005014~~
0005012

REAC, Edison, NJ
732 ~~(908)~~ 321-4200
EPA Contract ~~68-C4-0022~~ 68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
~~RFW~~ Lockheed Contact: John Johnson Phone: (732) 321-4200

No: 03555

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	tox test Leptocarbon	tox test Metabolites		
	A19725	Loc 5	SD	5/2/00	1	2gal/4°C	X	X		
	A19726	Loc 6	SD	5/2/00	1	2gal/4°C	X	X		

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all/analysis	G. Molan	5/3/00	Scott Rome	5-04-00	1025						

FORM #4 8/94

REAC, Edison, NJ
732(~~908~~) 321-4200
EPA Contract ~~68-C4-0022~~ C
68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
a ~~REW~~ Lockheed Contact: John Johnson Phone: (732) 321-4200

No: 02071

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	tox test L. plumbosus	tox test M. beryllina		
	A 19687	LOC1	SD	5/2/00	1	2 gal / 4°C	X	X		
	A 19688	LOC2SUB	SD	5/2/00	1	2 gal / 4°C	X	X		

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

* Definitive tests

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all/analyses	G. Molnar	5/3/00	[illegible]	5-04-00	1025						

FORM #4 8/94

★ U.S. GPO: 1994-383-015

~~000501~~
000512

REAC, Edison, NJ
(732) (908) 321-4200
EPA Contract ~~68-C4-0022~~
68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
a ~~RFW~~ Contact: ~~Ba~~ John Johnson Phone: (732) 321-4200
Lockheed Martin

No: 02066

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TOC			
	A19693	LOC1	SD	5/3/00	1	8oz/4°C	X			
	A19694	LOC2					X			
	A19695	LOC2SWB					X			
	A19696	LOC3					X			
	A19697	LOC4					X			
	A19698	LOC4SWB					X			
	A19699	LOC5					X			
	A19721	LOC6					X			

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

QA Gr

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all analysis	[illegible]	5/3/00	[illegible]	5/04/00	1035						

FORM #4

8/94

[redacted] * US [redacted] 994-3 [redacted]

TOXKON

CHAIN OF CUSTODY RECORD

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

WORK ORDER # : ____-____-____

DUE DATE : ____-____-____

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Ave.
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Don Cooke
PROJECT ID/LOCATION

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	PAHs	Coal Tar											COMMENTS
Control H_2O	6	1L	G	1	5/10/00	0910	4°C	✓	✓											
Control Sediment	2	100 mL	P	1	5/10/00	0910	4°C	✓	✓											

CERTIFIED COPY
SG 6-07-00
INITIALS

SAMPLED BY Scott Glover	DATE - 05 - 10 - 00 TIME: - - 0910	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TOXIKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # : 00-05-068

DUE DATE : 5-25-00

COMPANY Lockheed Martin
ADDRESS
PHONE # ( ) FAX ( )
P.O. #
PROJECT MANAGER Scott Glover
PROJECT ID/LOCATION Control Sediment

SAMPLE TYPE	CONTAINER TYPE
1. WASTEWATER	P - PLASTIC
2. SOIL/SEDIMENT	G - GLASS
3. SLUDGE	V - VOA
4. OIL	
5. DRINKING WATER	
6. WATER (GW/MW/SW)	
7. TISSUE	
8. OTHER (SPECIFY)	

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Acid/Cyanide/Phenol	Acid/Cyanide/Phenol	Lab Filtered Metals	8010	7470	NH3	pH	Reactive Sulfide					COMMENTS
Control Sediment	2	707	G	2	5/16/00		—													

CERTIFIED COPY
SC 6-07-00
INITIALS DATE

SAMPLED BY	DATE - - - / TIME: - - -	RECEIVED BY:	DATE - - - / TIME: - - -
RELINQUISHED BY:	DATE - - - / TIME: - - -	RECEIVED BY:	DATE - - - / TIME: - - -
RELINQUISHED BY:	DATE - - - / TIME: - - -	RECEIVED FOR LAB BY: [illegible]	DATE 5 - 16 - 00 / TIME: 15 00
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes [redacted] If [redacted] st Kn[redacted]

TOXIKON CORPORATION
106 COASTAL WAY
JUPITER, FL 33477
TEL: (561) 575-2477

June 05, 2000

Scott Glover
Toxikon - Jupiter

,
TEL:
FAX

RE: Control Sediment Lockheed Martin Order No.: 0005068

Dear Scott Glover,

Toxikon received 1 sample on 05/16/2000 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in a Case Narrative.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Certifications: FL: E86278, 86396

Toxikon

Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005068	**Collection Date:**	05/16/2000
Project:	Control Sediment Lockheed Martin	**Matrix:**	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
PH		**SW9045B**				Analyst: **AML**
pH	7.20	1.0		pH Units	1	05/18/2000
% SOLIDS		**D2216**				Analyst: **IT**
Percent Solids	59	0.00040		wt%	1	06/01/2000
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	40	1.6		mg/Kg	1	06/02/2000
ICP METALS, TOTAL		**SW6010B**				Analyst: **JS**
Antimony	ND	8.5		mg/Kg-dry	1	05/18/2000
Arsenic	ND	8.5		mg/Kg-dry	1	05/18/2000
Barium	26	17		mg/Kg-dry	1	05/18/2000
Beryllium	0.44	0.34		mg/Kg-dry	1	05/18/2000
Cadmium	1.1	0.85		mg/Kg-dry	1	05/18/2000
Chromium	16	0.85		mg/Kg-dry	1	05/18/2000
Cobalt	4.8	1.7		mg/Kg-dry	1	05/18/2000
Copper	9.6	0.87		mg/Kg-dry	1	05/18/2000
Lead	13	1.7		mg/Kg-dry	1	05/18/2000
Manganese	170	8.5		mg/Kg-dry	1	05/18/2000
Nickel	9.1	6.8		mg/Kg-dry	1	05/18/2000
Selenium	ND	1.7		mg/Kg-dry	1	05/18/2000
Silver	ND	0.85		mg/Kg-dry	1	05/18/2000
Thallium	ND	6.8		mg/Kg-dry	1	05/18/2000
Vanadium	19	1.7		mg/Kg-dry	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005068	**Collection Date:**	05/16/2000
Project:	Control Sediment Lockheed Martin	**Matrix:**	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PESTICIDES/PCB		**SW8081**				Analyst: **JS**
4,4'-DDD	ND	10		µg/Kg	1	05/18/2000
4,4'-DDE	ND	10		µg/Kg	1	05/18/2000
4,4'-DDT	ND	10		µg/Kg	1	05/18/2000
Aldrin	ND	10		µg/Kg	1	05/18/2000
alpha-BHC	ND	10		µg/Kg	1	05/18/2000
Aroclor 1016	ND	10		µg/Kg	1	05/18/2000
Aroclor 1221	ND	10		µg/Kg	1	05/18/2000
Aroclor 1232	ND	10		µg/Kg	1	05/18/2000
Aroclor 1242	ND	10		µg/Kg	1	05/18/2000
Aroclor 1248	ND	10		µg/Kg	1	05/18/2000
Aroclor 1254	ND	10		µg/Kg	1	05/18/2000
Aroclor 1260	ND	10		µg/Kg	1	05/18/2000
beta-BHC	ND	10		µg/Kg	1	05/18/2000
Chlordane	ND	50		µg/Kg	1	05/18/2000
delta-BHC	ND	10		µg/Kg	1	05/18/2000
Dieldrin	ND	10		µg/Kg	1	05/18/2000
Endosulfan I	ND	10		µg/Kg	1	05/18/2000
Endosulfan II	ND	10		µg/Kg	1	05/18/2000
Endosulfan sulfate	ND	10		µg/Kg	1	05/18/2000
Endrin	ND	10		µg/Kg	1	05/18/2000
Endrin aldehyde	ND	10		µg/Kg	1	05/18/2000
Endrin ketone	ND	10		µg/Kg	1	05/18/2000
gamma-BHC	ND	10		µg/Kg	1	05/18/2000
Heptachlor	ND	10		µg/Kg	1	05/18/2000
Heptachlor epoxide	ND	10		µg/Kg	1	05/18/2000
Methoxychlor	ND	10		µg/Kg	1	05/18/2000
Toxaphene	ND	50		µg/Kg	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005068	**Collection Date:**	05/16/2000
Project:	Control Sediment Lockheed Martin	**Matrix:**	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
POLYNUCLEAR AROMATICS		**SW8100**				Analyst: IT
Naphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
2-Methylnaphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
1-Methylnaphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
Acenaphthylene	ND	1400		µg/Kg-dry	1	05/23/2000
Acenaphthene	ND	1400		µg/Kg-dry	1	05/23/2000
Fluorene	ND	1400		µg/Kg-dry	1	05/23/2000
Phenanthrene	ND	1400		µg/Kg-dry	1	05/23/2000
Anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(a)anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Chrysene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(b)fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(k)fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(a)pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Dibenzo(a,h)anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Indeno(1,2,3-cd)pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(g,h,i)perylene	ND	1400		µg/Kg-dry	1	05/23/2000
SULFIDE		**SW9030**				Analyst: CD
Sulfide	ND	0.33		mg/Kg	1	06/01/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG

Test Sediment/Soil ID: Control Sediment	Date Received: 5-4-00
Sponsor: Control Soil Eastern Aquatic Biosupply & lookheed Martin Project	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 7	Type of Containers: 1 gallon plastic jar
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: blackish-brown		Associated Water pH: 6.8		
Sample Temperature upon Receipt: 14.8				
Check One:	Coarse Sand __	Fine Sand __	Silt X	Clay __

Label Information: N/A

Paperwork - Narrow River collection site collected by Christopher M. McManis at 1130 on 5/3/00

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge < 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

salinity 30 ‰

CERTIFIED COPY
SW 5-24-00
INITIALS DATE

Above Data By: SG JK

Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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(*) indicates sediment is to be used for definitive tests

TEST SEDIMENT/SOIL RECEIPT LOG SED A

Test Sediment/Soil ID: LOC 25 UB (*)	Date Received: 5-04-00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Fed Ex	

SEDIMENT/SOIL DESCRIPTION

Color: black	Associated Water pH:
Sample Temperature upon Receipt: 10.3°C	

Check One:	Coarse Sand __	Fine Sand __	Silt X	Clay __

Label Information: REAC, EDISON NJ LOC 25 UB "Def. Tox Tests"
SITE: Quanta Resources 5/2/00 L. plumulosus
M. berylling work order # 0-133 sample # A19688

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made: - Custody seal intact

Salinity = 10 ppt

Above Data By: [illegible] Date: [illegible]

Toxikon Corporation
Jupiter, Florida

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(*) indicates sediment is to be used for definitive test

TEST SEDIMENT/SOIL RECEIPT LOG SEDB

Test Sediment/Soil ID: LOC 1 (*)	**Date Received:** 5-4-00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	**Type of Containers:** 2 gallon plastic bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black	**Associated Water pH:**
Sample Temperature upon Receipt: 11.4 °C	

Check One:	**Coarse Sand** __	**Fine Sand** __	**Silt** ✓	**Clay** __

Label Information: REAC EDISON NJ site: Quanta Resources

work order # 0-133 LOC1 Sample # A19687

L. plumulosus & M. berylling "Definitive Tox. Test"

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made: Custody Seal intact

The sediment has a petroleum odor

- salinity = 10 ppt

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDC

Test Sediment/Soil ID: LOC 3	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: Black		Associated Water pH:		
Sample Temperature upon Receipt: 10.4°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ Quanta Site Resources
Sample # A19686 work order # 0133 LOC 3 5/2/00
M. berylling & L. plumulosus tox tests

Check if sample utilized on the day received. ___

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.
Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact. There is a slight petroleum odor
salinity = 10 ppt

Above Data By: SG JK	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEO D

Test Sediment/Soil ID: LOC 2	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: Black		Associated Water pH:		
Sample Temperature upon Receipt: 9.6 °C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ sample #A19685
Quanta site Resources work order # 0-133 LOC2
m. beryllina + L. plumulosus tox. tests 5/2/00

Check if sample utilized on the day received. __

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
Salinity = 8ppt

Above Data By: SG JM	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SED E

Test Sediment/Soil ID: LOC 6	Date Received: 5/4/00
Sponsor: Lockheed + Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket + plastic
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black	Associated Water pH:
Sample Temperature upon Receipt: 11.0 °C	

Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ sample # A19726
Quanta site Resources work order # 0-133 LOC 6
M. berylline
L. plumulosus

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
Salinity = 8 ppt

Above Data By: SD M	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDF

Test Sediment/Soil ID: LOC5	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket plastic
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black		Associated Water pH:		
Sample Temperature upon Receipt: 11.9°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON, NJ SITE Quanta Resources
Sample # A19725 Work order # 0-133 LOC5
M. beryllina + L. plumulosus 5/2/00

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
Salinity = 8ppt

Above Data By: SG JM	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDG

Test Sediment/Soil ID: LOC 4	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: Black	Associated Water pH:
Sample Temperature upon Receipt: 9.4°C	

Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON, NJ
Quanta Resources / Sample # A19727 / Work ORDER - 0-133
LOC4 M. beryllina & L. plumulosus toxe test

Check if sample utilized on the day received.____

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4° C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
salinity ~ 8ppt

Above Data By: JM SG AL	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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Effective: Dec. 1999

TEST SEDIMENT/SOIL RECEIPT LOG SEDH

Test Sediment/Soil ID: LOC 4 SUB	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: brown/black		Associated Water pH:		
Sample Temperature upon Receipt: 9.6°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: React Edison, NJ
Quanta Resources 5/2/00 Sample # A19728
Workorder # 0-133 LOC 4 Sub M. berylline C. plumulosus tox test

Check if sample utilized on the day received.____

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.
Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:
Custody seal intact
Salinity = 10 ppt

Above Data By: JK SG	Date: 5/4/00

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-1
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: **JY**
Organic Carbon, Total	22000	750		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: **JY**
Total Volatile Solids	13	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-2
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: **JY**
Organic Carbon, Total	11000	500		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: **JY**
Total Volatile Solids	9.7	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC2 SUB
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	15000	540		mg/Kg-	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	10	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-3
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	17000	550		mg/Kg-	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	11	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-4
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	16000	550		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	8.7	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC4 SUB
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	15000	380		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	8.4	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-5
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	16000	460		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	7.8	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	LOC-6
Lab Order:	0005012	**Collection Date:**	05/02/2000
Project:	TOC SAMPLES-LOCK MARTIN	**Matrix:**	SEDIMENT
Lab ID:	0005012-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
TOTAL ORGANIC CARBON		**SW9060**				Analyst: JY
Organic Carbon, Total	14000	510		mg/Kg	1	05/11/2000
TOTAL VOLATILE SOLIDS		**E160.4**				Analyst: JY
Total Volatile Solids	8.3	1.0		wt%	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

STANDARD OPERATING PROCEDURE

Reference No. 4.1.42
Revision: 004
Date: 07/11/96

VOLATILE
TOTAL ~~SOLIDS DRIED~~ SOLIDS
~~Method 160.3~~
AASHTO T-267-86

Project # 0005012

Batch QC # WC 000530B

Sample Volume

Analysis Date 5-30-00

Sample ID	SAMPLE WT (g) ~~Dilution Factor~~	Crucible ID	Crucible Weight (gr) 1	2	3	Crucible + Sample Weight (gr) 1	2	3	~~%~~ Volatile Residue (grams)	% Volatile ~~Total~~ Solids ~~(mg/L)~~ residue
0005012.01	12.1917		47.3319			57.9301 ~~60.9318~~	57.9343	57.9343	1.5893	13.04
.02	14.2725		48.0454			60.9318	60.9374	60.9372	1.3807	9.67
.03	15.9190		42.7430			56.9878	56.9955	56.9957	1.6663	10.5
.04	18.4316		47.4262			63.7681	63.7766	63.7772	2.0806	11.3
.05	27.2192		43.8427			68.6777	68.6814	68.6862	2.3757	8.73
.06	32.9588		43.5468			73.7128	73.7210	73.7275	2.7781	8.43
.07	35.4399		46.0842			78.7699	78.7766	78.7783	2.7458	7.75
.08	8.8198		45.9386			54.0208	54.0232	54.0263	0.7321	8.30

Analyst [signature]

Date 5/30/00

Verified By gil mlchwab

Date 05-30-00

Standard Method of Test
for

Determination of Organic Content in Soils by Loss on Ignition

AASHTO DESIGNATION: T 267-86

1. SCOPE

1.1 The "Loss on Ignition" method for the determination of organic content is most applicable to those materials identified as peats, organic muck, and soils containing relatively undecayed or undecomposed vegetative matter or fresh plant materials such as wood, roots, grass or carbonaceous materials such as lignite, coal, etc. This method determines the quantitative oxidation of organic matter in these materials and gives a valid estimate of organic content. The "Wet Combustion" (T 194) method is recommended when it is desired to determine the humus-like easily-oxidized organic material to provide information relating to the suitability of a soil for plant growth.

1.2 The following applies to all specified limits in this standard: For the purposes of determining conformance with these specifications, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of AASHTO R 11, Recommended Practice For Indicating Which Places Of Figures Are To Be Considered Significant In Specified Limiting Values.

2. APPARATUS

2.1 *Oven*—Drying oven capable of maintaining temperatures of 110 ± 5 C (230 ± 9 F). Gravity, instead of blower convection may be necessary when drying lightweight material.

2.2 *Balance*—The balance shall conform to AASHTO M 231, Class C.

2.3 *Muffle Furnace*—The furnace shall be capable of maintaining a continuous temperature of 445 ± 10 C (833 ± 18 F) and have a combustion chamber capable of accommodating the designated container and sample. Pyrometer recorder shall indicate temperature while in use.

2.4 *Crucibles or Evaporating Dishes*—High silica, aluminum, porcelain or nickel crucibles of 30 to 50 ml capacity or Coors porcelain evaporating dishes approximately 100 mm top diameter.

2.5 *Desiccator*—A desiccator of sufficient size containing an effective desiccant.

2.6 *Containers*—Suitable rustproof metal, porcelain, glass or plastic coated containers.

2.7 *Miscellaneous Supplies*—Asbestos gloves, tongs, spatulas, etc.

3. SAMPLE PREPARATION

3.1 A representative sample weighing at least 100 grams shall be taken from the thoroughly mixed portion of the material passing the 2.00 mm (No. 10) sieve which has been obtained in accordance with AASHTO T 87, Standard Method of Preparing Disturbed Soil Samples.

3.2 Place the sample in a container and dry in the oven at 110 ± 5 C (230 ± 9 F) to constant weight. Remove the sample from the oven, place in the desiccator and allow to cool.

NOTE 1—This sample can be allowed to remain in the oven until ready to proceed with the remainder of the test.

4. IGNITION PROCEDURE

4.1 Select a sample weighing approximately 10 to 40 grams, place into tared crucibles or porcelain evaporating dishes and weigh to the nearest 0.01 gram.

NOTE 2—Sample weights for lightweight materials such as peat may be less than 10 grams but should be of sufficient amount to fill the crucible to at least ½ depth. A cover may initially be required over the crucible during initial phase of ignition to decrease possibility of sample being "blown out" from the container.

4.2 Place the crucible or dish containing the sample into the muffle furnace for six hours at a temperature of 445 ± 10 C. Remove the sample from the furnace, place into the desiccator and allow to cool.

4.3 Remove the cooled sample from the desiccator and weigh to the nearest 0.01 gram.

5. CALCULATION

5.1 The organic content shall be expressed as a percentage of the mass of the oven dried soil and shall be calculated as follows:

Percent Organic Matter =

$$\frac{A - B}{A - C} \times 100$$

where:

A = Weight of crucible or evaporating dish and oven dried soil, before ignition.

B = Weight of crucible or evaporating dish and dried soil, after ignition.

C = Weight of crucible or evaporating dish, to the nearest 0.01 gram.

5.2 Calculate the percentage of organic content to the nearest 0.1 percent.

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	47	0.95		mg/Kg	1	06/02/2000

CERTIFIED COPY

SG 6-03-00

INITIALS DATE

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	89	2.1		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT B
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	170	2.6		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	92	2.3		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	84	2.5		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	48	2.4		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT F
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	33	2.3		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT G
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	37	2.1		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *02-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005053	**Collection Date:**	05/15/2000
Project:	LOCKHEED-LEPT 14DAY	**Matrix:**	SEDIMENT
Lab ID:	0005053-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	43	2.0		mg/Kg	1	06/02/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

TOXIKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # : ____-____-____

DUE DATE : ____-____-____

Day 0 Tuesday

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # 732 321-4200 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION Lepto 14day Screen/Def

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia	alkalinity										COMMENTS
Control sediment	6	250/400	P	1	5/16/00		H_2SO_4	✓	✓										marine sample ~10ppt
sediment A		250 mL						✓	✓										
sediment C								✓	✓										
sediment D								✓	✓										
sediment E								✓	✓										
sediment F								✓	✓										
sediment G								✓	✓										
sediment H								✓	✓										
sediment B 1%								✓	✓										
sediment B 10%								✓	✓										
sediment B 50%								✓	✓										
sediment B 100%								✓	✓										

SAMPLED BY Scott Clary	DATE 05/16/00 TIME: 11 - 25	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: **CD**
Alkalinity, Total (As CaCO3)	86	1.0		mg/L CaCO3	1	05/19/2000
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.32	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment A
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.72	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment C
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.61	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment D
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.44	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment E
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.43	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment F
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.27	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment G
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.34	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment H
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.59	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment B 1%
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.16	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment B 10%
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.38	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment B 50%
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-11A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.89	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment B 100%
Lab Order:	0005067	**Collection Date:**	05/16/2000
Project:	Lepto 14-day Screen/Def. Day 0	**Matrix:**	AQUEOUS
Lab ID:	0005067-12A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.4	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

TOXIKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

Day 07

WORK ORDER # : ____-____-____

DUE DATE : ____-____-____

COMPANY Lockheed Martin
ADDRESS
PHONE # ( ) FAX ( )
P.O. #
PROJECT MANAGER Dan Cole
PROJECT ID/LOCATION Lept. [illegible] screen/detention

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Ammonia (Total)												COMMENTS
Control Sed	G	250 mL	P	1	5-23-00	1540		✓												
Sed A																				
Sed C																				
Sed D																				
Sed E																				
Sed F																				
Sed G																				
Sed H																				
Sed B 1%																				
Sed B 10%																				
Sed B 50%																				
Sed B 100%																				

SAMPLED BY Santa Glenn	DATE 5-23-00 TIME: 15-40	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

Toxikon Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	0.40	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED A
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.38	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED C
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED D
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.066	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED E
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED F
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED G
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED H
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.058	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 1%
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.12	0.050		mg/L	1	05/30/2000

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 10%
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.15	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 50%
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-11A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.20	0.050		mg/L	1	05/30/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 100%
Lab Order:	0005094	**Collection Date:**	05/23/2000 3:40:00 PM
Project:	LOCK-DAY7 CONT 05012	**Matrix:**	AQUEOUS
Lab ID:	0005094-12A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

TOXICON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

Day 14 - Test Terminated

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

COMPANY Lockheed Martin
ADDRESS
PHONE # ( ) FAX ( )
P.O. #
PROJECT MANAGER Dan cooke
PROJECT ID/LOCATION Lepto. 14day screen / Def

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE H_2SO_4	ammonia											COMMENTS
Control Sed	6	250 mL	P	1	5-30-00	0920		✓											
Sed. A								✓											
Sed. C								✓											
Sed. D								✓											
Sed. E								✓											
Sed. F								✓											
Sed. G								✓											
Sed. H								✓											
Sed B 1%								✓											
Sed B 10%								✓											
Sed B 50%								✓											
Sed B 100%								✓											

SAMPLED BY Scottie Glenn	DATE 5 - 30 - 00 - TIME: - 0 - 920 -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH ....: BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.081	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED A
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.061	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED C
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.063	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED D
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.058	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED E
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED F
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED G
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.051	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED H
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	ND	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 1%
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.077	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 10%
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.078	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 50%
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-11A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.16	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *01-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SED B 100%
Lab Order:	0005107	**Collection Date:**	05/30/2000 9:20:00 AM
Project:	LOCKHEED-DAY 14/LEPTO 05012CONT	**Matrix:**	AQUEOUS
Lab ID:	0005107-12A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.22	0.050		mg/L	1	05/31/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

APPENDIX B

AMPHIPOD TEST RAW DATA

xikon Corp...ation
piter, Florida

Form No: _ 3
Effective: Dec. 1999

Range-finding Test data

SEDIMENT TOXICITY TEST -- TEST DESIGN

Sponsor: Lockheed Martin

Project Number: 0005012

Data By: SG

Date: 5-04-00

Test Substance

Test Substance: Quanta Resources Site Sediment
See Page 62-63 of Test Sed Receipt and Usage Log for Test Substance Information.

Concentrations Based on: [ ] A.I. [✓] W.M.

Test Conditions

[✓] Preliminary [ ] Definitive [ ] Screening
Range-finding

Duration: 96-hours

Test Animal History

Species : L. plumulosus
Batch/Lot Number : LP00-5-2
Age/Life Stage : 3-5 mm (mixed sex)
Date Acclimation/Maintenance Began : 5-02-00
See Page LP5-2-18 of Salt H2O Invertebrate Log for maintenance conditions.

Lighting : [✓] Fluorescent [ ] Incandescent
Photoperiod : [ ] Continuous [ ] Intermittent
16 hr Light : 8 hr Dark
Light Intensity Range: - to - E/m²/s
Laboratory ambient

Dilution Water: Filtered laboratory saltwater

Test Area Used: WB#3

Hard/Sal: 10ppt

Target Temperature Range: 20 +/- 1 Degrees C

Test Container Dimensions: - Dia x - Ht (cm)
Test Sediment Height : ~2 cm
Test Containers : [✓] Open [ ] Covered
Test Container Volume : 1.0 Liters
Dilution Water Volume : 0.8 Liters
Volume Additions per Day : minimum 2x/day

Reps/Concentration : 1
Animals/Replicate : 10

Protocol Followed: ASTM, 1999 Standard Guide for Conducting 10-day Static Sediment Toxicity Tests w/ Marine and Estuarine Amphipods E1367-99.

Solvent Used: NA Amt. Added: NA
Solvent CTRL Concentration: NA

Test Treatment:	Control	SED A / SED B	SED A / SED B	SED A / SED B	SED A / SED B			
Amount Control Sediment Added (g):	2cm	156.5 / 158.6	155.1 / 157.2	141.0 / 142.9	0 / 0			
Amount Test Substance Added (g):	N/A	0.2 / 0.2	1.6 / 1.6	15.7 / 15.9	156.7 / 158.8			
Test Concentration: (Units = %):	-	0.1	1.0	10	100			

Aeration: ( ) Yes
(✓) No

Date/Time Test Substance Added: 5/05/00 1330
Date/Time Test Animals Added : 5/06/00 1145

Toxikon Corporation
Jupiter, Florida

Page: ____
Form No: 138
Effective: Nov. 1999

TEST ORGANISM REQUIREMENTS							
Animal Species Required: L. plumulosus							
Number of Animals: 90			Age/Size: 3-5 mm mixed sex				
Day/Date Needed	S	M	T	W	T	F	(S)
							5-06-00

Acclimation Requirements

Water type: [✓] Filtered SW [ ] Filtered FW
[ ] Unfiltered SW [ ] Treated City Water
[ ] Reconstituted FW [ ] Recirculating FW

Temperature: 20 ± 1°C Salinity: 10 ppt Hardness: -

Feed before test? [✓] Yes [ ] No | If No: [ ] 24 hours [ ] 48 hours

Algal Species Required: -

Any Special Medium or Culture Requirements?: -

Any Additional Instructions:

-

Study Number: 005012	Requisitioner: SG	Date: 5-04-00

Toxikon Corporation
Jupiter, Florida

Page: _____
Form No: 064
Effective: Oct. 1999

MIN/MAX TEMPERATURE RECORDS

Sponsor: REAC	Project No.: 0005012
Test Material: Sediment	Species: L. plumulosus
Min/Max Thermometer: Radio Shack	ID No: 204
Sensor Location: WB #3	Target Temperature: 20 +/- 1°C

Date	Time	Test Day	Temperature (°C) Current	Minimum	Maximum	Reset	Data By
5-6-00	1215	0	17.8	—	—	✓	AL
5-7-00	1135	1	17.6	17.4	18.0	✓	AL
5-08-00	1130	2	17.7	17.4	18.1	✓	SG
5-9-00	1130	3	17.6	17.4	17.9	✓	SG JK
5-10-00	1335	4	19.4	17.5	19.7	✓	AL JK

NOTE: Values recorded above are uncorrected. To correct values add/subtract (circle one) 0.7 °C. This correction factor is obtained from the most recent comparison of the Micronta Min/Max Thermometer with the NBS thermometer (see the Temperature Monitoring Devices logbook). Date of calibration check: 2-17-00

Toxikon Corporation
Jupiter, Florida

Form No: 261
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SALTWATER MEASUREMENTS

Sponsor: REACT		Project No: 0005012	
Test Substance: Sediment		Test Species: L. Plumulosus	
Test Day: 0	By: AZ	Test Day: 1	By: AZ
Date: 5-6-00	Time: 1115	Date: 5-7-00	Time: 1110
Treatment	Salinity ‰	Treatment	Salinity
Control	10	Control	11
Sed. A 0.1	10	SED. A 0.1	11
1.0	10	" 1.0	11
10	10	" 10	11
100	10	" 100	11
Sed. B 0.1	10	SED. B 0.1	11
1.0	10	" 1.0	11
10	10	" 10	11
100	11	" 100	11
Meter Used:	Ref #3	Meter Used:	Ref #3
Comments:		Comments:	

Toxikon Corporation
Jupiter, Florida

Form No: 261
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SALTWATER MEASUREMENTS

Sponsor: REAC		Project No: 0005012	
Test Substance: Sediment		Test Species: L. plumulosus	
Test Day: 2	By: SG	Test Day: 3	By: SG
Date: 5-08-00	Time: 1135	Date: 5/09/00	Time: 1115
Treatment	Salinity ‰	Treatment	Salinity
Control	10	Control	10
Sed A 0.1	10	Sed A 0.1	10
1.0	10	1.0	10
10	10	10	10
100	10	100	10
Sed B 0.1	10	Sed D 0.1	10
1.0	10	1.0	10
10	10	10	10
100	10	100	10
Meter Used:	Ref #3	Meter Used:	Ref #3
Comments:		Comments:	

Toxikon Corporation
Jupiter, Florida

Form No: 261
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SALTWATER MEASUREMENTS

Sponsor: REAR		Project No: 0005012	
Test Substance: Sediment		Test Species: L. plumulosus	
Test Day: 4	By: AL JK	Test Day:	By:
Date: 5/10/00	Time: 1320	Date:	Time:
Treatment	Salinity	Treatment	Salinity
control	10‰		
SedA 0.1	10		
1.0	10		
10	10		
100	10		
Sed B 0.1	10		
1.0	10		
10	10		
100	10		
Meter Used:	Ref #3	Meter Used:	
Comments:		Comments:	

Toxikon Corporation
Jupiter, Florida

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAr

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: AL	Test Day (TD): 0 Date: 5-6-00				By: AL	TD: 1 Date: 5-7-00	By: SL	TD: 2 Date:
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Control	A	19.3	8.1	7.1	8.1	7.0	8.0	7.3
	B	~~19.3~~	~~8.1~~	~~7.1~~				
	C							
	D							
	E							
	F							
	G							
	H							
Sed A 0.1%	A	19.3	8.1	7.1	8.1	7.4	8.1	7.3
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed A 1.0%	A	19.3	8.1	7.1	8.1	7.4	8.1	7.2
	B							
	C							
	D							
	E							
	F							
	G							

Toxikon Corporation
Jupiter, Florida

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: Ac	Test Day (TD): 0 Date: 5-6-00				By: Ac	TD: 1 Date: 5-7-00	By: Sc	TD: 2 Date: 5-08
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. A 10%	A	19.6	8.2 / 7.0	7.1 / 8.2	8.1	7.2	8.1	7.2
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. A 100%	A	19.0	8.1	7.0	7.9	6.7	8.1	7.0
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 0.1%	A	19.2	8.1	7.0	8.1	7.2	8.1	7.0
	B							
	C							
	D							
	E							
	F							
	G							
	H							

Toxikon Corporation
Jupiter, Florida

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: Az	Test Day (TD): 0 Date: 5-6-00				By: Az	TD: 1 Date: 5-7-00	By: Sa	TD: 2 Date: 5-08
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. B 1.0%	A	19.2	8.1	6.9	8.1	7.2	8.1	7.0
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 10%	A	19.2	8.1	6.8	8.0	6.9	8.1	7.0
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 100%	A	19.2	8.0	6.9	7.8	6.3	7.8	7.0
	B							
	C							
	D							
	E							
	F							
	G							

Toxikon Corporation
Jupiter, Florida

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG TR	Test Day (TD): 3 Date: 5/08/00				By: AL JK	TD: 4 Date: 5/10/00	By: AL JK	TD: 4 Date: 5/10/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	Temp	D.O.
Control	A	19.1	8.1	7.0	8.1	7.0	19.3	—
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. A 0.1%	A	19.2	8.1	7.2	8.1	7.0	19.2	—
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. A 1.0%	A	19.2	8.1	7.3	8.4	7.2	19.2	—
	B							
	C							
	D							
	E							
	F							
	G							
	H							

Toxikon Corporation
Jupiter, Florida

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JK SG	Test Day (TD): 3 Date: 5-9-00				By: AL JK	TD: 4 Date: 5/10/00	By: AL JK	TD: 4 Date: 5/10/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	Temp	D.O.
Sed. A 10%	A	19.3	8.1	7.3	8.1	7.1	19.2	—
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. A 100%	A	19.3	8.1	7.2	8.1	6.9	19.4	—
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 0.1%	A	19.3	8.1	7.2	8.1	7.2	19.6	—
	B							
	C							
	D							
	E							
	F							
	G							

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① EE JL 5/10/00

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L plumulosus

By: JL SG	Test Day (TD): 3 Date: 5-9-00	By: JL	TD: 4 Date: 5/10/00	By: JL	TD: ~~5~~ 4 Date: 5/10/00

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	Temp	D.O.
Sed. B 1.0%	A	19.3	8.1	7.2	8.0	7.0	19.4	
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 10%	A	19.4	8.1	7.3	8.0	7.1	19.5	
	B							
	C							
	D							
	E							
	F							
	G							
	H							
Sed. B 100%	A	19.4	7.9	7.0	7.9	6.8	19.3	
	B							
	C							
	D							
	E							
	F							
	G							
	H							

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: AL	Day: 0	Date: 5-6-00		By: AL	Day: 1	Date: 5-7-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A	10	Five minutes after animal addition all animals were buried.	A	10	B
	B	~~10~~		B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 0.1%	A	10	5 minutes after animal addition all animal were buried	A	10	B
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 1.0%	A	10	5 minutes after animal addition all animals buried	A	10	B
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: AL	Day: 0	Date: 5-6-00		By: AL	Day: 1	Date: 5-7-00
Treatment	**Rep**	**# Alive**	**Observations**	**Rep**	**# Alive**	**Observations**
Sed. A 10%	A	10	5 minutes after animal addition all animals were buried	A	10	9B, 1AS
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 100%	A	10	Animals hung on on surface of sediment	A	10	6B, 4AS
	B		See Study Log	B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 0.1%	A	10	5 minutes after animal addition all animals were buried	A	10	B
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: AL	Day: 0	Date: 5-6-00	By: AL	Day: 1	Date: 5-7-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 1.0%	A	10	5 minutes after animal addition all animals were buried	A	10	B
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 10%	A	10	Some animals buried some hung out on surface of Sediment	A	10	B
	B		* See study log	B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 100%	A	10	Animals hung out on surface of Sediment	A	6	4D, 6AS, 6Leth
	B		* See Study Log	B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SB	Day: 2	Date: 5-08-00	By:	Day: 3	Date: 5-9-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A	10	BH 1 2 molts on sed surface	A	10	BH, molts AS of sediment
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 0.1%	A	10	BH molts on sed surface	A	10	BH, molts AS of sediment
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 1.0%	A	10	BH	A	10	BH, molts AS of sediment
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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@ EFSC 5-08-00

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG	Day: 2	Date: 5-08-00	By: SG JL	Day: 3	Date: 5-9-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 1.0%	A	10 ~~BH~~ @	BH, molts on surface of sed	A	10	BH, molts as of sediment
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 10%	A	10	BH	A	10	1AS, BH
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 100%	A	06	5 animals @ as and appear to be lethargic	A	6	Few BH (*) see study log
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG	Day: 4	Date: 5-10-00	By:	Day:	Date:

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A	9 ① ~~10~~ ~~9 INF~~	BH, molt AS of SEDIMENT INF	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 0.1%	A	① ~~10~~ 9	BH, molt AS of sediment INF	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 1.0%	A	10	BH	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

① EE JK 5/10/00

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

① FE
JK
5/10/00

By: SG JK	Day: 4	Date: 5-10-00	By:	Day:	Date:

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. A 10%	A	10	BH, MOLT AS of sediment	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 100%	A	~~10~~ 9	BH, MOLT AS 3NF of sediment	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 0.1%	A	10	BH, MOLT AS of sediment	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

(*) see study log

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

(1) EE JLS 5/10/00

By: JLSG	Day: 4	Date: 5-10-00	By:	Day:	Date:

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 1.0%	A	10	Bit, molt AS of sediment	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 10%	A	(1) 9	1 animal Bit (1) AS NF	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 100%	A	(1) 5	6 (*) AS + 6 LETH 1 D	A		
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG	Day: 2	Date: 5-08-00		By:	Day: 3	Date: 5-9-00
Treatment	**Rep**	**# Alive**	**Observations**	**Rep**	**# Alive**	**Observations**
Sed. A 10%	A	10	BH	A	10	BH, molts as of SED
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. A 100%	A	10	4 animals AS at sed BH	A	10	1AS, BH, molts AS of SED
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		
Sed. B 0.1%	A	10	BH	A	10	BH, molts AS of SED
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: ~~0005014~~ 0005012
Test Substance: Sediment	Study Type: Sediment bioassay (range-finding)

Initial and Date all Entries: 5-04-00

1025 SG 5 coolers from REAC arrived @ laboratory. Samples were immediately logged in and then placed into a Baxter Cryofridge set to maintain a target temp. of 4°C.

A 5g sample was collected from each of the sediment samples. Each 5g sample was placed into a labelled centrifuge tube and spun for 10 minutes @ an RPM of ~3500. The salinities from each of the respective test seds were recorded in the log-in data sheets. The salinities ranged between 8-10 ppt. Our aquaculture facility was notified that the salinity of the test animals and control sed should be acclimated to 10 ppt as previously discussed.

The 8 TOC samples were given to J. Yarenchuk for log-in purposes.

1030 Control sediment arrived from Eastern Aquatic Biosupply. Sediment was logged in and then sent to aquaculture facility. The control sediment was press sieved through a series of stainless steel sieves (1.00, 0.500, and 0.25 mm) before salinity adjustment to 10 ppt. Aeration was added for the sediment that will be utilized for the range-finding test that will be set-up tomorrow. The remainder of the control sed was placed into a Baxter Cryofridge set to maintain a temp. of 4°C.

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 0005012
Test Substance: Sediment	Study Type: range-finding

Initial and Date all Entries: 5-05-00

- Two of the total 8 sediment will be used for a definitive test w/ the animal L. plumulosus. These two sediments were identified on the COC as LOC 2 Sub (Sed A) and LOC 1 (Sed B). Toxikon randomly assigned identifications to each of the 8 testing seds:

Locations/site	Toxikon I.D.
LOC 2 Sub	Sed A *
LOC 1	Sed B *
LOC 3	Sed C
LOC 2	Sed D
LOC 6	Sed E
LOC 5	Sed F
LOC 4	Sed G
LOC 4 Sub	Sed H

* to be used for leptocheirus definitive test

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 0005012
Test Substance: sediment	Study Type: range-finding

Initial and Date all Entries: 5-05-00

The initial range-finding test for the Leptocheirus study will involve a 0.1 dilution factor or concentrations of seds A and B @ 100%, 10%, 1%, and 0.1% + a @ laboratory control sediment,

- only one replicate test chamber w/ 10 animals each will be initiated for the preliminary range-finding study as per the procedure summary.

Flow through system calibrated to deliver a minimum of 2 volume turnovers per day (1600 mL) per test chamber. Actual turnover rate was calculated to be 1777 mL per day per test chamber which is slightly > than the minimum volume defined by the protocol. System will flush every 4-hours (6 x per day) for 5 minutes each cycle.

∴ total turnover rate/day = $\frac{1777 mL}{1600 mL}$ = 2.2 turnovers per rep per day

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** range-finding

Initial and Date all Entries:

5-5-00 1330 SG, MC The sediment concentrations will be mixed with the appropriate volume of control sed as defined below.

Weights:

2 cm of Sed A — 156.73g

2 cm of Sed B — 158.84g

For sed A CT's of 100, 10, 1, and 0.1%

will use 156.7g for 100%

For 10% Sed A = 156.7g x 0.10 = 15.7g sed A to 141.0g control sed

For 1% sed A = 156.7g x 0.01 = 1.6g sed A to 155.1g control sed

For ~~0.0~~ 0.1% sed A = 156.7g x 0.001 = 0.2g sed A to 156.5g control sed

For sed B CT's of 100, 10, 1, and 0.1%

will use 158.8g for 100%

For 10% sed B = 158.8g x 0.10 = 15.9g sed B to 142.9g control sed

For 1% sed B = 158.8g x 0.01 = 1.6g sed B to 157.2g control sed

For ~~0.01~~ 0.1% Sed B = 158.8g x 0.001 = ~~0.16g~~ 0.2g sed B to 158.6g control sed

1100 SG Test chambers filled w/ ~800mL of dilution H_2O and placed onto H_2O table set to maintain a temp. of 20° ± 1°C. The flow-through lines were attached and the timer turned on to initiate the Day -1 flow through system. Test animals will be added tomorrow for the range-finding test Day 0.

FEC 5-5-00

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 000502
Test Substance: sediment	Study Type: range-finding

Initial and Date all Entries:

5-05-00 A definite oily surface film was noted on the two highest testing trts of sed B.

Day 0 range-finding test

5-6-00 Water Quality of renewal water:
1105 AC

Temp: 21.9°C

DO: 8.1 mg/L

pH: 8.2

Salinity: 10‰

Prior to animal addition an oily film was observed on the surface of the water in Sed. B 10% & 100%.

1245 AC 1 hour after test initiation observations were made. Animals were buried in all treatments except the following:

Sed. A 100% Some animals buried, most still at the surface of the sediment

Sed. B 10% - Most animals buried, 3 still observed at the surface of the sediment

Sed. B 100% - No animals appear to have buried. Some animals seem lethargic.

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Form No: 150
Effective: Nov. 1999

TEST ORGANISM ADDITIONS

Test Substance: Sediment	Test Organism: L. plumulosus
Study Number: 0005012	Sponsor: REAC

Test organisms were added to test chambers in accordance with SOP 6.6, Section 2.0, or as described below.

Time Test Organism Added: 1145

Addition By: AL

Date Added: 5-6-00

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STUDY DAILY LOG

Test Sponsor: REAL	Study No: 0005012
Test Substance: Sediment	Study Type: 96 hr. range-finding

Initial and Date all Entries: Day 01

5-7-00 Water Quality of Renewal Water:
AL
1050
Temp: 23.2°C
DO: 8.2 mg/L
pH: 8.2
Salinity: 10‰

5-08-00 Day 02 H_2O quality of renewal H_2O
SG Flow through system appears to be functioning properly.
Temp. 22.6°C
DO 8.3 mg/L
pH 8.2
Salinity: 10‰

Visual observations of each ~~replicate~~ ① test chamber concluded that most of the animals were buried and that borrow holes (BH) were observed. Additionally, several molts were observed, however, these could be dead animals. True survival data will not be collected until the termination of the study. 4 animals were observed on

① EESG 5-08-00

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 0005012
Test Substance: Sed	Study Type: range-finding

Initial and Date all Entries:

Day 02 cont.

- the surface of Sed A 100%. In comparison, 5 animals were observed on the surface of Sed B 100% and the animals appeared to be lethargic and/or dead. No surface film was observed on this trt at the time of observation. Control ref temperature was 19.5°C.

H2O quality was collected on Form #260 (H2O quality parameter data sheet). All test trt salinities and control were 10‰.

~~The lowest D.O. recorded was from trts Sed A 100%.~~

The lowest D.O. recorded were from Trts B 100%, 10%, 1.0%, 0.1% and Sed A 100% @ 7.0 mg/L @ 10 ppt salinity and 19.5°C = 83% saturation.

Day 3 1125
5-9-00 SG JK

Observations conducted on range-finding test. No mortality observed in any of the control or test seds. However, an observation was made that 5 animals were at the surface of the sed in Trt Sed B 100%. The animals were alive (presence of appendage movement) but were on their backs and continually moving their appendages.

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STUDY DAILY LOG

Test Sponsor: Lear	Study No: 0005012
Test Substance: Sediment	Study Type: range-finding

Initial and Date all Entries:

Day 03 cont. 5/09/00 SG, JK

H2O quality for renewal H2O

D.O. 8.4 mg/L

pH 8.1

Salinity 10 ‰

temp 23.0 °C

The lowest D.O. saturation was recorded from the control test chamber @ 17.0°C and 7.0 mg/L = 83% saturation.

Day 4 5/10/00 JK SG

In Seal B 100% animals are on their backs moving their appendages.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** Range-Finding

Initial and Date all Entries:

5-10-00
Day 4
AL JK SG

Sediment was sieved through a 0.5mm sieve. The animals were carefully rinsed into a saltwater holding chamber then transferred to a plastic cup containing approximately a centimeter of control sediment with about an inch of overlying saltwater at 10‰. Observations were made once animals were transferred to see how long it would take them to bury into the sediment. A maximum of 5 minutes was allowed for initial behavior.

Observations:

Control - animals immediately buried
Sed. A 0.1% - animals immediately buried
Sed A 1.0% - animals immediately buried
Sed A 10% - animals immediately buried
Sed A 100% - animals immediately buried
Sed B 0.1% - animals immediately buried
Sed B 1.0% - animals immediately buried

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① EE JK 5/10/00

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** Range-Finding

Initial and Date all Entries:

5-10-00 Observations (continued)

Day 4 SED B 10% - majority of the animals immediately buried, after five minutes two animals still had not buried ① ~~they~~ one swam around while the other sat or rested on the bottom.

SED B 100% - ① ~~no animals buried, four~~ ① ~~an~~ ① (see bottom of page)

The treatments with 100% sediment ① ~~had~~ were more difficult to find or locate the animals when compared to the lower concentrations of testing sediment. Treatment B 100% had a strong petroleum odor. The saltwater holding chamber had obvious oil residue floating at the surface. While trying to transfer the animals - the pipette was covered with the oily residue

SED B 100% - after five minutes none of the animals buried into the sediment. They appeared to lay on top of the

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: Range Finding

Initial and Date all Entries: observations (continued)

5/10/00 sediment moving thru appendages
JL AL SG

Day 4

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OBSERVATION CODES EXPLANATION SHEET

Code	Explanation
Animal Observations	
N - None	Nothing out of the ordinary was observed
MSP	Muscle spasms
PLE	Partial loss of equilibrium
CLE	Complete loss of equilibrium
LETH	Lethargic
HYP	Hyperactive
ERR	Erratic behavior
GYR	Gyrating
IMM	Immobile
DRK	Dark coloration / pigmentation
HEM	Hemorrhagic
RAR	Rapid respiration
GUL	Gulping at surface
AS	At surface
NF	Not found
D	Dead
STS	Stuck to side of test chamber above water line
FLT	Floating on surface
CS	Crooked spine
PAL	Pale coloration
B	Buried in sediment
Test Solution / Chemical Observations	
CLDY	Cloudy
PRE	Precipitate on bottom of test chamber
FOS	Film on surface
UC	Undissolved chemical
DMF	Dimethyl formamide
TEG	Triethylene glycol
ACE	Acetone
AI	Active ingredient
WM	Whole material
PM	Particulate matter

Code	Explanation
Water Codes	
LFW	Laboratory fresh water
FSW	Filtered saltwater
UFSW	Unfiltered saltwater
DIW	De-ionized water
HSFSW	High salinity filtered saltwater
RCW	Reconstituted fresh water
RSW	Raw saltwater
Error Codes	
EE	Entry error
CE	Calculation error
IE	Illegible entry
DE	Date error
SE	Spelling error
IM	Instrument malfunction
TE	Transcription error
T	Wrong time
TN	Wrong taxon name
LE	Late entry
Food Descriptions	
BS	Brine Shrimp nauplii
BBS	Boosted brine shrimp nauplii
FBS	Frozen brine shrimp adults
CBS	Concentrated brine shrimp
FF	Flake food
PF	Pelleted food
SS	Salmon starter
YCT	Yeast/cerophyll/trout chow
SEL	Selanastrum sp. algal suspension
PBS	Platinum brine shrimp
Miscellaneous/Special Codes	
NA	Not applicable

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Jupiter, Florida

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Effective: Sept. 1999

INSTRUMENTS

ID	Description	Serial Number
YSI-2	YSI Model 58 Dissolved Oxygen Meter	G9004053
REF-3	Aquafauna Salinity Refractometer	C5526
CM90-2	Corning Model M-90 Conductivity Meter	170421
DMa	Ryan Instruments DataMentor Logger A	RYANA910052B
DMb	Ryan Instruments DataMentor Logger B	RYAN910099
FS-28	Fisher Solid State/Ultrasonic FS-28	181242
CH-3	Orion Model 230A pH Meter	013556
pH-40 #1	Corning pH-40 Sensor	L47584100017CE6
pH-40 #2	Corning pH-40 Sensor	L4758410001C3A3

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Form No: ..
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- TEST DESIGN

Sponsor: Lockheed Martin

Project Number: 0005012

Test Substance

Test Substance: Sediment (Quanta Resources)
See Page RAW2-9 of Test Sub Receipt and Usage Log for Test Substance Information.

Concentrations Based on: [ ] A.I. [✓] W.M.

Data By: SC

Date: 5-15-00

Test Conditions

[ ] Preliminary [ ] Definitive [✓] Screening

Duration: 14-day

Test Animal History

Species : L. plumulosus
Batch/Lot Number : LP00-5-2
Age/Life Stage : 3-5 mm (mixed sex)
Date Acclimation/Maintenance Began : 5-02-00
See Page LPS-2-18 of Salt H2O Invertebrate Log for maintenance conditions.

Lighting : [✓] Fluorescent [ ] Incandescent
Photoperiod : [ ] Continuous [ ] Intermittent
16 hr Light : 8 hr Dark
Light Intensity Range: _____ to _____ E/m²/s

Test Container Dimensions: ____ Dia x ____ Ht (cm)
Test Sediment Height : ~2 cm
Test Containers : [✓] Open [ ] Covered
Test Container Volume : 1.0 Liters
Dilution Water Volume : 0.800 Liters
Volume Additions per Day : minimum 2x

Dilution Water: FSW C ~10ppt

Test Area Used: WB# 3

Hard/Salt 10ppt

Target Temperature Range: 20 +/- 1 Degrees C

Reps/Concentration : 8
Animals/Replicate : 20

Protocol Followed: ASTM 1999. E1367-99

Solvent Used: NA Amt. Added: -
Solvent CTRL Concentration: -

Test Treatment:	Control	Sed A	Sed C	Sed D	Sed E	Sed F	Sed G	Sed H
Amount Control Sediment Added (g):	172.9	-	-	-	-	-	-	-
Amount Test Substance Added (g):	N/A	156.7	161.1	163.7	156.6	189.9	149.7	165.0
Test Concentration: (Units = %):	100	100	100	100	100	100	100	100

Aeration: ( ) Yes
(✓) No

Date/Time Test Substance Added: 5-15-00 1000
Date/Time Test Animals Added : 5-16-00 1305

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Form No: 2..3
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- TEST DESIGN

;ponsor: Lockheed Martin	Project Number: 0005012
Test Substance	Data By: SG — Date: 5-15-00
Test Substance: Quanta Resources Site Sediment See Page R262-9 of Test Sed. Receipt and Usage Log for Test Substance Information.	**Test Conditions** [ ] Preliminary [✓] Definitive [ ] Screening
Concentrations Based on: [ ] A.I. [✓] W.M.	Duration: 14-days
Test Animal History	Lighting : [✓] Fluorescent [ ] Incandescent Photoperiod : [ ] Continuous [✓] Intermittent 16 hr Light : 8 hr Dark Light Intensity Range: ____ to ____ $E/m^2/s$
;pecies : Leptocheirus plumulosus 3atch/Lot Number : LP00-5-2 \ge/Life Stage : 3-5mm mixed sex)ate Acclimation/Maintenance Began : 5-02-00 ;ee Page LP5-2-18 of Salt H_2O Invertebrate .og for maintenance conditions.	Test Container Dimensions: - Dia x - Ht (cm) Test Sediment Height : ~2 cm Test Containers : [✓] Open [ ] Covered Test Container Volume : 1.0 Liters Dilution Water Volume : 0.800 Liters Volume Additions per Day : minimum 2x
)ilution Water: FSW (~10ppt)	
'est Area Used: WBH3 — Hard/Sal: 10 ‰	Reps/Concentration : 8 # Animals/Replicate : 20
'arget Temperature Range: +/- Degrees C	
'rotocol Followed: ASTM 1999, E1367-99	Solvent Used: NA Amt. Added: NA Solvent CTRL Concentration: NA

'est Treatment:	Control	Sed B 1.0	Sed B 10	Sed B 50	Sed B 100			
.mount Control Sediment Added (g):	172.9	1257.6	1143.2	635.2	0			
.mount Test Substance Added (g):	N/A	12.8	127.2	635.2	158.8/rep			
'est Concentration: (Units = %):	100	1.0	10	50	100			

.eration: ( ) Yes (✓) No	Date/Time Test Substance Added: 5-15-00 1000 Date/Time Test Animals Added : 5-16-00 1305

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TEST ORGANISM REQUIREMENTS

Animal Species Required: L. plumulosus

Number of Animals: ~ 2000 | Age/Size: 3-5mm mixed sex

Day/Date Needed	S	M	T	W	T	F	S
			5.16.00				

Acclimation Requirements

Water type:
[✓] Filtered SW
[ ] Filtered FW
[ ] Unfiltered SW
[ ] Treated City Water
[ ] Reconstituted FW
[ ] Recirculating FW

Temperature: 20 ± 1°C Salinity: 10 ‰ Hardness: —

Feed before test? [✓] Yes [ ] No | If No: [ ] 24 hours [ ] 48 hours

Algal Species Required:
—

Any Special Medium or Culture Requirements?: —

Any Additional Instructions:
—

Study Number: 0005012 | Requisitioner: SG | Date: 5.16.00

Toxikon Environmental Sciences
Jupiter, Florida

Form No: 057-B
Effective: August 1997

SEDIMENT TOXICITY TEST -- INITIAL ANIMAL MEASUREMENTS

Sponsor: REAC	Project No: 000 5012
Test Substance: Sediment	Species: L. plumulosus Lot:
Observations By: SV	Date: 5-16-00
Microscope Used: Wild M3C	Method: Base of Hr antenna to the end of the 3rd pleon, along the dorsal surface.

Animal No.	Measurement: mm HCW / (L)	Animal No.	Measurement: HCW / L
1	3.5	11	4.6
2	2.5	12	3.6
3	4.2	13	3.3
4	3.2	14	3.4
5	3.1	15	3.8
6	3.8	16	3.5
7	3.1	17	3.5
8	3.7	18	4.0
9	3.9	19	3.4
10	4.2	20	3.6

HCW = Head Capsule Width

L = Body Length

Mean: 3.6 STD: 0.47

Range: 2.5 - 4.6 mm

INITIAL BIOMASS MEASUREMENTS (Dry wt.)

Number of Animals	Weight (g) Tare	Gross	Net	Weight per Animal (mg)

Tare wt. By : Date:
Balance Used:

Gross wt. By: Date:
Balance Used:

Oven Used:

Oven Temperature:

Drying Duration:

Notes/Comments:

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Jupiter, FL

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Effective: Nov. 1999

TEST ORGANISM ADDITIONS

Test Substance: Sediment	Test Organism: L. plumulosus
Study Number: 0005012	Sponsor: REAC

Test organisms were added to test chambers in accordance with SOP 6.6, Section 2.0, or as described below.

Time Test Organism Added: 1305

Addition By: SL

Date Added:

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Jupiter, Florida

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MIN/MAX TEMPERATURE RECORDS

Sponsor: REAC	Project No.: 0005012
Test Material: Sediment	Species: L. plumulosus
Min/Max Thermometer: ~~Micronta~~ Radio Shack ①	ID No: ①~~25A~~ 204
Sensor Location: WB#3.	Target Temperature: 20 +/- 1°C

Date	Time	Test Day	Temperature (°C) Current	Minimum	Maximum	Reset	Data By
5-16-00	1535	0	17.6	—	—	✓	AL
5-17-00	1525	1	18.2	17.4	18.4	✓	JK
5-18-00	1630	2	18.0	17.4	18.3	✓	AL
5-19-00	1450	3	17.8	17.4	18.1	✓	SG JK
5-20-00	1350	4	17.9	17.4	18.1	✓	JK
5-21-00	1210	5	17.7	17.4	18.0	✓	JK
5-22-00	1550	6	17.5	17.4	18.0	✓	JK
5-23-00	1650	7	17.7	17.4	18.1	✓	SG
5-24-00	1355	8	17.7	17.4	18.0	✓	SG
5-25-00	1505	9	17.6	17.4	18.1	✓	AL
5-26-00	1550	10	17.6	17.4	18.0	✓	JK
5-27-00	0925	11	17.8	17.4	18.1	✓	AL
5-28-00	0945	12	17.6	17.4	18.0	✓	AL
5-29-00	1110	13	17.4	17.4	18.0	✓	AL
5-30-00	0900	14	17.7	17.4	18.0	✓	AL

NOTE: Values recorded above are uncorrected. To correct values add/subtract (circle one) 0.~~1018~~ °C. This correction factor is obtained from the most recent comparison of the Micronta Min/Max Thermometer with the NBS thermometer (see the Temperature Monitoring Devices logbook). Date of calibration check: 2-17-00

AL 5/16

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LIGHT READINGS FOR STATIC TEST SYSTEMS

Sponsor: REAC	Project #: 0005012
Test Material: Sediment	Test Species: L. plumulosus

REP A	Trt Ctl. umols 12.0	Trt Sed. A umols 13.2	Trt Sed. C umols 11.6	Trt Sed. D umols 9.9	Trt Sed. E umols 13.6	Trt Sed. F umols 14.0	Trt Sed. G umols 14.1	
REP B	Trt Sed. H umols 15.2	Trt Sed. B 1% umols 13.6	Trt Sed. B 10% umols 13.0	Trt Sed. B 50% umols 14.2	Trt Sed. B 100% umols 12.4	Trt umols	Trt umols	

Readings By: LV	Date: 5/30/00

Meter Used: LI-COR Quantum/Radiometer/Photometer Model LI-189

Sensor Used: Quantum (2 pi) Model LI-190SA

CALCULATIONS: Lux = (umols / 12) * 1000

Treatment	umols	Lux	Treatment	umols	Lux
Control A			Control B		
A			B		
A			B		
A			B		
A			B		
A			B		
A			B		

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type:

Initial and Date all Entries: Day -1

5/15/00 JK + AL Began measuring out the
1000 sediment for the screen and definitive tests.

Screen Test

Control 2cm = 172.9g for each rep.
Sediment A 2cm = 156.7g "
Sediment C 2cm = 161.1g "
Sediment D 2cm = 163.7g "
Sediment E 2cm = 156.6g "
Sediment F 2cm = 189.9g "
Sediment G 2cm = 149.7g "
Sediment H 2cm = 165.0g "

Sediment B definitive test
100% - 158.8g measured out for each rep.
50% - 635.2g of Sediment B
635.2g of control sediment
mixed together and 158.8g was measured out for each replicate

10% - 127.2g of sediment B
1143.2g of control sediment
mixed together and 158.8g was measured

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type:

Initial and Date all Entries: ① EEG

out for each replicate

1% - 12.8 g of sediment B
1257.6 g of control sediment
mixed together and 158.8 g was
measured out for each replicate

Any sediment on the sides of the jar
or test chamber were carefully rinsed
down to the bottom with 10‰ FSW

The test chambers were filled with
10‰ FSW and placed in the water
bath

Sta 1600

- The flow through ① renewal system was filled w/ 10 ppt Lab salt
H_2O. The system was initiated to replace a minimum of two turnovers
per day per test chamber (identical to the range finding test). Please see
range finding test study log for specifics on flow-through system.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 000-012
Test Substance: Sediment	Study Type: bioassay

Initial and Date all Entries:

5-16-00 SG Day 0 SG

0810 Flow through system appears to be functioning properly H_2O table temp. = 18.8°C.

Filled the flow through holding tank (for dilution water) H_2O quality parameter collected on "fresh" dilution H_2O.

Salinity	10 ‰
D.O.	8.3 mg/L
temp.	24.3 °C
pH.	

0945 H_2O quality (D.O., temp, pH) collected for every test chamber. Salinity recorded for 1 rep of each test sit and controls.

The lowest D.O. recorded was from Sed F rep B (5.6 mg/L @ 14.6°C and 10 ppt). at 62% saturation. All test chambers are above the defined 60% saturation as defined by the protocol.

① EESC 5.16.00

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STUDY DAILY LOG

Test Sponsor: Reac	Study No: 000501R
Test Substance: Sed	Study Type: bioassay

Initial and Date all Entries:

5.16.00 SC
1305 Began initiation of animals to each respective test chamber.
20 animals/rep or 160 animals/test trt and control.

1100 observations conducted on each test trt and control.
Normal behavior was observed (burrow holes and animals actively ① observed milling around on the surface of the sed. However, animals in Sed B 50% and 100% were observed to be lethargic, on their backs, with rapid appendage movement. No presence of burrow holes was observed.
The flow-through system appeared to be running properly. Test initiation complete.
- H2O tank temp. = 18.3°C

① ~~2200~~ The following abbreviations will be used on the observations data sheet to explain observations of testing animals
B = animals are buried in the sediment
BH = Burrow holes observed
AS = at surface : animals observed @ the surface of the sed.

① EESC 5.16.00

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type:

Initial and Date all Entries: Day 01 5/17/00 1505 JK SG

Renewal Saltwater

Salinity	10 ‰
pH	7.6
DO	8.2 mg/L
temp	24.5 °C

Sa water table temp @ 18.6°C.

1500 observations conducted on each replicate test chamber. The only significant observation was that animals in the Sed B 50% and 100% test frt are @ the surface of the sediment with both slight and rapid appendage movement on their backs. No burrow holes were observed as well.

Additionally, it should be noted that Sed B 100% frt there was few burrow holes observed which can be an indicator of toxicity.

- Some animals observed @ the surface of the sed may indeed be dead but this will not be conclusive until ~~that~~ @ each replicate test chamber is sieved @ the end of the experiment on Day 14.

(1) EF.SG 5.17.00

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① EESG 5.18.00

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STUDY DAILY LOG

Test Sponsor: Rea	**Study No:** 0005012
Test Substance: Sed	**Study Type:** Sed bioassay

Initial and Date all Entries: 5.17.00

Day 01 cont.

Test Sed H rep H had a low D.O. of 3.1 mg/L @ 10 ppt and 20.6°C. Upon further investigation, it was observed that the flow-through tube had become clogged. A new line was run to the test chamber to ↑ the D.O. saturation.

2200 SG Flow through system operating properly. H_2O table temp. = 18.6°C.

Day 02

1600 SG AL Water quality measurements of renewal water.

Temp: 24.0 °C
DO: 8.2 mg/L
pH: 7.8
Sal: 10‰

1620 SG Renewal System appears to be functioning properly.

All animals appeared to be healthy except for the animals observed in Sed B. Animals on surface of sed of the ① 50% and 100% trts were on their backs w/ slight appendage movement. Several of the animals appeared to have no movement and could ① ~~possibly~~ possibly be dead. Few burrow holes were observed in the 10% Sed B Trt which can be an indicator of toxicity.

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STUDY DAILY LOG

Test Sponsor: Reas	**Study No:** 000592
Test Substance: Sediment	**Study Type:** 14-day flow-through

Initial and Date all Entries: ① EESG 5-19-00

5-19-00 1455 Day 03

SG JR Water Quality on Renewal

Saltwater:

10 ‰ - salinity

23.6 °C - temperature

@ 8.7 / 7.6 mg/L - DO

7.3 - pH

- Animals in Sed B 50 and 100% appear to be close to death. Animals are still on their sides w/ slight appendage movement. Several of the animals appear to be dead as well.

- Lowest D.O. saturation calculated to be 74% (Sed A rep B @ 6.3 mg/L, 10 ‰, and 19.1°C.).

- Flow through systems appears to be functioning properly. H_2O fresh @ 18.5°C.

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① EE JK 5/20/00

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STUDY DAILY LOG 0005012

Test Sponsor: REAC	**Study No:** ① ~~00050~~
Test Substance: sediment	**Study Type:** 14 day flow-through

Initial and Date all Entries:

5-20-00 Water Quality on saltwater renewal
JK temp 23.2°C
DO 8.7 mg/L
Salinity 10‰
pH 7.8

Control replicate E - the dissolved oxygen was low (4.6 mg/L) because the renewal line was no longer in the test chamber. The renewal line was placed back in the test chamber. The DO will be checked again later after a renewal occurs

5-21-00 Water Quality on renewal saltwater
JK temp 23.2°C
DO 8.6 mg/L
salinity 10‰
pH 7.7

1600 SG Observations conducted on Lepto tests Animals in Sed B 50 and 100% are begining to die. There are still some slight appendage movement, however. Animals in Sed B 10% ① are producing few BH's as well as several ① reps in Sed B 1%.

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** 14 day Flow Through

Initial and Date all Entries:

5-22-00 Day 06 Water Quality on renewal saltwater

JK SG pH 7.6

1600 temp 24.3 °C

DO 8.0 mg/L

Salinity 10‰

5-22-00 SG 1600 Observations concluded that several animals in Seds C, D, E, G and H were @ the surface of the sed and lethargic. Animals observed in Sed B 50% and 100% are very lethargic and will most likely be dead in the next few hours. The ~~animals in~~ animals ① in Sed B and 10% are not producing as many burrow holes as the controls and other testing seds.

Day 07

5-23-00 SG - H_2O table temp. = 18.3°C

0830 - Flow through system appears to be functioning properly.

1540 SG NH_3 samples collected on this day 07 of the test.

EF SG 5-22-00

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 000502
Test Substance: Sediment	Study Type: Sed bioassay

Initial and Date all Entries:

5/23/00 1605 Water Quality on renewal saltwater
salinity 10 ‰
pH 7.4
DO 7.9 mg/L
temp 24.3 °C

Day 08

5-24-00 SG Flow through system appears to be functioning properly.
H2O table temp. = 18.3°C.

1325 SG Water quality on renewal
Salt water.
Salinity 10‰
DO 8.0 mg/L
Temp 24.2°C
pH 7.3

1330 SG Observations collected. Several animals noted on surface of seds and lethargic. (See observations datasheet for this day 08 of the test). Animals in Sed B trts are beginning to die and decompose. Only live animals are being counted @ the surface of sed as decaying animals are difficult to count.

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① EE JRS 5/26/00

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** 14 day flow-through

Initial and Date all Entries:

5-25-00 9510 AL JR — Water quality measurments of renewal water:

Salinity 10‰
Temp 23.9°C
DO 8.0 mg/L
pH 7.7

5-26-00 JK 1415 — Prepared re-burial cups. Placed approximately 1cm of control sediment in each plastic cup with about an inch of 10‰ FSW. The re-burial cups were placed in the cryofridge until Monday 5/29/00. Monday they will be placed ① in the waterbath to reach temperature

5/26/00 JK 1500

Water Quality on renewal saltwater

pH
salinity 10‰
temp 23.9°C
DO 8.2 mg/L

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 0005012
Test Substance: Sediment	Study Type: 14-day flow through

Initial and Date all Entries:

5-27-00 1000 AL — Water Quality measurements of renewal water
Salinity - 10‰
Temp - 24.3°C
DO - 8.4 mg/L
pH - 7.8

5-28-00 1020 AL — Water Quality of renewal water
Salinity - 10‰
Temp - 23.7°C
DO - 8.5 mg/L
pH - 7.6

5-29-00 1130 AL — Water Quality of renewal H_2O
Salinity - 10‰
Temp - 23.5°C
DO - 7.9
pH - 7.5

5-30-00 0120 AL — Reburial cups placed on waterbath. More overlying water with a salinity of 10‰ was added.

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** Sediment bioassay

Initial and Date all Entries:

5-30-00 Test Termination —

Day 14 observations on sediment

JK, SG reburial endpoint. specific for each replicate tot chamber can be found in the survival and observations datasheet for this day

Control - animals are very active, digging in the sediment and swimming around

Sediment A - animals are not as active when compared to the control animals some animals laid on the sediment and did not bury

Sediment C - The sediment has a petroleum odor there is a brown oil like film on the surface of the dilution water - in the holding chamber before reburial. There are concentrated brown oil spots floating on the surface. The oil film is adhering to the pipette Replicate G had the strongest

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STUDY DAILY LOG

Test Sponsor: REAC	Study No: 0005012
Test Substance: Sediment	Study Type: L. plumulosus

Initial and Date all Entries:

sediment C (continued) - petroleum odor and the most film 3 animals were stuck in the film alive

Sediment D - animals are active - digging swimming & burying in the sediment

Sediment E - animals immediately buried animals are active

Sediment F - animals are active animals immediately buried

Sediment G - Animals are active & immediately buried

Sediment H - Animals are active & immediately buried

Sediment B 1% - Animals are active & immediately buried

Sediment B 10% - Some oily patches on water surface. Animals are active & immediately buried

Sediment B 50% - Heavier oily patches on water surface. Very few live animals found

Sediment B 100% - Thick oily patches on water surface

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: Sediment	**Study Type:** Sed bioassay

Initial and Date all Entries:

5-30-00 Day 14 Test termination of Lepto 14-day sediment bioassay.

0830 H_2O table @ 18.4°C. Flow through system operating correctly.

0900 Water quality collected for each test replicate (D.O. and pH).

0920 Ammonia samples collected as a composite for each test trt and control

1000 Began termination of experiment by wet sieving the contents of each test chamber through a stainless steel sieve (0.5mm mesh). Dilution water was used for the sieving process. The ① animals were transferred into a clear glass dish which was placed on a light table. Observations of survival and any observable sublethal effects were noted. The surviving animals were then transferred via pipette to the previous described animal reburial containers. All animals were allowed a maximum of 5 minutes to rebury into the clean control sediments.

- After the reburial observations, the ① animals were resieved (0.5mm mesh), rinsed ① w/ DI water, and placed into tared AL weigh boats and drying oven set @ 60°C.

① EFSG 5-30-00

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STUDY DAILY LOG

Test Sponsor: REAC	**Study No:** 0005012
Test Substance: sediment	**Study Type:** Sed bioassay

Initial and Date all Entries: Day 14 cont.

5-30-00 SG * Sed D rep G 1 animal was lost in transfer to oven. Thus, total # @ termination of test to survive was 20 but total # weighed for dry wt. analysis was only 19 for this replicate test chamber.

5-31-00 1300 SG Animals taken out of drying oven and placed into dessicator to cool slowly to room temperature.

6-2-00 AL 0830 Dry weights were taken.

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Form No: 261
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SALTWATER MEASUREMENTS

Sponsor: REAC		Project No: 0005012	
Test Substance: sediment		Test Species: L. plumulosus	
Test Day: 0	By: JR AR	Test Day: 1	By: SV
Date: 5-16-00	Time: 1010	Date: 5/23/00	Time: 1300
Treatment	Salinity ‰	Treatment	Salinity
Control	10	Control	10
Sed A	10	Sed A	10
Sed C	10	C	10
Sed D	10	D	10
Sed E	10	E	10
Sed F	10	F	10
Sed G	10	G	10
Sed H	10	H	10
Sed B 1%	10	B 1%	10
Sed B 10%	10	B 10%	10
Sed B 50%	10	B 50%	10
Sed B 100%	10	B 100%	10
Meter Used:	Ref. # 3	Meter Used:	Ref #3
Comments:		Comments:	

Toxikon Corporation
Jupiter, Florida

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: RiAc

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JR AL	Test Day (TD): 0 Date: 5.16.00 0945				By: SG	TD: 1 Date: 5/17/00	By: SG AL	TD: 2 Date: 5-18-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Control	A	19.7	7.6	6.8	7.5	7.4	7.8	7.3
	B	20.1	7.6	6.9	7.5	7.5	7.8	7.3
	C	20.1	7.7	7.2	7.5	7.5	7.7	7.3
	D	20.0	7.7	7.1	7.5	7.4	7.7	7.1
	E	20.4	7.7	7.1	7.5	7.3	7.7	7.0
	F	20.0	7.7	7.0	7.5	7.6	7.7	7.2
	G	20.2	7.7	7.1	7.5	7.5	7.7	7.2
	H	20.1	7.7	7.0	7.5	7.4	7.7	7.0
Sed A	A	19.9	7.7	6.8	7.4	6.8	7.7	6.7
	B	19.7	7.7	7.0	7.4	6.5	7.7	6.7
	C	19.9	7.7	6.8	7.4	7.1	7.7	6.7
	D	20.0	7.7	6.7	7.4	7.1	7.7	6.8
	E	19.3	7.7	6.5	7.4	7.1	7.7	6.8
	F	19.7	7.7	6.7	7.4	7.1	7.7	6.8
	G	19.8	7.7	6.7	7.5	7.0	7.7	6.8
	H	20.0	7.7	6.6	7.4	7.0	7.7	7.0
Sed C	A	19.5	7.6	6.2	7.4	6.7	7.7	6.8
	B	19.6	7.6	5.9	7.4	6.6	~~7.8~~ 7.7	6.8
	C	19.2	7.6	6.1	7.4	6.7	7.7	6.6
	D	19.0	7.6	5.8	7.4	6.7	7.7	6.7
	E	19.5	7.6	6.3	7.4	7.0	7.7	6.9
	F	20.0	7.6	6.4	7.5	7.2	7.7	7.0
	G	20.1	7.6	6.4	7.5	7.3	7.7	7.0
	H	19.3	7.6	6.0	7.5	7.1	7.7	6.9

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: Reac	Project No: 0005012
Test Substance: sediment	Test Species: L. plumulosa

By: JR AL SG	Test Day (TD): 0 Date: 5-16-00				By: SG JR	TD: 1 Date: 5/17/00	By: SG AL	TD: 2 Date: 5-18-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed D	A	19.1	7.7	6.3	7.5	7.2	7.7	7.1
	B	19.4	7.7	6.0	7.5	7.5	7.7	7.2
	C	19.6	7.7	6.2	7.5	7.4	7.7	7.3
	D	19.9	7.6	5.9	7.5	7.1	7.7	7.0
	E	19.5	7.6	6.1	7.5	7.0	7.7	7.0
	F	19.1	7.6	5.8	7.5	7.0	7.7	6.8
	G	19.7	7.7	6.2	7.5	7.4	7.7	7.1
	H	19.9	7.7	5.8	7.5	6.0	7.7	7.1
Sed E	A	19.9	7.7	6.3	7.5	6.4	7.7	7.0
	B	19.7	7.7	6.0	7.5	6.8	7.7	6.8
	C	19.3	7.7	6.2	7.5	6.8	7.7	6.8
	D	19.6	7.7	6.2	7.5	7.2	7.7	7.0
	E	20.1	7.7	5.8	7.5	7.2	7.7	7.0
	F	20.3	7.7	6.0	7.5	7.1	7.7	6.9
	G	19.9	7.7	6.1	7.5	7.0	7.7	6.8
	H	19.3	7.7	6.0	7.5	6.7	7.7	6.5
Sed F	A	19.4	7.7	6.3	7.5	7.0	7.7	6.8
	B	19.6	7.7	5.6	7.5	7.1	7.7	6.8
	C	19.9	7.7	5.9	7.5	7.1	7.7	6.6
	D	19.4	7.7	6.0	7.5	7.0	7.7	6.6
	E	19.2	7.7	5.8	7.5	7.0	7.7	6.5
	F	19.4	7.7	6.1	7.5	7.4	7.7	6.8
	G	19.7	7.7	5.9	7.5	6.8	7.7	7.0
	H	19.8	7.7	6.0	7.5	6.7	7.7	6.9

① EF, SG 5-18-00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: JR AL	Test Day (TD): 0 Date: 5-16-00				SG By: JR	TD: 1 Date: 5/17/00	SG By: AL	TD: 2 Date: 5-18-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. G	A	19.5	7.7	6.2	7.5	7.0	7.7	6.8
	B	19.1	7.7	6.1	7.5	7.0	7.7	6.8
	C	19.9	7.7	6.0	7.5	7.1	7.7	6.8
	D	19.8	7.7	6.1	7.5	7.1	7.7	6.9
	E	20.2	7.7	6.1	7.5	7.1	7.7	6.8
	F	20.1	7.7	6.1	7.6	7.1	7.7	6.8
	G	20.0	7.7	6.1	7.5	7.0	7.7	6.7
	H	19.9	7.7	6.1	7.5	7.1	7.7	6.8
Sed. H	A	19.8	7.7	6.0	7.6	7.1	7.7	6.9
	B	19.9	7.7	5.9	7.6	7.3	7.7	6.8
	C	20.1	7.7	5.9	7.6	7.1	7.7	6.7
	D	19.5	7.7	6.0	7.6	7.0	7.7	6.6
	E	19.9	7.7	6.0	7.6	7.1	7.7	6.9
	F	20.2	7.7	6.1	7.6	7.2	7.7	7.0
	G	20.4	7.7	6.2	7.6	7.1	7.7	6.9
	H	19.6	7.7	6.2	7.4 / 20.6°C	3.1	7.7	7.0
Sed. B 1%	A	19.2	7.8	6.9	7.5	6.9	7.7	6.8
	B	19.9	7.8	7.1	7.6	7.1	7.7	7.1
	C	20.4	7.8	7.1	7.6	7.2	7.7	7.1
	D	20.2	7.8	7.2	7.6	7.2	7.7	7.1
	E	19.8	7.8	7.0	7.6	7.2	7.7	7.0
	F	19.7	7.8	7.2	7.6	7.2	7.7	7.0
	G	20.2	7.8	7.1	7.6	7.4	7.7	7.1
	H	20.3	7.8	6.9	7.6	7.5	7.7	7.2

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① EE JR 5/17/00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: JR AL	Test Day (TD): 0 Date: 5-16-00				SG By: JR	TD: 1 Date: 5/17/00	SG By: AL	TD: 2 Date: 5/18/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. B 10%	A	20.5	7.8	7.0	7.6	7.4	7.7	7.2
	B	20.3	7.8	7.1	7.6	7.3	7.7	7.1
	C	20.5	7.8	7.1	7.6	7.3	7.7	7.1
	D	20.1	7.8	7.2	7.6	7.5	7.7	7.1
	E	20.4	7.8	7.1	7.6	7.6	7.7	7.3
	F	20.3	7.8	7.1	7.6	7.5	7.7	7.2
	G	20.3	7.8	7.3	7.6	7.5	7.8	7.2
	H	19.5	7.8	7.0	7.6	① 57.4	7.8	7.2
Sed. B 50%	A	19.6	7.8	6.9	7.6	7.1	7.7	7.1
	B	19.9	7.8	6.9	7.6	7.2	7.7	7.2
	C	19.6	7.8	6.8	7.6	7.1	7.7	7.1
	D	19.5	7.8	7.0	7.6	7.1	7.7	7.1
	E	19.8	7.8	7.0	7.6	7.0	7.7	7.0
	F	20.2	7.8	6.8	7.6	7.0	7.7	7.1
	G	19.6	7.8	6.5	7.6	7.0	7.7	7.0
	H	19.8	7.8	6.6	7.6	7.1	7.7	7.0
Sed. B 100%	A	19.6	7.7	6.4	7.6	7.0	7.7	7.0
	B	19.7	7.7	6.6	7.6	7.0	7.7	6.8
	C	19.6	7.7	6.2	7.6	6.9	7.7	7.0
	D	19.8	7.7	6.3	7.6	7.1	7.7	7.0
	E	19.5	7.7	6.4	7.6	6.8	7.7	6.7
	F	19.9	7.7	6.3	7.6	6.8	7.7	6.7
	G	19.6	7.7	6.1	7.6	6.9	7.7	6.6
	H	19.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(2) EE JK 5/21/00 (1) EE JK 5/19/00 (*) See study log on 5/20/00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG JK	Test Day (TD): 3 Date: 5-19-00	By: JK	TD: 4 Date: 5/20/00	By: JK	TD: 5 Date: 5/21/00

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Control	A	N/A	7.2	7.0	7.7	7.0	7.4	7.0
	B		7.2	(1) ~~7.5~~ 6.8	7.7	7.1	7.4	7.0
	C		7.2	(1) ~~7.4~~ 6.9	7.7	7.1	7.4	7.0
	D		7.2	(1) ~~7.4~~ 6.9	7.7	7.1	7.4	6.7
	E		7.1	(1) ~~7.5~~ 6.7	7.7	(*) 4.6 [18.4c]	7.4	6.5
	F		7.1	(1) ~~7.7~~ 6.5	7.7	7.0	7.4	6.3
	G		7.1	(1) ~~7.6~~ 6.9	7.7	7.0	7.4	(2) ~~6.2~~ 6.5
	H		7.1	(1) ~~7.7~~ 6.9	7.7	7.0	7.4	6.5
Sed. A	A		7.1	(1) ~~7.4~~ 6.8	7.7	6.8	7.4	7.0
	B		7.1	(1) ~~6.8~~ 6.3	7.8	6.9	7.5	6.9
	C		7.1	(1) ~~7.7~~ 7.2	7.8	7.3	7.5	7.0
	D		7.1	(1) ~~8.0~~ 7.2	7.8	7.1	7.5	6.9
	E		7.1	(1) ~~7.9~~ 7.2	7.8	7.0	7.5	6.6
	F		7.1	(1) ~~7.9~~ 7.3	7.8	7.1	7.5	6.6
	G		7.2	(1) ~~7.9~~ 7.4	7.8	7.1	7.5	6.8
	H		7.2	(1) ~~7.9~~ 7.4	7.8	6.8	7.5	6.9
Sed. C	A		7.1	6.3	7.8	6.9	7.5	6.7
	B		7.1	6.5	7.8	7.0	7.5	6.7
	C		7.1	6.7	7.8	6.9	7.5	6.6
	D		7.1	6.8	7.8	6.9	7.5	6.6
	E		7.2	6.9	7.8	7.2	7.5	6.9
	F		7.2	7.1	7.8	7.3	7.6	6.9
	G		7.2	7.2	7.8	7.2	7.6	6.9
	H		7.2	7.1	7.8	7.1	7.6	6.7

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DEE JK 5/20/00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG JK	Test Day (TD): 3 Date: 5/19/00				By: JK	TD: 4 Date: 5/20/00	By: JK	TD: 5 Date: 5/21/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. D	A	N/A	7.2	7.2	7.8	7.2	7.5	6.8
	B		7.2	7.0	7.8	6.5	7.5	6.7
	C		7.2	7.1	7.8	6.6	7.5	6.7
	D		7.2	7.1	7.8	6.7	7.5	6.1
	E		7.2	7.0	7.8	6.7	7.5	6.5
	F		7.2	7.0	7.8	6.7	7.5	6.6
	G		7.2	7.1	7.8	6.9	7.5	6.9
	H		7.2	7.2	7.8	6.7	7.5	6.2
Sed. E	A		7.2	7.1	7.8	7.0	7.5	6.5
	B		7.2	7.1	7.8	6.9	7.5	6.6
	C		7.2	7.1	7.8	6.9	7.5	6.7
	D		7.2	7.0	7.8	6.6	7.5	6.5
	E		7.2	7.2	7.8	6.8	7.5	6.6
	F		7.2	7.1	7.8	~~6.6~~ 6.8	7.5	6.5
	G		7.2	6.9	7.8	6.6	7.5	6.5
	H		7.2	6.5	7.8	6.4	7.5	6.4
Sed P	A		7.2	6.7	7.8	7.1	7.5	7.0
	B		7.2	6.7	7.8	6.1	7.5	6.4
	C		7.2	6.7	7.8	6.5	7.5	6.5
	D		7.2	6.7	7.8	6.6	7.5	6.5
	E		7.2	6.7	7.8	6.3	7.5	6.4
	F		7.2	6.9	7.8	6.7	7.5	6.8
	G		7.2	6.8	7.8	6.8	7.5	6.5
	H		7.2	6.9	7.8	6.8	7.5	6.5

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG JK	Test Day (TD): 3 Date: 5/19/00				By: JK	TD: 4 Date: 5/20/00	By: JK	TD: 5 Date: 5/21/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. G	A	N/A	7.2	6.7	7.8	6.7	7.5	6.9
	B		7.2	6.8		6.8	7.5	6.6
	C		7.2	7.1		6.8	7.5	6.7
	D		7.2	7.1		6.9	7.5	6.6
	E		7.2	7.0		6.9	7.5	6.4
	F		7.2	6.9		6.8	7.5	6.4
	G		7.2	6.8		6.8	7.5	6.4
	H		7.2	7.2		7.0	7.5	6.6
Sed. H	A		7.2	7.2		7.1	7.5	6.7
	B		7.3	7.1		7.1	7.5	6.6
	C		7.3	7.1		6.9	7.5	6.5
	D		7.3	6.9		6.9	7.6	6.6
	E		7.2	7.1		7.0	7.6	6.8
	F		7.2	7.2		7.2	7.6	6.9
	G		7.3	7.1		7.0	7.6	6.9
	H		7.3	7.1		6.9	7.6	6.9
Sed. B 1%	A		7.3	7.2		7.1	7.6	6.8
	B		7.2	7.3		7.0	7.5	7.0
	C		7.2	7.3		7.0	7.5	6.9
	D		7.2	7.3		7.0	7.5	7.0
	E		7.2	7.2		7.1	7.5	7.0
	F		7.2	7.2		7.0	7.5	7.6
	G		7.2	7.4		7.1	7.5	7.0
	H		7.2	7.2		7.2	7.5	6.8

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG JM	Test Day (TD): 3 Date: 5/19/00				By: JM	TD: 4 Date: 5/20/00	By: JM	TD: 5 Date: 5/21/00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. B 10%	A	N/A	7.2	7.4	7.8	7.5	7.5	7.1
	B		7.2	7.5		7.4	7.5	7.2
	C		7.2	7.4		7.3	7.5	7.2
	D		7.2	7.5		7.0	7.5	7.2
	E		7.2	7.7		7.3	7.5	7.2
	F		7.2	7.6		7.3	7.5	7.2
	G		7.2	7.6		7.3	7.5	7.1
	H		7.2	7.6		7.3	7.5	7.0
Sed. B 50%	A		7.2	7.7		7.2	7.5	7.0
	B		7.2	7.7		7.2	7.5	7.0
	C		7.2	7.6		7.2	7.5	6.9
	D		7.2	7.4		7.2	7.5	7.0
	E		7.2	7.4		7.2	7.5	7.0
	F		7.2	7.4		7.2	7.5	7.2
	G		7.2	7.4		7.2	7.5	7.1
	H		7.2	7.3		7.1	7.5	7.1
Sed. B 100%	A		7.2	7.4		7.1	7.5	6.9
	B		7.2	7.4		7.0	7.4	6.8
	C		7.2	7.1		6.9	7.5	6.8
	D		7.2	7.2		6.8	7.4	6.7
	E		7.2	7.0		7.0	7.4	6.6
	F		7.2	7.0		6.8	7.4	6.5
	G		7.2	7.0		6.8	7.5	6.7
	H		7.2	7.3		7.0	7.4	6.3

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①EE
JK 5/22/00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG JK	Test Day (TD): 6 Date: 5-22-00	SG By: JK	TD: 7 Date: 5/23	By: SG JK	TD: 8 Date: 5/24

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Control	A	N/A	7.5	7.3	7.5	6.9	7.3	7.3
	B		7.5	7.3	7.5	7.0	7.3	7.4
	C		7.5	7.1	7.5	7.0	7.3	7.3
	D		7.5	7.1	7.5	6.9	7.3	7.3
	E		7.5	6.9	7.5	6.8	7.3	7.1
	F		7.5	7.2	7.5	7.0	7.3	7.4
	G		7.5	7.0	7.5	6.9	7.3	7.1
	H		7.5	6.9	7.5	6.9	7.3	6.9
Sed. A	A		7.5	6.8	7.5	6.7	7.3	6.8
	B		7.5	6.9	7.5	6.8	7.4	6.9
	C		7.5	7.1	7.5	6.9	7.4	7.1
	D		①7.6 7.6	7.1	7.5	7.0	7.4	7.1
	E		7.6	7.0	7.5	6.8	7.4	7.1
	F		7.5	6.9	7.5	6.8	7.4	7.0
	G		7.6	6.9	7.5	6.8	7.4	6.8
	H		7.6	6.9	7.5	7.0	7.4	7.1
Sed. C	A		7.6	6.8	7.5	6.8	7.5	6.9
	B		7.6	6.7	7.6	6.7	7.5	6.9
	C		7.6	6.7	7.6	6.7	7.5	6.7
	D		7.6	6.6	7.6	6.7	7.5	6.7
	E		7.6	6.8	7.6	6.8	7.5	6.6
	F		7.6	6.8	7.6	6.8	7.5	6.7
	G		7.6	6.8	7.6	6.7	7.5	6.7
	H		7.6	6.7	7.6	6.7	7.5	6.7

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Jupiter, Florida

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Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG JL	Test Day (TD): 4 Date: 5-22-00				SG By: JL	TD: 7 Date: 5/23	By: SG AL	TD: 8 Date: 5/24
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. D	A	N/A	7.6	6.8	7.6	6.7	7.5	6.7
	B		7.6	7.0		6.7	7.5	7.0
	C		7.6	7.0		6.9	7.5	6.8
	D		7.6	6.8		6.9	7.5	6.8
	E		7.6	6.7		6.7	7.5	6.6
	F		7.6	6.7		6.7	7.5	6.5
	G		7.6	6.9		6.5	7.5	6.7
	H		7.6	6.8		6.8	7.5	6.8
Sed. E	A		7.6	6.7		6.7	7.5	6.6
	B		7.6	6.7		6.5	7.5	6.4
	C		7.6	6.7		6.4	7.5	6.4
	D		7.6	6.9		6.5	7.5	6.7
	E		7.6	7.0		6.7	7.5	6.7
	F		7.6	6.9		6.8	7.5	6.8
	G		7.6	6.8		6.8	7.5	6.7
	H		7.6	6.7		6.8	7.5	6.4
Sed. F	A		7.6	6.8		6.5	7.5	6.6
	B		7.6	6.9		6.7	7.5	6.8
	C		7.6	6.8		6.7	7.5	6.7
	D		7.6	6.8		6.7	7.5	6.5
	E		7.6	6.8		6.5	7.5	6.6
	F		7.6	6.8		6.5	7.5	6.7
	G		7.6	6.9		6.7	7.5	6.8
	H		[illegible]	[illegible]		6.8	7.5	6.7

Toxikon Corporation
Jupiter, Florida

① EE JK 5/23/00

Form: 260
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. Plumulosus

By: SG JK	Test Day (TD): 6 Date: 5-22-00	SG By: JK	TD: 7 Date: 5/23	By: SG AR	TD: 8 Date: 5/24

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. G	A	N/A	7.6	6.8	7.6	6.7	7.5	6.6
	B		7.6	6.7		6.9	7.5	6.4
	C		7.6	6.8		6.8	7.5	6.8
	D		7.6	6.9		6.8	7.5	6.9
	E		7.6	6.8		6.7	7.5	6.8
	F		7.6	6.8		6.6	7.5	6.7
	G		7.6	6.7		6.7	7.5	6.6
	H		7.6	6.8		6.7	7.5	6.7
Sed. H	A		7.6	6.8		6.7	7.6	6.8
	B		7.6	6.7		6.6	7.6	6.7
	C		7.6	6.6		6.5	7.6	6.7
	D		7.6	6.6	7.7	6.5	7.6	6.6
	E		7.6	6.7	7.7	6.7	7.6	6.8
	F		7.6	6.8	7.7	① ~~6.8~~ 6.7	7.6	6.9
	G		7.6	6.7	7.7	6.8	7.6	6.8
	H		7.7	6.7	7.7	6.6	7.6	6.7
Sed. B 1%	A		7.6	6.7	7.7	6.5	7.6	6.6
	B		7.6	6.9	7.6	6.7	7.6	6.9
	C		7.6	7.1		6.8	7.6	6.9
	D		7.6	7.0		6.8	7.6	6.9
	E		7.6	7.0		6.8	7.4	6.8
	F		7.6	7.0		6.7	7.6	6.8
	G		7.6	7.0		6.8	7.6	6.8
	H		7.6	7.0		6.9	7.6	7.0

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: JK 96	Test Day (TD): 6 Date: 5-22-00				SG By: JK	TD: 7 Date: 5/23	By: SG AL	TD: 8 Date: 5/24
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. B 10%	A	N/A	7.6	6.9	7.6	6.8	7.4	6.9
	B		7.6	7.0		6.9	7.4	7.1
	C		7.6	7.1		7.0	7.6	7.0
	D		7.6	7.1		7.0	7.6	7.0
	E		7.6	7.2		7.0	7.4	7.0
	F		7.6	7.2		7.0	7.6	7.0
	G		7.6	7.1		7.0	7.6	7.0
	H		7.6	7.0		6.8	7.6	7.0
Sed. B 50%	A		7.6	7.1		7.0	7.6	7.0
	B		7.6	7.3		7.0	7.4	7.1
	C		7.6	7.2		6.9	7.6	7.0
	D		7.6	7.0		6.8	7.5	6.7
	E		7.6	7.0		6.8	7.4	6.7
	F		7.6	7.0		6.8	7.4	6.8
	G		7.6	7.1		7.0	7.4	7.0
	H		7.6	7.1		6.9	7.4	7.0
Sed. B 100%	A		7.6	7.0	7.7	6.8	7.4	6.8
	B		7.6	7.0		6.8	7.4	6.8
	C		7.6	7.0		6.8	7.4	6.8
	D		7.6	7.0		6.7	7.6	6.8
	E		7.6	6.9		6.7	7.5	6.9
	F		7.6	6.8		6.5	7.6	6.6
	G		7.6	6.7		6.7	7.6	6.5
	H		7.6	6.8		6.5	[illegible]	6.8

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JP / AL	Test Day (TD): 9 Date: 5-25-00				By: NB / AK	TD: 10 Date: 5/26	By: AL	TD: 11 Date: 5/27
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. D	A		7.8	7.1	7.7	7.2	8.1	7.2
	B		7.8	7.0		7.1		6.5
	C		7.8	6.7		6.9		6.5
	D		7.8	6.5		6.9		6.5
	E		7.8	6.6		6.8		6.4
	F		7.8	6.6		6.9		6.4
	G		7.8	6.6		6.9		6.6
	H		7.8	6.7		7.0		5.8
Sed. E	A		7.7	6.5	7.7	6.6	8.1	6.7
	B		7.7	6.6		6.7		6.6
	C		7.7	6.6		6.7		6.6
	D		7.7	6.7		7.0		6.5
	E		7.7	6.7		6.9		6.5
	F		7.7	6.8		6.9	8.0	6.5
	G		7.7	6.7		6.7	8.1	6.4
	H		7.7	6.5		6.6	8.1	6.0
Sed. F	A		7.7	6.6	7.7	7.0	8.1	7.0
	B		7.7	6.6		7.0		6.9
	C		7.7	6.7		6.9		6.5
	D		7.7	6.7		6.8		6.5
	E		7.7	6.7		6.8		6.5
	F		7.7	7.1		6.7		6.9
	G		7.7	6.5		6.7		6.7
	H		7.7	[illegible]		[illegible]		[illegible]

① EEAL 5/27/00

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: AR	Test Day (TD): 9 Date: 5-25-00				By: AR	TD: 10 Date: 5/26	By: AR	TD: 11 Date: 5/27
Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Control	A		7.6	6.7	7.5	6.7	7.8	6.9
	B		7.6	6.7		6.7		6.8
	C		7.6	6.6		6.7		6.9
	D		7.6	6.7		6.7		6.9
	E		7.6	6.8		6.8		6.8
	F		7.5	6.7		6.9		5.5
	G		7.5	6.4		6.7		6.7
	H		7.6	6.7		6.8		6.7
Sed. A	A		7.6	6.8	7.6	6.7	7.9	6.5
	B		① 7.7 ~~7.6~~	7.0		6.8		6.8
	C		7.7	7.1		7.0		7.1
	D		7.7	7.1		7.1		7.1
	E		7.7	7.1		7.0		7.1
	F		7.7	7.0		7.0	8.0	7.0
	G		7.7	7.0	7.7	7.0	8.0	7.0
	H		7.7	6.5	7.7	7.1	8.0	6.7
Sed. C	A		7.8	6.6	7.7	7.1	8.0	6.7
	B		7.8	6.7		7.1		6.8
	C		7.8	6.7		7.1		7.0
	D		7.8	6.6 ~~6.4~~		7.1		7.0
	E		7.8	6.6		7.1		7.2
	F		7.8	6.7		7.1		7.0
	G		7.8	6.7		7.0		7.0
	H		7.8	6.9		7.1		7.2

① EEW 5-25-00

① EEW 5-26

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC		Project No: 0005012	
Test Substance: Sediment		Test Species: L. plumulosus	
By: JR AL	Test Day (TD): 9 Date: 5-25-00	By: MS TR	TD: 10 Date: 5/26
By: AL	TD: 11 Date: 5/27		

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. G	A		7.8	6.8	7.8	6.7	8.1	6.7
	B		7.8	6.7		6.6		6.7
	C		7.8	6.8		6.9		6.7
	D		7.8	6.7		6.7		6.6
	E		7.8	6.6		6.7		6.7
	F		7.8	6.6		6.7		6.6
	G		7.8	6.7		6.6		6.5
	H		7.8	6.7		6.7		6.9
Sed. H	A		7.8	6.6	7.8	6.8	8.1	② ~~8.1~~ 6.8
	B		7.8	6.6		6.8	8.1	6.8
	C		7.8	6.6		6.8	8.1	6.7
	D		7.8	6.7		6.8	8.2	② ~~8.2~~ 6.6
	E		7.8	6.8		6.8		6.3
	F		7.8	6.8		6.7		6.5
	G		7.8	6.8		6.6		6.7
	H		7.8	6.8		6.6		6.7
Sed. B 1%	A		7.7	6.9	7.7	6.8	8.1	6.8
	B		7.7	6.8		7.1		6.3
	C		7.7	6.9		6.9		6.5
	D		7.7	6.9		6.8		6.6
	E		7.7	6.9		6.8		7.0
	F		7.7	6.9		6.8		7.1
	G		7.7	① ~~9~~ 7.1		6.9		6.5
	H		[illegible]	7[illegible]		[illegible]		[illegible]7

② EE AL 5/2[illegible]

① EE AL 5/25

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediment | Test Species: L. plumulosus

By: JR AL	Test Day (TD): 9 Date: 5-25-00	By: JR MB	TD: 10 Date: 5/26	By: AL	TD: 11 Date: 5/27

Treatment	Rep	Temp	pH	D.O.	~~Temp~~ pH	D.O.	~~Temp~~ pH	D.O.
Sed. B 10%	A		7.7	7.1	7.7	6.9	8.1	6.9
	B		7.7	~~7.7~~ 7.1		6.9		7.1
	C		7.7	7.1		7.0		7.2
	D		7.7	7.1		7.0		6.4
	E		7.7	7.0		7.0		6.8
	F		7.7	7.0		7.0		7.1
	G		7.7	7.0		6.9		7.2
	H		7.7	6.9		6.7		7.3
Sed. B 50%	A		7.7	6.9	7.7	6.8	8.1	6.8
	B		7.7	6.9		6.9		7.0
	C		7.7	6.9		6.7		7.2
	D		7.7	6.8		6.7		7.2
	E		7.7	6.8		6.7		7.1
	F		7.7	6.9		6.8		6.9
	G		7.7	6.8		6.8		7.0
	H		7.7	6.8		6.8		7.0
Sed. B 100%	A		7.6	6.9	7.7	6.8	8.1	7.1
	B		7.6	6.8	7.6	6.8	8.0	7.0
	C		7.7	6.6		6.5	8.0	6.9
	D		7.7	6.5		6.6	8.0	7.1
	E		7.7	6.5	7.7	6.5	8.1	7.2
	F		7.7	6.5		6.6	8.1	7.1
	G		7.7	6.5		6.6	8.1	7.0
	H							

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediment | Test Species: L. plumulosus

By: AL	Test Day (TD): 12 Date: 5-28-00				By: AL pH	TD: 13 Date: 5-29-00	By: AL	TD: 14 Date: 5-30-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~	D.O.	~~Temp~~ pH	D.O.
Control	A		7.6	7.4	7.6	6.9	7.4	6.7
	B			7.3	7.6	6.4		6.6
	C			7.3	7.6	6.2		6.4
	D			7.2	7.6	6.2		6.4
	E			7.1	7.6	6.1		6.3
	F			6.9	7.5	6.1		6.3
	G		7.7	7.0	7.6	5.7	7.5	6.0
	H		7.7	7.0	7.6	5.8	7.5	6.1
Sed. A	A		7.9	7.0	7.8	5.9	7.6	6.3
	B			7.2		6.0		6.3
	C			7.1		6.1		6.6
	D			7.1		6.3		6.5
	E			7.2		6.3	7.7	6.4
	F			7.2		6.3		6.3
	G			7.2		6.2		6.3
	H			7.1		6.4		6.6
Sed. C	A		7.9	7.1	7.8	6.4	7.7	6.6
	B			7.2		6.3		6.5
	C			7.2		6.3		6.3
	D			7.1		6.2		6.2
	E			7.1		6.2		6.3
	F			7.2		6.2		6.3
	G			7.1		6.2		6.4

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediment | Test Species: L. plumulosus

By: AL	Test Day (TD): 12 Date: 5-28-00				By: AL PH	TD: 13 Date: 5-29-00	By: AL	TD: 14 Date: 5-30-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~	D.O.	~~Temp~~ pH	D.O.
Sed. D	A		7.9	7.1	7.8	6.3	7.7	6.4
	B			7.0		6.0		6.5
	C			7.0		5.8		6.3
	D			7.0		5.8		5.7
	E			6.9		5.6		5.7
	F			6.9		5.6		5.8
	G			6.8		5.7		6.1
	H			6.8		5.7		6.1
Sed. E	A		7.9	6.8	7.8	5.8	7.7	6.2
	B			6.9		5.8		6.2
	C			6.9		5.8		6.2
	D			6.8		5.9		6.2
	E			6.8		5.9		6.3
	F			6.9		5.9		6.3
	G			6.8		6.0		6.2
	H			6.8		5.8		6.1
Sed. F	A		7.9	6.9	7.8	6.1	7.7	6.5
	B			6.9		6.1		6.4
	C			6.9		5.9		6.3
	D			6.9		5.9		6.3
	E			6.9		5.9		6.4
	F			6.9		6.1		6.5
	G			6.9		5.9		6.5

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediments | Test Species: L. plumulosus

By: AZ	Test Day (TD): 12 Date: 5-28-00				By: AZ DH	TD: 13 Date: 5-29-00	By: DR AZ	TD: 14 Date: 5-30-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~	D.O.	~~Temp~~ pH	D.O.
Sed. G	A		8.0	6.9	7.8	6.0	7.7	6.3
	B			6.9		5.9	7.7	6.1
	C			6.8		6.1	7.8	6.3
	D			6.8		6.0		6.3
	E			6.8		5.9		6.2
	F			6.8		5.8		6.1
	G			6.9		5.8		6.0
	H			6.9		5.8		6.1
Sed. H	A		8.0	6.9	7.8	5.8	7.8	6.3
	B			6.9	7.9	5.9		6.4
	C			7.0		6.2		6.3
	D			7.0		6.2		6.2
	E			7.0		6.4		6.7
	F			7.0		6.3		6.6
	G			7.1		6.3		6.6
	H			7.0		6.3		6.6
Sed. B 1%	A		7.9	7.1	7.8	6.2	7.7	7.0
	B			7.1		6.3		6.5
	C			7.0		6.3		6.6
	D			7.0		6.3		6.6
	E			7.0		6.3		6.5
	F			7.0		6.3		6.6
	G			6.9		6.5		6.7
	H			[illegible]	[illegible]	[illegible]		

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SEDIMENT TOXICITY TEST -- WATER QUALITY PARAMETERS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: AL	Test Day (TD): 12 Date: 5-28-00				By: AL pH	TD: 13 Date: 5-29-00	By: gR hL	TD: 14 Date: 5-30-00
Treatment	Rep	Temp	pH	D.O.	~~Temp~~	D.O.	~~Temp~~ pH	D.O.
Sed B 10%	A		7.9	6.9	7.8	6.2	7.7	6.6
	B			7.0		6.4		6.7
	C			7.0		6.4		6.8
	D			6.9		6.5		6.8
	E			7.0		6.5		6.9
	F			7.0		6.5		6.7
	G			7.1		6.6		6.8
	H			7.1		6.5		6.6
Sed B 50%	A		7.9	7.1	7.8	6.5	7.7	6.7
	B			7.1		6.5		6.6
	C			7.1		6.4		6.5
	D			① ~~7.4~~ 7.4		6.4		6.6
	E			7.1		6.5		6.6
	F			7.0		6.4		6.8
	G			7.1		6.4		6.8
	H			7.0		6.3		6.7
Sed. B 100%	A		7.9	7.0	7.8	6.4	7.7	6.6
	B		7.8	7.1	7.8	6.3	7.7	6.4
	C		7.8	6.9	7.7	6.1	7.6	6.2
	D		7.8	6.9	7.7	6.1	7.6	6.2
	E		7.9	6.9	7.8	6.2	7.6	6.2
	F		7.9	6.9	7.8	6.2	7.7	6.2
	G		7.9	7.0	7.8	6.1	7.7	6.4
	H		7.9	7.0	7.8	6.2	7.7	6.2

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Jupiter, Florida

Form: 259
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 0	Date: 5-16-00	By: SG JM	Day: 1	Date: 5/17/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. D	A	20	BH, B	A	20	B, BH
	B	20	BH, 2AS	B		1AS, BH
	C	20	BH, 1AS	C		B, BH
	D	20	BH, B	D		B, BH
	E	20	BH, B	E		B, BH
	F	20	BH, B	F		B, BH
	G	20	BH, B	G		B, BH
	H	20	BH, B	H		B, BH
Sed. E	A	20	BH, B	A	20	B, BH
	B	20	BH, B	B		1AS, BH
	C	20	BH, B	C		B, BH
	D	20	BH, B	D		B, BH
	E	20	BH, B	E		B, BH
	F	20	BH, 1AS	F		B, BH
	G	20	BH, B	G		B, BH
	H	20	BH, B	H		B, BH
Sed. F	A	20	BH, B	A	20	B, BH
	B	20	BH, 3AS	B		B, BH
	C	20	BH, B	C		B, BH
	D	20	BH, 1AS	D		B, BH
	E	20	BH, B	E		B, BH
	F	20	BH, B	F		B, BH
	G	20	BH, B	G		B, BH poly cheate observed
	H	20	BH, B	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 0	Date: 5-16-00	By: SG	Day: 1	Date: 5/17/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A	20	B, BH	A	20	B, BH
	B	20	B, BH	B		B, BH
	C	20	B, BH	C		B, BH
	D	20	B, BH	D		B, BH
	E	20	B, BH	E		B, BH
	F	20	B, BH	F		B, BH
	G	20	B, BH	G		B, BH
	H	20	B, BH	H		B, BH
Sed. A	A	20	BH, 7AS	A	20	1AS, BH, B
	B	20	BH, 3 AS	B		B, BH
	C	20	BH, B	C		B, BH
	D	20	BH, 5 AS	D		B, BH
	E	20	BH, 8 AS	E		3AS, BH, B
	F	20	BH, 3 AS	F		B, BH
	G	20	BH, 10 AS	G		3AS, BH
	H	20	BH, 6 AS	H		1 AS, BH
Sed. C	A	20	BH, B	A	20	2AS, BH
	B	20	BH, B	B		2AS, BH
	C	20	BH, B	C		3AS, BH
	D	20	BH, B	D		1AS, BH
	E	~~20~~ 20 ①	BH, 4 AS	E		1AS, BH
	F	20	BH, B	F		2AS, BH
	G	20	BH, 9 AS	G		2AS, BH
	H	20	BH, B	H		2AS, BH

① DEC 5/16

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 0	Date: 5-16-00	By: SG AL	Day: 1	Date: 5/17/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 10%	A	20	BH, 6 AS	A	20	3AS, 2LETH Few BH
	B	20	Few BH, 10 AS	B		Few BH
	C	20	Few BH, 6 AS	C		3AS, 3LETH Few BH
	D	20	Few BH, 6 AS	D		Few BH, B
	E	20	Few BH, 5 AS	E		Few BH, 2AS
	F	20	Few BH, 6 AS	F		1AS, 1LETH Few BH
	G	20	Few BH, B	G		Few BH, B
	H	20	BH, 6 AS	H		BH, B
Sed. B 50%	A	20	20 AS, 20 LETH	A	20	15AS, 13LETH no BH
	B	20		B		17AS, 15LETH no BH
	C	20		C		17AS, 17LETH no BH
	D	20		D		12AS, 12LETH no BH
	E	20		E		16AS, 16LETH no BH turbid
	F	20		F		17AS, 17LETH no BH
	G	20		G		15AS, 15LETH no BH
	H	20		H		10AS, 10LETH no BH
Sed. B 100%	A	20	20 AS, 20 LETH	A	20	17AS, 17LETH no BH
	B	20		B		15AS, 15LETH no BH
	C	20 ~~20~~		C		19AS, 19LETH no BH
	D	20		D		18AS, 18LETH no BH
	E	20		E		17AS, 16LETH no BH DEE 5/16
	F	20		F		16AS, 16LETH no BH
	G	20		G		16AS, 16LETH no BH
	H	20		H		13AS, 13LETH no BH

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Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 0	Date: 5-16-00	By: SG JM	Day: 1	Date: 5/17/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A	20	BH, B	A	20	B, BH
	B	20	BH, B	B		B, BH
	C	20	BH, B	C		1AS, BH
	D	20	BH, B	D		1AS, BH
	E	20	BH, B	E		B, BH
	F	20	BH, B	F		B, BH
	G	20	BH, B	G		1AS, BH
	H	20	BH, B	H		B, BH
Sed. H	A	20	BH, 3AS	A	20	B, BH
	B	20	BH, 7AS	B		B, BH
	C	20	BH, 5AS	C		B, BH
	D	20	BH, B	D		B, BH
	E	20	BH, 1AS	E		B, BH
	F	20	BH, 12AS	F		B, BH
	G	20	BH, 5AS	G		B, BH
	H	20	BH, 3AS	H		B, BH turbid
Sed. B 1%	A	20	BH, B	A	20	B, BH
	B	20	BH, B	B		1AS, BH
	C	20	BH, B	C		B, BH
	D	20	BH, B	D		B, BH
	E	20	BH, B	E		B, BH
	F	20	BH, B	F		B, BH
	G	20	BH, B	G		B, BH
	H	20	BH, B	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 2	Date: 5-18-00	By: GAR	Day: 3	Date: 5-19-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A	*see study log	B, BH	A		B, BH 1AS
	B		B, BH	B		B, BH, 2AS
	C		B, BH	C		B, BH,
	D		B, BH	D		B, BH, 1AS
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH, 2AS
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. A	A		B, BH	A		B, BH, 1AS
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH, 1AS
	D		B, BH	D		B, BH
	E		2AS, 1LETH, BH	E		B, BH, 2AS
	F		B, BH	F		B, BH
	G		1AS, BH	G		B, BH
	H		2AS, BH	H		B, BH, 1AS
Sed. C	A		3AS, BH	A		6AS, B, BH
	B		1AS, BH	B		2AS, B, BH
	C		B, BH	C		B, BH, 1AS
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH, 2AS
	F		2AS, BH	F		B, BH
	G		4AS, BH	G		3AS, B, BH
	H		1AS, BH	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 2	Date: 5-18-00	By: SG TA	Day: 3	Date: 5-19-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A	see study log	1 AS, 1 LETH, BH	A		B, BH
	B		B, BH	B		EW BH, B
	C		B, BH	C		B, BH
	D		1 AS, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		1 AS, BH	G		B, BH
	H		1 AS, BH	H		B, BH
Sed. H	A		4 AS, BH	A		3 AS, B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		1 AS, B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		2 AS, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. B 1%	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediment | Test Species: L. Plumulosus

By: SG AL	Day: 2	Date: 5-18-00	By: SG TR	Day: 3	Date: 5.19.00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 10%	A	See study Log	3AS, 3LETH, Few BH	A		Few BH, B
	B		1AS, 1LETH, Few BH	B		Few BH, B
	C		5AS, 5LETH, Few BH	C		Few BH, B
	D		4AS, 2LETH, Few BH	D		Few BH, 1AS, B
	E		5AS, 5LETH, Few BH	E		Few BH, 2AS, B
	F		1AS, Few BH	F		Few BH, 4AS, B
	G		B, Few BH	G		Few BH, B
	H		B, Few BH	H		B, Few BH
Sed. B 50%	A		NO BH 17 AS, all Leth	A		NO BH 3 leth, 18 AS
	B		NO BH 15 AS, 15 Leth	B		NO BH 18 AS, 5 leth
	C		NO BH 1 FLT 14 AS, 14 Leth,	C		NO BH 14 AS, 4 leth
	D		NO BH 15 AS, 15 Leth	D		8 AS, NO BH
	E		NO BH 14 AS, 14 Leth.	E		13 AS 10 LETH NO BH
	F		NO BH 13 AS, 13 Leth	F		14 AS 14 LETH NO BH
	G		NO BH 16 AS, 16 Leth	G		1 F, 13 AS NO BH 13 LETH
	H		NO BH 12 AS, 12 Leth.	H		NO BH, 12 AS 12 LETH
Sed. B 100%	A		NO BH 17 AS, 17 Leth	A		11 AS, 11 LETH NO BH
	B		NO BH 15 AS, 15 Leth	B		13 AS 13 LETH NO BH
	C		NO BH 18 AS, 18 Leth	C		16 AS 16 LETH NO BH
	D		NO BH 19 AS, 19 Leth	D		17 AS 17 LETH NO BH
	E		NO BH 17 AS, 17 Leth,	E		17 AS 17 LETH NO BH
	F		NO BH 16 AS, 16 Leth	F		15 AS 15 LETH NO BH
	G		NO BH 15 AS, 15 Leth,	G		13 AS 13 LETH NO BH
	H		NO BH 15 AS, 15 Leth	H		12 AS 12 LETH NO BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG AL	Day: 2	Date: 5-18-00	By: SG TR	Day: 3	Date: 5-19-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. D	A	see study Log	B, BH	A		B, BH
	B		B, BH	B		2AS, B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		3AS, B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. E	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH clams: pinon observed
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. F	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		B, BH	G		1AS, B, BH
	H		B, BH	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JL	Day: 4	Date: 5/20/00		By: JL	Day: 5	Date: 5/21/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. D	A		B, BH	A		B, B.H
	B		B. BH	B		
	C		B, BH	C		
	D		B, BH	D		
	E		B, BH	E		
	F		B, BH	F		
	G		B BH	G		
	H		B, BH	H		
Sed. E	A		B, BH	A		B. BH
	B		B, BH	B		
	C		B, BH	C		
	D		clam siphon B, BH	D		
	E		B, BH	E		
	F		B, BH	F		
	G		B, BH	G		
	H		B, BH	H		
Sed F	A		B, BH	A		B BH
	B		B, BH	B		
	C		B, BH	C		
	D		B, BH	D		
	E		B, BH	E		
	F		B, BH	F		
	G		B, BH	G		
	H		B BH	H		

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JK	Day: 4	Date: 5/20/00		By: JK	Day: 5	Date: 5/21/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		
	G		B, BH	G		
	H		B, BH	H		
Sed. A	A		1AS, B, BH	A		
	B		B, BH	B		
	C		B, BH	C		
	D		1AS, B, BH	D		
	E		3AS, B, BH	E		
	F		B, BH	F		
	G		B, BH	G		
	H		B, BH	H		
Sed. C	A		6AS, B, BH	A		5AS, B, BH
	B		6AS, B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		8AS, B, BH	E		4AS, B, BH
	F		4AS, B, BH	F		B, BH
	G		2AS, B, BH	G		3AS, B, BH
	H		B, BH	H		B, BH

NOTE: PAL means animals are white
most animals in 50% - 100% sediment appear pale

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC | Project No: 0005012

Test Substance: Sediment | Test Species: L. plumulosus

By: JM	Day: 4	Date: 5/20/00		By: JM	Day: 5	Date: 5/21/00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 10%	A		7AS, 1LETH Few BH	A		4AS 1LETH Few BH
	B		B. Few BH	B		2AS, B. Few BH
	C		B. Few BH	C		B. Few BH
	D		B. Few BH	D		B. Few BH
	E		6AS, B. Few BH	E		1AS, B. Few BH
	F		1AS, B, Few BH	F		B, Few BH
	G		B, Few BH	G		B. Few BH
	H		B, Few BH	H		B. Few BH
Sed. B 50%	A		18AS+PAL 4LETH	A		17 AS, 3LETH Few BH
	B		14 AS+PAL 5LETH	B		12AS 3LETH Few BH
	C		14 AS+PAL Few BH	C		12AS, 1LETH Few BH
	D		7AS 2LETH Few BH	D		8 AS, 2LETH Few BH
	E		12AS, 2LETH Few BH	E		10AS, 2LETH Few BH
	F		16AS, 8LETH Few BH	F		11AS, 9LETH Few BH
	G		14 AS 6LETH Few BH	G		13 AS, 7LETH Few BH
	H		8 AS 2LETH Few BH	H		8AS 2LETH NO BH
Sed. B 100%	A		14AS 2LETH Few BH	A		12AS 9LETH NO BH
	B		13AS Few BH	B		13AS FEW BH
	C		17AS 5LETH Few BH	C		14 AS 3LETH NO BH
	D		18 AS Few BH	D		18AS NO BH
	E		14 AS Few BH	E		14 AS NO BH
	F		14 AS Few BH	F		14 AS 1 LETH NO BH
	G		15 AS Few BH	G		16 AS NO BH
	H		12 AS Few BH	H		11 AS 3 LETH NO BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JK	Day: 4	Date: 5/20/00	By: JK	Day: 5	Date: 5/21/00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A		B, BH	A		B, BH
	B		B, BH	B		
	C		B, BH	C		
	D		B, BH	D		
	E		B, BH	E		
	F		B, BH	F		
	G		B, BH	G		
	H		B, BH	H		
Sed. H	A		B, BH	A		MS, B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		
	D		B, BH	D		
	E		B, BH	E		
	F		B, BH	F		
	G		B, BH	G		
	H		B, BH	H		
Sed. B 17.	A		B, BH	A		B, BH
	B			B		
	C			C		
	D			D		
	E			E		
	F			F		
	G			G		
	H			H		MS, B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG JL	Day: 6	Date: 5/22/00	By:	Day: 7	Date: 5/23/00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. D	A		B, BH	A		3AS, BH
	B		4AS, 4LETH, BH, B	B		2AS, 1LETH, BH
	C		2AS, BH, B	C		B, BH
	D		BH, B	D		B, BH
	E		BH, B	E		B, BH
	F		B, BH	F		2AS, 2LETH, BH
	G		B, BH	G		1AS, 1LETH, BH
	H		4AS, BH, 2LETH, B	H		4AS, 4LETH
Sed. E	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		2AS, 2LETH
	D		1AS, BH, B	D		2AS, 2ETH
	E		B, BH	E		2AS, 2ETH
	F		2AS, 1LETH, B, BH	F		2AS, 2LETH
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. F	A		B, BH	A		5AS, 1LETH
	B		B, BH	B		B, BH
	C		1AS, BH, B	C		B, BH
	D		B, BH	D		1AS, 1LETH, BH
	E		B, BH	E		2AS, 2LETH, BH
	F		B, BH	F		B, BH
	G		B, BH	G		2AS, 2LETH
	H		B, BH	H		9A

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Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: JLSU	Day: 6	Date: 5/22/00	By:	Day: 7	Date:

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A		1AS, BH, B	A		B, BH
	B		1AS, BH, B	B		B, BH
	C		1AS, BH, B	C		1AS 1LETH
	D		1AS, B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		1AS, BH	F		B, BH
	G		B, BH	G		2AS, BH
	H		B, BH	H		1AS, BH, B
Sed. A	A		B, BH	A		B, BH
	B		B, BH	B		1AS, 1LETH BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		1AS, BH, B	E		1AS, BH
	F		B, BH	F		B, BH
	G		B, BH	G		1AS, BH
	H		B, BH	H		3AS, BH, 1LETH
Sed. C	A		4AS, BH, B	A		4AS, BH, B
	B		2AS, BH, B	B		6AS, BH, B
	C		B, BH	C		3AS, BH, B
	D		B, BH	D		4AS, BH
	E		6AS, BH, B	E		7AS, 4LETH
	F		1AS, BH, B	F		5AS 3LETH
	G		5AS, 2LETH BH, B	G		9AS, 4LETH
	H		B, BH	H		8AS 1LETH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG	Day: 6	Date: 5/22/00	By: SG	Day: 7	Date: 5/23/00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed B 100%	A		B Few BH	A		1AS, Few BH
	B		1AS, Few BH 1LETH	B		"
	C		B, Few BH	C		B, Few BH
	D		1AS, Few BH	D		1AS, Few BH
	E		B, Few BH	E		B, Few BH
	F		B, Few BH	F		B, Few BH
	G		B, Few BH	G		"
	H		B, Few BH	H		"
Sed. B 50%	A		15 AS no BH	A		15AS no BH
	B		15AS no BH	B		18 AS no BH
	C		13AS no BH	C		15 AS no BH
	D		10 AS no BH	D		15 AS no BH
	E		14 AS no BH	E		13 AS no BH
	F		17AS no BH	F		16 AS no BH
	G		13AS no BH	G		15 AS no BH
	H		10AS no BH	H		12 AS no BH
Sed. B 100%	A		15AS no BH	A		16AS no BH
	B		12AS no BH	B		13AS no BH
	C		16AS no BH	C		17AS no BH
	D		19AS no BH	D		19AS - dead
	E		16AS no BH	E		15AS 1 dead
	F		16AS no BH	F		15AS 13 dead
	G		13AS no BH	G		9AS 9 dead
	H		14AS no BH	H		13AS 12 dead

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SO JK	Day: 6	Date: 5/22/00	By:	Day: 7	Date: 5/23/00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A		B, BH	A		9AS, 4LETH
	B		B, BH	B		3AS, 3LETH
	C		1AS B, 1LETH BH	C		2AS, BH
	D		1AS, 1LETH BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		2AS, BH
	G		B, BH	G		B, BH
	H		1AS, B, BH	H		2AS 1LETH BH
Sed. H	A		3AS, BH	A		B, BH
	B		1AS, BH	B		B, BH
	C		B, BH	C		3AS, 3LETH
	D		B, BH	D		3AS, 3LETH
	E		B, BH	E		1AS, 1LETH BH
	F		B, BH	F		B, BH
	G		2AS B, 2LETH BH	G		B, BH
	H		B, BH	H		1AS, 1LETH BH
Sed. B 1%	A		B Few BH	A		B, BH
	B		B Few BH	B		B, Few BH
	C		B, Few BH	C		1AS, B Few BH
	D		B, Few BH	D		1AS, B Few BH
	E		B, Few BH	E		B, Few BH
	F		B, Few BH	F		B, Few BH
	G		B, Few BH	G		1AS, 1LETH Few BH
	H		B Few BH	H		B Few BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG AL	Day: 8	Date: 5-24-00	By: SG AL	Day: 9	Date: 5-25-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. D	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		3AS, BH	C		B, BH
	D		1AS, 1Lath, BH	D		B, BH
	E		1AS, BH	E		2AS, BH
	F		B, BH	F		B, BH
	G		2AS, 1Lath, BH	G		2AS, BH
	H		1AS, BH	H		4AS, BH
Sed. E	A		B, BH	A		3AS, BH
	B		1AS, BH	B		1AS, BH
	C		B, BH	C		3AS, BH
	D		B, BH	D		4AS, BH
	E		B, BH	E		4AS, BH
	F		B, BH	F		3AS, BH
	G		B, BH	G		1AS, BH
	H		B, BH	H		2AS, BH
Sed. F	A		1AS, BH	A		2AS, BH
	B		B, BH	B		1AS, BH
	C		B, BH	C		1AS, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		1AS, BH
	G		1AS, 1Lath, BH	G		2AS, BH
	H		1AS, BH	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: SG / M	Day: 8	Date: 5-24-00	By: JR / M	Day: 9	Date: 5-25-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A		B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		1AS, BH	E		B, BH
	F		B, BH	F		B, BH
	G		B, BH	G		4AS, BH
	H		B, BH	H		B, BH
Sed. A	A		B, BH	A		B, BH
	B		B, BH	B		1AS, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		B, BH	G		B, BH
	H		B, BH	H		2AS, BH
Sed. C	A		7AS, Few BH	A		14AS, Few BH
	B		13AS, 6Leth, Few BH	B		18AS, Few BH
	C		5AS, Few BH	C		B, Few BH
	D		12 AS, 4Leth, Few BH	D		7AS, Few BH
	E		9 AS, 5Leth, No BH	E		17 AS, 7Leth, Few BH
	F		6 AS, 3Leth, Few BH	F		5 AS, 2Leth, Few BH
	G		7 AS, 4Leth, NO BH	G		8AS, Few BH
	H		1 FLT, 7AS 4Leth, Few BH	H		7AS Few BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: SG AL	Day: 8	Date: 5-24-00	By: JR AL	Day: 9	Date: 5-25-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A		B, BH	A		1AS, BH
	B		B, BH	B		5AS, BH
	C		1AS, 1Leth, BH	C		B, BH
	D		B, BH	D		2AS, BH
	E		B, BH	E		B, BH
	F		2AS, 2Leth, BH	F		2AS, BH
	G		B, BH	G		B, BH
	H		1AS, 1Leth, BH	H		2AS, BH
Sed. H	A		B, BH	A		2AS, BH
	B		3AS, 3Leth, BH	B		2AS, BH
	C		B, BH	C		1AS, BH
	D		2AS, 2Leth, BH	D		1AS, BH
	E		B, BH	E		1AS, BH
	F		B, BH	F		B, BH
	G		B, BH	G		1AS, BH
	H		B, BH	H		2AS, BH
Sed. B 1%	A		B, BH	A		1AS, No BH
	B		B, No BH	B		5AS, Few BH
	C		B, Few BH	C		1AS, Few BH
	D		B, Few BH	D		3AS, Few BH
	E		B, Few BH	E		B, Few BH
	F		B, Few BH	F		B, Few BH
	G		B, Few BH	G		1AS, Few BH
	H		B, BH	H		1AS, Few BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: [illegible]	Day: 10	Date: 5/26/00	By: AL	Day: 11	Date: 5-27-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed D	A		3AS, few BH	A		1AS, few BH
	B		B, BH	B		3AS, BH
	C		B, BH	C		1AS, BH
	D		B, BH	D		B, BH
	E		B, BH	E		1AS, BH
	F		B, BH	F		B, BH
	G		2AS, B, BH	G		4AS, BH
	H		B, BH	H		1AS, BH
Sed. E	A		2AS, B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		3AS, B, BH	C		B, BH
	D		2AS, B, BH	D		B, BH
	E		3AS, B, BH	E		B, BH
	F		B, BH	F		B, BH
	G		1AS, B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. F	A		1AS, B, BH	A		B, BH
	B		B, BH	B		B, BH
	C		B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		1AS, B, BH	F		B, BH
	G		2AS, B, BH	G		B, BH
	H		1AS, 1 BH	H		B, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: NB TR	Day: 10	Date: 5/26/00	By: AL	Day: 11	Date: 5-27-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A		B, BH	A		1AS, BH
	B		B, BH	B		B, BH
	C		2AS, B, BH	C		B, BH
	D		B, BH	D		B, BH
	E		B, BH	E		B, BH
	F		B, BH, 2AS	F		B, BH
	G		B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. A	A		1AS, B, BH	A		2AS, BH
	B		3AS, B, BH	B		B, BH
	C		4AS, 1LETH, B, BH	C		1AS, 1LETH, BH
	D		1AS, B, BH	D		2AS, 1LETH, BH
	E		10AS, 3LETH, B, BH	E		7AS, 4LETH, BH
	F		1AS, B, BH	F		B, BH
	G		1AS, B, BH	G		2AS, BH
	H		5AS, B, BH	H		7AS, BH
Sed. C	A		16AS, 3LETH, NO BH	A		18AS, 6LETH, Few BH
	B		17AS, Few BH	B		16AS, Few BH
	C		5AS, Few BH	C		14AS, Few BH
	D		6AS, NO BH	D		8AS, NO BH
	E		11AS, 7LETH, NO BH	E		11AS, 8LETH, NO BH
	F		10AS, 3LETH, NO BH	F		10AS, 3LETH, NO BH
	G		11AS, 5LETH, NO BH	G		15AS, 8LETH, NO BH
	H		7AS, NO BH	H		7AS, NO BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: [illegible]	Day: 10	Date: 5/26/00	By: AL	Day: 11	Date: 5-27-00
Treatment	**Rep**	**# Alive**	**Observations**	**Rep**	**# Alive**	**Observations**
Sed. B 10%	A		5AS, 1LETH, Few BH	A		B, Few BH
	B		5AS, Few BH	B		2AS, Few BH
	C		6AS, Few BH	C		B, Few BH
	D		5AS, Few BH	D		B, Few BH
	E		5AS, Few BH	E		1AS, Few BH
	F		6AS, Few BH	F		[illegible]
	G		2AS, Few BH	G		B, Few BH
	H		1AS, Few BH	H		B, Few BH
Sed. B 50%	A		No BH, No Live Animals	A		No live animals at surface, No BH
	B		↓	B		↓
	C		↓	C		1AS, 1LETH, NO BH
	D		↓	D		1AS, 1LETH, NO BH
	E		↓	E		3AS, 3LETH, NO BH
	F		2LETH	F		2AS, 2LETH, NO BH
	G		No Live Animals	G		No live animals at surface, NO BH
	H		↓	H		↓
Sed. B 100%	A		No BH, No Live Animals	A		No live animals at surface, No BH
	B		↓	B		↓
	C		↓	C		↓
	D		↓	D		↓
	E		↓	E		↓
	F		↓	F		↓
	G		↓	G		↓
	H		↓	H		↓

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: MR, TK	Day: 10	Date: 5/26/00	By: AL	Day: 11	Date: 5-27-00

Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A		B, BH	A		B, BH
	B		B, BH	B		2AS, BH
	C		1AS, B, BH	C		5AS, BH
	D		B, BH	D		1AS, BH
	E		1AS, B, BH	E		B, BH
	F		3AS, B, BH	F		1AS, BH
	G		1AS, B, BH	G		B, BH
	H		1AS, B, BH	H		2AS, 1Larv, BH
Sed. H	A		7AS, B, BH	A		B, BH
	B		4AS, B, BH	B		2AS, BH
	C		1AS, B, BH	C		1AS, BH
	D		1AS, B, BH	D		B, BH
	E		1AS, B, BH	E		B, BH
	F		4AS, B, BH	F		1AS, BH
	G		1AS, B, BH	G		B, BH
	H		B, BH	H		B, BH
Sed. B 17.	A		B, Few BH	A		B, Few BH
	B		1AS, B, Few BH	B		B, Few BH
	C		B, Few BH	C		B, Few BH
	D		B, Few BH	D		5AS, Few BH
	E		B, Few BH	E		B, Few BH
	F		B, Few BH	F		B, Few BH
	G		5AS, B, Few BH	G		3AS, BH
	H		1AS, B, BH	H		1AS, BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: Ar	Day: 12	Date: 5-28-00		By: Ar	Day: 13	Date: 5-29-00	
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations	
Sed. D	A		1AS, BH	A		B	BH
	B		1AS, BH	B		3AS	BH
	C		4AS, BH	C		2AS	BH
	D		B, BH	D		B	BH
	E		1AS, BH	E		1AS	BH
	F		B, BH	F		B	BH
	G		2AS, BH	G		3AS	BH
	H		3AS, BH	H		1AS	BH
Sed. E	A		B, BH	A		B	BH
	B		B, BH	B		B	BH
	C		B, BH	C		B	BH
	D		B, BH	D		B	BH
	E		B, BH	E		B	BH
	F		1AS, BH	F		B	BH
	G		1AS, BH	G		B	BH
	H		B, BH	H		B	BH
Sed. F	A		B, BH	A		B	BH
	B		B, BH	B		B	BH
	C		B, BH	C		B	BH
	D		B, BH	D		B	BH
	E		1AS, BH	E		B	BH
	F		B, BH	F		B	BH
	G		B, BH	G		B	BH
	H		1AS, BH	H		B	BH

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SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: Az	Day: 12	Date: 5-28-00		By: Az	Day: 13	Date: 5-29-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Control	A		B, BH	A		B, BH
	B		B, BH	B		B BH
	C		2AS, BH	C		1AS, BH
	D		B, BH	D		B BH
	E		2AS, BH	E		1AS, BH
	F		1AS, BH	F		B, BH
	G		B, BH	G		B BH
	H		2AS, BH	H		B BH
Sed A	A		11 AS, BH	A		6AS 3Leth Few BH
	B		4 AS, BH	B		8AS 2Leth BH
	C		B, BH	C		B BH
	D		1AS, BH	D		B, BH
	E		5AS, 3Leth, BH	E		10AS 4Leth BH
	F		3AS, BH	F		3AS BH
	G		12 AS, BH	G		14AS 5Leth Few BH
	H		1AS, BH	H		6AS 2Leth BH
Sed. C	A		18AS, 10Leth NO BH	A		14AS 8Leth NO BH
	B		13AS, 13Leth, NO BH	B		15AS 10Leth NO BH
	C		15 AS, 10Leth, NO BH	C		7AS NO BH
	D		11 AS, 9Leth, NO BH	D		14 AS 8Leth NO BH
	E		11 AS, 11Leth, NO BH	E		8AS 8Leth NO BH
	F		14AS, 10Leth, Few BH	F		9AS 9Leth NO BH
	G		13 AS, 8Leth, NO BH	G		14AS 14Leth NO BH
	H		4 AS, 4Leth, NO BH	H		7AS 7Leth NO BH

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Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: Az	Day: 12	Date: 5-28-00		By: Az	Day: 13	Date: 5-29-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. B 10%	A		1AS, Few BH	A		2AS Few BH
	B		1AS, Few BH	B		1AS Few BH
	C		1AS, Few BH	C		B Few BH
	D		1AS, Few BH	D		2AS 1Leth Few BH
	E		2AS, Few BH	E		B NO BH
	F		1AS, Few BH	F		B Few BH
	G		B, BH	G		B Few BH
	H		B, BH	H		B BH
Sed. B 50%	A		No live animals at surface, No BH	A		no live animals at surface NO BH
	B		↓	B		↓
	C		↓	C		↓
	D		↓	D		↓
	E		2AS, 2Leth, No BH	E		1AS 1Leth no BH
	F		3AS, 3Leth, No BH	F		" " "
	G		1AS, 1Leth, No BH	G		no live animals at surface NO BH
	H		No live animals at surface, No BH	H		" "
Sed. B 100%	A		1AS, 1Leth, No BH	A		2AS 2Leth NO BH
	B		No live animals at surface, No BH	B		no live animals at surface no BH
	C		↓	C		↓
	D		↓	D		↓
	E		↓	E		↓
	F		↓	F		↓
	G		↓	G		↓
	H		↓	H		↓

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Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By:	Day: 12	Date: 5-28-00	By:	Day: 13	Date: 5-29-00
Treatment	Rep	# Alive	Observations	Rep	# Alive	Observations
Sed. G	A		B, BH	A		B BH
	B		1AS, BH	B		B BH
	C		3AS, BH	C		1AS BH
	D		B, BH	D		2AS BH
	E		B, BH	E		B BH
	F		2AS, BH	F		1AS BH
	G		B, BH	G		1AS BH
	H		1AS, 1Lrvn, BH	H		2AS 1Leth BH
Sed. H	A		4AS, Few BH	A		1AS Few BH
	B		5AS, BH	B		3AS Few BH
	C		2AS, Few BH	C		1AS Few BH
	D		B, BH	D		B BH
	E		B, BH	E		B Few BH
	F		3AS, BH	F		7AS Few BH
	G		B, Few BH	G		B Few BH
	H		1AS, Few BH	H		1AS Few BH
Sed. B 17.	A		B, Few BH	A		1AS Few BH
	B		3AS, Few BH	B		10 AS Few BH
	C		3AS, Few BH	C		6AS Few BH
	D		8AS, Few BH	D		7AS Few BH
	E		B, Few BH	E		B Few BH
	F		B, No BH	F		1AS Few BH
	G		5, Few BH	G		2AS Few BH
	H		2AS, BH	H		2AS BH

(*) check # of animals

(1) FE 5/30/00

Toxikon Corporation
Jupiter, Florida

Form: 259
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By:	Day:	Date:	By:	Day:	Date:
SL	14	5-30-00			

Treatment	Rep	# Alive	Observations (on removal exp.)	Rep	# Alive	Observations
Sed. D	A	20	Buried	A		
	B	19	1LETH - 1AS 1NF 18 Buried	B		
	C	20	neonates obs. Buried	C		
	D	20	Buried	D		
	E	20	neonates obs. buried	E		
	F	17	3NF Buried	F		
(*)(*) see study log	G	20 (*)	Buried	G		
	H	20	Buried	H		
Sed. E	A	20	18 Buried 1AS 1LETH (1)	A		
	B	20	neonates, Buried	B		
	C	20	Buried	C		
	D	(*) 20	clam, Buried	D		
	E	(1) ~~20~~ 19	neonates obs. Buried	E		
	F	20	Buried	F		
	G	20	Buried	G		
	H	18	1D, 1NF. Buried	H		
Sed. F	A	20	Buried	A		
	B	20	Buried	B		
	C	20	Burried	C		
	D	20	Burried	D		
	E	18	Burried, 2NF, neonates	E		
	F	20	Burried	F		
	G	20	Buried	G		
	H	20	Buried	H		(2) FE 5-30-00

Toxikon Corporation
Jupiter, Florida

Form: 259
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. Plumulosus

By: AL JW SG	Day: 14	Date: 5-30-00	By:	Day:	Date:

Treatment	Rep	# Alive	Observations (On reburial exp.)	Rep	# Alive	Observations
Control	A	20	all buried in sediment	A		
	B	20	Buried, neonates observed	B		
	C	19	Buried, neonates observed INF	C		
	D	20	neonates observed, Buried	D		
	E	20	Buried	E		
	F	20	neonates obs. Buried	F		
	G	20	Buried	G		
	H	20	Buried	H		
Sed. A	A	19	1LETH 8AS INF 11 buried	A		
	B	19	1LETH 7AS INF 12 buried	B		
	C	19	Buried INF	C		
	D	19	2AS INF 17 buried	D		
	E	16	3D, INF 7AS 8LETH 4 buried	E		
	F	20	5LETH 7AS 13 buried	F		
	G	20	7LETH 12AS 8 buried	G		
	H	19	3LETH 9AS INF 10 buried	H		
Sed. C	A	① ~~17~~ 16	13LETH ~~3~~NF 13AS ① 4, 3 buried	A		
	B	① ~~11~~ 12	9LETH, 5D, ① ~~6~~NF 9AS 3 buried ~~12~~	B		
	C	① ~~15~~ 16	3D, ① ~~4~~NF, 12LETH 13AS, 3 buried	C		
	D	① ~~18~~ 17	2NF, 1LETH, 6AS 11 buried	D		
	E	① ~~12~~ 11	3D, 9LETH 2 buried 9AS, 6NF	E		
	F	① ~~19~~ 17	1D, 7LETH 13AS 4 buried	F		
	G	10	1D, 9NF, (3at, 9LETH surface in petroleum) 9AS	G		
	H	11	3D, 3LETH, 6AS 5 buried	H		

1 buried

① EE
JC
5/30/0

Toxikon Corporation
Jupiter, Florida

Form: 259
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC

Project No: 0005012

Test Substance: Sediment

Test Species: L. plumulosus

By: AC, DV, AR	Day: 14	Date: 5-30-00

Treatment	Rep	# Alive	Observations on removal exp
Sed. B 10%	A	18	2NF, Buried
	B	18	2NF, Buried
	C	16	4NF, Buried
	D	17	3NF, Buried
	E	18	2NF, Buried, moving
	F	17	3NF, Buried
	G	18	2NF, Buried
	H	11	1D, 8NF, Buried
Sed. B 50%	A	0	20 NF
	B	0	20 NF
	C	0	1D, 19 NF
	D	0	20 NF
	E	1	1 Did not bury 1Lem, 2D, 17 NF
	F	2	one animal buried 1Lem, 1D, 17NF
	G	0	20 NF
	H	0	20 NF
Sed. B 100%	A	1	1Lem, 19NF, 1 AS
	B	0	20 NF
	C	0	20 NF
	D	0	20 NF
	E	0	20 NF
	F	0	20 NF
	G	0	20 NF
	H	0	20 NF

By:	Day:	Date:

Rep	# Alive	Observations
A		
B		
C		
D		
E		
F		
G		
H		
A		
B		
C		
D		
E		
F		
G		
H		
A		
B		
C		
D		
E		
F		
G		
H		

Toxikon Corporation
Jupiter, Florida

Form: 259
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- SURVIVAL AND OBSERVATIONS

Sponsor: REAC	Project No: 0005012
Test Substance: Sediment	Test Species: L. plumulosus

By: AL SGITR	Day: 14	Date: 5-30-00	By:	Day:	Date:

Treatment	Rep	# Alive	Observations on reburial exp.	Rep	# Alive	Observations
Sed. G	A	20	Buried	A		
	B	20	Buried, neonates	B		
	C	20	Buried	C		
	D	20	Buried	D		
	E	20	Buried	E		
	F	19	INF, Buried	F		
	G	15	oil on surface SNF, Buried	G		
	H	19	ID, Buried	H		
Sed. H	A	20	Buried	A		
	B	19	ID, Buried	B		
	C	19	INF, Buried	C		
	D	20	Buried	D		
	E	20	Buried	E		
	F	19	INF, Buried	F		
	G	20	Buried	G		
	H	20	Buried, neonates	H		
Sed. B 1%	A	20	Buried	A		
	B	20	Buried	B		
	C	20	Buried	C		
	D	20	Buried	D		
	E	20	Buried	E		
	F	20	Buried	F		
	G	20	Buried	G		
	H	20	Buried [illegible]	H		

Toxikon Corporation
Jupiter, Florida

Form No: 259-A
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- FINAL OBSERVATIONS AND WEIGHTS

Sponsor: REAC	Project #: 0005012	Test Type: 14 day flow thru
Observations By: SG, JR, AL	Date: 5-30-00	Scope Used: —

Treatment	REP	Total #	Observations Reburial			Weight (gm) Tare	Gross	Net	Weight/ Animal (mg)
Sed. E	A	20	See study			0.9416	0.9561	0.0145	0.725
	B	20	Log			0.9412	0.9552	0.0140	0.700
	C	20				0.9419	0.9568	0.0149	0.745
	D	20				0.9428	0.9550	0.0122	0.610
	E	19				0.9430	0.9575	0.0145	0.763
	F	20				0.9437	0.9549	0.0112	0.560
	G	20				0.9435	0.9573	0.0138	0.690
	H	18				0.9453	0.9581	0.0134	0.744
Sed. F	A	20				0.9377	0.9503	0.0126	0.630
	B	20				0.9378	0.9493	0.0115	0.575
	C	20				0.9364	0.9499	0.0135	0.675
	D	20				0.9356	0.9482	0.0126	0.630
	E	18				0.9372	0.9480	0.0108	0.600
	F	20				0.9399	0.9525	0.0126	0.630
	G	20				0.9426	0.9554	0.0128	0.640
	H	20				0.9469	0.9609	0.0140	0.700
Sed. G	A	20				0.9192	0.9319	0.0127	0.635
	B	20				0.9165	0.9298	0.0133	0.665
	C	20				0.9180	0.9329	0.0149	0.745
	D	20				0.9206	0.9337	0.0131	0.655
	E	20				0.9449	0.9579	0.0130	0.650
	F	19				0.9421	0.9562	0.0141	0.742
	G	15				0.9207	0.9305	0.0098	0.653
	H	19				0.9421	0.9552	0.0131	0.689
Sed. H	A	20				0.9250	0.9360	0.0110	0.550
	B	19				0.9250	0.9365	0.0115	0.605
	C	19				0.9359	0.9465	0.0106	0.558
	D	20				0.9248	0.9351	0.0103	0.515
	E	20				~~0.9492~~ 0.9489	0.9521	0.0112	0.560
	F	19				0.9248	0.9357	0.0109	0.574
	G	20				0.9201	0.9302	0.0101	0.505
	H	20				0.9192	0.9291	0.0099	0.495

Tare wt By: AL Date: 5-23-00	Gross wt By: AL Date: 6-2-00
Balance Used: Mettler AE 240	Balance Used: Mettler AE 240

AL

Toxikon Corporation
Jupiter, Florida

Form No: 259-A
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- FINAL OBSERVATIONS AND WEIGHTS

Sponsor: REAC	Project #: 0005012	Test Type: 14 day flow-thru
Observations By: SG, TR, AL	Date: 5-30-00	Scope Used: —

Treatment	REP	Total #	Observations Reburple			Weight (gm) Tare	Gross	Net	Weight/Animal (mg)
Control	A	20	See Study			0.9522	0.9700	0.0178	0.890
	B	20	Log			0.9540	0.9715	0.0175	0.875
	C	19				0.9513	0.9693	0.0180	0.947
	D	20				0.9526	0.9709	0.0183	0.915
	E	20				0.9517	0.9702	0.0185	0.925
	F	20				0.9506	0.9675	0.0169	0.845
	G	20				0.9516	0.9702	0.0186	0.930
	H	20				0.9522	0.9696	0.0174	0.870
Sed. A	A	19				0.9405	0.9500	0.0095	0.500
	B	19				0.9396	0.9491	0.0095	0.500
	C	19				0.9388	0.9484	0.0096	0.505
	D	19				0.9368	0.9461	0.0093	0.489
	E	16				0.9373	0.9451	0.0078	0.488
	F	20				0.9355	0.9453	0.0098	0.490
	G	20				0.9354	0.9460	0.0106	0.530
	H	19				0.9326	0.9431	0.0105	0.553
Sed. C	A	16				0.9423	0.9516	0.0093	0.581
	B	12				0.9441	0.9505	0.0064	0.533
	C	16				0.9455	0.9548	0.0093	0.581
	D	17				0.9431	0.9522	0.0091	0.535
	E	11				0.9415	0.9469	0.0054	0.491
	F	17				0.9403	0.9504	0.0101	0.594
	G	10	A thick oily substance was stuck to a few animals and may alter the true dry weight			0.9403	0.9465	0.0062	0.620
	H	11				0.9413	0.9464	0.0051	0.464
Sed. D	A	20				0.9410	0.9554	0.0144	0.720
	B	19				0.9402	0.9545	0.0143	0.753
	C	20				0.9396	0.9540	0.0144	0.720
	D	20				0.9393	0.9530	0.0137	0.685
	E	20				0.9391	0.9527	0.0136	0.680
	F	17				0.9390	0.9518	0.0128	0.753
	G	*~~20~~ 19				0.9456	0.9600	0.0144	0.758
	H	20				0.9467	0.9611	0.0144	0.720

Tare wt By: AL Date: 5-23-00	Gross wt By: AL Date: 6-2-00
Balance Used: Mettler AE 240	Balance Used: Mettler AE 240

APPENDIX C

ANIMAL HOLDING

Toxikon Corporation
Jupiter, Florida

Form No: 259-A
Effective: Dec. 1999

SEDIMENT TOXICITY TEST -- FINAL OBSERVATIONS AND WEIGHTS

Sponsor: REAC	Project #: 0005012	Test Type: 14 day growth
Observations By: SG, JL, AL	Date: 5-30-00	Scope Used: —

Treatment	REP	Total #	Observations Reburial		Weight (gm) Tare	Gross	Net	Weight/ Animal (mg)
Sed. B 17%	A	20	See Study		0.9465	0.9623	0.0158	0.790
	B	20	Log		0.9448	0.9616	0.0168	0.840
	C	20			0.9453	0.9628	0.0175	0.875
	D	20			0.9438	0.9592	0.0154	0.770
	E	20			0.9436	0.9614	0.0178	0.890
	F	20			0.9411	0.9582	0.0171	0.855
	G	20			0.9458	0.9617	0.0159	0.795
	H	20			0.9439	0.9616	0.0177	0.885
Sed. B 10%	A	18			0.9381	0.9498	0.0117	0.650
	B	18			0.9297	0.9416	0.0119	0.661
	C	16			0.9299	0.9400	0.0101	0.631
	D	17			0.9392	0.9512	0.0120	0.706
	E	18			0.9377	0.9496	0.0119	0.661
	F	17			0.9350	0.9459	0.0109	0.641
	G	18			0.9315	0.9451	0.0136	0.756
	H	11			0.9373	0.9447	0.0074	0.673
Sed. B 50%	A	0			0.9296			
	B	0			0.9313		AL 6-2-00	
	C	0			0.9299			
	D	0			0.9296			
	E	1			0.9317	0.9323	0.0006	0.600
	F	2			0.9328	0.9335	0.0007	0.350
	G	0			0.9329		AL 6-2-00	
	H	0			0.9331			
Sed. B 100%	A	1			0.9338	0.9342	0.0004	0.400
	B	0			0.9334			
	C	0			0.9295			
	D	0			0.9295			
	E	0			0.9291			
	F	0			0.9333			
	G	0			0.9308			
	H	0			0.9329			

Tare wt By: AL Date: 5-23-00	Gross wt By: AL Date: 6-2-00
Balance Used: Mettler AE 240	Balance Used: Mettler AE 240

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 5-16-00 TEST NUMBER: 0005012 DURATION: 96 H
TOXICANT : SDS
SPECIES: LEPTOCHEIRUS PLUMULOSU

RAW DATA: Concentration (PPM)	Number Exposed	Mortalities
.00	20	0
.32	20	0
.63	20	1
1.25	20	7
2.50	20	16
5.00	20	20

SPEARMAN-KARBER TRIM: .00%

SPEARMAN-KARBER ESTIMATES: LC50: 1.54
95% LOWER CONFIDENCE: 1.26
95% UPPER CONFIDENCE: 1.89

Toxikon Corporation
Jupiter, Florida

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Species: L. plumulosus	Species Lot #: LP00-5-2
Dilution Water: FSW (10ppt)	Test Area Used: EC #2
Primary Stock Preparation: 1000 mg/L	Secondary Stock Preparation : NA
Toxicant Used: CdCl2 Lot #: 17H3734	Stock Prepared By: SC

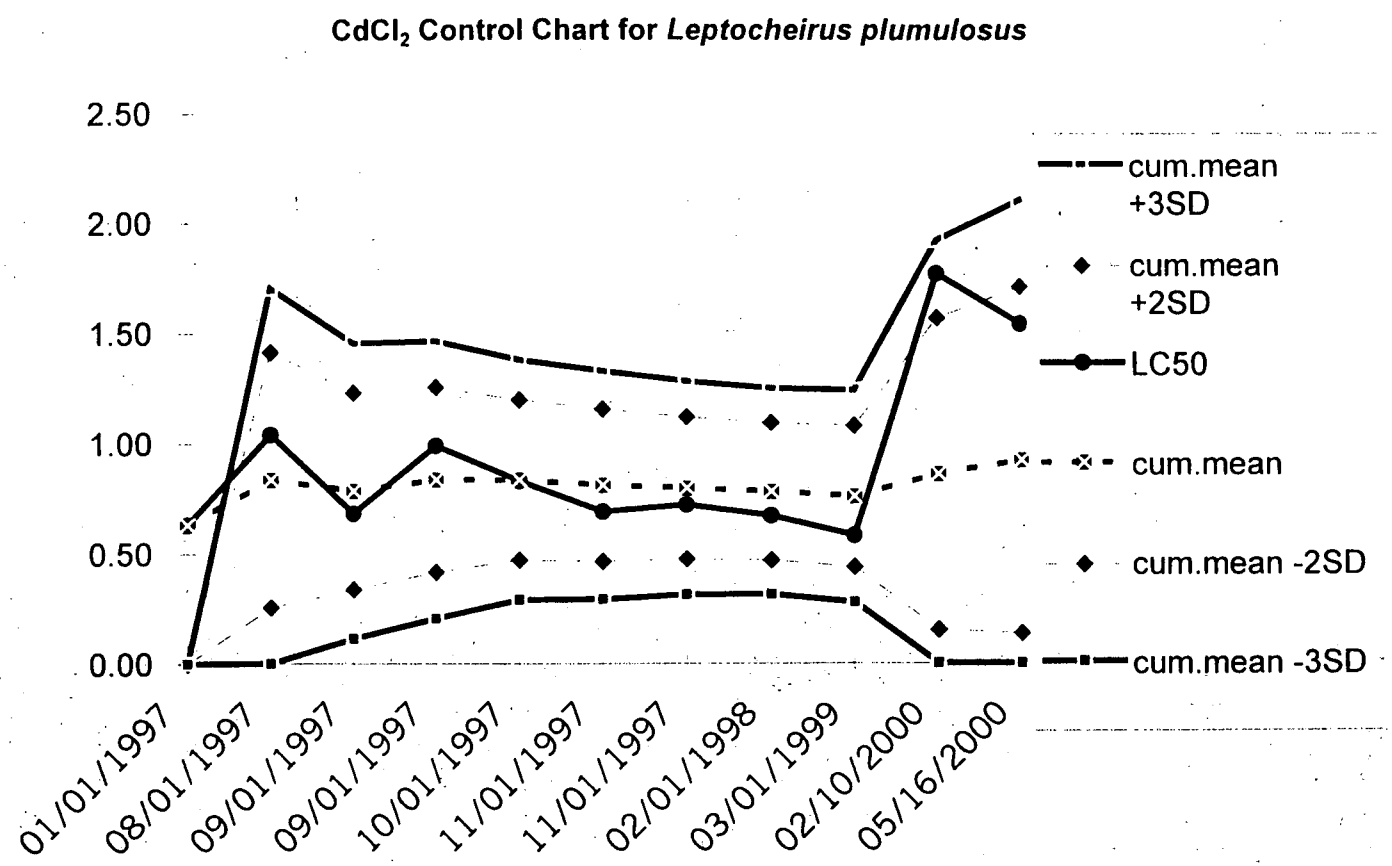
TRT Conc. (Units= PPM):	CTL	0.32	0.63	1.25	2.5	5.0	
Amt. Dilution H2O Added : (mL)	400	400	400	400	399	398	
Amt. Test Material Added: (mL)	N/A	0.13	0.25	0.50	1.00	2.00	

Time Test Substance Added: 1620	Time Animals Added: 1630
Data By: SC	Date: 5-16-00

Date	5-16-00	5-18-00	5-20-00	Final Results (Dead)
Time	1620	1335	1615	
By	SC	SC	JK	
Temperature	20.3°C	20.3°C	19.7°C	
Cond / Sal	10ppt	11ppt	10 ‰	

Treatment		A	OB	DO	pH	A	OB	A	OB	DO	pH	#	%
Control	A	10	N	9.3	7.5	10	N	10	N	8.5	7.4	0	0
	B	10	N	—	—	10	N	10	N	8.5	7.4	0	
0.32 mg/L	A	10	N	9.4	7.5	10	1 LETH	10	N	8.4	7.4	0	0
	B	10	N	—	—	10	N	10	N	8.5	7.5	0	
0.63	A	10	N	9.3	7.5	10	N	10	4 LETH	8.5	7.5	0	5
	B	10	N	—	—	10	N	9	1D 3LETH	8.5	7.5	1	
1.25	A	10	N	9.3	7.5	10	5 LETH	6	4D	8.5	7.5	4	35
	B	10	N	—	—	10	3 FLT 5 LETH	7	3D 2 LETH	8.4	7.5	3	
2.5	A	10	N	9.3	7.5	5	5d	1	4D	8.3	7.5	9	80
	B	10	N	—	—	6	4d	3	3D	8.5	7.5	7	
5.0	A	10	N	9.4	7.5	4	6d	0	4D	8.4	7.5	10	100
	B	10	N	—	—	4	6d	0	4D	8.5	7.5	10	
	A												
	B												
Meter Used:				YSI-2	pH40-2					YSI-2	pH40-2		

Comments: SC - Note that all H2O quality collected as a composite on Day 0 of test. SC
- ten animals added per rep for a total of 20 animals per trt.
5-24-00
SC


CdCl2 Control Chart for Leptocheirus plumulosus
2.50
2.00
1.50
1.00
0.50
0.00
01/01/1997
08/01/1997
09/01/1997
09/01/1997
10/01/1997
11/01/1997
11/01/1997
02/01/1998
03/01/1999
02/10/2000
05/16/2000
cum.mean +3SD
cum.mean +2SD
LC50
cum.mean
cum.mean -2SD
cum.mean -3SD

Cadium Chloride, CdCl2, Control Chart for *Leptocheirus plumulosus*

Date	SDS ppm Growth LC50	Cum. mean of 20 most recent LC50's	Stand. Dev. of 20 most recent LC50's	Cum. mean + 2SD	Cum. mean - 2SD	Cum. mean + 3SD	Cum. mean - 3SD	diff b/t cum. mean LC50 & LC50	% diff b/t LC50 & cum.mean	Relative % Difference (RPD)	Coefficent of Variation % C.V.
01/01/1997	0.63	0.63	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.0	#DIV/0!	#DIV/0!
08/01/1997	1.04	0.84	0.29	1.41	0.26	1.70	0.00	-0.21	-24.6	17.36	34.72
09/01/1997	0.68	0.78	0.22	1.23	0.34	1.45	0.11	0.10	13.2	19.15	28.56
09/01/1997	0.99	0.84	0.21	1.25	0.42	1.46	0.21	-0.16	-18.6	17.30	25.13
10/01/1997	0.83	0.83	0.18	1.20	0.47	1.38	0.29	0.00	0.5	15.40	21.79
11/01/1997	0.69	0.81	0.17	1.16	0.46	1.33	0.29	0.12	14.8	16.16	21.34
11/01/1997	0.72	0.80	0.16	1.12	0.47	1.28	0.31	0.08	9.7	15.44	20.25
02/01/1998	0.67	0.78	0.16	1.09	0.47	1.25	0.31	0.11	14.2	15.24	19.98
03/01/1999	0.58	0.76	0.16	1.08	0.44	1.24	0.28	0.18	23.6	16.10	21.17
02/10/2000	1.77	0.86	0.35	1.57	0.15	1.92	0.00	-0.91	-105.8	37.80	41.14
05/16/2000	1.54	0.92	0.39	1.71	0.14	2.10	0.00	-0.62	-67.1	40.13	42.67

- Note that only the 20 most recent test values are being used to calculate the cummulative mean, standard deviation, relative percent difference, and coefficent of variation from this point forward. The RPD and CV are not used in the graph but are useful pieces of information.

Toxikon Corporation
Jupiter, Florida

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Effective: Oct. 1999

STUDY DAILY LOG

Test Sponsor: NA	Study No: NA
Test Substance: NA	Study Type: NA

Initial and Date all Entries:

Lot LP00-5-2 was derived from in-house cultures of Leptocheirus plumulosus. Cultures 1 through 4 and 7 and 8 were thinned to create lot LP00-5-2. The holding records begin on tags LP5-2-1A and LP5-2-1B. These are two containers being used for holding purposes.

The in-house lot# is LP97-7-14. Collection of test animals started 4-27-00. ~~This~~ The test animals were collected by stacking a 710µm sieve below a 1mm sieve. Animals caught on the #710µm sieve are 5-5mm in length. These animals meet the test size requirements. 5-2-00 MB

A total of 1920 animals were removed for project 000502. These animals were gathered from two containers. 5-16-00 MB

Plus, 120 animals were used for a ref tox test. 1630/36 from container A 5-16-00 MB

MB 5-2-00

Toxikon Environmental Sciences
Jupiter, Florida

Form No: 006
Effective: Jan. 1995
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ANIMAL RECEIPT LOG

DATE	SPECIES	TAX. ID VERIFIED BY	# REC'D	SUPPLIER & LOCATION	TOXIKON LOT #	HOLDING LOG USED	PAGE	DATA BY	Shipping Docs on pg:
-10-97	L. plumulosus	MB	400+	Chesapeake Cultures Hayes VA	LP97-6-10	Saltwater Invert	LP6-10-1	MB	514
-17-97	Ampelisca abdita	MB	3500	ECA Newport RI	AA97-6-17	Saltwater Invert	AA6-17-1	MB	515
-1-97	Ampelisca abdita	MB	1200	ECA Newport RI	~~AA97-6-1~~ AA97-7-1 (1)	Saltwater Invert	~~AA6-1~~ AA7-1-1 (2)	MB	516
-18-97	L. plumulosus	MB	1300+	Chesapeake Cultures Hayes VA	LP97-7-18	Saltwater Invert	LP7-18-1	MB	517
-18-97	Menidia beryllina	MB	120	Aquatic Indicators St. Augustine FL	MNB97-7-18	Saltwater Fish	MNB7-18-1	MB	518
-21-97	Apis mellifera	JAA	~300	Van Husem	AM97-7-21	—	—	JAA	—
-21-97	Neanthes arenaceodentata	JAA	50	wattway exp't.	NA97-7-24	Saltwater Invert	NA7-24-1	JAA	—
29-97	Menidia beryllina	MB	480	Aquatic Ind. St. Augustine	MNB97-7-29	Saltwater Fish	MNB7-29-1	MB	519
5-97	Menidia beryllina	MB	500	Aquatic Ind St. Augustine	MNB97-8-5	Saltwater Fish	MNB8-5-1	MB	520
-13-97	O. mykiss	MB	1700	Mt Lassen Red Bluff CA	OM97-8-13	Freshwater Fish	OM8-13-1	MB	521
-14-97	L. plumulosus	MB	1200	Univ. of Maryland	LP97-8-14	Saltwater Invert	LP8-14-1	MB	522
3-19-97	Chironomus tentans	JAA	~200	Aquatic Bio Systems Ft Collins Co	CT97-8-19	Chironomid Culture	CT8-19-1 ~~97~~ (3)	JAA	523
-26-97	C. tentans	JAA	2200	Aquatic Biosys. Ft. Collins Co	CT97-8-26	Chironomid Culture	CT8-26-1	JAA	524
-26-97	C. tentans Egg Cases	JAA	3	Aquatic Biosys Ft. Collins CO	CTE97-8-26	Chironomid Culture	CTE8-26-1	JAA	525
-28-97	O. mykiss	MB	710	Mt. Lassen Red Bluff CA	OM97-8-28	Freshwater Fish	OM8-28-1	MB	526

(1) EE 7-1-97 MB
(2) EE 7-1-97 MB
(3) [redacted] JAA [redacted] 19-9[redacted]

CERTIFIED COPY
MB [redacted] 5[redacted]00

Toxikon Corporation
Jupiter, Florida

Page: LP5-2-2A
Form No: 077
Effective: Oct. 1999

SALTWATER INVERTEBRATE HOLDING LOG

Species: Leptocherus plumulosus	Date Received: Animals were collected in-house
Lot # : LP00-5-2	See Page 35 of Animal Receipt Log
Holding Chamber ID/Location: Aquaculture	
Records continued from page LP5-2-1A in this log.	

Date	5-11-00	5-12-00	5-15-00	5-16-00			
Time	1338	1510	1536	1553			
Data By	MB	MB	MB	MB			
Number Alive	1000+	1000+	1000+	—		5-18-00 MB	
Number Dead	NOB	NOB	NOB	NOB			
Fed	—	G	G	—			
Sal. (°/oo)	10	10	10	10			
Ref. #	3	3	3	3			
Temp. (°C)	20.2	20.3	21.0	20.0			
Meter #	YSI-2	YSI-2	YSI-2	YSI-2			
pH	7.5	7.3	7.3	7.4			
Meter #	CH-3	pH4D-2	pH4D-2	pH4D-2			
DO (mg/L)	7.1	7.5	7.6	7.1			
Meter #	YSI-2	YSI-2	YSI-2	YSI-2			
Bath Cleaned	—	—	—	—			
# Removed for Test	—	—	—	① 1920 / 120			
Time Removed	—	—	—	1300			
Removed By	—	—	—	TR, ALSO			
Toxikon Study #	—	—	—	0005012 R&Tox			5-20-00

RECORDS

HEMP

Records continued on page NA of this log.

MB INITIALS DATE

* See Notes Section for additional description.

NOB = None Observed BS = Brine Shrimp
SS = Salmon Starter FF = Flake Food G = Gorp

Toxikon Corporation
Jupiter, Florida

Page: [illegible]
Form No: 077
Effective: Oct. 1999

SALTWATER INVERTEBRATE HOLDING LOG

Species: Leptocheirus plumulosus

Date Received: Animals were collected in-house

Lot # : 2-P00-45-2

See Page ~~NA~~ 35 of Animal Receipt Log

Holding Chamber ID/Location: Aquaculture

Records continued from page NA in this log.

Date	5-1-00	5-3-00	5-4-00	5-5-00	5-8-00	5-9-00	5-10-00
Time	1626	1551	1607	1316	1610	1635	0943
Data By	MTS	MTS	MTS	MTS	MTS	MTS	MTS
Number Alive	1000+	1000+	1000+	1000+	1000+	1000+	1000+
Number Dead	NOB	NOB	NOB	NOB	NOB	NOB	NOB
Fed	G	—	G	G	G	—	G
Sal. (°/oo)	20	17	14	10	10	10	11
Ref. #	3	3	3	3	3	3	3
Temp. (°C)	19.9	19.9	21.3	20.0	20.3	20.4	20.1
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2
pH	8.1	8.0	—	7.4	—	—	7.3
Meter #	CH-3	CH-3	—	CH-3	—	—	CH-3
DO (mg/L)	7.7	7.4	7.5	6.9	7.0	6.4	5.8
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2
Bath Cleaned	—	—	—	—	—	—	—
# Removed for Test	—	—	—	—	—	—	—
Time Removed	—	—	—	—	—	—	—
Removed By	—	—	—	—	—	—	—
Toxikon Study #	—	—	—				

CERTIFIED COPY
MTS
INITIALS
5-10-00
DATE

Records continued on page ____ of this log. LP 5-1-1A

* See Notes Section for additional description.

NOB = None Observed BS = Brine Shrimp
SS = Salmon Starter FF = Flake Food G = Gorp

Toxikon Corporation
Jupiter, Florida

Page: [illegible]
Form No: 077 28
Effective: Oct. 1999

SALTWATER INVERTEBRATE HOLDING LOG

Species: Leptocherus plumulosus	Date Received: Animals were collected in-house
Lot # : LP00-5-2	See Page 35 of Animal Receipt Log
Holding Chamber ID/Location: Aquaculture	
Records continued from page LP5-2-1B in this log.	

Date	5-10-00	5-11-00	5-12-00	5-15-00	5-16-00		
Time	0946	1340	1513	1548	1557		
Data By	MB	MB	MB	MB	MB		
Number Alive	2500+	2500+	2500+	2500+	—		
Number Dead	NOB	NOB	NOB	NOB	NOB		5-16-00 MB
Fed	G	—	G	G	—		
Sal. (°/oo)	11	10	10	10	10		
Ref. #	3	3	3	3	3		
Temp. (°C)	20.1	20.4	21.0	21.2	20.1		
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2		
pH	7.4	7.4	7.3	7.3	7.4		
Meter #	CH-3	CH-3	pH4D-2	pH4D-2	pH4D-2		
DO (mg/L)	5.9	6.9	7.4	7.4	7.3		
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	YSI-2		
Bath Cleaned	—	—	—	—	—		
# Removed for Test	—	—	—	—	① 1920 / 120		
Time Removed	—	—	—	—	1300		
Removed By	—	—	—	—	TR, ALG		
Toxikon Study #	—	—	—	—	0005012 R&T		

RECORDS

END

Records continued on page NA of this log.

CERTIFIED COPY
MB 5-30-00
INITIATED DATE

* See Notes Section for additional description.

NOB = None Observed BS = Brine Shrimp
SS = Salmon Starter FF = Flake Food G = Gorp ① EE 5-10-00 MB

Lot LP00 5-2 was contained in two trays which were combined prior to test initiation 5-16-00 MB

Toxikon Corporation
Jupiter, Florida

Page: LP5-2-15
Form No: 077
Effective: Oct. 1999

SALTWATER INVERTEBRATE HOLDING LOG

Species: Leptocheirus plumulosus
Date Received: Animals were collected in-house
Lot # : LP00-5-2
See Page ~~NA~~ 95 of Animal Receipt Log
Holding Chamber ID/Location: Aquaculture
Records continued from page NA in this log.

Date	5-2-00	5-3-00	5-4-00	5-5-00	5-6-00	5-8-00	5-9-00
Time	1625	1550	1107	1316	1130	1608	1634
Data By	MTB	MTB	MTB	MTB	AL	MTB	MTB
Number Alive	1500+	1500+	1500+	1500+	1500+	1500+	1500+
Number Dead	NOB	NOB	NOB	NOB	NOB	NOB	NOB
Fed	G	–	G	G	–	G	–
Sal. (°/oo)	10	12	14	11	10	10	10
Ref. #	3	3	3	3	3	3	3
Temp. (°C)	19.9	10.0	21.3	19.9	–	10.3	10.5
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	–	YSI-2	YSI-2
pH	8.1	8.0	–	7.4	–	–	–
Meter #	CH-3	CH-5	–	CH-3	–	–	–
DO (mg/L)	7.9	7.6	7.6	7.0	–	6.8	6.7
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	–	YSI-2	YSI-2
Bath Cleaned	–	–	–	–	–	–	–
# Removed for Test	–	–	–	–	90	–	–
Time Removed	–	–	–	–	1145	–	–
Removed By	–	–	–	–	AL	–	–
Toxikon Study #	–	–	–	–	0005012	MTB –	[illegible]

Records continued on page ____ of this log. LP5-2-15

* See Notes Section for additional description.

NOB = None Observed BS = Brine Shrimp
SS = Salmon Starter FF = Flake Food G = Gorp

DEE5-1-00MB

Toxikon

Date: *30-Jun-99*

CLIENT: TOXIKON ENVIRONMENTAL SCIENCE
Lab Order: 9906398
Project: AQUACULTURE FEEDS
Lab ID: 9906398-01A

Client Sample ID: 88H1162
Collection Date: 6/17/99 9:12:00 AM
Matrix: FEED

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TOTAL		**SW6010B**				Analyst: BO
Antimony	ND	1.1		mg/Kg-dry	1	6/23/99
Arsenic	ND	1.1		mg/Kg-dry	1	6/23/99
Beryllium	ND	0.11		mg/Kg-dry	1	6/23/99
Cadmium	ND	0.53		mg/Kg-dry	1	6/23/99
Chromium	0.70	0.53		mg/Kg-dry	1	6/23/99
Copper	2.8	1.1		mg/Kg-dry	1	6/23/99
Lead	ND	1.1		mg/Kg-dry	1	6/23/99
Nickel	ND	4.2		mg/Kg-dry	1	6/23/99
Selenium	ND	1.1		mg/Kg-dry	1	6/23/99
Silver	ND	0.53		mg/Kg-dry	1	6/23/99
Thallium	ND	1.1		mg/Kg-dry	1	6/23/99
Zinc	14	4.2		mg/Kg-dry	1	6/23/99
MERCURY, TOTAL		**SW7471A**				Analyst: BO
Mercury	ND	0.080		mg/Kg-dry	1	6/22/99

MKS 5-30-00

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

ANIMAL FEEDS LOG

Date	Product Name	Supplier & Location	Quantity	Toxikon Lot #	Supplier Lot #	Feed Analysis Date & Pages	Data By	Shipping Docs on Page:
* 4-8-99	Manna Pro earthworm and cricket seed	Manna Pro St. Louis MO	50 lbs	WFV-11-21	—	LO 9901550 pgs 1-4	MB	—
4-14-99	Cereal Leaves	Sigma Aldrich St. Louis MO	100g	46H1162	46H1162	LO9906393 pgs 1-2	MB	—
5-5-99	Brine Shrimp Cysts	Aquarium Pet Glen Burnie MD	2 cans	FBSR-5-5	FB0317	LO 9906395 pgs 3-4	MB	—
6-3-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	24 pcks	FBSR-6-3	—	LO 9906395 pgs 5-6	MB	—
6-15-99	Selaginella Seed	Carolina Environmental Sciences NY	1 L	SECR-6-15	—	NA	MB	—
8-3-99	CL	Coastal Seeds Quilcene WA	1 L	CL99-8-3	—	LO 9908512 pgs 1-2	MB	—
10-12-99	Brine Shrimp Cysts	Aquarium Products Glen Burnie MD	1 can	FBSR-10-12	FB0317	LO 0001001 pgs 1-2	MB	—
① 10-21-99	Magic Moss Bedding	Carolina Biological Burlington NC	50 lbs	MMBSR-4-1	—	NA	MB	—
10-20-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	12 pcks	FBSR-10-20	—	LO 0001001 pgs 3-4	MB	—
② 12-18-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	12 pcks	FBSR-10-20	—	LO 0001001 pgs 3-4	MB	—
2-10-00	Tetra Min	Wal Mart	400g	TMOD-2-10	—	LO 0004138 pgs 1-2	MB	—
4-4-00	Frozen Brine Shrimp	Aquaculture Supply	48 pcks	FBSOD-4-4	—	LO 0004138 pgs 3-4	MB	—
4-6-00	Brine Shrimp Cysts	Brine Shrimp Direct	2 cans	FBSOD-4-6	—	LO 0004138 pgs 5-6	MB	—
4-7-00	APR	Aquatic Enterprises Apopka FL	1 can	APROD-4-7	—	LO 0004138 pgs 7-8	MB	—
5-17-00	Wheat Grass Powder	Pines Internat. and Lawrence KS	4 kg	WGOD-5-17	03120		MB	—

* This product was taken from the field site 4-8-99 (MB) ① 10-19-99 MB ② Toxikon lot FBSR-10-20/12-18-99 MB

Toxikon Date: *03-May-00*

CLIENT:	TOXIKON ENVIRONMENTAL SCIENC	**Client Sample ID:**	TM 00-2-10
Lab Order:	0004238	**Collection Date:**	04/13/2000 9:00:00 AM
Project:	ANIMAL FEEDS	**Matrix:**	TISSUE
Lab ID:	0004238-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TOTAL		**SW6010B**				Analyst: A
Antimony	ND	2.0		mg/Kg-dry	1	04/21/2000
Arsenic	ND	2.0		mg/Kg-dry	1	04/21/2000
Beryllium	ND	0.20		mg/Kg-dry	1	04/21/2000
Cadmium	ND	1.0		mg/Kg-dry	1	04/21/2000
Chromium	1.3	1.0		mg/Kg-dry	1	04/21/2000
Copper	8.9	2.0		mg/Kg-dry	1	04/21/2000
Lead	ND	2.0		mg/Kg-dry	1	04/21/2000
Nickel	ND	8.0		mg/Kg-dry	1	04/21/2000
Selenium	ND	2.0		mg/Kg-dry	1	04/21/2000
Silver	ND	1.0		mg/Kg-dry	1	04/21/2000
Thallium	ND	2.0		mg/Kg-dry	1	04/21/2000
Zinc	66	8.0		mg/Kg-dry	1	04/21/2000
MERCURY, TOTAL		**SW7471A**				Analyst: AS
Mercury	ND	0.080		mg/Kg-dry	1	04/20/2000

CERTIFIED COPY

MS 5-30-00

INITIALS DATE

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-Jun-99*

CLIENT:	TOXIKON ENVIRONMENTAL SCIENCE	**Client Sample ID:**	88H1162
Lab Order:	9906398	**Collection Date:**	6/17/99 9:12:00 AM
Project:	AQUACULTURE FEEDS	**Matrix:**	FEED
Lab ID:	9906398-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PEST/PCB		**SW8081A**				Analyst: CN
4,4'-DDD	ND	10		µg/Kg-dry	1	6/29/99
4,4'-DDE	ND	10		µg/Kg-dry	1	6/29/99
4,4'-DDT	ND	10		µg/Kg-dry	1	6/29/99
Aldrin	ND	10		µg/Kg-dry	1	6/29/99
alpha-BHC	ND	10		µg/Kg-dry	1	6/29/99
beta-BHC	ND	10		µg/Kg-dry	1	6/29/99
Chlordane	ND	50		µg/Kg-dry	1	6/29/99
delta-BHC	ND	10		µg/Kg-dry	1	6/29/99
Dieldrin	ND	10		µg/Kg-dry	1	6/29/99
Endosulfan I	ND	10		µg/Kg-dry	1	6/29/99
Endosulfan II	ND	10		µg/Kg-dry	1	6/29/99
Endosulfan sulfate	ND	10		µg/Kg-dry	1	6/29/99
Endrin	ND	10		µg/Kg-dry	1	6/29/99
Endrin aldehyde	ND	10		µg/Kg-dry	1	6/29/99
Endrin Ketone	ND	10		µg/Kg-dry	1	6/29/99
gamma-BHC	ND	10		µg/Kg-dry	1	6/29/99
Heptachlor	ND	10		µg/Kg-dry	1	6/29/99
Heptachlor epoxide	ND	10		µg/Kg-dry	1	6/29/99
Methoxychlor	ND	10		µg/Kg-dry	1	6/29/99
Toxaphene	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1016	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1221	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1248	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1232	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1242	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1254	ND	50		µg/Kg-dry	1	6/29/99
Aroclor 1260	ND	50		µg/Kg-dry	1	6/29/99
PETROLEUM HYDROCARBONS, T/R		**E418.1**				Analyst: CPF
Petroleum Hydrocarbons, TR	2500	40		mg/Kg-dry	1	6/25/99

MF 7-2-99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Environmental Sciences
Jupiter, Florida

Page: 1
Form No: 021
Effective: Nov. 1989

ANIMAL FEEDS LOG

Product Name	Supplier	Date Rec'd	Lot #	Data By
Brine Shrimps Eggs	Aquarium Products	9/89	180	GSW
Size No. 1 Salmon Starter	Zeigler Bros, Inc	9/89	38-476 V3	GSW
Prime Flake Diet	Zeigler Bros., Inc.	9/89	#1	GSW
Size 250 mm Larval AP100	Zeigler Bros., Inc.	9/89	9226	GSW
Brine Shrimp Eggs	Aquarium Products	9/90	180	KAC
Aqua Stable 3/8 PELLETS	ZEIGLER BROS	12/90		KAC
Size No. 1 Salmon Starter	Zeigler Bros. Inc	3/91	38-4763-91-50	KAC
Prime Flake Diet	Zeigler Bros. Inc.	12/90	#2	KAC
Larval Food 250 mc size	Zeigler Bros. Inc.	9/91	#1133	KAC
Brine Shrimp Eggs	Aquarium Products	9/91	180	KAC
Prime Flake Diet	Zeigler Bros, Inc.	9/91	#3	KAC
1/8" Floating Fish Nuggets	Zeigler Bros, Inc	9/91	FFN91-9-1 ~~#1~~ EE KF	KAC
Diet A Algal Concentrate	Coast Oyster Co.	10/91	#1	KAC
Brine Shrimp Eggs	Aquarium Products	6/17/92	180	[illegible]
PRIME FLAKE (RED)	ZEIGLER BROS. INC.	7-10-92		RMF
Artemia	Aquarium Products	10-20-92	822 ~~180~~ 11-16-92 EE RMF	RMF
PRIME FLAKE (RED)	ZEIGLER BROS. INC.	11-30-92	Product # 368006500	RMF
Bio-marine Inc Omega-3 Booster	Aquafauna Bio-marine Inc	12/17/92	FAS 93-12-17	JRS
Fritz A+B Algal Food	Fritz Pet Products	12/22/92	—	JRS
Cereal Leaves	Sigma Chemical Comp.	12/31/92	#111H0212A	JRS
Artemia SALINA	Aquarium products	1-29-93	B-1028	RMF
Cereal Leaves	EE JRS 2/24/93 Sigma ~~Aqua~~ Chemical comp	2/24/93	#111H0212B	JRS
SALMON STARTER	Zeigler	EE RMF 4.2.93	JS 3-29-93	RMF
Prime FLAKE RED	Zeigler	4.2.93	PF 3-26-93	RMF
FROZEN Brine Shrimp	Aquaculture Supply	4-15-93	FBS 93-4-15	RMF
ALFALFA PELLETS	B.R. FEED STORE	4-14-93	AP 93-4-14	RMF
THERAPEUTIC MULTIPLE VITAMIN Formula (2)	SUNDOWN VITAMINS Ft. Lauderdale, FL	4-22-93	10260-2 96	RMF

Lake Entries GSW 6/16/9[illegible]

Added when noticed no recorded KAC 11/20

Toxikon **Date:** *03-May-00*

CLIENT: TOXIKON ENVIRONMENTAL SCIENC **Client Sample ID:** TM 00-2-10
Lab Order: 0004238 **Collection Date:** 04/13/2000 9:00:00 AM
Project: ANIMAL FEEDS **Matrix:** TISSUE
Lab ID: 0004238-01A

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PEST/PCB IN TISSUE		**SW8081A**				Analyst: PC
4,4'-DDD	ND	10		µg/Kg	1	04/17/2000
4,4'-DDE	ND	10		µg/Kg	1	04/17/2000
4,4'-DDT	ND	10		µg/Kg	1	04/17/2000
Aldrin	ND	10		µg/Kg	1	04/17/2000
alpha-BHC	ND	10		µg/Kg	1	04/17/2000
beta-BHC	ND	10		µg/Kg	1	04/17/2000
Chlordane	ND	50		µg/Kg	1	04/17/2000
delta-BHC	ND	10		µg/Kg	1	04/17/2000
Dieldrin	ND	10		µg/Kg	1	04/17/2000
Endosulfan I	ND	10		µg/Kg	1	04/17/2000
Endosulfan II	ND	10		µg/Kg	1	04/17/2000
Endosulfan sulfate	ND	10		µg/Kg	1	04/17/2000
Endrin	ND	10		µg/Kg	1	04/17/2000
Endrin aldehyde	ND	10		µg/Kg	1	04/17/2000
Endrin Ketone	ND	10		µg/Kg	1	04/17/2000
gamma-BHC	ND	10		µg/Kg	1	04/17/2000
Heptachlor	ND	10		µg/Kg	1	04/17/2000
Heptachlor epoxide	ND	10		µg/Kg	1	04/17/2000
Methoxychlor	ND	10		µg/Kg	1	04/17/2000
Toxaphene	ND	50		µg/Kg	1	04/17/2000
Aroclor 1016	ND	50		µg/Kg	1	04/17/2000
Aroclor 1221	ND	50		µg/Kg	1	04/17/2000
Aroclor 1248	ND	50		µg/Kg	1	04/17/2000
Aroclor 1232	ND	50		µg/Kg	1	04/17/2000
Aroclor 1242	ND	50		µg/Kg	1	04/17/2000
Aroclor 1254	ND	50		µg/Kg	1	04/17/2000
Aroclor 1260	ND	50		µg/Kg	1	04/17/2000
PETROLEUM HYDROCARBONS, T/R		**E418.1**				Analyst: P C
Petroleum Hydrocarbons, TR	3,700	40		mg/Kg-dry	1	05/02/2000

MK 5-30-00

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Received: 04/23/93 Results by Sample

SAMPLE ID ALFALFA PELLETS AP93-4-14 FRACTION 05A TEST CODE PCB S NAME PCB - SW846-8080
Date & Time Collected 04/15/93 11:30:00 Category SOIL

PCB in SOIL

CAS NUM.	RESULT	LIMIT	UNITS	ANALYTE
12674-11-2	ND	0.1	mg/Kg	Aroclor 1016
11104-28-2	ND	0.1	mg/Kg	Aroclor 1221
11141-16-5	ND	0.1	mg/Kg	Aroclor 1232
53469-21-9	ND	0.1	mg/Kg	Aroclor 1242
12672-29-6	ND	0.1	mg/Kg	Aroclor 1248
11097-69-1	ND	0.1	mg/Kg	Aroclor 1254
11096-82-5	ND	0.1	mg/Kg	Aroclor 1260
37324-23-5	ND	0.1	mg/Kg	Aroclor 1262
	ND	0.1	mg/Kg	Aroclor 1268

Notes and Definitions for this Report:

EXTRACTED: 05/01/93
DATE RUN: 05/04/93
ANALYST: AP
INSTRUMENT: HP 2
DIL. FACTOR: 1

ND = Not detected at detection limit

NTE 5.50.00

Received: 04/23/93

Results by Sample

SAMPLE ID ALFALFA PELLETS AP93-4-14 SAMPLE # 05 FRACTIONS: A

Date & Time Collected 04/15/93 11:30:00 Category SOIL

TPH_IR 12800

mg/Kg DL=40

MTC 5-5-93

Toxiko. nvironmental Sciences
Jupiter, Florida

Page: 4
Form No: 021
Effective: Apr. 1995

ANIMAL FEEDS LOG

Date	Product Name	Supplier & Location	Quantity	Toxikon Lot #	Supplier Lot #	Feed Analysis Date & Pages	Data By	Shipping Docs on Page:
06.21.96	Platinum Shrimp	Argent Chem Co.	1 can	BP1906K	BP1906K	⊕ ~~N/A~~	JBM	① —
08.21.96	Platinum Shrimp	Argent Chem Co.	1 can	BP1308K	BP1308K	⊕ WO97-1-279 ~~N/A~~ pgs. 6-9	JBM	① —
9.24.96	F Brine Shrimp	Aquaculture Supply	12 pk.	FBS 96.9.24	—	⊕ WO97-1-279 ~~N/A~~ pgs. 10-13	HT	—
9.24.96	Artemia Cyst	Aquaculture Supply	3 can	BS 96.9.24	—	⊕ WO97-1-279 ~~N/A~~ pgs. 14-17	HT	—
10.10.96	Artemia Cysts	Aquarium Products	3 cans	BS96 ~~9.25~~ 10.10 ②	B0930	⊕ WO97-1-279 ~~N/A~~ pgs. 18-21	JBM	—
10.14.96	36% protein affect feed	Arkat Feeds, Inc Dumas, AR	6 x 50 lbs bag	CFP96.10.14	—	WO97-1-279 pgs. 22-25	HT	—
11.12.96	Frozen Brine Shrimp	Aquaculture Supply Dade City, FL	23 x 1# bag. 1 x 2# bag	FBS96-11-12	—	WO97-1-279 pgs. 26-29	JBJ	—
11.20.96	Gold Artemia Cysts	Argent Chem Co.	2 cans	BS96-11-20		WO97-1-279 pgs. 30-33	JBJ	—
12.11.96	Tetra Fin Flake Food	Tetra	1 can 100 g	FF 96.12.11	—	WO97-1-279 pgs. 34-37	HT	
1.10.97	Brine Shrimp (eggs)	Aquarium Products	3 cans	⊕ ~~BG~~ BS 97.1.10	B0930	WO97-1-279 pgs. 38-41	HT	—
1.16.97	Lumbricus spp.	Jupiter Bait & Tackle	12 box	L spp. 97.1.16	—	N/A	HT	
1.20.97	Artemia Cysts (Gold)	Argentemia Chem. Co.	1 can	~~BS~~ 97-1-20 MB	BG 0601 L	WO9704236 pgs. 2-4	HT	
1-20-97	Neo Novum	Argent Chem.	10 kg	NEN97-1-20	Nn 0109 J	WO9704236 pgs. 8-10	JAA	
1.23.97	Frozen Brine Shrimp	Petpourri Pet Shop	(2) 32 oz	FBS 97.1.23	—	not analyzed - not used for GLP test [illegible] 4-4-97	HT	
1-30-97	Frozen BS	Aquaculture Sup.	60-60 oz Paks	FBS97-1-30	BS# 51110	WO9704236 pgs. 5-7	MB	
3-6-97	Lumbricus terrestris	Jupiter Bait & Tackle	15 boxes	LT97-3-6	—	N/A	JAA	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

① EE 09.04.96/JBM ③ [illegible] MB
② EE 10.10.96 JBM

MB ⊕ analysis pages will be written in after analysis. FJC 11/10/96

Received: 04/23/93

TOXIKON CORP. REPORT
Results by Sample

Work Order # 93-04-387

SAMPLE ID ALFALFA PELLETS AP93-4-14 FRACTION 05A TEST CODE PEST S NAME PESTICIDES - SOIL
Date & Time Collected 04/15/93 11:30:00 Category SOIL

PESTICIDES in SOIL

	RESULT	LIMIT
a-BHC	ND	0.010
g-BHC (Lindane)	ND	0.010
b-BHC	ND	0.010
Heptachlor	ND	0.010
d-BHC	ND	0.010
Aldrin	ND	0.010
Heptachlor Epoxide	ND	0.010
Endosulfan I	ND	0.010
4,4'-DDE	ND	0.010
Dieldrin	ND	0.010
Endrin	ND	0.010
4,4'-DDD	ND	0.010
Endosulfan II	ND	0.010
4,4'-DDT	ND	0.010
Endrin Aldehyde	ND	0.010
Endosulfan Sulfate	ND	0.010
Chlordane	ND	0.010
Toxaphene	ND	0.010
Methoxychlor	ND	0.010

Notes and Definitions for this Report:

UNITS: mg/Kg
EXTRACTED: 05/01/93
DATE RUN: 05/04/93
ANALYST: AP
INSTRUMENT: HP 2
DIL. FACTOR: 1

ND = not detected at detection limit

CERTIFIED COPY
NB 5-20-93
INITIALS DATE

TOXIKON CORP. REPORT Work Order # 97-04-236

Received: 04/14/97

Results by Sample

SAMPLE ID NEN97-1-20 FRACTION 03A TEST CODE PP13 NAME METALS,13 PRI.POLL.

Date & Time Collected 04/10/97 11:25:00 Category FEED

13 PRIORITY POLLUTANT METALS

	RESULT	LIMIT
Silver	ND	0.4
Arsenic	ND	5.45
Beryllium	ND	0.2
Cadium	1.04	0.27
Chromium	4.25	0.55
Copper	15.6	0.55
Nickel	1.55	1.1
Lead	ND	2.7
Antimony	ND	8.18
Selenium	ND	13.6
Thallium	ND	16.4
Zinc	106	0.55
Mercury	ND	2.53

Notes and Definitions for this Report:

EXTRACTED 04/24/97
DATE RUN 04/25/97
ANALYST VR
INSTRUMENT ICP
DIL. FACTOR 1
UNITS mg/Kg

ND = Not detected at detection limit

CERTIFIED COPY
NES 5-30-00
DATE

SAMPLE ID NEN97-1-20 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 04/10/97 11:25:00 Category FEED

TPH_IR 6840
mg/Kg DL=40

CERTIFIED COPY
NTS 5-30-00

Toxikon Corporation
Jupiter, Florida

Page: FSL6
Form No: 061
Effective: Oct. 1999

SALTWATER WATER QUALITY HISTORICAL RECORD

Collection Date	Alkalinity (mg/L)	Salinity (°/oo)	Temp (°C)	pH	DO (mg/L)	Data By
1-14-00	172	21	21.3	8.4	7.6	MB
2-11-00	154	22	19.5	~~8.57.3~~ ①	7.3	MB
3-17-00	146	21	19.3	8.7	7.6	MB
4-25-00	158	21	19.1	8.6	7.5	MB

Comments: ① EE 2-11-00 MB

MB 5-30-00

 TOXIKON CORP. REPORT Work Order # 97-04-236

Received: 04/14/97 Results by Sample

SAMPLE ID NEN97-1-20 FRACTION 03A TEST CODE PPCBS NAME PESTICIDES/PCB (SOIL)

Date & Time Collected 04/10/97 11:25:00 Category FEED

PESTICIDES

	RESULT	LIMIT
Alpha-BHC	ND	0.010
Gamma-BHC (Lindane)	ND	0.010
Beta-BHC	ND	0.010
Heptachlor	ND	0.010
Delta-BHC	ND	0.010
Aldrin	ND	0.010
Heptachlor Epoxide	ND	0.010
Endosulfan I	ND	0.010
4,4'-DDE	ND	0.010
Dieldrin	ND	0.010
Endrin	ND	0.010
4,4'-DDD	ND	0.010
Endosulfan II	ND	0.010
4,4'-DDT	ND	0.010
Endrin Aldehyde	ND	0.010
Endosulfan Sulfate	ND	0.010
Chlordane	ND	0.010
Toxaphene	ND	0.010
Methoxychlor	ND	0.010

PCB

	RESULT	LIMIT
Aroclor 1016	ND	0.50
Aroclor 1221	ND	0.50
Aroclor 1232	ND	0.50
Aroclor 1242	ND	0.50
Aroclor 1248	ND	0.50
Aroclor 1254	ND	0.50
Aroclor 1260	ND	0.50

Notes and Definitions for this Report:

EXTRACTED: 04/22/97
UNITS: mg/Kg
DATE RUN: 04/24/97
ANALYST: ST
INSTRUMENT: HP 1
DIL. FACTOR: 1

ND = not detected at detection limit

MTS 5-5-00
INITIAL DATE

APPENDIX D

DILUTION WATER CHARACTERISTICS

Toxikon Corporation
Jupiter, Florida

Page: L-7
Form No: 062
Effective: Oct. 1999

FRESHWATER WATER QUALITY HISTORICAL RECORD

Collection Date	Conduct. (umhos/cm)	Hardness (mg/L)	Alk. (mg/L)	pH	DO (mg/L)	Data By
1-14-00	425	58	17	7.6	8.8	MB
2-11-00	340	71	22	7.4	8.8	MB
3-17-00	361	58	16	7.7	8.1	MB
4-15-00	407	66	18	7.3	9.0	MB

Comments:

NTS 5.00

FILTERED SALTWATER CHARACTERIZATION[a]

Parameter	Concentration[b]		Historical Range[c]
Aluminum	1.11	mg/L	ND – 1.11 mg/L
Arsenic	<0.010	mg/L	ND - 0.017
Boron	2.22	mg/L	1.69 - 2.39 mg/L
Beryllium	<0.004	mg/L	ND
Bromide	30.7	mg/L	ND - 72.1 mg/L
Cadmium	<0.005	mg/L	ND
Calcium	247	mg/L	247 - 311 mg/L
Chloride	11500	mg/L	9,900 - 14,400 mg/L
Chromium (hexavalent)	<0.01	mg/L	ND
Chromium (total)	<0.01	mg/L	ND
Cobalt	<0.01	mg/L	ND - 0.058 mg/L
Copper	0.047	mg/L	ND - 0.058 mg/L
Fluoride	0.155	mg/L	0.155 -0.320 mg/L
Iodide	0.239	mg/L	ND - 0.55 mg/L
Iron	1.48	mg/L	ND – 1.48 mg/L
Lead	<0.005	mg/L	ND
Manganese	0.012	mg/L	ND - 0.069 mg/L
Magnesium	682	mg/L	558 - 830 mg/L
Mercury	0.0003	mg/L	ND
Molybdenum	<0.02	mg/L	ND - 0.211 mg/L
Nickel	<0.02	mg/L	ND - 0.12 mg/L
Potassium	219	mg/L	183 - 370 mg/L
Selenium	<0.005	mg/L	ND
Silver	<0.005	mg/L	ND
Sodium	6000	mg/L	4450 - 8400 mg/L
Tin	0.891	mg/L	ND - 40.2 mg/L
Zinc	<0.02	mg/L	ND - 0.170 mg/L
Ammonia (total)	<0.04	mg/L	ND - 0.086 mg/L
Cyanide (total)	0.02	mg/L	ND
Nitrates/Nitrites (total as N)	0.748	mg/L	ND - 0.822
Phosphates (total)	<0.050	mg/L	ND - 0.633 mg/L
Sulfide (total)	<0.1	mg/L	ND
Sulfate (total)	1850	mg/L	1540 - 1850 mg/L
TDS	19400	mg/L	10,000 - 22,500 mg/L
TOC	<1.00	mg/L	ND - 4.2 mg/L
TSS	6.0	mg/L	ND - 60 mg/L
COD	88.3	mg/L	50.2 - 985 mg/L
Total organophosphorus pesticides	<1.10	µg/L	ND
Total phenoxy herbicides	<1.2	µg/L	ND
Total organochlorine pesticides	<0.04	µg/L	ND
PCBs	<0.1	µg/L	ND

[a] The characterized saltwater is from a shallow saltwater well which is aerated, sand-filtered, carbon-treated, diluted to a salinity of approximately 20‰ with treated (activated carbon) freshwater and re-aerated.
[b] Sample of filtered saltwater collected December 13, 1999.
[c] Historical range for laboratory saltwater.

LABORATORY FRESHWATER CHARACTERIZATION[a]

Parameter	Concentration[b]		Historical Range[c]
Aluminum	1.16	mg/L	ND – 1.16 mg/L
Arsenic	<0.010	mg/L	ND
Boron	0.144	mg/L	ND - 0.159 mg/L
Beryllium	0.028	mg/L	ND – 0.028 mg/L
Bromide	0.126	mg/L	ND - 30 mg/L
Cadmium	0.028	mg/L	ND – 0.028 mg/L
Calcium	24.2	mg/L	8.89 -24.6 mg/L
Chloride	78.8	mg/L	60 - 108 mg/L
Chromium (hexavalent)	<0.010	mg/L	ND
Chromium (total)	<0.01	mg/L	ND
Cobalt	0.029	mg/L	ND– 0.029 mg/L
Copper	0.064	mg/L	ND - 0.064 mg/L
Fluoride	<0.10	mg/L	ND - 0.826 mg/L
Iodide	<0.050	mg/L	ND
Iron	1.740	mg/L	ND – 1.74 mg/L
Lead	<0.005	mg/L	ND
Manganese	0.038	mg/L	ND
Magnesium	4.21	mg/L	0.789 - 9.91 mg/L
Mercury	<0.0002	mg/L	ND
Molybdenum	0.038	mg/L	ND - 0.054 mg/L
Nickel	0.035	mg/L	ND
Potassium	1.94	mg/L	1.14 - 5.50 mg/L
Selenium	<0.005	mg/L	ND
Silver	<0.005	mg/L	ND
Sodium	38.7	mg/L	27.4 - 74.0 mg/L
Tin	<0.30	mg/L	ND
Zinc	0.074	mg/L	ND - 0.074 mg/L
Ammonia (total)	0.067	mg/L	ND - 0.676 mg/L
Cyanide (total)	<0.010	mg/L	ND
Nitrates (total as N)	0.476	mg/L	ND - 1.38 mg/L
Nitrites (total as N)	0.062	mg/L	ND - 0.062 mg/L
Phosphates (total)	0.037	mg/L	ND - 0.12 mg/L
Sulfide (total)	<0.10	mg/L	ND
Sulfate (total)	26.3	mg/L	15 - 52 mg/L
TDS	208	mg/L	150 - 552 mg/L
TOC	<1.0	mg/L	ND - 6.0 mg/L
TSS	<2.0	mg/L	ND - 16 mg/L
COD	49.7	mg/L	ND - 54.6 mg/L
Total organophosphorus pesticides	<1.0	µg/L	ND
Total phenoxy herbicides	<1.12	µg/L	ND
Total organochlorine pesticides	<0.04	µg/L	ND
PCBs	<0.100	µg/L	ND

[a] The characterized freshwater is carbon-treated Jupiter, Florida, town water which is aerated following carbon treatment.
[b] Sample of freshwater collected December 13, 1999.
[c] Historical range for laboratory freshwater.

TOXICON

Dan Cooke
Lockheed Martin
Environmental Services REAC
2890 Woodbridge Ave, Building 209
Edison, NJ 08837-3679

August 1, 2000

Dear Dan:

Enclosed are the revised copies of the *Menidia* and *Leptocheirus* reports. As per your letter on July 11, the following revisions have been made.

1. The "statement of truth and accuracy" was integrated into each report.

2. The SRT information for the *Menidia* test was addressed in greater detail thus explaining the need to run a second SRT with the same lot of testing animals as the 7-day study.

3. The slight temperature deviation from the targeted range of 20 +/- 1 °C was addressed and explained in the text of each report.

4. And finally, a header was added to page 11 of the *Leptocheirus* report. Additionally, the animal receipt log for the amphipods is correct in that the animals used for culturing the specific lot used in the test was harvested from this parent group of animals acquired in 1997.

If you have any further questions or concerns, please feel free to contact me at your convenience.

Sincerely,

Scott A. Glover

Scott A. Glover
Senior Aquatic Toxicologist

106 Coastal Way, Jupiter, FL 33477, TEL (561) 575-2477 FAX (561) 575-2497

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

Scott Glover
Toxikon Corporation
106 Coastal Way
Jupiter, Florida 33477

July 11, 2000

Dear Scott,

Enclosed are your original raw data sheets for the Quanta Resources toxicity tests. Please include copies in the final reports, and keep the originals in your files. The comments from my 12 June letter were satisfactorily addressed in the 16 June revised reports. However, after reviewing the raw data, I have a few other concerns.

1. The "statement of truth and accuracy" should be integrated into each report, following the title page.

2. The test protocol required concurrent standard reference toxicant (SRT) testing, initiated on the same day, with the same batch of test organisms. The *Menidia* assay was initiated on 10 May, but the SRT wasn't initiated until 14 May. In addition, the SRT test fell outside (>2 standard deviations from the mean) of the laboratory's established control chart. Another SRT test was initiated on 18 May (the day after Quanta testing was completed). Though it fell within the laboratory control chart, it was initiated with a new batch of organisms, and therefore was not relevant to the Quanta assays.

The test protocol listed test acceptability criteria, stating that the concurrent SRT must fall within the laboratory established control chart. Please explain the delay in SRT initiation, and provide justification for Lockheed Martin to accept this data.

3. The protocols for both tests required temperatures of 20 ± 1°C. However, both tests were performed at less than 19°C (even after including the temperature correction factors listed on your data sheets). Please note this in the final report, and explain.

4. The *Leptocheirus* report does not have a header on page 11, and the animal receipt log is from 1997.

Please process final reports at your earliest convenience. If you have questions, call me at (732) 321-4202. I can also be reached at daniel.w.cooke@lmco.com

Sincerely,

Daniel Cooke
Senior Aquatic Toxicologist

c: G. Molnar
J. Johnson

CERTIFIED COPY
SC 8-01-00
INITIALS DATE

WA# R1A00133

7-DAY ACUTE STATIC RENEWAL SEDIMENT BIOASSAY UTILIZING SEDIMENT COLLECTED FROM THE QUANTA RESOURCES SITE ON THE FISH, *Menidia beryllina*

Prepared for:

Lockheed Martin Technology Services Group
Environmental Services Group REAC
2890 Woodbridge Avenue, Building 209 Annex
Edison, NJ 08837-3679

Prepared by:

Toxikon Corporation
106 Coastal Way
Jupiter, Florida 33477

Project No. 0005012

Authors: Scott A. Glover, B.A.
Walter Ellenberg, Ph. D.

May 2000

STATEMENT OF TRUTH AND ACCURACY

Title: 7-Day Acute Static Renewal Sediment Bioassay Utilizing Sediment Collected From The Quanta Resources Site On The Fish, *Menidia beryllina*

In signing this statement, I certify that to the best of my knowledge, the information contained in the attached report and data pack is true and accurately reflects the work performed by Toxikon Corporation.

Walt J Ellenberg 7-31-00

Walter J. Ellenberg, Ph.D. Date
Manager of Aquatic Toxicology
Toxikon Corporation

Jill Schwab 07-31-00

Jill Schwab Date
Quality Assurance Officer
Toxikon Corporation

CERTIFIED COPY

SC 7-31-00

INITIALS DATE

1.0 INTRODUCTION

A 7-day static renewal sediment bioassay test was conducted at Toxikon Corporation, Jupiter, Florida, to determine the toxicity of sediment samples collected from the Quanta Resources site. Toxicity determinations were conducted using 7-day exposures of the fish, *Menidia beryllina*, to whole sediments. The criterion for effect in the fish test was survival and growth via dry weight.

2.0 MATERIALS AND METHODS

2.1 Test Sediments

The testing sediment samples were collected on May 02, 2000 from the Quanta Resources site by Lockheed Martin. Chain-of-custody documentation was included with the testing sediment samples and all custody seals were intact upon arrival at the laboratory. Sediment log-in records can be found in Appendix A. All sediment samples utilized in the 7-day test are described below.

Sample ID	Salinity (‰)	Sediment Type	Sediment Color	Arrival Temp. (°C)	Ammonia (mg/kg)
Loc 2 sub (Sed A)	10	Silt	Black	10.3	89
Loc 1 (Sed B)	10	Silt	Black	11.4	170
Loc 3 (Sed C)	10	Silt	Black	10.4	92
Loc 2 (Sed D)	8	Silt	Black	9.6	84
Loc 6 (Sed E)	8	Silt	Black	11.0	48
Loc 5 (Sed F)	8	Silt	Black	11.9	33
Loc 4 (Sed G)	8	Silt	Black	9.4	37
Loc 4 sub (Sed H)	10	Silt	Black/Brown	9.6	43

Federal Express delivered the sediments to the Toxikon Jupiter facility on May 04, 2000. Sediment samples were logged in and immediately stored in a Baxter Cryofridge set to maintain a target temperature of 4°C. Sediment samples were received in plastic 2-gallon buckets; one per sample site. The sediment from each location was homogenized and large debris, such as rocks and shells, were removed from each sediment sample prior to testing.

2.11 Control Sediment

The control sediment used for the 7-day acute test was collected on May 05, 2000 by Chris McManis of Eastern Aquatic BioSupply (Middletown, RI). The sediment was received in six 1-gallon plastic buckets. The control sediment was logged in and stored in the same cooling unit as the testing sediments. Prior to test initiation the

control sediment was wet sieved through a successive series of stainless steel mesh sieves (sizes 1.0, 0.5, and 0.25 mm). The sediment passing through the 0.25 mm sieve was used as the control sediment. The sediment was allowed to settle for approximately 24 hours prior to adjusting the salinity to 10 parts per thousand (‰) with dilution water designated for use in the test. A sample of the control sediment was collected and sent to Lockheed Martin for analysis of contaminants of concern (PAH's and coal tar).

2.2 Test Organisms

2.2.1 *Menidia beryllina*

The inland silverside, *M. beryllina*, was used as the testing animal for the 7-day acute sediment bioassay. The test animals were supplied by Aquatic Indicators (St. Augustine, FL) on May 05, 2000. The animals were identified and monitored by the lab aquaculturist, Matthew Bolt. The *Menidia* cultures were maintained at a salinity of 10 ‰, a photoperiod of 16 hours light and 8 hours darkness, and a temperature of 20 +/- 1 °C. The testing animals were maintained on a diet of newly hatched brine shrimp during the holding period. No diseases/treatments were observed and/or required during this period. The animals appeared to be in good health at test initiation. Data for animal holding can be found in Appendix C.

A 48-hour, water-only, standard reference toxicity test (SRT) was initiated on the same day (May 10, 2000) with the same lot of testing animals (MNB 00-5-9) as the 7-day acute test in order to evaluate the health of the test organisms. The animals were exposed to the reference toxicant Sodium Dodecyl Sulfate (Sigma Lot No. 961958). The results of the initial test indicated that the control animal survival was acceptable, yielding 0 % mortality. Four concentrations (2.5, 5.0, 10, and 20 mg/L) were used as the reference test concentrations. Treatments 1, 2, and 3 yielded no mortalities while treatment 4 yielded a mortality of only 10 %. Therefore a 48-hour LC_{50} (the toxicant concentration that is lethal to 50 % of the testing population) could not be calculated.

A second SRT was initiated on May 14, 2000 with the same lot of testing animals (MNB 00-5-9) utilized in the 7-day study. The results of this test indicated that the control animal survival was acceptable, yielding 0 % mortality. Five concentrations (2.5, 5.0, 10, 20, and 40 mg/L) were used as the second SRT test concentrations. Treatments 1, 2, and 3 yielded 0 % mortality while treatments 4 and 5 yielded mortalities of 70 and 100 %, respectively. The 48-hour LC_{50} for the second SRT calculated to be 17.4 mg/L. This LC_{50} value (17.4 mg/L) is slightly outside of the +/- 2 cumulative standard deviation units (15.9 to 1.7 mg/L) as defined by Toxikon's 20 most recent SRTs (see control chart in Appendix C).

Although Toxikon attempts to remain constant with the source of testing animals, limited availability often requires the use of several different animal vendors. As a result, the animal condition varies greatly from not only vendor to vendor but also from lot to lot. This is noted in the variation of SRT LC_{50} values from successive intralaboratory

chart values using different animal lots. Since the SRTs in question initially started on the same day as the 7-day study, Toxikon was unable to evaluate the vigor of the test animal lot prior to test initiation. Reference toxicity raw data and laboratory control charts for *M. beryllina* can be found in Appendix C.

2.3 Dilution Water

The overlying test water utilized in this study was obtained directly from the laboratory's salt water well. This water was passed through a 5.0 µm string wound Omni Filter (Omni Corporation, Hammond, IN) and the salinity was adjusted with laboratory freshwater to 10 ‰. A current analysis of these two waters can be found in Appendix D. All dilution water was vigorously aerated prior to use in the bioassay study.

2.4 Test Methods

Methods for the sediment bioassay test of *M. beryllina* followed those outlined in the following USEPA testing manuals: Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual) EPA-503/8-91/001 and Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms EPA/600/4-91/003.

The test was initiated on May 09 (Day –1) by adding approximately 2 centimeters (cm) of sediment to one of the replicate chambers for the control and test sediments, respectively. The weight of the first replicate was measured and recorded in the study log for each sediment, including the control. The remaining replicate chambers were filled with the respective sediments by weight. This technique of sediment addition is more accurate as compared to depth. A total of five replicate chambers were prepared for each test sediment and control.

Following the addition of the sediment to the test chambers, dilution water (10 ‰) was added to each 1-L glass test chamber to a pre-marked 700-mL total volume (approximately 500 mL of overlying water in each test chamber). All test chambers were placed into a recirculating waterbath set to maintain a target temperature range of 20 ± 1°C. The replicates were positioned on a plastic grid in the waterbath to allow ample water flow around each chamber for temperature regulation.

In order to determine the levels of total ammonia associated with each test sediment, daily samples of the overlying water were collected for analysis. Overlying water samples were collected as a composite of the replicate test chambers for each sediment immediately prior to animal addition on Day 0 and daily throughout the duration of the 7-day test. The results of the ammonia analysis are located in Table 4. Additionally, total organic carbon (TOC) and alkalinity samples of the overlying water were collected on May 10 (Day 0) for each test site and control. The results of these analyses are located in Table 5.

Ten-day-old testing animals were added to each test chamber on May 10 (Day 0). Ten test organisms were added to each test chamber for a total of 50 organisms per test and control sediments (5 replicate test chambers per site). A water only control was also utilized in the test with the same lot and number of animals as the test sediment replicates. The animals in each replicate test chamber were fed approximately 150 newly hatched brine shrimp two times per day. Overhead illumination was provided by fluorescent lights set to maintain a 16/8 hour (light/dark) photoperiod.

Throughout the study, observations of mortality and sublethal effects were collected daily. Water quality (dissolved oxygen, pH, and temperature) was collected on Day 0 and Day 7 of the test from each test chamber. Daily dissolved oxygen and pH data were collected on each replicate test chamber for each testing sediment and control. A minimum/maximum temperature logger was used to monitor the temperature of the waterbath. The thermometer sensor was positioned in a dummy test chamber to record the diurnal temperature of the waterbath system. Final observations of the test organisms were recorded on Day 07.

The overlying testing water was renewed daily with aerated dilution water. During each renewal event, a Masterflex® peristaltic pump was used to remove approximately 400 milliliters (mL) of overlying water from each test chamber. Following the water removal, the pump was refitted with a "clean" delivery hose and the proper amount of dilution water was introduced back into each test chamber. In order to minimize re-suspension and disturbance of the sediment, a Plexiglas® diffuser was attached to the end of the renewal hose. Daily water quality (pH, dissolved oxygen, salinity, and temperature) of the renewal water was also collected prior to each renewal event.

2.5 Statistical Analysis

Statistical analyses were conducted following the decision tree for analysis of survival and growth (via dry weight) data utilizing the statistical program Toxcalc, Version 5.0. The survival data was transformed using the one-tailed arcsine-square root transformation. Statistical comparison of each testing sediment sample was made to the controls tested concurrently with the testing sediments. The statistical comparison for survival data used in this study included, Shapiro-Wilk's Test for normal distribution, and Wilcoxon Rank Sum Test for significant differences. The growth portion of the test examined the comparison of the dry weight of the control replicates as compared to seven of the testing sediments (Sediment B was not included in this analysis because of 100 % mortality). The statistical comparison for growth data used in this study included, Shapiro-Wilk's Test for normal distribution, Bartlett's test for equality of variances, and Bonferroni t Test for significant differences.

3.0 RESULTS AND DISCUSSION

Survival of *M. beryllina* in the control sediment, water-only control, and each test sediment replicates are provided in Table 1. Fish survival in the control sediment and water-only control replicates were both 98 %. No statistically significant difference was noted between the survival of animals exposed to the control sediment and the water-only controls thus the results of both were pooled for comparison against the results of the eight testing sediments. The eight testing sediments (Sed A through Sed H) yielded between 0 and 100 % survival. The only statistically significant difference in animal survival to the eight testing sediments as compared to the pooled control replicates was in testing Sed B (Loc 1) which yielded 100 % mortality. The remaining seven testing sediments had no statistically significant difference in survival when compared to the control replicates.

The growth portion of the experiment compared the dry weight of animals exposed to the control sediment and water only controls to the dry weight of the animals exposed to each of seven testing sediments (Table 2). Testing Sed B (Loc 1) yielded 100 % mortality thus no dry weight data was available for this site. The only testing sediment that produced a statistically significant difference in growth when compared to the control animals was Sed H (Loc 4 sub). Each of the remaining six testing sediments did not produce a significant difference in growth when compared to the control animals.

Water quality measurement ranges are provided in Table 3. All replicate measurements are provided in the raw data sheets in Appendix B. During the course of the study, several minor temperature excursions were recorded in the overlying water temperatures from the targeted range of 20 ± 1°C (minimum temperature of 18.7°C). These test chamber temperature deviations (maximum deviation of -0.3°C) were gradual and should not have affected the results of the test. The daily diurnal temperature of the water bath unit, as collected with a Radio Shack Digital min/max thermometer, had an adjusted range of 18.1 to 19.2°C. This temperature deviation of –0.9°C was gradual and should not have affected the test results. The "dummy" test chamber used for the min/max thermometer readings was placed at the head end of the water table which is generally cooler due to its closer proximity to the entry point of the prechilled water. This would account for the slightly lower temperatures (< 1 °C) recorded by the min/max thermometer from the targeted temperature of 20 ± 1 °C.

Prior to animal addition on Day 0 of the test, observations of water quality data concluded that the dissolved oxygen levels in several of the testing sediments were low. The lowest saturation recorded at this time was collected from Sediment E replicate B (35 % saturation or 3.0 mg/L at 19.0 °C and a salinity of 10 ‰). Lockheed Martin was notified of the low dissolved oxygen levels prior to animal addition. It was agreed to initiate aeration to each replicate test chamber to increase oxygen levels prior to animal addition. Each test chamber was immediately supplied with air (<100 bubbles per minute). Approximately four hours later, dissolved oxygen saturation levels

were again collected for each replicate test chamber. The lowest dissolved oxygen collected at this time was at 98 % saturation. The test was then initiated by the addition of animals to each replicate test chamber and aeration was continued to each test chamber for the remainder of the 7-day test.

Dissolved oxygen (DO) concentrations in all test chambers remained above 90 % saturation for the duration of the 7-day study. The lowest DO reading collected during the test was at 91 % saturation (7.7 mg/L at a temperature of 19.1°C and a salinity of 10 ‰). The salinities of the test replicates remained at 10 ‰ for the entirety of the study. The pH of the control and testing sediments ranged between 7.3 and 8.3 for the duration of the 7-day test. Overlying water ammonia samples were collected daily. Total ammonia concentrations of the overlying water ranged from 0.066 to 4.8 mg/L during the entirety of the 7-day study (Table 4). All raw data collected during the 7-day fish test can be found in Appendix B.

The toxicity test was concluded on May 17 (Day 7). The contents of each test chamber were wet sieved through a 0.5 mm stainless steel sieve to catch, collect, and record the number of surviving animals. Each of the live animals was rinsed with laboratory grade deionized water, transferred into a tared aluminum weigh boat, and place into a drying oven set at 60°C. The animals were allowed to dry overnight and were then placed into a dessicator for approximately 24 hours before recording of the final dry weights.

In summation, the only Quanta Resources site sediment that produced a toxic effect in survival to the testing fish, *Menidia beryllina*, was Sed B (Loc 1). Additionally, the only site sediment that produced a sublethal effect in growth via dry weight was Sed H (Loc 4 sub).

REFERENCES

Evaluation of Dredged Material Proposed for Ocean Disposal-Testing Manual; EPA-503/8-91/001.

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, second addition; EPA/600/4-91/003.

Table 1. Survival of *Menidia beryllina* During a 7-Day Exposure to Sediment Samples Dredged from the Quanta Resources Site

	Number Alive* (mean % Survival)					
Sample ID [a]	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
Control Water Only	10	10	10	10	9	(98)
Control Sediment	10	10	10	9	10	(98)
Sed A (Loc 2 Sub)	10	10	10	10	10	(100)
Sed B (Loc 1)[d]	0	0	0	0	0	(0)
Sed C (Loc 3)	8	8	12[b]	10	10	(92)
Sed D (Loc 2)	10	11[c]	10	10	10	(100)
Sed E (Loc 6)	10	10	10	10	10	(100)
Sed F (Loc 5)	10	9	9	9	10	(94)
Sed G (Loc 4)	8	9	9	10	9	(90)
Sed H (Loc 4 Sub)	10	10	10	10	10	(100)

* Animals that were not found during test termination were considered dead.

[a] Initial animal density for each replicate was 10 animals.

[b] Note that two extra animals were recovered during test termination for this replicate. Therefore, the mean survival was calculated with a total number of fish at test initiation equal to 52 animals.

[c] Note that one extra animal was recovered during test termination for this replicate. Therefore, the mean survival was calculated with a total number of fish at test initiation equal to 51 animals.

[d] Produced a statistically significant difference in survival when compared to the control replicates.

Table 2. Growth of *Menidia beryllina* During a 7-Day Exposure to Sediment Samples Dredged from the Quanta Resources Site

	Growth via Dry Weight, mg/animal (mean dry weight)					
	Rep 1	Rep 2	Rep3	Rep4	Rep5	
Control Sediment	1.92	1.65	1.82	1.93	1.87	(1.84)
Control Water Only	1.95	2.00	2.02	2.00	1.65	(1.92)
Sed A (Loc 2 Sub)	1.76	1.53	1.73	2.26	1.74	(1.80)
Sed C (Loc 3)	1.74	2.13	1.77	1.66	2.12	(1.88)
Sed D (Loc 2)	1.99	1.99	2.04	1.94	2.00	(1.99)
Sed E (Loc 6)	1.99	1.50	1.40	1.62	2.10	(1.72)
Sed F (Loc 5)	1.67	1.53	1.67	1.99	1.90	(1.75)
Sed G (Loc 4)	2.08	1.59	1.68	1.88	1.98	(1.84)
Sed H (Loc 4 Sub)*	1.83	1.53	1.59	1.38	1.66	(1.60)

*Indicates that this treatment produced a statistically significant difference in dry weight when compared to the growth of the control animals

Table 3. Water Quality Measurements During a 7-Day Exposure of *Menidia beryllina* to Sediment Samples Dredged from the Quanta Resources Site

ID	Temperature (°C)	pH	DO (mg/L)	Salinity (‰)
Control Sediment	18.7-19.3	7.4-8.2	6.8-8.7	10
Control Water Only	18.7-19.5	7.3-8.3	7.8-8.7	10
Sed A (Loc 2 Sub)	18.8-18.9	7.5-8.2	6.2-8.7	10
Sed B (Loc 1)	18.7-19.0	7.6-8.2	5.5-8.5	10
Sed C (Loc 3)	18.7-19.1	7.3-8.2	3.9-8.6	10
Sed D (Loc 2)	18.7-19.1	7.4-8.2	4.7-8.7	10
Sed E (Loc 6)	18.8-19.1	7.4-8.2	3.0-8.8*	10
Sed F (Loc 5)	18.8-19.0	7.5-8.1	4.1-8.7	10
Sed G (Loc 4)	18.7-19.0	7.5-8.2	4.6-8.7	10
Sed H (Loc 4 Sub)	18.7-18.9	7.6-8.2	5.7-8.7	10

*Note that the low dissolved oxygen reading 3.0 mg/L (35 % saturation) was collected prior to animal addition on Day 0 of the test. Aeration was initiated immediately and the saturation levels were raised to acceptable limits prior to animal addition. Each test chamber was continually aerated for the remainder of the 7-day test.

Table 4. Total Ammonia Concentrations During a 7-Day Exposure of *Menidia beryllina* to Sediment Samples Collected from the Quanta Resources Site

Sample ID*	Total Ammonia Concentration (mg/L)							
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control Sediment	0.19	0.77	1.0	1.4	1.3	0.75	0.86	0.64
Control Water Only	0.066	0.076	0.15	0.43	0.37	0.55	0.47	0.41
Sed A (Loc 2 Sub)	0.45	2.6	2.7	2.6	1.4	0.47	0.50	0.30
Sed B (Loc 1)	1.1	4.2	4.8	NA	NA	NA	NA	NA
Sed C (Loc 3)	0.77	1.6	1.9	2.2	0.31	0.20	0.26	0.33
Sed D (Loc 2)	1.1	1.0	0.50	0.35	0.17	0.19	0.23	0.27
Sed E (Loc 6)	0.67	1.5	0.74	0.35	0.19	0.17	0.25	0.27
Sed F (Loc 5)	0.36	0.54	0.26	0.27	0.13	0.15	0.23	0.23
Sed G (Loc 4)	0.53	0.86	0.38	0.20	0.11	0.15	0.25	0.26
Sed H (Loc 4 Sub)	0.82	1.9	1.3	1.1	0.49	0.28	0.25	0.26

*Note that ammonia samples were collected as a composite of the replicate test chambers for each test sediment and the laboratory control sediment.

Table 5. Alkalinity and Total Organic Carbon of Overlying Water Collected on Day 0 During a 7-Day Exposure of *Menidia beryllina* to Sediment Samples Collected from the Quanta Resources Site

Sample ID	Total Organ Carbon (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Control Sediment	4.1	76
Control Water Only	2.5	75
Sed A (Loc 2 Sub)	2.4	79
Sed B (Loc 1)	3.0	82
Sed C (Loc 3)	2.9	83
Sed D (Loc 2)	3.0	88
Sed E (Loc 6)	3.1	89
Sed F (Loc 5)	2.7	78
Sed G (Loc 4)	2.9	84
Sed H (Loc 4 Sub)	2.7	84

-Survival

Start Date:	05/10/2000	Test ID:	5012	Sample ID:	Quanta Resources
End Date:	05/17/2000	Lab ID:	TC-Toxikon Corporation Jup	Sample Type:	SED-Sediment
Sample Date:		Protocol:	EPA503/8-91/001 and 600/4	Test Species:	Menidia beryllina

Comments: Menidia 7-day sediment bioassay

Conc-%	1	2	3	4	5
Cont.Sed.	1.0000	1.0000	1.0000	1.0000	0.9000
ContWa.Only	1.0000	1.0000	1.0000	0.9000	1.0000
Sed A	1.0000	1.0000	1.0000	1.0000	1.0000
Sed B	0.0000	0.0000	0.0000	0.0000	0.0000
Sed C	0.8000	0.8000	1.0000	1.0000	1.0000
Sed D	1.0000	1.0000	1.0000	1.0000	1.0000
Sed E	1.0000	1.0000	1.0000	1.0000	1.0000
Sed F	1.0000	0.9000	0.9000	0.9000	1.0000
Sed G	0.8000	0.9000	0.9000	1.0000	0.9000
Sed H	1.0000	1.0000	1.0000	1.0000	1.0000

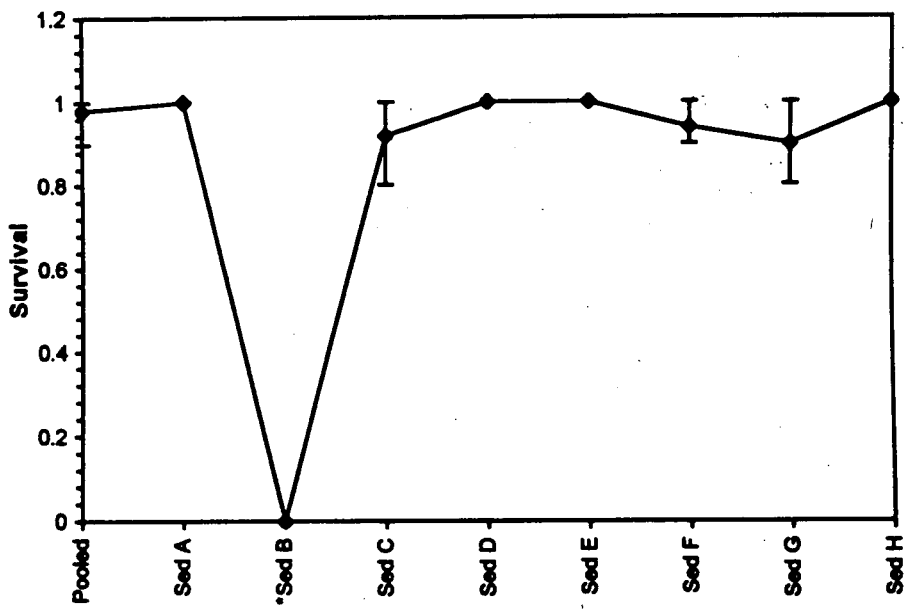
			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Pooled	0.9800	1.0000	1.3794	1.2490	1.4120	4.981	10		
Sed A	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00
*Sed B	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	19.00
Sed C	0.9200	0.9388	1.2929	1.1071	1.4260	13.120	5	37.00	19.00
Sed D	1.0000	1.0204	1.4135	1.4120	1.4195	0.236	5	49.00	19.00
Sed E	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00
Sed F	0.9400	0.9592	1.3142	1.2490	1.4120	6.792	5	30.00	19.00
Sed G	0.9000	0.9184	1.2533	1.1071	1.4120	8.613	5	24.00	19.00
Sed H	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	45.00	19.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.83614	0.93	-0.5912	1.78558
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 1.00)	0	2.30601		

Hypothesis Test (1-tail, 0.05)

Wilcoxon Rank Sum Test indicates significant differences

Dose-Response Plot



ToxCalc v5.0

Reviewed by: SL

-Growth

Start Date:	05/10/2000	Test ID:	5012	Sample ID:	Quanta Resources
End Date:	05/17/2000	Lab ID:	TC-Toxikon Corporation Jup	Sample Type:	SED-Sediment
Sample Date:		Protocol:	EPA 503/8-91/001 and 600/	Test Species:	MB-Menidia beryllina

Comments: Menidia 7-day sediment bioassay (growth)

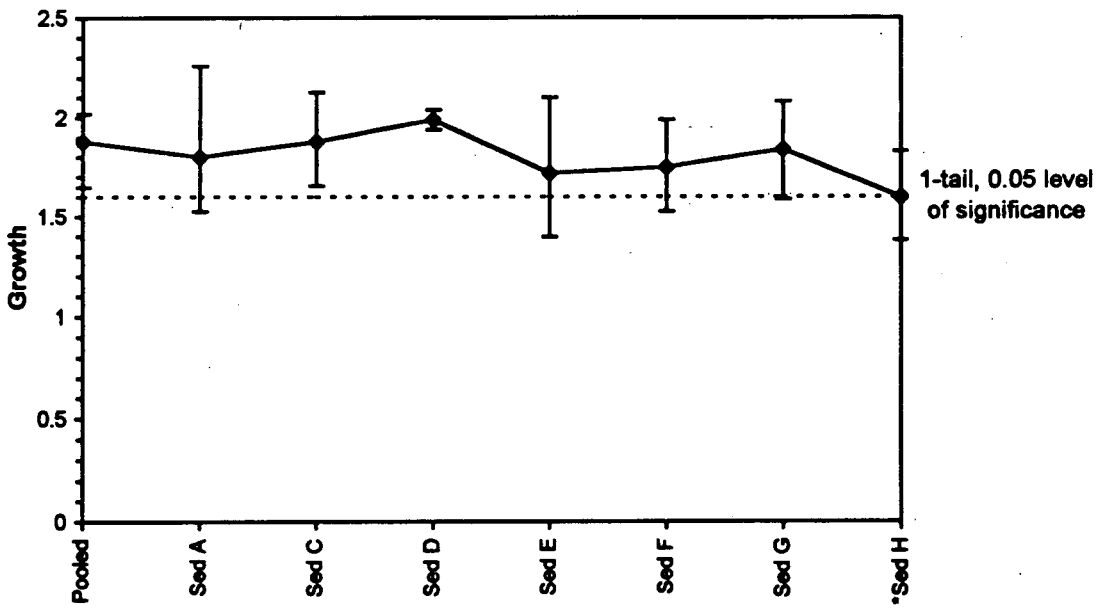
Conc-	1	2	3	4	5
Con. Sed	1.9200	1.6500	1.8200	1.9300	1.8700
ont.Wa.Only	1.9500	2.0000	2.0200	2.0000	1.6500
Sed A	1.7600	1.5300	1.7300	2.2600	1.7400
Sed C	1.7400	2.1300	1.7700	1.6600	2.1200
Sed D	1.9900	1.9900	2.0400	1.9400	2.0000
Sed E	1.9900	1.5000	1.4000	1.6200	2.1000
Sed F	1.6700	1.5300	1.6700	1.9900	1.9000
Sed G	2.0800	1.5900	1.6800	1.8800	1.9800
Sed H	1.8300	1.5300	1.5900	1.3800	1.6600

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Pooled	1.8810	1.0000	1.8810	1.6500	2.0200	7.239	10			
Sed A	1.8040	0.9591	1.8040	1.5300	2.2600	15.041	5	0.707	2.571	0.2800
Sed C	1.8840	1.0016	1.8840	1.6600	2.1300	11.872	5	-0.028	2.571	0.2800
Sed D	1.9920	1.0590	1.9920	1.9400	2.0400	1.789	5	-1.019	2.571	0.2800
Sed E	1.7220	0.9155	1.7220	1.4000	2.1000	17.854	5	1.460	2.571	0.2800
Sed F	1.7520	0.9314	1.7520	1.5300	1.9900	10.727	5	1.185	2.571	0.2800
Sed G	1.8420	0.9793	1.8420	1.5900	2.0800	11.089	5	0.358	2.571	0.2800
*Sed H	1.5980	0.8495	1.5980	1.3800	1.8300	10.372	5	2.599	2.571	0.2800

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96682	0.926	0.38447	-0.2958
Bartlett's Test indicates equal variances (p = 0.05)	14.1089	18.4753		
The control means are not significantly different (p = 0.35)	0.99838	2.30601		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test indicates significant differences	0.28002	0.14887	0.07522	0.03953	0.09698	7, 37

Dose-Response Plot



ToxCalc v5.0

Reviewed by: SV

APPENDIX A

SEDIMENT RAW DATA

TOXIKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

FORM NO. 050A 32
EFFECTIVE: FEBRUARY 1997

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7 day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	TOC	Ammonia											COMMENTS
control sediment	6	250 mL	P	1	5/10/00	1030	H_2SO_4	✓	✓											
sediment A								✓	✓											
sediment B								✓	✓											
sediment C								✓	✓											
sediment D								✓	✓											
sediment E								✓	✓											
sediment F								✓	✓											
sediment G								✓	✓											
sediment H								✓	✓											
H_2O only (control)								✓	✓											

SAMPLED BY Scott Glover	DATE - 05 - 10 00 TIME: - 1030	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

TOXKON

CHAIN OF CUSTODY RECORD

FORM NO. 050A 32
EFFECTIVE: FEBRUARY 1997

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

Day 0

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Alkalinity											COMMENTS
Control Sediment	6	250 mL	P	1	5/10/00	1040	N/A	✓											
Sediment A								✓											
Sediment B								✓											
Sediment C								✓											
Sediment D								✓											
Sediment E								✓											
Sediment F								✓											
Sediment G								✓											
Sediment H								✓											
H_2O only (control)								✓											

SAMPLED BY Scott Glover	DATE - 05 - 10 00 TIME: - 1040	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

TUXKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

Day 1

WORK ORDER # : 00 - 05 - 038

DUE DATE : 5 - 20 - 00

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. berylling - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia											COMMENTS
Control Sediment	6	250 mL	P	1	5/11/00	1105	H_2SO_4	✓											
Sediment A	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment B	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment C	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment D	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment E	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment F	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment G	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment H	↓	↓	↓	↓	↓	↓	↓	✓											
H_2O only (control)	↓	↓	↓	↓	↓	↓	↓	✓											

SAMPLED BY: SG	DATE: 5-11-00 TIME: 11-05	RECEIVED BY:	DATE: TIME:
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY:	DATE: TIME:
RELINQUISHED BY:	DATE: TIME:	RECEIVED FOR LAB BY: Melissa Pickens	DATE: 5-11-00 TIME: 11-05
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?
Yes ___ No ___ If Yes, 1st Known _____

TURNER CHAIN OF CUSTODY RECORD

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

Day 2

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia												COMMENTS
control Sediment	6	250 mL	P	1	5/12/00	1025	H_2SO_4	✓												
sediment A								✓												
Sediment B								✓												
Sediment C								✓												
Sediment D								✓												
Sediment E								✓												
Sediment F								✓												
Sediment G								✓												
Sediment H								✓												
H_2O only (control)								✓												

SAMPLED BY: [signature]	DATE - 05 - 12 00 TIME: - - 10 25	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TOXKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

Day 3 Saturday

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia											COMMENTS
Control Sediment	6	250 mL	P	1	5/13/00	1550	H_2SO_4	✓											
Sediment A	↓	↓	↓	↓	↓	↓	↓	✓											
Sediment B								✓											
Sediment C								✓											
Sediment D								✓											
Sediment E								✓											
Sediment F								✓											
Sediment G								✓											
Sediment H								✓											
H_2O only (control)	↓	↓	↓	↓	↓	↓	↓	✓											

SAMPLED BY [signature]	DATE 5 - 13 - 00 TIME: 15 - 50	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TOXKON

CHAIN OF CUSTODY RECORD

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

Day 4 Sunday

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Ammonia											COMMENTS
Control Sediment	6	250 mL	P	1	5/19/00	1535	H_2SO_4	✓											
Sediment A								✓											
~~Sediment B~~								✓											
Sediment C								✓											
Sediment D								✓											
Sediment E								✓											
Sediment F								✓											
Sediment G								✓											
Sediment H								✓											
H_2O only (control)	✓	✓	✓	✓	✓	✓	✓	✓											

SAMPLED BY Scott A. Clark	DATE 5 - 19 - 00 - TIME: 15 - 35 -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

CHAIN OF CUSTODY RECORD

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

Day 5 Monday

COMPANY Lockheed Martin
ADDRESS
PHONE # ( ) FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. berylline - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Ammonia												COMMENTS
Control Sed	6	250 ml	P	1	5/15/00	1015	H_2SO_4													Marine water, ~1 l
Sed A																				
Sed C																				
Sed D																				
Sed E																				
Sed F																				
Sed G																				
Sed H																				
H_2O only (control)																				

SAMPLED BY Scotta Glass	DATE 5 - 15 - 00 - TIME: 10 - 15 - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TOXKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # : ___-___-___

DUE DATE : ___-___-___

Day 6 Tuesday

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION M. beryllina - 7day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia											COMMENTS
Control Sediment	6	250 mL	P	1	5/16/00		H_2SO_4	✓											
Sediment A								✓											
Sediment C								✓											
Sediment D								✓											
Sediment E								✓											
Sediment F								✓											
Sediment G								✓											
Sediment H								✓											
H_2O (only) control								✓											

SAMPLED BY Scott A. Glenn	DATE 05-16-00 TIME: 09:20	RECEIVED BY:	DATE TIME:
RELINQUISHED BY:	DATE TIME:	RECEIVED BY:	DATE TIME:
RELINQUISHED BY:	DATE TIME:	RECEIVED FOR LAB BY:	DATE TIME:
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TOXIKON

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

Day 7 - Wednesday Test Terminated

WORK ORDER # : 0005012

DUE DATE : ___-___-___

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Avenue
Edison, NJ 08837-3679
PHONE # 732 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION m. berylling - 7 day

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	ammonia											COMMENTS
Control sediment	6	250 mL	P	1	5/17/00	1850	H_2SO_4	✓											Marine H_2O
Sediment A								✓											~10ppt
Sediment C								✓											
Sediment D								✓											
Sediment E								✓											
Sediment F								✓											
Sediment G								✓											
Sediment H								✓											
H_2O (only) control								✓											

SAMPLED BY: Scott Clauss	DATE - 05 - 17 00 TIME: - 18 - 50 -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information
Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TUAKON — CHAIN OF CUSTODY RECORD

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

WORK ORDER # [redacted]

DUE DATE : 5-23-00

COMPANY Lockheed Martin
ADDRESS
PHONE # ( ) FAX ( )
P.O. #
PROJECT MANAGER Scott Glover
PROJECT ID/LOCATION Control Sediment

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	Ag, Cd, Cr, Cu, Ni, Pb	As, Se, Be, Sb, Tl	Ba, Mn, Cr, V	8020	8100	NH3	pH	% solids	Sulfide					COMMENTS
Control Sediment	2	8oz	G	2	5/16/00		—														

SAMPLED BY	DATE - - - / TIME: - - -	RECEIVED BY:	DATE - - - / TIME: - - -
RELINQUISHED BY:	DATE - - - / TIME: - - -	RECEIVED BY:	DATE - - - / TIME: - - -
RELINQUISHED BY:	DATE - - - / TIME: - - -	RECEIVED FOR LAB BY: [illegible]	DATE 5 - 16 - 00 / TIME: 15 00
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known _____

TUNKUN

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # : ____-____-____

DUE DATE : ____-____-____

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Ave.
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	PAHs	Coal Tar											COMMENTS
Control H_2O	6	1L	G	1	5/10/00	0910	4°C	✓	✓											
Control Sediment	2	100 mL	P	1	5/10/00	0910	4°C	✓	✓											

SAMPLED BY Scott Glover	DATE - 05 - 10 - 00 TIME: - - 0910	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED BY:	DATE - - - TIME: - - -
RELINQUISHED BY:	DATE - - - TIME: - - -	RECEIVED FOR LAB BY:	DATE - - - TIME: - - -
METHOD OF SHIPMENT		COOLER TEMPERATURE	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes___ No___ If Yes, 1st Known_____

REAC, Edison, NJ
732 (908) 321-4200
EPA Contract ~~68-C4-0022~~ 69-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
~~REW~~ Lockheed Contact: John Johnson Phone: 360 321-4200

No: 02070

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	for test cyanide	for test M. beryllium		
	A A185	LOC2	SD	5/2/00	1	2 gal / 4°C	X	X		
	A A186	LOC3	SD	5/2/00	1	2 gal 4°C	X	X		

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
[illegible]	[illegible]	5/3/00	[illegible]	5/4/00	1025						

FORM #4 8/94

★ U.S. GPO: 1994-383-015

REAC, Edison, NJ
32 (908) 321-4200
EPA Contract ~~68-C4-0022~~ 69-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
~~RFW~~ Lockheed Contact: John Johnson Phone: (908) 321-4200

No. 02069

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	tox test L. plumulosus	tox test M. beryllina		
	A19727	LOC4	SD	5/2/00	1	2gal/4°C	X	X		
	A19728	LOC4SUB	SD	5/2/00	1	2gal/4°C	X	X		

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
Sill/analysis	G. Molnar	5/3/00	[illegible]	5-04-00	1025						

FORM #4 8/94

* U[redacted]1994-[redacted]

REAC, Edison, NJ
32 (908) 321-4200
EPA Contract 68-C4-0022
68-[illegible]-223

CHAIN OF CUSTODY RECORD

Project Name: [illegible]
Project Number: [illegible]0133
RFW Contact: [illegible] Phone: [illegible]

No: 03556

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	for test L. plumulosa	for test M. bayllis		
	A19725	1025	SD	5/2/00	1	2 gal/4°C	X	X		
	A19726	2026	SD	5/2/00	1	2 gal/4°C	X	X		

Matrix:

SD	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

* Definitive

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
[illegible]	C. Melan	5/3/00	[illegible]	5-4-00	1025						

FORM #4 8/94

★ U.S. GPO: 1994-383-015

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: [illegible]
Project Number: [illegible]
REW Contact: [illegible] Phone: [illegible]

No: 02071

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	1	2 gal / 8°C	X	X		
	[illegible]	[illegible]	[illegible]	[illegible]	1	2 gal / 7°C	X	X		

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

#3 Definitive tests

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
[illegible]	[illegible]	5/3/00	[illegible]	5-04-00	1025						

FORM [illegible] 8/94

REAC, Edison, NJ
(908) 321-4200
EPA Contract ~~68-04-0022~~ 68-C99-233

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00132
RFW Contact: John Johnson Phone (732) 321-4200

No: 02066

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TOC			
	A19693	LOC1	SD	5/3/00	1	8oz/4°C	X			
	A19694	LOC2					X			
	A19695	LOC2 SUB					X			
	A19696	LOC3					X			
	A19697	LOC4					X			
	A19698	LOC4 SUB					X			
	A19699	LOC5					X			
	A19721	LOC6					X			

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

QA Gr

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
[illegible]	[illegible]	[illegible]	[illegible]	5/04/00	1035						

FORM #

8/94

U.S. GPO: 1994-383-015

TOXIKON CORPORATION
106 COASTAL WAY
JUPITER, FL 33477
TEL: (561) 575-2477

June 05, 2000

Scott Glover
Toxikon - Jupiter

TEL:
FAX

RE: Control Sediment Lockheed Martin Order No.: 0005068

Dear Scott Glover,

Toxikon received 1 sample on 05/16/2000 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in a Case Narrative.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Certifications: FL: E86278, 86396

Toxikon

Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005068	**Collection Date:**	05/16/2000
Project:	Control Sediment Lockheed Martin	**Matrix:**	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
PH		SW9045B				Analyst: AML
pH	7.20	1.0		pH Units	1	05/18/2000
% SOLIDS		D2216				Analyst: IT
Percent Solids	59	0.00040		wt%	1	06/01/2000
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	40	1.6		mg/Kg	1	06/02/2000
ICP METALS, TOTAL		SW6010B				Analyst: JS
Antimony	ND	8.5		mg/Kg-dry	1	05/18/2000
Arsenic	ND	8.5		mg/Kg-dry	1	05/18/2000
Barium	26	17		mg/Kg-dry	1	05/18/2000
Beryllium	0.44	0.34		mg/Kg-dry	1	05/18/2000
Cadmium	1.1	0.85		mg/Kg-dry	1	05/18/2000
Chromium	16	0.85		mg/Kg-dry	1	05/18/2000
Cobalt	4.8	1.7		mg/Kg-dry	1	05/18/2000
Copper	9.6	0.87		mg/Kg-dry	1	05/18/2000
Lead	13	1.7		mg/Kg-dry	1	05/18/2000
Manganese	170	8.5		mg/Kg-dry	1	05/18/2000
Nickel	9.1	6.8		mg/Kg-dry	1	05/18/2000
Selenium	ND	1.7		mg/Kg-dry	1	05/18/2000
Silver	ND	0.85		mg/Kg-dry	1	05/18/2000
Thallium	ND	6.8		mg/Kg-dry	1	05/18/2000
Vanadium	19	1.7		mg/Kg-dry	1	05/18/2000

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JG 6-05-00

INITIALS DATE

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005068	**Collection Date:**	05/16/2000
Project:	Control Sediment Lockheed Martin	**Matrix:**	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PESTICIDES/PCB		SW8081				Analyst: JS
4,4'-DDD	ND	10		µg/Kg	1	05/18/2000
4,4'-DDE	ND	10		µg/Kg	1	05/18/2000
4,4'-DDT	ND	10		µg/Kg	1	05/18/2000
Aldrin	ND	10		µg/Kg	1	05/18/2000
alpha-BHC	ND	10		µg/Kg	1	05/18/2000
Aroclor 1016	ND	10		µg/Kg	1	05/18/2000
Aroclor 1221	ND	10		µg/Kg	1	05/18/2000
Aroclor 1232	ND	10		µg/Kg	1	05/18/2000
Aroclor 1242	ND	10		µg/Kg	1	05/18/2000
Aroclor 1248	ND	10		µg/Kg	1	05/18/2000
Aroclor 1254	ND	10		µg/Kg	1	05/18/2000
Aroclor 1260	ND	10		µg/Kg	1	05/18/2000
beta-BHC	ND	10		µg/Kg	1	05/18/2000
Chlordane	ND	50		µg/Kg	1	05/18/2000
delta-BHC	ND	10		µg/Kg	1	05/18/2000
Dieldrin	ND	10		µg/Kg	1	05/18/2000
Endosulfan I	ND	10		µg/Kg	1	05/18/2000
Endosulfan II	ND	10		µg/Kg	1	05/18/2000
Endosulfan sulfate	ND	10		µg/Kg	1	05/18/2000
Endrin	ND	10		µg/Kg	1	05/18/2000
Endrin aldehyde	ND	10		µg/Kg	1	05/18/2000
Endrin ketone	ND	10		µg/Kg	1	05/18/2000
gamma-BHC	ND	10		µg/Kg	1	05/18/2000
Heptachlor	ND	10		µg/Kg	1	05/18/2000
Heptachlor epoxide	ND	10		µg/Kg	1	05/18/2000
Methoxychlor	ND	10		µg/Kg	1	05/18/2000
Toxaphene	ND	50		µg/Kg	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

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* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *06-Jun-00*

CLIENT:	Toxikon - Jupiter	Client Sample ID:	Control Sediment
Lab Order:	0005068	Collection Date:	05/16/2000
Project:	Control Sediment Lockheed Martin	Matrix:	SEDIMENT
Lab ID:	0005068-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
POLYNUCLEAR AROMATICS		SW8100				Analyst: IT
Naphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
2-Methylnaphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
1-Methylnaphthalene	ND	1400		µg/Kg-dry	1	05/23/2000
Acenaphthylene	ND	1400		µg/Kg-dry	1	05/23/2000
Acenaphthene	ND	1400		µg/Kg-dry	1	05/23/2000
Fluorene	ND	1400		µg/Kg-dry	1	05/23/2000
Phenanthrene	ND	1400		µg/Kg-dry	1	05/23/2000
Anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(a)anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Chrysene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(b)fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(k)fluoranthene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(a)pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Dibenzo(a,h)anthracene	ND	1400		µg/Kg-dry	1	05/23/2000
Indeno(1,2,3-cd)pyrene	ND	1400		µg/Kg-dry	1	05/23/2000
Benzo(g,h,i)perylene	ND	1400		µg/Kg-dry	1	05/23/2000
SULFIDE		SW9030				Analyst: CD
Sulfide	ND	0.33		mg/Kg	1	06/01/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG

Test Sediment/Soil ID: Control Sediment	Date Received: 5-4-00
Sponsor: Control Soil Eastern Aquatic Biosupply & Lockheed Martin Project	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 7	Type of Containers: 1 gallon plastic jar
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: blackish-brown	Associated Water pH: 6.8
Sample Temperature upon Receipt: 14.8	

Check One:	Coarse Sand __	Fine Sand __	Silt X	Clay __

Label Information: N/A

Paperwork - Narrow River collection site collected by Christopher M. McManis at 1130 on 5/3/00

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge < 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

salinity 30 ‰

CERTIFIED COPY
SG 6-04-00
INITIALS DATE

Above Data By: SG JK

Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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Effective: Dec. 1999

(*) indicates sediment is to be used for definitive tests

TEST SEDIMENT/SOIL RECEIPT LOG SED A

Test Sediment/Soil ID: LOC 25 UB (*)	Date Received: 5-04-00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Fed Ex	

SEDIMENT/SOIL DESCRIPTION

Color: black	Associated Water pH:
Sample Temperature upon Receipt: 10.3°C	

Check One:	Coarse Sand __	Fine Sand __	Silt X	Clay __

Label Information: REAC, EDISON NJ LOC 25 UB "Ref. Tox Tests"
SITE: Quanta Resources 5/2/00 L. plumulosus
M. berylling work order # 0-133 sample # A19688

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made: - Custody seal intact

Salinity = 10 ppt

Above Data By: [illegible]	Date: 5-04-00

Toxikon Corporation
Jupiter, Florida

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Effective: Dec. 1999

(*) indicates sediment is to be used for definitive test

TEST SEDIMENT/SOIL RECEIPT LOG SED B

Test Sediment/Soil ID: LOC 1 (*)	Date Received: 5-4-00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucke
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black	Associated Water pH:
Sample Temperature upon Receipt: 11.4 °C	

Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC EDISON NJ site: Quanta Resources

work order # 0-133 LOC1 sample # A19687

L. plumulosus & M. berylling "Definitive Tox. Test"

Check if sample utilized on the day received. __

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made: Custody Seal intact

The sediment has a petroleum odor

- salinity = 10 ppt

Above Data By: SG JM

Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDC

Test Sediment/Soil ID: LOC 3	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: Black		Associated Water pH:		
Sample Temperature upon Receipt: 10.4°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ Quanta Site Resources
Sample # A19686 work order # 0133 LOC 3 5/2/00
M. beryllina & L. plumulosus tox tests

Check if sample utilized on the day received. __

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.
Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact. There is a slight petroleum odor
salinity = 10 ppt

Above Data By: SG JK | Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SED D

Test Sediment/Soil ID: LOC2	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: Black	Associated Water pH:
Sample Temperature upon Receipt: 9.6 °C	

Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ sample #A19685
site: Quanta Resources work order # 0-133 LOC2
m. beryllina + L. plumulosus tox. tests 5/2/00

Check if sample utilized on the day received. __

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
Salinity = 8 ppt

Above Data By: SG JM	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SED E

Test Sediment/Soil ID: LOC 6	Date Received: 5/4/00
Sponsor: Lockheed + Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket plastic
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black	Associated Water pH:
Sample Temperature upon Receipt: 11.0 °C	

Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON NJ sample # A19726
Quanta site Resources work order # 0-133 LOC 6
M. berylline
L. plumulosus

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact
Salinity = 8 ppt

Above Data By: SD JM	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDF

Test Sediment/Soil ID: LOC5	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon bucket plastic
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: black		Associated Water pH:		
Sample Temperature upon Receipt: 11.9°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: REAC, EDISON, NJ SITE Quanta Resources

Sample # A19725 Work order # 0-133 LOC5

M. beryllina + L. plumulosus 5/2/00

Check if sample utilized on the day received. —

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact

Salinity = 8ppt

Above Data By: SG JM	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEOG	
Test Sediment/Soil ID: LOC 4	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Federal Express	
SEDIMENT/SOIL DESCRIPTION	
Color: Black	Associated Water pH:
Sample Temperature upon Receipt: 9.4°C	
Check One: Coarse Sand __	Fine Sand __ Silt ✓ Clay __
Label Information: REAC, EDISON, NJ	
Quanta Resources / Sample # A19727 / Work ORDER - 0-133	
LOC4 M. beryllina & L. plumulosus tox test	
Check if sample utilized on the day received.____	
Record dates sample will be used, if not utilized on the day received.	
Sample Storage Location/Conditions if not utilized upon receipt. Baxter Cryofridge ≤ 4° C	
Note if sample is wet pressed through a sieve or pH adjustment made:	
Custody seal intact	
salinity ~ 8ppt	
Above Data By: JL SG AL	Date: 5/4/00

Toxikon Corporation
Jupiter, Florida

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TEST SEDIMENT/SOIL RECEIPT LOG SEDH

Test Sediment/Soil ID: LOC 4 SUB	Date Received: 5/4/00
Sponsor: Lockheed Martin	
Toxikon Study/Protocol No(s):	
Number of Containers Rec'd: 1	Type of Containers: 2 gallon plastic bucket
Mode of Transportation: Federal Express	

SEDIMENT/SOIL DESCRIPTION

Color: brown/black		Associated Water pH:		
Sample Temperature upon Receipt: 9.6°C				
Check One:	Coarse Sand __	Fine Sand __	Silt ✓	Clay __

Label Information: React Edison, NJ

Quanta Resources 5/2/00 Sample # A19728

Workorder # 0-133 LOC 4 Sub M. beryllina c. plumulosus tox test

Check if sample utilized on the day received.____

Record dates sample will be used, if not utilized on the day received.

Sample Storage Location/Conditions if not utilized upon receipt.

Baxter Cryofridge ≤ 4°C

Note if sample is wet pressed through a sieve or pH adjustment made:

Custody seal intact

Salinity = 10 ppt

Above Data By: JK SG	Date: 5/4/00

Toxikon Day 0 **Date:** *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005032	**Collection Date:**	05/10/2000 10:30:00 AM
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		E310.1				Analyst: IT
Alkalinity, Total (As CaCO3)	76	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	0.19	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		E415.1				Analyst: JY
Organic Carbon, Total	4.1	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

CLIENT:	Toxikon - Jupiter	**Date:**	*25-May-00*
Lab Order:	0005032	**Client Sample ID:**	SEDIMENT A
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Collection Date:**	05/10/2000
Lab ID:	0005032-02A	**Matrix:**	AQUEOUS

Analyses

	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	79	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.45	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.4	1.0		mg/L	1	05/24/2000

ers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT B
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	82	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	1.1	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	3.0	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	83	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.77	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.9	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	88	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	1.1	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	3.0	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: **IT**
Alkalinity, Total (As CaCO3)	89	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.67	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: **JY**
Organic Carbon, Total	3.1	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT F
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	78	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.36	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.7	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT G
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	84	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.53	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.9	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon **Date:** *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	84	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.82	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.7	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *25-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	H2O ONLY
Lab Order:	0005032	**Collection Date:**	05/10/2000
Project:	LOCKHEED(05012)-M.BERYLLINA-7DAY	**Matrix:**	AQUEOUS
Lab ID:	0005032-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**E310.1**				Analyst: IT
Alkalinity, Total (As CaCO3)	75	1.0		mg/L CaCO3	1	05/12/2000
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.066	0.050		mg/L	1	05/17/2000
TOTAL ORGANIC CARBON		**E415.1**				Analyst: JY
Organic Carbon, Total	2.5	1.0		mg/L	1	05/24/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Day 01 **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control Sediment
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.77	0.050		mg/L	1	05/17/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment A
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	2.6	0.050		mg/L	1	05/17/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment B
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	4.2	0.20		mg/L	1	05/17/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment C
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.6	0.050		mg/L	1	05/17/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment D
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		E350.3				Analyst: LKP
Nitrogen, Ammonia (As N)	1.0	0.050		mg/L	1	05/17/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment E
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.5	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment F
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.54	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment G
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.86	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment H
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.9	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	H2O Only (Control)
Lab Order:	0005038	**Collection Date:**	05/11/2000 11:05:00 AM
Project:	m. beryllina day 1 Lockheed Martin	**Matrix:**	SURFACE WATER
Lab ID:	0005038-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.076	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Day 02 **Date:** *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.0	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	2.7	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT B
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	4.8	0.10		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.9	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.50	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.74	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005044
Project: LOCKHEED-DAY2 0005012 CONT
Lab ID: 0005044-07A

Client Sample ID: SEDIMENT F
Collection Date: 05/12/2000 10:25:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT G
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.38	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.3	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *18-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	H2O ONLY
Lab Order:	0005044	**Collection Date:**	05/12/2000 10:25:00 AM
Project:	LOCKHEED-DAY2 0005012 CONT	**Matrix:**	AQUEOUS
Lab ID:	0005044-10A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.15	0.050		mg/L	1	05/18/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Day 03 **Date:** *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.4	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	2.6	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	2.2	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.35	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.35	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT F
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.27	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIEMNT G
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.20	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005050	**Collection Date:**	05/13/2000 3:50:00 PM
Project:	LOCKHEED-05012CONT DAY3	**Matrix:**	AQUEOUS
Lab ID:	0005050-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.1	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *22-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005050
Project: LOCKHEED-05012CONT DAY3
Lab ID: 0005050-09A

Client Sample ID: H2O ONLY
Collection Date: 05/13/2000 3:50:00 PM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.43	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon Day 04 **Date:** *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.3	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	1.4	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.31	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon **Date:** *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.17	0.050		mg/L	1	05/19/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.19	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT F
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.13	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT G
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.11	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits.

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.49	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *05-Jun-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	H2O ONLY
Lab Order:	0005051	**Collection Date:**	05/14/2000 3:35:00 PM
Project:	LOCKHEED(05012CONT)DAY4	**Matrix:**	AQUEOUS
Lab ID:	0005051-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.37	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Day 05

Toxikon

Date: *24-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005052	**Collection Date:**	05/15/2000 10:15:00 AM
Project:	LOCKHEED(05012)DAY5	**Matrix:**	AQUEOUS
Lab ID:	0005052-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.75	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005052	**Collection Date:**	05/15/2000 10:15:00 AM
Project:	LOCKHEED(05012)DAY5	**Matrix:**	AQUEOUS
Lab ID:	0005052-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.47	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005052
Project: LOCKHEED(05012)DAY5
Lab ID: 0005052-03A

Client Sample ID: SEDIMENT C
Collection Date: 05/15/2000 10:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.20	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005052	**Collection Date:**	05/15/2000 10:15:00 AM
Project:	LOCKHEED(05012)DAY5	**Matrix:**	AQUEOUS
Lab ID:	0005052-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.19	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005052
Project: LOCKHEED(05012)DAY5
Lab ID: 0005052-05A

Client Sample ID: SEDIMENT E
Collection Date: 05/15/2000 10:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.17	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005052
Project: LOCKHEED(05012)DAY5
Lab ID: 0005052-06A

Client Sample ID: SEDIMENT F
Collection Date: 05/15/2000 10:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.15	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005052
Project: LOCKHEED(05012)DAY5
Lab ID: 0005052-07A

Client Sample ID: SEDIMENT G
Collection Date: 05/15/2000 10:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.15	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005052	**Collection Date:**	05/15/2000 10:15:00 AM
Project:	LOCKHEED(05012)DAY5	**Matrix:**	AQUEOUS
Lab ID:	0005052-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.28	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *24-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005052
Project: LOCKHEED(05012)DAY5
Lab ID: 0005052-09A

Client Sample ID: H2O ONLY
Collection Date: 05/15/2000 10:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.55	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Day 06

Date: *30-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005054
Project: 00 05 012 Lockheed Martin m. beryllina -7 day
Lab ID: 0005054-01A

Client Sample ID: Control Sediment
Collection Date: 05/16/2000
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.86	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005054
Project: 00 05 012 Lockheed Martin m. beryllina -7 day
Lab ID: 0005054-02A

Client Sample ID: Sediment A
Collection Date: 05/16/2000
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.50	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment C
Lab Order:	0005054	**Collection Date:**	05/16/2000
Project:	00 05 012 Lockheed Martin m. beryllina -7 day	**Matrix:**	AQUEOUS
Lab ID:	0005054-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/23/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment D
Lab Order:	0005054	**Collection Date:**	05/16/2000
Project:	00 05 012 Lockheed Martin m. beryllina -7 day	**Matrix:**	AQUEOUS
Lab ID:	0005054-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.23	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005054
Project: 00 05 012 Lockheed Martin m. beryllina -7 day
Lab ID: 0005054-05A

Client Sample ID: Sediment E
Collection Date: 05/16/2000
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.25	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment F
Lab Order:	0005054	**Collection Date:**	05/16/2000
Project:	00 05 012 Lockheed Martin m. beryllina -7 day	**Matrix:**	AQUEOUS
Lab ID:	0005054-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.23	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Sediment G
Lab Order:	0005054	**Collection Date:**	05/16/2000
Project:	00 05 012 Lockheed Martin m. beryllina -7 day	**Matrix:**	AQUEOUS
Lab ID:	0005054-07A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.25	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005054
Project: 00 05 012 Lockheed Martin m. beryllina -7 day
Lab ID: 0005054-08A

Client Sample ID: Sediment H
Collection Date: 05/16/2000
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.25	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	Control H2O Only
Lab Order:	0005054	**Collection Date:**	05/16/2000
Project:	00 05 012 Lockheed Martin m. beryllina -7 day	**Matrix:**	AQUEOUS
Lab ID:	0005054-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.47	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Day 07

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	CONTROL SEDIMENT
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-01A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.64	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits.

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT A
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-02A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.30	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT C
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.33	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT D
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-04A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.27	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT E
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-05A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.27	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT F
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-06A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.23	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT: Toxikon - Jupiter
Lab Order: 0005080
Project: LOCKHEED 05012 CONT_DAY7
Lab ID: 0005080-07A

Client Sample ID: SEDIMENT G
Collection Date: 05/17/2000 6:50:00 PM
Matrix: AQUEOUS

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: LKP
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	SEDIMENT H
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-08A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.26	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon

Date: *30-May-00*

CLIENT:	Toxikon - Jupiter	**Client Sample ID:**	H2O ONLY
Lab Order:	0005080	**Collection Date:**	05/17/2000 6:50:00 PM
Project:	LOCKHEED 05012 CONT_DAY7	**Matrix:**	AQUEOUS
Lab ID:	0005080-09A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
AMMONIA AS N		**E350.3**				Analyst: **LKP**
Nitrogen, Ammonia (As N)	0.41	0.050		mg/L	1	05/26/2000

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

APPENDIX B

FISH TEST RAW DATA

Toxikon Corporation
Jupiter, Florida

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OBSERVATION CODES EXPLANATION SHEET

Code	Explanation
Animal Observations	
N - None	Nothing out of the ordinary was observed
MSP	Muscle spasms
PLE	Partial loss of equilibrium
CLE	Complete loss of equilibrium
LETH	Lethargic
HYP	Hyperactive
ERR	Erratic behavior
GYR	Gyrating
IMM	Immobile
DRK	Dark coloration / pigmentation
HEM	Hemorrhagic
RAR	Rapid respiration
GUL	Gulping at surface
AS	At surface
NF	Not found
D	Dead
STS	Stuck to side of test chamber above water line
FLT	Floating on surface
CS	Crooked spine
PAL	Pale coloration
B	Buried in sediment
Test Solution / Chemical Observations	
CLDY	Cloudy
PRE	Precipitate on bottom of test chamber
FOS	Film on surface
UC	Undissolved chemical
DMF	Dimethyl formamide
TEG	Triethylene glycol
ACE	Acetone
AI	Active ingredient
WM	Whole material
PM	Particulate matter

Code	Explanation
Water Codes	
LFW	Laboratory fresh water
FSW	Filtered saltwater
UFSW	Unfiltered saltwater
DIW	De-ionized water
HSFSW	High salinity filtered saltwater
RCW	Reconstituted fresh water
RSW	Raw saltwater
Error Codes	
EE	Entry error
CE	Calculation error
IE	Illegible entry
DE	Date error
SE	Spelling error
IM	Instrument malfunction
TE	Transcription error
T	Wrong time
TN	Wrong taxon name
LE	Late entry
Food Descriptions	
BS	Brine Shrimp nauplii
BBS	Boosted brine shrimp nauplii
FBS	Frozen brine shrimp adults
CBS	Concentrated brine shrimp
FF	Flake food
PF	Pelleted food
SS	Salmon starter
YCT	Yeast/cerophyll/trout chow
SEL	Selenastrum sp. algal suspension
PBS	Platinum brine shrimp
Miscellaneous/Special Codes	
NA	Not applicable

INSTRUMENTS		
ID	Description	Serial Number
YSI-2	YSI Model 58 Dissolved Oxygen Meter	G9004053
REF-3	Aquafauna Salinity Refractometer	C5526
CM90-2	Corning Model M-90 Conductivity Meter	170421
DMa	Ryan Instruments DataMentor Logger A	RYANA910052B
DMb	Ryan Instruments DataMentor Logger B	RYAN910099
FS-28	Fisher Solid State/Ultrasonic FS-28	181242
CH-3	Orion Model 230A pH Meter	013556
pH-40 #1	Corning pH-40 Sensor	L47584100017CE6
pH-40 #2	Corning pH-40 Sensor	L4758410001C3A3

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Jupiter, Florida

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CHRONIC TOXICITY TEST -- TEST DESIGN

Sponsor: Lockheed Martin Services, Inc.

Project Number: 000501.2

Test Substance

Test Substance: Sediment
See Page A262-69 of Test Soil / Sediment Receipt Log for Test Substance Information.

Test Conditions

[X] Static-Renewal [ ] Flow-through

Duration : 7- days

Test Animal History

Species : Menidia beryllina
Source : Aquatic Research Organisms
Batch/Lot Number : MNB 00-5-9
Age/Life Stage : 10-days old
See Page MNB-5-9-1 of Salt Water Fish Log for raw data.

Lighting: Flourscent
Photoperiod: 16 hr Light 8 hr Dark
Light Transition Periods: ____
Light Intensity Range: 11.1 to 19.2 µmols

Test Container Dimensions: — L x 8 W x 16.5 H
Test ~~Solution~~ Sediment Height : 2 cm
Test Containers : [X] Open [ ] Covered
Test Container Volume : 0.95 Liters
Dilution Volume : 0.5 Liters

Test Area Used	Temperature	Hardness/Salinity
WB-6	20 ± 1°C	10 ‰ ±

Reps / Concentration : 5
Animals / Replicate : 10

Protocol Followed: Modified EPA 600/4-91/003

Diet: Brine shrimp (< 24 hrs old) twice daily

Type Solvent Used : N/A
Solvent CTL Concentration : ↓
Solvent Volume Injected/Cycle: ↓

Concentrations Based on [ ] A. I. [X] W. M.

Test Concentrations: (%)	Control	~~Solvent~~ Control						
	FSW	Sediment	100 % silt sed	—	—	—	—	—

Additional Information:

Toxikon Corporation
Jupiter, Florida

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TEST ORGANISM REQUIREMENTS

Animal Species Required: Menidia beryllina

Number of Animals: 550 | Age/Size: 7-11 days

Day/Date Needed	S	M	T	W	T	F	S
				5/10			

Acclimation Requirements

Water type:
- [X] Filtered SW
- [ ] Filtered FW
- [ ] Unfiltered SW
- [ ] Treated City Water
- [ ] Reconstituted FW
- [ ] Recirculating FW

Temperature: 20 °C Salinity: 10‰ Hardness: N/A

Feed before test? [X] Yes [ ] No | If No: [ ] 24 hours [ ] 48 hours

Algal Species Required: N/A

Any Special Medium or Culture Requirements?: Animals acclimated to 10‰

Any Additional Instructions:

Study Number: 0005012 | Requisitioner: AL | Date: 5-1-00

Locked Murlin

Toxikon Corporation
Jupiter, FL

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TEST ORGANISM ADDITIONS

Test Substance: Sediment	Test Organism: M. beryllina
Study Number: 0005012	Sponsor: Lockheed Martin

Test organisms were added to test chambers in accordance with SOP 6.6, Section 2.0, or as described below.

5-1-00

Time Test Organism Added: 1130

Addition By: SG

Date Added: 5-1-00

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Jupiter, Florida

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MIN/MAX TEMPERATURE RECORDS

Sponsor: Lockheed Martin	Project No.:
Test Material: Sediment	Species: M. beryllina
Min/Max Thermometer: Micronta	ID No: 25A
Target Temperature	20 +/- 1°C
Sensor Location: WB-6	

Date	Time	Test Day	Temperature (°C) Current	Minimum	Maximum	Reset	Data By
5/10/00	1540	0	17.8	—	—	✓	JK
5-11-00	1145	1	18.1	17.5	18.1	✓	AL
5-12-00	1045	2	17.6	17.5	18.2	✓	JK
5-13-00	1645	3	18.1	17.5	18.2	✓	SG
5-14-00	1528	4	18.1	17.6	18.1	✓	NB
5-15-00	1515	5	17.9	17.5	18.2	✓	SG
5-16-00	1535	6	18.0	17.6	18.3	✓	AL
5-17-00	2000	7	18.0	17.5	18.6	—	SG

AL 5-1-00

NOTE: Values recorded above are uncorrected. To correct values add/subtract (circle one) +0.6°C. This correction factor is obtained from the most recent comparison of the Micronta Min/Max Thermometer with the NBS thermometer (see the Temperature Monitoring Devices logbook). Date of calibration check: 2-17-00

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DAILY FEEDING RECORD

Sponsor: Lockheed Martin	Project No:
Test Substance: Sediment	Test Species: M. beryllina

See page - of Animal Feeds Log for information on receipt of food.

Describe how food is/was prepared:

Day	Date	Time	By	Amount Fed	Comments
0	5-10-00	2115	SG	~150 brine shrimp	–
1	5-11-00	1145 1345	SG SG	~150 brine shrimp	—
① ~~2~~ 2	5-12-00	1055	JM	~150 brine shrimp	–
① ~~3~~ 2	5-12-00	1455	SG	~150 brine shrimp	–
3	5-13-00	1430	SG	~150 brine shrimp	–
3	5-13-00	1700	SG	" "	–
4	5-14-00	1445	SG	" "	–
4	5-14-00	1615	SG	" "	–
5	5-15-00	0830 1325	SG SG	" " " "	–
6	5-16-00	0825 1600	SG AL	" "	–
7	5-17-00 5-17-00	0845 1600	AL SG	" "	–

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Jupiter, FL

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LIGHT READINGS FOR STATIC TEST SYSTEMS

Sponsor: Lockheed Martin	Project #: 000012
Test Material: Sediment	Test Species: M. beryllina

REP A	Trt Ctl. FSW umols 11.1	Trt Ctl. Sediment umols 13.7	Trt Sed. A umols 17.3	Trt Sed. B umols 18.1	Trt Sed. C umols 17.6	Trt Sed. D umols 16.2	Trt Sed. E umols 12.4
REP B	Trt Sed. F umols 18.9	Trt Sed. G umols 19.2	Trt Sed. H umols 16.6	Trt umols	Trt umols	Trt umols	Trt umols

Readings By: AL	Date: 5-16-00

Meter Used: LI-COR Quantum/Radiometer/Photometer Model LI-189

Sensor Used: Quantum (2 pi) Model LI-190SA

CALCULATIONS: Lux = (umols / 12) * 1000

Treatment	umols	Lux	Treatment	umols	Lux
Control ~~A~~ H_2O only			~~Control B~~ Sed F		
A Control Sed			~~B~~ Sed G		
A Sed A			~~B~~ Sed H		
A Sed B			B		
A Sed C			B		
A Sed D			B		
A Sed E			B		

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OK JK 5/12/00

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FISH SHORT-TERM ~~CHRONIC~~ Screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: C+1 (FSW)

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1900	0	SG	10	A	19.2	—	8.2	—	7.8 ~~8.4~~	8.4	10	—		
				10	B	19.1	—	8.2	—	7.9 ~~8.3~~	8.3	—	—		
				10	C	19.0	—	8.2	—	8.0 ~~8.4~~	8.4	—	—		
				10	D	18.8	—	8.3	—	7.9 ~~8.4~~	8.5	—	—		
				10	E	18.7	—	8.3	—	8.0 ~~8.4~~	8.5	—	—		
5-11-00	H2O quality 1040 / obser. 1335	1	SG AL	10	A	23.9	—	8.2	8.1	8.0	8.4	10	—		
				10	B	—	—	—	8.1	—	8.4	—	—		
				10	C	—	—	—	8.2	—	8.4	—	—		
				10	D	—	—	—	8.2	—	8.4	—	—		
				10	E	—	—	—	8.2	—	8.5	—	—		
5-12-00	H2O quality 1000 / 1315 observ.	2	SG, TF	10	A	24.4	—	~~7.3~~ 7.7	7.7	8.0	8.6	10	—		
				10	B	—	—	—	7.7	—	8.6	—	—		
				10	C	—	—	—	7.7	—	8.6	—	—		
				10	D	—	—	—	7.7	—	8.6	—	—		
				10	E	—	—	—	7.7	—	8.7	—	—		
5-13-00	H2O quality 1525 / 1645 obser	3	SG	10	A	24.7	19.3	7.8	7.4	8.1	8.0	10	—		
				10	B	—	—	—	7.4	—	8.3	—	—		
				10	C	—	—	—	7.5	—	8.3	—	—		
				10	D	—	—	—	7.5	—	8.6	—	—		
				10	E	—	—	—	7.5	—	8.5	—	—		

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TREATMENT: C+1. (FSW)

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	Sp. ~~Cond.~~ SAL. ~~New~~	Sp. ~~Cond.~~ SAL. ~~Old~~	Hrd. New	Alk. New
5-14-00	H2O qual. 1505 / 1720 observ.	4	SG MB	10	A	24.5	19.2	7.3	7.4	8.1	8.5	10‰	—		
				10	B	~~7~~ ①	—	—	7.4	① ~~8.2~~	8.4	—	—		
				10	C	—	—	—	7.4	—	8.5	—	—		
				10	D	—	—	—	7.4	—	8.5	—	—		
				10	E	—	—	—	7.4	—	8.6	—	—		
5-15-00	H2O qual. 0945 / 1330 observ.	5	SG AL	10	A	23.9	—	7.6	7.5	8.2	8.4	10‰	—		
				10	B	—	—	—	7.5	—	8.5	—	—		
				10 ①	C	—	—	—	7.5	—	8.5	—	—		
				10 ~~1 leth~~	D	—	—	—	7.5	—	8.6	—	—		
				10 / 1 leth	E	—	—	—	7.5	—	8.5	—	—		
5-16-00	0850 H2O quality / observ. 0910	6	SG AL	10	A	24.8	19.1	7.4	7.5	8.4	8.4	10‰	—		
				10	B	—	—	—	7.5	—	8.6	—	—		
				10	C	—	—	—	7.5	—	8.4	—	—		
				10	D	—	—	—	7.5	—	8.6	—	—		
				9 / 1D	E	—	—	—	7.5	—	8.6	—	—		
5-17-00	H2O qual. 1820 / observ 1915	7	SG AL	10	A	—	19.5	—	7.3	—	8.5	② ~~10‰~~	10‰		
				10	B	—	19.1	—	7.3	—	8.6	—	—		
				10	C	—	19.2	—	7.3	—	8.2	—	—		
				10	D	—	19.0	—	7.4	—	8.2	—	—		
				9	E	—	19.1	—	7.4	—	7.8	—	—		

① EFIG 5-15-00 AFE AL ② ELSC

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① FE
JK 5/10/00

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FISH SHORT-TERM ~~CHRONIC~~ Screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: C+1 (Sediment)

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	Sp. Cond. salinity New	Sp. Cond. salinity Old	Hrd. New	Alk. New
5-10-00	1900	0	SG	10	A	~~19.1~~ 19.0	—	8.0	—	~~7.9~~ 7.9	8.4	10	—		
				10	B	19.1	—	8.0	—	6.8	8.4	—	—		
				10	C	19.1	—	8.0	—	6.8	8.4	—	—		
				10	D	18.9	—	8.0	—	6.8	8.3 —				
				10	E	18.7	—	8.0	—	6.8	8.4 —				
5-11-00	H2O quality 1040 / 1340	1	SG AL	10	A	* —	19.0	—	8.2	—	8.5	—	—		
				10	B	—	—	—	8.2	—	8.3	—	—		
				10	C	—	—	—	8.2	—	8.3	—	—		
				10	D	—	—	—	8.2	—	8.4	—	—		
				10	E	—	—	—	8.2	—	8.4	—	—		
5-12-00	H2O quality 1000 / 1320 observ.	2	SG, TR	10	A	—	—	—	7.6	① ~~8.~~ —	8.7	—	—		
				10	B	—	—	—	7.6	—	8.6	—	—		
				10	C	—	—	—	7.7	—	8.6	—	—		
				10	D	—	—	—	7.7	—	8.6	—	—		
				10	E	—	—	—	7.7	—	8.6	—	—		
5-13-00	H2O qual. 1525 / observ. 1650	3	SG	10	A	—	—	—	7.5	—	8.0	—	—		
				10	B	—	—	—	7.5	—	8.2	—	—		
				10	C	—	—	—	7.5	—	8.3	—	—		
				10	D	—	—	—	7.5	—	8.5	—	—		
				10	E	—	—	—	7.6	—	8.5	—	—		

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FISH SHORT-TERM ~~CHRONIC~~ Screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: C+1 (Sediment)

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5.14.00	H_2O aml. 1505	4	SC MB	10	A	—	—	—	7.4	—	8.2	—	—		
				10	B	—	—	—	7.5	—	8.3	—	—		
	1725 observ.			10	C	—	—	—	7.5	—	8.4	—	—		
				10	D	—	—	—	7.5	—	8.4	—	—		
				10	E	—	—	—	7.5	—	8.5	—	—		
5.15.00	H_2O aml. 0945	5	SC AL	10	A				7.5		8.3				
				10	B				7.5		8.4				
	1345			10	C				7.5		8.5				
				10	D				7.5		8.5				
				10	E				7.5		8.5				
5.16.00	0850 H_2O aml.	6	SC AL	10	A				7.5		8.7				
				10	B				7.5		8.7				
	observ. 0910			10	C				7.5		8.6				
				10/ 1 DEAD	D				7.5		8.6				
				10	E				7.5		8.6				
5.17.00	H_2O aml. 1820	7	SC AL	② 10 ~~9/1 DEAD~~	A	-	19.2		7.4	-	8.0	① ~~10‰~~	10‰		
				10 ~~11/1 DEAD~~ ①	B	-	19.3		7.4	-	8.0	-	-		
	observ. 1915			10	C	-	19.1		7.4	-	8.2	-	-		
				9/1 D	D	-	19.0		7.4	-	8.2	-	-		
				10	E	-	18.9		7.4	-	7.9	-	-		

① FEB ② FEB 5.17.00

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FISH SHORT-TERM ~~CHRONIC~~ Screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: Sediment A

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1800	0	SU	10	A	18.9	—	7.8	—	6.7	8.7	10	—		
				10	B	18.9	—	7.8	—	6.7	8.4	—	—		
				10	C	18.9	—	7.8	—	6.2	8.5	—	—		
				10	D	18.8	—	7.9	—	6.7	8.4	—	—		
				10	E	18.8	—	7.5	—	6.7	8.5	—	—		
5-11-00	H2O quality 1010 / 1350 observ.	1	SG TR	10	A	* —	—	—	8.2	—	8.5	—	—		
				10	B	—	—	—	8.2	—	8.4	—	—		
				10	C	—	—	—	8.2	—	8.4	—	—		
				10	D	—	—	—	8.2	—	8.4	—	—		
				10	E	—	—	—	8.2	—	8.4	—	—		
5-12-00	H2O quality 1000 / observ. 1320	2	SG TR	10	A				7.6		8.1				
				10	B				7.6		8.3				
				10	C				7.6		8.5				
				10	D				7.6		8.5				
				10	E				7.6		8.5				
5-13-00	H2O quality 1375 / observ. 1655	3	SU	10	A				7.5		8.3				
				10	B				7.5		8.2				
				10	C				7.5		8.4				
				10	D				7.5		8.4				
				10	E				7.5		8.5				

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TREATMENT: Sediment A

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	Sp. Cond. salinity ‰ New	Sp. Cond. salinity ‰ Old	Hrd. New	Alk. New
5.14.00	H2O qual. 1505 / 1735 observ.	4	SG MB	10	A				7.5		8.2				
				10	B				7.5		8.3				
				10	C				7.5		8.4				
				10	D				7.5		8.4				
				10	E				7.5		8.4				
5.15.00	H2O qual. 0945 / 1405 observ.	5	SG AL	10	A				7.5		8.5				
				10 / 1 Leth	B				7.5		8.5				
				10	C				7.5		8.5				
				10	D				7.5		8.5				
				10	E				7.5		8.5				
5.16.00	0850 H2O quality / observ. 0910	6	SG AL	10	A				7.5		8.3				
				10	B				7.5		8.3				
				10	C				7.5		8.4				
				10	D				7.5		8.4				
				10	E				7.5		8.4				
5.17.00	H2O qual. 1820 / observ. 1915	7	SG AL	10	A		19.1		7.5		8.0	-	10‰		
				10	B		18.9		7.6		7.7	-	-		
				10	C		18.9		7.6		7.8	-	-		
				10	D		18.9		7.6		7.9	-	-		
				10	E		18.9		7.6		7.9	-	-		

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① EESG 5-12-00 ② EESG 5.13.00

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TREATMENT: Sediment B

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1800	0	SG	10	A	19.0	—	7.6	—	5.5	8.5 —	10	—		
				10	B	19.0	—	7.6	—	5.8	8.5 —	—	—		
				10	C	19.0	—	7.6	—	5.8	8.4 —	—	—		
				10	D	18.8	—	7.6	—	6.0	8.4 —	—	—		
				10	E	18.7	—	7.6	—	6.1	— 8.4	—	—		
5-11-00	1120 quality 1040 observ. 1400	1	SG AL	2	A	* —	—	—	8.1	—	8.1	—	—		
				1	B	—	—	—	8.1	—	8.3	—	—		
				0	C	—	—	—	8.2	—	8.2	—	—		
				1	D	—	—	—	8.2	—	8.2	—	—		
				3	E	—	—	—	8.2	—	8.3	—	—		
5-12-00	H_2O quality 1000 1335 observ.	2	SG TR	① ~~10~~ 0	A				7.6		8.4				
				0	B				7.6		8.4				
				0	C				N/A		N/A				
				0	D				7.7		8.4				
				0	E				7.7		8.5				
② ~~5-13-00~~	~~H_2O qual. 1[illegible]~~ ② ~~observ. 1765~~ ②	3	SG		A								10‰		
					B		Terminated								
					C										
					D										
					E										

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TREATMENT: Sediment C

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1900	0	SG	10	A	19.0	—	7.5	—	5.9	8.6	10	—		
				10	B	19.1	—	7.3	—	3.9	8.6	—	—		
				10	C	19.0	—	7.5	—	5.6	8.4	—	—		
				10	D	18.9	—	7.5	—	6.1	8.4	—	—		
				10	E	18.7	—	7.5	—	6.3	8.4	—	—		
5-11-00	H_2O qual. 1040	1	SG AR	10	A	—	—	—	8.2	—	8.1	—	—		
				10	B	—	—	—	8.1	—	8.3	—	—		
				10	C	—	—	—	8.1	—	8.3	—	—		
	1430 observ.			10	D	—	—	—	8.1	—	8.3	—	—		
				10	E	—	—	—	8.2	—	8.4	—	—		
5-12-00	H_2O quality 1000	2	SG, TR	10	A				7.6		8.3				
				10	B				7.6		8.4				
	1340 observ.			10	C				7.6		8.5				
				10	D				7.6		8.5				
				10	E				7.6		8.6				
5-13-00	H_2O qual. 1525	3	SG	10	A				7.5		8.1				
				10	B				7.5		8.2				
	1705 observ.			10	C				7.6		8.3				
				10	D				7.6		8.4				
				10	E				7.6		8.5				

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TREATMENT: Sediment C

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity, ‰ New	~~Sp. Cond.~~ Salinity, ‰ Old	Hrd. New	Alk. New
5.14.00	H2O qual. 1505	4	SG MAS	10	A				7.5		8.3				
				10	B				7.5		8.4				
	observ. 1745			10	C				7.5		8.4				
				10	D				7.5		8.5				
				10	E				7.5		8.5				
5.15.00	H2O qual. 0945	5	SG AL	9/1NG	A				7.6		8.5				
				10	B				7.6		8.4				
	1410			11/1F	C				7.5		8.4				
				10	D				7.6		8.4				
				10/1leth	E				7.6		8.5				
5.16.00	H2O qual. 0850	6	SG AL	9	A				7.7		8.6				
				10	B				7.7		8.4				
	observ 0910			11	C				7.7		8.4				
				10	D				7.7		8.5				
				10	E				7.7		8.5				
5.17.00	H2O qual. 1820	7	SG AL	8/1D	A		19.0		7.7		7.9	–	18‰		
				8	B		19.1		7.7		7.7	–	–		
	observ. 1915			12/1F	C		18.9		7.7		7.8	–	–		
				10	D		18.8		7.7		7.8	–	–		
				10/1LETH	E		18.7		7.7		7.8	–	–		

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TREATMENT: Sediment D

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00		0	SG	10	A	19.0	—	7.5	—	5.1	8.3	10	—		
				10	B	19.1	—	7.6	—	5.3	8.5	—	—		
				10	C	19.0	—	7.5	—	4.7	8.5	—	—		
				10	D	18.9	—	7.5	—	4.7	8.5	—	—		
				10	E	18.7	—	7.4	—	4.7	8.5	—	—		
5-11-00	H2O quality 1040	1	SG AL	10	A	—	—	—	8.1	—	8.6	—	—		
				10	B	—	—	—	8.2	—	8.6	—	—		
				10	C	—	—	—	8.2	—	8.6	—	—		
	observ. 1435			10	D	—	—	—	8.2	—	8.6	—	—		
				10	E	—	—	—	8.1	—	8.5	—	—		
5-12-00	H2O quality 1000	2	SG, TR	10	A				7.6		8.6				
				11 1F	B				7.6		8.7				
	observ. 1355			10	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.7		8.6				
5-13-00	H2O qual. 1515	3	SG	10	A				7.6		8.3				
				11	B				7.6		8.3				
	observ. 1715			10	C				7.6		8.4				
				10	D				7.6		8.5				
				10	E				7.6		8.5				

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TREATMENT: Sediment D

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity, ‰ New	~~Sp. Cond.~~ Salinity, ‰ Old	Hrd. New	Alk. New
14.00	H2O qual. 1505	4	SG MB	10	A				7.5		8.6				
				11	B				7.5		8.6				
	observ. 1750			10	C				7.5		8.6				
				10	D				7.5		8.6				
				10	E				7.5		8.6				
15.00	H2O qual. 0945	5	SG AL	10	A				7.6		8.6				
				11	B				7.6		8.6				
	1440 observ.			10	C				7.6		8.6				
				10	D				7.6		8.6				
				10	E				7.6		8.6				
5.16.00	0850 H2O quality	6	SG AL	10	A				7.7		8.7				
	observ. 0910			11	B				7.7		8.7				
				10	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.7		8.6				
5.17.00	H2O qual. 1920	7	SG AL	10	A		19.1		7.7		7.9	–	10		
				11	B		19.1		7.7		7.9	–	–		
	observ. 1915			10	C		19.1		7.7		8.1	–	–		
				10	D		18.9		7.7		8.1	–	–		
				10	E		18.8		7.7		8.1	–	–		

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TREATMENT: Sediment E

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1900	0	SG	10	A	19.0	—	7.7	—	5.6	8.4	10	—		
				10	B	19.0	—	7.4 ① 7.7	—	3.0	8.5		—		
				10	C	18.9	—	7.6	—	4.5	8.5		—		
				10	D	18.9	—	7.6	—	4.5	8.5		—		
				10	E	18.8	—	7.6	—	4.5	8.4		—		
5-11-00	H2O quality 1040	1	SG JR	10	A	—	—	—	8.1	—	8.6	—	—		
				10	B	—	—	—	8.2	—	8.5	—	—		
				10	C	—	—	—	8.2	—	8.5	—	—		
	1450			10	D	—	—	—	8.2	—	8.5	—	—		
				10	E	—	—	—	8.2	—	8.5	—	—		
-12-00	H2O quality 1000	2	SG, TE	10	A				7.6		8.8				
				10	B				7.6		8.7				
	Observ. 1415			9 INF	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.7		8.7				
-13-00	1525 water qual	3	SG	10	A				7.6		8.3				
				10	B				7.6		8.4				
	1725 observ.			9	C				7.6		8.4				
				10	D				7.6		8.4				
				10	E				7.6		8.5				

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TREATMENT: Sediment E

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	Sp. Cond. Salinity, ‰ New	Sp. Cond. Salinity, ‰ Old	Hrd. New	Alk. New
5.14.00	H2O qual. 1505	4	SG MB	10	A				7.5		8.6				
				10	B				7.5		8.6				
	1755 observ.			9	C				7.5		8.5				
				10	D				7.5		8.5				
				10	E				7.5		8.5				
.15.00	H2O qual. 0945	5	SG AL	10	A				7.5		8.6				
				10	B				7.5		8.6				
	1445 observ.			10 IF	C				7.5		8.6				
				10	D				7.5		8.6				
				10	E				7.5		8.6				
5.16.00	0850 H2O quality	6	SG AL	10	A				7.6		8.6				
				10	B				7.6		8.6				
	observ. 0910			10	C				7.6		8.6				
				10	D				7.6		8.6				
				10	E				7.6		8.5				
5.17.00	H2O qual 1820	7	SG AL	10	A		19.1		7.7		8.1	—	10		
				10	B		19.1		7.6		8.1	—	—		
	observ. 1915			10	C		19.0		7.6		8.1	—	—		
				10	D		19.0		7.6		8.2	—	—		
				10	E		18.0		7.6		8.2	—	—		

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TREATMENT: Sediment F

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity New	~~Sp. Cond.~~ Salinity Old	Hrd. New	Alk. New
5-10-00	1800	0	SG	10	A	19.0	—	7.7	—	4.8	8.4	10	—		
				10	B	19.0	—	7.7	—	5.1	8.5	—	—		
				10	C	19.0	—	7.6	—	4.6	8.5	—	—		
				10	D	18.9	—	7.6	—	4.1	8.5	—	—		
				10	E	18.8	—	7.6	—	4.4	8.5	—	—		
5-11-00	H2O quality 1040 / observ. 1500	1	SG AL	10	A	—	—	—	8.1	—	8.6	—	—		
				10	B	—	—	—	8.1	—	8.6	—	—		
				10	C	—	—	—	8.1	—	8.5	—	—		
				10	D	—	—	—	8.1	—	8.5	—	—		
				10	E	—	—	—	8.1	—	8.5	—	—		
5-12-00	H2O quality 1000 / observ. 1425	2	SG TR	10	A				7.7		8.7				
				10	B				7.7		8.7				
				10	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.6		8.6				
5-13-00	H2O qual 1525 / 1730 observ.	3	JK	10	A				7.6		8.7				
				10	B				7.6		8.5				
				10	C				7.6		8.5				
				10	D				7.6		8.5				
				10	E				7.6		8.5				

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TREATMENT: Sediment F

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ salinity, ‰ New	~~Sp. Cond.~~ salinity, ‰ Old	Hrd. New	Alk. New
5.14.00	H2O qual. 1550	4	MB SG	10	A				7.5		8.6				
				10	B				7.5		8.5				
	1755 observ.			10	C				7.5		8.5				
				10	D				7.6		8.6				
				10	E				7.6		8.5				
5.15.00	H2O qual. 0945	5	SG AL	10	A				7.5		8.7				
				10/1 leth	B				7.6		8.6				
	observ. 1450			10	C				7.6		8.6				
				10/1 leth	D				7.6		8.6				
				10	E				7.6		8.6				
5.16.00	0800 H2O quality	6	SG AL	10	A				7.6		8.5				
				10	B				7.6		8.5				
	observ. 0910			10	C				7.6		8.6				
				9/1D	D				7.6		8.6				
				10	E				7.6		8.6				
5.17.00	H2O qual. 1820	7	SG AL	10	A		19.0		7.7		8.8	–	10		
				9/1D	B		19.0		7.7		8.4	–	–		
	observ. 1915			9	C		19.0		7.7		8.3	–	–		
				9	D		18.9		7.7		8.3	–	–		
				10	E		18.8		7.7		8.1	–	–		

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TREATMENT: Sediment G

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ salinity New	~~Sp. Cond.~~ salinity Old	Hrd. New	Alk. New
5-10-00	1800	0	SG	10	A	19.0	—	7.6	—	5.2	8.5	10	—		
				10	B	18.9	—	7.5	—	4.9	8.5	—	—		
				10	C	18.9	—	7.5	—	4.7	8.5	—	—		
				10	D	18.9	—	7.5	—	4.6	8.5	—	—		
				10	E	18.8	—	7.5	—	4.6	8.5	—	—		
5-11-00	H2O quality 1040 / 1520	1	SG AL	10	A	—	—	—	8.1	—	8.6	—	—		
				10	B	—	—	—	8.2	—	8.3	—	—		
				11 (1F)	C	—	—	—	8.2	—	8.4	—	—		
				10	D	—	—	—	8.2	—	8.5	—	—		
				10	E	—	—	—	8.1	—	8.4	—	—		
5-12-00	H2O quality 1000 / observ. 1430	2	SG TR	10	A				7.6		8.6				
				10	B				7.7		8.7				
				11	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.6		8.7				
5-13-00	H2O qual. 1525 / observ. 1735	3	SG	10	A				7.6		8.4				
				10	B				7.6		8.4				
				11	C				7.6		8.5				
				10	D				7.6		8.5				
				10	E				7.6		8.6				

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TREATMENT: Sediment G

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ salinity, ‰ New	~~Sp. Cond.~~ salinity, ‰ Old	Hrd. New	Alk. New
5.14.00	H_2O qual, 1505	4	SG MB	10	A				7.6		8.5				
				10	B				7.6		8.6				
	1800 observ			11	C				7.6		8.7				
				10	D				7.6		8.7				
				10	E				7.6		8.6				
5.15.00	H_2O qual, 0945	5	SG AL	9/1d 1 kth	A				7.6		8.6				
				10	B				7.6		8.6				
	observ 1500			① ~~10~~ 11	C				7.6		8.6				
				10	D				7.6		8.6				
				10	E				7.6		8.6				
5.16.00	H_2O qual, 0850	6	SG AL	9	A				7.7		8.7				
				10	B				7.7		8.7				
	observ. 0910			10 / 1D	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.7		8.4				
5.17.00	H_2O qual 1810	7	SG AL	8/1D	A		18.9		7.7		8.6	-	10		
				② ~~10~~ 9	B		18.9		7.7		8.4	-	-		
	observ. 1915			② ~~10~~ 9	C		18.8		7.7		8.3	-	-		
				② ~~11~~ 10	D		18.8		7.7		8.2	-	-		
				9/1D	E		18.7		7.7		8.2	-	-		

② EE AL 5/17

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FISH SHORT-TERM ~~CHRONIC~~ screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: Sediment H

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ salinity New	~~Sp. Cond.~~ salinity Old	Hrd. New	Alk. New
5.10.00	1900	0	SG	10	A	18.9	—	7.7	—	5.9	8.7	10	—		
				10	B	18.8	—	7.8	—	6.0	8.6		—		
				10	C	18.8	—	7.7	—	5.7	8.5		—		
				10	D	18.8	—	7.7	—	6.0	8.5		—		
				10	E	18.8	—	7.8	—	5.8	8.5		—		
5.11.00	1120 quality 1040 observ. 1530	1	SG AR	10	A	*	—	—	8.1	—	8.5	—	—		
				10	B	—	—	—	8.2	—	8.5	—	—		
				10	C	—	—	—	8.1	—	8.5	—	—		
				10	D	—	—	—	8.1	—	8.6	—	—		
				10	E	—	—	—	8.2	—	8.4	—	—		
5-12-00	H2O quality 1000 observ. 1435	2	SG, TR	10	A				7.7		8.7				
				10	B				7.7		8.6				
				10	C				7.7		8.5				
				10	D				7.6		8.6				
				10	E				7.6		8.4				
5-13-00	H2O qual. 1525 1745 observ.	3	SG	10	A				7.6		8.6				
				10	B				7.6		8.7				
				10	C				7.6		8.5				
				10	D				7.6		8.6				
				10	E				7.6		8.5				

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FISH SHORT-TERM ~~CHRONIC~~ screen TOXICITY TEST -- SURVIVAL AND WATER QUALITY DATA

TREATMENT: Sediment H

Date	Time	Test Day	Data By	# Alive	Rep	Temp. New	Temp. Old	pH New	pH Old	DO New	DO Old	~~Sp. Cond.~~ Salinity, ‰ New	~~Sp. Cond.~~ Salinity, ‰ Old	Hrd. New	Alk. New
5.14.00	H2O qual. 1505	4	SG MB	10	A				7.6		8.7				
				10	B				7.6		8.7				
	observ. 1810			10	C				7.6		8.6				
				10	D				7.6		8.5				
				10	E				7.6		8.6				
5.15.00	H2O qual. 0945	5	SG AL	10	A				7.6		8.6				
				10/1AS	B				7.6		8.6				
	1505 observ			10	C				7.6		8.6				
				10	D				7.6		8.6				
				10	E				7.6		8.5				
5.16.00	0950 H2O qual.	6	SG AL	10	A				7.7		8.5				
				10	B				7.7		8.6				
	observ. 0910			10	C				7.7		8.6				
				10	D				7.7		8.6				
				10	E				7.7		8.6				
5.17.00	1820 H2O qual	7	SG AL	10	A		18.9		7.7		8.0	-	10		
				10	B		18.8		7.7		8.3	-	-		
	observ. 1915			10	C		18.8		7.7		8.2	-	-		
				10	D		18.7		7.7		8.2	-	-		
				10	E		18.7		7.7		8.2	-	-		

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~~FATHEAD MINNOW SHORT-TERM CHRONIC TOXICITY~~ TEST -- WEIGHT DATA

Type/Model of Drying Oven: Lindberg / Blue M Oven Temperature: 60°C
Drying Duration: 18 hrs. Date: 5-17-00 - 5-18-00 Data By: AL

Test Concentration (% Effluent)	Rep	Tare	Total Wet Weight	Total Dry Weight	Number of Fry Weighed	Average Dry Weight (g/animal)	Observations
Ctl. (FSW)	A	0.9485	1.0542	0.9677	10	0.00192 g	
	B	0.9499	1.0365	0.9664	10	0.00165 g	
	C	0.9495	1.0570	0.9677	10	0.00182 g	
	D	0.9478	1.0626	0.9671	10	0.00193 g	
	E	0.9470	1.0499	0.9638	9	~~0.00148 g~~	0.00187 g
Ctl. (Sediment)	A	0.9227	1.0427	0.9422	10	0.00195	
	B	0.9222	1.0286	0.9422	10	0.00200	
	C	0.9222	1.0368	0.9424	10	0.00202	
	D	0.9239	1.0282	0.9419	9	~~0.00180~~	0.00200 g
	E	0.9227	1.0147	0.9392	10	0.00165	
Sed. A	A	0.9225	1.0167	0.9401	10	0.00176	
	B	0.9232	1.0220	0.9385	10	0.00153	
	C	0.9222	1.0258	0.9395	10	0.00173	
	D	0.9248	1.0661	0.9474	10	0.00226	
	E	0.9251	1.0303	0.9425	10	0.00174	
Sed. B	A	0.9258					
	B	0.9287			100% mortality		
	C	0.9315					
	D	0.9337					
	E	0.9367					

SEE AL

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FATHEAD MINNOW SHORT-TERM CHRONIC TOXICITY TEST -- WEIGHT DATA

Type/Model of Drying Oven: Lindberg / Blue M Oven Temperature: 60°C
Drying Duration: 18 hrs. Date: 5-17-00 - 5-18-00 Data By: AL

Test Concentration (% Effluent)	Rep	Tare	Total Wet Weight	Total Dry Weight	Number of Fry Weighed	Average Dry Weight (g/animal)	Observations
Sed. C	A	0.9436	1.0195	0.9575	8	~~0.00139~~ (2)	0.00174g
	B	0.9436	1.0388	0.9606	8	~~0.00170~~ (2)	0.00213g
	C	0.9426	1.0664	0.9638	12	~~0.00212~~ (2)	0.00177g
	D	0.9431	1.0505	0.9597	10	0.00166	
	E	0.9426	1.0799	0.9638	10	0.00212	
Sed. D	A	0.9415	1.0543	0.9614	10	0.00199	
	B	0.9407	1.0798	0.9626	11	0.00199	
	C	0.9407	1.0609 ~~1.0558~~ (1)	0.9611	~~9~~ 10 (1)	0.00204	
	D	0.9397	1.0538	0.9591	10	0.00194	
	E	0.9360	1.0435	0.9560	10	0.00200	
Sed. E	A	0.9456	1.0778	0.9655	10	0.00199	
	B	0.9361	1.0336	0.9511	10	0.00150	
	C	0.9358	1.0365	0.9498	10	0.00140	
	D	0.9363	1.0315	0.9525	10	0.00162	
	E	0.9376	1.0616	0.9586	10	0.00210	
Sed. F	A	0.9470	1.0585	0.9637	10	0.00167	
	B	0.9473	1.0343	0.9611	9	0.00153	
	C	0.9366	1.0295	0.9514	9	0.00167	
	D	0.9368	1.0313	0.9547	9	0.00199	
	E	0.9380	1.0439	0.9570	10	0.00190	

(1) EE AL 5/17

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FATHEAD MINNOW SHORT-TERM CHRONIC TOXICITY TEST -- WEIGHT DATA

Type/Model of Drying Oven: Lindberg / Blue M Oven Temperature: 60°C
Drying Duration: 18 hrs. Date: 5-17-00 - 5-18-00 Data By: [illegible]

Test Concentration (% Effluent)	Rep	Tare (g)	Total Wet Weight	Total Dry Weight	Number of Fry Weighed	Average Dry Weight (g/animal)	Observations
Sed. G	A	0.9374 ~~0.93733~~	1.0354	0.9540	8	0.00208 g	
	B	0.9364 ~~0.93638~~	1.0156	0.9507	9	0.00159	
	C	0.9361	1.0215	0.9512	9	0.00168	
	D	0.9465	1.0552	0.9653	10	0.00188	
	E	0.9457	1.0570	0.9635	9	0.00198	
Sed. H	A	0.9480	1.0519	0.9663	10	0.00183	
	B	0.9492	1.0371	0.9645	10	0.00153	
	C	0.9504	1.0526	0.9663	10	0.00159	
	D	0.9524	1.0503	0.9662	10	0.00138	
	E	0.9542	1.0503	0.9708	10	0.00166	
	A						
	B						
	C						
	D						
	A						
	B						
	C						
	D						

[illegible] 5-17-00

[illegible]

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SG 5/08/00
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STUDY DAILY LOG

Test Sponsor: REAC	Study No: ~~0005011~~ 0005012
Test Substance: Sediment	Study Type: Sediment bioassay (range-finding)

Initial and Date all Entries: 5-04-00

1025 SG 5 coolers from REAC arrived @ laboratory. Samples were immediately logged in and then placed into a Baxter Cryofridge set to maintain a target temp. of 4°C.

A 5g sample was collected from each of the sediment samples. Each 5g sample was placed into a labeled centrifuge tube and spun for 10 minutes @ an RPM of ~3500. The salinities from each of the respective test seds were recorded in the log-in data sheets. The salinities ranged between 8-10 ppt. Our aquaculture facility was notified that the salinity of the test animals and control sed should be acclimated to 10 ppt as previously discussed.

The 8 TOC samples were given to J. Yarembik for log-in purposes.

1030 Control sediment arrived from Eastern Aquatic Biosupply. Sediment was logged in and then sent to aquaculture facility. The control sediment was press sieved through a series of stainless steel sieves (1.00, 0.500, and 0.25 mm) before salinity adjustment to 10 ppt. Aeration was added for the sediment that will be utilized for the range-finding test that will be set-up tomorrow. The remainder of the control sed was placed into a Baxter Cryofridge set to maintain a temp. of 4°C.

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STUDY DAILY LOG

Test Sponsor: REAL	Study No: 0005012
Test Substance: sediment	Study Type: range-finding

Initial and Date all Entries: 5-05-00

- Two of the total 8 sediment will be used for a definitive test w/ the animal L. plumulosus. These two sediments were identified on the COC as LOC 2 Sub (Sed A) and LOC 1 (Sed B). Toxikon randomly assigned identifications to each of the 8 testing seds:

Locations/site	Toxikon I.D.
LOC 2 Sub	Sed A *
LOC 1	Sed B *
LOC 3	Sed C
LOC 2	Sed D
LOC 6	Sed E
LOC 5	Sed F
LOC 4	Sed G
LOC 4 Sub	Sed H

* to be used for leptocheirus definitive test

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	**Study No:** 000502
Test Substance: Sediment	**Study Type:** 7-day daily renewal screen test

Initial and Date all Entries: ① EESG 5/08/00 ② EESG 5/09/00

5-08-00 SG

- 7-day Menidia ① ~~Static~~ beryllina static renewal whole sediment screen bioassay test w/ all 8 of the Quanta Resources site sediments (Seds A - H). Additionally, a laboratory control sediment as well as a H_2O only (dilution H_2O) ~~replicates~~ treatment ① will also be used.
- A daily renewal will be used to add fresh dilution H_2O to each of the test sediments. A variable speed masterflex peristaltic pump will be used to remove ~400 mL of overlying testing H_2O daily to each replicate test chamber. The same pump coupled w/ a plexiglass diffuser attached to the hose (to avoid disturbing the sediment) will be used to transfer clean dilution H_2O (lab filtered salt H_2O) @ a salinity of 10 ppt.

Day -1

5-09-00 All test chambers (1L glass) were labelled. ~~A con~~ ② For each testing sediment 2 cm of each sed will be weighed to get an approximate weight. This 2cm weight will be recorded and used to prepare each of the remaining replicate test chambers for that specific sed. This is a more accurate means of replication as compared to replication by sediment depth.

① ~~1930 Began initiation~~

① EESG 5-08-00

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① EF JK 5/9/00

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal screen test

Initial and Date all Entries:

5-09-00 cont. Day -1 1330

Weights of 2cm of each respective sediment

Control = 172.9 g
Sed A = ⊛ 156.7 g
Sed B = ⊛ 158.8 g
Sed C = 161.1 g
Sed D = 163.7 g
Sed E = 156.6 g
Sed F = 189.9 g ①
Sed G = 149.7 g
Sed H = 165.0 g

1600 Dilution H_2O added to each replicate test chamber. A plexiglass diffuser was used to avoid or reduce the amount of sediment suspension. All test chambers placed onto a water bath set to maintain a temp. of 20° ± 1°C. All test chambers were covered w/ a clear clear plastic cover to prevent evaporation and potential contamination.

⊛ Weight taken from Lepto. range-finding test

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries: Day 0

5-10-00 TOC, ammonia and alkalinity
JK samples were taken from the test
1030 chambers and given to sample
custody to be logged in for the
environmental chemistry.
1055 Test chambers were renewed with
dilution water

1900 JG Full H_2O quality collected on all replicates prior to animal initiation. It should ~~be~~ be noted that a ~~significant~~ @ ~~# of the~~ test sediment replicate had D.O. saturation levels below the 4.0 mg/L saturation defined by the guideline. The lowest D.O. saturation was collected from sediment E-C rep B. @ 3.0 mg/L ~~3.0 mg/L~~, 19.0°C and a salinity of 10 ‰. (@ 35% ~~40%~~ saturation).

1600 Client called back and discussed situation of low D.O.'s of test sed chambers. He said to initiate aeration to each chamber to increase D.O. levels. Once D.O. levels have risen to an acceptable level go ahead and initiate test w/ animals today.

1630 - All test chambers were initiated w/ aeration

1900 D.O. collected from each rep (note that all D.O. readings collected were placed in the "old" space on the H_2O quality datasheet ~~directly~~ directly beside the initial D.O. readings.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 000502
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

5-10-00 cont. Day 0.

The lowest D.O. saturation recorded post aeration calculated to be 98% saturated or 8.3 mg/L @ a temp. of 19.0°C and a salinity of 10 ‰.

1930 Animals added to each respective test chamber for a total of 10 animals per rep and a total of 50 animals per test trt and control.

2115 ~150 newly hatched brine shrimp added to each replicate test chamber. All test chambers covered and aeration returned to all test chambers. 1170 tank temp. = 18.5°C.

5-11-00 Day 01

0805 - All test chambers receiving air. Water table temp. = 18.4°C.

1040 Water Quality taken
AL SGR

1105 Began to collect ammonia samples
AL SGR

1135 SGR Renewal of ~1000 mL of test H_2O to each respective test chamber. Aeration returned to each test chamber after feeding #1 for the day.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediments	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

5-11-00 Day 01 cont

1335 Observations collected on each replicate test chamber. No mortality observed in any control or test sediment except for sediment B which yielded 43 dead animals. The remaining 7 animals were all observed to be @ the bottom of the test chamber (on the sediment) and lethargic. Several of the surviving animals for this Trt were respiring heavily as compared to the surviving animals in the control replicates. Sediment B replicate C was terminated as observations concluded a 100% mortality for this replicate.

1545 Animals fed a second time for this day 01 of the test.

1600 All test chambers were renewed with aeration.

Table temp. = 18.4°C.

5-12-00 Day 02

- H_2O table temp. = 18.2°C.
- All test chambers receiving air.

1040 JK Water quality was taken on renewal dilution water + old dilution water. Ammonia samples were taken & given to sample custody. Renewed each test chamber and restored aeration

1055 Fed animals ~150 brine shrimp per test chamber.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No:
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

5-12-00
Day 02 cont.

1305 Observations conducted on each replicate test chamber. All animals alive except for Sed B reps which yielded 100% mortality. All reps to this trt (Sed B) were terminated.

1455 SL Animals fed for the 2nd time today.
Aeration plates returned to each test chamber.
H_2O table temp. = 18.7°C.

5-13-00 Day 03

1430 All test chambers receiving air. H_2O table temp. > 18.5°C
All test chambers fed w/ brineshrimp.

1525 Wq quality (pH, DO) collected for each test chamber. Ammonia samples collected.

1620 Renewal complete to each test chamber

1700 - Animals fed for second time today.
- Observations conducted on each test chamber. No mortality was observed in any control or test replicate. D.O. saturations are fine.

1745 - Aeration returned to each test chamber.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

- Animals fed ~150 brine shrimp per test chamber.

5-14-00 Day 04 1445 - All test chambers receiving air. H_2O table temp. = 18.4°C.

- H_2O quality (D.O. and pH) collected for each test chamber.

1555 Renewal of overlying H_2O to each test chamber.

1615 Animals fed for 2nd time today

1625 Aeration returned to each test chamber.

1720 observation conducted on each test chamber.

No mortality observed in any test trt.

H_2O table temp. = 18.4°C.

1810 All test chambers returned to H_2O table and air added.

Day 05 0805 - Water table temp. = 18.5°C

- Aeration being supplied to each test chamber

0830 Animals fed for the 1st time today

0945 H_2O quality collected for each test chamber and renewal H_2O.

1015 Collected Ammonia samples

1115 Renewal of overlying H_2O to each test chamber.

Aeration returned to each test chamber.

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Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

Day 05 cont. SG 1330 Observations conducted on each test chamber.

Thus for the observed mortalities have been:

	# dead	
Control (H_2O only)	0	
Control Sediment	0	
Sed A	0	
Sed B	50	(100%)
Sed C	1	(2%)
Sed D	0	
Sed E	0	
Sed F	0	
Sed G	1	(2%)
Sed H	0	

1515 Aeration returned to each test chamber.

Day 06 5-16-00 0825

- All test chambers fed
- H_2O table temp = 18.7°C.

0850
0910 H_2O quality collected and observations

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 000501C
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

Day 06 cont.

Mortality observed on this day 06 of the test

	# Dead
Control (H_2O only)	1
Control Sed	0
Sed A	0
~~Sed B~~	~~0~~
Sed C	0
Sed D	0
Sed E	0
Sed F	1
Sed G	1
Sed H	0

0945 SG Ammonia samples collected and removal of overlying H_2O to each test chamber

1000 Aeration returned to each test chamber

1610 AL Following feeding aeration was returned to each test chamber

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries: Day 07

5-17-00 Day 7 0850 Following feeding aeration was returned to all test chambers.

SC 1600 - Animals for for the 2nd time today.
- All test chamber receiving a.v.
Test termination initiated

SC 1820 H_2O quality (pH, D.O. and temp.) collected for each test chamber. Salinity collected for 1 rep of each test trt and control

1850 Final Day 07 ammonia samples collected for each test trt and control.

1915 Test termination. Final observations collected. ~~Each to~~ The contents of each test chamber was then run through a ~~0.725~~ 710 µm stainless steel sieve. All retained testing animals were then rinsed w/ DI H_2O, placed into tared weigh boats, and then transferred to a 60°C drying oven.
- All testing sediments and controls contained within a hazardous waste drum for proper disposal.

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STUDY DAILY LOG

Test Sponsor: Lockheed Martin	Study No: 0005012
Test Substance: Sediment	Study Type: 7-day daily renewal Screen test

Initial and Date all Entries:

5-18-00 1430 Dried animals taken out of 60°C drying oven and placed into a dessicator.

APPENDIX C

ANIMAL HOLDING

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REFERENCE TOXICITY TEST DATA SHEET

Species:	Menidia beryllina	Species Lot #:	MNB00-5-9
Dilution Water:	FSW + LFW	Test Area Used:	EC-2
Primary Stock Preparation:	0.5 g into 25mL DIW	Secondary Stock Preparation:	n/a
Toxicant Used: SDS	Lot #: 961958	Stock Prepared By:	AL

TRT Conc. (Units= PPM):		CTL	2.5	5.0	10	20		
Amt. Dilution H2O Added:	(mL)	300	300	300	300	300		
Amt. Test Material Added:	(µL)	N/A	37.5	75	150	300		

Time Test Substance Added:	1610	Time Animals Added:	1635
Data By:	MB JK	Date:	5-10-00

DAILY RECORDS

Date		5-10-00				5-11-00		5-12-00				Final Results (Dead)	
Time		1620				1690		1613					
By		MB JK				SG, TR		MB					
Temperature		20.5°C				20.4°C		20.0					
Cond / Sal.		10‰				-							
Test Day													
Treatment		A	OB	DO	pH	A	OB	A	OB	DO	pH	#	%
Control	A	10	N	7.8	8.2	10	N	10	N	7.8	7.2	0	0
	B												
2.5	A	10	N	7.9	8.2	10	N	10	N	7.4	7.2	0	0
	B												
5.0	A	10	N	7.9	8.2	10	N	10	N	7.5	7.2	0	0
	B												
10	A	10	N	7.9	8.2	10	N	10	N	7.4	7.2	0	0
	B												
20	A	10	N	7.9	8.2	9	1d	9	N	7.2	7.2	1	10
	B												
	A												
	B												
	A												
	B												
Meter Used:				YSI-2	CH-3					YSI-2			

Comments:

7-24-00

Page: _____
Form No: 124
Effective: Nov. 1999

Toxikon Corporation
Jupiter, Florida

REFERENCE TOXICITY TEST DATA SHEET

Species:	Menidia beryllina	Species Lot #:	MNB00-5-9
Dilution Water:	FSW + LFW	Test Area Used:	EC-2
Primary Stock Preparation:	0.5g to 25mL 47W	Secondary Stock Preparation:	NA
Toxicant Used:	SDS Lot #: 961958	Stock Prepared By:	MB

TRT Conc. (Units= PPM):	CTL	2.5	5.0	10	20	40	
Amt. Dilution H2O Added: (mL)	300	300	300	300	300	300	
Amt. Test Material Added: (mL)	N/A	375	75	150	300	600	

Time Test Substance Added:	1620	Time Animals Added:	1710
Data By:	SG	Date:	5-14-00

DAILY RECORDS

Date		5-14-00				5-15-00		5-16-00				Final Results (Dead)	
Time		1700				1605		1608					
By		SG				MB		MB					
Temperature		20.0 °C				20.2		20.3					
Cond/Sal.		10 ppt				—		10					
Test Day													
Treatment		A	OB	DO	pH	A	OB	A	OB	DO	pH	#	%
Control	A	10	N	8.6	7.6	10	N	10	N	8.2	7.5	0	0
	B												
2.5	A	10	N	8.6	7.7	10	N	10	N	7.7	7.5	0	0
	B												
5.0	A	10	N	8.7	7.7	10	N	10	N	7.7	7.5	0	0
	B												
10	A	10	N	8.7	7.7	10	N	10	N	7.5	7.5	0	0
	B												
20	A	10	N	8.7	7.7	7	3D LETH	3	4D	7.2	7.5	7	70
	B												
40	A	10	N	8.8	7.7	0	10D	—	—	1.5	7.3	10	100
	B												
	A												
	B												
Meter Used:				YSI-2	pH-10					YSI-2	pH-10-2		

Comments:

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 5-14-00 JK TEST NUMBER: 0005012 DURATION: 48 H
TOXICANT : SDS
SPECIES: MENIDIA BERYLLINA

RAW DATA:

Concentration (PPM)	Number Exposed	Mortalities
.00	10	0
2.50	10	0
5.00	10	0
10.00	10	0
20.00	10	7
40.00	10	10

SPEARMAN-KARBER TRIM: .00%

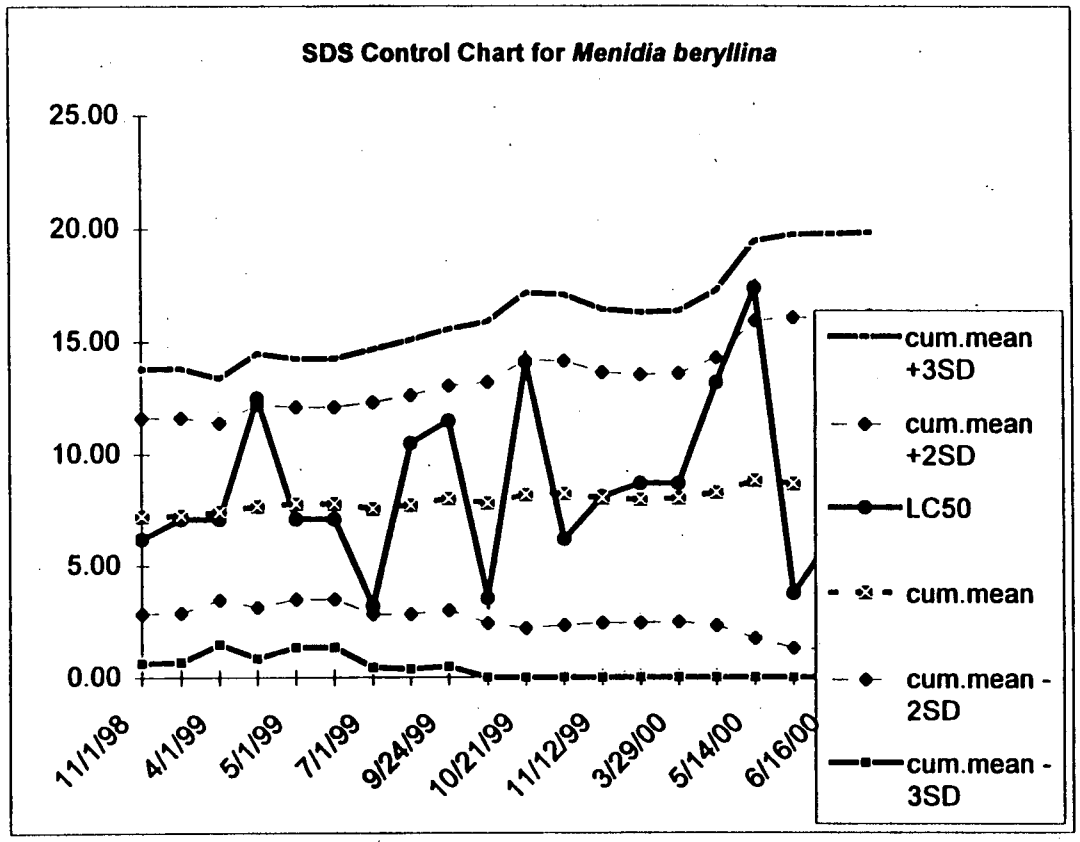
SPEARMAN-KARBER ESTIMATES: LC50: 17.41
95% LOWER CONFIDENCE: 14.24
95% UPPER CONFIDENCE: 21.28

Sodium Dodecyl Sulfate, SDS Control Chart for *Menidia beryllina*

Date	SDS ppm Growth LC50	Cum. mean of 20 most recent LC50's	Stand. Dev. of 20 most recent LC50's	Cum. mean + 2SD	Cum. mean - 2SD	Cum. mean + 3SD	Cum. mean - 3SD	diff b/t cum. mean LC50 & LC50	% diff b/t LC50 & cum.mean	Relative % Difference (RPD)	Coefficent of Variation % C.V.
5/1/96	9.30										
7/1/96	6.70	8	1.84	11.68	4.32	13.52	2.48	1.3	16.3		22.98
7/2/96	6.70	7.57	1.5	10.57	4.56	12.07	3.06	0.87	11.5	3.39	19.84
9/1/96	3.10	6.45	2.55	11.55	1.35	14.09	0.00	3.35	51.9	22.12	39.50
11/1/96	4.40	6.04	2.39	10.82	1.26	13.21	0.00	1.64	27.2	18.06	39.57
11/2/96	6.60	6.13	2.15	10.43	1.84	12.58	0.00	-0.47	-7.6	21.91	35.07
12/2/96	3.20	5.71	2.25	10.22	1.21	12.47	0.00	2.51	44.0	21.94	39.40
2/1/97	7.60	5.95	2.19	10.33	1.57	12.52	0.00	-1.65	-27.7	27.95	36.81
2/2/97	4.40	5.78	2.11	10	1.55	12.12	0.00	13.8	23.8	26.01	36.51
2/3/97	7.10	5.91	2.04	9.98	1.84	12.02	0.00	-1.19	-20.1	27.36	34.52
2/4/97	8.10	6.11	2.04	10.19	2.03	12.23	0.00	-1.99	-32.6	29.59	33.39
3/1/97	7.10	6.19	1.97	10.13	2.26	12.09	0.29	-0.91	-14.7	28.94	31.83
6/1/97	5.20	6.12	1.9	9.92	2.31	11.82	0.41	0.92	15.0	27.70	31.05
6/2/97	8.00	6.25	1.9	10.04	2.46	11.94	0.56	-1.75	-28.0	28.26	30.40
9/1/97	6.20	6.25	1.83	9.9	2.59	11.73	0.76	0.05	0.7	27.17	29.28
10/1/97	5.20	6.18	1.78	9.75	2.61	11.54	0.83	0.98	15.9	26.36	28.80
12/1/97	12.30	6.54	2.28	11.1	1.99	13.37	0.00	-5.76	-88.0	34.49	34.86
12/2/97	9.80	6.72	2.34	11.4	2.04	13.74	0.00	-3.08	-45.8	35.14	34.82
2/1/98	7.60	6.77	2.28	11.33	2.2	13.62	0.00	-0.83	-12.3	34.15	33.68
7/1/98	7.60	6.81	2.23	11.27	2.35	13.5	0.12	-0.79	-11.6	33.23	32.75
7/2/98	6.20	6.66	2.15	10.96	2.35	13.12	0.19	0.45	6.8	32.44	32.28
8/1/98	6.80	6.66	2.15	10.97	2.35	13.12	0.20	-0.14	-2.1	32.11	32.28
8/2/98	7.10	6.68	2.16	10.99	2.37	13.15	0.21	-0.42	-6.3	31.88	32.34
9/1/98	7.10	6.88	1.99	10.85	2.91	12.84	0.92	-0.22	-3.2	28.89	28.92
10/1/98	12.30	7.28	2.24	11.75	2.8	13.98	0.57	-5.03	-69.1	30.63	30.77
11/1/98	6.2	7.22	2.19	11.60	2.84	13.80	0.64	1.02	14.1	31.21	30.36
2/1/99	7.1	7.25	2.19	11.63	2.87	13.81	0.69	0.15	2.1	28.54	30.17
4/1/99	7.1	7.43	1.98	11.40	3.46	13.38	1.48	0.33	4.4	28.64	26.69
4/2/99	12.5	7.67	2.27	12.21	3.13	14.48	0.85	-4.83	-63.0	29.42	29.62
5/1/99	7.1	7.80	2.15	12.09	3.50	14.24	1.35	0.70	8.9	29.96	27.58
6/1/99	7.1	7.80	2.15	12.09	3.50	14.24	1.35	0.70	8.9	30.15	27.58
7/1/99	3.2	7.56	2.37	12.30	2.82	14.67	0.45	4.36	57.7	34.07	31.34
8/1/99	10.5	7.72	2.45	12.63	2.82	15.08	0.37	-2.78	-35.9	34.02	31.74
9/24/99	11.5	8.02	2.51	13.05	3.00	15.56	0.49	-3.48	-43.3	48.89	31.30
10/4/99	3.54	7.81	2.70	13.20	2.42	15.90	0.00	4.27	54.7	37.66	34.51
10/21/99	14.1	8.19	2.99	14.18	2.20	17.17	0.00	-5.91	-72.2	39.54	36.57
11/3/99	6.2	8.24	2.95	14.14	2.33	17.09	0.00	2.04	24.7	36.46	35.85
11/12/99	8.1	8.04	2.80	13.64	2.43	16.44	0.00	-0.06	-0.8	35.46	34.86
1/6/00	8.7	7.98	2.78	13.54	2.43	16.31	0.00	-0.72	-9.0	35.44	34.78
3/29/00	8.7	8.04	2.78	13.59	2.48	16.37	0.00	-0.66	-8.3	35.42	34.59

4/26/00	13.2	8.30	3.00	14.29	2.31	17.29	0.00	-4.90	-59.0	37.13	36.09
5/14/00	17.4	8.84	3.55	15.93	1.74	19.48	0.00	-8.56	-96.9	41.85	40.17
5/18/00	3.77	8.69	3.69	16.08	1.30	19.77	0.00	4.92	56.6	44.76	42.51
6/16/00	6.24	8.65	3.72	16.09	1.21	19.80	0.00	2.41	27.9	45.60	42.98
7/14/00	9.33	8.76	3.70	16.16	1.35	19.87	0.00	-0.57	-6.6	43.41	42.29

- note that only the 20 most recent test values are being used to calculate the cummulative mean, standard deviation, relative percent difference, and coefficent of variation from this point forward. The RPD and CV are not used in the graph but are useful pieces of information.


SDS Control Chart for *Menidia beryllina*
25.00
20.00
15.00
10.00
5.00
0.00
11/1/98
4/1/99
5/1/99
7/1/99
9/24/99
10/21/99
11/12/99
3/29/00
5/14/00
6/16/00
cum.mean +3SD
cum.mean +2SD
LC50
cum.mean
cum.mean - 2SD
cum.mean - 3SD

xikon Corporation
piter, Florida

Form No: 006
Effective: Sept. 1999
Page: 47

ANIMAL RECEIPT LOG

DATE	SPECIES	TAX. ID VERIFIED BY	# REC'D	SUPPLIER & LOCATION	TOXIKON LOT #	HOLDING LOG USED	PAGE	DATA BY	Shipping Docs on pg:
6-00	Oncorhynchus mykiss	MB	300	Thomas Fish Comp. Anderson CA	OM00-1-6	Freshwater Fish	OM1-6-1	MB	685
3-00	Cyprinodon variegatus	MB	350+	ARO Hampton NH	CV00-3-3	Saltwater Fish	CV3-3-1	MB	~~686~~ 686 ①
7-00	Ceriodaphnia dubia	MB	Gravid adults	ARO Hampton NH	CD00-3-7	Cerio Log	~~CV~~ CD 00-3-1 ①	MB	687
10-00	Cyprinodon variegatus	MB	350+	ARO Hampton NH	CV00-3-10	Saltwater Fish	CV3-10-1	MB	688
15-00	Oncorhynchus mykiss	MB	200	Thomas Fish Comp Anderson CA	OM00-3-15	Freshwater Fish	OM3-15-1	MB	689
28-00	Menidia beryllina	MB	120+	Aquatic Ind St. Augustine FL	MNB00-3-28	Saltwater Fish	MNB3-28-1	MB	690
6-00	Daphnia magna	MB	Gravid adults	ARO Hampton NH	DM00-4-6	D. magna log	DM00-66	MB	691
11-00	Menidia beryllina	MB	125	CK associates Baton Rouge LA	MNB00-4-11	Saltwater Fish	MNB4-11-1	MB	692
21-00	Menidia beryllina	MB	100	Aquatic Ind St. Augustine FL	MNB00-4-21	Saltwater Fish	MNB4-21-1	MB	693
9-00	Menidia beryllina	MB	600	Aquatic Ind. St. Augustine FL	MNB00-5-9	Saltwater Fish	MNB5-9-1	MB	694
9-00	Oncorhynchus mykiss	MB	400	Thomas Fish Comp. Anderson CA	OM00-5-9	Freshwater Fish	OM5-9-1	MB	695
9-00	Lepomis macrochirus	MB	400	Northeastern Aquatics Rhinebeck NY	LM00-5-9	Freshwater Fish	LM5-9-1	MB	696
16-00	Menidia beryllina	MB	120+	Aquatic Indicators St. Augustine FL	MNB00-5-16	Saltwater Fish	MNB5-16-1	MB	697
18-00	Ceriodaphnia dubia	MB	Gravid adults	ARO Hampton NH	CD00-5-18	Ceriodaphnia Log	CD00-5-1	MB	698

①EE3-3-00 MB ②EE5-8-00 MB

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NB 5-18-00
INITIALS DATE

Toxikon Corporation
Jupiter, Florida

Page: MNB5-9-1
Form No: 044
Effective: Sept. 1999

Species: Menidia beryllina	Date Hatched / Received: 5-9-00
Lot #: MNB00-5-9	See Page 47 of Animal Receipt Log for Receipt Info.

Holding Chamber Location: Aquaculture

Records continued from page NA in this log.

Date	5-9-00	5-10-00	5-11-00	5-12-00	5-14-00		
Time	1534	1611	1624	1646	1300		
Data By	MB	MB	MB	MB	MB		
Number Alive	600+	100+	100+	100+	—		
Number Dead	①	NOB	NOB	NOB	—		
Fed? (Describe)	BS	BS	BS	BS	BS		

Daily Water Quality Measurements

Temp. (oC)	19.4	19.6	19.4	19.3	—		
Meter #	YSI-2	YSI-2	YSI-2	YSI-2	—		
Sal. (o/oo)	* 10	12	10	10	10		
Refractometer. #	Ref - 3	Ref - 3	Ref - 3	Ref - 3	Ref - 3	Ref -	Ref -
Describe Disease Treatment, if any:	—	—	—	—	—		
# Removed for Test	—	500/50	—	—	60		
Time / By	—	0700/SG 1410/TR	—	—	1300/SG		
Project Number	—	0005012 Ref Tox	—	—	Ref Tox		

Weekly Water Quality Measurements

Date: 5-10-00	DO: 7.9 (mg/L)	Meter Used: YSI-2	See Dilution Waters Log for Information on other Water Quality Parameters.
By: MB	pH: 8.0	Meter Used: CH-3	

Records for this lot are continued on page NA of this log.

NOB = None Observed SS = Salmon Starter (F)BS = (Frozen) Brine Shrimp FF = Flake Food

Comments: ① 14 animals dead upon arrival 5-9-00 MB
* Animals arrived at 13‰ salinity then acclimated to 10‰ [illegible]

MB 5-16-00

Toxil Environmental Sciences
Jupiter, Florida

Form No: 021
Effective: Apr. 1995

ANIMAL FEEDS LOG

Date	Product Name	Supplier & Location	Quantity	Toxikon Lot #	Supplier Lot #	Feed Analysis Date & Pages	Data By	Shipping Docs on Page:
* 4-8-99	Manna Pro earthworm and cricket feed	Manna Pro St. Louis MO	50 lbs	WF96-11-21	—	LO 9901330 PSS 2-4	MB	—
4-14-99	Cereal Leaves	Sigma Aldrich St. Louis MO	100g	88H1162	88H1162	LO 9906398 PSS 1-2	MB	—
5-5-99	Brine Shrimp Cysts	Aquarium Pro Glen Burnie MD	2 cans	BS99-5-5	B0317	LO 9906398 PSS 3-4	MB	—
6-3-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	24 paks	FBS99-6-3	—	LO 9906398 PSS 5-6	MB	—
6-15-99	Selenastrum Food	Cooper Environmental Bohemia NY	1 L	SEC99-6-15	—	NA	MB	—
8-3-99	C6	Coast Seafoods Quilcene WA	2 L	C699-8-3	—	LO 9908512 PSS 1-2	MB	—
10-12-99	Brine Shrimp Cysts	Aquarium Products Glen Burnie MD	2 cans	BS99-10-12	B0317	LO 0002001 PSS 1-2	MB	—
① 10-19-99	Magic Worm Bedding	Carolina Biological Burlington NC	50 lbs	MWB99-4-1	—	NA	MB	—
10-20-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	12 paks	FBS99-10-20	—	LO 0002001 PSS 3-4	MB	—
② 12-28-99	Frozen Brine Shrimp	Aquaculture Supply Trade City FL	12 paks	FBS99-10-20	—	LO 0002001 PSS 3-4	MB	—
2-10-00	Tetra Min	Walmart	400g	TM00-2-10	—	LO 0004238 PSS 1-2	MB	—
4-4-00	Frozen Brine Shrimp	Aquaculture Supply	48 paks 800g	FBS00-4-4	—	LO 0004238 PSS 3-4	MB	—
4-6-00	Brine Shrimp Cysts	Brine Shrimp Direct	2 cans	BS00-4-6	—	LO 0004238 PSS 5-6	MB	—
4-7-00	APR	Aquatic Ecosystems Apopka FL	1 can	APR00-4-7	—	LO 0004238 PSS 7-8	MB	—
5-17-00	Wheat Grass Powder	Pines International Lawrence KS	240g	WG00-5-17	03220		MB	—

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MB INITIALS 5-18-00 DATE

* This product was taken from the field site 4-8-99 MB ① LE 10-19-99 MB ② backorder for lot FBS99-10-20/12-28-99 MB

Toxikon **Date:** *03-May-00*

CLIENT:	TOXIKON ENVIRONMENTAL SCIENC	**Client Sample ID:**	BS 00-4-6
Lab Order:	0004238	**Collection Date:**	04/13/2000 9:00:00 AM
Project:	ANIMAL FEEDS	**Matrix:**	TISSUE
Lab ID:	0004238-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TOTAL		**SW6010B**				Analyst: A
Antimony	ND	2.0		mg/Kg-dry	1	04/21/2000
Arsenic	ND	2.0		mg/Kg-dry	1	04/21/2000
Beryllium	ND	0.20		mg/Kg-dry	1	04/21/2000
Cadmium	ND	1.0		mg/Kg-dry	1	04/21/2000
Chromium	ND	1.0		mg/Kg-dry	1	04/21/2000
Copper	ND	2.0		mg/Kg-dry	1	04/21/2000
Lead	ND	2.0		mg/Kg-dry	1	04/21/2000
Nickel	ND	8.0		mg/Kg-dry	1	04/21/2000
Selenium	ND	2.0		mg/Kg-dry	1	04/21/2000
Silver	ND	1.0		mg/Kg-dry	1	04/21/2000
Thallium	ND	2.0		mg/Kg-dry	1	04/21/2000
Zinc	ND	8.0		mg/Kg-dry	1	04/21/2000
MERCURY, TOTAL		**SW7471A**				Analyst: AS
Mercury	ND	0.080		mg/Kg-dry	1	04/20/2000

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MKS 5-18-00

INITIALS DATE

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Date: *03-May-00*

CLIENT:	TOXIKON ENVIRONMENTAL SCIENC	**Client Sample ID:**	BS 00-4-6
Lab Order:	0004238	**Collection Date:**	04/13/2000 9:00:00 AM
Project:	ANIMAL FEEDS	**Matrix:**	TISSUE
Lab ID:	0004238-03A		

Analyses	Result	Rpt Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PEST/PCB IN TISSUE		**SW8081A**				Analyst: PC
4,4'-DDD	ND	10		µg/Kg	1	04/17/2000
4,4'-DDE	ND	10		µg/Kg	1	04/17/2000
4,4'-DDT	ND	10		µg/Kg	1	04/17/2000
Aldrin	ND	10		µg/Kg	1	04/17/2000
alpha-BHC	ND	10		µg/Kg	1	04/17/2000
beta-BHC	ND	10		µg/Kg	1	04/17/2000
Chlordane	ND	50		µg/Kg	1	04/17/2000
delta-BHC	ND	10		µg/Kg	1	04/17/2000
Dieldrin	ND	10		µg/Kg	1	04/17/2000
Endosulfan I	ND	10		µg/Kg	1	04/17/2000
Endosulfan II	ND	10		µg/Kg	1	04/17/2000
Endosulfan sulfate	ND	10		µg/Kg	1	04/17/2000
Endrin	ND	10		µg/Kg	1	04/17/2000
Endrin aldehyde	ND	10		µg/Kg	1	04/17/2000
Endrin Ketone	ND	10		µg/Kg	1	04/17/2000
gamma-BHC	ND	10		µg/Kg	1	04/17/2000
Heptachlor	ND	10		µg/Kg	1	04/17/2000
Heptachlor epoxide	ND	10		µg/Kg	1	04/17/2000
Methoxychlor	ND	10		µg/Kg	1	04/17/2000
Toxaphene	ND	50		µg/Kg	1	04/17/2000
Aroclor 1016	ND	50		µg/Kg	1	04/17/2000
Aroclor 1221	ND	50		µg/Kg	1	04/17/2000
Aroclor 1248	ND	50		µg/Kg	1	04/17/2000
Aroclor 1232	ND	50		µg/Kg	1	04/17/2000
Aroclor 1242	ND	50		µg/Kg	1	04/17/2000
Aroclor 1254	ND	50		µg/Kg	1	04/17/2000
Aroclor 1260	ND	50		µg/Kg	1	04/17/2000
PETROLEUM HYDROCARBONS, T/R		**E418.1**				Analyst: P C
Petroleum Hydrocarbons, TR	1,800	40		mg/Kg-dry	1	05/02/2000

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MR 5-16-00

INITIALS DATE

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Toxikon Corporation
Jupiter, Florida

Page: FSL6
Form No: 061
Effective: Oct. 1999

SALTWATER WATER QUALITY HISTORICAL RECORD

Collection Date	Alkalinity (mg/L)	Salinity (°/oo)	Temp (°C)	pH	DO (mg/L)	Data By
1-14-00	172	21	21.3	8.4	7.6	NB
2-11-00	154	22	19.5	~~8.5~~ 7.5 ①	7.3	NB
3-17-00	146	21	19.3	8.7	7.6	NB
4-25-00	158	21	19.1	8.6	7.5	NB

Comments: ① EE 2-11-00 NB

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NB 5-8-00
INITIALS DATE

Toxikon Corporation
Jupiter, Florida

Page: L-7
Form No: 062
Effective: Oct. 1999

FRESHWATER WATER QUALITY HISTORICAL RECORD

Collection Date	Conduct. (umhos/cm)	Hardness (mg/L)	Alk. (mg/L)	pH	DO (mg/L)	Data By
1-14-00	425	58	17	7.6	8.8	MB
2-11-00	360	71	11	7.4	8.8	MB
3-17-00	361	58	16	7.7	8.1	MB
4-15-00	407	66	18	7.3	8.0	MB

Comments:

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MB
INITIALS
5-18-00
DATE

APPENDIX D

DILUTION WATER CHARACTERISTICS

LABORATORY FRESHWATER CHARACTERIZATION[a]

Parameter	Concentration[b]		Historical Range[c]
Aluminum	1.16	mg/L	ND – 1.16 mg/L
Arsenic	<0.010	mg/L	ND
Boron	0.144	mg/L	ND - 0.159 mg/L
Beryllium	0.028	mg/L	ND – 0.028 mg/L
Bromide	0.126	mg/L	ND - 30 mg/L
Cadmium	0.028	mg/L	ND – 0.028 mg/L
Calcium	24.2	mg/L	8.89 -24.6 mg/L
Chloride	78.8	mg/L	60 - 108 mg/L
Chromium (hexavalent)	<0.010	mg/L	ND
Chromium (total)	<0.01	mg/L	ND
Cobalt	0.029	mg/L	ND– 0.029 mg/L
Copper	0.064	mg/L	ND - 0.064 mg/L
Fluoride	<0.10	mg/L	ND - 0.826 mg/L
Iodide	<0.050	mg/L	ND
Iron	1.740	mg/L	ND – 1.74 mg/L
Lead	<0.005	mg/L	ND
Manganese	0.038	mg/L	ND
Magnesium	4.21	mg/L	0.789 - 9.91 mg/L
Mercury	<0.0002	mg/L	ND
Molybdenum	0.038	mg/L	ND - 0.054 mg/L
Nickel	0.035	mg/L	ND
Potassium	1.94	mg/L	1.14 - 5.50 mg/L
Selenium	<0.005	mg/L	ND
Silver	<0.005	mg/L	ND
Sodium	38.7	mg/L	27.4 - 74.0 mg/L
Tin	<0.30	mg/L	ND
Zinc	0.074	mg/L	ND - 0.074 mg/L
Ammonia (total)	0.067	mg/L	ND - 0.676 mg/L
Cyanide (total)	<0.010	mg/L	ND
Nitrates (total as N)	0.476	mg/L	ND - 1.38 mg/L
Nitrites (total as N)	0.062	mg/L	ND - 0.062 mg/L
Phosphates (total)	0.037	mg/L	ND - 0.12 mg/L
Sulfide (total)	<0.10	mg/L	ND
Sulfate (total)	26.3	mg/L	15 - 52 mg/L
TDS	208	mg/L	150 - 552 mg/L
TOC	<1.0	mg/L	ND - 6.0 mg/L
TSS	<2.0	mg/L	ND - 16 mg/L
COD	49.7	mg/L	ND - 54.6 mg/L
Total organophosphorus pesticides	<1.0	µg/L	ND
Total phenoxy herbicides	<1.12	µg/L	ND
Total organochlorine pesticides	<0.04	µg/L	ND
PCBs	<0.100	µg/L	ND

[a] The characterized freshwater is carbon-treated Jupiter, Florida, town water which is aerated following carbon treatment.
[b] Sample of freshwater collected December 13, 1999.
[c] Historical range for laboratory freshwater.

FILTERED SALTWATER CHARACTERIZATION[a]

Parameter	Concentration[b]		Historical Range[c]
Aluminum	1.11	mg/L	ND – 1.11 mg/L
Arsenic	<0.010	mg/L	ND - 0.017
Boron	2.22	mg/L	1.69 - 2.39 mg/L
Beryllium	<0.004	mg/L	ND
Bromide	30.7	mg/L	ND - 72.1 mg/L
Cadmium	<0.005	mg/L	ND
Calcium	247	mg/L	247 - 311 mg/L
Chloride	11500	mg/L	9,900 - 14,400 mg/L
Chromium (hexavalent)	<0.01	mg/L	ND
Chromium (total)	<0.01	mg/L	ND
Cobalt	<0.01	mg/L	ND - 0.058 mg/L
Copper	0.047	mg/L	ND - 0.058 mg/L
Fluoride	0.155	mg/L	0.155 -0.320 mg/L
Iodide	0.239	mg/L	ND - 0.55 mg/L
Iron	1.48	mg/L	ND – 1.48 mg/L
Lead	<0.005	mg/L	ND
Manganese	0.012	mg/L	ND - 0.069 mg/L
Magnesium	682	mg/L	558 - 830 mg/L
Mercury	0.0003	mg/L	ND
Molybdenum	<0.02	mg/L	ND - 0.211 mg/L
Nickel	<0.02	mg/L	ND - 0.12 mg/L
Potassium	219	mg/L	183 - 370 mg/L
Selenium	<0.005	mg/L	ND
Silver	<0.005	mg/L	ND
Sodium	6000	mg/L	4450 - 8400 mg/L
Tin	0.891	mg/L	ND - 40.2 mg/L
Zinc	<0.02	mg/L	ND - 0.170 mg/L
Ammonia (total)	<0.04	mg/L	ND - 0.086 mg/L
Cyanide (total)	0.02	mg/L	ND
Nitrates/Nitrites (total as N)	0.748	mg/L	ND - 0.822
Phosphates (total)	<0.050	mg/L	ND - 0.633 mg/L
Sulfide (total)	<0.1	mg/L	ND
Sulfate (total)	1850	mg/L	1540 - 1850 mg/L
TDS	19400	mg/L	10,000 - 22,500 mg/L
TOC	<1.00	mg/L	ND - 4.2 mg/L
TSS	6.0	mg/L	ND - 60 mg/L
COD	88.3	mg/L	50.2 - 985 mg/L
Total organophosphorus pesticides	<1.10	µg/L	ND
Total phenoxy herbicides	<1.2	µg/L	ND
Total organochlorine pesticides	<0.04	µg/L	ND
PCBs	<0.1	µg/L	ND

[a] The characterized saltwater is from a shallow saltwater well which is aerated, sand-filtered, carbon-treated, diluted to a salinity of approximately 20‰ with treated (activated carbon) freshwater and re-aerated.
[b] Sample of filtered saltwater collected December 13, 1999.
[c] Historical range for laboratory saltwater.

APPENDIX C
Final Analytical Report
Quanta Resources Site
Edgewater, NJ
August 2000

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

DATE: 18 July 2000

TO: R. Singhvi EPA/ERTC

FROM: D. Miller Analytical Section Leader

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-133

Attached please find the following document prepared under this work assignment:

Quanta Resources - Analytical Report

Central File WA # 0-133	(w/attachment)
M. Sprenger	Work Assignment Manager (w/attachment)
G. Molnar	Task Leader (w/attachment)
D. Killeen	DVRW Group Leader (w/o attachment)

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ANALYTICAL REPORT

Prepared by
Lockheed Martin

Quanta Resources
Edgewater, New Jersey

July, 2000

EPA Work Assignment No. 0-133
LOCKHEED-MARTIN Work Order No. R1A00133
EPA Contract No. 68-C99-223

Submitted to
M. Sprenger
EPA-ERTC

G. Mohar Task Leader	7/20/00 Date	Analysis by: REAC, GPL Laboratories
D. Miller Analytical Section Leader	7/20/00 Date	Prepared by: D. Laviska
S. Clapp Program Manager	7/20/00 Date	Reviewed by: D. Killeen

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The appendices will be furnished on request.

Introduction

REAC, in response to WA# 0-133, provided analytical support for environmental samples collected from the Quanta Resources site located in Edgewater, New Jersey as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008.

Chain of Custody	Number of Samples Analyzed	Sampling Date	Date Received	Matrix	Analysis	Laboratory
02064	9	05/02/00	05/03/00	Soil	Oil Characteristics	**
	9				VOC	REAC
02068	9	05/02/00	05/04/00	Soil	BNA, Pesticides, PCB, Metals	GPL Laboratories
05012	1	05/10/00	05/15/00	Soil	BNA, Pesticides, PCB, Metals	
	1			Water	BNA, Pesticides, PCB, Metals	

**The results of the analysis for oil characteristics are presented under separate cover.

CASE NARRATIVE

The data in this analytical report have been validated to two significant figures. Any other interpretation of the data is the responsibility of the user.

Data Package J172 - VOC Analysis

Acetone (90 μg/kg) was detected in the methanol blank of 05/04/00. The results for this compound in the associated samples A08504 and A08502 should be considered non-detected.

Acetone (2.1 μg/kg) was detected in the soil blank of 05/04/00. The results for this compound in the associated samples A08503, A08506, A08507, A08508, and A08509 should be considered non-detected.

In the initial calibration of 04/25/00, the values for percent relative standard deviation (%RSD) for vinyl chloride (63%) and 1,2,4-trichlorobenzene (30.5%) exceeded the acceptable QC limit. The results for vinyl chloride in the methanol blank of 05/04/00, the soil blank of 05/04/00, and the associated samples A08510, A08504, A08505, A08502, A08503, A08506, A08507, A08508, and A08509 should be considered estimated.

The methanol blank of 05/04/00 was injected six (6) minutes outside the twelve hour BFB time requirement for analysis. All results for this blank as well as the associated samples A08510, A08504, A08505, and A08502 should be considered estimated.

The soil blank of 05/04/00 was injected forty-two (42) minutes outside the twelve hour BFB time requirement for analysis. All results for this blank as well as the associated samples A08503, A08506, A08507, A08508, and A08509 should be considered estimated.

An initial calibration standard at the concentration 5 ppb was not used for the compound naphthalene (as allowed by the method). The MDL value for this compound has been raised accordingly.

Data Package J200 - BNA Analysis

Diethylphthalate (280 μg/kg), di-n-butylphthalate (3600 μg/kg), and bis(2-ethylhexyl)phthalate (260 μg/kg) were detected in the soil method blank of 05/16/00. The results for these three compounds should be considered non-detected for the associated samples A19070, A19071, A19072, A19073, A19074, A19075, A19076, A19077, and A19078. The results for di-n-butylphthalate and bis(2-ethylhexyl)phthalate should be considered non-detected for the associated sample Control Sediment. The remaining results for these compounds are not affected.

In the initial calibration of 05/16/00, the values for percent relative standard deviation (%RSD) for bis(2-chloroethyl)ether (18%), 2-chlorophenol (20%), 1,3-dichlorobenzene (22%), 1,2-dichlorobenzene (30%), 2-methylphenol (21%), hexachloroethane (19%), n-nitroso-di-n-propylamine (16%), bis(2-chloroethoxy)methane (18%), 1,2,4-trichlorobenzene (27%), naphthalene (29%), 4-chloroaniline (27%), 2-methylnaphthalene (28%), 2,4,5-trichlorophenol (19%), 2-chloronaphthalene (26%), acenaphthylene (30%), dimethylphthalate (23%), 2,4-dinitrophenol (28%), dibenzofuran (17%), fluorene (23%), 4-chlorophenyl-phenylether (16%), 4-nitroaniline (33%), 4,6-dinitro-2-methylphenol (17%), phenanthrene (21%), anthracene (20%), carbazole (16%), di-n-butylphthalate (19%), 3,3'-dichlorobenzidine (22%), and

the surrogates 2-fluorophenol (22%) and 2-fluorobiphenyl (30%) exceeded the acceptable QC limit. The results for naphthalene, 2-methylnaphthalene, acenaphthylene, dibenzofuran, fluorene, phenanthrene, anthracene, and carbazole should be considered estimated for the associated samples A19070, A19071, A19074, and A19075. The results for naphthalene, acenaphthylene, dibenzofuran, fluorene, phenanthrene, and anthracene should be considered estimated for the associated sample A19072. The results for naphthalene, acenaphthylene, dibenzofuran, fluorene, phenanthrene, anthracene, and carbazole should be considered estimated for the associated sample A19073. The results for acenaphthylene, phenanthrene, and anthracene should be considered estimated for the associated sample A19076. The results for naphthalene, phenanthrene, and anthracene should be considered estimated for the associated sample A19077. The results for phenanthrene and anthracene should be considered estimated for the associated sample A19078.

In the continuing calibration of 05/22/00 (10:42 am), the values for percent difference (%D) for bis(2-chloroethyl)ether (22%), 4-chloroaniline (38%), hexachlorocyclopentadiene (40%), 2,4-dichlorophenol (42%), 4,6-dinitro-2-methylphenol (31%), and di-n-octylphthalate (26%) exceeded the acceptable QC limit. None of these compounds was detected in the associated samples; the data are not affected.

In the continuing calibration of 05/22/00 (10:14 pm), the values for percent difference (%D) for 2,2'-oxybis(1-chloropropane) (52%), 2-methylphenol (25%), n-nitroso-di-n-propylamine (22%), nitrobenzene (21%), 4-chloroaniline (37%), indeno(1,2,3-c,d)pyrene (29%), dibenz(a,h)anthracene (26%), and benzo(g,h,i)perylene (47%) exceeded the acceptable QC limit. The results for 2,2'-oxybis(1-chloropropane) in the associated samples A19072, A19073, A19075, A19076, A19077, A19078, A19070, A19071, and Control Sediment should be considered estimated. The results for indeno(1,2,3-c,d)pyrene in the associated samples A19072, A19073, A19075, A19076, A19070, and A19071 should be considered estimated. The results for dibenz(a,h)anthracene in the associated samples A19072, A19070, and A19071 should be considered estimated. The results for benzo(g,h,i)perylene in the associated samples A19072, A19073, A19075, A19076, A19070, and A19071 should be considered estimated.

In the continuing calibration of 05/23/00 (12:44 pm), the values for percent difference (%D) for 2,2'-oxybis(1-chloropropane) (38%), hexachlorocyclopentadiene (26%), 4-nitroaniline (37%), fluoranthene (22%), pyrene (30%), butylbenzylphthalate (25%), di-n-octylphthalate (21%), benzo(g,h,i)perylene (22%), and the surrogate terphenyl-d14 (27%) exceeded the acceptable QC limit. The results for fluoranthene, pyrene, and benzo(g,h,i)perylene in the associated sample A19074 should be considered estimated. The result for fluoranthene in the associated sample A19070 should be considered estimated. The results for fluoranthene and pyrene in the associated sample A19071 should be considered estimated.

The area for the internal standard d12-perylene was outside the acceptable QC limits for the five-fold (5x) dilution of the sample A19070. No compounds were quantified by this internal standard; the data are not affected.

Data Package J202 - Pesticides Analysis

A dual column method was used during the analysis for pesticides, and the higher of the two results has been reported in each case except for the result for endosulfan sulfate in the sample A19076. It is suspected that matrix interference contributes to this result.

In the initial calibration of 05/21/00 on the primary column, the values for percent relative standard deviation (%RSD) for alpha-BHC (25%), gamma-BHC (21%), and delta-BHC (29%) exceeded the acceptable QC limit. None of these compounds was detected in the associated samples; the data are not affected.

In the continuing calibration of 05/22/00 (1:19 am) on the primary column, the values for percent difference (%D) for delta-BHC (34%) and 4,4'-DDT (23%) exceeded the acceptable QC limit. In this same continuing calibration on the secondary column, the values for percent difference (%D) for delta-BHC (26%) and 4,4'-DDT (16%) exceeded the acceptable QC limit. The results for 4,4'-DDT in the associated samples A19070, A19071, A19072, and A19075 should

be considered estimated.

In the continuing calibration of 05/22/00 (5:02 am) on the primary column, the values for percent difference (%D) for delta-BHC (37%), 4,4'-DDD (24%), endosulfan sulfate (17%), and endrin ketone (17%) exceeded the acceptable QC limit. In this same continuing calibration on the secondary column, the values for percent difference (%D) for delta-BHC (29%) and 4,4'-DDD (18%) exceeded the acceptable QC limit. In cases where the compounds were detected in the associated samples, the results were reported from the column on which the value for percent difference was acceptable; the data are not affected.

In the continuing calibration of 05/23/00 (1:38 am) on the primary column, the values for percent difference (%D) for delta-BHC (17%), 4,4'-DDT (17%), and the surrogate decachlorobiphenyl (46%) exceeded the acceptable QC limit. In this same continuing calibration on the secondary column, the value for percent difference (%D) for delta-BHC (16%) and the surrogate decachlorobiphenyl (51%) exceeded the acceptable QC limit. None of these compounds was detected in the associated samples; the data are not affected.

The percent recovery of one surrogate was outside the acceptable QC limits for the sample A19072; the data are not affected.

The recoveries of the matrix spike (143%) for beta-BHC, the matrix spike (120%) for delta-BHC, and the matrix spike (38%) and matrix spike duplicate (18%) for gamma-chlordane the sample A19072 were outside the acceptable QC limits. The data are not affected.

Data Package J203 - PCB Analysis

In the continuing calibration of 05/22/00 on the primary column, the value for percent difference (%D) for the surrogate decachlorobiphenyl (18%) exceeded the acceptable QC limit. In the same continuing calibration on the secondary column, the value for percent difference (%D) for the surrogate decachlorobiphenyl (23%) exceeded the acceptable QC limit. The data are not affected.

The percent recovery of one surrogate was outside the acceptable QC limits for the samples A19070 and A19071 and the QC samples A19071MS and A19071MSD; the data are not affected.

Data Package J201 - Metals Analysis

Aluminum (8.18 mg/kg), barium (0.135 mg/kg), beryllium (0.037 mg/kg), calcium (21.2 mg/kg), chromium (0.088 mg/kg), iron (3.48 mg/kg), magnesium (2.80 mg/kg), manganese (0.165 mg/kg), potassium (5.53 mg/kg), and sodium (27.2 mg/kg) were detected in the soil method blank of 05/16/00. All results for these metals in the associated samples were greater than five times the respective concentrations found in the method blank; the data are not affected. In addition, the absolute value of nickel (0.333 mg/kg) detected in the method blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Beryllium (0.1 μg/L), iron (26.0 μg/L), and potassium (19.3 μg/L) were detected in the initial calibration blank of 05/16/00 (12:28).

Beryllium (0.2 μg/L), iron (23.4 μg/L), magnesium (13.1 μg/L), and potassium (20.1 μg/L) were detected in the continuing calibration blank of 05/16/00 (13:16).

Beryllium (0.2 μg/L) and iron (21.6 μg/L) were detected in the continuing calibration blank of 05/16/00 (14:30). In

addition, the absolute value of potassium (24.1 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Aluminum (55.7 μg/L), beryllium (0.3 μg/L), iron (27.5 μg/L), and potassium (21.4 μg/L) were detected in the continuing calibration blank of 05/16/00 (15:51). In addition, the absolute value of magnesium (19.4 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Beryllium (0.4 μg/L), iron (18.0 μg/L), and potassium (23.0 μg/L) were detected in the continuing calibration blank of 05/16/00 (17:05).

Beryllium (0.4 μg/L), iron (24.0 μg/L), and potassium (22.5 μg/L) were detected in the continuing calibration blank of 05/16/00 (18:23). All results for these metals in the associated samples A19070 and A19171 were greater than five times the respective concentrations found in the continuing calibration blank; the data are not affected. In addition, the absolute value of magnesium (14.2 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Beryllium (0.4 μg/L), iron (27.5 μg/L), manganese (0.2 μg/L), and potassium (23.2 μg/L) were detected in the continuing calibration blank of 05/16/00 (19:39). All results for these metals in the associated samples A19072, A19073, A19074, A19075, A19076, A19077, and A19078 were greater than five times the respective concentrations found in the continuing calibration blank; the data are not affected.

Calcium (24.5 mg/kg), copper (0.104 mg/kg), magnesium (3.39 mg/kg), manganese (0.115 mg/kg), potassium (5.42 mg/kg), sodium (93.5 mg/kg), and zinc (2.98 mg/kg) were detected in the soil method blank of 05/18/00. All results for these metals in the associated sample (CONTROL SEDIMENT) were greater than five times the respective concentrations found in the method blank; the data are not affected. In addition, the absolute value of nickel (0.300 mg/kg) detected in the method blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Magnesium (7.0 μg/L) and potassium (21.1 μg/L) were detected in the initial calibration blank of 05/18/00 (16:40).

Potassium (18.9 μg/L) was detected in the continuing calibration blank of 05/18/00 (17:28). In addition, the absolute values of magnesium (13.4 μg/L) and manganese (0.5 μg/L) detected in the continuing calibration blank were greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Iron (21.1 μg/L) and potassium (14.6 μg/L) were detected in the continuing calibration blank of 05/18/00 (18:48).

Aluminum (55.5 μg/L), iron (19.0 μg/L), and potassium (22.3 μg/L) were detected in the continuing calibration blank of 05/18/00 (20:12). In addition, the absolute value of magnesium (37.2 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Potassium (19.9 μg/L) was detected in the continuing calibration blank of 05/18/00 (21:26). In addition, the absolute value of manganese (0.6 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Iron (20.9 μg/L) and potassium (21.8 μg/L) were detected in the continuing calibration blank of 05/18/00 (22:47). In addition, the absolute values of magnesium (41.1 μg/L) and manganese (0.6 μg/L) detected in the continuing calibration blank were greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Potassium (20.3 μg/L) was detected in the continuing calibration blank of 05/19/00 (00:01). The result for potassium in

the associated sample (CONTROL SEDIMENT) was greater than five times the concentration found in the continuing calibration blank; the data are not affected. In addition, the absolute value of manganese (0.5 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Calcium (123 μg/L), potassium (42.6 μg/L), sodium (201 μg/L), and zinc (22.0 μg/L) were detected in the water method blank of 05/18/00. The results for calcium, potassium, and sodium in the associated sample (CONTROL H_2O) were greater than five times the respective concentrations found in the method blank; the data for these metals are not affected. The result for zinc in the associated sample (CONTROL H_2O) was less than five times the concentration found in the initial calibration blank and should be considered non-detected.

Aluminum (26.7 μg/L) was detected in the initial calibration blank of 05/18/00 (16:40). In addition, the absolute value of potassium (21.1 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Aluminum (33.1 μg/L) was detected in the continuing calibration blank of 05/18/00 (17:28). In addition, the absolute value of potassium (18.9 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Aluminum (24.6 μg/L), iron (21.1 μg/L), and potassium (14.6 μg/L) were detected in the continuing calibration blank of 05/18/00 (18:48). In addition, the absolute value of sodium (496 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Iron (19.0 μg/L) and magnesium (37.2 μg/L) were detected in the continuing calibration blank of 05/18/00 (20:12). In addition, the absolute values of aluminum (55.5 μg/L) and potassium (22.3 μg/L) detected in the continuing calibration blank were greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

The absolute value of potassium (19.9 μg/L) detected in the continuing calibration blank of 05/18/00 (21:26) was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

Aluminum (29.6 μg/L), iron (20.9 μg/L), and magnesium (41.1 μg/L) were detected in the continuing calibration blank of 05/18/00 (22:47). In addition, the absolute value of potassium (21.8 μg/L) detected in the continuing calibration blank was greater than two times the MDL value. According to the professional judgement of the data validator, the data are not affected.

The absolute value of potassium (20.3 μg/L) detected in the continuing calibration blank of 05/19/00 (00:01) was greater than two times the MDL value. The result for potassium in the associated sample (CONTROL H_2O) was greater than five times the concentration found in the continuing calibration blank. According to the professional judgement of the data validator, the data are not affected.

The recoveries of the matrix spike for antimony (31%), selenium (57%), and lead (141%) in the sample A19078 were outside the acceptable QC limits. The results for antimony, selenium, and lead in the associated samples A19070, A19071, A19072, A19073, A19074, A19075, A19076, A19077, and A19078 should be considered estimated.

Summary of Abbreviations

AA	Atomic Absorption
B	The analyte was found in the blank
BFB	Bromofluorobenzene
C	Centigrade
cont.	Continued
D	(Surrogate Table) this value is from a diluted sample and was not calculated
	(Result Table) this result was obtained from a diluted sample
Dioxin	Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans and/or PCDD and PCDF
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
ICAP	Inductively Coupled Argon Plasma
ISTD	Internal Standard
J	The value is below the method detection limit and is estimated
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDL	Method Detection Limit
MI	Matrix Interference
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	either Not Applicable or Not Available
NC	Not Calculated
NR	Not Requested
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
PPB	Parts per billion
PPBV	Parts per billion by volume
PPMV	Parts per million by volume
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SIM	Selected Ion Monitoring
TCLP	Toxic Characteristics Leaching Procedure
U	Denotes not detected
W	Weathered analyte; the results should be regarded as estimated

m^3	cubic meter	kg	kilogram	μg	microgram
L	liter	g	gram	pg	picogram
mL	milliliter	mg	milligram	ng	nanogram
μL	microliter				

*	denotes a value that exceeds the acceptable QC limit
	Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 2/15/00

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Analytical Procedure for VOC in Soil

Analytical Procedure

A modified 524.2 method for the analysis of Volatile Organic Compounds in soil was used. Samples (5 g.) were purged, trapped, and desorbed to a GC/MS system. Prior to purging, the samples were spiked with a three component surrogate mixture consisting of toluene-d_8, 4-bromofluorobenzene and 1,2-dichloroethane-d_4, and a three component internal standard mixture consisting of bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d_5.

The purge and trap unit consisted of: A Tekmar concentrator (3000 Series) equipped with an Archon autosampler (Dynatech Corp.) and a trap consisting of a VOCARB 3000 (Supelco), which itself contained of three adsorbent beds: Carbopack B (graphitized carbon 60/80 mesh), Carboxen-1000 (60/80 mesh), and Carboxen-1001 (60/80 mesh).

The purge and trap instrument conditions were:

Purge	10 min at 50 °C
Dry Purge	2 min at 50 °C
Desorb Preheat	230 °C
Desorb	4 min at 230 °C
Purge Flow Rate	40 mL/min
Bake	10 min at 250 °C

A Hewlett Packard 5973 GC/MSD equipped with an HP CHEM Station data system was used to analyze the data.

The instrument conditions were:

Column:	30 meter x 0.25mm ID, RTx-Volatiles (Restek Corp.) column with 3.0μm thickness.
Temperature:	4 min at 40 °C 9 °C/min to 165 °C, hold for 2 min. 12 °C/min to 220 °C, hold for 7 min.
Flow Rate	Helium at 1.0 mL/min.
GC/MS Interface	Glass jet separator with 30 mL/min helium make-up gas at 250 °C.
Mass Spectrometer:	Electron Impact Ionization at a nominal electron energy of 70 electron volts, scanning from 35-300 amu at one scan/sec.
Computer:	Preprogrammed to plot Extracted Ion Current Profile (EICP):Capable of integrating ions and plotting abundances vs time or scan number. A library search (NBS-Wiley) for tentatively identified compounds was performed on samples.

The GC/MS system was calibrated using 6 VOC standards at 5, 20, 50, 100, 150, and 200 μg/L. Exceptions were acetone and naphthalene which were calibrated using 5 VOC standards at 5, 20, 50, 100, 150, and 200 μg/L. Before analysis each day, the system was tuned with 50 ng BFB and passed a continuing calibration check when analyzing a 50 μg/L standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The results are listed in Table 1.1 and the Tentatively Identified Compounds are listed in Table 1.2.

The concentrations of the analytes for samples analyzed by the low level method of 5.0 g soil in 5.0 mL of water were calculated using the following equation:

$$C_u = \frac{A_x \times I_{is}}{A_{is} \times RF \text{ (or } RF_{ave}) \times D}$$

where

C_u	= concentration of the target analyte (μg/kg) on a dry weight basis
A_x	= Area of the target analyte
I_{is}	= concentration of specific internal standard in the volume purged (μg/L)
A_{is}	= Area of the specific internal standard
RF	= Response Factor
RF_{ave}	= average Response Factor
D	= decimal percent solids

The concentrations of the analytes for samples analyzed by the medium level method of 5.0 g soil with 5.0 mL of methanol and diluting an aliquot with 5.0 mL prior to analysis, were calculated using the following equation:

$$C_u = \frac{A_x \times I_{is} \times 5.0 \text{ (Nominal Method Mass)}}{A_{is} \times RF \text{ (or } RF_{ave}) \times W_s \times D}$$

where

C_u	= concentration of the target analyte (μg/kg) on a dry weight basis
A_x	= Area of the target analyte
I_{is}	= concentration of specific internal standard in the volume purged (μg/L)
A_{is}	= Area of the specific internal standard
RF	= Response Factor
RF_{ave}	= average Response Factor
W_s	= mass of sample (g) purged
D	= decimal percent solids

The average Response Factor is used when a sample is associated with an initial calibration curve. The Response Factor is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The response factor (RF) for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \times I_{is}}{A_{is} \times I_c}$$

where

RF	= Response factor for a specific analyte
A_c	= Area of the analyte in the standard
I_{is}	= Concentration of the specific internal standard
A_{is}	= Area of the specific internal standard
I_c	= Concentration of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + \ldots + RF_n}{n}$$

where

n = number of Samples

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Analytical Procedure for BNA in Water

The subcontracted laboratory determined the concentrations of BNA in water samples by following the SW-846 series extraction method 3520C and analysis method 8270C. The results of the analyses are listed in Table 1.3.

Analytical Procedure for BNA in Soil

The subcontracted laboratory determined the concentrations of BNA in soil samples by following the SW-846 series extraction method 3540C and analysis method 8270C. The results of the analyses are listed in Table 1.4.

Analytical Procedure for Pesticides in Water

The subcontracted laboratory determined the concentrations of pesticides in water samples by following the SW-846 series extraction method 3540C and modified analysis method 8081. The results of the analyses are listed in Table 1.5.

Analytical Procedure for Pesticides in Soil

The subcontracted laboratory determined the concentrations of pesticides in soil samples by following the SW-846 series extraction method 3540C and modified analysis method 8081. The results of the analyses are listed in Table 1.6.

Analytical Procedure for PCB in Water

The subcontracted laboratory determined the concentrations of PCB in water samples by following the SW-846 series extraction method 3540C and analysis method 8082. The results of the analyses are listed in Table 1.7.

Analytical Procedure for PCB in Soil

The subcontracted laboratory determined the concentrations of PCB in soil samples by following the SW-846 series extraction method 3540C and analysis method 8082. The results of the analyses are listed in Table 1.8.

Analytical Procedure for Metals in Water

The subcontracted laboratory determined the concentrations of metals in water samples by following the SW-846-6010B and series 7000 methods. The results of the analyses are listed in Table 1.9.

Analytical Procedure for Metals in Soil

The subcontracted laboratory determined the concentrations of metals in soil samples by following the SW-846-6010B and series 7000 methods. The results of the analyses are listed in Table 1.10.

Table 1.1 Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Methanol blank		A08510		A08504		A08505		A08502	
Location			LOC 1		LOC 3		LOC 4		LOC 1 DUP	
Collected			05/02/00		05/02/00		05/02/00		05/02/00	
Analyzed	05/04/00		05/03/00		05/03/00		05/03/00		05/03/00	
Injected	12:01 am		3:56 pm		6:30 pm		7:07 pm		10:11 pm	
File	AV1795.D		AV1782.D		AV1786.D		AV1787.D		AV1792.D	
Dil. Fact.	1		250		10		10		250	
Unit	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
% Solid	100		38.4		38.8		37.8		38.1	
Compound	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*
Dichlorodifluoromethane	U	50	U	660	U	26	U	26	U	660
Chloromethane	U	50	U	660	U	26	U	26	U	660
Vinyl Chloride	U	50	U	660	U	26	U	26	U	660
Bromomethane	U	100	U	1300	U	51	U	53	U	1300
Chloroethane	U	50	U	660	U	26	U	26	U	660
Trichlorofluoromethane	U	50	U	660	U	26	U	26	U	660
Acetone	90 J	400	U	5300	180 JB	210	U	210	2400 JB	5300
1,1-Dichloroethene	U	50	U	660	U	26	U	26	U	660
Methylene Chloride	U	50	U	660	U	26	U	26	U	660
Carbon Disulfide	U	50	U	660	U	26	U	26	U	660
Methyl-t-butyl Ether	U	50	U	660	U	26	U	26	U	660
trans-1,2-Dichloroethene	U	50	U	660	U	26	U	26	U	660
1,1-Dichloroethane	U	50	U	660	U	26	U	26	U	660
2-Butanone	U	200	U	2600	97 J	100	110	110	U	2600
2,2-Dichloropropane	U	50	U	660	U	26	U	26	U	660
cis-1,2-Dichloroethene	U	50	U	660	U	26	U	26	U	660
Chloroform	U	50	U	660	U	26	U	26	U	660
1,1-Dichloropropene	U	50	U	660	U	26	U	26	U	660
1,2-Dichloroethane	U	50	U	660	U	26	U	26	U	660
1,1,1-Trichloroethane	U	50	U	660	U	26	U	26	U	660
Carbon Tetrachloride	U	50	U	660	U	26	U	26	U	660
Benzene	U	50	U	660	U	26	U	26	U	660
Trichloroethene	U	50	U	660	U	26	U	26	U	660
1,2-Dichloropropane	U	50	U	660	U	26	U	26	U	660
Dibromomethane	U	50	U	660	U	26	U	26	U	660
Bromodichloromethane	U	50	U	660	U	26	U	26	U	660
cis-1,3-Dichloropropene	U	50	U	660	U	26	U	26	U	660
trans-1,3-Dichloropropene	U	50	U	660	U	26	U	26	U	660
1,1,2-Trichloroethane	U	50	U	660	U	26	U	26	U	660
1,3-Dichloropropane	U	50	U	660	U	26	U	26	U	660
Dibromochloromethane	U	50	U	660	U	26	U	26	U	660
1,2-Dibromoethane	U	50	U	660	U	26	U	26	U	660
Bromoform	U	50	U	660	U	26	U	26	U	660

Table 1.1 (cont.) Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Methanol blank	A08510	A08504	A08505	A08502
Location		LOC 1	LOC 3	LOC 4	LOC 1 DUP
Collected		05/02/00	05/02/00	05/02/00	05/02/00
Analyzed	05/04/00	05/03/00	05/03/00	05/03/00	05/03/00
Injected	12:01 am	3:56 pm	6:30 pm	7:07 pm	10:11 pm
File	AV1795.D	AV1782.D	AV1786.D	AV1787.D	AV1792.D
Dil. Fact.	1	250	10	10	250
Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
% Solid	100	38.4	38.8	37.8	38.1

Compound	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*
4-Methyl-2-Pentanone	U	100	U	1300	U	51	U	53	U	1300
Toluene	U	50	U	660	U	26	U	26	U	660
2-Hexanone	U	100	U	1300	U	51	U	53	U	1300
Tetrachloroethene	U	50	U	660	U	26	U	26	U	660
Chlorobenzene	U	50	U	660	U	26	U	26	U	660
1,1,1,2-Tetrachloroethane	U	50	U	660	U	26	U	26	U	660
Ethylbenzene	U	50	U	660	U	26	U	26	U	660
p&m-Xylene	U	50	U	660	U	26	U	26	U	660
o-Xylene	U	50	U	660	U	26	U	26	U	660
Styrene	U	50	U	660	U	26	U	26	U	660
Isopropylbenzene	U	50	U	660	U	26	U	26	U	660
1,1,2,2-Tetrachloroethane	U	50	U	660	U	26	U	26	U	660
1,2,3-Trichloropropane	U	50	U	660	U	26	U	26	U	660
Bromobenzene	U	50	U	660	U	26	U	26	U	660
n-Propylbenzene	U	50	U	660	U	26	U	26	U	660
2-Chlorotoluene	U	50	U	660	U	26	U	26	U	66
4-Chlorotoluene	U	50	U	660	U	26	U	26	U	66
1,3,5-Trimethylbenzene	U	50	U	660	U	26	U	26	U	660
tert-Butylbenzene	U	50	U	660	U	26	U	26	U	660
1,2,4-Trimethylbenzene	U	50	U	660	U	26	U	26	U	660
sec-Butylbenzene	U	50	U	660	U	26	U	26	U	660
1,3-Dichlorobenzene	U	50	U	660	U	26	U	26	U	660
p-Isopropyltoluene	U	50	U	660	U	26	U	26	U	660
1,4-Dichlorobenzene	U	50	U	660	U	26	U	26	U	660
1,2-Dichlorobenzene	U	50	U	660	U	26	U	26	U	660
n-Butylbenzene	U	50	U	660	U	26	U	26	U	660
1,2-Dibromo-3-chloropropane	U	50	U	660	U	26	U	26	U	660
1,2,4-Trichlorobenzene	U	50	U	660	U	26	U	26	U	660
Hexachlorobutadiene	U	50	U	660	U	26	U	26	U	660
Naphthalene	U	200	30000	2600	1800	100	2700	110	31000	2600
1,2,3-Trichlorobenzene	U	50	U	660	U	26	U	26	U	660

Table 1.1 (cont.) Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Soil blank	A08503	A08506	A08507	A08508
Location		LOC 2	LOC 2 SUB	LOC 4 SUB	LOC 5
Collected		05/02/00	05/02/00	05/02/00	05/02/00
Analyzed	05/04/00	05/03/00	05/03/00	05/03/00	05/03/00
Injected	12:37 am	5:53 pm	7:43 pm	8:20 pm	8:57 pm
File	AV1796.D	AV1785.D	AV1788.D	AV1789.D	AV1790.D
Dil. Fact.	1	1	1	1	1
Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
% Solid	100	38.0	40.3	43.6	40.1

Compound	*Conc.*		*MDL*	*Conc.*		*MDL*	*Conc.*		*MDL*	*Conc.*		*MDL*	*Conc.*		*MDL*
Dichlorodifluoromethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Chloromethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Vinyl Chloride	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Bromomethane	U		2.0	U		5.3	U		5.0	U		4.5	U		5.0
Chloroethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Trichlorofluoromethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Acetone	2.1	J	8.0	47	B	21	39	B	20	27	B	18	36	B	20
1.1-Dichloroethene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Methylene Chloride	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Carbon Disulfide	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Methyl-t-butyl Ether	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
trans-1.2-Dichloroethene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.1-Dichloroethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
2-Butanone	U		4.0	8.3	J	11	10		10	7.9	J	9.1	9.1	J	10
2.2-Dichloropropane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
cis-1.2-Dichloroethene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Chloroform	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.1-Dichloropropene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.2-Dichloroethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.1.1-Trichloroethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Carbon Tetrachloride	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Benzene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Trichloroethene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.2-Dichloropropane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Dibromomethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Bromodichloromethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
cis-1.3-Dichloropropene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
trans-1.3-Dichloropropene	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.1.2-Trichloroethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.3-Dichloropropane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Dibromochloromethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
1.2-Dibromoethane	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5
Bromoform	U		1.0	U		2.6	U		2.5	U		2.3	U		2.5

Table 1.1 (cont.) Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Soil blank	A08503	A08506	A08507	A08508
Location		LOC 2	LOC 2 SUB	LOC 4 SUB	LOC 5
Collected		05/02/00	05/02/00	05/02/00	05/02/00
Analyzed	05/04/00	05/03/00	05/03/00	05/03/00	05/03/00
Injected	12:37 am	5:53 pm	7:43 pm	8:20 pm	8:57 pm
File	AV1796.D	AV1785.D	AV1788.D	AV1789.D	AV1790.D
Dil. Fact.	1	1	1	1	1
Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
% Solid	100	38.0	40.3	43.6	40.1

Compound	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*	*Conc.*	*MDL*
4-Methyl-2-Pentanone	U	2.0	U	5.3	U	5.0	U	4.5	U	5.0
Toluene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
2-Hexanone	U	2.0	U	5.3	U	5.0	U	4.5	U	5.0
Tetrachloroethene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Chlorobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.1.1.2-Tetrachloroethane	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Ethylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
p&m-Xylene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
o-Xylene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Styrene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Isopropylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.1.2.2-Tetrachloroethane	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.2.3-Trichloropropane	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Bromobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
n-Propylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
2-Chlorotoluene	U	1.0	U	2.6	U	2.5	U	2.3	U	[illegible]
4-Chlorotoluene	U	1.0	U	2.6	U	2.5	U	2.3	U	[illegible]
1.3.5-Trimethylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
tert-Butylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.2.4-Trimethylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
sec-Butylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.3-Dichlorobenzene	U	1.0	74	2.6	U	2.5	U	2.3	U	2.5
p-Isopropyltoluene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.4-Dichlorobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.2-Dichlorobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
n-Butylbenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.2-Dibromo-3-chloropropane	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
1.2.4-Trichlorobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Hexachlorobutadiene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5
Naphthalene	U	4.0	6.3 J	11	3.7 J	10	U	9.1	U	10
1.2.3-Trichlorobenzene	U	1.0	U	2.6	U	2.5	U	2.3	U	2.5

Table 1.1 (cont.) Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Soil blank	A08509
Location		LOC 6
Collected		05/02/00
Analyzed	05/04/00	05/03/00
Injected	12:37 am	9:34 pm
File	AV1796.D	AV1791.D
Dil. Fact.	1	1
Unit	µg/kg	µg/kg
% Solid	100	35.9

Compound	*Conc.*		*MDL*	*Conc.*		*MDL*
Dichlorodifluoromethane	U		1.0	U		2.8
Chloromethane	U		1.0	U		2.8
Vinyl Chloride	U		1.0	U		2.8
Bromomethane	U		2.0	U		5.6
Chloroethane	U		1.0	U		2.8
Trichlorofluoromethane	U		1.0	U		2.8
Acetone	2.1	J	8.0	29	B	22
1,1-Dichloroethene	U		1.0	U		2.8
Methylene Chloride	U		1.0	U		2.8
Carbon Disulfide	U		1.0	U		2.8
Methyl-t-butyl Ether	U		1.0	U		2.8
trans-1,2-Dichloroethene	U		1.0	U		2.8
1,1-Dichloroethane	U		1.0	U		2.8
2-Butanone	U		4.0	6.8	J	11
2,2-Dichloropropane	U		1.0	U		2.8
cis-1,2-Dichloroethene	U		1.0	U		2.8
Chloroform	U		1.0	U		2.8
1,1-Dichloropropene	U		1.0	U		2.8
1,2-Dichloroethane	U		1.0	U		2.8
1,1,1-Trichloroethane	U		1.0	U		2.8
Carbon Tetrachloride	U		1.0	U		2.8
Benzene	U		1.0	U		2.8
Trichloroethene	U		1.0	U		2.8
1,2-Dichloropropane	U		1.0	U		2.8
Dibromomethane	U		1.0	U		2.8
Bromodichloromethane	U		1.0	U		2.8
cis-1,3-Dichloropropene	U		1.0	U		2.8
trans-1,3-Dichloropropene	U		1.0	U		2.8
1,1,2-Trichloroethane	U		1.0	U		2.8
1,3-Dichloropropane	U		1.0	U		2.8
Dibromochloromethane	U		1.0	U		2.8
1,2-Dibromoethane	U		1.0	U		2.8
Bromoform	U		1.0	U		2.8

Table 1.1 (cont.) Results of the Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Soil blank	A08509
Location		LOC 6
Collected		05/02/00
Analyzed	05/04/00	05/03/00
Injected	12:37 am	9:34 pm
File	AV1796.D	AV1791.D
Dil. Fact.	1	1
Unit	µg/kg	µg/kg
% Solid	100	35.9

Compound	*Conc.*	*MDL*	*Conc.*	*MDL*
4-Methyl-2-Pentanone	U	2.0	U	5.6
Toluene	U	1.0	U	2.8
2-Hexanone	U	2.0	U	5.6
Tetrachloroethene	U	1.0	U	2.8
Chlorobenzene	U	1.0	U	2.8
1,1,1,2-Tetrachloroethane	U	1.0	U	2.8
Ethylbenzene	U	1.0	U	2.8
p&m-Xylene	U	1.0	U	2.8
o-Xylene	U	1.0	U	2.8
Styrene	U	1.0	U	2.8
Isopropylbenzene	U	1.0	U	2.8
1,1,2,2-Tetrachloroethane	U	1.0	U	2.8
1,2,3-Trichloropropane	U	1.0	U	2.8
Bromobenzene	U	1.0	U	2.8
n-Propylbenzene	U	1.0	U	2.8
2-Chlorotoluene	U	1.0	U	2.8
4-Chlorotoluene	U	1.0	U	2.8
1,3,5-Trimethylbenzene	U	1.0	U	2.8
tert-Butylbenzene	U	1.0	U	2.8
1,2,4-Trimethylbenzene	U	1.0	U	2.8
sec-Butylbenzene	U	1.0	U	2.8
1,3-Dichlorobenzene	U	1.0	U	2.8
p-Isopropyltoluene	U	1.0	U	2.8
1,4-Dichlorobenzene	U	1.0	U	2.8
1,2-Dichlorobenzene	U	1.0	U	2.8
n-Butylbenzene	U	1.0	U	2.8
1,2-Dibromo-3-chloropropane	U	1.0	U	2.8
1,2,4-Trichlorobenzene	U	1.0	U	2.8
Hexachlorobutadiene	U	1.0	U	2.8
Naphthalene	U	4.0	11	11
1,2,3-Trichlorobenzene	U	1.0	U	2.8

Table 1.2 Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	Methanol blank	Unit	µg/kg
LabFile#	AV1795	Con. Factor	50.0

	CAS#	Compound	Q	RT	Conc
1	000075-45-6	Chlorodifluoromethane	90	1.99	460
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

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Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	Compound
A08510	NO PEAKS FOUND
A08507	NO PEAKS FOUND
A08508	NO PEAKS FOUND

Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08504	Unit	µg/kg
LabFile#	AV1786	Con. Factor	25.8

	CAS#	Compound	Q	RT	Conc
1		PAH		20.88	410
2		Unknown		23.77	150
3		C11 methylnaphthalene isomer		26.43	140
4		C11 methylnaphthalene isomer		26.98	170
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08505	Unit	µg/kg
LabFile#	AV1787	Con. Factor	26.5

	CAS#	Compound	Q	RT	Conc
1		PAH		20.87	260
2		Unknown		23.74	200
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08502	Unit	µg/kg
LabFile#	AV1792	Con. Factor	656.2

	CAS#	Compound	Q	RT	Conc
1		PAH		20.87	3900
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

Table 1.3 Results of the Analysis for BNA in Water
WA# 0-133 Quanta Resources

Sample #	Method Blank		—	
Sample Identification	05/16/00		Control H_2O	
Date Collected	—		05/10/00	
Parameter	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
bis(2-Chloroethyl)ether	U	10	U	22
Phenol	U	10	U	22
2-Chlorophenol	U	10	U	22
1,3-Dichlorobenzene	U	10	U	22
1,4-Dichlorobenzene	U	10	U	22
1,2-Dichlorobenzene	U	10	U	22
2,2'-Oxybis(1-chloropropane)	U	10	U	22
2-Methylphenol	U	10	U	22
Hexachloroethane	U	10	U	22
n-Nitroso-di-n-propylamine	U	10	U	22
4-Methylphenol	U	10	U	22
Nitrobenzene	U	10	U	22
Isophorone	U	10	U	22
2-Nitrophenol	U	10	U	22
2,4-Dimethylphenol	U	10	U	22
bis(2-Chloroethoxy)methane	U	10	U	22
2,4-Dichlorophenol	U	10	U	22
1,2,4-Trichlorobenzene	U	10	U	22
Naphthalene	U	10	U	22
4-Chloroaniline	U	10	U	22
Hexachlorobutadiene	U	10	U	22
4-Chloro-3-methylphenol	U	10	U	22
2-Methylnaphthalene	U	10	U	22
Hexachlorocyclopentadiene	U	10	U	22
2,4,6-Trichlorophenol	U	10	U	22
2,4,5-Trichlorophenol	U	50	U	110
2-Chloronaphthalene	U	10	U	22
2-Nitroaniline	U	50	U	110
Acenaphthylene	U	10	U	22
Dimethylphthalate	U	10	U	22
2,6-Dinitrotoluene	U	10	U	22
Acenaphthene	U	10	U	22

Table 1.3 (cont.) Results of the Analysis for BNA in Water
WA# 0-133 Quanta Resources

Sample #	Method Blank		—	
Sample Identification	05/16/00		Control H_2O	
Date Collected	—		05/10/00	
Parameter	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
3-Nitroaniline	U	50	U	110
2,4-Dinitrophenol	U	50	U	110
Dibenzofuran	U	10	U	22
2,4-Dinitrotoluene	U	10	U	22
4-Nitrophenol	U	50	U	110
Fluorene	U	10	U	22
4-Chlorophenyl phenylether	U	10	U	22
Diethylphthalate	U	10	U	22
4-Nitroaniline	U	50	U	110
4,6-Dinitro-2-methylphenol	U	50	U	110
n-Nitroso-diphenylamine	U	10	U	22
4-Bromophenyl phenylether	U	10	U	22
Hexachlorobenzene	U	10	U	22
Pentachlorophenol	U	50	U	110
Phenanthrene	U	10	U	22
Anthracene	U	10	U	22
Carbazole	U	10	U	22
Di-n-butylphthalate	U	10	U	22
Fluoranthene	U	10	U	22
Pyrene	U	10	U	22
Butylbenzylphthalate	U	10	U	22
3,3'-Dichlorobenzidine	U	20	U	44
Benzo(a)anthracene	U	10	U	22
Chrysene	U	10	U	22
bis(2-Ethylhexyl)phthalate	U	10	U	22
Di-n-octylphthalate	U	10	U	22
Benzo(b)fluoranthene	U	10	U	22
Benzo(k)fluoranthene	U	10	U	22
Benzo(a)pyrene	U	10	U	22
Indeno(1,2,3-c,d)pyrene	U	10	U	22
Dibenzo(a,h)anthracene	U	10	U	22
Benzo(g,h,i)perylene	U	10	U	22

Table 1.4 Results of the Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Method Blank		A19070		A19071		A19072		A19073		A19074	
Sample Identification	05/16/00		LOC 1		LOC 1 DUP		LOC 2 SUB		LOC 2		LOC 3	
Date Collected	—		05/02/00		05/02/00		05/02/00		05/02/00		05/02/00	
Percent Solids	100		40		37		42		39		40	
Parameter	Conc µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
bis(2-Chloroethyl)ether	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Phenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2-Chlorophenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
1,3-Dichlorobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
1,4-Dichlorobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
1,2-Dichlorobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,2'-Oxybis(1-chloropropane)	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2-Methylphenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Hexachloroethane	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
n-Nitroso-di-n-propylamine	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
4-Methylphenol	U	1000	400 J	2500	730 J	2700	U	2400	U	2600	U	2500
Nitrobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Isophorone	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2-Nitrophenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,4-Dimethylphenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
bis(2-Chloroethoxy)methane	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,4-Dichlorophenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
1,2,4-Trichlorobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Naphthalene	U	1000	110000	2500	270000	2700	190 J	2400	570 J	2600	1100 J	2500
4-Chloroaniline	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Hexachlorobutadiene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
4-Chloro-3-methylphenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2-Methylnaphthalene	U	1000	31000	2500	160000	2700	U	2400	U	2600	370 J	2500
Hexachlorocyclopentadiene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,4,6-Trichlorophenol	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,4,5-Trichlorophenol	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
2-Chloronaphthalene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2-Nitroaniline	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
Acenaphthylene	U	1000	4600	2500	12000	2700	370 J	2400	1000 J	2600	1500 J	2500
Dimethylphthalate	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
2,6-Dinitrotoluene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Acenaphthene	U	1000	26000	2500	95000	2700	840 J	2400	1800 J	2600	2600	2500

Table 1.4 (cont.) Results of the Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Method Blank		A19070		A19071		A19072		A19073		A19074	
Sample Identification	05/16/00		LOC 1		LOC 1 DUP		LOC 2 SUB		LOC 2		LOC 3	
Date Collected	—		05/02/00		05/02/00		05/02/00		05/02/00		05/02/00	
Percent Solids	100		40		37		42		39		40	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
3-Nitroaniline	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
2,4-Dinitrophenol	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
Dibenzofuran	U	1000	20000	2500	42000	2700	520 J	2400	760 J	2600	740 J	2500
2,4-Dinitrotoluene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
4-Nitrophenol	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
Fluorene	U	1000	26000	2500	91000	2700	660 J	2400	1500 J	2600	1400 J	2500
4-Chlorophenyl phenylether	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Diethylphthalate	280 J	1000	300 J	2500	1400 J	2700	460 J	2400	450 J	2600	550 J	2500
4-Nitroaniline	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
4,6-Dinitro-2-methylphenol	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
n-Nitroso-diphenylamine	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
4-Bromophenyl phenylether	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Hexachlorobenzene	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Pentachlorophenol	U	5000	U	12000	U	13000	U	12000	U	13000	U	12000
Phenanthrene	U	1000	74000	2500	190000	2700	2200 J	2400	7600	2600	7100	2500
Anthracene	U	1000	16000	2500	38000	2700	580 J	2400	2100 J	2600	2500	2500
Carbazole	U	1000	4400	2500	12000	2700	U	2400	290 J	2600	330 J	2500
Di-n-butylphthalate	3600	1000	2100 J	2500	6900	2700	5900	2400	6000	2600	4700	2500
Fluoranthene	U	1000	78000	2500	190000	2700	7200	2400	19000	2600	28000	2500
Pyrene	U	1000	27000	2500	100000	2700	4600	2400	10000	2600	15000	2500
Butylbenzylphthalate	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
3,3'-Dichlorobenzidine	U	2000	U	5000	U	5400	U	4800	U	5100	U	5000
Benzo(a)anthracene	U	1000	21000	2500	64000	2700	2900	2400	7900	2600	12000	2500
Chrysene	U	1000	16000	2500	42000	2700	2500	2400	6300	2600	9600	2500
bis(2-Ethylhexyl)phthalate	260 J	1000	1200 J	2500	2800	2700	550 J	2400	1000 J	2600	820 J	2500
Di-n-octylphthalate	U	1000	U	2500	U	2700	U	2400	U	2600	U	2500
Benzo(b)fluoranthene	U	1000	17000	2500	52000	2700	4100	2400	7900	2600	12000	2500
Benzo(k)fluoranthene	U	1000	9000	2500	22000	2700	920 J	2400	3800	2600	4700	2500
Benzo(a)pyrene	U	1000	16000	2500	49000	2700	3000	2400	7700	2600	10000	2500
Indeno(1,2,3-c,d)pyrene	U	1000	9200	2500	26000	2700	2100 J	2400	4500	2600	6600	2500
Dibenzo(a,h)anthracene	U	1000	2700	2500	7000	2700	680 J	2400	U	2600	2000 J	2500
Benzo(g,h,i)perylene	U	1000	11000	2500	28000	2700	2400 J	2400	5200	2600	7600	2500

Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08506	Unit	µg/kg
LabFile#	AV1788	Con. Factor	2.5

	CAS#	Compound	Q	RT	Conc
1	000075-45-6	Chlorodifluoromethane	90	1.99	13
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

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Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08509	Unit	µg/kg
LabFile#	AV1791	Con. Factor	2.8

	CAS#	Compound	Q	RT	Conc
1	000075-45-6	Chlorodifluoromethane	91	1.99	37
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	Soil blank	Unit	µg/kg
LabFile#	AV1796	Con. Factor	1.0

	CAS#	Compound	Q	RT	Conc
1	000075-45-6	Chlorodifluoromethane	90	1.99	10
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

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Table 1.2 (cont.) Results of TIC for VOC in Soil

WA# 0-133 Quanta Resources

Based on dry weight

Sample #	A08503	Unit	µg/kg
LabFile#	AV1785	Con. Factor	2.6

	CAS#	Compound	Q	RT	Conc
1		C10 Cycloalkane		18.71	61
2		C10 Cycloalkene		20.60	130
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

*Estimated Concentration (Response Factor = 1.0)

Table 1.4 (cont.) Results of the Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	A19075		A19076		A19077		A19078		—	
Sample Identification	LOC 4		LOC 4 SUB		LOC 5		LOC 6		Control Sediment	
Date Collected	05/02/00		05/02/00		05/02/00		05/02/00		05/10/00	
Percent Solids	39		43		43		37		62	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
bis(2-Chloroethyl)ether	U	2600	U	2300	U	2300	U	2700	U	1600
Phenol	U	2600	U	2300	U	2300	U	2700	U	1600
2-Chlorophenol	U	2600	U	2300	U	2300	U	2700	U	1600
1,3-Dichlorobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
1,4-Dichlorobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
1,2-Dichlorobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
2,2'-Oxybis(1-chloropropane)	U	2600	U	2300	U	2300	U	2700	U	1600
2-Methylphenol	U	2600	U	2300	U	2300	U	2700	U	1600
Hexachloroethane	U	2600	U	2300	U	2300	U	2700	U	1600
n-Nitroso-di-n-propylamine	U	2600	U	2300	U	2300	U	2700	U	1600
4-Methylphenol	U	2600	U	2300	U	2300	U	2700	U	1600
Nitrobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
Isophorone	U	2600	U	2300	U	2300	U	2700	U	1600
2-Nitrophenol	U	2600	U	2300	U	2300	U	2700	U	1600
2,4-Dimethylphenol	U	2600	U	2300	U	2300	U	2700	U	1600
bis(2-Chloroethoxy)methane	U	2600	U	2300	U	2300	U	2700	U	1600
2,4-Dichlorophenol	U	2600	U	2300	U	2300	U	2700	U	1600
1,2,4-Trichlorobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
Naphthalene	1700 J	2600	U	2300	130 J	2300	U	2700	U	1600
4-Chloroaniline	U	2600	U	2300	U	2300	U	2700	U	1600
Hexachlorobutadiene	U	2600	U	2300	U	2300	U	2700	U	1600
4-Chloro-3-methylphenol	U	2600	U	2300	U	2300	U	2700	U	1600
2-Methylnaphthalene	690 J	2600	U	2300	U	2300	U	2700	U	1600
Hexachlorocyclopentadiene	U	2600	U	2300	U	2300	U	2700	U	1600
2,4,6-Trichlorophenol	U	2600	U	2300	U	2300	U	2700	U	1600
2,4,5-Trichlorophenol	U	13000	U	12000	U	12000	U	14000	U	8100
2-Chloronaphthalene	U	2600	U	2300	U	2300	U	2700	U	1600
2-Nitroaniline	U	13000	U	12000	U	12000	U	14000	U	8100
Acenaphthylene	570 J	2600	210 J	2300	U	2300	U	2700	U	1600
Dimethylphthalate	U	2600	U	2300	U	2300	U	2700	U	1600
2,6-Dinitrotoluene	U	2600	U	2300	U	2300	U	2700	U	1600
Acenaphthene	1500 J	2600	150 J	2300	110 J	2300	U	2700	U	1600

Table 1.4 (cont.) Results of the Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	A19075		A19076		A19077		A19078		—	
Sample Identification	LOC 4		LOC 4 SUB		LOC 5		LOC 6		Control Sediment	
Date Collected	05/02/00		05/02/00		05/02/00		05/02/00		05/10/00	
Percent Solids	39		43		43		37		62	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc µg/kg	MDL µg/kg
3-Nitroaniline	U	13000	U	12000	U	12000	U	14000	U	8100
2,4-Dinitrophenol	U	13000	U	12000	U	12000	U	14000	U	8100
Dibenzofuran	730 J	2600	U	2300	U	2300	U	2700	U	1600
2,4-Dinitrotoluene	U	2600	U	2300	U	2300	U	2700	U	1600
4-Nitrophenol	U	13000	U	12000	U	12000	U	14000	U	8100
Fluorene	1300 J	2600	U	2300	U	2300	U	2700	U	1600
4-Chlorophenyl phenylether	U	2600	U	2300	U	2300	U	2700	U	1600
Diethylphthalate	580 J	2600	390 J	2300	640 J	2300	320 J	2700	U	1600
4-Nitroaniline	U	13000	U	12000	U	12000	U	14000	U	8100
4,6-Dinitro-2-methylphenol	U	13000	U	12000	U	12000	U	14000	U	8100
n-Nitroso-diphenylamine	U	2600	U	2300	U	2300	U	2700	U	1600
4-Bromophenyl phenylether	U	2600	U	2300	U	2300	U	2700	U	1600
Hexachlorobenzene	U	2600	U	2300	U	2300	U	2700	U	1600
Pentachlorophenol	U	13000	U	12000	U	12000	U	14000	U	8100
Phenanthrene	5300	2600	740 J	2300	410 J	2300	700 J	2700	U	1600
Anthracene	1300 J	2600	260 J	2300	130 J	2300	190 J	2700	U	1600
Carbazole	290 J	2600	U	2300	U	2300	U	2700	U	1600
Di-n-butylphthalate	7600	2600	4600	2300	5300	2300	1200 J	2700	680 J	1600
Fluoranthene	12000	2600	3700	2300	1600 J	2300	1900 J	2700	U	1600
Pyrene	6400	2600	2100 J	2300	1100 J	2300	970 J	2700	U	1600
Butylbenzylphthalate	U	2600	U	2300	U	2300	U	2700	U	1600
3,3'-Dichlorobenzidine	U	5100	U	4600	U	4700	U	5400	U	3200
Benzo(a)anthracene	4900	2600	1400 J	2300	630 J	2300	790 J	2700	U	1600
Chrysene	3700	2600	1100 J	2300	500 J	2300	600 J	2700	U	1600
bis(2-Ethylhexyl)phthalate	850 J	2600	680 J	2300	850 J	2300	800 J	2700	340 J	1600
Di-n-octylphthalate	U	2600	U	2300	U	2300	U	2700	U	1600
Benzo(b)fluoranthene	5500	2600	1700 J	2300	780 J	2300	780 J	2700	U	1600
Benzo(k)fluoranthene	1800 J	2600	470 J	2300	U	2300	U	2700	U	1600
Benzo(a)pyrene	4500	2600	1400 J	2300	700 J	2300	710 J	2700	U	1600
Indeno(1,2,3-c,d)pyrene	2400 J	2600	920 J	2300	U	2300	U	2700	U	1600
Dibenzo(a,h)anthracene	U	2600	U	2300	U	2300	U	2700	U	1600
Benzo(g,h,i)perylene	2600	2600	1000 J	2300	U	2300	U	2700	U	1600

Table 1.5 Results of the Analysis for Pesticides in Water
WA# 0-133 Quanta Resources

Sample #	Method Blank		—	
Sample Identification	05/16/00		Control H_2O	
Date Collected	—		05/10/00	
Parameter	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
alpha-BHC	U	0.050	U	0.11
beta-BHC	U	0.050	U	0.11
delta-BHC	U	0.050	U	0.11
gamma-BHC (Lindane)	U	0.050	U	0.11
Heptachlor	U	0.050	U	0.11
Aldrin	U	0.050	U	0.11
Heptachlor epoxide	U	0.050	U	0.11
Endosulfan I	U	0.050	U	0.11
Dieldrin	U	0.10	U	0.22
4,4'-DDE	U	0.10	U	0.22
Endrin	U	0.10	U	0.22
Endosulfan II	U	0.10	U	0.22
4,4'-DDD	U	0.10	U	0.22
Endosulfan sulfate	U	0.10	U	0.22
4,4'-DDT	U	0.10	U	0.22
Methoxychlor	U	0.50	U	1.1
Endrin ketone	U	0.10	U	0.22
Endrin aldehyde	U	0.10	U	0.22
alpha-Chlordane	U	0.050	U	0.11
gamma-Chlordane	U	0.050	U	0.11
Toxaphene	U	5.0	U	11

Table 1.6 Results of the Analysis for Pesticides in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Method Blank		A19070		A19071		A19072		A19073		A19074	
Sample Identification	05/16/00		LOC 1		LOC 1 DUP		LOC 2 SUB		LOC 2		LOC 3	
Date Collected	—		05/02/00		05/02/00		05/02/00		05/02/00		05/02/00	
Percent Solids	100		40		37		42		39		40	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc µg/kg	MDL µg/kg
alpha-BHC	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
beta-BHC	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
delta-BHC	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
gamma-BHC (Lindane)	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
Heptachlor	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
Aldrin	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
Heptachlor epoxide	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
Endosulfan I	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
Dieldrin	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
4,4'-DDE	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
Endrin	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
Endosulfan II	U	3.3	U	8.4	9.7	9.0	U	7.9	U	8.4	U	8.1
4,4'-DDD	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
Endosulfan sulfate	U	3.3	24	8.4	31	9.0	14	7.9	4.6 J	8.4	7.1 J	8.1
4,4'-DDT	U	3.3	28	8.4	24	9.0	5.8 J	7.9	U	8.4	U	8.1
Methoxychlor	U	17	U	43	U	46	U	41	U	43	U	42
Endrin ketone	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
Endrin aldehyde	U	3.3	U	8.4	U	9.0	U	7.9	U	8.4	U	8.1
alpha-Chlordane	U	1.7	U	4.3	U	4.6	U	4.1	U	4.3	U	4.2
gamma-Chlordane	U	1.7	79	4.3	72	4.6	31	4.1	12	4.3	33	4.2
Toxaphene	U	170	U	430	U	460	U	410	U	430	U	420

Table 1.6 (cont.) Results of the Analysis for Pesticides in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	A19075		A19076		A19077		A19078		—	
Sample Identification	LOC 4		LOC 4 SUB		LOC 5		LOC 6		Control Sediment	
Date Collected	05/02/00		05/02/00		05/02/00		05/02/00		05/10/00	
Percent Solids	39		43		43		37		62	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc µg/kg	MDL µg/kg
alpha-BHC	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
beta-BHC	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
delta-BHC	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
gamma-BHC (Lindane)	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
Heptachlor	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
Aldrin	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
Heptachlor epoxide	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
Endosulfan I	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
Dieldrin	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
4,4'-DDE	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
Endrin	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
Endosulfan II	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
4,4'-DDD	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
Endosulfan sulfate	U	8.3	3.0 J	7.7	U	7.7	U	8.9	U	5.3
4,4'-DDT	4.3 J	8.3	U	7.7	U	7.7	U	8.9	U	5.3
Methoxychlor	U	43	U	40	U	40	U	46	U	27
Endrin ketone	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
Endrin aldehyde	U	8.3	U	7.7	U	7.7	U	8.9	U	5.3
alpha-Chlordane	U	4.3	U	4.0	U	4.0	U	4.6	U	2.7
gamma-Chlordane	34	4.3	26	4.0	24	4.0	U	4.6	U	2.7
Toxaphene	U	430	U	400	U	400	U	460	U	270

Table 1.7 Results of the Analysis for PCB in Water
WA# 0-133 Quanta Resources

Sample #	Method Blank		—	
Sample Identification	05/16/00		Control H_2O	
Date Collected	—		05/10/00	
Parameter	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
Aroclor-1016	U	1.0	U	2.2
Aroclor-1221	U	2.0	U	4.4
Aroclor-1232	U	1.0	U	2.2
Aroclor-1242	U	1.0	U	2.2
Aroclor-1248	U	1.0	U	2.2
Aroclor-1254	U	1.0	U	2.2
Aroclor-1260	U	1.0	U	2.2

Table 1.8 Results of the Analysis for PCB in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	Method Blank		A19070		A19071		A19072		A19073		A19074	
Sample Identification	05/16/00		LOC 1		LOC 1 DUP		LOC 2 SUB		LOC 2		LOC 3	
Date Collected	—		05/02/00		05/02/00		05/02/00		05/02/00		05/02/00	
Percent Solids	100		40		37		42		39		40	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
Aroclor-1016	U	100	U	250	U	270	U	240	U	260	U	250
Aroclor-1221	U	200	U	510	U	540	U	480	U	510	U	490
Aroclor-1232	U	100	U	250	U	270	U	240	U	260	U	250
Aroclor-1242	U	100	U	250	U	270	U	240	U	260	U	250
Aroclor-1248	U	100	U	250	U	270	U	240	U	260	U	250
Aroclor-1254	U	100	U	250	U	270	U	240	U	260	U	250
Aroclor-1260	U	100	U	250	U	270	U	240	U	260	U	250

Table 1.8 (cont.) Results of the Analysis for PCB in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample #	A19075		A19076		A19077		A19078		—	
Sample Identification	LOC 4		LOC 4 SUB		LOC 5		LOC 6		Control Sediment	
Date Collected	05/02/00		05/02/00		05/02/00		05/02/00		05/10/00	
Percent Solids	39		43		43		37		62	
Parameter	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
Aroclor-1016	U	250	U	230	U	230	U	270	U	160
Aroclor-1221	U	500	U	470	U	470	U	540	U	320
Aroclor-1232	U	250	U	230	U	230	U	270	U	160
Aroclor-1242	U	250	U	230	U	230	U	270	U	160
Aroclor-1248	U	250	U	230	U	230	U	270	U	160
Aroclor-1254	U	250	U	230	U	230	U	270	U	160
Aroclor-1260	U	250	U	230	U	230	U	270	U	160

Table 1.9 Results of the Analysis for Metals in Water
WA# 0-133 Quanta Resources

Sample #	Method Blank		—	
Sample Identification	05/16/00		Control H_2O	
Date Collected	—		05/10/00	
Parameter	Conc µg/L	MDL µg/L	Conc µg/L	MDL µg/L
Aluminum	U	23.1	27.4	23.1
Antimony	U	3.7	U	3.7
Arsenic	U	3.2	U	3.2
Barium	U	0.60	18.5	0.60
Beryllium	U	0.10	U	0.10
Cadmium	U	0.40	U	0.40
Calcium	123	104	114000	104
Chromium	U	0.80	U	0.80
Cobalt	U	0.90	U	0.90
Copper	U	1.2	7.3	1.2
Iron	U	15	U	15
Lead	U	1.5	U	1.5
Magnesium	U	22.4	269000	22.4
Manganese	U	0.40	U	0.40
Mercury	U	0.10	U	0.10
Nickel	U	2.0	U	2.0
Potassium	42.6	10.4	104000	10.4
Selenium	U	2.3	U	2.3
Silver	U	0.70	U	0.70
Sodium	201	104	2290000	104
Thallium	U	5.5	U	5.5
Vanadium	U	0.90	U	0.90
Zinc	22.0	4.0	14.6	4.0

Table 1.10 Results of the Analysis for Metals in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample #	Method Blank		A19070		A19071		A19072		A19073		A19074	
Sample Identification	05/16/00		LOC 1		LOC 1 DUP		LOC 2 SUB		LOC 2		LOC 3	
Date Collected	—		05/02/00		05/02/00		05/02/00		05/02/00		05/02/00	
Percent Solids	100		40		37		42		39		40	
Parameter	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg
Aluminum	8.18	5.52	16700	25.6	16000	27.3	16600	22.9	15000	25.0	14700	18.7
Antimony	U	0.270	2.3	1.25	1.8	1.34	U	1.12	U	1.22	0.92	0.913
Arsenic	U	0.400	17.2	1.86	19.3	1.98	18.2	1.66	13.3	1.81	15.6	1.35
Barium	0.135	0.0500	70.8	0.232	71.4	0.248	77.0	0.208	68.9	0.227	72.4	0.169
Beryllium	0.037	0.0100	1.0	0.0465	1.1	0.0495	0.98	0.0415	0.91	0.0453	0.84	0.0338
Cadmium	U	0.0400	0.45	0.186	0.82	0.198	0.86	0.166	0.57	0.181	0.63	0.135
Calcium	21.2	14.0	4210	65.0	4450	69.4	4040	58.2	4020	63.5	4390	47.4
Chromium	0.088	0.0600	80.3	0.279	84.7	0.297	83.6	0.249	69.9	0.272	68.9	0.203
Cobalt	U	0.130	12.1	0.604	12.0	0.644	11.8	0.540	10.6	0.589	10.6	0.440
Copper	U	0.100	101	0.465	115	0.495	109	0.415	90.6	0.453	94.1	0.338
Iron	3.48	1.77	35300	8.22	36200	8.77	33300	7.35	30900	8.02	30900	5.99
Lead	U	0.130	113	0.604	116	0.644	118	0.540	95.6	0.589	103	0.440
Magnesium	2.80	0.600	8110	2.79	8270	2.97	8020	2.49	7400	2.72	7660	2.03
Manganese	0.165	0.0200	746	0.0929	705	0.0991	462	0.0831	538	0.0907	502	0.0676
Mercury	U	0.0100	1.7	0.046	1.8	0.050	1.7	0.042	1.5	0.045	1.9	0.034
Nickel	U	0.100	33.7	0.465	34.4	0.495	37.8	0.415	32.9	0.453	35.9	0.338
Potassium	5.53	1.19	3450	5.53	3370	5.90	3370	4.94	3060	5.39	2860	4.03
Selenium	U	0.330	U	1.53	U	1.63	U	1.37	U	1.50	U	1.12
Silver	U	0.180	4.0	0.836	4.7	0.892	4.0	0.748	3.3	0.816	3.2	0.609
Sodium	27.2	25.0	6020	116	6190	124	6000	104	5310	113	5160	85
Thallium	U	0.500	U	2.32	U	2.48	U	2.08	U	2.27	U	1.69
Vanadium	U	0.110	39.9	0.511	40.2	0.545	40.0	0.457	34.7	0.499	34.6	0.372
Zinc	U	0.420	214	1.95	237	2.08	240	1.74	198	1.90	213	1.42

Table 1.10 (cont.) Results of the Analysis for Metals in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample #	A19075		A19076		A19077		A19078		Method Blank		—	
Sample Identification	LOC 4		LOC 4 SUB		LOC 5		LOC 6		05/19/00		Control Sediment	
Date Collected	05/02/00		05/02/00		05/02/00		05/02/00		—		05/10/00	
Percent Solids	39		43		43		37		100		62	
Parameter	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg	Conc mg/kg	MDL mg/kg
Aluminum	15500	23.4	16000	17.8	15000	25.1	17000	23.8	U	5.52	6020	7.4
Antimony	U	1.14	U	0.87	U	1.23	1.6	1.16	U	0.270	U	0.361
Arsenic	14.1	1.69	16.9	1.29	12.8	1.82	13.9	1.73	U	0.400	3.0	0.535
Barium	70.5	0.212	71.0	0.161	65.3	0.227	72.9	0.216	U	0.0500	20.3	0.0669
Beryllium	0.94	0.0423	0.93	0.0322	0.92	0.0455	1.0	0.0431	U	0.0100	0.31	0.0134
Cadmium	0.38	0.169	0.64	0.129	0.46	0.182	0.36	0.173	U	0.0400	0.21	0.0535
Calcium	4160	59.2	3940	45.0	3790	63.7	4320	60.4	24.5	14.0	1740	18.7
Chromium	71.8	0.254	80.3	0.193	68.1	0.273	74.6	0.259	U	0.0600	15.3	0.0803
Cobalt	11.2	0.550	11.3	0.418	10.8	0.591	12.4	0.561	U	0.130	2.9	0.174
Copper	91.5	0.423	103	0.322	83.3	0.455	89.8	0.431	0.104	0.100	10.5	0.134
Iron	31700	7.49	32200	5.69	30000	8.05	33900	7.63	U	1.77	10700	2.37
Lead	98.2	0.550	111	0.418	90.8	0.591	98.1	0.561	U	0.130	13.2	0.174
Magnesium	7770	2.54	7720	1.93	7190	2.73	8120	2.59	3.39	0.600	3010	0.803
Manganese	575	0.0846	505	0.0643	542	0.0909	672	0.0863	0.115	0.0200	112	0.0268
Mercury	1.4	0.042	1.8	0.032	1.5	0.045	1.4	0.043	U	0.0100	0.03	0.0134
Nickel	34.0	0.423	35.9	0.322	30.9	0.455	33.7	0.431	U	0.100	7.6	0.134
Potassium	3190	5.03	3150	3.83	3040	5.41	3340	5.13	5.42	1.19	1810	1.59
Selenium	U	1.40	U	1.06	U	1.50	U	1.42	U	0.330	U	0.441
Silver	3.4	0.761	3.9	0.579	3.2	0.819	3.3	0.776	U	0.180	U	0.241
Sodium	6040	106	5500	80	4520	114	5160	108	93.5	25.0	3150	33.4
Thallium	U	2.12	U	1.61	U	2.27	U	2.16	U	0.500	U	0.669
Vanadium	36.2	0.465	38.1	0.354	34.2	0.500	38.6	0.474	U	0.110	16.5	0.147
Zinc	201	1.78	219	1.35	185	1.91	202	1.81	2.98	0.420	54.3	0.562

Results of the Internal Standard Areas and Surrogate Percent Recoveries for VOC in Soil

Prior to extraction, each sample was spiked with a three component surrogate mixture consisting of 1,2-dichloroethane-d4, toluene-d8, and p-bromofluorobenzene. The surrogate percent recoveries, listed in Table 2.1, ranged from 72 to 119. All 42 percent recoveries were within the acceptable QC limits. The internal standard areas are also listed in Table 2.1. All 42 internal standard areas were within QC criteria.

Results of the MS/MSD Analysis for VOC in Soil

The sample A08506 was chosen for the MS/MSD analysis. The percent recoveries, listed in Table 2.2 ranged from 79 to 103. All ten percent recoveries were within the acceptable QC limits. The RPD values also listed in Table 2.2, ranged from 1 (one) to 9. All five RPD values were within the acceptable QC limits.

Table 2.1 Results of the Surrogate Percent Recoveries and Internal Standard Areas for VOC in Soil
WA# 0-133 Quanta Resources

Analysis Date 05/03/00
Matrix Soil

File ID	Sample No.	IS 1	IS 2	IS 3	Surr. 1	Surr. 2	Surr. 3
AV1782.D	A08510/250x	151378	1446580	692138	103	105	91
AV1785.D	A08503	128452	1174841	474369	100	117	75
AV1786.D	A08504/10x	127002	1326704	570007	101	119	91
AV1787.D	A08505/10x	135122	1376513	593268	98	119	89
AV1788.D	A08506	145801	1343575	532226	97	117	72
AV1789.D	A08507	150154	1409826	570640	95	116	73
AV1790.D	A08508	153553	1416700	574512	97	116	74
AV1791.D	A08509	147267	1395246	565229	97	117	73
AV1792.D	A08502/250x	171767	1628082	784068	99	104	93
AV1795.D	Methanol blank 05/03/00**	160455	1564986	741462	100	106	88
AV1796.D	Soil blank 05/03/00**	174608	1505455	703303	103	105	86
Cal Check Area	AV1780.D	169337	1521720	787927			

**Beyond the twelve hour limit.

			Surrogate Limits	Soil
IS 1	Bromochloromethane	Surr. 1	1,2-Dichloroethane-d4	70 - 121
IS 2	1,4-Difluorobenzene	Surr. 2	Toluene-d8	84 - 138
IS 3	Chlorobenzene-d5	Surr. 3	p-Bromofluorobenzene	59 - 113

Table 2.1 (cont.) Results of the Surrogate Percent Recoveries and Internal Standard Areas for VOC in Soil
WA# 0-133 Quanta Resources

Analysis Date 05/04/00
Matrix Soil

File ID	Sample No.	IS 1	IS 2	IS 3	Surr. 1	Surr. 2	Surr. 3
AV1801.D	Soil Blank 05/04/00	162449	1507820	709560	103	104	89
AV1802.D	A08506ms	139364	1356179	549882	106	113	76
AV1803.D	A08506msd	137518	1305610	535002	106	113	77
Cal Check Area	AV1800.D	175994	1646120	829112			

**Beyond the twelve hour limit.

				Surrogate Limits
				Soil
IS 1	Bromochloromethane	Surr. 1	1,2-Dichloroethane-d4	70 - 121
IS 2	1,4-Difluorobenzene	Surr. 2	Toluene-d8	84 - 138
IS 3	Chlorobenzene-d5	Surr. 3	p-Bromofluorobenzene	59 - 113

Table 2.2 Results of the MS/MSD Analysis for VOC in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Sample ID: A08506

Compound Name	Sample Conc. µg/kg	MS Spike Added µg/kg	MS Conc. µg/kg	MS % Rec.	MSD Spike Added µg/kg	MSD Conc. µg/kg	MSD % Rec.	RPD	QC Limits % Rec.	QC Limits RPD
1,1-Dichloroethene	U	125	129	103	125	124	99	4	59 - 172	22
Benzene	U	125	114	91	125	116	93	2	66 - 142	21
Trichloroethene	U	125	98.3	79	125	99.0	79	1	62 - 137	24
Toluene	U	125	123	98	125	127	102	3	59 - 139	21
Chlorobenzene	U	125	99	79	125	108	86	9	60 - 133	21

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Results of the Surrogate Percent Recoveries for BNA in Water

Prior to extraction, each sample was spiked with a six component surrogate mixture consisting of nitrobenzene-d_5, 2-fluorobiphenyl, terphenyl-d_{14}, phenol-d_5, 2-fluorophenol, and 2,4,6-tribromophenol. The surrogate percent recoveries, listed in Table 2.3, ranged from 25 to 80. All eighteen surrogate percent recoveries were within the acceptable QC limits.

Results of the LCS Analysis for BNA in Water

The percent recoveries for the LCS analysis, listed in Table 2.4, ranged from 14 to 89. All eleven percent recoveries were within the acceptable QC limits.

Table 2.3 Results of the Surrogate Percent Recoveries for BNA in Water
WA# 0-133 Quanta Resources

Sample No.	Surr. 1	Surr. 2	Surr. 3	Surr. 4	Surr. 5	Surr. 6
Method Blank 05/16/00	35	51	71	63	61	69
LCS-1	25	54	80	69	45	76
Control H_2O	31	48	72	58	60	70

Surrogate Limits

Surr 1 =	2-Fluorophenol	(19 - 118)
Surr 2 =	Phenol-d5	(24 - 117)
Surr 3 =	Nitrobenzene-d5	(48 - 106)
Surr 4 =	2-Fluorobiphenyl	(51 - 108)
Surr 5 =	2,4,6-Tribromophenol	(38 - 153)
Surr 6 =	Terphenyl-d14	(20 - 165)

Table 2.4 Results of the LCS Analysis for BNA in Water
WA# 0-133 Quanta Resources

Compound Name	LCS Spike Added µg/L	LCS Conc. µg/L	LCS % Rec.	QC Limits % Rec.
Phenol	100	76	76	32 - 127
2-Chlorophenol	100	63	63	24 - 138
1,4-Dichlorobenzene	100	77	77	23 - 87
n-Nitroso-di-n-propylamine	100	88	88	66 - 128
1,2,4-Trichlorobenzene	100	74	74	47 - 95
4-Chloro-3-methylphenol	100	74	74	50 - 120
Acenaphthene	100	86	86	67 - 98
2,4-Dinitrotoluene	100	89	89	73 - 122
4-Nitrophenol	100	14	14	10 - 181
Pentachlorophenol	100	21	21	10 - 184
Pyrene	100	75	75	68 - 114

QA/QC for BNA in Soil

Results of the Surrogate Percent Recoveries for BNA in Soil

Prior to extraction, each sample was spiked with a six component surrogate mixture consisting of nitrobenzene-d_5, 2-fluorobiphenyl, terphenyl-d_{14}, phenol-d_5, 2-fluorophenol, and 2,4,6-tribromophenol. The surrogate percent recoveries, listed in Table 2.5, ranged from 42 to 88. All 96 surrogate percent recoveries were within the acceptable QC limits.

Results of the MS/MSD Analysis for BNA in Soil

The sample A19070 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.6, ranged from 56 to 104. Twenty out of 22 percent recoveries were within the acceptable QC limits. The RPD values, also listed in Table 2.6, ranged from 4 to 19. All eleven RPD values were within the acceptable QC limits.

Results of the LCS Analysis for BNA in Soil

The percent recoveries for the LCS analysis, listed in Table 2.7, ranged from 78 to 90. All eleven percent recoveries were within the acceptable QC limits.

Table 2.5 Results of the Surrogate Percent Recoveries for BNA in Soil
WA# 0-133 Quanta Resources

Sample No.	Surr. 1	Surr. 2	Surr. 3	Surr. 4	Surr. 5	Surr. 6
Method Blank 05/16/00	47	56	75	77	68	83
LCS-1	50	59	76	76	72	83
A19072	49	59	64	60	67	63
A19073	47	61	70	64	73	61
A19075	47	60	72	58	61	56
A19076	47	56	69	50	60	54
A19077	54	67	81	58	74	65
A19078	54	67	85	59	64	56
A19071	50	66	77	63	70	81
A19070	46	62	75	64	67	63
A19070MS	55	65	80	66	66	74
A19074	42	54	64	61	62	60
A19070MSD	45	61	84	68	77	88
A19070 (Dilution)	48	65	67	82	62	79
A19071 (Dilution)	51	69	54	80	56	83
Control Sediment	42	51	68	57	59	57

Surrogate Limits

Surr 1 =	2-Fluorophenol	(33 - 110)
Surr 2 =	Phenol-d5	(30 - 119)
Surr 3 =	Nitrobenzene-d5	(34 - 113)
Surr 4 =	2-Fluorobiphenyl	(24 - 120)
Surr 5 =	2,4,6-Tribromophenol	(23 - 160)
Surr 6 =	Terphenyl-d14	(20 - 152)

Table 2.6 Results of the MS/MSD Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample: A19070

Compound Name	Sample Result µg/kg	MS Spike Added µg/kg	MS Conc. µg/kg	MS % Rec.	MSD Spike Added µg/kg	MSD Conc. µg/kg	MSD % Rec.	RPD	QC Limits % Rec.	QC Limits RPD
Phenol	U	25000	22000	88	25000	21000	84	5	68 - 104	35
2-Chlorophenol	U	25000	18000	72	25000	19000	76	5	53 - 116	50
1,4-Dichlorobenzene	U	25000	18000	72	25000	19000	76	5	19 - 90	27
n-Nitroso-di-n-propylamine	U	25000	26000	104	25000	25000	100	4	70 - 139	38
1,2,4-Trichlorobenzene	U	25000	19000	76	25000	22000	88	15	50 - 104	23
4-Chloro-3-methylphenol	U	25000	21000	84	25000	22000	88	5	74 - 118	33
Acenaphthene	26000	25000	41000	60 *	25000	40000	56 *	7	64 - 107	19
2,4-Dinitrotoluene	U	25000	19000	76	25000	22000	88	15	69 - 151	47
4-Nitrophenol	U	25000	14000	56	25000	17000	68	19	54 - 139	50
Pentachlorophenol	U	25000	18000	72	25000	21000	84	15	41 - 154	47
Pyrene	27000	25000	50000	92	25000	51000	96	4	63 - 139	36

Table 2.7 Results of the LCS Analysis for BNA in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Compound Name	LCS Spike Added µg/kg	LCS Conc. µg/kg	LCS % Rec.	QC Limits % Rec.
Phenol	10000	8100	81	62 - 114
2-Chlorophenol	10000	7900	79	55 - 126
1,4-Dichlorobenzene	10000	8500	85	38 - 117
n-Nitroso-di-n-propylamine	10000	9000	90	75 - 140
1,2,4-Trichlorobenzene	10000	7800	78	66 - 115
4-Chloro-3-methylphenol	10000	7800	78	69 - 120
Acenaphthene	10000	8800	88	70 - 105
2,4-Dinitrotoluene	10000	8800	88	74 - 141
4-Nitrophenol	10000	8800	88	58 - 138
Pentachlorophenol	10000	8300	83	60 - 139
Pyrene	10000	8000	80	76 - 126

Results of the Surrogate Percent Recoveries for Pesticides in Water

Prior to extraction, each sample was spiked with a two component surrogate mixture consisting of tetrachloro-m-xylene and decachlorobiphenyl. The surrogate percent recoveries, listed in Table 2.8, ranged from 21 to 49. All twelve surrogate percent recoveries were within the acceptable QC limits.

Results of the LCS Analysis for Pesticides in Water

The percent recoveries for the LCS analysis, listed in Table 2.9, ranged from 58 to 122. Sixteen out of twenty percent recoveries were within the acceptable QC limits.

Table 2.8 Results of the Surrogate Percent Recoveries for Pesticides in Water
WA# 0-133 Quanta Resources

Sample ID	Percent Recovery (%) for Pesticides Analysis			
	TCMX - 1	TCMX - 2	DCB - 1	DCB - 2
Method Blank	49	40	34	27
LCS-1	29	21	40	34
Control H_2O	47	39	39	34

	QC Limits
Tetrachloro-m-xylene (TCMX)	(6 - 154)
Decachlorobiphenyl (DCB)	(16 - 155)

Table 2.9 Results of the LCS Analysis for Pesticides in Water
WA# 0-133 Quanta Resources

Compound Name	LCS Spike Added µg/L	LCS Conc. µg/L	LCS % Rec.	QC Limits % Rec.
alpha-BHC	0.50	0.37	74	68 - 124
gamma-BHC (Lindane)	0.50	0.37	74	72 - 118
Heptachlor	0.50	0.37	74	60 - 124
Aldrin	0.50	0.29	58 *	61 - 109
beta-BHC	0.50	0.61	122	67 - 122
delta-BHC	0.50	0.35	70	21 - 92
Heptachlor epoxide	0.50	0.39	78	73 - 111
Endosulfan I	0.50	0.39	78	65 - 117
gamma-Chlordane	0.50	0.34	68	63 - 108
alpha-Chlordane	0.50	0.35	70	70 - 115
4,4'-DDE	0.50	0.37	74	62 - 119
Dieldrin	0.50	0.36	72	62 - 113
Endrin	0.50	0.43	86	68 - 115
Endosulfan II	0.50	0.37	74	57 - 123
4,4'-DDD	0.50	0.35	70	58 - 118
4,4'-DDT	0.50	0.31	62 *	77 - 115
Endrin aldehyde	0.50	0.32	64	58 - 127
Endosulfan sulfate	0.50	0.35	70	37 - 135
Methoxychlor	0.50	0.30	60 *	66 - 112
Endrin ketone	0.50	0.33	66 *	74 - 124

Results of the Surrogate Percent Recoveries for Pesticides in Soil

Prior to extraction, each sample was spiked with a two component surrogate mixture consisting of tetrachloro-m-xylene and decachlorobiphenyl. The surrogate percent recoveries, listed in Table 2.10, ranged from 17 to 162. Fifty-five out of 56 surrogate percent recoveries were within the acceptable QC limits.

Results of the MS/MSD Analysis for Pesticides in Soil

The sample A19072 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.11, ranged from 18 to 143. Thirty-six out of 40 percent recoveries were within the acceptable QC limits. The RPD values, also listed in Table 2.11, ranged from 30 to 72. One out of twenty RPD values were within the acceptable QC limits.

Results of the LCS Analysis for Pesticides in Soil

The percent recoveries for the LCS analysis, listed in Table 2.12, ranged from 64 to 96. All twenty percent recoveries were within the acceptable QC limits.

Table 2.10 Results of the Surrogate Percent Recoveries for Pesticides in Soil
WA# 0-133 Quanta Resources

Sample ID	Percent Recovery (%) for Pesticides Analysis			
	TCMX - 1	TCMX - 2	DCB - 1	DCB - 2
Method Blank	78	81	106	106
LCS-1	69	76	89	87
A19070	143	32	55	20
A19071	144	40	132	20
A19072	162 *	60	118	23
A19072MS	97	74	99	37
A19072MSD	66	53	71	27
A19073	84	49	81	19
A19074	94	47	106	17
A19075	105	48	99	28
A19076	145	71	104	38
A19077	82	62	84	41
A19078	83	75	80	56
Control Sediment	79	75	84	91

	QC Limits
Tetrachloro-m-xylene (TCMX)	(6 - 154)
Decachlorobiphenyl (DCB)	(16 - 155)

Table 2.11 Results of the MS/MSD Analysis for Pesticides in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample: A19072

Compound Name	Sample Result µg/kg	MS Spike Added µg/kg	MS Conc. µg/kg	MS % Rec.	MSD Spike Added µg/kg	MSD Conc. µg/kg	MSD % Rec.	RPD	QC Limits % Rec.	QC Limits RPD
alpha-BHC	U	120	125	105	119	77	65	47 *	35 - 116	35
gamma-BHC (Lindane)	U	120	140	116	119	97	81	36 *	30 - 132	35
Heptachlor	U	120	130	107	119	86	72	39 *	42 - 122	35
Aldrin	U	120	120	98	119	75	63	43 *	40 - 121	35
beta-BHC	U	120	170	143 *	119	110	94	41 *	38 - 125	35
delta-BHC	U	120	140	120 *	119	88	73	49 *	3 - 80	35
Heptachlor epoxide	U	120	110	95	119	76	64	39 *	45 - 117	35
Endosulfan I	U	120	120	103	119	82	69	40 *	38 - 124	35
gamma-Chlordane	30.8	120	76	38 *	119	49	18 *	72 *	45 - 116	35
alpha-Chlordane	U	120	100	86	119	68	57	41 *	38 - 123	35
4,4'-DDE	U	120	130	108	119	77	64	51 *	23 - 127	35
Dieldrin	U	120	120	97	119	70	59	49 *	31 - 125	35
Endrin	U	120	140	115	119	88	74	43 *	29 - 131	35
Endosulfan II	U	120	120	103	119	82	69	40 *	14 - 155	35
4,4'-DDD	U	120	140	114	119	84	70	48 *	9 - 134	35
4,4'-DDT	5.8	120	140	112	119	90	71	45 *	23 - 150	35
Endrin aldehyde	U	120	56	46	119	41	34	30	26 - 135	35
Endosulfan sulfate	14.4	120	120	87	119	76	52	51 *	19 - 144	35
Methoxychlor	U	120	140	120	119	96	80	40 *	31 - 133	35
Endrin ketone	U	120	140	119	119	95	80	39 *	19 - 139	35

Table 2.12 Results of the LCS Analysis for Pesticides in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Compound Name	LCS Spike Added µg/kg	LCS Conc. µg/kg	LCS % Rec.	QC Limits % Rec.
alpha-BHC	50	35	70	51 - 124
gamma-BHC (Lindane)	50	37	74	56 - 125
Heptachlor	50	43	86	59 - 124
Aldrin	50	39	78	55 - 131
beta-BHC	50	40	80	57 - 121
delta-BHC	50	33	66	18 - 89
Heptachlor epoxide	50	39	78	56 - 122
Endosulfan I	50	43	86	56 - 127
gamma-Chlordane	50	32	64	52 - 117
alpha-Chlordane	50	39	78	56 - 126
4,4'-DDE	50	37	74	56 - 127
Dieldrin	50	39	78	56 - 123
Endrin	50	44	88	55 - 130
Endosulfan II	50	43	86	50 - 138
4,4'-DDD	50	43	86	52 - 128
4,4'-DDT	50	44	88	55 - 143
Endrin aldehyde	50	38	76	42 - 136
Endosulfan sulfate	50	41	82	42 - 137
Methoxychlor	50	48	96	50 - 134
Endrin ketone	50	46	92	54 - 136

Results of the Surrogate Percent Recoveries for PCB in Water

Prior to extraction, each sample was spiked with a two component surrogate mixture consisting of tetrachloro-m-xylene and decachlorobiphenyl. The surrogate percent recoveries, listed in Table 2.13, ranged from 65 to 110. All twelve surrogate percent recoveries were within the acceptable QC limits.

Results of the LCS Analysis for PCB in Water

The percent recoveries for the LCS analysis, listed in Table 2.14, were 106 and 112. Both percent recoveries were within the acceptable QC limits.

Table 2.13 Results of the Surrogate Percent Recoveries for PCB in Water
WA# 0-133 Quanta Resources

Sample ID	Percent Recovery (%) for Pesticides Analysis			
	TCMX - 1	TCMX - 2	DCB - 1	DCB - 2
Method Blank	67	84	104	107
LCS-1	66	90	108	110
Control H_2O	65	77	101	105

	QC Limits
Tetrachloro-m-xylene (TCMX)	(23 - 112)
Decachlorobiphenyl (DCB)	(21 - 134)

Table 2.14 Results of the LCS Analysis for PCB in Water
WA# 0-133 Quanta Resources

Compound Name	LCS Spike Added µg/L	LCS Conc. µg/L	LCS % Rec.	QC Limits % Rec.
Aroclor-1016	5	5.6	112	54 - 164
Aroclor-1260	10	11	106	80 - 145

QA/QC for PCB in Soil

Results of the Surrogate Percent Recoveries for PCB in Soil

Prior to extraction, each sample was spiked with a two component surrogate mixture consisting of tetrachloro-m-xylene and decachlorobiphenyl. The surrogate percent recoveries, listed in Table 2.15, ranged from 55 to 289. Fifty-two out of 56 surrogate percent recoveries were within the acceptable QC limits.

Results of the MS/MSD Analysis for PCB in Soil

The sample A19071 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.16, ranged from 74 to 124. All four percent recoveries were within the acceptable QC limits. The RPD values, also listed in Table 2.16, were 5 and 6. Both RPD values were within the acceptable QC limits.

Results of the LCS Analysis for PCB in Soil

The percent recoveries for the LCS analysis, listed in Table 2.17, were 110 and 112. Both percent recoveries were within the acceptable QC limits.

Table 2.15 Results of the Surrogate Percent Recoveries for PCB in Soil
WA# 0-133 Quanta Resources

Sample ID	Percent Recovery (%) for Pesticides Analysis			
	TCMX - 1	TCMX - 2	DCB - 1	DCB - 2
Method Blank	89	88	116	123
LCS-1	88	88	115	121
A19070	127	289 *	111	81
A19071	126	235 *	110	63
A19071MS	121	289 *	79	56
A19071MSD	136	271 *	81	55
A19072	190	78	123	87
A19073	94	98	130	97
A19074	89	95	120	80
A19075	121	94	92	72
A19076	113	94	95	80
A19077	106	96	96	88
A19078	107	97	79	80
Control Sediment	121	99	99	104

	QC Limits
Tetrachloro-m-xylene (TCMX)	(19 - 191)
Decachlorobiphenyl (DCB)	(21 - 155)

Table 2.16 Results of the MS/MSD Analysis for PCB in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample: A19071

Compound Name	Sample Result µg/kg	MS Spike Added µg/kg	MS Conc. µg/kg	MS % Rec.	MSD Spike Added µg/kg	MSD Conc. µg/kg	MSD % Rec.	RPD	QC Limits % Rec.	QC Limits RPD
Aroclor-1016	U	1357	1600	118	1354	1700	124	5	58 - 133	20
Aroclor-1260	U	2714	2000	74	2709	2100	79	6	40 - 159	15

Table 2.17 Results of the LCS Analysis for PCB in Soil
WA# 0-133 Quanta Resources
Based on dry weight

Compound Name	LCS Spike Added µg/kg	LCS Conc. µg/kg	LCS % Rec.	QC Limits % Rec.
Aroclor-1016	500	550	110	54 - 164
Aroclor-1260	1000	1100	112	80 - 145

Results of the LCS Analysis for Metals in Water

The percent recoveries for the LCS analysis, listed in Table 2.18, ranged from 86 to 118. No QC limits were provided by the subcontracted laboratory for this analysis.

Table 2.18 Results of the LCS Analysis for Metals in Water
WA# 0-133 Quanta Resources

Compound Name	LCS Certified Concentration µg/L	Concentration Found µg/L	LCS % Rec.
Aluminum	50000	48025.87	96
Antimony	500	458.98	92
Arsenic	500	463.79	93
Barium	500	477.98	96
Beryllium	50	45.83	92
Cadmium	500	452.94	91
Calcium	100000	92204.75	92
Chromium	500	464.60	93
Cobalt	500	459.86	92
Copper	500	474.94	95
Iron	50000	45478.45	91
Lead	500	457.24	91
Magnesium	100000	91435.30	91
Manganese	500	465.21	93
Mercury	1.0	0.86	86
Nickel	500	456.69	91
Potassium	25000	23895.61	96
Selenium	500	433.05	87
Silver	50	47.91	96
Sodium	100000	92060.59	92
Thallium	500	462.87	93
Vanadium	500	470.94	94
Zinc	500	592.18	118

QA/QC for Metals in Soil

Results of the LCS Analysis for Metals in Soil

The percent recoveries for the LCS analysis, listed in Table 2.19, ranged from 65 to 129. All 46 recovered concentrations were within the acceptable QC limits.

Results of the MS/MSD Analysis for Metals in Soil

The sample A19078 was used for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.20, ranged from 31 to 141. Thirteen out of sixteen percent recoveries were within the acceptable QC limits.

Results of the Duplicate Analysis for Metals in Soil

The sample A19078 was used for the duplicate analysis. The values for relative percent difference (RPD), listed in Table 2.21, ranged from 0 (zero) to 5. All nineteen reported RPD values were within the acceptable QC limits. The RPD values for antimony, selenium, and thallium were not calculated since one or both of the concentrations for the sample and the duplicate were below the corresponding MDL values.

Table 2.19 Results of the LCS Analysis for Metals in Soil
WA# 0-133 Quanta Resources

Compound Name	LCS Certified Concentration mg/kg	Concentration Found mg/kg	LCS % Rec.	QC Limits mg/kg
Aluminum	5250.0	5083.4	97	3140.0 - 7360.0
Antimony	33.0	21.3	65	5.9 - 60.2
Arsenic	93.9	98.2	105	69.8 - 118.0
Barium	330.0	379.7	115	254.0 - 405.0
Beryllium	42.7	42.6	100	33.5 - 51.9
Cadmium	97.2	99.7	103	74.8 - 120.0
Calcium	1320.0	1258.1	95	986.0 - 1650.0
Chromium	46.0	50.2	109	35.5 - 56.5
Cobalt	120.0	125.3	104	95.6 - 145.0
Copper	147.0	153.1	104	121.0 - 174.0
Iron	10200.0	9058.7	89	5920.0 - 14500.0
Lead	135.0	137.6	102	103.0 - 167.0
Magnesium	2340.0	2347.0	100	1890.0 - 2790.0
Manganese	166.0	162.6	98	127.0 - 205.0
Mercury	2.2	2.8	129	1.5 - 2.9
Nickel	138.0	146.1	106	108.0 - 168.0
Potassium	1480.0	1461.9	99	1100.0 - 1950.0
Selenium	96.0	93.7	98	71.2 - 121.0
Silver	86.0	93.2	108	64.6 - 109.0
Sodium	845.0	836.8	99	531.0 - 1160.0
Thallium	45.7	50.9	111	23.2 - 68.3
Vanadium	65.1	66.0	101	44.4 - 85.8
Zinc	75.0	73.6	98	58.0 - 92.1

Table 2.19 (cont.) Results of the LCS Analysis for Metals in Soil
WA# 0-133 Quanta Resources

Compound Name	LCS Certified Concentration mg/kg	Concentration Found mg/kg	LCS % Rec.	QC Limits mg/kg
Aluminum	5250.0	5318.6	101	3140.0 - 7360.0
Antimony	33.0	22.1	67	5.9 - 60.2
Arsenic	93.9	94.3	100	69.8 - 118.0
Barium	330.0	348.7	106	254.0 - 405.0
Beryllium	42.7	42.3	99	33.5 - 51.9
Cadmium	97.2	96.9	100	74.8 - 120.0
Calcium	1320.0	1313.4	100	986.0 - 1650.0
Chromium	46.0	49.5	108	35.5 - 56.5
Cobalt	120.0	122.0	102	95.6 - 145.0
Copper	147.0	153.9	105	121.0 - 174.0
Iron	10200.0	9292.1	91	5920.0 - 14500.0
Lead	135.0	137.3	102	103.0 - 167.0
Magnesium	2340.0	2331.3	100	1890.0 - 2790.0
Manganese	166.0	164.1	99	127.0 - 205.0
Mercury	2.2	2.8	129	1.5 - 2.9
Nickel	138.0	141.2	102	108.0 - 168.0
Potassium	1480.0	1473.4	100	1100.0 - 1950.0
Selenium	96.0	91.4	95	71.2 - 121.0
Silver	86.0	90.9	105	64.6 - 109.0
Sodium	845.0	888.3	105	531.0 - 1160.0
Thallium	45.7	52.7	115	23.2 - 68.3
Vanadium	65.1	65.6	101	44.4 - 85.8
Zinc	75.0	83.4	111	58.0 - 92.1

Table 2.20 Results of the Matrix Spike Analysis for Metals in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample ID: A19078

Metal	Sample Conc mg/kg	MS Spike Added mg/kg	MS Conc mg/kg	MS % Rec	Recommended QC Limits %Rec
Antimony	1.5765	42.85	15.0258	31 *	75 - 125
Arsenic	13.8676	17.14	30.2719	96	75 - 125
Barium	72.8866	857.04	983.7243	106	75 - 125
Beryllium	1.0102	21.43	22.6691	101	75 - 125
Cadmium	0.3635	21.43	21.7255	100	75 - 125
Chromium	74.6305	85.70	168.8211	110	75 - 125
Cobalt	12.4471	214.26	230.6739	102	75 - 125
Copper	89.7655	107.13	204.9384	108	75 - 125
Lead	98.1200	8.57	110.2242	141 *	75 - 125
Manganese	671.8378	214.26	922.8378	117	75 - 125
Nickel	33.6818	214.26	253.0826	102	75 - 125
Selenium	U	4.29	2.4478	57 *	75 - 125
Silver	3.3186	21.43	25.0506	101	75 - 125
Thallium	U	21.43	20.4700	96	75 - 125
Vanadium	38.6375	214.26	267.6320	107	75 - 125
Zinc	201.9726	214.26	418.4852	101	75 - 125

Table 2.22 Results of the Duplicate Analysis for Metals in Soil
WA# 0-133 Quanta Resources
Based on Dry Weight

Sample: A19078 Metal	Sample Conc. mg/kg	Duplicate Conc. mg/kg	Relative Percent Difference (%)
Aluminum	17000.0887	17117.8878	1
Antimony	1.5765	U	NC
Arsenic	13.8676	13.3494	4
Barium	72.8866	73.3846	1
Beryllium	1.0102	0.9739	4
Cadmium	0.3635	0.3701	2
Calcium	4322.5972	4552.9951	5
Chromium	74.6305	74.9839	0
Cobalt	12.4471	12.5786	1
Copper	89.7655	90.3286	1
Iron	33923.3700	34514.7479	2
Lead	98.1200	99.7256	2
Magnesium	8122.4992	8236.5705	1
Manganese	671.8378	680.9062	1
Nickel	33.6818	34.6073	3
Potassium	3337.5765	3359.3630	1
Selenium	U	U	NC
Silver	3.3186	3.3983	2
Sodium	5163.1795	5274.9149	2
Thallium	U	U	NC
Vanadium	38.6375	39.0228	1
Zinc	201.9726	206.1922	2

REAC, Edison, NJ
732 ~~(908)~~ 321-4200
EPA Contract ~~68-C4-0022~~ 68-699-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A00133
Lockheed Martin Con ~~RFW~~ Contact: G. Molnar Phone: (732) 321-4200

No: 02064

SHEET NO. 1 OF 1

050300 -

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	VOC	oil charact.	~~Grain size~~ Cm	
870	A08511	Loc 1	SP	5/2/00	1	8oz/4°C		X		
871	A08512	Loc 1 DUP						X		
872	A08513	Loc 2						X		
873	A08517	Loc 2 SUB						X		
874	A08514	Loc 3						X		
875	A08515	Loc 4						X		
876	A08516	Loc 4 SUB						X		
877	A08518	Loc 5						X		
878	A08519	Loc 6						X		
879	A08510	Loc 1				4oz/4°C	X			
880	A08502	Loc 1 DUP					X			
881	A08503	Loc 2					X			
882	A08506	Loc 2 SUB					X			
883	A08504	Loc 3					X			
884	A08505	Loc 4					X			
885	A08507	Loc 4 SUB					X			
886	A08508	Loc 5					X			
887	A08509	Loc 6					X			

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	G. Molnar	5/3/00	C Gasser	5/3/00	15:00	9/0.1 Char.	C Gasser	5/3/00	M. Young	5/3/00	4:00pm
						9/VOC	C Gasser	5/3/00	J Gonzalez	5/3/00	1545

FORM #4 8/94

02064

REAC, Edison, NJ
732 (~~908~~) 321-4200
EPA Contract ~~68-C4-0022~~
68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: RIA 00133
RFW Contact: John Johnson Phone: (732) 321-4200

No: 02068

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	Tal Metal	BNA	Pest/Pcbs
	A19070	Loc 1	SD	5/2/00	1	16oz/4°C	X	X	X
	A19071	Loc 1 Dup			1		X	X	X
	A19072	Loc 2 Sub			1		X	X	X
	A19073	Loc 2			1		X	X	X
	A19074	Loc 3			1		X	X	X
	A19075	Loc 4			1		X	X	X
	A19076	Loc 4 Sub			1		X	X	X
	A19077	Loc 5			1		X	X	X
	A19078	Loc 6			1		X	X	X

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

QA Gm

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all/Analysis	G. Molnar	5/3/00							D. [illegible]	5-4-00	1200

54

106 COASTAL WAY • JUPITER, FL 33477
TEL: (561) 575-2477 • FAX: (561) 575-2497

CHAIN OF CUSTODY RECORD

WORK ORDER # ___-___-___

DUE DATE : ___-___-___

COMPANY Lockheed Martin
ADDRESS 2890 Woodbridge Ave.
Edison, NJ 08837-3679
PHONE # (732) 321-4202 FAX ( )
P.O. #
PROJECT MANAGER Dan Cooke
PROJECT ID/LOCATION

SAMPLE TYPE
1. WASTEWATER
2. SOIL/SEDIMENT
3. SLUDGE
4. OIL
5. DRINKING WATER
6. WATER (GW/MW/SW)
7. TISSUE
8. OTHER (SPECIFY)

CONTAINER TYPE
P - PLASTIC
G - GLASS
V - VOA

ANALYSES

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	PRESERVATIVE	PAHs	Coal Tar											COMMENTS
Control H_2O	6	1L	G	1	5/10/00	0910	4°C	✓	✓											
Control Sediment	2	100 mL	P	1	5/10/00	0910	4°C	✓	✓											

SAMPLED BY Scott Glover	DATE 05-10-00 TIME 0910	RECEIVED BY: [signature]	DATE 5-15-00 TIME 1030
RELINQUISHED BY:	DATE - TIME -	RECEIVED BY:	DATE - TIME -
RELINQUISHED BY:	DATE - TIME -	RECEIVED FOR LAB BY:	DATE - TIME -
METHOD OF SHIPMENT		COOLER TEMPERATURE 3.0°C	

SPECIAL INSTRUCTIONS:

☐ RUSH .... BUSINESS DAY TURN AROUND
☐ ROUTINE

Sample disposal information

Are there any other known or suspected contaminants in these samples other than those listed above?

Yes ___ No ___ If Yes, 1st Known ___ ___

92009

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

GPL
202 Perry Parkway
Gaithersburg, MD 20877

21 June 2000

Attn: Marty Sadoughi

Project # RIA-00133 Quanta Resources

As per Lockheed Martin / REAC Purchase Order GB83753J73, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
BNA/ SW-846-8270C	Sediment Bivalves	8 3
Pesticides/ SW-846-8081A	Sediment Bivalves	8 3
PCB / SW-846-8082	Sediment Bivalves	8 3
TAL Metals/ SW-846-6010 and Series 7000	Sediment Bivalves	8 3
Data package: Package with Diskette Deliverable		

Samples are expected to arrive at your laboratory on May 04, 2000. **All applicable QA/QC (MS/MSD) analysis as per method, will be performed on our sample matrix.** Preliminary sample and QC result tables plus a signed copy of our Chain of Custody must be faxed to REAC 10 business days after receipt of the samples. The complete data package is due 21 business days after receipt of the last samples. The complete data package must include all items on the deliverables checklist. **Expect all samples to be difficult matrix and all raw data must be included in final analytical report.**

ALL ORGANIC EXTRACTIONS ON SOLIDS IE: BNA,PEST/PCB MUST BE BY SOXHLET EXTRACTION

Please submit all reports and technical questions concerning this project to **John Johnson at (732) 321-4248 or fax to (732) 494-4020.** Any contractual question, please call Ray McCurdy at (732) 321-4296.

Sincerely,

Deborah Killeen
Data Validation and Report Writing Group Leader
Lockheed Martin / REAC Project

DK:jj Attachments
The estimated cost for these analyses is $7145

cc. R. Singhvi
M. Sprenger
0133\non\mem\200x\sub\0133Con3
D. Miller
Subcontracting File
C. Gasser
R. McCurdy
G. Molnar
D. Killeen

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

GLP Laboratories, LLLP
202 Perry Parkway
Gaithersburg, MD 20877

Attn.: Marty Sadoughi **13 June 2000**

Dear Mr Sadoughi:

Upon review of your analytical report from Quanta Resource Site WA# R1A00133, your reference numbers 0005046 for metals analysis of soil samples the following information is required.

1.) On Form X, page 4029, total metals detection limits are reported as PQLs and MDLs. Are these MDLs based on your laboratory studies, or do they represent IDLs?

2.) For the MDLs, please provide a summary table recapitulating your laboratory MDL study.

We would appreciate a response to these questions within twenty-four hours of receiving this letter, as our deadline for reporting to our client is rapidly approaching. **If you have any questions please call Dr. Antonio Lo Surdo at (732) 494 - 4012, or fax response to (732) 494 -4020**

Thank you.

Deborah Killeen
Data Validation and Report Writing Group Leader
Lockheed Martin Technology Services Group/REAC Project

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

GPL Laboratories, LLLP
202 Perry Parkway
Gaithersburg, MD 20877

Attn.: Marty Sadoughi **14 June 2000**

Dear Mr Sadoughi:

Upon review of your analytical report from Quanta Resource Site WA# R1A00133, your reference numbers 0005103 for metals analysis of one water sample, the following information is required.

1.) On Form III, page 4012, method detection limits are reported for preparation blank as well as initial and continuing calibration blanks. Please supply the water MDL study summary.

We would appreciate a response to these questions within twenty-four hours of receiving this letter, as our deadline for reporting to our client is rapidly approaching. **If you have any questions please call Dr. Antonio Lo Surdo at (732) 494 - 4012, or fax response to (732) 494 -4020**

Thank you.

Deborah Killeen
Data Validation and Report Writing Group Leader
Lockheed Martin Technology Services Group/REAC Project

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

GPL Laboratories, LLLP
202 Perry Parkway
Gaithersburg, MD 20877

Attn.: Marty Sadoughi **16 June 2000**

Dear Mr Sadoughi:

Upon review of your analytical report from Quanta Resource Site WA# R1A00133, your reference numbers 0005103 for metals analysis of one water sample and one sediment sample, the following information is required.

1.) On Form IV, page 4049, ICP INTERFERENCE CHECK SAMPLE, only the initial results for solutions A and AB are reported. Please supply the corrected form IV with the final ICSA and ICSAB as well as the backup raw data.

We would appreciate a response to these questions within twenty-four hours of receiving this letter, as our deadline for reporting to our client is rapidly approaching. **If you have any questions please call Dr. Antonio Lo Surdo at (732) 494 - 4012, or fax response to (732) 494 -4020**

Thank you.

Deborah Killeen
Data Validation and Report Writing Group Leader
Lockheed Martin Technology Services Group/REAC Project

APPENDIX D
Final Oil Characterization Report
Quanta Resources Site
Edgewater, NJ
August 2000

Lockheed Martin Technology Services Group
Environmental Services REAC
2890 Woodbridge Avenue, Building 209 Annex Edison, NJ 08837-3679
Telephone 732-321-4200 Facsimile 732-494-4021

LOCKHEED MARTIN

Date: June 16, 2000

To: Work Assignment Manager Mark Sprenger, EPA/ERTC

From: Vinod Kansal, Organic Group Leader, Analytical Section, REAC Vinod Kansal

Subject: Preliminary Results of Project Quanta Resources WA# R1A00133

Attached please find the preliminary results of the above referenced project for the following samples:

Chain(s) of Custody No.: 02064
Analyses: Full oil characterization
No. of Samples: 8
Matrix: Sediment

Comments: See the attached

cc Raj Singhvi, V.Kansal
Central File
~~D. Angwenyi~~
Task Leader: G. Molnar
Analyst: C.W. CHUANG

Preliminary Analytical Report Summary Date: June 16, 2000

Subject: Results of Full Oil Characterization Analysis by GC-MS on the Quanta Resources site (R1A00133)

Nine sediment samples collected from the Quanta Resources site (Chain of Custody # 02064) were requested for full oil characterization analysis. The analysis included the determination of saturates, polynuclear aromatic hydrocarbons (PAHs), steranes, hopanes and their pattern distributions, and the concentration of total petroleum hydrocarbons (TPH). Procedures for full oil characterization analysis are described in the next section.

The analysis results of saturates, PAHs, steranes, hopanes and their pattern distributions of the samples are shown in Tables 1-4, respectively. The results of TPH are listed in Table 5.

Tables 1.0 & 1.1 show that the samples contain saturates that below their detection limit (MDL). As a result, their pattern distributions are too low to be used for interpretation.

Tables 2.0 & 2.1 show that sample collected from LOC 1 contains high concentrations of PAHs and their isomers. The results indicate that this location contaminated with fresh creosote (coal tar). Tables 2.0 & 2.1 also show that PAHs pattern distributions of the samples collected from other locations (i.e., LOC 2-6) are identical. The pattern distributions show that PAHs before phenanthrene (a three-ring PAH) in these locations were diminished, possibly through both evaporative and natural biodegradable weathering. The amount of PAHs (after phenanthrene) and their isomers of these samples diminished in a reducing order of LOC 3, LOC 2 SUB, LOC 4, LOC 4 SUB, LOC 2, LOC 5, and LOC 6. Statistically, the amount of PAHs at LOC 4 is the same as that at LOC 4 SUB and at LOC 2, and LOC 5 is the same as LOC 6. In this case, the degree of weathering increased in an order of LOC 1, LOC 3, LOC 2 SUB, LOC 2 (LOC 4, LOC 4 SUB), and LOC 5 (LOC 6). In conclusion, severe weathering occurred at both LOC 5 and 6 such that the amount of light PAHs has already reduced to below their MDL and very low amount of heavy PAHs remains in these two locations. On the other hand, the sample at LOC 1 seems to show no sign of weathering.

Tables 3.0 & 4.0 show results of both steranes and hopanes measurements. The results of all samples below their MDL indicate that the source of contamination is believed to be non-crude oil.

The concentrations of TPH, as listed in Table 5, below or near their MDL indicate that low amount of saturates was detected in the samples. Their TPH profiles also indicate that the samples (except LOC 1) have certain degrees of weathering. Overall, all samples (except LOC 1) are identified as biodegraded creosote (coal tar) substances.

In this analysis, all calibration checks and surrogate recovery of the extraction passed the acceptable criteria. No MS/MSD are required for the analysis. The data package includes result tables of all analytes, a surrogate recovery table, and all necessary supporting files such as original calibration ranges, continuing calibration checks, and raw acquisition files. The package also includes documents such as chain of custody, extraction log, and %solid results.

The Analytical Method of Full Oil Characterization for Soil Samples

The method outlines procedures for oil analysis/oil characterization. The complete method is based on the drafts submitted in May 1996 by J. Syslo, with titles of "Procedures for the Extraction and Analysis of Oil as Source Oil, and Oil Found in Aqueous and Solid Matrices." and "Revised Draft Action Plan for Analyses of Oil Spill Bioremediation Samples". The two drafts are a compilation of SW846's 8015B, ASTM's D3328, Marine Safety Laboratories Notice 5200.9, and several other methods used by the US Coast Guard, Environment Canada, and other labs that are currently developing methods and techniques for oil analysis/oil characterization. The method characterizes oil samples using standard oil fingerprinting techniques, PAHs and their homologue patterns, saturated hydrocarbon patterns and distributions, and steranes and triterpanes (hopanes) isomers and distributions, as well as their overall intrinsic relationships with sources of oils. This new analytical method is still in "pilot" stage and is subjected to future changes to improve its performance.

Extraction Procedure

Approximately 30 grams of an oil sample was spiked with 500 µL of a surrogate mixture that contains anthracene-d_{10}, 5a-androstane, and triacontane-d_{62} (400 µg/mL each). The sample was mixed with sufficient amount of anhydrous sodium sulfate, followed by Soxhlet extraction with 300 mL of methylene chloride for 16 hours. The methylene chloride solution was then concentrated to a final volume of 10 mL.

Analytical Procedure

One milliliter of the final extract of each sample was transferred to a GC vial, followed by spiking with 20 uL of an internal standard mix, prior to instrumental analysis. The internal standard mix contains phenanthrene-d_{10}, chrysene-d_{12}, perylene-d_{12}, tetradecane-d_{30}, and tetracosane-d_{50} (500 µg/mL each).

A HP 5890 gas chromatograph/5972 mass selective detector (GC-MS) equipped with a 7673 autosampler was used to analyze samples. The instrument is operated on a PC equipped with the HP Chemstion/Enviroquant.

The instrument operating conditions are as follows:

Column	Rtx-5, 30 meter x 0.25mm ID, 0.50 µm film thickness fused silica capillary (Restek)
Column flow	Helium at 1.1 mL/min (constant flow)
Injection temperature	290 °C
Transferline temperature	290 °C
Source temperature	170 °C
Temperature program	50 °C for 0.5 min ramp to 295° C at 20° C/min (hold 8.5 min) ramp to 305° C at 25° C/min (hold 15 min)
Injection mode	Splitess (purge time = 1 min)
Injection volume	1µL
Liner	2 mm ID straight, packed with about 10 mm of silanized & conditioned glass wool.
Scan mode	Selective Ion Monitoring (SIM)
Electronic multiplier	200 volts above the tune's value

The analytical method includes two separate method files to quantitate different target analytes. The first one, OILSIMI, is used to acquire all samples using the above operating conditions and to quantitate saturates, PAHs, and TPH. The other one, HOPSTERI, is used for calculate hopanes, steranes, and surrogates. Quantiation of saturates, and PAHs are processed on Enviroquant, whereas PAHs' homologue isomers are identified and quantitated by manual search.

Three separate calibration ranges were used for full oil analysis: the TPH calibration range includes five standards at 1000, 5000, 10000, 25000, and 50000 µg/mL. The hopane and sterane calibration range includes C_{27}-sterane, C_{30}-hopane and three surrogates at 0.5, 1.0, 5.0, 10, and 25 µg/mL. The calibration range of saturates and PAHs include

C_8-C_{38} normal alkanes, pristane, phytane, 16 PAHs and three surrogates at 1.0, 5.0, 10, 25 and 50 µg/mL. The TPH/oil standard should be an original source, a similar product, or ideally obtained from the sampling site.

Saturates and PAHs are quantitated using their individual average response factors. Quantitation of PAHs' homologue isomers was based on their parent PAHs' average response factors. The average response factor, RF_{ave}, is used when target analytes are quantitated with an initial calibration curve. The continuing calibration response factor, RF_{cc}, is used when target analytes are quantitated with a continuing calibration standard.

Response Factor calculations

The response factor of each specific analyte at each calibration concentration is calculated based on the following equation:

$$RF = \frac{Ac \times Iis}{Ais \times Ic}$$

where
RF = Response factor for a specific analyte
A_c = Area of the analyte in the standard
I_{is} = Mass of the specific internal standard
A_{is} = Area of the specific internal standard
I_c = Mass of the analyte in the standard

The average response factor, RF_{ave}, is defined as follows:

$$RF_{ave} = \frac{RF_1 + RF_2 + \ldots RF_n}{n}$$

where n is the number of calibration standards. Usually, n = 5.

The average response factor of each analyte of saturates, PAHs, C_{27}-sterane, C_{30}-hopane, three surrogates, and TPH is calculated either using Evironquant or QuattroPro. The standard deviation of the five-point calibration range is also calculated. The criteria of acceptable calibration range for all analytes are 30%.

Analyte Concentration Calculations

The SHC and PAHs, and surrogates were calculated using the average response factors of the method. The concentration of the detected analytes was calculated using the following equation:

$$C = \frac{DFA_uI_{is}V_t}{A_{is}RF_{ave}(\text{or } RFcc)V_iW_{t0}}$$

where
C_u = Concentration of target analyte (mg/Kg)
DF = Dilution Factor
A_u = Area of target analyte
I_{is} = Mass of specific internal standard (ng)
V_t = Volume of extract (µL)
A_{is} = Area of specific internal standard
RF_{cc} = Continuing calibration response Factor
RF_{ave} = average Response Factor
V_i = Volume of extract injected (µL)
Wt_o = Sample weight (g)

The steranes and hopanes are calculated manually using QuattroPro. The surrogates are calculated using their average response factors in the method, HOPSTERI. The sum of the C_{29} hopane(17a(H),21B(H)-30-norhopane) and C_{30} hopane (17a(H),21B(H)-hopane) are use to represent hopane concentrations for normalizing TPH data because they are widely recommended in oil literature. The concentrations of the 15 hopanes and 13 steranes in the samples

are calculated based on the hopane and sterane compounds in the daily check. The hopane and sterane data is generally used to establish a "pattern" to be used either for source oil identification or for bioremediation monitoring.

The TPH area of each sample is obtained by generating an extracted ion chromatogram (EIC) at m/z = 85 from its total ion chromatogram (TIC). The whole EIC is subsequently integrated as one peak. The response factor of each TPH standard is calculated based on area sum of the two internal standards, tetradecane-d_{30} and tetracosane-d_{50}.

The concentration of the TPH was calculated using the following equation:

$$C = \frac{DFA_uI_{is}V_t}{A_{is}RF_{ave}(\text{or } RF)V_iWt_0}$$

where

C_u	=	Concentration of target analyte (mg/Kg)
DF	=	Dilution Factor
A_u	=	Integrated area of Ion 85 (one peak)
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (µl)
A_{is}	=	Area sum of tetradecane-d_{30} and tetracosane-d_{50}
RF	=	Response Factor of the calibration check
RF_{ave}	=	Average Response Factor
V_i	=	Volume of extract injected (µl)
Wt_0	=	Weight of sample (g)

RF_{ave} is used when samples are associated with an initial calibration curve; whereas RF is used when samples are associated with a continuing calibration check.

Sample Analysis

The GC-MS is first tuned by injecting 50 ng of decafluorotriphenylphosphine (DFTPP) in the linear scan mode. After the system passed the DFTPP tune criteria, three mid-range calibration standards are used as daily calibration check standards: TPH standard at 10000 µg/mL, saturates and PAHs at 10 µg/mL, and hopane/sterane and surrogates of at 5.0 µg/mL. The response factor of each continuing calibration check standard (RFcc) is evaluated by comparison to the average response of it original calibration range. Continuing calibration check evaluation for saturates, PAHs, hopane, sterane, and surrogates is conducted on Enviroquant; Continuing calibration check evaluation for TPH is performed manually on Quattro Pro. The samples can be acquired once all three calibration checks passed the acceptable criteria (e.g., ±30%)

Table 1 of the appendix lists analytes of staruates, PAHs, and their corresponding internal standards used in the method. Table II lists quant ion of analytes , surrogates, and internal standard used in the method.

APPENDIX

Table I. Analytes of Saturates, PAHs and their Corresponding Internal Standa

Naphthalene-d_8
n-C_8 thru n-C_{15} SHCs
Naphthalene
C1N thru C4N isomers

Phenanthrene-d_{10}
n-C_{16} thru n-C_{23} SHCs
Fluorene
C1F thru C3F isomers
Pristane
Phytane
Dibenzothiophene
C1D thru C3D isomers
Phenanthrene
Anthracene
C1P/A thru C3P/A isomers
Anthracene-d_{10} {surr}
5a-androstane {surr}

Chrysene-d_{12}
Fluoranthene
Pyrene
C1F/P & C2F/P isomers
Chrysene
C1C & C2C isomers
Chloestane {Steranes}

Perylene-d_{12}
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(e)pyrene
Benzo(a)pyrene
Perylene
Indeno(1,2,3-cd)pyrene
Dibenzo(a,h)anthracene
Benzo(g,h,i)perylene
Hopane {moretane / hopanes}

d_{50}-Tetracosane
n-C_{19} thru n-C_{36}, & n-C_{38}
d62-Triacontane {surr}

Sum of d_{30}-Tetradecane + d_{50}-Tetracosane
Total TPH using m/z ion 85

Table II. Quant Ions of Saturates, PAHs, Surrogates, and Internal Standards.

Compound:	Quant Ion:
d8-Naphthalene {is}	136
Octane C8	85
Nonane C9	85
Decane C10	85
Undecane C11	85
Naphthalene	128
C1-naphthalene isomers	142
C2-naphthalene isomers	156
C3-naphthalene isomers	170
C4-naphthalene isomers	184
Dodecane C12	85
Tridecane C13	85
Tetradecane C14	85
Pentadecane C15	85
d10-Phenanthrene {is}	188
Hexadecane C16	85
Fluorene	166
C1-fluorene isomers	180
C2-fluorene isomers	194
C3-fluorene isomers	208
Heptadecane C17	85
Pristane	85
Dibenzothiophene	184
C1-dibenzothiophene isomers	198
C2-dibenzothiophene isomers	212
C3-dibenzothiophene isomers	226
Octadecane C18	85
Phytane	85
Phenanthrene	178
Anthracene	178
C1-phenanthrene/anthracene isomers	192
C2-phenanthrene/anthracene isomers	206
C3-phenanthrene/anthracene isomers	220
d12-Chrysene {is}	240
C27 Baa-cholestane and other Sterane isomers	217
Fluoranthene	202
Pyrene	202
C1-fluoranthene/pyrene isomers	216
C2-fluoranthene/pyrene isomers	230
Chrysene	228
C1-chrysene isomers	242
C2-chrysene isomers	256
d12-Perylene {is}	264
Benzo(b)fluoranthene	252
Benzo(k)fluoranthene	252
Benzo(e)pyrene	252

(continued)

Table II. (continued)

COMPOUND	Quant Ion
Benzo(a)pyrene	252
Perylene	252
Indeno(1,2,3-cd)pyrene	276
Dibenzo(a,h)anthracene	278
Benzo(g,h,i)perylene	276
C30 17B(H),21a(H) hopane & other hopane isomers	191
d50-Tetracosane {is}	66
Nonadecane C19	85
Eicosane C20	85
Heneicosane C21	85
Docosane C22	85
Tricosane C23	85
Tetracosane C24	85
Pentacosane C25	85
Hexacosane C26	85
Heptacosane C27	85
Octacosane C28	85
Nonacosane C29	85
Triacontane C30	85
Hentriacontane C31	85
Dotriacontane C32	85
Tritriacontane C33	85
Tetratriacontane C34	85
Pentatriacontane C35	85
Hexatriacontane C36	85
Octatriacontane C38	85
d30-Tetradecane {is}	66
Total TPH uses sum of d30-Tetradecane {is} & d50-Tetracosane {is}	85

Note: The analytes included in the method, HOPSTERI, are listed as follows:

Compound:	Quant Ion
d10-Phenanthrene {is}	188
d10-Anthracene {surr}	188
5a Androstane {surr}	260
d12-Chrysene {is}	240
C27 Baa Cholestane (20R)	217
d12-Perylene {is}	264
C30 17b(H), 21a(H) Hopane and other hopane isomers	191
d50-Tetracosane {is}	66
d62-Triacontane {surr}	66

Chain of Custody

REAC, L..son, NJ
732 (908) 321-4200
EPA Contract ~~68-C4-0022~~

CHA.. OF CUSTODY RECORD

Project Name: Quanta Resources
Project Number: R1A-00133
Lockheed Martin Contact: G. Molnar Phone: (732) 321-4200

No: 02064

SHEET NO. 1 OF 1

050300-

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	VOC	oil charact.	Grain size	
870	A08511	Loc 1	SD	5/2/00	1	8oz/4°C		X		
871	A08512	Loc 1 DUP						X		
872	A08513	Loc 2						X		
873	A08517	Loc 2 SUB						X		
874	A08514	Loc 3						X		
875	A08515	Loc 4						X		
876	A08516	Loc 4 SUB						X		
877	A08518	Loc 5						X		
878	A08519	Loc 6						X		
879	A08510	Loc 1				4oz/4°C	X			
880	A08502	Loc 1 DUP					X			
881	A08503	Loc 2					X			
882	A08506	Loc 2 SUB					X			
883	A08504	Loc 3					X			
884	A08505	Loc 4					X			
885	A08507	Loc 4 SUB					X			
886	A08508	Loc 5					X			
887	A08509	Loc 6					X			

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	G. Molnar	5/3/00	C Gasser	5/3/00	15:00	9/Oil Char.	C Gasser	5/3/00	M. Younis	5/3/00	4:00pm
						9/VOC	C Gasser	5/3/00	J Donayez	5/3/00	1545

FORM 1 8/94

Results of SHC

TABLE 1.0 Results of the Oil Analysis for Saturated Hyrdrocarbons (SHCs) in Soil
WA# R1A00133: Quanta Resources
Results are Based on Dry Weight

Sample No.	SBLK050800		A08511		A08512		A08513		A08517	
Sample Location			LOC 1		LOC 1 DUP		LOC 2		LOC 2 SU	
GC/MS File Name	LM1648		LM1649		LM1650		LM1651		LM1652	
Matrix	SOIL		SOIL		SOIL		SOIL		SOIL	
Dilution Factor	1.0		5.0		5.0		1.0		5.0	
% Solid	100.0		38.6		37.8		41.3		42.6	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Compound Name	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	M
C8	U	0.3	U	4.3	U	4.4	U	0.8	U	
C9	U	0.3	U	4.3	U	4.4	U	0.8	U	
C10	U	0.3	0.5 J	4.3	0.5 J	4.4	U	0.8	U	
C11	U	0.3	0.6 J	4.3	0.8 J	4.4	U	0.8	U	
C12	U	0.3	1.1 J	4.3	1.6 J	4.4	U	0.8	U	
C13	U	0.3	1.2 J	4.3	1.6 J	4.4	U	0.8	U	
C14	U	0.3	1.7 J	4.3	2.2 J	4.4	0.08 J	0.8	U	
C15	U	0.3	1.6 J	4.3	2.1 J	4.4	0.1 J	0.8	0.8 J	
C16	U	0.3	2.2 J	4.3	2.8 J	4.4	0.2 J	0.8	0.5 J	
C17	U	0.3	1.4 J	4.3	1.8 J	4.4	0.2 J	0.8	U	
PRISTANE	U	0.3	2.0 J	4.3	2.4 J	4.4	0.3 J	0.8	1.1 J	
C18	U	0.3	0.8 J	4.3	1.4 J	4.4	U	0.8	U	
PHYTANE	U	0.3	1.7 J	4.3	2.1 J	4.4	0.2 J	0.8	0.7 J	
C19	U	0.3	1.0 J	4.3	1.4 J	4.4	0.1 J	0.8	U	
C20	U	0.3	0.8 J	4.3	1.3 J	4.4	0.2 J	0.8	U	
C21	U	0.3	0.8 J	4.3	1.2 J	4.4	0.2 J	0.8	U	
C22	U	0.3	3.9 J	4.3	5.0	4.4	0.6 J	0.8	U	
C23	U	0.3	1.0 J	4.3	1.9 J	4.4	0.4 J	0.8	U	
C24	U	0.3	0.5 J	4.3	1.7 J	4.4	0.4 J	0.8	U	
C25	U	0.3	1.5 J	4.3	2.9 J	4.4	0.8 J	0.8	1.0 J	
C26	U	0.3	0.7 J	4.3	2.2 J	4.4	0.6 J	0.8	U	
C27	U	0.3	1.3 J	4.3	2.6 J	4.4	0.8	0.8	0.9 J	
C28	U	0.3	0.7 J	4.3	2.0 J	4.4	0.6 J	0.8	U	
C29	U	0.3	3.5 J	4.3	4.9	4.4	1.4	0.8	U	
C30	U	0.3	0.8 J	4.3	1.6 J	4.4	0.4 J	0.8	U	
C31	U	0.3	2.0 J	4.3	2.7 J	4.4	1.0	0.8	1.0 J	
C32	U	0.3	U	4.3	U	4.4	0.2 J	0.8	U	
C33	U	0.3	0.9 J	4.3	1.1 J	4.4	0.4 J	0.8	U	
C34	U	0.3	U	4.3	U	4.4	U	0.8	U	
C35	U	0.3	U	4.3	U	4.4	U	0.8	U	
C36	U	0.3	U	4.3	U	4.4	U	0.8	U	
C37	U	0.3	U	4.3	U	4.4	U	0.8	U	
C38	U	0.3	U	4.3	U	4.4	U	0.8	U	

Note: The concentration for C37 is estimated
J - Concentrations are estimated and below the MDL
Quanta Resources

TABLE 1.0 Results of the Oil Analysis for Saturated Hyrdrocarbons (SHCs) in Soil
WA# R1A00133: Quanta Resources
Results are Based on Dry Weight

Sample No.	A08514		A08515		A08516		A08518		A08519	
Sample Location	LOC 3		LOC 4		LOC 4 SUB		LOC 5		LOC 6	
GC/MS File Name	LM1653		LM1654		LM1655		LM1656		LM1657	
Matrix	SOIL		SOIL		SOIL		SOIL		SOIL	
Dilution Factor	5.0		1.0		1.0		1.0		1.0	
% Solid	40.3		42.3		44.2		47.2		41.8	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Compound Name	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MD
C8	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C9	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C10	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C11	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C12	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C13	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C14	U	4.1	0.1 J	0.8	0.08 J	0.8	U	0.7	U	0.
C15	0.7 J	4.1	0.1 J	0.8	0.2 J	0.8	U	0.7	U	0.
C16	U	4.1	0.1 J	0.8	0.1 J	0.8	U	0.7	U	0.
C17	U	4.1	0.2 J	0.8	0.1 J	0.8	0.1 J	0.7	0.1 J	0.
PRISTANE	0.8 J	4.1	0.3 J	0.8	0.3 J	0.8	0.1 J	0.7	0.1 J	0.
C18	U	4.1	0.2 J	0.8	U	0.8	U	0.7	U	0.
PHYTANE	0.6 J	4.1	0.2 J	0.8	0.2 J	0.8	0.1 J	0.7	0.1 J	0.
C19	U	4.1	0.1 J	0.8	U	0.8	U	0.7	U	0.
C20	U	4.1	0.1 J	0.8	U	0.8	U	0.7	U	0.
C21	U	4.1	0.2 J	0.8	U	0.8	U	0.7	U	0.
C22	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C23	U	4.1	U	0.8	U	0.8	0.2 J	0.7	0.1 J	0.
C24	0.7 J	4.1	U	0.8	U	0.8	U	0.7	U	0.
C25	1.2 J	4.1	0.6 J	0.8	0.4 J	0.8	0.4 J	0.7	0.3 J	0.
C26	U	4.1	0.2 J	0.8	U	0.8	U	0.7	U	0.
C27	1.2 J	4.1	0.6 J	0.8	0.4 J	0.8	0.5 J	0.7	0.4 J	0.
C28	0.9 J	4.1	U	0.8	U	0.8	U	0.7	U	0.
C29	U	4.1	U	0.8	U	0.8	0.9	0.7	0.8	0.
C30	0.8 J	4.1	U	0.8	U	0.8	U	0.7	U	0.
C31	1.2 J	4.1	1.0	0.8	0.7 J	0.8	0.8	0.7	0.6 J	0.
C32	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C33	0.5 J	4.1	0.4 J	0.8	U	0.8	0.4 J	0.7	0.3 J	0.
C34	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C35	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C36	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C37	U	4.1	U	0.8	U	0.8	U	0.7	U	0.
C38	U	4.1	U	0.8	U	0.8	U	0.7	U	0.

Note: The concentration for C37 is estimated
J - Concentrations are estimated and below the MDL
Quanta Resources

Table 1.1
Distribution of n-Alkanes and TPH

Sample No. SBLK050800
Sample Location

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.0
Pentadecane	C15	0.0
Hexadecane	C16	0.0
Heptadecane	C17	0.0
Pristane	PRI	0.0
Octadecane	C18	0.0
Phytane	PHY	0.0
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.0
Tetracosane	C24	0.0
Pentacosane	C25	0.0
Hexacosane	C26	0.0
Heptacosane	C27	0.0
Octacosane	C28	0.0
Nonacosane	C29	0.0
Triacontane	C30	0.0
Hentriacontane	C31	0.0
Dotriacontane	C32	0.0
Tritriacontane	C33	0.0
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		0

C17/Pristane	N/A
C18/Phytane	N/A
Pristane/Phytane	N/A
WI	N/A
CPI	ERR
RES	0
RES + UCM	0
RES/(RES+UCM)	NC

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture

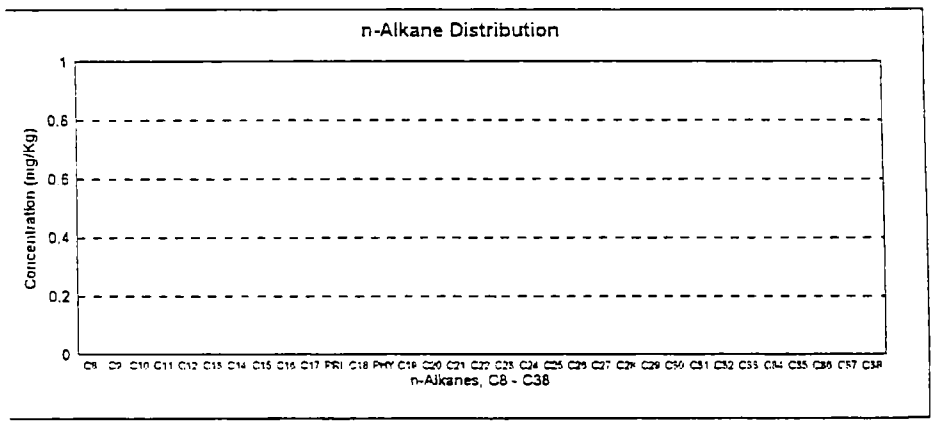


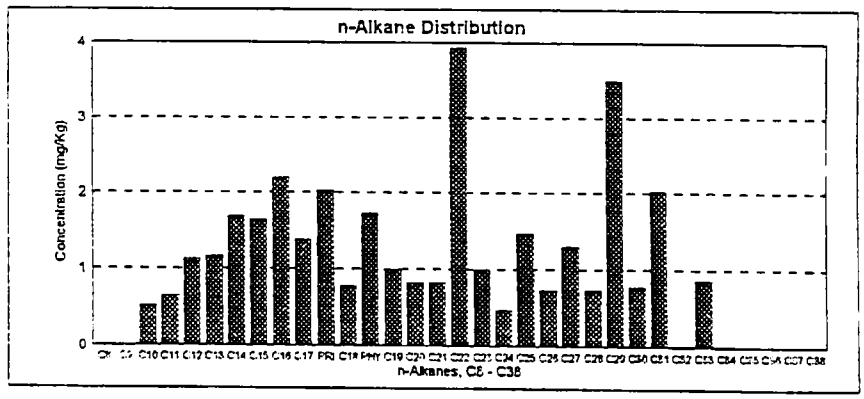
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08511
Sample Location	LOC 1

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.5
Undecane	C11	0.6
Dodecane	C12	1.1
Tridecane	C13	1.2
Tetradecane	C14	1.7
Pentadecane	C15	1.6
Hexadecane	C16	2.2
Heptadecane	C17	1.4
Pristane	PRI	2.0
Octadecane	C18	0.8
Phytane	PHY	1.7
Nonadecane	C19	1.0
Eicosane	C20	0.8
Heneicosane	C21	0.8
Docosane	C22	3.9
Tricosane	C23	1.0
Tetracosane	C24	0.5
Pentacosane	C25	1.5
Hexacosane	C26	0.7
Heptacosane	C27	1.3
Octacosane	C28	0.7
Nonacosane	C29	3.5
Triacontane	C30	0.8
Hentriacontane	C31	2.0
Dotriacontane	C32	0.0
Tritriacontane	C33	0.9
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		34

C17/Pristane	0.68
C18/Phytane	0.45
Pristane/Phytane	1.18
WI	0.57
CPI	1.05
RES	34
RES + UCM	2422
RES/(RES+UCM)	0.0142

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



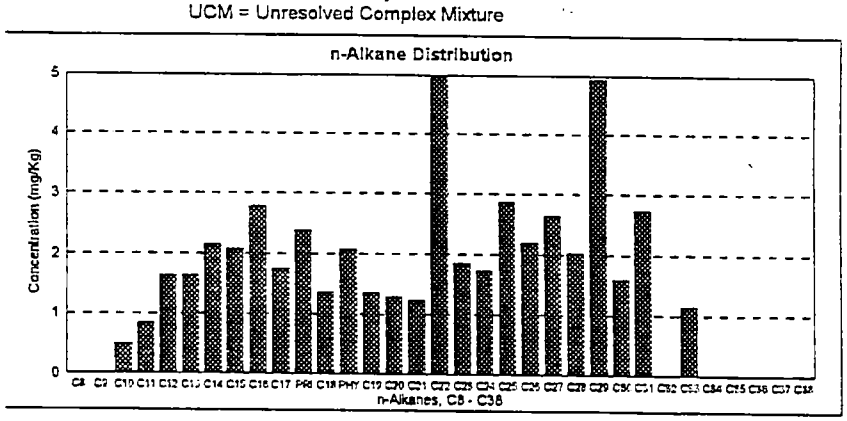
LOC 1

Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08512
Sample Location	LOC 1 DUP

n-Alkanes	Cn.	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.5
Undecane	C11	0.8
Dodecane	C12	1.6
Tridecane	C13	1.6
Tetradecane	C14	2.2
Pentadecane	C15	2.1
Hexadecane	C16	2.8
Heptadecane	C17	1.8
Pristane	PRI	2.4
Octadecane	C18	1.4
Phytane	PHY	2.1
Nonadecane	C19	1.4
Eicosane	C20	1.3
Heneicosane	C21	1.2
Docosane	C22	5.0
Tricosane	C23	1.9
Tetracosane	C24	1.7
Pentacosane	C25	2.9
Hexacosane	C26	2.2
Heptacosane	C27	2.6
Octacosane	C28	2.0
Nonacosane	C29	4.9
Triacontane	C30	1.6
Hentriacontane	C31	2.7
Dotriacontane	C32	0.0
Tritriacontane	C33	1.1
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		52
C17/Pristane		0.74
C18/Phytane		0.66
Pristane/Phytane		1.15
WI		0.39
CPI		1.05
RES		52
RES + UCM		2988
RES/(RES+UCM)		0.0173

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 1 DUP

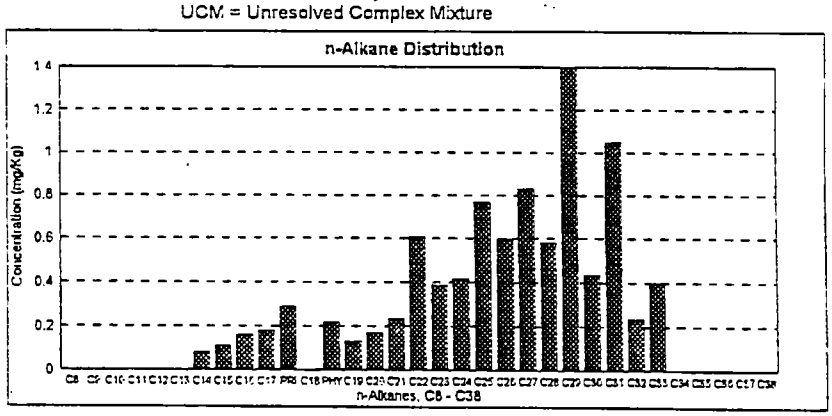
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08513
Sample Location	LOC 2

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.1
Pentadecane	C15	0.1
Hexadecane	C16	0.2
Heptadecane	C17	0.2
Pristane	PRI	0.3
Octadecane	C18	0.0
Phytane	PHY	0.2
Nonadecane	C19	0.1
Eicosane	C20	0.2
Heneicosane	C21	0.2
Docosane	C22	0.6
Tricosane	C23	0.4
Tetracosane	C24	0.4
Pentacosane	C25	0.8
Hexacosane	C26	0.6
Heptacosane	C27	0.8
Octacosane	C28	0.6
Nonacosane	C29	1.4
Triacontane	C30	0.4
Hentriacontane	C31	1.0
Dotriacontane	C32	0.2
Tritriacontane	C33	0.4
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		9

C17/Pristane	0.61
C18/Phytane	N.A.
Pristane/Phytane	1.33
WI	0.04
CPI	1.45
RES	9
RES + UCM	876
RES/(RES+UCM)	0.0106

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 2

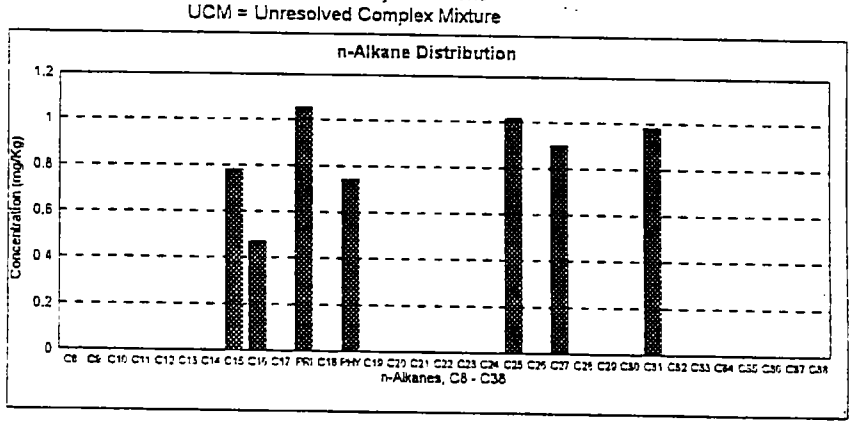
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08517
Sample Location	LOC 2 SUB

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.0
Pentadecane	C15	0.8
Hexadecane	C16	0.5
Heptadecane	C17	0.0
Pristane	PRI	1.1
Octadecane	C18	0.0
Phytane	PHY	0.7
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.0
Tetracosane	C24	0.0
Pentacosane	C25	1.0
Hexacosane	C26	0.0
Heptacosane	C27	0.9
Octacosane	C28	0.0
Nonacosane	C29	0.0
Triacontane	C30	0.0
Hentriacontane	C31	1.0
Dotriacontane	C32	0.0
Tritriacontane	C33	0.0
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		6

C17/Pristane	N/A
C18/Phytane	N/A
Pristane/Phytane	1.42
WI	N/A
CPI	1.62
RES	6
RES + UCM	178
RES/(RES+UCM)	0.0334

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 2 SUB

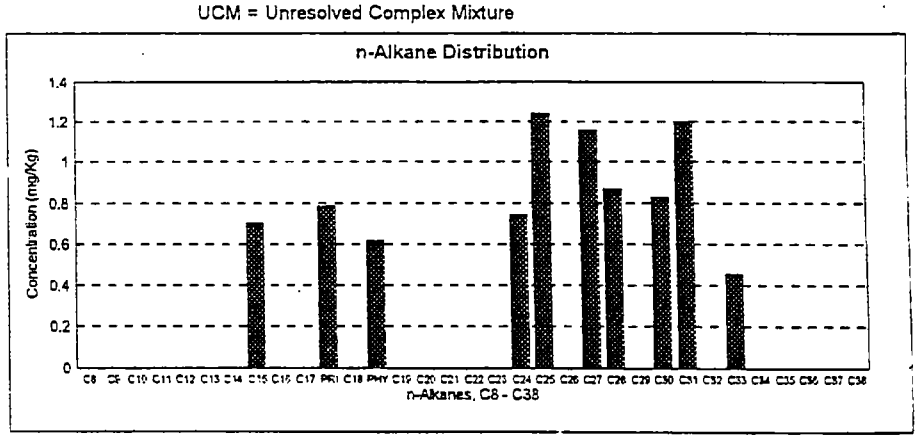
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08514
Sample Location	LOC 3

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.0
Pentadecane	C15	0.7
Hexadecane	C16	0.0
Heptadecane	C17	0.0
Pristane	PRI	0.8
Octadecane	C18	0.0
Phytane	PHY	0.6
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.0
Tetracosane	C24	0.7
Pentacosane	C25	1.2
Hexacosane	C26	0.0
Heptacosane	C27	1.2
Octacosane	C28	0.9
Nonacosane	C29	0.0
Triacontane	C30	0.8
Hentriacontane	C31	1.2
Dotriacontane	C32	0.0
Tritriacontane	C33	0.5
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		9

C17/Pristane	N/A
C18/Phytane	N/A
Pristane/Phytane	1.27
WI	0.00
CPI	1.24
RES	9
RES + UCM	2162
RES/(RES+UCM)	0.0040

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 3

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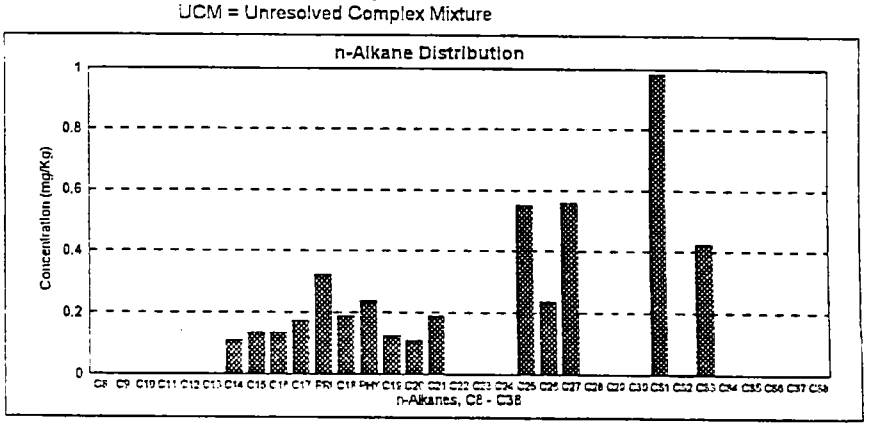
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.		A08515
Sample Location		LOC 4
n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.1
Pentadecane	C15	0.1
Hexadecane	C16	0.1
Heptadecane	C17	0.2
Pristane	PRI	0.3
Octadecane	C18	0.2
Phytane	PHY	0.2
Nonadecane	C19	0.1
Eicosane	C20	0.1
Heneicosane	C21	0.2
Docosane	C22	0.0
Tricosane	C23	0.0
Tetracosane	C24	0.0
Pentacosane	C25	0.6
Hexacosane	C26	0.2
Heptacosane	C27	0.6
Octacosane	C28	0.0
Nonacosane	C29	0.0
Triacontane	C30	0.0
Hentriacontane	C31	1.0
Dotriacontane	C32	0.0
Tritriacontane	C33	0.4
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		4
C17/Pristane		0.54
C18/Phytane		0.80
Pristane/Phytane		1.37
WI		0.47
CPI		2.90
RES		4
RES + UCM		800
RES/(RES+UCM)		0.0056

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



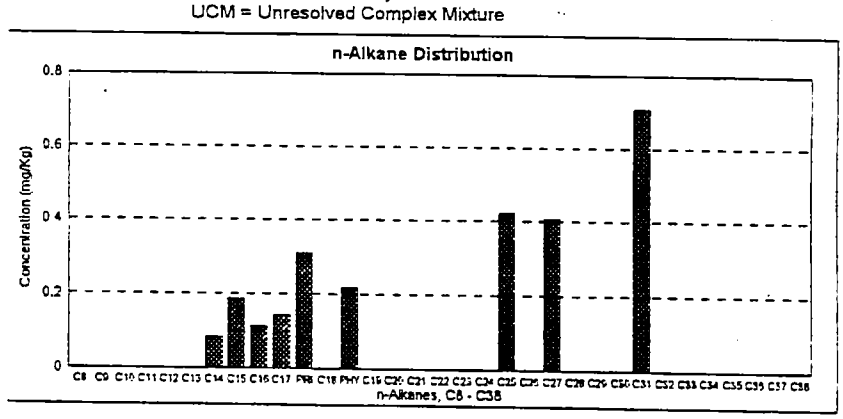
LOC 4

Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08516
Sample Location	LOC 4 SUB

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.1
Pentadecane	C15	0.2
Hexadecane	C16	0.1
Heptadecane	C17	0.1
Pristane	PRI	0.3
Octadecane	C18	0.0
Phytane	PHY	0.2
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.0
Tetracosane	C24	0.0
Pentacosane	C25	0.4
Hexacosane	C26	0.0
Heptacosane	C27	0.4
Octacosane	C28	0.0
Nonacosane	C29	0.0
Triacontane	C30	0.0
Hentriacontane	C31	0.7
Dotriacontane	C32	0.0
Tritriacontane	C33	0.0
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		3
C17/Pristane		0.46
C18/Phytane		N/A
Pristane/Phytane		1.41
WI		N/A
CPI		2.58
RES		3
RES + UCM		865
RES/(RES+UCM)		0.0030

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 4 SUB

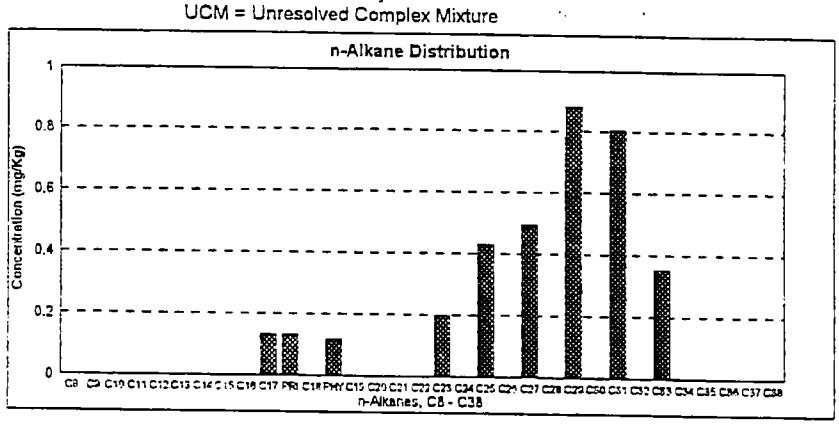
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08518
Sample Location	LOC 5

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.0
Pentadecane	C15	0.0
Hexadecane	C16	0.0
Heptadecane	C17	0.1
Pristane	PRI	0.1
Octadecane	C18	0.0
Phytane	PHY	0.1
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.2
Tetracosane	C24	0.0
Pentacosane	C25	0.4
Hexacosane	C26	0.0
Heptacosane	C27	0.5
Octacosane	C28	0.0
Nonacosane	C29	0.9
Triacontane	C30	0.0
Hentriacontane	C31	0.8
Dotriacontane	C32	0.0
Tritriacontane	C33	0.4
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		4

C17/Pristane	1.00
C18/Phytane	N/A
Pristane/Phytane	1.12
WI	N/A
CPI	12.97
RES	4
RES + UCM	667
RES/(RES+UCM)	0.0053

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



LOC 5

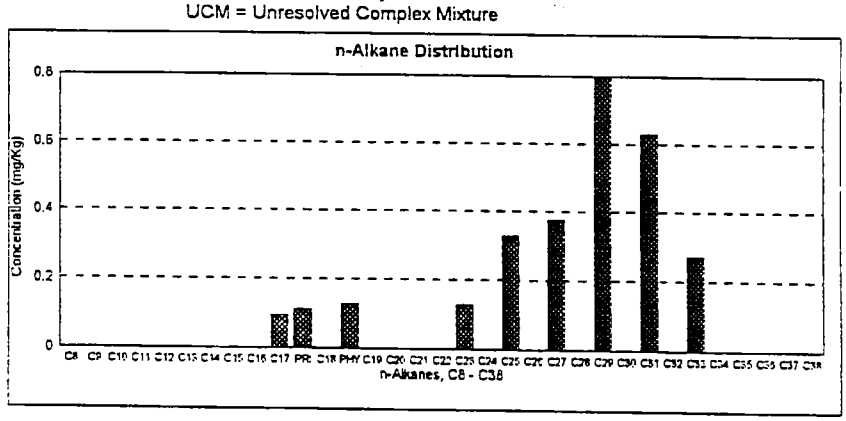
Table 1.1
Distribution of n-Alkanes and TPH

Sample No.	A08519
Sample Location	LOC 6

n-Alkanes	Cn	Concentration (mg/Kg)
Octane	C8	0.0
Nonane	C9	0.0
Decane	C10	0.0
Undecane	C11	0.0
Dodecane	C12	0.0
Tridecane	C13	0.0
Tetradecane	C14	0.0
Pentadecane	C15	0.0
Hexadecane	C16	0.0
Heptadecane	C17	0.1
Pristane	PRI	0.1
Octadecane	C18	0.0
Phytane	PHY	0.1
Nonadecane	C19	0.0
Eicosane	C20	0.0
Heneicosane	C21	0.0
Docosane	C22	0.0
Tricosane	C23	0.1
Tetracosane	C24	0.0
Pentacosane	C25	0.3
Hexacosane	C26	0.0
Heptacosane	C27	0.4
Octacosane	C28	0.0
Nonacosane	C29	0.8
Triacontane	C30	0.0
Hentriacontane	C31	0.6
Dotriacontane	C32	0.0
Tritriacontane	C33	0.3
Tetratriacontane	C34	0.0
Pentatriacontane	C35	0.0
Hexatriacontane	C36	0.0
Heptatriacontane	C37	0.0
Octatriacontane	C38	0.0
TOTAL		3

C17/Pristane	0.86
C18/Phytane	N/A
Pristane/Phytane	0.86
WI	N/A
CPI	10.97
RES	3
RES + UCM	566
RES/(RES+UCM)	0.0051

WI = Weathering Index
CPI = Carbon Preference Index
RES = All Resolved Hydrocarbons
UCM = Unresolved Complex Mixture



Results of PAHs

TABLE 2.0 Results of the Oil Analysis for PAH and PAH Homologues in Soil
WA# R1A00133: Quanta Resources
Results are Based on Dry Weight

Sample No.	SBLK050800		A08511		A08512		A08513		A08517	
Sample Location			LOC 1		LOC 1 DUP		LOC 2		LOC 2 SUB	
GC/MS File Name	LM1648		LM1649		LM1650		LM1651		LM1652	
Matrix	SOIL		SOIL		SOIL		SOIL		SOIL	
Dilution Factor	1.0		5.0		5.0		1.0		5.0	
% Solid	100.0		38.6		37.8		41.3		42.6	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Compound Name	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MD
Naphthalene	U	0.3	290	4.3	360	4.4	0.9	0.8	1.1 J	3
C1N	U	0.3	150	4.3	180	4.4	0.5 J	0.8	0.9 J	3
C2N	U	0.3	60	4.3	75	4.4	0.8 J	0.8	3.8 J	3
C3N	U	0.3	18	4.3	22	4.4	0.7 J	0.8	5.9	3
C4N	U	0.3	5.2	4.3	6.0	4.4	0.4 J	0.8	2.8 J	3
Fluorene	U	0.3	85	4.3	100	4.4	1.1	0.8	6.6	3
C1F	U	0.3	21	4.3	25	4.4	1.4	0.8	8.9	3
C2F	U	0.3	6.0	4.3	7.0	4.4	0.8 J	0.8	6.0	3
C3F	U	0.3	4.6	4.3	5.1	4.4	0.8 J	0.8	3.5 J	3
Dibenzothiophene	U	0.3	18	4.3	21	4.4	0.6 J	0.8	3.9 J	3
C1D	U	0.3	7.9	4.3	10	4.4	0.7 J	0.8	5.1	3
C2D	U	0.3	7.4	4.3	8.7	4.4	1.1	0.8	6.1	3
C3D	U	0.3	4.4	4.3	5.0	4.4	0.6 J	0.8	3.9	3
Phenanthrene	U	0.3	220	4.3	260	4.4	6.8	0.8	45	3
Anthracene	U	0.3	62	4.3	75	4.4	3.0	0.8	17	3
C1P/A	U	0.3	70	4.3	83	4.4	4.6	0.8	34	3
C2P/A	U	0.3	33	4.3	35	4.4	3.9	0.8	23	3
C3P/A	U	0.3	12	4.3	14	4.4	1.8	0.8	9.7	3
Fluoranthrene	U	0.3	210	4.3	240	4.4	25	0.8	130	3
Pyrene	U	0.3	160	4.3	180	4.4	19	0.8	100	3
C1F/P	U	0.3	110	4.3	120	4.4	13	0.8	65	3
C2F/P	U	0.3	31	4.3	36	4.4	5.2	0.8	24	3
Chrysene	U	0.3	75	4.3	83	4.4	10	0.8	49	3
C1C	U	0.3	54	4.3	63	4.4	8.4	0.8	38	3
C2C	U	0.3	23	4.3	25	4.4	3.8	0.8	17	3
Benzo(b)fluoranthene	U	0.3	66	4.3	65	4.4	10	0.8	40	3
Benzo(k)fluoranthene	U	0.3	52	4.3	64	4.4	7.6	0.8	41	3
Benzo(e)pyrene	U	0.3	41	4.3	45	4.4	6.5	0.8	29	3
Benzo(a)pyrene	U	0.3	73	4.3	79	4.4	11	0.8	51	3
Perylene	U	0.3	18	4.3	20	4.4	U	0.8	11	3
Indeno(1,2,3-cd)pyre	U	0.3	35	4.3	38	4.4	5.2	0.8	24	3
Dibenzo(a,h)anthrace	U	0.3	12	4.3	14	4.4	1.9	0.8	8.8	3
Benzo(g,h,i)perylene	U	0.3	36	4.3	40	4.4	5.7	0.8	26	3

Note: All concentrations for substituted PAHs are estimated.
J - Concentrations are estimated and below the MDL
Quanta Resources

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TABLE 2.0 Results of the Oil Analysis for PAH and PAH Homologues in Soil
WA# R1A00133: Quanta Resources
Results are Based on Dry Weight

Sample No.	A08514		A08515		A08516		A08518		A08519	
Sample Location	LOC 3		LOC 4		LOC 4 SUB		LOC 5		LOC 6	
GC/MS File Name	LM1653		LM1654		LM1655		LM1656		LM1657	
Matrix	SOIL		SOIL		SOIL		SOIL		SOIL	
Dilution Factor	5.0		1.0		1.0		1.0		1.0	
% Solid	40.3		42.3		44.2		47.2		41.8	
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Compound Name	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL
Naphthalene	14	4.1	4.2	0.8	0.7 J	0.8	0.4 J	0.7	0.4 J	0
C1N	4.2	4.1	1.8	0.8	0.7 J	0.8	0.2 J	0.7	0.2 J	0
C2N	3.9 J	4.1	1.3	0.8	0.6 J	0.8	0.2 J	0.7	0.2 J	0
C3N	3.3 J	4.1	0.9	0.8	0.8	0.8	0.2 J	0.7	0.2 J	0
C4N	1.6 J	4.1	0.5 J	0.8	0.5 J	0.8	0.2 J	0.7	0.1 J	0
Fluorene	11	4.1	2.3	0.8	0.9	0.8	0.2 J	0.7	0.3 J	0
C1F	8.0	4.1	1.7	0.8	1.4	0.8	0.3 J	0.7	0.4 J	0
C2F	3.0 J	4.1	0.7 J	0.8	0.6 J	0.8	0.2 J	0.7	0.1 J	0
C3F	9.6	4.1	0.8	0.8	0.6 J	0.8	0.3 J	0.7	0.2 J	0
Dibenzothiophene	6.4	4.1	0.9	0.8	0.6 J	0.8	0.1 J	0.7	0.2 J	0
C1D	4.0 J	4.1	0.9	0.8	0.7 J	0.8	0.2 J	0.7	0.2 J	0
C2D	5.0	4.1	1.2	0.8	1.1	0.8	0.3 J	0.7	0.3 J	0
C3D	3.5 J	4.1	0.7 J	0.8	0.6 J	0.8	0.3 J	0.7	0.2 J	0
Phenanthrene	92	4.1	11	0.8	4.8	0.8	1.4	0.7	2.0	0
Anthracene	19	4.1	3.9	0.8	3.2	0.8	0.8	0.7	0.8 J	0
C1P/A	27	4.1	6.5	0.8	4.9	0.8	1.4	0.7	1.1	0
C2P/A	18	4.1	4.3	0.8	4.0	0.8	1.1	0.7	0.9	0
C3P/A	8.1	4.1	2.2	0.8	2.1	0.8	0.7 J	0.7	0.5 J	0
Fluoranthrene	150	4.1	27	0.8	26	0.8	5.8	0.7	5.5	0
Pyrene	120	4.1	20	0.8	22	0.8	5.6	0.7	4.6	0
C1F/P	57	4.1	14	0.8	14	0.8	3.5	0.7	3.0	0
C2F/P	28	4.1	5.5	0.8	5.5	0.8	1.7	0.7	1.3	0
Chrysene	57	4.1	11	0.8	9.5	0.8	2.7	0.7	2.4	0
C1C	39	4.1	9.5	0.8	9.5	0.8	2.6	0.7	2.1	0
C2C	16	4.1	3.8	0.8	4.1	0.8	1.2	0.7	0.9	0
Benzo(b)fluoranthene	48	4.1	11	0.8	9.9	0.8	2.6	0.7	2.2	0
Benzo(k)fluoranthene	45	4.1	8.6	0.8	9.4	0.8	2.5	0.7	2.0	0
Benzo(e)pyrene	35	4.1	7.0	0.8	7.1	0.8	2.0	0.7	1.6	0
Benzo(a)pyrene	56	4.1	12	0.8	12	0.8	3.1	0.7	2.5	0
Perylene	13	4.1	3.0	0.8	3.0	0.8	0.8	0.7	0.6 J	0
Indeno(1,2,3-cd)pyre	30	4.1	5.8	0.8	5.9	0.8	1.6	0.7	1.3	0
Dibenzo(a,h)anthrace	10	4.1	2.1	0.8	2.1	0.8	0.6 J	0.7	0.5 J	0
Benzo(g,h,i)perylene	34	4.1	6.2	0.8	6.4	0.8	1.8	0.7	1.5	0

Note: All concentrations for substituted PAHs are estimated.
J - Concentrations are estimated and below the MDL
Quanta Resources

Table 2.1
Distribution of PAH Homologues

Sample No.	SBLK050800
Sample Location	0

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	U
Methyls	C1N	U
Dimethyls	C2N	U
Trimethyls	C3N	U
Tetramethyls	C4N	U
TOTAL		0
Fluorenes		
Fluorene	C0F	U
Methyls	C1F	U
Dimethyls	C2F	U
Trimethyls	C3F	U
TOTAL		0
Dibenzothiophenes		
Dibenzothiophene	C0D	U
Methyls	C1D	U
Dimethyls	C2D	U
Trimethyls	C3D	U
TOTAL		0
Phenanthrenes		
Phenanthrene	C0P/A	0
Methyls	C1P/A	U
Dimethyls	C2P/A	U
Trimethyls	C3P/A	U
TOTAL		0
Pyrenes		
Pyrene	C0P/F	0
Methyls	C1P/F	U
Dimethyls	C2P/F	U
TOTAL		0
Chrysenes		
Chrysene	C0C	U
Methyls	C1C	U
Dimethyls	C2C	U
TOTAL		0
GRAND TOTAL		0

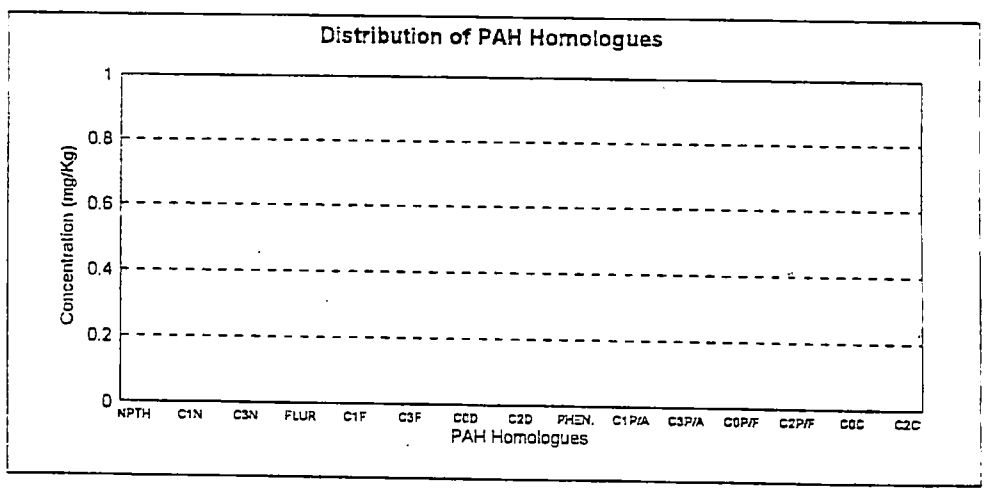


Table 2.1
Distribution of PAH Homologues

Sample No.	A08511
Sample Location	LOC 1

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	290
Methyls	C1N	150
Dimethyls	C2N	60
Trimethyls	C3N	18
Tetramethyls	C4N	5.2
TOTAL		523.2
Fluorenes		
Fluorene	C0F	85
Methyls	C1F	21
Dimethyls	C2F	6
Trimethyls	C3F	4.6
TOTAL		116.6
Dibenzothiophenes		
Dibenzothiophene	C0D	18
Methyls	C1D	7.9
Dimethyls	C2D	7.4
Trimethyls	C3D	4.4
TOTAL		37.7
Phenanthrenes		
Phenanthrene	C0P/A	282
Methyls	C1P/A	70
Dimethyls	C2P/A	33
Trimethyls	C3P/A	12
TOTAL		397
Pyrenes		
Pyrene	C0P/F	370
Methyls	C1P/F	110
Dimethyls	C2P/F	31
TOTAL		511
Chrysenes		
Chrysene	C0C	75
Methyls	C1C	54
Dimethyls	C2C	23
TOTAL		152
GRAND TOTAL		**1738**

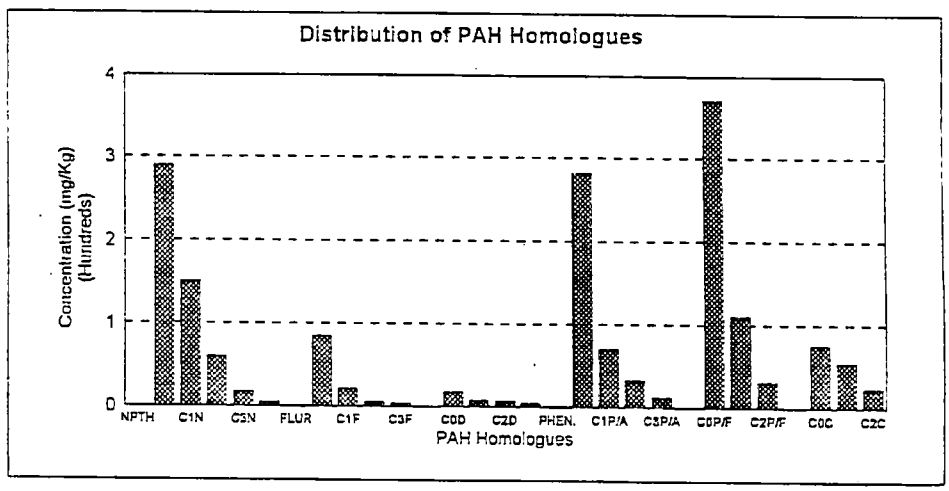


Table 2.1
Distribution of PAH Homologues

Sample No.	A08512
Sample Location	LOC 1 DUP

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	360
Methyls	C1N	180
Dimethyls	C2N	75
Trimethyls	C3N	22
Tetramethyls	C4N	6
TOTAL		643
Fluorenes		
Fluorene	C0F	100
Methyls	C1F	25
Dimethyls	C2F	7
Trimethyls	C3F	5.1
TOTAL		137.1
Dibenzothiophenes		
Dibenzothiophene	C0D	21
Methyls	C1D	10
Dimethyls	C2D	8.7
Trimethyls	C3D	5
TOTAL		44.7
Phenanthrenes		
Phenanthrene	C0P/A	335
Methyls	C1P/A	83
Dimethyls	C2P/A	35
Trimethyls	C3P/A	14
TOTAL		467
Pyrenes		
Pyrene	C0P/F	420
Methyls	C1P/F	120
Dimethyls	C2P/F	36
TOTAL		576
Chrysenes		
Chrysene	C0C	83
Methyls	C1C	63
Dimethyls	C2C	25
TOTAL		171
GRAND TOTAL		**2039**

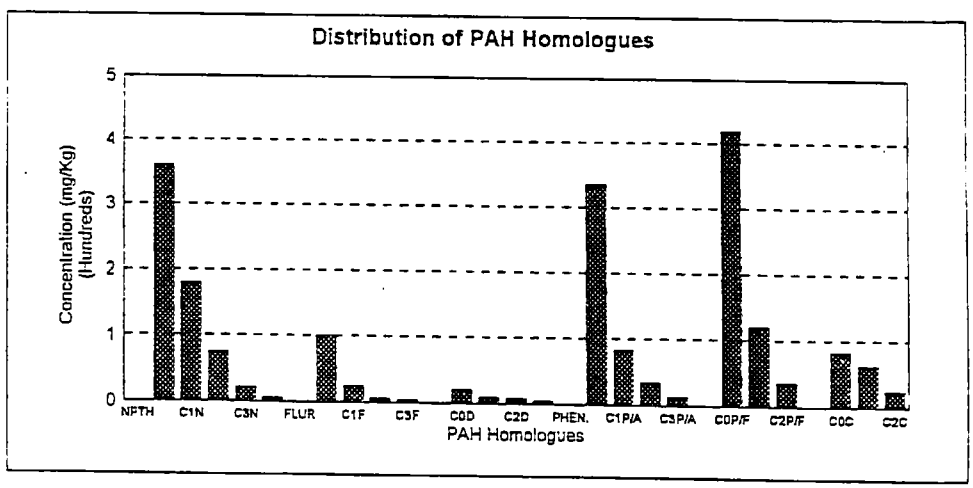


Table 2.1
Distribution of PAH Homologues

Sample No.		A08513
Sample Location		LOC 2
Homologue	**CnPAH**	**Concentration (mg/Kg)**
Naphthalenes		
Naphthalene	C0N	0.9
Methyls	C1N	0.5
Dimethyls	C2N	0.8
Trimethyls	C3N	0.7
Tetramethyls	C4N	0.4
TOTAL		3.3
Fluorenes		
Fluorene	C0F	1.1
Methyls	C1F	1.4
Dimethyls	C2F	0.8
Trimethyls	C3F	0.8
TOTAL		4.1
Dibenzothiophenes		
Dibenzothiophene	C0D	0.6
Methyls	C1D	0.7
Dimethyls	C2D	1.1
Trimethyls	C3D	0.6
TOTAL		3
Phenanthrenes		
Phenanthrene	C0P/A	9.8
Methyls	C1P/A	4.6
Dimethyls	C2P/A	3.9
Trimethyls	C3P/A	1.8
TOTAL		20.1
Pyrenes		
Pyrene	C0P/F	44
Methyls	C1P/F	13
Dimethyls	C2P/F	5.2
TOTAL		62.2
Chrysenes		
Chrysene	C0C	10
Methyls	C1C	8.4
Dimethyls	C2C	3.8
TOTAL		22.2
GRAND TOTAL		**115**

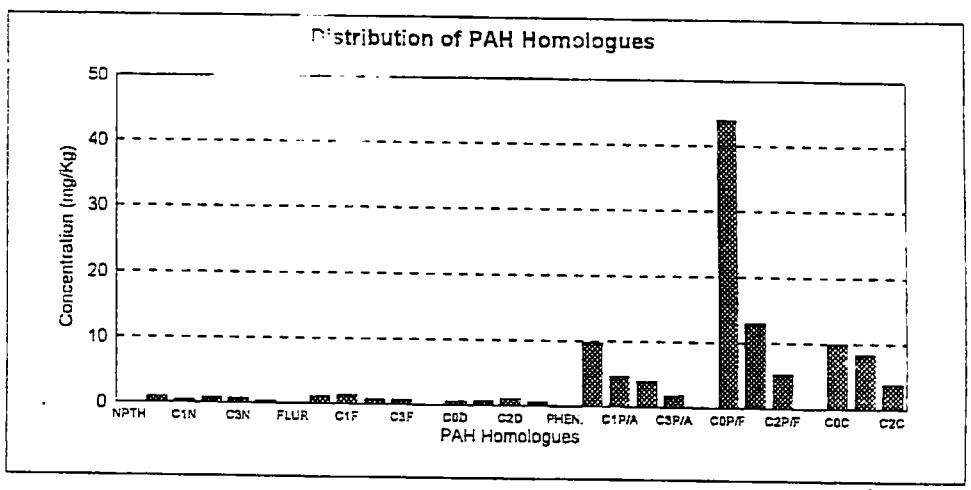


Table 2.1
Distribution of PAH Homologues

Sample No.	A08517
Sample Location	LOC 2 SUB

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	1.1
Methyls	C1N	0.9
Dimethyls	C2N	3.8
Trimethyls	C3N	5.9
Tetramethyls	C4N	2.8
TOTAL		14.5
Fluorenes		
Fluorene	C0F	6.6
Methyls	C1F	8.9
Dimethyls	C2F	6
Trimethyls	C3F	3.5
TOTAL		25
Dibenzothiophenes		
Dibenzothiophene	C0D	3.9
Methyls	C1D	5.1
Dimethyls	C2D	6.1
Trimethyls	C3D	3.9
TOTAL		19
Phenanthrenes		
Phenanthrene	C0P/A	62
Methyls	C1P/A	34
Dimethyls	C2P/A	23
Trimethyls	C3P/A	9.7
TOTAL		128.7
Pyrenes		
Pyrene	C0P/F	230
Methyls	C1P/F	65
Dimethyls	C2P/F	24
TOTAL		319
Chrysenes		
Chrysene	C0C	49
Methyls	C1C	38
Dimethyls	C2C	17
TOTAL		104
GRAND TOTAL		610

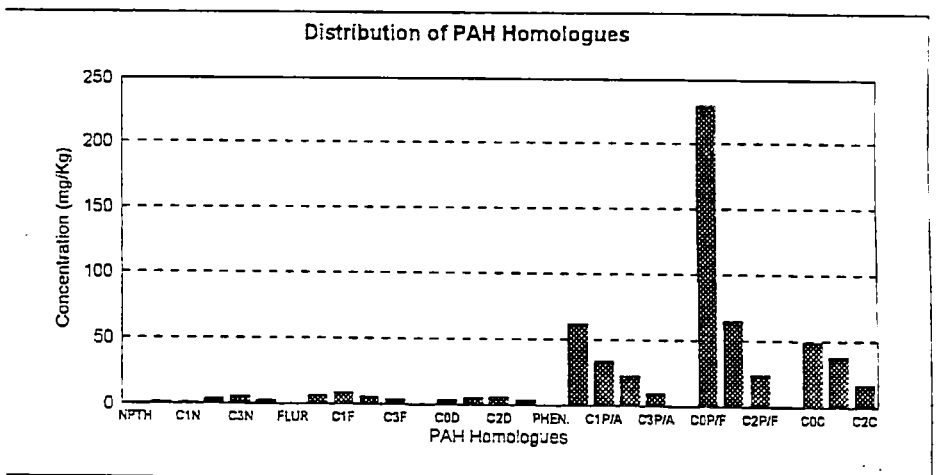


Table 2.1
Distribution of PAH Homologues

Sample No.	A08514
Sample Location	LOC 3

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	14
Methyls	C1N	4.2
Dimethyls	C2N	3.9
Trimethyls	C3N	3.3
Tetramethyls	C4N	1.6
TOTAL		27
Fluorenes		
Fluorene	C0F	11
Methyls	C1F	8.0
Dimethyls	C2F	3.0
Trimethyls	C3F	9.6
TOTAL		31.6
Dibenzothiophenes		
Dibenzothiophene	C0D	6.4
Methyls	C1D	4.0
Dimethyls	C2D	5.0
Trimethyls	C3D	3.5
TOTAL		18.9
Phenanthrenes		
Phenanthrene	C0P/A	111
Methyls	C1P/A	27
Dimethyls	C2P/A	18
Trimethyls	C3P/A	8.1
TOTAL		164.1
Pyrenes		
Pyrene	C0P/F	270
Methyls	C1P/F	57
Dimethyls	C2P/F	28
TOTAL		355
Chrysenes		
Chrysene	C0C	57
Methyls	C1C	39
Dimethyls	C2C	16
TOTAL		112
GRAND TOTAL		**709**

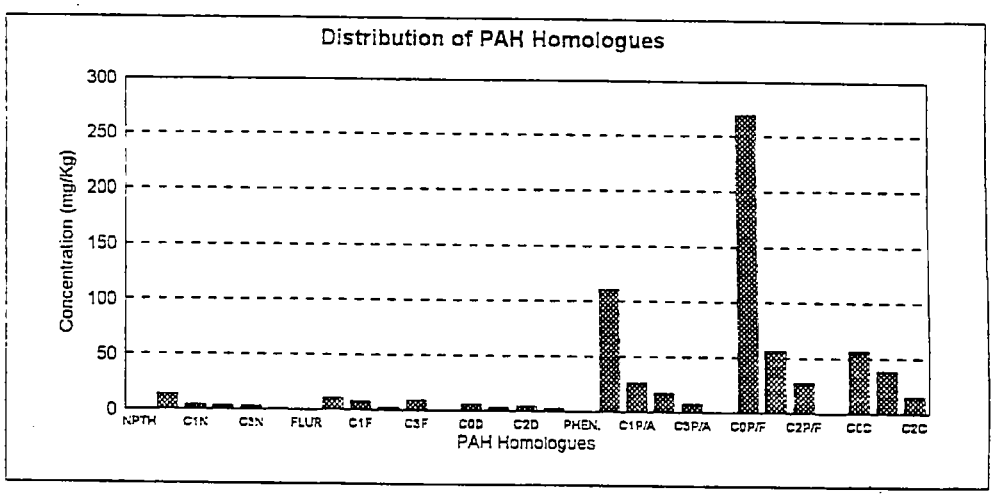


Table 2.1
Distribution of PAH Homologues

Sample No.	A08515
Sample Location	LOC 4

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	4.2
Methyls	C1N	1.8
Dimethyls	C2N	1.3
Trimethyls	C3N	0.9
Tetramethyls	C4N	0.5
TOTAL		8.7
Fluorenes		
Fluorene	C0F	2.3
Methyls	C1F	1.7
Dimethyls	C2F	0.7
Trimethyls	C3F	0.8
TOTAL		5.5
Dibenzothiophenes		
Dibenzothiophene	C0D	0.9
Methyls	C1D	0.9
Dimethyls	C2D	1.2
Trimethyls	C3D	0.7
TOTAL		3.7
Phenanthrenes		
Phenanthrene	C0P/A	14.9
Methyls	C1P/A	6.5
Dimethyls	C2P/A	4.3
Trimethyls	C3P/A	2.2
TOTAL		27.9
Pyrenes		
Pyrene	C0P/F	47
Methyls	C1P/F	14
Dimethyls	C2P/F	5.5
TOTAL		66.5
Chrysenes		
Chrysene	C0C	11
Methyls	C1C	9.5
Dimethyls	C2C	3.8
TOTAL		24.3
GRAND TOTAL		**137**

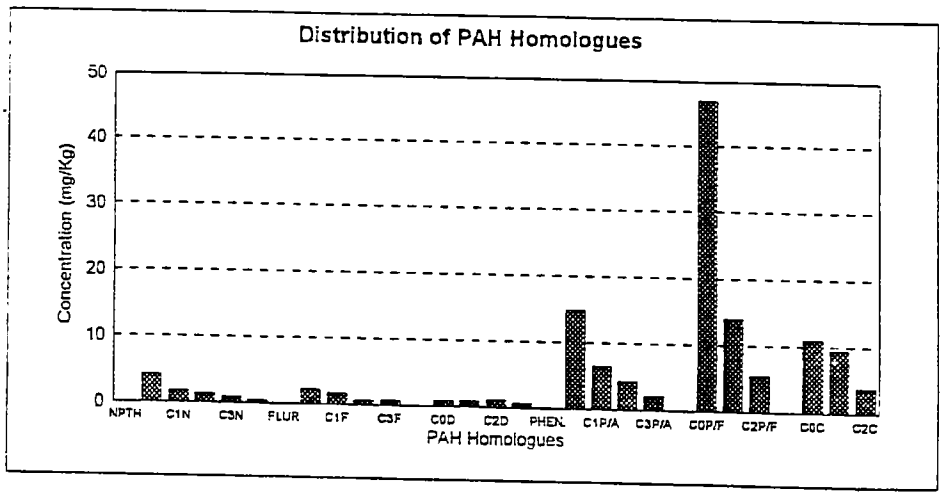


Table 2.1
Distribution of PAH Homologues

Sample No.		A08516
Sample Location		LOC 4 SUB
Homologue	**CnPAH**	**Concentration (mg/Kg)**
Naphthalenes		
Naphthalene	C0N	0.7
Methyls	C1N	0.7
Dimethyls	C2N	0.6
Trimethyls	C3N	0.8
Tetramethyls	C4N	0.5
TOTAL		3.3
Fluorenes		
Fluorene	C0F	0.9
Methyls	C1F	1.4
Dimethyls	C2F	0.6
Trimethyls	C3F	0.6
TOTAL		3.5
Dibenzothiophenes		
Dibenzothiophene	C0D	0.6
Methyls	C1D	0.7
Dimethyls	C2D	1.1
Trimethyls	C3D	0.6
TOTAL		3.0
Phenanthrenes		
Phenanthrene	C0P/A	8.0
Methyls	C1P/A	4.9
Dimethyls	C2P/A	4
Trimethyls	C3P/A	2.1
TOTAL		19
Pyrenes		
Pyrene	C0P/F	48
Methyls	C1P/F	14
Dimethyls	C2P/F	5.5
TOTAL		67.5
Chrysenes		
Chrysene	C0C	9.5
Methyls	C1C	9.5
Dimethyls	C2C	4.1
TOTAL		23.1
GRAND TOTAL		**119**

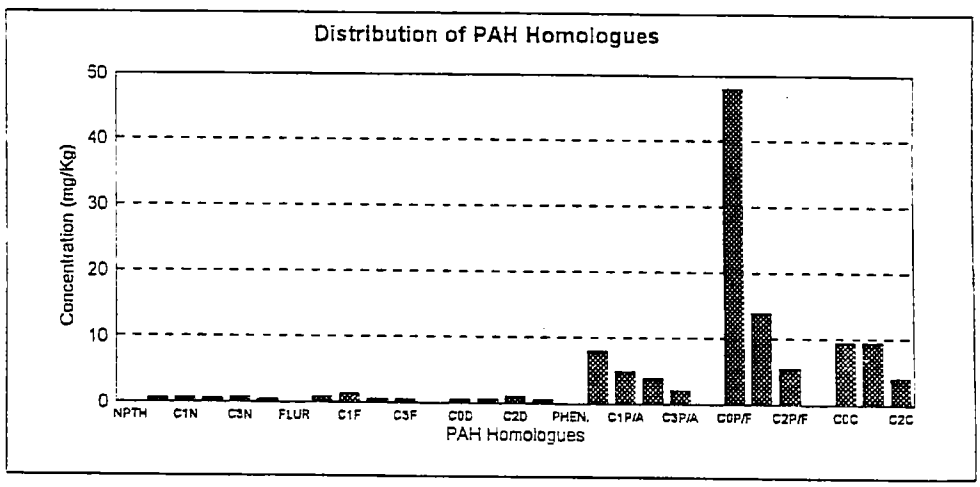


Table 2.1
Distribution of PAH Homologues

Sample No.		A08518
Sample Location		LOC 5
Homologue	**CnPAH**	**Concentration (mg/Kg)**
Naphthalenes		
Naphthalene	C0N	0.4
Methyls	C1N	0.2
Dimethyls	C2N	0.2
Trimethyls	C3N	0.2
Tetramethyls	C4N	0.2
TOTAL		1.2
Fluorenes		
Fluorene	C0F	0.2
Methyls	C1F	0.3
Dimethyls	C2F	0.2
Trimethyls	C3F	0.3
TOTAL		1.0
Dibenzothiophenes		
Dibenzothiophene	C0D	0.1
Methyls	C1D	0.2
Dimethyls	C2D	0.3
Trimethyls	C3D	0.3
TOTAL		0.9
Phenanthrenes		
Phenanthrene	C0P/A	2.2
Methyls	C1P/A	1.4
Dimethyls	C2P/A	1.1
Trimethyls	C3P/A	0.7
TOTAL		5.4
Pyrenes		
Pyrene	C0P/F	11.4
Methyls	C1P/F	3.5
Dimethyls	C2P/F	1.7
TOTAL		16.6
Chrysenes		
Chrysene	C0C	2.7
Methyls	C1C	2.6
Dimethyls	C2C	1.2
TOTAL		6.5
GRAND TOTAL		**32**

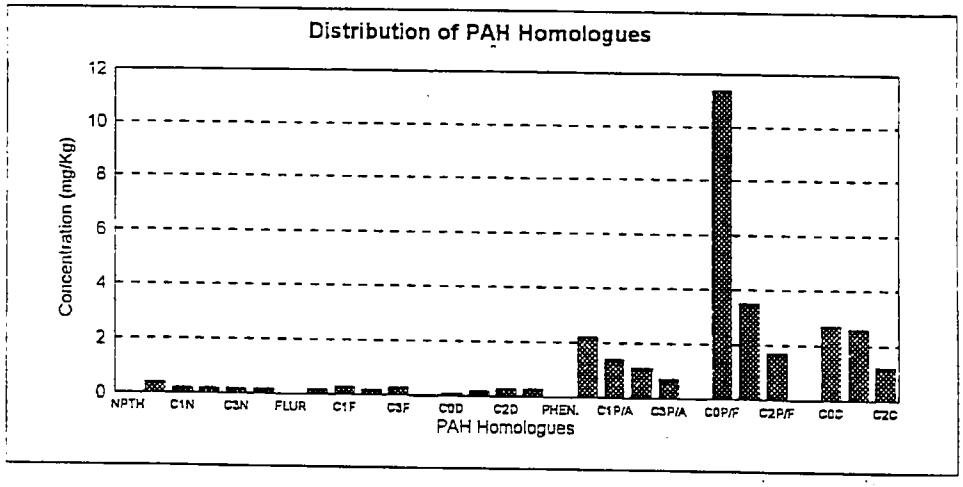
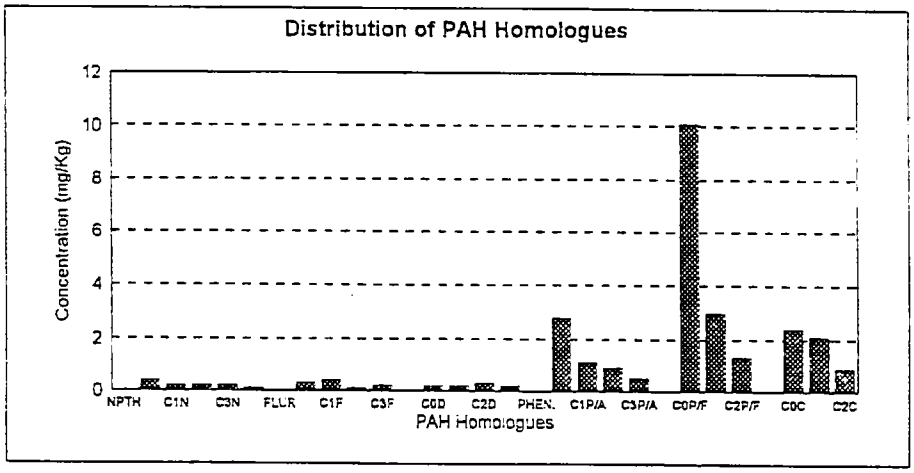


Table 2.1
Distribution of PAH Homologues

Sample No.	A08519
Sample Location	LOC 6

Homologue	CnPAH	Concentration (mg/Kg)
Naphthalenes		
Naphthalene	C0N	0.4
Methyls	C1N	0.2
Dimethyls	C2N	0.2
Trimethyls	C3N	0.2
Tetramethyls	C4N	0.1
TOTAL		1.1
Fluorenes		
Fluorene	C0F	0.3
Methyls	C1F	0.4
Dimethyls	C2F	0.1
Trimethyls	C3F	0.2
TOTAL		1.0
Dibenzothiophenes		
Dibenzothiophene	C0D	0.2
Methyls	C1D	0.2
Dimethyls	C2D	0.3
Trimethyls	C3D	0.2
TOTAL		0.9
Phenanthrenes		
Phenanthrene	C0P/A	2.8
Methyls	C1P/A	1.1
Dimethyls	C2P/A	0.9
Trimethyls	C3P/A	0.5
TOTAL		5.3
Pyrenes		
Pyrene	C0P/F	10.1
Methyls	C1P/F	3.0
Dimethyls	C2P/F	1.3
TOTAL		14.4
Chrysenes		
Chrysene	C0C	2.4
Methyls	C1C	2.1
Dimethyls	C2C	0.9
TOTAL		5.4
GRAND TOTAL		28



Sterane Profiles

Table 3.C

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08511
SAMPLE LOCATION : LOC 1

Compound	MW	Formula	Symbol	Concentration (ug/L)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.17
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.04
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.16
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.24
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.10
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.31
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.31
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.11
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.15
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.29
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.07
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.17
C30 Steranes (Total)	414	C30H54	S13	0.32
Total Steranes				2.3
% C27 Steranes				26.3
% C28 Steranes				30.5
% C29 Steranes				27.6
Ratio 5a,14B,17B/Total Steranes				0.43
Ratio 20S/20R + 20S				0.45

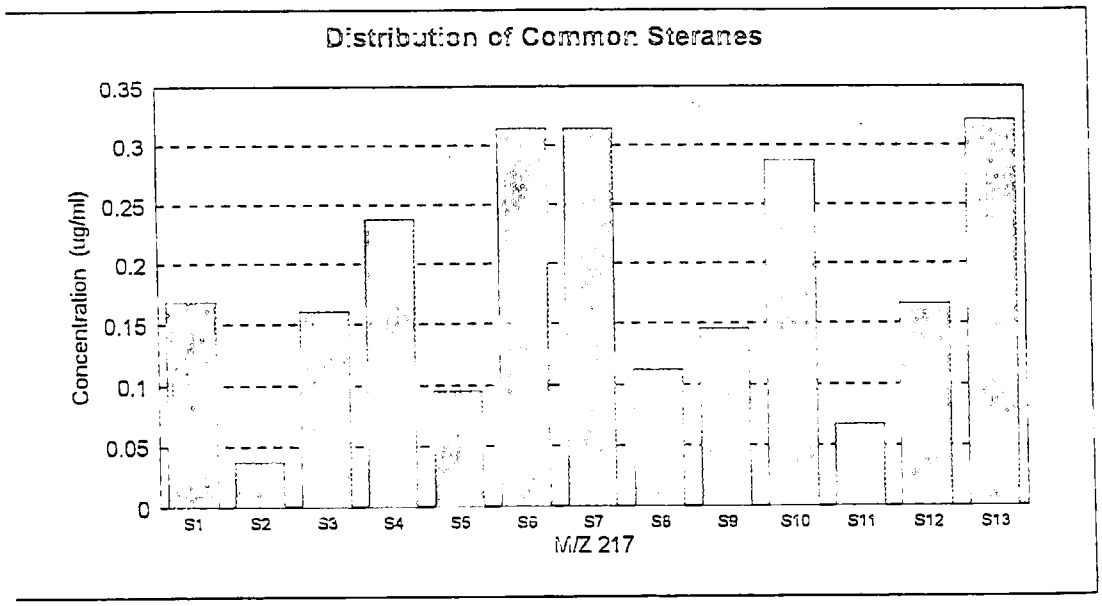


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08512
SAMPLE LOCATION : LOC 1 DUP

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.22
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.06
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.18
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.19
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.14
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.12
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.50
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.11
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.16
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.33
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.05
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.27
C30 Steranes (Total)	**414**	**C30H54**	**S13**	**0.57**

Total Steranes	2.9
% C27 Steranes	22.4
% C28 Steranes	30.2
% C29 Steranes	27.8
Ratio 5a,14B,17B/Total Steranes	0.43
Ratio 20S/20R + 20S	0.54

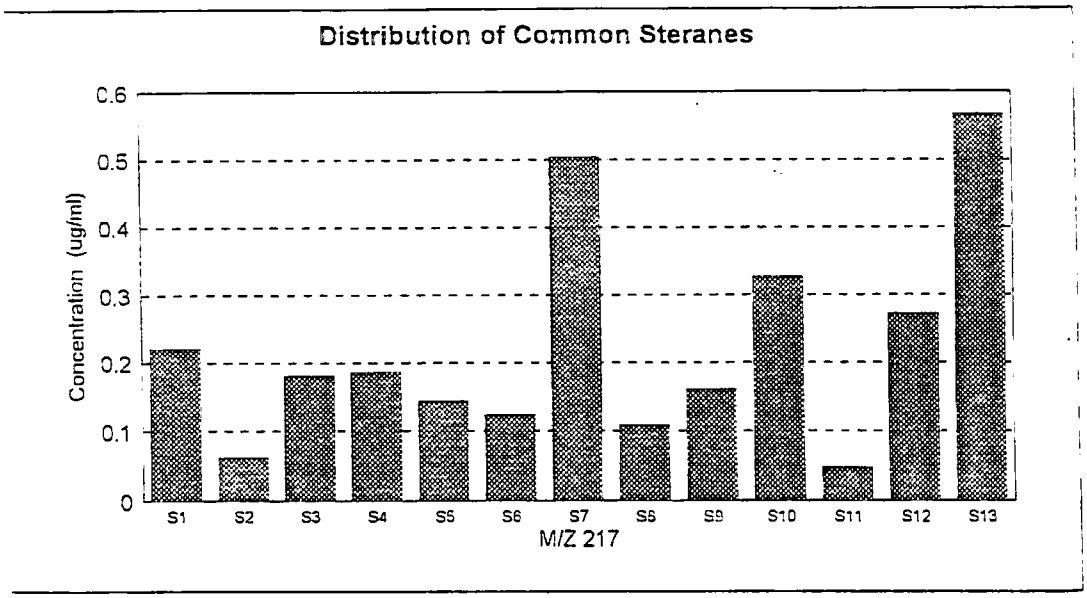


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08513
SAMPLE LOCATION : LOC 2

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.13
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.05
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.09
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.16
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.08
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.06
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.19
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.07
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.08
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.20
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.04
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.12
C30 Steranes (Total)	414	C30H54	S13	0.24
Total Steranes				1.5
% C27 Steranes				28.6
% C28 Steranes				26.1
% C29 Steranes				29.2
Ratio 5a,14B,17B/Total Steranes				0.41
Ratio 20S/20R + 20S				0.48

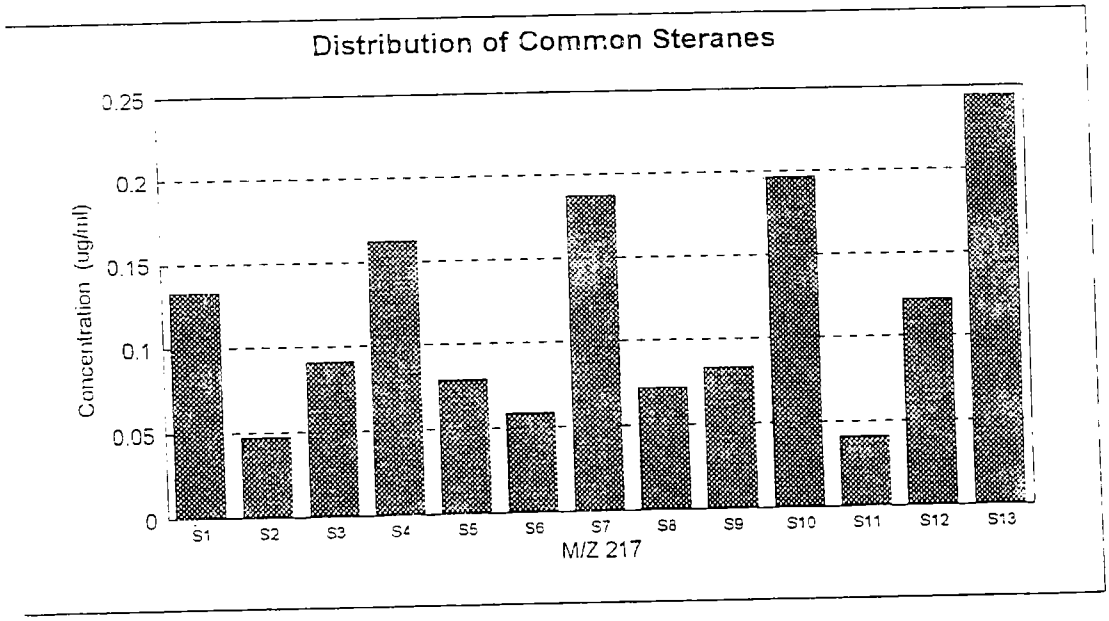


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08517
SAMPLE LOCATION : LOC 2 SUB

Compound	M/W	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.19
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.05
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.14
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.26
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.12
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.08
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.41
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.10
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.14
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.29
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.10
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.21
C30 Steranes (Total)	414	C30H54	S13	0.39
Total Steranes				2.5
% C27 Steranes				26.0
% C28 Steranes				28.4
% C29 Steranes				30.0
Ratio 5a,14B,17B/Total Steranes				0.43
Ratio 20S/20R + 20S				0.52

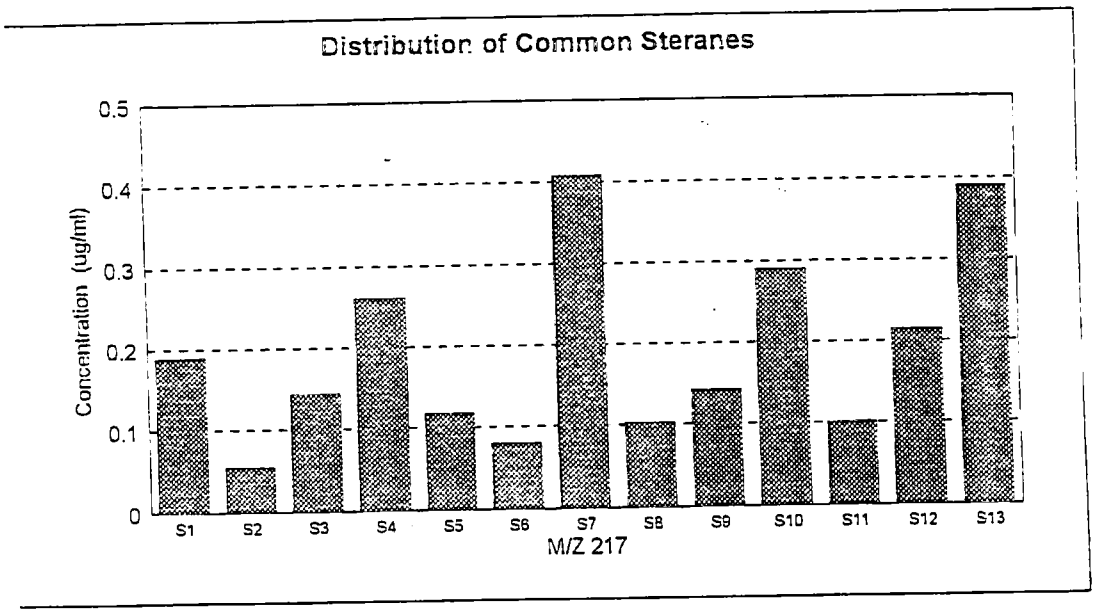


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08514
SAMPLE LOCATION : LOC 3

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.21
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.06
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.12
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.29
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.14
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.11
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.42
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.11
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.16
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.35
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.08
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.22
C30 Steranes (Total)	414	C30H54	S13	0.40
Total Steranes				2.7
% C27 Steranes				25.4
% C28 Steranes				29.1
% C29 Steranes				30.5
Ratio 5a,14B,17B/Total Steranes				0.43
Ratio 20S/20R + 20S				0.50

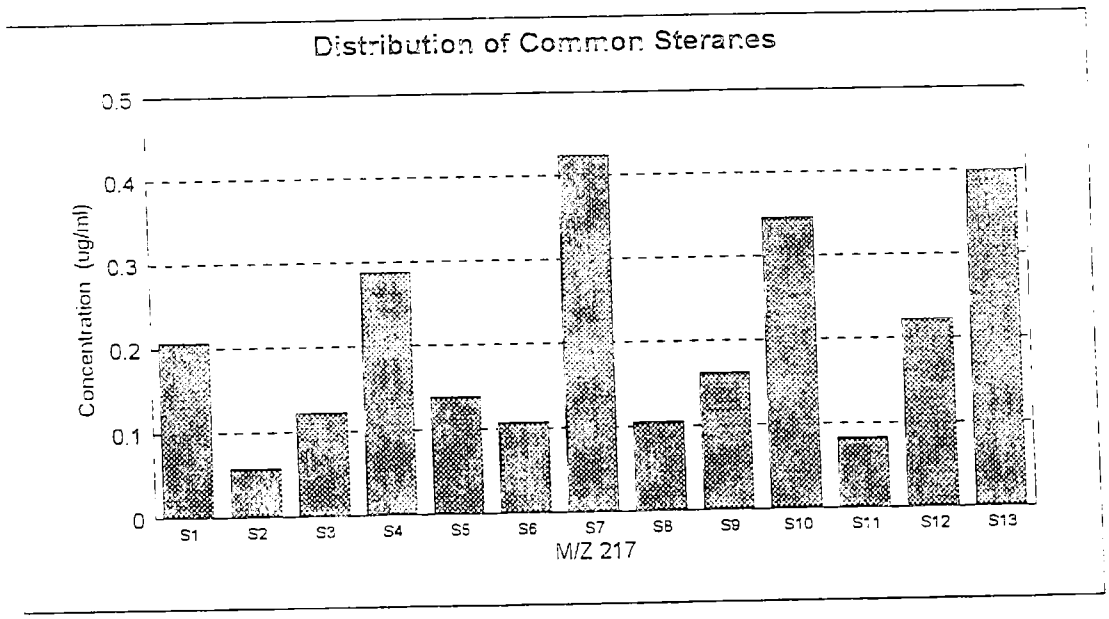


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08515
SAMPLE LOCATION : LOC 4

Compound	MW	Formula	Symbol	Concentration (ug/L)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.14
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.05
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.11
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.19
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.07
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.07
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.16
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.07
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.10
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.19
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.04
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.12
C30 Steranes (Total)	**414**	**C30H54**	**S13**	**0.24**
Total Steranes				1.5
% C27 Steranes				31.2
% C28 Steranes				24.1
% C29 Steranes				29.1
Ratio 5a,14B,17B/Total Steranes				0.40
Ratio 20S/20R + 20S				0.47

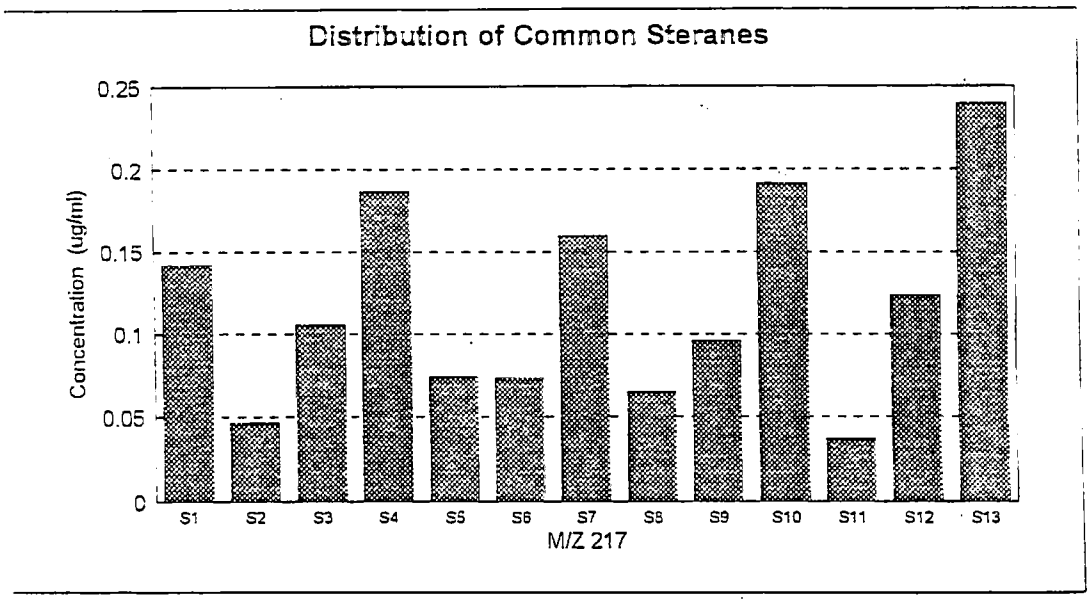


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08516
SAMPLE LOCATION : LOC 4 SUB

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.14
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.05
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.11
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.19
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.06
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.06
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.20
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.09
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.20
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.04
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.11
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.22
C30 Steranes (Total)	**414**	**C30H54**	**S13**	**ERR**

Total Steranes	**ERR**
% C27 Steranes	**ERR**
% C28 Steranes	**ERR**
% C29 Steranes	**ERR**
Ratio 5a,14B,17B/Total Steranes	**ERR**
Ratio 20S/20R + 20S	**0.56**

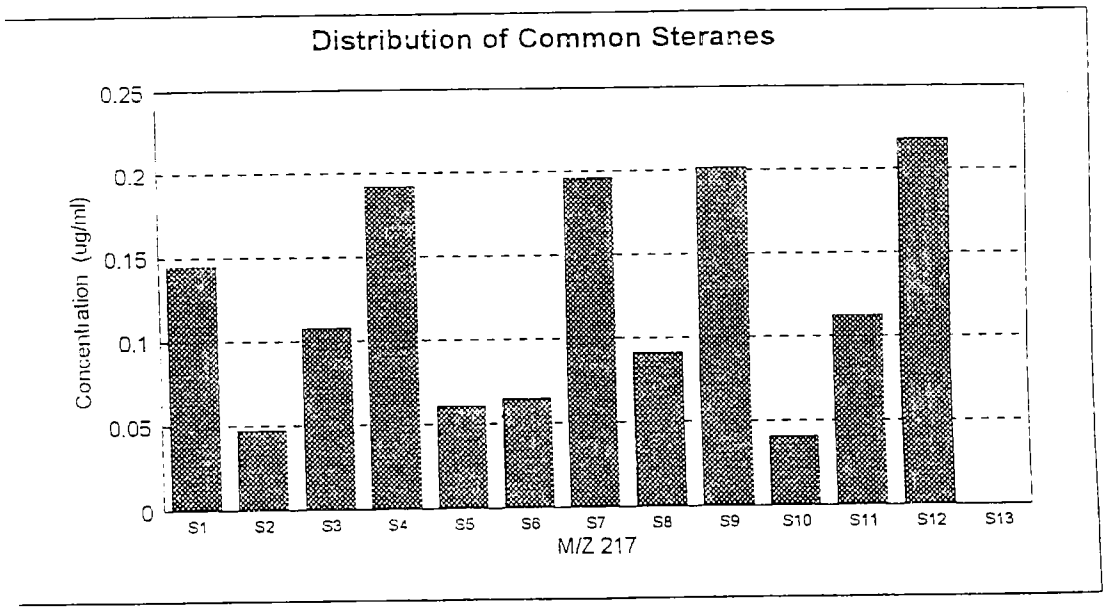


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08518
SAMPLE LOCATION : LOC 5

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.13
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.04
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.07
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.16
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.09
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.08
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.14
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.05
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.09
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.17
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.03
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.10
C30 Steranes (Total)	414	C30H54	S13	0.19
Total Steranes				1.3
% C27 Steranes				30.8
% C28 Steranes				28.4
% C29 Steranes				30.8
Ratio 5a,14B,17B/Total Steranes				0.22
Ratio 20S/20R + 20S				0.48

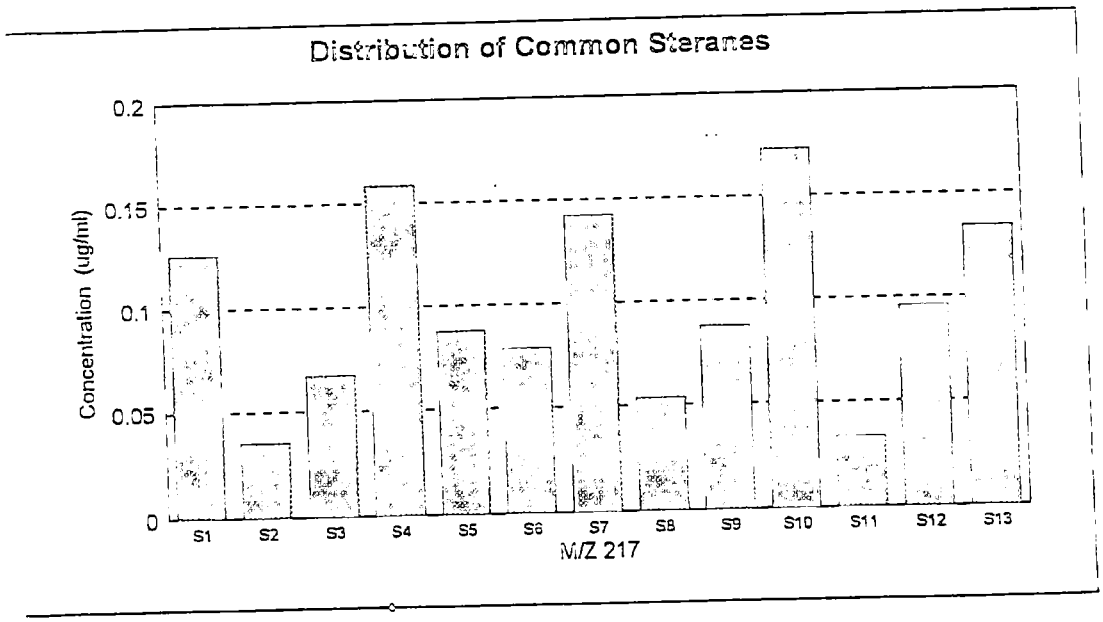
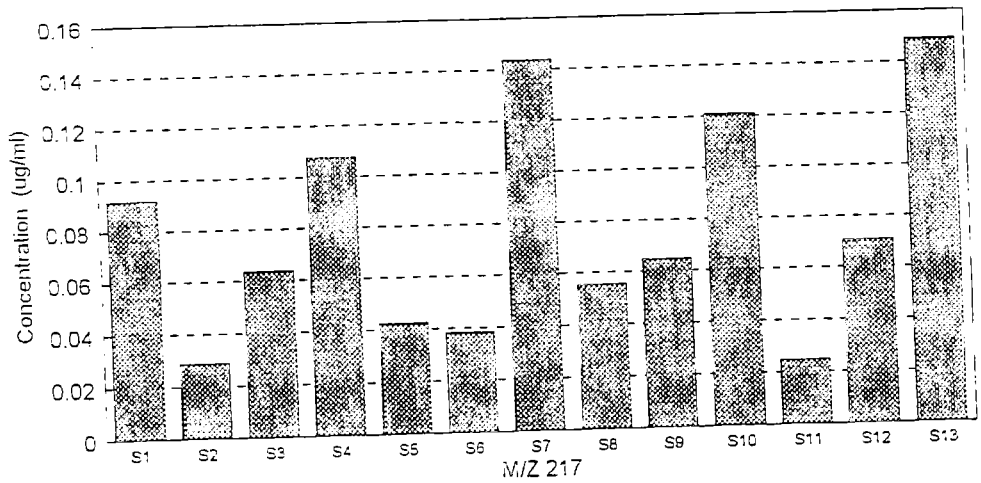


Table 3.0

Distribution of Common Steranes (m/z 217)

SAMPLE NUMBER : A08519
SAMPLE LOCATION : LOC 6

Compound	MW	Formula	Symbol	Concentration (ug/L)
5a(H),14a(H),17a(H)-cholestane (20S)	372	C27H48	S1	0.09
5a(H),14B(H),17B(H)-cholestane (20R)	372	C27H48	S2	0.03
5a(H),14B(H),17B(H)-cholestane (20S)	372	C27H48	S3	0.06
5a(H),14a(H),17a(H)-cholestane (20R)	372	C27H48	S4	0.11
5a(H),14a(H),17a(H),24-methylcholestane (20S)	386	C28H50	S5	0.04
5a(H),14B(H),17B(H),24-methylcholestane (20R)	386	C28H50	S6	0.04
5a(H),14B(H),17B(H),24-methylcholestane (20S)	386	C28H50	S7	0.14
5a(H),14a(H),17a(H),24-methylcholestane (20R)	386	C28H50	S8	0.06
5a(H),14a(H),17a(H),24-ethylcholestane (20S)	400	C29H52	S9	0.06
5a(H),14B(H),17B(H),24-ethylcholestane (20R)	400	C29H52	S10	0.12
5a(H),14B(H),17B(H),24-ethylcholestane (20S)	400	C29H52	S11	0.02
5a(H),14a(H),17a(H),24-ethylcholestane (20R)	400	C29H52	S12	0.07
C30 Steranes (Total)	414	C30H54	S13	0.15
Total Steranes				1.0
% C27 Steranes				29.2
% C28 Steranes				28.0
% C29 Steranes				28.0
Ratio 5a,14B,17B/Total Steranes				0.42
Ratio 20S/20R + 20S				0.51



Hopane Profiles

Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08511
SAMPLE LOCATION : LOC 1

Compound	MW	Formula	Symbol	Concentration (ug/L)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.16
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.21
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.58
17a(H),21B(H)-hopane	412	C30H52	T4	0.82
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.17
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.17
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.10
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.19
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.10
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.13
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.06
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.03
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.13
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.00
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.00
Total Triterpanes				2.8
% C30				28.9
% C31-C33				32.4
% C34-C35				5.6
Tm/Ts				1.28
C29/C30				0.70
C32(S)/C32(R)				1.95
C33(S)/C33(R)				2.07
C34(S)/C34(R)				0.24
C35(S)/C35(R)				1.00
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				1.4

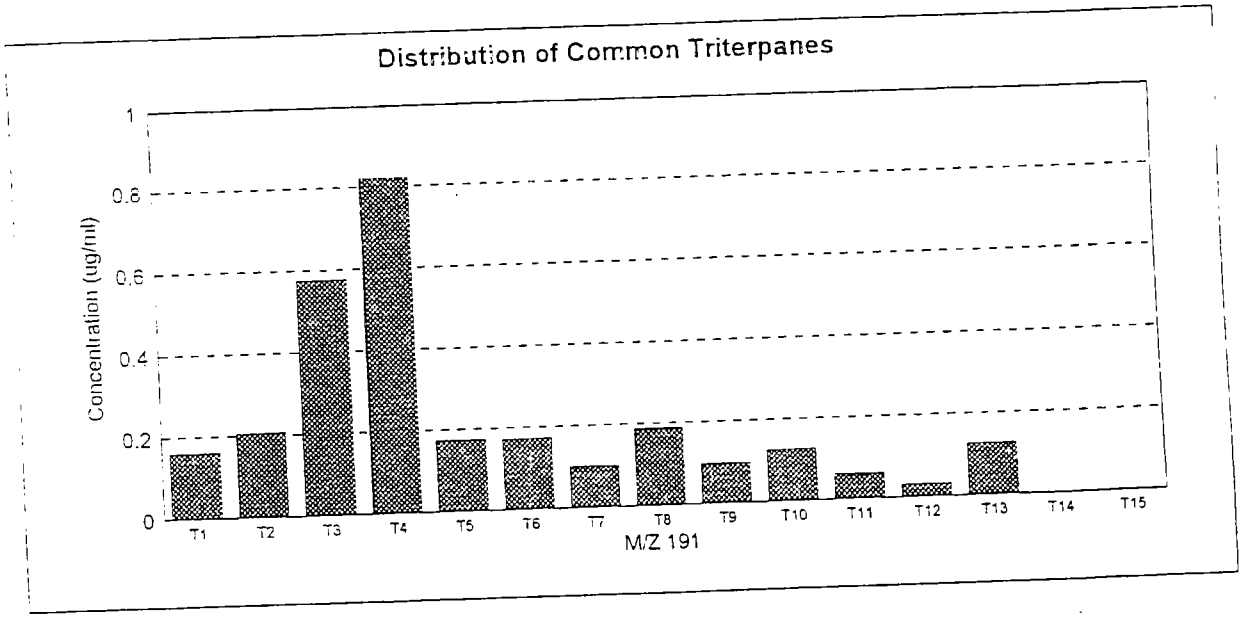


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08512
SAMPLE LOCATION : LOC 1 DUP

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.22
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.23
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.62
17a(H),21B(H)-hopane	412	C30H52	T4	0.91
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.20
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.19
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.11
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.21
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.12
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.14
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.07
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.06
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.12
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.05
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.12
Total Triterpanes				3.4
% C30				27.0
% C31-C33				30.9
% C34-C35				19.5
Tm/Ts				1.08
C29/C30				0.68
C32(S)/C32(R)				1.78
C33(S)/C33(R)				2.10
C34(S)/C34(R)				0.53
C35(S)/C35(R)				0.45
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				1.5

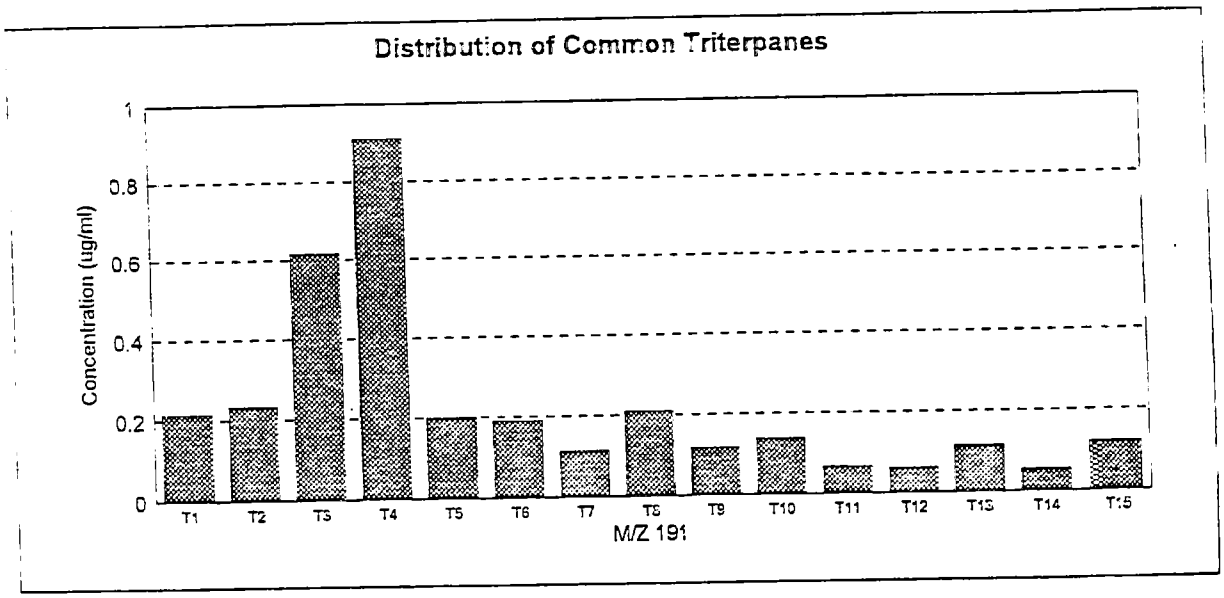


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08513
SAMPLE LOCATION : LOC 2

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.12
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.12
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.36
17a(H),21B(H)-hopane	412	C30H52	T4	0.51
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.11
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.09
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.04
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.17
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.06
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.07
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.03
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.03
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.09
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.04
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.02

Total Triterpanes	1.9
% C30	27.3
% C31-C33	30.8
% C34-C35	9.6
Tm/Ts	1.02
C29/C30	0.70
C32(S)/C32(R)	2.66
C33(S)/C33(R)	2.15
C34(S)/C34(R)	0.40
C35(S)/C35(R)	1.58
Weathered Percentage (%P) C29/C30 hopanes	NA
Sum of C29 + C30 Hopane (T3+T4)	0.9

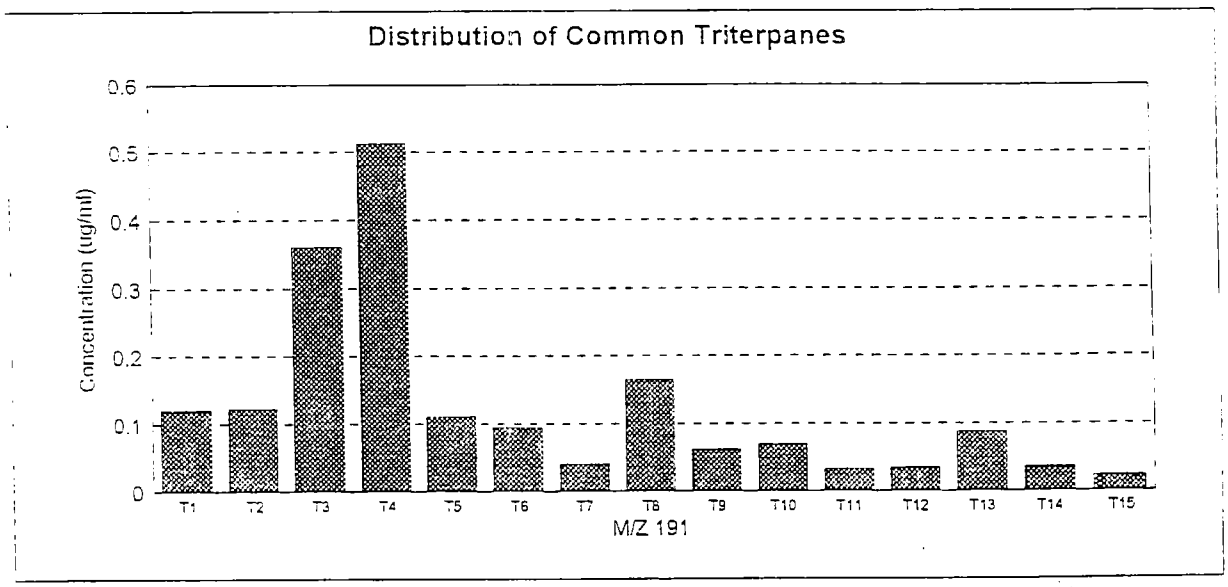


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08517
SAMPLE LOCATION : LOC 2 SUB

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.18
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.20
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.59
17a(H),21B(H)-hopane	412	C30H52	T4	0.82
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.16
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.16
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.12
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.20
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.12
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.09
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.05
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.05
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.08
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.00
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.00
Total Triterpanes				2.8
% C30				29.0
% C31-C33				31.7
% C34-C35				4.6
Tm/Ts				1.14
C29/C30				0.73
C32(S)/C32(R)				1.71
C33(S)/C33(R)				1.79
C34(S)/C34(R)				0.64
C35(S)/C35(R)				1.00
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				1.4

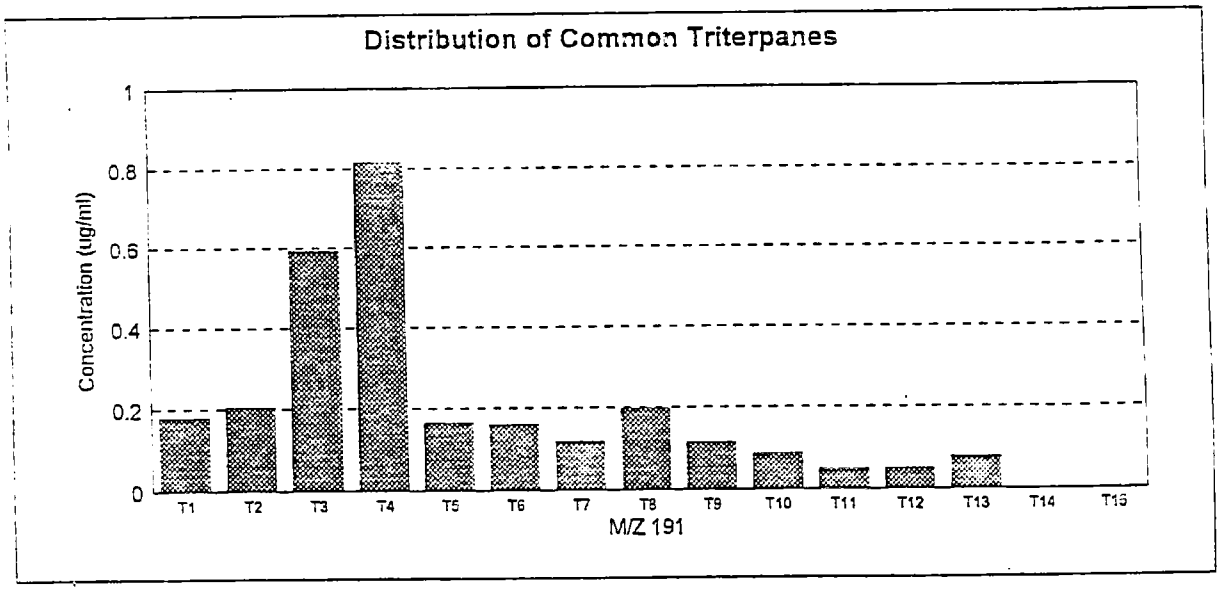


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08514
SAMPLE LOCATION : LOC 3

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.23
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.20
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.60
17a(H),21B(H)-hopane	412	C30H52	T4	0.88
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.22
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.23
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.09
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.17
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.11
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.13
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.06
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.11
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.07
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.00
Total Triterpanes				3.2
% C30				28.0
% C31-C33				32.2
% C34-C35				7.2
Tm/Ts				0.89
C29/C30				0.68
C32(S)/C32(R)				1.56
C33(S)/C33(R)				2.26
C34(S)/C34(R)				0.36
C35(S)/C35(R)				472.00
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				1.5

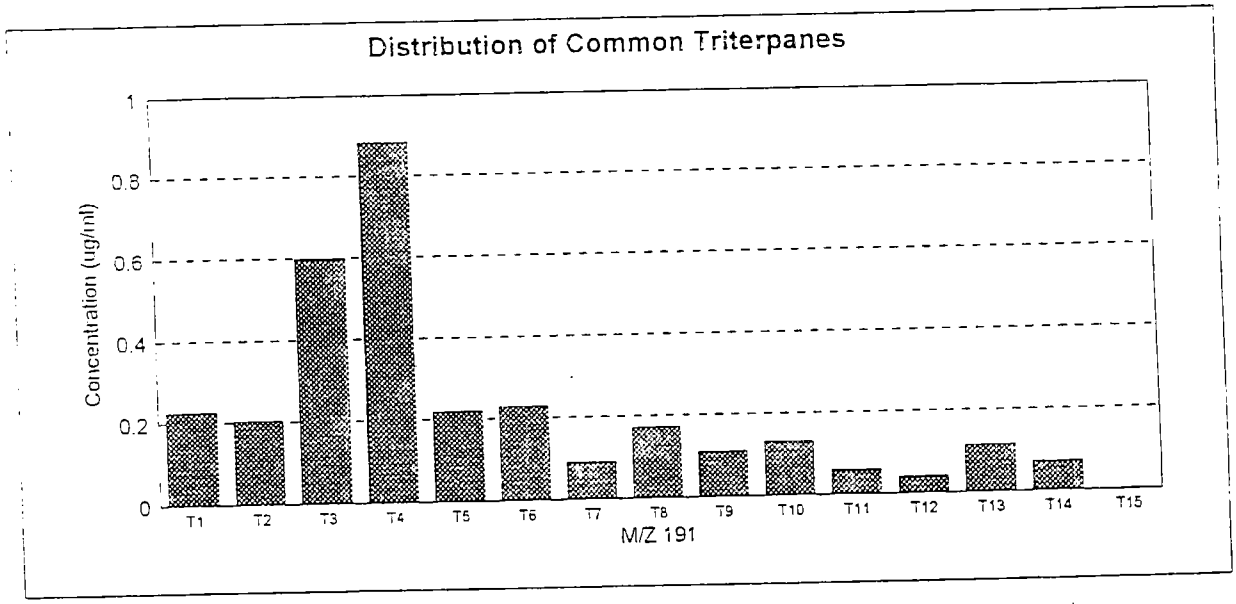


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08515
SAMPLE LOCATION : LOC 4

Compound	MW	Formula	Symbol	Concentration (ug/L)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.12
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.13
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.39
17a(H),21B(H)-hopane	412	C30H52	T4	0.55
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.12
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.11
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.05
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.17
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.07
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.07
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.06
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.04
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.02

Total Triterpanes	2.0
% C30	27.8
% C31-C33	31.5
% C34-C35	8.6
Tm/Ts	1.00
C29/C30	0.70
C32(S)/C32(R)	2.52
C33(S)/C33(R)	1.80
C34(S)/C34(R)	0.67
C35(S)/C35(R)	1.62
Weathered Percentage (%P) C29/C30 hopanes	NA
Sum of C29 + C30 Hopane (T3+T4)	0.9

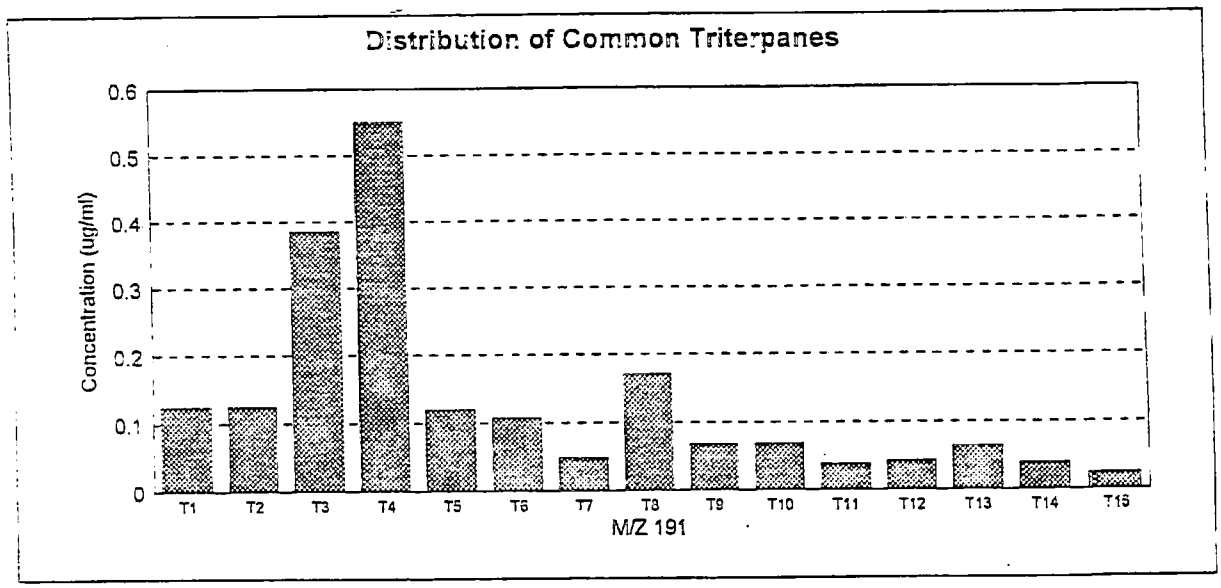


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08516
SAMPLE LOCATION : LOC 4 SUB

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.13
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.14
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.40
17a(H),21B(H)-hopane	412	C30H52	T4	0.58
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.12
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.10
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.05
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.16
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.07
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.06
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.06
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.04
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.03
Total Triterpanes				2.0
% C30				28.7
% C31-C33				29.7
% C34-C35				8.[illegible]
Tm/Ts				1.04
C29/C30				0.70
C32(S)/C32(R)				2.27
C33(S)/C33(R)				1.72
C34(S)/C34(R)				0.64
C35(S)/C35(R)				1.47
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				1.0

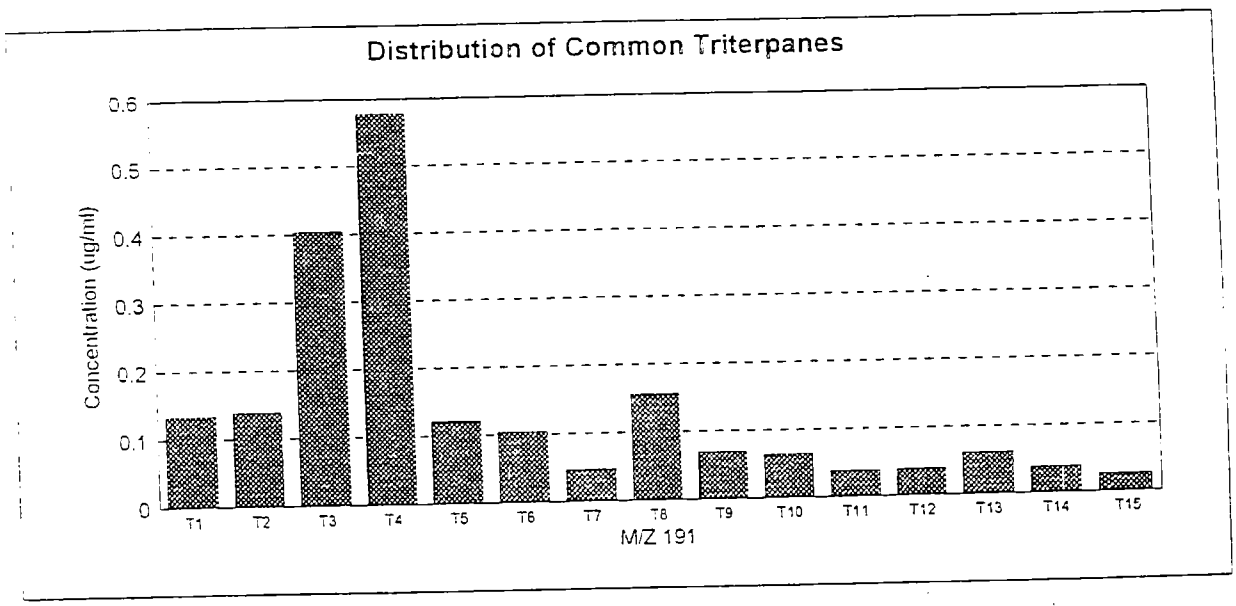


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08518
SAMPLE LOCATION : LOC 5

Compound	MW	Formula	Symbol	Concentration (mg/Kg)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.12
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.11
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.35
17a(H),21B(H)-hopane	412	C30H52	T4	0.51
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.11
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.09
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.04
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.14
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.06
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.06
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.03
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.04
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.06
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.03
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.03
Total Triterpanes				1.8
% C30				28.4
% C31-C33				29.6
% C34-C35				9.2
Tm/Ts				0.95
C29/C30				0.70
C32(S)/C32(R)				2.29
C33(S)/C33(R)				1.93
C34(S)/C34(R)				0.58
C35(S)/C35(R)				0.94
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				0.9

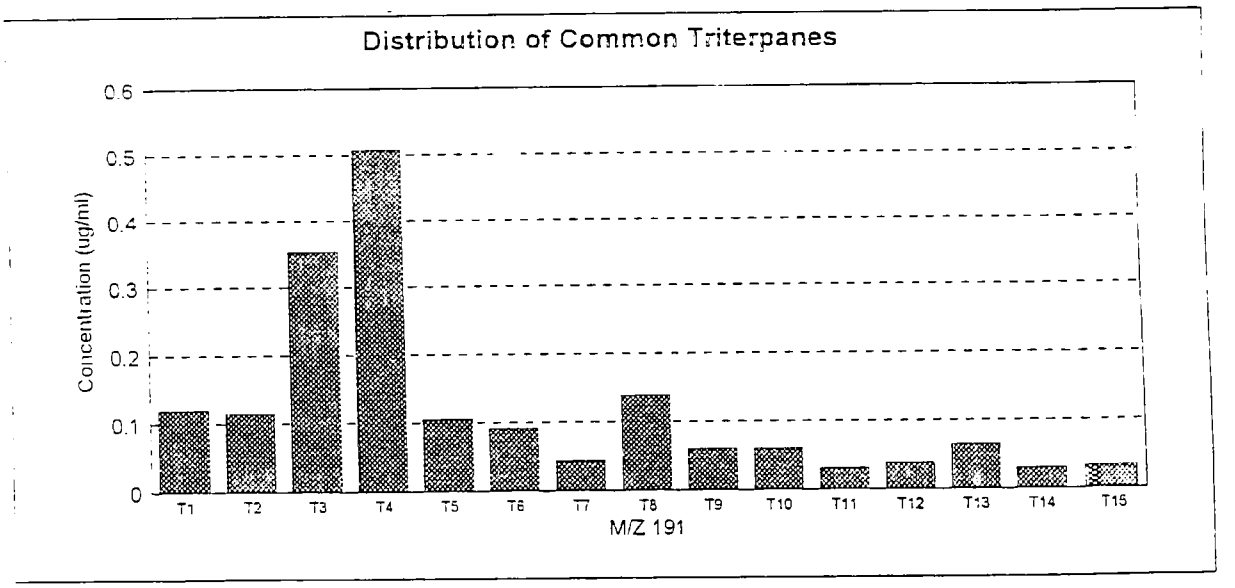
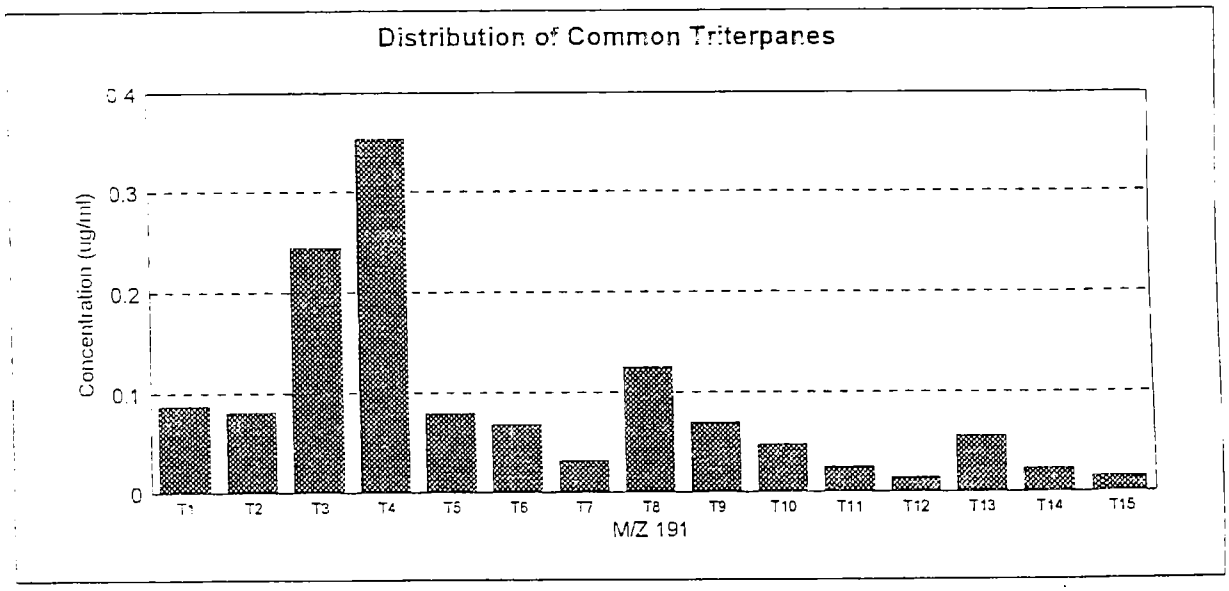


Table 4.0

Distribution of Common Hopanes (m/z 191)

SAMPLE NUMBER : A08519
SAMPLE LOCATION : LOC 6

Compound	MW	Formula	Symbol	Concentration (ug/L)
18a(H)-22,29,30-trisnorhopane (Ts)	370	C27H46	T1	0.09
17a(H)-22,29,30-trisnorhopane (Tm)	370	C27H46	T2	0.08
17a(H),21B(H)-30-norhopane	398	C29H50	T3	0.24
17a(H),21B(H)-hopane	412	C30H52	T4	0.35
17a(H),21B(H)-30-homohopane (22S)	426	C31H54	T5	0.08
17a(H),21B(H)-30-homohopane (22R)	426	C31H54	T6	0.07
17B(H),21a(H)-homomoretane	426	C31H54	T7	0.03
17a(H),21B(H)-30,31-bishomohopane (22S)	440	C32H56	T8	0.12
17a(H),21B(H)-30,31-bishomohopane (22R)	440	C32H56	T9	0.07
17a(H),21B(H)-30,31,32-trishomohopane (22S)	454	C33H58	T10	0.05
17a(H),21B(H)-30,31,32-trishomohopane (22R)	454	C33H58	T11	0.03
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22S)	468	C34H60	T12	0.01
17a(H),21B(H)-30,31,32,33-tetrakishomohopane (22R)	468	C34H60	T13	0.06
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T14	0.02
17a(H),21B(H)-30,31,32,33,34-pentakishomohopane (22	482	C35H62	T15	0.01
Total Triterpanes				1.3
% C30				26.7
% C31-C33				33.9
% C34-C35				8.2
Tm/Ts				0.93
C29/C30				0.69
C32(S)/C32(R)				1.79
C33(S)/C33(R)				1.89
C34(S)/C34(R)				0.26
C35(S)/C35(R)				1.53
Weathered Percentage (%P) C29/C30 hopanes				NA
Sum of C29 + C30 Hopane (T3+T4)				0.6



SAMPLE NUMBER	A08512	Quanta Resources	
Sample Location	LOC 1 DUP		
WA#	R1A00133		
Matrix	Soil		
HIGH, or LOW level	LOW		
Initial Wt. or Vol.	30.0 Gram	Steranes RF	0.18600
Percent Solids	38	Hopanes RF	0.49400
Final Volume	10 mL		
Additional Dilution	5 x		
Chrysene d12 Area	611650		
Perylene d12 Area	563870		
Internal Standard (ng)	10		

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	570	0.1860	0.05	0.22	2.20
STERANE (S2)	160	0.1860	0.01	0.06	2.20
STERANE (S3)	467	0.1860	0.04	0.18	2.20
STERANE (S4)	480	0.1860	0.04	0.19	2.20
STERANE (S5)	371	0.1860	0.03	0.14	2.20
STERANE (S6)	319	0.1860	0.03	0.12	2.20
STERANE (S7)	1298	0.1860	0.11	0.50	2.20
STERANE (S8)	278	0.1860	0.02	0.11	2.20
STERANE (S9)	415	0.1860	0.04	0.16	2.20
STERANE (S10)	844	0.1860	0.07	0.33	2.20
STERANE (S11)	123	0.1860	0.01	0.05	2.20
STERANE (S12)	703	0.1860	0.06	0.27	2.20
C30 STERANES (S13)	1463	0.1860	0.13	0.57	2.20
TRITERPANE (T1)	1359	0.4940	0.05	0.22	2.20
TRITERPANE (T2)	1473	0.4940	0.05	0.23	2.20
TRITERPANE (T3)	**3891**	**0.4940**	**0.14**	**0.62**	2.20
TRITERPANE (T4)	**5752**	**0.4940**	**0.21**	**0.91**	2.20
TRITERPANE (T5)	1272	0.4940	0.05	0.20	2.20
TRITERPANE (T6)	1198	0.4940	0.04	0.19	2.20
TRITERPANE (T7)	722	0.4940	0.03	0.11	2.20
TRITERPANE (T8)	1336	0.4940	0.05	0.21	2.20
TRITERPANE (T9)	750	0.4940	0.03	0.12	2.20
TRITERPANE (T10)	874	0.4940	0.03	0.14	2.20
TRITERPANE (T11)	417	0.4940	0.01	0.07	2.20
TRITERPANE (T12)	389	0.4940	0.01	0.06	2.20
TRITERPANE (T13)	728	0.4940	0.03	0.12	2.20
TRITERPANE (T14)	345	0.4940	0.01	0.05	2.20
TRITERPANE (T15)	763	0.4940	0.03	0.12	2.20
Total of T3+T4	9643			1.53	

SAMPLE NUMBER	A08513	Quanta Resources		
Sample Location	LOC 2			
WA#	R1A00133			
Matrix	Soil			
HIGH, or LOW level	LOW			
Initial Wt. or Vol.	30.0 Gram		Steranes RF	0.18600
Percent Solids	41		Hopanes RF	0.49400
Final Volume	10 mL			
Additional Dilution	1 x			
Chrysene d12 Area	682004			
Perylene d12 Area	608706			
Internal Standard (ng)	10			

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	2080	0.1860	0.16	0.13	0.40
STERANE (S2)	746	0.1860	0.06	0.05	0.40
STERANE (S3)	1424	0.1860	0.11	0.09	0.40
STERANE (S4)	2554	0.1860	0.20	0.16	0.40
STERANE (S5)	1239	0.1860	0.10	0.08	0.40
STERANE (S6)	918	0.1860	0.07	0.06	0.40
STERANE (S7)	2941	0.1860	0.23	0.19	0.40
STERANE (S8)	1125	0.1860	0.09	0.07	0.40
STERANE (S9)	1304	0.1860	0.10	0.08	0.40
STERANE (S10)	3086	0.1860	0.24	0.20	0.40
STERANE (S11)	649	0.1860	0.05	0.04	0.40
STERANE (S12)	1914	0.1860	0.15	0.12	0.40
C30 STERANES (S13)	3844	0.1860	0.30	0.24	0.40
TRITERPANE (T1)	4535	0.4940	0.15	0.12	0.40
TRITERPANE (T2)	4611	0.4940	0.15	0.12	0.40
TRITERPANE (T3)	**13454**	**0.4940**	**0.45**	**0.36**	0.40
TRITERPANE (T4)	**19110**	**0.4940**	**0.64**	**0.51**	0.40
TRITERPANE (T5)	4166	0.4940	0.14	0.11	0.40
TRITERPANE (T6)	3537	0.4940	0.12	0.09	0.40
TRITERPANE (T7)	1522	0.4940	0.05	0.04	0.40
TRITERPANE (T8)	6157	0.4940	0.20	0.17	0.40
TRITERPANE (T9)	2315	0.4940	0.08	0.06	0.40
TRITERPANE (T10)	2616	0.4940	0.09	0.07	0.40
TRITERPANE (T11)	1217	0.4940	0.04	0.03	0.40
TRITERPANE (T12)	1298	0.4940	0.04	0.03	0.40
TRITERPANE (T13)	3235	0.4940	0.11	0.09	0.40
TRITERPANE (T14)	1338	0.4940	0.04	0.04	0.40
TRITERPANE (T15)	848	0.4940	0.03	0.02	0.40
Total of T3+T4	**32564**			**0.87**	

Data Sheets
of

Steranes and Hopanes

SAMPLE NUMBER	A08511	Quanta Resources	
Sample Location	LOC 1		
WA#	R1A00133		
Matrix	Soil		
HIGH, or LOW level	LOW		
Initial Wt. or Vol.	30.0 Gram	Steranes RF	0.18600
Percent Moisture	39	Hopanes RF	0.49400
Final Volume	10 mL		
Additional Dilution	5 x		
Chrysene d12 Area	651175		
Perylene d12 Area	584167		
Internal Standard (ng)	10		

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. ug/L	Estimated MDL
STERANE (S1)	472	0.1860	0.04	0.17	2.16
STERANE (S2)	104	0.1860	0.01	0.04	2.16
STERANE (S3)	451	0.1860	0.04	0.16	2.16
STERANE (S4)	668	0.1860	0.06	0.24	2.16
STERANE (S5)	268	0.1860	0.02	0.10	2.16
STERANE (S6)	881	0.1860	0.07	0.31	2.16
STERANE (S7)	881	0.1860	0.07	0.31	2.16
STERANE (S8)	315	0.1860	0.03	0.11	2.16
STERANE (S9)	408	0.1860	0.03	0.15	2.16
STERANE (S10)	804	0.1860	0.07	0.29	2.16
STERANE (S11)	188	0.1860	0.02	0.07	2.16
STERANE (S12)	465	0.1860	0.04	0.17	2.16
C30 STERANES (S13)	901	0.1860	0.07	0.32	2.16
TRITERPANE (T1)	1086	0.4940	0.04	0.16	2.16
TRITERPANE (T2)	1385	0.4940	0.05	0.21	2.16
TRITERPANE (T3)	**3844**	**0.4940**	**0.13**	**0.58**	2.16
TRITERPANE (T4)	**5486**	**0.4940**	**0.19**	**0.82**	2.16
TRITERPANE (T5)	1169	0.4940	0.04	0.17	2.16
TRITERPANE (T6)	1153	0.4940	0.04	0.17	2.16
TRITERPANE (T7)	671	0.4940	0.02	0.10	2.16
TRITERPANE (T8)	1263	0.4940	0.04	0.19	2.16
TRITERPANE (T9)	647	0.4940	0.02	0.10	2.16
TRITERPANE (T10)	842	0.4940	0.03	0.13	2.16
TRITERPANE (T11)	406	0.4940	0.01	0.06	2.16
TRITERPANE (T12)	205	0.4940	0.01	0.03	2.16
TRITERPANE (T13)	848	0.4940	0.03	0.13	2.16
TRITERPANE (T14)	1	0.4940	0.00	0.00	2.16
TRITERPANE (T15)	1	0.4940	0.00	0.00	2.16
Total of T3+T4	**9330**			**1.40**	

SAMPLE NUMBER	A08517	Quanta Resources
Sample Location	LOC 2 SUB	
WA#	R1A00133	
Matrix	Soil	
HIGH, or LOW level	LOW	
Initial Wt. or Vol.	30.0 Gram	
Percent Solids	43	
Final Volume	10 mL	
Additional Dilution	5 x	
Chrysene d12 Area	642422	
Perylene d12 Area	562514	
Internal Standard (ng)	10	

Steranes RF	0.18600
Hopanes RF	0.49400

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	580	0.1860	0.05	0.19	1.96
STERANE (S2)	167	0.1860	0.01	0.05	1.96
STERANE (S3)	437	0.1860	0.04	0.14	1.96
STERANE (S4)	798	0.1860	0.07	0.26	1.96
STERANE (S5)	358	0.1860	0.03	0.12	1.96
STERANE (S6)	245	0.1860	0.02	0.08	1.96
STERANE (S7)	1247	0.1860	0.10	0.41	1.96
STERANE (S8)	313	0.1860	0.03	0.10	1.96
STERANE (S9)	434	0.1860	0.04	0.14	1.96
STERANE (S10)	887	0.1860	0.07	0.29	1.96
STERANE (S11)	308	0.1860	0.03	0.10	1.96
STERANE (S12)	654	0.1860	0.05	0.21	1.96
C30 STERANES (S13)	1188	0.1860	0.10	0.39	1.96
TRITERPANE (T1)	1275	0.4940	0.05	0.18	1.96
TRITERPANE (T2)	1456	0.4940	0.05	0.20	1.96
TRITERPANE (T3)	**4204**	0.4940	**0.15**	0.59	1.96
TRITERPANE (T4)	**5789**	0.4940	**0.21**	0.82	1.96
TRITERPANE (T5)	1169	0.4940	0.04	0.16	1.96
TRITERPANE (T6)	1142	0.4940	0.04	0.16	1.96
TRITERPANE (T7)	841	0.4940	0.03	0.12	1.96
TRITERPANE (T8)	1399	0.4940	0.05	0.20	1.96
TRITERPANE (T9)	820	0.4940	0.03	0.12	1.96
TRITERPANE (T10)	623	0.4940	0.02	0.09	1.96
TRITERPANE (T11)	348	0.4940	0.01	0.05	1.96
TRITERPANE (T12)	359	0.4940	0.01	0.05	1.96
TRITERPANE (T13)	561	0.4940	0.02	0.08	1.96
TRITERPANE (T14)	1	0.4940	0.00	0.00	1.96
TRITERPANE (T15)	1	0.4940	0.00	0.00	1.96
Total of T3+T4	9993			1.41	

SAMPLE NUMBER	A08514	Quanta Resources	
Sample Location	LOC 3		
WA#	R1A00133		
Matrix	Soil		
HIGH, or LOW level	LOW		
Initial Wt. or Vol.	30.0 Gram	Steranes RF	0.18600
Percent Solids	40	Hopanes RF	0.49400
Final Volume	10 mL		
Additional Dilution	5 x		
Chrysene d12 Area	614342		
Perylene d12 Area	552989		
Internal Standard (ng)	10		

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	571	0.1860	0.05	0.21	2.07
STERANE (S2)	160	0.1860	0.01	0.06	2.07
STERANE (S3)	339	0.1860	0.03	0.12	2.07
STERANE (S4)	795	0.1860	0.07	0.29	2.07
STERANE (S5)	383	0.1860	0.03	0.14	2.07
STERANE (S6)	297	0.1860	0.03	0.11	2.07
STERANE (S7)	1171	0.1860	0.10	0.42	2.07
STERANE (S8)	291	0.1860	0.03	0.11	2.07
STERANE (S9)	446	0.1860	0.04	0.16	2.07
STERANE (S10)	954	0.1860	0.08	0.35	2.07
STERANE (S11)	229	0.1860	0.02	0.08	2.07
STERANE (S12)	612	0.1860	0.05	0.22	2.07
C30 STERANES (S13)	1103	0.1860	0.10	0.40	2.07
TRITERPANE (T1)	1501	0.4940	0.05	0.23	2.07
TRITERPANE (T2)	1343	0.4940	0.05	0.20	2.07
TRITERPANE (T3)	**3954**	**0.4940**	**0.14**	**0.60**	2.07
TRITERPANE (T4)	**5826**	**0.4940**	**0.21**	**0.88**	2.07
TRITERPANE (T5)	1449	0.4940	0.05	0.22	2.07
TRITERPANE (T6)	1520	0.4940	0.06	0.23	2.07
TRITERPANE (T7)	595	0.4940	0.02	0.09	2.07
TRITERPANE (T8)	1141	0.4940	0.04	0.17	2.07
TRITERPANE (T9)	731	0.4940	0.03	0.11	2.07
TRITERPANE (T10)	876	0.4940	0.03	0.13	2.07
TRITERPANE (T11)	388	0.4940	0.01	0.06	2.07
TRITERPANE (T12)	270	0.4940	0.01	0.04	2.07
TRITERPANE (T13)	755	0.4940	0.03	0.11	2.07
TRITERPANE (T14)	472	0.4940	0.02	0.07	2.07
TRITERPANE (T15)	1	0.4940	0.00	0.00	2.07
Total of T3+T4	**9780**			**1.48**	

SAMPLE NUMBER	A08515	Quanta Resources	
Sample Location	LOC 4		
WA#	R1A00133		
Matrix	Soil		
HIGH, or LOW level	LOW		
Initial Wt. or Vol.	30.0 Gram	Steranes RF	0.18600
Percent Moisture	42	Hopanes RF	0.49400
Final Volume	10 mL		
Additional Dilution	1 x		
Chrysene d12 Area	605449		
Perylene d12 Area	545644		
Internal Standard (ng)	10		

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. ug/L	Estimated MDL
STERANE (S1)	2028	0.1860	0.18	0.142	0.39
STERANE (S2)	664	0.1860	0.06	0.046	0.39
STERANE (S3)	1510	0.1860	0.13	0.106	0.39
STERANE (S4)	2668	0.1860	0.24	0.187	0.39
STERANE (S5)	1056	0.1860	0.09	0.074	0.39
STERANE (S6)	1046	0.1860	0.09	0.073	0.39
STERANE (S7)	2283	0.1860	0.20	0.160	0.39
STERANE (S8)	932	0.1860	0.08	0.065	0.39
STERANE (S9)	1373	0.1860	0.12	0.096	0.39
STERANE (S10)	2735	0.1860	0.24	0.191	0.39
STERANE (S11)	530	0.1860	0.05	0.037	0.39
STERANE (S12)	1767	0.1860	0.16	0.124	0.39
C30 STERANES (S13)	3425	0.1860	0.30	0.240	0.39
TRITERPANE (T1)	4269	0.4940	0.16	0.12	0.39
TRITERPANE (T2)	4286	0.4940	0.16	0.13	0.39
TRITERPANE (T3)	**13172**	**0.4940**	**0.49**	**0.39**	0.39
TRITERPANE (T4)	**18832**	**0.4940**	**0.70**	**0.55**	0.39
TRITERPANE (T5)	4105	0.4940	0.15	0.12	0.39
TRITERPANE (T6)	3689	0.4940	0.14	0.11	0.39
TRITERPANE (T7)	1656	0.4940	0.06	0.05	0.39
TRITERPANE (T8)	5859	0.4940	0.22	0.17	0.39
TRITERPANE (T9)	2328	0.4940	0.09	0.07	0.39
TRITERPANE (T10)	2363	0.4940	0.09	0.07	0.39
TRITERPANE (T11)	1312	0.4940	0.05	0.04	0.39
TRITERPANE (T12)	1461	0.4940	0.05	0.04	0.39
TRITERPANE (T13)	2193	0.4940	0.08	0.06	0.39
TRITERPANE (T14)	1342	0.4940	0.05	0.04	0.39
TRITERPANE (T15)	830	0.4940	0.03	0.02	0.39
Total of T3+T4	32004			0.94	

SAMPLE NUMBER	A08516	Quanta Resources
Sample Location	LOC 4 SUB	
WA#	R1A00133	
Matrix	Soil	
HIGH, or LOW level	LOW	
Initial Wt. or Vol.	30.0 Gram	
Percent Solids	44	
Final Volume	10 mL	
Additional Dilution	1 x	
Chrysene d12 Area	641579	
Perylene d12 Area	575706	
Internal Standard (ng)	10	

Steranes RF	0.18600
Hopanes RF	0.49400

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	2292	0.1860	0.19	0.14	0.38
STERANE (S2)	743	0.1860	0.06	0.05	0.38
STERANE (S3)	1702	0.1860	0.14	0.11	0.38
STERANE (S4)	3033	0.1860	0.25	0.19	0.38
STERANE (S5)	953	0.1860	0.08	0.06	0.38
STERANE (S6)	1024	0.1860	0.09	0.06	0.38
STERANE (S7)	3105	0.1860	0.26	0.20	0.38
STERANE (S8)	1443	0.1860	0.12	0.09	0.38
STERANE (S9)	1693	0.1860	0.27	0.20	0.38
STERANE (S10)	3190	0.1860	0.05	0.04	0.38
STERANE (S11)	645	0.1860	0.15	0.11	0.38
STERANE (S12)	1770	0.1860	0.29	0.22	0.38
C30 STERANES (S13)	3456	0.1860	ERR	ERR	0.38
TRITERPANE (T1)	5052	0.4940	0.18	0.13	0.38
TRITERPANE (T2)	5252	0.4940	0.18	0.14	0.38
TRITERPANE (T3)	**15230**	**0.4940**	**0.54**	**0.40**	0.38
TRITERPANE (T4)	**21799**	**0.4940**	**0.77**	**0.58**	0.38
TRITERPANE (T5)	4587	0.4940	0.16	0.12	0.38
TRITERPANE (T6)	3925	0.4940	0.14	0.10	0.38
TRITERPANE (T7)	1748	0.4940	0.06	0.05	0.38
TRITERPANE (T8)	5888	0.4940	0.21	0.16	0.38
TRITERPANE (T9)	2595	0.4940	0.09	0.07	0.38
TRITERPANE (T10)	2424	0.4940	0.09	0.06	0.38
TRITERPANE (T11)	1411	0.4940	0.05	0.04	0.38
TRITERPANE (T12)	1472	0.4940	0.05	0.04	0.38
TRITERPANE (T13)	2310	0.4940	0.08	0.06	0.38
TRITERPANE (T14)	1403	0.4940	0.05	0.04	0.38
TRITERPANE (T15)	954	0.4940	0.03	0.03	0.38
Total of T3+T4	**37029**			**0.98**	

SAMPLE NUMBER	A08518	Quanta Resources
Sample Location	LOC 5	
WA#	R1A00133	
Matrix	Soil	
HIGH, or LOW level	LOW	
Initial Wt. or Vol.	30.0 Gram	
Percent Solids	47	
Final Volume	10 mL	
Additional Dilution	1 x	
Chrysene d12 Area	584748	
Perylene d12 Area	524689	
Internal Standard (ng)	10	

Steranes RF	0.18600
Hopanes RF	0.49400

COMPOUND	Area	Calib. Avg.RF	Inst Conc.	Conc. mg/Kg	MDL
STERANE (S1)	1940	0.1860	0.18	0.13	0.35
STERANE (S2)	543	0.1860	0.05	0.04	0.35
STERANE (S3)	1033	0.1860	0.09	0.07	0.35
STERANE (S4)	2450	0.1860	0.23	0.16	0.35
STERANE (S5)	1349	0.1860	0.12	0.09	0.35
STERANE (S6)	1210	0.1860	0.11	0.08	0.35
STERANE (S7)	2192	0.1860	0.20	0.14	0.35
STERANE (S8)	820	0.1860	0.08	0.05	0.35
STERANE (S9)	1348	0.1860	0.12	0.09	0.35
STERANE (S10)	2662	0.1860	0.24	0.17	0.35
STERANE (S11)	507	0.1860	0.05	0.03	0.35
STERANE (S12)	1476	0.1860	0.14	0.10	0.35
C30 STERANES (S13)	2060	0.1860	0.19	0.13	0.35
TRITERPANE (T1)	4425	0.4940	0.17	0.12	0.35
TRITERPANE (T2)	4194	0.4940	0.16	0.11	0.35
TRITERPANE (T3)	**12953**	**0.4940**	**0.50**	**0.35**	0.35
TRITERPANE (T4)	**18636**	**0.4940**	**0.72**	**0.51**	0.35
TRITERPANE (T5)	3902	0.4940	0.15	0.11	0.35
TRITERPANE (T6)	3352	0.4940	0.13	0.09	0.35
TRITERPANE (T7)	1593	0.4940	0.06	0.04	0.35
TRITERPANE (T8)	5078	0.4940	0.20	0.14	0.35
TRITERPANE (T9)	2213	0.4940	0.09	0.06	0.35
TRITERPANE (T10)	2190	0.4940	0.08	0.06	0.35
TRITERPANE (T11)	1137	0.4940	0.04	0.03	0.35
TRITERPANE (T12)	1381	0.4940	0.05	0.04	0.35
TRITERPANE (T13)	2371	0.4940	0.09	0.06	0.35
TRITERPANE (T14)	1110	0.4940	0.04	0.03	0.35
TRITERPANE (T15)	1182	0.4940	0.05	0.03	0.35
Total of T3+T4	31589			0.86	

Results of TPH

TABLE 5.0 Results of the TPH Analysis in Soil by GC/MS Using Modifed Method 8015B
WA # R1A00133: Quanta Resources
Results Based on Dry Weight

Sample No.	Sampling Location	Conc. (mg/Kg)	TPH MDL (mg/Kg)
SBLK05080	Sand Blank	U	330
A08511	LOC 1	2400	4300
A08512	LOC 1 DUP	3000	4400
A08513	LOC 2	880	810
A08517	LOC 2 SUB	1800	3900
A08514	LOC 3	2200	4100
A08515	LOC 4	800	790
A08516	LOC 4 SUB	860	750
A08518	LOC 5	670	710
A08519	LOC 6	570	800

APPENDIX E
Grain Size Results
Quanta Resources Site
Edgewater, NJ
August 2000

Results	Loc 1

Sieve Analysis

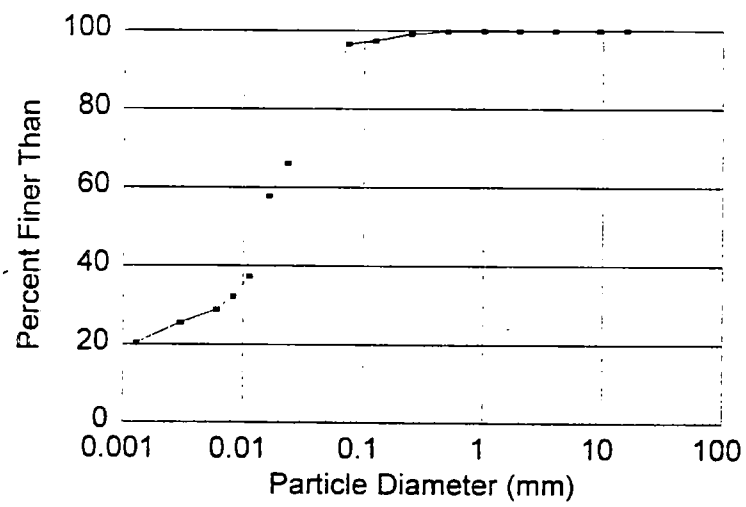
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.04	1.039	5.98	0.0236	66.25
5	1.035	1.034	7.30	0.0165	57.75
15	1.023	1.022	10.48	0.0114	37.37
30	1.02	1.019	11.27	0.0084	32.27
60	1.018	1.017	11.80	0.0061	28.88
250	1.016	1.015	12.33	0.0030	25.48
1440	1.013	1.012	13.12	0.0013	20.38

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.04	94.51	99.96
0.5	0.17	94.34	99.78
0.25	0.52	93.82	99.23
0.125	1.80	92.02	97.32
0.075	0.74	91.28	96.54
TOTAL	3.27		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	99.96
	0.5	99.78
Fine Sand	0.25	99.23
	0.125	97.32
	0.075	96.54
Silt	0.0236	66.25
	0.0165	57.75
	0.0114	37.37
	0.0084	32.27
	0.0061	28.88
Clay	0.0030	25.48
	0.0013	20.38

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 1

Sample Data

Mass of sample split on No. 10 sieve (g):	131.5
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	131.5
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	131.5
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	131.5

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	10.785
Percent hygroscopic moisture:	28.10
Corrected mass of soil used in hydrometer test (g):	94.55

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	94.55
F:	0.00

Results	Loc 2

Sieve Analysis

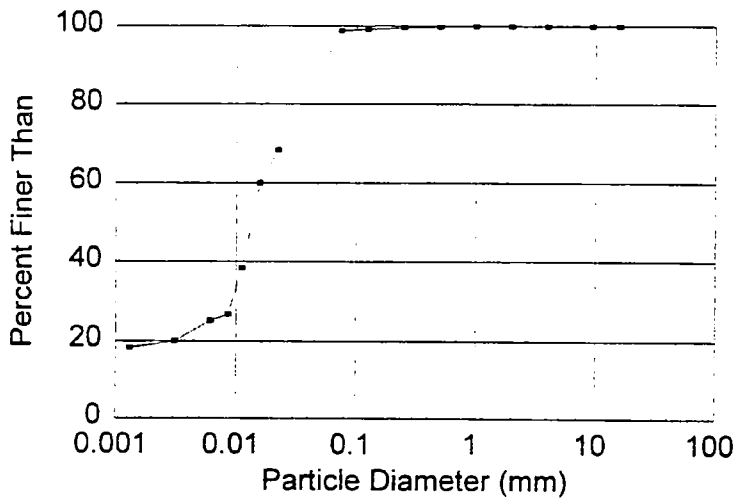
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.042	1.041	5.45	0.0225	68.41
5	1.037	1.036	6.77	0.0159	60.07
15	1.024	1.023	10.21	0.0113	38.38
30	1.017	1.016	12.06	0.0087	26.70
60	1.016	1.015	12.33	0.0062	25.03
250	1.013	1.012	13.12	0.0031	20.02
1440	1.012	1.011	13.39	0.0013	18.35

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.01	96.24	99.99
0.5	0.22	96.02	99.76
0.25	0.12	95.90	99.64
0.125	0.27	95.63	99.36
0.075	0.39	95.24	98.95
TOTAL	1.01		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	99.99
	0.5	99.76
Fine Sand	0.25	99.64
	0.125	99.36
	0.075	98.95
Silt	0.0225	68.41
	0.0159	60.07
	0.0113	38.38
	0.0087	26.70
	0.0062	25.03
Clay	0.0031	20.02
	0.0013	18.35

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 2

Sample Data

Mass of sample split on No. 10 sieve (g):	129.2
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	129.2
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	129.2
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	129.2

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	11.175
Percent hygroscopic moisture:	25.50
Corrected mass of soil used in hydrometer test (g):	96.25

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	96.25
F:	0.00

Results	Loc 2 SUB

Sieve Analysis

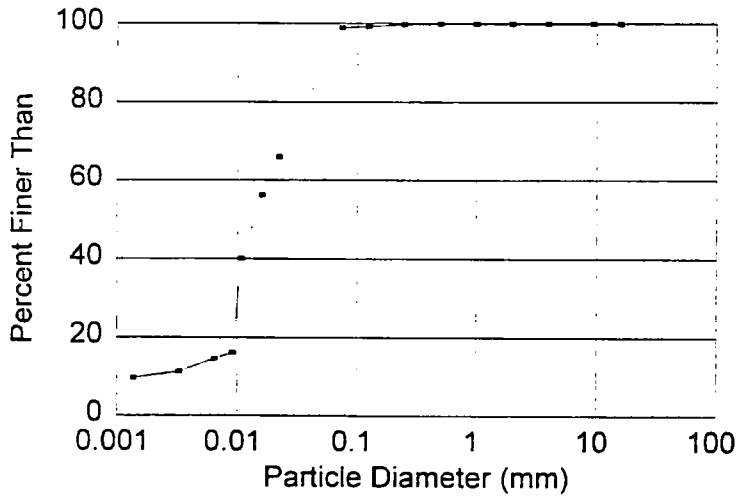
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.042	1.041	5.45	0.0225	65.90
5	1.036	1.035	7.04	0.0162	56.26
15	1.026	1.025	9.68	0.0110	40.18
30	1.011	1.01	13.65	0.0092	16.07
60	1.01	1.009	13.91	0.0066	14.47
250	1.008	1.007	14.44	0.0033	11.25
1440	1.007	1.006	14.71	0.0014	9.64

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.04	99.88	99.96
0.5	0.06	99.82	99.90
0.25	0.16	99.66	99.74
0.125	0.36	99.30	99.38
0.075	0.41	98.89	98.97
TOTAL	1.03		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	99.96
	0.5	99.90
Fine Sand	0.25	99.74
	0.125	99.38
	0.075	98.97
Silt	0.0225	65.90
	0.0162	56.26
	0.0110	40.18
	0.0092	16.07
	0.0066	14.47
Clay	0.0033	11.25
	0.0014	9.64

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 2 SUB

Sample Data

Mass of sample split on No. 10 sieve (g):	134.3
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	134.3
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	134.3
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	134.3

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	11.16
Percent hygroscopic moisture:	25.60
Corrected mass of soil used in hydrometer test (g):	99.92

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	99.92
F:	0.00

Results	Loc 3

Sieve Analysis

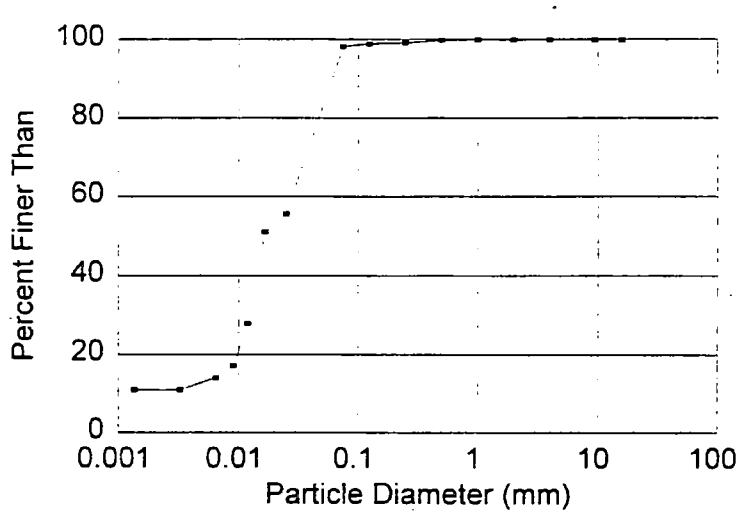
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.037	1.036	6.77	0.0251	55.65
5	1.034	1.033	7.57	0.0168	51.01
15	1.019	1.018	11.53	0.0120	27.82
30	1.012	1.011	13.39	0.0091	17.00
60	1.01	1.009	13.91	0.0066	13.91
250	1.008	1.007	14.44	0.0033	10.82
1440	1.008	1.007	14.44	0.0014	10.82

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.07	103.83	99.93
0.5	0.14	103.69	99.80
0.25	0.67	103.02	99.15
0.125	0.24	102.78	98.92
0.075	0.74	102.04	98.21
TOTAL	1.86		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	99.93
	0.5	99.80
Fine Sand	0.25	99.15
	0.125	98.92
	0.075	98.21
Silt	0.0251	55.65
	0.0168	51.01
	0.0120	27.82
	0.0091	17.00
	0.0066	13.91
Clay	0.0033	10.82
	0.0014	10.82

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 3

Sample Data

Mass of sample split on No. 10 sieve (g):	138.9
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	138.9
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	138.9
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	138.9

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	11.22
Percent hygroscopic moisture:	25.20
Corrected mass of soil used in hydrometer test (g):	103.90

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	103.90
F:	0.00

Results: Loc 4

Sieve Analysis

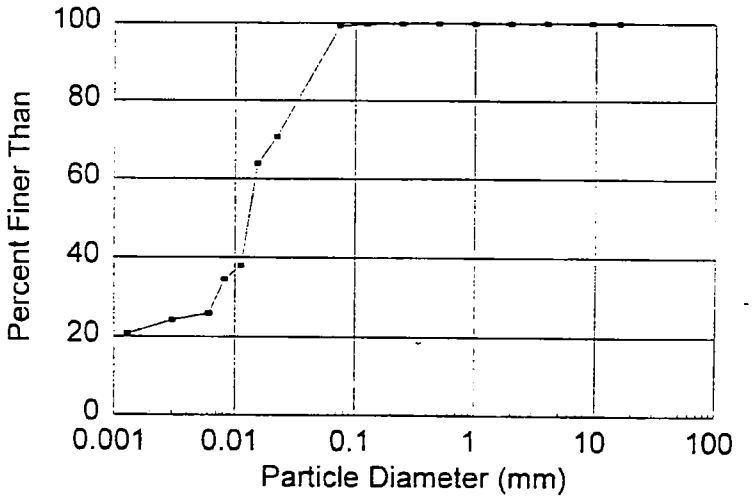
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.042	1.041	15.45	0.0225	70.76
5	1.038	1.037	16.51	0.0156	63.86
15	1.023	1.022	10.48	0.0114	37.97
30	1.021	1.02	11.00	0.0083	34.52
60	1.016	1.015	12.33	0.0062	25.89
250	1.015	1.014	12.59	0.0031	24.16
1440	1.013	1.012	13.12	0.0013	20.71

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.00	93.05	100.00
0.5	0.03	93.02	99.97
0.25	0.04	92.98	99.92
0.125	0.16	92.82	99.75
0.075	0.33	92.49	99.40
TOTAL	0.56		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	100.00
	0.5	99.97
Fine Sand	0.25	99.92
	0.125	99.75
	0.075	99.40
Silt	0.0225	70.76
	0.0156	63.86
	0.0114	37.97
	0.0083	34.52
	0.0062	25.89
Clay	0.0031	24.16
	0.0013	20.71

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 4

Sample Data

Mass of sample split on No. 10 sieve (g):	129.6
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	129.6
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	129.6
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	129.6

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	10.77
Percent hygroscopic moisture:	28.20
Corrected mass of soil used in hydrometer test (g):	93.05

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	93.05
F:	0.00

Results	Loc 4 SUB

Sieve Analysis

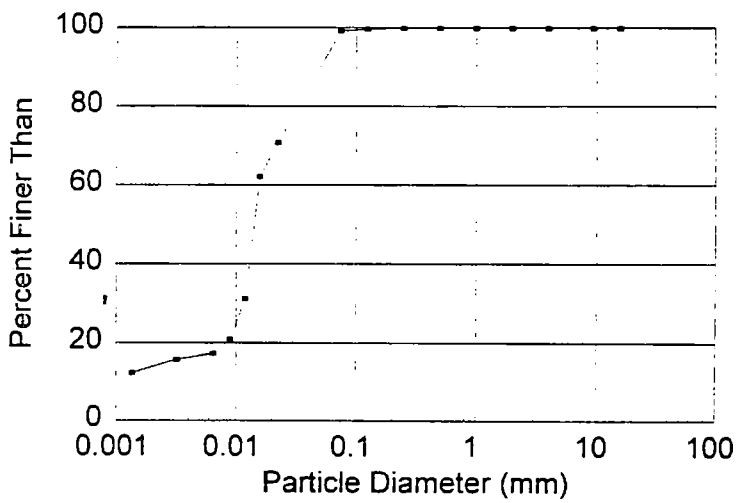
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.042	1.041	5.45	0.0225	70.76
5	1.037	1.036	6.77	0.0159	62.13
15	1.019	1.018	11.53	0.0120	31.07
30	1.013	1.012	13.12	0.0090	20.71
60	1.011	1.01	13.65	0.0065	17.26
250	1.01	1.009	13.91	0.0032	15.53
1440	1.008	1.007	14.44	0.0014	12.08

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.00	93.05	100.00
0.5	0.02	93.03	99.98
0.25	0.07	92.96	99.90
0.125	0.24	92.72	99.65
0.075	0.38	92.34	99.24
TOTAL	0.71		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	100.00
	0.5	99.98
Fine Sand	0.25	99.90
	0.125	99.65
	0.075	99.24
Silt	0.0225	70.76
	0.0159	62.13
	0.0120	31.07
	0.0090	20.71
	0.0065	17.26
Clay	0.0032	15.53
	0.0014	12.08

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 4 SUB

Sample Data

Mass of sample split on No. 10 sieve (g):	129.6
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	129.6
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	129.6
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	129.6

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	10.77
Percent hygroscopic moisture:	28.20
Corrected mass of soil used in hydrometer test (g):	93.05

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	93.05
F:	0.00

Results :	Loc 5

Sieve Analysis

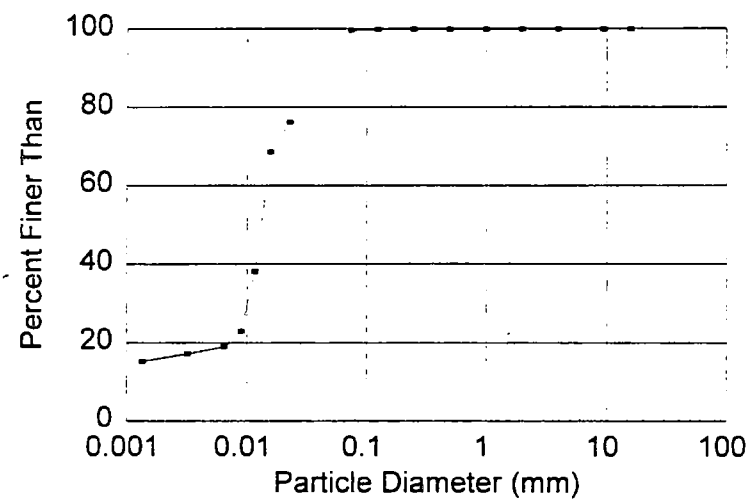
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.041	1.04	5.71	0.0231	76.22
5	1.037	1.036	6.77	0.0159	68.60
15	1.021	1.02	11.00	0.0117	38.11
30	1.013	1.012	13.12	0.0090	22.87
60	1.011	1.01	13.65	0.0065	19.06
250	1.01	1.009	13.91	0.0032	17.15
1440	1.009	1.008	14.18	0.0014	15.24

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.00	84.28	100.00
0.5	0.03	84.25	99.96
0.25	0.01	84.24	99.95
0.125	0.10	84.14	99.83
0.075	0.16	83.98	99.64
TOTAL	0.30		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	100.00
	0.5	99.96
Fine Sand	0.25	99.95
	0.125	99.83
	0.075	99.64
Silt	0.0231	76.22
	0.0159	68.60
	0.0117	38.11
	0.0090	22.87
	0.0065	19.06
Clay	0.0032	17.15
	0.0014	15.24

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 5

Sample Data

Mass of sample split on No. 10 sieve (g):	136.6
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	136.6
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	136.6
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	136.6

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	9.255
Percent hygroscopic moisture:	38.30
Corrected mass of soil used in hydrometer test (g):	84.28

Hydrometer Test

Hydrometer type:	
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	84.28
F:	0.00

Results	Loc 6

Sieve Analysis

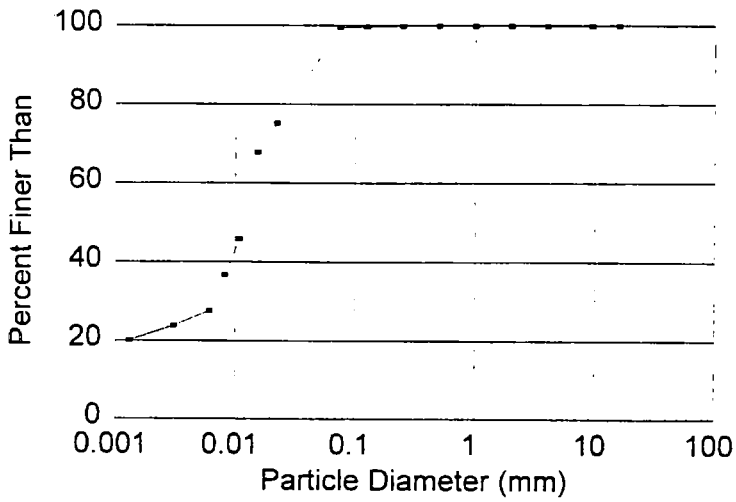
Sieve Size (mm)	Mass Retained (g)	Hygroscopic Corrected Mass Retained (g)	Mass Retained Corrected for F (g)	Mass Passing (g)	Percent Finer Than
16	0.00	0.00	0.00	0.00	0.00
9.5	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Hydrometer Test Analysis

Time, T (Minutes)	Hydrometer Reading	Corrected Reading	Length, L (cm)	Diameter (mm)	Percent Suspended
2	1.042	1.041	5.45	0.0225	75.14
5	1.038	1.037	6.51	0.0156	67.81
15	1.026	1.025	9.68	0.0110	45.82
30	1.021	1.02	11.00	0.0083	36.65
60	1.016	1.015	12.33	0.0062	27.49
250	1.014	1.013	12.86	0.0031	23.82
1440	1.012	1.011	13.39	0.0013	20.16

Sieve Analysis <No.10

Size (mm)	Mass Retained (g)	Mass Passing (g)	Percent Finer Than
1	0.00	87.64	100.00
0.5	0.04	87.60	99.95
0.25	0.07	87.53	99.87
0.125	0.10	87.43	99.76
0.075	0.15	87.28	99.59
TOTAL	0.36		



ASTM Grain Size	Particle Dia. (mm)	Percent Finer
Fine Gravel	16	100.00
	9.5	100.00
Course Sand	4	100.00
	2	100.00
Medium Sand	1	100.00
	0.5	99.95
Fine Sand	0.25	99.87
	0.125	99.76
	0.075	99.59
Silt	0.0225	75.14
	0.0156	67.81
	0.0110	45.82
	0.0083	36.65
	0.0062	27.49
Clay	0.0031	23.82
	0.0013	20.16

PARTICLE SIZE ANALYSIS

Technician's name:	Brian Holderness
Date:	10 July 2000
Site name:	Quanta Resources
Sample No.:	Loc 6

Sample Data

Mass of sample split on No. 10 sieve (g):	143.9
Mass retained on No. 10 sieve (g):	0
Mass passing No. 10 sieve (g):	143.9
Percent passing No. 10 sieve (g):	100.00
Mass used in Hydrometer test (g):	143.9
Specific gravity of soil:	2.65
Correction factor:	1
Corrected mass of soil used in hydrometer test (g):	143.9

Hygroscopic Moisture

Wet mass of hygroscopic test sample (g):	15
Oven-dry mass of test sample (g):	9.135
Percent hygroscopic moisture:	39.10
Corrected mass of soil used in hydrometer test (g):	87.64

Hydrometer Test

Hydrometer type:	[redacted]
Hydrometer correction:	0.001
Average temperature (C):	21
Temperature correction factor:	0
Total Hydrometer correction:	0.001

Values

K:	0.01365
W:	87.64
F:	0.00

APPENDIX F
Multivariate Analyses for Benthic Macroinvertebrates
Quanta Resources Site
Edgewater, NJ
August 2000

Compare Variances for Location Cluster Analysis
Quanta Site

Variable	Label	N	Mean	Std Dev	Variance	Minimum	Maximum
NEMATODA	Nematoda	6	0.6666667	0.8164966	0.6666667	0	2.0000000
NEMERTIN	Nemertinea	6	3.0000000	5.0596443	25.6000000	0	13.0000000
OLIGOCHA	Oligochaeta	6	630.3333333	527.8919081	278669.87	126.0000000	1307.00
AMPHARET	Ampharetidae	6	3.0000000	3.4641016	12.0000000	0	9.0000000
CAPITELL	Capitellidae	6	5.5000000	6.8044103	46.3000000	0	18.0000000
NEREIDA	Nereida	6	4.0000000	4.8989795	24.0000000	0	13.0000000
ORBINIDA	Orbinidae	6	0.8333333	0.9831921	0.9666667	0	2.0000000
PHYLLODO	Phyllodocidae	6	9.3333333	8.2865353	68.6666667	1.0000000	23.0000000
SPIONIDA	Spionidae	6	0.1666667	0.4082483	0.1666667	0	1.0000000
SCOLECOL	Scolecolepides viridis	6	0.8333333	1.6020820	2.5666667	0	4.0000000
STREBLOS	Streblospio benedicti	6	23.6666667	24.1716087	584.2666667	1.0000000	52.0000000
COPEPODA	Copepoda	6	3.5000000	1.8708287	3.5000000	2.0000000	7.0000000
AMPHIPOD	Amphipoda	6	0.3333333	0.5163978	0.2666667	0	1.0000000
ISOPODA	Isopoda	6	1.3333333	2.0655911	4.2666667	0	4.0000000
MACOMABA	Macoma balthica	6	1.6666667	1.6329932	2.6666667	0	4.0000000
TELINAAG	Telina agilis	6	1.3333333	1.3662601	1.8666667	0	4.0000000

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Quanta Site

Average Linkage Cluster Analysis

Eigenvalues of the Correlation Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	6.00826	0.39119	0.375517	0.37552
2	5.61708	3.24059	0.351067	0.72658
3	2.37649	1.24424	0.148530	0.87511
4	1.13225	0.26632	0.070765	0.94588
5	0.86592	0.86592	0.054120	1.00000
6	0.00000	0.00000	0.000000	1.00000
7	0.00000	0.00000	0.000000	1.00000
8	0.00000	0.00000	0.000000	1.00000
9	0.00000	0.00000	0.000000	1.00000
10	0.00000	0.00000	0.000000	1.00000
11	0.00000	0.00000	0.000000	1.00000
12	-0.00000	0.00000	-.000000	1.00000
13	-0.00000	0.00000	-.000000	1.00000
14	-0.00000	0.00000	-.000000	1.00000
15	-0.00000	0.00000	-.000000	1.00000
16	-0.00000	.	-.000000	1.00000

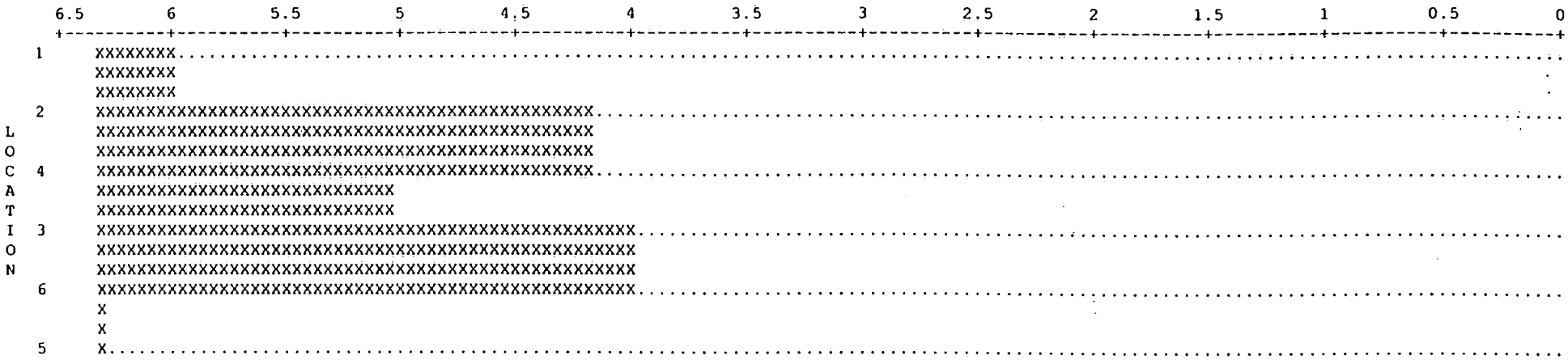
The data have been standardized to mean 0 and variance 1
Root-Mean-Square Total-Sample Standard Deviation = 1

Number of Clusters	--Clusters Joined--		Frequency of New Cluster	RMS Distance	Tie
5	3	6	2	3.98638	
4	2	4	2	4.18546	
3	CL4	CL5	4	5.06349	
2	1	CL3	5	6.01117	
1	CL2	5	6	6.31662	

Cluster Analysis Per Location - Data Standardized Prior to Analysis
Quanta Site

Average Linkage Cluster Analysis

Average Distance Between Clusters



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Quanta Site

Variable	Label	N	Mean	Std Dev	Variance	Minimum	Maximum
NEMATODA	Nematoda	36	0.1111111	0.3187276	0.1015873	0	1.0000000
NEMERTIN	Nemertinea	36	0.5000000	1.0000000	1.0000000	0	3.0000000
OLIGOCHA	Oligochaeta	36	105.0555556	95.0365176	9031.94	0	363.0000000
AMPHARET	Ampharetidae	36	0.5000000	1.1084094	1.2285714	0	5.0000000
CAPITELL	Capitellidae	36	0.9166667	2.1957752	4.8214286	0	12.0000000
NEREIDA	Nereida	36	0.6666667	1.0141851	1.0285714	0	4.0000000
ORBINIDA	Orbinidae	36	0.1388889	0.3507362	0.1230159	0	1.0000000
PHYLLODO	Phyllodocidae	36	1.5555556	2.0346210	4.1396825	0	9.0000000
SPIONIDA	Spionidae	36	0.0277778	0.1666667	0.0277778	0	1.0000000
SCOLECOL	Scolecolepides viridis	36	0.1388889	0.4244511	0.1801587	0	2.0000000
STREBLOS	Streblospio benedicti	36	3.9166667	4.1222393	16.9928571	0	11.0000000
COPEPODA	Copepoda	36	0.5833333	0.9373214	0.8785714	0	4.0000000
AMPHIPOD	Amphipoda	36	0.0555556	0.2323107	0.0539683	0	1.0000000
ISOPODA	Isopoda	36	0.2222222	0.5909368	0.3492063	0	3.0000000
MACOMABA	Macoma balthica	36	0.2777778	0.5662463	0.3206349	0	2.0000000
TELINAAG	Telina agilis	36	0.2222222	0.5909368	0.3492063	0	3.0000000

Cluster Analysis Per Replicate - Data Standardized Prior to Analysis
Quanta Site

Average Linkage Cluster Analysis

Eigenvalues of the Correlation Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	3.12820	0.621363	0.195512	0.19551
2	2.50683	0.715515	0.156677	0.35219
3	1.79132	0.222084	0.111957	0.46415
4	1.56924	0.249634	0.098077	0.56222
5	1.31960	0.169346	0.082475	0.64470
6	1.15026	0.263426	0.071891	0.71659
7	0.88683	0.118353	0.055427	0.77202
8	0.76848	0.107262	0.048030	0.82005
9	0.66121	0.082930	0.041326	0.86137
10	0.57828	0.097739	0.036143	0.89752
11	0.48054	0.037754	0.030034	0.92755
12	0.44279	0.095744	0.027674	0.95522
13	0.34705	0.153006	0.021690	0.97691
14	0.19404	0.081051	0.012128	0.98904
15	0.11299	0.050651	0.007062	0.99610
16	0.06234	.	0.003896	1.00000

The data have been standardized to mean 0 and variance 1
Root-Mean-Square Total-Sample Standard Deviation = 1

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Quanta Site

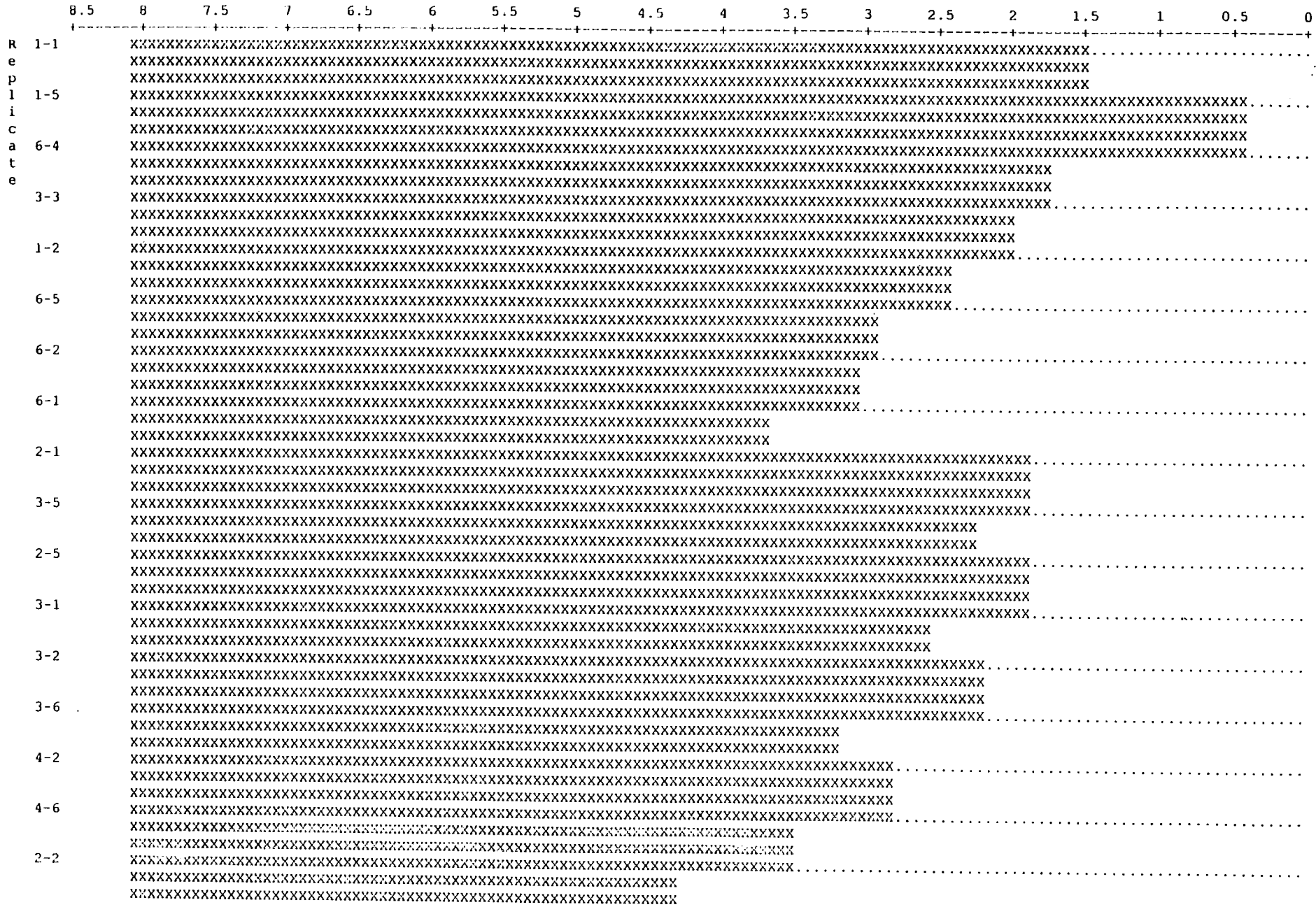
Average Linkage Cluster Analysis

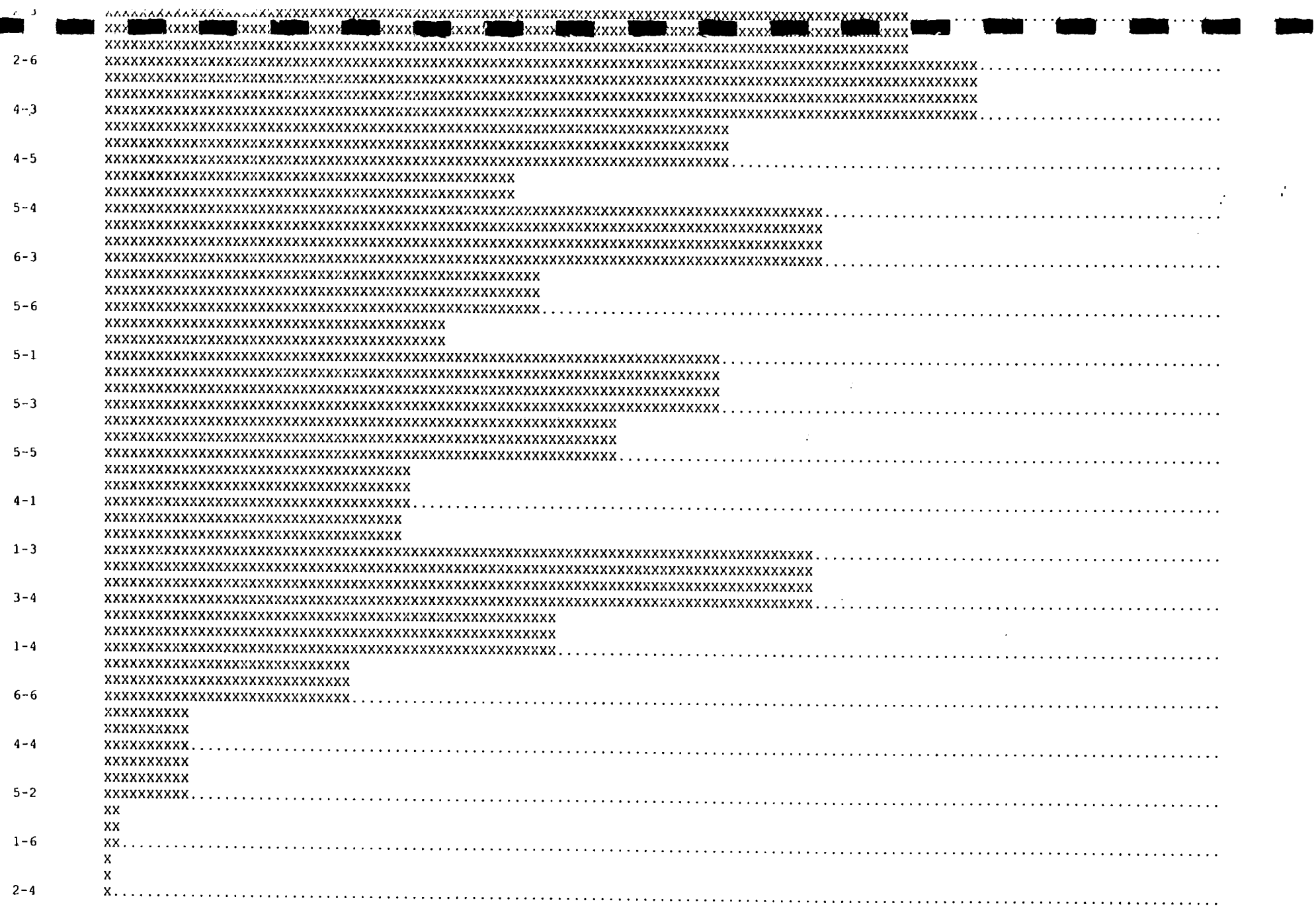
Number of Clusters	--Clusters	Joined--	Frequency of New Cluster	RMS Distance	Tie
35	1-5	6-4	2	0.46742	
34	1-1	CL35	3	1.49175	
33	CL34	3-3	4	1.73192	
32	2-6	4-3	2	1.75081	
31	2-1	3-5	2	1.85916	
30	2-5	3-1	2	1.88453	
29	CL33	1-2	5	2.01977	
28	3-2	3-6	2	2.19605	
27	CL31	CL30	4	2.22946	
26	2-3	CL32	3	2.25989	
25	CL29	6-5	6	2.43082	
24	CL27	CL28	6	2.56202	
23	4-2	4-6	2	2.81563	
22	5-4	6-3	2	2.86250	
21	1-3	3-4	2	2.92714	
20	CL25	6-2	7	2.93987	
19	CL20	6-1	8	3.08940	
18	CL24	CL23	8	3.21138	
17	CL18	2-2	9	3.47411	
16	CL26	4-5	4	3.54814	
15	5-1	5-3	2	3.61648	
14	CL19	CL17	17	3.68095	
13	CL14	CL16	21	4.32722	
12	CL15	5-5	3	4.39314	
11	CL21	1-4	3	4.83436	
10	CL22	5-6	3	4.94027	
9	CL13	CL10	24	5.15590	
8	CL9	CL12	27	5.60573	
7	CL8	4-1	28	5.88591	
6	CL7	CL11	31	5.96733	
5	CL6	6-6	32	6.29484	
4	CL5	4-4	33	7.47233	
3	CL4	5-2	34	7.53075	
2	CL3	1-6	35	8.00800	
1	CL2	2-4	36	8.06161	

Cluster Analysis Per Replicate - Data Standardized Prior to Analysis
Quanta Site

Average Linkage Cluster Analysis

Average Distance Between Clusters




2-6
4-3
4-5
5-4
6-3
5-6
5-1
5-3
5-5
4-1
1-3
3-4
1-4
6-6
4-4
5-2
1-6
2-4

Quanta Site Principal Component Analysis

Principal Component Analysis

8 Observations
5 Variables

Simple Statistics

	PAHS	TOC	SAND	SILT	CLAY
Mean	167285.0000	15750.00000	0.0118250000	0.8028875000	0.1852875000
StD	333870.5809	3105.29502	0.0102733706	0.0603710772	0.0577618865

Correlation Matrix

	PAHS	TOC	SAND	SILT	CLAY	
PAHS	1.0000	0.8098	0.9425	-.5813	0.4399	Total PAHs
TOC	0.8098	1.0000	0.7637	-.3299	0.2090	Total Organic Carbon
SAND	0.9425	0.7637	1.0000	-.3336	0.1708	% Sand
SILT	-.5813	-.3299	-.3336	1.0000	-.9858	% Silt
CLAY	0.4399	0.2090	0.1708	-.9858	1.0000	% Clay

Eigenvalues of the Correlation Matrix

	Eigenvalue	Difference	Proportion	Cumulative
PRIN1	3.26272	1.80275	0.652544	0.65254
PRIN2	1.45997	1.19526	0.291993	0.94454
PRIN3	0.26471	0.25211	0.052942	0.99748
PRIN4	0.01260	0.01260	0.002520	1.00000
PRIN5	0.00000	.	0.000000	1.00000

Eigenvectors

	PRIN1	PRIN2	PRIN3	PRIN4	PRIN5	
PAHS	0.529409	0.201878	-.263390	0.780767	0.000000	Total PAHs
TOC	0.440409	0.362797	0.812667	-.118280	0.000000	Total Organic Carbon
SAND	0.459536	0.402527	-.514496	-.589237	0.122037	% Sand
SILT	-.426606	0.527207	0.019025	0.159367	0.717148	% Silt
CLAY	0.364144	-.622614	0.071622	-.061765	0.686153	% Clay

Quanta Site Principal Component Analysis
Location Listing Of Areas Determined By First Principal Component

LOCATION	PRIN1	PRIN2	PAHS	TOC	SAND	SILT	CLAY
2-sub	-1.36713	1.20663	35760	15000	0.0103	0.8772	0.1125
4-sub	-0.96740	0.27685	15150	15000	0.0076	0.8371	0.1553
5	-0.83053	-0.04968	6090	16000	0.0036	0.8249	0.1715
2	-0.66622	-0.93329	89520	11000	0.0105	0.7893	0.2002
3	-0.57926	1.81968	141740	17000	0.0179	0.8739	0.1082
6	-0.19558	-1.56922	6640	14000	0.0041	0.7577	0.2382
4	0.31327	-1.31303	57930	16000	0.0060	0.7524	0.2416
1	4.29285	0.56207	985450	22000	0.0346	0.7106	0.2548

Quanta Site Principal Component Analysis
Locations Listed in Order as Determined by Second Principal Component

LOCATION	PRIN1	PRIN2	PAHS	TOC	SAND	SILT	CLAY
6	-0.19558	-1.56922	6640	14000	0.0041	0.7577	0.2382
4	0.31327	-1.31303	57930	16000	0.0060	0.7524	0.2416
2	-0.66622	-0.93329	89520	11000	0.0105	0.7893	0.2002
5	-0.83053	-0.04968	6090	16000	0.0036	0.6249	0.1715
4-sub	-0.96740	0.27685	15150	15000	0.0076	0.8371	0.1553
1	4.29285	0.56207	985450	22000	0.0346	0.7106	0.2548
2-sub	-1.36713	1.20663	35760	15000	0.0103	0.8772	0.1125
3	-0.57926	1.81968	141740	17000	0.0179	0.8739	0.1082

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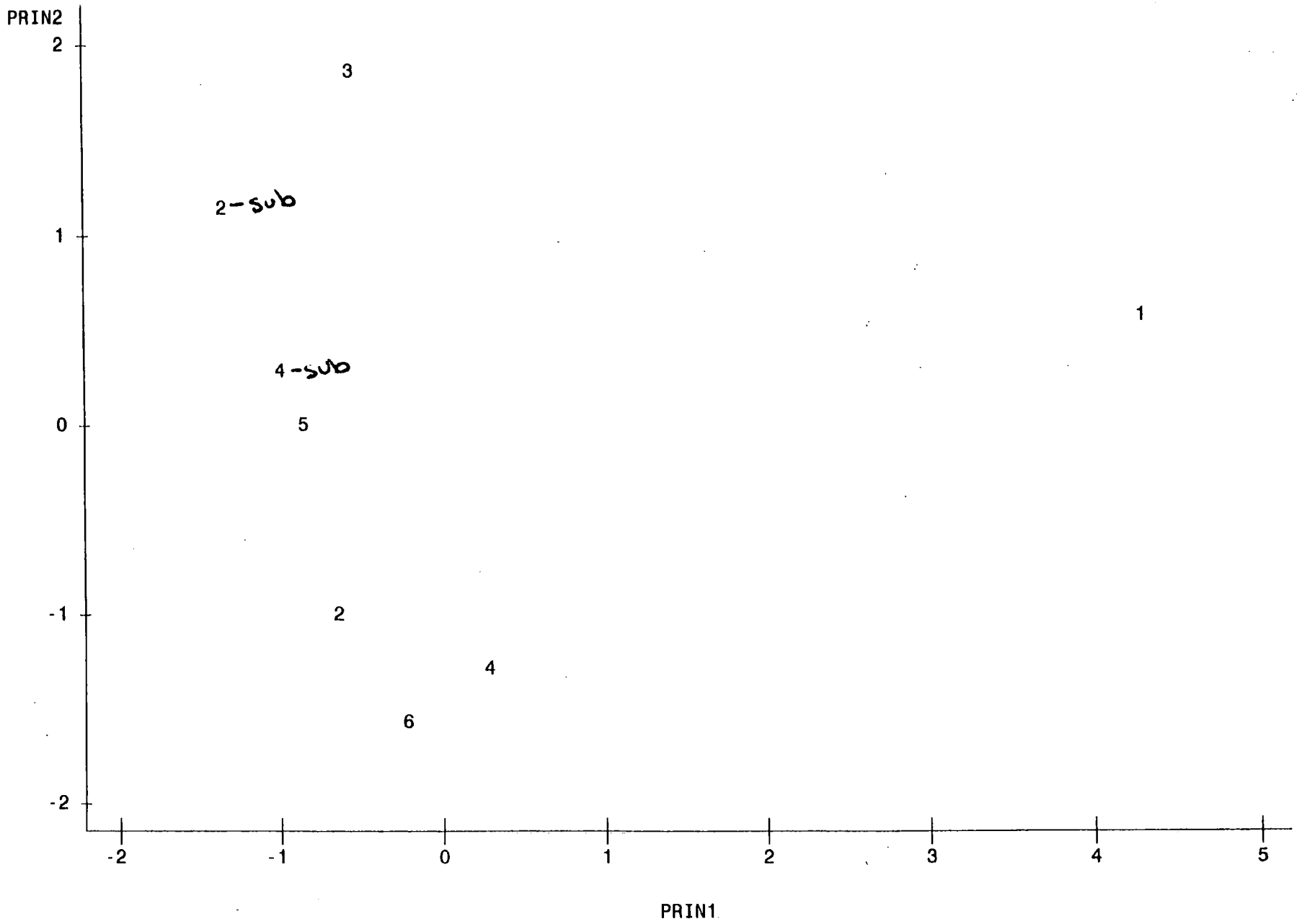
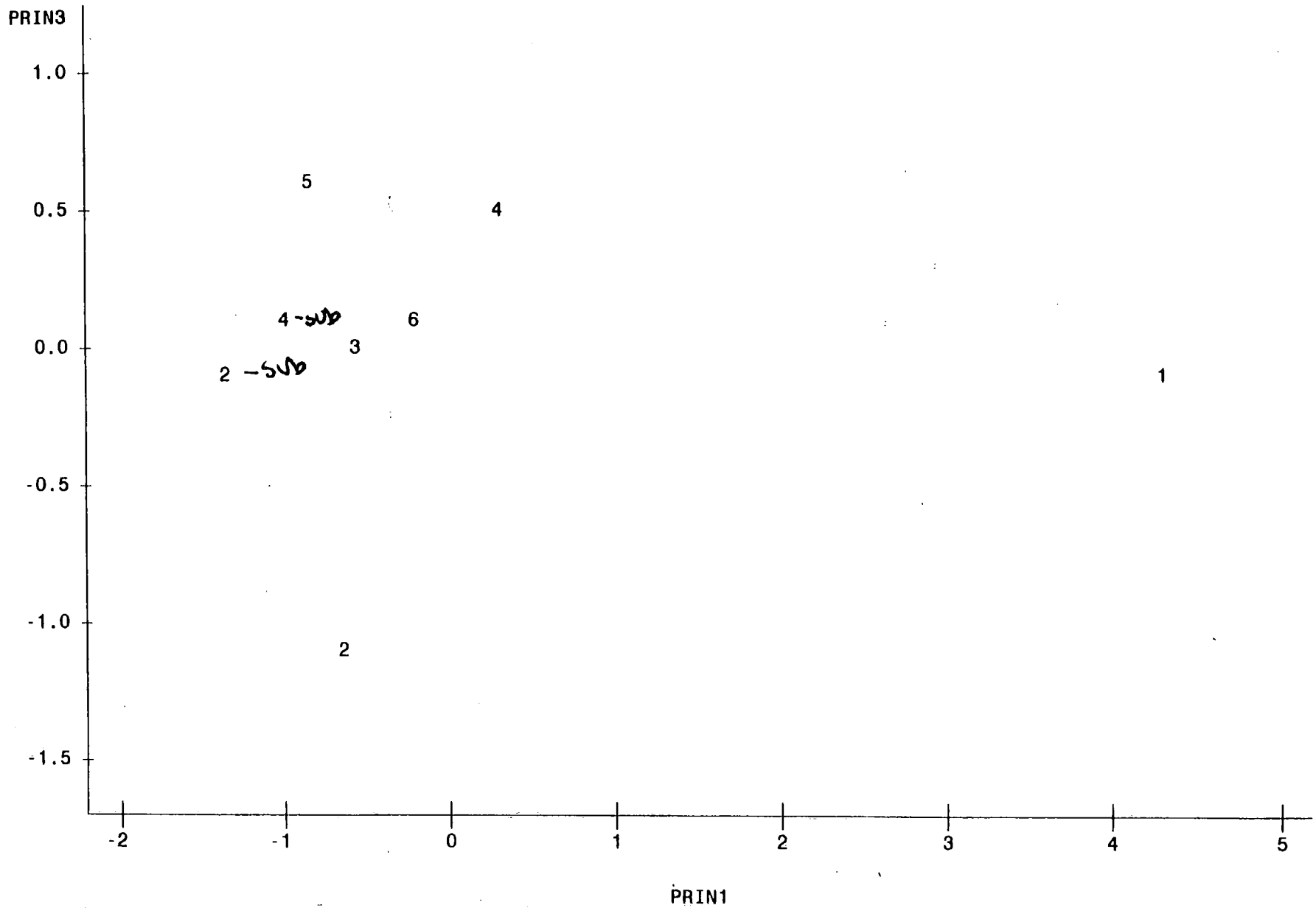
Plot of the First Two Principal Components

Plot of PRIN2*PRIN1. Symbol is value of LOCATION.



Quanta Site Principal Component Analysis
Plot of the First and Third Principal Components

Plot of PRIN3*PRIN1. Symbol is value of LOCATION.