CHEMICAL ANALYSIS, TOXICITY EVALUATION AND BIOACCUMULATION EXPOSURE OF SEDIMENTS FROM **HUMBOLDT BAY:**

BASELINE SURVEY II

Fiscal Year 1994

FINAL REPORT

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TABLE OF CONTENTS

LIST OF TABLES ii

LIST OF FIGURES ii

1.0 Introduction 1

2.0 Methods 1
2.1 Sediment Collection 1
2.1.1 Sample Handling 2
2.2 Water Collection 3
2.3 Chemical and Physical Sediment Analysis 3
2.4 Bioassay and Bioaccumulation Test Procedures 5
2.4.1 Suspended Particulate Phase (SPP) Bioassays 5
2.4.1.1 Bivalve Larvae (*Mytilus edulis*) 5
2.4.1.2 Mysid (*Holmesmysis costata*) 7
2.4.1.3 Teleost Fish (*Citharichthys stigmaeus*) 8
2.4.1.4 Initial Mixing Calculations 8
2.4.2 Solid Phase (SP) Static Bioassays (Amphipod: *Rhepoxynius abronius*) 8
2.4.3 Solid Phase (SP) Flow-through Bioassays (Mysid Shrimp: *Holmesimysis costata* and Polychaete Worm: *Nephtys caecoides*) 9
2.4.4 Bioaccumulation Exposure 10
3.0 Results 11
3.1 Sediment Physical Analysis 11
3.2 Bulk Sediment Chemistry 11
3.3 Bioassay Test Results 14
3.3.1 Suspended Particulate Phase (SPP) Bioassays 14
3.3.1.1 Bivalve Larvae 14
3.3.1.2 Mysid Shrimp 15
3.3.1.3 Teleost Fish 15
3.3.1.4 Initial Mixing Calculations 15
3.3.2 Solid Phase (SP) Static Bioassay (Amphipod) 16
3.3.3 Solid Phase (SP) Flow-Through Bioassays (Mysid and Worm) 16
3.3.4 Bioaccumulation Analyses (Clam and Worm) 17

REFERENCES 18

TABLES 19

FIGURES 33

APPENDICES

Appendix A: Scope of Services
Appendix B: Field Sampling Log Sheets
Appendix C: Chemistry Results/Physical Parameters
Appendix C-1: Dioxin Analyses Results
Appendix D: QA/QC Data Plan and Report
Appendix E: LPC Calculations and Test Organism Handling Logs
Appendix F: Chains of Custody

LIST OF TABLES

Table 1. Analyses Performed 21

Table 2. Sediments Collected 22

Table 3. Biological Assessments 23

Table 4. Sediment Chemistry Summary 24

Table 5. Sediment Pore Water Salinity and Total Ammonia 26

Table 6. Bivalve Larvae (*M. edulis*) SPP Bioassays 27

Table 7. Mysid SPP Bioassays 28

Table 8. Fish (*C. stigmaeus*) SPP Bioassays 29

Table 9. Amphipod (*R. abronius*) SP Static Bioassays 30

Table 10. Mysid (*H. costata*) SP flow-through Bioassays 31

Table 11. Polychaete worm (*N. caecoides*) SP flow-through Bioassays 32

LIST OF FIGURES

Figure 1. Humboldt Bay FY 1994 sampling locations. Reference station.

Figure 2. Humboldt Bay FY 1994 sampling locations. Stations FL1 through FL8, ENT1, ENT2, and BAR1.

Figure 3. Humboldt Bay FY 1994 sampling locations. Stations NB1 through NB10.

Figure 4. Humboldt Bay FY 1994 sampling locations. Stations EK1 through EK4 and SAM1 through SAM7.

CHEMICAL ANALYSIS, TOXICITY EVALUATION AND BIOACCUMULATION TESTING OF SEDIMENTS FROM HUMBOLDT BAY

BASELINE SURVEY II

1.0 Introduction

Under Contract No. DACW07-92-D-002 from San Francisco District, Army Corps of Engineers (SFACOE), ToxScan, Inc. collected and analyzed sediment samples from **Humboldt Bay** for FY 1994, **Baseline Survey II**. Sediments were sampled by Kinnetic Laboratories, Inc., and returned to the ToxScan, Inc. laboratory at Watsonville, CA where they were assigned laboratory number **T-10774** for physical, chemical and bioassay analyses. Bioaccumulation analyses were not performed on tissues exposed to these sediments. Samples collected, composites and analyses are summarized in Table 1.

2.0 Methods

2.1 Sediment Collection

Sediment sampling was conducted between 31 March and 5 April 1994 from the M/V Celtic and the M/V Sally Kae. Target sampling locations (California state plane coordinates) are listed in Table 1 of the Scope of Services provided by SFACOE (Appendix A, this report). The target locations were placed at or near sampling stations of Baseline Survey I (FY 1993) to establish an historical database of sediment characteristics at Humboldt Harbor. In some cases, sampling stations had to be moved from the target locations in order to sample areas with significant shoaling. Prior to initiating the field program each station's plane coordinates were converted to latitude/longitude coordinates to allow use of a differential Global Positioning System (GPS) for actual field positioning, and target locations were plotted on SFACOE-provided "blue line" pre-dredge survey charts to determine the site and approximate depth of each core. Actual sampling locations are plotted on Figures 1 through 4. Details of each core and grab sample (time collected, depth, location) are summarized in Table 2 and documented in field log sheets (Appendix B).

Horizontal positioning was established with a Trimble series 4000 Differential GPS navigation system with base station set on Corps of Engineers survey markers. Mudline elevations were determined at each core location at the time of sampling with a dual frequency fathometer calibrated by leadline to 0.1 feet at the expected depth range. Mean lower low water (MLLW) mudline elevations were extrapolated using Micronautics, Inc. Tide 1 software, and verified daily with USGS or COE benchmarks.

A preliminary field determination of sediment particle size distribution (PSD) was made at each sampling station, using a Smith-Macintyre grab sampler. Locations that yielded predominantly sand or coarser-grained material (80% $\Phi \leq 4$) were sampled for individual PSD analysis only. Stations that did not meet this criterion and showed greater than one foot of shoaling were sampled for discrete chemistry analysis using the Vibra-core sampler. Composite samples of material from the fine grained sites in each sampling area were made for chemistry, bioassay, and bioaccumulation analysis. Five composite samples were generated: 1) Eureka Upper Channel (EKUP); 2) Samoa Turning Basin (SAMTB); 3) Fields Landing Lower Channel and Turning Basin (FLTB); and 4) the disposal site reference (REF). Individual samples comprising each composite are indicated in Table 2. The composite samples were homogenized by thorough mixing using Teflon-lined containers and tools.

The vibracore cutting tip and core sample catcher were #306 grade stainless steel; the Vibracore barrel was aluminum. The Smith-Macintyre grab was constructed of galvanized steel. Prior to sampling at each station, the vibracore cutting tip, core catcher and the compositing equipment were all cleaned by the following EPA approved clean-up protocol (the Smith-Macintyre grab was cleaned with Steps 1 and 2 only):

1. Wash with 2% Micro Laboratory Soap
2. Rinse three times with clean water
3. Rinse with 2N nitric acid
4. Final rinse 3x with Milli-Q type I reagent grade DI water
5. Store in cleaned containers until use

2.1.1 Sample Handling. Vibracore and Smith Macintyre grab samples were taken during this project. Handling procedures for each sample type are summarized below:

Vibracore Samples. Each core sample was measured for total core length. If the core achieved penetration to project dredge depth the desired sample (from dredge depth to sediment surface) was extruded into the compositing container.

Grab Samples. Each grab sample was evaluated for grain size, composition, and penetration. Grabs which had "washed out", or which were determined to have insufficient penetration, were rejected.

The individual samples and area composites were placed in appropriate containers in precleaned coolers, on ice, to reduce the temperature to the prescribed 4°C. All samples were transported to ToxScan's chemistry and bioassay facilities in Watsonville under chain of custody at the prescribed temperature. Subsamples of the four composites were subsequently shipped at temperature under chain of custody to Alta Analytical Laboratory Inc., El Dorado Hills, CA for 2,3,7,8-TCDD and 2,3,7,8-TCDF (Dioxins) analysis.

2.2 Water Collection

Reference water for bioassay tests was collected at mid depth at the reference site using an EPA protocol-cleaned peristaltic pump and cleaned silicon and teflon hoses. The hose was lowered into the water at one end of the reference site, and the vessel drifted with the current through the reference site while sampling. The water was pumped into five (5) gallon cubitainers which were then stored at 4°C until delivery to the ToxScan laboratory in Watsonville.

2.3 Chemical and Physical Sediment Analysis

Sediment samples for chemical and physical analysis were collected in glass containers. Prior to analysis, samples were stored in the laboratory at 4°C. Analyses were conducted according to the following methods:

Sediment Grain Size was determined using the methods described in Plumb (1981).

Interstitial Water Salinity and Total Ammonia values were determined for centrifuge-extracted sediment pore waters by salinometer-calibrated refractometer (YSI Model 33 Conductivity/Salinity Meter and Atago S-10 or S-28 Hand Held Refractometer), and by pH meter / ammonia probe (Fisher Accumet Model 925 with Orion Ammonia Electrode Model 95-12). One hundred to two hundred grams of sediment were centrifuged at 7,000 to 8,000 rpm until supernatant was clear (15 - 30 minutes).

Total and Water Soluble Sulfides. This method was adapted from EPA Method 376.1 (EPA 1983) and Standard Method 4500-S^{-2}-E (APHA 1992). Sediment samples were mixed with O_2-free DIW, and treated in a manner similar to aqueous samples. Hydrogen sulfide present in aqueous samples was purged into a zinc acetate trap using nitrogen gas. The sample pH was adjusted to about 4 if total sulfide was to be determined, or left unadjusted for free sulfide determinations. The zinc sulfide precipitate in the trap was oxidized with a known and excess amount of iodine, and the unreacted iodine was back-titrated with thiosulfate.

Oil and Grease, Total Petroleum Hydrocarbon. Samples were acidified to a low pH and extracted with fluorocarbon-113 in a separatory funnel. The fluorocarbon layer was separated from each sample, passed over sodium sulfate and collected for analysis of Oil and Grease using an Infrared spectrophotometer scanning the wavelengths from 3200 to 2700 cm^{-1}. To determine Total Petroleum Hydrocarbons, this above extract was passed through silica gel which extracted the vegetable oil fractions; the remaining petroleum fraction was then analyzed by Infrared spectrophotometric techniques as described below.

Total Organic Carbon (TOC). Analysis for total organic carbon followed the method of Gaudette, et al. (1974). One-to-two grams of sediment were placed in a 500 ml flask to which 10 ml of potassium dichromate ($K_2CR_2O_7$) had been added. Twenty ml of concentrated sulfuric acid (H_2SO_4) was then added while the flask was swirled. After 30 minutes, the sample was diluted to a volume of 200 ml with de-

ionized water (DIW), and 10 ml of phosphoric acid (H_3PO_4) and 0.2 g of sodium fluoride (NaF) were added. After more swirling, 15 drops of diphenylamine indicator was added and the sample was titrated with 0.5N ferrous ammonium sulfate.

Metals. Analyses for metals employed combinations of the following Varian spectrophotometers: SpectrAA 400P or 400Z with GTA 96 a Graphite Furnace and autosampler; or a SpectrAA 10 with VOA 76 hydride—cold vapor generator and flame autosamplers. Sample preparation prior to analysis by atomic absorption was accomplished by guidelines specified by Chapter 3, Sections 3.2 and 3.3, 7000 series (EPA 1986).

Organotins. Organotin species analysis was by the method of Uhler and Durrel (1989). Speciation was done by a n-pentyl derivatization using a Gas Chromatograph with a Flame Photometric Detector. A sediment sample was mixed with 5 ml of hydrobromic acid (HBr), converting cationic butyltins to the bromide complexes, which were then extracted with a toluene-tropolone mixture. Following this extraction a n-pentylmagnesium bromide was used to convert the butyltins to the n-pentyl derivatives. This extract was cleaned by passing it through a Florisil/Silica chromatograph column and then injected into the Gas Chromatograph with a FPD detector where butyltins were quantified.

Chlorinated Pesticides and PCB's. Analyses for these constituents were determined by EPA Method 8080 (EPA 1986). Each solid sample was mixed with anhydrous sodium sulfate, placed in an extraction thimble and extracted using acetone and hexane in a Soxhlet extractor. The extract was then dried, concentrated, and, as necessary, underwent a Florisil clean-up. After extraction, a 2 microliter sample was injected into a gas chromatograph and the effluent detected by an electron capture detector.

Polynuclear Aromatic Hydrocarbons and Phthalates. Analyses for semivolatile compounds were by GC-MS techniques, following Method 8270 (EPA 1986). Each solid sample was mixed with anhydrous sodium sulfate, placed in an extraction thimble and extracted using acetone and hexane in a Soxhlet extractor. The extract was then dried, concentrated and cleaned up by gel permeation chromatography. After extraction, a 2 microliter sample was injected into a gas chromatograph and the effluent detected by mass spectroscopy.

TCDD and TCDF (Dioxins). Sediment samples were analyzed for 2,3,7,8-TCDD and 2,3,7,8-TCDF using EPA Method 8290. These analyses were performed by Alta Analytical Laboratory, Inc., El Dorado Hills, CA.

2.4 Bioassay and Bioaccumulation Test Procedures

2.4.1 Suspended Particulate Phase (SPP) Bioassays

Suspended particulate phase elutriates were prepared by procedures outlined in the "Green Book" (EPA/USACE 1991) using reference site water and test sediments. The test protocol for bivalves was as specified by ASTM (1989). Three concentrations (100%, 50%, 10%) of suspended particulate phase were tested. The lower concentrations were evaluated only if the 100% concentrations produced >50% inhibition of development. Three species were tested in suspended particulate phase bioassays: The larvae of a marine bivalve (the bay mussel, *Mytilus edulis*), a mysid (*Holmesimysis costata*), and a marine teleost fish (the speckled sanddab, *Citharichthys stigmaeous*).

Elutriate sanddab bioassays were performed at the Davenport laboratory, and elutriate bioassays with mysids and bivalve larvae were performed at the Watsonville laboratory. The positioning of test containers and other conditions in the laboratories were designed for uniform exposure to the controlled laboratory environment. Five replicates of test treatments were randomly assigned (complete random design) to the test containers by use of a random numbers generating program.

The sediment samples were placed in cleaned 5-gallon polyethylene buckets with laboratory seawater for elutriate preparation. The sediment to water ratio was 1:4 as specified in the Green Book. The mixtures were agitated by vigorous aeration for 30 minutes. After a one-hour settling period, the elutriates were siphoned off and used as suspended particulate phase media.

2.4.1.1 Bivalve Larvae (*Mytilus edulis*)

Mussels were induced to spawn by high-temperature stimulation. Eggs and sperm were collected in separate basins filled with aerated seawater at 20°C. Egg density was determined by microscopically counting several 1-ml aliquots taken from the well-mixed egg basin. Fertilization was accomplished by addition of an appropriate amount of sperm suspension, and confirmed by microscopic examination.

The control exposure, performed for quality assurance purposes, used seawater from our laboratory system. Five replicate dishes were used for each test exposure. Temperature, dissolved oxygen, pH and salinity were monitored in each test concentration and in controls at the beginning and end of the test.

Larvae were tested in 250 ml polyethylene beakers containing approximately 200 ml of test solution. After fertilization was confirmed an aliquot containing approximately 6000 fertilized eggs was pipetted into each test beaker. Gentle aeration was provided throughout the 48-hour duration of the test. Five extra beakers were prepared in addition to those required for test and control replicates. These "extra" test containers were not incubated for 48 hours, but rather they were evaluated immediately after

inoculation to provide the "initial recovery" data used to establish the mean number of embryos added to each experimental beaker.

At the end of the 48-hour exposure period the contents of each dish were poured through a 45μ nytex screen. Surviving larvae were retained on the screen. The test beaker was rinsed three times with seawater and each successive rinse was poured through the screen to ensure complete transfer of larvae. Larvae were quantitatively transferred from the screen into a graduated cylinder and the volume was adjusted with a seawater-formalin mixture. Contents of the cylinder were mixed by inversion to ensure uniform distribution of larvae, and a 1 ml aliquot was transferred to a Sedgwick-Rafter counting slide for microscopic evaluation. Larvae were scored for evidence of internal tissue inside a complete larval shell. Larvae which had a complete larval shell containing tissue were counted as normal, whereas empty shells and larvae with incomplete shells were scored as abnormal. Data were reported as percent of initial embryos which survived, and percent of survivors which showed normal development, as calculated below.

The raw data resulting from these bioassays included the following:

- Counts of embryos added to five replicate test containers which were <u>not</u> incubated for 48 hours (= initial recovery).

- Counts of normal and abnormal embryos from test containers (five replicates per sample, reference and control) which <u>were</u> incubated for 48 hours.

The results were calculated from these data as follows:

$$\%\ Survival = \frac{No.\ normal\ larvae\ recovered}{N} \times 100$$

$$\%\ Normal = \frac{No.\ normal\ larvae}{No.\ normal\ larvae + No.\ abnormal\ larvae} \times 100$$

where N = the mean initial number of embryos added (from initial recovery data).

For each test chamber other than controls, % survival data were adjusted to correct for mortality observed in the control exposures by use of **Abbott's correction**:

$$\textit{Corrected Sample \% Survival} = 100 - \left(\frac{\textit{mean \% control survival} - \textit{\% sample survival}}{\textit{mean \% control survival}} \times 100\right)$$

Percent normal development data were similarly adjusted.

For the bioassay to be considered a valid test, an average of at least 70% of the exposed embyros must survive in the controls; abnormals were counted as mortalities as per the Testing Guidelines contained in SFACOE Public Notice No. 93-2: Response to Comments on Public Notice 92-5.

Following the Scope of Services, the 100% elutriate concentrations were evaluated initially. If Abbott's-corrected survival or normal development values were $\geq$50%, no further evaluations were performed. If these values were $\leq$50%, the 10% and 50% elutriate exposures were evaluated and EC_{50} and/or LC_{50} calculations were made using the Trimmed Spearman-Karber method. For LC_{50} calculations, abnormal larvae and calculated mortalities were added; whereas for EC_{50} calculations, separate abnormality counts were used, as per Public Notice 93-2 (see above).

A reference toxicant bioassay was also performed for quality assurance purposes, to verify the health and sensitivity of the test organism population. The reference toxicant used was cupric sulfate ($CuSO_4 \cdot 5H_2O$) dissolved in laboratory seawater.

2.4.1.2 Mysid (*Holmesmysis costata*)

Adult mysids (*Holmesimysis costata*) were collected from kelp beds near Monterey, California. The animals were gently aggregated with a dip net, corralled into a submerged bucket without removing them from the water and transported directly to the bioassay lab. In transit, holding tank temperatures were maintained within 2°C of the ambient temperature at sampling. Gentle aeration was supplied from a bottle of compressed oxygen. Throughout testing, the mysids were fed about 50 brine shrimp (*Artemia salina*) nauplii per mysid per day to prevent mortality from starvation and cannibalism.

Mysids were tested in one-liter polycarbonate tanks containing one liter of test solution. To initiate testing, mysids were sorted into groups of 10 in small containers with very small volumes of seawater. Mysids were transferred to the test containers by submerging the containers and slowly tipping the animals into the test medium. During the bioassays, the number of survivors of the original 10 animals per tank were recorded as experimental data at 4, 8, 24, 48, 72, and 96 hours after test initiation. At each of these checkpoints, dead animals (i.e., those nonresponsive to mechanical stimulus) were removed from the test containers.

A reference toxicant bioassay was also performed on the mysids for quality assurance purposes, to verify the health and sensitivity of the test organism population. The reference toxicant used was Sodium Dodecyl Sulfate (SDS) dissolved in laboratory seawater.

2.4.1.3 Teleost Fish (*Citharichthys stigmaeus*)

Speckled sanddabs were collected by otter trawl from Tomales Bay and kept in holding tanks until transported to the laboratory via overnight delivery. They were allowed to acclimate to laboratory conditions prior to testing. Fish were fed a high protein pellet food during the holding period until 48 hours before test initiation; they were not fed thereafter.

Sanddabs were tested in 10-liter aquaria and were individually transferred from holding tanks to aquaria to start the test. During the bioassays, the number of survivors of the original 10 animals per tank was recorded as experimental data at 4, 8, 24, 48, 72, and 96 hours after test initiation. At each of these checkpoints, dead animals (i.e., those nonresponsive to mechanical stimulus) were removed from the test containers.

A reference toxicant bioassay was also performed on the sanddabs for quality assurance purposes, to verify the health and sensitivity of the test organism population. The reference toxicant used was Sodium Dodecyl Sulfate (SDS) dissolved in laboratory seawater.

2.4.1.4 Initial Mixing Calculations

In cases where an EC_{50} or LC_{50} was obtained, calculations of initial mixing were made using standardized formulae developed by the USACOE and EPA (EPA/ACOE 1977).

2.4.2 Solid Phase (SP) Static Bioassays (Amphipod)

Solid phase static bioassays were conducted on the harbor sediments simultaneously with control and reference sediments. The amphipod *Rhepoxynius abronius* was tested following procedures outlined in ASTM (1990).

Salinity and total ammonia measurements were made on sediment interstitial water as received; in addition, a final pore-water ammonia measurement was taken from one replicate of each test sediment at test termination. Pore waters were extracted by centrifugation. Interstitial water salinity was measured using a salinometer-calibrated refractometer. Interstitial water ammonia concentrations were measured with an ammonia probe calibrated to three concentration standards (see Sediment Physical and Chemical Analysis- Section 2.3).

In each test, five replicates of each station and reference treatment were randomly assigned to test jars. A 2-cm deep layer of appropriate sediment was added to each jar on the day prior to test initiation, and each test jar was provided with aeration via pasteur pipet. Each test was started on the following day by randomly assigning 20 amphipods to each jar, and continued for 10 days under static conditions with constant illumination and aeration. Daily measurements of environmental test conditions (temperature, salinity, pH, dissolved oxygen) were made in each test container, and the number of animals which had appeared on the sediment surface was noted.

At the end of the ten day exposure period, the contents of each jar were poured through a 0.5 mm sieve and the number of surviving amphipods counted. Survivors from each replicate were transferred into bowls containing control sediment and monitored for their ability to rebury within one hour. Test data for each replicate therefore include number of survivors and number of survivors able to rebury.

Reference toxicant bioassays were performed with each batch of test animals to verify the health and sensitivity of the test organism population. The reference toxicant used was cadmium chloride ($CdCl_2$) dissolved in laboratory seawater.

2.4.3 Solid Phase (SP) Flow-through Bioassays (Mysid Shrimp and Polychaete Worm)

Solid phase flow-through bioassays with mysids and worms were conducted on the harbor sediments simultaneously with control and reference sediments. Control sediments were collected from Tomales Bay. Testing for both species was performed at the Davenport facility where continuously flowing seawater is available, using testing procedures in EPA/COE (1991).

Mysids (*Holmesimysis costata*) were collected from kelp beds near Monterey, California. The animals were gently aggregated with a dip net, corralled into a submerged bucket without removing them from the water and transported directly to the bioassay lab. In transit, holding tank temperatures were maintained within 2°C of the ambient temperature at sampling. Gentle aeration was supplied from a bottle of compressed oxygen. Throughout testing, the mysids were fed about 50 brine shrimp (*Artemia salina*) nauplii per mysid per day to prevent mortality from starvation and cannibalism.

Polychaete worms (*Nephtys caecoides*) were collected from Tomales Bay and shipped overnight to the bioassay laboratory. They were kept in holding tanks with home sediment and overlying seawater until test initiation.

All sediments were sieved through a 1.0 mm screen to remove indigenous fauna, and a 3.0 cm layer of appropriate sediment was added to each test container. Tanks were then filled with lab seawater, and either twenty polychaete worms (*Nephtys caecoides*) or twenty mysids (*Holmesimysis costata*) were added to each container. Worms were tested in 31 L glass aquaria; mysids were tested in 1.5 L

polycarbonate tanks fitted with small, screened drain holes. The small mysid containers were suspended above the larger worm containers such that when the flow-through seawater system was activated, seawater passed through the mysid tanks, overflowed through the screened drain holes into the worm tanks, then drained to sea.

Solid Phase flow-through bioassays continued for 10 days. At least twice each day, environmental systems were checked for proper functioning. Once each day, the salinity and temperature of the system were measured. Dissolved oxygen and pH values of each tank were measured twice daily.

After the 10-day bioassay period, the contents of each tank were gently washed with seawater through a 0.5-mm nylon screen. The animals were retrieved from the screen and counted. Test data were the number of survivors of each species.

A reference toxicant bioassay was also performed on the mysids for quality assurance purposes, to verify the health and sensitivity of the test organism population. The reference toxicant used was Sodium Dodecyl Sulfate (SDS) dissolved in laboratory seawater.

2.4.4 Bioaccumulation Exposure

Based on evaluations of sediment chemistry, bioaccumulation tissue assessments were not performed on these sediments (see below). However, clams (*Macoma nasuta*) and polychaete worms (*Nephtys caecoides*) were exposed to test and control sediments in an array of 31-liter flow-through glass aquaria, as follows: Five replicates of each harbor composite, reference composite and control sediments were randomly assigned to the test tanks. The control sediment was collected from Tomales Bay, CA. Sediments were screened through a 1.0 mm screen to remove indigenous fauna, and a 3.0 cm layer was added to each tank. Tanks were filled with water and 30 clams and 40 worms were added to each. After a one-hour settling time, the flow-through seawater system was activated and adjusted to a flow rate equivalent to 5 tank/volume changes per 24 hours (6.5 liters/hour).

Bioaccumulation exposures continued for 28 days. At least twice each day, environmental systems were checked for proper function. Each tank was monitored daily for temperature and D.O., and the seawater system was monitored daily for salinity and pH.

After exposure, the contents of each tank were gently washed with seawater through a 0.5-mm nylon screen from which the animals were retrieved. Surviving clams were transferred for two days to filtered flowing seawater for gut evacuation. Surviving worms were transferred to 30-liter flow-through aquaria containing a 3-cm layer of fine, clean sand. Visual inspection of individuals confirmed how much time (typically 24 hours) was necessary for complete gut evacuation in worms. Directly following these treatments, the soft tissues of clams and worms were homogenized, then frozen.

3.0 Results

Sediment physical, chemical, and bioassay analyses are summarized in Table 1. Fourteen samples (including one replicate) from North Bay, Entrance and Bar were screened and analyzed only for particle size distribution (PSD). Twenty-seven samples were analyzed for PSD and sediment chemistry: 22 discrete samples plus four composites (EKUP, SAMTB, FLTB, REF) and the Tomales Bay control sediment. Bioassay testing and bioaccumulation exposures were performed on the four composites and on the control sediment; subsamples of these sediments were subcontracted for dioxin (2,3,7,8-TCDD and 2,3,7,8-TCDF) analysis.

3.1 Sediment Physical Analysis

The particle size distributions of the sediment samples and composites are summarized in Table 4 and detailed in Appendix C. Except for NB4, Rep 1, the North Bay, Entrance and Bar samples each contained at least 90% coarse sediments by weight ($\Phi \leq 4$). Coarse sediment composition of the three harbor composites were as follows: Eureka Upper Channel (EKUP) = 61.1%; Samoa Turning Basin (SAMTB) = 81.0%; and Field's Landing Lower Channel and Turning Basin (FLTB) = 42.6%. The disposal site reference (REF) composite contained 59.3% coarse sediments, and the Tomales Bay control sediment contained 97.9% coarse particles.

3.2 Bulk Sediment Chemistry

Results of bulk sediment chemical analyses of the Humboldt Harbor sediment samples and composites are summarized in Table 4. The laboratory reports are presented in Appendix C, and QA/QC reports are presented in Appendix D. Chains of Custody are Presented in Appendix F. The discussion below is generally limited to analyses of the harbor and reference composites; please refer to Appendix C for results of analyses of the individual samples.

Metals. The Humboldt Harbor sediment composites were analyzed for ten metals. Except for cadmium, metals concentrations in the Harbor composites were similar to or less than those found in the Reference composite. Within the Harbor composites, Comp FLTB tended to have the highest metals concentrations, and contained cadmium levels twice that of the reference composite. Individual accounts of the ten metals analyzed in these sediments are as follows:

- Arsenic concentrations ranged from 5.7 ppm to 7.0 ppm in the harbor composites. None of the harbor composites exceeded the 7.3 ppm found in the reference composite.

- Cadmium concentrations ranged from 0.1 ppm to 0.2 ppm in the harbor composites. FLTB and EKUP exceeded (by 2.0x) the 0.1 ppm found in the reference composite. It should be noted, however, that the cadmium concentrations found in these sediments were near the detection limit.

- Chromium concentrations ranged from 97 ppm to 100 ppm in the harbor composites. None of the harbor composites exceeded the 110 ppm found in the reference composite.

- Copper concentrations ranged from 12 ppm to 28 ppm in the harbor composites. Only FLTB (1.3x) exceeded the 21 ppm found in the reference composite.

- Lead concentrations ranged from 5.8 ppm to 8.1 ppm in the harbor composites. FLTB (1.09x) and EKUP (1.04x) exceeded the 7.4 ppm found in the reference composite.

- Mercury concentrations ranged from 0.08 ppm to 0.05 ppm in the harbor composites. None of the harbor samples exceeded the 0.20 ppm found in the reference composite.

- Nickel concentrations ranged from 62 ppm to 98 ppm in the harbor composites. Only FLTB (1.01x) exceeded the 97 ppm found in the reference composite.

- Selenium was not detected in any of the harbor composites, nor in the reference composite.

- Silver was not detected in any of the harbor composites, nor in the reference composite.

- Zinc concentrations ranged from 41 ppm to 66 ppm in the harbor composites. Only FLTB (1.06x) exceeded the 62 ppm found in the reference composite.

Butyltins. Three organotins (tri-, di-, and mono-butyltin) were measured in the Humboldt Harbor sediment composites. A small amount (1 ppb) of tributyltin was detected in the SAMTB composite. No mono- or tetrabutyltins were detected from the harbor composites, and the reference and control sediments contained no detectable butyltins.

Semivolatiles. Phthalate esters and seventeen polynuclear aromatic hydrocarbons (PAHs) were measured in the Humboldt Harbor sediment composites. Phthalate concentrations ranged from 160 to 170 ppb in the harbor composites; none exceeded the 1200 ppb measured in the reference composite. PAH detections were as follows:

LPAHs. Three low molecular weight PAHs were detected in the harbor or reference composites, as follows:

- 2-methylnaphthalene concentrations ranged from <20 ppb to 78 ppb in the harbor composites; FLTB (1.95x) and EKUP (1.03x) exceeded the 40 ppb detected in the reference composite.

- Naphthalene concentrations ranged from 37 ppb to 43 ppb in the harbor composites; all three harbor composites exceeded the <20 ppb detected in the reference composite.

- Phenanthrene concentrations ranged from <20 ppb to 49 ppb in the harbor composites; none of the harbor composites exceeded the 58 ppb detected in the reference composite.

HPAHs. Three high molecular weight PAHs (HPAHs) were detected in the harbor or reference composites, as follows:

- Fluoranthene concentrations ranged from 30 ppb to 42 ppb in the harbor composites; all three harbor composites exceeded the <20 ppb detected in the reference composite.
- Pyrene concentrations ranged from <20 ppb to 47 ppb in the harbor composites; FLTB and EKUP exceeded the <20 ppb detected in the reference composite.
- Benz(a)pyrene concentrations ranged from <20 ppb to 52 ppb in the harbor composites; only SAMTB exceeded the <20 ppb detected in the reference composite.

Chlorinated Pesticides and PCBs. The Humboldt Harbor sediment composites were analyzed for the eighteen chlorinated pesticides and four polychlorinated biphenyls (PCBs as Aroclors). None of the harbor composites, reference or Tomales Bay control sediments contained detectable amounts of these substances.

Dioxins. The Humboldt Harbor composites were analyzed for 3,7,8-TCDD and 3,7,8-TCDF by Alta Analytical Laboratories, (El Dorado Hills, CA). Only SAMTB (0.51 pg/g 2,3,7,8-TCDF) contained detectable quantities of dioxins.

Sediment Conventionals. Total sulfides ranged from 29 ppm to 110 ppm in the harbor sediment composites. The reference composite contained 0.3 ppm total sulfides. Except for a trace amount (0.2 ppm) in the FLTB composite, no water soluble sulfides were found in the harbor composites, nor in the reference composite.

Oil and Grease (31 ppm) was detected only in the FLTB composite; total petroleum hydrocarbons were not detected in the harbor and reference composites.

Percent solids in the harbor composites ranged from 65% to 77% compared to 73% in both the reference composite and the Tomales Bay control sediment; total organic carbon ranged from 0.3% to 0.8% in the harbor composites, compared to 0.4% in the reference composite.

Sediment Chemistry Summary: Except for total sulfides, Humboldt Harbor sediments appear to contain no particularly high concentrations of any of the tested substances or compounds when compared to the reference site sediments. Although sulfide concentrations in the harbor composites (29 ppm to 110 ppm) were not particularly high for harbor sediments in general, they exceeded the very low reference site concentration of 0.3 ppm. Concentrations of some PAHs (Naphthalene, Fluoranthene, Pyrene and Benzo(a)pyrene) in some harbor composites exceeded reference site values by 4.2x to 5.2x (calculating non-detects at 0.5 x D.L.), but again, the absolute concentrations (30 ppb to 52 ppb) of these compounds were not high.

3.3 Bioassay Test Results

Six sediment toxicity evaluations were conducted on the Humboldt Harbor sediments. Suspended particulate phase (SPP) bioassays and solid-phase (SP) bioassays employed a total of five species, and bioaccumulation exposures were conducted with two species (Table 3). Bioassay test results and statistical evaluations are summarized in Tables 6 through 11. Water quality monitoring data summaries and reference toxicant test results are tabularized in Appendix D. Logs of test animal shipping, receiving, acclimation and holding are contained in Appendix E.

3.3.1 Suspended Particulate Phase (SPP) Bioassays

Suspended Particulate Phase bioassay testing of the Humboldt Harbor Baseline Survey II sediments comprised three species: a bivalve larva (*Mytilus edulis*), a teleost fish (*Citharichthys stigmaeous*) and a mysid shrimp (*Holmesimysis costata*). Results of these bioassays are summarized below, and in Tables 6 through 8.

3.3.1.1 Bivalve Larvae

Adult *Mytilus edulis* were purchased from Carlsbad Aquafarm Inc., Carlsbad, CA. Collection data were not available. The animals were shipped on 13 April 1994 and arrived at ToxScan's Watsonville laboratory on 14 April via Federal Express overnight. The mussels were held in 33.2 - 33.9‰ seawater at 14.3 - 15.2 °C until test initiation on 20 April. Results of the bivalve larvae tests are presented in Table 6.

Survival. Mean survival of bivalves in the laboratory seawater control was 101.8%, well above the ASTM (1989) protocol requirements of 70 percent. The reference site 100% elutriate produced 86.4% survival, Abbott's-corrected to 84.9%. Abbott's corrected mean survival in the 100% elutriates of the Humboldt Harbor composites ranged from 76.6% in the FLTB composite to 93.2% in the SAMTB composite. None of the harbor sediment bivalve tests demonstrated enough toxicity to generate an LC_{50}.

Development. Mean normal development values (adjusted with Abbott's correction) for bivalve larvae exposed to 100% elutriates of the test sediment ranged from 88.3% in the FLTB composite to 99.7% in the EKUP composite. Normal development in the disposal site reference elutriate was 98.2%, Abbott's-corrected to 99.1%. Normal development the laboratory seawater control was 99.0%. None of the Humboldt Harbor sediment bivalve tests demonstrated enough toxicity to generate an EC_{50}.

Reference Toxicant. The bivalve reference toxicant LC_{50} was 5.72 ppb Cu (95% CL: 5.21 - 7.15), and the EC_{50} for development was 6.66 ppb (95% CL: 6.21 - 7.15). These values are within ±2 SD of the mean of EC_{50}s calculated from previous *Mytilus*: copper reference toxicant tests.

3.3.1.2 Mysid Shrimp

Adult *Holmesimysis costata* were collected from kelp beds near Monterey, California by SP Aquatics on 11 May 1994 and transported directly to the bioassay lab. The mysid suspended particulate phase bioassay was initiated that afternoon.

Mean survival of the mysids was 100% in each of the Humboldt Harbor Baseline Survey II sediment elutriates (Table 7). Mean control and reference site composite survival were each 98%. Mysid survival in the harbor composites was not significantly different than reference site survival (Steel's Many-One Rank Test: p=0.05, k=3).

Reference Toxicant. The mysid reference toxicant 96 hour LC_{50} was 5.46 mg/L SDS (95% CL: 4.45 - 6.71). This value is within ±2 SD of the mean of LC_{50}s calculated from previous *Holmesimysis*: SDS reference toxicant tests.

3.3.1.3 Teleost Fish

Speckled sanddabs (*Citharichthys stigmaeus*) were collected from Tomales Bay by John Brezina & Associates. Collection data was not available. The animals arrived at ToxScan's Watsonville laboratory on 6 May 1994 via Federal Express overnight. The sanddabs were held in 33.0 - 33.3‰ seawater at 11.7 - 14.1 °C until test initiation on 10 May.

Mean survival of the sanddabs in the Humboldt Harbor sediment elutriates ranged from 4.0% in the FLTB composite to 96% in the EKUP composite (Table 8). Mean control survival was 100%, and the reference site survival was 98%. Survival in the FLTB composite was significantly diminished from survival in the reference sediment (Steel's Many-One Rank Test: p=0.05, k=3).

Reference Toxicant. The sanddab reference toxicant 96 hour LC_{50} was 2.87 mg/L SDS (95% CL: 2.66 - 3.10). This value is above ±2 SD of the mean of LC_{50}s calculated from previous *Citharichthys*: SDS reference toxicant tests. This suggests that these fish may less sensitive indicators of sediment toxicity than those used in prior sediment bioassays in our laboratory.

3.3.1.4 Initial Mixing Calculations

Calculations of initial mixing concentrations for disposal depths of 50m, 20m and 10m are detailed in Appendix E (Table E1). Only one composite (FLTB) generated an EC_{50} value (71.74% SPP) for one test species (*Citharichthys*) and therefore qualified for initial mixing calculations. In this case the factored EC_{50} (0.71) was higher than the projected concentrations (C_{sp}) for each of the three depths. Therefore the Limiting Permissible Concentrations (LPCs) were not exceeded for this sediment.

3.3.2 Solid Phase (SP) Static Bioassay (Amphipod)

Test amphipods (*R. abronius*) were collected on 11 April 1994 at West Beach, Whidbey Island, WA by Northwestern Aquatics, Inc.. They arrived via overnight delivery at ToxScan's bioassay facility in Watsonville, CA on 19 April. These amphipods did not require salinity acclimation; they were held at 33‰ to 34.1‰ until testing was initiated on 25 and 26 April with 32.5‰ - 33.0‰ overlying seawater.

Solid phase static bioassay results for the amphipod *Rhepoxynius abronius* are summarized below and in Table 9. Prior to initiation of the bioassay, analysis of interstitial waters found ammonia concentrations in the FLTB composite (57.7 mg/L) exceeded the threshold limit of 30 mg/L for *Rhepoxynius*. Therefore, ammonia-purging procedures were initiated for the FLTB sediments, and a parallel (purged) control was set up using home sediments from Yaquina Bay. After two days of aeration and twice-daily renewals of overlying water, total ammonia levels in the FLTB pore water was sufficiently reduced ($\leq$30 mg/L) to begin the test. Twice daily renewals continued for the test duration. The final concentration of total ammonia in the FLTB pore water was 8.6 mg/L (Table 5).

Survival. Mean survival of *R. abronius* in the Humboldt Harbor Baseline Survey II sediment composites ranged from 96.9% to 99.0% (versus 93.0% in the home sediment control and 94.0% in the reference site composite. Survival in the harbor composites did not differ significantly from reference site survival (Dunnett's Test: p=0.05, df=16,3).

Reference Toxicant. The amphipod reference toxicant 96 hour LC_{50} was 0.76 μg/L Cd (95% CL: 0.56 - 1.02). This value is within $\pm$2 SD of the mean of LC_{50}s calculated from previous *Rhepoxynius* : Cd reference toxicant tests.

3.3.3 Solid Phase (SP) Flow-Through Bioassays: Mysid Shrimp and Polychaete Worm

Solid phase flow-through bioassay results are summarized below and in Tables 10 (mysid) and 11 (worm).

Mysid Shrimp Survival. Adult *Holmesimysis costata* were collected from kelp beds near - Monterey, California by SP Aquatics on 4 May 1994. They were transported directly to the bioassay lab where the mysid SP bioassay was initiated that afternoon.

Mean survival of *H. costata* was 95% to 96% in the Humboldt Harbor composites, in the home sediment control and in the reference composite. Mysid survival in the harbor composites was equal to or greater than survival in the reference site composite.

Reference Toxicant. The mysid reference toxicant 96 hour LC_{50} was 9.28 mg/L SDS (95% CL: 7.61 - 11.3). This value falls above $\pm$2 SD of the mean of LC_{50}s calculated from previous *Holmesimysis*:

SDS reference toxicant tests. This suggests that these mysids may be less sensitive indicators of sediment toxicity than mysids used in other sediment bioassays in our laboratory.

Polychaete Worm Survival. Adult *N. caeciodes* were collected from Tomales Bay by John Brezina and Associates. Collection data were not available. They were received at the bioassay laboratory on 26 April 1994 via overnight delivery. These animals did not require salinity acclimation; they were held in home sediment with 32.8‰ - 32.9‰ overlying seawater at 10.9 °C - 12.7 °C until testing was initiated on 28 April.

Mean survival of *Nephtys caecoides* in the Humboldt Harbor sediment composites ranged from 93% to 94% (versus 100% in the home sediment control and 89% in the reference composite. Worm survival in each of the harbor composites exceeded survival in the reference site composite.

Reference Toxicant. The polychaete reference toxicant 96 hour LC_{50} was 107.5 µg/L copper (95%CL: 71.5 - 161.6). Sufficient data were not available to generate a control chart for this species.

3.3.4 Bioaccumulation Exposure (Clam and Worm)

Based on EPA and SFACOE review of the sediment chemistry results for the three harbor composites and the reference composite, no assessment of the exposed tissues was deemed warranted for either *Macoma nasuta* or *Nephtys caecoides*. The bulk sediment chemistry data revealed no detectable chlorinated pesticides or PCBs, while total detected organotins (<1 ppb) were close to detection limits. Similarly, analyses for dioxins found trace amounts (0.51 pg/g 2,3,7,8-TCDF; 0.94 pg/g total TCDF) in only one composite (SAMTB). PAHs were detected at low concentrations (98 - 160 ppb) in the composites.

Bioassay Results Summary. Except for the sanddab elutriate (SPP) test, the bioassay testing of the Humboldt Bay Baseline Survey II sediments demonstrated little or no toxicity to the test species. In the sanddab test, the high mortality found in the 100% elutriate was not carried through to the 50% and 10% dilutions, and did not produce an initial mixing scenario which exceeded the LPC. High concentrations of initial pore water ammonia (57.7 mg/L) in the FLTB composite may have been the major source of the observed toxicity. The reference toxicant tests for the sanddabs and for the solid phase mysid test produced LC_{50}s which were above our control chart limits.

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TABLES

Table 1. Analyses Performed, Humboldt Bay Baseline Survey II (FY 1994). Shaded samples composited; SP = Suspended Phase; SPP = Suspended Particulate Phase.

SAMPLE	Initial Grain Size	Sediment Chemistry	SP + SPP Bioassay	Bioaccumulation[1]
North Bay Channel:				
NB1	YES	NO	NO	NO
NB2	YES	NO	NO	NO
NB3	YES	NO	NO	NO
NB4 Rep 1	YES	YES	NO	NO
NB4 Rep 2	YES	NO	NO	NO
NB5	YES	NO	NO	NO
NB6	YES	NO	NO	NO
NB7	YES	NO	NO	NO
NB8	YES	NO	NO	NO
NB9	YES	NO	NO	NO
NB10	YES	NO	NO	NO
Samoa Turning Basin:				
SAM1	YES	YES	NO	NO
SAM2	YES	YES	NO	NO
SAM3	YES	YES	NO	NO
SAM4	YES	YES	NO	NO
SAM5	YES	YES	NO	NO
Comp SAMTB:	YES	YES	YES	YES
SAM6-A	YES	YES	NO	NO
SAM6-B	YES	YES	NO	NO
SAM6-C	YES	YES	NO	NO
SAM7	YES	YES	NO	NO
Eureka Upper Channel:				
EK1	YES	YES	NO	NO
Comp EKUP:	YES	YES	YES	YES
EK2	YES	YES	NO	NO
EK3	YES	YES	NO	NO
EK4	YES	YES	NO	NO
Fields Landing Lower Channel and Turning Basin:				
Comp FLTB:	YES	YES	YES	YES
FL1	YES	YES	NO	NO
FL2	YES	YES	NO	NO
FL3	YES	YES	NO	NO
FL4	YES	YES	NO	NO
FL5	YES	YES	NO	NO
FL6	YES	YES	NO	NO
FL7	YES	YES	NO	NO
FL8	YES	YES	NO	NO
Entrance Channel, Bar, Reference Site and Control:				
ENT1	YES	NO	NO	NO
ENT2	YES	NO	NO	NO
BAR1	YES	NO	NO	NO
REF	YES	YES	YES	YES
CONTROL	YES	YES	YES	YES

[1] Exposures only; no tissue analyses performed.

Table 2. Sediments Collected, Humboldt Bay Baseline Survey II (FY 1994). Samples collected by vibracore or Smith-Macintyre grab; shaded samples composited.

SAMPLE	DATE	TIME	MUDLINE	Core Penetration (Feet) ACHIEVED	SAMPLED	California State Plane Coordinates[1] NORTH	EAST
North Bay Channel:							
NB 1	4/1/94	16:47	36.0	GRAB[2]	0.5	525040	1384353
NB 2	4/4/94	14:10	37.5	GRAB	0.5	526977	1380256
NB 3	4/1/94	16:20	34.5	GRAB	0.5	528632	1386625
NB 4 Rep1	4/1/94	15:55	36.5	GRAB	0.5	530690	1387641
NB 4 Rep2	4/1/94	17:23	36.5	GRAB	0.5	530690	1387641
NB 5	4/1/94	15:23	37.0	GRAB	0.8	531747	1389429
NB 6	4/1/94	15:02	35.7	GRAB	0.4	533775	1391711
NB 7	4/1/94	14:31	34.4	GRAB	0.4	535684	1392296
NB 8	4/1/94	14:10	36.5	GRAB	0.5	536655	1392972
NB 9	4/1/94	13:52	35.4	GRAB	0.7	540438	1394733
NB 10	4/1/94	13:33	35.5	GRAB	0.3	552578	1395037
Samoa Turning Basin (SAMTB):							
SAM 1	3/31/94	10:56	34.6	GRAB	0.4	541657	1394834
SAM 2	3/31/94	10:27	36.1	GRAB	0.5	542636	1395296
SAM 3	3/31/94	10:03	33.0	GRAB	0.5	544222	1395985
SAM 4	3/31/94	09:30	35.5	GRAB	0.5	545254	1396359
SAM 5	3/31/94	09:02	34.5	GRAB	0.7	548030	1397957
SAM 6 A	4/1/94	09:54	35.7	GRAB	0.5	547562	1397303
SAM 6 B	3/31/94	16:34	33.9	4.1	3.1	548139	1397482
SAM 6 C	3/31/94	12:10	34.9	3.2	2.1	548418	1397752
SAM 7D	3/31/94	08:36	35.9	GRAB	0.7	548030	1397957
Eureka Upper Channel (EKUP):							
EK 1	4/2/94	13:48	35.8	GRAB	0.5	541580	1395533
EK 2	4/2/94	09:25	24.7	3.5	3.3	543195	1396863
EK 3	4/2/94	14:48	21.9	6.5	6.1	543562	1397576
EK 4	4/2/94	16:46	27.2	GRAB	0.5	543841	1399100
Fields Landing Lower Channel and Turning Basin (FLTB):							
FL 1	4/4/94	11:15	27.8	GRAB	0.3	513355	1384535
FL 2	4/4/94	12:44	26.5	GRABS	0.5	514065	1384547
FL 3	4/3/94	12:09	27.2	GRABS	0.5	514488	1384092
FL 4	4/3/94	09:23	25.9	3.1	2.1	515355	1384535
FL 5	4/3/94	11:27	26.3	GRAB	0.5	517271	1385416
FL 6	4/3/94	11:05	30.2	GRAB	0.5	519202	1385029
FL 7	4/3/94	10:51	28.4	GRAB	0.5	521204	1383853
FL 8	4/3/94	10:45	25.2	GRAB	0.5	523214	1384976
Entrance Channel, Bar and Reference Site:							
ENT 1	4/5/94	12:00	36	GRAB	0.5	526000	1382500
ENT 2	4/5/94	12:10	48	GRAB	0.5	529100	1380400
BAR 1	4/5/94	11:45	42	GRAB	0.5	530800	1377700
REF 1	4/5/94	08:46	165	GRAB	0.5	524700	1351300

[1] Field measurements of station locations were made in latitude x longitude (see Field Logs, Appendix A), and converted here to California State Plane Coordinates.

[2] Grab samples (except Entrance and Bar) were taken only where depth from bottom to project depth was less than 1.5 ft; Entrance and Bar stations were grab sampled due to wind and sea conditions.

Table 3. Biological Assessments, Humboldt Bay Baseline Survey II (FY 1994).

Test Species:	SP	SPP	BA
R. abronius	X	-	-
M. edulis	-	X	-
H. costata	X	X	-
C. stigmaeus	-	X	-
N. caecoides	X	-	(x)
M. nasuta	-	-	(x)

X = test performed; (x) = exposure only, no tissue evaluation

SP = Solid Phase; SPP = Suspended Particulate Phase; BA = Bioaccumulation.

Table 4. Sediment Chemistry Summary, Humboldt Bay Baseline Survey II (FY 1994): Composites only; for individual sample results, see Appendix C.

Analyte	Sampling Sections				Detection Limit
	SAMTB	EKUP	FLTB	REF	
METALS (ppm, dry wt)					
Arsenic	5.7	6.3	7.0	7.3	0.1
Cadmium	0.1	0.2	0.2	0.1	0.1
Chromium	100	97	100	110	0.1
Copper	12	20	28	21	0.1
Lead	5.8	7.7	8.1	7.4	0.1
Mercury	0.05	0.06	0.08	0.20	0.02
Nickel	62	81	98	97	0.1
Selenium	ND	ND	ND	ND	0.1
Silver	ND	ND	ND	ND	0.1
Zinc	41	55	66	62	1.0
ORGANOTINS (ppb, dry weight)					
Monobutyltin	ND	ND	ND	ND	1.0
Dibutyltin	ND	ND	ND	ND	1.0
Tributyltin	1	ND	ND	ND	1.0
PAHs (ppb, dry wt)					
2-Methylnaphthalene	ND	41	78	40	20
Naphthalene	43	37	43	ND	20
Acenaphthylene	ND	ND	ND	ND	20
Acenaphthene	ND	ND	ND	ND	20
Fluorene	ND	ND	ND	ND	20
Phenanthrene	49	ND	ND	58	20
Anthracene	ND	ND	ND	ND	20
Fluoranthene	30	39	42	ND	20
Pyrene	36	47	ND	ND	20
Chrysene	ND	ND	ND	ND	20
Benzo(a)anthracene	ND	ND	ND	ND	20
Benzo(b)fluoranthene	ND	ND	ND	ND	20
Benzo(k)fluoranthene	ND	ND	ND	ND	20
Benzo(a)pyrene	52	ND	ND	ND	20
Indeno[1,2,3-CD]pyrene	ND	ND	ND	ND	20
Dibenzo(a,h)anthracene	ND	ND	ND	ND	20
Benzo[ghi]perylene	ND	ND	ND	ND	20
total PAHs	160	160	160	98	20
PHTHALATES (ppb, dry wt)					
total phthalates	160	160	170	1200	10
DIOXINS (pptr, dry wt)					
2,3,7,8-TCDD	ND	ND	ND	ND	0.22-0.33
Total TCDD	ND	ND	ND	ND	"
2,3,7,8-TCDF	ND	0.51	ND	ND	0.13-0.45
Total TCDF	ND	0.94	ND	ND	"

Table 4, continued. Sediment Chemistry Summary, Humboldt Bay Baseline Survey II (FY 1994): Composites only; for individual sample results, see Appendix C.

Analyte	Sampling Sections				Detection Limit
	SAMTB	EKUP	FLTB	REF	
GRAIN SIZE (% dry)					
Coarse Sand/Gravel ($\Phi < -1$)	0.8	0.3	0.2	0.0	-
Sand ($-1 \leq \Phi \leq 4$)	80.1	60.8	41.4	59.3	-
Silt ($5 \leq \Phi \leq 8$)	12.4	26.2	39.4	33.8	-
Clay ($\Phi \geq 9$)	6.7	12.7	19.0	6.9	-
MISCELLANEOUS CHEMISTRIES					
Total sulfides (ppm, dry)	29	110	35	0.3	0.1
Water soluble sulfides (ppm, dry)	ND	ND	0.2	ND	0.1
Oil & Grease (ppm, dry)	ND	ND	31	ND	20
Petroleum Hydrocarbons (ppm, dry)	ND	ND	ND	ND	20
% Solids (%)	77	72	65	73	0.1
TOC (%)	0.3	0.7	0.8	0.4	0.1
CHLORINATED PESTICIDES (ppb, dry weight)					
Aldrin	ND	ND	ND	ND	0.5
alpha-BHC	ND	ND	ND	ND	1.0
beta-BHC	ND	ND	ND	ND	1.0
delta-BHC	ND	ND	ND	ND	1.0
gamma-BHC (lindane)	ND	ND	ND	ND	1.0
alpha-Chlordane	ND	ND	ND	ND	5.0
gamma-Chlordane	ND	ND	ND	ND	5.0
4,4'-DDD	ND	ND	ND	ND	1.0
4,4'-DDE	ND	ND	ND	ND	1.0
4,4'-DDT	ND	ND	ND	ND	1.0
Dieldrin	ND	ND	ND	ND	0.5
Endosulfan I	ND	ND	ND	ND	2.0
Endosulfan II	ND	ND	ND	ND	0.5
Endosulfan sulfate	ND	ND	ND	ND	10
Endrin	ND	ND	ND	ND	0.5
Endrin aldehyde	ND	ND	ND	ND	0.5
Heptachlor	ND	ND	ND	ND	0.5
Heptachlor epoxide	ND	ND	ND	ND	10
Toxaphene	ND	ND	ND	ND	30
PCBs (ppb, dry weight)					
PCB 1242	ND	ND	ND	ND	20
PCB 1248	ND	ND	ND	ND	20
PCB 1254	ND	ND	ND	ND	20
PCB 1260	ND	ND	ND	ND	20
total PCBs	ND	ND	ND	ND	20

Table 5. Sediment Pore Water Salinity and Total Ammonia, Humboldt Bay Baseline II (FY 1994).

	Initial (As Received)		Final
Composite	S‰	NH_3	NH_3
REF	34.5	8.7	6.2
EKUP	30.5	6.1	4.1
SAMTB	32.0	4.0	2.6
FLTB	33.0	57.7[1]	8.6

[1] Exceeds threshold value for *R. abronius* bioassay; sample purged as per EPA memorandum of 12/23/93 (see text).

Table 6. Bivalve larvae (*M. edulis*) SPP Bioassays, Humboldt Bay Baseline Survey II (FY1994). See text for explanation of calculations (Mean initial recovery = 4795).

Sample ID	Rep	Number Normal	Number Abnormal	Total Recovered per 1 mL	Resuspended Volume	Total # Normal Larvae Recovered	% Survival	Mean % Survival ± S.D.	% Normal Develop-ment	Mean % Normal Development ± S.D.	Survival		Normal Development	
											Abbotts Corrected Value	Mean Corrected Value	Abbotts Corrected Value	Mean Corrected Value
	1	126	2	128	50.5	6363	132.7		98.4					
	2	91	3	94	51	4641	96.8	**101.8**	96.8	**99.0**				
Control	3	84	0	84	51	4284	89.3	±	100.0	±				
	4	104	0	104	49	5096	106.3	19.24	100.0	1.42				
	5	78	0	78	51.5	4017	83.8		100.0					
	1	88	2	90	47	4136	86.3		97.8		84.8		98.7	
REF	2	70	1	71	48.5	3395	70.8	86.4	98.6	98.2	69.6	**84.9**	99.5	**99.1**
100%	3	98	1	99	48	4704	98.1	±	99.0	±	96.4	±	99.9	±
	4	85	3	88	48	4080	85.1	10.16	96.6	1.00	83.6	9.98	97.5	1.01
	5	90	1	91	49	4410	92.0		98.9		90.4		99.9	
	1	90	0	90	47.5	4275	89.2		100.0		87.6		101.0	
EKUP	2	92	4	96	49	4508	94.0	93.5	95.8	98.8	92.4	**91.8**	96.8	**99.7**
100%	3	78	0	78	49.7	3877	80.8	±	100.0	±	79.4	±	101.0	±
	4	94	2	96	47	4418	92.1	11.08	97.9	1.86	90.5	10.89	98.9	1.88
	5	111	0	111	48	5328	111.1		100.0		109.2		101.0	
	1	89	2	91	47.9	4263	88.9		97.8		87.4		98.7	
SAMTB	2	101	2	103	49	4949	103.2	94.8	98.1	98.0	101.4	**93.2**	99.0	**98.9**
100%	3	104	3	107	48.5	5044	105.2	±	97.2	±	103.4	±	98.1	±
	4	80	1	81	48	3840	80.1	10.41	98.8	0.56	78.7	10.23	99.7	0.57
	5	98	2	100	47.3	4635	96.7		98.0		95.0		98.9	
	1	72	12	84	47.5	3420	71.3		85.7		70.1		86.5	
FLTB	2	81	7	88	47	3807	79.4	78.0	92.0	87.5	78.0	**76.6**	92.9	**88.3**
100%	3	77	14	91	47	3619	75.5	±	84.6	±	74.2	±	85.4	±
	4	71	11	82	49.5	3515	73.3	7.61	86.6	2.90	72.0	7.48	87.4	2.93
	5	91	12	103	47.7	4341	90.5		88.3		88.9		89.2	

ENDPOINT ESTIMATES:

	LC_{50}	EC_{50}
EKUP:	>100%	>100%
SAMTB:	>100%	>100%
FLTB:	>100%	>100%

Table 7. Mysid SPP Bioassays, Humboldt Bay Baseline Survey II (FY 1994).

Holmesimysis costata
Suspended Particulate Phase Bioassay Results
Humboldt Harbor Sediments

NUMBER OF SURVIVORS (Start n = 10)					
Rep #	Control	REF	EKUP	SAMTB	FLTB
1	10	9	10	10	10
2	10	10	10	10	10
3	9	10	10	10	10
4	10	10	10	10	10
5	10	10	10	10	10
Mean	9.8	9.8	10.0	10.0	10.0
SD	0.45	0.45	0.0	0.0	0.0
Mean % Survival	98	98	100	100	100

1. Data **FAIL** SHAPIRO-WILKS TEST for normality at P=0.01:

   W=0.575 D = 1.600 Critical $W_{(25,\ 0.01)}$ = 0.888

2. Data **FAIL** BARTLETT'S TEST for homogeneity of variance at α=0.01: At least one group has zero variance.

3. Steel's Many-One Rank test shows **NO significant difference** among sample data and disposal site reference:

   Critical value = 17 (0.05, k=3)

	EKUP	SAMTB	FLTB
Rank Sum:	30.0	30.0	30.0

Table 8. Fish (*C. stigmaeus*) suspended particulate phase bioassays, Humboldt Bay Baseline Survey II (FY 1994).

Citharichthys stigmaeus
Suspended Particulate Phase Bioassay Results
Humboldt Harbor Sediments

	NUMBER OF SURVIVORS (Start n = 10)				
Rep #	Control	Reference	EKUP	SAMTB	FLTB
1	10	10	10	10	0
2	10	10	10	9	0
3	10	10	10	10	2
4	10	9	9	10	0
5	10	10	9	7	0
Mean	10.0	9.8	9.6	9.2	0.40*
SD	0.0	0.45	0.55	1.3	0.89
Mean % Survival	100	98	96	92	4.0

1. Data **PASS** SHAPIRO-WILKS TEST for normality at P=0.01:

   W=0.992 D = 12.00 Critical $W_{(25,\ 0.01)}$ = 0.888

2. Data **FAIL** BARTLETT'S TEST for homogeneity of variance at α=0.01: At least one group has zero variance.

3. Steel's Many-One Rank test shows **FLTB significantly different from the disposal site reference composite**.

   Critical F value = 17 (0.05, k=4)

	EKUP	SAMTB	FLTB
Rank Sum:	9.6	9.2	0.40*

Table 9. Amphipod (*R. abronius*) solid phase static bioassays, Humboldt Bay Baseline Survey II (FY 1994). Home A and composite FLTB replicates were ammonia-purged (daily renewals) as per EPA/ACOE memo of 21 December 1993.

Rhepoxynius abronius
Solid Phase Static Bioassay Results
Humboldt Harbor Sediments

	NUMBER OF SURVIVORS (Start n = 20)					
Rep #	Home A	Home B	REF	EKUP	SAMTB	FLTB
1	18	19	18	18	19	20
2	19	20	18	17	19	19
3	20	19	18	18	20	17
4	18	18	16	20	19	18
5	20	20	18	20	20	20
Mean	19.0	19.2	17.6	18.6	19.4	18.8
SD	1.00	0.84	0.89	1.34	0.55	1.30
Mean % Survival	95	96	88	93	97	94
Mean % Reburial	100	96.8	98.9	96.9	99.0	97.0

1. Data **PASS** SHAPIRO-WILKS TEST for normality at P=0.01:

   W = 0.936 D = 18.400 Critical $W_{(20,\ 0.01)}$ = 0.868

2. Data **PASS** BARTLETT'S TEST for homogeneity of variance at α=0.01:

   Calculated B statistic = 3.14 Table Chi-square value = 11.34

3. ANOVA test shows **NO significant difference** among sample means and disposal site reference:

   Critical F value = 3.24 (0.05, 3, 16) Calculated F value = 2.435
   Calculated F > Critical F; ∴ **Fail to Reject** H_0: all groups equal

4. DUNNETT'S TEST (Mean Comparison Test) shows **NO Humboldt Harbor sample composite with lower survival** than the Humboldt reference composite at P = 0.05:

	EKUP	SAMTB	FLTB
Dunnett's t: (1-tailed, P=0.05, d.f.=16,3)	-1.474	-2.654	-1.769

Dunnett table value = 2.23

Table 10. Mysid (*H. costata*) solid phase flow-through bioassays, Humboldt Bay Baseline Survey II (FY 1994).

Holmesimysis costata
Solid Phase Flow-Through Bioassay Results
Humboldt Harbor Sediments

	NUMBER OF SURVIVORS (Start n = 20)				
Rep #	Home	REF	EKUP	SAMTB	FLTB
1	19	20	18	19	19
2	19	19	20	19	18
3	20	19	20	19	20
4	18	18	20	20	18
5	19	19	19	19	20
Mean	19.0	19.0	19.4	19.2	19.0
SD	0.71	0.71	0.89	0.45	1.00
Mean % Survival	95	95	97	96	95

1. Data **PASS** SHAPIRO-WILKS TEST for normality at P=0.01:

   W = 0.928 D = 10.000 Critical $W_{(20, 0.01)}$ = 0.868

2. Data **PASS** BARTLETT'S TEST for homogeneity of variance at α=0.01:

   Calculated B statistic = 2.34 Table Chi-square value = 11.34

3. ANOVA test shows **NO significant difference** among sample means and disposal site reference:

   Critical F value = 3.24 (0.05, 3, 16) Calculated F value = 0.293
   Calculated F > Critical F; ∴ **Fail to Reject** H_0: all groups equal

4. DUNNETT'S TEST (Mean Comparison Test) shows **NO Humboldt Harbor sample composite with <u>lower</u> survival** than the Humboldt reference composite at P = 0.05:

	EKUP	SAMTB	FLTB
Dunnett's t: (1-tailed, P=0.05, d.f.=16,3)	-0.800	-0.400	0.000

Dunnett table value = 2.23

Table 11. Polychaete worm (*N. caecoides*) solid phase flow-through bioassays, Humboldt Bay Baseline Survey II (FY 1994).

Nephtys caecoides
Solid Phase Flow-Through Bioassay Results
Humboldt Harbor Sediments

	NUMBER OF SURVIVORS (Start n = 20)				
Rep #	Home	Reference	EKUP	SAMTB	FLTB
1	20	18	19	18	17
2	20	16	18	20	20
3	20	18	18	18	18
4	20	18	19	18	19
5	20	19	20	20	19
Mean	20.0	17.8	18.8	18.8	18.6
SD	0.0	1.10	0.84	1.10	1.14
Mean % Survival	100	89	94	94	93

1. Data **PASS** SHAPIRO-WILKS TEST for normality at P=0.01:

   W = 0.918 D = 17.600 Critical $W_{(20,\ 0.01)}$ = 0.868

2. Data **PASS** BARTLETT'S TEST for homogeneity of variance at α=0.01:

   Calculated B statistic = 0.40 Table Chi-square value = 11.34

3. ANOVA test shows **NO significant difference** among sample means and disposal site reference:

   Critical F value = 3.24 (0.05, 3, 16) Calculated F value = 5.652
   Calculated F > Critical F; ∴ **Reject** H_0: all groups equal

4. DUNNETT'S TEST (Mean Comparison Test) shows **NO sample composites produce lower survival** than the Humboldt reference composite at P = 0.05:

	EKUP	SAMTB	FLTB
Dunnett's t: (1-tailed, P=0.05, d.f.=16,3)	-1.508	-1.508	-1.206

Dunnett table value = 2.23

FIGURES

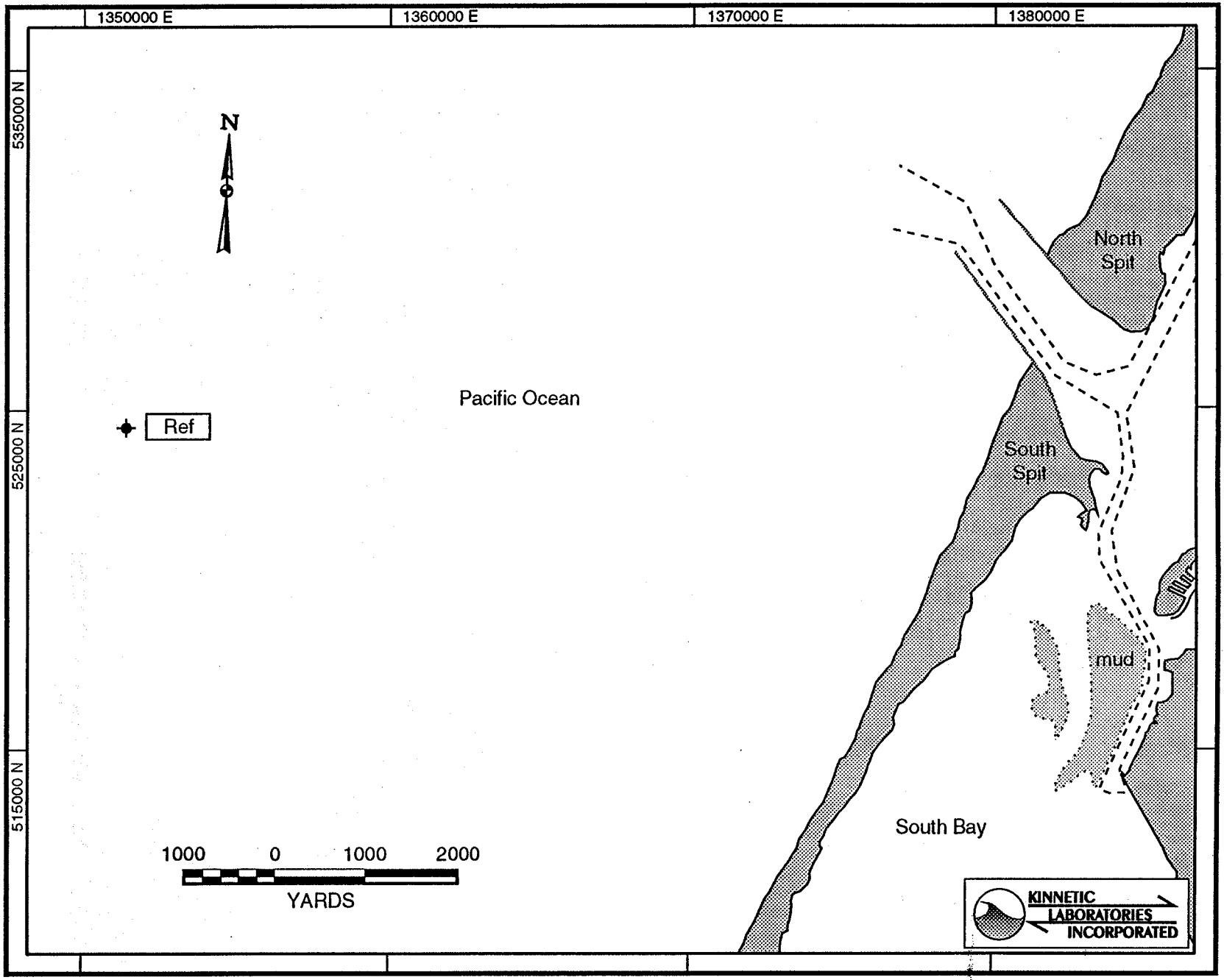


Figure 1. Humboldt Bay FY 1994 sampling locations. Reference station (solid) composite of six grab samples.

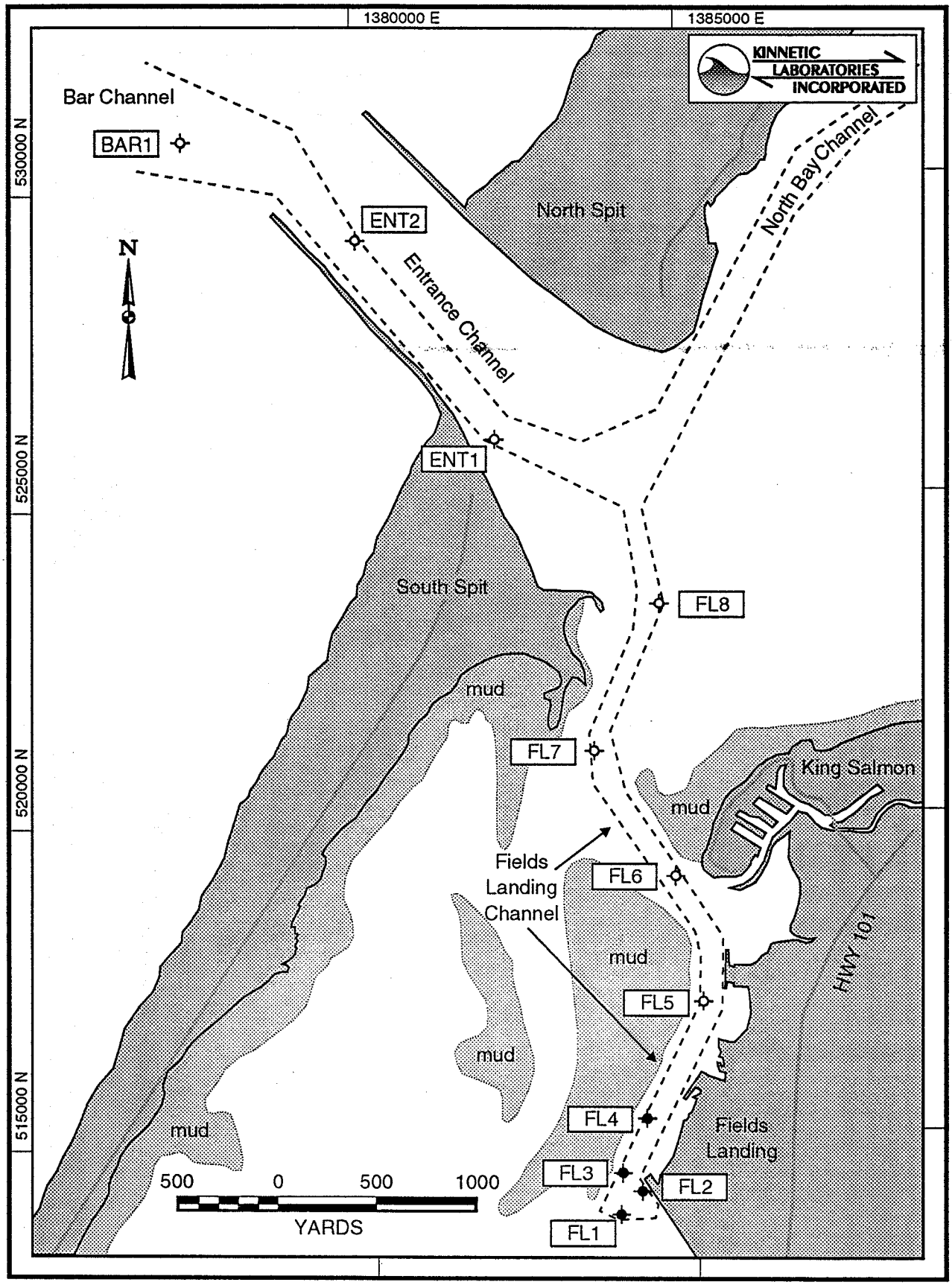


Figure 2. Humboldt Bay FY1994 sampling locations. Stations FL1 through FL8, ENT1, ENT2, and BAR1. Solid stations indicate those used in Fields Landing Lower Channel and Turning Basin (FLTB) composite.

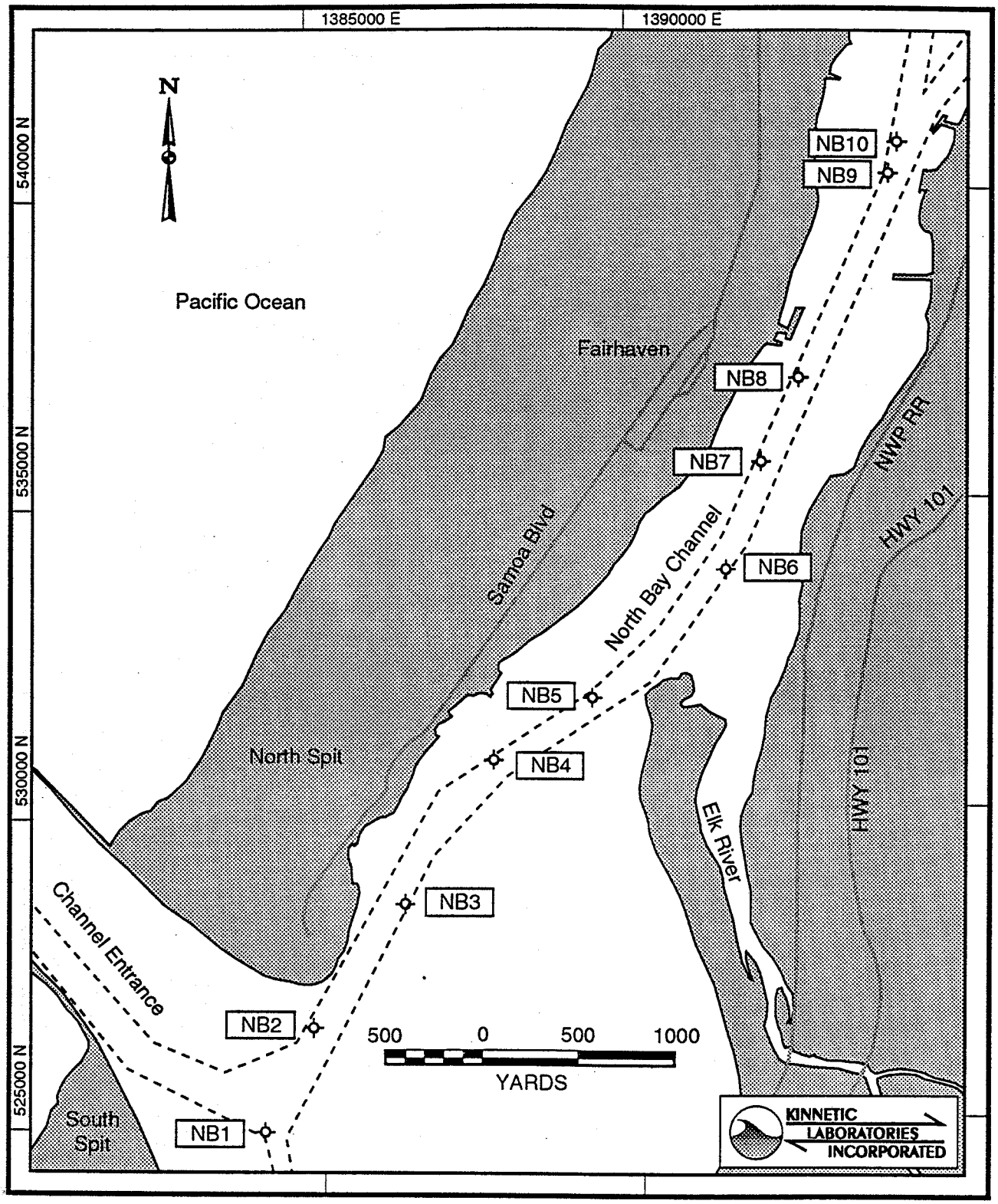


Figure 3. Humboldt Bay FY1994 sampling locations. Stations NB1 through NB10.

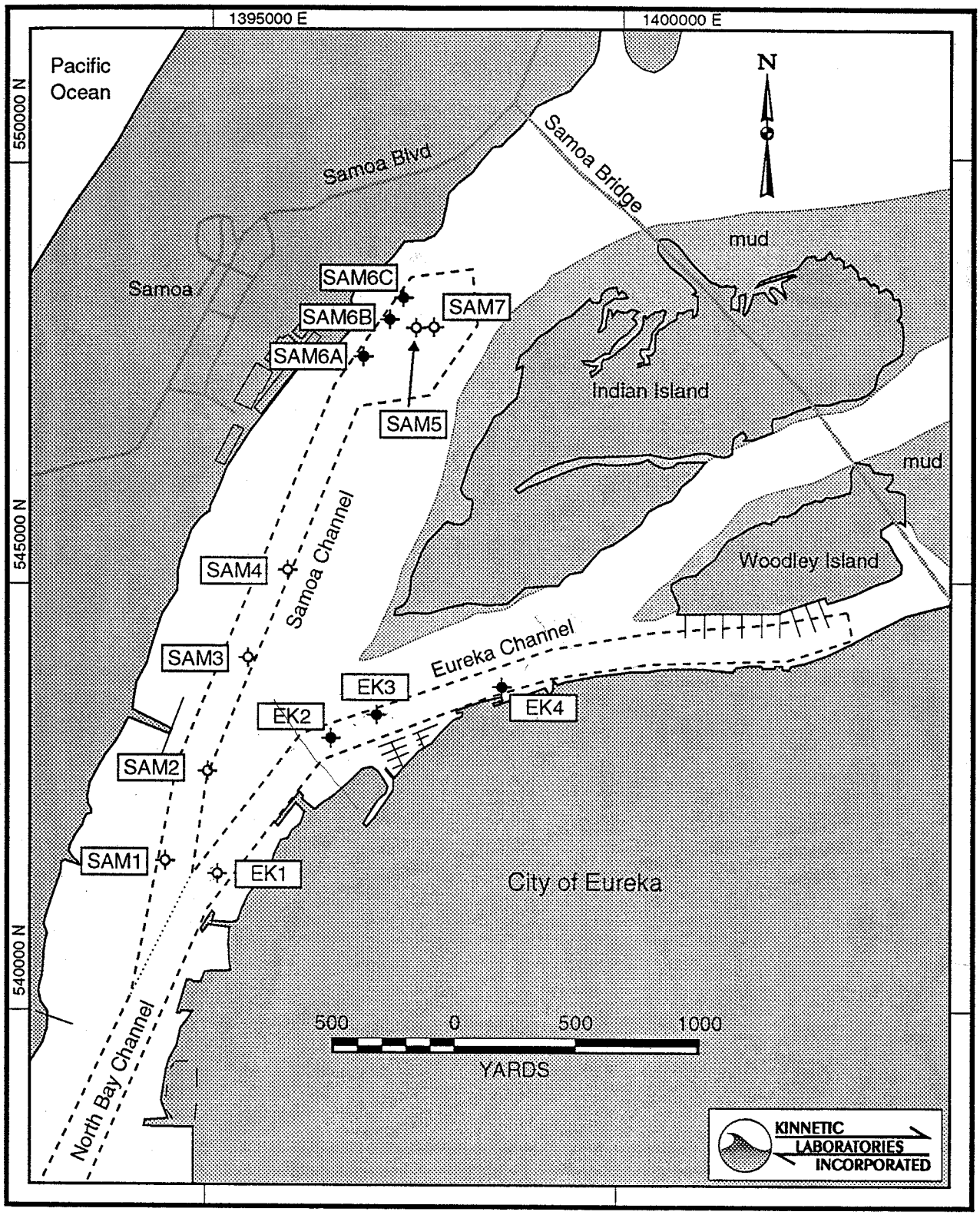


Figure 4. Humboldt Bay FY1994 sampling locations. Stations EK1 through EK4 and SAM1 through SAM7. Solid stations indicate those used in Eureka Upper Channel (EKUP) and Samoa Turning Basin (SAMTB) composites.

APPENDICES

Appendix A

Scope of Services

September 1, 1994
Revised Scope of Services
Sediment Chemical, Bioassay and Bioaccumulation Testing
Humboldt Harbor FY 94 Maintenance Dredging

Note: This Revised Scope of Service contains the following three specific modifications to the Revised Scope of Services dated April 8, 1994, which the contractor should address in his revised proposal:

Change 1 (section 5a). The following has been added (in bold) to section 5a: This task has been completed since the award of the initial contract and the number of samples requiring chemistry, including composited samples, is 27.

Change 2 (section 7d2). The following has been added (in bold) to section 7d(2): This task has been completed since the award of the contract and was determined necessary for Composite FL.

Change 3 (section 8c(1)). The Corps and EPA have decided to not conduct tissue chemistry on tissues archived by the contractor for bioaccumulation evaluation. This decision was made by the two agencies after review of sediment chemistry, which was provided by the contractor as part of this contract. Therefore, this section has been deleted from this revised scope of service and no longer required.

1. PURPOSE. The purpose of this contract is to perform bulk sediment analyses, suspended particulate bioassays, solid phase bioassays, and bioaccumulation testing of sediments collected from Humboldt Harbor and Bay. The testing will assist in determining whether the material from Humboldt Harbor and Bay is suitable for aquatic disposal in compliance with Section 103 of the Marine Protection Research and Sanctuaries Act.

2. THE CONTRACTOR'S RESPONSIBILITY. The Contractor shall furnish all necessary labor, facilities, equipment, and materials to perform the work described under this contract. The Contractor's representative shall be available to meet with Government personnel as requested by the USACE San Francisco District. The Contractor shall perform the services in accordance with this statement of work and the general provisions. Any modifications in equipment and/or methodology from those outlined in this Scope of Services must be approved by the San Francisco District (SFD). In order to adhere to the project schedule, all requests for modification or variations in equipment or procedures shall be forwarded to the SFD at the earliest date/time to ensure a timely review. The Contractor shall comply with all pertinent provisions of the U.S. Army Corps of Engineers Safety and Health Requirements Manual EM-385-1-1, date October 1984. The Contractor shall provide transportation and access from shore to the sampling vessel to a representative of the U.S. Army Corps of Engineers who may be present during sampling.

SEDIMENT SAMPLING LOCATIONS

a. Samoa, Eureka, Fields Landing, North Bay, Bar and Entrance Channels. Sediment samples shall be taken at those sites

listed in Table 1 (shown in Figure 1). A total of three composites shall be made according to the compositing scheme in Table 2.

b. A sufficient amount of sediment shall be collected from each location specified in Table 1, so that a representative amount of sediment is included from each sampling location in each composite, and that there is sufficient composited sediment to run the initial suite of sediment chemistry, bioassays and bioaccumulation and also one additional sediment chemistry, suspended particulate phase, and solid phase toxicity bioassay on each composite should a re-test be necessary. Sufficient individual sediment from each sediment location within a composite area shall be taken to conduct individual sediment chemistry analyses.

c. All of the samples shall have their containers physically marked as to area, sample location, and purpose of sampling. The Contractor shall furnish SFD an inventory of all samples taken and delivered, and their respective labels.

d. Sediment samples shall be placed in appropriate containers and stored following methodologies described in the manual. Care shall be taken to ensure that the containers are completely filled by the samples and that air bubbles are not trapped in the containers. All samples shall be stored immediately at 4°C and not frozen or dried. The Contractor shall provide the ice and ice chests or chest freezers to be used in the field to maintain samples at 4 C. These samples shall be stored at 4 C until testing initiated.

e. That portion of each individual sediment sample remaining after analyses shall be archived at 4°C. for possible additional chemical analyses until completion of the work and acceptance of the final report. Disposal of all sediments remaining at the end of testing shall be the Contractor's responsibility.

f. The Contractor shall provide the mudline elevations at each sample gathering location in reference to mean lower low water.

g. The Contractor shall maintain a daily field activity log listing the beginning and ending time for every and all phases of operation.

h. Formal chain-of-custody procedures shall be followed and documented.

4. SEDIMENT SAMPLING EQUIPMENT

a. Sediments in the Samoa, Eureka, Fields Landing, and North Bay channels shall be sampled with vibracore equipment. Each of the sampling locations within Humboldt Bay and Harbor sampled by vibracore shall be sampled from mudline to project depths (MLLW) listed on Table 1. Material below the required depths listed on Table 1 shall not be

used for testing. Where there is less than a foot of sediment at the sampling location or attempts to sample with the Vibracore equipment has failed, sediment samples at that location shall be obtained with either a Van Veen Grab sampler or a pipe dredge sampler. Samples from the Bar and Entrance channels, reference site, and control site shall be sampled using either a Van Veen Grab Sampler or equivalent, or a pipe dredge.

b. A fathometer shall be used to ensure vertical control of sampling. Horizontal positioning equipment with an accuracy of ten (10) feet is required to locate sampling points within the harbor. An accuracy of fifty (50) feet is required to locate the sampling site of the reference area.

c. Each individual sediment core sample taken in the Humboldt channels shall be taken within an area bounded by a 50-foot radius having its center located at the coordinates provided above or as approved by the government representative. In the event that there is insufficient sediment to sample between mudline elevation and the sampling depth listed above, with either the vibracore or grab sampler, the contractor shall locate as close as possible to the original sampling site, a new sampling location (inside the channel lines) which will provide sufficient sediment for sampling.

d. Care shall be taken during sampling to avoid contamination of sediment. All coring devices, if possible, shall be composed of or lined with a noncontaminating material such as cellulose buterate or lexan. If this is not possible, the Contractor must document what steps will be taken to prevent contamination of sediments during sampling as well as during storage prior to initiation of testing. Any samples indicating external contamination due to handling shall require resampling at no additional cost to the SFD.

5. SEDIMENT CHEMICAL,PHYSICAL AND GEOLOGICAL CHARACTERIZATION.

a. Grain size analyses shall be completed for all individual sediment samples taken in each of the Humboldt Harbor and Bay channels. Individual sediment samples taken in the Bar, Entrance, and North Bay channels, which are found to not be predominantly sand (if <80% retained on #200 sieve), and are not included in a compositing area, shall be analyzed for the parameters specified in Table 3. All composited sediments from Humboldt Harbor channels, the reference site, and the control, and all individual sediments sampled within the Fields landing, Samoa, and Eureka channels, shall be analyzed for the parameters specified in Table 3. In addition, for each composited sediment, Dioxin/Furan analyses shall be conducted. The required detection limits are also given in Table 3. The results shall be reported in dry weight. **This task has been completed since the award of the initial contract and the number of samples requiring chemistry, including composited samples, is 27.**

b. All analyses must be conducted using EPA approved methodologies that are suitable for marine sediments and which yield the required detection limits with good precision and accuracy. Appropriate clean-up procedures shall be employed that remove as much of the interfering material as possible from the sample without compromising the integrity of the sample or increasing the detection limits.

c. The presence of major "unknown" analytes on gas chromatograms or reconstructed ion chromatography (GC/MS) should be noted.

d. Grain size analysis and hydrometer readings shall be performed in accordance with the grain size procedure found in "Procedures for Handling and Chemical Analysis of Sediment and Water Samples, U.S. Army Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material (Plumb 1981)".

TABLE 1. Humboldt Sampling Locations

CHANNEL	SAMPLE	NORTHING	EASTING	Estimated depth to mudline (MLLW)	Sample to maximum Depth of (MLLW)
North Bay					
	NB1	525,070	1,384,200	GRAB	37
	NB2	525,920	1,383,850	GRAB	37
	NB3	528,610	1,386,270	GRAB	37
	NB4	530,600	1,387,800	GRAB	37
	NB5	531,750	1,389,435	GRAB	37
	NB6	533,710	1,391,365	GRAB	37
	NB7	535,691	1,392,300	36	37
	NB8	537,165	1,392,987	36	37
	NB9	538,680	1,393,630	35	37
	NB10	540,530	1,394,465	36	37
SAMOA					
	SAM1	541,698	1,394,581	36.5	37
	SAM2	542,620	1,34,962	35.5	37
	SAM3	544,057	1,395,362	35-36	37
	SAM4	545,480	1,396,110	35-36	37
	SAM5	547,270	1,397,500	34-35	37
	SAM6-A	547,592	1,396,836	36	37
	SAM6-B	547,998	1,397,080	36	37
	SAM6-c	548,368	1,397,403	36	37
	SAM7	548,480	1,398,061	36	37
EUREKA					
	EK1	541,498	1,395,132	36.5	37
	EK2	543,115	1,396,720	26.5	28
	EK3	543,600	1,397,863	27	28
	EK4	543,792	1,398,985	26.5	28
FIELDS LANDING					
	FL1	513,800	1,383,820	27.5-28	28

CHANNEL	SAMPLE	NORTHING	EASTING	Estimated depth to mudline (MLLW)	Sample to maximum Depth of (MLLW)
	FL2	514,070	1,384,130	27.5-28	28
	FL3	514,250	1,383,790	28-30	28
	FL4	515,660	1,384,580	28	28
	FL5	517,305	1,385,100	27	28
	FL6	519,220	1,384,600	27	28
	FL7	521,140	1,383,510	25	28
	FL8	523,300	1,384,500	27	28
ENTRANCE	ENT1	526,110	1,382,040	Grab	45
	ENT2	529,240	1,379,860	Grab	45
BAR	BAR1	531,010	1,377,490	GRAB	45
Reference site	RF	40°49'41"	124°18'34"	GRAB OR PIPE DREDGE	165-165' or 26.5-27.0 fathoms
Control Site	Tomales Bay	38°13'50"	172o57'40"		

Table 2. Compositing Plan

Composite	SAMPLE
EKUP	EK1
EKUP	EK2
EKUP	EK3
EKUP	EK4
SAMTB	SAM6-A
SAMTB	SAM6-B
SAMTB	SAM6-C
FLTB	FL1
FLTB	FL2
FLTB	FL3
FLTB	FL4
Ref	Reference

* Only placed in composte if >80% passes through #200 sieve

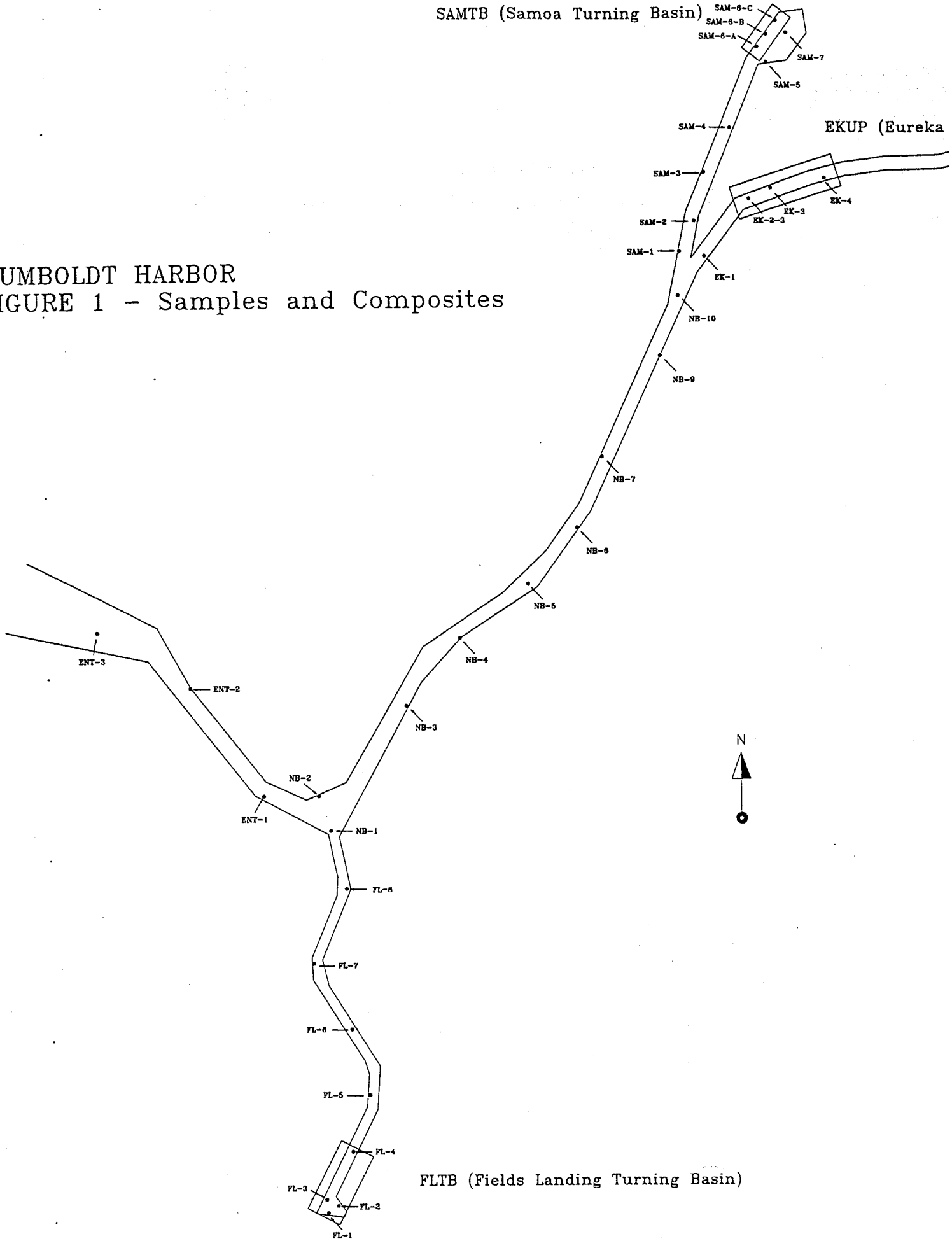
Table 3 Designation of Parameters for Analysis

Parameters	Detection Limit (mg/kg dry wt)[a]
Sediment Conventionals	
TOC	0.1%
Oil and Grease	20
TPH	20
Grain Size	NA
Total Solids	0.1%
Total and Water Soluble Sulfides	0.1
Metals	
Ag	0.1
As	0.1
Cd	0.1
Cr	0.1
Cu	0.1
Hg	0.02
Ni	0.1
Pb	0.1
Se	0.1
Zn	1.0
Organic Compounds	
Phthalate esters	0.01
Butyltins[b]	0.001
PCBs[c]	0.02
Pesticides-[e]	
Aldrin	0.002
Alpha-BHC	0.002
Beta-BHC	0.002
Delta-BHC	0.002
Gamma-BHC	0.002
Alpha-Chlordane	0.002
Gamma-Chlordane	0.002
4.4'-DDD	0.002
4.4'-DDE	0.002
4.4'-DDT	0.002
Dieldrin	0.002
Endosulfan I	0.002
Endosulfan II	0.002
Endosulfan Sulfate	0.01
Endrine	0.002
Heptochlor	0.002
Heptochlor Epoxide	0.01
Toxaphene	0.03
TCDD/TCDF [f]	1 (part per trillion)
PAHs[d]	
NAPHTHALENE	0.02
ACENAPHTHYLENE	0.02
ACENAPHTHENE	0.02
FLUORENE	0.02
PHENANTHRENE	0.02
ANTHRACENE	0.02
FLUORANTHENE	0.02
PYRENE	0.02
CHRYSENE	0.02
BENZO(A)ANTHRACENE	0.02
BENZO(B)FLUORANTHENE	0.02

BENZO(K)FLUORANTHENE	0.02
BENZO(A)PYRENE	0.02
INDENO(1,2,3-CD)PYRENE	0.02
DIBENZ(A,H)ANTHRACENE	0.02
BENZO(GHI)PERYLENE	0.02

(a) Report as mg/kg dry wt., unless otherwise noted.
(b) Mono-, Di-, and Tributyltin.
(c) Reported as Aroclor equivalents 1242, 1248, 1254, and 1260 and total PCB.
(d) All compounds on EPA Method 610 list.
(e) All compounds on EPA Method 608 list.
(f) Only on composited sediments

HUMBOLDT HARBOR
FIGURE 1 – Samples and Composites



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Note: Throughout the following discussions on bioassays the term Manual refers to the Evaluation of Dredged Material for Ocean Disposal, Testing Manual (EPA-503/8-91/001, February 1991) developed by the EPA Office of Marine and Estuarine Protection and U. S. Army Corps of Engineers, available through the Corps of Engineers' Waterways Experiment Station, Telephone (601)634-2571.

6. SUSPENDED PARTICULATE PHASE BIOASSAYS.

a. Sediment and Water Collection. The Contractor shall collect and preserve all sediment samples as described in sections 3 and 4 above and in the Manual. Water shall be clean, uncontaminated seawater of appropriate salinity, pH and temperature. Sufficient water shall be collected to perform the required tests. Seawater from any suitable location may be used provided it does not exceed applicable EPA quality criteria for marine waters and is of constant quality. Contractors shall be able to provide evidence that water meets these criteria, if necessary. Testing shall be conducted on the composited samples as specified in sections 3 and 4 above.

b. Preparation of the Bioassay Phase.

(1) Suspended Particulate Phase Bioassay. Phase preparation shall follow the procedure in the Manual for the suspended phase.

(2) Water Samples. Preparation of water samples shall follow the Manual.

(3) Sediment Sample. Composited sediment samples from Humboldt Bay and Harbor shall be prepared according to the manual. In addition to the treatment composites, there shall be the control water, reference water, and reference sediments. The control and reference water may be the same if the animals are being held before testing in the same water to be used for the bioassays.

c. Collection and Maintenance of Test Species.

(1) Species Selection. Three species shall be used: (1) Larvae of (pacific oyster) *Crassostraea gigas* or (bay mussel) Mytilus edulis (% normal development to D stage) (2) (mysid shrimp) *Holmesimysis sculpta*, and (3) (juvenile sanddab) *Citharicthys stigmaeus*.

(2) Organism Handling and Holding. Organisms shall be held no longer than two weeks. The SFD must approve additional holding time. Experiments shall be designed and performed so that organisms are handled as minimally as possible. Procedures for handling are found in the Manual. The physiological and biological needs of the test organisms must be met at all times.

d. Bioassay Testing of the Suspended Phase. Five replications of each treatment (including control) shall be performed. If greater than 10% of the control dies during any test, that test must be repeated at no additional expense to the SFD. However, control mortalities of 30% are acceptable in zooplankton

bioassays. Conditions and procedures shall follow those found in the Manual, unless otherwise noted.

e. Deviations From the Manual. If there is an odor of hydrogen sulfide, the water shall be aerated until the odor of hydrogen sulfide is no longer detected. The Contractor shall measure NH_3 in the test containers. If the NH_3 concentration is elevated, the water shall be aerated until the concentration is adequately reduced before introducing the test organisms.

f. Experimental Design. The design is a completely randomized design with three dilutions per dredging area per species, three reference sediments, and a control.

Suspended Particulate Treatments	As a Reference	As a Control
For each dredge area:	(1) 100% marine water	(1) 100% culture water Note: May be the same as reference water
(1) 100% Suspended Particulate Phase	(The following use reference sediment)	
(2) 50% suspended particulate phase	(2) 100% suspended particulate phase	
(3) 10% suspended particulate phase	(3) 50% suspended particulate phase	
	(4) 10% suspended particulate phase	

The test organisms and treatment shall be randomly assigned to test containers. The variable measured shall be percent survival except for the bivalve larvae test for which both survival and percent normal development are measured. The EC50 and LC50 shall both be calculated according to ASTM E724-89. Each species shall be considered a separate test. The 100% suspended particulate phase may be run first. If mortalities (or abnormal development) of 50% or less occur by 48-96 hours, the 50% and 10% dilutions need not be run. If greater than 50% mortality (or abnormal development) occurs by 48-96 hours, the test must be rerun at the Contractor's expense using the full series of dilutions (100%, 50%, 10% and control).

g. Data Analysis for Suspended Particulate Bioassays.

(1) If total survival or percent normal development in the test medium is equal to or higher than survival in the reference or control, visual inspection of the data is adequate and no statistical analyses are needed.

(2) A table or tables shall be provided for each species tested, giving the number of organisms tested, the total number of

surviving organisms for each time period and each treatment, the mean, and the standard deviation.

(3) If mean percent survival or normal development in the control is greater than any of the other treatments, for the bioassays, than additional statistical analyses shall be performed. The statistical analyses shall be as described in the Manual. Any deviations from the Manual must be approved by the Government. The results of all statistical analyses shall be presented in tabular form.

(4) If 50 percent or greater mortality or abnormal development occurs in the highest concentration of test medium, than a LC50 or EC50 must be calculated as described in the Manual.

7. SOLID PHASE BIOASSAY

a. Sediment and Water Collection. The Contractor shall collect and preserve all sediment and water samples as described in sections 3 and 4 above and in the Manual. Composited sediment samples shall be prepared and handled according to the Manual. For control sediment, the Contractor shall procure unpolluted sediment that is compatible with the test organisms and preferably from where they were collected. The control sediment must meet the needs of the organisms. The bioassays shall be conducted with a flow-through seawater system except for the test using the amphipod. Seawater of approximately 15°C, 30-32 ppt salinity should be passed through a sand filter and flow into each aquarium at a rate that will replace the aquarium volume at least once every 12 hours. The flow should be directed to achieve good mixing without disturbing the layer of sediment on the aquarium bottom. Water for all bioassays will be clean, uncontaminated seawater of appropriate salinity, pH and temperature. Seawater from any suitable location may be used provided it does not exceed applicable EPA quality criteria for marine waters and is of constant quality.

b. Collection and Maintenance of Test Species.

(1) Species Collection. It is recommended that collection of species should include at least 20% more than the minimum requirement.

(2) Species Selection. Three species shall be used: (1)(Amphipod) *Rhepoxynius abronius*; (2) (burrowing polychaete) *Nepthys caecoides*, and (3) (mysid shrimp) *Holmesimysis costata*.

(3) Organism Handling and Holding. Organisms shall be held no longer than two weeks. The SFD must approve additional holding time. Experiments shall be designed and performed so that organisms are handled as minimally as possible. Procedures for handling are found in the Manual. The physiological and biological needs of the organisms must be met at all times.

c. Solid Phase Preparation and Experimental Design. The test treatments shall consist of the dredged material samples, a reference, and a control. Five replications of each treatment shall be

performed. Each replicate shall consist of at least 20 organisms of each of these species. The dredged material treatments, references, and control shall be prepared as described in the Manual. However, only whole sediments shall be used in the solid phase tests. Layering of test sediments or control sediments over reference sediments is no longer acceptable. The purpose of the control is to verify the health of test organisms and the acceptability of test conditions. It also provides for quality assurance. If the mean survival in the control is less than 90 percent, the test must be repeated at no additional cost to the SFD. The variable measured shall be percent survival. Each species shall be considered a separate test.

d. Solid Phase Testing. Conditions and procedures for the 10-day solid phase bioassay shall follow ASTM (E 1367-90), 1991 and the Manual. In the event of a discrepancy between the ASTM and the Manual the Contractor shall contact the Corp's Contracting Officer for clarification.

(1) The following table[1] contains test condition acceptability ranges for organisms used to evaluate dredged material.

MARINE AND ESTUARINE AMPHIPOD TOXICITY TEST APPLICATION CONDITIONS*

Parameter	Rhepoxynius	Ampelisca	Eohaustorius	Leptocheirus
Temperature (°C)	15	20	15	25
Overlying Salinity (ppt)	>25	>20	2-34	2-32
Grain Size (% silt/clay)	<90	>10	full range	full range
Ammonia (total mg/L, ph 7.7)*	<30	<30	<60	<60
Ammonia (UI** mg/L, ph 7.7)*	<0.4	<0.4	<0.8	<0.8
Sulfides	***	**	**	***

A framework for deciding whether observed sediment (or elutriate) toxicity may be due to ammonia is presented in EPA/USACE (1993: Appendix F). This document should be consulted if ammonia is suspected to be a contaminant of concern.

** Unionized

*** Hydrogen Sulfide is not likely to be a problem in these tests if adequate oxygen levels are maintained in the overlying water.

(2) The contractor shall conduct measurements of interstitial ammonia, ph, and salinity on the sediments prior to the beginning and end of each bioassay test. Whenever chemical evidence of ammonia is present at toxicologically important levels prior to initiation of the test, ammonia in the interstitial water shall be reduced to below 20 mg/l before adding the benthic test organism. Ammonia levels in the interstitial water can be reduced by sufficiently aerating the sample at saturation and replacing two

volumes of water per day. During the test, the contractor shall ensure that ammonia concentrations remain within the acceptable range by conducting the toxicity test with continuous flow or volume replacement not to exceed two volumes per day. **This task has been completed since the award of the contract and was determined necessary for Composite FL.**

e. Data Analysis For Solid Phase Bioassay.

(1) If total survival in the test medium is equal to or higher than in the reference, visual inspection of the data is adequate and no statistical analyses are needed for that test.

(2) A table or tables shall be provided for each species tested, giving the number of organisms tested, the total number of surviving organisms for each treatment, the means, and the standard deviation.

(3) If mean percent survival in the reference is greater than any of the other treatments, for the bioassays, then additional statistical analyses shall be performed. The statistical analyses shall be as described in the Manual except that multiple t-test shall not be used. Alternative statistical methods must be approved by the SFD. The results of all statistical analyses shall be presented in tabular form.

8. BIOACCUMULATION.

a. Sediment and Water Collection. The Contractor shall collect and preserve all sediment and water samples as described in sections 3 and 4 above and in the Manual. Composited sediment samples shall be prepared and handled according to the Manual. For control sediment, the Contractor shall procure unpolluted sediment that is compatible with the test organisms and preferably from where they were collected. The control sediment must meet the needs of the organisms. The bioassays shall be conducted with a flow-through seawater system except for the test using the amphipod. Seawater of approximately 15°C, 30-32 ppt salinity should be passed through a sand filter and flow into each aquarium at a rate that will replace the aquarium volume at least once every 12 hours. The flow should be directed to achieve good mixing without disturbing the layer of sediment on the aquarium bottom. Water for all bioassays will be clean, uncontaminated seawater of appropriate salinity, pH and temperature. Seawater from any suitable location may be used provided it does not exceed applicable EPA quality criteria for marine waters and is of constant quality.

b. Collection and Maintenance of Test Species.

(1) Species Collection. It is recommended that collection of species should include at least 20% more than the minimum requirement.

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

(2) Species Selection. Two species shall be used: (1) Macuma nasuta and (2) Nephtys caecoides

(3) Organism Handling and Holding. Organisms shall be held no longer than two weeks. The SFD must approve additional holding time. Experiments shall be designed and performed so that organisms are handled as minimally as possible. Procedures for handling are found in the Manual. The physiological and biological needs of the organisms must be met at all times.

c. Solid Phase Preparation and Experimental Design. The test treatments shall consist of the dredged material samples, a reference, and a control. Five replications of each treatment shall be performed. Each replicate shall consist of at least 20 organisms of each of these species. The dredged material treatments, references, and control shall be prepared as described in the Manual. However, only whole sediments shall be used in the solid phase tests. Layering of test sediments or control sediments over reference sediments is no longer acceptable. The purpose of the control is to verify the health of test organisms and the acceptability of test conditions. It also provides for quality assurance. If the mean survival in the control is less than 90 percent, the test must be repeated at no additional cost to the SFD. This data must be reported to the SFD The variable measured shall be percent survival. Each species shall be considered a separate test.

(1) Tissue Analyses. **After Corps and EPA review, it was determined that, based on the low levels of contaminants measured in the sediment chemistry, tissue analyses is not necessary and therefore not required in this revised scope of service.**

(2) Number of Samples. Five replicates from each of the treatments shall be tested for the parameters listed in Table 3. Survivors within each replicate shall be pooled as necessary to provide sufficient tissue for testing. The treatments shall consist of the dredged material samples, the references, and the control.

a. The results shall be reported in dry weight. Percent moisture shall also be reported.

b. Procedure. Suggested procedures for specific constituents are given in the Manual. The method selected must yield the required detection limits with good precision and accuracy.

c. Solid Phase Testing. Conditions and procedures shall follow those found in the Manual for the 28-day solid phase bioassay. Observations and water quality measurements (temperature, pH salinity, dissolve oxygen shall be made daily.

(1) If the test sediment has an odor of hydrogen sulfide or has elevated ammonia levels, prior to introducing the organisms let

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

the sediment settle in tank and then aerate until the ammonia concentration is sufficiently reduced and there is sufficient oxygen (approximately 4ppm) at the sediment-water interface being careful not to oxidize the sediment. One hour after the addition of the organism, the water in the tank shall be analyzed for hydrogen sulfide, ammonia, and dissolved oxygen. This information shall be included in the final report.

d. Data Analysis and Presentation.

NA

9. QUALITY ASSURANCE AND QUALITY CONTROL.

a. The Contractor and subcontractors shall have an established quality control plan which is based on Environmental Protection Agency's quality control program as outlined in Handbook for Analytical Quality Control in Water and Wastewater Laboratories, USEPA 600/4-79-019, March 1979, EPA Office of Research and Development, Cincinatti, Ohio (Handbook). This plan shall also comply with the manual.

b. Quality control charts will be used for precision and accuracy (see section 6.1-6.3 of the Handbook). Percent recovery will be the control chart statistic for controlling accuracy. The industrial statistic "I" will be the control chart statistic for controlling precision. When it is discovered that any analysis is out of control from the standpoint of either precision or accuracy, all analyses since the last in control point will be repeated.

c. Upon completion of the analyses, the laboratory shall prepare a quality control report which includes the precision and accuracy of data generated on the analyzed samples.

d. As an absolute minimum, the following quality control measures shall be taken with each group of samples analyzed:

(1) A reagent blank per batch of samples shall be analyzed.

(2) One duplicate analyses per 10-20 samples shall be made, and precision data shall be reported in the quality control report.

(3) At least one audit or reference sample (EPA, NBS or other EPA- acceptable sources) for each constituent (if available) shall be analyzed (per batch or one per 10-20 samples whichever is less) and reported in the quality control report. This audit sample (marine or

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

estuarine sediment and tissue) shall be within the same concentration range as the samples that are being analyzed.

(4) Spiked samples shall be analyzed in order to address analytical accuracy. At least one per 10-20 samples must be spiked with an appropriate standard in order to address accuracy. The concentration of the spike shall be within 200% of the detection limit.

(5) Printouts from all AA and GC analyses shall be kept on file in the event that any concerns arise with the data.

e. All laboratory analyses shall be completed within the recommended holding time for each analytical method.

f. In addition to following quality control procedures described in the Handbook, quality control procedures described for specific analytical methods shall also be followed.

g. All GC analyses require confirmation using a second column which is different from the one used in the initial GC analysis.

h. Standard reference toxicant tests shall be conducted on all species. The results shall be reported in the report.

10. RELEASE OF DATA.

All data, reports, and materials obtained as a result of this contract shall become the property of the U.S. Government and shall be turned over to the SFD upon completion of this work. No data shall be released by the Contractor to any other party other than the SFD without expressed written permission from the SFD.

11. RESPONSIBILITY FOR FIELD WORK.

The Contractor shall be responsible for all damages to persons and property that occur as a result of actions by the Contractor's employees in connection with execution of the work.

12. REPORT PREPARATION.

a. The contractor shall prepare a project report according to the following format.

(1) Introduction. This section shall include a discussion of the purpose and a description of the project.

(2) Materials and Methods. This section shall include:

a. Narrative description of the material, methods and equipment used to perform the project

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

tasks.

b. Daily field activity log which includes tidal stage and weather conditions.

c. Inventory of all samples taken and explanation of how used in the tests.

d. Diagrams and figures as appropriate including location map of the sampling areas and sample locations within each area.

(3) Results. The Contractor shall include a narrative of the chemical characterization test results as well as the tables and graphs as described earlier. Any unusual laboratory or field observations shall also be described.

(4) References.

(5) Include appendixes

Appendix A -Scope of Work
Appendix B- Field Sampling Log Sheets/Field Notes
Appendix C- Grain Size data/graphs
Appendix D- QA/QC Data Plan and Report

(6) Text material shall be typed on good quality 8 1/2 by 11 inch bond paper with a 1 1/2-inch margin on the right, and 1-inch at the top and bottom.

(7) Drawings or plates shall be no larger than 20 inches by 11 inches with sufficient margin for binding on the left side and shall include a geographical scale.

(8) Each draft report shall be reviewed by the Corps of Engineers and comments returned to the Contractor. The Contractor shall address comments, correct typographical errors, and otherwise revise the document in accordance to the Contracting Officer's or his Authorized Representative's comments and questions.

Period of Service

Check Point One:
Pre-sampling Conference
Within 2 days of receiving the notice to proceed the contractor shall contact the Corps contract representative and provide the proposed dates for sampling.

Check Point Two:

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

Within 15 workdays of receiving the notice to proceed the contractor shall complete the sampling.

Check Point Three:
Within 60 workdays following the sampling the contractor shall submit 3 copies of the draft report.

Check Point Four:
Within 10 workdays of receiving the Corps comments on the draft report, the contractor shall submit 10 copies of the final report.

1. Table taken from Memorandum dated December 21, 1993, "Technical Panel Recommendations Concerning Use of Acute Amphipod Tests in Evaluation of Dredged Material."

Appendix B

Field Sampling Log Sheets

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 3/31/97 Vessel: Celtic

Captain: Phil Glen Crew: Kronschnabl, Filios, M. Kacher.

GENERAL OBSERVATIONS: N.E. corner of turning basin.
Medium to fine grain sand - very little silt
Shell hash & large wood debris - No odor - Grey/Brown
Take PSD only (Clear & calm)

Location I.D.: SAM-7D Time: 0836

Coordinates: 40° 49' 01.39 _____

124 10 35.83 _____

Grab 1

Core#: Grab Core Length Obtained: 8" Core Length Sampled Took entire depth

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		M.L.L.W. Sampling Depth	= 37
~~32.8~~ 35.25	(+/-)	~~-.59~~ -(-.7)	=	M.L.L.W. Mudline Depth	= ~~34.55~~ 35.95
				Core Length	= ~~2.45~~ 4.05

COMMENTS: Took a grab to characterize grain size first. Based on grain size will not core

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: Phil Glen Crew: K.K., W.F, M.K.

GENERAL OBSERVATIONS: Calm + Clear
S.E side of turning basin - Just west(north) of channel side
Medium to fine grain sand w/ shell hash - Very little silt
no odor - Grey/brown - 1 large shell
very little current - @ peak low

Location I.D.: SAM-5D Time: 0902

Coordinates: 40° 49' 01.39

129 10 35.83

Grab 1 8" penetration

~~Core#~~: ~~Core~~ Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth (+/-) Tide

33.75

~~35.25~~ (+/-) (-.79) =

M.L.L.W. Sampling Depth = 37

M.L.L.W. Mudline Depth = ~~32.96~~ 34.54

Core Length = NA 2.46

COMMENTS: Took Grab first to characteriz PSD
will not do core based on grainsize.
Took PSD only

Last Position from last years Job was on side of channel

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: P. Glen Crew: KK, W.F, M.K

GENERAL OBSERVATIONS: West edge of channel near marker
Calm & Clear -
Med. to fine grain sand w/ small shell hash - ~~very little silt~~
Brownish green in color - Found Fine clay like silt & sand
below 5cm - No odor

Location I.D.: SAM-4B Time: 0930

Coordinates: 40° 48' 33.58"
124° 10' 55.71"

Grab 6" penetration

~~Core#~~: Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA
~~will not keep~~ PSD only

Water Depth	(+/-) Tide			
34.75	(+/-) (-.70)	=	M.L.L.W. Sampling Depth	= 37
			M.L.L.W. Mudline Depth	= ~~34.05~~ 35.45
			Core Length	= ~~3.05~~ 1.58

COMMENTS: Took Grab First to characterize PSD. Decided to include this site w/ the composite will come back to core

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: B. Glen Crew: KK, W, F, M. K

GENERAL OBSERVATIONS: Slight breeze (clear)
Grabbed on the Eastern side of channel. West limit of site from last years plot on the chart - LAT Lanes Did not match -
Med. to fine grain sand w/ shell hash - very little silt. no odor grey/brown - no organic debris.

Location I.D.: SAM-3 Time: 0955 (#1 attempt) 1003 (#2 attempt)

Coordinates: 40° 46' 23.29 } #2
124° 11' 00.23 }

Grab #2
~~Core#~~: Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-) Tide		
		M.L.L.W. Sampling Depth	= 32
32.75	(+/-) (-.32) =	M.L.L.W. Mudline Depth	= ~~32.43~~ 33.07
		Core Length	= 3.93

COMMENTS: ~~to~~ Take Grab first to characterize PSD
Made two attempts - First attempt we drifted out of the channel.
Will use for PSD characterization only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: P. Glen Crew: K K, W.E, M.K

GENERAL OBSERVATIONS: Clear & slight breeze
Near Center of Channel between marker 2 & the LP Loading Dock
To the S.W of marker #2
Med. grain sand w/ Shell hash - very little silt. - NO oder or no organic debris

Location I.D.: SAM-2 Time: 1027

Coordinates: 40° 48' 07.45" N
124° 11' 08.68" W

Core#: ~~Grab~~ ~~Core~~ #1 Grab Length Obtained: 6" penetration Core Length Sampled NA

Sample: Composite (Discrete) Core subsampled: Yes/No Sub Sample Interval: NA.

Water Depth	(+/-) Tide		
36.05	(+/-) (±.05)	=	M.L.L.W. Sampling Depth = 37
		=	M.L.L.W. Mudline Depth = 36.1
		=	Core Length =

COMMENTS: Took Grab Sample first to characterize PSD
Will not use for compositing. PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: P. Glen Crew: Kramschmidt, M. K, W.F

GENERAL OBSERVATIONS: wind ~10 knts (clear) - OFF wood chip piles very Southern extent of Samoa channel
Medium to coarse sand w/ shell hash. very little silt. - NO smell
Brown in color
went to last times coordinates

Location I.D.: SAm - 10 Time: 1056

Coordinates: 40° 47' 57.67" _____

124° 11' 14.37" _____

Grab #1 5" penetration

Core#: _____ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-) Tide			
35.25	(+/-) (±.64)	=	M.L.L.W. Sampling Depth	= 37
			M.L.L.W. Mudline Depth	= ~~35.86~~ 34.61
			Core Length	= 2.39

COMMENTS: Took Grab first to characterize PSD

PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: P. Glen Crew: KK, M.K, W.F.

GENERAL OBSERVATIONS: Wind 10-15 kts (Clear) - High current speed (Flood) Dark Fine sand w/silt - little shell hash + little organic debris - no odor hard clay/sand below 2'

(Core #1 - pen. rec. 3.2' kept 2.1' discarded bot. 1.1) (Core #4 penetrated 4' recovered 2.0' kept 1.8')
(Core #2 - recovered 2.3' - kept 2.0') (Core #5 - pen. 4.5' - recovered 3.3' - kept 2.1')
(Core #3 - penetrated 3.5 recovered 2.0') (Core #6 - pen. 4.0' - recovered 2.8' - kept 2.1')
(Core #7 - pen 4.5' - recovered 3.9 - kept 2.1')
(Core #8 - pen 4.5' - " 2.0 - kept 2.1)

Location I.D.: SAM-6C Time: #1 (1210) #2 (1305) #3 (1323) #4 (1349)
#5 (1404) #6 (1423) #7 (1443) #8 (1509)

Coordinates: 40° 49' 05.18"
124° 10' 38.62"

3.2, 2.3, 3.5, 2.0, 3.3, 2.6, 3.9, 3.0

Core#: Core Length Obtained: ~~2.1, 2.0, 2.0, 1.8~~ Core Length Sampled 2.1, 2.0, 2.0, 1.8, 2.1
2.1, ~~2.1~~, 2.1, 2.1

Sample: (Composite) Discrete Core subsampled: Yes (No) Sub Sample Interval: NA

Water Depth (+/-) Tide

36.95 (+/-) -(+ 2.07) =

~1200hrs

M.L.L.W. Sampling Depth = 37

M.L.L.W. Mudline Depth = 34.88

Core Length = 2.12

COMMENTS: dropped buoy on last times coordinates.
Took 8 cores ~~8'~~ each + composited together - To fill 8 gals
~~Made~~ 1 chem sample for the 8 cores + the rest went towards the SAM composite
generated sample Humsed0007
1 spoon went towards chemistry composite from each core

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 3/31/94 Vessel: Celtic

Captain: P. Glen Crew: KK, WF, MK

GENERAL OBSERVATIONS: ~15 kn winds - clear - current beginning to ebb
Very fine sand & silty clay throughout the 5' - no horizons - slight H_2S smell - dark grey
not much in the way of large organic matter - no shell hash
(Core #1 pen. - ~~3.8~~ 4.5' 4.1' recovery - kept 3.1') (Core #2 4.5' pen - 3.66' recovery - kept 3.1')
(core #3 pen - ~~3.8~~ 4.5' - 3.75' recov. kept 3.1) (#4 4.5' pen - 3.75' recov - kept 3.1')
(#5 - 4.5' pen - 3.66' recov. - kept 3.1) (#6 - 4.5' pen - 3.5' recov - kept 3.1')
Very strong current by the end of sampling.

Location I.D.: SAM - 6B Time: #1 (1634) #2 (1655) #3 (1714) #4 (1745) #5 (1808) #6 (1818)

Coordinates: 40° 49' 02.35" N
124° 10' 42.04" W

Core#: _____ Core Length Obtained: 4.1, 3.66, 3.75, 3.75, 3.66, 3.5' Core Length Sampled 3.1, 3.1, 3.1, 3.1, 3.1, 3.1

Sample: (Composite/Discrete) Core subsampled: Yes (No) Sub Sample Interval: NA

Water Depth (+/-) Tide

39.75 (+/-) 5.86 = M.L.L.W. Sampling Depth = 37

-(+5.86)

M.L.L.W. Mudline Depth = 33.89

Core Length = 3.1'
6 cores

COMMENTS: Changed position slightly from last time to slightly shallower water (~100' to the NE of old position - same distance offshore ~200' off Pacific Pier). 1.5 Spoons towards chemistry composite for each core
Generated sample HUMAYSED0008 From the 6 cores - rest of mud went to SAM compos.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, M.K, W.F.

GENERAL OBSERVATIONS: Fast current (Ebb) - Cloudy - Calm

Location I.D.: SAM-6A Time: 0855

Coordinates: 40° 48' 57.29"
124° 10' 46.13"

Core#: Core Length Obtained: Core Length Sampled

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval:

Water Depth	(+/-) Tide		
		M.L.L.W. Sampling Depth	= 37'0
36.75	(+/-) -(-.05)	= M.L.L.W. Mudline Depth	= 36.8
		Core Length	= .2

COMMENTS: Station abanded due to lack of dredgable material - will move to find alternate site. The site sampled last time also is too deep. Suspect prop washed out area.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic.

Captain: R Glen Crew: KK, W.F, M.K

GENERAL OBSERVATIONS: high speed ebb current. Searched around for shallower sediments & came up w/ this location (66m from previous location) Fine sand on top w/ silt turning more silt/clay like below 5cm Brown/grey - darker below - no odor some organics. some shell hash The tide

Location I.D.: Stm-6A (alt.) Time: Grab: 0942 (not used) Grab #1: 0954

#2: 1006

#3: 1009

#4: 1039

#5 1049

Grab coordinates: START 40° 48' 56.61" (KK) 124° 10' 44.18" Finish 40° 48' 56.82" (KK) 124° 10' 44.05"

Grab penetration: #1(5") #2(5") #3(6") #4(6") #5 (6")

Core#: Core Length Obtained: Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: N/A

Water Depth	(+/-)	Tide			
				M.L.L.W. Sampling Depth	= 37.0
35.25	(+/-)	-(-.43)	=	M.L.L.W. Mudline Depth	= 35.68
				Core Length	= 1.32

COMMENTS: Took Grab first to characterize sediment (PSD)
Took 6 grabs for composite sam - Generated sample Humg4sed0009 for discrete sediment chemestry
- Took sediment only from center & away from edges of grab.
- The tide changed direction in the middle of sampling moving us slightly off position

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4-1-94 Vessel: Celtic

Captain: P. Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: Overcast + CALM - strong Flood current

(core #1 - 4.0' pen, 2.33' recovery, kept 2.2')
Medium to coarse grain sand + shell hash. There was a thin layer of silty clay a few inches down from the surface. overall very little silt
No odor

Location I.D.: SAM - 4(D) Time: #1(1217)

Coordinates: 44° 40' 33.58"
124° 10' 55.71"

Core#: _____ Core Length Obtained: 2.33 Core Length Sampled 2.2'

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: _____

Water Depth 35.25 ~~33.5~~	(+/-) Tide (+/-) -(.91)	=	M.L.L.W. Sampling Depth	= 37.0
			M.L.L.W. Mudline Depth	= 34.34
			Core Length	= 2.66

COMMENTS: Decided to scrap this site as part of the composite. We were fooled by the thin layer of silty clay that was found in yesterdays grab.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, W.E, M.K

GENERAL OBSERVATIONS: Overcast + Calm (strong Flood current)
Sand (med to coarse), gravel & large shell hash, very little silt - No odor

Location I.D.: NB-1D Time: 1333

Coordinates: 40° 49' 45.6" N
124° 11' 15.28" W

Grab
~~Core#~~: 1 Core Length Obtained: 8" penetration Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-) Tide			
36 L	(+/-) -(+2.86)	=	M.L.L.W. Sampling Depth	= 37
			M.L.L.W. Mudline Depth	= 35.49
			Core Length	= 1.51

COMMENTS: Took preliminary grab to characterize PSD
Generated sample HUM94SED0012 to be analyzed for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, M.E, W.F.

GENERAL OBSERVATIONS: Overcast calm Flood current.
Med to coarse grain sand w/ small shell hash - very little silt. No odor - A few large shells - no organic debris. Brownish color

Location I.D.: NB-9 Time: 1352

Coordinates: 40° 47' 45.60"
124° 18' 15.28"

Grab
Core#: ~~Core~~ Grab Length Obtained: 8" penetration Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-) Tide		M.L.L.W. Sampling Depth	= 37
~~37.8~~ 38.75	(+/-) -(+3.37)	=	M.L.L.W. Mudline Depth	= 35.38
			Core Length	= 1.62

COMMENTS: Took preliminary grab to characterize PSD
Generated sample Hum945ed0014 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: partly cloudy - calm - strong flood current.
Starfish in sample
Medium to coarse sand - very little silt - some large & small shell hash
No odor - no organic debris - some small gravel

Location I.D.: B-8 Time: 1410

Coordinates: 40° 47' 07.79"
124° 11' 36.94"

Core#: Grab Grab penetrated 6" Core Length Obtained: Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/~~No~~ Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
40.25	(+/-)	-(+3.7)	=	M.L.L.W. Sampling Depth	= 37
				M.L.L.W. Mudline Depth	= 36.55
				Core Length	= .45

COMMENTS: Took preliminary Grab for PSD characterization
Moved site from last years position because the MLLW depth was 49.05'
Generated sample HUM94SED0014 For PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, WF, M.K

GENERAL OBSERVATIONS: partly cloudy & calm
Went to last times position - very edge of channel - might have been slightly to the west of the channel
Fine to medium sand w/small gravel & small shell hash - very little silt. Gray sand - looks clean

Location I.D.: NB-7 Time: 1431

Coordinates: 40° 46' 58.03" 124° 11' 45.41"

Grab 5" penetration

Core#: ~~Core~~ Length Obtained: NA Core Length Sampled NA

Sample: Composite/(Discrete) Core subsampled: Yes/(No) Sub Sample Interval:

Water Depth	(+/-) Tide			
38.6	(+/-) -(4.16)	=	M.L.L.W. Sampling Depth	= 37
			M.L.L.W. Mudline Depth	= 34.4
			Core Length	= 2.6

COMMENTS: Took preliminary grab for PSD ~~only~~ characterization
Generated sample HumGrabPSD015 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4-1-94 Vessel: Celtic

Captain: P. Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: mostly cloudy & calm - strong flow current. Went to site preselected by COE. Position given by R Mattison Mouth of Elk River.
Medium grain sand - large shell hash - brown algae - no odor - gray in color small pebbles

Location I.D.: NB-6 Time: 1502

Coordinates: 40° 46' 39.03" 124° 11' 52.39"

~~Core#~~: Grab Core Length Obtained: Grab penetration ~ 5" Core Length Sampled NA

Sample: Composite/(Discrete) Core subsampled: Yes/(No) Sub Sample Interval: NA

Water Depth	(+/-) Tide		
40.4	(+/-) -(+4.73)	=	M.L.L.W. Sampling Depth = 37
			M.L.L.W. Mudline Depth = 35.72
			Core Length = 1.25

COMMENTS: Took preliminary grab to characterize BD
Generated sample Hum94SED0016 for BD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, W.F, M.K

GENERAL OBSERVATIONS: Mostly cloudy - slight breez - incoming tide. Medium grain sand w/ very little shell hes - small globs of fine mud - NO organics -

1' swell

Location I.D.: NB-5 Time: 1523

Coordinates: 40° 46' 18.43" 124° 12' 21.38"

Core#: Grab Core Length Obtained: Grab penetration: 10" penetration Core Length Sampled NA

Sample: Composite (Discrete) Core subsampled: Yes (No) Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
42.1	(+/-)	-(+5.05)	=	M.L.L.W. Sampling Depth	= 37
			=	M.L.L.W. Mudline Depth	= 37.05
				Core Length	= -05

COMMENTS: At dredge depth
Took Grab to characterize PSD
Generated sample Humayse0017 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: P. Glen Crew: KK, GF, MK

GENERAL OBSERVATIONS: mostly cloudy - 5 knt wind - 1-2' swell
Fine sand & silty mud grabed in a very small shallower area some shell - Fine enough for chem sampling. - grey in color - no odor

Location I.D.: NB-4 Time: ~1555

Coordinates: 40° 46' 07.54"
124° 12' 44.27

Grab Grab penetration: 7"
~~Core#:~~ ~~Core~~ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth (+/-) Tide
~~40.1~~ 41.8 (+/-) -(+5.22) =

M.L.L.W. Sampling Depth = 37.0
M.L.L.W. Mudline Depth = 36.58
Core Length = .42

COMMENTS: moved slightly away from last times position into shallower water
took grab to characterize PSD
Generated sample # HUM94SED0018 for PSD ~~NO GOOD redone~~
may have to redo for chemestry ~~redone~~

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4-1-94 Vessel: Celtic

Captain: Phil Glen Crew: KK, MK, WE

GENERAL OBSERVATIONS: Mostly sunny w/ slight breeze. ~1' swell
Makes fathometer readings difficult - went to position given by R. Mattison from Kerry Guy

medium to coarse sand w/ shell hash - gray in color - very little silt. no organics - no smell

Location I.D.: NB-3 Time: 1620

Coordinates: 40° 45' 46.95" _____

124° 12' 56.80" _____

Grab Grab pen: ~6"

Core#: _____ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-) Tide		M.L.L.W. Sampling Depth	= 37.0
40.05	(+/-) -(+5.61)	=	M.L.L.W. Mudline Depth	= 34.44
			Core Length	= 2.56

COMMENTS: Grabbed to characterize grain size

Generated Sample Hum94SED0019 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: Phil Glen Crew: KK, M.K, W.F

GENERAL OBSERVATIONS: Mostly clear slight breeze - 2-3' swells - very large surf in entrance
clean fine to medium sand w/ small shell hash - no odor - ~~no odor~~ pieces of wood in sample

Location I.D.: NB-2 KK Time: 1647

Coordinates: 40° 45' 10.9" _____

124° 13' 25.13" _____

~~Core#~~: Grab Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		
41.7	(+/-)	-(+5.7)	=	M.L.L.W. Sampling Depth = 37.0
			=	M.L.L.W. Mudline Depth = 36.0
			=	Core Length = 1.0

COMMENTS: Took Grab to characterize grain size
Generated sample Hum94sed0020 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/1/94 Vessel: Celtic

Captain: Phil Glen Crew: KK, MK, WF.

GENERAL OBSERVATIONS: Going back to site for 2nd time to get a grab for a chemestry sample
Fine sand - very little silt. very confusing - we were within a ~~few~~ 10 meters of the last grab but this time there was no fine mud - there was a ~~grab~~ crab in the grab. no odor
Cannot use NB-4 rep 1 for chemestry because the sample was contaminated (handled improperly)

Location I.D.: NB-4 rep 2 Time: 1723

Coordinates: 40° 46' 07.54" ____

124° 12' 44.27" ____

Grabed Grab penetration: ~6"

~~Core#~~: ____ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite (Discrete) Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
42.25	(+/-)	-(+5.7)	=	M.L.L.W. Sampling Depth	= 37
				M.L.L.W. Mudline Depth	= 36.55
				Core Length	= ~.45

COMMENTS: Took Grab for Sediment Chemestry. However, due to grain size it will only be a PSD SAMPLE
*See NB-4 rep 1
Generated sample Hum94SED0021 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/8/94 Vessel: Celtic

Captain: Phil Flenk Crew: KK

GENERAL OBSERVATIONS: Adjacent to last years position first it didn't look right - moved it more towards center of channel - medium to large grain sand with little silt. Large shell has some pepples & wood chips - 1 stone - dark grey - no odor.

NOT USED - WRONG COORDINATES

Location I.D.: EK-1 Time: 0835

Coordinates: 40° 47' 55.79" 124° 11' 13.99"

Core#: Penetration: Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
37.8	(+/-)	-(+2.1)	=	M.L.L.W. Sampling Depth	= EK1
				M.L.L.W. Mudline Depth	= 35.7
				Core Length	= 43.1

.37

COMMENTS: Took Grab to characterize grain size.

Generated Sample Hum94sed0022 for PSD only.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/2/94 Vessel: Celtic

Captain: P. Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: Overcast - slight breeze. Strong ebb current. Fine sand, silt & clay - very little shell hash - slight H_2S smell coarser sand on top 6"

(Core #1 - 4.5' pen., 3.5' recovery, Kept 3.3') (Core #4 - 4.5' pen, 3.9' recov., Kept 3.3)
(Core #2 - 4.0' pen, 2.6 recove, Kept all) (Core #5 - 5' pen, 2.2' recovery, Kept all)
(Core #3 - 4.5' pen, 3.5 recovery, Kept 3.3)

Location I.D.: EK-2 Time: #1 (0925) #2 (0958) #3 (1031) #4 (1105) NO GOOD — #5 (1136) #5 (11:55) ↑ NO GOOD #5 (1204)

Coordinates: 40° 48' 13.36" 124° 10' 48.49"

Core#: _____ Core Length Obtained: 3.5, 2.6, 3.9, 3.9, 2.2 Core Length Sampled 3.9, 2.6, 3.3, 3.3, 2.2

Sample: (Composite/Discrete) Core subsampled: Yes (No) Sub Sample Interval: NA

Water Depth	(+/-) Tide		
25.65	(+/-) -(+.96)	=	M.L.L.W. Sampling Depth = 28.0
			M.L.L.W. Mudline Depth = 24.7
			Core Length = 3.3

COMMENTS: Did prelim grab for grain size then went into coring
Generated sample HUM94SED0023 for EK-2 discrete chemistry analysis
Had problems at this site w/ tubes breaking + sediment washing out.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/2/94 Vessel: Celtic

Captain: R Glen Crew: KK, MK, W.C

GENERAL OBSERVATIONS:
Fine to medium sand w/ small shell hash., brownish to grey, no odor - Small amount of silt. Estimated that fine fraction was less than 80 %

Location I.D.: EK1 (redo) Time: 1348

Coordinates: 40° 47' 57.08" N
124° 11' 05.26" W

~~Core#:~~ GRAB Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval:

Water Depth	(+/-)	Tide			
				M.L.L.W. Sampling Depth	= 37
37.75	(+/-)	-(+1.54)	=	M.L.L.W. Mudline Depth	= 36.81
				Core Length	= 1.19

COMMENTS: Re grabbed for PSD characterization. Changed location per memo from COE

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/2/94 Vessel: Celtic

Captain: Phil Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: Partly foggy & breezy
soft clay & silt w/fine sand throughout - very soft on top 6" - dark grey - slight H_2S odor - occasional small shell hash.

(Core #1 - penetrated 6.5' where we met rejection, recovered 4.75'. Kept it all)
(Core #2 - penetrated 7.0 ft - recovered 5.66 - kept it all)
Core #3 penetrated 7.5 ft - recovered 6.5' Kept 6.1')
(Core #4 penetrated 7.5 ft - recovered 6.0' Kept all but bottom 2")
(Core #5 penetrated 7.5 ft - recovered 7.0' Kept 6.1')

Location I.D.: EK-3 Time: #1(1448) #2(1506) #3(1522) #4(1538) #5(1550)

Coordinates: 40° 48' 17.16"
124° 10' 39.34"

Core#: Core Length Obtained: 4.75, 5.66, 6.5, 6.0, 7.0 Core Length Sampled 4.75, 5.66, 6.1, ~~6.0~~ 5.8, 6.1.

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: N/A

Water Depth	(+/-) Tide		
24.95	(+/-) +3.1	=	M.L.L.W. Sampling Depth = 28
			M.L.L.W. Mudline Depth = 21.85
			Core Length = 6.15

COMMENTS: Went to last times position. appeared to be to close to Channel edge so we moved ~20m closer
Did total of 5 cores - Generated sample # HUM94SE00024 for digest/chemistry

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/2/94 Vessel: Celtic

Captain: Phil Glen Crew: KK, MK, WF

GENERAL OBSERVATIONS: Mostly Cloudy & breezy - Near slack tide soft silty clay - very little sand. No Organics - Very very little shell hash. Slight H2S smell

Location I.D.: EK-4 Time: #1 (1646) #2 (1656) #3 (1703) #4 (1711) #5 (1718)

Coordinates: 40° 48' 20.29" N 124° 10' 19.61" W

Core#: Grabs ~~Core~~ Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA.

Water Depth	(+/-)	Tide			
32.85	(+/-)	-5.04	=	M.L.L.W. Sampling Depth	= 28.0
				M.L.L.W. Mudline Depth	= 27.17
				Core Length	= .83

COMMENTS: Not enough mud for coring so we took 3 grabs to composite w/ the EK sediments - removed ~1/2 gal from each grab to allow equal weighing

Generated sample # Humgy se00025 as a discrete - rest of mud went towards composite

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4-3-94 Vessel: Celtic

Captain: Phil Glen Crew: KK, W.F. M.K

GENERAL OBSERVATIONS: Clear - slight breeze - slack tide - starting to ebb
Soft mud w/fine sand turning to hard pack sand below 2' - grey - no shell hash
no organics
razor clam

(core #1 - 4' pen. - 2.0' recovery - kept all)
(core #2 - 4' pen. - 3.1 recovery - kept 2.1)
(core #3 4' pen 3.0 recovery - kept 2.1)
(core #4 4' pen 2.2' recovery - kept 2.1)
(core #5 - 4' pen 2.5' recov kept 2.1)
(core #6 - 4' pen 2.68' recov kept 2.1)
(core #7 - 4' pen 2.75' recov kept 2.1)
(core #8 - 4' pen 2.0 recov kept all)

Location I.D.: FL-4

Time: #1(0923) #2(0945) #3(0957) #4(1013) #5(1022) #6(1032) #7(1040) #8(1052)

Coordinates: 40° 43' 35.27" N
124° 13' 19.57" W

Core#: ______ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete (Composite circled) Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
31.5	(+/-)	-+5.6	=	M.L.L.W. Sampling Depth	= 28
				M.L.L.W. Mudline Depth	= 25.9
				Core Length	= 2.1

COMMENTS: Took 8 cores for sediment Composite
The vibracore stopped vibrating after the 3rd core. However, we were able to penetrate by dropping it
Generated sample # HUM94SED0033 for discrete chemistry

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/3/94 Vessel: Celtic.

Captain: Phil Glen Crew: V.K, M.K, W.F

GENERAL OBSERVATIONS: Mostly clear - westerly winds 20-25 knts - cool
FL-8: Medium Coarse Sand - no shell hash - clean looking - very little silt no odor
FL-7: Same as FL-8 except more shell hash & little more silt.

Location I.D.: FL-8 & FL7 Time: FL8: 1045 FL7: 1051

Coordinates:
FL-8: 40° ~~52~~ 44' 53.02 N; 124° 13' 16.43 W
FL-7: 40° 44' 32.88 N; 124° 13' 30.36 W

Grab
~~Core#~~: Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/~~No~~ Sub Sample Interval: NA

FL-7 times are given in the ( )

Water Depth (+/-) Tide

28.~~2~~25 (+/-) - +3.1 = M.L.L.W. Sampling Depth = 28
(31.3) - (+2.9)

M.L.L.W. Mudline Depth = 25.15 (28.4)

Core Length = 2.85 (-.4)

COMMENTS: Took initial grab to characterize PSD at both stations
Very hard to stay on position - went coordinates given by ~~COE for~~ last time
Generated Sample # HumSED0027 for PSD only from FL-8
Generated Sample # HWSED0028 for PSD only from FL-7

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/3/94 Vessel: Celtic

Captain: Ph.1 Glen Crew: KK, M.K. W.F.

GENERAL OBSERVATIONS: Mostly Clear ~25 kt winds out of West
Some Silt (Silt fraction less than 80%)

FL6: Medium to coarse sand w/ some shell hash - There was a thin layer of mud 4" down

FL5: Medium to fine grain sand w/ very little shell hash + wood debris. Brown to grey in color - Estimate less than 80% fines - No odor

Location I.D.: RL-6 & RL-5 Time: PL6: ~~HOSE~~ 1105 RL6: 1127

Coordinates: FL-6 { 40° 44' 13.4" / 124° 13' 14.42" } FL-5 { 40° 43' 59.42" / 124° 13' 07.77" }

Core#: Grab Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

FL5 times in ( )

Water Depth	(+/-)	Tide			
				M.L.L.W. Sampling Depth	= 28
32.7 (28.4)	(+/-)	-(+2.52) (-+2.14)	=	M.L.L.W. Mudline Depth	= 30.2 (26.3)
				Core Length	= -1.8 (1.7)

COMMENTS: Took initial grab to characterize PSD at both sites
Very hard to hold position due to wind + current
We were in too deep of water @ FL-6 - however the shallower spots appeared to be out of channel

~~Generated Sample Humsed 0039 for site FL-6 (PSD only)~~
Generated Sample Humgrsed 0030 for site FL-5 (PSD only)

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/3/94 Vessel: Celtic.

Captain: Phil Olen Crew: KK, M.K, WS.

GENERAL OBSERVATIONS: winds out of west @ 25+ knts - strong ebb current
Soft mud w/ fine sand. Grey in color

Location I.D.: FL-4 Time: Grab: 1141

Coordinates: 40° 43' 35.70" } ?
124° 13' 20.01" }
↖ not sure if in channel

~~Core#:~~ Grab Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval:

Water Depth	(+/-)	Tide			
				M.L.L.W. Sampling Depth	= 28.0
28.2	(+/-)	1.78	=	M.L.L.W. Mudline Depth	= 26.4
				Core Length	= 1.6

COMMENTS: Did an initial grab for PSD characterization.

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/3/94 Vessel: Celtic

Captain: Phil Glen Crew: K.K., M.K., W.F.

GENERAL OBSERVATIONS: Verry strong winds (clear)
Soft mud/clay w/ organic debris & eel grass. no odor
Presence of Razor Clams & Polychaetes - little sand but present
Light Brown softer material on top 4" turning grayer & sandier below 4"

Location I.D.: FL-3 Time: Grab #1 (1209) #2 (1224) #3 (1229) #3 (1234 mis fire) #4 (1250) #5 (1257) #6 (1306) #7 (1310) #8 (1330)

Coordinates: 40° 43' ~~54.42~~ 26.59" K.K. N
124° 13' ~~00.77~~ 25.04" W

Core#: Grab Core Length Obtained: NA Core Length Sampled NA

Sample: (Composite)/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		
~~26.6~~ 28.4	(+/-)	-(+1.2)	=	M.L.L.W. Sampling Depth = 28
			=	M.L.L.W. Mudline Depth = 27.2
			=	Core Length = .8

COMMENTS: Took 8 grabs for Sediment + Chemestry
Very hard to anchor up. at very edge of channel - water too deep toward center of channel
Generated sample # HUM94SED0031 for discrete sediment chemestry per K.K.
Left over mud composited w/ ~~EK1, EK2, + EK4~~ → FL1, FL2, + FL4

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/4/94 Vessel: Celtic

Captain: Phil Otey Crew: KK, WF.

GENERAL OBSERVATIONS: Clear Wind out of N.W @ 10 kts. Very soft loose mud - very slightly clay like - Sl. sht H_2S - no shells has. Some green algae, worm tubes, razor clams very little if any sand. light brown on top 2" turning dark grey

Location I.D.: FL-1 Time: #1 (1115) #2 (1125) #3 (1132) #4 (1141) #5 (1147) #6 (1156) #7 (1204) #8 (1214)

Coordinates: 40° 43' 20.10" 124° 13' 24.65"

Core#: ~~Core#~~ Grab Core Length Obtained: NA Core Length Sampled NA

Sample: (Composite)/~~Discrete~~ Core subsampled: ~~Yes~~/~~No~~ Sub Sample Interval: NA

Water Depth	(+/-)	Tide			
31.75	(+/-)	(+3.96)	=	M.L.L.W. Sampling Depth	= 28
			=	M.L.L.W. Mudline Depth	= 27.79
				Core Length	= .21

COMMENTS: On edge of channel to find enough material Did 8 grabs - used the top 3" only

Generated sample # HUM94SED0034 for discrete chemistry

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/4/94 Vessel: Celtic.

Captain: Phil Glen Crew: EK, W.F.

GENERAL OBSERVATIONS: Wind: 10-15 Knts out of N.W - Clear
Very loose brown mud - no shell hash - no sand - Grey + more clay like below 4" - Some green algae - polychaetes

Location I.D.: FL-2 Time: #1(1244) #2(1257) #3(1252) #4(1302)
#5(1310) #6(1317) #7(1330) #8(1341)

Coordinates: 40° 43' 22.53"
424° 13' 18.99"

Core#: _____ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth (+/-) Tide = M.L.L.W. Sampling Depth = 28.0

29.8 (+/-) -(+2.3) = M.L.L.W. Mudline Depth = ~~27.5~~ 26.5

Core Length = 1.5

COMMENTS: Took 8 grabs for FL sediment composite. Went to last times coordinates - would have cored @ this location. However the vibracore stopped working.
Generated sample # Hum94SED0035 for discrete chemistry.

SFCOE MAINTENA... REDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/4/94 Vessel: Celtic

Captain: Phil Glen Crew: KK, W.F.

GENERAL OBSERVATIONS: Winds out of N.W. @ 20 knots - 2-3' swell
Medium to Coarse grain sand w/ some small shell hash
No silt
Grey in color.
No odor

Location I.D.: NB-2 Time: 1410

Coordinates: 40° 45' 29"
124° 14' 19"

Core#: Grab Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/~~Discrete~~ Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		
~~38.5~~ 38.2	(+/-)	+.72	=	M.L.L.W. Sampling Depth = 37
			=	M.L.L.W. Mudline Depth = 37.48
			=	Core Length = -.48

COMMENTS: Took Grab to characterize PSD.
Went to edge of channel to grab
Generated Sample # Humayse10037 for PSD only

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/5/94 Vessel: Sally Kae

Captain: Mike Crew: K.K. W.T

GENERAL OBSERVATIONS: Overcast + - Slight breeze - 5' swell
Fine sand & silt - Thin layer (~1cm) on surface of most grabs. Some mollusks & polychaetes.

Location I.D.: Ref. Time: START: 0846 Finish: 1058

Coordinates: 40° 44' 69"
124° 20 34"

Grabs.

Core#: _____ Core Length Obtained: NA Core Length Sampled NA

Sample: (Composite) Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth (+/-) Tide = M.L.L.W. Sampling Depth = _____

~165 (+/-) _____ = M.L.L.W. Mudline Depth = _____

Core Length = _____

COMMENTS: Took grabs around above coordinates using Loranc.
Took 25 grabs
Generated composite sample# hum94sed0043
Also filled 3 5gal cubitainers w/ water

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

KINNETIC LABORATORIES INCORPORATED

CORE SAMPLING DATA SHEET

Date: 4/5/94 Vessel: Sally Kae

Captain: Mike Crew: KK, Wife

GENERAL OBSERVATIONS: Overcast drizzle (calm) - 5'+ swells
Coarse sand & shell hash. no silt - woo debris

Location I.D.: Bar Time: 1145

Coordinates: 40° 46' 06"
124° 14' 54"

Core#: ~~WA~~ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		
42'	(+/-)	_____	=	M.L.L.W. Sampling Depth = _____
			=	M.L.L.W. Mudline Depth = _____
				Core Length = _____

COMMENTS: Took grab for PSD characterization only
went to coordinates used last time

Looms for NAD

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/5/94 Vessel: Sally Kae

Captain: _____ Crew: KC, ES

GENERAL OBSERVATIONS: 3' swell - cloudy & drizzle

Medium grain sand w/ a verry small amount of small shell hash - brown to grey in color

Location I.D.: ENT 1 Time: 1200 hrs

Coordinates: 40° ~~46'~~ " 45' 20"

124° ~~14' 54"~~ 13' 50"

Core#: N/A Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth (+/-) Tide = M.L.L.W. Sampling Depth = 37

_____ (+/-) _____ = M.L.L.W. Mudline Depth = _____

Core Length = _____

6 fathoms

COMMENTS: Took Grab to characterize PSD only
Went to positions used last time
Generated sample # HUM94SED0045
Loran C for NAV

SFCOE MAINTENANCE DREDGING FY94

HUMBOLDT

CORE SAMPLING DATA SHEET

KINNETIC LABORATORIES INCORPORATED

Date: 4/5/94 Vessel: Sally Kae

Captain: Mike Crew: EK, W.F

GENERAL OBSERVATIONS: Cloudy w/ drizzle · wind 10kts
Medium grain sand w/ small shell trash - very little silt

Location I.D.: ENT2 Time: 1210 ~~1200~~ hrs

Coordinates: 40° 45' 50.6~~8~~" 124° ~~14~~ 14' 18"

Core#: _____ Core Length Obtained: NA Core Length Sampled NA

Sample: Composite/Discrete Core subsampled: Yes/No Sub Sample Interval: NA

Water Depth	(+/-)	Tide		M.L.L.W. Sampling Depth	=
~~8~~ Salts	(+/-)	_____	=	M.L.L.W. Mudline Depth	=
~~8~~ Salts				Core Length	=

COMMENTS: Took grab to characterize PSD only
Generated sample # Hum94SED0042
Loran C for nav

Appendix C

Chemistry Results

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Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Percent Solids
(%)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as percent:

Sample Identification	% Solids
SAM-7D	80
SAM-5D	80
SAM-3D	75
SAM-4D	78
SAM-2D	82
SAM-1D	81
SAM-6C	80
SAM-6B	75
SAM-6A	75
SAM-4(D)	78
SAM-6 Composite	77
EK-1	78
EK-2	76
EK-3	74
EK-4	63
EK Composite	72

Detection Limit = 20 ppm

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Percent Solids
(%)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
DATE COMPLETED:	April 19 & May 9, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as percent:

Sample Identification	% Solids
NB-4 Rep 1	74
FL-8	77
FL-7	76
FL-6	69
FL-5	74
FL-3	70
FL-4	64
FL-1	64
FL-2	56
FL-Composite	65
Reference Composite	73
Home Sediment	81

Detection Limit = 20 ppm

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Sulfides
mg/Kg (ppm)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
DATE COMPLETED:	April 26-27, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Total Sulfides as received	Total Sulfides dry weight	Water Soluble Sulfides as received	Water Soluble Sulfides dry weight
SAM-7D	ND	ND	ND	ND
SAM-5D	ND	ND	ND	ND
SAM-3D	5.2	6.9	ND	ND
SAM-4D	ND	ND	ND	ND
SAM-2D	ND	ND	ND	ND
SAM-1D	ND	ND	ND	ND
SAM-6C	14	18	ND	ND
SAM-6B	45	60	ND	ND
SAM-6A	0.3	0.4	ND	ND
SAM-4(D)	0.6	0.8	ND	ND
SAM-6 Composite	22	29	ND	ND
EK-1	ND	ND	ND	ND
EK-2	150	200	0.3	0.4
EK-3	48	65	ND	ND
EK-4	47	75	ND	ND
EK Composite	76	110	ND	ND
Detection Limit		0.1		0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Sulfides
mg/Kg (ppm)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 26-27 & May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Total Sulfides as received	Total Sulfides dry weight	Water Soluble Sulfides as received	Water Soluble Sulfides dry weight
NB-4 Rep 1	15	20	ND	ND
FL-8	3.2	4.2	ND	ND
FL-7	5.5	7.2	ND	ND
FL-6	69	100	0.5	0.7
FL-5	2.8	3.8	ND	ND
FL-3	34	49	ND	ND
FL-4	29	45	ND	ND
FL-1	11	17	ND	ND
FL-2	26	46	ND	ND
FL-Composite	23	35	0.1	0.2
Reference Composite	0.2	0.3	ND	ND
Home Sediment	0.3	0.4	ND	ND
Detection Limit		0.1		0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Total Organic Carbon (TOC)
(%)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
DATE COMPLETED:	May 9, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as percent:

Sample Identification	TOC as received	TOC dry weight
SAM-7D	ND	ND
SAM-5D	ND	ND
SAM-3D	0.4	0.5
SAM-4D	ND	ND
SAM-2D	ND	ND
SAM-1D	ND	ND
SAM-6C	0.2	0.3
SAM-6B	0.3	0.4
SAM-6A	0.3	0.4
SAM-4(D)	ND	ND
SAM-6 Composite	0.3	0.3
EK-1	ND	ND
EK-2	0.3	0.4
EK-3	0.4	0.5
EK-4	0.7	1.0
EK Composite	0.5	0.7
Detection Limit		0.1

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Total Organic Carbon (TOC)
(%)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
DATE COMPLETED:	May 9, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as percent:

Sample Identification	TOC as received	TOC dry weight
NB-4 Rep 1	0.3	0.5
FL-8	0.08	0.1
FL-7	0.3	0.4
FL-6	0.5	0.7
FL-5	0.3	0.4
FL-3	0.5	0.7
FL-4	0.6	0.9
FL-1	0.6	0.9
FL-2	0.7	1.3
FL-Composite	0.5	0.8
Reference Composite	0.3	0.4
Home Sediment	ND	ND
Detection Limit		0.1

Philip D. Carpenter
Laboratory Director

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Metals
mg/Kg (ppm)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as received:

Element	SAM-7D	SAM-5D	SAM-3D	SAM-4D	SAM-2D	SAM-1D
Arsenic	4.7	5.1	6.2	4.3	3.9	4.4
Cadmium	ND	ND	0.1	ND	ND	ND
Chromium	62	89	85	50	59	53
Copper	4.6	4.8	26	4.1	4.6	4.6
Lead	4.9	4.6	7.8	4.0	3.4	3.7
Mercury	0.02	0.02	0.06	0.02	0.02	0.02
Nickel	33	33	76	33	33	32
Selenium	ND	ND	0.1	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Zinc	25	26	53	23	25	25

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

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Laboratory Director

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Metals
mg/Kg (ppm)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as received:

Element	SAM-6C	SAM-6B	SAM-6A	SAM-4(D)	SAM-6 Composite
Arsenic	4.3	4.3	5.4	5.0	4.4
Cadmium	ND	0.1	0.1	ND	0.1
Chromium	78	72	86	49	79
Copper	7.8	9.1	12	7.2	10
Lead	4.3	4.5	24.9	4.3	4.5
Mercury	0.04	0.04	0.06	0.02	0.04
Nickel	42	46	54	37	48
Selenium	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND
Zinc	30	32	36	27	31

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Metals
mg/Kg (ppm)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as received:

Element	EK-1	EK-2	EK-3	EK-4	mean	EK Composite
Arsenic	3.7	4.2	4.7	4.5	4.5	4.5
Cadmium	ND	ND	ND	0.1	<0.1	0.1
Chromium	54	69	69	75	66.8	70
Copper	4.7	11	11	18	11.2	14
Lead	3.5	5.1	5.9	6.3	5.2	5.5
Mercury	0.02	0.04	0.05	0.05	0.04	0.04
Nickel	37	52	54	66	52	59
Selenium	ND	ND	ND	0.1	<0.1	ND
Silver	ND	ND	ND	ND	<0.1	ND
Zinc	24	36	37	47	36	40

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Metals
mg/Kg (ppm)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as received:

Element	NB-4 Rep 1	FL-8	FL-7	FL-6	FL-5	FL-3
Arsenic	5.0	3.8	4.3	2.5	5.0	4.9
Cadmium	0.1	ND	0.1	0.1	ND	0.1
Chromium	76	68	91	60	65	76
Copper	18	7.1	8.6	8.5	8.5	15
Lead	6.2	4.2	4.3	3.5	3.8	5.5
Mercury	0.05	0.04	0.04	0.05	0.04	0.05
Nickel	67	50	50	43	50	64
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Zinc	43	31	31	28	31	42

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Environmental Chemistry and Bioassay Laboratories
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Metals
mg/Kg (ppm)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as received:

Element	FL-4	FL-1	FL-2	FL Composite	Reference Composite	Home Sediment
Arsenic	5.1	5.2	5.0	4.5	5.3	3.3
Cadmium	0.1	0.1	0.2	0.1	0.1	0.1
Chromium	79	75	68	68	77	23
Copper	18	21	21	18	15	4.5
Lead	5.6	6.1	6.6	5.3	5.4	2.3
Mercury	0.05	0.08	0.06	0.05	0.14	0.02
Nickel	67	71	64	63	71	15
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	0.06	ND	ND	ND
Zinc	45	47	46	43	45	15

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Metals
mg/Kg (ppm)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) on a dry weight basis:

Element	SAM-7D	SAM-5D	SAM-3D	SAM-4D	SAM-2D	SAM-1D
Arsenic	5.9	6.3	8.2	5.5	4.7	5.4
Cadmium	ND	ND	0.2	ND	ND	ND
Chromium	77	110	110	64	72	66
Copper	5.7	6.0	34	5.2	5.6	5.7
Lead	6.1	5.7	10	5.2	4.2	4.6
Mercury	0.02	0.02	0.08	0.02	0.02	0.02
Nickel	41	41	100	43	40	40
Selenium	ND	ND	0.2	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Zinc	31	32	71	30	30	31

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Metals
mg/Kg (ppm)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) on a dry weight basis:

Element	SAM-6C	SAM-6B	SAM-6A	SAM-4(D)	SAM-6 Composite
Arsenic	5.4	5.7	7.2	6.4	5.7
Cadmium	ND	0.1	0.1	ND	0.1
Chromium	98	97	120	63	100
Copper	10	12	16	9.2	12
Lead	5.4	6.0	6.6	5.5	5.8
Mercury	0.05	0.05	0.08	ND	0.05
Nickel	53	62	72	47	62
Selenium	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND
Zinc	38	43	48	35	41

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Metals
mg/Kg (ppm)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) on a dry weight basis:

Element	EK-1	EK-2	EK-3	EK-4	EK Composite
Arsenic	4.7	5.6	6.4	7.2	6.3
Cadmium	ND	ND	ND	0.1	0.2
Chromium	69	91	93	120	97
Copper	6.0	14	15	29	20
Lead	4.5	6.7	7.9	10	7.7
Mercury	0.03	0.05	0.06	0.08	0.06
Nickel	48	69	74	100	81
Selenium	ND	ND	ND	0.2	ND
Silver	ND	ND	ND	ND	ND
Zinc	30	47	50	75	55

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Metals
mg/Kg (ppm)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) on a dry weight basis:

Element	NB-4 Rep 1	FL-8	FL-7	FL-6	FL-5	FL-3
Arsenic	6.7	4.9	5.7	3.7	6.8	6.9
Cadmium	0.1	ND	0.1	0.2	ND	0.1
Chromium	100	88	120	87	88	110
Copper	24	9.3	11	12	11	21
Lead	8.4	5.4	5.7	5.1	5.1	7.9
Mercury	0.06	0.05	ND	0.07	0.05	0.07
Nickel	90	64	65	62	68	92
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Zinc	58	41	40	40	42	60

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Metals
mg/Kg (ppm)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 28 - May 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) on a dry weight basis:

Element	FL-4	FL-1	FL-2	FL Composite	Reference Composite	Home Sediment
Arsenic	8.0	8.1	8.9	7.0	7.3	4.1
Cadmium	0.2	0.2	0.1	0.2	0.1	0.1
Chromium	120	120	120	100	110	28
Copper	29	32	38	28	21	5.6
Lead	8.7	9.5	12	8.1	7.4	2.9
Mercury	0.08	0.13	0.10	0.08	0.20	0.03
Nickel	110	110	110	98	97	19
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	0.1	ND	ND	ND
Zinc	70	74	82	66	62	19

Mercury Detection Limit = 0.02

All other Detection Limits = 0.1

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Oil & Grease
Standard Method 5520C
mg/Kg (ppm)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 25 and May 3, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Oil & Grease as received	Oil & Grease dry weight
SAM-7D	ND	ND
SAM-5D	ND	ND
SAM-3D	ND	ND
SAM-4D	ND	ND
SAM-2D	ND	ND
SAM-1D	ND	ND
SAM-6C	ND	ND
SAM-6B	ND	ND
SAM-6A	ND	ND
SAM-4(D)	ND	ND
SAM-6 Composite	ND	ND
EK-1	ND	ND
EK-2	ND	ND
EK-3	ND	ND
EK-4	ND	ND
EK Composite	ND	ND
Detection Limit	10	20

Philip D. Carpenter
Laboratory Director

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Oil & Grease
Standard Method 5520C
mg/Kg (ppm)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
DATE COMPLETED:	April 25, May 3 & 12, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Oil & Grease as received	Oil & Grease dry weight
NB-4 Rep 1	ND	ND
FL-8	ND	ND
FL-7	ND	ND
FL-6	20	29
FL-5	ND	ND
FL-4	ND	ND
FL-1	ND	ND
FL-2	23	40
FL-Composite	20	31
Reference Composite	ND	ND
Home Sediment	38	46
Detection Limit	10	20

Philip D. Carpenter
Laboratory Director

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Total Petroleum Hydrocarbons
Standard Method 5520F
mg/Kg (ppm)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 25 and May 3, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Total Petroleum Hydrocarbons as received	Total Petroleum Hydrocarbons dry weight
SAM-7D	ND	ND
SAM-5D	ND	ND
SAM-3D	ND	ND
SAM-4D	ND	ND
SAM-2D	ND	ND
SAM-1D	ND	ND
SAM-6C	ND	ND
SAM-6B	ND	ND
SAM-6A	ND	ND
SAM-4(D)	ND	ND
SAM-6 Composite	ND	ND
EK-1	ND	ND
EK-2	ND	ND
EK-3	ND	ND
EK-4	ND	ND
EK Composite	ND	ND
Detection Limit	10	20

Philip D. Carpenter
Laboratory Director

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Total Petroleum Hydrocarbons
Standard Method 5520F
mg/Kg (ppm)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 25, May 3 & 12, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as milligrams per kilogram (parts per million) as indicated:

Sample Identification	Total Petroleum Hydrocarbons as received	Total Petroleum Hydrocarbons dry weight
NB-4 Rep 1	ND	ND
FL-8	ND	ND
FL-7	ND	ND
FL-6	ND	ND
FL-5	ND	ND
FL-4	ND	ND
FL-1	ND	ND
FL-2	ND	ND
FL-Composite	ND	ND
Reference Composite	ND	ND
Home Sediment	30	37
Detection Limit	10	20

Philip D. Carpenter
Laboratory Director

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Organotin Speciation
µg/Kg (ppb)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion) as received:

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
SAM-7D	ND	ND	ND	ND	51
SAM-5D	ND	ND	ND	ND	62
SAM-3D	ND	ND	ND	ND	60
SAM-4D	ND	ND	ND	ND	59
SAM-2D	ND	ND	ND	ND	49
SAM-1D	15	ND	ND	ND	51
SAM-6C	ND	ND	ND	ND	48
SAM-6B	ND	ND	2	ND	46
SAM-6A	ND	ND	ND	ND	51
SAM-4(D)	ND	ND	ND	ND	61
SAM-6 Composite	ND	ND	1	ND	62
EK-1	ND	ND	ND	ND	67
EK-2	ND	ND	ND	ND	60
EK-3	ND	ND	1	ND	60
EK-4	1	ND	2	ND	67
EK Composite	ND	ND	ND	ND	57

TPT Sur = Tripropyltin surrogate recovery

ND = None Detected

Detection Limit = 1 ppb

Philip D. Carpenter
Laboratory Director

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Organotin Speciation
µg/Kg (ppb)
As Received

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 20-21 & May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion) as received:

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
NB-4 Rep 1	ND	ND	ND	ND	57
FL-8	ND	ND	ND	ND	56
FL-7	ND	ND	ND	ND	64
FL-6	ND	ND	ND	ND	60
FL-5	ND	ND	ND	ND	67
FL-3	ND	ND	ND	ND	61
FL-4	ND	ND	1	ND	69
FL-1	ND	ND	ND	ND	67
FL-2	ND	1	1	ND	51
FL-Composite	ND	ND	ND	ND	63
Reference Composite	ND	ND	ND	ND	57
Home Sediment	ND	ND	ND	ND	54

TPT Sur = Tripropyltin surrogate recovery

ND = None Detected

Detection Limit = 1 ppb

Philip D. Carpenter
Laboratory Director

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Organotin Speciation
µg/Kg (ppb)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion) on a dry weight basis:

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
SAM-7D	ND	ND	ND	ND	51
SAM-5D	ND	ND	ND	ND	62
SAM-3D	ND	ND	ND	ND	60
SAM-4D	ND	ND	ND	ND	59
SAM-2D	ND	ND	ND	ND	49
SAM-1D	19	ND	ND	ND	51
SAM-6C	ND	ND	ND	ND	48
SAM-6B	ND	ND	3	ND	46
SAM-6A	ND	ND	ND	ND	51
SAM-4(D)	ND	ND	ND	ND	61
SAM-6 Composite	ND	ND	1	ND	62
EK-1	ND	ND	ND	ND	67
EK-2	ND	ND	ND	ND	60
EK-3	ND	ND	1	ND	60
EK-4	2	ND	3	ND	67
EK Composite	ND	ND	ND	ND	57

TPT Sur = Tripropyltin surrogate recovery

ND = None Detected

Detection Limit = 1 ppb

Philip D. Carpenter
Laboratory Director

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Organotin Speciation
µg/Kg (ppb)
Dry Weight

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
DATE COMPLETED: April 20-21 & May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion) on a dry weight basis:

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
NB-4 Rep 1	ND	ND	ND	ND	57
FL-8	ND	ND	ND	ND	56
FL-7	ND	ND	ND	ND	64
FL-6	ND	ND	ND	ND	60
FL-5	ND	ND	ND	ND	67
FL-3	ND	ND	ND	ND	61
FL-4	ND	ND	2	ND	69
FL-1	ND	ND	ND	ND	67
FL-2	ND	2	2	ND	51
FL-Composite	ND	ND	ND	ND	63
Reference Composite	ND	ND	ND	ND	57
Home Sediment	ND	ND	ND	ND	54

TPT Sur = Tripropyltin surrogate recovery

ND = None Detected

Detection Limit = 1 ppb

Philip D. Carpenter
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 28, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0031 Site ID: FL-3 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	37	20	26	14
Acenaphthylene	ND	20	ND	14
Acenaphthene	ND	20	ND	14
Fluorene	ND	20	ND	14
Phenanthrene	ND	20	ND	14
Anthracene	ND	20	ND	14
Fluoranthene	28	20	20	14
Pyrene	42	25	29	18
Benzo(a)anthracene	ND	20	ND	14
Chrysene	27	20	19	14
Benzo(b)fluoranthene	37	20	26	14
Benzo(k)fluoranthene	ND	20	ND	14
Benzo(a)pyrene	ND	20	ND	14
Indeno(1,2,3-cd)pyrene	ND	20	ND	14
Dibenzo(a,h)anthracene	ND	20	ND	14
Benzo(ghi)perylene	ND	20	ND	14
2-Methylnaphthalene	45	20	31	14
Total phthalates:	180	10	120	7.0
Total PAHs:	220	20	150	14

ND = None Detected

Phillip D. Carpenter
Laboratory Director
DPC

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-27

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 28, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0033 Site ID: FL-4 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	38	20	27	14
Acenaphthylene	ND	20	ND	14
Acenaphthene	ND	20	ND	14
Fluorene	ND	20	ND	14
Phenanthrene	ND	100*	ND	70*
Anthracene	ND	20	ND	14
Fluoranthene	33	20	23	14
Pyrene	38	25	27	18
Benzo(a)anthracene	ND	20	ND	14
Chrysene	ND	20	ND	14
Benzo(b)fluoranthene	39	20	27	14
Benzo(k)fluoranthene	ND	20	ND	14
Benzo(a)pyrene	ND	20	ND	14
Indeno(1,2,3-cd)pyrene	ND	20	ND	14
Dibenzo(a,h)anthracene	ND	20	ND	14
Benzo(ghi)perylene	ND	20	ND	14
2-Methylnaphthalene	66	20	46	14
Total phthalates:	240	10	170	7.0
Total PAHs:	210	20	150	14

ND = None Detected

* Detection Limit raised due to matrix interference.

Philip D. Carpenter / DBC
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 28, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0034 Site ID: FL-1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	42	20	27	13
Acenaphthylene	ND	20	ND	13
Acenaphthene	ND	20	ND	13
Fluorene	ND	20	ND	13
Phenanthrene	ND	100*	ND	64*
Anthracene	ND	20	ND	13
Fluoranthene	45	20	29	13
Pyrene	56	25	36	16
Benzo(a)anthracene	ND	20	ND	13
Chrysene	41	20	26	13
Benzo(b)fluoranthene	ND	20	ND	13
Benzo(k)fluoranthene	ND	20	ND	13
Benzo(a)pyrene	ND	20	ND	13
Indeno(1,2,3-cd)pyrene	ND	20	ND	13
Dibenzo(a,h)anthracene	ND	20	ND	13
Benzo(ghi)perylene	ND	20	ND	13
2-Methylnaphthalene	89	20	57	13
Total phthalates:	170	10	110	6.4
Total PAHs:	270	20	180	13

ND = None Detected

* Detection limit raised due to matrix interference.

Philip D Carpenter
Laboratory Director
DBC

ToxScan, Inc.
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 28, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0035 Site ID: FL-2 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	52	20	33	13
Acenaphthylene	ND	20	ND	13
Acenaphthene	ND	20	ND	13
Fluorene	ND	20	ND	13
Phenanthrene	120	20	79	13
Anthracene	ND	20	ND	13
Fluoranthene	48	20	31	13
Pyrene	110	25	68	16
Benzo(a)anthracene	ND	20	ND	13
Chrysene	46	20	29	13
Benzo(b)fluoranthene	55	20	36	13
Benzo(k)fluoranthene	ND	20	ND	13
Benzo(a)pyrene	40	20	26	13
Indeno(1,2,3-cd)pyrene	ND	20	ND	13
Dibenzo(a,h)anthracene	ND	20	ND	13
Benzo(ghi)perylene	ND	20	ND	13
2-Methylnaphthalene	100	20	64	13
Total phthalates:	210	10	140	6.4
Total PAHs:	570	20	370	13

ND = None Detected

Philip D. Carpenter /DBL
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 28, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0036 Site ID: FL-Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	43	20	28	13
Acenaphthylene	ND	20	ND	13
Acenaphthene	ND	20	ND	13
Fluorene	ND	20	ND	13
Phenanthrene	ND	20	ND	13
Anthracene	ND	20	ND	13
Fluoranthene	42	20	27	13
Pyrene	ND	25	ND	16
Benzo(a)anthracene	ND	20	ND	13
Chrysene	ND	20	ND	13
Benzo(b)fluoranthene	ND	20	ND	13
Benzo(k)fluoranthene	ND	20	ND	13
Benzo(a)pyrene	ND	20	ND	13
Indeno(1,2,3-cd)pyrene	ND	20	ND	13
Dibenzo(a,h)anthracene	ND	20	ND	13
Benzo(ghi)perylene	ND	20	ND	13
2-Methylnaphthalene	78	20	51	13
Total phthalates:	170	10	110	6.4
Total PAHs:	160	20	110	13

ND = None Detected

Philip D. Carpenter/DBL
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	April 29, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0001 Site ID: SAM-7D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	110	10	80	8.0
Total PAHs:	ND	20	ND	16

ND = None Detected

Philip D. Carpenter/DBC
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: April 29, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0002 Site ID: SAM-5D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	110	10	87	8.0
Total PAHs:	ND	20	ND	16

ND = None Detected

Philip D. Carpenter/DBC
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: April 29, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0003 Site ID: SAM-4D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	46	20	36	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	79	20	61	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	35	25	27	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	31	20	25	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	58	20	45	16
Total phthalates:	180	10	140	7.8
Total PAHs:	250	20	190	16

ND = None Detected

Philip D. Carpenter DBC
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	April 29, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0004 Site ID: SAM-3D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	29	25	22	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	180	10	140	7.5
Total PAHs:	29	20	22	15

ND = None Detected

Philip D. Carpenter/DBL
Laboratory Director

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Tel: 408/724-4522 FAX: 408/724-3188

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: April 29, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0005 Site ID: SAM-2D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	39	20	32	16
Pyrene	85	25	70	21
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	210	10	180	8.2
Total PAHs:	120	20	100	16

ND = None Detected

Philip D. Carpenter/DBL
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ToxScan, Inc.
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Tel: 408/724-4522 FAX: 408/724-3188

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: April 29, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0006 Site ID: SAM-1D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	21	20	17	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	130	10	100	8.1
Total PAHs:	21	20	17	16

ND = None Detected

Laboratory Director

JBC

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	April 29, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0007 Site ID: SAM-6C Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	29	25	23	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	140	10	110	8.0
Total PAHs:	29	20	23	16

ND = None Detected

Phillip D. Carpenter/DBC
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	April 29, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0008 Site ID: SAM-6B Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	78	20	58	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	39	20	29	15
Pyrene	56	25	42	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	160	10	120	7.5
Total PAHs:	170	20	130	15

ND = None Detected

Philip D. Carpenter/DBL
Laboratory Director

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-39

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 29, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0028 Site ID: FL-7 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	84	20	64	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	70	20	54	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	31	25	23	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	38	20	29	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	59	20	45	15
Total phthalates:	250	10	190	7.6
Total PAHs:	280	20	220	15

ND = None Detected

Phillip D. Carpenter/DPL
Laboratory Director

ToxScan, Inc.
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0009 Site ID: SAM-6A Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	30	25	23	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	170	10	130	7.5
Total PAHs:	30	20	23	15

ND = None Detected

Philip D. Carpenter/DDL
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-41

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0010 Site ID: SAM-4(D) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	170	10	130	7.8
Total PAHs:	ND	20	ND	16

ND = None Detected

Philip D. Carpenter / DBL
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0011 Site ID: SAM-6 Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	43	20	33	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	49	20	38	15
Anthracene	ND	20	ND	15
Fluoranthene	30	20	23	15
Pyrene	36	25	28	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	160	10	120	8.0
Total PAHs:	160	20	120	15

ND = None Detected

Philip D. Campeau/DBC
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 30, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0022 Site ID: EK-1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	ND	20	ND	16
Anthracene	ND	20	ND	16
Fluoranthene	ND	20	ND	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	280	10	220	7.8
Total PAHs:	ND	20	ND	16

ND = None Detected

Philip D. Garpeth / DBC
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0023 Site ID: EK-2 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	29	20	22	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	56	20	43	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	100*	ND	76*
Pyrene	71	25	54	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	34	20	26	15
Benzo(b)fluoranthene	69	20	52	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	180	10	140	7.6
Total PAHs:	260	20	200	15

ND = None Detected

* Detection Limit raised due to matrix interference.

Phillip D. Carpenter
Laboratory Director DBC

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0024 Site ID: EK-3 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	54	20	40	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	59	20	44	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	42	25	31	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	28	20	21	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	44	20	32	15
Total phthalates:	180	10	130	7.4
Total PAHs:	230	20	170	16

ND = None Detected

Philip D. Carpenter/DBC
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0025 Site ID: EK-4 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	69	20	43	13
Acenaphthylene	ND	20	ND	13
Acenaphthene	ND	20	ND	13
Fluorene	53	20	33	13
Phenanthrene	160	20	100	13
Anthracene	ND	20	ND	13
Fluoranthene	71	20	45	13
Pyrene	92	25	58	16
Benzo(a)anthracene	ND	20	ND	13
Chrysene	54	20	34	13
Benzo(b)fluoranthene	58	20	37	13
Benzo(k)fluoranthene	ND	20	ND	13
Benzo(a)pyrene	41	20	26	13
Indeno(1,2,3-cd)pyrene	ND	20	ND	13
Dibenzo(a,h)anthracene	ND	20	ND	13
Benzo(ghi)perylene	ND	20	ND	13
2-Methylnaphthalene	76	20	48	13
Total phthalates:	200	10	130	6.3
Total PAHs:	670	20	420	13

ND = None Detected

Philip D. Carpenter/JBC
Laboratory Director

ToxScan, Inc.
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 30, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0026 Site ID: EK-Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	37	20	28	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	39	20	30	15
Pyrene	47	25	36	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	41	20	31	15
Total phthalates:	160	10	120	8.0
Total PAHs:	160	20	130	15

ND = None Detected

Philip D. Carpenter
Laboratory Director

DBL

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0027 Site ID: FL-8 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	34	20	26	15
Pyrene	33	25	25	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	20	20	16	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	ND	20	ND	15
Total phthalates:	190	10	140	7.7
Total PAHs:	90	20	70	15

ND = None Detected

Laboratory Director

DBC

ToxScan, Inc.
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Tel: 408/724-4522 FAX: 408/724-3188

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 14, 1994
DATE COMPLETED:	April 30, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0029 Site ID: FL-6 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	33	20	23	14
Acenaphthylene	ND	20	ND	14
Acenaphthene	ND	20	ND	14
Fluorene	ND	20	ND	14
Phenanthrene	ND	20	ND	14
Anthracene	ND	20	ND	14
Fluoranthene	47	20	32	14
Pyrene	52	25	36	17
Benzo(a)anthracene	ND	20	ND	14
Chrysene	ND	20	ND	14
Benzo(b)fluoranthene	ND	20	ND	14
Benzo(k)fluoranthene	ND	20	ND	14
Benzo(a)pyrene	ND	20	ND	14
Indeno(1,2,3-cd)pyrene	ND	20	ND	14
Dibenzo(a,h)anthracene	ND	20	ND	14
Benzo(ghi)perylene	ND	20	ND	14
2-Methylnaphthalene	38	20	26	14
Total phthalates:	190	10	130	6.9
Total PAHs:	170	20	120	14

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 14, 1994
DATE COMPLETED: April 30, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0030 Site ID: FL-5 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	28	20	21	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	ND	20	ND	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	ND	25	ND	19
Benzo(a)anthracene	ND	20	ND	15
Chrysene	33	20	25	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	42	20	31	15
Total phthalates:	130	10	99	7.4
Total PAHs:	100	20	80	15

ND = None Detected

Philip D. Carpenter
Laboratory Director

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-51

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	May 1, 1994
DATE COMPLETED:	May 6, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0042 Site ID: REF COMPOSITE Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	58	20	42	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	ND	25	ND	18
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	40	20	29	15
Total phthalates:	1200	10	910	7.0
Total PAHs:	100	20	70	15

ND = None Detected

Philip D. Carpenter
Laboratory Director

DBL

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-52

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: May 5, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Site ID: HOME SED Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	16
Acenaphthylene	ND	20	ND	16
Acenaphthene	ND	20	ND	16
Fluorene	ND	20	ND	16
Phenanthrene	25	20	21	16
Anthracene	ND	20	ND	16
Fluoranthene	24	20	20	16
Pyrene	ND	25	ND	20
Benzo(a)anthracene	ND	20	ND	16
Chrysene	ND	20	ND	16
Benzo(b)fluoranthene	ND	20	ND	16
Benzo(k)fluoranthene	ND	20	ND	16
Benzo(a)pyrene	ND	20	ND	16
Indeno(1,2,3-cd)pyrene	ND	20	ND	16
Dibenzo(a,h)anthracene	ND	20	ND	16
Benzo(ghi)perylene	ND	20	ND	16
2-Methylnaphthalene	ND	20	ND	16
Total phthalates:	96	10	77	8.1
Total PAHs:	50	20	40	16

ND = None Detected

Philip D. Carpenter
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Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	June 21, 1994
DATE COMPLETED:	June 23, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0018 Site ID: NB-4 Rep 1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Naphthalene	ND	20	ND	15
Acenaphthylene	ND	20	ND	15
Acenaphthene	ND	20	ND	15
Fluorene	ND	20	ND	15
Phenanthrene	34	20	25	15
Anthracene	ND	20	ND	15
Fluoranthene	ND	20	ND	15
Pyrene	ND	20	ND	15
Benzo(a)anthracene	ND	20	ND	15
Chrysene	ND	20	ND	15
Benzo(b)fluoranthene	ND	20	ND	15
Benzo(k)fluoranthene	ND	20	ND	15
Benzo(a)pyrene	ND	20	ND	15
Indeno(1,2,3-cd)pyrene	ND	20	ND	15
Dibenzo(a,h)anthracene	ND	20	ND	15
Benzo(ghi)perylene	ND	20	ND	15
2-Methylnaphthalene	27	20	20	15
Total phthalates:	230	10	170	7.4
Total PAHs:	60	20	50	15

ND = None Detected

Philip D. Carpenter
Laboratory Director

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0001 Site ID: SAM-7D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
Laboratory Director

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0002 Site ID: SAM-5D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	May 20-21, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0003 Site ID: SAM-4D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.8
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.8
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0004 Site ID: SAM-3D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	May 20-21, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0005 Site ID: SAM-2D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.2
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.2
Toxaphene	ND	30	ND	25
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip R. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0006 Site ID: SAM-1D Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.1
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.1
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 20-21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0007 Site ID: SAM-6C Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 13, 1994
DATE COMPLETED:	May 20-21, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0008 Site ID: SAM-6B Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpente
Laboratory Director

ToxScan, Inc.
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Tel: 408/724-4522 FAX: 408/724-3188

Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0009 Site ID: SAM-6A Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpenter
Laboratory Director

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0010 Site ID: SAM-4(D) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.8
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.8
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 9, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0011 Site ID: SAM-6 Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.7
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.7
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0022 Site ID: EK1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.8
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.8
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 15, 1994
DATE COMPLETED:	May 10, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0023 Site ID: EK-2 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0024 Site ID: EK-3 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0025 Site ID: EK-4 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.8
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.8
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
Laboratory Director

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Environmental Chemistry and Bioassay Laboratories
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0026 Site ID: EK-Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpenter
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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-70

Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0027 Site ID: FL-8 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.2
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.2
Toxaphene	ND	30	ND	25
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 10, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0028 Site ID: FL-7 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.1
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.1
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0029 Site ID: FL-6 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0030 Site ID: FL-5 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpenter
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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 15, 1994
DATE COMPLETED:	May 19, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0031 Site ID: FL-3 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

Philip D. Carpenter
Laboratory Director

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0033 Site ID: FL-4 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0034 Site ID: FL-1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.8
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.8
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0035 Site ID: FL-2 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.5
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	7.5
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	7.5
Toxaphene	ND	30	ND	23
PCBs:				
PCB 1242	ND	20	ND	15
PCB 1248	ND	20	ND	15
PCB 1254	ND	20	ND	15
PCB 1260	ND	20	ND	15
TOTAL PCBs	ND	20	ND	15

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 15, 1994
DATE COMPLETED: May 19, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0036 Site ID: FL-Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.2
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.2
Toxaphene	ND	30	ND	25
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL:	Sediment samples received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
EXTRACTION DATE:	April 15, 1994
DATE COMPLETED:	May 19, 1994
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0042 Site ID: REF-Comp. Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.1
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.1
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-80

Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: April 13, 1994
DATE COMPLETED: May 21, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Site ID: HOME-SED Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.1
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.1
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-81

Chlorinated Pesticides
EPA Method 8080
µg/Kg (ppb)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
EXTRACTION DATE: June 21, 1994
DATE COMPLETED: June 23, 1994
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per kilogram (parts per billion):

Sample ID: HUM94SED0018 Site ID: NB-4 Rep 1 Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit	Wet Wt. Sample Value	Wet Wt. Detection Limit
Aldrin	ND	0.5	ND	0.4
alpha-BHC	ND	1.0	ND	0.8
beta-BHC	ND	1.0	ND	0.8
delta-BHC	ND	1.0	ND	0.8
gamma-BHC (lindane)	ND	1.0	ND	0.8
alpha-Chlordane	ND	1.0	ND	0.8
gamma-Chlordane	ND	1.0	ND	0.8
4,4'-DDD	ND	1.0	ND	0.8
4,4'-DDE	ND	1.0	ND	0.8
4,4'-DDT	ND	1.0	ND	0.8
Dieldrin	ND	0.5	ND	0.4
Endosulfan I	ND	2.0	ND	1.6
Endosulfan II	ND	0.5	ND	0.4
Endosulfan sulfate	ND	10	ND	8.0
Endrin	ND	0.5	ND	0.4
Heptachlor	ND	0.5	ND	0.4
Heptachlor epoxide	ND	10	ND	8.0
Toxaphene	ND	30	ND	24
PCBs:				
PCB 1242	ND	20	ND	16
PCB 1248	ND	20	ND	16
PCB 1254	ND	20	ND	16
PCB 1260	ND	20	ND	16
TOTAL PCBs	ND	20	ND	16

ND = None detected

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Particle Size
Plumb, 1981
(%)
SAM-7D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.20	0.8	0.8
1	1-0.5	0.30	1.2	2.0
2	0.5-0.25	12.95	52.1	54.1
3	0.25-0.125	10.80	43.4	97.5
4	0.125-0.062	0.17	0.7	98.2
5	0.062-0.031	0.04	0.2	98.4
6	0.031-0.016	0.03	0.1	98.5
7	0.016-0.008	0.00	0.0	98.5
8	0.008-0.004	0.09	0.4	98.9
9	0.004-0.002	0.01	0.0	98.9
>9	< 0.002	0.28	1.1	100.0

total wt	coarse wt	fine wt
24.9	24.4	0.4
% sand	% silt	% clay
98.23	0.65	1.14

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-83

Particle Size
Plumb, 1981
(%)
SAM-5D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.13	0.5	0.5
1	1-0.5	1.52	5.9	6.4
2	0.5-0.25	18.60	72.5	78.9
3	0.25-0.125	5.05	19.7	98.6
4	0.125-0.062	0.11	0.4	99.0
5	0.062-0.031	0.04	0.1	99.2
6	0.031-0.016	0.00	0.0	99.2
7	0.016-0.008	0.00	0.0	99.2
8	0.008-0.004	0.03	0.1	99.3
9	0.004-0.002	0.00	0.0	99.3
>9	< 0.002	0.19	0.8	100.0

total wt	coarse wt	fine wt
25.7	25.4	0.2
% sand	% silt	% clay
99.05	0.25	0.79

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Particle Size
Plumb, 1981
(%)
SAM-3D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.09	0.4	0.4
1	1-0.5	0.57	2.6	3.0
2	0.5-0.25	6.41	29.4	32.4
3	0.25-0.125	5.12	23.4	55.8
4	0.125-0.062	0.61	2.8	58.6
5	0.062-0.031	1.89	8.6	67.3
6	0.031-0.016	1.75	8.0	75.2
7	0.016-0.008	1.20	5.5	80.7
8	0.008-0.004	1.05	4.8	85.5
9	0.004-0.002	0.75	3.4	89.0
>9	< 0.002	2.41	11.0	100.0

total wt	coarse wt	fine wt
21.8	12.8	9.0
% sand	% silt	% clay
58.62	26.91	14.47

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Particle Size
Plumb, 1981
(%)
SAM-4D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.13	0.5	0.5
1	1-0.5	0.22	0.9	1.4
2	0.5-0.25	11.12	45.7	47.2
3	0.25-0.125	12.10	49.8	97.0
4	0.125-0.062	0.11	0.5	97.4
5	0.062-0.031	0.19	0.8	98.2
6	0.031-0.016	0.14	0.6	98.8
7	0.016-0.008	0.00	0.0	98.8
8	0.008-0.004	0.03	0.1	98.9
9	0.004-0.002	0.00	0.0	98.9
>9	< 0.002	0.28	1.2	100.0

total wt	coarse wt	fine wt
24.3	23.7	0.6
% sand	% silt	% clay
97.41	1.52	1.18

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Particle Size
Plumb, 1981
(%)
SAM-2D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	1.59	6.5	6.5
1	1-0.5	3.67	15.1	21.7
2	0.5-0.25	15.73	64.8	86.4
3	0.25-0.125	3.02	12.4	98.9
4	0.125-0.062	0.02	0.1	99.0
5	0.062-0.031	0.01	0.0	99.0
6	0.031-0.016	0.00	0.0	99.0
7	0.016-0.008	0.03	0.1	99.1
8	0.008-0.004	0.01	0.0	99.2
9	0.004-0.002	0.00	0.0	99.2
>9	< 0.002	0.21	0.9	100.0

total wt	coarse wt	fine wt
24.3	24.0	0.3
% sand	% silt	% clay
98.97	0.20	0.90

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-87

Particle Size
Plumb, 1981
(%)
SAM-1D

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.23	1.1	1.1
1	1-0.5	0.39	1.8	2.9
2	0.5-0.25	1.20	5.6	8.5
3	0.25-0.125	18.44	86.3	94.9
4	0.125-0.062	0.80	3.7	98.6
5	0.062-0.031	0.00	0.0	98.6
6	0.031-0.016	0.00	0.0	98.6
7	0.016-0.008	0.05	0.3	98.9
8	0.008-0.004	0.03	0.2	99.1
9	0.004-0.002	0.00	0.0	99.1
>9	< 0.002	0.23	1.5	100.0

total wt	coarse wt	fine wt
21.4	21.1	0.3
% sand	% silt	% clay
98.60	0.49	1.47

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-88

Particle Size
Plumb, 1981
(%)
SAM-6C

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.02	0.1	0.1
1	1-0.5	0.10	0.5	0.6
2	0.5-0.25	0.71	3.3	3.8
3	0.25-0.125	16.33	74.9	78.8
4	0.125-0.062	1.56	7.2	85.9
5	0.062-0.031	0.63	2.9	88.8
6	0.031-0.016	0.50	2.3	91.1
7	0.016-0.008	0.46	2.1	93.2
8	0.008-0.004	0.40	1.8	95.0
9	0.004-0.002	0.22	1.0	96.0
>9	< 0.002	0.88	4.0	100.0

total wt	coarse wt	fine wt
21.8	18.7	3.1
% sand	% silt	% clay
85.91	9.06	5.03

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-89

Particle Size
Plumb, 1981
(%)
SAM-6B

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.52	1.9	1.9
1	1-0.5	2.10	7.6	9.5
2	0.5-0.25	12.23	44.2	53.7
3	0.25-0.125	8.28	29.9	83.6
4	0.125-0.062	0.14	0.5	84.1
5	0.062-0.031	0.92	3.3	87.4
6	0.031-0.016	0.74	2.7	90.1
7	0.016-0.008	0.69	2.5	92.6
8	0.008-0.004	0.51	1.8	94.4
9	0.004-0.002	0.31	1.1	95.5
>9	< 0.002	1.25	4.5	100.0

total wt	coarse wt	fine wt
27.7	23.3	4.4
% sand	% silt	% clay
84.11	10.28	5.60

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Particle Size
Plumb, 1981
(%)
SAM-6A

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.16	0.8	0.8
1	1-0.5	0.32	1.5	2.3
2	0.5-0.25	2.40	11.4	13.7
3	0.25-0.125	10.07	48.0	61.7
4	0.125-0.062	1.73	8.2	69.9
5	0.062-0.031	2.08	9.9	79.8
6	0.031-0.016	1.06	5.0	84.9
7	0.016-0.008	0.77	3.7	88.5
8	0.008-0.004	0.58	2.7	91.3
9	0.004-0.002	0.35	1.6	92.9
>9	< 0.002	1.49	7.1	100.0

total wt	coarse wt	fine wt
21.0	14.7	6.3
% sand	% silt	% clay
69.92	21.36	8.72

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Particle Size
Plumb, 1981
(%)
SAM-4(D)

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.55	2.0	2.0
1	1-0.5	5.42	20.0	22.1
2	0.5-0.25	14.86	55.0	77.0
3	0.25-0.125	4.79	17.7	94.8
4	0.125-0.062	0.13	0.5	95.2
5	0.062-0.031	0.40	1.5	96.7
6	0.031-0.016	0.22	0.8	97.5
7	0.016-0.008	0.13	0.5	98.0
8	0.008-0.004	0.12	0.4	98.4
9	0.004-0.002	0.06	0.2	98.6
>9	< 0.002	0.37	1.4	100.0

total wt	coarse wt	fine wt
27.0	25.8	1.3
% sand	% silt	% clay
95.25	3.18	1.57

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Particle Size
Plumb, 1981
(%)
SAM-6 Composite

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.18	0.8	0.8
1	1-0.5	0.28	1.2	2.0
2	0.5-0.25	2.87	12.4	14.4
3	0.25-0.125	14.29	61.9	76.4
4	0.125-0.062	1.05	4.6	80.9
5	0.062-0.031	1.01	4.4	85.3
6	0.031-0.016	0.83	3.6	88.9
7	0.016-0.008	0.61	2.6	91.5
8	0.008-0.004	0.41	1.8	93.3
9	0.004-0.002	0.32	1.4	94.6
>9	< 0.002	1.24	5.4	100.0

total wt	coarse wt	fine wt
23.1	18.7	4.4
% sand	% silt	% clay
80.91	12.35	6.74

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-93

Particle Size
Plumb, 1981
(%)
EK-1

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.31	1.3	1.3
1	1-0.5	0.75	3.2	4.5
2	0.5-0.25	14.00	60.1	64.6
3	0.25-0.125	7.46	32.0	96.7
4	0.125-0.062	0.22	0.9	97.6
5	0.062-0.031	0.09	0.4	98.0
6	0.031-0.016	0.06	0.3	98.2
7	0.016-0.008	0.10	0.4	98.6
8	0.008-0.004	0.04	0.2	98.8
9	0.004-0.002	0.00	0.0	98.8
>9	< 0.002	0.28	1.2	100.0

total wt	coarse wt	fine wt
23.3	22.7	0.6
% sand	% silt	% clay
97.60	1.22	1.18

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Particle Size
Plumb, 1981
(%)
EK-2

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.04	0.2	0.2
1	1-0.5	0.20	0.9	1.1
2	0.5-0.25	4.18	18.5	19.5
3	0.25-0.125	11.84	52.3	71.8
4	0.125-0.062	1.32	5.8	77.6
5	0.062-0.031	1.00	4.4	82.0
6	0.031-0.016	0.86	3.8	85.8
7	0.016-0.008	0.69	3.0	88.9
8	0.008-0.004	0.57	2.5	91.4
9	0.004-0.002	0.41	1.8	93.2
>9	< 0.002	1.55	6.8	100.0

total wt	coarse wt	fine wt
22.6	17.6	5.1
% sand	% silt	% clay
77.63	13.73	8.63

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Particle Size
Plumb, 1981
(%)
EK-3

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.05	0.2	0.2
1	1-0.5	0.20	0.9	1.1
2	0.5-0.25	3.21	13.9	15.0
3	0.25-0.125	12.18	52.7	67.7
4	0.125-0.062	1.41	6.1	73.8
5	0.062-0.031	0.95	4.1	77.9
6	0.031-0.016	1.93	8.4	86.2
7	0.016-0.008	0.38	1.6	87.9
8	0.008-0.004	1.14	4.9	92.8
9	0.004-0.002	0.03	0.1	92.9
>9	< 0.002	1.64	7.1	100.0

total wt	coarse wt	fine wt
23.1	17.1	6.1
% sand	% silt	% clay
73.78	19.02	7.20

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Particle Size
Plumb, 1981
(%)
EK-4

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.02	0.1	0.1
1	1-0.5	0.10	0.6	0.7
2	0.5-0.25	0.37	2.1	2.8
3	0.25-0.125	2.06	11.6	14.4
4	0.125-0.062	3.24	18.3	32.7
5	0.062-0.031	2.67	15.1	47.8
6	0.031-0.016	2.60	14.7	62.5
7	0.016-0.008	2.06	11.6	74.2
8	0.008-0.004	0.58	3.3	77.4
9	0.004-0.002	1.36	7.7	85.1
>9	< 0.002	2.64	14.9	100.0

total wt	coarse wt	fine wt
17.7	5.8	11.9
% sand	% silt	% clay
32.74	44.70	22.56

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Particle Size
Plumb, 1981
(%)
EK Composite

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.06	0.3	0.3
1	1-0.5	0.14	0.6	0.9
2	0.5-0.25	2.52	11.1	12.0
3	0.25-0.125	8.85	39.1	51.1
4	0.125-0.062	2.25	9.9	61.1
5	0.062-0.031	1.97	8.7	69.8
6	0.031-0.016	1.95	8.6	78.4
7	0.016-0.008	1.28	5.7	84.0
8	0.008-0.004	0.74	3.3	87.3
9	0.004-0.002	0.72	3.2	90.5
>9	< 0.002	2.16	9.5	100.0

total wt	coarse wt	fine wt
22.6	13.8	8.8
% sand	% silt	% clay
61.07	26.25	12.68

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Particle Size
Plumb, 1981
(%)
NB-4 Rep 1

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.33	1.4	1.4
1	1-0.5	1.30	5.6	7.0
2	0.5-0.25	6.82	29.4	36.4
3	0.25-0.125	4.76	20.5	56.9
4	0.125-0.062	1.05	4.5	61.4
5	0.062-0.031	2.37	10.2	71.7
6	0.031-0.016	1.90	8.2	79.8
7	0.016-0.008	1.30	5.6	85.4
8	0.008-0.004	0.86	3.7	89.1
9	0.004-0.002	0.66	2.8	91.9
>9	< 0.002	1.88	8.1	100.0

total wt	coarse wt	fine wt
23.2	14.3	9.0
% sand	% silt	% clay
61.44	27.64	10.92

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Particle Size
Plumb, 1981
(%)
FL-8

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.01	0.0	0.0
1	1-0.5	0.03	0.1	0.2
2	0.5-0.25	7.09	29.4	29.6
3	0.25-0.125	15.91	66.0	95.6
4	0.125-0.062	0.48	2.0	97.6
5	0.062-0.031	0.18	0.8	98.4
6	0.031-0.016	0.00	0.0	98.4
7	0.016-0.008	0.10	0.4	98.9
8	0.008-0.004	0.00	0.0	98.9
9	0.004-0.002	0.05	0.2	99.0
>9	< 0.002	0.25	1.1	100.0

total wt	coarse wt	fine wt
24.1	23.5	0.6
% sand	% silt	% clay
97.63	1.22	1.30

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Particle Size
Plumb, 1981
(%)
FL-7

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.19	0.8	0.8
1	1-0.5	0.16	0.7	1.5
2	0.5-0.25	5.20	21.6	23.0
3	0.25-0.125	11.76	48.7	71.8
4	0.125-0.062	1.08	4.5	76.2
5	0.062-0.031	1.17	4.8	81.1
6	0.031-0.016	1.26	5.2	86.3
7	0.016-0.008	0.82	3.4	89.7
8	0.008-0.004	0.67	2.8	92.4
9	0.004-0.002	0.45	1.8	94.3
>9	< 0.002	1.38	5.7	100.0

total wt	coarse wt	fine wt
24.1	18.4	5.7
% sand	% silt	% clay
76.23	16.21	7.56

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-101

Particle Size
Plumb, 1981
(%)
FL-6

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.35	1.7	1.7
1	1-0.5	1.65	7.9	9.6
2	0.5-0.25	5.54	26.6	36.2
3	0.25-0.125	8.64	41.5	77.7
4	0.125-0.062	1.66	8.0	85.7
5	0.062-0.031	0.76	3.6	89.3
6	0.031-0.016	0.34	1.6	90.9
7	0.016-0.008	0.61	2.9	93.9
8	0.008-0.004	0.25	1.2	95.1
9	0.004-0.002	0.24	1.1	96.2
>9	< 0.002	0.79	3.8	100.0

total wt	coarse wt	fine wt
20.8	17.8	3.0
% sand	% silt	% clay
85.69	9.39	4.92

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Particle Size
Plumb, 1981
(%)
FL-5

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.05	0.2	0.2
1	1-0.5	0.11	0.5	0.7
2	0.5-0.25	3.35	15.3	16.0
3	0.25-0.125	13.89	63.5	79.5
4	0.125-0.062	0.84	3.8	83.4
5	0.062-0.031	0.97	4.4	87.8
6	0.031-0.016	0.28	1.3	89.1
7	0.016-0.008	0.78	3.5	92.6
8	0.008-0.004	0.38	1.7	94.3
9	0.004-0.002	0.33	1.5	95.8
>9	< 0.002	0.92	4.2	100.0

total wt	coarse wt	fine wt
21.9	18.2	3.6
% sand	% silt	% clay
83.36	10.97	5.67

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-103

Particle Size
Plumb, 1981
(%)
FL-3

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.09	0.5	0.5
1	1-0.5	0.11	0.6	1.0
2	0.5-0.25	0.52	2.6	3.6
3	0.25-0.125	8.07	40.6	44.2
4	0.125-0.062	3.61	18.2	62.4
5	0.062-0.031	2.45	12.3	74.7
6	0.031-0.016	0.72	3.6	78.3
7	0.016-0.008	1.21	6.1	84.4
8	0.008-0.004	0.74	3.7	88.1
9	0.004-0.002	0.50	2.5	90.7
>9	< 0.002	1.86	9.3	100.0

total wt	coarse wt	fine wt
19.9	12.4	7.5
% sand	% silt	% clay
62.41	25.74	11.85

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-104

Particle Size
Plumb, 1981
(%)
FL-4

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.04	0.2	0.2
1	1-0.5	0.10	0.5	0.8
2	0.5-0.25	0.57	3.1	3.8
3	0.25-0.125	4.01	21.7	25.5
4	0.125-0.062	3.21	17.4	42.9
5	0.062-0.031	2.54	13.7	56.6
6	0.031-0.016	1.79	9.7	66.3
7	0.016-0.008	1.94	10.5	76.8
8	0.008-0.004	1.10	5.9	82.7
9	0.004-0.002	0.76	4.1	86.8
>9	< 0.002	2.45	13.2	100.0

total wt	coarse wt	fine wt
18.5	7.9	10.6
% sand	% silt	% clay
42.90	39.79	17.31

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-105

Particle Size
Plumb, 1981
(%)
FL-1

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.05	0.3	0.3
1	1-0.5	0.07	0.4	0.6
2	0.5-0.25	0.20	1.1	1.7
3	0.25-0.125	2.24	12.0	13.7
4	0.125-0.062	3.18	17.0	30.7
5	0.062-0.031	3.36	17.9	48.6
6	0.031-0.016	2.33	12.4	61.0
7	0.016-0.008	2.03	10.8	71.8
8	0.008-0.004	1.16	6.2	78.0
9	0.004-0.002	1.16	6.2	84.2
>9	< 0.002	2.96	15.8	100.0

total wt	coarse wt	fine wt
18.7	5.7	13.0
% sand	% silt	% clay
30.65	47.37	21.98

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-106

Particle Size
Plumb, 1981
(%)
FL-2

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.09	0.6	0.6
1	1-0.5	0.09	0.6	1.1
2	0.5-0.25	0.08	0.5	1.7
3	0.25-0.125	0.16	1.0	2.7
4	0.125-0.062	0.85	5.4	8.1
5	0.062-0.031	3.22	20.5	28.6
6	0.031-0.016	2.44	15.5	44.2
7	0.016-0.008	2.42	15.4	59.6
8	0.008-0.004	1.72	11.0	70.6
9	0.004-0.002	1.11	7.1	77.7
>9	< 0.002	3.50	22.3	100.0

total wt	coarse wt	fine wt
15.7	1.3	14.4
% sand	% silt	% clay
8.11	62.50	29.40

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-107

Particle Size
Plumb, 1981
(%)
FL-Composite

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.04	0.2	0.2
1	1-0.5	0.08	0.4	0.7
2	0.5-0.25	0.33	1.8	2.4
3	0.25-0.125	4.21	22.9	25.4
4	0.125-0.062	2.98	16.2	41.6
5	0.062-0.031	2.86	15.5	57.1
6	0.031-0.016	1.87	10.2	67.3
7	0.016-0.008	1.46	7.9	75.3
8	0.008-0.004	1.05	5.7	80.9
9	0.004-0.002	0.86	4.7	85.6
>9	< 0.002	2.64	14.4	100.0

total wt	coarse wt	fine wt
18.4	7.6	10.7
% sand	% silt	% clay
41.59	39.36	19.05

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-108

Particle Size
Plumb, 1981
(%)
Reference Composite

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.00	0.0	0.0
1	1-0.5	0.03	0.1	0.1
2	0.5-0.25	0.06	0.3	0.4
3	0.25-0.125	1.43	6.4	6.8
4	0.125-0.062	11.67	52.5	59.3
5	0.062-0.031	3.78	17.0	76.3
6	0.031-0.016	1.98	8.9	85.2
7	0.016-0.008	1.14	5.1	90.3
8	0.008-0.004	0.62	2.8	93.1
9	0.004-0.002	0.36	1.6	94.7
>9	< 0.002	1.18	5.3	100.0

total wt	coarse wt	fine wt
22.2	13.2	9.1
% sand	% silt	% clay
59.29	33.78	6.92

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-109

Particle Size
Plumb, 1981
(%)
Home Sediment

MATERIAL: Sediment samples received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.02	0.1	0.1
1	1-0.5	0.32	1.0	1.0
2	0.5-0.25	15.98	47.9	48.9
3	0.25-0.125	15.88	47.6	96.6
4	0.125-0.062	0.44	1.3	97.9
5	0.062-0.031	0.12	0.4	98.3
6	0.031-0.016	0.00	0.0	98.3
7	0.016-0.008	0.16	0.6	98.9
8	0.008-0.004	0.08	0.3	99.1
9	0.004-0.002	0.06	0.2	99.3
>9	< 0.002	0.30	1.1	100.0

total wt	coarse wt	fine wt
33.4	32.6	0.7
% sand	% silt	% clay
97.87	1.27	1.27

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-110

Particle Size
Plumb, 1981
(%)
NB-10

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	4.97	18.7	18.7
-1	4- 2	4.69	17.6	36.3
0	2- 1	2.12	8.0	44.3
1	1-0.5	2.95	11.1	55.4
2	0.5-0.25	7.99	30.1	85.5
3	0.25-0.125	3.02	11.4	96.8
4	0.125-0.062	0.19	0.7	97.6
5	0.062-0.031	0.12	0.4	98.0
6	0.031-0.016	0.08	0.3	98.3
7	0.016-0.008	0.07	0.2	98.5
8	0.008-0.004	0.04	0.1	98.7
9	0.004-0.002	0.05	0.2	98.9
>9	< 0.002	0.31	1.1	100.0
		total wt	coarse wt	fine wt
		26.6	25.9	0.7
		% sand	% silt	% clay
		78.86	1.11	1.34

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-111

Particle Size
Plumb, 1981
(%)
NB-9

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.52	1.9	1.9
-1	4- 2	3.26	12.1	14.0
0	2- 1	4.86	18.0	32.0
1	1-0.5	9.57	35.5	67.5
2	0.5-0.25	8.17	30.3	97.8
3	0.25-0.125	0.55	2.0	99.9
4	0.125-0.062	0.04	0.1	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
27.0	27.0	0.0
% sand	% silt	% clay
98.07	0.00	0.00

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-112

Particle Size
Plumb, 1981
(%)
NB-8

MATERIAL:	Sediment sample received April 4-6, 1994
IDENTIFICATION:	Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER:	T-10774
REPORT:	Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	2.70	10.8	10.8
-1	4- 2	5.00	20.0	30.8
0	2- 1	3.16	12.7	43.5
1	1-0.5	3.58	14.3	57.8
2	0.5-0.25	6.67	26.7	84.5
3	0.25-0.125	2.18	8.7	93.3
4	0.125-0.062	0.19	0.8	94.0
5	0.062-0.031	0.28	1.1	95.1
6	0.031-0.016	0.30	1.2	96.3
7	0.016-0.008	0.23	0.9	97.2
8	0.008-0.004	0.15	0.6	97.8
9	0.004-0.002	0.13	0.5	98.3
>9	< 0.002	0.43	1.7	100.0
		total wt	coarse wt	fine wt
		25.0	23.5	1.5
		% sand	% silt	% clay
		83.20	3.76	2.22

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-113

Particle Size
Plumb, 1981
(%)
NB-7

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	3.30	12.4	12.4
-1	4- 2	1.54	5.8	18.2
0	2- 1	0.97	3.7	21.9
1	1-0.5	2.03	7.7	29.6
2	0.5-0.25	12.85	48.4	78.0
3	0.25-0.125	5.26	19.8	97.8
4	0.125-0.062	0.09	0.3	98.2
5	0.062-0.031	0.10	0.4	98.5
6	0.031-0.016	0.06	0.2	98.7
7	0.016-0.008	0.06	0.2	98.9
8	0.008-0.004	0.03	0.1	99.1
9	0.004-0.002	0.01	0.0	99.1
>9	< 0.002	0.24	0.9	100.0
		total wt	coarse wt	fine wt
		26.5	26.0	0.5
		% sand	% silt	% clay
		85.71	0.90	0.94

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-114

Particle Size
Plumb, 1981
(%)
NB-6

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	3.74	14.9	14.9
-1	4- 2	3.23	12.9	27.8
0	2- 1	1.15	4.6	32.4
1	1-0.5	1.27	5.1	37.5
2	0.5-0.25	7.50	29.9	67.4
3	0.25-0.125	7.05	28.1	95.5
4	0.125-0.062	0.62	2.5	98.0
5	0.062-0.031	0.11	0.4	98.4
6	0.031-0.016	0.08	0.3	98.7
7	0.016-0.008	0.07	0.3	99.0
8	0.008-0.004	0.01	0.0	99.0
9	0.004-0.002	0.02	0.1	99.1
>9	< 0.002	0.24	0.9	100.0

total wt	coarse wt	fine wt
25.1	24.6	0.5
% sand	% silt	% clay
83.05	1.04	1.00

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-115

Particle Size
Plumb, 1981
(%)
NB-5

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.86	3.7	3.7
-1	4- 2	0.61	2.6	6.2
0	2- 1	1.48	6.3	12.5
1	1-0.5	8.07	34.3	46.8
2	0.5-0.25	10.81	45.9	92.7
3	0.25-0.125	1.66	7.0	99.7
4	0.125-0.062	0.07	0.3	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
23.6	23.6	0.0
% sand	% silt	% clay
96.35	0.00	0.00

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San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-116

Particle Size
Plumb, 1981
(%)
NB-3

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.53	2.3	2.3
-1	4- 2	0.33	1.4	3.7
0	2- 1	1.67	7.3	11.0
1	1-0.5	6.58	28.6	39.6
2	0.5-0.25	12.09	52.5	92.1
3	0.25-0.125	1.81	7.9	99.9
4	0.125-0.062	0.02	0.1	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
23.0	23.0	0.0
% sand	% silt	% clay
97.70	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-117

Particle Size
Plumb, 1981
(%)
NB-1

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.03	0.1	0.1
0	2- 1	0.06	0.2	0.4
1	1-0.5	0.31	1.2	1.6
2	0.5-0.25	17.24	68.3	69.8
3	0.25-0.125	7.48	29.6	99.4
4	0.125-0.062	0.14	0.6	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
25.3	25.3	0.0
% sand	% silt	% clay
100.00	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-118

Particle Size
Plumb, 1981
(%)
NB 4 Rep 2

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.06	0.3	0.3
0	2- 1	0.16	0.7	0.9
1	1-0.5	1.02	4.4	5.3
2	0.5-0.25	11.93	51.1	56.4
3	0.25-0.125	9.84	42.2	98.6
4	0.125-0.062	0.33	1.4	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
23.3	23.3	0.0
% sand	% silt	% clay
100.00	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-119

Particle Size
Plumb, 1981
(%)
NB-2

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.12	0.5	0.5
-1	4- 2	2.21	8.5	8.9
0	2- 1	0.99	3.8	12.7
1	1-0.5	2.27	8.7	21.4
2	0.5-0.25	17.95	68.7	90.1
3	0.25-0.125	2.56	9.8	99.9
4	0.125-0.062	0.02	0.1	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
26.1	26.1	0.0
% sand	% silt	% clay
99.54	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-120

Particle Size
Plumb, 1981
(%)
BAR

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.19	0.8	0.8
-1	4- 2	0.41	1.6	2.4
0	2- 1	1.78	7.1	9.4
1	1-0.5	6.84	27.1	36.6
2	0.5-0.25	11.63	46.1	82.7
3	0.25-0.125	4.34	17.2	99.9
4	0.125-0.062	0.02	0.1	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
25.2	25.2	0.0
% sand	% silt	% clay
99.25	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-121

Particle Size
Plumb, 1981
(%)
ENT 2

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.09	0.4	0.4
-1	4- 2	0.38	1.6	2.0
0	2- 1	1.32	5.6	7.5
1	1-0.5	4.78	20.1	27.7
2	0.5-0.25	15.43	65.0	92.7
3	0.25-0.125	1.73	7.3	100.0
4	0.125-0.062	0.00	0.0	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
23.7	23.7	0.0
% sand	% silt	% clay
99.62	0.00	0.00

Philip D. Carpenter
Laboratory Director

ToxScan, Inc.
Environmental Chemistry and Bioassay Laboratories
Tel: 408/724-4522 FAX: 408/724-3188

San Francisco Army Corps of Engineers
Humboldt Maintenance Dredge Sediments
T-10774
C-122

Particle Size
Plumb, 1981
(%)
ENT 1

MATERIAL: Sediment sample received April 4-6, 1994
IDENTIFICATION: Humboldt Maintenance Dredge Sediments
TOXSCAN NUMBER: T-10774
REPORT: Quantitative chemical analysis is as follows:

SIZE INTERVAL Phi	mm	INTERVAL WT	INTERVAL %	CUMULATIVE %
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.00	0.0	0.0
-1	4- 2	0.00	0.0	0.0
0	2- 1	0.04	0.2	0.2
1	1-0.5	0.12	0.5	0.7
2	0.5-0.25	10.88	46.6	47.3
3	0.25-0.125	12.18	52.2	99.5
4	0.125-0.062	0.11	0.5	100.0
5	0.062-0.031	0.00	0.0	100.0
6	0.031-0.016	0.00	0.0	100.0
7	0.016-0.008	0.00	0.0	100.0
8	0.008-0.004	0.00	0.0	100.0
9	0.004-0.002	0.00	0.0	100.0
>9	< 0.002	0.00	0.0	100.0

total wt	coarse wt	fine wt
23.3	23.3	0.0
% sand	% silt	% clay
100.00	0.00	0.00

Philip D. Carpenter
Laboratory Director

Appendix C-1

Dioxin Analyses Results
(Alta Analytical Laboratory, Inc.)

Please note: The composite sample labels in this appendix are equivalent to the composite sample labels referenced in other sections and appendices of this report, as follows:

EK COMPOSITE = EKUP

SAM6 COMPOSITE = SAMTB

FL COMPOSITE = FLTB

REFERENCE COMPOSITE = REF

ALTA

April 21, 1994

Alta Batch I.D.: 13353

Ms. Mary Lou Milazzo
Toxscan, Inc.
42 Hanger Way
Watsonville, CA 95076

Dear Ms. Milazzo,

Enclosed are the results for the four sediment samples received at Alta Analytical Laboratory on April 8, 1994. This work was authorized under your Purchase Order #09680. The samples were analyzed using EPA Method 8290 for 2,3,7,8-TCDD and 2,3,7,8-TCDF. Routine turnaround time was requested for this work.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix. The Appendix contains a copy of the chain-of-custody, a list of data qualifiers and abbreviations and copies of the raw data (if requested).

If you have any questions regarding this report please feel free to contact me.

Sincerely,

William J. Luksemburg
Director of HRMS Services

Alta Analytical Laboratory Inc.
5070 Robert J. Mathews Parkway
El Dorado Hills, CA 95762
FAX (916) 933-0940
(916) 933-1640

ALTA

Section I. Sample Inventory

Date Received: 8-Apr-94

Alta Lab ID.	Client ID.
13353-1-SA	T-10774-32 SAM 6 COMPOSITE
13353-2-SA	T-10774-33 REFERENCE COMPOSITE
13353-3-SA	T-10774-34 FL COMPOSITE
13353-4-SA	T-10774-35 EK COMPOSITE

ALTA

TCDD & TCDF
EPA METHOD 8290

LCS RESULTS
Lab ID: 13353-LCS1/LCS2
Matrix: Sediment

Date Received: NA
Date Extracted: 4/4/94
Sample Amount: 10.00 g

ICAL ID: I551
QC Lot: LC0404S
Units: NA

Compound	LCS1 % R	LCS2 % R	RPD %
2,3,7,8-TCDD	95	97	2.1
2,3,7,8-TCDF	92	88	4.4

Isotopic Recovery Results

Internal Standard:	LCS1 % R	LCS2 % R
^{13}C-2,3,7,8-TCDD	87	96
^{13}C-2,3,7,8-TCDF	87	95
Clean-up Recovery Standard:		
^{37}Cl-2,3,7,8-TCDD	96	98

Dates Analyzed:

DB-5: 4/5/94

Analyst: _____

Reviewer: _____

SECTION II.

ALTA

TCDD & TCDF
EPA METHOD 8290

METHOD BLANK
Lab ID: 13353-001-MB
Matrix: Sediment

Date Received: NA
Date Extracted: 4/12/94
Sample Amount: 10.00 g

ICAL ID: I551
QC Lot: LC0404S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.26			
Total TCDD	ND	0.26			
2,3,7,8-TCDF	ND	0.047			
Total TCDF	ND	0.047			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	95	0.78	
^{13}C-2,3,7,8-TCDF	95	0.83	

Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	101	NA	

Dates Analyzed:

DB-5: 4/15/94 **DB-225:** NA

Analyst: [signature]

Reviewer: [signature]

ALTA

TCDD & TCDF
EPA METHOD 8290

Sample ID: T-10774-32
Lab ID: 13353-001-SA
Matrix: Sediment
% Solid: 67

Date Received: 4/8/94
Date Extracted: 4/12/94
Sample Amount: 10.18 g

ICAL ID: I551
QC Lot: LC0404S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.25			
Total TCDD	ND	0.25			
2,3,7,8-TCDF	0.51		0.86	>10:1	
Total TCDF	0.94		0.81	>10:1	

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	95	0.78	
^{13}C-2,3,7,8-TCDF	100	0.83	
Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	99	NA	

Dates Analyzed:

DB-5: 4/15/94
DB-225: 4/20/94

Analyst: 6M

Reviewer: M

ALTA

TCDD & TCDF
EPA METHOD 8290

Sample ID: T-10774-33
Lab ID: 13353-002-SA
Matrix: Sediment
% Solid: 77

Date Received: 4/8/94
Date Extracted: 4/12/94
Sample Amount: 10.10 g

ICAL ID: I551
QC Lot: LC0404S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.22			
Total TCDD	ND	0.22			
2,3,7,8-TCDF	ND	0.13			
Total TCDF	ND	0.13			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	96	0.79	
^{13}C-2,3,7,8-TCDF	97	0.83	

Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	97	NA	

Dates Analyzed:

DB-5: 4/15/94

DB-225: NA

Analyst: BH

Reviewer: BJ

ALTA

TCDD & TCDF
EPA METHOD 8290

Sample ID: T-10774-34
Lab ID: 13353-003-SA
Matrix: Sediment
% Solid: 67

Date Received: 4/8/94
Date Extracted: 4/12/94
Sample Amount: 10.13 g

ICAL ID: I551
QC Lot: LC0404S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.33			
Total TCDD	ND	0.33			
2,3,7,8-TCDF	ND	0.44			
Total TCDF	ND	0.44			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	89	0.77	
^{13}C-2,3,7,8-TCDF	97	0.81	
Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	95	NA	

Dates Analyzed:

DB-5: 4/15/94
DB-225: 4/20/94

Analyst: BAJ

Reviewer: A

ALTA

TCDD & TCDF
EPA METHOD 8290

Sample ID: T-10774-35
Lab ID: 13353-004-SA
Matrix: Sediment
% Solid: 76

Date Received: 4/8/94
Date Extracted: 4/12/94
Sample Amount: 10.20 g

ICAL ID: I551
QC Lot: LC0404S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.30			
Total TCDD	ND	0.30			
2,3,7,8-TCDF	ND	0.45			
Total TCDF	ND	0.45			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	94	0.78	
^{13}C-2,3,7,8-TCDF	99	0.83	

Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	95	NA	

Dates Analyzed:

DB-5: 4/15/94 **DB-225:** 4/20/94

Analyst: _____ Reviewer: _____

APPENDIX

ALTA

DATA QUALIFIERS & ABBREVIATIONS

A	**The amount detected is below the Method Calibration Limit.**
B	**This compound was also detected in the blank.**
C	**The amount detected is less than five times the Method Quantitation Limit.**
D	**The amount reported is the maximum possible concentration.**
E	**The detection limit was raised above the Method Quantitation Limit due to chemical interferences.**
F	**This result has been confirmed on a DB-225 column.**
G	**This result has been confirmed on a SP-2331 column.**
H	**The signal-to-noise ratio is greater than 10:1.**
I	**Chemical Interference**
Conc.	**Concentration**
D.L.	**Detection Limit**
NA	**Not applicable**
S/N	**Signal-to-noise**
*	**See Cover Letter**
ND	**Not Detected**
MPC	**Maximum Possible Concentration**

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

COMPANY NAME: ToxScan Inc.
ATTN: Mary Lou Milazzo
ADDRESS:
PHONE: 408 / 724-4522
FAX: 408 / 724-3188
PROJECT NAME: Humboldt Harbor
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:
DL = 1 part per trillion
TAT = 3 weeks (by 29 April '94)
QC = 1 LCS, 1 blank

SEND INVOICE TO:
P.O. / CONTRACT NO: 09680

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sampling Date	Sampling Time	Sample Matrix	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	ANALYSIS(ES) REQUESTED: TCDD/TCDF only by EPA 8290 — CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-32	SAM 6 Composite	04/01/94		sediment		wide glass jar	1L	1	X	
T-10774-33	Reference Composite	04/05/94		↓		↓	↓	1	X	
T-10774-34	FL Composite	04/04/94		↓		↓	↓	1	X	
T-10774-35	EK Composite	04/02/94		↓		↓	↓	1	X	

SAMPLER'S SIGNATURE AND PRINTED NAME:

Sub contract Laboratory: Alta Analytical 916-933-1640

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
Mary Lou Milazzo via UPS Red Label	ALTA Ken FOTT 4-8-94 1100	04/07/94	16:05

F:\WP51\DATALOGS\COC.MLM\March 15, 1994

Please return completed copy of COC to ToxScan. Thankyou.

ALTA Analytical Laboratory

Batch ID: 13353

Sample Log-In Checklist		Yes	No
1.	Samples Arrived by: UPS Red		
2.	Airbill Present? Number 011315765516	X	
3.	Shipping Container is Intact?	X	
4.	Custody Seals Present? Number _____		X
	If yes, are they intact? N/A		
5.	Sample Containers Intact?	X	
6.	Shipping Preservation: Ice/(Blue Ice)/None		
7.	Temperature: 18°C		
8.	Chain of Custody Present?	X	
9.	Discrepancies in Chain of Custody?		X
10.	Packing Retained?	X	

Name: _____ Date Rcv'd: 4-8-04

Comments:

ALTA

May 11, 1994

Alta Batch I.D.: 13413

Ms. Mary Lou Milazzo
ToxScan Inc.
42 Hanger Way
Watsonville, CA 95076

Dear Ms. Milazzo,

Enclosed are the results for the one sediment sample received at Alta Analytical Laboratory on April 29, 1994. The work was authorized under your Purchase Order #09723. These samples were analyzed using EPA Method 8290 for 2,3,7,8-TCDD and 2,3,7,8-TCDF. Routine turnaround time was provided for these samples.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix. The Appendix contains a copy of the chain-of-custody, a list of data qualifiers and abbreviations and copies of the raw data (if requested).

If you have any questions regarding this report please feel free to contact me.

Sincerely,

William J. Luksemburg
Director of HRMS Services

Alta Analytical Laboratory Inc.
5070 Robert J. Mathews Parkway
El Dorado Hills, CA 95762
FAX (916) 933-0940
(916) 933-1640

ALTA

Section I. Sample Inventory

Date Received: 29-Apr-94

Alta Lab ID.	Client ID.
13413-1-SA	T-10774-89 CONTROL SEDIMENT

ALTA

TCDD & TCDF
EPA METHOD 8290

LCS RESULTS
Lab ID: 13413-LCS1/LCS2
Matrix: Sediment

Date Received: NA
Date Extracted: 5/6/94
Sample Amount: 10.00 g

ICAL ID: I551
QC Lot: LC0506S
Units: NA

Compound	LCS1 % R	LCS2 % R	RPD %
2,3,7,8-TCDD	101	106	4.8
2,3,7,8-TCDF	95	117	21

Isotopic Recovery Results

Internal Standard:	LCS1 % R	LCS2 % R
^{13}C-2,3,7,8-TCDD	87	107
$_{13}$C-2,3,7,8-TCDF	83	96
Clean-up Recovery Standard:		
^{37}Cl-2,3,7,8-TCDD	93	118

Dates Analyzed:

DB-5: 5/10/94

Analyst: _____

Reviewer: _____

SECTION II.

ALTA

TCDD & TCDF
EPA METHOD 8290

METHOD BLANK
Lab ID: 13413-001-MB
Matrix: Sediment

Date Received: NA
Date Extracted: 5/6/94
Sample Amount: 10.00 g

ICAL ID: I551
QC Lot: LC0506S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.14			
Total TCDD	ND	0.14			
2,3,7,8-TCDF	ND	0.17			
Total TCDF	ND	0.17			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	109	0.83	
^{13}C-2,3,7,8-TCDF	52	0.83	

Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	114	NA	

Dates Analyzed:

DB-5: 5/9/94 **DB-225:** NA

Analyst: LMJ

Reviewer: JP

ALTA

TCDD & TCDF
EPA METHOD 8290

Sample ID: T-10774-89
Lab ID: 13413-001-SA
Matrix: Sediment
% Solid: 82

Date Received: 4/29/94
Date Extracted: 5/6/94
Sample Amount: 10.06 g

ICAL ID: I551
QC Lot: LC0506S
Units: pg/g

Compound	Conc.	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8-TCDD	ND	0.25			
Total TCDD	ND	0.25			
2,3,7,8-TCDF	ND	0.20			
Total TCDF	ND	0.20			

Isotopic Recovery Results

Internal Standard:	% R	Ratio	Qualifier
^{13}C-2,3,7,8-TCDD	103	0.83	
^{13}C-2,3,7,8-TCDF	114	0.86	

Clean-up Recovery Standard:			
^{37}Cl-2,3,7,8-TCDD	102	NA	

Dates Analyzed:

DB-5: 5/10/94
DB-225: NA

Analyst: BRy

Reviewer: [illegible]

APPENDIX

DATA QUALIFIERS & ABBREVIATIONS

ALTA

A	**The amount detected is below the Method Calibration Limit.**
B	**This compound was also detected in the blank.**
C	**The amount detected is less than five times the Method Quantitation Limit.**
D	**The amount reported is the maximum possible concentration.**
E	**The detection limit was raised above the Method Quantitation Limit due to chemical interferences.**
F	**This result has been confirmed on a DB-225 column.**
G	**This result has been confirmed on a SP-2331 column.**
H	**The signal-to-noise ratio is greater than 10:1.**
I	**Chemical Interference**
Conc.	**Concentration**
D.L.	**Detection Limit**
NA	**Not applicable**
S/N	**Signal-to-noise**
*****	**See Cover Letter**
ND	**Not Detected**
MPC	**Maximum Possible Concentration**

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT Sub-Contract C.O.C.

COMPANY NAME: Toxscan Inc.
ATTN: Mary Lou Milazzo
ADDRESS: 42 Hangar Way
Watsonville Ca 95076
PHONE: (408) 724-4522
FAX:
PROJECT NAME: Humboldt C.O.E.
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:
DL = 1 part per trillion
TAT = 3 weeks 05/20/94
QC = 1 LCS, 1 blank.

SEND INVOICE TO:
P.O. / CONTRACT NO: 09723.

ANALYSIS(ES) REQUESTED

TCDD/TCDF only by EPA 8250

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-82	Control Sediment	04/25/94	/	Sediment	On Blue Ice	G/S	1L	1	X	

SAMPLER'S SIGNATURE AND PRINTED NAME:

Via UPS Next Day 04/28/94

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
M. Lou Milazzo Michael DeMenz	Ken Fiatt ALTA	4-29-94	1100

ALTA Analytical Laboratory

Batch ID: 13413

Sample Log-In Checklist	Yes	No
1. Date Samples Arrived: 4-29-94 Initials: RAF		
2. Samples Arrived By: (circle one) Airborne Express Federal Express (UPS) Emery Freezer Truck Company Courier Other _____		
3. Shipping Documentation Present? (circle one) Shipping Label (Airbill) Tracking Number 025154901 12	X	
4. Shipping Container(s) Intact? If no, describe condition below.	X	
5. Custody Seals Present and Intact? If not intact, describe condition below. No. of Seals _____ or Seal No. _____ Type:(circle) Bottle or Container		X
6. Sample Container Intact? If no, indicate sample condition below.	X	
7. Shipping Preservation: (circle one) Ice (Blue Ice) Dry Ice None Temp(°C) 17		
8. Chain of Custody (COC) or other Sample Documentation Present?	X	
9. COC/Documentation Acceptable? If no, complete COC Anomaly Form.	X	
10. Shipping Container: (circle one each) ALTA or (Client) / (Return) or Retain		
11. Container and/or Bottles Requested?		X
*12. Drinking Water Sample? If yes, Acceptable Preservation? (circle) Y or N		X

*Required for HRMS

Name: _____ Date Samples Reconciled: _____
(Signature Required for LCMS Only)

Comments:

Appendix D

QA/QC Data Plan and Report

QA/QC PLAN AND REPORT

1.0 Field Survey Procedures

Sediment samples were collected from prescribed locations in Humboldt Harbor by use of a vibra-core and Smith-Macintyre grab. The vibra-core consists of a vibrating aluminum head and a ten foot long aluminum core tube. The core tube is capped with a stainless steel cutting tip and a stainless steel core catcher. The vibra-core is lowered slowly into the sediment; the vibration allows entry into the sediment from the mudline to the sample depth. If a sample was not obtained on the first attempt, core attempts were repeated until a sample was secured. The Smith-Macintyre grab consists of a set of spring-loaded galvanized steel jaws, triggered by impact with the sediment surface.

The water sample used to prepare elutriates for bioassays was collected from the disposal site using a peristaltic pump with silicon and teflon hoses which had been precleaned with soap and nitric acid, and thoroughly rinsed with deionized (DI) water.

Horizontal positioning was accomplished by use of a Trimble Global Positioning System (GPS). Water depth was measured by use of a precision Fathometer, calibrated daily according to manufacture specification. Tidal height was extrapolated from tide tables.

Sediment samples were composited in a precleaned teflon-lined container. Samples for chemical analysis were placed into pre-cleaned glass jars and sealed with teflon-lined lids. Bioassay samples were placed into one-gallon, pre-cleaned polyethylene jars with poly screw closures. Immediately after collection and compositing, samples were stored in insulated coolers with ice. Upon arrival at the ToxScan laboratory in Watsonville, CA, sediments were stored in the 4°C room until analyzed. Holding times for chemical analysis are detailed below. None were exceeded during this study.

All sampling data are documented in the field log sheets included in this report.

2.0 Laboratory

Laboratory QA/QC procedures for this testing program were implemented as described in the ToxScan QA/QC program. Generic QA measures are described below in an excerpt from our written program. Table 5 presents a summary of instruments used in this study for bulk sediment analyses, along with methods and schedules for calibration, maintenance, precision/accuracy monitoring and record keeping.

All sediment samples were preserved by storage at 4°C in the dark. While EPA/COE protocol allows a 6-week holding period for dredged material sampled, certain of the methods require extraction and/or analysis within a shorter time period. These restricted holding times are listed below, and were adhered to in this program.

Analyte	Maximum Holding Time
Mercury	28 days
PAH's	extraction within 14 days
Chlorinated Hydrocarbons	extraction within 14 days
Sulfides	7 days
Petroleum Hydrocarbons	28 days
Organotins	28 days

As required by the Scope of Services for this program, the frequency of duplicate analyses and spiked sample analyses has been increased over our standard practice. For this study, 10% of the analyses have been duplicated and 20% of samples have been spiked.

Following is an excerpt from our QA/QC program which details the routine QA/QC measures followed in this program.

Procedures for Sample Receiving

The samples, accompanied by a chain of custody form are received by the sample control officer who follows the listed procedures for receiving a sample.

All sample containers are inspected to determine if any breakage or mishandling occurred and to determine that the proper container and preservatives have been used. The sample control officer will verify that sample labels match those on the chain of custody and that all samples listed are present. If a chain of custody does not exist and one is to be generated. See section below on Chain of Custody and Documentation.

The "log-in" process is initiated by giving each sample a discrete laboratory number which is entered on the chain of custody, in the log book and on the project sheet.

The proper paperwork (Sample Analysis Request Form or SARF) indicating analyses needed, detection limits, due dates, sample description and location, and necessary QA/QC is prepared and given to the appropriate analyst. The project manager receives the project sheet, which indicates analyses to be performed and due dates, along with a copy of the original SARF.

Sample Identification Procedure

In order to maintain sample identity, the following scheme is used:
T-0001-01, where T = ToxScan
0001 is the group number assigned to the set of samples
01 is the individual container number received.

Chain of Custody and Documentation

A chain of custody is initiated prior to sampling or at the time of sample delivery is submitted by a walk-in client. This chain of custody accompanies all samples and is given to the sample control officer along with the samples. Samples are logged in and the chain of custody is kept with the original SARF. If samples are to be subcontracted to another laboratory, a photocopy of the original chain of custody is made and will accompany those samples.

Source and Preparation of Standards

All primary standards are purchased in concentrated solutions or as pure substances and purchased in the highest purity available from reputable manufacturers or suppliers. Liquid stock solutions of concentrated standards are accompanied by a certification as to purity and concentration. All batch numbers, catalogue numbers, supplier and date of purchase are kept in the standards log book and updated as necessary.

Stock and working standards are prepared taking into account the stability and concentration of the analyte. Thus, some standards are prepared daily, others at less frequent intervals. Those standards that are light sensitive are stored in amber or like containers. If refrigeration will maximize the lifetime of the standards, they are stored at 4°C. Included on the standards container are date of preparation, concentration of solution analyte, and weight or volume used to prepare the standard if applicable. All standards are prepared with a high quality deionized or distilled water or with known purity solvents. A blank of all dilutants is checked to determine if any contamination has been introduced.

Calibration Procedures and Methods of Analysis

All instrument calibration methods are related to known analyte concentrations. This requires a calibration curve be prepared for each analyte. Some instruments can be calibrated directly from known concentrations of a standard; others furnish data for construction of a three-point curve.

The analyst follows the procedures specified in the operational manual for each instrument as well as those guidelines set forth by operational standard methods: Standard Methods for the Evaluation of Waters and Wastewaters, EPA Protocol SW-846, AOAC Manual of Methodologies,

etc. Calibration of instrumental parameters is further checked against standard reference materials provided by the EPA or NBS with listings of certified values. The worksheets given to the analyst have pertinent areas for calibration data to be recorded from which calibration or standard curves can be obtained.

Once the instrument has been standardized, analyte concentrations are checked against the standard curve every 10 analyses to assure continued calibration.

Samples are prepared, analyzed and reported according to those standardized procedures specified by EPA, Standard Methods, AOAC, or other recognized, documented methodologies. Sample weights, preparation, aliquots taken, and calculations are recorded on the analysis sheet furnished for each parameter to be determined and recorded in ink.

Method Blanks and Duplicate and Spiked Samples

A method blank is the analysis of pure organic-free water, high purity solvent or clean sample matrix after being subjected to treatment specified by the method used. Method blanks are used on all analyses to verify, qualitatively, that no false positives will occur and quantitatively, that concentrations are accurate and do not reflect contamination. A method blank is analyzed at a minimum of once for each batch of samples or after every twentieth sample, whichever is more frequent.

Spiking concentrations are dependent upon the background levels in the original sample. When spiking for a scan analysis, nominal spiking levels are used as described by the method. If a small number of specified chemicals are being measured, the sample is ideally spiked at one-half to one-and-one-half times the concentration found in the sample.

The recovery of the spiked samples is calculated and summarized in the quality control record as accuracy and gives the control chart limits.

Establishment of Acceptance Limits of Precision and Accuracy

Each set of samples analyzed per analyte has a blank, duplicate, spike and a standard reference material from which the precision and accuracy data are obtained.

The precision of RPD is obtained by the manipulation of duplicate sample data as follows:

$$RPD = \frac{(D1 - D2)}{(D1 + D2)/2} \times 100$$

where D1 = sample
D2 = sample replicate

The accuracy is a measurement of the percentage of a spike recovery, %R, calculated by the formula:

$$\%R = [(SSR - SR)/SA] \times 100$$

where SSR = spiked sample
SR = sample
SA = spike added

Control charts are maintained to show the limits within which measurements should fall. The upper and lower control limits are calculated as follows and are based on 25 sample sets:

$$Upper\ control\ limits = M + 3\ Sm \quad (UCL)$$
$$Lower\ control\ limits = M - 3\ Sm \quad (LCL)$$

M = the average of the RPD
Sm = standard deviation of the RPD

Procedures for Corrective Action

If values fall outside the ULC or LCL, the following guidelines are taken for corrective action:

1. Define the problem.
2. QA/QC officer and laboratory section leader assign the investigation responsibility to an analyst.
3. Document the action needed to correct the problem.
4. Implement and verify that corrective action is taken and the problem corrected.

In general, when QA techniques or procedures identify errors, deficiencies or an "out of control" situation, and two types of action need to be considered. The first, immediate action is generally to correct instrumentation error or malfunction, poor technique, or sample variability. Long-term action is to correct out-of-control conditions that may stem from contamination, old standards, improper spiking, or improperly calibrated equipment.

The above guidelines would be followed to correct the problem and maintain acceptable levels of confidence. No laboratory results will be reported or released until the "out of control" situation is rectified.

All worksheets given to the analyst for analyte determination are dated and initialed after major analytical procedures are completed, i.e. on date weighed, after extraction, upon completion of digestion, and on the date the sample is given to the laboratory supervisor for review. This is signed by the supervisor after review for reliability in terms of accuracy, precision, detection limits, and quantitative limits, and forwarded to data processing.

Reports submitted to clients routinely include method numbers and detection limits as well as identifying information, date received, data analyzed, etc.

Maintenance and Repair of Instrumentation

Instruments are maintained according to the operation manuals supplied by the manufacturer. Repairs are conducted as needed, either by manufacturer representatives or by in-house personnel (for simple problems). Routine maintenance, such as lamp replacement, is conducted as indicated by the collected QC data.

3.0 Bioassay

All bioassays for this testing program (with the exception of the bivalve larval test) were conducted following methods outlined in the EPA/COE Testing Manual (1991). The bivalve larval bioassays were performed according to protocol described in ASTM (1989). Standard operating procedures (SOPs) have been written and approved for these procedures, and are accessible to all bioassay staff. Dilution water for the bioassays, collected from the ToxScan Davenport laboratory, meets all requirements outlined in ASTM (1989).

Data resulting from the bioassays were recorded in ink on laboratory data sheets, evaluated by the project manager to insure that all test conditions were within protocol limits, and incorporated into the permanent project record file.

SOPs have been developed for instrument calibration, which detail standards to be used, units for reporting data and expected performance standards for accuracy and precision. Water quality monitoring instruments (D.O. meter, pH meter, salinometer, thermometer) are calibrated at least once daily according to these SOPs, and data are recorded in logbooks at the laboratory. Backup instrumentation is available in the event of equipment failure.

Bioassay test protocols generally specify acceptable limits of water quality (pH, D.O., temperature, salinity) in test containers during test performance. They also specify certain minimum levels of organism response (survival, normal development, growth) which must be achieved in test controls in order to validate the bioassay. A reference toxicant bioassay has been requested for this program as an additional quality assurance measure. Reference toxicant tests serve to "calibrate" the sensitivity of organisms to a known toxic compound, and control charts are maintained in the laboratory

for each organism:toxicant combination. Our control charts are continuously updated as each new reference toxicant bioassay data set is incorporated. In order to be within control limits, the reftox EC50 or LC50 must fall within the range of ±2 standard deviations of the mean of all previous reference toxicant bioassays. The following table outlines reference toxicants used by the laboratory with each test species:

TEST ORGANISM	REFERENCE TOXICANT	CONCENTRATION RANGE
Amphipod	Cadmium Chloride ($CdCl_2$)	0.125 - 4.0 mg/L
Mysid	Sodium Dodecyl Sulfate (SDS)	0.5 - 16.0 mg/L
Fish (Sanddab)	Sodium Dodecyl Sulfate (SDS)	0.25 - 4.0 mg/L
Bivalve (Mussel)	Copper Sulfate ($CuSO_4$)	2.0 - 32.0 µg/L
Worm (Polychaete)	Copper Sulfate ($CuSO_4$)	6.25 - 500 µg/L

Statistical analyses of bioassay data are performed using computer programs which provide not only the EC50 or LC50 calculation but also provide estimates of the precision of the data in the form of 95% confidence limits around the EC/LC50 point.

QA/QC data for chemical analyses and reference toxicant data for this test program, as well as environmental monitoring data for these bioassays are presented herein. Chains of Custody are presented in Appendix E.

Table 5. Summary of instruments, calibration methods, precision/accuracy monitoring, maintenance and record-keeping for analytical equipment utilized in this test program.

Analyte	Instruments	Calibration Method	Precision & Accuracy Standards	Maintenance Schedule	Record-keeping Methods
Metals	Varian AA5; Models 400P, 4002, 10	3-4 point standard curve	SRMs* and replicate analyses	as needed	instrument print-out, electronic meter hard copy
Oil & Grease	Perkin-Elmer IR Spectrophotometer Model 710B	4-point standard curve	spikes and replicate analyses	as needed	chromatogram charts, hard copy
Sulfides	Titration	standardized titrant	replicate analyses	clean burettes	notebook hard copy
Organotins	Hewlett-Packard GC; model 5890, series II	3-point standard curve and surro-gate injection	SRMs and replicate analyses	as needed	instrument print-out, hard copy
Chlorinated pesticides and PCBs	Hewlett-Packard GC; model 5890 dual columns; ECD detectors	3-point standard curve	SRMs, matrix spikes, matrix spike duplicates, duplicate samples, surrogates	as needed	instrument printout and work sheet
PAHs, phenols, phthalates	Varian GC/MS Saturn II	5-point standard curve	SRMs, matrix spikes, matrix spike duplicates, duplicate samples, surrogates	as needed	instrument printout and work sheet

* SRM = standard reference materials, obtained from NIST (National Institute of Standards and Technology).

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report
QA/QC on sample SAM-7D

Compound	% REC MS	% REC MSD	% RPD	QC LIMITS % REC	QC LIMITS % RPD
Lindane	125	120	4	46-127	50
Heptachlor	220†	105	-	35-130	31
Aldrin	345†	210†	-	34-132	43
Dieldrin	124	124	0	31-134	38
Endrin	114	118	3	42-139	43
DDT	76	36	71*	23-134	50

* Outside QC Limits; no corrective action required.

† Matrix Interference; LCS within QC limits.

MS = matrix spike

MSD = matrix spike duplicate

RPD = relative percent difference

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report
QA/QC on sample EK1

Compound	% REC MS	% REC MSD	% RPD	QC LIMITS % REC	QC LIMITS % RPD
Lindane	100	65	42	46-127	50
Heptachlor	105	110	5	35-130	31
Aldrin	100	85	16	34-132	43
Dieldrin	72	136†	62†	31-134	38
Endrin	62	98	45*	42-139	43
DDT	76	124	48	23-134	50

* Outside QC Limits; no corrective action required.

† Matrix Interference; LCS within QC limits.

MS = matrix spike

MSD = matrix spike duplicate

RPD = relative percent difference

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report
QA/QC on sample Home Sediment

Compound	% REC MS	% REC MSD	% RPD	QC LIMITS % REC	QC LIMITS % RPD
Lindane	†	†	-	46-127	50
Heptachlor	†	†	-	35-130	31
Aldrin	†	†	-	34-132	43
Dieldrin	100	100	0	31-134	38
Endrin	100	140	33	42-139	43
DDT	120	130	8	23-134	50

† Matrix Interference; LCS within QC limits.

MS = matrix spike

MSD = matrix spike duplicate

RPD = relative percent difference

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Lindane	75	46-127
Heptachlor	85	35-130
Aldrin	70	34-132
Dieldrin	86	31-134
Endrin	84	42-139
DDT	54	23-134

LCS = Laboratory Control Sample

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Lindane	70	46-127
Heptachlor	105	35-130
Aldrin	150	34-132
Dieldrin	96	31-134
Endrin	96	42-139
DDT	112	23-134

LCS = Laboratory Control Sample

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Lindane	90	46-127
Heptachlor	95	35-130
Aldrin	95	34-132
Dieldrin	88	31-134
Endrin	92	42-139
DDT	56	23-134

LCS = Laboratory Control Sample

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	HOME-SED	HOME-SED Duplicate	Detection Limit
Aldrin	ND	ND	0.5
alpha-BHC	ND	ND	1.0
beta-BHC	ND	ND	1.0
delta-BHC	ND	ND	1.0
gamma-BHC (lindane)	ND	ND	1.0
alpha-Chlordane	ND	ND	1.0
gamma-Chlordane	ND	ND	1.0
4,4'-DDD	ND	ND	1.0
4,4'-DDE	ND	ND	1.0
4,4'-DDT	ND	ND	1.0
Dieldrin	ND	ND	0.5
Endosulfan I	ND	ND	2.0
Endosulfan II	ND	ND	0.5
Endosulfan sulfate	ND	ND	10
Endrin	ND	ND	0.5
Heptachlor	ND	ND	0.5
Heptachlor epoxide	ND	ND	10
Toxaphene	ND	ND	30
PCB's	ND	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	SAM-7D	SAM-7D Duplicate	Detection Limit
Aldrin	ND	ND	0.5
alpha-BHC	ND	ND	1.0
beta-BHC	ND	ND	1.0
delta-BHC	ND	ND	1.0
gamma-BHC (lindane)	ND	ND	1.0
alpha-Chlordane	ND	ND	1.0
gamma-Chlordane	ND	ND	1.0
4,4'-DDD	ND	ND	1.0
4,4'-DDE	ND	ND	1.0
4,4'-DDT	ND	ND	1.0
Dieldrin	ND	ND	0.5
Endosulfan I	ND	ND	2.0
Endosulfan II	ND	ND	0.5
Endosulfan sulfate	ND	ND	10
Endrin	ND	ND	0.5
Heptachlor	ND	ND	0.5
Heptachlor epoxide	ND	ND	10
Toxaphene	ND	ND	30
PCB's	ND	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	EK-1	EK-1 Duplicate	Detection Limit
Aldrin	ND	ND	0.5
alpha-BHC	ND	ND	1.0
beta-BHC	ND	ND	1.0
delta-BHC	ND	ND	1.0
gamma-BHC (lindane)	ND	ND	1.0
alpha-Chlordane	ND	ND	1.0
gamma-Chlordane	ND	ND	1.0
4,4'-DDD	ND	ND	1.0
4,4'-DDE	ND	ND	1.0
4,4'-DDT	ND	ND	1.0
Dieldrin	ND	ND	0.5
Endosulfan I	ND	ND	2.0
Endosulfan II	ND	ND	0.5
Endosulfan sulfate	ND	ND	10
Endrin	ND	ND	0.5
Heptachlor	ND	ND	0.5
Heptachlor epoxide	ND	ND	10
Toxaphene	ND	ND	30
PCB's	ND	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Sample ID: Method Blank (MB062194) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit
Aldrin	ND	0.5
alpha-BHC	ND	1.0
beta-BHC	ND	1.0
delta-BHC	ND	1.0
gamma-BHC (lindane)	ND	1.0
alpha-Chlordane	ND	1.0
gamma-Chlordane	ND	1.0
4,4'-DDD	ND	1.0
4,4'-DDE	ND	1.0
4,4'-DDT	ND	1.0
Dieldrin	ND	0.5
Endosulfan I	ND	2.0
Endosulfan II	ND	0.5
Endosulfan sulfate	ND	10
Endrin	ND	0.5
Heptachlor	ND	0.5
Heptachlor epoxide	ND	10
Toxaphene	ND	30
PCBs:		
PCB 1242	ND	20
PCB 1248	ND	20
PCB 1254	ND	20
PCB 1260	ND	20
TOTAL PCBs	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Sample ID: Method Blank (MB041394) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit
Aldrin	ND	0.5
alpha-BHC	ND	1.0
beta-BHC	ND	1.0
delta-BHC	ND	1.0
gamma-BHC (lindane)	ND	1.0
alpha-Chlordane	ND	1.0
gamma-Chlordane	ND	1.0
4,4'-DDD	ND	1.0
4,4'-DDE	ND	1.0
4,4'-DDT	ND	1.0
Dieldrin	ND	0.5
Endosulfan I	ND	2.0
Endosulfan II	ND	0.5
Endosulfan sulfate	ND	10
Endrin	ND	0.5
Heptachlor	ND	0.5
Heptachlor epoxide	ND	10
Toxaphene	ND	30
PCBs:		
PCB 1242	ND	20
PCB 1248	ND	20
PCB 1254	ND	20
PCB 1260	ND	20
TOTAL PCBs	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Sample ID: Method Blank (MB041594) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit
Aldrin	ND	0.5
alpha-BHC	ND	1.0
beta-BHC	ND	1.0
delta-BHC	ND	1.0
gamma-BHC (lindane)	ND	1.0
alpha-Chlordane	ND	1.0
gamma-Chlordane	ND	1.0
4,4'-DDD	ND	1.0
4,4'-DDE	ND	1.0
4,4'-DDT	ND	1.0
Dieldrin	ND	0.5
Endosulfan I	ND	2.0
Endosulfan II	ND	0.5
Endosulfan sulfate	ND	10
Endrin	ND	0.5
Heptachlor	ND	0.5
Heptachlor epoxide	ND	10
Toxaphene	ND	30
PCBs:		
PCB 1242	ND	20
PCB 1248	ND	20
PCB 1254	ND	20
PCB 1260	ND	20
TOTAL PCBs	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
µg/Kg (ppb) dry weight
QA/QC Report

Sample ID: Method Blank (MB050994) Analyte	Dry Wt. Sample Value	Dry Wt. Detection Limit
Aldrin	ND	0.5
alpha-BHC	ND	1.0
beta-BHC	ND	1.0
delta-BHC	ND	1.0
gamma-BHC (lindane)	ND	1.0
alpha-Chlordane	ND	1.0
gamma-Chlordane	ND	1.0
4,4'-DDD	ND	1.0
4,4'-DDE	ND	1.0
4,4'-DDT	ND	1.0
Dieldrin	ND	0.5
Endosulfan I	ND	2.0
Endosulfan II	ND	0.5
Endosulfan sulfate	ND	10
Endrin	ND	0.5
Heptachlor	ND	0.5
Heptachlor epoxide	ND	10
Toxaphene	ND	30
PCBs:		
PCB 1242	ND	20
PCB 1248	ND	20
PCB 1254	ND	20
PCB 1260	ND	20
TOTAL PCBs	ND	20

ND = None Detected

Chlorinated Pesticides
EPA METHOD 8080
QA/QC Report
Surrogate Recoveries (%)

Sample	Tetrachloro-m-xylene	Decachlorobiphenyl
SAM-7D	132	124
SAM-5D	214†	204†
SAM-3D	88	109
SAM-4D	156†	110
SAM-2D	98	122
SAM-1D	101	117
SAM-6C	212†	118
SAM-6B	168†	109
SAM-6A	93	96
SAM-4(D)	87	93
SAM-6 Composite	80	95
EK-1	79	90
EK-2	88	98
EK-3	106	104
EK-4	128	108
EK Composite	135	104
NB-4 Rep 1	172†	93
FL-8	119	98
FL-7	179†	97
FL-6	165†	102
FL-5	153†	92
FL-3	137	90
FL-4	166†	85
FL-1	110	81
FL-2	134	87
FL-Composite	202†	75
Reference Composite	68	75
Home Sediment	179†	123

QC Limits

(20-150)

† Matrix Interference

Organic Compounds
SRM QA/QC Report
µg/Kg (ppb)

Element	Value Found	Certified Value	Advisory Range
Pesticides			
Aldrin	275	246	103-300
beta-BHC	208	145	25-213
gamma-BHC (Lindane)	263	219	70-278
4,4'-DDD	421	334	104-471
4,4'-DDE	554	455	137-660
4,4'-DDT	316	287	72-459
Dieldrin	98	101	36-147
Endrin	386	297	122-598
Heptachlor	301	160	101-330
Methoxychlor	251	160	61-253
Semi-volatiles			
Naphthalene	757	1640	623-2180
Fluorene	2922	6060	2670-7330
Phenanthrene	1144	1570	848-1880
Anthracene	59*	1010	273-1340
Pyrene	4641	8030	4180-9230
Benzo(a)anthracene	519*	2030	670-2900
Chrysene	1727	2350	400-3950
Butylbenzylphthalate	7510	10600	1590-16100
Bis(2-ethylhexyl)phthalate	6056	7120	1140-11200

* Outside QC limits; no corrective action required.

SRM = Environmental Resource Associates Lot #324

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA METHOD 8270
QA/QC Report
QA/QC on sample HUM94SED0001

Compound	% REC MS	% REC MSD	% RPD	QC LIMITS % REC	QC LIMITS % RPD
Acenaphthene	79	88	11	31-137	19
Pyrene	62	64	3	35-142	36

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA METHOD 8270
QA/QC Report
QA/QC on sample HUM94SED0028

Compound	% REC MS	% REC MSD	% RPD	QC LIMITS % REC	QC LIMITS % RPD
Acenaphthene	94	87	8	31-137	19
Pyrene	110	93	17	35-142	36

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA METHOD 8270
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Acenaphthene	67	31-137
Pyrene	70	35-142

LCS = Laboratory Control Sample

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA METHOD 8270
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Acenaphthene	80	31-137
Pyrene	71	35-142

LCS = Laboratory Control Sample

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA METHOD 8270
QA/QC Report

Compound	% REC LCS	QC LIMITS % REC
Acenaphthene	79	31-137
Pyrene	61	35-142

LCS = Laboratory Control Sample

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	SAM-7D	SAM-7D DUPLICATE	Detection Limit
Naphthalene	ND	ND	20
Acenaphthylene	ND	ND	20
Acenaphthene	ND	ND	20
Fluorene	ND	ND	20
Phenanthrene	ND	20	20
Anthracene	ND	ND	20
Fluoranthene	ND	ND	20
Pyrene	ND	ND	25
Chrysene	ND	ND	20
Benzo(a)anthracene	ND	ND	20
Benzo(b)fluoranthene	ND	ND	20
Benzo(k)fluoranthene	ND	ND	20
Benzo(a)pyrene	ND	ND	20
Indeno(1,2,3-CD)pyrene	ND	ND	20
Dibenzo(a,h)anthracene	ND	ND	20
Benzo(ghi)perylene	ND	ND	20
2-Methylnaphthalene	ND	ND	20
Total PAH's	ND	20	20
Total phthalates	110	120	10

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	FL-7	FL-7 DUPLICATE	Detection Limit
Naphthalene	84	37	20
Acenaphthylene	ND	ND	20
Acenaphthene	ND	ND	20
Fluorene	ND	ND	20
Phenanthrene	70	62	20
Anthracene	ND	ND	20
Fluoranthene	ND	ND	20
Pyrene	31	27	25
Chrysene	ND	ND	20
Benzo(a)anthracene	38	ND	20
Benzo(b)fluoranthene	ND	ND	20
Benzo(k)fluoranthene	ND	ND	20
Benzo(a)pyrene	ND	ND	20
Indeno(1,2,3-CD)pyrene	ND	ND	20
Dibenzo(a,h)anthracene	ND	ND	20
Benzo(ghi)perylene	ND	ND	20
2-Methylnaphthalene	59	55	20
Total PAH's	280	180	20
Total phthalates	250	180	10

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	MB050194 Method Blank	Detection Limit
Naphthalene	ND	20
Acenaphthylene	ND	20
Acenaphthene	ND	20
Fluorene	ND	20
Phenanthrene	ND	20
Anthracene	ND	20
Fluoranthene	ND	20
Pyrene	ND	25
Chrysene	ND	20
Benzo(a)anthracene	ND	20
Benzo(b)fluoranthene	ND	20
Benzo(k)fluoranthene	ND	20
Benzo(a)pyrene	ND	20
Indeno(1,2,3-CD)pyrene	ND	20
Dibenzo(a,h)anthracene	ND	20
Benzo(ghi)perylene	ND	20
2-Methylnaphthalene	ND	20
Total PAH's	ND	20
Total phthalates	940*	10

* Suspected laboratory contaminant

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	MB050594 Method Blank	Detection Limit
Naphthalene	ND	20
Acenaphthylene	ND	20
Acenaphthene	ND	20
Fluorene	ND	20
Phenanthrene	ND	20
Anthracene	ND	20
Fluoranthene	ND	20
Pyrene	ND	25
Chrysene	ND	20
Benzo(a)anthracene	ND	20
Benzo(b)fluoranthene	ND	20
Benzo(k)fluoranthene	ND	20
Benzo(a)pyrene	ND	20
Indeno(1,2,3-CD)pyrene	ND	20
Dibenzo(a,h)anthracene	ND	20
Benzo(ghi)perylene	ND	20
2-Methylnaphthalene	ND	20
Total PAH's	ND	20
Total phthalates	59*	10

* Suspected laboratory contaminant

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	MB041494 Method Blank	Detection Limit
Naphthalene	ND	20
Acenaphthylene	ND	20
Acenaphthene	ND	20
Fluorene	ND	20
Phenanthrene	ND	20
Anthracene	ND	20
Fluoranthene	ND	20
Pyrene	ND	25
Chrysene	ND	20
Benzo(a)anthracene	ND	20
Benzo(b)fluoranthene	ND	20
Benzo(k)fluoranthene	ND	20
Benzo(a)pyrene	ND	20
Indeno(1,2,3-CD)pyrene	ND	20
Dibenzo(a,h)anthracene	ND	20
Benzo(ghi)perylene	ND	20
2-Methylnaphthalene	ND	20
Total PAH's	ND	20
Total phthalates	190*	10

* Suspected laboratory contaminant

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	MB041394 Method Blank	Detection Limit
Naphthalene	ND	20
Acenaphthylene	ND	20
Acenaphthene	ND	20
Fluorene	ND	20
Phenanthrene	ND	20
Anthracene	ND	20
Fluoranthene	ND	20
Pyrene	ND	25
Chrysene	ND	20
Benzo(a)anthracene	ND	20
Benzo(b)fluoranthene	ND	20
Benzo(k)fluoranthene	ND	20
Benzo(a)pyrene	ND	20
Indeno(1,2,3-CD)pyrene	ND	20
Dibenzo(a,h)anthracene	ND	20
2-Methylnaphthalene	ND	20
Total PAH's	ND	20
Total phthalates	90*	10

* Suspected laboratory contaminant

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs)
EPA Method 8270
µg/Kg (ppb) dry weight
QA/QC Report

Analyte	MB062194 Method Blank	Detection Limit
Naphthalene	ND	20
Acenaphthylene	ND	20
Acenaphthene	ND	20
Fluorene	ND	20
Phenanthrene	ND	20
Anthracene	ND	20
Fluoranthene	ND	20
Pyrene	ND	25
Chrysene	ND	20
Benzo(a)anthracene	ND	20
Benzo(b)fluoranthene	ND	20
Benzo(k)fluoranthene	ND	20
Benzo(a)pyrene	ND	20
Indeno(1,2,3-CD)pyrene	ND	20
Dibenzo(a,h)anthracene	ND	20
2-Methylnaphthalene	ND	20
Total PAH's	ND	20
Total phthalates	150*	10

* Suspected laboratory contaminant

ND = None Detected

Polynuclear Aromatic Hydrocarbons (PAHs) and Phthalate Esters
EPA Method 8270
QA/QC Report
Surrogate Recovery (%)

Sample ID	S1	S2	S3	S4	S5	S6
SAM-7D	54	62	62	70	51	82
SAM-5D	52	61	66	71	50	86
SAM-4D	48	57	53	66	69	81
SAM-3D	52	58	59	67	53	80
SAM-2D	60	71	78	80	48	85
SAM-1D	53	58	39	75	44	71
SAM-6C	60	57	62	71	68	84
SAM-6B	66	68	69	73	86	96
SAM-6A	41	49	57	61	34	78
SAM-4(D)	56	68	68	85	58	84
SAM-6 Composite	70	69	63	81	83	86
EK-1	52	63	72	89	34	89
EK-2	61	65	59	78	86	89
EK-3	63	67	61	79	88	84
EK-4	73	77	67	81	95	91
EK Composite	67	69	62	76	89	89
NB-4 Rep 1	70	65	65	76	85	80
FL-8	62	70	63	79	72	83
FL-7	55	66	67	74	57	89
FL-6	76	82	71	88	101	92
FL-5	72	67	52	78	78	91
FL-4	68	78	72	88	87	74
FL-3	64	71	67	91	94	82
FL-2	73	85	76	89	93	77
FL-1	66	73	71	85	94	74
FL-Composite	59	72	69	88	98	78
Reference Composite	39	57	46	75	76	85
Home Sediment	25	28	39	49	42	47

Surrogate ID	QC Limits
S1 = 2-Fluorophenol	(25-121)
S2 = Phenol-d5	(24-113)
S3 = Nitrobenzene-d5	(23-120)
S4 = 2-Fluorobiphenyl	(30-115)
S5 = 2,4,6-Tribromophenol	(19-122)
S6 = Terphenyl-d14	(18-137)

Organotin Speciation
µg/Kg (ppb) dry weight
QA/QC Report
QA/QC on sample SAM-6 Composite

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
Amount of Spike (µg/Kg) = 100					
Spike 1 (%)	3	85	88	74	60
SRM (%)	188	122	102	-	53
Blank	ND	ND	ND	ND	54

TPT Sur = Tripropyltin surrogate recovery
Detection Limit = 1 ppb
ND = None Detected

NOTE: As stated in TBT methodology protocol[1], the analytical method has been optimized to tributyltin at the decreased efficiency of monobutyltin extraction and recovery of analyte

	SRM Value Found	SRM Certified Value	% Recovery
Dibutyltin	1.42	1.16	122
Tributyltin	1.30	1.27	102

SRM = National Research Council Canada PACS-1, marine sediment

[1]Battelle Project No. N-0519-6100, Measurement of Butyltin Species in Sediment by n-Pentyl Derivatization with Gas Chromatography/Flame Photometric Detection.

Organotin Speciation
µg/Kg (ppb) dry weight
QA/QC Report
QA/QC on sample EK-1

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin	% TPT SUR
Amount of Spike (µg/Kg) = 100					
Spike 1 (%)	7	74	99	83	64
SRM (%)	165	101	88	-	85
Blank	ND	ND	ND	ND	70

TPT Sur = Tripropyltin surrogate recovery
Detection Limit = 1 ppb
ND = None Detected

NOTE: As stated in TBT methodology protocol[2], the analytical method has been optimized to tributyltin at the decreased efficiency of monobutyltin extraction and recovery of analyte

	SRM Value Found	SRM Certified Value	% Recovery
Dibutyltin	1.17	1.16	101
Tributyltin	1.12	1.27	88

SRM = National Research Council Canada PACS-1, marine sediment

[2]Battelle Project No. N-0519-6100, Measurement of Butyltin Species in Sediment by n-Pentyl Derivatization with Gas Chromatography/Flame Photometric Detection.

Metals
µg/g (ppm)
QA/QC Report
QA/QC on sample SAM-7D

Analyte/ Sample ID	Amount of Spike µg/mL	% Recovery of Spike*	Rep 1	Rep 2	RPD**	Method Blank
Arsenic	0.29	107	5.9	6.0	2	ND
Cadmium	0.029	92	ND	ND	NA	ND
Chromium	2.86	117	77	96	22	ND
Copper	2.86	86	5.7	6.3	10	ND
Lead	1.43	95	6.1	5.7	7	ND
Mercury	0.029	98	0.020	0.025	22	ND
Nickel	1.43	107	41	43	5	ND
Selenium	0.14	79	ND	ND	NA	ND
Silver	0.29	96	ND	ND	NA	ND
Zinc	2.86	94	31	33	6	ND

ND = None Detected
NA = Not Applicable
** ToxScan acceptance limits: 30% (at 5 times detection limit)

Element	Value Found µg/g	Certified Value µg/g	+/-	Percent Recovery*
Arsenic	21.2	23.4	0.8	91
Cadmium	3.69	3.45	0.2	107
Chromium	95.6	135	5.0	71
Copper	83.0	89.6	5.0	84
Lead	155	161	17	96
Mercury	1.20	1.47	0.07	82
Nickel	31.5	44.1	3.0	71
Zinc	373	438	12	85

SRM = National Institute of Standards and Technology Estuarine Sediment, # 1646
* ToxScan acceptance limits: 65-130% recovery

Metals
µg/g (ppm)
QA/QC Report
QA/QC on sample FL-2

Analyte/ Sample ID	Amount of Spike µg/mL	% Recovery of Spike*	Rep 1	Rep 2	RPD**	Method Blank
Arsenic	0.29	104	8.9	8.4	6	ND
Cadmium	0.029	106	0.3	0.2	40	ND
Chromium	2.86	106	120	120	0	ND
Copper	2.86	94	38	36	5	ND
Lead	1.43	96	12	11	9	ND
Mercury	0.029	107	0.10	0.10	0	ND
Nickel	1.43	118	110	110	0	ND
Selenium	0.14	73	ND	ND	NA	ND
Silver	0.29	99	ND	ND	NA	ND
Zinc	2.86	101	82	79	4	ND

ND = None Detected
NA = Not Applicable
* ToxScan acceptance limits: 65-130% recovery
** ToxScan acceptance limits: 30% (at 5 times detection limit)

Inorganic Method Numbers

Percent Solids	EPA Method 160.3
Sulfides	EPA/SW846 Method 9030
Total Organic Carbon	Gaudette et al. [1]
Arsenic	EPA/SW846 Method 7060
Cadmium	EPA/SW846 Method 7131
Chromium	EPA/SW846 Method 7191
Copper	EPA/SW846 Method 7210
Lead	EPA/SW846 Method 7421
Mercury	EPA/SW846 Method 7471
Nickel	EPA/SW846 Method 7521
Selenium	EPA/SW846 Method 7741
Silver	EPA/SW846 Method 7761
Zinc	EPA/SW846 Method 7950
Organotins	GC/FPD
Oil & Grease	Standard Method 5520C
Total Petroleum Hydrocarbons	Standard Method 5520F

[1] Henri E. Gaudette, Wilson R. Flight, Lois Toner and David W. Folger, *Determination of Organic Carbon in Recent Sediments*; Journal of Sedimentary Petrology, Vol. 44, No. 1, p. 249-253; 1974.

Summary of Environmental Monitoring Data: Bivalve Larvae Suspended Particulate Phase Bioassay

Sample ID	Parameter	Initial	Final
Seawater Control	pH value (units)	7.9	8.1
	Temperature (°C)	16.9	15.6
	D.O. (mg/L)	7.6	7.4
	Salinity (‰)	32.8	---
Humboldt Reference Sediment	pH value (units)	7.7	8.1
	Temperature (°C)	16.5	15.5
	D.O. (mg/L)	7.8	7.5
	Salinity (‰)	33.0	---
SAMTB 100%	pH value (units)	7.8	8.1
	Temperature (°C)	16.7	15.4
	D.O. (mg/L)	7.8	7.4
	Salinity (‰)	32.8	---
FLTB 100%	pH value (units)	7.8	8.2
	Temperature (°C)	16.7	15.4
	D.O. (mg/L)	7.7	7.5
	Salinity (‰)	32.8	---
EKUP 100%	pH value (units)	7.8	8.2
	Temperature (°C)	16.7	15.5
	D.O. (mg/L)	7.8	7.5
	Salinity (‰)	32.8	---

Summary of Environmental Monitoring Data: *Rhepoxynius abronius* Solid Phase Static Bioassay

Sample ID	Parameter	Mean	Std Dev.	Maximum	Minimum
Control	D.O. (mg/L)	7.69	0.11	8.0	7.3
	Temperature (°C)	15.34	0.37	15.6	14.5
	pH value (units)	8.06	0.07	8.1	7.9
Humboldt Reference Sediment	D.O. (mg/L)	7.68	0.09	7.8	7.5
	Temperature (°C)	15.32	0.38	15.6	14.5
	pH value (units)	8.10	0.07	8.2	7.9
EKUP	D.O. (mg/L)	7.64	0.09	7.8	7.5
	Temperature (°C)	15.31	0.35	15.5	14.5
	pH value (units)	8.07	0.06	8.1	7.9
SAMTB	D.O. (mg/L)	7.65	0.11	7.9	7.5
	Temperature (°C)	15.32	0.37	15.5	14.5
	pH value (units)	8.07	0.06	8.2	7.9
FLTB	D.O. (mg/L)	8.07	0.05	8.1	7.9
	Temperature (°C)	15.26	0.38	15.7	14.6
	pH value (units)	8.07	0.05	8.1	7.9

Summary of Environmental Monitoring Data: *Holmesimysis costata* Solid Phase Flow Through Bioassay

Sample ID	Parameter	Mean	Std Dev	Maximum	Minimum
Control	D.O. (mg/L)	8.59	0.18	8.9	8.2
	Temperature (°C)	13.35	0.73	14.6	12.1
	pH value (units)	8.02	0.11	8.2	7.7
Humboldt Reference Sediment	D.O. (mg/L)	8.59	0.18	9.0	8.2
	Temperature (°C)	13.32	0.70	14.4	12.1
	pH value (units)	8.03	0.10	8.1	7.7
EKUP	D.O. (mg/L)	8.59	0.17	8.9	8.3
	Temperature (°C)	13.30	0.72	14.3	12.1
	pH value (units)	8.02	0.11	8.1	7.6
SAMTB	D.O. (mg/L)	8.61	0.20	9.0	8.0
	Temperature (°C)	13.33	0.71	14.4	12.0
	pH value (units)	8.02	0.10	8.1	7.7
FLTB	D.O. (mg/L)	8.61	0.19	9.0	8.3
	Temperature (°C)	13.34	0.70	14.4	12.0
	pH value (units)	8.03	0.11	8.1	7.6

Summary of Environmental Monitoring Data: *Nephtys caecoides* Solid Phase Flow Through Bioassay

Sample ID	Parameter	Mean	Std.Dev.	Maximum	Minimum
Control	D.O. (mg/L)	8.16	0.20	8.6	7.6
	Temperature (°C)	12.96	0.40	14.0	12.4
	pH value (units)	8.03	0.10	8.1	7.7
Humboldt Reference Sediment	D.O. (mg/L)	8.15	0.22	8.5	7.5
	Temperature (°C)	13.04	0.43	14.1	12.5
	pH value (units)	8.02	0.10	8.1	7.7
EKUP	D.O. (mg/L)	8.18	0.19	8.6	7.5
	Temperature (°C)	12.95	0.40	14.1	12.4
	pH value (units)	8.01	0.12	8.1	7.6
SAMTB	D.O. (mg/L)	8.19	0.17	8.5	7.7
	Temperature (°C)	12.97	0.38	14.1	12.4
	pH value (units)	8.00	0.13	8.1	7.6
FLTB	D.O. (mg/L)	8.12	0.18	8.4	7.7
	Temperature (°C)	13.03	0.40	14.2	12.5
	pH value (units)	8.02	0.10	8.1	7.7

Summary of Environmental Monitoring Data: *Citharichthys stigmaeus* Suspended Particulate Phase Bioassay

Sample ID	Parameter	Mean	Std.Dev.	Maximum	Minimum
Control	D.O. (mg/L)	7.73	0.12	7.9	7.4
	Temperature (°C)	14.71	0.06	14.8	14.6
	pH value (units)	8.02	0.05	8.1	7.9
Humboldt Reference Sediment	D.O. (mg/L)	7.61	0.31	7.9	6.1
	Temperature (°C)	14.72	0.07	14.8	14.6
	pH value (units)	8.04	0.10	8.2	7.8
EKUP	D.O. (mg/L)	7.65	0.23	7.9	6.3
	Temperature (°C)	14.70	0.08	15.0	14.6
	pH value (units)	7.90	0.24	8.1	6.9
SAMTB	D.O. (mg/L)	7.71	0.19	7.9	6.4
	Temperature (°C)	14.71	0.09	15.0	14.6
	pH value (units)	8.08	0.07	8.2	7.8
FLTB	D.O. (mg/L)	7.69	0.22	7.9	6.6
	Temperature (°C)	14.66	0.07	14.8	14.5
	pH value (units)	8.13	0.17	8.4	7.8

Summary of Environmental Monitoring Data: *Holmesimysis costata* Suspended Particulate Phase Bioassay

Sample ID	Parameter	Mean	Std.Dev.	Maximum	Minimum
Control	D.O. (mg/L)	7.75	0.29	8.1	7.3
	Temperature (°C)	14.80	0.11	15.0	14.7
	pH value (units)	8.02	0.04	8.1	8.0
Humboldt Reference Sediment	D.O. (mg/L)	7.64	0.30	8.0	7.0
	Temperature (°C)	14.76	0.11	15.0	14.6
	pH value (units)	8.01	0.10	8.1	7.7
EKUP	D.O. (mg/L)	7.64	0.28	8.0	7.1
	Temperature (°C)	14.73	0.07	14.9	14.7
	pH value (units)	8.04	0.07	8.1	7.9
SAMTB	D.O. (mg/L)	7.62	0.37	8.0	7.0
	Temperature (°C)	14.71	0.05	14.8	14.6
	pH value (units)	8.06	0.05	8.2	8.0
FLTB	D.O. (mg/L)	7.60	0.33	8.0	7.0
	Temperature (°C)	14.71	0.07	14.9	14.6
	pH value (units)	8.13	0.15	8.6	7.8

REFERENCE TOXICANT BIOASSAY
Mytilus edulis (Copper)

Sample ID	Rep	Number Normal	Number Abnormal	Total Recovered per 1 mL	Resuspended Volume	Total # Normal Larvae Recovered	% Survival	Mean % Survival ± S.D.	% Normal Develop-ment	Mean % Normal Development ± S.D.	Survival		Normal Development	
											Abbotts Corrected Value	Mean Corrected Value	Abbotts Corrected Value	Mean Corrected Value
	1	126	2	128	50.5	6363	132.7		98.4					
	2	91	3	94	51	4641	96.8	101.8	96.8	99.0				
Control	3	84	0	84	51	4284	89.3	±	100.0	±				
	4	104	0	104	49	5096	106.3	19.24	100.0	1.42				
	5	78	0	78	51.5	4017	83.8		100.0					
	1	89	0	89	49	4361	90.9	95.2	100.0	97.5	89.4	93.5	101.0	98.4
2	2	81	5	86	47	3807	79.4	±	94.2	±	78.0	±	95.1	±
	3	115	2	117	48	5520	115.1	18.23	98.3	2.99	113.1	17.91	99.2	3.02
	1	60	4	64	47	2820	58.8	81.5	93.8	95.9	57.8	80.1	94.6	96.8
4	2	79	2	81	47	3713	77.4	±	97.5	±	76.1	±	98.5	±
	3	106	4	110	49	5194	108.3	25.01	96.4	1.94	106.4	24.57	97.3	1.95
	1	23	56	79	47	1081	22.5	23.7	29.1	25.2	22.2	23.3	29.4	25.4
8	2	40	73	113	46	1840	38.4	±	35.4	±	37.7	±	35.7	±
	3	10	81	91	48.5	485	10.1	14.16	11.0	12.67	9.9	13.92	11.1	12.80
	1	0	74	74	48	0	0.0	2.4	0.0	2.7	0.0	2.3	0.0	2.8
16	2	0	60	60	51	0	0.0	±	0.0	±	0.0	±	0.0	±
	3	7	78	85	49	343	7.2	4.13	8.2	4.75	7.0	4.06	8.3	4.80
	1	0	10	10	51	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	2	0	9	9	49.8	0	0.0	±	0.0	±	0.0	±	0.0	±
	3	0	0	0	55.5	0	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00

LC_{50} = 5.72 ppb (5.21, 6.27); EC_{50} = 6.66 ppb (6.21, 7.15)

Reference Toxicant Bioassay

Species: *Rhepoxynius abronius*
Toxicant: Cadmium chloride

Date: 25 April 1994
T-10774

Concentration (mg/L)	Replicate	Number Surviving: Observation Time (hours) 0	Number Surviving: Observation Time (hours) 96	Mean % Survival
Control	1	10	10	100
	2	10	10	
0.125	1	10	10	90
	2	10	8	
0.25	1	10	8	85
	2	10	9	
0.50	1	10	8	75
	2	10	7	
1.00	1	10	6	40
	2	10	2	
2.00	1	10	1	5
	2	10	0	
4.00	1	10	0	0
	2	10	0	

96-hour LC_{50} (Spearman) = 0.76 ppm

95% confidence limits = 0.56 ppm - 1.02 ppm

Reference Toxicant Bioassay

Species: *Holmesimysis costata*
Toxicant: Sodium Dodecyl Sulfate

Date: 4 May 1994
T-10774

Concentration (mg/L)	Replicate	Number Surviving: Observation Time (hours) 0	Number Surviving: Observation Time (hours) 96	Mean % Survival
Control	1	10	10	100
	2	10	10	
0.5	1	10	10	100
	2	10	10	
1.0	1	10	8	90
	2	10	10	
2.0	1	10	9	95
	2	10	10	
4.0	1	10	10	100
	2	10	10	
8.0	1	10	8	65
	2	10	5	
16.0	1	10	1	10
	2	10	1	

96-hour LC_{50} (Spearman) = 9.28 ppm

95% confidence limits = 7.61 ppm - 11.3 ppm

Reference Toxicant Bioassay

Species: *Holmesimysis costata*
Toxicant: Sodium Dodecyl Sulfate

Date: 11 May 94
T-10774

Concentration (mg/L)	Replicate	Number Surviving, Observation Time (hours) 0	Number Surviving, Observation Time (hours) 96	Mean % Survival
Control	1	10	10	100
	2	10	10	
0.5	1	10	10	100
	2	10	10	
1.0	1	10	10	100
	2	10	10	
2.0	1	10	8	90
	2	10	10	
4.0	1	10	7	80
	2	10	9	
8.0	1	10	3	25
	2	10	2	
16.0	1	10	0	0
	2	10	0	

96-hour LC_{50} (Spearman) = 5.46 ppm

95% confidence limits = 4.45 ppm - 6.71 ppm

Reference Toxicant Bioassay

Species: *Citharichthys stigmaeus*
Toxicant: Sodium Dodecyl Sulfate

Date: 10 May 1994
T-10774

Concentration (mg/L)	Replicate	Number Surviving: Observation Time (hours) 0	Number Surviving: Observation Time (hours) 96	Mean % Survival
Control	1	10	10	100
	2	10	10	
	3	10	10	
	4	10	10	
	5	10	10	
0.25	1	10	9	97
	2	10	10	
	3	10	10	
0.5	1	10	8	93
	2	10	10	
	3	10	10	
1.0	1	10	10	100
	2	10	10	
	3	10	10	
2.0	1	10	9	90
	2	10	10	
	3	10	8	
4.0	1	10	1	13
	2	10	2	
	3	10	1	

96-hour LC_{50} (Spearman) = 2.87 ppm

95% confidence limits = 2.66 ppm - 3.10 ppm

Reference Toxicant Bioassay

Species: *Nephtys caecoides*
Toxicant: Copper Sulfate

Date: 28 April 1994
T-10774

Concentration (μg/L)	Replicate	Number Surviving, Observation Time (hours) 0	Number Surviving, Observation Time (hours) 96	Mean % Survival
Control	1	10	8	90
	2	10	10	
6.25	1	10	8	90
	2	10	10	
12.5	1	10	9	85
	2	10	8	
25	1	10	8	70
	2	10	6	
50	1	10	9	90
	2	10	9	
100	1	10	6	60
	2	10	6	
500	1	10	0	0
	2	10	0	

96-hour LC_{50} (Spearman) = 108 ppb

95% confidence limits = 71.5 ppb - 162 ppb

Appendix E

Appendix E: LPC Calculation and Test Organism Handling Logs

Table E1. Calculations of the Limiting Permissible Concentrations (from EPA/ACOE 1977) for disposal depths of **50**, **20** and **10** meters, Humboldt Baseline Survey II, Composite FLTB: *Citharichthys stigmaeous* .

	50	**20**	**10**
Mixing Zone Estimation (V_m)			
Depth of disposal site (m) =			
Pi =	3.1416	3.1416	3.1416
Width of vessel (m) =	11*	11*	11*
Length of vessel (m) =	35*	35*	35*
Speed of vessel (m/sec) =	0.5*	0.5*	0.5*
Time of discharge (sec) =	15*	15*	15*
Mixing Zone Volume (m^3) =	2139075	855630	427815
Volume of Liquid Phase (V_w)			
Bulk density (constant) =	1.5	1.5	1.5
Particle density (constant) =	2.6	2.6	2.6
Density of liquid phase (constant) =	1.0	1.0	1.0
Volume of disposal vessel (m^3) =	1155*	1155*	1155*
Liquid phase volume (m^3) =	794	794	794
Concentration of Suspended Phase (C_{sp})			
Percent Silt =	39.4	39.4	39.4
Percent Clay =	19.1	19.1	19.1
Volume (m^3) of suspended phase (V_{sp}) =	211	211	211
Projected Percent Concentration (C_{sp}) =	0.0099	0.024	0.049
LC_{50} from bioassay (% elutriate) =	71.7	71.7	71.7
Factor LC_{50} X 0.01 =	0.717	0.717	0.717

The factored LC50s are higher than the projected concentrations; therefore the Limiting Permissible Concentration (LPC) is not exceeded for composite FLTB: *Citharichtys stigmaeous* for disposal depths of 50, 20 and 10 meters.

* These values are estimations; actual values were not available.

Toxscan, Inc.

Receiving, Evaluation and Acclimation Log Worksheet

REAL

Species: Cithariichthys Stigmaeus	Supplier: Brezina & Assoc.	# Ordered: 960
Date Shipped:	Date/Time Received: 06MA494 1130	Shipped via: Fed Ex

INITIAL EVALUATION

Package Intact? ☒ Yes ☐ No	Initials: CRW	pH: 6.8 units
Temperature: 14.7 °C	Dissolved Oxygen: 720 mg/l	Sal./Cond.: 31.9 ‰/µmhos
Estimated # received: 800 200/4 boxes		# Dead: 4

Organism condition/comments: Arrived in 4 boxes, 1 pack of blue ice per box
Divided into Holding Tanks 3, 7, & 8

HOLDING/ACCLIMATION

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments
06MA494	CRW	8.0	11.7	9.1	33.3	—	—	Holding Tank Conditions
07MA494	ASB	7.9	12.3	8.6	33.2	✓	1	
08MA494	ASB	7.9	13.4		33.0	✓	1	
09MA494	CRW	8.1	13.7	8.6	33.0	Brine ✓	6	
10 May 94	CRW	8.0	14.1	8.3	33.0	—	8	Test ↑ today
	used	entire	lot	of	animals	- CRW	11MA494	

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
10MA494	CRW	T- 10774	800	ACOE - Humboldt
		T-		
		T-		
		T-		
		T-		

Report #2074

ToxScan, Inc.

Receiving, Evaluation and Acclimation Log Worksheet

REAL

Species: *Nephtys cicoides*	Supplier: *Brezina & Assoc.*	# Ordered: *2000*
Date Shipped: *25APR94*	Date/Time Received: *26APR94 1.*	Shipped via: *Greyhound*

INITIAL EVALUATION *in 6 coolers - 2 coolers monitored*

Package Intact? ☒ Yes ☐ No	Initials: *FB*	pH: *7.6 / 7.6* units
Temperature: *13.6 / 14.3* °C	Dissolved Oxygen: *20+ / 20+* mg/l	Sal./Cond.: *35.0 / 34.8* (‰) µmhos
Estimated # received: *2000*		# Dead: *none observed*

Organism condition/comments:

HOLDING/ACCLIMATION *6 coolers split into 3 holding tanks with ~2" of sediment each #1, #2, #3*

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments
26APR94	FB	8.1	12.7	8.9	32.9	NA	—	holding tank conditions
27APR94	TB	8.0	10.9	8.4	32.8	—	—	
28APR94	CRW	8.0	12.2	8.0	32.8	NA.	2	
28APR94	CRW	Used	all	remaining	animals			

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
28APR94	CRW	T-	~~1678~~ ①	COE - Humboldt project ① C-CRW 28APR94
		T-		
		T-		
		T-		
		T-		

RECIPIENT'S COPY

1 [redacted] Date 4/19/94

From (Your Name) Please Print: John Brezina
Your Phone Number (Very Important): (707) 878-2853
Company: BREZINA AND ASSOC — Department/Floor No.
Street Address: 520 OCEANA DR
City: DILLON BEACH — State: CA — ZIP Required: 94929

2 To (Recipient's Name) Please Print: Pete Schafer
Recipient's Phone Number (Very Important): 408 724 4522
Company: Toxscan — Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 42 Hanger Way
City: Watsonville — State: Ca — ZIP Required: 95076

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City — State — ZIP Required

3 PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check [redacted]

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†): 11 ☒ OTHER PACKAGING; 16 ☐ FEDEX LETTER*; 12 ☐ FEDEX PAK*; 13 ☐ FEDEX BOX; 14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon. No Saturday delivery†): 51 ☐ OTHER PACKAGING; 56 ☐ FEDEX LETTER*; 52 ☐ FEDEX PAK*; 53 ☐ FEDEX BOX; 54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day †): 30 ☐ ECONOMY*
*Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only): 46 ☐ GOV'T LETTER; 41 ☐ GOV'T PACKAGE

Freight Service (for packages over 150 lbs.): 70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required); 80 ☐ TWO-DAY FREIGHT**
†Delivery commitment may be later in some areas.
*Declared Value Limit $500.
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service: 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H); 2 ☒ DELIVER WEEKDAY
Saturday Service: 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H); 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations); 9 ☐ SATURDAY PICK-UP (Extra charge)
Special Handling: 4 ☐ DANGEROUS GOODS (Extra charge); 6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice 9, UN 1845 ____ X ____ kg. 904 III
☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES / WEIGHT In Pounds Only / YOUR DECLARED VALUE (See right)
Total 1 — Total 13 — Total 200.

Emp. No. — Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City — State — Zip
Received By: X
Date/Time Received — FedEx Employee Number

7 Release Signature:

Federal Express Use
Base Charges
Declared Value Charge

REVISION DATE 12/92
FORMAT #158
158

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AIRBILL PACKAGE TRACKING NUMBER 8924491715

8924491715

RECIPIENT'S COPY

1 [redacted] Date 4-...

From (Your Name) Please Print: [illegible] Bullock
Your Phone Number (Very Important): ( )
Company — Department/Floor No.
Street Address
City — State — ZIP Required

2 To (Recipient's Name) Please Print: Peter Schafer
Recipient's Phone Number (Very Important): (408)
Company: TOXSCAN — Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 42 HANGAR WAY
City: WATSONVILLE — State: CA — ZIP Required: 95076

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

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4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†): 11 ☒ OTHER PACKAGING; 16 ☐ FEDEX LETTER*; 12 ☐ FEDEX PAK*; 13 ☐ FEDEX BOX; 14 ☐ FEDEX TUBE

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*Economy Letter Rate not available. Minimum charge: One pound Economy rate.

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†Delivery commitment may be later in some areas.
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**Call for delivery schedule.

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Weekday Service: 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H); 2 ☒ DELIVER WEEKDAY
Saturday Service: 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H); 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations); 9 ☐ SATURDAY PICK-UP (Extra charge)
Special Handling: 4 ☐ DANGEROUS GOODS (Extra charge); 6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845, ____ X ____ kg. 904 III
☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES / WEIGHT In Pounds Only / YOUR DECLARED VALUE (See right)
1 — 15 — 100
Total 1 — Total 15 — Total 100

DIM SHIPMENT (Chargeable Weight)
☐ ____ lbs.
L x W x H

Received At
1 ☐ Regular Stop 2 ☐ On-Call Stop 3 ☐ Drop Box 4 ☐ B.S.C. 5 ☐ Station

Emp. No. — Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City — State — Zip
Received By: X
Date/Time Received — FedEx Employee Number

7 Release Signature:

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 12/92
PART #137204 FXEM 12/...
FORMAT #158
158

ToxScan, Inc.

Receiving, Evaluation and Acclimation Log Worksheet

REAL

Species: Macoma nasuta	Supplier: Brezina & Assoc.	# Ordered: 800
Date Shipped: 19APR94	Date/Time Received: 20APR94:1000	Shipped via: fed ex 863704027 4

INITIAL EVALUATION

Package Intact? ☒ Yes ☐ No	Initials: FB	pH: 7.0 units
Temperature: 15.0 °C	Dissolved Oxygen: 2.6 mg/l	(Sal) /Cond.: 32.5 (‰) µmhos
Estimated # received: 800		# Dead: 5

Organism condition/comments: Very low DO level Mostly buried by 1645
Split between two tanks #7 and #8 [#7 / #8]

HOLDING/ACCLIMATION

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments
20APR94	FB	8.1	13.2	8.6	33.2	NA	—	Holding tank conditions
21APR94	FB	8.1 / 8.1	13.4 / 12.9	8.7 / 8.9	33.2 / 33.2	1 / 1	—	
22APR94	CRW	8.1 / 8.1	12.6 / 12.2	8.5 / 9.1	33.3 / 33.3	NA	4	
23APR94	ASB/CRW	illegible	13.3 / 12.3	8.6 / 9.2	33.2	NA	2	
24APR94	FB/ASB	8.1 / 8.1	11.5 / 11.2	8.5 / 8.9	33.2	NA	1 / 0	
25APR94	FB	8.1 / 8.1	13.0 / 12.0	8.8 / 9.3	33.1	NA	1 / 1	
26APR94	FB	8.0 / 8.0	12.2 / 11.6	8.6 / 8.9	32.9	NA	0 / 0	
27APR94	TS	8.1 / 8.1	12.1 / 12.2	8.6 / 8.9	32.8	—	1 / 0	
28APR94	CRW	8.0 / 7.9	12.5 / 12.3	8.0 / 8.4	32.8	—	2 / 0	

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
28APR94	CRW	T-	750	COE – Humboldt project
		T-		
		T-		
		T-		
		T-		

TW1041444

ToxScan, Inc.
Receiving, Evaluation and Acclimation Log Worksheet
REAL

Species: Mytilus edulis	Supplier: Carlsbad Aquafarm	# Ordered: 1 gallon
Date Shipped: 13APR94	Date/Time Received: 14APR94 - 0943	Shipped via: FedX 898544736 5

INITIAL EVALUATION

Package Intact? ☒ Yes ☐ No	Initials: FB	pH: NA units
Temperature: 14.5 °C	Dissolved Oxygen: NA mg/l	Sal./Cond.: NA ‰/µmhos
Estimated # received: 100+		# Dead: 0

Organism condition/comments: Arrived dry on blue ice. Cracked 6 open to sete gonads 5♀: 1 poor, 4 good, 1♂ fair. ~2♂ spawned during acclimation, spawners removed from tank. Tank temperature turned down to prevent further spawning. Monitored closely for spawning activity. Lots of spawning. Floated tubs till spawning stopped. Discarded gametes and rinsed animals before submerging tubs again. Monitored closely. No more spawning observed

HOLDING/ACCLIMATION

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments
14APR94	FB	7.7	15.2	7.6	33.2	—	0	holding tank conditions
15APR94	JC	7.5	14.3	7.7	33.8	—	0	
16APR94	JC	7.5	14.3	7.7	33.8	—	0	
17APR94	CRW	7.5	14.4	7.7	33.9	—	0	
19APR94	FB	7.5	14.4	7.8	33.9	—	0	
20APR94	TS	7.7	14.3	7.9	33.8	—	0	
↳ Termination								

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
4/20/94	FB	T-10774	≃40	Successful Spawn
		T-		
		T-		
		T-		
		T-		

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City | State | ZIP Required

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Company | Department/Floor

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)

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5 ☐ Cash/Check

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning)
11 ☐ OTHER PACKAGING
16 ☐ FEDEX LETTER*
12 ☐ FEDEX PAK*
13 ☐ FEDEX BOX
14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon / No Saturday delivery)
51 ☒ OTHER PACKAGING
56 ☐ FEDEX LETTER*
52 ☐ FEDEX PAK*
53 ☐ FEDEX BOX
54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day †)
30 ☐ ECONOMY*
* Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
46 ☐ GOVT LETTER
41 ☐ GOVT PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☐ TWO-DAY FREIGHT**
† Delivery commitment may be later in some areas
*Declared Value Limit $500.
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 ☐ DELIVER WEEKDAY

Saturday Service
31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
4 ☐ DANGEROUS GOODS (Extra charge)
6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845, ____ X ____ kg, 904 III
☐ RESTRICTED
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
Total	Total	Total

DIM SHIPMENT (Chargeable Weight)
☐ ____ lbs.
L x W x H

Received At
1 ☐ Regular Stop | 3 ☐ Drop Box
2 ☐ On-Call Stop | 4 ☐ B.S.C. | 5 ☐ Station

7 Release Signature: X

Emp. No. | Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City | State | Zip
Received By:
X
Date/Time Received | FedEx Employee Number

REVISION DATE 12/92
PART #137204 FXEM
FORMAT #158
158

CU# 118
ID#
DP
CK#

INVOICE

INVOICE NO: 2575 DATE: APR 13, 1994

CARLSBAD AQUAFARM INC.
P.O. BOX 2600
CARLSBAD, CA 92018
PHONE (619)438-2444 FAX (619)438-3568

SOLD TO

TOXSCAN INC.
42 HANGAR WAY
WATSONVILLE CA 95076-
PHONE (408) 724-4522
FAX

SHIP TO

TOXSCAN INC.
42 HANGAR WAY
WATSONVILLE CA 95076-

SHIP DA APR 13, 1994	FOB SAN DIEGO	SOURCE
TERMS NET 30 DAYS	SHIP VIA FEDX 121251221	PO REF PETE

	ITEM NO	QTY	DESCRIPTION	POUNDS	PRICE	AMOUNT
1	BIO	1	MUSSEL FOR BIOASSAY	1	$100.00	$100.00

TOTAL WEIGHT (POUNDS) ****** 1 ******

MEMO IF THESE MUSSELS ARE INSUFFICIENT OR THEY DO NOT SPAWN FOR YOU PLEASE ADVISE, AND I WILL SEND ANOTHER BATCH. PLEASE MAIL ICE CHEST BACK WITH YOUR NEXT ORDER THANK YOU!

RELEASE DATE

BATCH #

AIR BILL #

FLIGHT #

ORDER VALUE	$100.00
LESS CREDIT	
SUBTOTAL	$100.00
SALES TAX	
SHIPPING	
TOTAL INVOICE	$100.00

SHIPMENT RECEIVED BY_____ DATE_____

ToxScan, Inc.
Receiving, Evaluation and Acclimation Log Worksheet
REAL

Species: *Rhepoxynius abronius*	Supplier: NAS	# Ordered: 900
Date Shipped: 4-18-94	Date/Time Received: 19APR94 1000h	Shipped via: FED. EX.

INITIAL EVALUATION

Package Intact? ☒ Yes ☐ No	Initials: PS	pH: N/A sediment units
Temperature: 12.5 °C	Dissolved Oxygen: N/A mg/l	Sal./Cond.: 30 ‰/µmhos
Estimated # received: 900 +10%		# Dead: 4 after immersing in S.W.

Organism condition/comments: Animals acclimated to full-strength S.W at 14.8°C. in 30 minutes.

HOLDING/ACCLIMATION

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments
21APR94	AB	8.1	15.7	7.8	33.2	—	3	
22 APR 94	AB	8.2	15.4	7.8	33.9	—	0	lowered S.W. to 33‰ using 16°C MH water.
23 APR94	CRW	8.0	15.5	7.7	33.0	—	6	
24APR94	FB	8.1	15.5	7.7	33.1	—	4	
25APR94	CRW	8.1	15.6	7.7	33.0	—	2	
26APR94	CRW	8.1	15.4	7.7	33.5	—	3	
27APR94	PS	8.0	15.4	7.8	34.0	—	0	
28APR94	PS	8.1	15.5	7.6	34.1	—	0	
29APR94	ASB	8.0	15.6	7.7	34.0	—	0	
29APR94	PS	1534h — Animals (few) terminated after successful Ref. Tox. test.						

460

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
25APR94	PS	T-10774	600	Set up Home, Ref SAM6 & EK ~~Ref~~ and Cd ref tox but not FL
		T-		
		T-		Home-Renew or NH_3 Ref. tox.
26 Apr 94	TS	T-10774	220	FL/Home-Renew ↑
		T-		NH_3 Ref. Tox. not run — PS

P:\WP51\CATALOGS\BA-REAL.01/25/94

29APR94

NORTHWESTERN AQUATIC SCIENCES
NEWPORT, OR 97365

SUBJECT: Animal Collection Data Sheet

SOLD TO: TOXSCAN
42 HANGAR WAY
WATSONVILLE, CA 95076

ATTN: Peter Slafer
(408) 724-4522

DATE OF SHIPMENT: 4-18-94

ANIMAL HISTORY

Species	Age/Size	Number Shipped
Rhepoxynius abronius	adult	900 (+10%)

WATER QUALITY AT TIME OF SHIPMENT

✓ Temperature	13.8°C	Hardness	———
✓ Salinity	30ppt	Alkalinity	———
Conductivity	———	pH	7.9
✓ DO	8.8 mg/L	other:	———

PACKAGED BY: Carri Bullock DATE: 4-18-94

FIELD COLLECTION/CULTURE NOTES: Collected on 4-11-94 at West Beach, Whidbey Is. wa. No collection site data available.

ADDITIONAL COMMENTS: 2 Liters of sediment included.

Please call Linda Garrison at (503) 265-7225 if you have any questions.

Form: SHIPPING

ToxScan, Inc.

Receiving, Evaluation and Acclimation Log Worksheet

REAL

Species: *Holmesimysis costata*	Supplier: *Steve Peters*	# Ordered:
Date Shipped: *05/11/94*	Date/Time Received: *05/11/94*	Shipped via: *hand delivered*

INITIAL EVALUATION

Package Intact? ☒ Yes ☐ No	Initials: *FB*	pH: *7.9* units
Temperature: *13.8* °C	Dissolved Oxygen: *7.5* mg/l	Sal./Cond.: *34.0* ‰/µmhos
Estimated # received:		# Dead:

Organism condition/comments: *appear healthy and active*

HOLDING/ACCLIMATION

Date	Initials	pH (units)	Temp (°C)	D.O. (mg/l)	Sal/Cond (‰/µmhos)	Food	# Dead	Comments

TEST INITIATION

Date	Initials	Test ID	# Organisms used	Comments
11MAY94	*FB*	T-*10774*	*770*	
		T-		
		T-		
		T-		
		T-		

Appendix F

Chains of Custody

OXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C T-10774

DC 25AUG94

COMPANY NAME: Kinnetic Laboratories Inc
ATTN: Tasha Grandi
ADDRESS: 307 Washington St.
Santa Cruz Ca 95060
PHONE: (408) 457-3950
FAX:
PROJECT NAME: Humboldt
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:
→ ToxScan Bioassay Division.
SEND INVOICE TO:
P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: 12

~~Lab Use Only~~ ID Number / Sample I.D	~~Client Sample~~ Identification / Site I.D	Sample Information: Sampling Date	Sampling Time	Sample Matrix	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW: Sediment PSDonly	Sediment Chemistry						SAMPLE CONDITION: ToxScan I.D.
UM94SED0001	SAM-7D	03/31/94		Sediment		Glass	1 liter	1		X						T-10774-01
UM94SED0002	SAM-5D	03/31/94								X						T-10774-02
UM94SED0003	SAM-4D	03/31/94								X						T-10774-03
UM94SED0004	SAM-3D	03/31/94								X						T-10774-04
UM94SED0005	SAM-2D	03/31/94								X						T-10774-05
UM94SED0006	SAM-1D	03/31/94								X						T-10774-06
UM94SED0007	SAM-6C	03/31/94									X					T-10774-07
UM94SED0008	SAM-6B	03/31/94									X					T-10774-08
UM94SED0009	SAM-6A	04/01/94									X					T-10774-09
UM94SED0010	SAM-4(D)	04/01/94		↓		↓	↓	↓		X						T-10774-10

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	Michael Schley	3/4/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C

T-10774

DC 354

COMPANY NAME: Kinnetic Laboratories Inc
ATTN: Tasha Grand
ADDRESS: 307 Washington St.
Santa Cruz Ca 95060
PHONE: (408)457-3950
FAX:
PROJECT NAME: Humboldt
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:

SEND INVOICE TO:
P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

Sediment Chemistry
Sediment PSD only

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4622
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: 12

Lab Use Only: ID Number / Sample I.D	Client Sample Identification / Site I.D	Sample Information: Sampling Date	Sampling Time	Sample Matrix	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:							SAMPLE CONDITION: Toxscan I.D.
HUM94SED0011	SAM-6 Composite	04/01/94		Sediment		Glass	1 liter	1	X							T-10774-11
HUM94SED0012	NB-10	04/01/94								X						T-10774-12
HUM94SED0013	NB-9	04/01/94								X						T-10774-13
HUM94SED0014	NB-8	04/01/94								X						T-10774-14
HUM94SED0015	NB-7	04/01/94								X						T-10774-15
HUM94SED0016	NB-6	04/01/94								X						T-10774-16
HUM94SED0017	NB-5	04/01/94								X						T-10774-17
HUM94SED0018	NB-4 Rep 1	04/01/94								X						T-10774-18
HUM94SED0019	NB-3	04/01/94								X						T-10774-19
HUM94SED0020	NB-1	04/01/94								X						T-10774-20

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	Tasha Sorkin Michael Sorkin	04/04/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT   Internal C.O.C   T-10774   PAGE 2 OF 11

DC 3/12/94

COMPANY NAME: Kinnetich Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS:
ATTN: Tasha Grand.	
ADDRESS: 307 Washington St. Santa Cruz Ca 95060	
PHONE: (408) 457-3950	
FAX:	
PROJECT NAME: Humboldt	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 1
SHELF #: / 2

ANALYSIS(ES) REQUESTED — CHECK THE APPROPRIATE BOX BELOW:

~~Lab Use Only: ID Number~~ Sample I.D	~~Client Sample Identification~~ Site I.D	Sampling Date	Sampling Time	Sample Matrix	Sample Preservative	Bottle Type	Bottle Size	No. of Bottles	Sediment Chemistry	Sediment PSD only						~~SAMPLE CONDITION:~~ Toxscan I.D
HUM94SED0021	NB4 rep 2	04/01/94		Sediment		Glass	1-Liter	1		X						T-10774-21
HUM94SED0022	EK-1	04/02/94								X						T-10774-22
HUM94SED0023	EK-2	04/02/94							X							T-10774-23
HUM94SED0024	EK-3	04/02/94							X							T-10774-24
HUM94SED0025	EK-4	04/02/94							X							T-10774-25
HUM94SED0026	EK-Composite	04/02/94							X							T-10774-26
HUM94SED0027	FL-8	04/03/94								X						T-10774-27
HUM94SED0028	FL-7	04/03/94								X						T-10774-28
HUM94SED0029	FL-6	04/03/94								X						T-10774-29
HUM94SED0030	FL-5	04/03/94								X						T-10774-30

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	Michael Schley Michael Schlenz	04/04/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C

T-10774

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

COMPANY NAME: Kinnetich Laboratories Inc.
ATTN: Tasha Guand.
ADDRESS: 307 Washington St
Santa Cruz Ca 95060
PHONE: (408) 457-3950
FAX:
PROJECT NAME: Humboldt
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:

SEND INVOICE TO:

P.O. / CONTRACT NO:

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: 12

ANALYSIS(ES) REQUESTED: Sediment Chemistry; Sediment PSD only

~~Lab Use Only:~~ Sample I.D	~~Client Sample Identification~~ Site I.D	Sampling Date	Sampling Time	Sample Matrix	Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	Sediment Chemistry	Sediment PSD only						~~SAMPLE CONDITION:~~ Toxscan I.D
HUM945ED0031	FL-3	04/03/94		Sediment		Glass	1-Liter	1	X							T-10774-31

CHECK THE APPROPRIATE BOX BELOW:

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	[signature] Michael Schley	04/04/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Sub-Contract Order 4107 Page 1 of 1 PAGE

COMPANY NAME:	ToxScan Inc.
ATTN:-	Mary Lou Milazzo
ADDRESS:	
PHONE:	408 / 724-4522
FAX:	408 / 724-3188
PROJECT NAME:	Humboldt Harbor
PROJECT NUMBER:	

COMMENTS / SPECIAL INSTRUCTIONS:
DL = 1 part per trillion
TAT = 3 weeks (by 29 April '94)
QC = 1 LCS, 1 blank

SEND INVOICE TO:

P.O. / CONTRACT NO: 09680

ANALYSIS(ES) REQUESTED — 25 APR 94

TCDD/TCDF only by EPA 8290

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION:
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ToxScan ID Number / Sample I.D	Client Sample Identification / Site I.D	Sample Information: Sampling Date	Sampling Time	Sample Matrix	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION: ToxScan I.D
10774-32	SAM 6 Composite	04/01/94		Sediment		wm glass jar	1L	1	X	
10774-33	Reference Composite	04/05/94		↓		↓	↓	1	X	
10774-34	FL Composite	04/04/94						1	X	
10774-35	EK Composite	04/02/94						1	X	

SAMPLER'S SIGNATURE AND PRINTED NAME:

Sub contract Laboratory: Alta Analytical 916-933-1640

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
Mary Lou Milazzo via UPS Red Label		04/07/94	16:05

WP51\DATALOGS\COC.MLM\March 15, 1994

Please return completed copy of COC to ToxScan. Thankyou.

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C

T-10774

25 APR 94

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

COMPANY NAME: Kinnetick Laboratories Inc
ATTN: Tasha Grand
ADDRESS: 307 Washington St. Santa Cruz Ca 95060
PHONE: (408) 457-3950
FAX:
PROJECT NAME: Humboldt
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:

SEND INVOICE TO:

P.O. / CONTRACT NO:

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: 47

~~Lab Use Only: ID Number~~ Sample I.D	~~Client Sample Identification~~ Site I.D	Sampling Date	Sampling Time	Sample Matrix	Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	Sediment Chemistry	Sediment PSD only					~~SAMPLE CONDITION:~~ Toxscan I.D
HUM94SED0033	FL-4	04/04/94		Sediment		Glass	1-1Liter	1	X						T-10774-36
HUM94SED0034	FL-1	04/04/94		↓		↓	↓	↓	X						T-10774-37
HUM94SED0035	FL-2	04/04/94							X						T-10774-38
HUM94SED0036	FL-Composite	04/04/94							X	~~X~~					T-10774-39
HUM94SED0037	NB-2	04/04/94								X					T-10774-40
HUM94SED0042	Ref-Composite	04/05/94							X						T-10774-41
HUM94SED0043	Bar	04/05/94								X					T-10774-42
HUM94SED0044	Ent 2	04/05/94								X					T-10774-43
HUM94SED0045	Ent 1	04/05/94								X					T-10774-44

CHECK THE APPROPRIATE BOX BELOW:

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	[signature] Michael Schlenz	04/06/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C T-1074 PAGE 1 OF 1

25 APR 94

COMPANY NAME: Kinnetich Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS: → TOXSCAN BIOASSAY DIVISION
ATTN: Tasha Grunel	
ADDRESS: 307 Washington St. Santa Cruz Ca 95060	
PHONE: (408) 457-3950	
FAX:	
PROJECT NAME: Humboldt	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

Sediment Bioaccumulation

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: *

~~Lab Use Only~~ ID Number Sample I.D	~~Client Sample~~ Identification Site I.D	Sample Information: Sampling Date	Sampling Time	Sample Matrix	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION: Toxscan I.D
HUM94SED0036	FL-Composite	04/04/94		Sediment		Cooler	68qt	3	X	T-1074-45-46-47
HUM94SED0042	Ref-Composite	04/05/94		↓		↓	↓	↓	X	T-1074-48-49-50
HUM94SED0011	SAmb Composite	04/01/94						2	X	T-1074-51-52
HUM94SED0026	EK-Composite	04/02/94						3	X	T-1074-53-54-55

SAMPLER'S SIGNATURE AND PRINTED NAME:

* Under Shelf 6 Coolers 01 & 02 * Under Shelf 31 Cooler 53
Under Shelf 12 Coolers 03 & 04 Under Shelf 45 Cooler 54-55
Under Shelf 18 Coolers 05 & 06 Under Shelf 51 Cooler 51-52
Under Shelf 6 Cooler 45-46
Under Shelf 12 Cooler 47-48
Under Shelf 18 Cooler 49-50

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	Tom Sibley Michael Schleng	04/04-06/94	

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Internal C.O.C.

T-10774

COMPANY NAME: Kinnetick Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS:
ATTN: Tasha Grandl.	
ADDRESS: 307 Washington St. Santa Cruz Ca 95060	
PHONE: (408) 457-3950	
FAX:	
PROJECT NAME: Humboldt	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: under shelf # 31
SAMPLE CONDITION: Toxscan I.D.
T-10774-56-58

ANALYSIS(ES) REQUESTED

CHECK THE APPROPRIATE BOX BELOW:

~~Lab Use Only:~~ ~~ID Number~~ Sample I.D	~~Client Sample~~ ~~Identification~~ Site I.D	Sampling Date	Sampling Time	Sample Matrix	Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:
Elutriate	Reference	04/05/94	—	Elutriate water	—	Cubitainer	5 gal	3

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
	[signature] Michael Schlang	04/04/94	

COMPANY NAME: Kinnetich Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS: → TOXSCAN BIOASSAY DIVISION
ATTN: Tasha Grand	
ADDRESS: 307 Washington St	
Santa Cruz Ca 95060	
PHONE: 408-457-3950	
FAX:	
PROJECT NAME: Humboldt	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED: Diss Sulfides

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #: 4
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sub Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-59	EK-1	04/14/94	10:00	Sediment	Frozen	Glass	125ml	1	X	INTACT
T-10774-60	EK-2								X	
T-10774-61	EK-3								X	
T-10774-62	EK-4								X	
T-10774-63	EK Composite								X	
T-10774-64	SAM-1D								X	
T-10774-65	SAM-2D								X	
T-10774-66	SAM-3D								X	
T-10774-67	SAM-4D								X	
T-10774-68	SAM-4(D)								X	

SAMPLER'S SIGNATURE AND PRINTED NAME: Michael Schlenz

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
Michael Schlenz Michael Schlenz	Douglas Clark DOUGLAS CLARK	04/14/94	1520

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

Sub-Sample C.O.C

COMPANY NAME: Kinnetich Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS: → TOXSCAN BIOASSAY DIVISION
ATTN: Tasha Gruenel.	
ADDRESS: 307 Washington St. Santa Cruz Ca 95060	
PHONE: (408) 457-3950	
FAX:	
PROJECT NAME: Humboldt	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

Diss Sulfides

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #: 4
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sub Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-69	SAM-5D	04/14/94	10:00	Sediment	Frozen	Glass	125ml	1	X	INTACT
T-10774-70	SAM-6A								X	
T-10774-71	SAM-6B								X	
T-10774-72	SAM-6C								X	
T-10774-73	SAM-6 Composite								X	
T-10774-74	SAM-7D								X	
T-10774-75	FL-1								X	
T-10774-76	FL-2								X	
T-10774-77	FL-3								X	
T-10774-78	FL-4								X	

SAMPLER'S SIGNATURE AND PRINTED NAME: Michael Schlutz

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
Michael Schlutz Michael Schlutz	Douglas Clark DOUGLAS CLARK	04/14/94	1520

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

COMPANY NAME: Kinnetich Laboratories Inc	COMMENTS / SPECIAL INSTRUCTIONS: → TOXSCAN BIOASSAY DIVISION
ATTN: Tasha Grancl	
ADDRESS: 307 Washington St. Santa Cruz Ca 95060	
PHONE: 408-457-3950	
FAX:	
PROJECT NAME: Humboldt.	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

Diss Sulfides

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #: 4
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sub Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-79	FL-5	04/14/94	10:00	Sediment	Frozen	Glass	125ml	1	X	INTACT
T-10774-80	FL-6								X	
T-10774-81	FL-7								X	
T-10774-82	FL-8								X	
T-10774-83	FL-Composite								X	
T-10774-84	Reference Composite								X	
T-10774-85	NB-4 Repl								X	

SAMPLER'S SIGNATURE AND PRINTED NAME: Michael Schlenz

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
Michael Schlenz Michael Schlenz	Douglas Clark DOUGLAS CLARK	04/14/94	1520

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

Pg. 1 of 1

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT TOXSCAN BIOASSAY DIVISION

CONTACT _____ PHONE _____

LABORATORY NO. T-10774

ACCOUNT NO. 325/T02

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE			~~PER PETE SCHAFER SAMPLE LABEL SHOULD READ "HOME SEDIMENT" ERROR~~ DC 03 MAY 94					ToxScan Inc.			CONTRACT LABORATORY		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
control	Sediment *		2 5gal. Buckets				John Brezina	4/25	Peter Schafer	4/27/94	Shipped temp: 15.0°C Intact	4/25		

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: John Brezina

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: Greyhound Bus

RECEIVED BY LABORATORY: Peter Schafer 4/27/94 10:40 a.m.

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: _____

* PER PETE SCHAFER, SAMPLE LABEL SHOULD READ "HOME SEDIMENT" DC 03 MAY 94

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

TOXSCAN INC. / LABORATORY (BATCH) ID: I- 10177

SAMPLE LOG-IN CHECKLIST (CHECK ONE)	YES	NO	N/A
1. Shipping service: UPS Red / UPS Blue / UPS Ground / Federal Express (circle one) courier / delivered by hand / (other) (describe): GREYHOUND			
Airbill number (write the number in this space):			
2. Is the shipping container intact?	✓		
Type of shipping container received? cooler / box / none / (other) (describe): (circle one) BUCKET			
Are custody seals present on the shipping container?		✓	
If yes, are they intact?			✓
Shipping preservation (circle one): water ice / dry ice / blue ice / (none) / other (describe):			
Shipping container temperature (record on this line in °C): ~~N/A~~ DC 15.0°			
3. Is a chain of custody (COC) form present?	✓		
Are there discrepancies between the COC and the samples? (If yes, describe on COC or below.)		✓	
4. Are the sample containers intact? (If no, describe on COC or below.)	✓		
Are custody seals present on the sample containers?		✓	
If yes, are they intact? (If no, describe on COC or below.)			✓
5. Liquid samples only: Are the samples appropriately preserved?			✓

Liquid sample pH verification (10% of samples):	(circle one or write-in the pH)		
ToxScan ID:	pH<2	pH>12	pH=
ToxScan ID:	pH<2	pH>12	pH=
ToxScan ID:	pH<2	pH>12	pH=
ToxScan ID:	pH<2	pH>12	pH=
ToxScan ID:	pH<2	pH>12	pH=

6. Date shipping container returned (write-in date or N/A): N/A

NOTES / COMMENTS:

For Samples Preserved by Sample Acquisition Staff (write-in the appropriate information):

Chemical Preservative:	Sample ID #'s preserved:	Lot # of Chemical Preservative:

Signature: Peter Schafer

Date Received: 27 APR 94

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT

SUB-SAMPLING C.O.C. T-10774 PAGE 1 OF 2

COMPANY NAME: TOXSCAN BIOASSAY DIV.	COMMENTS / SPECIAL INSTRUCTIONS: SUB-SAMPLED FROM A COMPOSITE OF T-10774-86 & -87 * SUBCONTRACTED TO ALTA ANALYTICAL
ATTN: RAY MARICEL	
ADDRESS: 42 HANGAR WAY	
WATSONVILLE CA 95076	
PHONE: 724-4522	
FAX:	
PROJECT NAME: HUMBOLDT C.O.E.	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED: TIER II CHEMISTRY; TCDD/TCDF *

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #: 11
SHELF #: 47

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sub-Sampling Date	Sub-Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-88	HOME SEDIMENT	27APR94		SEDIMENT	NONE	G/J	1 LITER	1	✓	INTACT
T-10774-89	HOME SEDIMENT	↓		↓	↓	↓	↓	1	✓	↓

SAMPLER'S SIGNATURE AND PRINTED NAME: Peter Schafer Peter Schafer

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT — SUB-SAMPLE COC

COMPANY NAME: TOXSCAN BIOASSAY DIV.
ATTN: RAY MARKEL
ADDRESS: 42 HANGAR WAY
WATSONVILLE CA 95076
PHONE: 724-4522
FAX:
PROJECT NAME: HUMBOLDT C.O.E.
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:

SEND INVOICE TO:

P.O. / CONTRACT NO:

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #: 4
REFRIGERATOR #:
SHELF #:

ANALYSIS(ES) REQUESTED: DISSOLVED SULFIDES

Lab Use Only: ID Number	Client Sample Identification	Sample Information: SUB-Sampling Date	SUB Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW: DISSOLVED SULFIDES							SAMPLE CONDITION:
T-10774-90	HOME SEDIMENT	03 MAY 94	1130	SEDIMENT	FROZEN	G/J	125 ml	1	✓							INTACT

SAMPLER'S SIGNATURE AND PRINTED NAME: Sub Sampled by [signature] 05/03/94

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT INTERNAL C.O.C. T-10774

COMPANY NAME: TOXSCAN BIOASSAY DIV.
ATTN: RAY MARKEL
ADDRESS: 42 HANGAR WAY
WATSONVILLE CA 95076
PHONE: 724-4522
FAX:
PROJECT NAME: HUMBOLDT C.O.E.
PROJECT NUMBER:

COMMENTS / SPECIAL INSTRUCTIONS:
PER PETE SCHAFER, SAMPLES WERE NOT PRESERVED

* SUB-SAMPLES LOCATED IN FRIG 11, SHELF 47; REMAINING SEDIMENTS ENTIRELY USED FOR BIOACCUMULATION (PER PETE SCHAFER 05MAY94)

SEND INVOICE TO:
P.O. / CONTRACT NO:

ANALYSIS(ES) REQUESTED

COMPOSITE THESE 2 SAMPLES FOR BIOACCUMULATION. SUB SAMPLE FOR TIER II CHEMISTRY.

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION *
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-86	HOME SEDIMENT	25 APR94		SEDIMENT	NONE	PLASTIC BUCKET	5 GAL.	1	✓	INTACT
T-10774-87	HOME SEDIMENT	↓		↓	↓	↓	↓	1	✓	↓

SAMPLER'S SIGNATURE AND PRINTED NAME:

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:

OXSCAN CHAIN-OF-CUSTODY DOCUMENT [illegible]

PAGE 1 OF 1

COMPANY NAME: Toxscan Inc	COMMENTS / SPECIAL INSTRUCTIONS: DL = 1 part per trillion; TAT = 3 weeks 05/20/94; QC = 1 LCS, 1 blank.
ATTN: Mary Lou Milazzo	
ADDRESS: 42 Hangar Way, Watsonville Ca 95076	
PHONE: (408) 724-4522	
FAX:	
PROJECT NAME: Humboldt C.O.E	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO: 09723.

ANALYSIS(ES) REQUESTED: TCDD/TCDF only by EPA 8290

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076

PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION:
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW: TCDD/TCDF only by EPA 8290							SAMPLE CONDITION:
T-10774-89	Control Sediment	04/25/94	/	Sediment	On Blue Ice	G/J	1L	1	X							

SAMPLER'S SIGNATURE AND PRINTED NAME:

Via UPS Next Day 04/25/94

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
[signature] Michael Schlesing			

42 Hangar Way
WATSONVILLE, CA 95076-2404

TEL (408) 724-4522
FAX (408) 724-3188

Show this Purchase Order Number on all correspondence, invoices, shipping papers and packages.

09723

TO Alta Analytical

916.933.1640

DATE	REQUISITION NO.
04/28/94	T-10774

SHIP TO Marylou Milazzo.

REQUISITIONED BY	WHEN REQUIRED	SHIPVIA	F.O.B. POINT
>			

QUANTITY ORDERED	QUANTITY RECEIVED	STOCK NO. / DESCRIPTION	UNIT PRICE		AMOUNT	
1		EPA 8290 for TCDD/TCDF	800	-	800	-
		only				
		D.L. = 1 part per trillion				
		QC = LCS, blank.				
		TAT = 3 weeks				
		(by ~~05/19/94~~) ms				
		05/20/94				
>						

1. Please send _____ copies of your invoice.
2. Order is to be entered in accordance with prices, delivery and specifications shown above.
3. Notify us immediately if you are unable to ship as specified.

M Schlea
AUTHORIZED BY

ORIGINAL

TOXSCAN CHAIN-OF-CUSTODY DOCUMENT Sub-Contract C.O.C. PAGE 1 OF 1

COMPANY NAME: Toxscan Inc.	COMMENTS / SPECIAL INSTRUCTIONS: DL = 1 part per trillion TAT = 3 weeks 05/20/94 QC = 1 LCS, 1 blank.
ATTN: Mary Lou Milazzo	
ADDRESS: 42 Hangar Way Watsonville Ca. 95076	
PHONE: (408) 724-4522	
FAX:	
PROJECT NAME: Humboldt C.O.E	SEND INVOICE TO:
PROJECT NUMBER:	P.O. / CONTRACT NO: 09723.

ANALYSIS(ES) REQUESTED: TCDD/TCDF only by EPA 8290

TOXSCAN INC.
42 Hangar Way
Watsonville, CA 95076
PHONE: 408/724-4522
FAX: 408/724-3188

LAB USE ONLY:
STORAGE LOCATION
FREEZER #:
REFRIGERATOR #:
SHELF #:

Lab Use Only: ID Number	Client Sample Identification	Sample Information: Sampling Date	Sampling Time	Sample Type	Bottle or Container Information: Sample Preservative	Bottle Type:	Bottle Size:	No. of Bottles:	CHECK THE APPROPRIATE BOX BELOW:	SAMPLE CONDITION:
T-10774-89	Control Sediment	04/25/94		Sediment	ON Blue Ice	G/J	1L	1	X	

SAMPLER'S SIGNATURE AND PRINTED NAME:

Via UPS Next Day 04/25/94

RELINQUISHED BY (SIGNATURE AND PRINTED NAME):	RECEIVED BY (SIGNATURE AND PRINTED NAME):	DATE:	TIME:
M. Lou Milazzo Michael Sellers	Ken Fatt ALTA	4-29-94	1100

F:\WP51\DATALOGS\COC.MLM\April 8, 1994

ALTA Analytical Laboratory

Batch ID: 13413

Sample Log-In Checklist	Yes	No
1. Date Samples Arrived: 4-29-94 Initials: RMF		
2. Samples Arrived By: (circle one) Airborne Express Federal Express (UPS) Emery Freezer Truck Company Courier Other _____		
3. Shipping Documentation Present? (circle one) Shipping Label (Airbill) Tracking Number 0251549011 2	X	
4. Shipping Container(s) Intact? If no, describe condition below.	X	
5. Custody Seals Present and Intact? If not intact, describe condition below. No. of Seals _____ or Seal No. _____ Type:(circle) Bottle or Container		X
6. Sample Container Intact? If no, indicate sample condition below.	X	
7. Shipping Preservation: (circle one) Ice (Blue Ice) Dry Ice None Temp(°C) 17		
8. Chain of Custody (COC) or other Sample Documentation Present?	X	
9. COC/Documentation Acceptable? If no, complete COC Anomaly Form.	X	
10. Shipping Container: (circle one each) ALTA or (Client) / (Return) or Retain		
11. Container and/or Bottles Requested?		X
*12. Drinking Water Sample? If yes, Acceptable Preservation? (circle) Y or N		X

*Required for HRMS

Name: _____ Date Samples Reconciled: _____
(Signature Required for LCMS Only)

Comments:

42 Hangar Way
WATSONVILLE, CA 95076-2404

TEL (408) 724-4522
FAX (408) 724-3188

Show this Purchase Order Number on all correspondence, invoices, shipping papers and packages.

09680

TO Alta Analytical

916.933.1640

DATE 04/07/94 | REQUISITION NO. T-10774

SHIP TO Mary Lou Milazzo

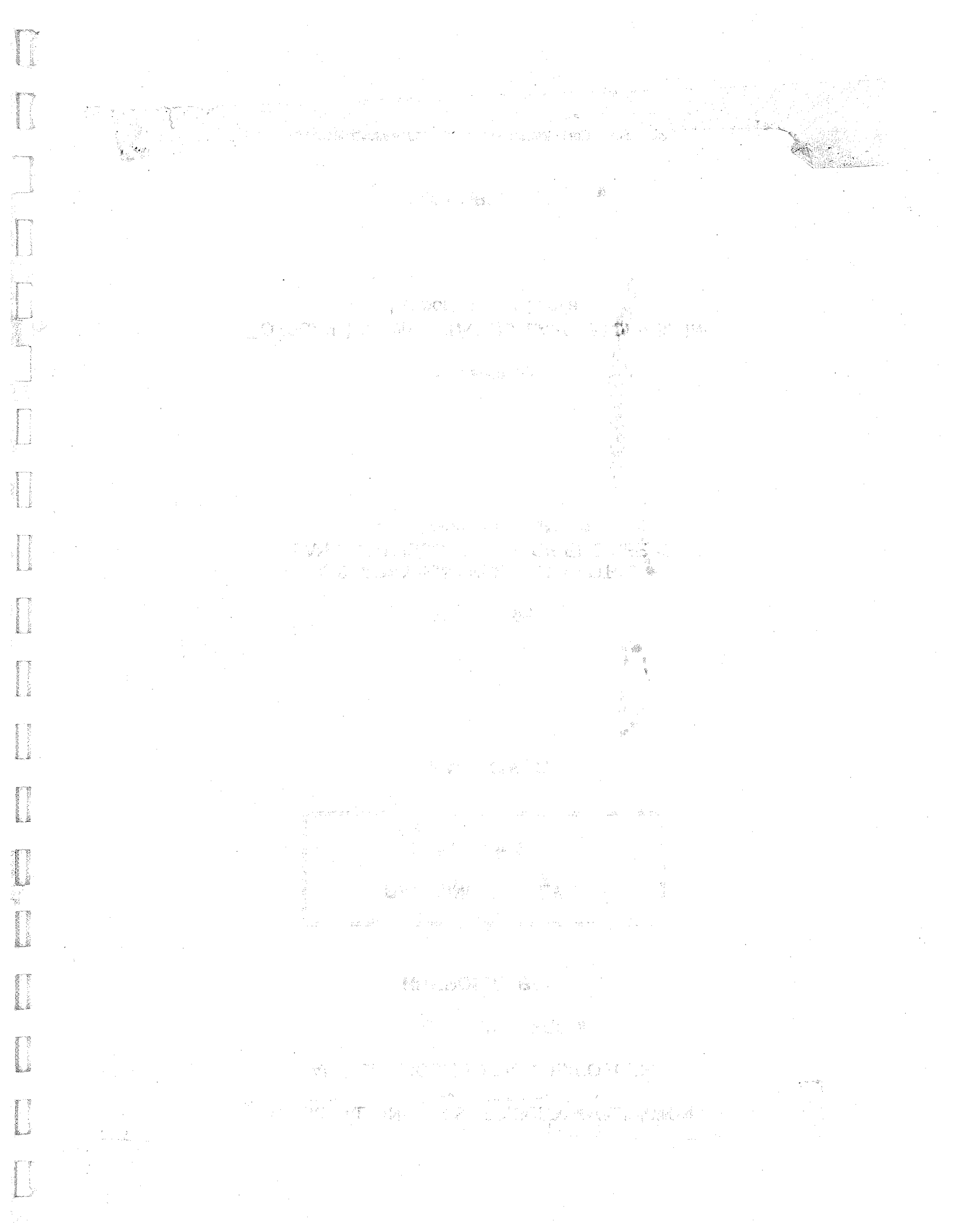
QUESTIONED BY	WHEN SHIP	SHIP VIA	TERMS F.O.B. POINT		

QTY ORDERED	QTY RECEIVED	STOCK NO./DESCRIPTION	UNIT PRICE	TOTAL
4		EPA 8290 for TCDD/TCDF only.	800 —	3200 —
		DL = 1 part per trillion		
		QC = LCS, blank		
		TAT = 3 weeks (by 29 April 1994)		

1. Please send _____ copies of your invoice.
2. Order is to be entered in accordance with prices, delivery and specifications shown above.
3. Notify us immediately if you are unable to ship as specified.

AUTHORIZED BY

ORIGINAL



CHEMICAL ANALYSIS, TOXICITY EVALUATION AND BIOACCUMULATION EXPOSURE OF SEDIMENTS FROM **HUMBOLDT BAY:**

BASELINE SURVEY II

Fiscal Year 1994

FINAL REPORT

Prepared for:

U.S. ARMY ENGINEERING DISTRICT
SAN FRANCISCO CORPS OF ENGINEERS
San Francisco, California

Prepared by:

TOXSCAN INC. and KINNETIC LABORATORIES, INC.
Watsonville, California

NOVEMBER 1994

C:\WP51\BIOASSAY\SFCOE\HUMBOLT4\HUMBOLT4.RPT:11/09/94:1722