

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

BASELINE SURVEY I

Fiscal Year 1993

FINAL REPORT

Prepared for:

U.S. ARMY ENGINEERING DISTRICT
SAN FRANCISCO CORPS OF ENGINEERS
San Francisco, California

Prepared by:

TOXSCAN INC. and KINETIC LABORATORIES, INC.
Watsonville, California

SEPTEMBER 1993
Final Revision 9/94

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San Francisco Army Corps of Engineers
Humboldt Bay
Survey I (FY 1993)

**CHEMICAL ANALYSIS, TOXICITY EVALUATION
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HUMBOLDT BAY**

BASELINE SURVEY I

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 FY1993 maintenance dredging. Sediments were sampled by Kinetic Laboratories, Inc., and returned to the ToxScan, Inc. laboratory at Watsonville, CA where they were assigned laboratory number T-9209 for physical, chemical and bioassay analyses. Bioaccumulation analyses on four composites were analyzed under laboratory number T-9284. Samples collected, composites and analyses are summarized in Table 1.

2.0 Methods

2.1 Sediment Collection

Sediment sampling was conducted between 29 October 1992 and 2 November 1992 from the M/V Celtic. Target sampling locations (California state plane coordinates) are listed in Table 1 of the Scope of Services provided by the San Francisco District, Army Corps of Engineers (SFACOE). Prior to initiating the field program, each station location was converted to latitude x longitude to allow use of a differential Global Positioning System (GPS). Station locations were plotted on "blue line" pre-dredge survey charts provided by the SFACOE to determine the location and approximate depth of each core. Final 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. Mudline elevations were determined at each core location at the time of sampling with a JFV 90 dual frequency color sounder with an accuracy of 0.1 feet. Mean lower low water (MLLW) mudline elevations were extrapolated using Micronautics, Inc. Tide 1 software. Elevations were determined at each core location at the time of sampling.

Where cores were necessary (due to depth of depositional sediment) samples were collected by Vibracore; in areas where sedimentation appeared to be minimal samples were collected by Smith-Macintyre grab. 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, compositing equipment, and (steps 1 and 2 only) Smith-Macintyre grab were all cleaned by the following EPA approved clean-up protocol:

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 deionized (DI) water
5. Store in cleaned containers until use.

Samples were taken as close to the target locations as possible. Sampling at many of the targeted sites were relocated because they were at or below proposed dredge depth. When a targeted site was not substantially shallower than dredge depth, a grab sample was taken to characterize the sediment present. If the grab sample was field-determined primarily to be sand, an aliquot was obtained for PSD only. If the grab sample was field-determined primarily to be fine sediment (silt or clay) an aliquot was taken for compositing with samples from the same area.

Composite Samples. Composite samples for toxicity testing were to exclude individual samples composed predominantly of sand (80% $\Phi \leq 4$). The composites were formulated based on field assessment of grain size. In two instances (SAM6 and the Reference Site station) the composite could be accumulated only by taking replicate cores or grabs from the same location.

Four composite samples (three harbor composites and one reference site composite) were collected for toxicity and chemistry evaluation after consultation in the field with SFACOE representatives: 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 original study design projected four sampling harbor stations to be composited; however, the samples projected for composite 3 did not meet grain size criteria (by field inspection) for bioassay and bioaccumulation testing. Comp 3 was therefore never produced. To avoid possible confusion, the harbor composites have been renamed in this report. The original composite labels (which appear in the chains of custody and in Appendix C-1) and their counterparts are as follows:

- Comp 1 = EKUP
- Comp 2 = SAMTB
- Comp 4 = FLTB

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 was acceptable (i.e., penetration to dredge depth) the desired sample was extruded into the compositing container. Only the sediment from project dredge depth to the surficial sediment was extruded into the compositing container.

Grab Samples. Each grab sample was evaluated for grain size, composition, and depth of penetration. Grabs which had "washed out", or which were determined to have insufficient penetration, were rejected. Grab samples which consisted primarily of sand, gravel, shell hash or a combination of these materials (field-estimated 80% $\Phi \leq 4$) were collected as discrete samples for PSD only, and were not included in area composite samples. Grab samples were used in the Bar and Entrance Channel because of the extreme wave environment, and were collected in the inner channels where less than 1.5 feet of shoaling existed between the existing bottom and the project depth.

Each area composite was homogenized by thorough mixing in Teflon lined compositing containers. These containers and all sediment handling tools were cleaned to the same protocols as the sampling device. The homogenized sample was then aliquoted into the chemistry sample containers utilizing cleaned Teflon lined tools, and placed in precleaned coolers, on ice, to reduce the temperature to the prescribed 4°C. The balance of each homogenized composite (for bioassay and bioaccumulation analyses) was placed in a precleaned plastic bag, and put into precleaned plastic coolers, on ice, to reduce the temperature to the prescribed 4 degrees centigrade. 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 site water was not collected for this project. Instead, seawater for suspended particulate phase bioassays, solid phase static and flow-through bioassays, and for the bioaccumulation assessments was pumped directly from the ocean immediately offshore of ToxScan's Davenport facility. For flowthrough tests and bioaccumulation exposures, the seawater was first pumped into a 55,000 gallon indoor cistern, then pumped into the flow-through system. Seawater for the elutriate (suspended particulate phase) preparations and for the solid phase static testing was transported from Davenport to ToxScan's Watsonville facilities by truck.

