Project Number: 040772
Project Title: Sediment Quality Survey Of Heavily-Oiled Beaches In Prince William Sound
PI Name: Betsy Day, Integral Consulting, Inc.
Time Period Covered by Report: May – August 15, 2004
Date of Report: August 19, 2004

1. Work Performed:

The Exxon Valdez Trustee Council approved a research proposal in May 2004 to assess the potential effects of lingering oil on intertidal sediment quality. The objectives of the work are to:

1. Determine whether heavily-oiled sediments exhibit toxicity to invertebrates relative to nearby non-oiled sediments
2. Determine whether the benthic infaunal community in heavily-oiled sediments differs from that community in nearby non-oiled sediments
3. Determine whether a relationship exists among sediment PAH concentrations, bioassay response and benthic community structure
4. Evaluate the suitability of sediment toxicity tests and benthic infauna enumeration as elements of long-term monitoring.

To meet these objectives, a sampling program to evaluate sediment chemistry, sediment toxicity and infaunal benthic community structure was conducted from June 13-17, 2004. Field work was conducted in collaboration with ongoing lingering oil studies being conducted by the National Marine Fisheries Service (NMFS) [i.e., the retrieval of semi-permeable membrane devices (SPMDs)]. Samples were collected from five pairs of sampling stations. Each pair consisted of one intertidal station that had been classified as remaining heavily-oiled in 2003, and one nearby non-oiled reference station.

SEDIMENT SAMPLING

Two types of sediment sampling were accomplished. One set of samples was collected for chemical analyses and toxicity testing and the second set of samples was collected for infaunal benthic community analysis. Sampling locations on each of the oiled beaches were established with the assistance of the NMFS personnel who were retrieving the SPMDs. All samples were collected from as small an area as possible at each beach location to reduce the potential for spatial variability. Sampling equipment (i.e., cores, bowls and spoons) was decontaminated prior to use following the proposed methods. The benthic samples were collected prior to the chemistry/toxicity samples to reduce the chance of disturbing the benthic habitat.

Sampling for Infaunal Benthic Community Structure

Benthic samples were collected at each oiled and reference station to evaluate benthic infauna community structure. Cores were collected within 5-10 feet of the semi-permeable monitoring device that had been previously deployed by NMFS. Ten replicate core samples were collected at each station with the exception of North Herring Bay Stations KN0109A (oiled site) and KN0110A (associated reference station). Benthic cores were not collected at these two stations because the removal of the site's cobble and boulder overburden to permit sampling caused the removal of gammarid amphipods from sediments which would have caused the resulting sample

to not have been representative of the benthic community. At Station KN0144A (Herring Bay oiled location), only nine replicate cores could be collected because of inadequate sediment penetration depth (i.e. less than 5 cm) for the last replicate. Contents of benthic cores were processed (i.e., sieved and preserved) onboard the chartered research vessel following the procedures outlined in the project proposal. Concurrent with the benthic infauna sampling effort, the upper 2-cm of sediments adjacent to each of the replicated benthic cores was collected using decontaminated stainless steel spoons and processed into containers for conventional (i.e., total organic carbon and grain size) and total petroleum hydrocarbon (TPH) analyses. Sediment samples were placed into zip-locked bags and then packed into coolers containing blue ice to maintain a temperature of $4^{o}C$ ($\pm 2^{o}C$).

Sampling for Chemical and Toxicity Analyses

Ten hand-held cores were collected at both the oiled stations and associated non-oiled reference stations for chemical analyses and toxicity testing. Sediment from the cores at each station was placed into a single stainless steel pot and transported back to the field vessel for processing as a single composite sample. During processing sediments were homogenized until they obtained a uniform color and texture. The homogenized sediments were then placed into pre-labeled containers for analysis of conventional parameters (i.e., total solids, total organic carbon and grain size), polyaromatic hydrocarbons (PAHs) and TPH, as well as for bioassay testing. Each container was placed into a zip-locked bag and packed into coolers containing blue ice to maintain a temperature of $4^{o}C$ ($\pm 2^{o}C$) inside the cooler. PAH samples were provided to NMFS staff for storage and transport to the Auke Bay Laboratory for analysis.

LABORATORY ANALYSES

Sample processing is ongoing with raw data becoming available starting in late August 2004. The following laboratories are involved:

- NMFS Auke Bay Lab: PAHs in sediment samples and bioassay elutriates
- Analytical Resources, Inc.: Sediment grain size, total organic carbon, TPH
- Weston Solutions: Mussel larval bioassay (*Mytilus* sp.) using sediment elutriates and the amphipod chronic bioassay (*Leptocheirus plumulosus)*
- Marine Taxonomic Services: Benthic infauna sorting and identifications

Communications from the laboratories indicate that analyses are proceeding as proposed.

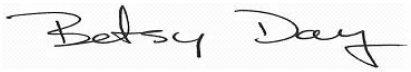
2. Future Work: Completion of this project involves receipt of all raw data (anticipated to be complete by the end of September 2004), data validation, data evaluation including statistical analyses to assess the relationships among sediment chemistry, toxicity and benthic community structure, and reporting. A simple data report and a final report (prepared as a manuscript for publication in *Environmental Science and Technology*) will be provided to the Trustee Council by March 15, 2005.

3. Coordination/Collaboration: Field work was carried out in collaboration with the NMFS SPMD program. Sample locations were identified by NMFS personnel. Sediment and bioassay elutriate samples are being analyzed by NOAA's Auke Bay Lab.

4. Community Involvement/TEK and Resource Management Applications: Field work was conducted from a locally chartered vessel, the Auklet.

5. Information Transfer: This project was initiated in spring 2004. Results will be submitted for publication in FY05.

6. Budget: There are no changes to the budget of $208,000.

Signature of PI: 

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