

*Exxon Valdez* Oil Spill  
Restoration Project Annual Report

Hydrocarbon Data Analysis, Interpretation and Database  
Maintenance for Restoration and NRDA Environmental  
Samples Associated with the *Exxon Valdez* Oil Spill

Restoration Project 00290  
Annual Report

This annual report has been prepared for peer review as  
Part of the Exxon Valdez Oil Spill Trustee Council  
Restoration program for the purpose of assessing project  
Progress. Peer review comments have not been  
Addressed in this annual report.

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Annual Report

**Study History:** Restoration Project 00290 was initiated in 1983 as a continuation of Technical Services Study Number 1 (TS#1 – Hydrocarbon Analytical Support Services and Analysis of Distribution and Weathering of Spilled Oil) funded from 1989 through 1992. TS#1 was a service project coordinating sample storage and dissemination of hydrocarbon analysis data to principal investigators for Trustee funded projects. TS#1 produced an archival database called PWSOIL, which contains hydrocarbon sample and analysis information collected for Trustee funded NRDA and Restoration projects funded from 1989 to the present. In 1992, a related project, Subtidal Study Number 8 (ST8- Mussel Tissue and Sediment Hydrocarbon Data Synthesis), was funded to evaluate the internal consistency of sediment and mussel tissue hydrocarbon data in PWSOIL. Project ST8 produced a final report (Short et al, 1996) which included a public release of a subset of the hydrocarbon sample and analysis data from PWSOIL. This product, *Exxon Valdez Oil Spill of 1989: State/Federal Trustee Council Hydrocarbon Database 1989-1995 – EVTHD* contained the analytical results of the environmental samples collected in the spill zone between 1989 through 1995. Restoration project 00290 continues to integrate new hydrocarbon sample and analysis information into the Trustee hydrocarbon database (PWSOIL) as well as updates the public release of the data set EVTHD with new information. The updated version of EVTHD includes all laboratory samples analyzed since 1989 in addition to new environmental samples.

**Abstract** This project is an on-going service project providing data and sample archiving services for all samples collected for hydrocarbon analysis in support of *Exxon Valdez Oil Spill* Trustee Council projects. These data represent samples collected since the oil spill in 1989 to the present and include environmental and laboratory Response (National Resource Damage Assessment - NRDA) and Restoration data. Additionally, we provide interpretive services for the hydrocarbon analyses. The data are organized into three matrix types: tissues (representing 70 species), sediment and seawater samples collected from approximately 400 locations in or near the spill area or in laboratory facilities in the State of Alaska. The analytical results include concentrations of 63 hydrocarbons, summary statistics for the evaluation of the hydrocarbon sources and laboratory quality control data. Features of the database include identification of samples collected for analysis, presentation of results in dry or wet weight, correction for method detection limits of the analytes. Two versions of this data exist. The archival database, named PWSOIL, is maintained in RBASE and ACCESS formats and contains all information relating to collection, shipping and handling, and analysis of data collected for NRDA and Restoration

efforts. A public release of this dataset The Exxon Valdez Oil Spill of 1989: State/Federal Trustee Hydrocarbon Database (EVTHD) which contains only the information from analyzed samples is available on diskette or CD-ROM in a stand alone application written in Visual Basic. This dataset is available from the principal investigator, Bonita Nelson. Updating the database and sample archival is an on-going yet scaled back program.

**Key Words:** *Exxon Valdez*, hydrocarbon, database, oil spill

**Project Data:**

1. PWSOIL contains collection information for 48,000 samples and hydrocarbon analysis for 15,500 of those samples collected for Restoration and NRDA Trustee funded projects from 1989 to the present. EVTHD is a subset of PWSOIL and contains only the sample and analysis all samples analyzed for hydrocarbon analyses. PWSOIL is stored in RBASE software and EVTHD is a Visual Basic stand-alone product.
2. Data are available by request. A users guide is available for EVTHD and is updated in October of each year.
3. The custodian of PWSOIL an EVTHD is:  
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Hydrocarbon Data Analysis, Interpretation and Database  
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**Executive Summary:** This report contains the description of the archival EVOS Trustee hydrocarbon database PWSOIL and the associated activities related to maintaining the data. The primary purpose of this project is maintenance of PWSOIL, an 82 megabyte database which is the collection and analysis information for samples generated for hydrocarbon analysis from NRDA, Restoration and Subsistence studies funded by the EVOS Trustees. Currently the database has over 49,000 lines of information describing sample collection details for over 65 projects and 15,500 lines of hydrocarbon analysis information for 63 analytes. The matrices of the samples include sediments, tissues, waters or oil. The database also contains information used to track sample shipping and storage. A user-friendly public release of all of the analyzed data (EVTHD) and its users guide is also maintained and available on request. We also provide interpretive services for hydrocarbon analyses, which distinguish the source of hydrocarbons in samples analyzed. This service is expected to have activity for the next year and afterwards the service will be to archive the hydrocarbon records and provide public releases of the data as necessary.

## INTRODUCTION

The Auke Bay Laboratory provides data and sample archiving services for all samples collected for hydrocarbon analysis in support of the *Exxon Valdez* Trustee Council projects. These data represent samples collected since the oil spill in 1989 to the present and include environmental and laboratory Response and Restoration data as well as subsistence information. Additionally, we provide interpretive services for the hydrocarbon analyses, which aid investigators in determination of the origin of the hydrocarbons found in analyses. Currently, the database contains the collection information from more than 48,000 samples and the analyses information from over 15,500 of those samples. The data represent sediment, tissue, water or oil samples collected from over 65 projects. The primary purpose of this project is to maintain the integrity of the database, incorporate new data and continue hydrocarbon data interpretive services. The secondary purpose of this project is to make the information available to interested parties and maintain the integrity of the stored unanalyzed samples.

The Trustee hydrocarbon database not only contains sample collection and hydrocarbon analyses data but also has tracking information related to sample shipment and storage. Original copies of the chain of custody forms are maintained. A public version of the analyzed environmental samples was released in 1996 (*Exxon Valdez Oil Spill of 1989: State/Federal Trustee Council Hydrocarbon Database 1989 – 1995 / EVTHD*). Updating the main database, PWSOIL, and the set of analyzed data is an on-going program. Although the number of volume of samples has decreased over the past few years, new samples are still being added to the database, usually during the same fiscal year they are collected depending on completion of laboratory analyses. Data added in calendar year 2000 include samples from Pink Salmon Oil Toxicity- 99476, Pink Salmon Natal Stream – 054, Yakataga Oil Seeps –599 and Pristane samples – 195.

The hydrocarbon interpretive service is designed specifically for investigators and managers. This includes: (1) identification of the probable sources of the hydrocarbons observed in the samples, (2) evaluation of new hydrocarbon data for evidence of systematic bias, (3) hydrocarbon data editing according to consistent criteria. Recently interpretation has grown to include identification of potential hydrocarbon sources (e.g. coal) for the background hydrocarbon signal in Prince William Sound. This is a continuation of project 99290 previously funded under TS#1, 93 – 98290.

The Trustee hydrocarbon database is a dynamic structure, which requires updating and maintenance because of new samples being added and because of new types of data request. Over the past year, requests for the data have been generated from sources other than principle investigators, which requires public releases of specific data sets or clarifications of issues related to those data. Additionally, in FY98 , FY99 and FY00 we received FOIA requests for hydrocarbon data for Trustee funded projects. We were able to comply with the FOIA request because of the accuracy of the data in the hydrocarbon database and the format it is in. However, new data requests such as FOIAs requires a new type of data release process. The database is

being transformed into a long-term archival form during the next fiscal year so it will conform to new standards imposed with the GEM program transition..

## **OBJECTIVES**

1. Continue maintenance of the Trustee hydrocarbon database by updating the database with new information and continue the sample archiving procedures developed under NRDA.
2. Continue interpretation of hydrocarbon data, including new data products for principal investigators, resources managers, synthesis products, FOIA as needed and to apply PAH source ID Model to samples collected .
3. Provide new software updates of the publicly accessible database. This includes assessing the state of the Visual Basic "front end" to the public version (EVTHD).

## **METHODS**

All Trustee funded hydrocarbon samples and data are archived at the Auke Bay Laboratory in Juneau. Incoming samples are inventoried and stored in freezers, sample collection information is entered into PWSOIL. Samples are released form hydrocarbon analysis by the database custodian when requested by the project leader. The analytical laboratory reports hydrocarbon data to the database custodian who matches the appropriate sample collection information. All the data are sent to principle investigators or other requesters.

An updated version of the analyzed data is released on October 1 of each year in the form of EVTHD version 2.-. The updated version will include all samples collected analyzed to date. The users guide will be updated if necessary. Samples included for FY00 are those from the Mussel bed samples 00090, Mussel Beds GOA 00459 laboratory samples from Pink Salmon Oil Toxicity Studies 00476, Pink Salmon Oil Effects, 00454, Yakataga Oil Seeps 00599 .

The weathering model of Short and Heintz (1997) is used interpret the hydrocarbon data for investigators. This model identifies the PAH sources in samples along with measures of statistical reliability. In 1997, samples form the Katalla oil seep and coalfield were examined and found to support the conclusion that PAH derived form coal characterized the background hydrocarbon signal in Prince William Sound. This work continued in through 2000.

Any requests for data will be fulfilled in a timely basis. This includes FOIA requests, which include providing all of the analytical detail from the chemical laboratory that analyzed the hydrocarbon samples and the sample information of data requested. A copy of all data sent to requesters is maintained.

## **RESULTS AND DISCUSSION**

New versions of EVTHD are produced at the end of each fiscal year. Seven hundred lines of sample data were added in FY00 from 5 projects. Results from FOIA requests for hydrocarbon data relating to pink salmon were provided and sent. Data from continuing projects listed above will or have been added to the database as they become available from the chemistry laboratory.

## **CONCLUSIONS**

PWSOIL and EVTHD are dynamic structures that require periodic maintenance. This project provides a service that insures that the Trustee hydrocarbon data will be available to interested parties for as long as necessary. This project is designed to provide easy access to the Trustee hydrocarbon database and ensure the accuracy of the data. These data form the basis of all toxicological studies performed by the Trustees, and provide an important baseline against which future analyses can be compared. The volume of data contained in the database PWSOIL suggests that other uses will benefit from access.

## **ACKNOWLEDGEMENTS**

Marie Larsen organized the analytical data from the chemistry laboratory and Jacek Malseko writes the program for EVTHD. Both of these people's efforts, attention to detail and adherence to accuracy greatly insure that PWSOIL has accurate data that can be easily obtained by the public.



## **LITERATURE CITED**

- Short, J.W. and R.A. Heintz. 1997. Identification of Exxon Valdez oil in sediments and tissues from Prince William Sound and the northwestern Gulf of Alaska based on a PAH weathering model. *Environmental Science & Technology* 31:2375-2384.
- Short, J.W., B.D. Nelson, R.A. Heintz, J.M. Maselko, M. Kendziorek, M.G. Carls, and S. Korn. 1996. Mussel tissue and sediment hydrocarbon data synthesis, 1989-1995. Exxon Valdez Oil Spill State/Federal Natural Resource Damage Assessment Final Report (Subtidal Study Number 8), National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Auke Bay Laboratory Juneau, Alaska