

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 97290
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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Study History: Restoration Project 97290 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 principle 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 called: *Exxon Valdez* Oil Spill of 1989: State/Federal Trustee Council Hydrocarbon Database 1989 - 1995 — EVTHD only contained the analytical results of environmental samples collected in the spill zone between 1989 through 1995. Restoration project 97290 continues to integrate new hydrocarbon sample and analysis information into the archival Trustee hydrocarbon database (PWSOIL) as well as updates the public release data set EVTHD (created from Project ST8) with new information.

Abstract: This project is a continuation of the NRDA and Restoration database management, sample storage, and interpretive services. New data has continued to be incorporated into the Trustee hydrocarbon database. Updated summary reports for investigators and managers are produced upon request along with an electronic copy of the data. An updated public version of recently acquired and analyzed data will be produced on October 1, 1998.

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

Project Data:

1. PWSOIL contains collection information for 45,600 samples and analysis information for 14,600 of those samples for data collected for hydrocarbon analysis for Restoration and NRDA Trustee funded projects from 1989 to the present. EVTHD contains sample and analysis information for 8,400 environmental samples. Samples not reported in EVTHD include those from laboratory studies and more recent data acquisitions.

2. PWSOIL is stored in RBASE software (version 3.4). EVTHD has a Visual Basic interface to data downloaded from PWSOIL in the format of .DBF files.

3. The custodian of PWSOIL and EVTHD is:

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4. Data from PWSOIL are available in spreadsheet format by request. Copies of EVTHD (a stand alone product) including a user's guide are also available upon request. EVTHD requires windows 3.1 or higher, 8 Mbytes of Ram and 13 Mbytes of free space on a hard disk drive.

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Table of Contents

LIST OF TABLES	iv
EXECUTIVE SUMMARY	v
INTRODUCTION	1
OBJECTIVES	1
RESULTS AND DISCUSSION	3
CONCLUSION	3
ACKNOWLEDGMENTS	3
LITERATURE CITED	4

List of Tables

Table 1.-Catalog of data submissions to EVOS Trustee archival database PWSOIL 1996 - 1998.	5
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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 (maintained at the Auke Bay Laboratory) and the associated activities related to maintaining the database. PWSOIL 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 45,000 lines of information describing sample collection details and 14,500 of these lines have associated hydrocarbon analysis data. Over 60 projects are represented. The database also contains data used to track sample shipping and storage. Data records are initiated when new samples arrive and when samples are analyzed. Additionally, we provide interpretive services for the hydrocarbon analyses. The primary purpose of this project is to maintain the integrity of the database, incorporate new data, and continue hydrocarbon data interpretive and sample storage services. The second though equally important purpose is to make the results of the hydrocarbon analyses available to principle investigators, resources managers and to the public by distributing a public release data set (EVTHD) which includes the most recent samples analyzed or acquired to date. This service is expected to have activity through the synthesis period of the next two years, afterwards we do not expect further submissions, so the service will be to archive these records.

INTRODUCTION

The Auke Bay Laboratory provides data and sample archiving services for all samples collected for hydrocarbon analysis in support of *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 data. Additionally, we provide interpretive services for the hydrocarbon analyses. Currently, the database contains results of the hydrocarbon analysis of more than 14,000 samples and collection information from more than 47,000 sediments, tissues, water, or oil samples. The primary purpose of this project is to maintain the integrity of the database, incorporate new data and continue hydrocarbon data interpretive services. (In FY99 we are proposing to include the task of maintaining a Pristane database and generate a fatty acid/lipid class database for Trustee funded projects at the Auke Bay Laboratory.) The second purpose is to make the results of the hydrocarbon analyses available to principal investigators, resources managers and to the public. This service is expected to have activity through the next two years when the results of many studies are synthesized into general conclusions. The third purpose of this project is to maintain the integrity of archived samples in freezers many of which have not yet been analyzed for hydrocarbons.

The Trustee hydrocarbon database not only contains sample collection and hydrocarbon analyses information, but also has data concerning sample shipping and location information as well as lists of other database identifiers (such as species and location codes). A public version of this database containing the sample collection and environmental hydrocarbon sample analyses was released in 1996 (*Exxon Valdez* Oil Spill of 1989: State/Federal Trustee Council Hydrocarbon Database 1989-1995 -EVTHD). Updating the database is an on-going program, samples from Chenega cleanup (98291) and Subsistence database were added in 1998, stream sediment data (97194) and pink salmon data (97076) were added in 1997 and additional Chenega samples as well as samples collected from mussel beds are projected to be added in 1999.

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 PWS. This is a continuation of project 98290 and previously funded under TS#1, 93090, 94290, 95290, 96290 and 97290.

The Trustee hydrocarbon database is a dynamic structure which requires updating and maintenance. Currently, the database contains an inventory of the Trustee hydrocarbon sample collection and provides for retrieval of hydrocarbon analyses by principal investigators and managers. This project is designed to provide easy access to the Trustee hydrocarbon database and ensure the accuracy of the data. The volume of data contained in the database suggests that other users will benefit from access, particularly as more data is added (Chenega project; oiled mussel bed project) and as more synthesis products are produced (salmon and herring).

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 produced for principal investigators and resources managers and for syntheses products as needed, and to apply PAH source ID Model (Short & Heintz, 1997) to samples collected from Kattala oil seep.
3. Provide a new software product for the publicly accessible database which includes Subsistence data, laboratory investigation samples and additional environmental hydrocarbon samples analyzed since release of public version of the database EVTHD (version 1.0).

METHODS

All Trustee funded hydrocarbon samples and data are archived at the Auke Bay Laboratory of NMFS. Incoming samples are inventoried and stored in laboratory freezers, and sample collection information is entered into the database along with the shipping and storage data. Samples are released for hydrocarbon analysis by the database custodian after ABL receives a written request from the responsible project leader. Hydrocarbon data are reported by the analytical laboratory to the custodian who matches the appropriate sample collection information. All the data are checked for errors and electronic copies are sent to principle investigators or other requesters.

An updated version of the public release of the database will be released on October 1, 1998 using *Exxon Valdez* Oil Spill of 1989: State/Federal Trustee Council Hydrocarbon Database 1989-1995 (EVTHD) as a template. This version (2.0) will include data collected from more recent Trustee funded projects including subsistence samples collected during NRDA, samples from the Chenega clean-up in 1997, previously unreported laboratory samples, sediments taken from pink salmon streams in 1996, and other studies relevant to Trustee projects (Table 1).

The weathering model of Short and Heintz (1997) is used to interpret the hydrocarbon data for investigators. This model identifies the PAH sources in samples along measures of statistical reliability. In 1997, samples from the Kattala oil seep and coal fields east of the Copper River were examined and found to support the conclusion that PAH derived from coal characterizes the background hydrocarbon signal in Prince William Sound. We will continue developing this technique in FY99 by demonstrating the generality of the weathering model with other oil sources and the absence of weathering in coal.

RESULTS AND DISCUSSION

Table 1 describes the data which has been entered into PWSOIL since the public release (EVTHD) in 1996. The new version of EVTHD (version 2.0) will be available on October 1, 1998. This version will include laboratory experimental data, new data from environmental projects (including data collected in FY97 for the Chenega - 97 project), Subsistence data and environmental samples collected from Fish & Wildlife Service. This new version will be produced on a CD-ROM.

CONCLUSIONS

PWSOIL is a dynamic structure that requires periodic maintenance. The 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 suggests that other users will benefit from access, particularly as more data is added (Chenega project; oiled mussel bed project) and as more synthesis products are produced (salmon and herring).

ACKNOWLEDGMENTS

Marie Larsen organizes the analytical data from the chemistry laboratory and Jacek Maselko writes the program for the EVTHD interface of the public release of the hydrocarbon data. Both of these people's efforts and adherence to accuracy greatly insure that PWSOIL has accurate data that can be easily obtained by the public.

LITERATURE CITED

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Table 1.--Catalog of data submissions to PWSOIL 1996 - 1998.

Year	Project Number	Project Description	# of Samples
1996			
	96090	Restored Mussel Beds	161
	96076	Pink Salmon Oiling	64
	96025I	NVP - Mussels	97
	---	ABL Katalla Samples	24
	96194	Stream Sediments	348
1997			
	---	ABL Samples	46
	97291	Chenega	291
	97025	NVP	70
	---	ABL Katalla Samples	28
	---	Subsistence (1989-1992)	2000
1998			
	99090	Restored Mussel Beds	
	98291	Chenega	
	---	Subsistence (1994 --)	