



TESORO

Tesoro Hawaii Corporation
733 Bishop Street, Suite 2700
P.O. Box 3379
Honolulu, Hawaii 96842-0001
808 547 3111
808 547 3148 Fax

February 3, 1999

VIA DHL EXPRESS

Ms. Judith Nedoff
Entrix, Inc.
590 Ygnacio Valley Road, Suite 200
Walnut Creek, CA 94596

Dear Judy:

Re: Arthur D. Little Report - Feather Samples

Attached for your records is a copy of the Polynuclear Aromatic Hydrocarbons In Tissue Samples report dated January 29, 1999.

Very truly yours,

R. Chris Jansen
Manager
Environmental Compliance

RCJ:ds
Attachment

cc: Gordon Robilliard (w/attach. - full report)
Donald Palawski (w/attach. - full report)
Carol Terry (w/attach. - full report)
Barry Ogilby (w/attach. - Project Narrative only)
Dennis Saito (w/attach. - Project Narrative only)
Glenn Ford (w/attach. - Project Narrative only)
Linda Elliott (w/attach. - Project Narrative only)
Dave Hoffman (w/attach. - Project Narrative only)
Rich Rosen (w/attach. - full report)
Rose Chu / Corporate Records (w/attach. - full report)

ARTHUR D. LITTLE
Environmental Monitoring and Analysis Unit
Polynuclear Aromatic Hydrocarbons in Tissue Samples
Project Narrative

Client: Tesoro Hawaii Corporation Batch No. B0247
Project No.: 39650 Package No.: 1491 & 1512
Entered By: Richard Purdy Date: January 29, 1999

Polynuclear Aromatic Hydrocarbons in Tissue Samples

Sample Receipt

Four (4) feather samples were received intact and in good condition by Arthur D. Little, Inc. on October 19 and November 25 1998 on behalf of Tesoro Hawaii Corporation. All pertinent sample receipt information is noted on the chain of custody records included as part of this deliverable. Data for the following samples are reported in this package:

Item 4 Item 5 OA 1010-1 OA 1010-2

Laboratory Methods

These samples were prepared and analyzed for Parent and Alkyl Homologue Polynuclear Aromatic Hydrocarbons (PAH), Saturated Hydrocarbons (SHC), and Steranes and Triterpanes (S/T) in accordance with the laboratory procedures described in the quality assurance workplan for the project. Quality control samples include a preparation blank, matrix spike/matrix spike duplicate (MS/MSD), and reference material samples.

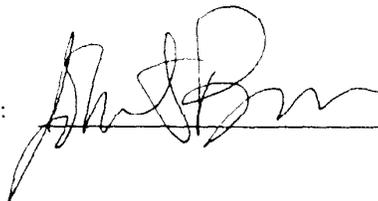
Preparation

These feather samples were prepared by serially extracting each sample with methylene chloride. The extracts were dried with sodium sulfate and extract weights were determined gravimetrically. The solvent extracts were then concentrated to a known volume and submitted for analysis.

Analysis

The sample extracts were analyzed for Parent and Alkyl Homologue Polynuclear Aromatic Hydrocarbons and Steranes and Triterpanes using gas chromatography/mass spectrometry in the selected ion monitoring mode (GC/MS/SIM). The GC/MS is tuned using PFTBA at the start of each analytical sequence, before the calibration. Saturated Hydrocarbons were analyzed by gas chromatography/flame ionization detection (GC/FID). Continuing calibration standards are analyzed after every fifteen to eighteen

Approved By: _____



Date: _____

1/29/99

ARTHUR D. LITTLE
Environmental Monitoring and Analysis Unit
Polynuclear Aromatic Hydrocarbons in Tissue Samples
Project Narrative

samples and at the end of the sequence. Target compounds are quantified from the average response factor (RRF) of the initial calibration curve. PAH alkyl homologues are quantified using the RRF of the parent compound.

Data Evaluation

An evaluation of these feather data versus the spilled Tesoro source oil indicate the following:

- Only one to the feather samples (Item 5) is contaminated with a measurable pattern and/or distribution of petroleum hydrocarbons (i.e., SHC and PAH)
- The Item 5 hydrocarbons likely represent a **severely** weathered/degraded mid - heavy range petroleum product (see GC/FID chromatogram)

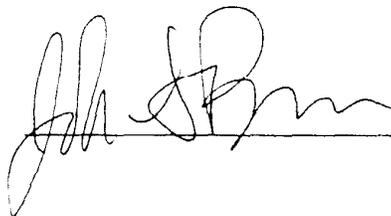
A comparison of the Item 5 feather data to the Tesoro spilled oil indicates that the spilled Tesoro No. 6 fuel oil (SPM Hose 001) is not the source of petroleum hydrocarbons found on the Item 5 feather sample: Note the differences in the sterane and triterpane chromatograms, i.e., the presence of oleanane (T18) in the feather and the difference in the Ts/Tm ratio (T11/T12).

Quality Assurance/Quality Control

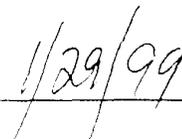
Quality assurance and quality control procedures for the analyses are documented in the laboratory quality assurance plan and standard operating procedures (SOPs). The preparation and analysis data are contained in ADL packages 1491 and 1512. Quality assurance audits were performed on all data generated as part of this deliverable. Please note the following:

- Initial and continuing calibration standards met control limit requirements.
- All surrogate compound recoveries met control limit requirements.
- Target compound recoveries in the associated standard reference material (SRM) alank spike, and North Slope Crude oil check sample met quality control requirements.

Approved By:



Date:



ARTHUR D. LITTLE
Environmental Monitoring and Analysis Unit
Polynuclear Aromatic Hydrocarbons in Tissue Samples
Project Narrative

Data Report

The final report includes the following components:

- Narrative – includes project discussion, sample listing, report qualifiers
- Chain of Custody – includes all signed chain of custody records and observation forms for the reported field samples.
- Data Tables – includes data summary, surrogate recovery summary and quality control results for all analyses
- SHC Chromatograms
- Sterane and Triterpane extracted ion chromatogram profiles

The method detection limit (MDL) and minimum reporting limits (MRL) were adjusted for sample size, sample split and pre-injection volume (PIV). The minimum reporting limits (MRL) were calculated based on the low calibration standards, 25 ng/mL for PAH and 1 µg/mL for SHC.

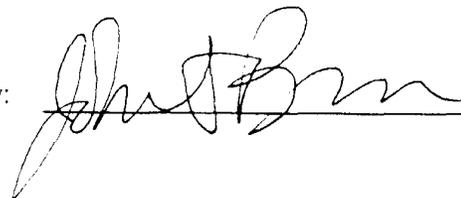
Qualifiers used in reporting of the analytical data are described in the following table.

Table 1: Report Qualifiers

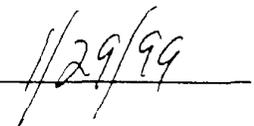
Qualifier	Explanation
J	Concentration between the adjusted minimum reporting limit (MRL) and the adjusted method detection limit (MDL)
ND	Concentration below MDL
D	Concentration quantitated from dilution analysis
B	Detected in the associated procedural blank
DO	Diluted out; result could not be measured

Additional qualifiers may be used as defined in the individual data reports or project narrative

Approved By: _____



Date: _____



Clayton LABORATORY SERVICES

REQUEST FOR LABORATORY ANALYTICAL SERVICES

IMPORTANT

Date Results Requested: Yes No
 Rush Charges Authorized? Yes No
 Phone or Fax Results

Page 1 of 1
 For Clayton Use Only
 Clayton Lab Project No.

Name: Richard Rosen Client Job No. 547-3041
 Company: TPS Corp Hawaii Corporation Dept. Environmental
 Mailing Address: 431 Kawaii St
 City, State, Zip: Honolulu Hawaii 96817
 Telephone No. (808) 547-3795 FAX No. (808) 547-3041

Purchase Order No. _____
 Name _____
 Company _____
 Address _____
 City, State, Zip _____

Special Instructions and/or specific regulatory requirements:
 (method, limit of detection, etc.)
Analyze feathers on regular schedule

Explanation of Preservative	CLIENT SAMPLE IDENTIFICATION		DATE SAMPLED	TIME SAMPLED	MATTY MEL	AIR VOLUME (specify units)	ANALYSIS REQUESTED (Enter an 'X' in the box below to indicate request. Enter a 'P' if Preservative added.)
	CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED					
OA 1010-1 - collected by Rich Rosen	12-12-98	4:50pm	Feathers				FOR LAB USE ONLY 98D3503
OA 1010-2 - collected by Ken Foster	10-10-98	5:20pm	Feathers				FOR LAB USE ONLY 98D3504
Feather samples from Dead birds							
Collected at Makapu'u Pt.							
Kanoe Marine Corps Base Hawaii							

Number of Containers: 2
 Does CAC trap samples? Y N
 Broken containers? Y N
 Received within 72 hours? Y N
 CAC traps used? Y N
 Any other problems? Y N
 If problems, Client contacted? Y N
 Date contacted: 10/19/98
 Temperature (C): 19

Collector's Signature: Richard Rosen Date/Time: _____
 Received by: _____ Date/Time: _____
 Received at Lab by: Link T. WARD Date/Time: 10/19/98 10:30
 Sample Condition Upon Receipt: Acceptable Other (explain)

Authorized by: Richard Rosen Date: 10-16-98
 (Client Signature, MUST Accompany Request)

Please return completed form and samples to one of the Clayton Group Services, Inc. labs listed below:

Detroit Regional Lab 22345 Forthel Drive Novi, MI 48375 (800) 805-5887 (248) 344-1770 FAX (248) 344-2665	Atlanta Regional Lab 400 Chairman Center Blvd., N.W., Suite 490 Kennesaw, GA 30144 (800) 252-9911 (770) 489-7900 FAX (770) 423-4950	San Francisco Regional Lab 1252 Quarry Lane Pleasanton, CA 94566 (800) 204-1755 (510) 428-2857 FAX (510) 428-0106	Seattle Regional Lab 4638 E. Marginal Way S., Suite 216 Seattle, WA 98134 (800) 568-7755 (206) 755-7384 FAX (206) 753-4188
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DISTRIBUTION:
 White = Clayton Laboratory
 Yellow = Clayton Accounting
 Pink = Client Copy

9/97 20K

Arthur D. Little, Inc. CHAIN OF CUSTODY RECORD

Cooler Number: _____ of _____ Page _____ of _____

PROJ. NO.	PROJECT NAME	ANALYSES	REMARKS			
SAMPLERS: (Signature) _____						
Teboro - Hawaii						
Field Sample Number	DATE	TIME	*SAMPLE MATRIX	# of CON-TAINER	PRESERVATION	(Shaded area for ADL use only) ADL #
Item 2	10-21-98		Feather	1		98D4901
4	10-27-98		1	1		98D4902
5	10-4-98		1	1		98D4904
6	10-1-98		Iceballs	1		98D4905
7	10-20-98		1	1		98D4906
8	10-19-98		1	1		98D4907
9	10-22-98		1	1		98D4908
Does COC map... Broken container... Receiver with... COC Ser... Any... If... Date... Temperature... 2.4						
Relinquished by: (Signature)		Date / Time	Received by: (Signature)		Date / Time	Ship to:
Relinquished by: (Signature)		Date / Time	Received by: (Signature)		Date / Time	
Relinquished by: (Signature)		Date / Time	Received for Laboratory by: (Signature)		Date / Time	Carrier / Airbill #:
			Walter T. L.		11/25/98	
					11:00	

CHAIN OF CUSTODY RECORD

FILE NO.

INV.

ORIGINAL COPY FOR SPLIT

DATE AND TIME OF SEIZURE: <i>4 Oct 98</i>	REGION:	EVIDENCE/PROPERTY SEIZED BY: <i>Matthew M. Patterson</i>
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SOURCE OF EVIDENCE/PROPERTY (person and/or location): <input type="checkbox"/> TAKEN FROM: <input type="checkbox"/> RECEIVED FROM: <input checked="" type="checkbox"/> FOUND AT: <i>Laysan Island</i>	CASE TITLE AND REMARKS:
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ITEM NO. <i>5</i>	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers): <i>20 oiled feathers from masked Boobies captured and released after feather collection</i>
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Does COC cover:
 Broker, agent, or
 Receiver of goods?
 COG see serial #
 Any other information?
 If problems, please contact us by
 Date contacted: _____
 Temperature (°C) *21*

ITEM NO. <i>5</i>	FROM: (PRINT NAME, AGENCY) <i>Matthew M. Patterson USFWS</i>	RELEASE SIGNATURE: <i>Matthew M. Patterson</i>	RELEASE DATE <i>11/4/98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input checked="" type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Elizabeth Flint</i>	RECEIPT SIGNATURE: <i>Elizabeth M Flint</i>	RECEIPT DATE <i>4 Nov 98</i>	

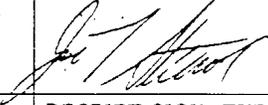
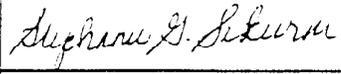
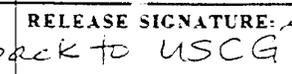
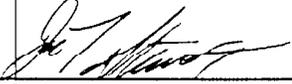
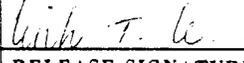
ITEM NO. <i>5</i>	FROM: (PRINT NAME, AGENCY) <i>Elizabeth Flint</i>	RELEASE SIGNATURE: <i>Elizabeth Flint</i>	RELEASE DATE <i>12 Nov 98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Kevin B. Foster</i>	RECEIPT SIGNATURE: <i>K. B. Foster</i>	RECEIPT DATE <i>12 Nov 98</i>	

ITEM NO. <i>5</i>	FROM: (PRINT NAME, AGENCY) <i>Kevin B. Foster</i>	RELEASE SIGNATURE: <i>K. B. Foster</i>	RELEASE DATE <i>13 Nov 98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Joe T. Stewart USCG</i>	RECEIPT SIGNATURE: <i>Joe T. Stewart</i>	RECEIPT DATE <i>13 Nov 98</i>	

ADDITIONAL TRANSFERS ON REVERSE SIDE

CHAIN OF CUSTODY RECORD (continued)

FILE NO.
INV.

ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	DELIVERED VIA:
5 NO SPLIT w/USCG	JOE T. STEWART ^{USCG}		11-16-98	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) Stephanie G. Sakurai (Clayton)	RECEIPT SIGNATURE: 	RECEIPT DATE 11/16/98	
5	Stephanie G. Sakurai (Clayton)		11/17/98	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input checked="" type="checkbox"/> OTHER: FedEx 807903036783
5	FROM: (PRINT NAME, AGENCY) Brought samples back to USCG to Sakurai split on 11/19/98. USCG took original containers	RELEASE SIGNATURE: ^{Stephanie} 	RELEASE DATE 11/19/98	<input type="checkbox"/> U.S. MAIL <input checked="" type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) and COC. ^{USCG} JOE T. STEWART	RECEIPT SIGNATURE: 	RECEIPT DATE 11/19/98	
5 (split)	FROM: (PRINT NAME, AGENCY) Stephanie G. Sakurai (Clayton Environmental)	RELEASE SIGNATURE: 	RELEASE DATE 11/23/98	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input checked="" type="checkbox"/> OTHER: FedEx 807903036783
	TO: (PRINT NAME, AGENCY) ARTHUR J. LITTLE LINH TUNG LE	RECEIPT SIGNATURE: 	RECEIPT DATE 11/25/98	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	<input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	

CHAIN OF CUSTODY RECORD

FILE NO.

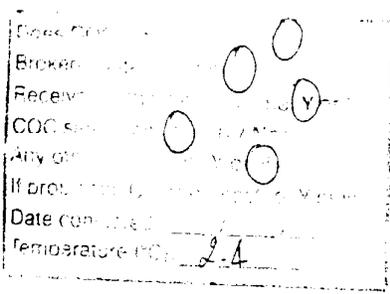
INV.

ORIGINAL COPY FOR SPLIT *11/1*

DATE AND TIME OF SEIZURE: <i>17 Sept 98</i>	REGION:	EVIDENCE/PROPERTY SEIZED BY: <i>Matthew M. Patterson</i>
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SOURCE OF EVIDENCE/PROPERTY (person and/or location): <input type="checkbox"/> TAKEN FROM: <input type="checkbox"/> RECEIVED FROM: <input checked="" type="checkbox"/> FOUND AT: <i>Laysan Island</i>	CASE TITLE AND REMARKS:
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ITEM NO.	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers):
<i>3</i> <i>4</i>	<i>1 frozen Christmas Shearwater Carcass #2 (feather sample from same bird refrigerated) in separate package 10 feathers <i>mg</i></i>



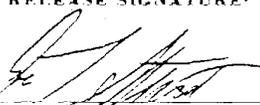
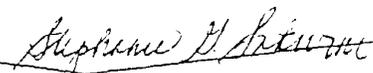
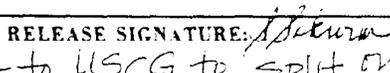
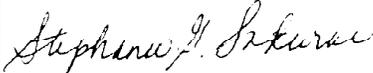
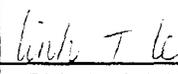
<i>3,4</i>	FROM: (PRINT NAME, AGENCY) <i>Matthew M. Patterson USFWS</i>	RELEASE SIGNATURE: <i>Matthew M. Patterson</i>	RELEASE DATE: <i>11/4/98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input checked="" type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Elizabeth Flint</i>	RECEIPT SIGNATURE: <i>Elizabeth N. Flint</i>	RECEIPT DATE: <i>4 Nov 98</i>	

<i>3,4</i>	FROM: (PRINT NAME, AGENCY) <i>Elizabeth Flint</i>	RELEASE SIGNATURE: <i>Elizabeth Flint</i>	RELEASE DATE: <i>12 Nov 98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Kevin B. Foster</i>	RECEIPT SIGNATURE: <i>K. B. Foster</i>	RECEIPT DATE: <i>12 Nov 98</i>	

<i>3,4</i>	FROM: (PRINT NAME, AGENCY) <i>Kevin B. Foster</i>	RELEASE SIGNATURE: <i>K. B. Foster</i>	RELEASE DATE: <i>3 Nov 98</i>	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) <i>Job T. STEWART</i>	RECEIPT SIGNATURE: <i>Job T. Stewart</i>	RECEIPT DATE: <i>13 Nov 98</i>	

CHAIN OF CUSTODY RECORD (continued)

FILE NO. _____
INV. _____

ITEM NO. NO SPLIT W/ USCG 4 4 ONLY FEATHER SAMPLE	FROM: (PRINT NAME, AGENCY) JOE T. STEWART USCG	RELEASE SIGNATURE: 	RELEASE DATE 11-16-98	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) Stephanie G. Sakurai (Clayton)	RECEIPT SIGNATURE: 	RECEIPT DATE 11/16/98	
4	FROM: (PRINT NAME, AGENCY) Stephanie G. Sakurai (Clayton)	RELEASE SIGNATURE: 	RELEASE DATE 11/17/98	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input checked="" type="checkbox"/> OTHER: FedEx 807903036788
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	
4	FROM: (PRINT NAME, AGENCY) Brought samples back to USCG to split on USCG took original container & coc.	RELEASE SIGNATURE: 	RELEASE DATE 11/19/98	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input checked="" type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY) USCG JOE T. STEWART	RECEIPT SIGNATURE: 	RECEIPT DATE 11/19/98	
4 (split)	FROM: (PRINT NAME, AGENCY) Stephanie G. Sakurai (Clayton Environmental)	RELEASE SIGNATURE: 	RELEASE DATE 11/23/98	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input checked="" type="checkbox"/> OTHER: FedEx 807903036788
	TO: (PRINT NAME, AGENCY) ARTHUR D. LITTLE Linn TOUG LE	RECEIPT SIGNATURE: 	RECEIPT DATE 11/25/98 11:00	
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE	

Arthur D. Little
Environmental Monitoring and Analysis Unit

Project Title : Tesoro Hawaii
Sample Set: B0247
Data : SHC/TPH - Main - Surrogate Corrected

	ACF PB B0247	ACF BS B0247	OA 1010-1 TESORO B0247	OA 1010-2 TESORO B0247
Field ID	ACF PB B0247	ACF BS B0247	TESORO B0247	TESORO B0247
Lab ID	BY-S-57PB	BY-S-58BS	98D3503	98D3504
Lab Batch	B0247	B0247	B0247	B0247
File	12069891.D	12069892.D	12069896.D	12069884.D
Sample Type	QC	QC	SAMP	SAMP
Weight Basis	DRY	DRY	Oil	Oil
Matrix	Soil	Soil	Feather	Feather
Sample Size	10 g	10 g	3.8 mg	2.96 mg
Associated Blank	NA	BY-S-57PB	BY-S-57PB	BY-S-57PB
Field Date	NA	NA	10/10/98	10/10/98
Extract Date	11/13/98	11/13/98	11/16/98	11/16/98
Analysis Date	12/09/98	12/09/98	12/09/98	12/09/98
Min Reporting Limit	0.1	0.1	0.26	0.34
Units	ug/g	ug/g	ug/mg	ug/mg
nC8	0.22	0.25	0.24 J	0.094 J
nC9	ND	ND	0.074 J	0.075 J
nC10	0.0079 J	1.1	0.15 J	0.085 J
nC11	ND	ND	0.19 J	0.24 J
nC12	ND	ND	0.013 J	ND
nC13	ND	ND	ND	ND
1380	ND	ND	0.043 J	ND
nC14	0.0079 J	0.017 J	ND	ND
1470	ND	0.077 J	ND	0.043 J
nC15	ND	1.8	ND	0.017 J
nC16	ND	ND	ND	0.022 J
1650	ND	ND	ND	0.063 J
nC17	ND	ND	0.023 J	0.03 J
pristane	ND	1.9	ND	0.0086 J
nC18	ND	0.0069 J	ND	ND
phytane	ND	0.0097 J	ND	ND
nC19	ND	ND	ND	0.022 J
nC20	ND	1.9	ND	ND
nC21	ND	ND	ND	ND
nC22	ND	ND	0.15 J	ND
nC23	ND	0.01 J	1.2	0.6
nC24	ND	ND	ND	ND
nC25	ND	1.9	1.3	0.81
nC26	ND	ND	0.076 J	0.027 J
nC27	ND	ND	0.53	0.3 J
nC28	ND	0.026 J	ND	1
nC29	ND	ND	0.59	0.33 J
nC30	ND	1.8	0.12 J	ND
nC31	ND	ND	1.5	30
nC32	ND	0.0069 J	ND	0.036 J
nC33	ND	ND	0.056 J	0.1 J
nC34	ND	1.5	0.45	1.6
nC35	ND	ND	ND	0.12 J
nC36	ND	1.3	ND	ND
nC37	ND	ND	0.039 J	ND
nC38	ND	ND	0.067 J	ND
nC39	ND	ND	ND	ND
nC40	ND	ND	ND	ND
TPH (RES)	5.9	26	110	200
TPH	5.9	26	340	340
%OTP	110	116	97	96
%5AA	108	115	216 & 1	90
%D50T	116	118	100	106

Arthur D. Little
 Environmental Monitoring and Analysis Unit

Project Title : Tesoro Hawaii
 Sample Set: B0247
 Data : SHC/TPH - Main - Surrogate Corrected

	ITEM 4 TESORO	ITEM 5 TESORO
Field ID	B0247	B0247
Lab ID	98D4903	98D4904
Lab Batch	B0247	B0247
File	12069886.D	12069894.D
Sample Type	SAMP	SAMP
Weight Basis	Oil	Oil
Matrix	Feather	Feather
Sample Size	0.16 mg	4.05 mg
Associated Blank	BY-S-57PB	BY-S-57PB
Field Date	09/27/98	10/04/98
Extract Date	12/02/98	12/02/98
Analysis Date	12/09/98	12/09/98
Min Reporting Limit	6.2	0.25
Units	ug/mg	ug/mg
nC8	ND	ND
nC9	ND	ND
nC10	ND	0.03 J
nC11	ND	ND
nC12	ND	ND
nC13	ND	ND
1380	ND	ND
nC14	ND	ND
1470	ND	ND
nC15	ND	ND
nC16	ND	ND
1650	ND	ND
nC17	ND	0.063 J
pristane	ND	0.023 J
nC18	ND	0.3
phytane	ND	0.064 J
nC19	ND	1.1
nC20	ND	2.1
nC21	ND	3.3
nC22	ND	3.9
nC23	ND	5
nC24	ND	5.4
nC25	ND	6.5
nC26	ND	6.3
nC27	ND	7
nC28	ND	6.5
nC29	ND	6.4
nC30	ND	4.9
nC31	2.7 J	5.2
nC32	ND	3.4
nC33	ND	2.9
nC34	ND	2
nC35	ND	1.9
nC36	ND	1.1
nC37	ND	0.93
nC38	ND	0.76
nC39	ND	0.68
nC40	ND	0.68
TPH (RES)	170	130
TPH	170	290
%OTP	111	80
%5AA	111	81
%D50T	108	80

Arthur D. Little
 Environmental Monitoring and Analysis Unit

Project Title : Tesoro Hawaii
 Sample Set: B0247
 Data : SHC/TPH - BS - Surrogate Corrected

Field ID	ACF PB B0247	ACF BS B0247			
Lab ID	BY-S-57PB	BY-S-58BS			
Lab Batch	B0247	B0247			
File	12069891.D	12069892.D			
Sample Type	QC	QC			
Weight Basis	DRY	DRY			
Matrix	Soil	Soil			
Sample Size	10 g	10 g			
Associated Blank	NA	BY-S-57PB			
Field Date	NA	NA			
Extract Date	11/13/98	11/13/98			
Analysis Date	12/09/98	12/09/98			
Min Reporting Limit	0.1	0.1			
Units	ug/g	ug/g	T	%R	Q
nC8	0.22	0.25			
nC9	ND	ND			
nC10	0.0079 J	1.1	2.5	44	&
nC11	ND	ND			
nC12	ND	ND			
nC13	ND	ND			
1380	ND	ND			
nC14	0.0079 J	0.017 J			
1470	ND	0.077 J			
nC15	ND	1.8	2.5	72	
nC16	ND	ND			
1650	ND	ND			
nC17	ND	ND			
pristane	ND	1.9	2.5	76	
nC18	ND	0.0069 J			
phytane	ND	0.0097 J			
nC19	ND	ND			
nC20	ND	1.9	2.5	76	
nC21	ND	ND			
nC22	ND	ND			
nC23	ND	0.01 J			
nC24	ND	ND			
nC25	ND	1.9	2.5	76	
nC26	ND	ND			
nC27	ND	ND			
nC28	ND	0.026 J			
nC29	ND	ND			
nC30	ND	1.8	2.5	72	
nC31	ND	ND			
nC32	ND	0.0069 J			
nC33	ND	ND			
nC34	ND	1.5	2.5	60	
nC35	ND	ND			
nC36	ND	1.3	2.5	52	
nC37	ND	ND			
nC38	ND	ND			
nC39	ND	ND			
nC40	ND	ND			
TPH (RES)	5.9	26			
TPH	5.9	26			
%OTP	110	116			
%5AA	108	115			
%D50T	116	118			

Arthur D. Little
Environmental Monitoring and Analysis Unit

Project Title : Tesoro Hawaii
Sample Set: B0247
Data : SHC/TPH - ORS - Surrogate Corrected

Field ID	ORS				ORS			
Lab ID	BN14				BN14			
Lab Batch	B0247				B0247			
File	12069819.D				12069820.D			
Sample Type	QC				QC			
Weight Basis	Oil				Oil			
Matrix	Oil				Oil			
Sample Size	5 mg				5 mg			
Associated Blank	NA				NA			
Field Date	NA				NA			
Extract Date	NA				NA			
Analysis Date	12/7/98				12/07/98			
Min Reporting Limit	0.2				0.2			
Units	ug/mg	T	%D	Q	ug/mg	T	%D	Q
nC8	4.5	4.7	-4.2		4	4.7	-15	
nC9	5	4.8	4.2		4.8	4.8	0	
nC10	3.9	4.2	-7.1		4.1	4.2	-2.4	
nC11	4	4.3	-7		4.4	4.3	2.3	
nC12	3.9	4	-2.5		4.2	4	5	
nC13	3.6	4	-10		3.8	4	-5	
1380	1.2	1	20		1.3	1	30	
nC14	3.2	4.2	-24		4.6	4.2	9.5	
1470	1.4	1.4	0		1.5	1.4	7.1	
nC15	3.6	3.7	-2.7		3.7	3.7	0	
nC16	3.3	3.2	3.1		3.4	3.2	6.2	
1650	1.5	1.5	0		1.8	1.5	20	
nC17	3.2	3.2	0		3.4	3.2	6.2	
pristane	2	2.2	-9.1		2.2	2.2	0	
nC18	2.8	2.9	-3.4		3	2.9	3.4	
phytane	1.6	1.6	0		1.4	1.6	-12	
nC19	2.7	2.6	3.8		2.5	2.6	-3.8	
nC20	2.4	2.7	-11		2.3	2.7	-15	
nC21	2.3	2.4	-4.2		2.4	2.4	0	
nC22	2.2	2.2	0		2.2	2.2	0	
nC23	2.1	2	5		2.1	2	5	
nC24	1.9	2	-5		1.9	2	-5	
nC25	1.8	1.7	5.9		1.8	1.7	5.9	
nC26	1.5	1.5	0		1.5	1.5	0	
nC27	1.1	1.2	-8.3		1.1	1.2	-8.3	
nC28	0.89	0.88	1.1		0.89	0.88	1.1	
nC29	0.85	0.81	4.9		0.78	0.81	-3.7	
nC30	0.63	0.65	-3.1		0.63	0.65	-3.1	
nC31	0.58	0.58	0		0.76	0.58	31	
nC32	0.42	0.44	-4.5		0.41	0.44	-6.8	
nC33	0.43	0.4	7.5		0.37	0.4	-7.5	
nC34	0.42	0.35	20		0.38	0.35	8.6	
nC35	0.36	0.35	2.8		0.44	0.35	26	
nC36	0.25	0.23	8.7		0.29	0.23	26	
nC37	0.25	0.23	8.7		0.24	0.23	4.3	
nC38	0.22	0.22	0		0.23	0.22	4.5	
nC39	0.18 J	0.18	0		0.19 J	0.18	5.6	
nC40	0.2	0.19	5.3		0.19 J	0.19	0	
TPH (RES)	200	220	-9.1		190	220	-14	
TPH	610	660	-7.6		640	660	-3	
%OTP	91				94			
%5AA	96				97			
%D50T	94				94			

Arthur D. Little
Environmental Monitoring and Analysis Unit

Project Title : Tesoro - Feathers
Data Package: 1512
Data Table: PAH - Main - Surrogate Corrected

Field ID	SRM 1491	North Slope Crude	Item 5	Item 4
Lab ID	BO19	BN14	98D4904	98D4903
Lab Batch	B0247	B0247	B0247	B0247
File	DZ5836.D	DZ5837.D	DZ5838.D	DZ5839.D
Sample Type	QC	QC	SAMP	SAMP
Weight Basis	VOLUME	OIL	OIL	OIL
Matrix	SRM	OIL	FEATHER	FEATHER
Sample Size	0.1 mL	5 mg	4.05 mg	0.16 mg
Associated Blank	NA	NA	BY-S-57PB	BY-S-57PB
Field Date	NA	NA	10/04/98	09/27/98
Extract Date	NA	NA	11/16/98	11/16/98
Analysis Date	01/05/99	01/05/99	01/05/99	01/05/99
Min Reporting Limit	250	5	6.2	160
Units	ug/L	mg/Kg	mg/Kg	mg/Kg
Naphthalene	6600	770 E	1.1 J	ND
C1-Naphthalenes	ND	1800	ND	ND
C2-Naphthalenes	ND	2400	ND	ND
C3-Naphthalenes	ND	2000	ND	ND
C4-Naphthalenes	ND	1200	ND	ND
Acenaphthylene	6900	ND	5.3 J	ND
Acenaphthene	6900	ND	ND	ND
Biphenyl	7200	220	0.39 J	ND
Fluorene	6700	95	ND	ND
C1-Fluorenes	ND	250	ND	ND
C2-Fluorenes	ND	380	ND	ND
C3-Fluorenes	ND	380	ND	ND
Anthracene	8300	ND	ND	ND
Phenanthrene	7000	290	ND	ND
C1-Phenanthrenes/anthracenes	ND	660	16	ND
C2-Phenanthrenes/anthracenes	ND	760	110	ND
C3-Phenanthrenes/anthracenes	ND	580	180	ND
C4-Phenanthrenes/anthracenes	ND	420	150	ND
Dibenzothiophene	ND	240	ND	ND
C1-Dibenzothiophenes	ND	510	ND	ND
C2-Dibenzothiophenes	ND	690	ND	ND
C3-Dibenzothiophenes	ND	650	16	ND
Fluoranthene	6000	ND	ND	ND
Pyrene	6100	11	3.4 J	ND
C1-Fluoranthenes/pyrenes	ND	89	39	ND
C2-Fluoranthenes/pyrenes	ND	160	84	ND
C3-Fluoranthenes/pyrenes	ND	180	94	ND
Benzo[a]anthracene	4000	ND	6.6	ND
Chrysene	6700	44	13	ND
C1-Chrysenes	ND	81	48	ND
C2-Chrysenes	ND	99	93	ND
C3-Chrysenes	ND	93	100	ND
C4-Chrysenes	ND	88	45	ND
Benzo[b]fluoranthene	5200	7.1	2.7 J	ND
Benzo[k]fluoranthene	5600	ND	ND	ND
Benzo[e]pyrene	5700	14	ND	ND
Benzo[a]pyrene	7400	ND	ND	ND
Perylene	7300	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	6100	ND	ND	ND
Dibenzo[a,h]anthracene	5100	1.5 J	1.7 J	ND
Benzo[g,h,i]perylene	5200	3.5 J	2.1 J	ND
Total PAH	120000	15000	1000	0
%d8-Naphthalene	93	101	109	103
%d10-Acenaphthene	00	100	105	101
%d10-Phenanthrene	90	97	103	99
%d12-Benzo[a]pyrene	98	113	115	113

Arthur D. Little
 Environmental Monitoring and Analysis Unit

Project Title : Tesoro - Feathers
 Data Package: 1512
 Data Table: PAH - Main - Surrogate Corrected

Field ID	OA 1010-1	OA 1010-2
Lab ID	98D3503	98D3504
Lab Batch	B0247	B0247
File	DZ5840.D	DZ5841.D
Sample Type	SAMP	SAMP
Weight Basis	OIL	OIL
Matrix	FEATHER	FEATHER
Sample Size	3.8 mg	2.96 mg
Associated Blank	BY-S-57PB	BY-S-57PB
Field Date	10/10/98	10/10/98
Extract Date	11/16/98	11/16/98
Analysis Date	01/05/99	01/05/99
Min Reporting Limit	6.6	8.4
Units	mg/Kg	mg/Kg
Naphthalene	1.3 J	0.12 J
C1-Naphthalenes	ND	ND
C2-Naphthalenes	ND	ND
C3-Naphthalenes	ND	ND
C4-Naphthalenes	ND	ND
Acenaphthylene	1 J	ND
Acenaphthene	ND	ND
Biphenyl	0.81 J	0.72 J
Fluorene	ND	ND
C1-Fluorenes	ND	ND
C2-Fluorenes	ND	ND
C3-Fluorenes	ND	ND
Anthracene	ND	ND
Phenanthrene	1.3 J	ND
C1-Phenanthrenes/anthracenes	ND	ND
C2-Phenanthrenes/anthracenes	ND	ND
C3-Phenanthrenes/anthracenes	ND	ND
C4-Phenanthrenes/anthracenes	ND	ND
Dibenzothiophene	ND	ND
C1-Dibenzothiophenes	ND	ND
C2-Dibenzothiophenes	ND	ND
C3-Dibenzothiophenes	ND	ND
Fluoranthene	ND	1.4 J
Pyrene	ND	1.2 J
C1-Fluoranthenes/pyrenes	ND	ND
C2-Fluoranthenes/pyrenes	ND	ND
C3-Fluoranthenes/pyrenes	ND	ND
Benzo[a]anthracene	ND	ND
Chrysene	ND	ND
C1-Chrysenes	ND	ND
C2-Chrysenes	ND	ND
C3-Chrysenes	ND	ND
C4-Chrysenes	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND
Dibenzo[a,h]anthracene	ND	ND
Benzo[g,h,i]perylene	0.89 J	1.3 J
Total PAH	5.3	4.7
%d8-Naphthalene	94	83
%d10-Acenaphthene	97	92
%d10-Phenanthrene	95	96
%d12-Benzo[a]pyrene	107	106