



4690 Table Mountain Drive  
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Golden, CO 80403  
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June 9, 2010

Mr. Randall Ferguson  
Petroleum Development Corporation  
1775 Sherman Street; Suite 3000  
Denver, Colorado 80203

**RE: Hoshiko 2-2 (API # 05-123-13273) Soil Excavation  
Weld County, Colorado**

Dear Mr. Ferguson:

Petroleum Development Corporation (PDC) retained Olsson Associates (Olsson) for environmental oversight and confirmation sampling associated with an excavation of a condensate release at the Hoshiko 2-2 (API # 05-123-13273) site near Kersey, Colorado. The general site location is shown on Figures 1, 2 and 3. This letter report summarizes our field observations and the laboratory results for the soil and groundwater samples collected associated with excavation activities.

### **Background**

PDC field crews encountered hydrocarbon impacted soil and groundwater while upgrading dump lines at the Hoshiko 2-2 well pad in November 2007. PDC retained LT Environmental for environmental oversight, confirmation sampling and long-term groundwater monitoring associated with the excavation of impacted material. Approximately 180 cubic yards (CY) of petroleum hydrocarbon impacted soil was removed from the excavation and transported to a Waste Management landfill for disposal. Laboratory analysis of soil at the extents of the excavation was confirmed to be below the Colorado Oil and Gas Conservation Commission (COGCC) allowable Total Petroleum Hydrocarbon (TPH) levels set forth in Table 910-1 prior to April 1, 2009. Prior to backfill, a five gallon mixture of Microblaze was applied to the groundwater and exposed smear zone soils in the excavation. PDC submitted Forms 19 (COGCC Spill # 1881467) and 27 (COGCC Remediation Project # 4239) to the COGCC in November 2007 and May 2008, respectively. A quarterly groundwater monitoring program has been in place since January 2008.

PDC field crews encountered additional hydrocarbon impacted soil and groundwater while upgrading dump lines in February 2010 and retained Olsson for environmental oversight and confirmation sampling. Olsson field screened soils with a photoionization detector (PID) to determine the excavation extents and collected 11 confirmation soil and 2 groundwater samples.

### **Impacted Soil Excavation, Field Observations and Laboratory Analysis**

Olsson observed soil excavation activities at Hoshiko 2-2 from February 16, 2010 to February 26, 2010. The initial areal excavation extents were determined by potholing with a John Deere 310G backhoe and field screening soils with a MiniRAE 2000 Portable VOC Monitor (PGM-7600). Figures 4 and 5 show the final excavation extents as determined by PID field screening. Approximately 1000 CY of impacted soil was removed from the excavation, with the following approximate dimensions: 83 feet (ft) by 43 ft by 6 ft deep. Soil was primarily excavated, using a John Deere 310G backhoe and a Caterpillar 314C trackhoe, and loaded into 10 CY end dump trucks for disposal offsite at the Waste Management North Weld Landfill in Ault, Colorado. Hydrocarbon staining and odor were observed in the excavated material. The two tanks in the tank battery (100 barrel (bbl) produced water tank and 400 bbl crude oil tank) were removed to facilitate remediation activities. There was approximately 6 inches of free product underneath the partially buried 100 bbl produced water tank, as shown in photos in Attachment A. Groundwater was encountered at approximately 6 ft below ground surface (bgs) throughout the excavation. A vacuum truck was onsite to remove the free product and other accumulated groundwater from the excavation. Impacted soil from 3 ft to 6 ft bgs was not excavated underneath an active sales gas pipe, due to concerns of the structural integrity of the pipe. Prior to backfill, PDC applied 10 bags of granulated activated carbon to the groundwater and exposed smear zone soils in the excavation.

### **Soil**

Eleven confirmation soil samples (SS-1 through SS-11) were collected from various locations along the sidewalls of the excavation (Figure 5) and sent off-site for laboratory analysis (Table 1). The 11 soil samples were collected from the locations listed in the table below:

<b>Sample</b>	<b>Sample Location</b>
SS-1	South wall of excavation ~4 ft bgs
SS-2	West wall of excavation, ~30 ft north of the southwest corner, ~4 ft bgs
SS-3	West wall of excavation ~18 ft north of southwest corner, ~4 ft bgs
SS-4	West wall of excavation, just west of separator ~4 ft bgs
SS-5	West wall of excavation, ~60 ft north of southwest corner, ~4 ft bgs
SS-6	East wall of excavation, ~51 ft north of southeast corner, ~4 ft bgs
SS-7	East wall of excavation, ~33 ft north of southeast corner, ~4 ft bgs
SS-8	East wall of excavation, ~15 ft north of southeast corner, ~4 ft bgs
SS-9	North wall of excavation, underneath active sales gas line, ~3 ft bgs
SS-10	North wall of excavation, east of meter house, ~4 ft bgs
SS-11	Northeast corner of excavation, ~3 ft bgs

Nitrile gloves were worn during sampling and changed between sample collection to prevent cross-contamination. Samples SS-1 through SS-11 were placed in clean wide-mouthed, 4 ounce jars, packed in a cooler with ice and delivered to Origins Laboratories, Inc. in Denver, Colorado. The samples were transported following Chain-of-Custody Protocols. The requested analyses for samples SS-1 through SS-11 are listed below:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) analyzed using Environmental Protection Agency (EPA) Method 8260B;
- TPH Gasoline Range Organics (GRO) and Diesel Range Organics (DRO) analyzed using EPA Method 8015M; and
- Polyaromatic Hydrocarbons (PAHs) analyzed using EPA Method 8270C.

#### Groundwater

Two groundwater samples, EX-W-1 (bottom of the separator excavation) and EX-W-2 (bottom of the larger excavation), were collected from standing groundwater at the bottom of the excavation. Collected samples were placed in 40 milliliter unpreserved VOAs, packed in a cooler with ice and delivered to Origins Laboratories, Inc. in Denver, Colorado. The samples were transported following Chain-of-Custody Protocols. BTEX via EPA Method 8260B was analyzed for samples EX-W-1 and EX-W-2.

#### Laboratory Results

The samples were analyzed by standard protocols and within method holding times. The BTEX, TPH-GRO and TPH-DRO laboratory results for soil samples SS-1 through SS-11 indicate that reported target analyte concentrations did not exceed the applicable standard in COGCC Table 910-1, with the exception of Total TPH for SS-9. A summary of the soil confirmation laboratory results (Figure 6, Table 1, Table 2 and Attachment B) for samples SS-1 through SS-11 are provided below:

- The laboratory results indicate that benzene and toluene were not detected above laboratory reporting limits in any of the samples;
- The laboratory results indicate that ethylbenzene was detected above laboratory reporting limits in samples SS-1 and SS-9; however, both were below the COGCC Standard outlined in Table 910-1. Ethylbenzene was not detected above the laboratory reporting limits in the remainder of the samples;
- The laboratory results indicate that xylenes were detected above laboratory reporting limits in samples SS-9 and SS-10; however, both were below the COGCC Standard

outlined in Table 910-1. Xylenes were not detected above the laboratory reporting limits in the remainder of the samples;

- The laboratory results indicate that Total TPH (TPH-GRO and TPH-DRO) were detected above laboratory reporting limits in samples SS-1 and SS-9. The COGCC Standard for Total TPH (500 milligrams per kilogram [mg/kg], as outlined in Table 910-1) was exceeded in sample SS-9 (829 mg/kg). Total TPH was not detected above the laboratory reporting limits in the remainder of the samples; and
- PAH results for sample SS-9 are presented in Table 2. PAH samples were collected for each of the sample locations, however were only analyzed for sample SS-9, due to the TPH detection above the COGCC Standard at this location. The laboratory results indicate that 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, phenanthrene, naphthalene and flourene were detected above the laboratory reporting limits; however, all were below the COGCC Standard outlined in Table 910-1. Benzo(a)pyrene and dibenz(a,h)anthracene were not detected above laboratory reporting limits (0.09 mg/kg); however the laboratory reporting limits are above the COGCC Standard (0.022 mg/kg, as outlined in Table 910-1).

A summary of the groundwater laboratory results (Table 3 and Attachment B) for samples EX-W-1 and EX-W-2 are provided below:

- The laboratory results indicate that benzene was detected above laboratory reporting limits in sample EX-W-2. The COGCC Standard for benzene (0.005 milligrams per liter [mg/L], as outlined in Table 910-1) was exceeded in sample EX-W-2 (0.195 mg/L). Benzene was not detected above the laboratory reporting limits in sample EX-W-1;
- The laboratory results indicate that toluene was detected above laboratory reporting limits in sample EX-W-2; however, it was below the COGCC Standard outlined in Table 910-1. Toluene was not detected above the laboratory reporting limits in sample EX-W-1;
- The laboratory results indicate that ethylbenzene was detected above laboratory reporting limits in samples EX-W-1 and EX-W-2; however, both were below the COGCC Standard outlined in Table 910-1; and
- The laboratory results indicate that xylenes were detected above laboratory reporting limits in samples EX-W-1 and EX-W-2; however, both were below the COGCC Standard outlined in Table 910-1.

Copies of the laboratory reports are included in Attachment B.

Olsson appreciates the opportunity to assist Petroleum Development Corporation with the environmental oversight and confirmation sampling associated with an excavation of a condensate release at the Hoshiko 2-2 near Kersey, Colorado. Please do not hesitate to contact us if you have any questions concerning our report.

Sincerely,

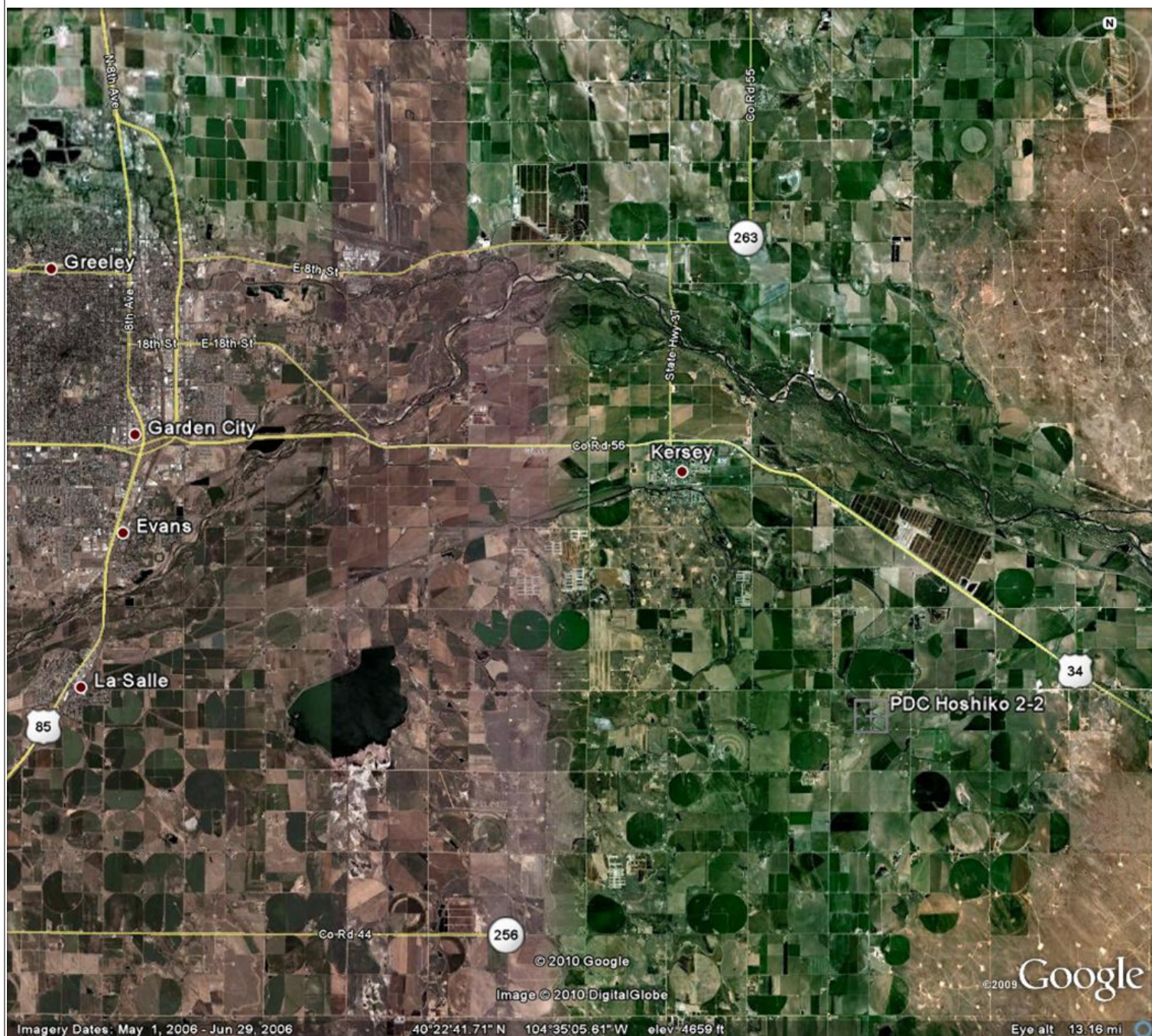
**Olsson Associates**



William Lambert, EIT  
Assistant Engineer

## FIGURES





PROJECT NO:	010-0284
DRAWN BY:	WSL
DATE:	3/10/10

## PDC Hoshiko 2-2 Site Location

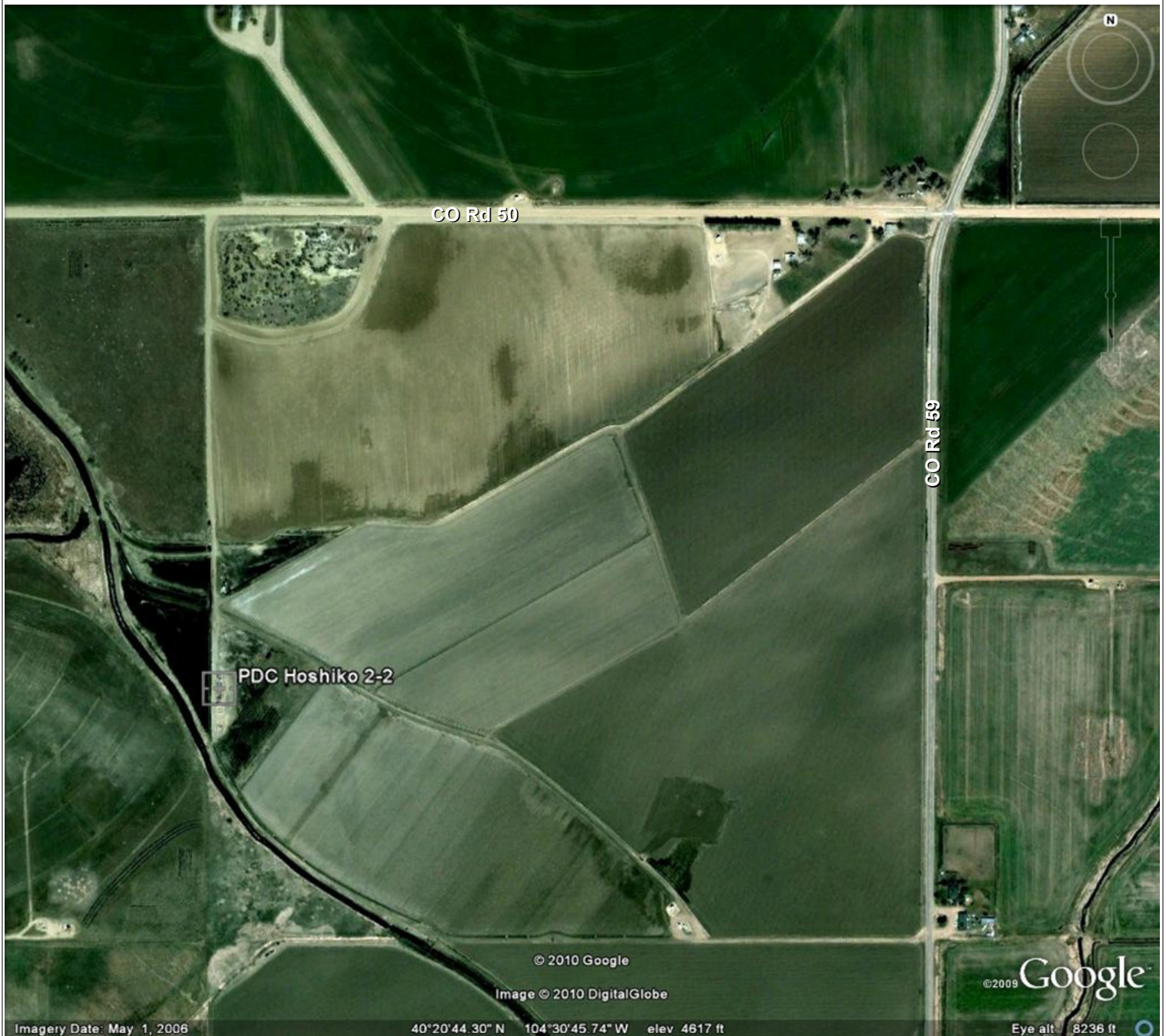


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FIGURE

1





PROJECT NO:	010-0284
DRAWN BY:	WSL
DATE:	3/10/10

PDC Hoshiko 2-2 Local Site  
Location

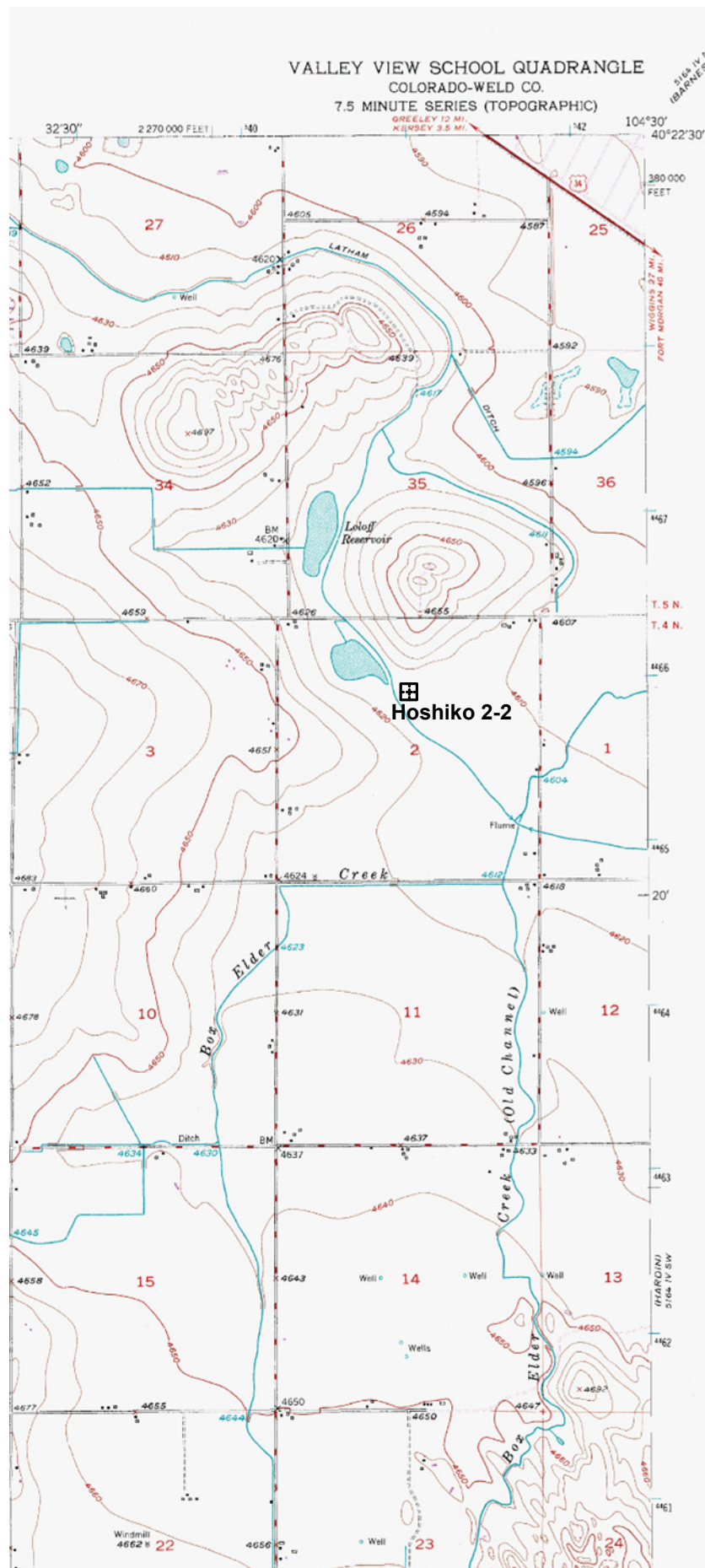


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FIGURE

2





PROJECT NO: 010-0284  
DRAWN BY: WSL  
DATE: 3/10/10

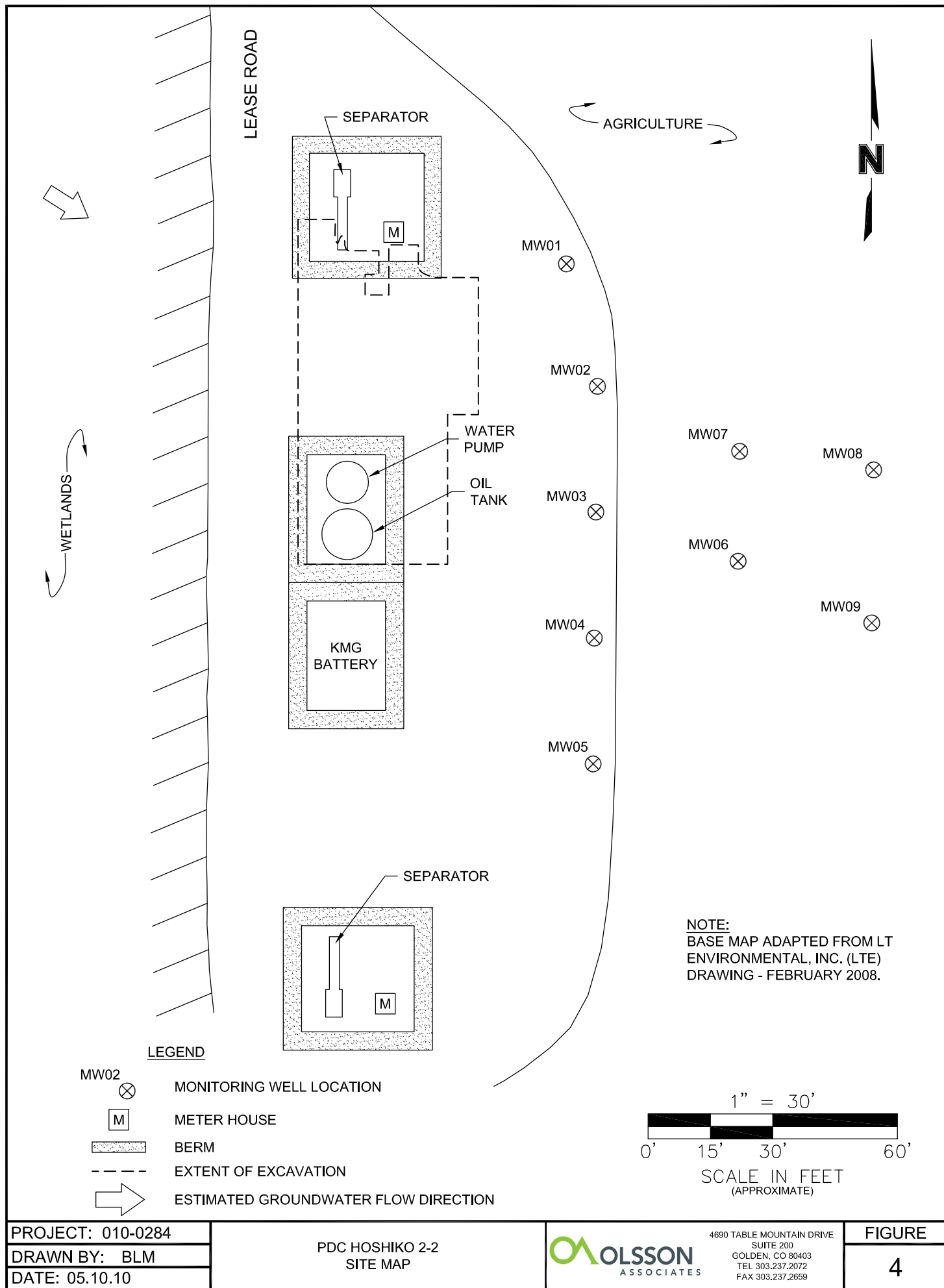
PDC Hoshiko 2-2  
Topographic Map

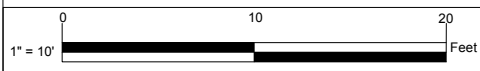
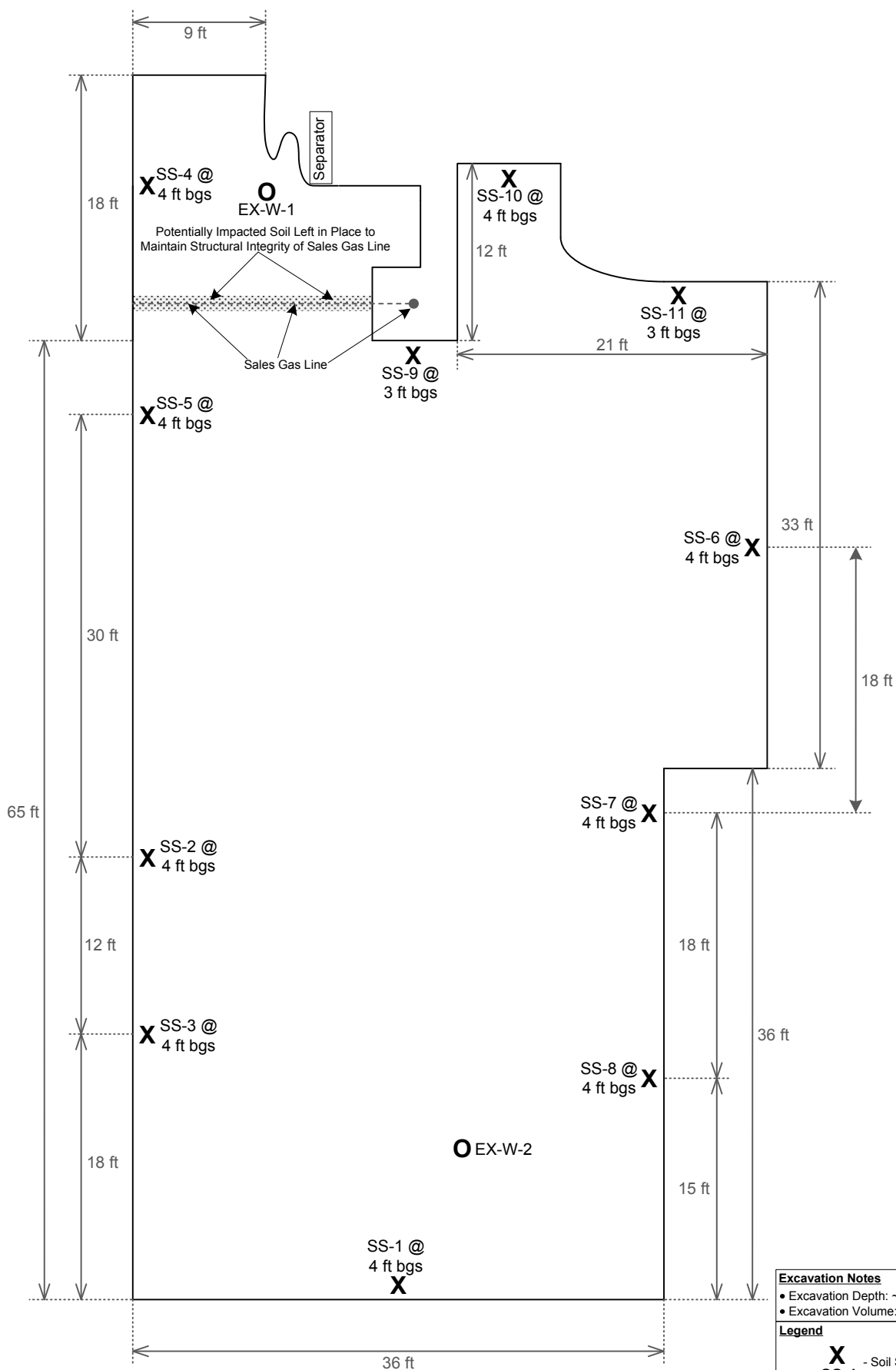
**OLSSON**  
ASSOCIATES

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Golden, CO 80403  
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FIGURE

3





Excavation Notes	
• Excavation Depth: ~6 ft	
• Excavation Volume: ~1000 yd <sup>3</sup>	
Legend	
<b>X</b>	- Soil Sampling Location
<b>O</b>	- Groundwater Sampling Location
<b>EX-W-1</b>	- Excavation Location

PROJECT NO:	010-0284
DRAWN BY:	WSL
DATE:	5/25/10

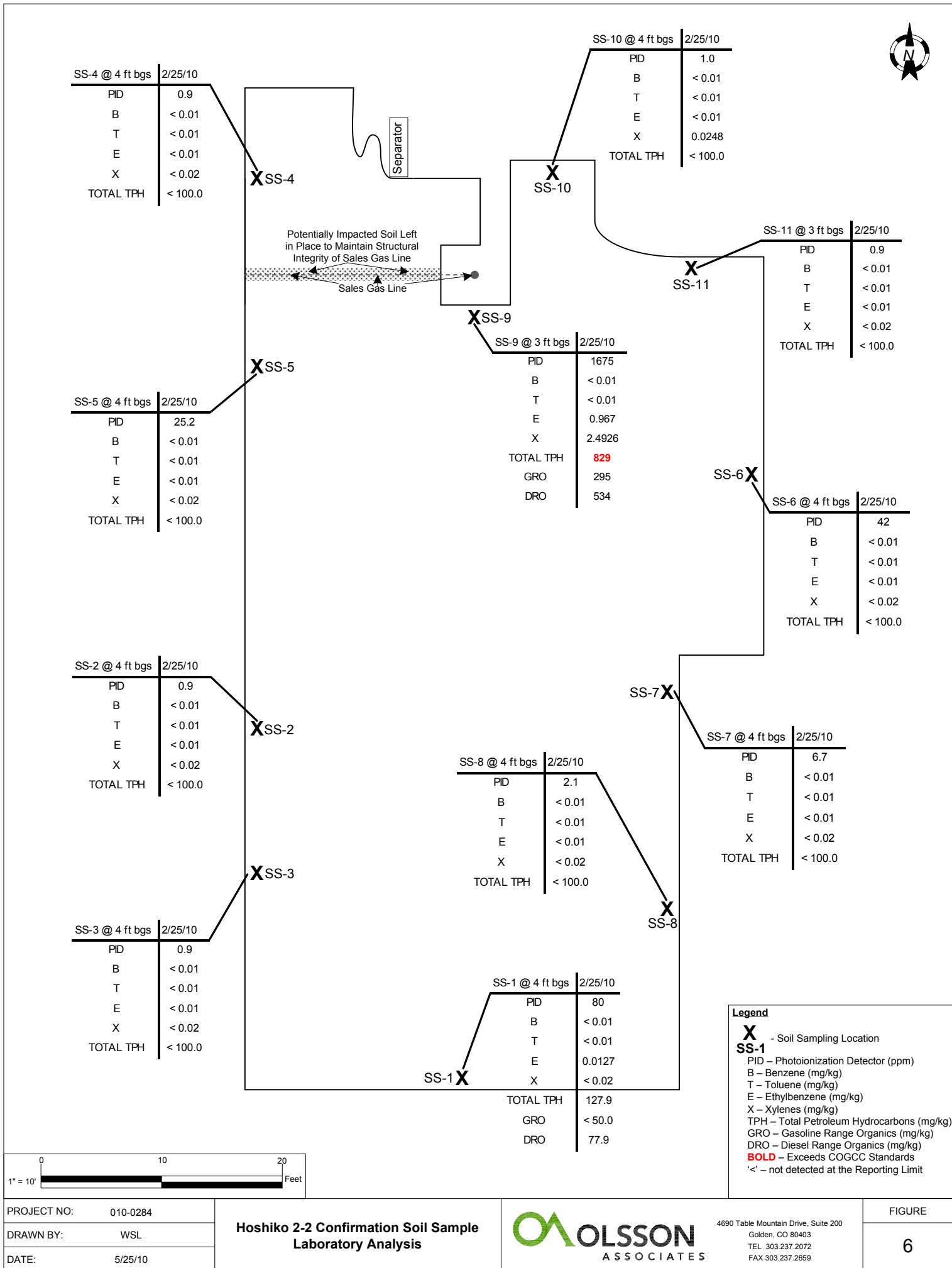
### Hoshiko 2-2 Confirmation Soil Sample Locations



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FIGURE

5



PROJECT NO:	010-0284
DRAWN BY:	WSL
DATE:	5/25/10

# Hoshiko 2-2 Confirmation Soil Sample Laboratory Analysis



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Golden, CO 80403  
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FIGURE

6



## TABLES

**Table 1. Excavation Confirmation Soil Samples - Petroleum Development Corporation  
Hoshiko 2-2 - Weld County, Colorado**

Sample Number	Date Sampled	Sample Depth (ft bgs)	PID Reading (ppm)	Laboratory Analytical Results						
				Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	Total TPH (mg/kg)
COGCC Cleanup Standard				0.17	85	100	175			500
SS-1	02/25/10	4	80	< 0.01	< 0.01	0.0127	< 0.02	< 50.0	77.9	127.9
SS-2	02/25/10	4	0.9	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-3	02/25/10	4	0.9	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-4	02/25/10	4	0.9	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-5	02/25/10	4	25.2	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-6	02/25/10	4	42	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-7	02/25/10	4	6.7	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-8	02/25/10	4	2.1	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0
SS-9	02/25/10	3	1675	< 0.01	< 0.01	0.967	2.4926	295	534	829
SS-10	02/25/10	4	1.0	< 0.01	< 0.01	< 0.01	0.0248	< 50.0	< 50.0	< 100.0
SS-11	02/25/10	3	0.9	< 0.01	< 0.01	< 0.01	< 0.02	< 50.0	< 50.0	< 100.0

**Notes:**

COGCC: Colorado Oil and Gas Conservation Commission

DRO: Diesel Range Organics

ft bgs: feet below ground surface

GRO: Gasoline Range Organics

mg/kg: milligrams per kilogram

PID: Photoionization Detector

ppm: parts per million

'<': not detected at the Reporting Limit

**0.17: Exceeds COGCC Table 910-1 Standard**

BTEX analyzed by EPA Method 8260B

GRO/DRO analyzed by EPA Method 8015 Mod.

**Table 2. Excavation Confirmation Soil Samples (PAHs) - Petroleum Development Corporation**  
**Hoshiko 2-2 - Weld County, Colorado**

Sample Number	Date Sampled	Laboratory Analytical Results																	
		Benzo(b) fluoranthene (mg/kg)	1-Methyl naphthalene (mg/kg)	2-Methyl naphthalene (mg/kg)	Acenaph-thene (mg/kg)	Acenaph-ylene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a) pyrene (mg/kg)	Indeno(1,2,3-c,d) Pyrene (mg/kg)	Anthracene (mg/kg)	Phenan-threne (mg/kg)	Naphthalene (mg/kg)	Fluorene (mg/kg)	Benzo(g,h,i) perylene (mg/kg)	Dibenz(a,h) Anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(k) fluoranthene (mg/kg)	Fluor-anthene (mg/kg)	Pyrene (mg/kg)
COGCC Cleanup Stand		0.22			1000		0.22	0.022	0.22	1000		23	1000		0.022	22	2.2	1000	1000
SS-9	02/25/10	< 0.136	0.919	1.97	0.182	< 0.136	< 0.136	< 0.09	< 0.136	0.162	0.166	0.518	0.203	< 0.136	< 0.09	< 0.136	< 0.136	< 0.136	< 0.136

**Notes:**

COGCC: Colorado Oil and Gas Conservation Commission

ft bgs: feet below ground surface

mg/kg: milligrams per kilogram

PID: Photoionization Detector

ppm: parts per million

'<': not detected at the Reporting Limit

0.22: Exceeds COGCC Table 910-1 Standard

PAHs analyzed by EPA Method 8270C

**Table 3.       Excavation Groundwater Samples - Petroleum Development Corporation**  
**Hoshiko 2-2 - Weld County, Colorado**

Sample Number	Date Sampled	Sample Depth (ft bgs)	Laboratory Analytical Results			
			Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
COGCC Cleanup Standard			0.005	1	0.7	10
EX-W-1	02/26/10	6	< 0.001	< 0.001	0.00471	0.02434
EX-W-2	02/26/10	6	0.195	0.119	0.0126	0.1929

**Notes:**

COGCC: Colorado Oil and Gas Conservation Commission

ft bgs: feet below ground surface

mg/L: milligrams per liter

'<': not detected at the Reporting Limit

**0.005: Exceeds COGCC Table 910-1 Standard**

BTEX analyzed by EPA Method 8260B



## **ATTACHMENT A**

### **Photographs**



Photo 1 – Excavation west of tank battery by truck load out – north view.



Photo 2 – Excavation 4 ft bgs inside separator secondary containment. staining present.





Photo 3 – Free product from exposed pipe area.



Photo 4 – Free product east side of 100 bbl produced water tank by pipe/valve connection.





Photo 5 – Free product underneath 100 bbl produced water tank.

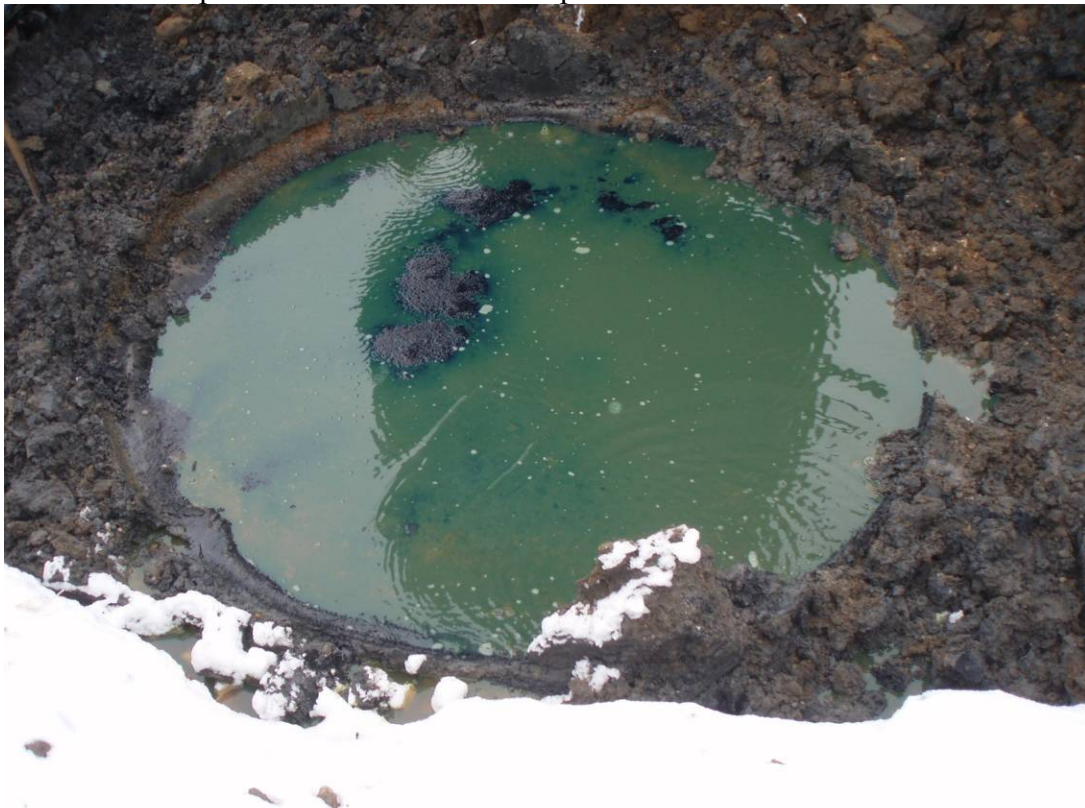


Photo 6 – Free product underneath 100 bbl produced water tank.





Photo 7 – Bottom of 100 bbl produced water tank.



Photo 8 – South wall of the excavation.





Photo 9 – View north of the east wall of the excavation.



Photo 10 – Excavation by separator.





Photo 11 – Exposed sales pipe left in place. Not removed due to structural integrity.



Photo 12 – Exposed sales pipe left in place with probable impacts below.





Photo 13 – Digging/load out at northwest corner of excavation near separator.



Photo 14 – Load out of impacted material into ~10 cubic yard end dump truck.

## **ATTACHMENT B**

### **Laboratory Reports**

3/5/2010

Petroleum Development Corporation

Tony Cooper

3801 Carson Ave.

Evans

CO

80534

Project Name- Hoshiko

Project Number- 2-2

Attached are your analytical results for Hoshiko received by Origins Laboratory, Inc. February 25, 2010 5:18 pm. This project is associated with Origins project number X002109-01 .

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all,

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com





Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

**CROSS REFERENCE REPORT**

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
SS-1 4'	X002109-01	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-2 4'	X002109-02	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-3 4'	X002109-03	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-4 4'	X002109-04	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-5 4'	X002109-05	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-6 4'	X002109-06	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-7 4'	X002109-07	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-8 4'	X002109-08	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-9 3'	X002109-09	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-10 4'	X002109-10	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18
SS-11 3'	X002109-11	Soil	2/25/2010 12:00:00AM	02/25/2010 17:18

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

Need results by Nov. 3/1/10



X002109

Page \_\_\_\_\_ of \_\_\_\_\_

originslaboratory.com

Client: DCP  
Address: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_  
E-Mail Address: mburrows@aconsulting.com  
Project Manager: Tony Cooper  
Project Name: Hoshiko 2-2  
Project Number: \_\_\_\_\_  
Samples Collected by: Matt Burrows

Sample ID - Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analysis		Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other -	Groundwater	Soil	Air - Summa Canister #	Other -	Other -	
SS-1 4'	2/25/10	-	1										1
SS-2 4'	"	"	1										2
SS-3 4'	"	"	1										3
SS-4 4'	"	"	1										4
SS-5 4'	"	"	1										5
SS-6 4'	"	"	1										6
SS-7 4'	"	"	1										7
SS-8 4'	"	"	1										8
SS-9 3'	"	"	1										9
SS-10 4'	"	"	1										10
Relinquished by: <u>Matt Burrows</u>	Date: <u>2/25/10</u>	Time: <u>17:18</u>		Received by: <u>[Signature]</u>				Date: <u>2/25/10</u>		Time: <u>17:10</u>	Temperature Upon Receipt:		
Relinquished by:	Date:	Time:		Received by:				Date:		Time:	Turn Around Time:		
											24-hr <input type="checkbox"/>		
											48-hr <input checked="" type="checkbox"/>		
											72-hr <input type="checkbox"/>		
											Standard		

4640 North Pecos Street | Unit C | Denver, Colorado 80211 | Laboratory - 303.433.1322 | Fax - 303.265.9645

Origins Laboratory, Inc.

*Noelle E Doyle*

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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

Need results **X002104** of ☐  
Mon. 3/1/10

Client: **DCP**  
Address:  
Telephone Number:  
Email Address: **mburrows@oceansulthg.com**

Project Manager: **Tony Cooper**  
Project Name: **Hoshiko 2-2**  
Project Number:  
Samples Collected By: **Matt Burrows**

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions	
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summa Canister #			Other
SS-11 3'	2/25/10	-	1										1
													2
													3
													4
													5
													6
													7
													8
													9
													10

Analysis: **D20** **Geo** **BTX** **HTH**

Relinquished By: **Matt Burrows** Date: **2/25/10** Time: **17:10**  
Relinquished By: **[Signature]** Date: **2/25/10** Time: **17:10**

Received By: **[Signature]** Date: **2/25/10** Time: **17:10**  
Received By: **[Signature]** Date: **2/25/10** Time: **17:10**

Turnaround Time: Same Day ☐ 24 Hr ☐ 48 Hr ☒ 72 Hr ☐ Standard ☐

1725 Elk Place | Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

Origins Laboratory, Inc.

*Noelle E Doyle*

Noelle E Doyle, Laboratory Manager

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Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-1 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	-----------------	-------	----------	-------	----------	----------	-------

Origins Laboratory, Inc.  
X002109-01 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	OB25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	0.0127	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	97.8 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	96.1 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	95.3 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	OB25004	02/25/2010	02/25/2010	
Diesel (C10-C28)	77.9	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	111 %	65-140			"	"	"	
------------------------	-------	--------	--	--	---	---	---	--

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-2 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-02 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	95.2 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	104 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	101 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/25/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	106 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-3 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-03 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	96.4 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	102 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	99.8 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/25/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	106 %	65-140			"	"	"	
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Noelle E Doyle, Laboratory Manager



Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-4 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-04 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	98.3 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	103 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	99.9 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	100 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-5 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-05 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	95.7 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	104 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	98.7 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	104 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-6 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-06 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	95.1 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	103 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	101 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	102 %	65-140			"	"	"	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-7 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-07 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	96.4 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	104 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	96.8 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	102 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-8 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-08 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	94.4 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	104 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	98.1 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	103 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-9 3'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-09 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	OB25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	0.967	0.0100	"	"	"	"	"	
o-Xylene	0.0226	0.0100	"	"	"	"	"	
m,p-Xylene	2.47	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	96.6 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	78.0 %	81.4-121			"	"	"	5-04
Surrogate: 4-Bromofluorobenzene	91.7 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	295	50.0	mg/kg	1	OB25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	534	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	112 %	65-140			"	"	"	
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## Percent Moisture by AD2216A

Percent Moisture	26.4	1	mg/kg	1	795773	02/26/2010	02/26/2010	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager



Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-9 3'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## GENAPURE

X002109-09 (Soil)

### Polyaromatic Hydrocarbons (PAHs) by SW8270C

Benzo(b)fluoranthene	ND	0.136	mg/kg	1	796216	02/27/2010	03/02/2010
1-Methylnaphthalene	0.919	0.136	"	"	"	"	"
2-Methylnaphthalene	1.97	0.271	"	"	"	"	"
Acenaphthene	0.182	0.136	"	"	"	"	"
Acenaphthylene	ND	0.136	"	"	"	"	"
Benzo(a)anthracene	ND	0.136	"	"	"	"	"
Benzo(a)pyrene	ND	0.09	"	"	"	"	"
Indeno(1,2,3-c,d)Pyrene	ND	0.136	"	"	"	"	"
Anthracene	0.162	0.136	"	"	"	"	"
Phenanthrene	0.166	0.136	"	"	"	"	"
Naphthalene	0.518	0.136	"	"	"	"	"
Fluorene	0.203	0.136	"	"	"	"	"
Benzo(g,h,i)perylene	ND	0.136	"	"	"	"	"
Dibenz(a,h)Anthracene	ND	0.09	"	"	"	"	"
Chrysene	ND	0.136	"	"	"	"	"
Benzo(k)fluoranthene	ND	0.136	"	"	"	"	"
Fluoranthene	ND	0.136	"	"	"	"	"
Pyrene	ND	0.136	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	88 %	59-123	"	"	"
Surrogate: Terphenyl-D14	98 %	43-124	"	"	"

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation

3801 Carson Ave.

Evans CO 80534

Tony Cooper

Project Number: 2-2

Project: Hoshiko

**SS-9 3'****2/25/2010 12:00:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**GENAPURE**

X002109-09 (Soil)

**Polyaromatic Hydrocarbons (PAHs) by SW8270C***Surrogate: Nitrobenzene-d5**106 %**46-137**796216**02/27/2010**03/02/2010*

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## SS-10 4'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-10 (Soil)

### BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	OB25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	0.0248	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	95.0 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	107 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	102 %	74.7-123			"	"	"	

### GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	OB25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	104 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

SS-11 3'

2/25/2010 12:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002109-11 (Soil)

## BTEX by EPA 8260B

Benzene	ND	0.0100	mg/kg	2.5	0B25003	02/25/2010	03/01/2010	
Toluene	ND	0.0100	"	"	"	"	"	
Ethylbenzene	ND	0.0100	"	"	"	"	"	
o-Xylene	ND	0.0100	"	"	"	"	"	
m,p-Xylene	ND	0.0200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	95.6 %	77.6-134			"	"	"	
Surrogate: Toluene-d8	105 %	81.4-121			"	"	"	
Surrogate: 4-Bromofluorobenzene	99.2 %	74.7-123			"	"	"	

## GRO/DRO by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	0B25004	02/25/2010	02/26/2010	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	104 %	65-140			"	"	"	
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager



Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch OB25004 - Default Prep GC-Semi</b>										
<b>Blank (OB25004-BLK1)</b>					Prepared: 02/25/2010 Analyzed: 02/25/2010					
Gasoline (C6-C10)	ND	50.0	mg/kg							
Diesel (C10-C28)	ND	50.0	"							
<i>Surrogate: o-Terphenyl</i>	<i>51.6</i>		<i>g</i>	<i>50.0</i>		<i>103</i>	<i>65-140</i>			
<b>LCS (OB25004-BS1)</b>					Prepared: 02/25/2010 Analyzed: 02/25/2010					
Gasoline (C6-C10)	ND	50.0	mg/kg				65-140			
Diesel (C10-C28)	492	50.0	"	500		98.3	60-140			
<i>Surrogate: o-Terphenyl</i>	<i>56.6</i>		<i>g</i>	<i>50.0</i>		<i>113</i>	<i>65-140</i>			
<b>Matrix Spike (OB25004-MS1)</b>					Source: X002110-01	Prepared: 02/25/2010 Analyzed: 02/25/2010				
Gasoline (C6-C10)	4100	50.0	mg/kg		5010		65-130			
Diesel (C10-C28)	1020	50.0	"	500	778	47.6	60-140			QM-07
<i>Surrogate: o-Terphenyl</i>	<i>56.4</i>		<i>g</i>	<i>50.0</i>		<i>113</i>	<i>65-140</i>			
<b>Matrix Spike Dup (OB25004-MSD1)</b>					Source: X002110-01	Prepared: 02/25/2010 Analyzed: 02/25/2010				
Gasoline (C6-C10)	3150	50.0	mg/kg		5010		65-130	26.0	20	QM-07
Diesel (C10-C28)	894	50.0	"	500	778	23.1	60-140	12.8	25	QM-07
<i>Surrogate: o-Terphenyl</i>	<i>56.5</i>		<i>g</i>	<i>50.0</i>		<i>113</i>	<i>65-140</i>			

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

### **Volatile Organic Compounds by EPA Method 8260B - Quality Control** **Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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#### Batch OB25003 - EPA 5030B

##### Blank (OB25003-BLK1)

Prepared: 02/25/2010 Analyzed: 02/25/2010

Benzene	ND	0.004	mg/kg
Toluene	ND	0.004	"
Ethylbenzene	ND	0.004	"
o-Xylene	ND	0.004	"
m,p-Xylene	ND	0.008	"

Surrogate: 1,2-Dichloroethane-d4	70.4		ug/L	62.5	113	77.6-134
Surrogate: Toluene-d8	55.5		"	62.5	88.8	81.4-121
Surrogate: 4-Bromofluorobenzene	69.2		"	62.5	111	74.7-123

##### LCS (OB25003-BS1)

Prepared: 02/25/2010 Analyzed: 02/25/2010

Benzene	0.16	0.004	mg/kg	0.200	82.3	75.2-128
Toluene	0.17	0.004	"	0.200	83.7	76.3-130
Surrogate: 1,2-Dichloroethane-d4	71.9		ug/L	62.5	115	77.6-134
Surrogate: Toluene-d8	56.0		"	62.5	89.7	81.4-121
Surrogate: 4-Bromofluorobenzene	69.5		"	62.5	111	74.7-123

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporator

3801 Carson Ave.

Evans

CO

80534

Tony Cooper

Project Number: 2-2

Project: Hoshiko

## Percent Moisture by AD2216A - Quality Control GENAPURE

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 795773 - NONE

BLANK (795773-1-BLK)

Source: 795773-1-BLK

Prepared: 02/26/2010 Analyzed: 02/26/2010

Percent Moisture	ND	1	%	0.00	-	0	20
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Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Polyaromatic Hydrocarbons (PAHs) by SW8270C - Quality Control GENAPURE

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 796216 - SW3550

MS (362424-100 S)		Source: 362424-100 S			Prepared: 02/27/2010 Analyzed: 03/02/2010					
Fluoranthene	1.57	0.112	MG/KG	1.87	±0.112	84	59-106	0	20	
Fluorene	1.43	0.112	"	1.87	±0.112	76	54-115	0	20	
Indeno(1,2,3-c,d)Pyrene	1.54	0.112	"	1.87	±0.112	82	70-130	0	30	
Naphthalene	1.31	0.112	"	1.87	±0.112	70	50-105	0	20	
Phenanthrene	1.44	0.112	"	1.87	±0.112	77	54-120	0	20	
Dibenz(a,h)Anthracene	1.54	0.074	"	1.87	±0.074	82	47-120	0	20	
Pyrene	1.47	0.112	"	1.87	±0.112	79	49-125	0	20	
2-Methylnaphthalene	1.35	0.225	"	1.87	±0.225	72	48-100	0	20	
Benzo(k)fluoranthene	1.35	0.112	"	1.87	±0.112	72	60-112	0	20	
Benzo(g,h,i)perylene	1.44	0.112	"	1.87	±0.112	77	44-119	0	20	
Benzo(b)fluoranthene	1.58	0.112	"	1.87	±0.112	84	61-108	0	20	
Benzo(a)pyrene	1.48	0.074	"	1.87	±0.074	79	62-104	0	20	
Benzo(a)anthracene	1.52	0.112	"	1.87	±0.112	81	51-119	0	20	
Anthracene	1.45	0.112	"	1.87	±0.112	78	59-104	0	20	
Acenaphthylene	1.5	0.112	"	1.87	±0.112	80	63-103	0	20	
Chrysene	1.72	0.112	"	1.87	±0.112	92	61-106	0	20	
1-Methylnaphthalene	1.43	0.112	"	1.87	±0.112	76	44-104	0	20	
Acenaphthene	1.42	0.112	"	1.87	±0.112	76	48-119	0	20	
Surrogate: Nitrobenzene-d5	1.31		PERCENT	1.67		78	46-137			
Surrogate: Terphenyl-D14	1.43		"	1.67		86	43-124			
Surrogate: 2-Fluorobiphenyl	1.3		"	1.67		78	59-123			

MSD (362424-100 SD)		Source: 362424-100 SD			Prepared: 02/27/2010 Analyzed: 03/02/2010					
Benzo(a)anthracene	1.66	0.112	MG/KG	1.87	±0.112	89	51-119	9	20	
Anthracene	1.57	0.112	"	1.87	±0.112	84	59-104	8	20	
Acenaphthylene	1.6	0.112	"	1.87	±0.112	86	63-103	6	20	
Acenaphthene	1.52	0.112	"	1.87	±0.112	81	48-119	7	20	

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Polyaromatic Hydrocarbons (PAHs) by SW8270C - Quality Control GENAPURE

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 796216 - SW3550

MSD (362424-100 SD)		Source: 362424-100 SD			Prepared: 02/27/2010 Analyzed: 03/02/2010					
2-Methylnaphthalene	1.47	0.225	MG/KG	1.87	±0.225	79	48-100	9	20	
Benzo(g,h,i)perylene	1.56	0.112	"	1.87	±0.112	83	44-119	8	20	
1-Methylnaphthalene	1.59	0.112	"	1.87	±0.112	85	44-104	11	20	
Pyrene	1.56	0.112	"	1.87	±0.112	83	49-125	6	20	
Benzo(b)fluoranthene	1.67	0.112	"	1.87	±0.112	89	61-108	6	20	
Benzo(a)pyrene	1.56	0.074	"	1.87	±0.074	83	62-104	5	20	
Phenanthrene	1.56	0.112	"	1.87	±0.112	83	54-120	8	20	
Naphthalene	1.48	0.112	"	1.87	±0.112	79	50-105	12	20	
Indeno(1,2,3-c,d)Pyrene	1.66	0.112	"	1.87	±0.112	89	70-130	8	30	
Fluorene	1.53	0.112	"	1.87	±0.112	82	54-115	7	20	
Fluoranthene	1.65	0.112	"	1.87	±0.112	88	59-106	5	20	
Dibenz(a,h)Anthracene	1.66	0.074	"	1.87	±0.074	89	47-120	8	20	
Chrysene	1.86	0.112	"	1.87	±0.112	99	61-106	8	20	
Benzo(k)fluoranthene	1.51	0.112	"	1.87	±0.112	81	60-112	11	20	
Surrogate: 2-Fluorobiphenyl	1.43		PERCENT	1.67		86	59-123			
Surrogate: Terphenyl-D14	1.57		"	1.67		94	43-124			
Surrogate: Nitrobenzene-d5	1.47		"	1.67		88	46-137			

LCS (551439-1-BKS)		Source: 551439-1-BKS			Prepared: 02/27/2010 Analyzed: 03/02/2010					
Fluorene	1.29	0.1	MG/KG	1.67	±0.023	77	54-115	0	20	
Chrysene	1.54	0.1	"	1.67	±0.023	92	61-106	0	20	
Pyrene	1.32	0.1	"	1.67	±0.033	79	49-125	0	20	
Phenanthrene	1.3	0.1	"	1.67	±0.032	78	54-120	0	20	
Indeno(1,2,3-c,d)Pyrene	1.41	0.1	"	1.67	±0.034	84	70-130	0	30	
Fluoranthene	1.38	0.1	"	1.67	±0.038	83	59-106	0	20	
Dibenz(a,h)Anthracene	1.42	0.066	"	1.67	±0.027	85	47-120	0	20	
Acenaphthene	1.28	0.1	"	1.67	±0.022	77	48-119	0	20	

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Noelle E Doyle, Laboratory Manager



Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Polyaromatic Hydrocarbons (PAHs) by SW8270C - Quality Control GENAPURE

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 796216 - SW3550

LCS (551439-1-BKS)		Source: 551439-1-BKS			Prepared: 02/27/2010 Analyzed: 03/02/2010					
Naphthalene	1.26	0.1	MG/KG	1.67	±0.021	75	50-105	0	20	
Benzo(k)fluoranthene	1.35	0.1	"	1.67	±0.033	81	60-112	0	20	
2-Methylnaphthalene	1.25	0.2	"	1.67	±0.028	75	48-100	0	20	
1-Methylnaphthalene	1.38	0.1	"	1.67	±0.027	83	44-104	0	20	
Acenaphthylene	1.35	0.1	"	1.67	±0.030	81	63-103	0	20	
Anthracene	1.32	0.1	"	1.67	±0.035	79	59-104	0	20	
Benzo(a)anthracene	1.39	0.1	"	1.67	±0.028	83	51-119	0	20	
Benzo(a)pyrene	1.35	0.066	"	1.67	±0.025	81	62-104	0	20	
Benzo(b)fluoranthene	1.37	0.1	"	1.67	±0.020	82	61-108	0	20	
Benzo(g,h,i)perylene	1.31	0.1	"	1.67	±0.027	78	44-119	0	20	
Surrogate: Nitrobenzene-d5	1.45		PERCENT	1.67		87	46-137			
Surrogate: Terphenyl-D14	1.51		"	1.67		90	43-124			
Surrogate: 2-Fluorobiphenyl	1.35		"	1.67		81	59-123			

BLANK (551439-1-BLK)		Source: 551439-1-BLK			Prepared: 02/27/2010 Analyzed: 03/02/2010					
Fluoranthene	ND	0.1	MG/KG	1.67			-	0	20	
Fluorene	ND	0.1	"	1.67			-	0	20	
Indeno(1,2,3-c,d)Pyrene	ND	0.1	"	1.67			-	0	30	
Naphthalene	ND	0.1	"	1.67			-	0	20	
Phenanthrene	ND	0.1	"	1.67			-	0	20	
Dibenz(a,h)Anthracene	ND	0.066	"	1.67			-	0	20	
Acenaphthylene	ND	0.1	"	1.67			-	0	20	
Pyrene	ND	0.1	"	1.67			-	0	20	
Chrysene	ND	0.1	"	1.67			-	0	20	
Benzo(k)fluoranthene	ND	0.1	"	1.67			-	0	20	
Benzo(g,h,i)perylene	ND	0.1	"	1.67			-	0	20	
Benzo(b)fluoranthene	ND	0.1	"	1.67			-	0	20	

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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Polyaromatic Hydrocarbons (PAHs) by SW8270C - Quality Control GENAPURE

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 796216 - SW3550</b>										
<b>BLANK (551439-1-BLK)</b>		<b>Source: 551439-1-BLK</b>			<b>Prepared: 02/27/2010 Analyzed: 03/02/2010</b>					
Benzo(a)pyrene	ND	0.066	MG/KG	1.67			-	0	20	
Anthracene	ND	0.1	"	1.67			-	0	20	
Acenaphthene	ND	0.1	"	1.67			-	0	20	
2-Methylnaphthalene	ND	0.2	"	1.67			-	0	20	
1-Methylnaphthalene	ND	0.1	"	1.67			-	0	20	
Benzo(a)anthracene	ND	0.1	"	1.67			-	0	20	
Surrogate: Nitrobenzene-d5	1.59		PERCENT	1.67		95	46-137			
Surrogate: Terphenyl-D14	1.63		"	1.67		98	43-124			
Surrogate: 2-Fluorobiphenyl	1.46		"	1.67		87	59-123			

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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation

3801 Carson Ave.

Evans

CO

80534

Tony Cooper

Project Number: 2-2

Project: Hoshiko

### Notes and Definitions

- S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
- QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference

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Noelle E Doyle, Laboratory Manager

3/5/2010

Petroleum Development Corporation

Tony Cooper

3801 Carson Ave.

Evans

CO

80534

Project Name- Hoshiko

Project Number- 2-2

Attached are your analytical results for Hoshiko received by Origins Laboratory, Inc. February 26, 2010 1:03 pm. This project is associated with Origins project number X002120-01 .

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all,

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



Petroleum Development Corporatior  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
EX-W-1	X002120-01	Water	2/26/2010 11:00:00AM	02/26/2010 13:03
EX-W-2	X002120-02	Water	2/26/2010 11:30:00AM	02/26/2010 13:03

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Noelle E Doyle, Laboratory Manager



Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

# ORIGINS

LABORATORY, INC

www.originslaboratory.com

Fax: 303.265.9645 | Phone: 303.433.1322 | Denver, CO 80211

Client: PPL  
Address: \_\_\_\_\_

PLEASE EMAIL: 303.907.2453  
Telephone Number: WLANBET@ORIGINSLAB.COM  
Email Address: WLANBET@ORIGINSLAB.COM

Project Manager: Tony Cooper  
Project Name: SAE HOSTING 2-2  
Project Number: \_\_\_\_\_  
Samples Collected By: WLANBET

page \_\_\_\_\_ of \_\_\_\_\_

X602120

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions	
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summa Canister #			Other
EXW-1	2/26/10	1100	3					X				1	
EXW-2	2/26/10	1130	3					X				2	
												3	
												4	
												5	
												6	
												7	
												8	
												9	
												10	
Relinquished By: <u>[Signature]</u>	Date: <u>2/26/10</u>	Time: <u>1303</u>		Received By: <u>[Signature]</u>				Date: <u>02-26-10</u>			Time: <u>1303</u>	Turnaround Time: <input checked="" type="checkbox"/> Standard <input type="checkbox"/> 24 Hr <input type="checkbox"/> 48 Hr <input type="checkbox"/> 72 Hr	
Relinquished By: <u>[Signature]</u>	Date: <u>02-26-10</u>	Time: <u>1303</u>		Received By: <u>[Signature]</u>				Date: <u>02-26-10</u>			Time: <u>1303</u>	Standard <input checked="" type="checkbox"/>	

**Origins Laboratory, Inc.**

Naale G.

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Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

**EX-W-1****2/26/2010 11:00:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002120-01 (Water)

**BTEX by EPA 8260B**

Benzene	ND	0.00100	mg/L	1	OC01003	03/01/2010	03/03/2010	
Toluene	ND	0.00100	"	"	"	"	"	
Ethylbenzene	0.00471	0.00100	"	"	"	"	"	
o-Xylene	0.00484	0.00100	"	"	"	"	"	
m,p-Xylene	0.0195	0.00200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	100 %	73.5-130			"	"	"	
Surrogate: Toluene-d8	99.5 %	79.3-113			"	"	"	
Surrogate: 4-Bromofluorobenzene	95.6 %	81.5-117			"	"	"	

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

**EX-W-2****2/26/2010 11:30:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X002120-02 (Water)

**BTEX by EPA 8260B**

Benzene	0.195	0.00100	mg/L	1	OC01003	03/01/2010	03/03/2010	
Toluene	0.119	0.00100	"	"	"	"	"	
Ethylbenzene	0.0126	0.00100	"	"	"	"	"	
o-Xylene	0.0942	0.00100	"	"	"	"	"	
m,p-Xylene	0.0987	0.00200	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	98.1 %	73.5-130			"	"	"	
Surrogate: Toluene-d8	98.8 %	79.3-113			"	"	"	
Surrogate: 4-Bromofluorobenzene	91.5 %	81.5-117			"	"	"	

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

### **Volatile Organic Compounds by EPA Method 8260B - Quality Control** **Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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#### Batch OC01003 - EPA 5030B

##### Blank (OC01003-BLK1)

Prepared: 03/01/2010 Analyzed: 03/03/2010

Benzene	ND	0.001	mg/L							
Toluene	ND	0.001	"							
Ethylbenzene	ND	0.001	"							
o-Xylene	ND	0.001	"							
m,p-Xylene	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	60.0		ug/L	62.5		96.0	73.5-130			
Surrogate: Toluene-d8	62.4		"	62.5		99.9	79.3-113			
Surrogate: 4-Bromofluorobenzene	66.2		"	62.5		106	81.5-117			

##### Blank (OC01003-BLK2)

Prepared: 03/01/2010 Analyzed: 03/02/2010

Benzene	ND	0.001	mg/L							
Toluene	ND	0.001	"							
Ethylbenzene	ND	0.001	"							
o-Xylene	ND	0.001	"							
m,p-Xylene	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	61.8		ug/L	62.5		98.8	73.5-130			
Surrogate: Toluene-d8	63.4		"	62.5		101	79.3-113			
Surrogate: 4-Bromofluorobenzene	62.7		"	62.5		100	81.5-117			

##### LCS (OC01003-BS1)

Prepared: 03/01/2010 Analyzed: 03/02/2010

Benzene	0.05	0.001	mg/L	0.0500		100	77.3-128			
Toluene	0.05	0.001	"	0.0500		104	81.7-118			
Surrogate: 1,2-Dichloroethane-d4	63.0		ug/L	62.5		101	73.5-130			
Surrogate: Toluene-d8	64.2		"	62.5		103	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.3		"	62.5		101	81.5-117			

##### LCS (OC01003-BS2)

Prepared: 03/01/2010 Analyzed: 03/02/2010

Benzene	0.05	0.001	mg/L	0.0500		96.4	77.3-128			
Toluene	0.05	0.001	"	0.0500		92.4	81.7-118			

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Petroleum Development Corporation  
3801 Carson Ave.  
Evans CO 80534

Tony Cooper  
Project Number: 2-2  
Project: Hoshiko

## Volatile Organic Compounds by EPA Method 8260B - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch OC01003 - EPA 5030B</b>										
<b>LCS (OC01003-BS2)</b>					Prepared: 03/01/2010 Analyzed: 03/02/2010					
Surrogate: 1,2-Dichloroethane-d4	63.6		ug/L	62.5		102	73.5-130			
Surrogate: Toluene-d8	62.1		"	62.5		99.3	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.4		"	62.5		101	81.5-117			
<b>Matrix Spike (OC01003-MS1)</b>					Source: X002105-02		Prepared: 03/01/2010 Analyzed: 03/02/2010			
Benzene	0.05	0.001	mg/L	0.0500	ND	91.2	74.5-132			
Toluene	0.04	0.001	"	0.0500	ND	85.9	74.2-116			
Surrogate: 1,2-Dichloroethane-d4	63.5		ug/L	62.5		102	73.5-130			
Surrogate: Toluene-d8	62.0		"	62.5		99.1	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.1		"	62.5		101	81.5-117			
<b>Matrix Spike (OC01003-MS2)</b>					Source: X002105-03		Prepared: 03/01/2010 Analyzed: 03/02/2010			
Benzene	0.05	0.001	mg/L	0.0500	0.003	102	74.5-132			
Toluene	0.05	0.001	"	0.0500	ND	98.3	74.2-116			
Surrogate: 1,2-Dichloroethane-d4	63.2		ug/L	62.5		101	73.5-130			
Surrogate: Toluene-d8	62.9		"	62.5		101	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.5		"	62.5		102	81.5-117			
<b>Matrix Spike Dup (OC01003-MSD1)</b>					Source: X002105-02		Prepared: 03/01/2010 Analyzed: 03/02/2010			
Benzene	0.05	0.001	mg/L	0.0500	ND	94.9	74.5-132	3.95	13.1	
Toluene	0.05	0.001	"	0.0500	ND	92.5	74.2-116	7.44	21.2	
Surrogate: 1,2-Dichloroethane-d4	65.8		ug/L	62.5		105	73.5-130			
Surrogate: Toluene-d8	63.2		"	62.5		101	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.7		"	62.5		102	81.5-117			
<b>Matrix Spike Dup (OC01003-MSD2)</b>					Source: X002105-03		Prepared: 03/01/2010 Analyzed: 03/02/2010			
Benzene	0.05	0.001	mg/L	0.0500	0.003	97.5	74.5-132	3.93	13.1	
Toluene	0.05	0.001	"	0.0500	ND	91.6	74.2-116	7.05	21.2	
Surrogate: 1,2-Dichloroethane-d4	64.4		ug/L	62.5		103	73.5-130			
Surrogate: Toluene-d8	62.6		"	62.5		100	79.3-113			
Surrogate: 4-Bromofluorobenzene	63.0		"	62.5		101	81.5-117			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Noelle E Doyle, Laboratory Manager



Petroleum Development Corporatior

3801 Carson Ave.

Evans

CO

80534

Tony Cooper

Project Number: 2-2

Project: Hoshiko

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch OC01003 - EPA 5030B

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### Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

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Noelle E Doyle, Laboratory Manager