

## **NOTE TO THE COMMUNITY:**

*The attached Report, “Dissolved Phase Groundwater Investigation and P-60 Free Phase Product Delineation Report” was submitted to the Illinois Environmental Protection Agency on February 18, 2010, completing the investigation required by the Illinois EPA’s May 12, 2009 letter. The report and its conclusions are currently under review by the agency, and as such are subject to potential revision.*

## **REPORT SUMMARY**

Shell Oil Products US (SOPUS) conducted a multimedia subsurface investigation (e.g., soil, groundwater, soil vapor) in the Village of Roxana as outlined in the *Dissolved Phase Groundwater Investigation and P-60 Free Phase Product Delineation Work Plan for Roxana, Illinois* (January 21, 2009).

The primary objectives of this investigation were to: refine our understanding of the extent of benzene impact in the subsurface; assess the nature and extent of dissolved hydrocarbons in groundwater in the area west of the WRB Refining LLC Wood River Refinery (WRR) west fenceline; and gather data to assist in the delineation of the extent of petroleum product historically observed in groundwater beneath the WRR in the area of Monitoring Well P-60. The field investigation was conducted during multiple mobilizations between June and November 2009. These investigations were used to supplement previous investigations by URS Corporation and others.

From the results of this investigation, SOPUS has concluded:

- “Soil exposure does not pose a risk, except with respect to construction workers along the pipeline corridor. These potential risks are managed via safe work procedures.
- No LNAPL product (*separate phase petroleum product*) has been measured in the village.
- Exposure to groundwater does not pose a risk. Only a limited area of groundwater in the Village exceeds Class I screening criteria. The groundwater ordinance prevents exposure via prohibition on water wells. The use of production water, and Part B permit-required pumping at the WRR has a significant impact on the capture and treatment of groundwater in the area.
- Soil vapors do not appear to pose a risk; however two specific areas will be further evaluated.”

As a result of this work and previous investigations, SOPUS submitted recommendations for additional work. The results of the work will be presented to the Illinois EPA along with a revised “Conclusions and Recommendations” in a brief letter report.

R E P O R T

DISSOLVED PHASE  
GROUNDWATER  
INVESTIGATION AND P-60  
FREE PHASE PRODUCT  
DELINEATION

Roxana, Illinois

VOLUME II  
Appendix A - H

*Prepared for:*

Shell Oil Products US  
17 Junction Drive  
PMB#399  
Glen Carbon, Illinois 62034

February 2010



URS Corporation  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110  
(314) 429-0100  
**Project 21562289.00010**





Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**


<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>1</b>	<b>Date:</b> 07/17/09		
<b>Description:</b>  REDI crew setting up the air vac system to perform borehole clearance.			

<b>Photo No.</b> <b>2</b>	<b>Date:</b> 07/17/09	
<b>Description:</b>  REDI crew performing borehole clearance using an air vac system.		





Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**

<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>3</b>	<b>Date:</b> 07/22/09		
<b>Description:</b>  Locations ROST 9, GWP-7, and VMP-4 backfilled with sand after borehole clearance was completed and prior to drilling activities.			

<b>Photo No.</b> <b>4</b>	<b>Date:</b> 07/22/09
<b>Description:</b>  Fugro performing CPT/ROST activities at the site.	





Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**


<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>5</b>	<b>Date:</b> 08/28/09		
<b>Description:</b>  Fugro crew advancing CPT/ROST probes at location ROST-08.			

<b>Photo No.</b> <b>6</b>	<b>Date:</b> 08/26/09		
<b>Description:</b>  Soil cores recovered during drilling and soil sampling activities at GP-10.			





# Dissolved Phase Groundwater Investigation and P-60 Free Phase Product Delineation PHOTOGRAPHIC LOG

<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> 7	<b>Date:</b> 08/24/09		
<b>Description:</b>  Soil cores recovered during drilling and soil sampling activities at GP-8.			

<b>Photo No.</b> <b>8</b>	<b>Date:</b> 08/26/09
<b>Description:</b>  Hollow Stem Auger Rig being used during vapor point installation activities at location VMP-16.	







Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**

<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>9</b>	<b>Date:</b> 08/29/09		
<b>Description:</b>  Split spoon containing soil recovered during vapor point installation activities at location VMP-9.			

<b>Photo No.</b> <b>10</b>	<b>Date:</b> 08/11/09	
<b>Description:</b>  Vapor monitoring point consisting of four stainless steel ports with 6-inch stainless steel screens at location VMP-12.		



Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**

<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>11</b>	<b>Date:</b> 07/27/09		
<b>Description:</b>  REDI crew advancing a 4-foot long, mill-slotted sampler using a Geoprobe® hydraulic push system at groundwater profiling location GWP-6.			

<b>Photo No.</b> <b>12</b>	<b>Date:</b> 07/27/09	
<b>Description:</b>  Set up of groundwater profiling pump and equipment at location GWP-7.		





Dissolved Phase Groundwater Investigation and P-60 Free  
Phase Product Delineation  
**PHOTOGRAPHIC LOG**


<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>13</b>	<b>Date:</b> 08/19/09		
<b>Description:</b>  REDI personnel backfilling borehole GWP-7 after completion of groundwater profiling activities.			

<b>Photo No.</b> <b>14</b>	<b>Date:</b> 08/19/09	
<b>Description:</b>  Locations in which a permanent feature was not installed were backfilled and then graded with asphalt.		





# Dissolved Phase Groundwater Investigation and P-60 Free Phase Product Delineation PHOTOGRAPHIC LOG

<b>Client Name:</b> Shell Oil Products US		<b>Site Location:</b> Roxana, Illinois	<b>Project No.</b> 21562289
<b>Photo No.</b> <b>15</b>	<b>Date:</b> 10/27/09		
<b>Description:</b>  Leak testing performed on the sample train prior to sampling of vapor port.			

<b>Photo No.</b> <b>16</b>	<b>Date:</b> 11/03/09	
<b>Description:</b>  Set up of helium leak check shroud (containing summa canister, tedlar bags, valves and tubing) used to isolate sample set up from the atmosphere.		



# URS

## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:

JOB NUMBER:

OBSERVED BY:

B. Crafter

DATE STARTED:

30 June 09

DATE COMPLETED:

30 June 09

BORING LOCATION:

B-8

SUBCONTRACTOR:

REDI

REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or obstructions prior to drilling.

AIR KNIFE 1

Description/Location/Observations:

0" - 6" bgs, gravel ~ 1/4 - 3/4"

AIR KNIFE 2

Description/Location/Observations:

~6" bgs → became soil.

AIR KNIFE 3

Description/Location/Observations:

Complete boring at ~ 5' bgs.

No utilities observed

AIR KNIFE 4

Description/Location/Observations:



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:

JOB NUMBER:

OBSERVED BY:

B. Crafton

DATE STARTED:

30 June 09

DATE COMPLETED:

30 June 09

BORING LOCATION:

VMP-10

SUBCONTRACTOR:

REDI

REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or obstructions  
prior to drilling.

AIR KNIFE 1

Description/Location/Observations:

0" - 6" bgs. soil/grass

AIR KNIFE 2

Description/Location/Observations:

At ~ 3.3" bgs ~ 3ft ~ 6-8" pvc pipe discovered, which  
trends East to west. (Will step-off ~ 5' to NW).

AIR KNIFE 3

Description/Location/Observations:

Complete Air Knifing at ~ 5ft bgs.  
(No further obstructions/utilities)

AIR KNIFE 4

Description/Location/Observations:



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: B. Crafton
	DATE STARTED: 30 June 09	DATE COMPLETED: 30 June 09
	BORING LOCATION: VMP - 12	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

## REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or obstructions prior to drilling operations.

## AIR KNIFE 1

Description/Location/Observations:

0 ~ 6" pea gravel

## AIR KNIFE 2

Description/Location/Observations:

~ 6" → becomes soil

## AIR KNIFE 3

Description/Location/Observations:

Complete air knifing at ~ 5 ft bgs.

No utilities encountered

## AIR KNIFE 4

Description/Location/Observations:



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NUMBER:	OBSERVED BY: B. Crafton
	DATE STARTED: 30 June 09	DATE COMPLETED: 30 June 09
	BORING LOCATION: VMP-13	
	SUBCONTRACTOR: REDI	

REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or obstructions prior to drilling operations

AIR KNIFE 1  
Description/Location/Observations:  
0 ~ 6" bgs gravel ~ 1/4 - 3/4"

AIR KNIFE 2  
Description/Location/Observations:  
6" → becomes soil

AIR KNIFE 3  
Description/Location/Observations:  
Complete air knifing at ~ 5' bgs.  
No utilities observed

AIR KNIFE 4  
Description/Location/Observations:





# AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: B. Crafton
	DATE STARTED: 1 July 09	DATE COMPLETED: 1 July 09
	BORING LOCATION: B-7	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or  
obstructions prior to drilling.

AIR KNIFE 1

Description/Location/Observations:

0 ~ 3" bgs. grass

AIR KNIFE 2

Description/Location/Observations:

3" → becomes soil

AIR KNIFE 3

Description/Location/Observations:

End of air Knifing @ ~5' bgs.

No utilities observed

AIR KNIFE 4

Description/Location/Observations:



# URS

## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: <i>B. Crafton</i>
	DATE STARTED: <i>1 July 09</i>	DATE COMPLETED: <i>1 July 09</i>
	BORING LOCATION: <i>VMP-11</i>	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

*To clear underground utilities and/or obstructions prior to drilling.*

AIR KNIFE 1

Description/Location/Observations:

*0 ~ 3" bgs, grass.*

AIR KNIFE 2

Description/Location/Observations:

*3" → becomes soil*

AIR KNIFE 3

Description/Location/Observations:

*End of air Knifing @ ~5' bgs*

AIR KNIFE 4

Description/Location/Observations:

*No utilities observed*



# AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: B. Crafton
	DATE STARTED: 1 July 09	DATE COMPLETED: 1 July 09
	BORING LOCATION: UMP-15	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

To clear underground utilities and/or obstacles  
prior to drilling

AIR KNIFE 1

Description/Location/Observations:

0 ~ 12" bgs  $\frac{1}{4}$  - 2" gravel compacted

AIR KNIFE 2

Description/Location/Observations:

~ 1'  $\rightarrow$  becomes soil.

AIR KNIFE 3

Description/Location/Observations:

End of <sup>air knifing</sup> boring at ~ 10' bgs X 12" diameter

AIR KNIFE 4

Description/Location/Observations:

No utilities observed.



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7 July 09	DATE COMPLETED: 7 July 09
	BORING LOCATION: Roxana Public Works	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Clear underground utilities and/or  
obstacles prior to drilling

no utilities found

AIR KNIFE 1 12"dia. 5'lys B-7 relocated / Roxana Public Works

Description/Location/Observations:

small metal lines found Jeff Adams to inspect  
appears to be junk fill  
lines inspected by street superintendent (Lee)

AIR KNIFE 2 12"dia. 5'lys VMP-II Relocated / Roxana Public Works

Description/Location/Observations:

small metal pipe possibly copper  
appears to be junk fill  
lines inspected by street superintendent (Lee)

AIR KNIFE 3

Description/Location/Observations:

no utilities found :

AIR KNIFE 4

Description/Location/Observations:



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 8 July 09	DATE COMPLETED: 8 July 09
	BORING LOCATION: WRR North Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

## REASON FOR AIR KNIFING AT THIS LOCATION:

Locate utilities for installation  
of monitoring wells

## AIR KNIFE 1

Description/Location/Observations:

~~ROST-13 / WRR Property North  
no utilities found. gravel area by Wegman trailer  
found water seeping into hole with  
black oily substance with oil odor~~

## AIR KNIFE 2

Description/Location/Observations:

\* ROST 13 / WRR North Property by trailers  
12" dia. 10' bgs drilled to 5' bgs then quit to  
empty vac truck / resume air knife (9 July)  
no obstructions to 10' bgs 12" dia.

## AIR KNIFE 3

Description/Location/Observations:

[no utilities found]  
\* ROST-13 relocated due to bollard  
obstructing where box truck needs  
to be

## AIR KNIFE 4

Description/Location/Observations:



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 9 July 09	DATE COMPLETED: 9 July 09
	BORING LOCATION: WRR North Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

## REASON FOR AIR KNIFING AT THIS LOCATION:

to ~~detect~~ locate  
underground utilities for  
boring installation

[No utilities located]

AIR KNIFE 1 12" dia. 10' bgs ROST-16 / Gravel area west of tank A-27  
Description/Location/Observations: by fence abutting Chaffer St.  
Soil is black  
throughout encountered 12" corrugated metal pipe appears to be  
w/ some abandoned, moved hole 2' west per J. Adams phone conversation  
water in bottom seeping in finished hole to 10' bgs 12" dia., no obstructions found

AIR KNIFE 2 12" dia. 10' bgs ROST 15 / Gravel area east side of road to east  
Description/Location/Observations: of ROST 16 trace  
all clear to 5' bgs, soil brown to black @ 5' bgs  
5' bgs to 10' bgs brown in color w/ some black mixed in  
[no utilities located]

AIR KNIFE 3 ROST 18 / gravel area south of intersection  
Description/Location/Observations: of M Street & 1st St. / East of 1st St.  
12" dia. 10' bgs all clear to 5' bgs, soil brown with traces black  
all clear 5' bgs to 10' bgs soil same as above  
[no utilities located] throughout

AIR KNIFE 4  
Description/Location/Observations:





## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 10 July 09	DATE COMPLETED: 10 July 09
	BORING LOCATION: WRR North Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

ROST-14 / Just south of Wegman Trailer  
West of tank A28  
to clear utilities for  
well installation

AIR KNIFE 1

Description/Location/Observations:

ROST-14 / Just south of Wegman Trailers west of tank A28  
Soil Brown with Black traces to 5' bgs Myelocarbon vapors  
12" dia. hole 10' bgs from 5' bgs to 10' bgs  
No utilities found Soil is mostly black in color from  
5' bgs to 10' bgs

AIR KNIFE 2

Description/Location/Observations:

ROST-11 / West of Wegman trailers by smoking area  
Soil Dark Gray in color to 5' bgs / little vapors  
12" dia. hole 5' bgs to 10' bgs soil dark gray / little vapors  
No utilities found

AIR KNIFE 3

Description/Location/Observations:

ROST 17 / West of tank A27 between chaffer st.  
fence line & asphalt road in North Property  
Soil dark gray throughout to 10' bgs  
12" dia. hole 10' bgs little vapors  
no utilities found

AIR KNIFE 4

Description/Location/Observations:

ROST-12 / Driveway to North Prop. ON Building in center  
soil brown w/ black spots to 10' bgs  
6" dia. hole 10' bgs little vapors  
no utilities found

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NUMBER:	21562175	OBSERVED BY:	C. Smith
	DATE STARTED:	7/13/09	DATE COMPLETED:	7/13/09
	BORING LOCATION:	WRR North Property / Mobil 50		
	SUBCONTRACTOR:	Roberts Drilling		

REASON FOR AIR KNIFING AT THIS LOCATION:

to locate utilities for  
drilling and well installation

### AIR KNIFE 1

Description/Location/Observations:

VMP-12 / ~~WRR~~ Northwest of bridge to WRR North Prop.  
in gravel east of fence  
12" dia. Silt w/ Sand Fill 0 to 2.5' bgs black in color with trace gravel  
10' bgs Silty CLAY 2.5' to 10' bgs black in color with some gravel  
no utilities found

### AIR KNIFE 2

Description/Location/Observations:

~~VMP-16 / Southwest of bridge to WRR North Prop.  
in fenced area  
Fill 0 to 2.5' bgs black in color with little gravel  
Clay 2.5' to 5' bgs black in color~~

### AIR KNIFE 3

Description/Location/Observations:

VMP-16 / Southwest of bridge to WRR North Prop.  
in fenced area (fueling station)  
1.5' to 3.5' Silty SAND moist, low plastic  
3.5' to 10' gray w/ some gravel  
12" ~~dia.~~ 3" asphalt  
10' bgs gravel FILL  
no utilities found

### AIR KNIFE 4

Description/Location/Observations:

\*VMP-16A / 5' East of VMP-16 \*Renamed GP-6  
see sht. 1 of 4 on 7/14/09  
6" asphalt  
6" to 12" hand auger GRAVEL FILL  
air monitor PID 493 ppm  
100%, fine grained  
2' to 2'-6" gray, moist, ~~fine grained~~, silty SAND w/ trace  
air monitor PID 546 ppm & pebbles



## AIR KNIFING FORM

SHEET 2 of 2

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NUMBER:	OBSERVED BY:
	21562175	C. Smith
	DATE STARTED:	DATE COMPLETED:
	7/13/09	7/13/09
BORING LOCATION:		
WRR North Property / Mobil 50		
SUBCONTRACTOR:		
REPI		

REASON FOR AIR KNIFING AT THIS LOCATION:

to locate utilities for  
drilling and well install

AIR KNIFE 1

Description/Location/Observations:

\* 16A cont. / same as sheet 1 of 2  
4' to 4'6" encountered steel pipe @ 4' bgs  
\* moved hole 5' southwest of  
original 5' south of UMP-16  
is new hole location

AIR KNIFE 2

Description/Location/Observations:

\* Renamed GP-6 See sh. 1 of 4 on 7/14/09

AIR KNIFE 3

Description/Location/Observations:

AIR KNIFE 4

Description/Location/Observations:

# URS

## AIR KNIFING FORM

SHEET 1 of 4

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NUMBER:	OBSERVED BY:
	21562175	C. Smith
	DATE STARTED:	DATE COMPLETED:
	7/14/09	7/14/09
BORING LOCATION:		
WRR N. Property / Mobil 50		
SUBCONTRACTOR:		
REDI		

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw  
installation

\* Formerly called VMP-164 but relocated due to  
utility found on 7/13/09

### AIR KNIFE 1

#### Description/Location/Observations:

\*GP-6 / West of Bridge at N. fence line of Mobil 50  
6" dia 10' bgs 6" asphalt  
12" gravel FILL w/ sand  
18" to 10' bgs, moist, dense, fine grained, gray, SAND w/ trace silt

### AIR KNIFE 2

#### Description/Location/Observations:

PID readings 6" to 12" bgs - 393ppm with gravel to  
2' to 2'-6" bgs - 250ppm 2' bgs  
4' to 4'-6" bgs - 761ppm  
6' to 6'-6" bgs - 1866ppm  
8' to 8'-6" bgs - 1730ppm

### AIR KNIFE 3

#### Description/Location/Observations:

no utilities found

### AIR KNIFE 4

#### Description/Location/Observations:



## AIR KNIFING FORM

SHEET 2 of 4

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/14/09	DATE COMPLETED: 7/14/09
	BORING LOCATION: WRR N. Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

AIR KNIFE 1 6" dia. 10' bgs GP-8 / East of Asphalt Roadway next to tank A28

Description/Location/Observations:

0-6" bgs, moist to dry, very stiff, low plastic, ~~dk brown~~ Silty ~~fill~~ w/ some clay  
2' to 2'6" bgs - moist, dk. brown, ~~stiff~~ low plasticity, silty CLAY

AIR KNIFE 2

Description/Location/Observations:

4' to 4'6" bgs - moist, dk grayish brown, stiff, low plasticity, CLAY w/ some silt  
6' to 6'6" bgs - moist, reddish brown, stiff, low plasticity, CLAY w/ some silt

AIR KNIFE 3

Description/Location/Observations:

8' to 8'6" bgs - moist, dk gray, med. dense, fine grained, silty SAND

AIR KNIFE 4

Description/Location/Observations:

PID readings 0-6" bgs - NM  
2' to 2'6" bgs - 24.8 ppm  
4' to 4'6" bgs - 485 ppm  
6' to 6'6" bgs - 246 ppm  
8' to 8'6" bgs - 356 ppm

no utilities found



## AIR KNIFING FORM

SHEET 4 of 4

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/14/09	DATE COMPLETED: 7/14/09
	BORING LOCATION: WRR N. Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Locate utilities for  
mw installation

AIR KNIFE 1 6" dia, 10' bgs GP-T South of DM Building near smoking area

Description/Location/Observations:

3" asphalt

6" to 12" bgs - dry, grey, loose, medium to coarse grained,  
gravelly FILL w/ some silt

2' to 2'-6" bgs - moist, dk. brown, stiff, low plasticity, silty CLAY  
w/ trace gravel

~~AIR KNIFE 2~~

Description/Location/Observations:

~~4' to 6'-6" bgs - moist, greenish brown, stiff, low plasticity,~~  
~~6' to 6'-6" CLAY w/ some silt~~

~~4' to 4'-6" bgs - moist, dk. brown to gray, stiff low plasticity,~~  
~~4' to 4'-6" silty CLAY~~

~~AIR KNIFE 3~~

Description/Location/Observations:

~~8' to 8'-6" bgs - moist, dk. brown to grey, soft, low plasticity,~~  
~~silty CLAY with sand~~  
~~trace~~

PID Readings

~~AIR KNIFE 4~~

Description/Location/Observations:

6"-12" bgs - 22.1 ppm  
2' to 2'-6" bgs - 109 ppm  
4' to 4'-6" bgs - 54 ppm  
6' to 6'-6" bgs - 63 ppm

8' to 8'-6" bgs - 62 ppm

no utilities  
found





## AIR KNIFING FORM

SHEET 3 of 4

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/14/09	DATE COMPLETED: 7/14/09
	BORING LOCATION: WRR N. Property	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

AIR KNIFE 1 6" dia. 10' bgs GP-9 / Gravel area South of N. St. @ intersection of N. St. and 1st St.

Description/Location/Observations:

0 to 6" clean gravel FILL

6" to 12" gravel FILL w/ trace silt

2' to 2'-6" bgs - moist to dry, dk. gray, stiff, low plasticity

SILT w/ trace gravel

AIR KNIFE 2

Description/Location/Observations:

4' to 4'-6" bgs - moist, dk. brown, stiff, low plasticity,  
CLAY w/ some silt6' to 6'-6" bgs - moist, stiff, low plasticity, SILT  
dk. brown to gray

AIR KNIFE 3

Description/Location/Observations:

8' to 8'-6" bgs - moist, greenish brown, dense, fine grained  
silty SAND

PID readings

AIR KNIFE 4

Description/Location/Observations:

6" to 12" dia. 10' bgs - 4.1 ppm

2' to 2'-6" bgs - 985 ppm

4' to 4'-6" bgs - 1725 ppm

6' to 6'-6" bgs - 1780 ppm

8' to 8'-6" bgs - 1599

no utilities  
found



## AIR KNIFING FORM

SHEET 1 of 2

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/15/09	DATE COMPLETED: 7/15/09
	BORING LOCATION: Village Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

## AIR KNIFE 1

Description/Location/Observations:

6" dia. 5' bgs

GWP-11 / Middle of Alley between 1st st. & 2nd St.  
0' to 5' bgs - driller comments seems to be silty CLAY  
easy to get through, brown in color  
moist, brown, soft, low plastic, silty CLAY  
no utilities found

## AIR KNIFE 2

Description/Location/Observations:

6" dia. 5' bgs

ROST-23 / West side of Alley between 1st st. & 2nd. St.  
0 to 5' bgs - driller comments easy to get through  
moist, soft, low plastic, silty CLAY  
brown  
no utilities found

## AIR KNIFE 3

Description/Location/Observations:

GWP-16 / West side of Alley between 1st st. & 2nd st.  
~~Comments same as AIR KNIFE 2~~  
0 to 6" bgs - PID reading - 4.7 ppm  
moist, dk. gray, soft, low plastic, gravelly CLAY w/ silt  
2' to 2'6" bgs - PID reading - 1.7 ppm  
moist, brown, stiff, low plastic, CLAY w/ trace silt  
no utilities found  
6" dia. 5' bgs

## AIR KNIFE 4

Description/Location/Observations:

6" dia. 5' bgs

GP-10 / West side of Alley between 1st st. & 2nd St.  
comments same as AIR KNIFE 2  
no utilities found

4' to 4'6" bgs - PID reading - 3.0 ppm  
moist, reddish brown, stiff, low plastic, CLAY w/ trace silt  
\* hand auger samples done 1' north of GWP-16



## AIR KNIFING FORM

SHEET 2 of 2

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/15/09	DATE COMPLETED: 7/15/09
	BORING LOCATION: Village Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for new installation

## AIR KNIFE 1

Description/Location/Observations:

GWP-1 / East side of alley between 1st & 2nd St.  
0' to 5' bgs - moist, lt. brown, med. dense, fine grained, SAND  
6" dia. 5' bgs. no utilities found  
Droller comments 0 to 5' bgs easy to get through  
appears to be SAND from 0 to 5' bgs

## AIR KNIFE 2

Description/Location/Observations:

## AIR KNIFE 3

Description/Location/Observations:

## AIR KNIFE 4

Description/Location/Observations:

### AIR KNIFING EXCAVATION ARRANGEMENT:

### JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/16/09

### DATE COMPLETED:

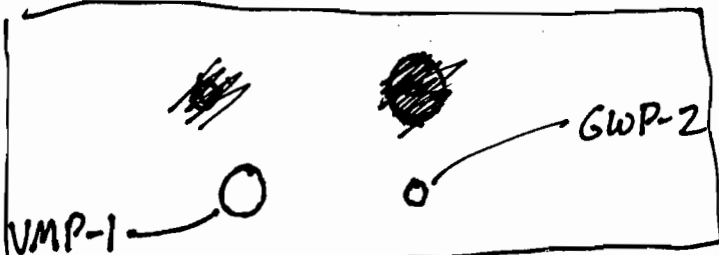
7/16/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.



### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

### AIR KNIFE 1

### Description/Location/Observations:

6" dia. 5' bgs

GWP-2 / East side of Second St. @ Chaffer St.

Driller comments easy to get through first 3' bgs further down to 5' bgs becomes stiffer  
Appears to be a Silty CLAY

no utilities found

### AIR KNIFE 2

### Description/Location/Observations:

12" dia.  
5' bgs

VMP-1 / East side of second st. @ Chaffer St.

0 to 6" bgs - PID reading 5.3 ppm

2' to 2'-6" bgs - PID reading 0.2 ppm

4' to 4'-6" bgs - PID reading 0.5 ppm

no utilities found

### AIR KNIFE 3

### Description/Location/Observations:

0 to 6" bgs - moist, dk. brown, ~~moist~~ soft, low plasticity, silty CLAY

2' to 2'-6" bgs - moist, reddish brown, stiff, low plasticity, CLAY w/ trace sil.

4' to 4'-6" bgs - moist, reddish brown, stiff, low plasticity, CLAY w/ trace sil.

### AIR KNIFE 4

### Description/Location/Observations:

6" dia. 5' bgs

GWP-3 / Alley between 2nd St. & 3rd St. east side @ Chaffer

Driller comments easy to get through to 3' bgs

appears to be silty CLAY w/ trace sand

3' to 5' tougher to get through

no utilities found

appears to be CLAY 3' to 5' bgs

AIR KNIFING EXCAVATION ARRANGEMENT: 	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/16/09	DATE COMPLETED: 7/16/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

### AIR KNIFE 1

Description/Location/Observations:

no utilities found

ROST-1 / Alley between 2nd & 3rd St., East side @ Chaffee  
 Driller comments easy hard to get through  
 1' to 5' bgs appears to be CLAY w/ trace silt  
 6" dia. 5' bgs

### AIR KNIFE 2

Description/Location/Observations:

no utilities found  
 12" dia. 5' bgs

VMP-2 / Alley between 2nd & 3rd St., East side @ Chaffee  
 Driller comments easy to get through to 3' bgs gets tougher after 3' bgs to 5' bgs appears to be silty CLAY to 3' bgs turning to CLAY

### AIR KNIFE 3

Description/Location/Observations:

no utilities found

GWP-12 / Alley between 2nd & 3rd St., in middle of alley  
 Driller comments easy to get through appears to be silty CLAY  
 6" dia. 5' bgs

### AIR KNIFE 4

Description/Location/Observations:

no utilities found

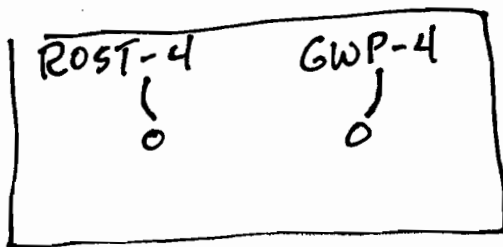
GWP-17 / Alley between 2nd & 3rd St., west side of alley  
 Driller comments easy to get through appears to be silty CLAY  
 6" dia. 5' bgs

# URS

## AIR KNIFING FORM

SHEET 3 of 3

### AIR KNIFING EXCAVATION ARRANGEMENT:



### JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/14/09

### DATE COMPLETED:

7/14/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

### AIR KNIFE 1

#### Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

ROST-4 / East side of third st. @ Chaffer  
Driller Comments mid range as far as  
difficulty air knifing  
appears to be a sandy SILT w/ trace  
clay

### AIR KNIFE 2

#### Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

GWP-4 / East side of 3rd. St. @ Chaffer  
Driller comments mid range as far as  
difficulty air knifing  
appears to be a sandy SILT w/ trace  
CLAY

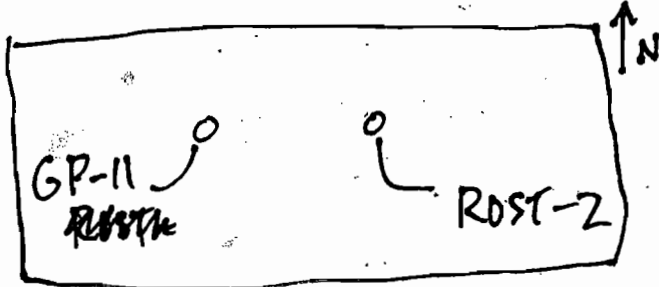
### AIR KNIFE 3

#### Description/Location/Observations:

### AIR KNIFE 4

#### Description/Location/Observations:

### AIR KNIFING EXCAVATION ARRANGEMENT:



### JOB NUMBER:

21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/17/09

### DATE COMPLETED:

7/17/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

REDI

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

### AIR KNIFE 1

#### Description/Location/Observations:

GP-11 / West side of 3rd St.

Driller comments soil is harder to get through, appears to be CLAY

6" dia. 5' bgs

no utilities found

### AIR KNIFE 2

#### Description/Location/Observations:

ROST-2 / West side of 3rd St.

PID readings - 0 to 6" bgs - 0.6 ppm

Driller comments 2' to 2'-6" bgs - 0.2 ppm  
soil tough to get through 4' to 4'-6" bgs - 0.2 ppm

no utilities found

6" dia. 5' bgs

### AIR KNIFE 3

#### Description/Location/Observations:

3" asphalt

0 to 6" bgs - moist, dk. brown, ~~stale~~ loose, low plastic, silty CLAY

2' to 2'-6" bgs - moist, dk. brown w/ reddish tint, stiff, low plastic  
CLAY w/ silt

no utilities found

6" dia. 5' bgs

4' to 4'-6" bgs - moist, reddish brown, soft, low plastic, ~~CLAY~~ sandy sand

### AIR KNIFE 4

#### Description/Location/Observations:

ROST-20 / Middle of alley between 3rd St. & 4th St. Sandy CLAY

Driller comments soil is soft first two feet then becomes harder to 5' bgs  
appears to be silt in top and CLAY to 5' bgs

no utilities found

6" dia. 5' bgs

GP-13 ROST-20

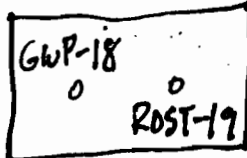
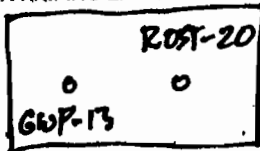
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## AIR KNIFING FORM

SHEET 2 of 2

## AIR KNIFING EXCAVATION ARRANGEMENT:



## JOB NAME &amp; NUMBER:

Dissolved Phase & P-60  
21562175

## OBSERVED BY:

C. Smith

## DATE STARTED:

7/17/09

## DATE COMPLETED:

7/17/09

## BORING LOCATION:

Roxanna

## SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

## REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

## AIR KNIFE 1

## Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-13 / middle of alley between 3rd &amp; 4th St.

Driller comments easy to get through  
0' to 2' bgs then becomes tougher to 5' bgs  
appears to go from silty CLAY to CLAY

## AIR KNIFE 2

## Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-18 / West side of alley between 3rd St. &amp; 4th St.

Driller comments easy to get through from  
0' to 3' bgs then becomes harder from 3' to 5' bgs  
appears to be silty CLAY to CLAY

## AIR KNIFE 3

## Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

ROST-19 / West side of alley between 3rd St. &amp; 4th St.

Driller comments easy to get through from  
0' to 3' bgs then becomes harder from 3' to 5' bgs  
appears to be silty CLAY to CLAY

## AIR KNIFE 4

## Description/Location/Observations:



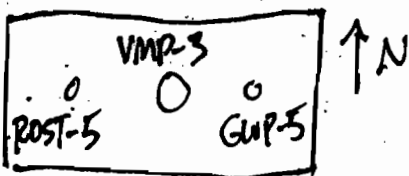
ROST-5, GWP-5, VMP-3 will be redone in same area but relocated south due to gas line located in hole ROST-5 these holes will be cold patched after air knifing new locations

**URS**

AIR KNIFING FORM

SHEET 1 of 2

AIR KNIFING EXCAVATION ARRANGEMENT:



JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

OBSERVED BY:

C. Smith

DATE STARTED:

7/20/09

DATE COMPLETED:

7/20/09

BORING LOCATION:

Roxanna

SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

\* See sheet 1 of 3 on 7/21/09 for relocated holes which will be used

AIR KNIFE 1

Description/Location/Observations:

no utilities  
found

\* GWP-5 / East side of alley between 3rd St. & 4th St.  
Driller comments 0' bgs to 2.5' bgs easy to get through 2.5' bgs to 5' bgs harder appears to be silt to 2.5' and clay to 5' bgs

AIR KNIFE 2

Description/Location/Observations:

no utilities  
found

\* VMP-3 / East side of alley between 3rd St. & 4th St.  
PID readings - 0 to 6" bgs - 91.4 ppm  
2' to 2'-6" bgs - 3.7 ppm  
4' to 4'-6" bgs - 2.1 ppm

AIR KNIFE 3

Description/Location/Observations:

~~ROST-5 / East side of alley between 3rd St. & 4th St.~~  
0 to 6" bgs -  
2' to 2'-6" bgs - Not finished due to hole relocation  
4' to 4'-6" bgs -

AIR KNIFE 4

Description/Location/Observations:

\* ROST-5 / East side of alley between 3rd St. & 4th St.  
found orange line approx. 2", spoke with Marty Reynolds instructs us to leave hole open and he would inquire what it is with gas company

\* These logs for informational purposes only holes will not be used

### AIR KNIFING EXCAVATION ARRANGEMENT:

### JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/20/09

### DATE COMPLETED:

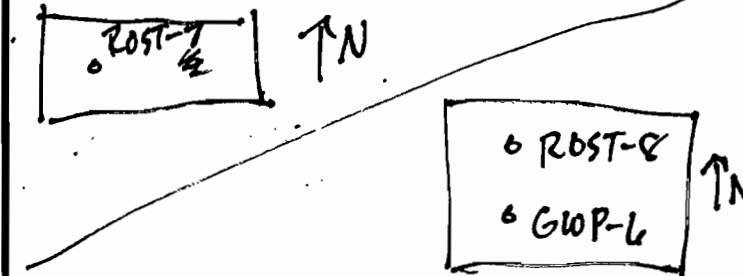
7/20/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.



### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for mw installation

### AIR KNIFE 1

#### Description/Location/Observations:

no utilities  
found

GWP-6/East side of 4th St. @ Chaffer  
Driller comments easy to get through to  
5' bgs, appears to be silty CLAY (loose)

6" dia. 5' bgs

### AIR KNIFE 2

#### Description/Location/Observations:

no utilities  
found

ROST-8/East side of 4th St. @ Chaffer  
Driller comments easy to get through to  
5' bgs, appears to be silty CLAY (loose)

6" dia. 5' bgs

### AIR KNIFE 3

#### Description/Location/Observations:

no utilities  
found

ROST-7/Middle of 4th St. 6" dia. 5' bgs  
Driller comments easy to get through from  
0 to 3' bgs and harder from 3' bgs to 5' bgs  
appears to be silty CLAY to 3' bgs then  
CLAY from 3' bgs to 5' bgs

### AIR KNIFE 4

#### Description/Location/Observations:

no utilities  
found

ROST-6/West side of 4th St.  
Driller comments easy to get through from  
0 to 3' bgs and harder from 3' bgs to 5' bgs  
appears to be silty CLAY to 3' bgs then  
CLAY from 3' bgs to 5' bgs

6" dia. 5' bgs

(R) = relocated

# URS

## AIR KNIFING FORM

SHEET 1 of 3

AIR KNIFING EXCAVATION ARRANGEMENT: <div style="border: 1px solid black; padding: 5px; display: inline-block;">ROST-5 VMP-3 GWP-5 O(R) O(R) O(R)</div> ↑ N	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/21/09	DATE COMPLETED: 7/21/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

(7/20/09)  
\* Orange pipe found in ROST-5 which Marty Reynolds confirms is Ameren gas line, ROST-5/VMP-3/GWP-5 relocated south (Marty Reynolds approves new locations onsite)

#### AIR KNIFE 1

##### Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

\* ROST-5 (R) / East side of alley between 3rd st. & 4th st. @ Chaffin  
Driller comments easy to get through to 3' bgs then becomes harder from 3' to 5' bgs appears to be loose silty CLAY to 3' bgs then dense CLAY from 3' to 5' bgs

#### AIR KNIFE 2

##### Description/Location/Observations:

no utilities  
found

12" dia. 5' bgs

\* VMP-3 (R) / East side of alley between 3rd st. & 4th st. @ Chaffin  
PID readings - 0 to 6" bgs - 91.4 ppm  
2' to 2'-6" bgs - 3.7 ppm  
4' to 4'-6" bgs - 2.1 ppm

#### AIR KNIFE 3

##### Description/Location/Observations:

\* GWP-5 (R) / East side of alley between 3rd st. & 4th st. @ Chaffin  
0 to 6" bgs - moist, dk. grey, loose, medium to coarse, silty GRAVEL

2' to 2'-6" bgs - moist, dk. grey, stiff, low plastic, silty CLAY

4' to 4'-6" bgs - moist, brown, very stiff, low plastic, CLAY w/ silt

#### AIR KNIFE 4

##### Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

\* GWP-5 (R) / East side of alley between 3rd st. & 4th st. @ Chaffin  
Driller comments easy to get through to 3' bgs then becomes harder from 3' to 5' bgs appears to be loose silty clay to 3' bgs then dense CLAY from 3' to 5' bgs

### AIR KNIFING EXCAVATION ARRANGEMENT:

### JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/21/09

### DATE COMPLETED:

7/21/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

### AIR KNIFE 1

### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-7/East side of Alley between 4th St. & 5th St. @ chaffer  
Driller comments easy to get through from 0 to 4' bgs then becomes harder from 4' to 5' bgs appears to be silty CLAY from 0 to 4' bgs then becomes stiff CLAY 4' bgs to 5' bgs

### AIR KNIFE 2

### Description/Location/Observations:

no utilities  
found  
12" dia. 5' bgs

VMP-4/East side of Alley between 4th St. & 5th St. @ Alley  
Driller comments 0 to 4' bgs easy to get through & 4' to 5' bgs becomes harder appears to be sandy SILT from 0 to 4' bgs then becomes CLAY from 4' bgs to 5' bgs

### AIR KNIFE 3

### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

RST-9/East side of alley between 4th st. & 5th st. @ chaffer  
Driller comments easy to get through from 0 to 4' bgs then becomes harder from 4' to 5' bgs appears to be silty CLAY from 0 to 4' bgs then becomes stiff CLAY 4' bgs to 5' bgs

### AIR KNIFE 4

### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

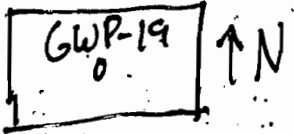
GWP-14/Middle of alley between 4th St. & 5th St.  
Driller comments easy to get through from 0 to 2.5' bgs then becomes harder from 2.5' to 5' bgs appears to be silty CLAY from 0 to 2.5' bgs then becomes CLAY from 2.5' to 5' bgs



## AIR KNIFING FORM

SHEET 3 of 3

## AIR KNIFING EXCAVATION ARRANGEMENT:



## JOB NAME &amp; NUMBER:

Dissolved Phase & P-60  
21562175

## OBSERVED BY:

C. Smith

## DATE STARTED:

7/21/09

## DATE COMPLETED:

7/21/09

## BORING LOCATION:

Roxanna

## SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

## REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation.

## AIR KNIFE 1

## Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

GWP-19/ west side of alley between 4th & 5th st.  
Driller comments easy to get through 0' to 4' bgs  
then becomes harder from 4' to 5' bgs  
appears to be silty CLAY from 0' to 4' bgs  
then becomes stiff CLAY from 4' to 5' bgs

## AIR KNIFE 2

## Description/Location/Observations:

## AIR KNIFE 3

## Description/Location/Observations:

## AIR KNIFE 4

## Description/Location/Observations:

# URS

## AIR KNIFING FORM

SHEET 1 of 3

AIR KNIFING EXCAVATION ARRANGEMENT: 	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/22/09	DATE COMPLETED: 7/22/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

#### AIR KNIFE 1

##### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

ROST-21/East side of 5th St. @ Chaffer  
Driller comments easy to get through from 0 to 4' bgs then becomes harder from 4' to 5' bgs appears to be silty CLAY from 0 to 4' bgs then becomes stiff CLAY from 4' to 5' bgs

#### AIR KNIFE 2

##### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-8/East side of 5th St. @ Chaffer  
Driller comments easy to get through from 0 to 4' bgs then becomes harder from 4' to 5' bgs appears to be silty CLAY from 0 to 4' bgs then becomes stiff CLAY from 4' to 5' bgs

#### AIR KNIFE 3

##### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

ROST-10/East side of alley between 5th & 6th St. @ Chaffer  
Driller comments easy to get through from 0 to 5' bgs, appears to be silty CLAY to 4' bgs then sandy CLAY from 4' to 5' bgs

#### AIR KNIFE 4

##### Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-9/East side of alley between 5th & 6th St. @ Chaffer  
Driller comments easy to get through from 0 to 5' bgs, appears to be silty CLAY to 4' bgs then sandy CLAY from 4' to 5' bgs



## AIR KNIFING FORM

SHEET 2 of 3

AIR KNIFING EXCAVATION ARRANGEMENT: 	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/22/09	DATE COMPLETED: 7/22/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION: 4

locate utilities for well installation

## AIR KNIFE 1

Description/Location/Observations:

no utilities  
found  
12" dia. 5' bgs

VMP-5/East side of alley between 5th &amp; 6th St. @ chaffer

PID Readings - 0 to 6" bgs - 0.5 ppm  
 2' to 2'-6" bgs - 0.6 ppm  
 4' to 4'-6" bgs - 0.5 ppm

## AIR KNIFE 2

Description/Location/Observations:

0 to 6" bgs - moist, dk brown, stiff, low plastic, silty CLAY w/ trace gravel

2' to 2'-6" bgs - moist, reddish brown, stiff, low plastic, silty CLAY

4' to 4'-6" bgs - moist, red, stiff, low plastic, sandy CLAY

## AIR KNIFE 3

Description/Location/Observations:

no utilities  
found  
6" dia. 5' bgs

GWP-15/Middle of alley between 5th St. & 6th St.  
 Driller comments easy to get through from 0 to 3' bgs  
 harder to get through from 3' to 5' bgs  
 appears to be silty CLAY from 0 to 3' bgs  
 then becomes CLAY from 3' to 5' bgs

## AIR KNIFE 4

Description/Location/Observations:

see sheet  
3 of 3 for  
relocated hole  
information

GWP-20/West side of alley between 5th &amp; 6th St.

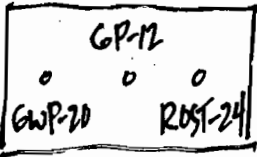
found metal gas line about 2' bgs  
 Marty Reynolds comes to site and instructs  
 us to move hole approx. 3' north in grassy  
 area adjacent to pavement 7/22/09 15:00  
 Also moved are GP-12 & ROST-24

# URS

## AIR KNIFING FORM

SHEET 3 of 3

### AIR KNIFING EXCAVATION ARRANGEMENT:



### JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

### OBSERVED BY:

C. Smith

### DATE STARTED:

7/22/09

### DATE COMPLETED:

7/22/09

### BORING LOCATION:

Roxanna

### SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

### REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

### AIR KNIFE 1

### Description/Location/Observations:

~~GP-12~~ west side of alley between 5th & 6th St.  
relocated

\* GP-12

### AIR KNIFE 2

### Description/Location/Observations:

~~GP-12~~ west side of alley between 5th & 6th St.  
relocated

no utilities  
found  
6" dia. 5' bgs

Driller comments easy to get through from 0 to 4' bgs  
then becomes harder from 4' to 5' bgs  
appears to be silty CLAY from 0 to 4' bgs  
then becomes CLAY from 4' to 5' bgs

### AIR KNIFE 3

### Description/Location/Observations:

\* GWP-20 Relocated west side of alley between 5th & 6th St.

no utilities  
found  
6" dia. 5' bgs

Driller comments easy to get through from 0 to 4' bgs  
then becomes harder from 4' to 5' bgs  
appears to be silty CLAY from 0 to 4' bgs  
then becomes CLAY from 4' to 5' bgs

### AIR KNIFE 4

### Description/Location/Observations:

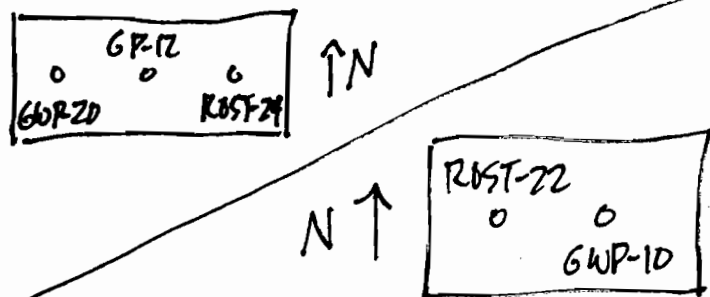
\* see sheet 2 of 3 for relocation justification





## AIR KNIFING FORM

SHEET 1 of 3

AIR KNIFING EXCAVATION ARRANGEMENT: 	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/23/09	DATE COMPLETED: 7/23/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Locate utilities for well installation

## AIR KNIFE 1

Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

ROST-3 / middle of 3rd St.

Driller comments soil easy to get through from 0 to 5' bgs, appears to be silty CLAY from 0 to 3' bgs then sandy CLAY from 3' to 5' bgs

## AIR KNIFE 2

Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

\*ROST-24 / West side of alley between 5th &amp; 6th St. relocated

Driller comments easy to get through from 0 to 3' bgs then becomes harder from 3' to 5' bgs, appears to be silty CLAY from 0 to 3' bgs then becomes CLAY from 3' to 5' bgs

## AIR KNIFE 3

Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

ROST-22 / East side of 6th St. @ Chaffer

Driller comments easy to get through from 0 to 5' bgs, appears to be silty CLAY from 0 to 5' bgs

## AIR KNIFE 4

Description/Location/Observations:

no utilities  
found

6" dia. 5' bgs

GWP-10 / East side of 6th St. @ Chaffer

Driller comments easy to get through from 0 to 5' bgs, appears to be silty CLAY from 0 to 5' bgs

\*see sheet 2 of 3 from 7/22/09 for relocation justification



## AIR KNIFING FORM

SHEET 2 of 3

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/23/09	DATE COMPLETED: 7/23/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

## REASON FOR AIR KNIFING AT THIS LOCATION:

locate utilities for well installation

## AIR KNIFE 1

## Description/Location/Observations:

no utilities  
found

12" dia. 5' bgs

VMP-6 / East side of alley between 6th & 7th @ Chaffer  
Driller comments easy to get through from  
0 to 3' bgs then becomes harder 3' to 5' bgs  
appears to be silty CLAY from 0 to 3' bgs  
then becomes CLAY from 3' to 5' bgs

## AIR KNIFE 2

## Description/Location/Observations:

no utilities  
found

12" dia. 5' bgs

VMP-7 / East side of 7th St. @ Chaffer  
Driller comments easy to get through from  
0 to 5' bgs, appears to be silty CLAY  
from 0 to 3' bgs then becomes sandy CLAY  
from 3' to 5' bgs~~AIR KNIFE 3~~~~Description/Location/Observations:~~~~VMP-8 / East side of alley between 7th & 8th St. @ Chaffer  
Driller comments easy to get through from  
0 to 3' bgs then becomes harder 3' to 5' bgs  
appears to be silty CLAY from 0 to 3' bgs  
then becomes CLAY from 3' to 5' bgs~~

## AIR KNIFE 4

## Description/Location/Observations:

no utilities  
found

12" dia. 5' bgs

VMP-9 / East side of alley between 7th & 8th St. @ Chaffer  
Driller comments easy to get through from  
0 to 3' bgs then becomes harder from 3' to 5' bgs  
appears to be silty CLAY from 0 to 3' bgs  
then becomes CLAY from 3' to 5' bgs



## AIR KNIFING FORM

SHEET 3 of 3

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: C. Smith
	DATE STARTED: 7/23/09	DATE COMPLETED: 7/23/09
	BORING LOCATION: Roxanna	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Locate utilities for well installation

## AIR KNIFE 1

Description/Location/Observations:

12" dia 5' bgs  
no utilities found  
VMP-8/Middle of alley between 7th & 8th St.  
Driller comments easy to get through from 0 to 2.5' bgs then becomes harder from 2.5 to 5' bgs appears to be silty CLAY from 0 to 2.5' bgs then becomes CLAY from 2.5' to 5' bgs

AIR KNIFE 2 6"x5' ROST-25/4 ft south of ~~alley~~ between 7th & 8th St. and OLD Edwardsville Rd.

Description/Location/Observations:

Possible utility found - 1.5" copper pipe (e-w) on south edge of hole. Offset 18" to the north.  
Initial hole: driller comments tough to get through from 0' to 5'. Appears to be silty CLAY with gravel from 0 to 4' bgs. 4'-5' CLAY. Offset hole: driller comments fairly easy to get from 0' to 5' bgs. Appears to be silty CLAY from 0 to 4' bgs, then CLAY 4'-5' bgs.

## AIR KNIFE 3

Description/Location/Observations:

no utilities found in relocated hole as explained above

## AIR KNIFE 4

Description/Location/Observations:

# URS

## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: Mike Corbett
	DATE STARTED: 7/31/09	DATE COMPLETED: 7/31/09
	BORING LOCATION: VMP-3(A)	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Hand-auger to 5 ft (12-in. diameter) for the installation of a vapor point screened from 22' to 22.5'. This is a stop-out location of VMP-3, at which the installation of a vapor point of the aforementioned screened interval failed.

AIR KNIFE 1

Description/Location/Observations:

No utilities encountered. Driller remarks fairly easy to hand auger to 5ft. Soft, moist, brown silty clay.

AIR KNIFE 2

Description/Location/Observations:

AIR KNIFE 3

Description/Location/Observations:

AIR KNIFE 4

Description/Location/Observations:



# AIR KNIFING FORM

SHEET \_\_\_\_ of \_\_\_\_

AIR KNIFING EXCAVATION ARRANGEMENT:

JOB NAME & NUMBER:

Dissolved Phase & P-60  
21562175

OBSERVED BY:

N. Satam

DATE STARTED:

8/27/09

DATE COMPLETED:

8/27/09

BORING LOCATION:

ROST-30

SUBCONTRACTOR:

Roberts Environmental Drilling, Inc.

REASON FOR AIR KNIFING AT THIS LOCATION:

Clear utilities

AIR KNIFE 1

ROST-30

Description/Location/Observations:

Diameter - 4 in.  
Depth - 50 feet  
No utilities observed

AIR KNIFE 2

Description/Location/Observations:

AIR KNIFE 3

Description/Location/Observations:

AIR KNIFE 4

Description/Location/Observations:





## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: Mike Corbett
	DATE STARTED: 8/27/09	DATE COMPLETED: 8/27/09
	BORING LOCATION:	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION: ROST

## AIR KNIFE 1 ROST-26

Description/Location/Observations: 6 in. diameter x 12 foot deep (12 in. diameter at the surface)  
0'-0.5' surface gravel. 0.5'-8' dark brown to black silty clay, moist. 8'-11' fine SAND, gray.  
Strong odor.  
No utilities observed

## AIR KNIFE 2 ROST-27

Description/Location/Observations: ~~same~~ 6 in. diameter x 11 ft deep (12 in. diam. at surface). same  
as ROST-26  
no utilities observed

## AIR KNIFE 3 ROST-29

Description/Location/Observations: 6 in. x 10 ft deep (12 in. diameter at surface)  
0'-0.5' surface gravel. 0.5'-6' dark brown to black silty clay, moist. 6'-10' fine gray SAND.  
no utilities observed

## AIR KNIFE 4 ROST-28

Description/Location/Observations: 6 in. x 11 ft deep (12 in. diameter at surface)  
0'-0.5' surface gravel. 0.5'-8' dark brown silty clay, moist/dry. 8'-11' fine gray SAND.  
no utility observed



## AIR KNIFING FORM

SHEET 1 of 1

AIR KNIFING EXCAVATION ARRANGEMENT:	JOB NAME & NUMBER: Dissolved Phase & P-60 21562175	OBSERVED BY: Mike Corbett
	DATE STARTED: 8/31/09	DATE COMPLETED: 8/31/09
	BORING LOCATION:	
	SUBCONTRACTOR: Roberts Environmental Drilling, Inc.	

REASON FOR AIR KNIFING AT THIS LOCATION:

Utility Clearance for geoprobeing.

AIR KNIFE 1 GP-4 (hand auger)

Description/Location/Observations: First 2 attempts (west of location 3ft) could not advance past 2.5ft due to an unknown obstruction. 3rd attempt also west of location 3ft to 5ft bgs. No utilities observed.

Loose, brown, silty SAND (SM-SP), moist, with gravel

AIR KNIFE 2 GP-2 (hand auger)

Description/Location/Observations: First attempt (3ft east of location) could not advance past 2.5ft due to an unknown obstruction. 2nd attempt (3ft west of location) to 5ft bgs. No utilities observed.

Soft, brown, silty CLAY (CL), moist, trace sand and gravel.

AIR KNIFE 3 GP-1 (hand auger)

Description/Location/Observations: Seven attempts (all directions 3ft from location) could not advance past 2ft due to concrete fragments in the subsurface. 8th attempt occurred 3ft east of location to 5ft bgs. Gravelly silt, hard to 2ft. Med. stiff, brown, silty clay (CL), moist, trace sand and gravel to 3ft. No utilities observed.

AIR KNIFE 4 GWP-21 (hand auger)

Description/Location/Observations: First 2 attempts (north and south 3ft of location) could not advance past 2ft due to concrete fragments in the subsurface. 3rd attempt occurred 3ft west of location to 5ft bgs. Hard gravelly silt to 2ft. Medium stiff, brown, silty CLAY (CC), moist, trace sand and gravel to 5ft. No utilities observed.





## FUGRO CONSULTANTS, INC.

6105 Rookin Road  
Houston, Texas 77074  
Tel: 713-346-4000  
Fax: 713-346-4002

September 4, 2009  
Report Number 04.19090044

URS Corporation  
1001 Highlands Plaza Drive West  
St. Louis, MO 63110

Attention: Ms. Wendy Pennington, P.E.

**REPORT FOR  
PIEZOCONE PENETRATION TESTING,  
RAPID OPTICAL SCREENING TOOL (CPT/ROST™) TESTING  
AND RELATED SERVICES  
ROXANA, ILLINOIS  
WORK ORDER # 21562175**

Dear Ms. Pennington:

Fugro Consultants (Fugro) is pleased to present this data report for Cone Penetration (CPT) and Rapid Optical Screening Tool (ROST™) testing at the above-referenced site. CPT/ROST™ provided continuous characterization of stratigraphy and petroleum hydrocarbon distribution at the testing locations. A description of the CPT and ROST™ technologies and a discussion of general ROST™ data interpretation follow. CPT and ROST™ logs and electronic data CD are included as attachments. The final data has been reviewed and has undergone the appropriate QA/QC process.

### **Cone Penetration Testing**

CPT was performed simultaneously with each ROST™ sounding and yielded real-time stratigraphic data. CPT is a proven method for rapidly evaluating the physical characteristics of unconsolidated soils. It is based on the resistance to penetration of an electronically instrumented cone, which is continuously advanced into the subsurface. In accordance with ASTM Standard D5778-07, the cone was advanced at a rate of two centimeters per second with the driving force provided by hydraulic rams.

The CPT cone used at this site had an apex angle of 60 degrees with a base area of 15 square centimeters (cm<sup>2</sup>), and friction sleeve with a surface area of 200 cm<sup>2</sup>. The standard geotechnical sensors within the cone measure tip resistance and sleeve friction in tons per square foot (TSF). The combined data from the tip resistance and sleeve friction form the basis of the soil classification (e.g., sand, silt, clay, etc.).

Soil stratigraphy was identified using Campanella and Robertson's Simplified Soil Behavior Chart. Please note that because of the empirical nature of the soil behavior chart, the soil identification should be verified locally. Some soils, such as glacial till, cemented soils and calcareous soils are outside the scope of these soil behavior charts."







## ROST™ Testing

Fugro Consultants' ROST™ Laser-Induced Fluorescence system was used for this investigation to screen soils for petroleum hydrocarbon materials containing aromatic hydrocarbon constituents. The system consists of a tunable laser mounted in the CPT truck that is connected to a down-hole sensor. The down-hole sensor consists of a small diameter sapphire window mounted flush with the side of the cone penetrometer probe.

The laser and associated equipment transmit 50 pulses of light per second to the sensor through a fiber optic cable. The wavelength of the pulsed excitation light is tunable and can be set to wavelengths of 266 nanometers (nm) or to wavelengths between 280 and 300 nm. An excitation wavelength of 290 nm was used for each test during this project.

The laser light passes through the sapphire window and is absorbed by aromatic hydrocarbon molecules in contact with the window, as the probe is advanced. This addition of energy (photons) to the aromatic hydrocarbons causes them to fluoresce. A portion of the fluorescence emitted from any encountered aromatic constituents is returned through the sapphire window and conveyed by a second fiber optic cable to a detection system within the CPT rig. The emission data resulting from the pulsed laser light is averaged into one reading per one-second interval (approximately one reading per 2 cm vertical interval) and is recorded continuously. ROST™ may be operated in single or multi-wavelength mode, depending on project objectives. For this project, ROST™ was operated in multi-wavelength mode (MWL).

**Multi-Wavelength Mode (MWL).** In MWL mode, several characteristics of the emitted fluorescence are measured and recorded simultaneously at four (4) specific wavelengths (340, 390, 440, and 490 nm). These four wavelengths represent the spectrum of fluorescence typically produced by aromatic hydrocarbons ranging from light fuels through heavy contaminants such as coal tar and creosote. The recorded data is then presented as a color graph of fluorescence intensity (the combined fluorescence of all four monitored wavelengths) versus depth (FVD).

On the FVD graph, each of the four monitored wavelengths is assigned a color. These colors are combined based on the proportional fluorescence intensity of each of the individual wavelengths. The combined color is then used on the FVD graph. Changes in color on the FVD graph typically represent changes in product type. Similarly, like colors on the FVD graph typically represent the same product, regardless of the total fluorescence intensity. Changes in the total fluorescence intensity typically indicate changes in contaminant concentration, with higher fluorescence intensities representing proportionally higher concentrations when compared to lower fluorescence intensities.

In addition to the FVD graph, depth specific waveforms are presented at four (4) selected depths throughout the sounding. These waveform graphs are presented to the right of the FVD graph on each plot. In the waveform graphs, the fluorescence intensity and duration of fluorescence of each of the monitored wavelengths is represented by an individual peak, starting at 340 nm and increasing in 50 nm wavelengths as you move to the right. The intensity of each wavelength is represented by the height of the peaks, and the duration of fluorescence is represented by the width of each peak. For general interpretation purposes, lighter aromatic hydrocarbon molecules will emit fluorescence at the shorter wavelengths, and heavier, longer chained hydrocarbons will emit fluorescence at the longer wavelengths. The presented waveforms can be compared to waveforms typical of common hydrocarbon products to determine the likely product type that has been encountered. Please note that the waveforms are available at every two-centimeter interval throughout the entire sounding. Additional waveforms can be generated at any time during or after testing is complete.







**Reference Solution.** The fluorescence intensity of a reference solution placed on the sapphire window was measured immediately prior to conducting each test. This reference solution measurement serves two purposes. First, as a quality control check, the solution is used to ensure that the performance of the system is within specifications. Second, it allows for normalization of the data from different test locations for variation in laser power, operating conditions, and monitored emission wavelength. The reference solution used for this project was the standard M1 reference, which is a proprietary PHC containing solution. M1 provides consistent fluorescence response across the portion of the spectrum analyzed by ROST and therefore, allows the fluorescence data collected to be consistently normalized to intensities recorded as a percentage of M1.

#### **LIMITATIONS OF ENVIRONMENTAL SUBSURFACE WORK**

Fugro Consultants' report is based upon our observations made during fieldwork, the information provided to Fugro and the results of the ROST/CPT survey. Given the inherent limitation of environmental subsurface work, Fugro cannot guarantee that the site is free of hazardous or potentially hazardous materials or conditions or that latent or undiscovered conditions will not become evident in the future. Fugro's report was prepared in accordance with our proposal and the General Conditions agreed to between Fugro and Client and no warranties, representations, or certifications are made.

Fugro Consultants, Inc. appreciates the opportunity to be of service to your organization. Please do not hesitate to contact us if we can be of further assistance. We look forward to working with you in the future.

Sincerely,  
**FUGRO CONSULTANTS, INC.**

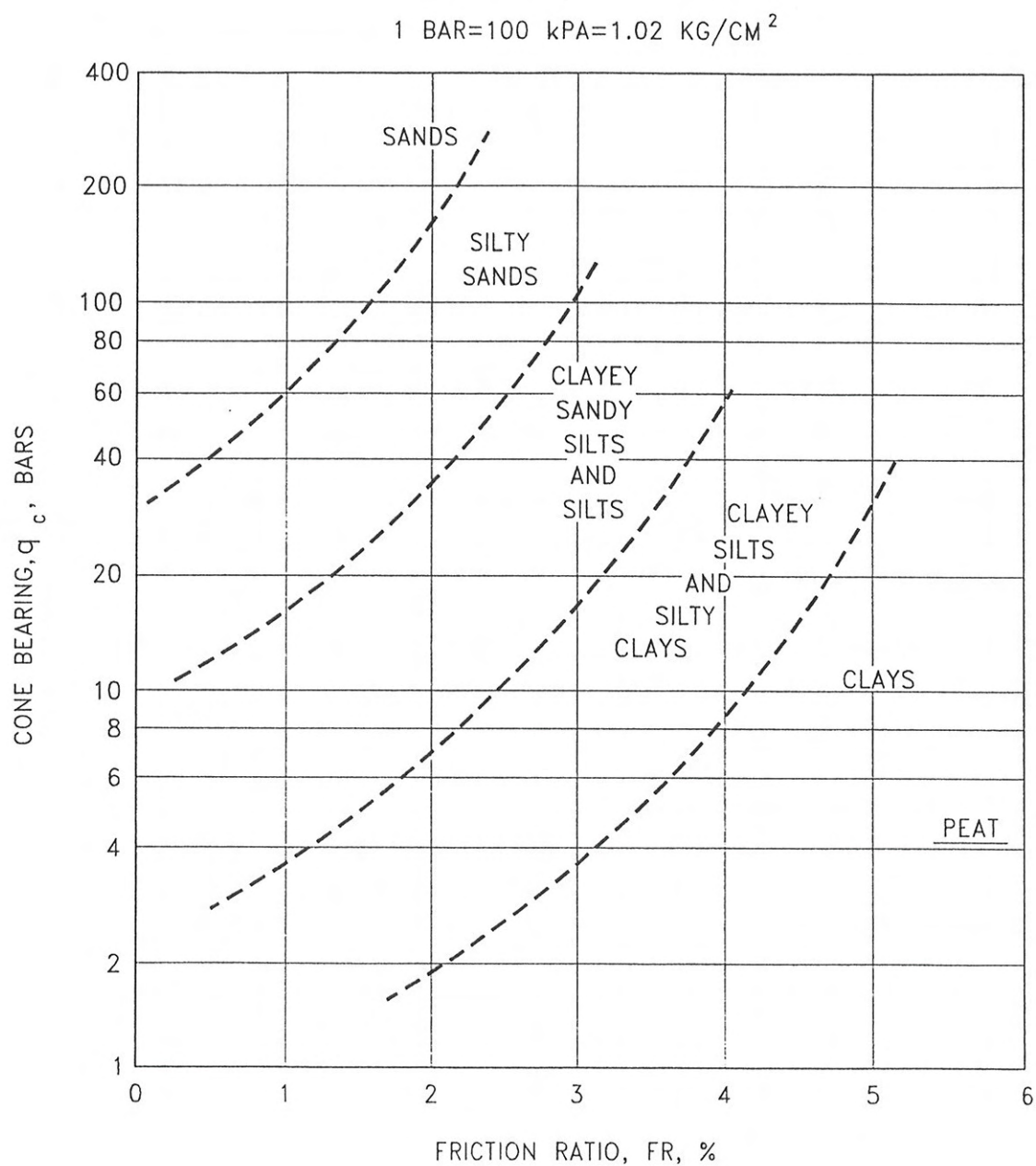
A handwritten signature in dark ink, appearing to read "Recep Yilmaz", with a stylized flourish at the end.

Recep Yilmaz  
Senior Vice President

RY/tsp

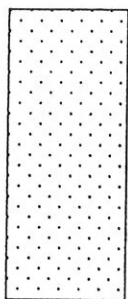
Enclosure: - 1 CD



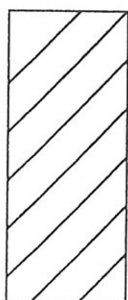


MODIFIED CAMPANELLA AND ROBERTSON SOIL BEHAVIOR CHART (1983)

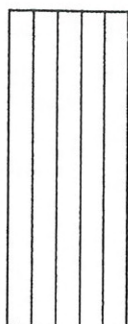
## KEY TO SOIL BEHAVIOR TYPE



SAND AND SANDY SOIL



CLAY AND CLAYEY SOIL



SILT AND SILTY SOIL





**ROXANA, ILLINOIS**

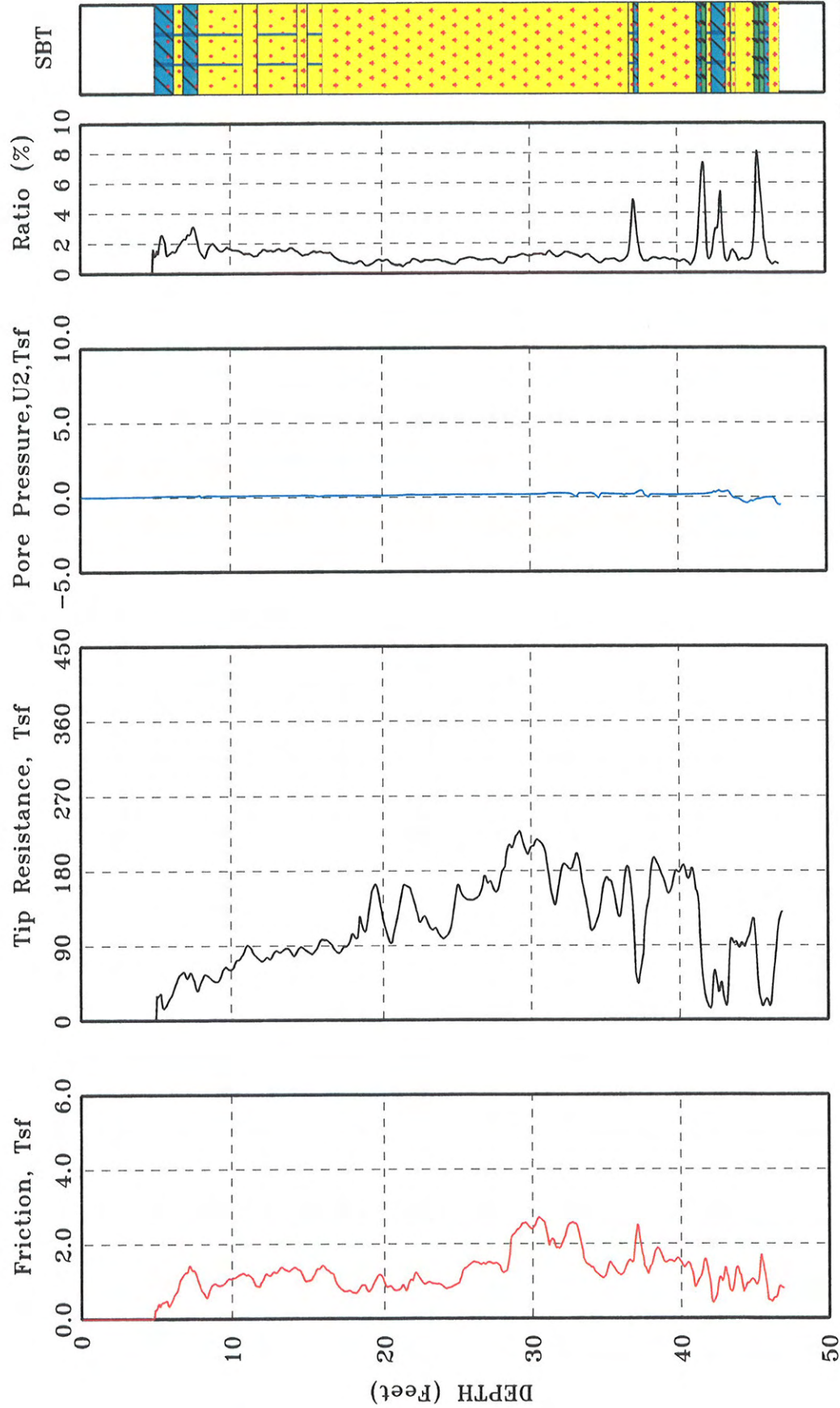
**CPT PLOTS**



FUGRO GEOSCIENCES, INC.

CPT No : ROST-01  
JOB No : 04.1909-0044  
CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
CLIENT : URS Corporation  
OPERATOR : DANIEL GARZA  
DATE : 26-Aug-2009

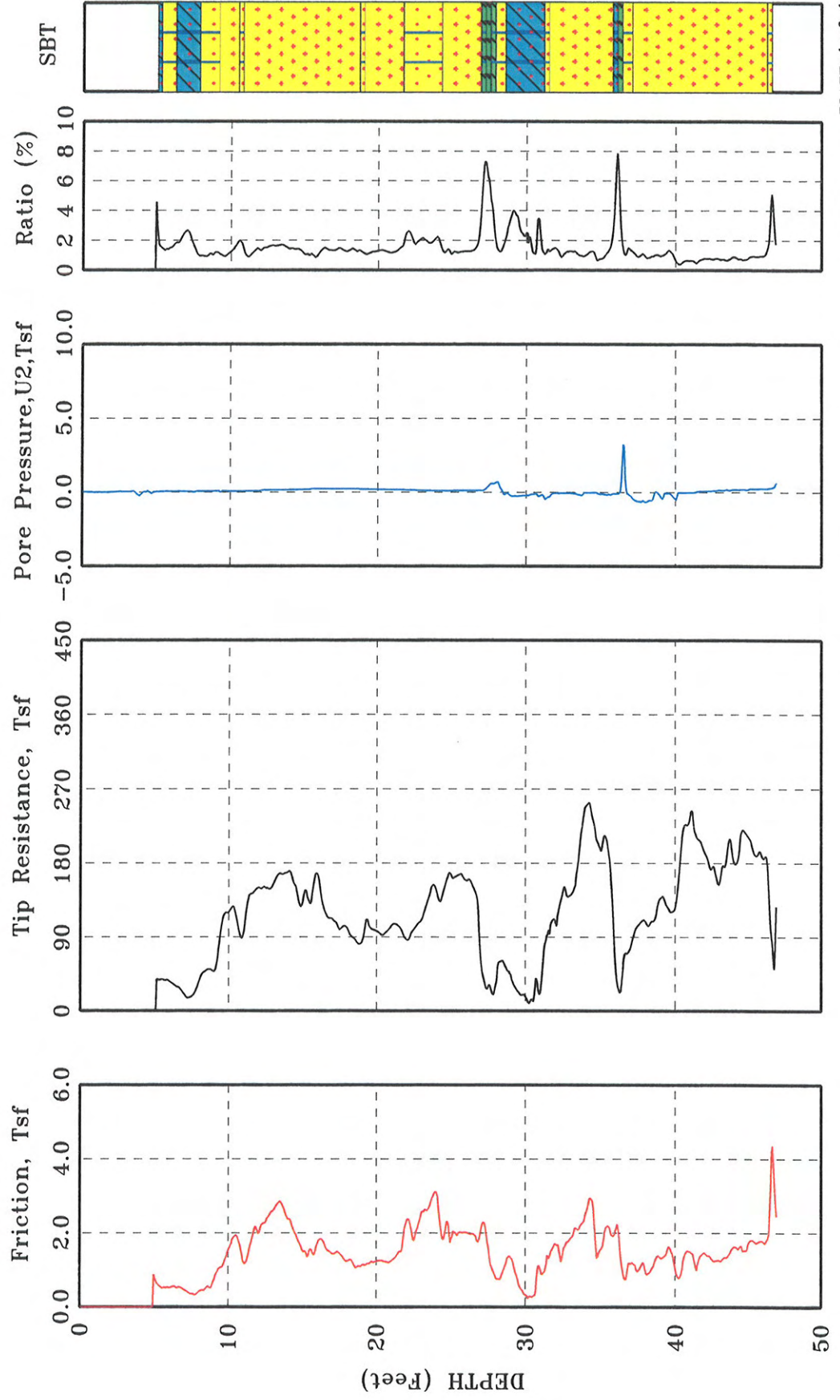




**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-02  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

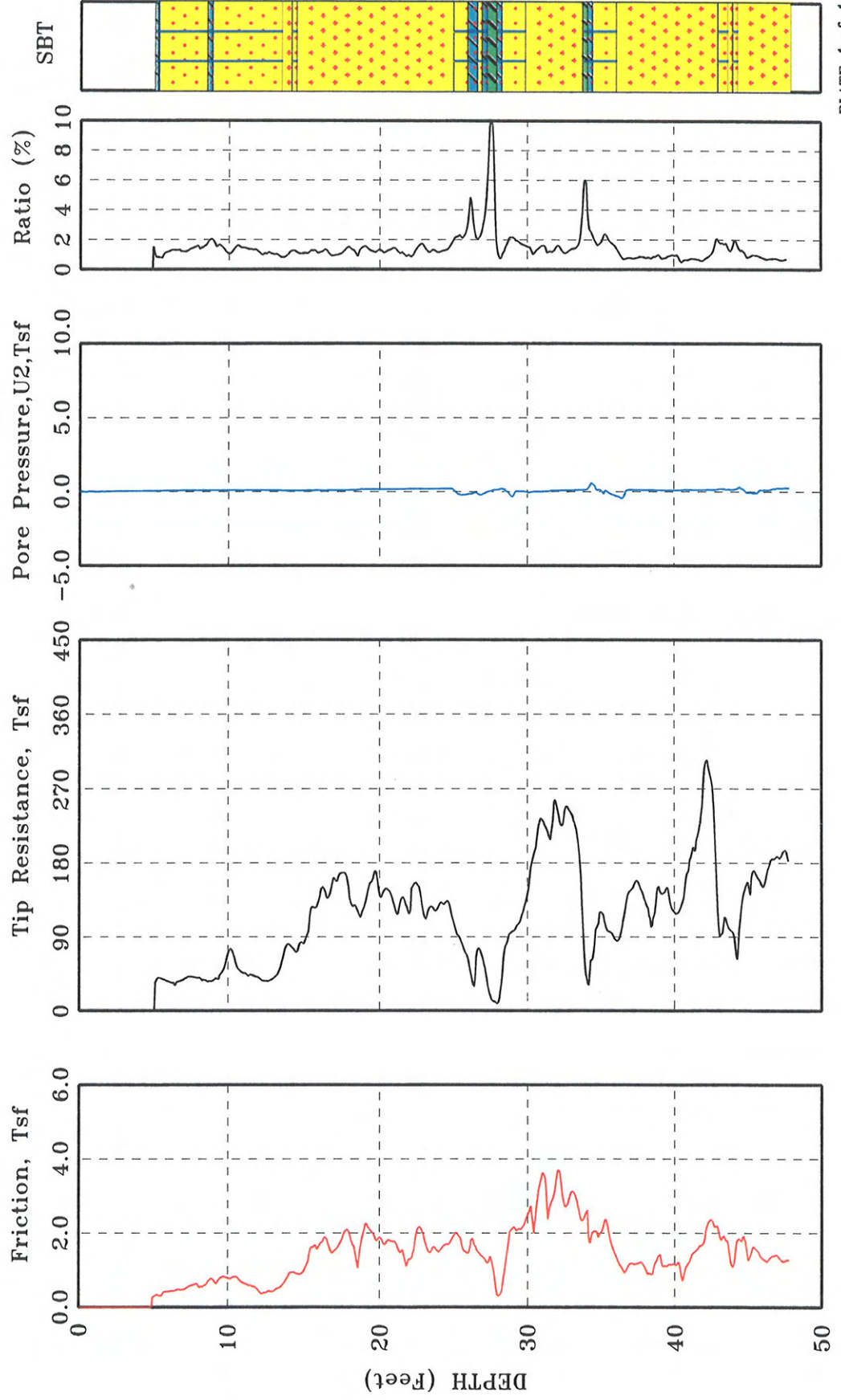
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009



**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-03  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

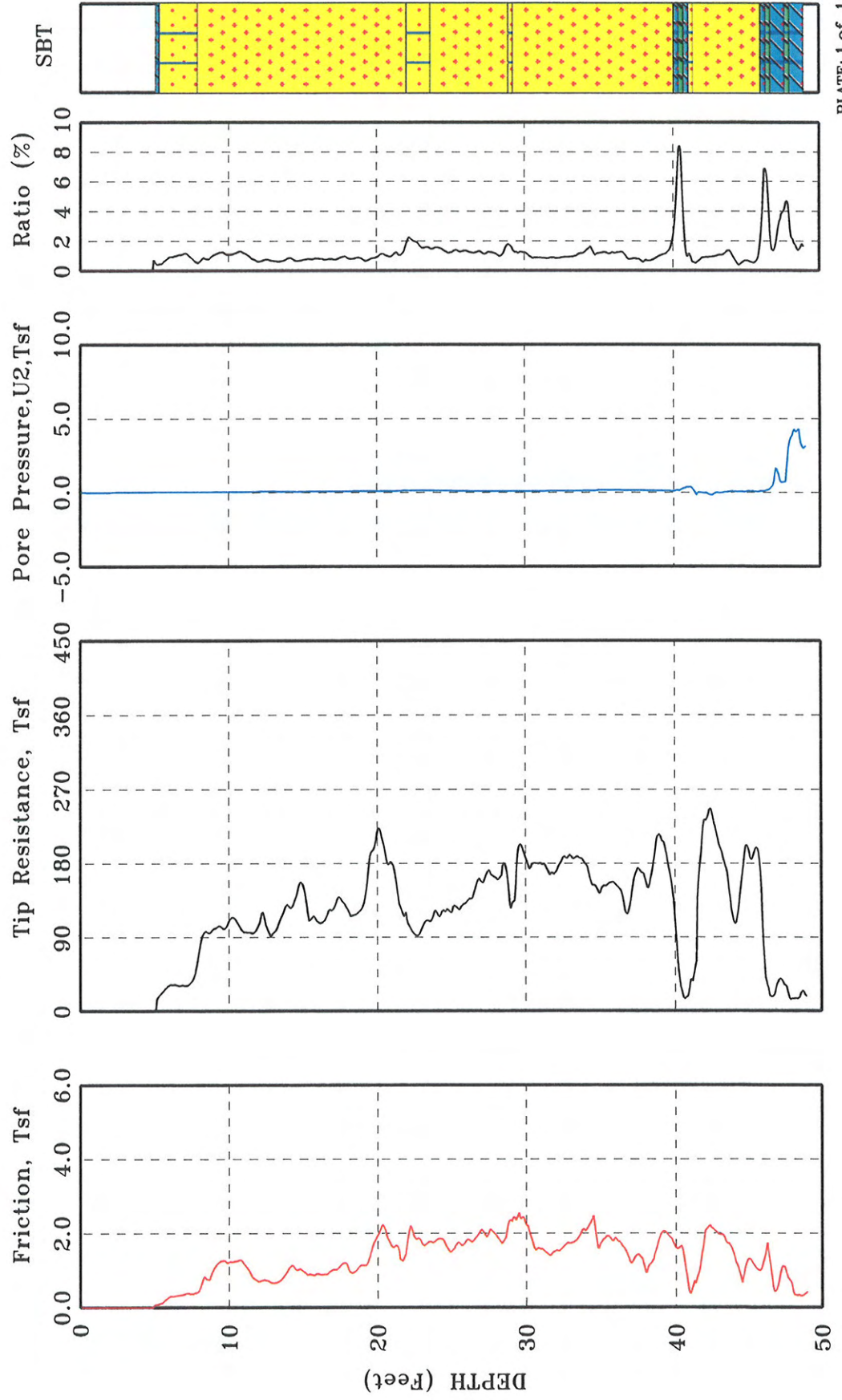
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009



fugro GEOSCIENCES, INC.

CPT No : ROST-04  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009

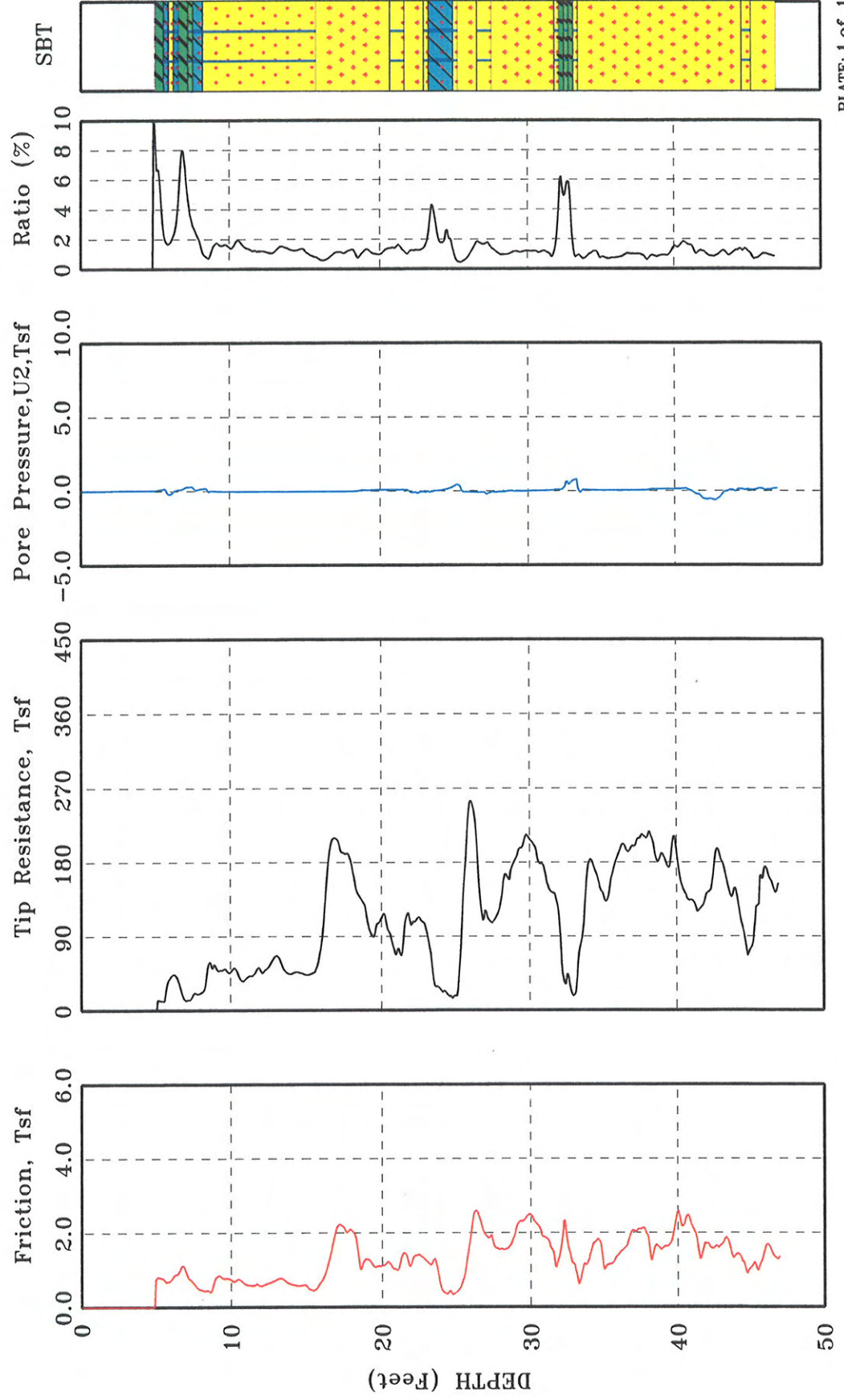




**fugro GEOSCIENCES, INC.**

CPT No : ROST-05  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

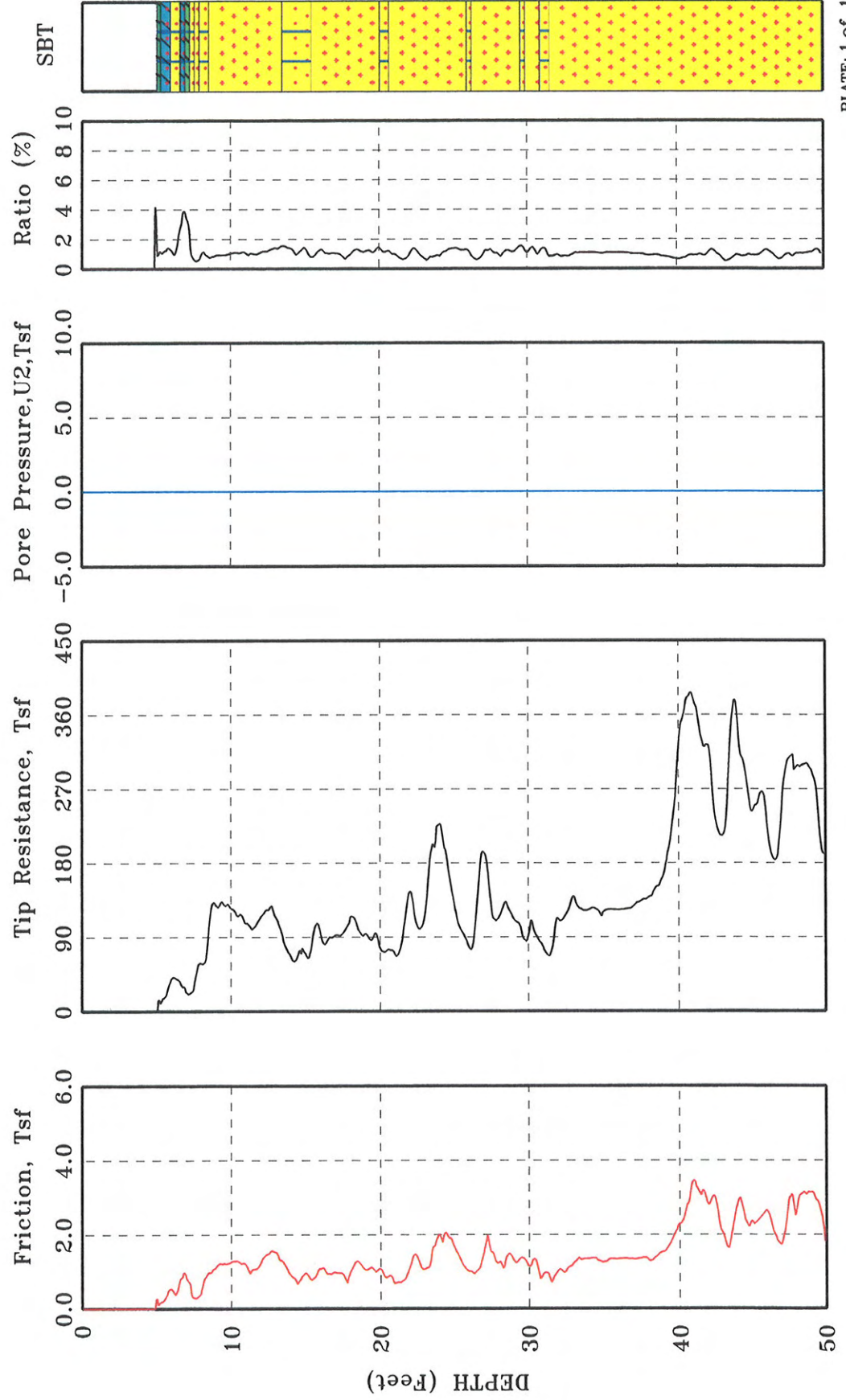
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009



FUGRO GEOSCIENCES, INC.

CPT No : ROST-06  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

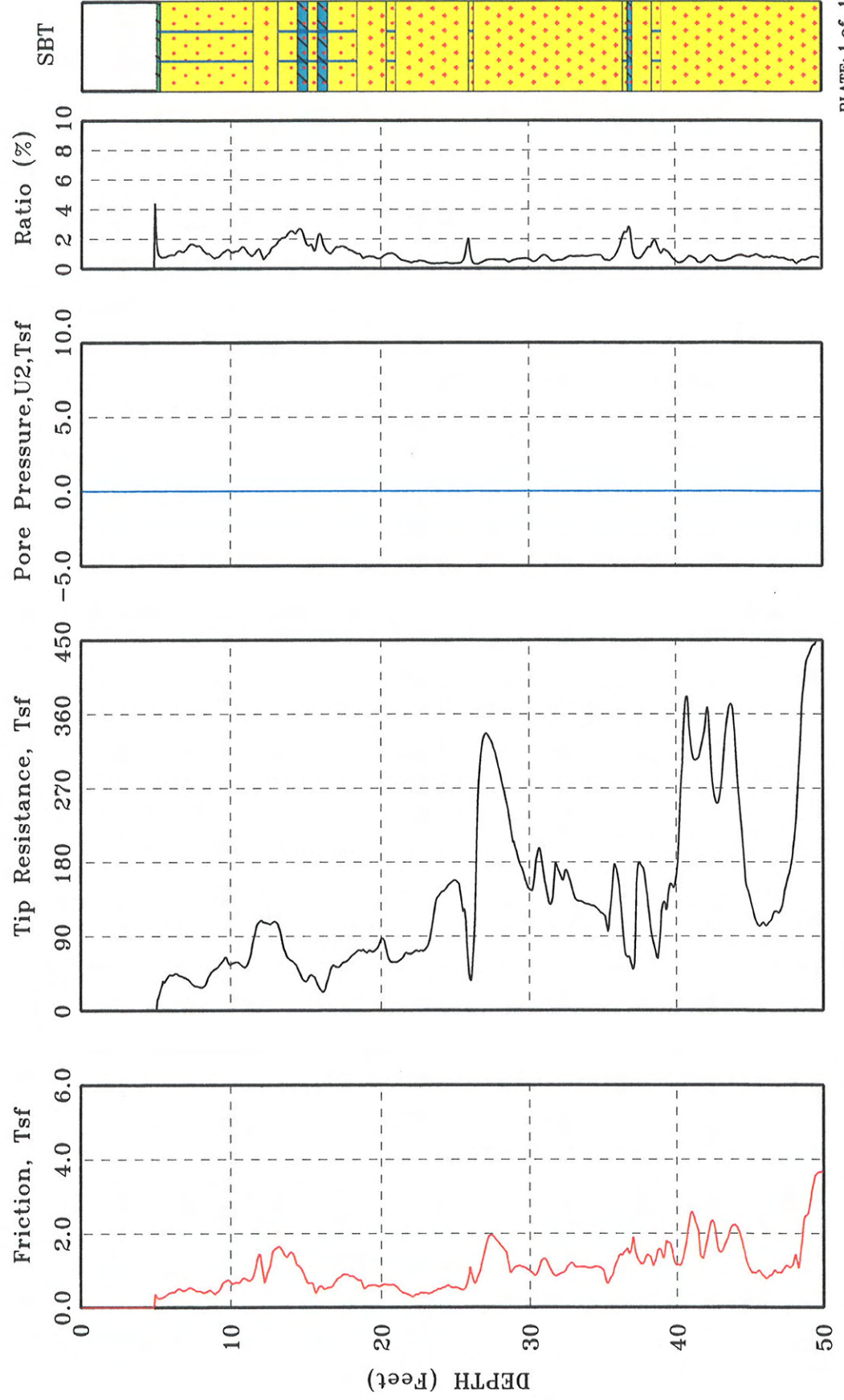
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009



**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-07  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009

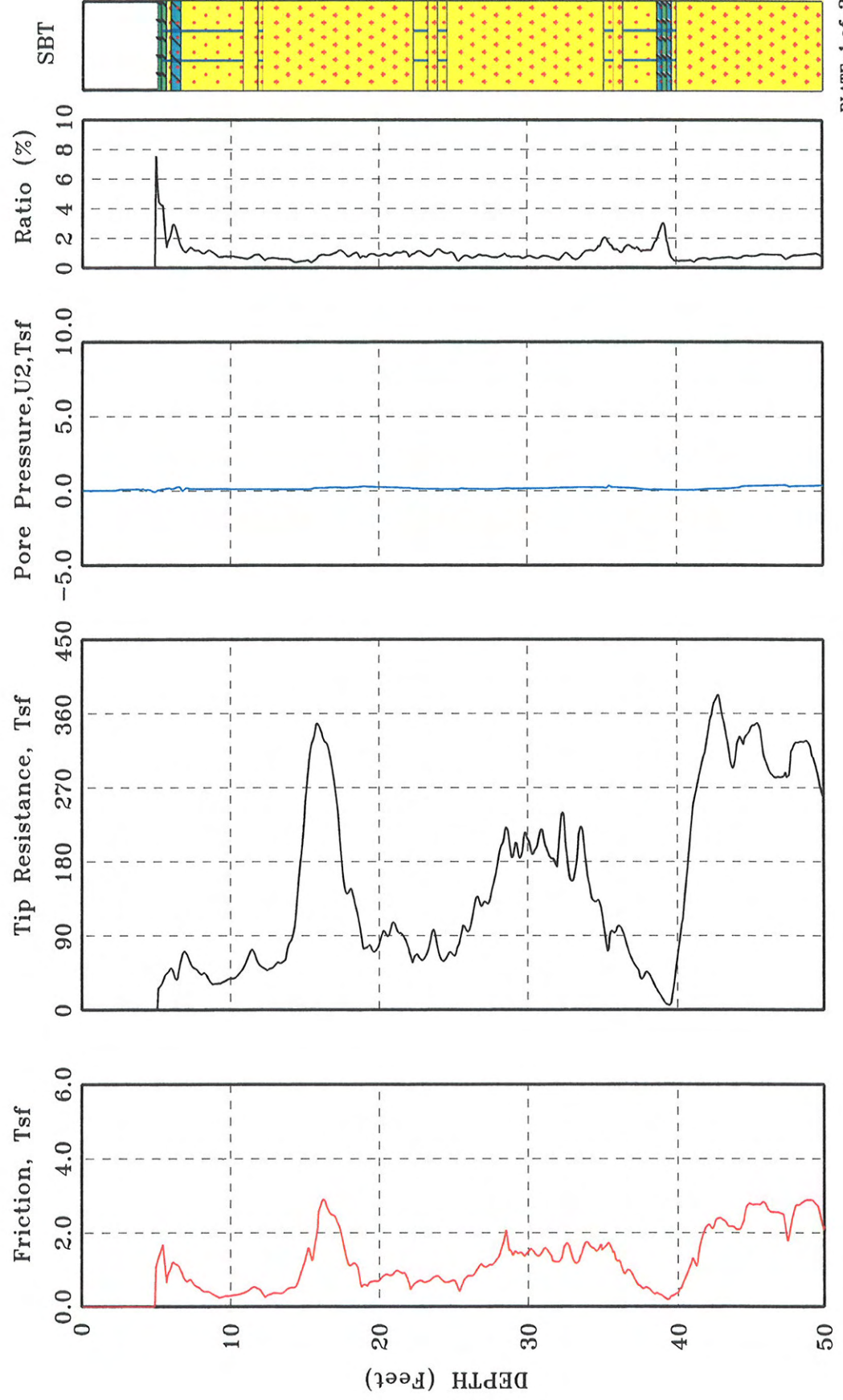




**fugro GEOSCIENCES, INC.**

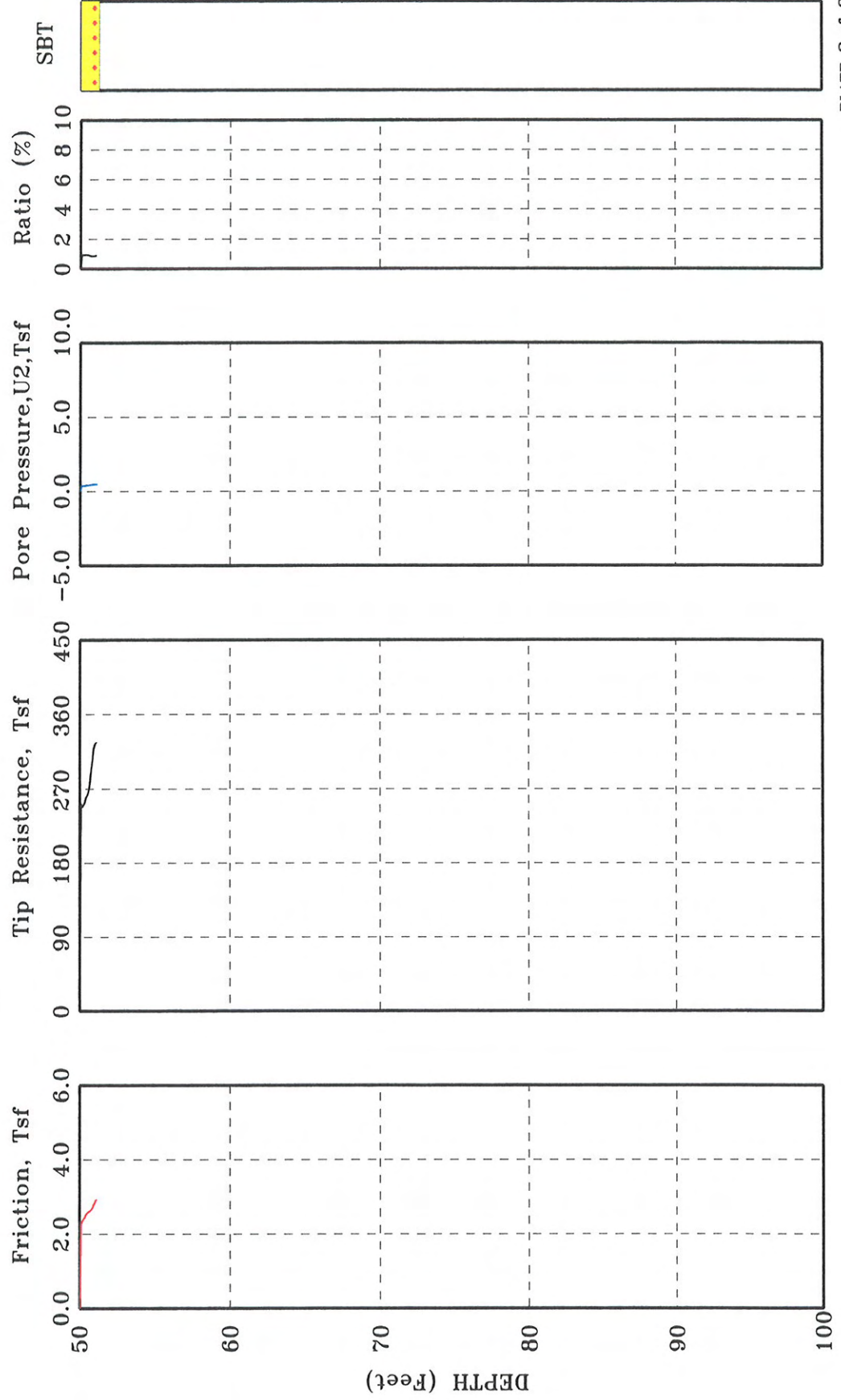
CPT No : ROST-08  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009



**FUGRO GEOSCIENCES, INC.**

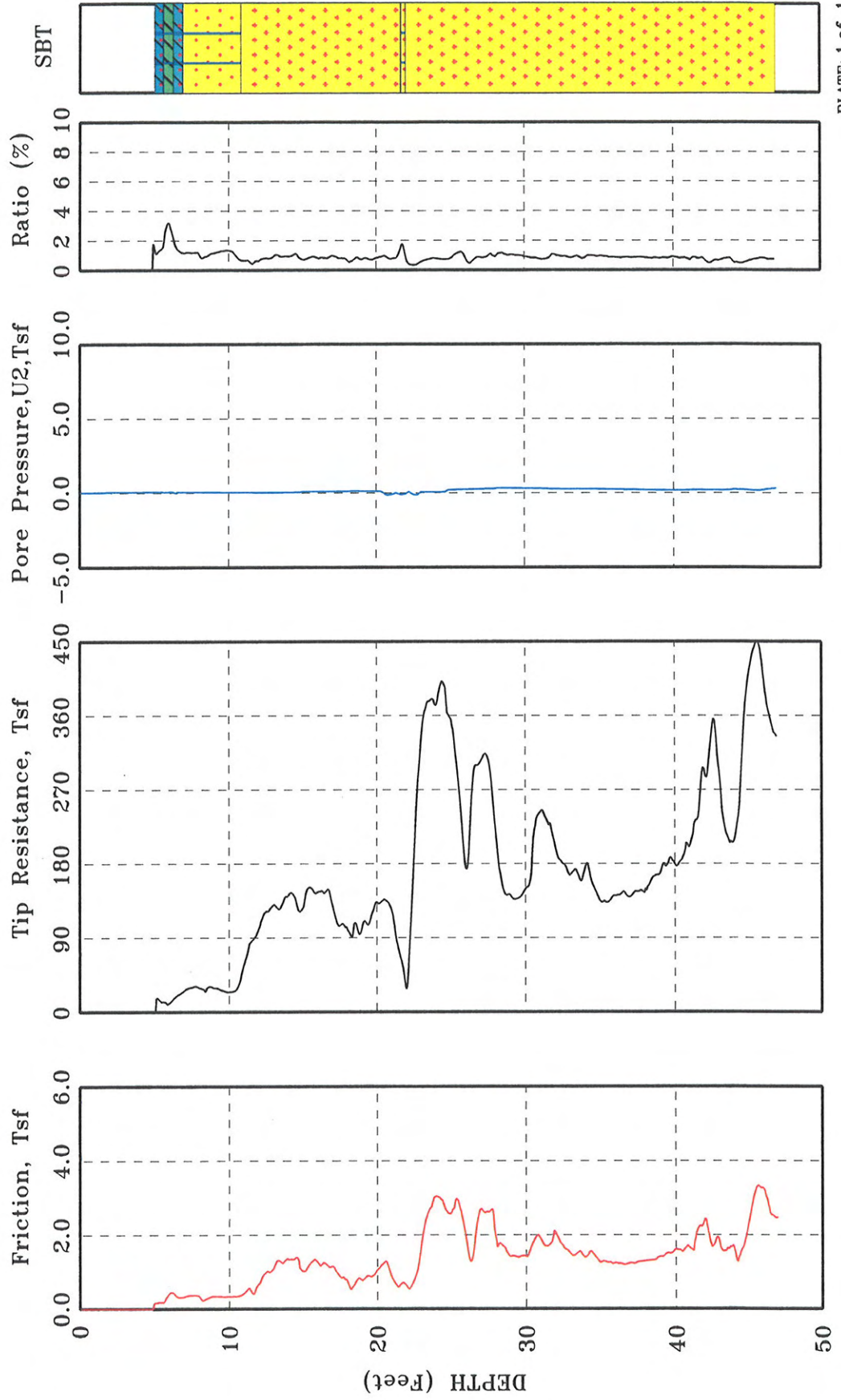
CPT No : ROST-08	SITE : Roxana, IL
JOB No : 04.1909-0044	CLIENT : URS Corporation
CONE No : F7.5CKE2HAW21344	OPERATOR : DANIEL GARZA
	DATE : 26-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-09  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009

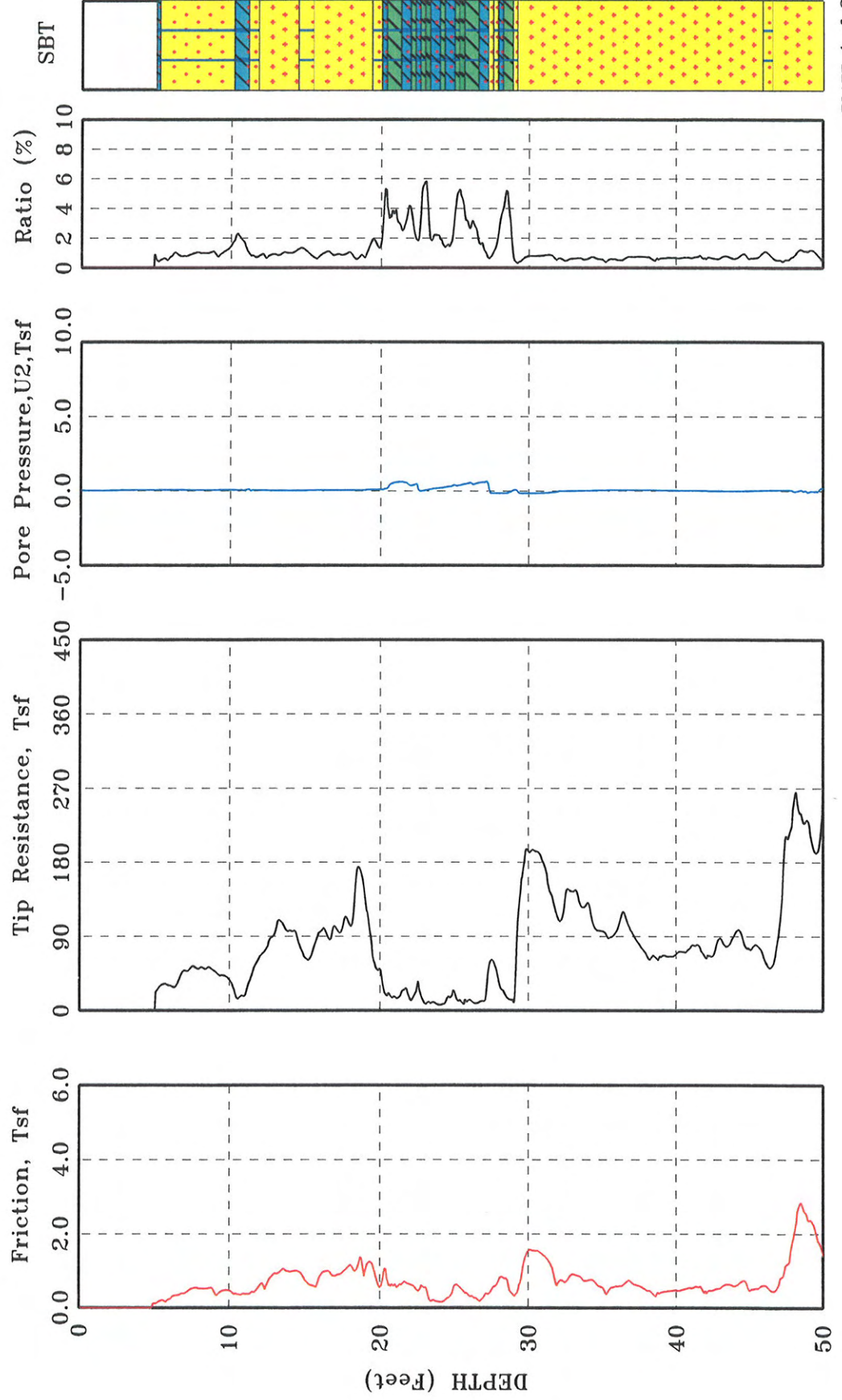




FUGRO GEOSCIENCES, INC.

CPT No : ROST-10  
JOB No : 04.1909-0044  
CONE No : F7.5CKE2HAW21344

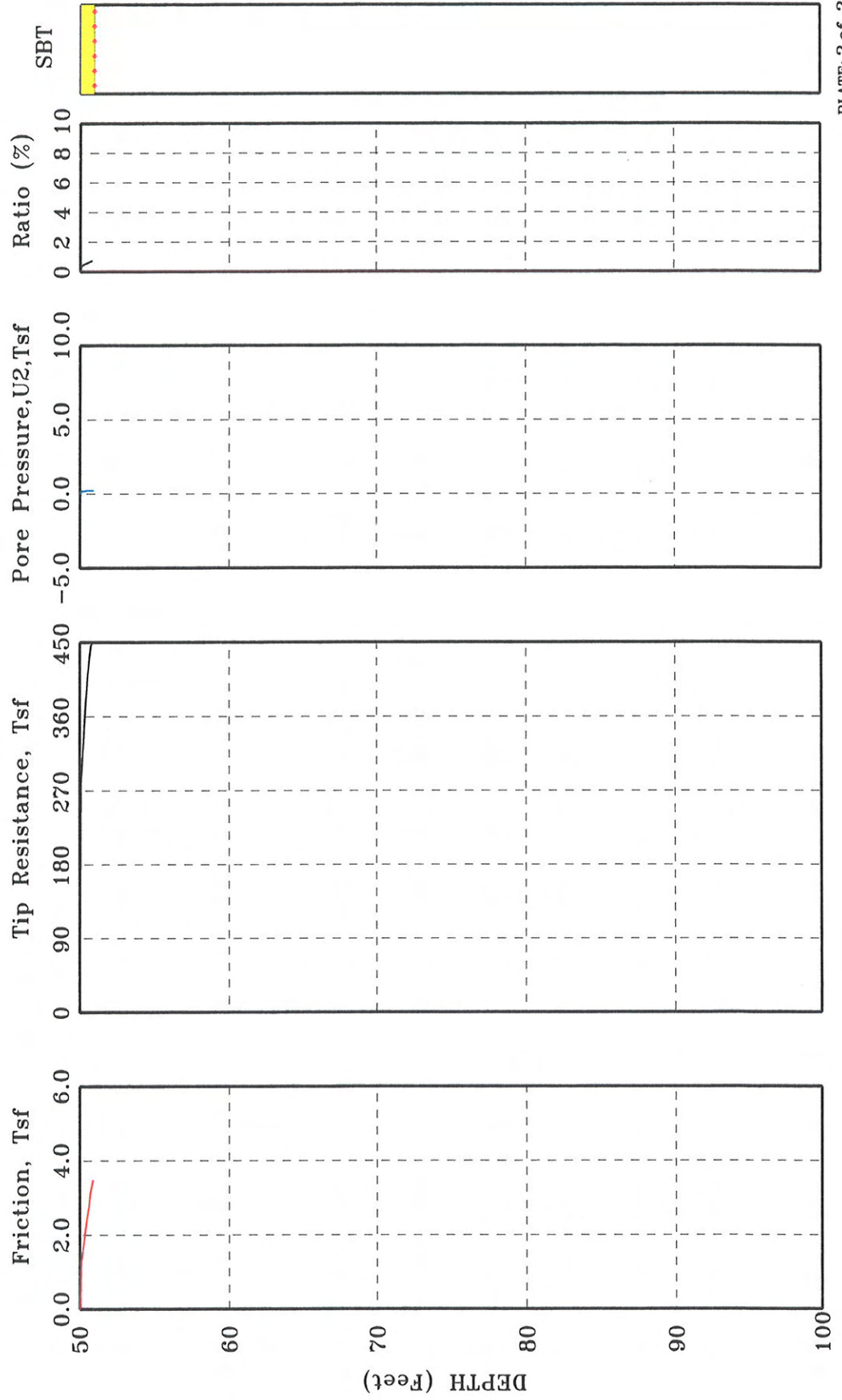
SITE : Roxana, IL  
CLIENT : URS Corporation  
OPERATOR : DANIEL GARZA  
DATE : 26-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-10  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

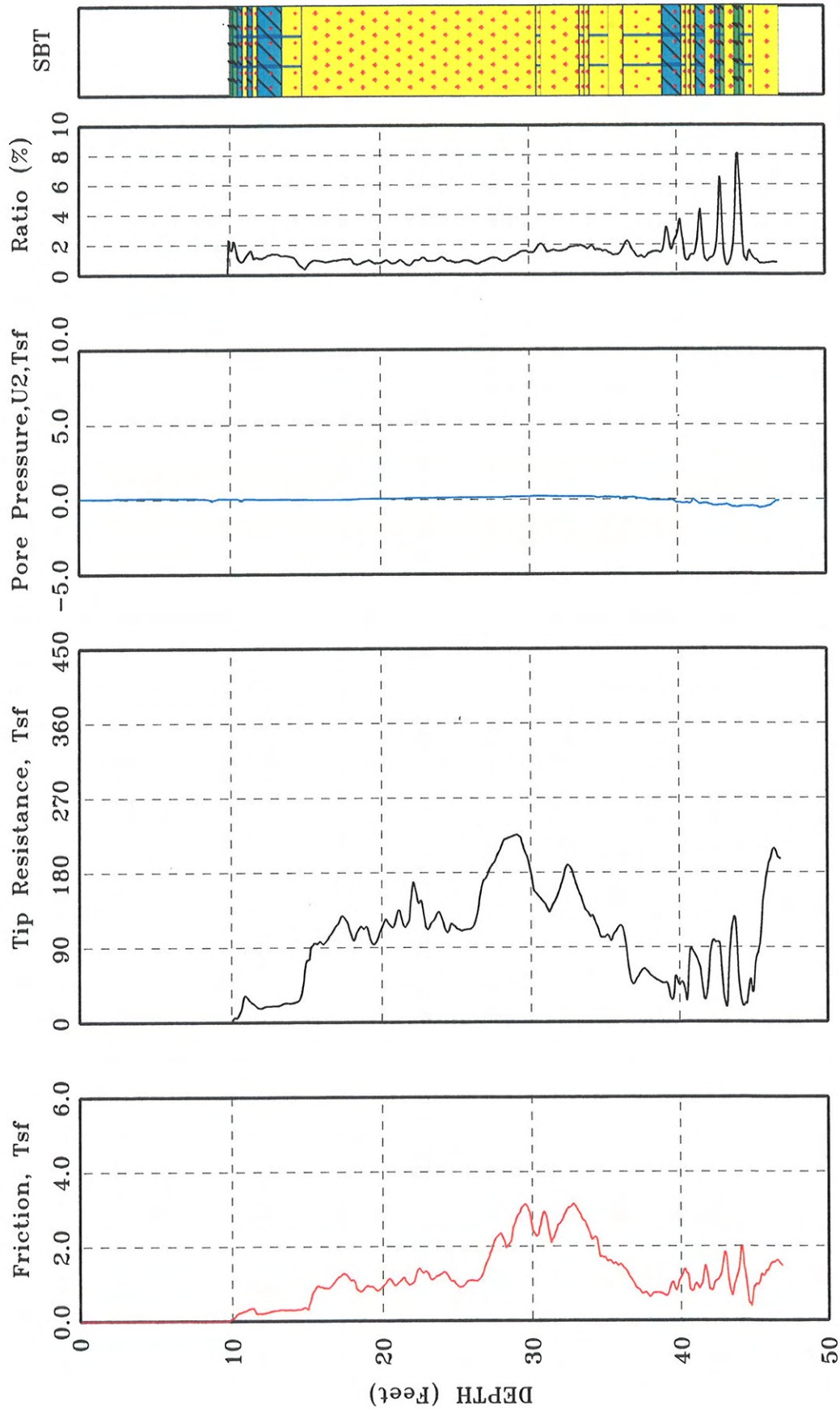
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-11  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 24-Aug-2009

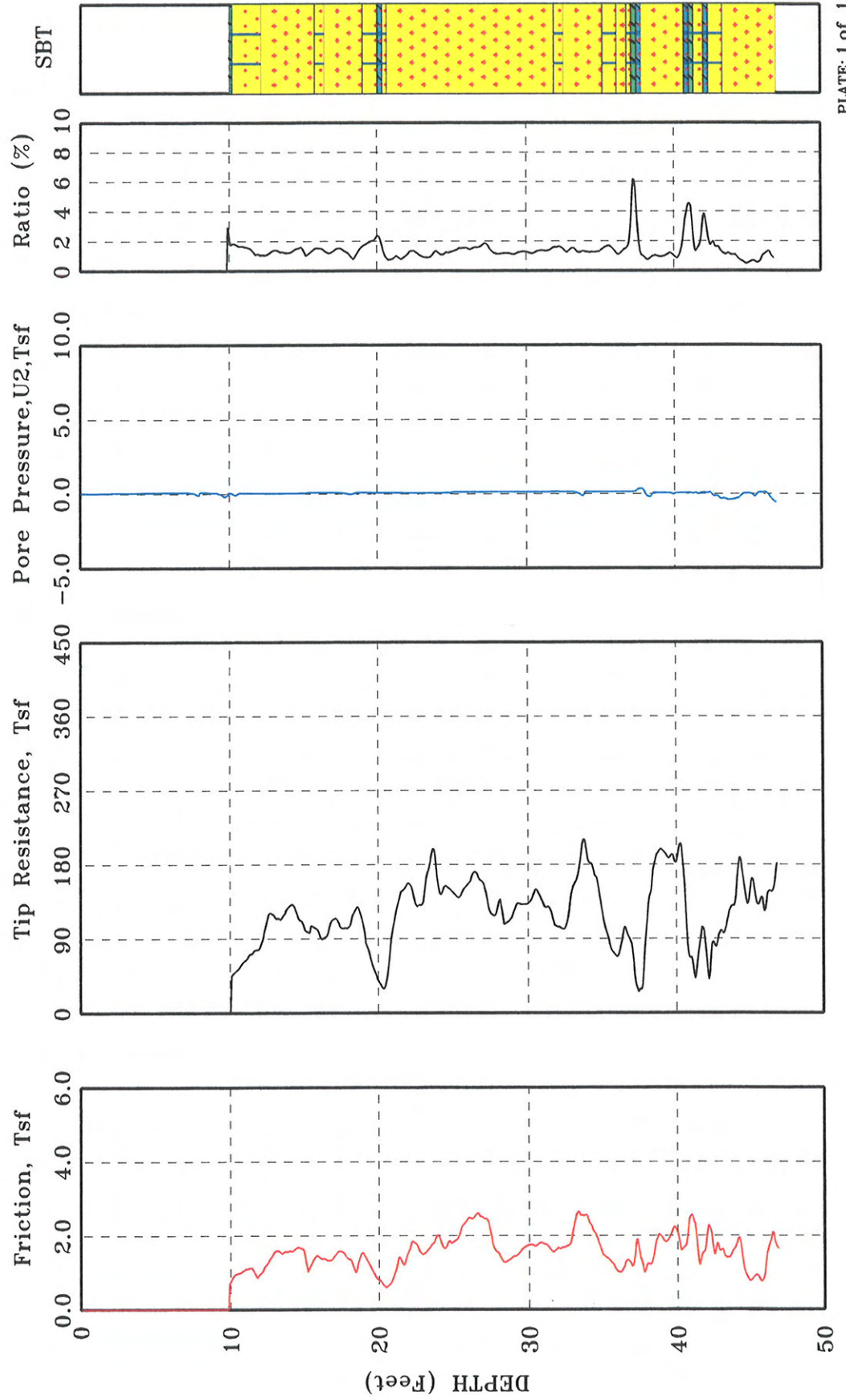




**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-12  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 24-Aug-2009

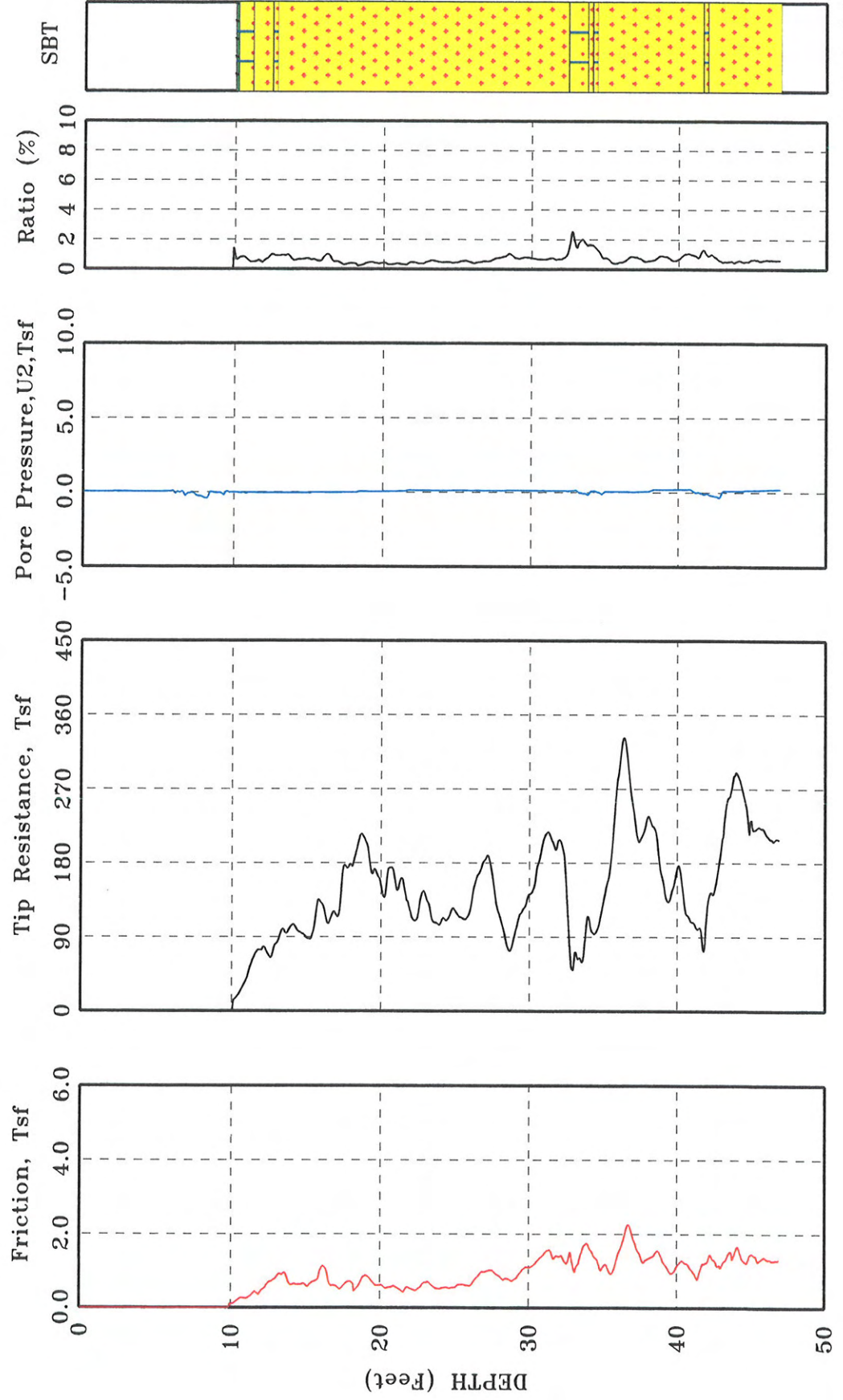




**fugro GEOSCIENCES, INC.**

CPT No : ROST-13  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

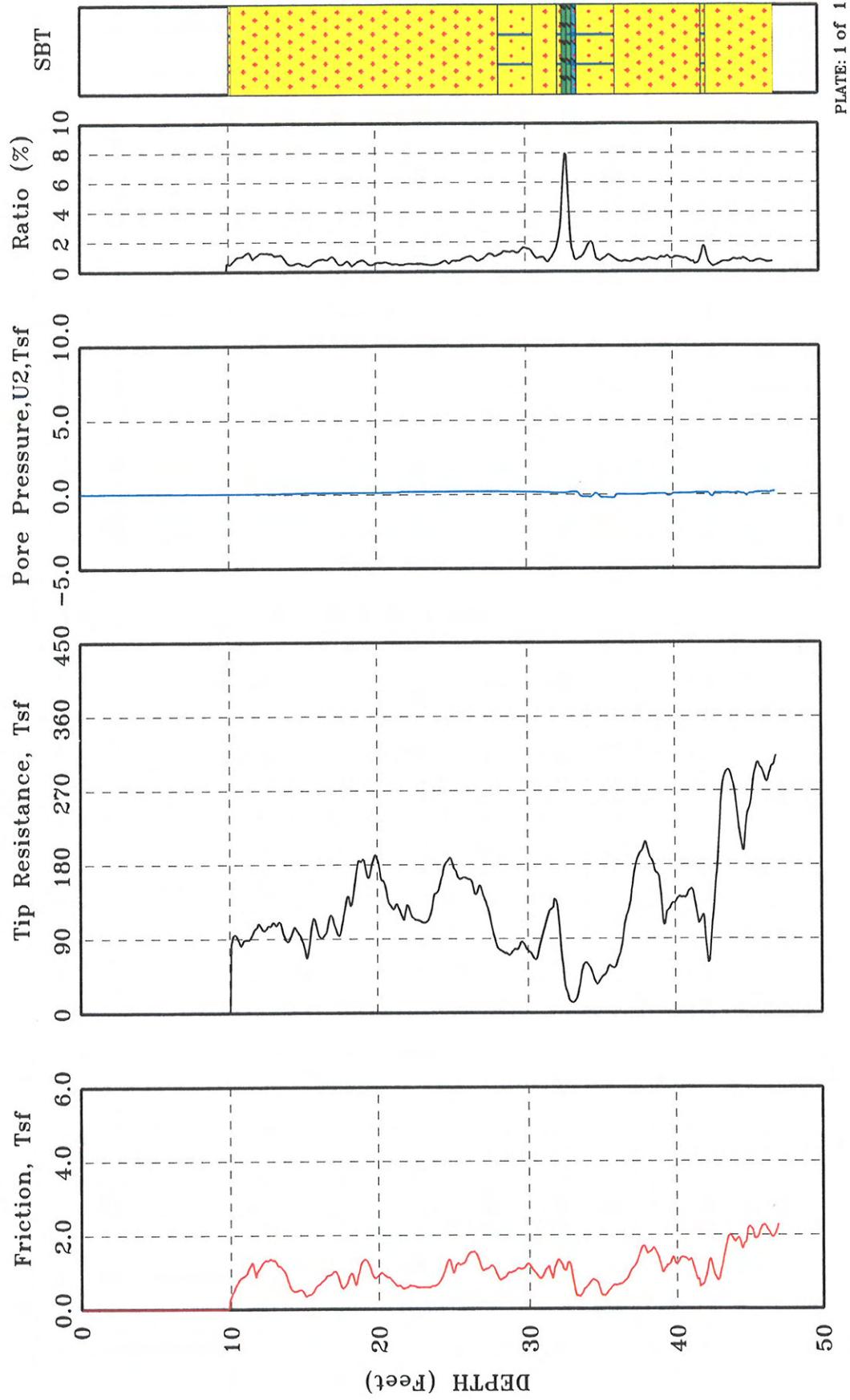
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-14  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

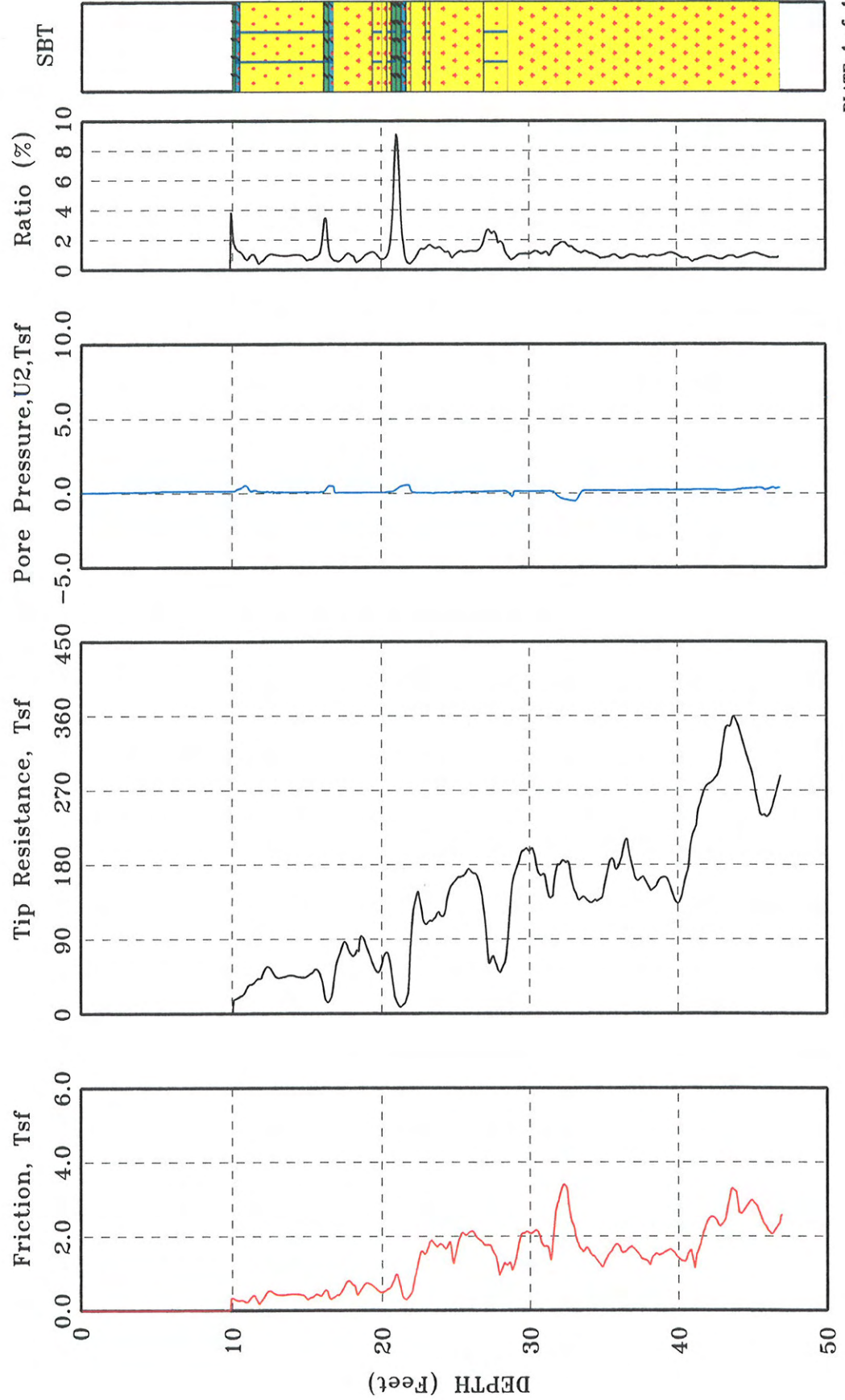
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009



**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-15  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009

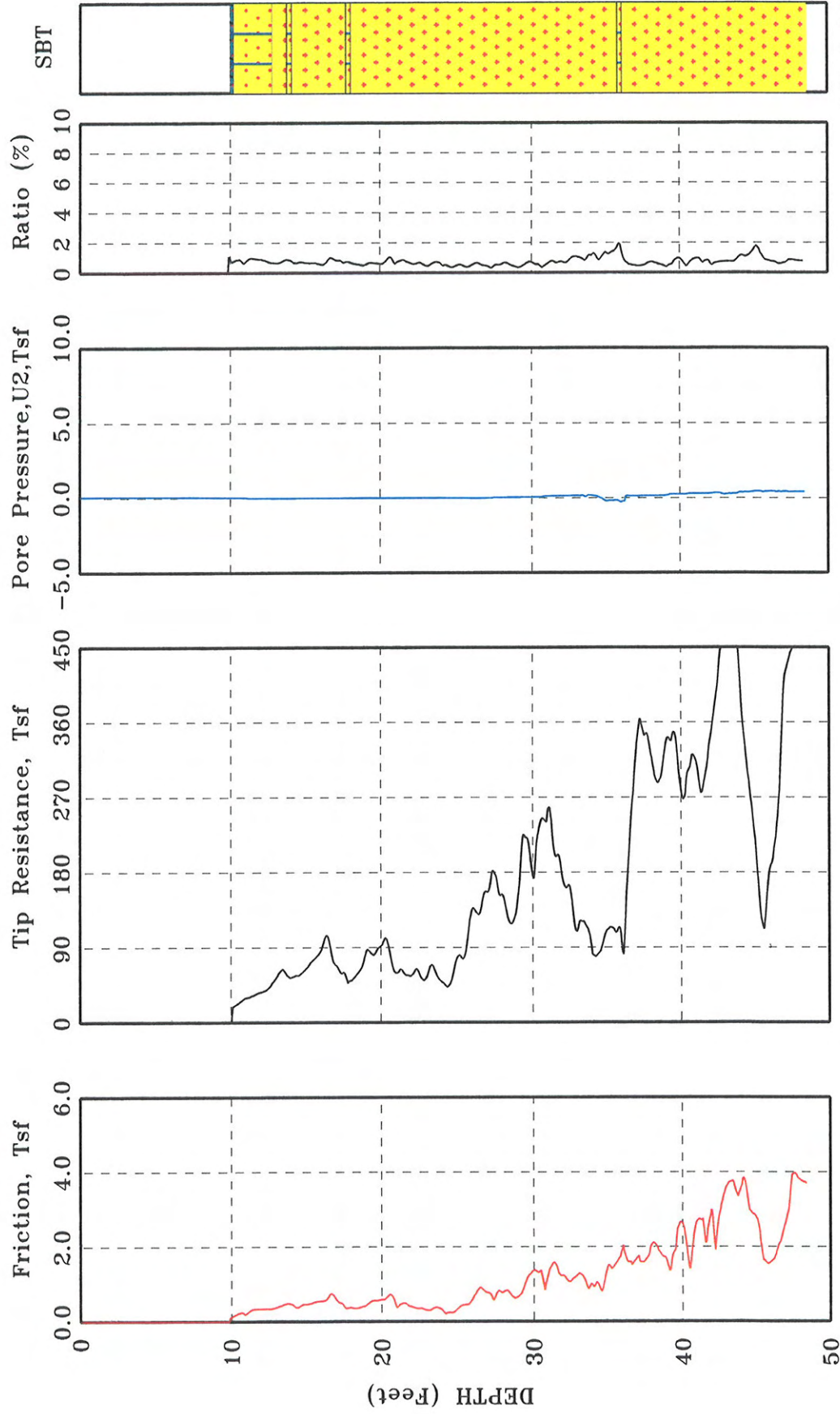




**fugro GEOSCIENCES, INC.**

CPT No : ROST-16  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

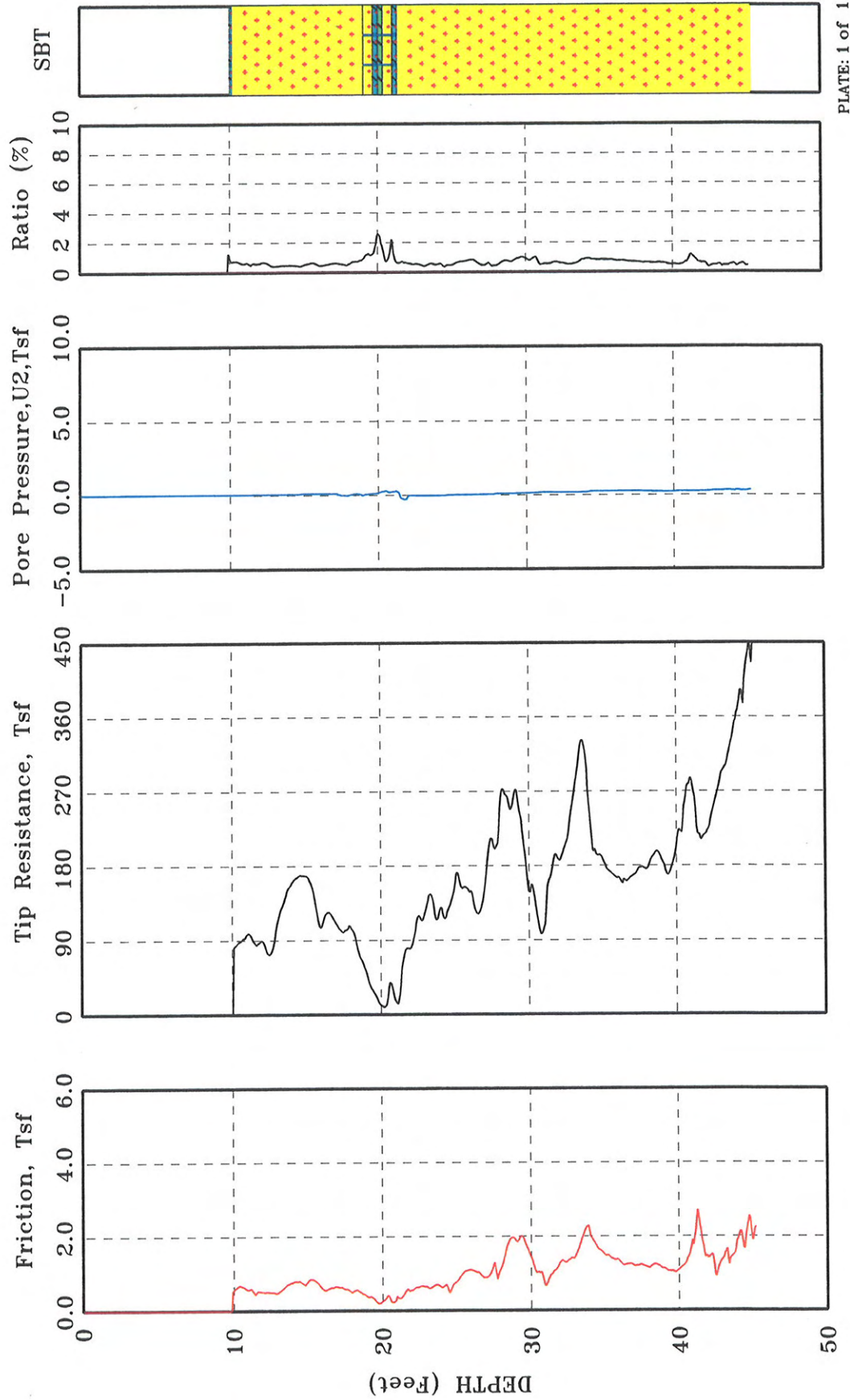
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009



FUGRO GEOSCIENCES, INC.

CPT No : ROST-17  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

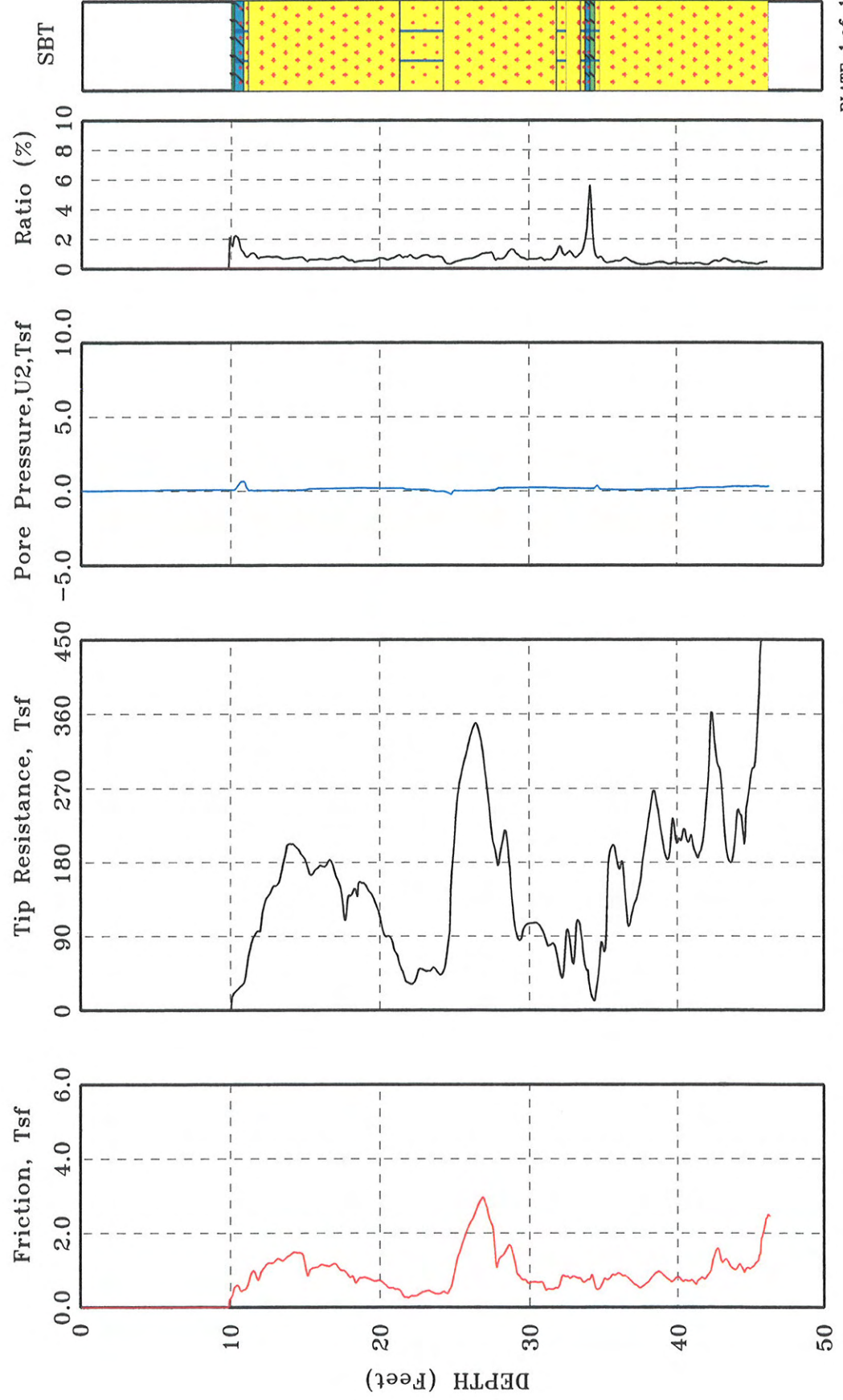
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-18  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 25-Aug-2009

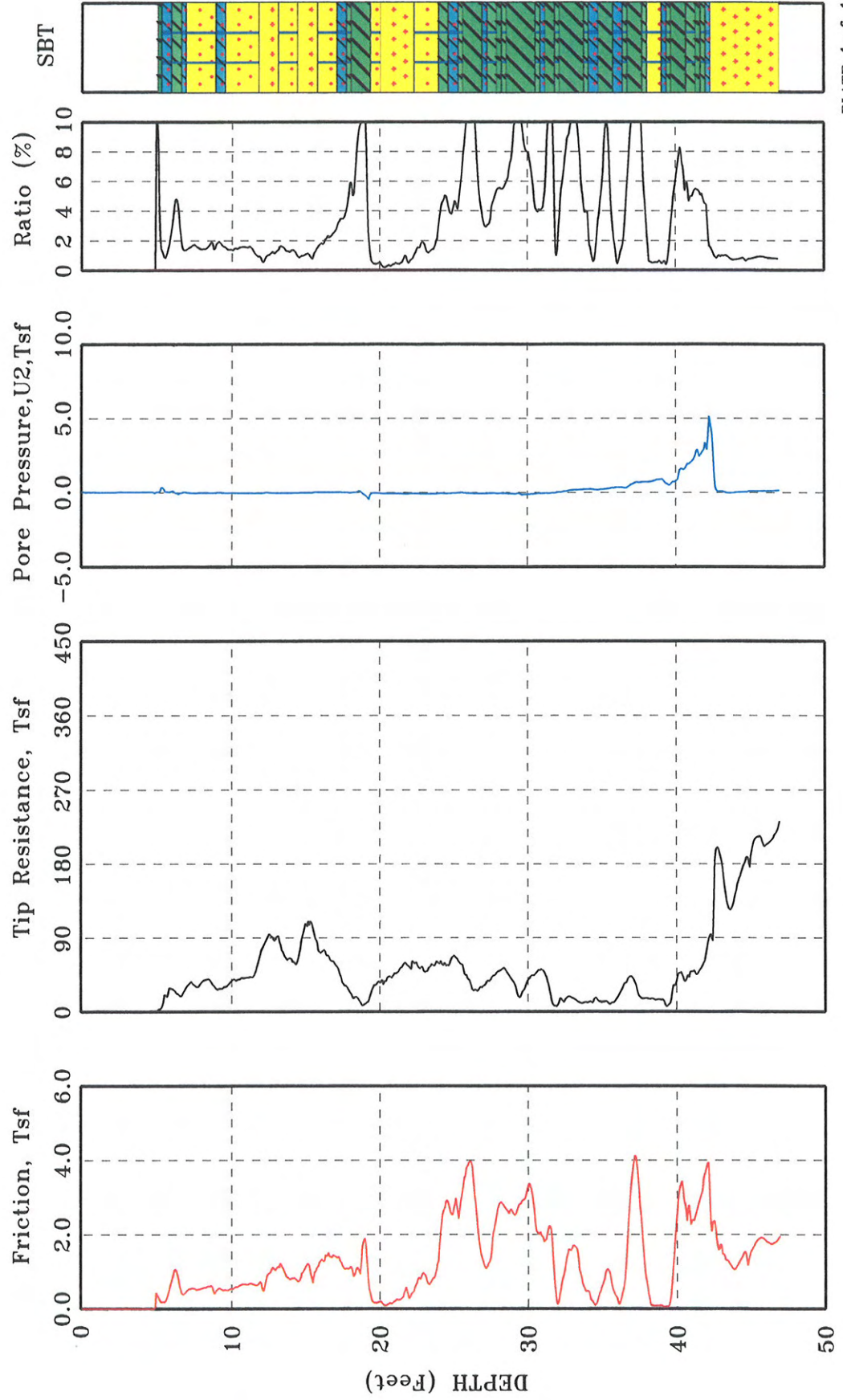




**fugro GEOSCIENCES, INC.**

CPT No : ROST-19  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

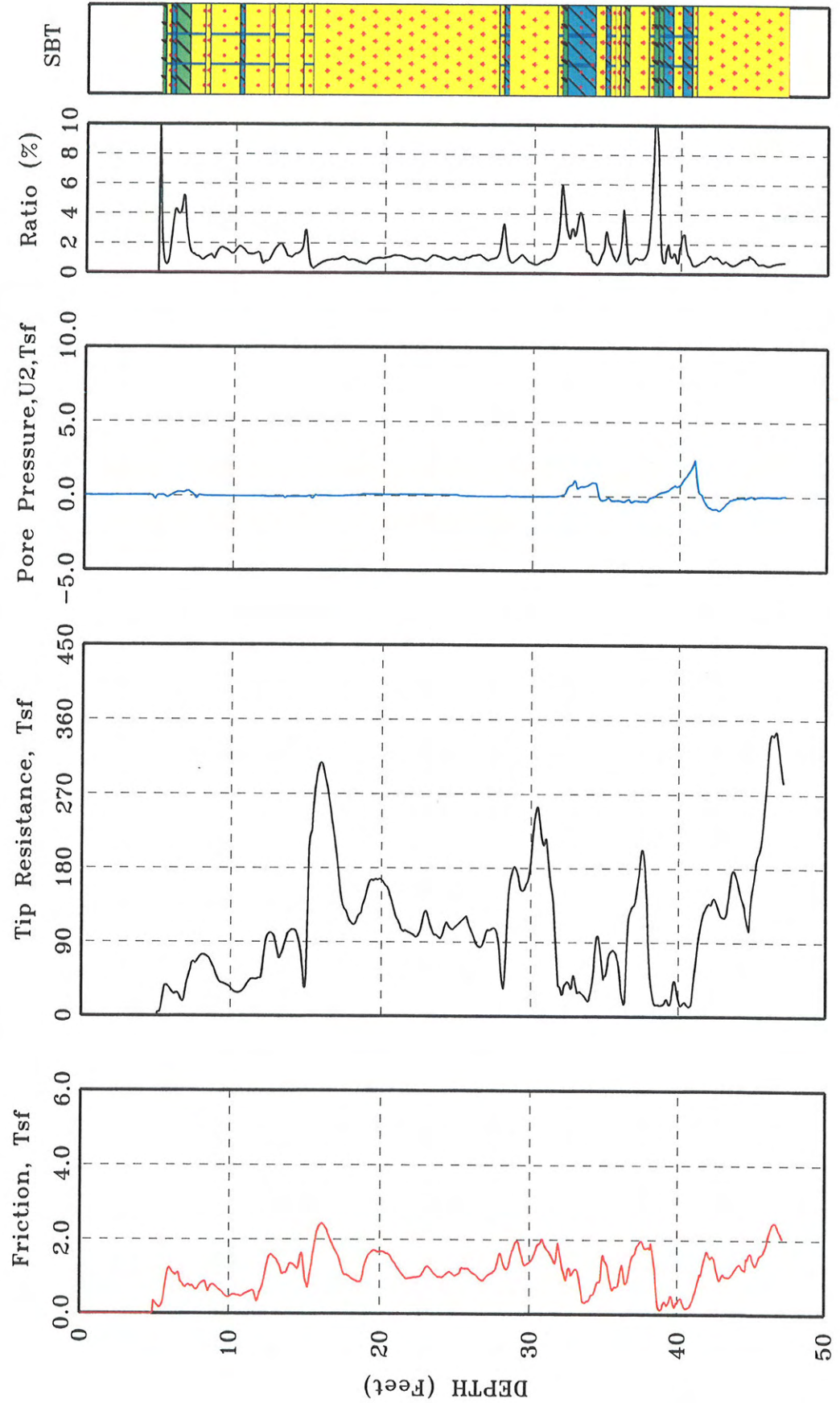
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009



fugro GEOSCIENCES, INC.

CPT No : ROST-20  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

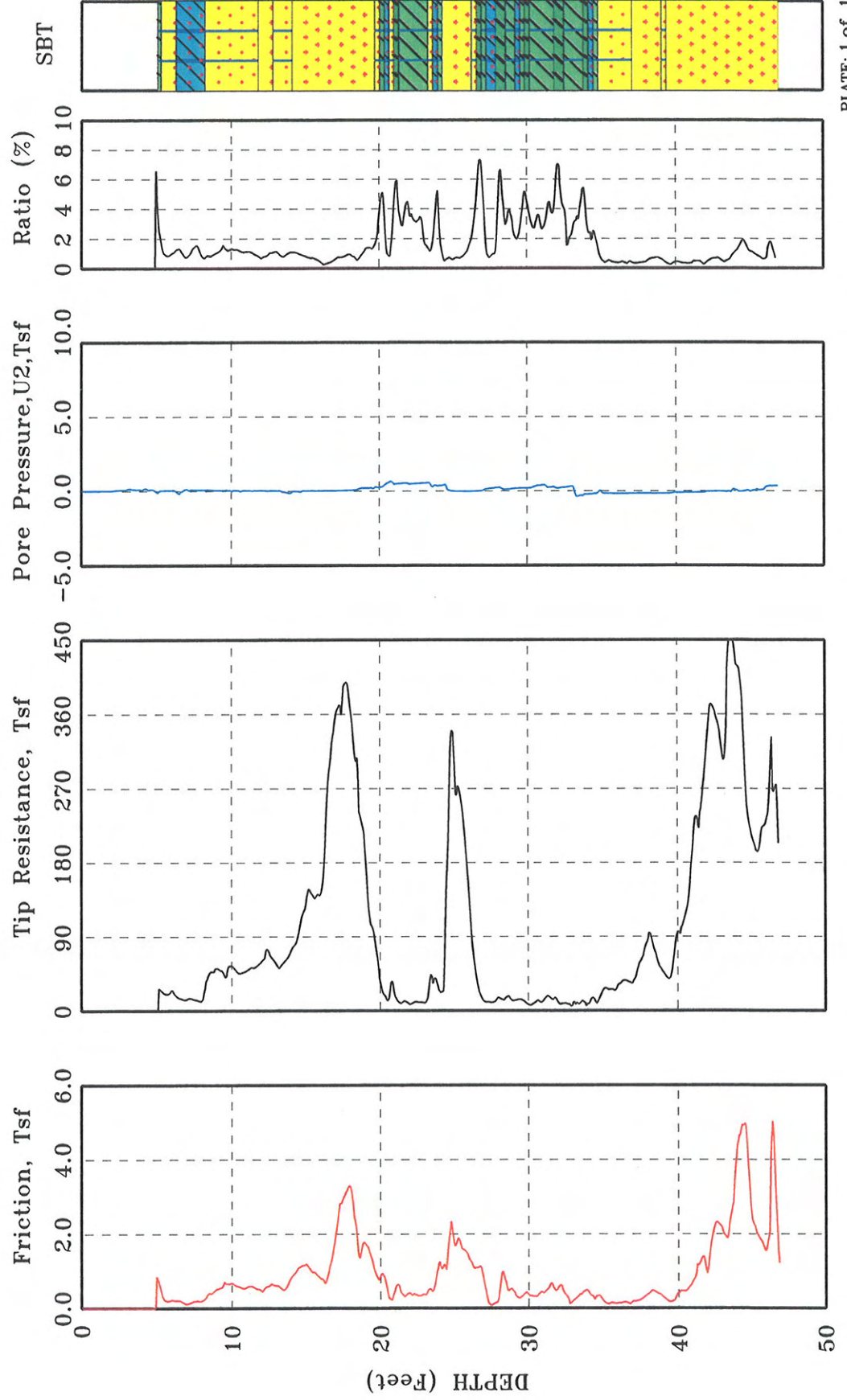
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-21  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009

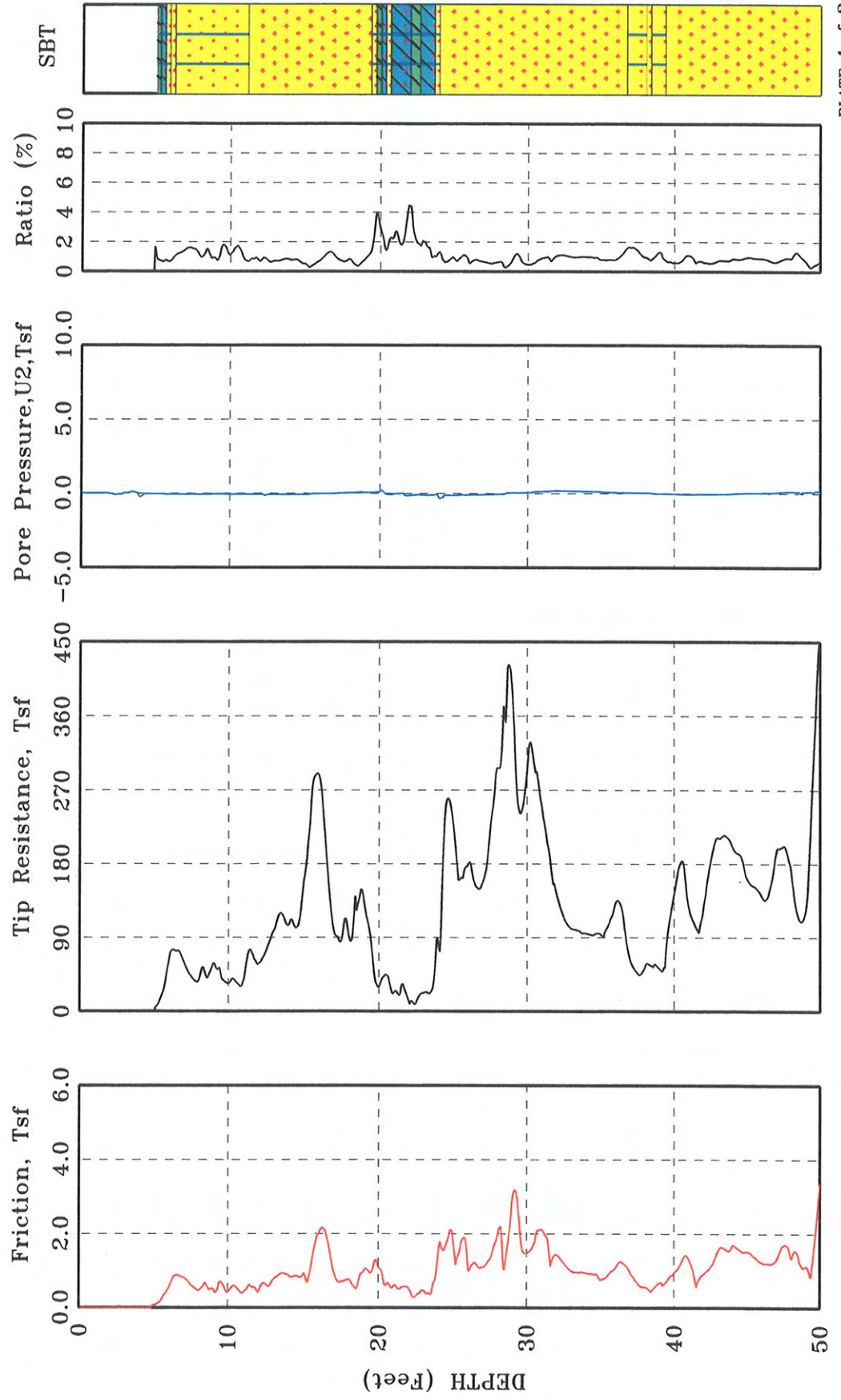




**fugro GEOSCIENCES, INC.**

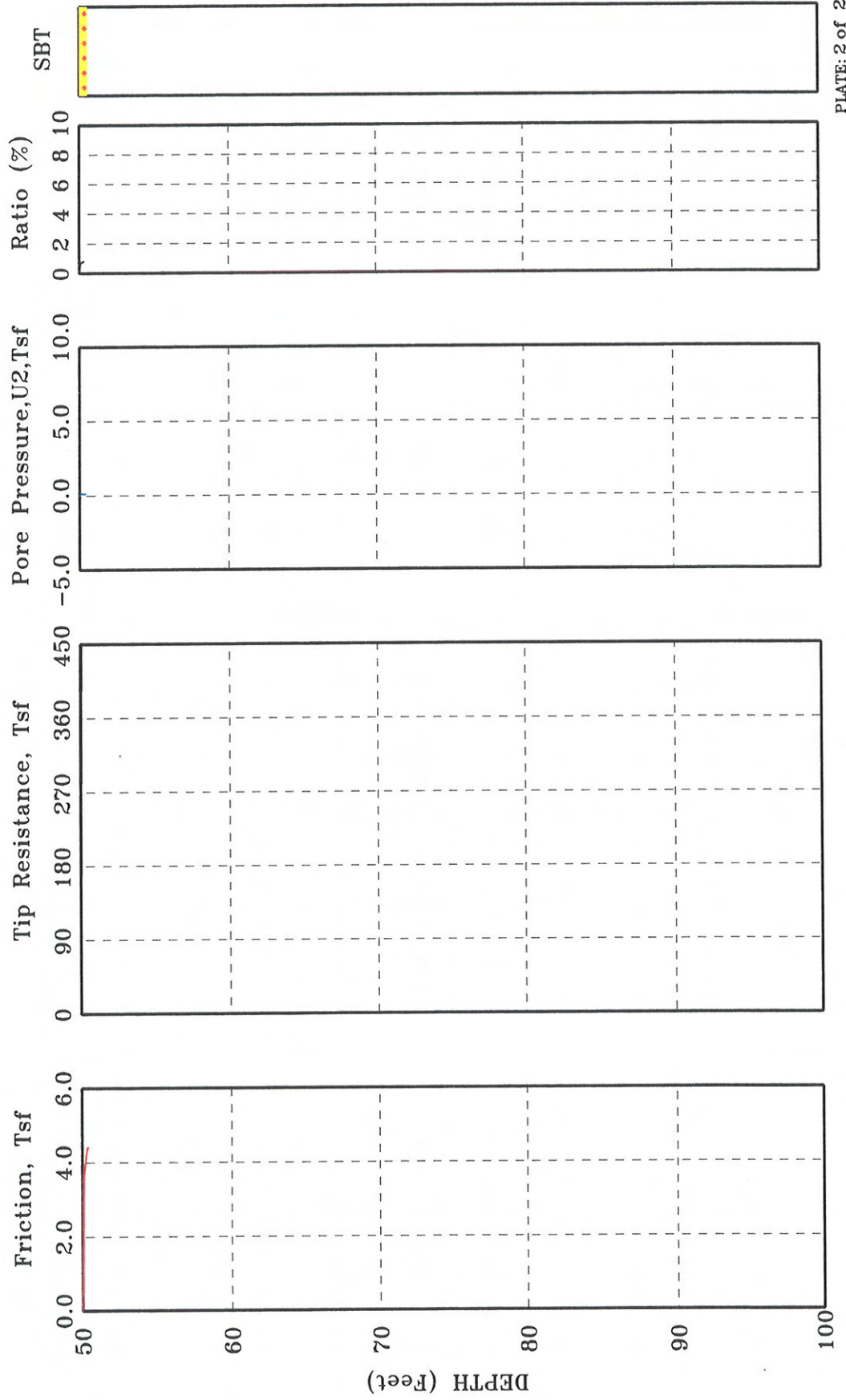
CPT No : ROST-22  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 26-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-22	SITE : Roxana, IL
JOB No : 04.1909-0044	CLIENT : URS Corporation
CONE No : F7.5CKE2HAW21344	OPERATOR : DANIEL GARZA
	DATE : 26-Aug-2009

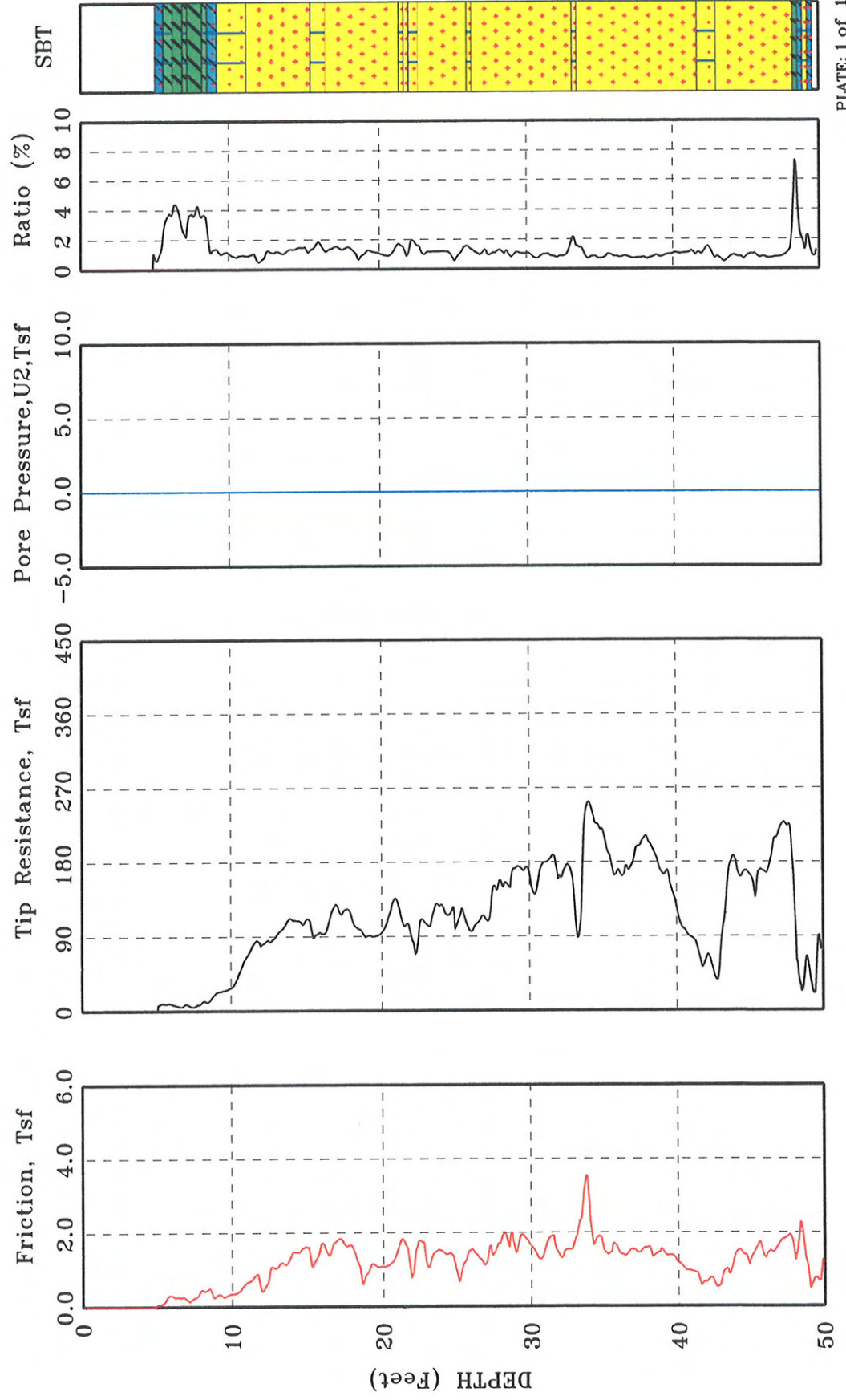




**fugro GEOSCIENCES, INC.**

CPT No : ROST-23  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

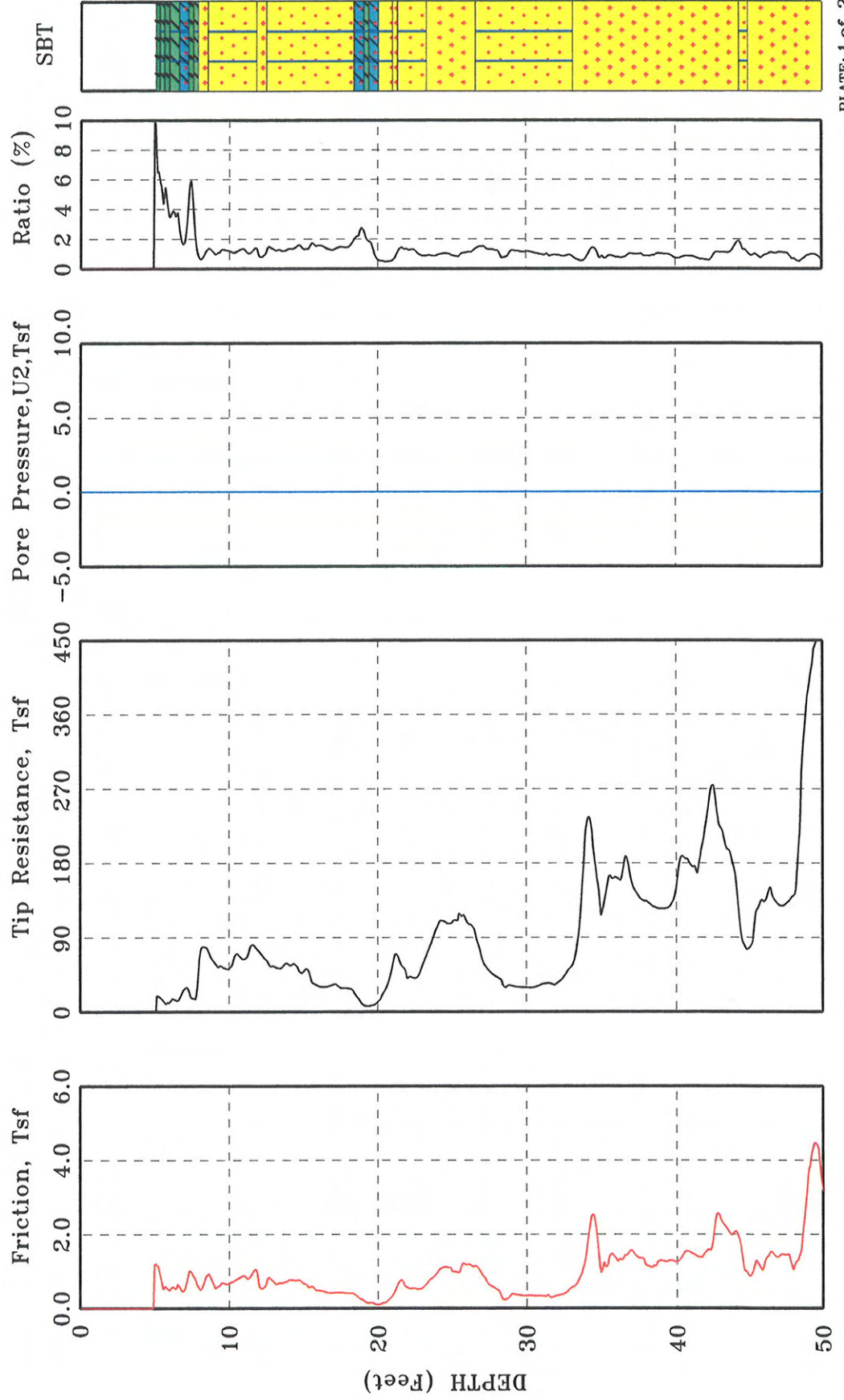
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-24  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

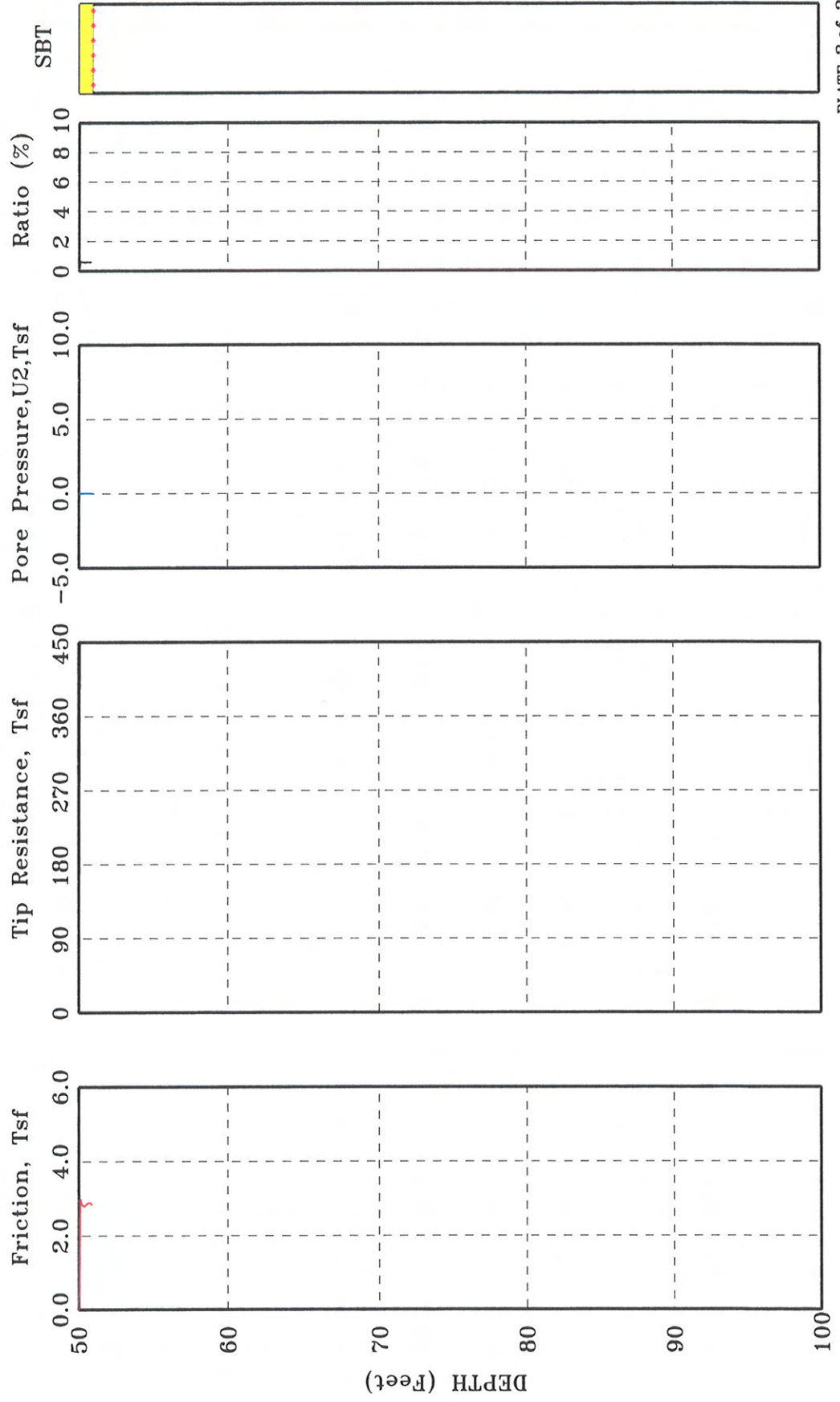
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009



FUGRO GEOSCIENCES, INC.

CPT No : ROST-24  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009

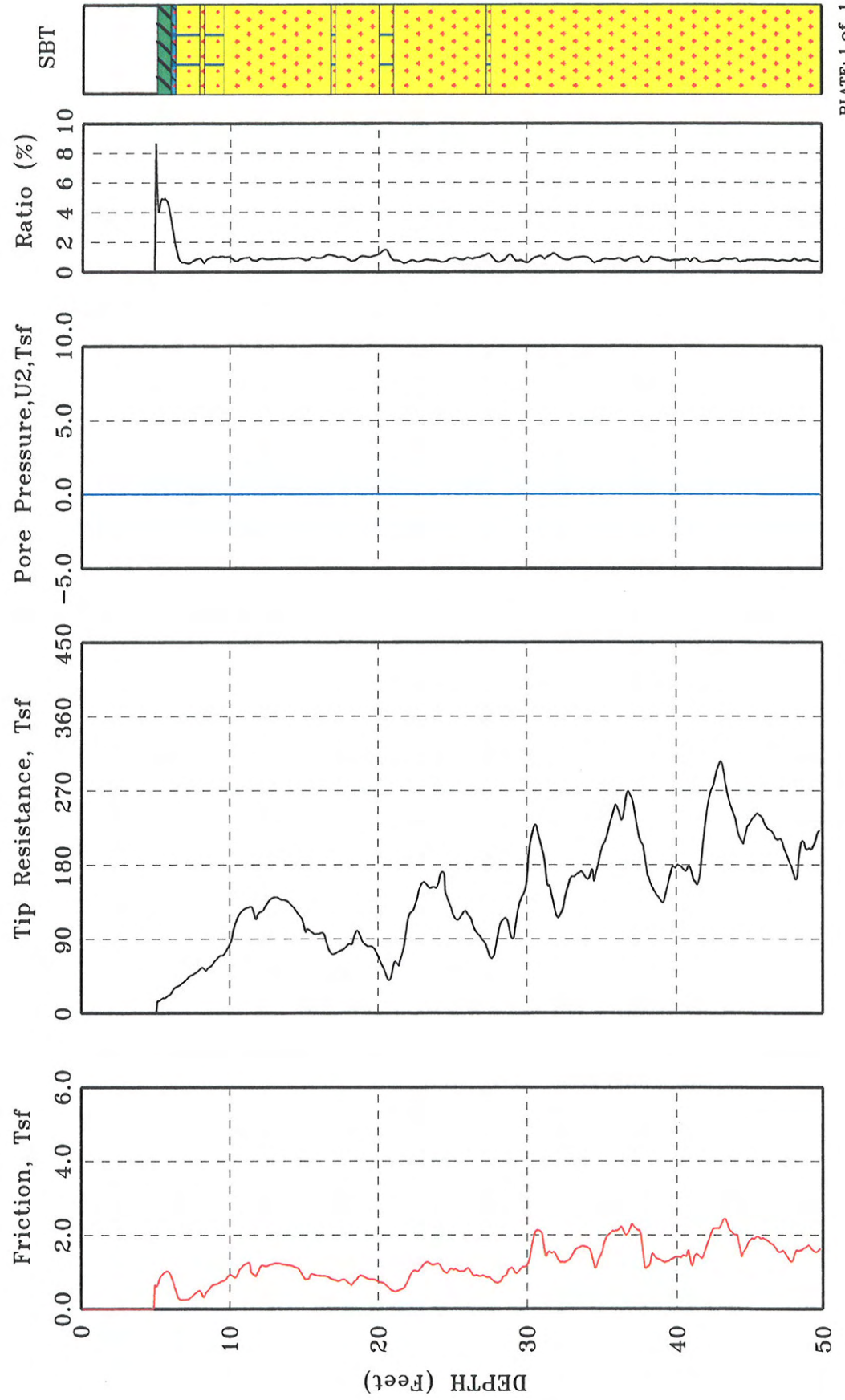




**FUGRO GEOSCIENCES, INC.**

CPT No : ROST-25  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

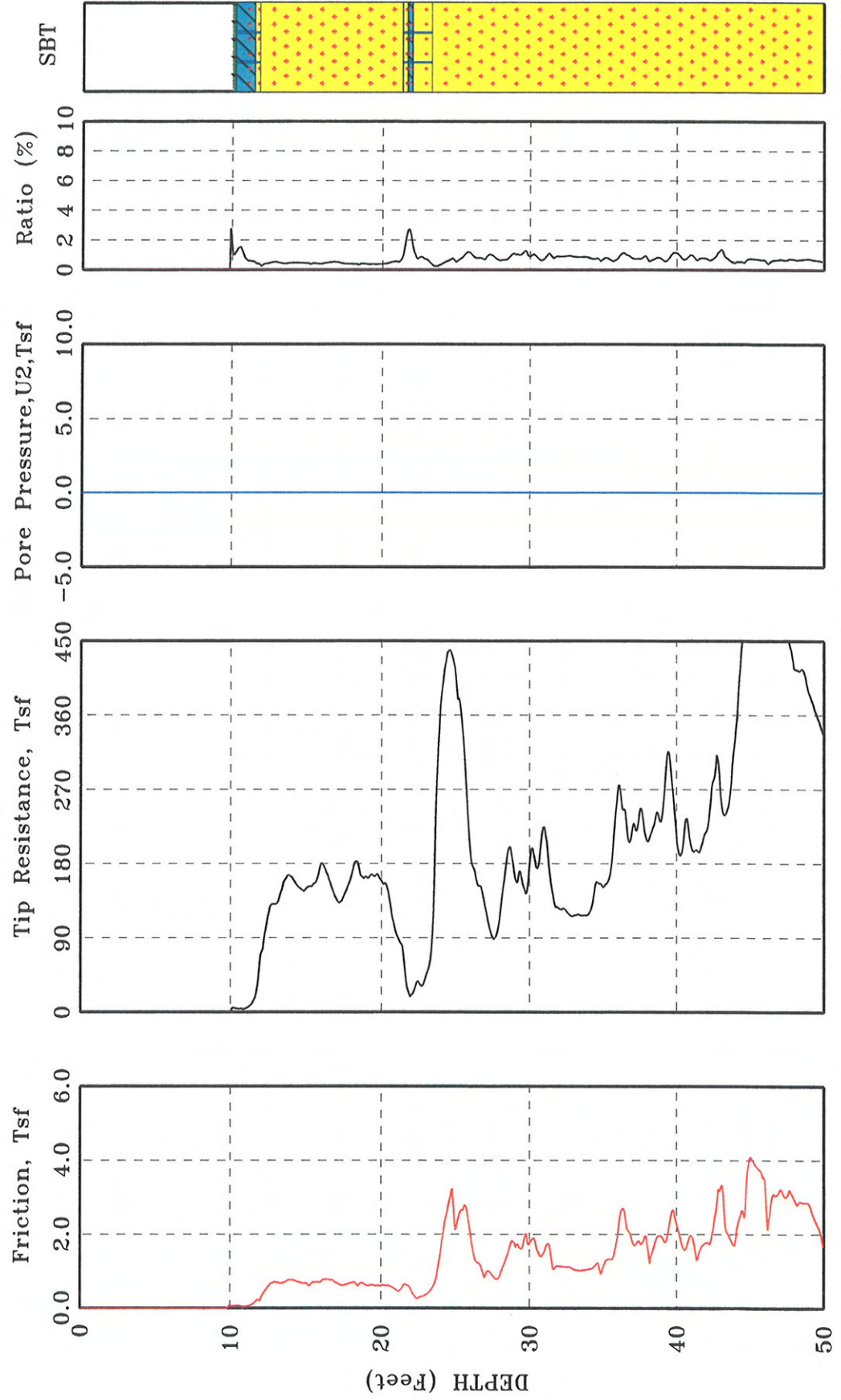
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-26  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009

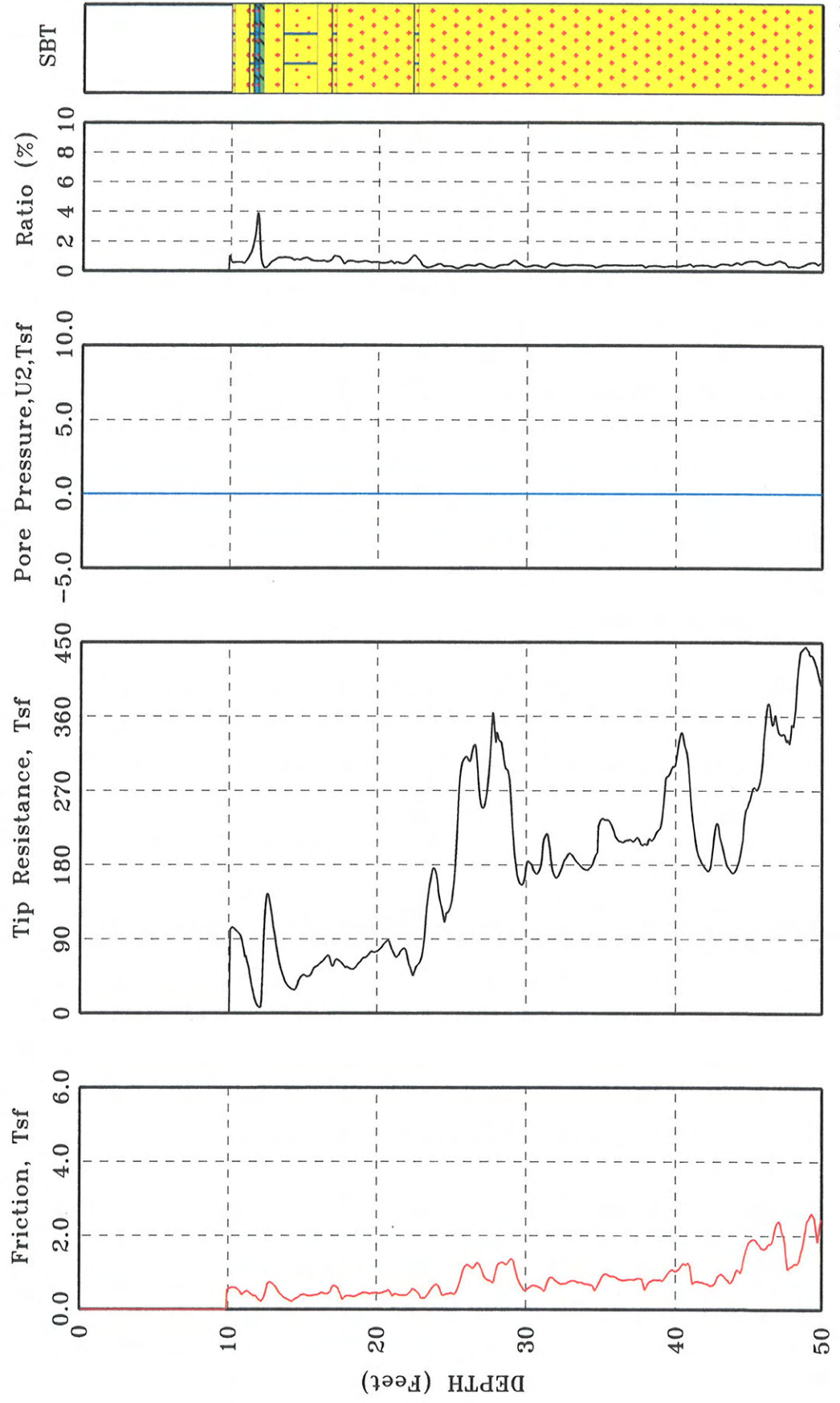




fugro GEOSCIENCES, INC.

CPT No : ROST-27  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

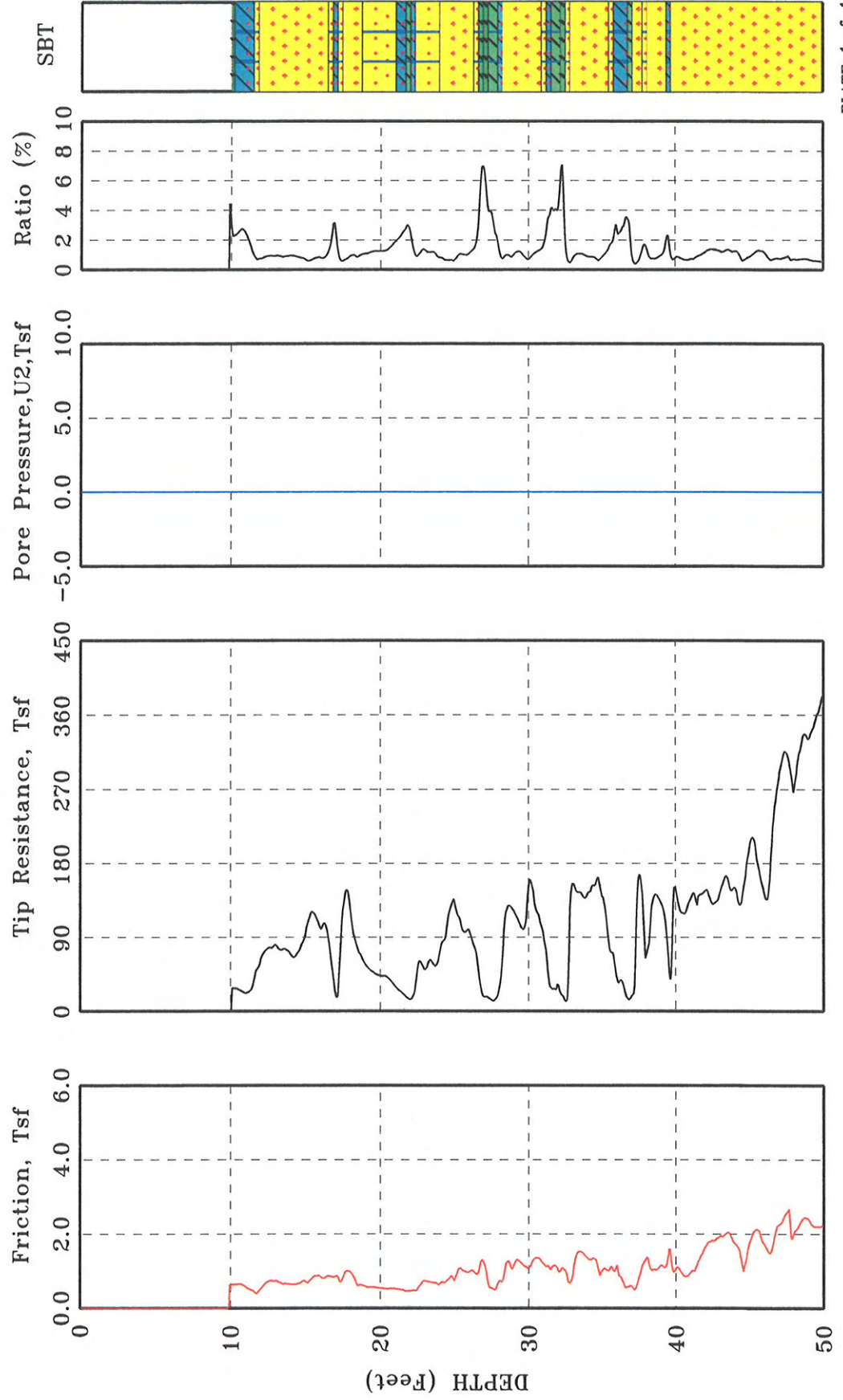
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009



FUGRO GEOSCIENCES, INC.

CPT No : ROST-28  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

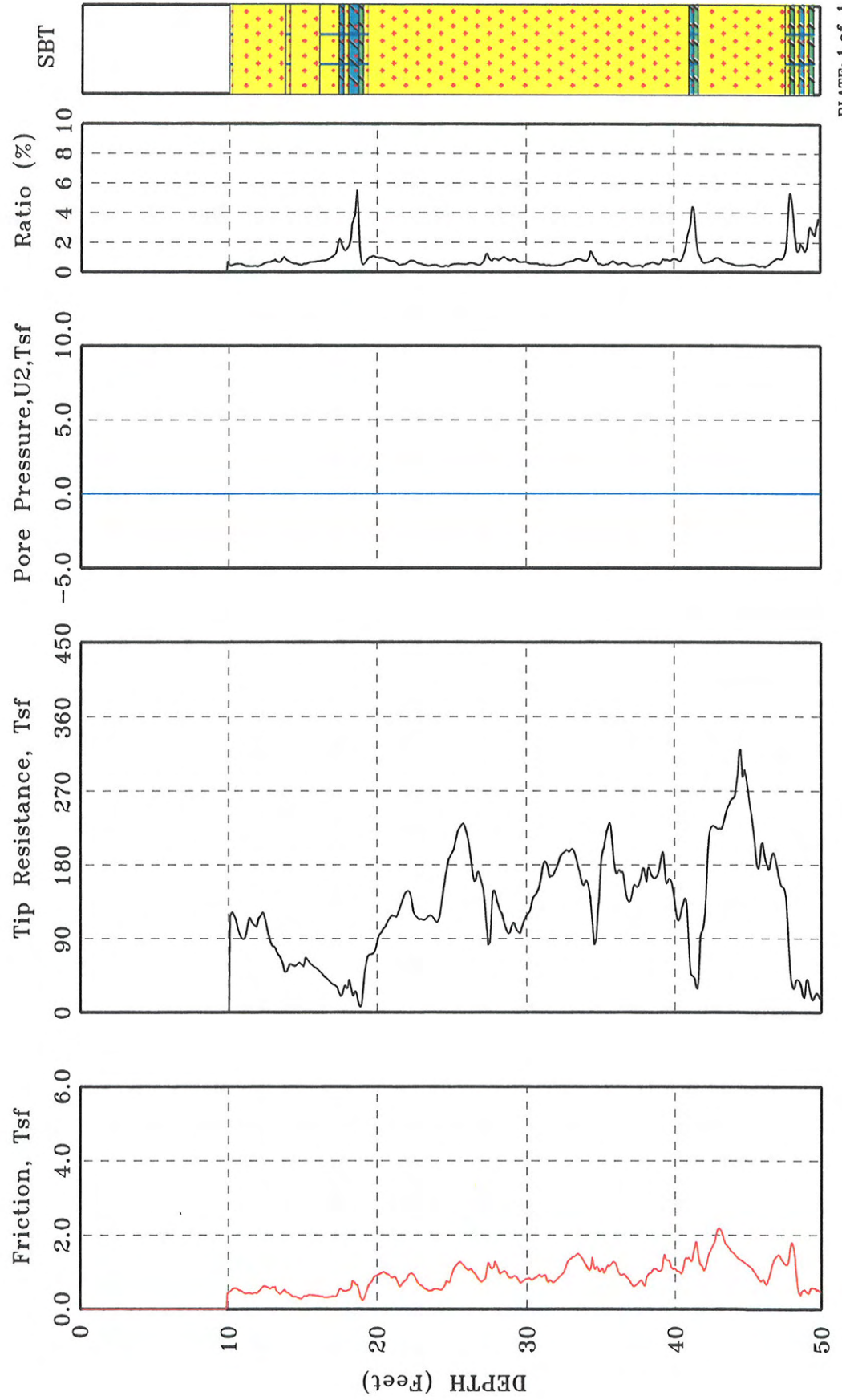
SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009



**fugro GEOSCIENCES, INC.**

CPT No : ROST-29  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 27-Aug-2009

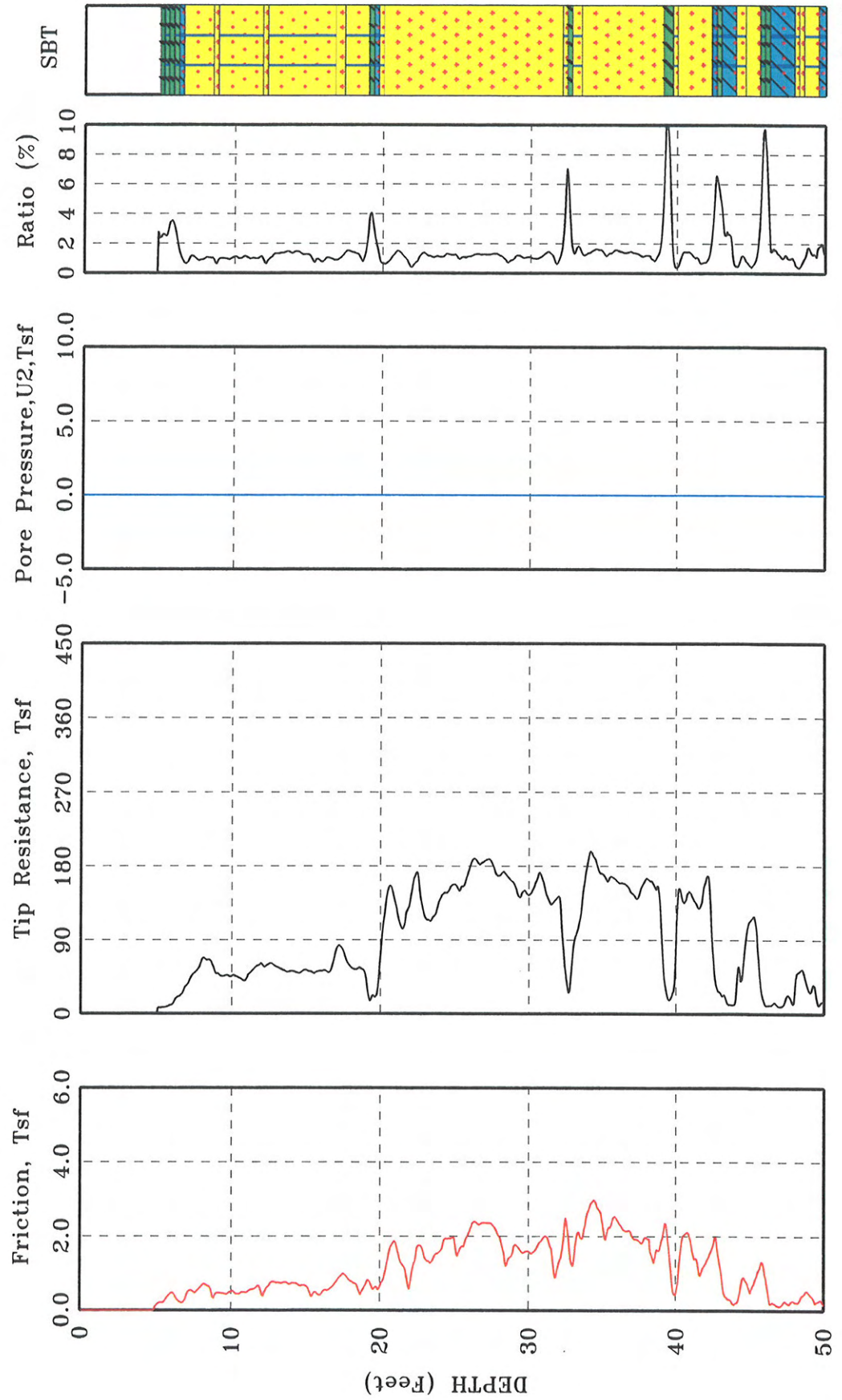




fugro GEOSCIENCES, INC.

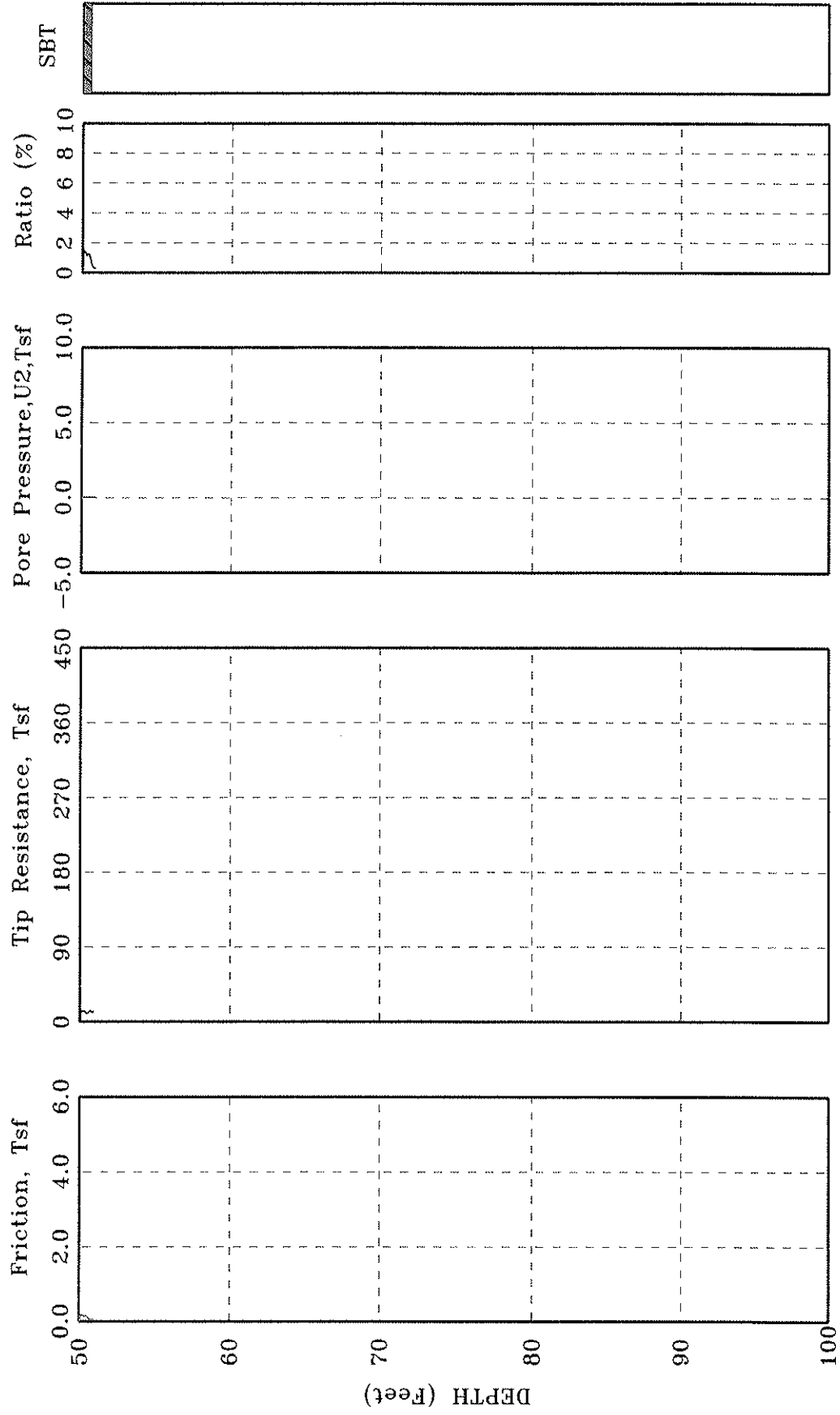
CPT No : ROST-30  
 JOB No : 04.1909-0044  
 CONE No : F7.5CKE2HAW21344

SITE : Roxana, IL  
 CLIENT : URS Corporation  
 OPERATOR : DANIEL GARZA  
 DATE : 28-Aug-2009



FUGRO GEOSCIENCES, INC.

CPT No : ROST-30	SITE : Roxana, IL
JOB No : 04.1909-0044	CLIENT : URS Corporation
CONE No : F7.5CKE2HAW21344	OPERATOR : DANIEL GARZA
	DATE : 28-Aug-2009







**ROXANA, ILLINOIS**

**ROST PLOTS**



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 8:39:27 AM

ROST Unit: Houston

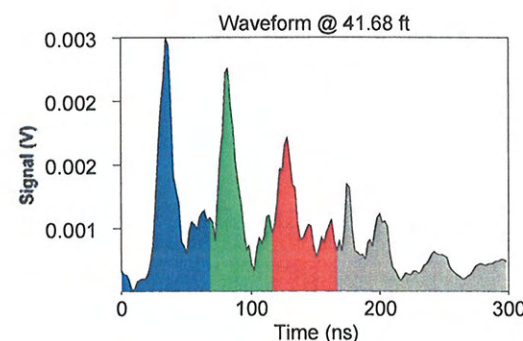
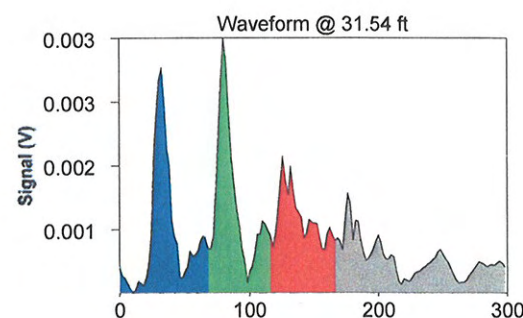
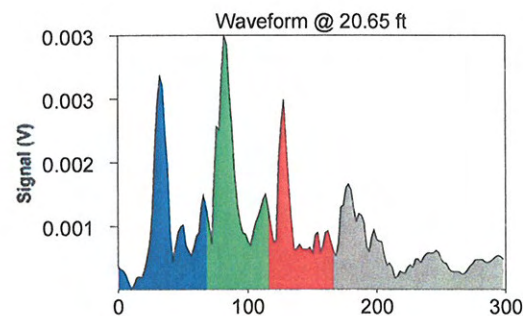
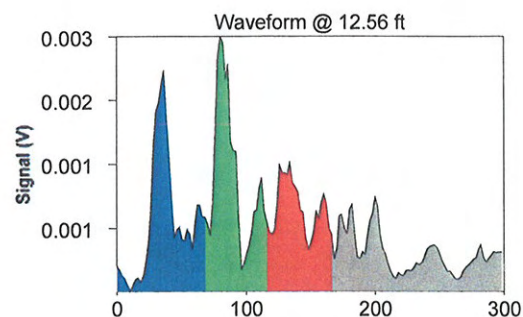
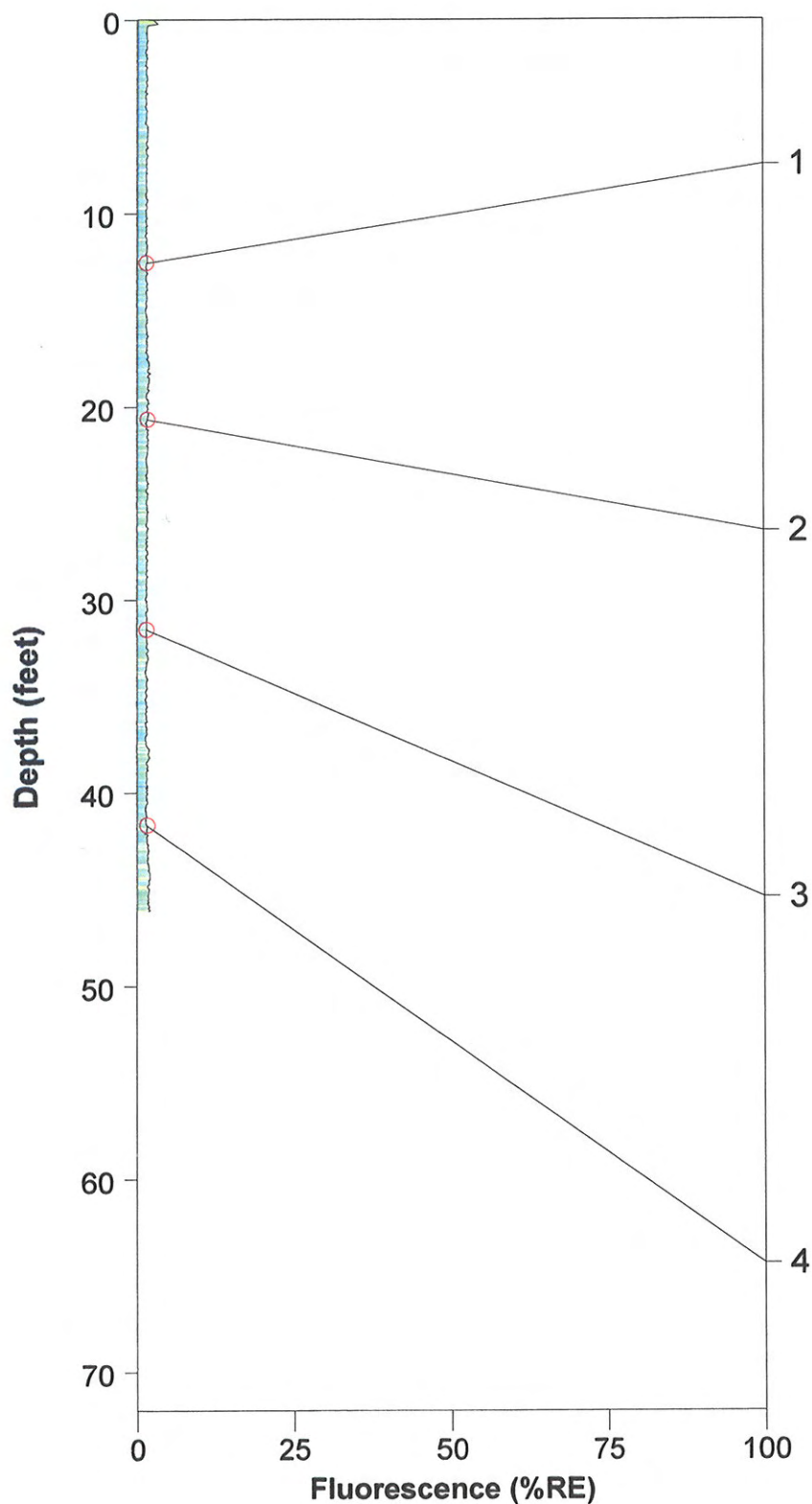
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 3.27% @ 0.20 ft

Final depth BGS: 46.10 ft

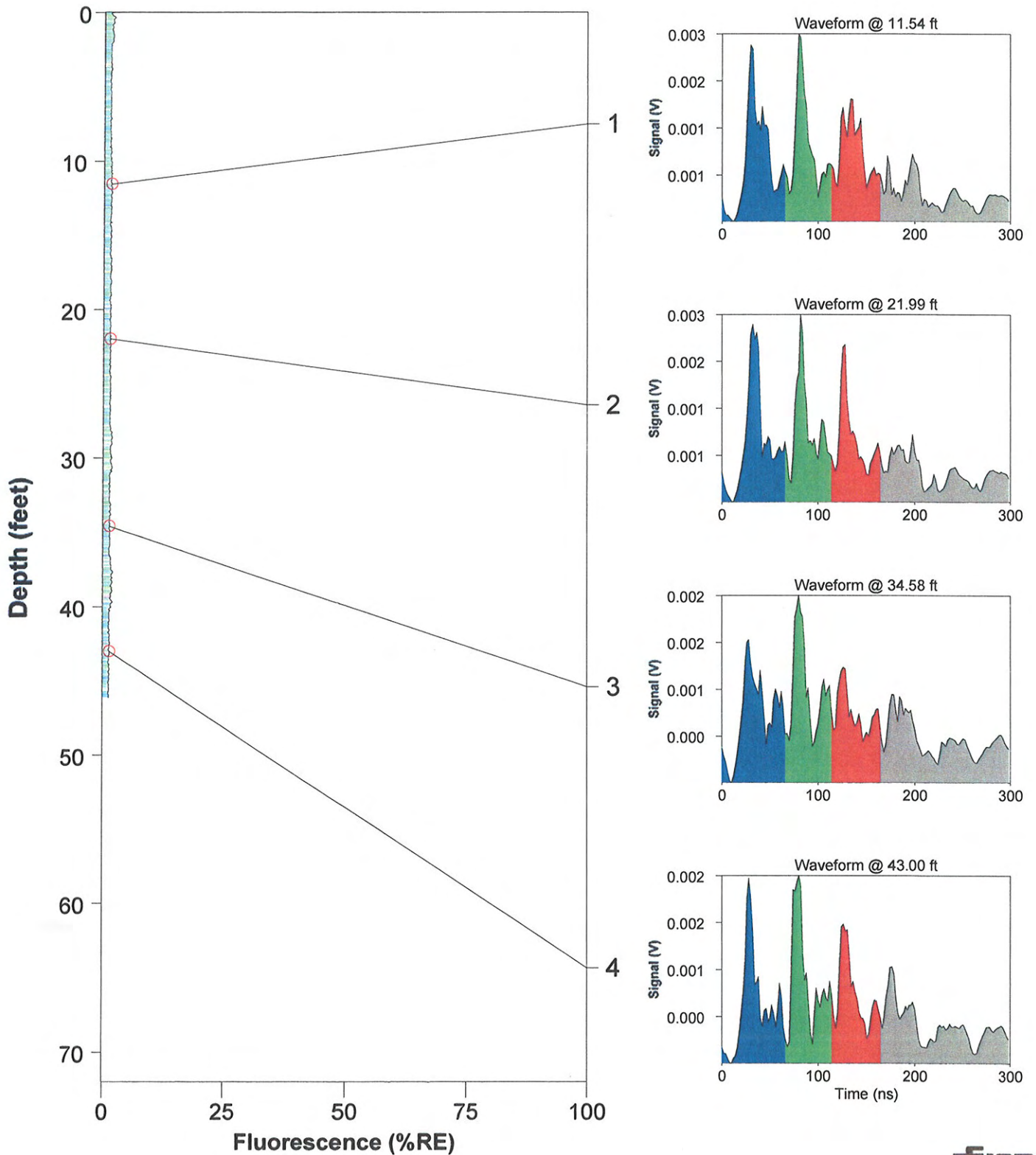
## ROST-01



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL	Operator: Robert Biehle
Client: URS	Fugro Job #: 04.1909-0044
Date/Time: 8/27/2009 @ 9:16:44 AM	Max fluorescence: 2.23% @ 0.35 ft
ROST Unit: Houston	Final depth BGS: 46.11 ft

## ROST-02



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/27/2009 @ 8:26:18 AM

ROST Unit: Houston

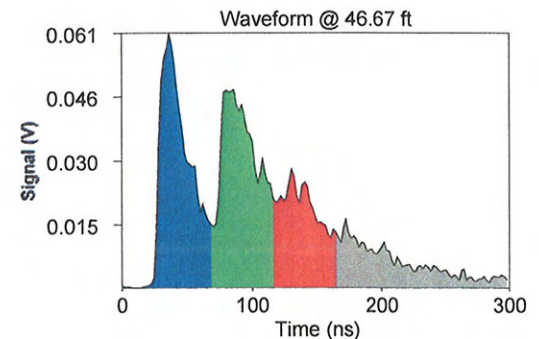
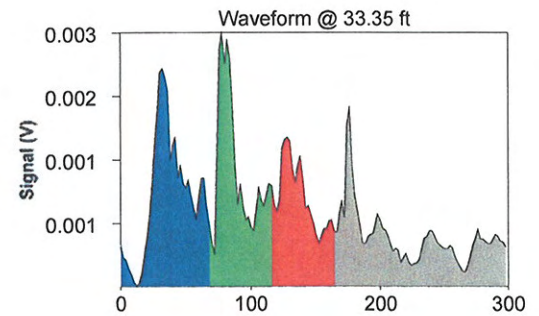
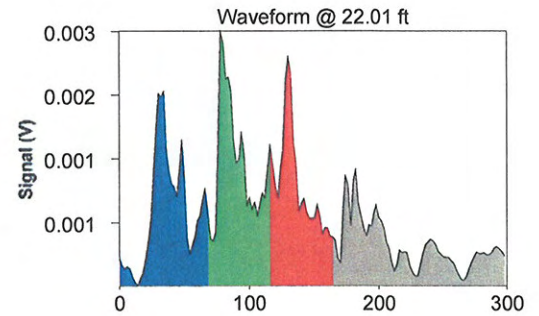
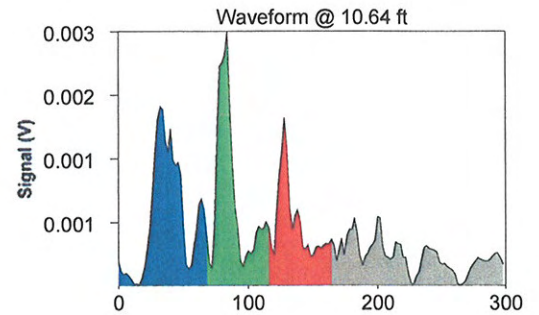
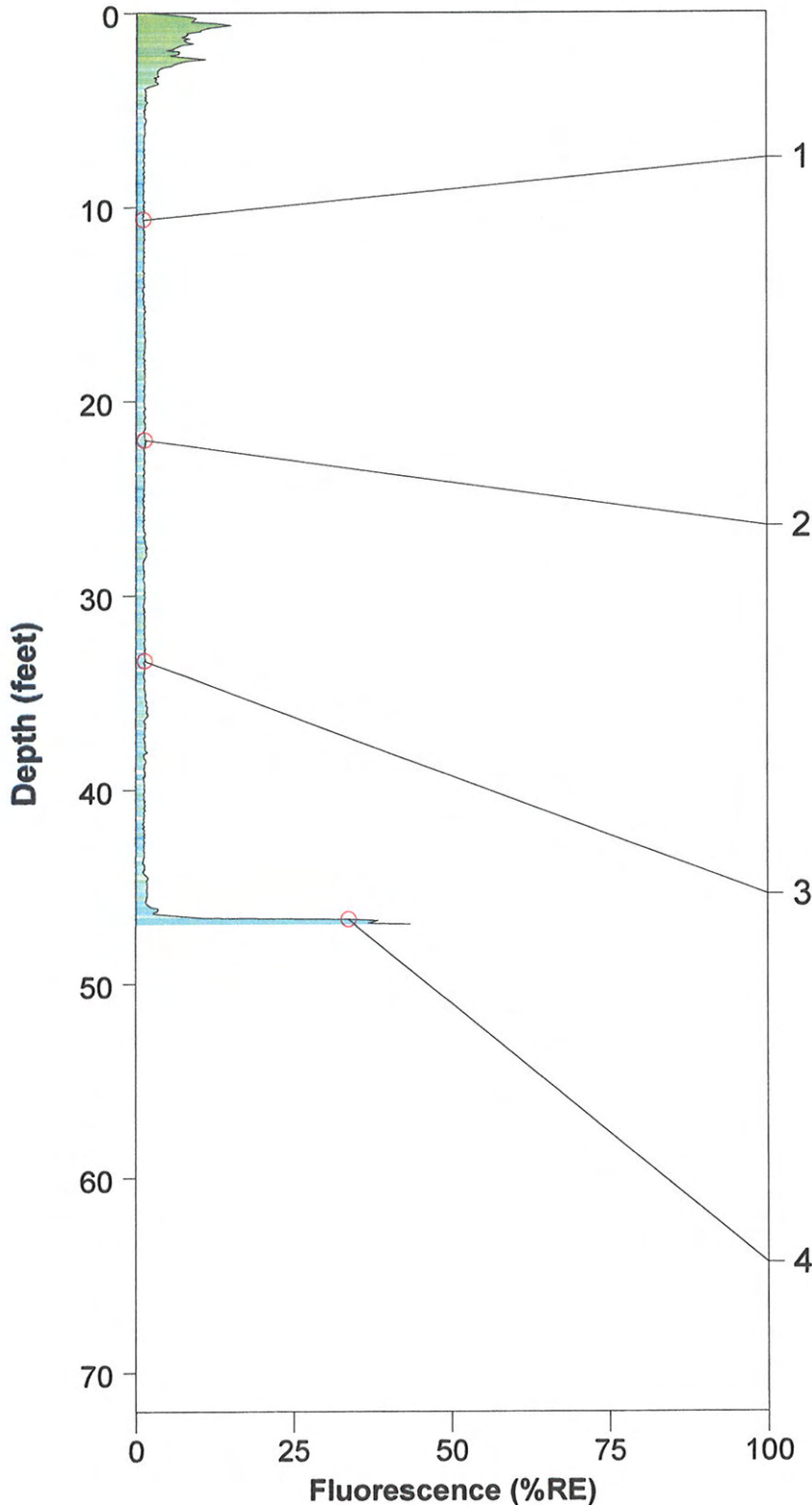
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 43.60% @ 46.93 ft

Final depth BGS: 46.93 ft

## ROST-03





# ROST Fluorescence Response Data

Site: Connoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 4:27:38 PM

ROST Unit: Houston

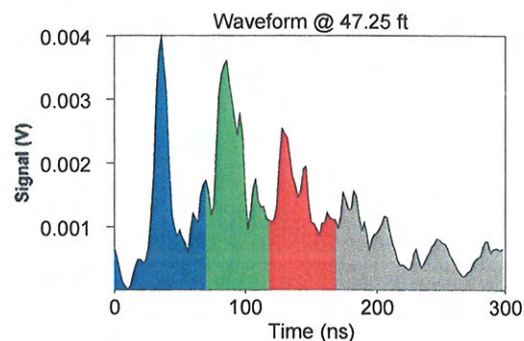
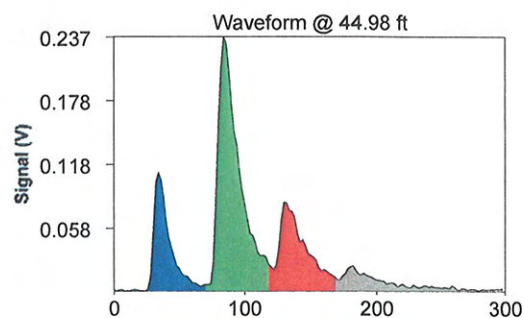
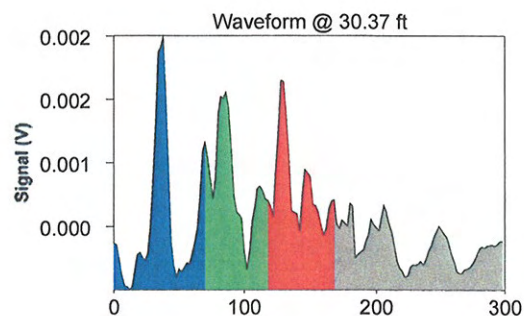
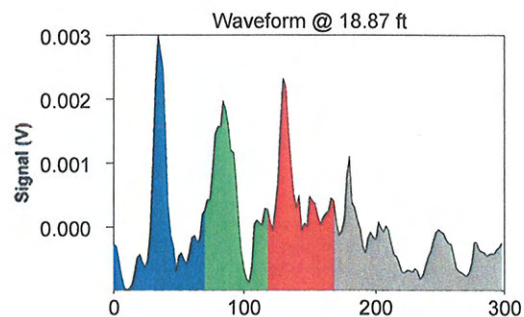
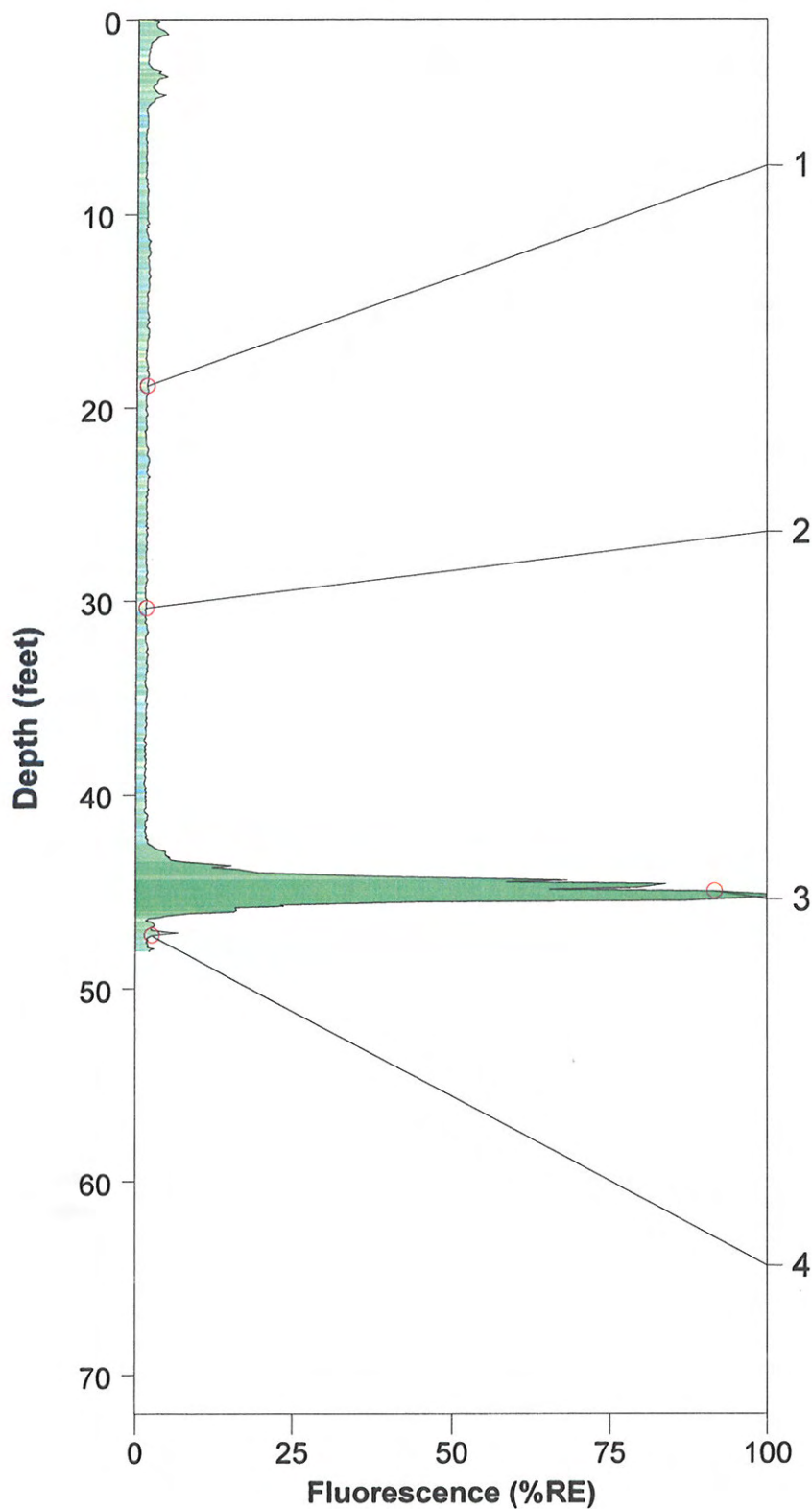
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 122.74% @ 45.27 ft

Final depth BGS: 48.08 ft

## ROST-04



# ROST Fluorescence Response Data

Site: Connoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 5:29:23 PM

ROST Unit: Houston

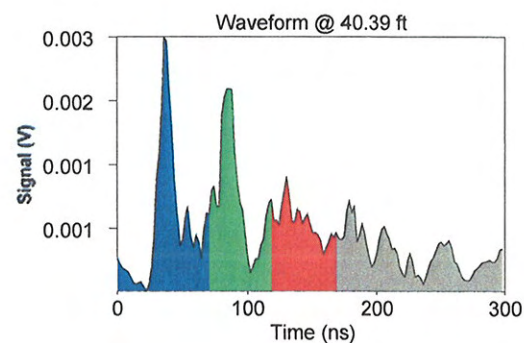
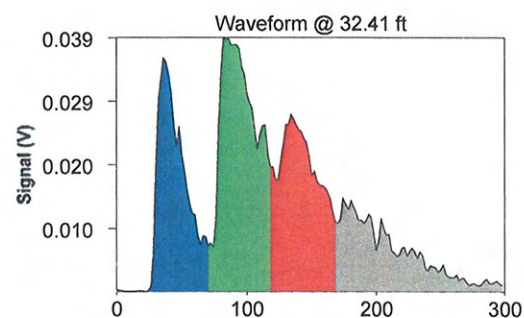
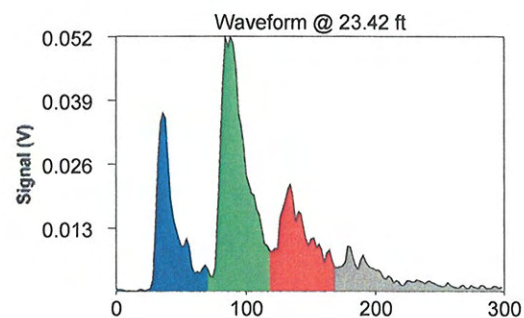
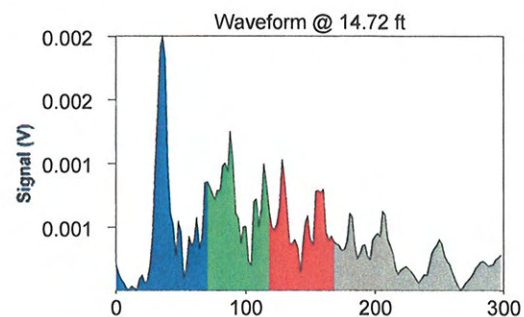
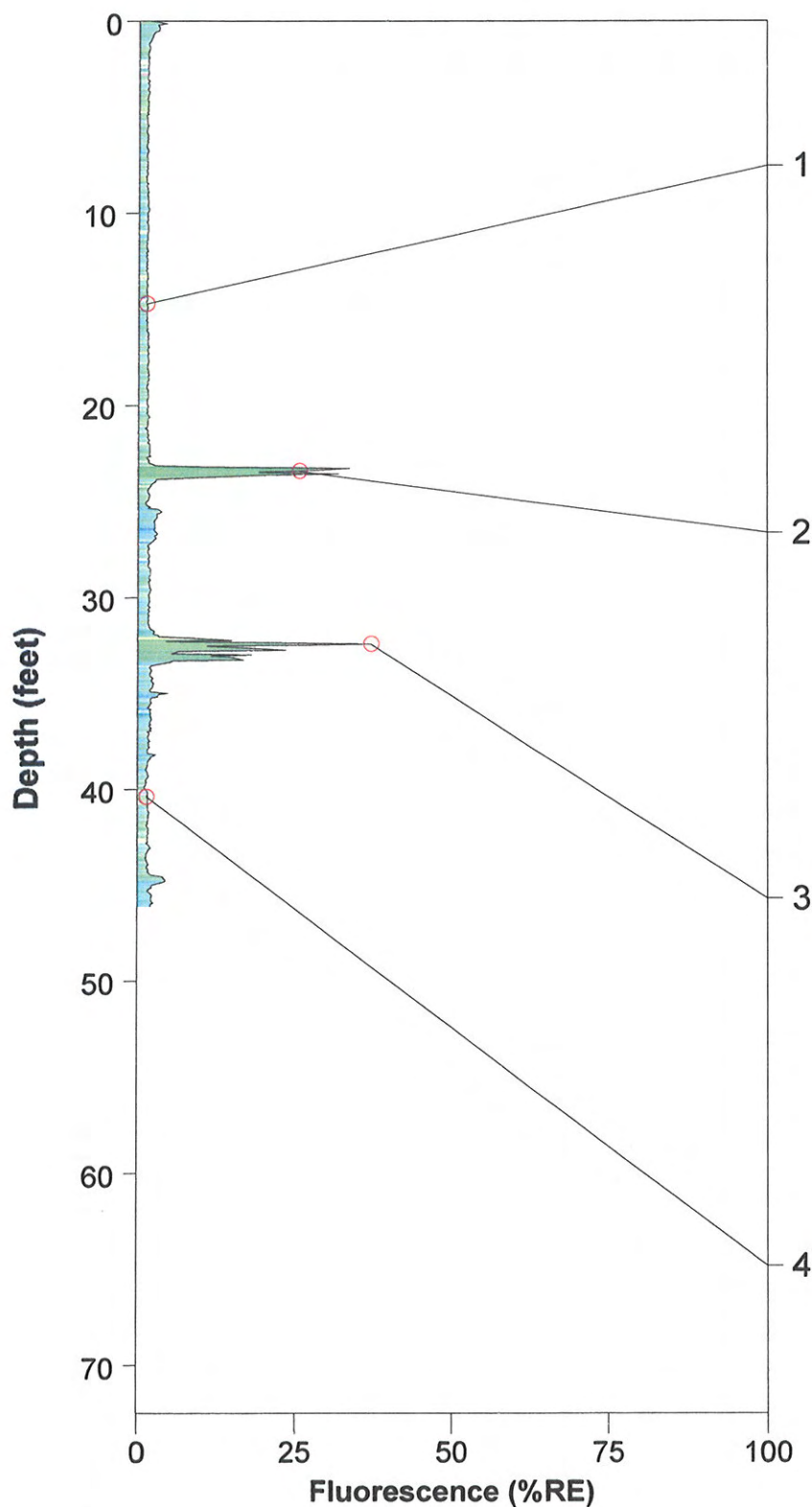
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 37.25% @ 32.41 ft

Final depth BGS: 46.12 ft

## ROST-05



# ROST Fluorescence Response Data

Site: Connoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 8:14:37 AM

ROST Unit: Houston

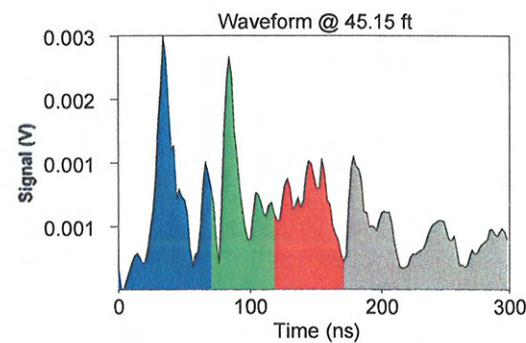
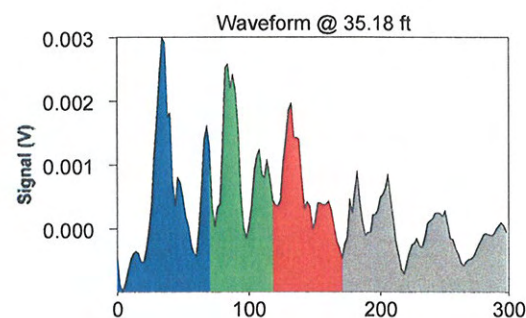
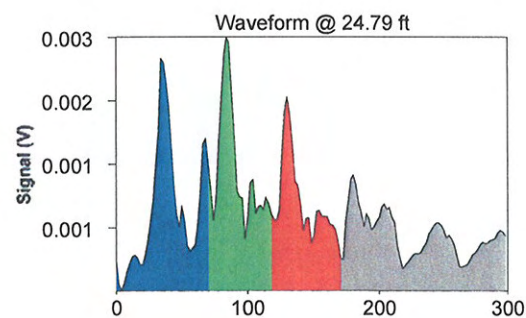
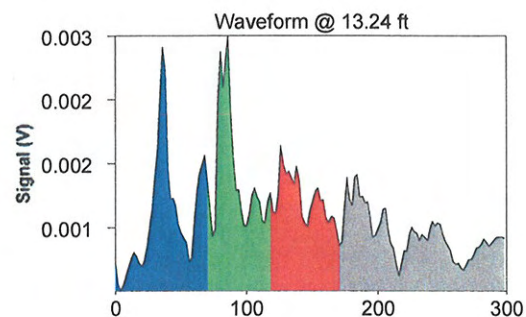
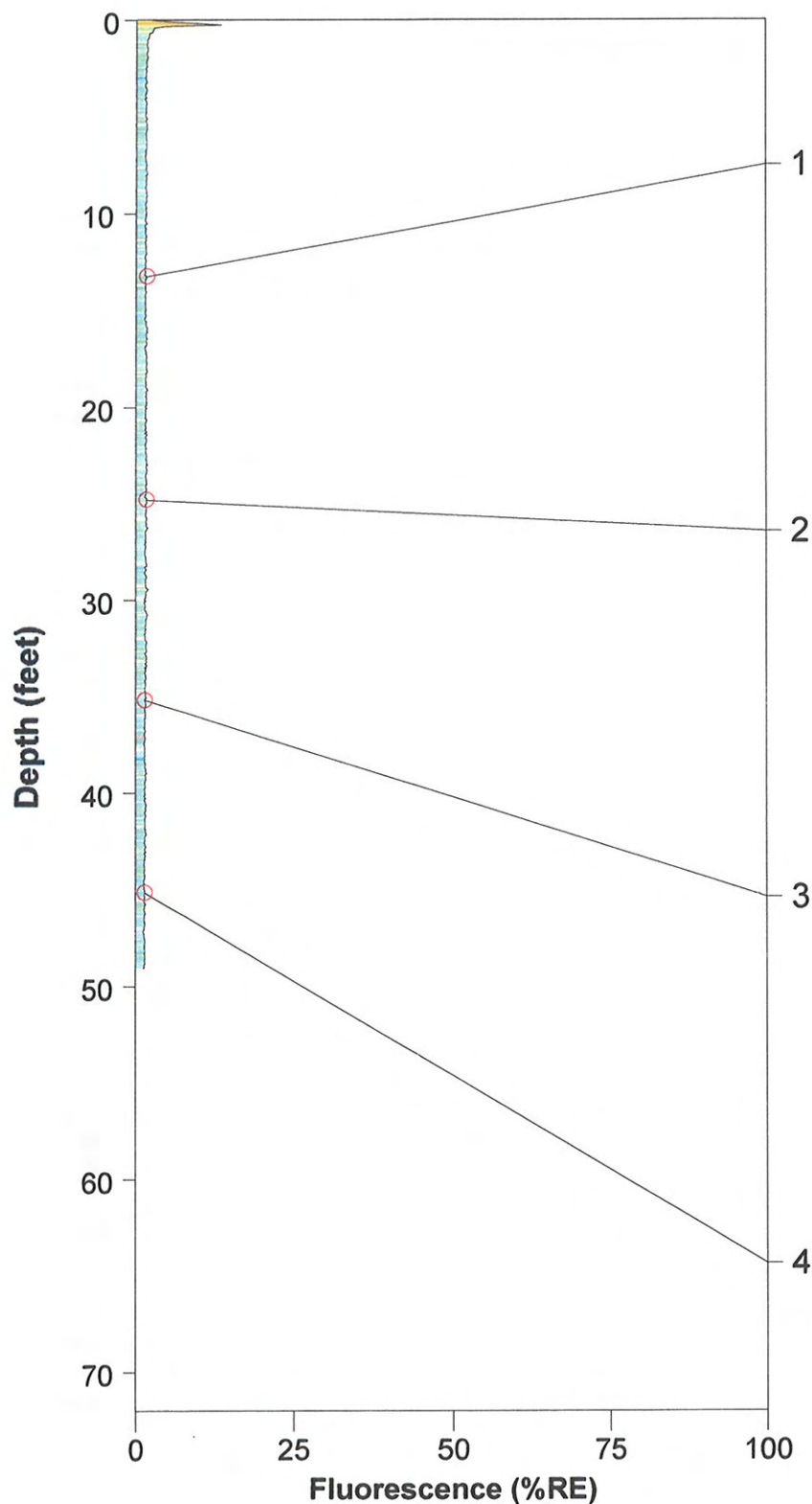
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 13.37% @ 0.26 ft

Final depth BGS: 49.05 ft

## ROST-06





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 8:59:51 AM

ROST Unit: Houston

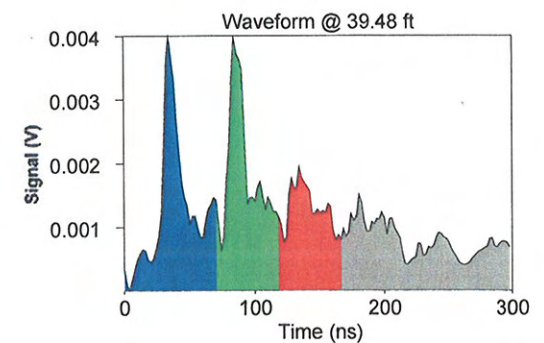
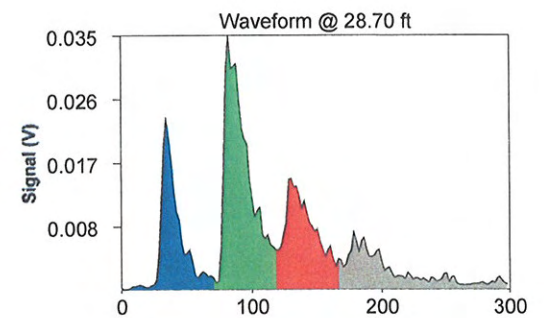
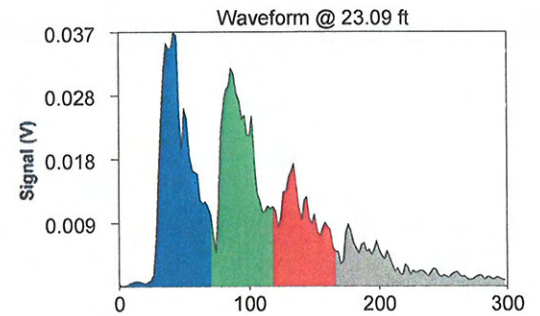
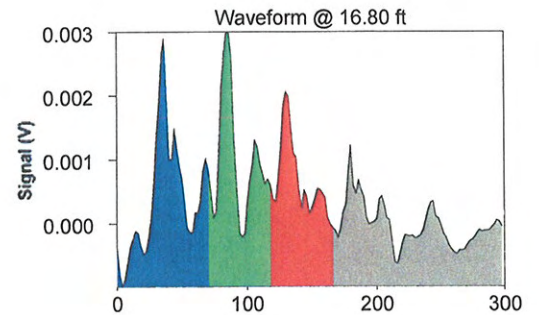
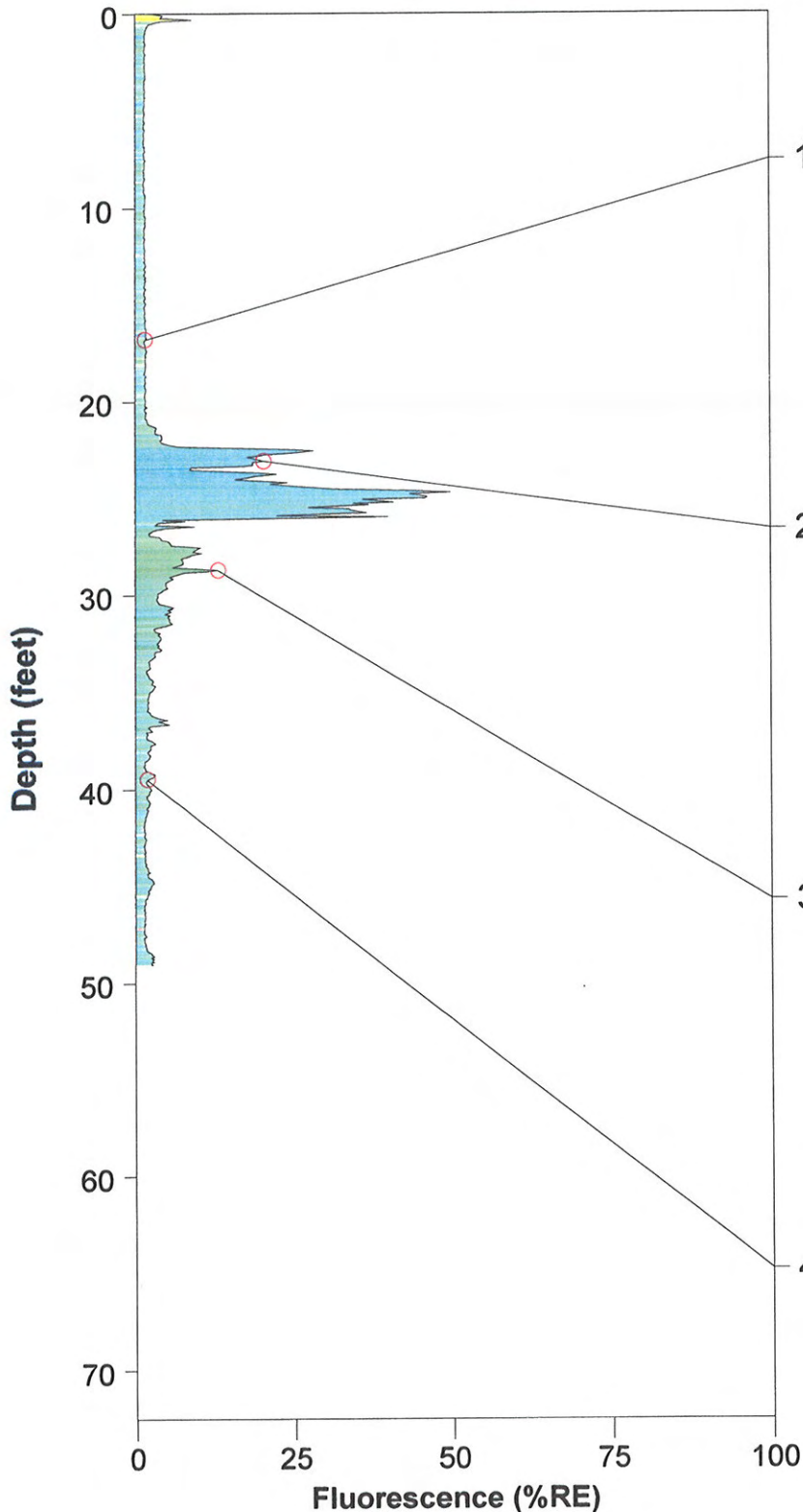
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 49.79% @ 24.71 ft

Final depth BGS: 49.05 ft

## ROST-07





# ROST Fluorescence Response Data

Site: Conoco-Roxanna, IL

Client: URS

Date/Time: 8/26/2009 @ 9:31:38 AM

ROST Unit: Houston

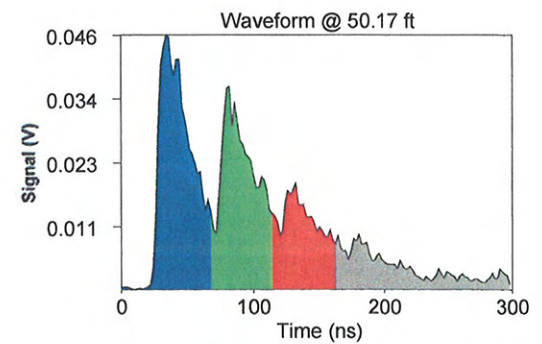
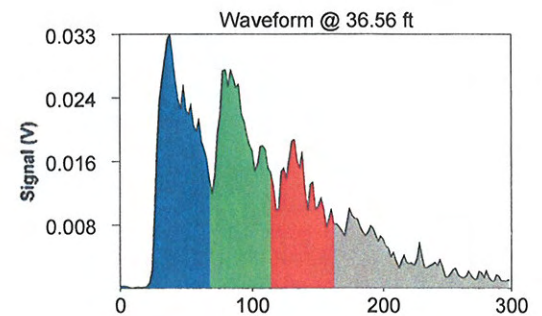
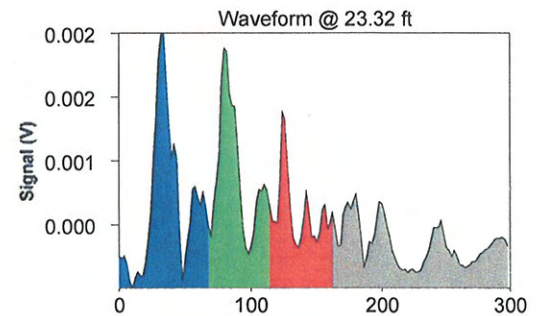
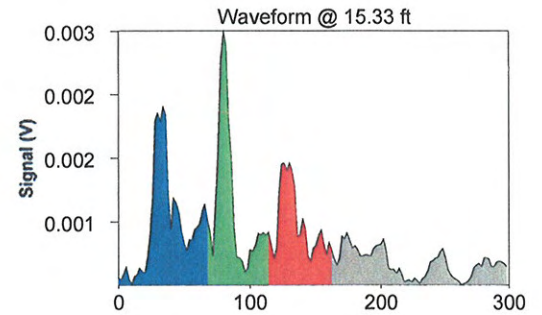
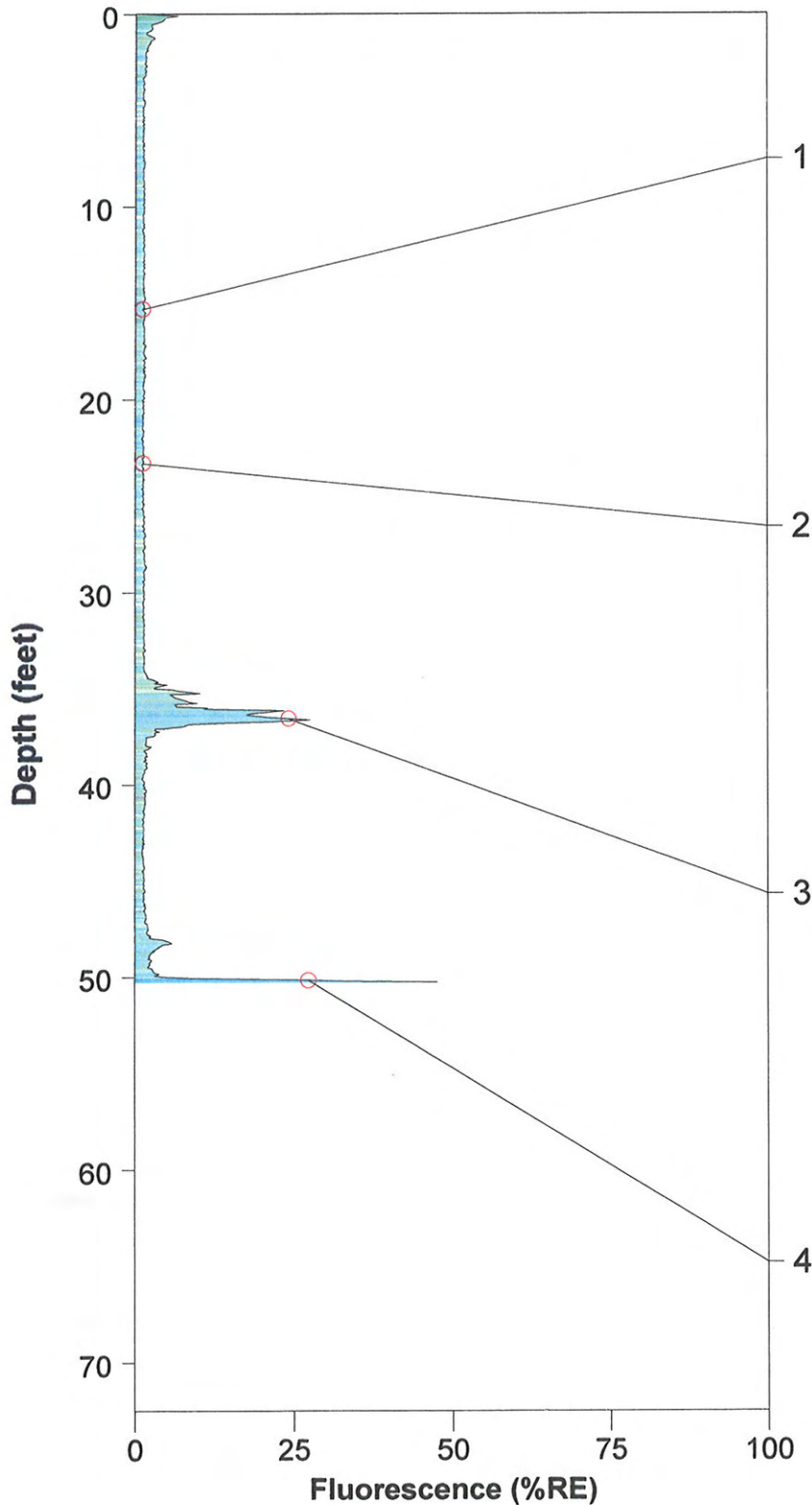
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 47.57% @ 50.27 ft

Final depth BGS: 50.27 ft

## ROST-08



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 10:29:41 AM

ROST Unit: Houston

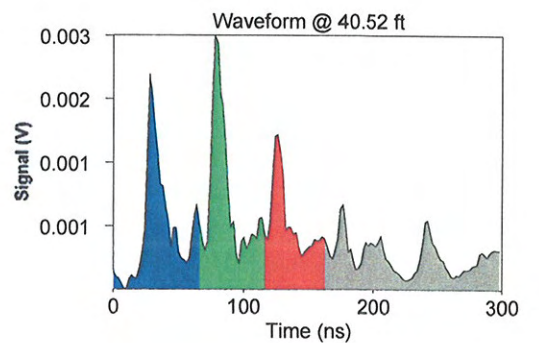
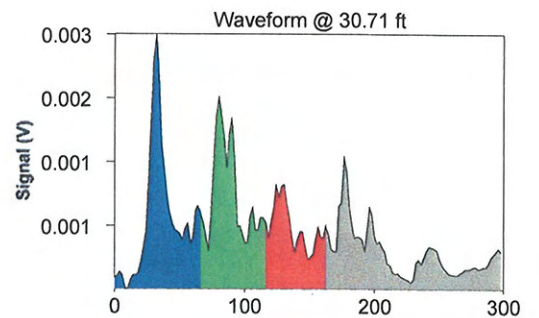
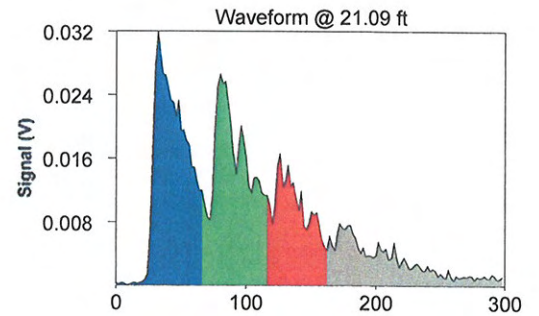
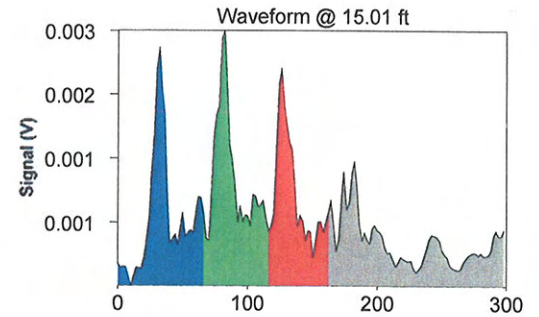
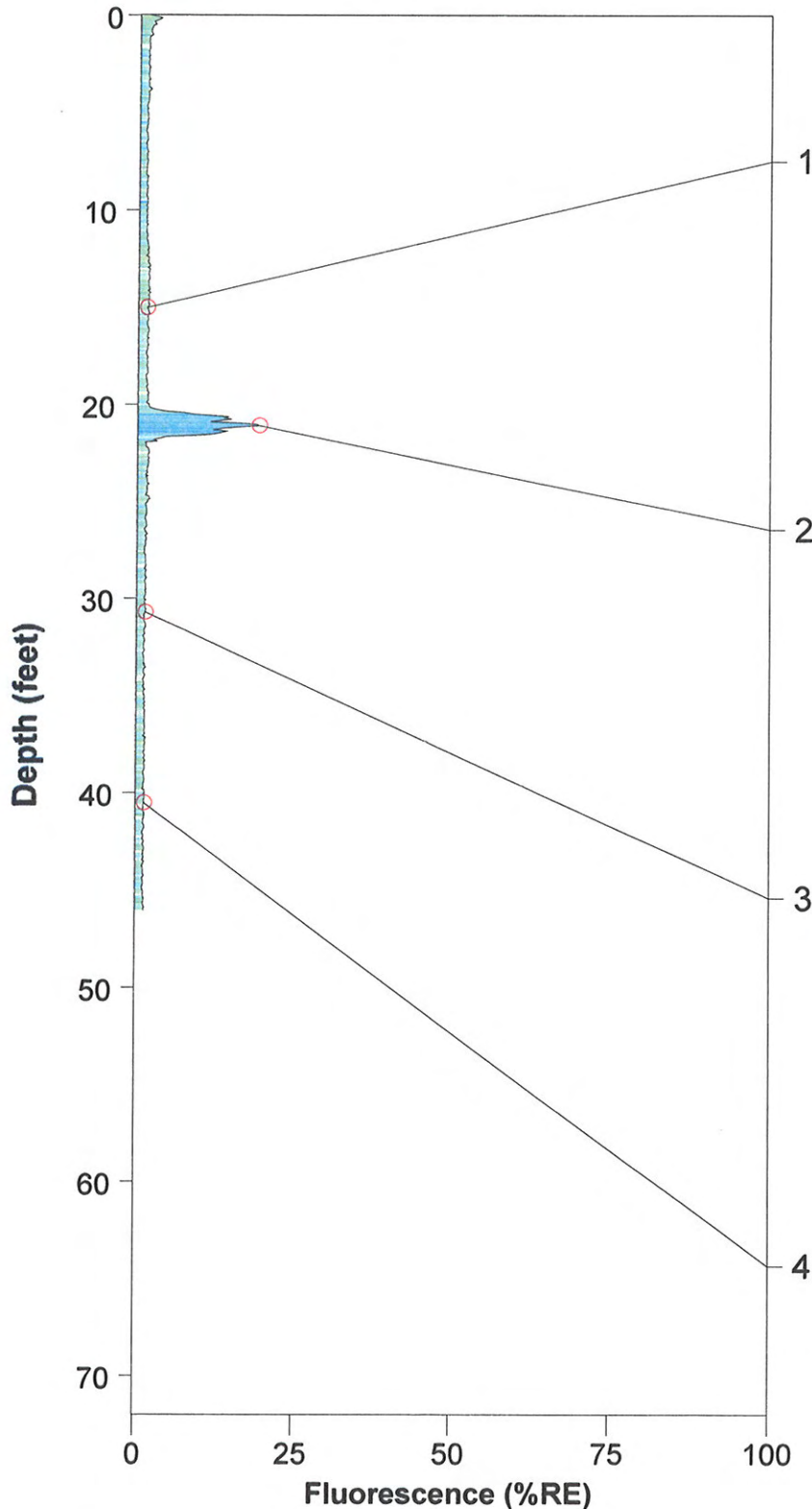
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 19.34% @ 21.09 ft

Final depth BGS: 46.05 ft

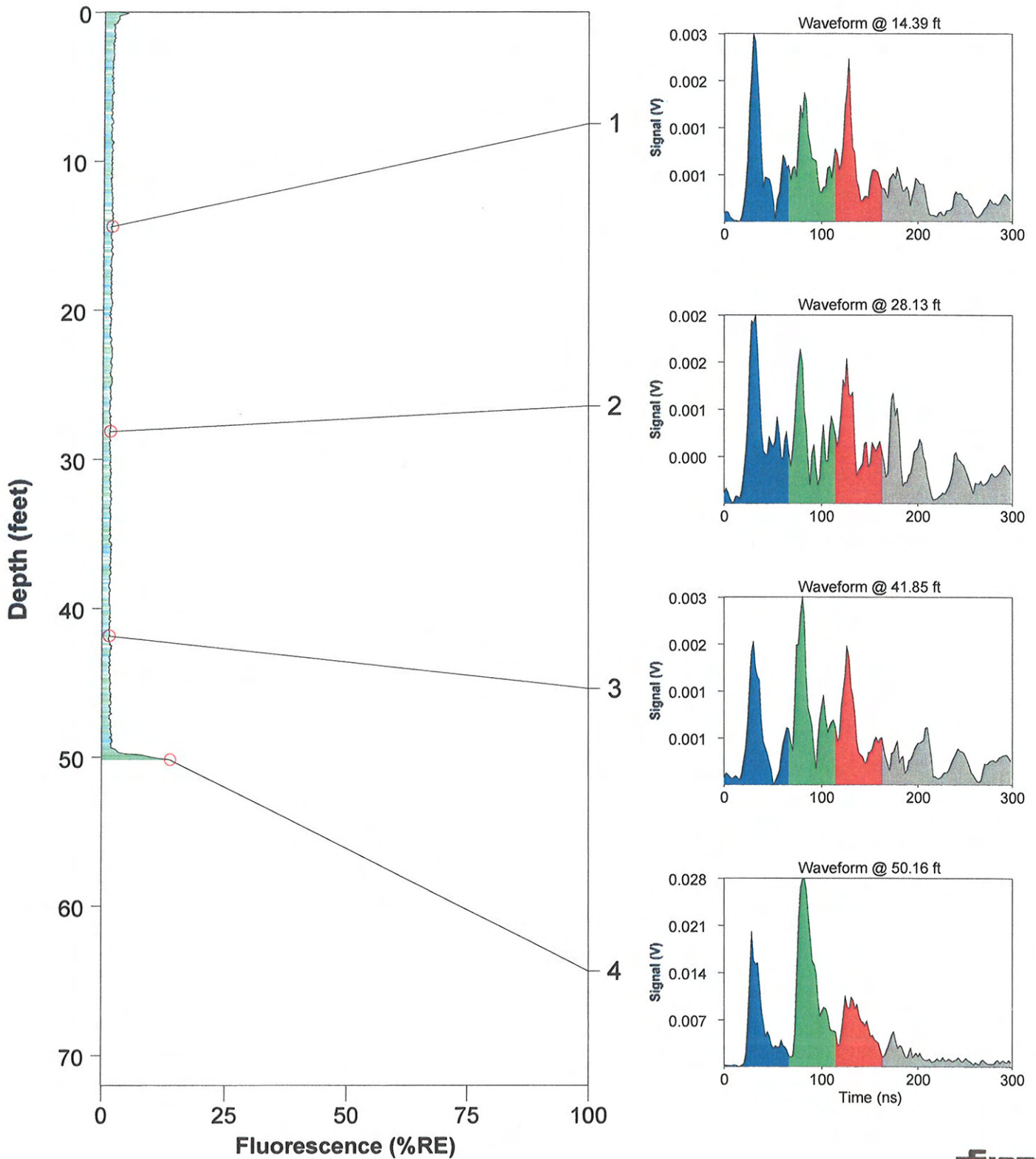
## ROST-09



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL	Operator: Robert Biehle
Client: URS	Fugro Job #: 04.1909-0044
Date/Time: 8/26/2009 @ 12:14:11 PM	Max fluorescence: 13.79% @ 50.16 ft
ROST Unit: Houston	Final depth BGS: 50.16 ft

## ROST-10





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/24/2009 @ 3:46:24 PM

ROST Unit: Houston

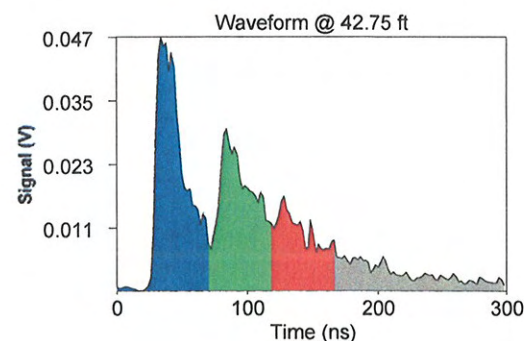
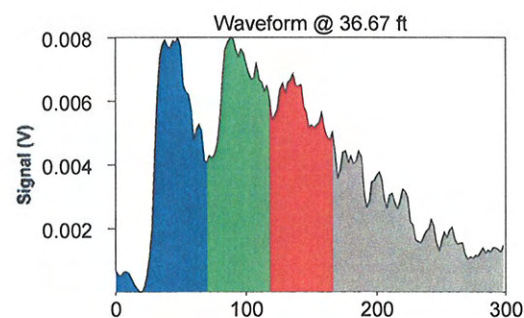
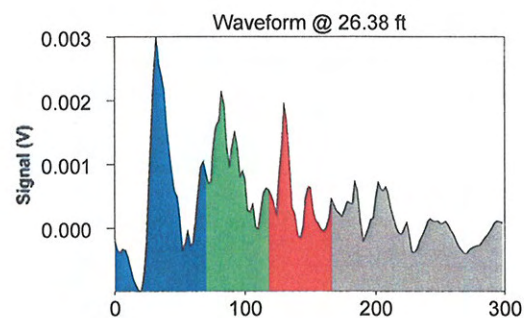
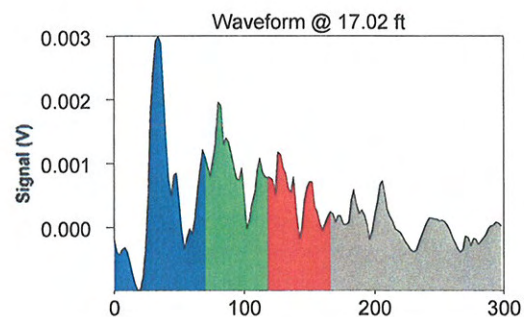
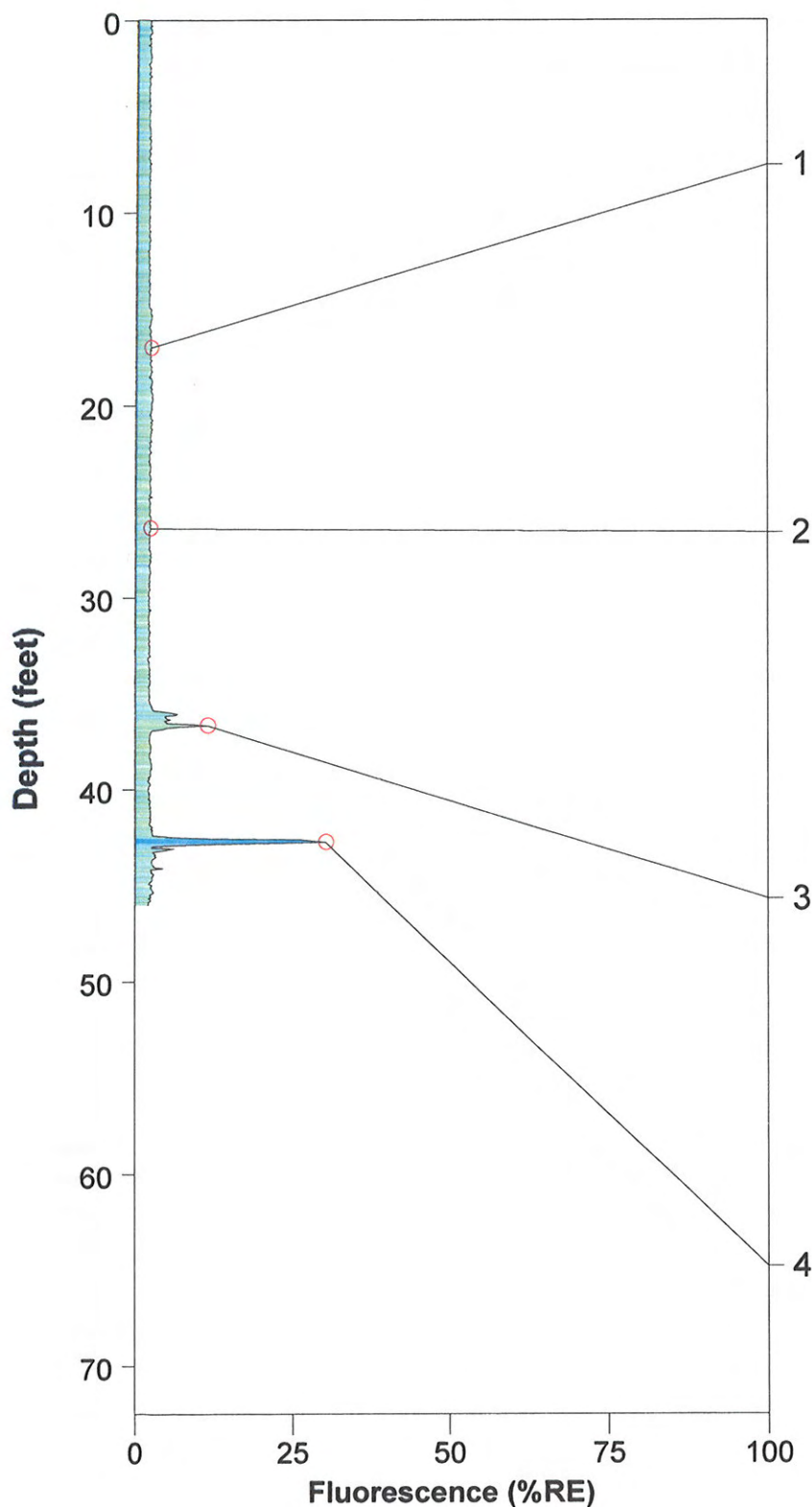
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 30.31% @ 42.75 ft

Final depth BGS: 46.03 ft

## ROST-11





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/24/2009 @ 4:49:05 PM

ROST Unit: Houston

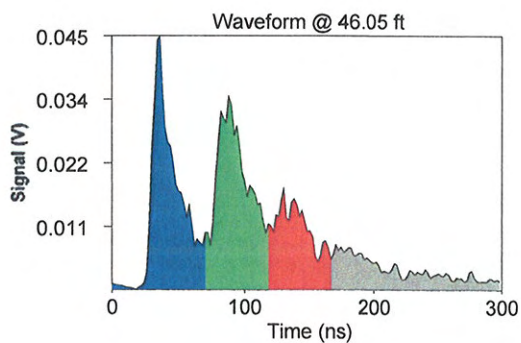
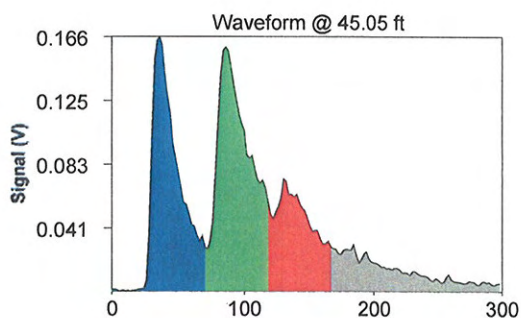
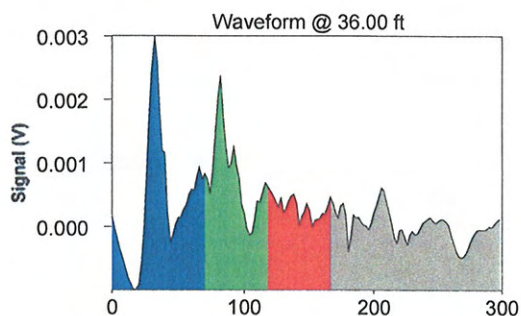
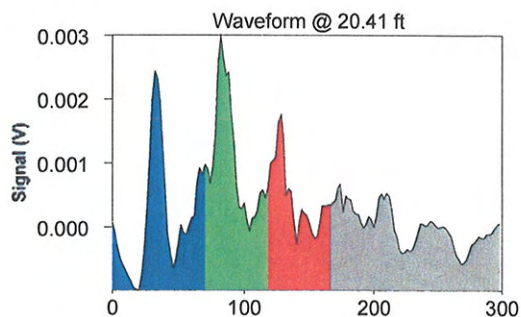
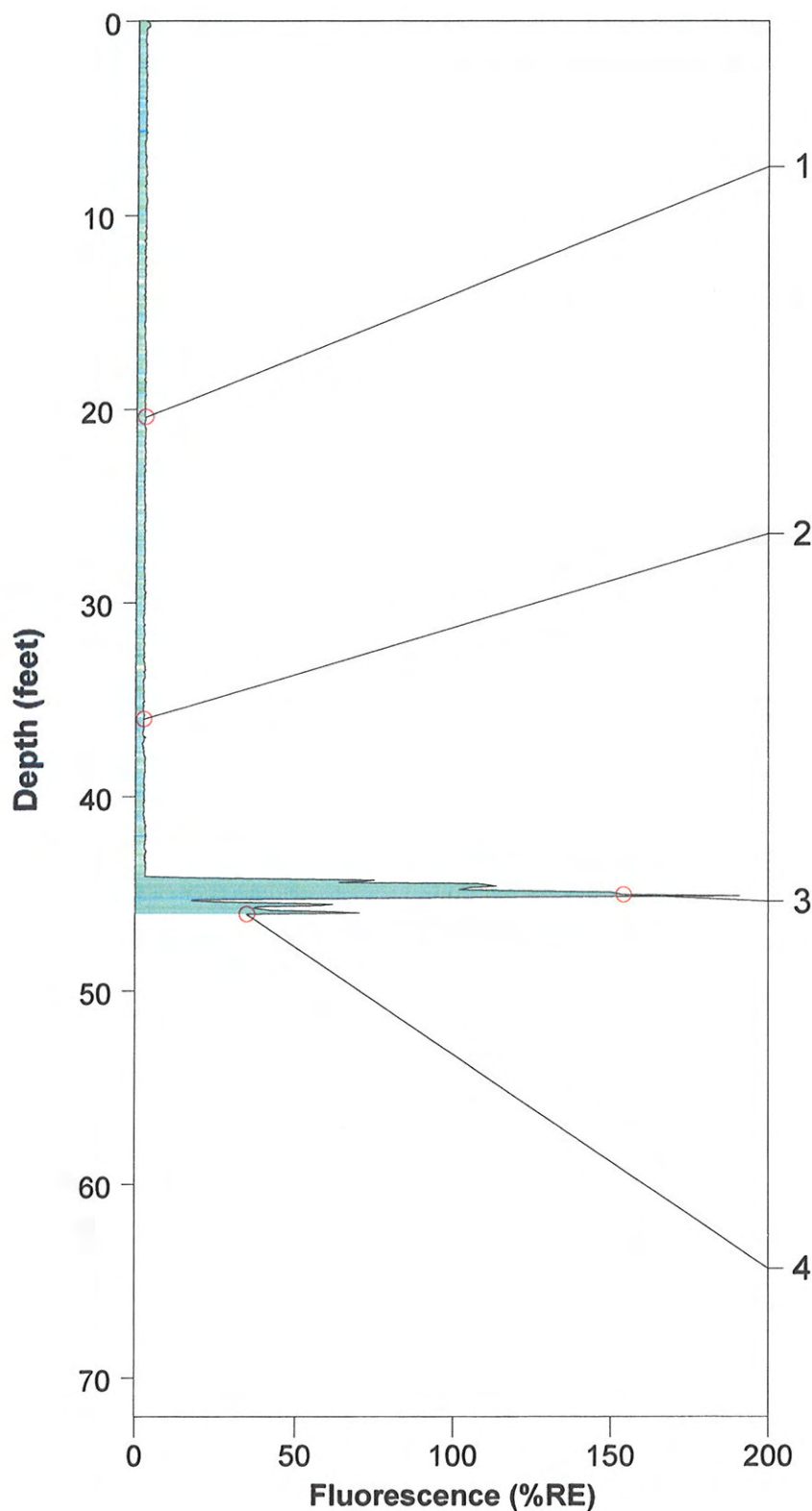
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 190.95% @ 45.11 ft

Final depth BGS: 46.05 ft

## ROST-12



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 12:49:24 PM

ROST Unit: Houston

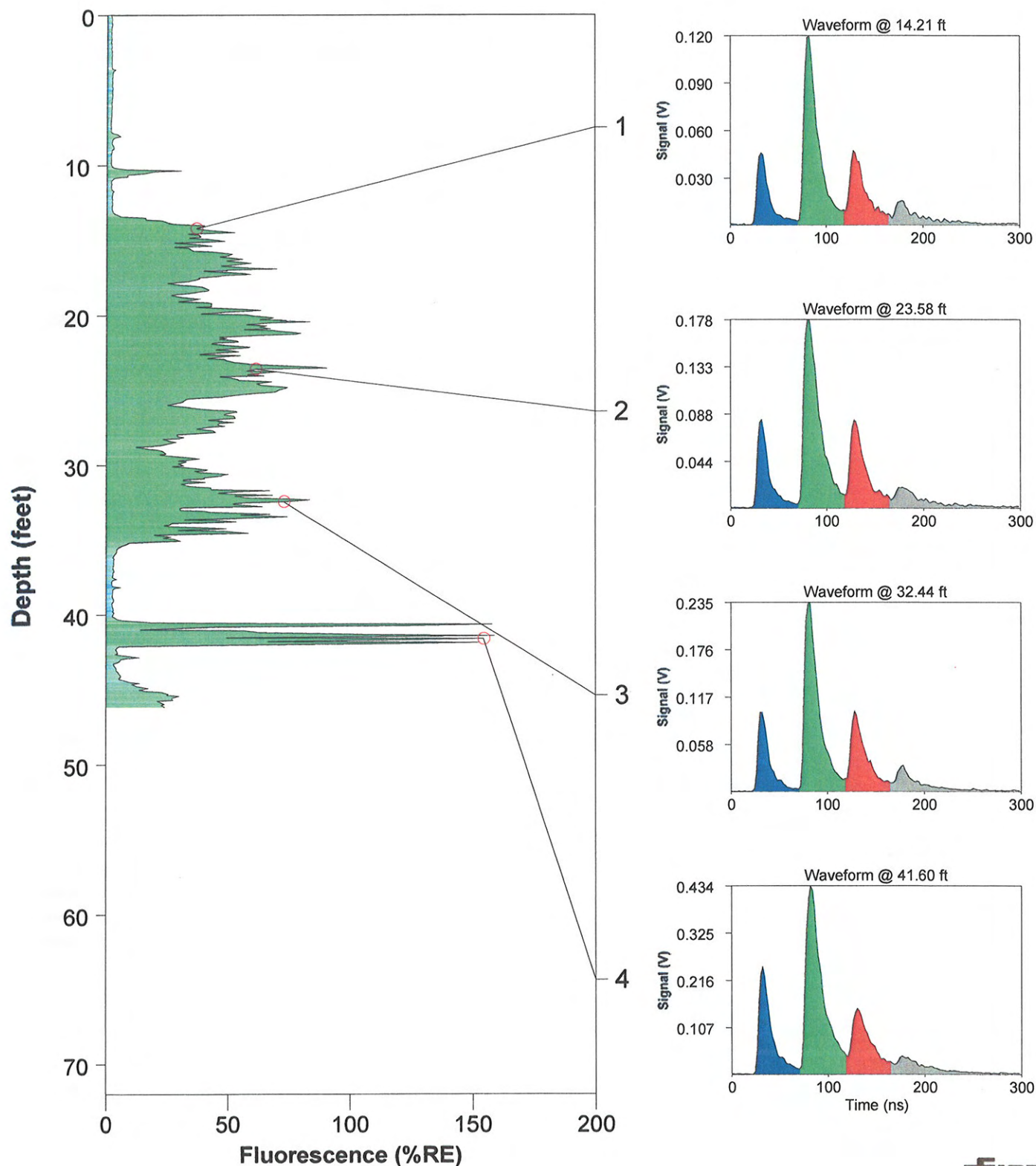
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 158.84% @ 41.40 ft

Final depth BGS: 46.14 ft

## ROST-13



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 1:46:59 PM

ROST Unit: Houston

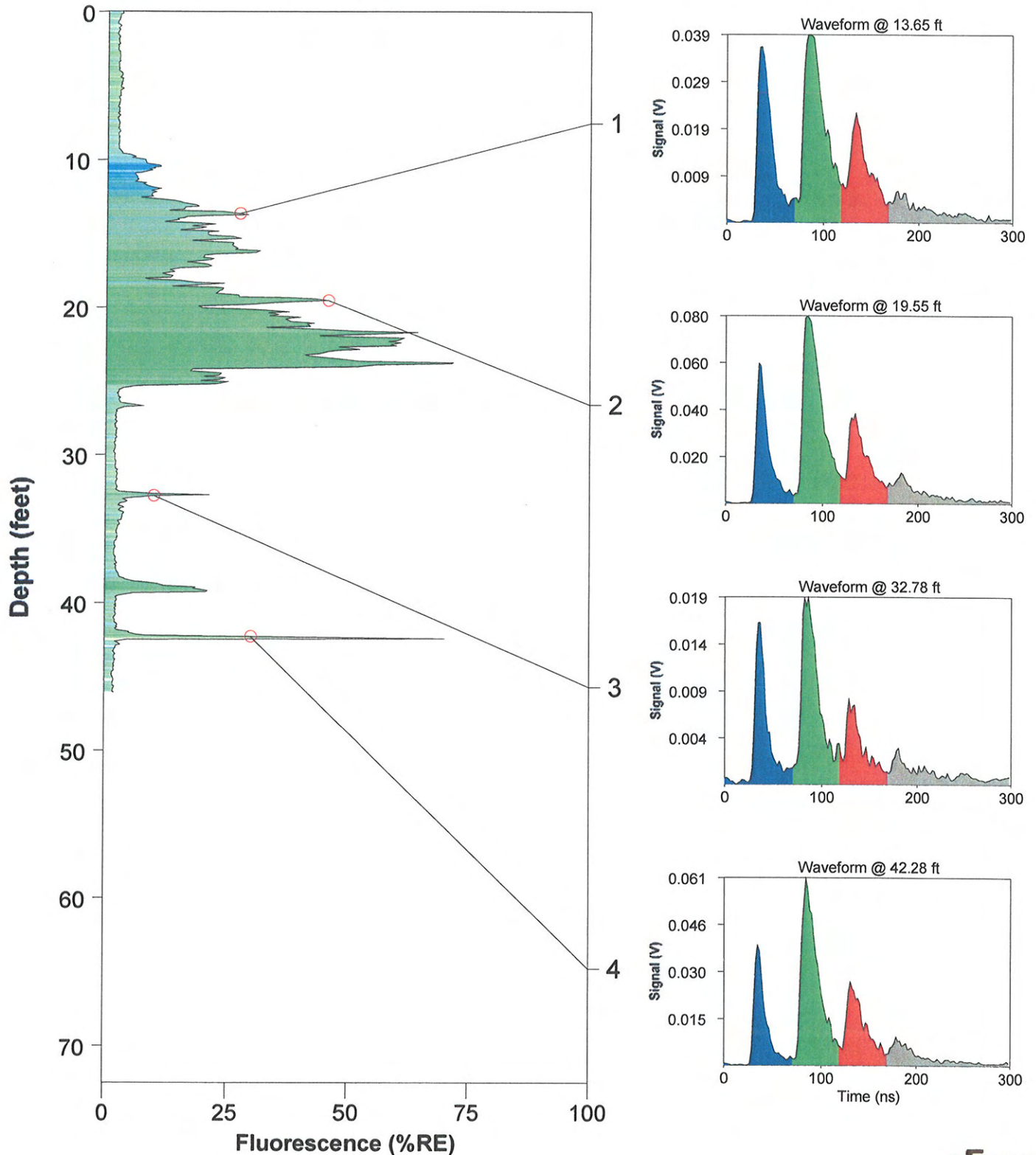
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 71.70% @ 23.75 ft

Final depth BGS: 46.05 ft

## ROST-14





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 7:39:08 AM

ROST Unit: Houston

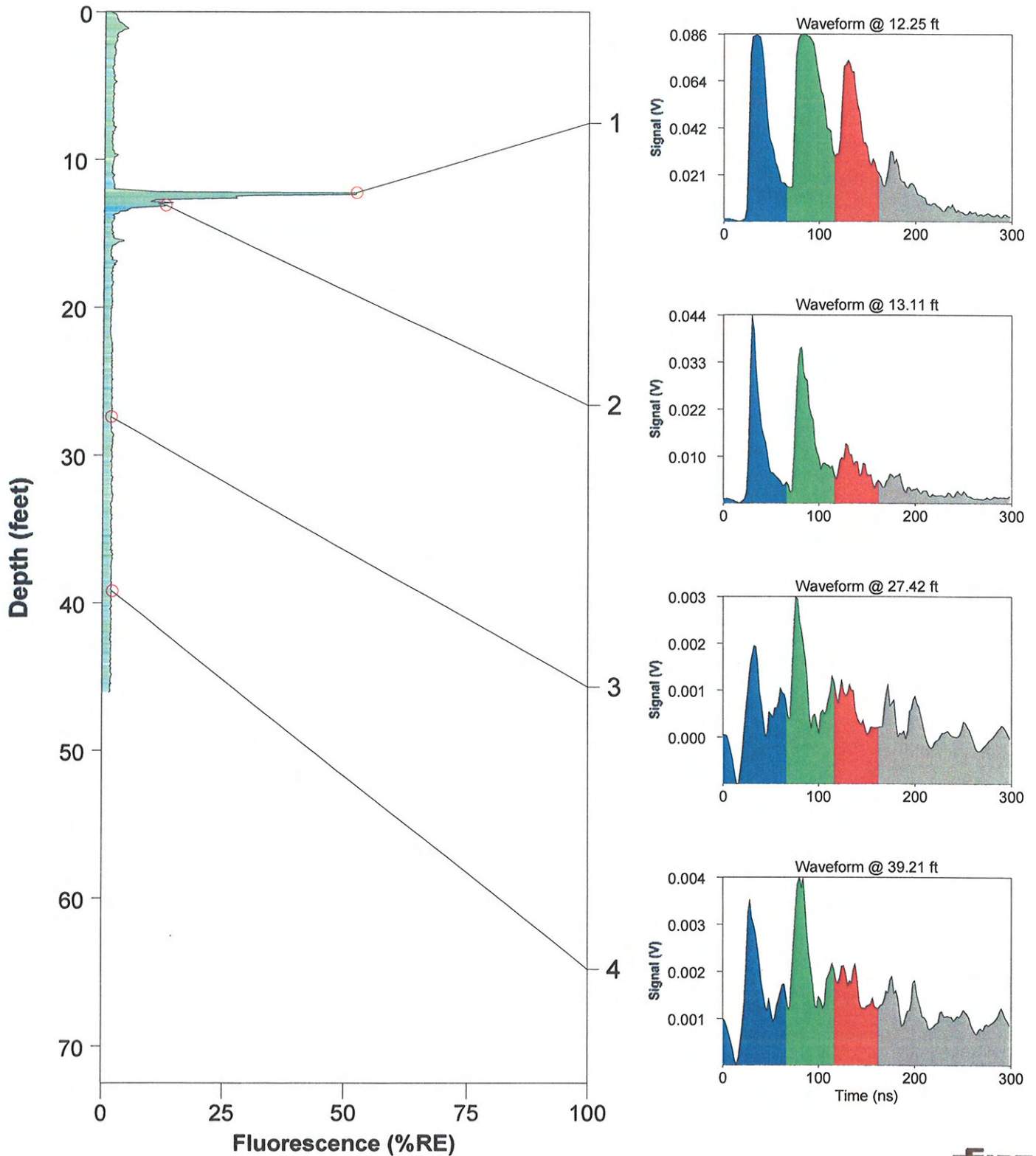
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 52.20% @ 12.25 ft

Final depth BGS: 46.07 ft

## ROST-15





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 10:38:02 AM

ROST Unit: Houston

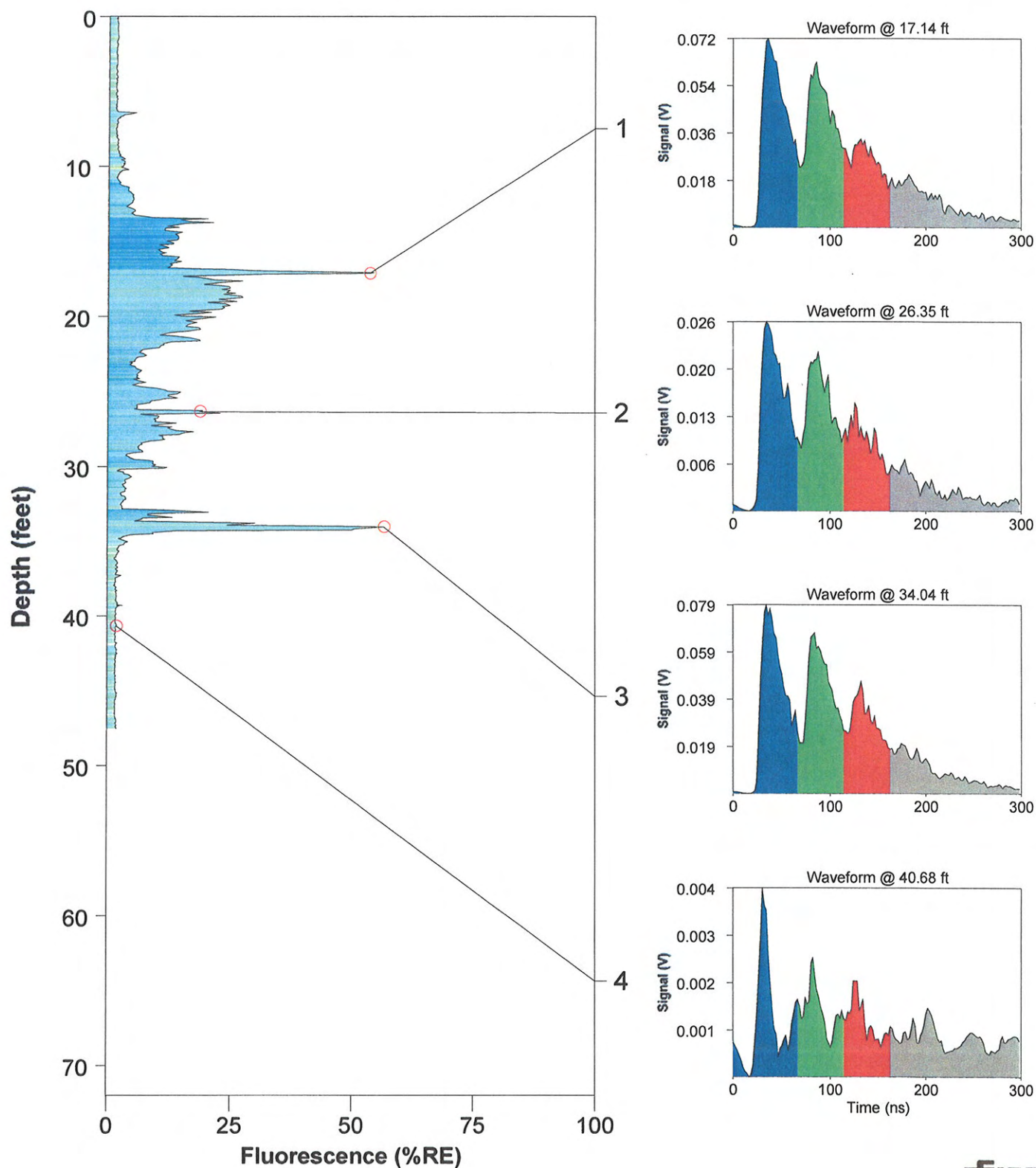
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 56.66% @ 34.04 ft

Final depth BGS: 47.53 ft

## ROST-16



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/25/2009 @ 9:35:47 AM

ROST Unit: Houston

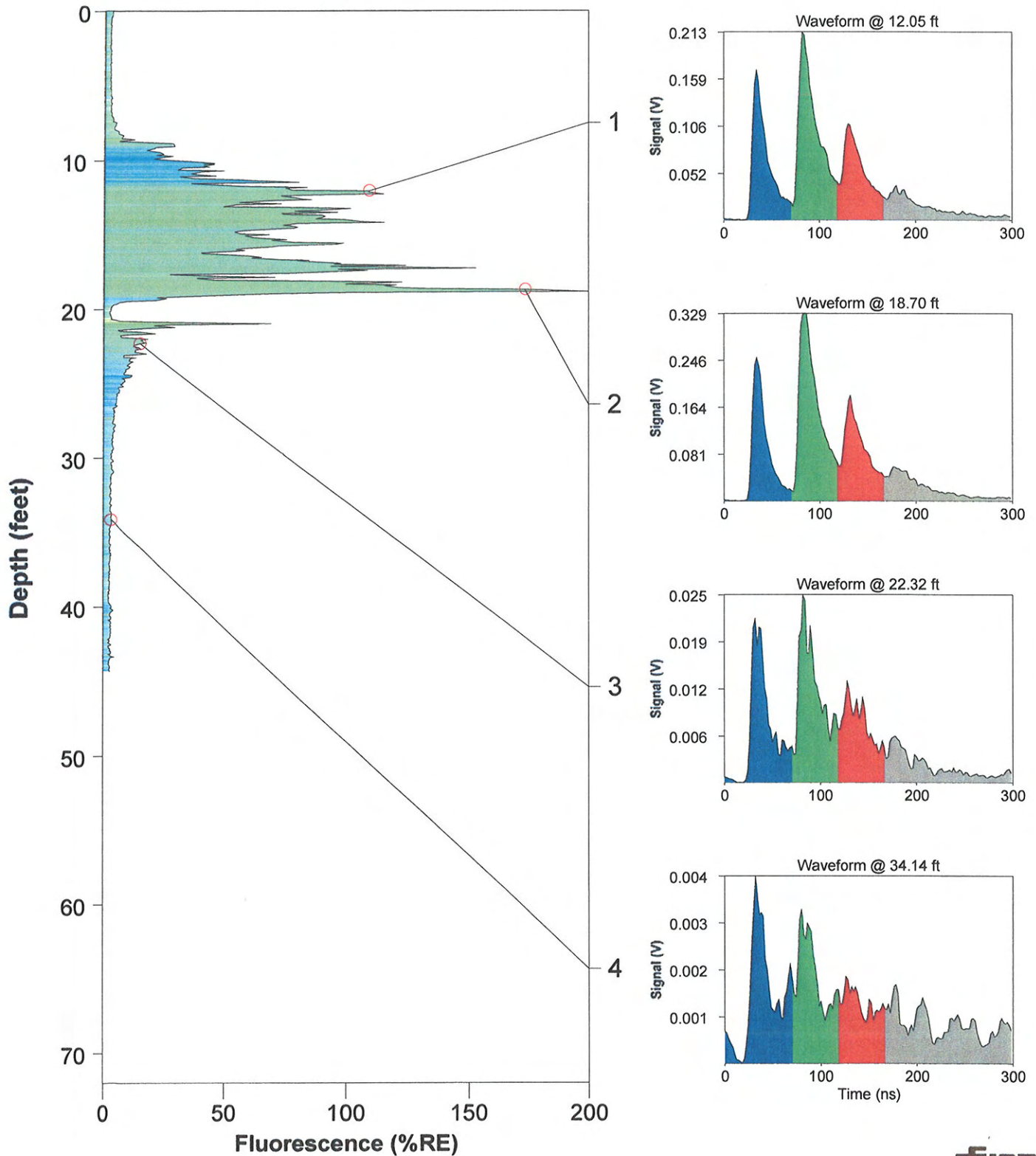
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 218.68% @ 18.83 ft

Final depth BGS: 44.32 ft

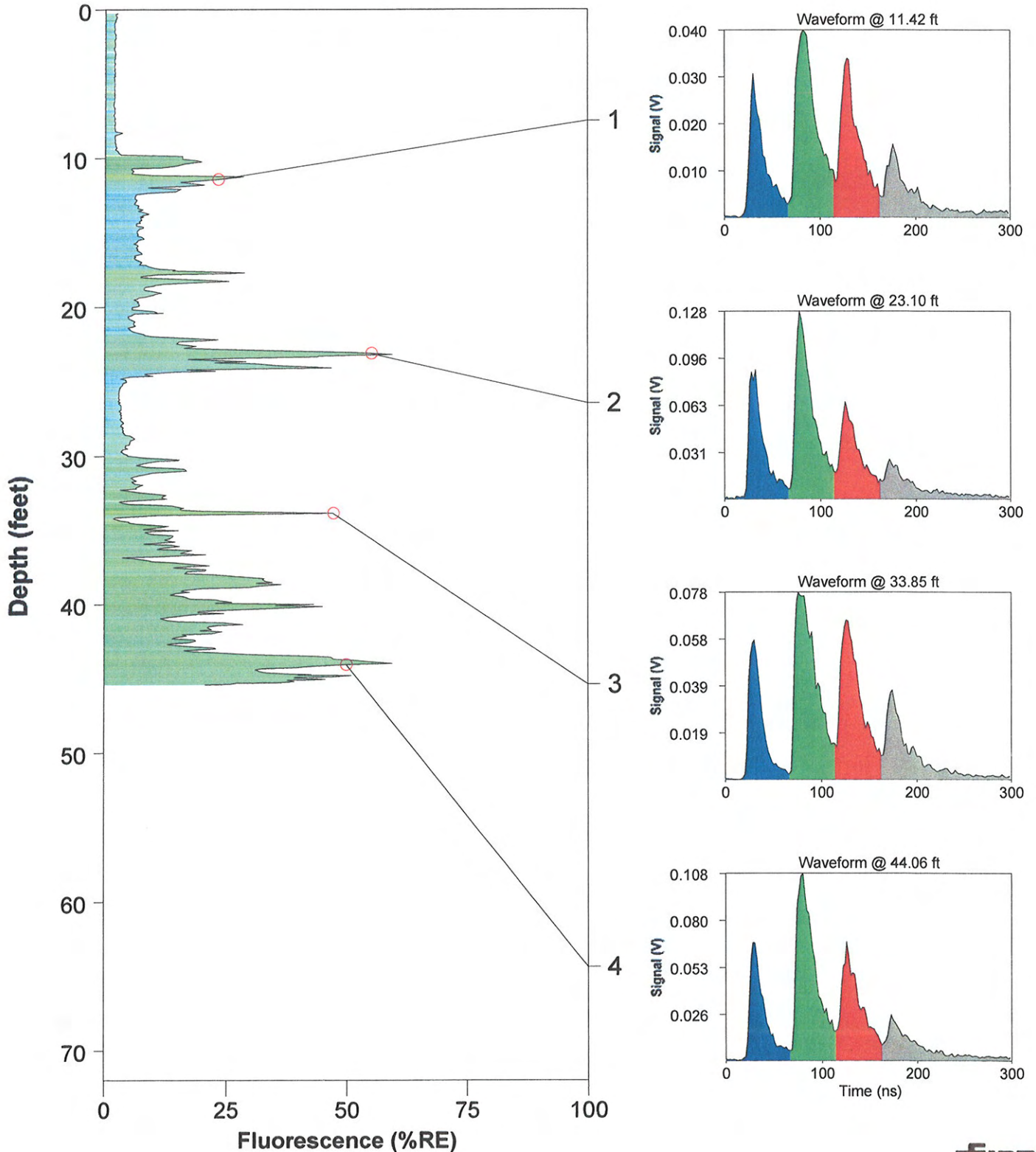
## ROST-17



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL	Operator: Robert Biehle
Client: URS	Fugro Job #: 04.1909-0044
Date/Time: 8/25/2009 @ 8:47:25 AM	Max fluorescence: 59.56% @ 23.17 ft
ROST Unit: Houston	Final depth BGS: 45.41 ft

## ROST-18





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 4:24:34 PM

ROST Unit: Houston

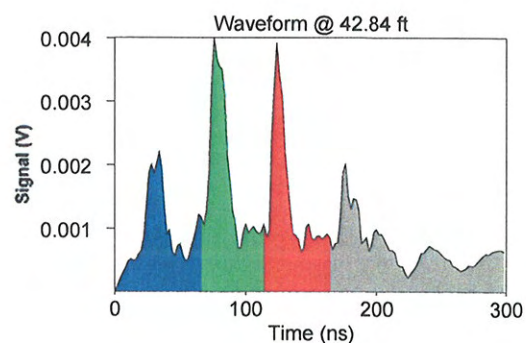
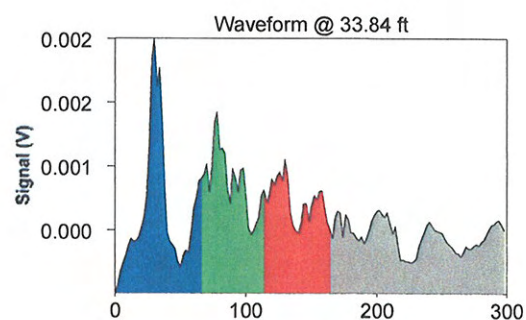
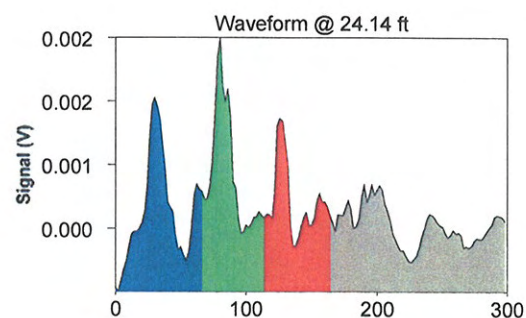
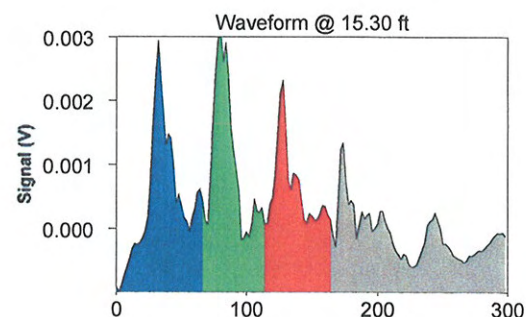
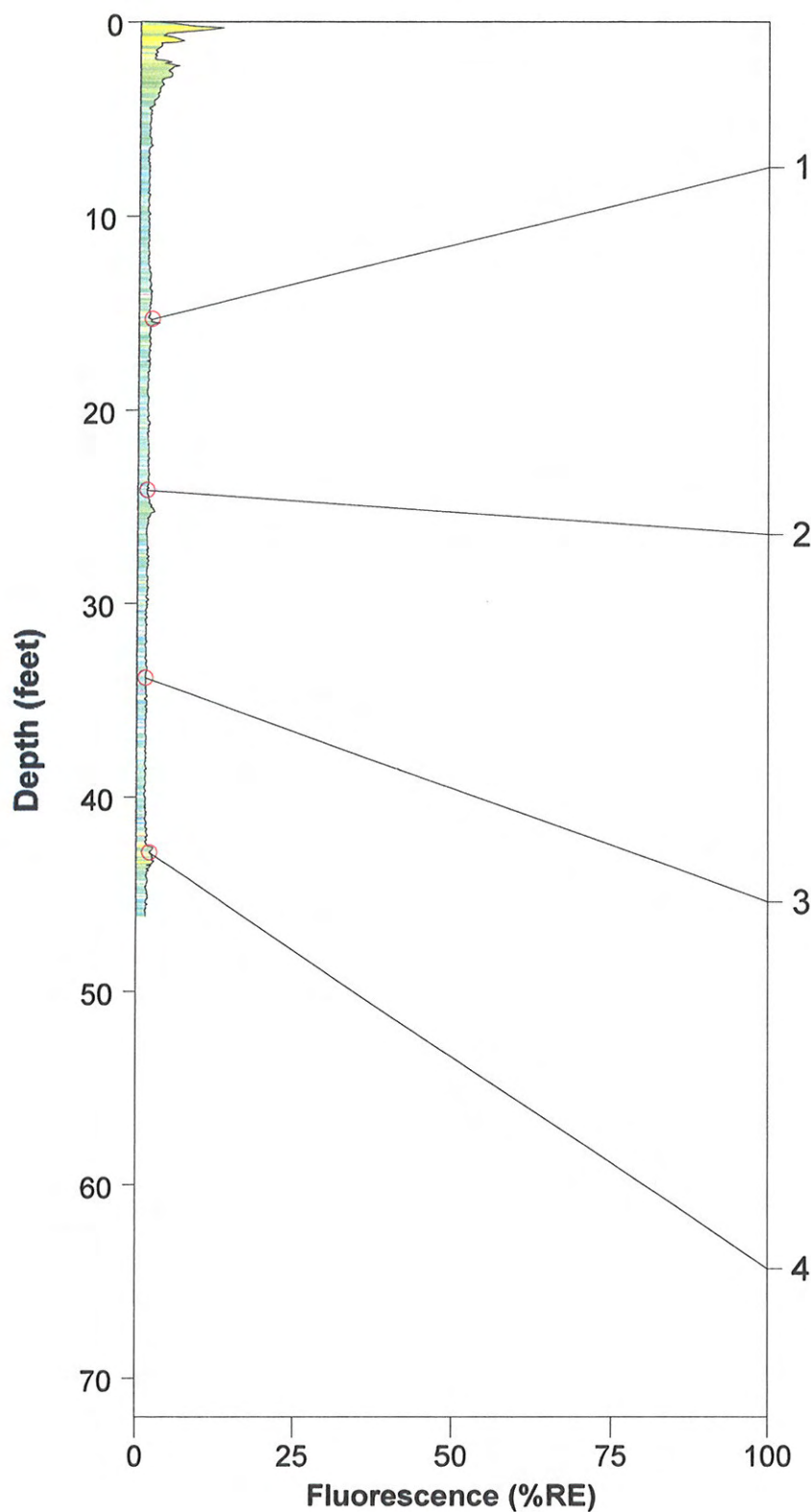
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 13.26% @ 0.30 ft

Final depth BGS: 46.14 ft

## ROST-19





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 3:33:30 PM

ROST Unit: Houston

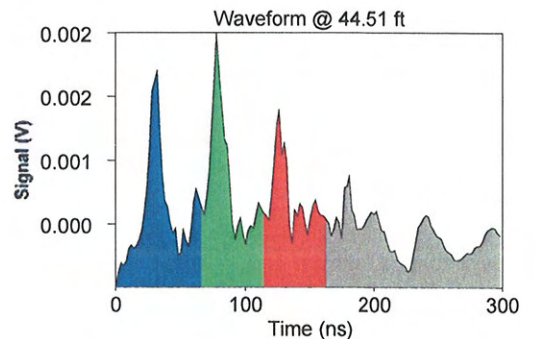
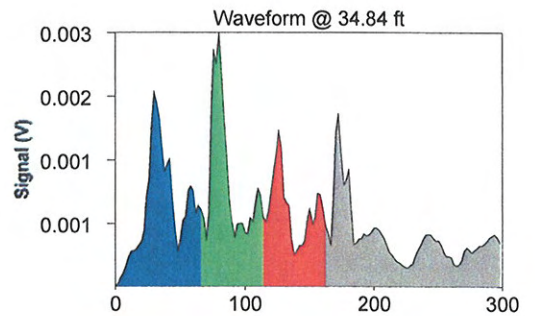
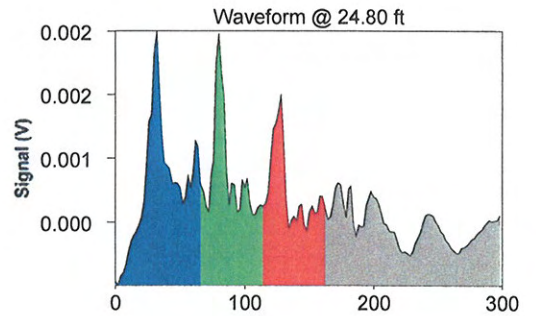
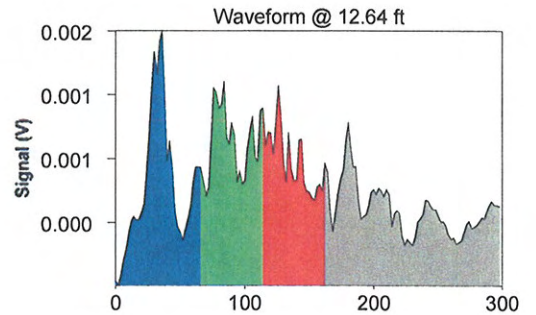
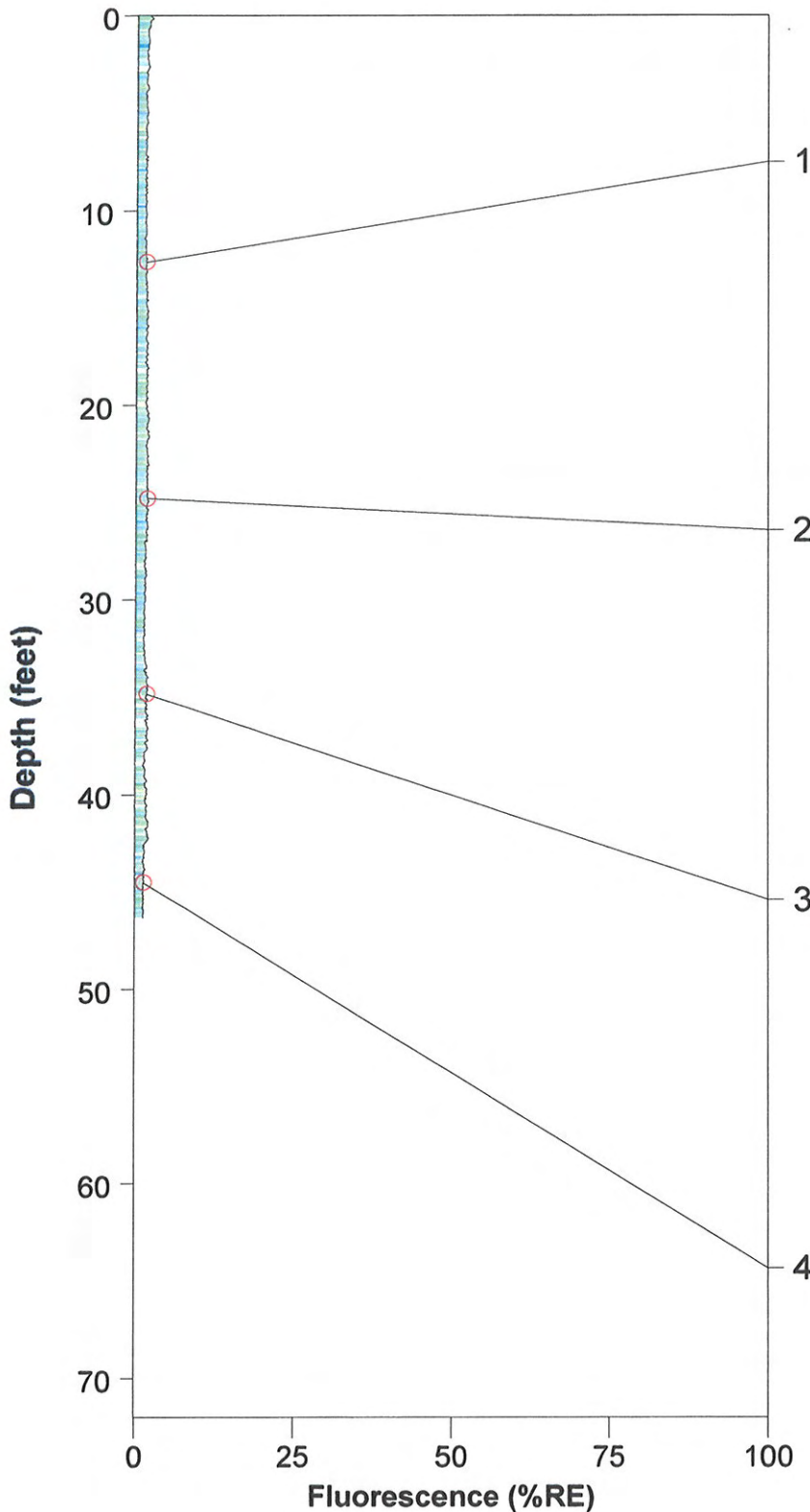
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 2.43% @ 0.16 ft

Final depth BGS: 46.31 ft

## ROST-20



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 11:18:03 AM

ROST Unit: Houston

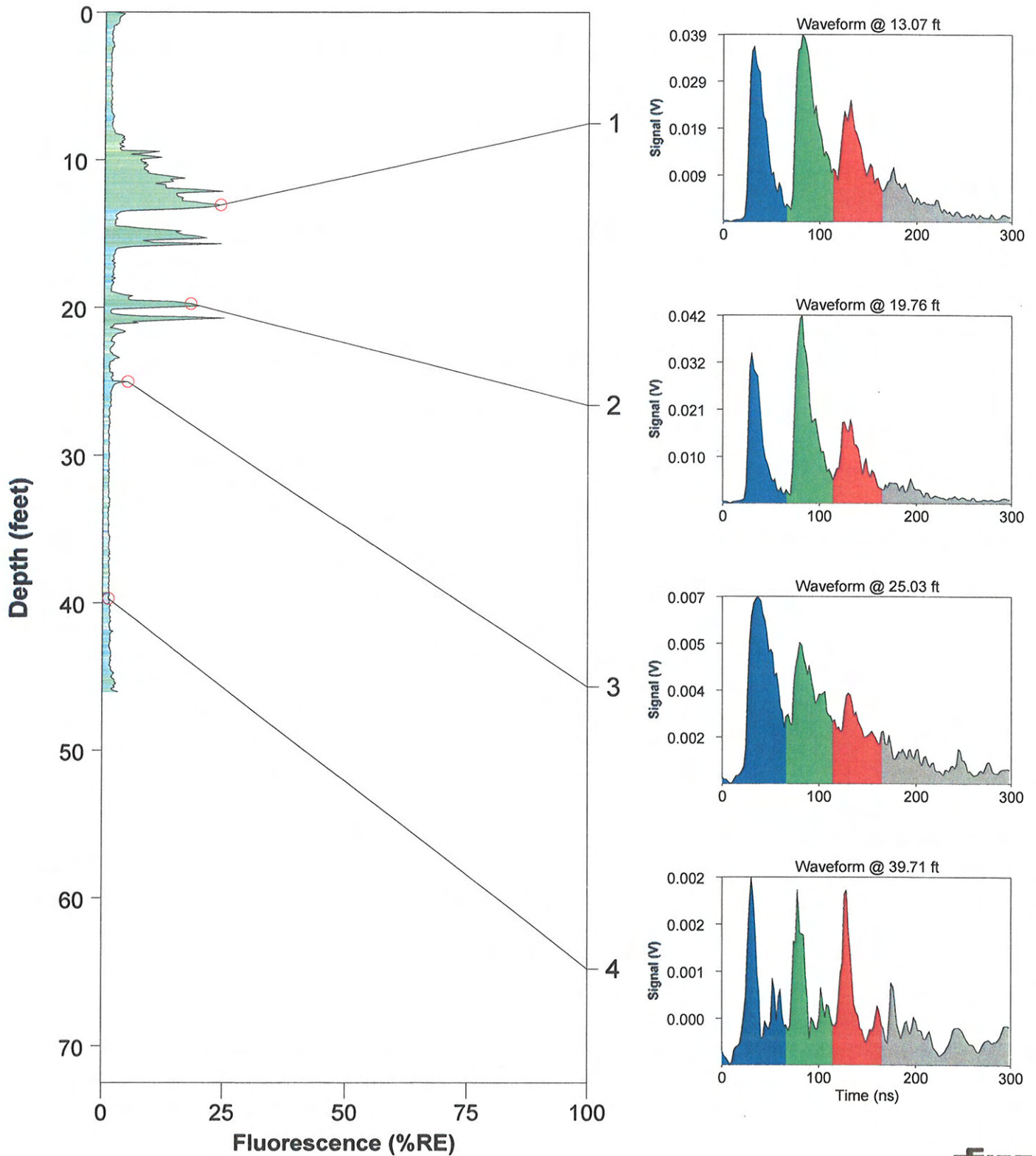
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 24.90% @ 20.73 ft

Final depth BGS: 46.07 ft

## ROST-21



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/26/2009 @ 2:37:36 PM

ROST Unit: Houston

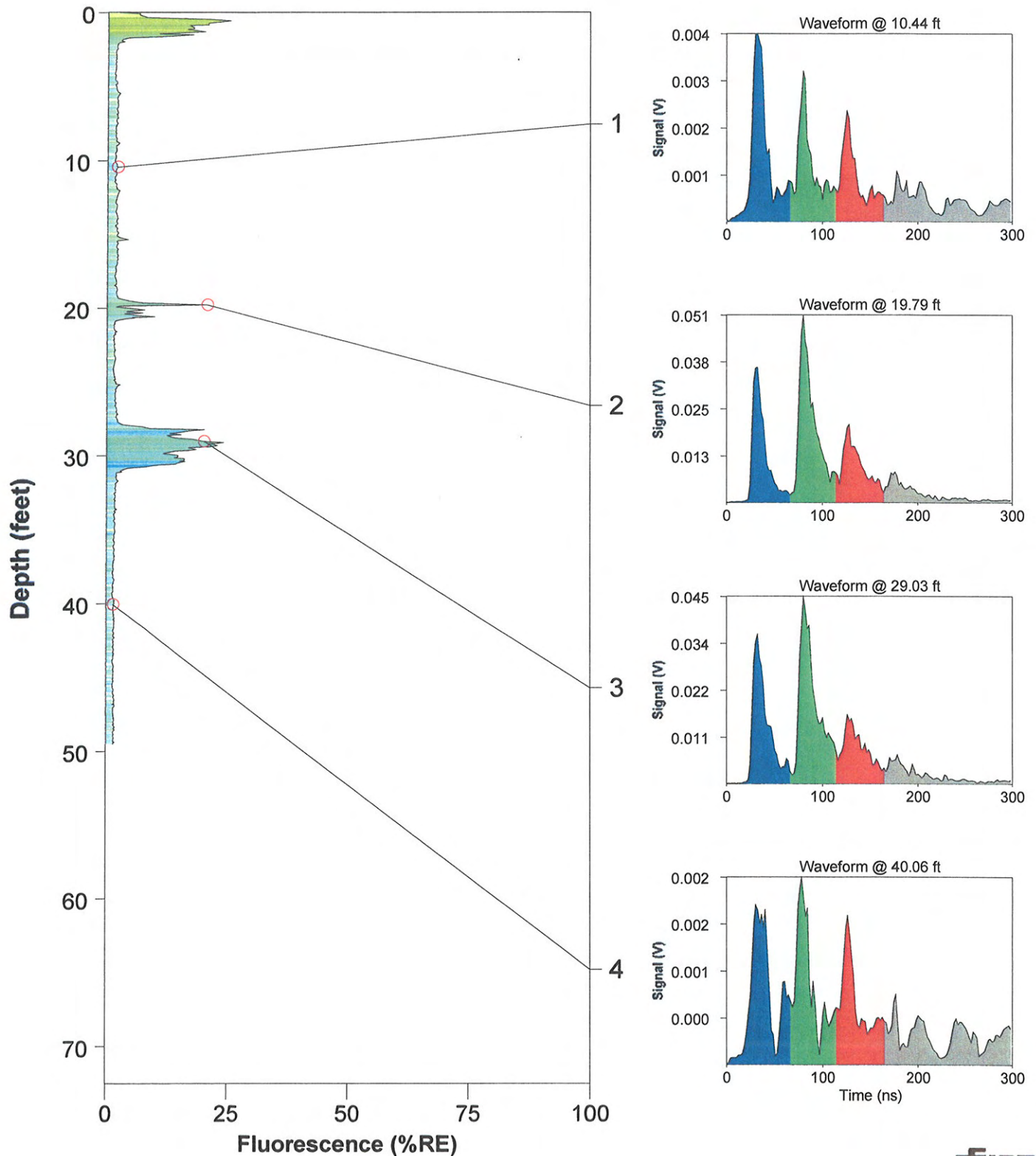
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 25.61% @ 0.56 ft

Final depth BGS: 49.51 ft

## ROST-22





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 9:49:30 AM

ROST Unit: Houston

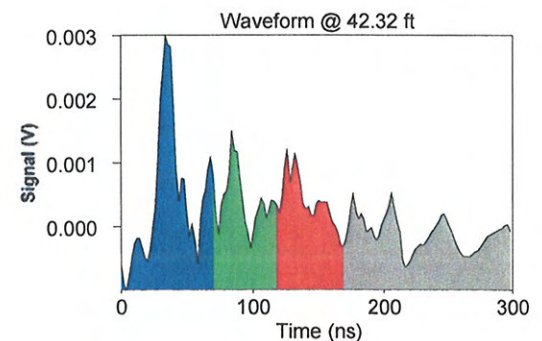
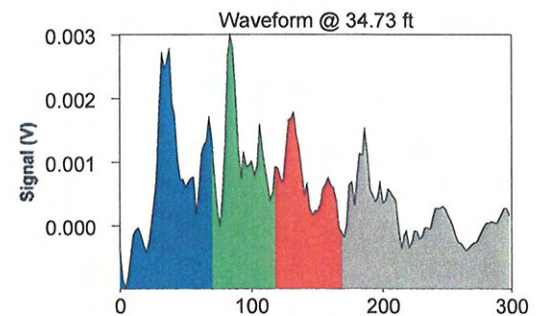
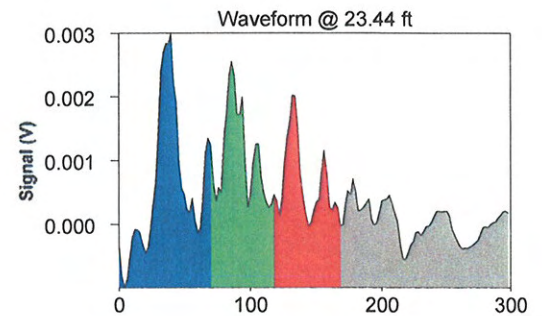
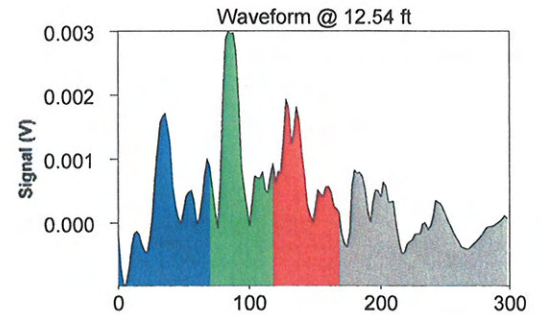
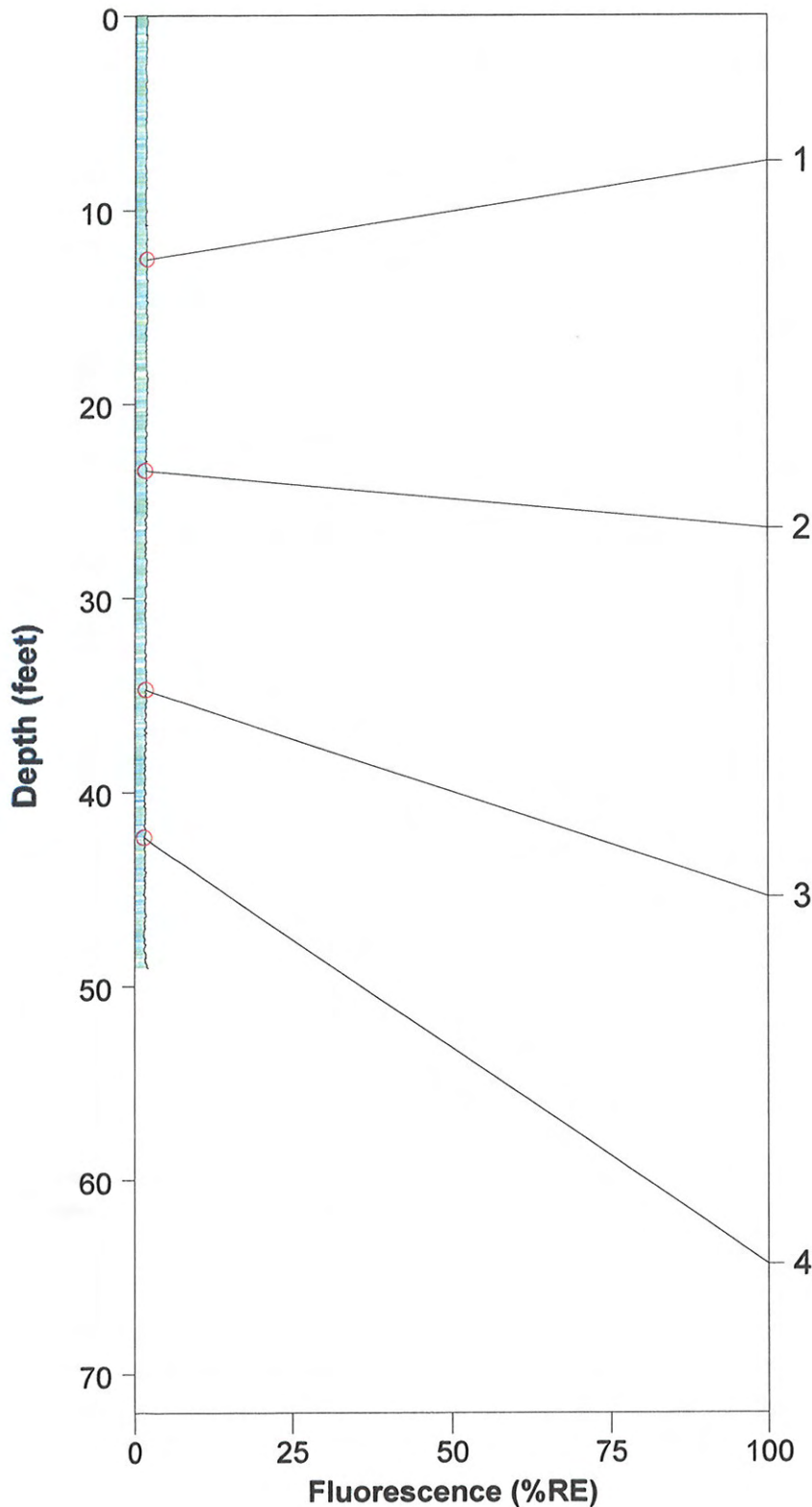
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 2.03% @ 49.05 ft

Final depth BGS: 49.05 ft

## ROST-23





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 11:51:21 AM

ROST Unit: Houston

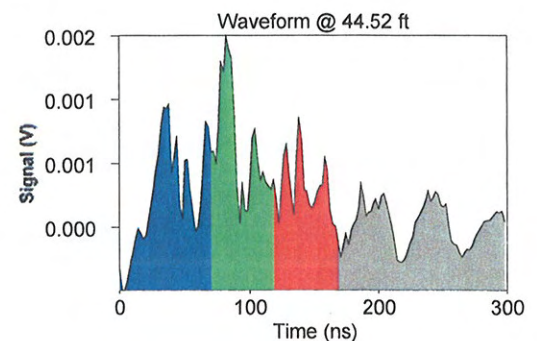
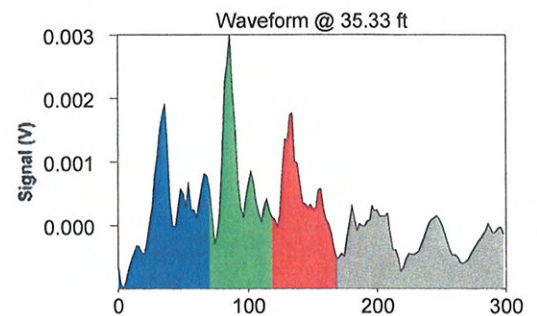
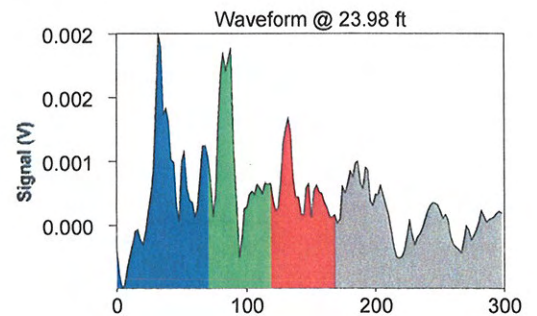
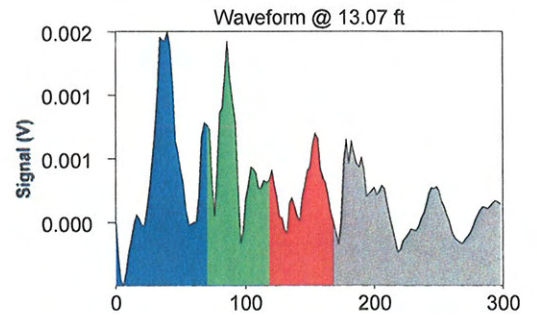
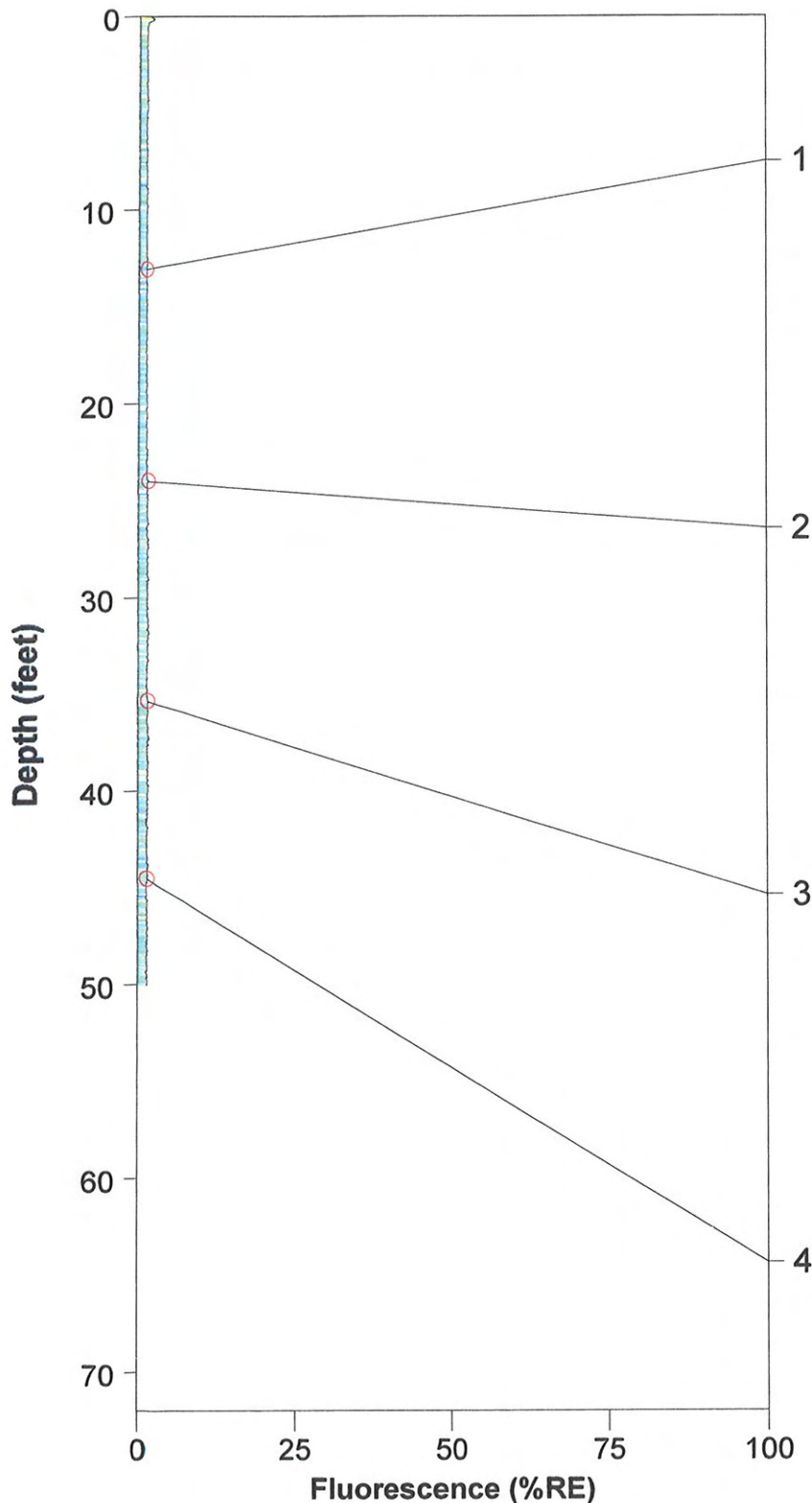
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 2.87% @ 0.13 ft

Final depth BGS: 50.07 ft

## ROST-24



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 1:29:32 PM

ROST Unit: Houston

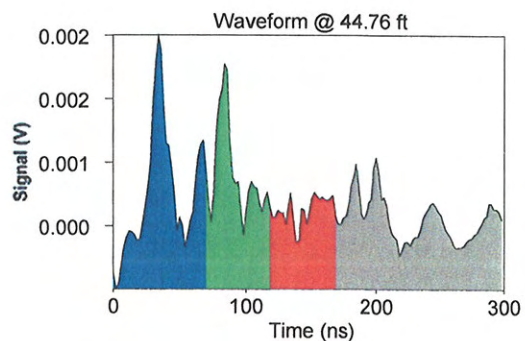
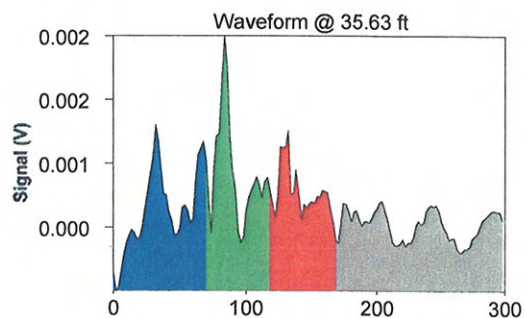
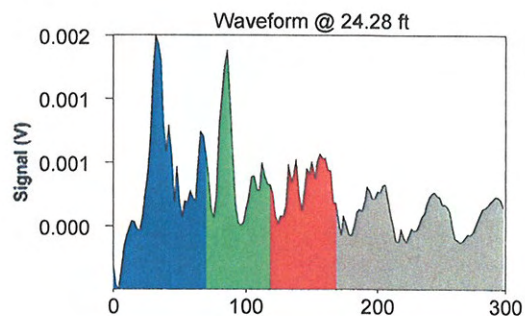
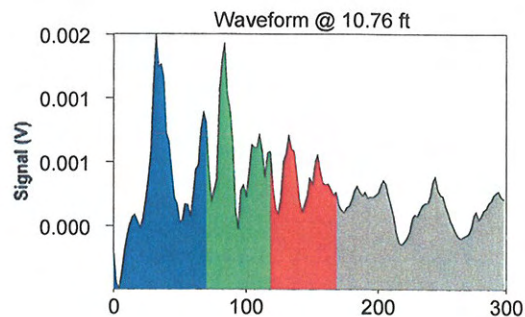
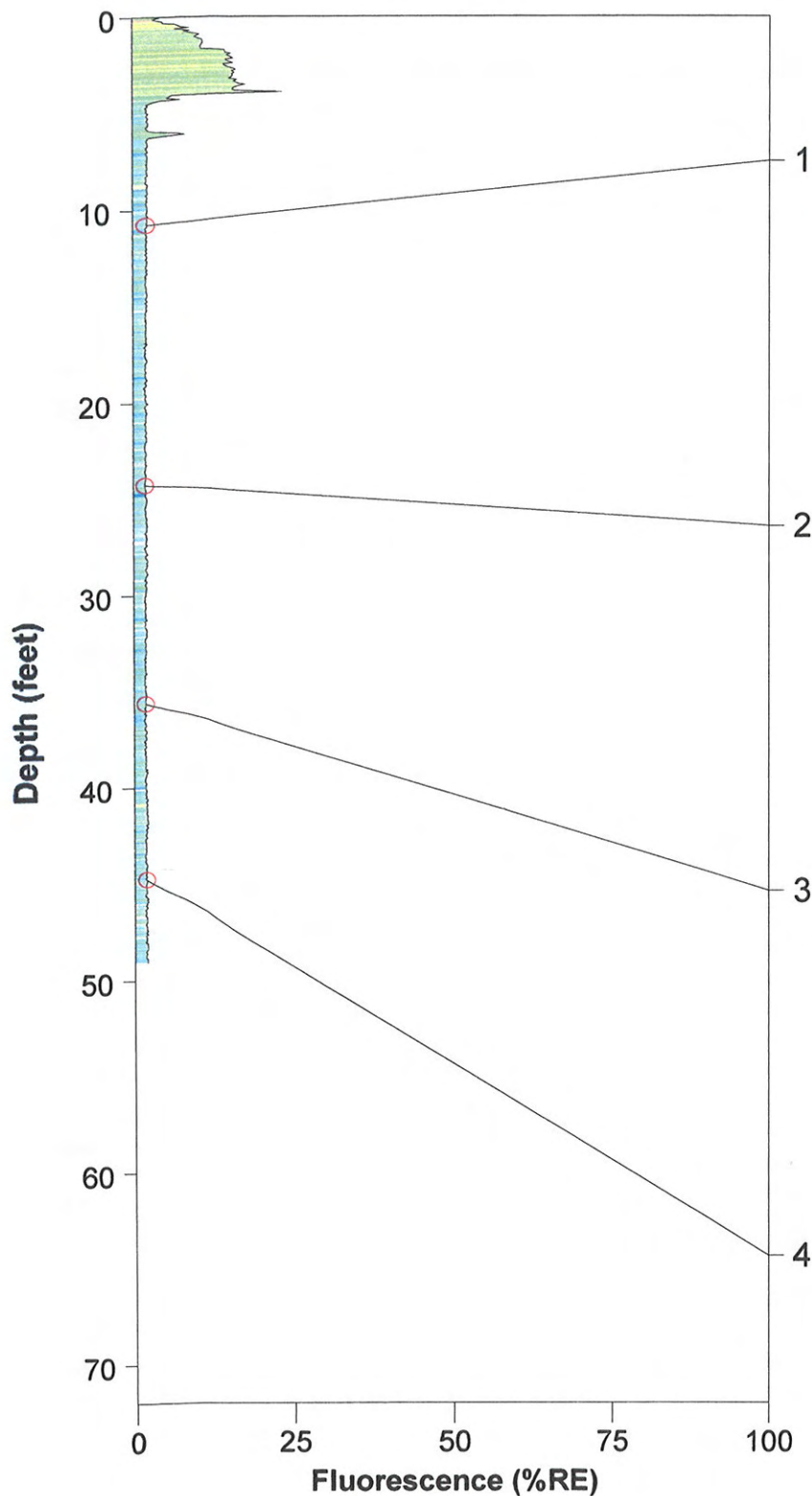
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 21.93% @ 3.90 ft

Final depth BGS: 49.06 ft

## ROST-25



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/27/2009 @ 4:01:40 PM

ROST Unit: Houston

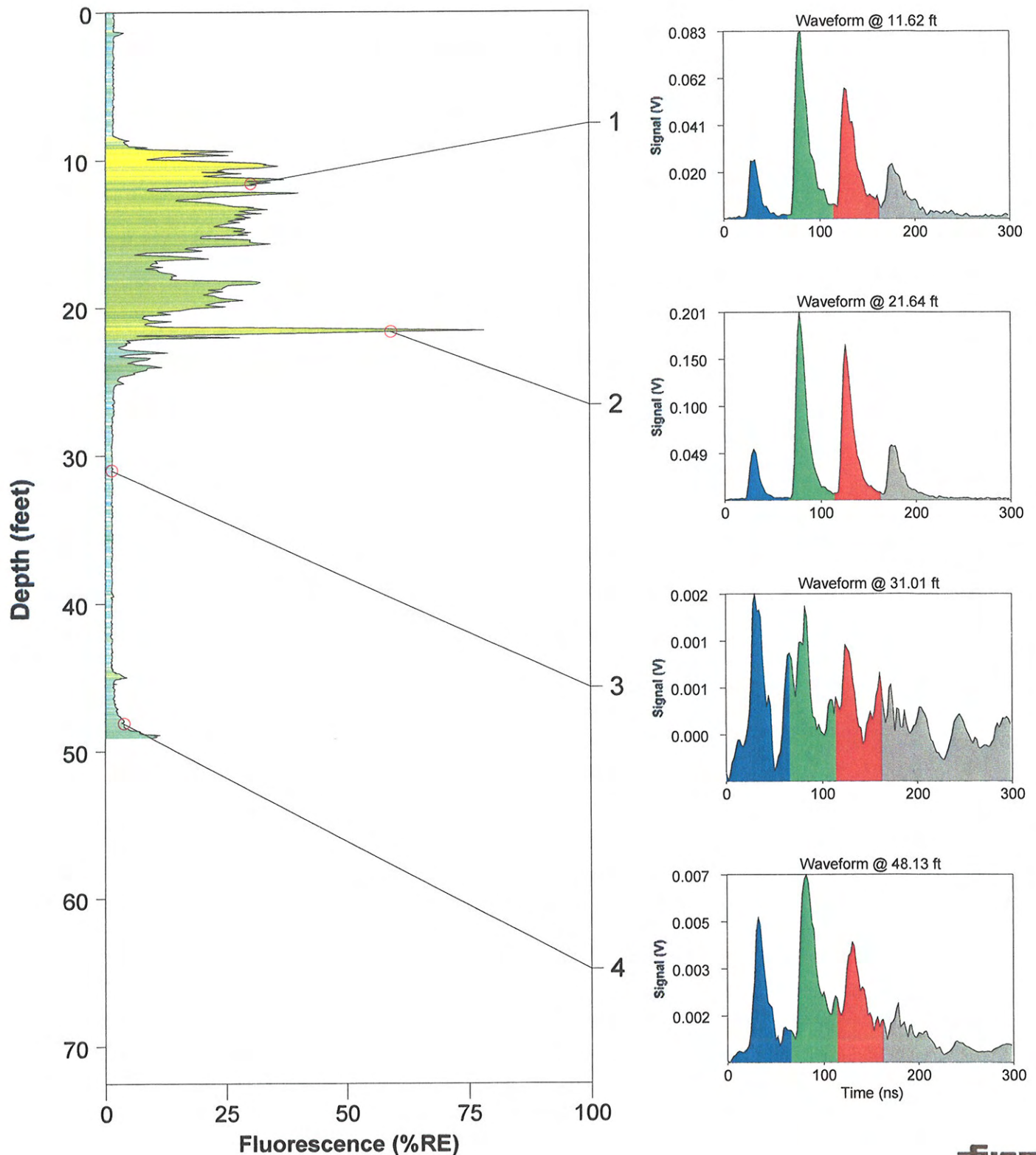
Operator: Robert Biehle

Fugro Job #: 04 1909-0044

Max fluorescence: 78.45% @ 21.57 ft

Final depth BGS: 49.11 ft

## ROST-26

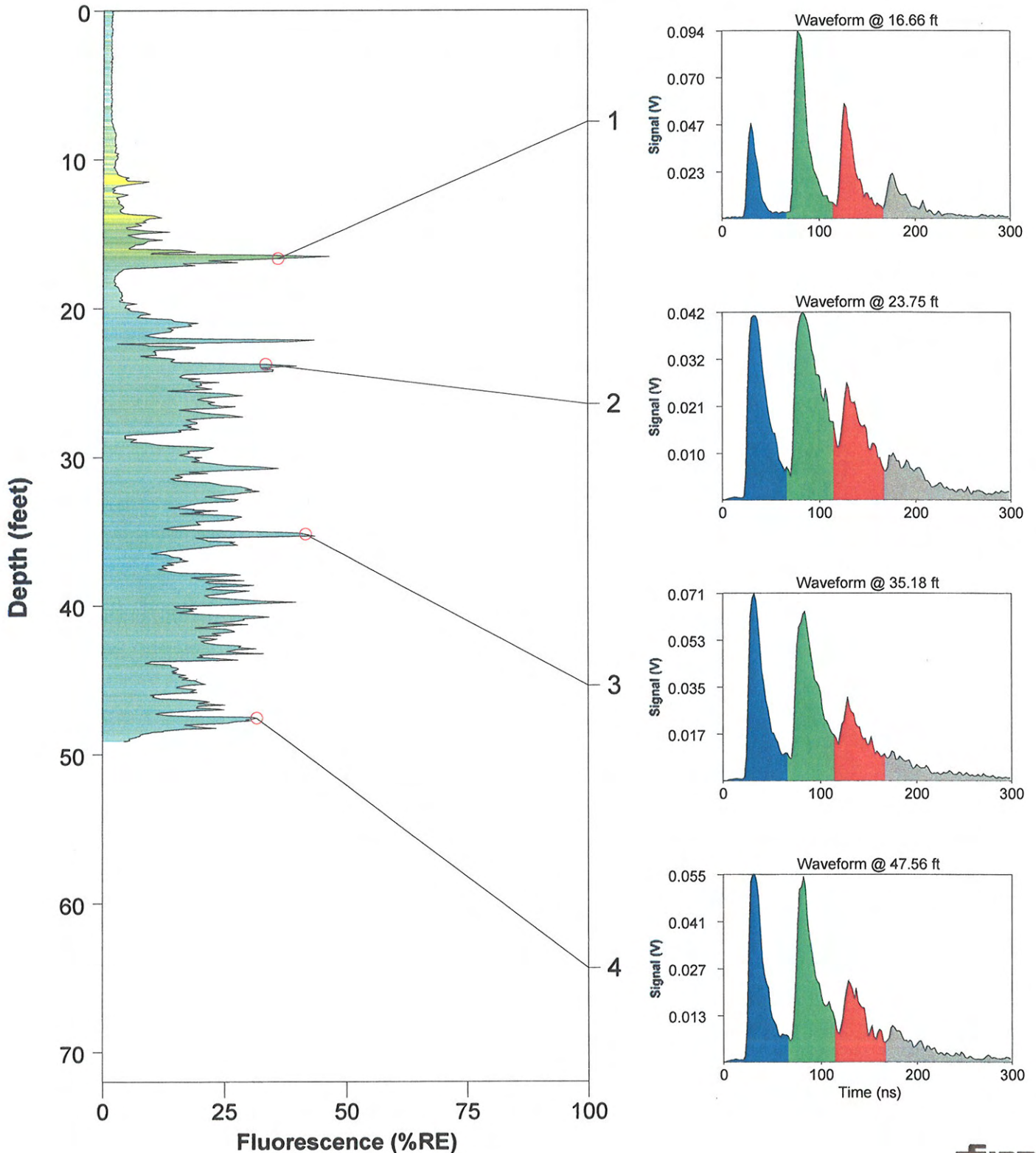




# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL	Operator: Robert Biehle
Client: URS	Fugro Job #: 04.1909-0044
Date/Time: 8/27/2009 @ 3:12:32 PM	Max fluorescence: 46.38% @ 16.52 ft
ROST Unit: Houston	Final depth BGS: 49.12 ft

## ROST-27





# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/27/2009 @ 1:51:43 PM

ROST Unit: Houston

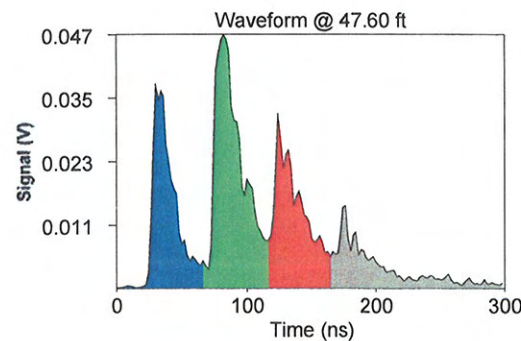
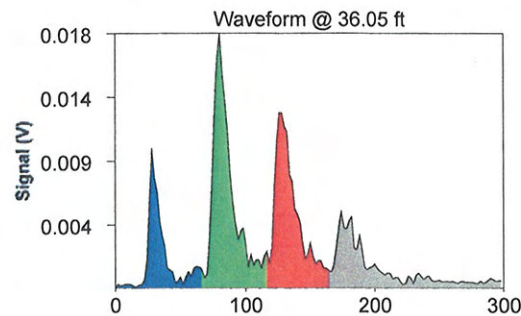
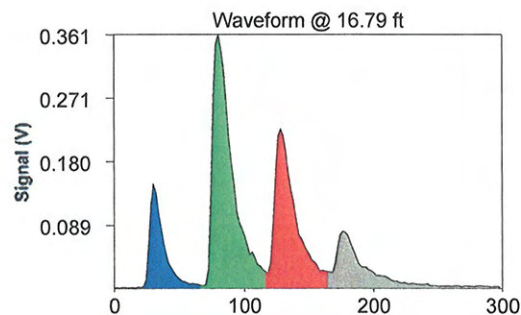
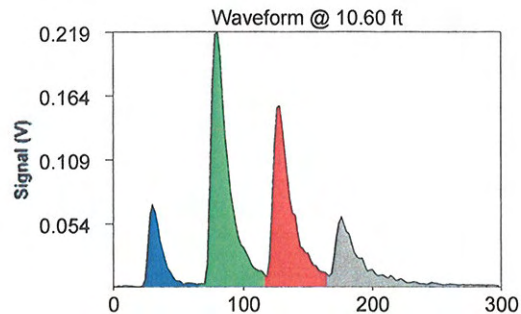
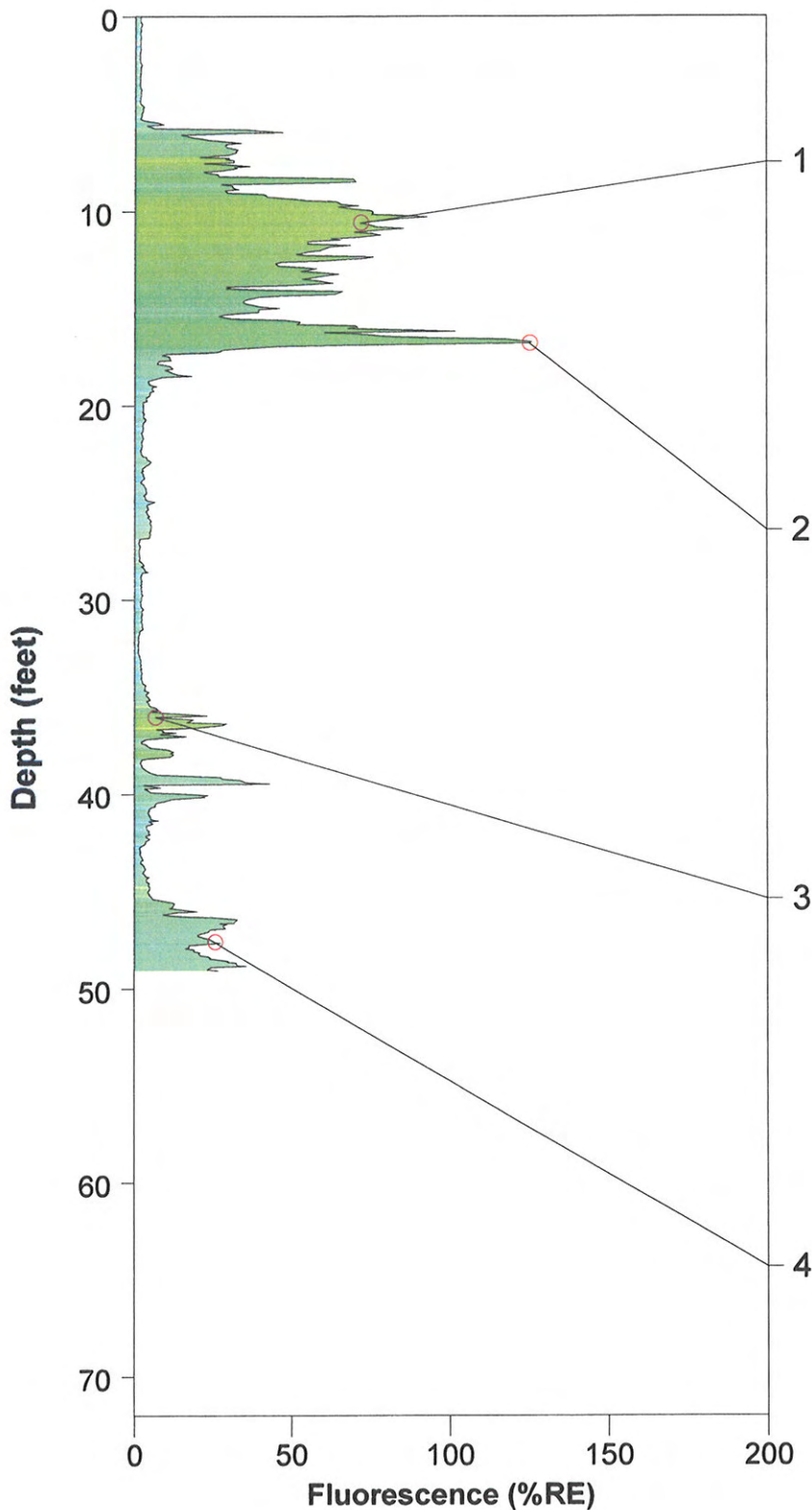
Operator: Robert Biehle

Fugro Job #: 04 1909-0044

Max fluorescence: 126.21% @ 16.73 ft

Final depth BGS: 49.07 ft

## ROST-28



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/27/2009 @ 4:57:18 PM

ROST Unit: Houston

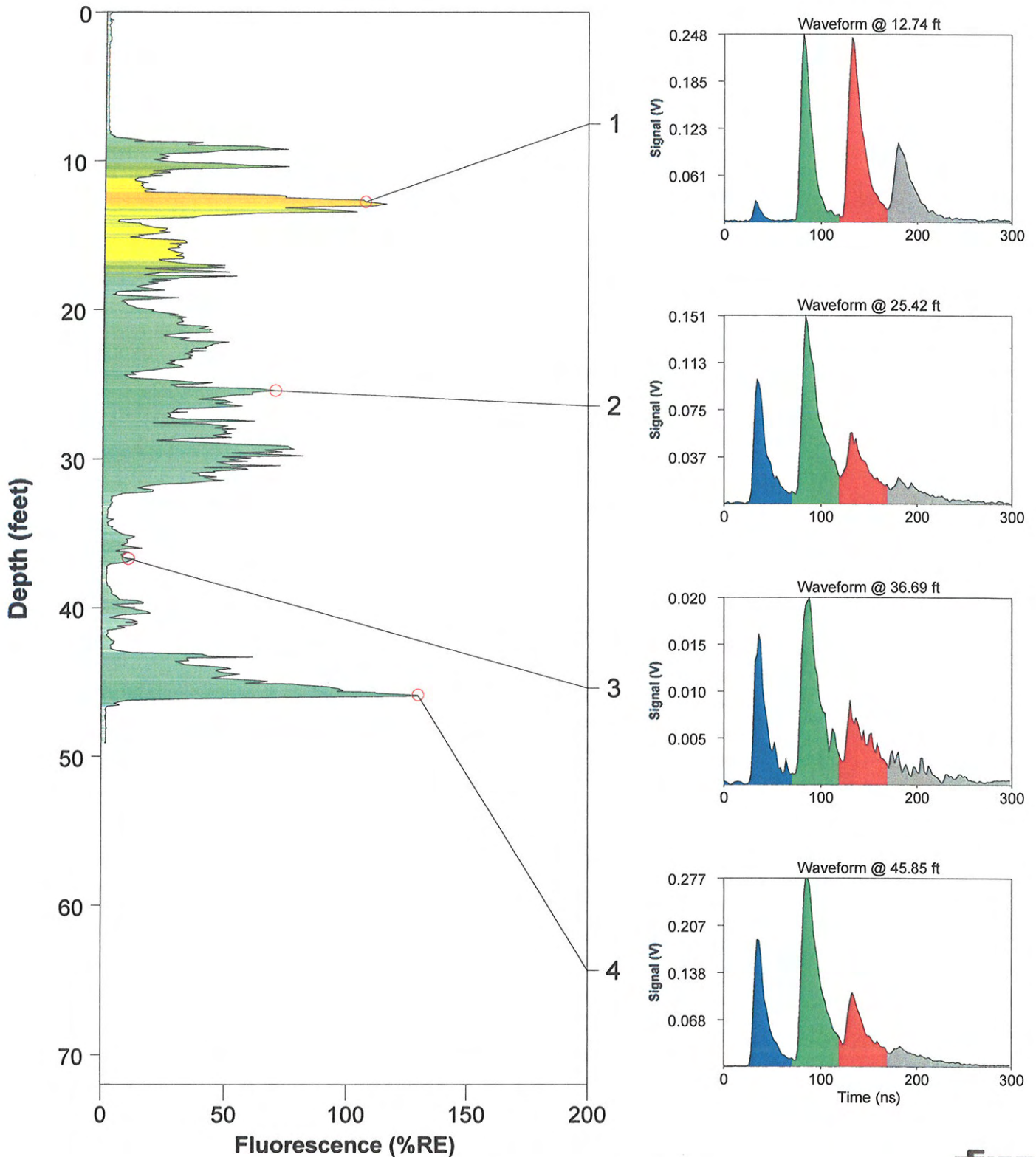
Operator: Robert Biehle

Fugro Job #: 04 1909-0044

Max fluorescence: 129.67% @ 45.85 ft

Final depth BGS: 49.10 ft

## ROST-29



# ROST Fluorescence Response Data

Site: Conoco-Roxana, IL

Client: URS

Date/Time: 8/28/2009 @ 10:40:02 AM

ROST Unit: Houston

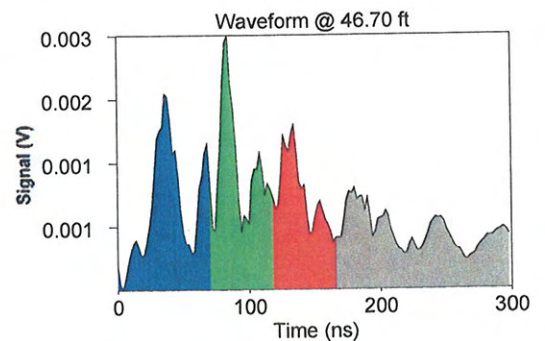
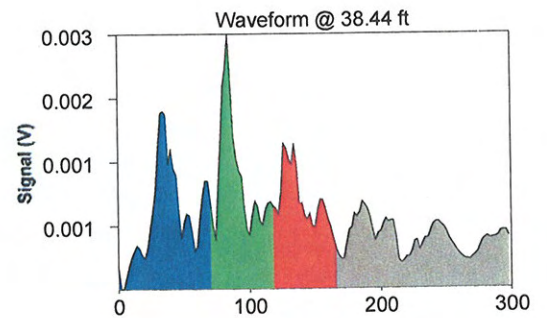
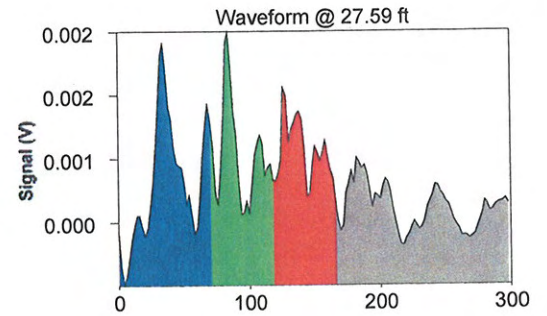
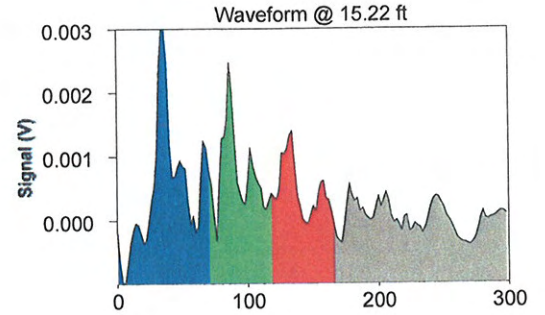
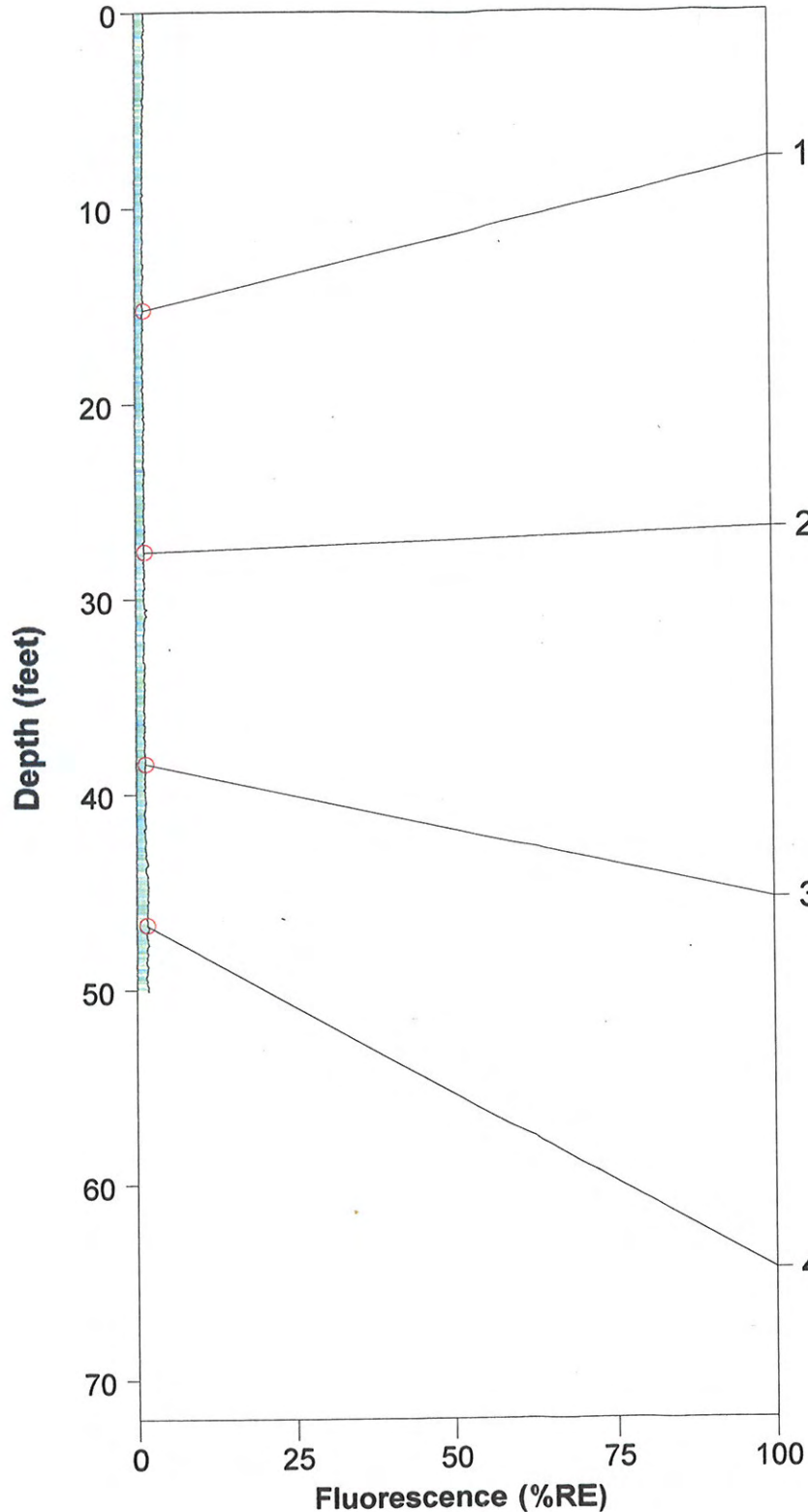
Operator: Robert Biehle

Fugro Job #: 04.1909-0044

Max fluorescence: 1.82% @ 46.90 ft

Final depth BGS: 50.05 ft

## ROST-30



**Monitoring Well Locations**

MW-7

MW-8

**Soil Boring Location**

GP-1

GP-2

GP-4

GP-7

GP-8

GP-9

GP-10

GP-11

GP-12

**Vapor Monitoring Points Location**

VMP-1

VMP-2

VMP-3

VMP-4

VMP-5

VMP-6

VMP-7

VMP-8

VMP-9

VMP-10

VMP-11

VMP-12

VMP-13

VMP-14

VMP-15

VMP-16



# KEY TO BORING LOGS

## SUBSURFACE MATERIAL LEGEND

	Graphic Symbol	Description	USCS Classification
GRAVEL		GRAVEL with little or no fines	GP or GW
		Silty GRAVEL	GM
		Clayey GRAVEL	GC
		SAND and GRAVEL	SP/GP
SAND		SAND with little or no fines	SP or SW
		Silty SAND	SM
		Clayey SAND	SC
LOW PLASTIC SILTS AND CLAYS		Inorganic low plastic SILT	ML
		Inorganic low plastic CLAY	CL
		Organic low plastic SILT or CLAY	OL
LOW PLASTIC SILTS AND CLAYS		Inorganic high plastic SILT	MH
		Inorganic high plastic CLAY	CH
		Organic high plastic SILT or CLAY	OH
ROCKS		LIMESTONE	
SURFACE MATERIALS		FILL	

## WELL CONSTRUCTION LEGEND

	Concrete with Schedule 40 PVC riser pipe
	Grout with Schedule 40 PVC riser pipe
	Bentonite chip seal with Schedule 40 PVC riser pipe
	20/40 silica filter sand with Schedule 40 PVC riser pipe
	20/40 silica filter sand with 0.010 inch slot size Schedule 40 PVC well screen
	20/40 silica filter sand
	Native Backfill

### ABBREVIATIONS USED

HSA = Hollow Stem Auger  
 ATD = At Time of Drilling  
 AD = After Drilling  
 WOR = Weight of Rod  
 WOH = Weight of Hammer

# LOG OF BORING AND WELL CONSTRUCTION DETAIL B-7

Completion  
Date: 7/9/09  
Casing Elevation: 443.10  
Ground Elevation: 443.46

Coordinates  
Northing: 792024.62  
Easting: 2322181.25

DESCRIPTION

NOTES

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
	MW-7							Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
5		24	18	0.4				Loose, moist, brown, fine to medium grained, SAND (SP)	
		24	12	0.3					
10		24	12	0.3					
		24	18	0.3				Becomes medium dense	
15		24	18	0.2					
		24	18	0.2			SP	1" sandy clay	
		24	20	0.2				Becomes grayish brown	
20		24	22	0.1					
		24	20	0.1					
		24	18	0.1					

Completion Depth: 55.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: P. SeymourLogged by: M. Corbett/W. PenningtonWater Depth: 45 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING AND WELL CONSTRUCTION DETAIL B-7

Completion  
Date: 7/9/09  
Casing Elevation: 443.10  
Ground Elevation: 443.46

Coordinates  
Northing: 792024.62  
Easting: 2322181.25

## DESCRIPTION

## NOTES

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
	MW-7								
		24	20	6.7				SAME: Medium dense, moist, grayish brown, fine to medium grained, SAND (SP)	
		24	18	17.8				1" clay	
30		24	20	19.2					
		24	20	84.7					
		24	15	376					
35		24	18.5	229					
		24	6	16.9			SP		Very hard drilling at 37'
40		24	21	351				2" black bands	
		24	20.5	658				Becomes gray	
		24	16	2605				2" coal	
		24	0.5	4958				Becomes grayish brown	
45		24	20	9999				Becomes wet, medium grained, with fine grains	▽
		24	14.5	3186				Becomes dense	
								Becomes medium dense	
								Becomes loose, gray, some coarse grains, trace gravel	

Completion Depth: 55.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: P. SeymourLogged by: M. Corbett/W. PenningtonWater Depth: 45 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

▽ Water level at time of drilling ☒ Geoprobe Macro Sampler▽ Water level after drilling ☐ Air Knife/Hand Auger

ATD - At time of drilling

☐ Air Rotary☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☐ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING AND WELL CONSTRUCTION DETAIL B-7

Completion  
Date: 7/9/09  
Casing Elevation: 443.10  
Ground Elevation: 443.46

Coordinates  
Northing: 792024.62  
Easting: 2322181.25

DESCRIPTION

NOTES

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL B-7	
								Completion Date: 7/9/09 Casing Elevation: 443.10 Ground Elevation: 443.46	Coordinates Northing: 792024.62 Easting: 2322181.25
	MW-7								
		24	16	1015			SP	Becomes medium dense  Becomes dense	End split spoon sampling at 53' bgs. Blind drill to 55' bgs
55								Bottom of boring at 55' bgs	Bottom of boring at 55' bgs at time of drilling. Monitoring well installed  Screened interval based on the ground surface at the time of installation was 43' to 53' bgs (shown)  Survey data of the existing ground surface shows the screen interval from 43.28' to 53.28' bgs
60									
65									
70									

Completion Depth: 55.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: P. SeymourLogged by: M. Corbett/W. PenningtonWater Depth: 45 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger-  
Soil samples not collected ☒ 3" Clear Acetate Liner  
USC based on field visual observations



# LOG OF BORING AND WELL CONSTRUCTION DETAIL B-8

Completion  
Date: 7/6/09  
Casing Elevation: 434.11  
Ground Elevation: 434.40

Coordinates  
Northing: 791930.86  
Easting: 2321984.79

DESCRIPTION

NOTES

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
	MW-8							Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
5		24	12	0.2				Loose to medium dense, moist, brown, fine to medium grained, SAND (SP)	
		24	24	0.2					
10		24	18	0.1					
		24	18	0.4				Becomes grayish brown	
15		24	20	1.4			SP		
		24	12	22.1					
		24	12	29.8					
20		24	16	112					
		24	20	75.0					
		24	18	271				Becomes medium dense to dense, gray, trace black banding	

Completion Depth: 44.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: P. SeymourLogged by: W. Pennington/C. SmithWater Depth: 35 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING AND WELL CONSTRUCTION DETAIL B-8

Completion  
Date: 7/6/09  
Casing Elevation: 434.11  
Ground Elevation: 434.40

Coordinates  
Northing: 791930.86  
Easting: 2321984.79

## DESCRIPTION

## NOTES

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL B-8	
								Completion Date: 7/6/09 Casing Elevation: 434.11 Ground Elevation: 434.40	Coordinates Northing: 791930.86 Easting: 2321984.79
	MW-8							DESCRIPTION	NOTES
		24	18	729				SAME: Medium dense to dense, moist, gray, fine to medium grained, SAND (SP), trace black banding	
		24	20	1437					
30		24	20	1179					
		24	18	4002					
		24	20	3439					
35		24	18	491					
							SP	Becomes wet	End split spoon sampling at 37' bgs. Blind drill to 44' bgs
40									
45								Bottom of boring at 44' bgs	Bottom of boring at 44' bgs at time of drilling. Monitoring well installed
									Screened interval based on the ground surface at the time of installation was 33.5' to 43.5' bgs (shown)
									Survey data of the existing ground surface shows the screen interval from 33.50' to 43.60' bgs

Completion Depth: 44.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: P. SeymourLogged by: W. Pennington/C. SmithWater Depth: 35 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger- ☒ 3" Clear Acetate Liner☒ Soil samples not collected

USC based on field visual observations

# LOG OF BORING GP-1

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 9/2/09 Casing Elevation: Ground Elevation: 433.07	Coordinates Northing: 791975.34 Easting: 2321614.60
							DESCRIPTION	NOTES
5	36	21	3.8			FILL	Gravelly silt, FILL (FILL)  Becomes medium stiff, moist, brown, low plastic, silty clay, trace sand and gravel  With gravel  Becomes dark brown, silty gravel  Becomes wet, clayey	Boring advanced to a depth of 5' via hand auger to clear utilities, then continued with direct push dual tube
10	48	41	6.1					
			2.4				Medium stiff, moist, gray, medium plastic, CLAY (CL)	
15	48	48	3.7			CL	Trace iron staining  Becomes stiff  Becomes brown and light gray	
			4.3					
			5.1					
20	48	48	4.9					
			5.5				Becomes soft, moist to very moist, gray, low plastic, sandy	
	48	37	4.9					
						SP	Medium dense, moist, grayish brown, fine to medium grained, SAND (SP), trace clay	Sampled GP-1-22.5 for VOC at 0950  Collected Sudan kit at 23.5'

Completion Depth: 40.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling☒ Water level after drilling

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-

Soil samples not collected

☒ Geoprobe Macro Sampler☐ Air Knife/Hand Auger

Sampler

☐ Air Rotary☒ 3" Clear Acetate Liner

USC based on field visual observations

# URS

# LOG OF BORING GP-1

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 9/2/09 Casing Elevation: Ground Elevation: 433.07	Coordinates Northing: 791975.34 Easting: 2321614.60
							DESCRIPTION	NOTES
30	48	39	6.9			SP	Same: Medium dense, moist, grayish brown, fine to medium grained, SAND (SP), trace clay	Collected Sudan kit at 27'
			7.9			SC	Loose, moist, gray, low plastic, Clayey SAND (SC)	
	48	33	5.1			SP	Medium dense, moist, grayish brown, fine to medium grained, SAND (SP), trace clay	
			5.3				Becomes light brown	
35	48	40	9.2				Becomes wet, trace gravel	Sampled GP-1-31 and GP-1-31D for VOC at 0940 Collected Sudan kit at 31.5'  Collected Sudan kit at 33'
			6.3				Becomes medium grained, clay grades out	
	48	40	6.0				Becomes fine to medium grained	
			7.1				Becomes brownish gray Coal seam Becomes light brown, trace gravel	
40							Bottom of boring at 40' bgs	
45								

Completion Depth: 40.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations



# LOG OF BORING GP-2

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/31/09 Casing Elevation: Ground Elevation: 432.47	Coordinates Northing: 791928.10 Easting: 2321630.26
							DESCRIPTION	NOTES
5							Soft to medium stiff, moist, brown, silty clay, trace sand and gravel, FILL (FILL)	Boring advanced to a depth of 5' via hand auger to clear utilities, then continued with direct push dual tube
10	36	26	2.8 2.7			FILL	Becomes medium dense sandy gravel, trace silt	Collected Sudan kit at 17' Sampled GP-2-17 for VOC at 1630
15	48	27	3.7 3.2				Becomes wet	
20	48	46	3.7 4.0			CH	Soft, moist, gray, high plastic, CLAY (CH)  Becomes medium stiff  Becomes stiff	
25	48	44.5	7.8 5.1			CL	Soft, moist, brownish gray, low plastic, Silty CLAY (CL),  Becomes sandy	
30	48	29	7.5 5.2			SP	Medium dense, moist, brownish gray, fine to medium grained, SAND (SP)	
						CL	Medium stiff, gray, medium plastic, CLAY (CL) Becomes sandy	
						SP	Medium dense, moist, brownish gray fine to medium grained, SAND (SP), trace silt	

Completion Depth: 40.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

▽ Water level at time of drilling

▼ Water level after drilling

ATD - At time of drilling

■ Splitspoon Sampler

□ Hollow Stem Auger-  
Soil samples not collected

☒ Geoprobe Macro Sampler

☒ Air Knife/Hand Auger  
Sampler

☒ Air Rotary

■ 3" Clear Acetate Liner  
USC based on field  
visual observations

# URS

# LOG OF BORING GP-2

LOG OF BORING GP-2												
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/31/09 Casing Elevation: Ground Elevation: 432.47	Coordinates Northing: 791928.10 Easting: 2321630.26				
DESCRIPTION								NOTES				
30	48	39	4.3				Same: Medium dense, moist, brownish gray fine to medium grained, SAND (SP), trace silt  Becomes brownish gray    Becomes light brown   Becomes wet  Becomes brownish gray, medium to coarse grained  Becomes dense, light brown, fine to medium grained   Becomes brownish gray   Becomes light brown	<div>▽</div>	Collected Sudan kit at 35'			
			3.3									
	48	39	3.8									
			4.0									
35	48	41	5.0									
			7.7									
	48	48	4.6									
			4.5									
40										Bottom of boring at 40' bgs		
45												

Completion Depth: 40.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING GP-4

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/3/09 Casing Elevation: Ground Elevation: 433.13	Coordinates Northing: 791837.03 Easting: 2321684.23
							DESCRIPTION	NOTES
5			1.1			FILL	Loose, moist, brown, silty sand, with gravel, FILL (FILL)	Boring advanced to a depth of 5' via hand auger to clear utilities, then continued with direct push dual tube
	36	18	1.2					
10	48	14				CL	Becomes wet	Collected Sudan kit at 11' Sampled GP-4-11 for VOC at 1205
			18.0				Soft, moist, low plastic, Sandy CLAY (CL)	
							Becomes medium stiff to stiff, gray, medium plastic, sand grades out	
15	48	48	3.0			CL		
			2.7				Becomes brownish gray	
20	48	45	3.0			CL		
			4.0				Becomes sandy	
	48	39	3.1			SP	Becomes soft, brown	Sampled GP-4-22.5 for VOC at 1215
			3.1				Becomes, wet, gray, low plastic	
							Medium dense, moist, brownish gray, fine to medium grained, SAND (SP), trace silt	Black staining, petroleum - like odor Collected Sudan kit at 23.5'

Completion Depth: 41.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-

Soil samples not collected

☒ 3" Clear Acetate Liner

USC based on field visual observations

# URS

# LOG OF BORING GP-4

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/3/09 Casing Elevation: Ground Elevation: 433.13	Coordinates Northing: 791837.03 Easting: 2321684.23
							DESCRIPTION	NOTES
30	48	39	3.7				Same: Medium dense, moist, brownish gray, fine to medum grained, SAND (SP), trace silt	Collected Sudan kit at 33' Sampled GP-4-33 for VOC at 1225
			3.8				2" soft, moist, gray, clay 3" soft, moist, gray, clay Becomes light brown	
	48	40	4.3					
			4.0				1" soft, moist, gray, clay, trace gravel Becomes wet	
35	48	41	27.1					
			20.1					
40	48	48	9.4					
			12.1				2" moist, gray, medium plastic, clay Trace coal seams	
45							Bottom of boring at 40' bgs	

Completion Depth: 41.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. CorbettWater Depth: 32 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations



# LOG OF BORING GP-7

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/26/09 Casing Elevation: Ground Elevation: 444.00	Coordinates Northing: 793706.85 Easting: 2322424.53
							DESCRIPTION	NOTES
						FILL	Asphalt and gravel, FILL (FILL)	Boring advanced to a depth of 10' via air knife to clear utilities, then continued with direct push dual tube
							Stiff, moist, dark brown, low plastic, Silty CLAY (CL), with gravel	
5						CL	Becomes brown, some silt	
							Becomes soft, gray, silty, trace sand	
10							Loose, moist, brown, fine grained, Silty SAND (SM)	
	24	14	43.9				Becomes brownish gray	
			36.7			SM		
15	48	36	28.9					
			27.4				Loose to medium dense, moist, grayish brown, fine grained, SAND (SP)	
	48	39	41.3					
20			19.3			SP	Becomes fine to medium grained, trace silt	
	48	36	7.9					

Completion Depth: 44.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: N. Satam/W. PenningtonWater Depth: 40.5 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# URS

# LOG OF BORING GP-7

LOG OF BORING GP-7															
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/26/09 Casing Elevation: Ground Elevation: 444.00			Coordinates Northing:793706.85 Easting:2322424.53					
							DESCRIPTION			NOTES					
30	48	37	127.0			SP	Same: Loose to medium dense, moist, grayish brown, fine to medium grained, SAND (SP)			Collected Sudan kit at 25' Sampled GP-7-25 for VOC at 1045					
			21.3				Becomes dense								
	48	39	69.7			SM	Medium dense to dense, dry to moist, gray, fined grained, Silty SAND (SM)								
			33.1				Medium dense to dense, dry, gray, fine grained, SAND (SP), trace silt								
35	48	48	54.6			SP				Strong petroleum - like odor					
			557												
	48	45	1519			CL	Soft, wet, gray to dark gray, Silty CLAY (CL)						Collected Sudan kit at 36.5' Very strong petroleum - like odor, possible slight sheen Sampled GP-7-37 for VOC at 1015		
			1700				Dense to medium dense, moist, grayish brown, medium grained, SAND (SP)								
40	48	48	46.2			SM	Becomes dark gray			Strong petroleum - like odor Sampled GP-7-41 for VOC at 1020					
			40.0				Medium dense to dense, wet, gray, fine grained, Silty SAND (SM)								
							Bottom of boring at 44' bgs			Collected Sudan kit at 43'					
45															

Completion Depth: 44.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: N. Satam/W. PenningtonWater Depth: 40.5 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING GP-8

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/26/09 Casing Elevation: Ground Elevation: 442.64	Coordinates Northing: 793350.77 Easting: 2322347.98
							DESCRIPTION	NOTES
						FILL	Stiff, moist, dark brown, low plastic, silty clay, FILL (FILL)	Boring advanced to a depth of 10' via air knife to clear utilities, then continued with direct push dual tube
5						CL	Stiff, moist, grayish brown to brown, low plastic, CLAY (CL), some silt	
						SM	Medium dense, moist, gray, fine grained, Silty SAND (SM)	
10						ML	Soft to medium stiff, moist, gray with brown, low plastic, Sandy SILT (ML)	Collected Sudan kit at 13' bgs Sampled GP-8-13 for VOC at 1345
	24	24	72.0				Medium dense, moist, gray and brown, fine to medium grained, SAND (SP), trace silt	
			445				Becomes grayish brown, silt grades out	
15	48	26	331			SP	Becomes moist to wet, gray	
			211				6" wet, brown, clayey silt	
	48	30	23.0				Becomes moist, grayish brown	
20							Becomes, moist to wet, gray, medium grained	
			30.0					
	48	48	28.0			CL	Soft, moist to wet, brown, some gray, low plastic, CLAY (CL), with silt	
						SP	Medium dense to dense, moist, grayish brown, fine to medium grained, SAND (SP)	
							Medium grain grades out for 6"	

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: N. Satam/W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Spitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# URS

# LOG OF BORING GP-8

							LOG OF BORING GP-8		
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/26/09 Casing Elevation: Ground Elevation: 442.64	Coordinates Northing:793350.77 Easting:2322347.98	
							DESCRIPTION	NOTES	
30	48	43	24.4			SP	Same: Medium dense to dense, moist, grayish brown, fine to medium grained, SAND (SP)		
			60.9						
	48	37	32.0						Becomes dense, brown and gray, medium grained
			16.9						
35	48	42	31.0			SM	Loose, wet, brown to grayish brown, Silty SAND (SM)		
			124			SP	Dense, moist, brown gray, medium grained, SAND (SP)		
	48	36	10.2				Becomes medium dense to dense, moist to dry, grayish brown, medium to coarse grained, sand		
			7.0						
40	48	34	37.4			SP	Becomes wet at 44'		
			17.5						
	48	48	233						Mild petroleum like odor
			586						
45	48	48	233			SP	Becomes wet at 44'		Mild petroleum like odor
			586						
							Bottom of boring at 48' bgs		Collected Sudan kit at 47' Sampled GP-8-47 for VOC at 1410

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: N. Satam/W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger- ☒ 3" Clear Acetate Liner☐ Soil samples not collected

USC based on field visual observations

# URS



# LOG OF BORING GP-9

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/25/09 Casing Elevation: 442.41 Ground Elevation: 442.71	Coordinates Northing: 792931.19 Easting: 2322420.46
							DESCRIPTION	NOTES
5						FILL	Gravelly, FILL (FILL)	Boring advanced to a depth of 10' via air knife to clear utilities, then continued with direct push dual tube
						FILL	Becomes stiff, moist to dry, dark gray, silt, trace gravel	
						FILL	Becomes moist, dark brown, low plastic, clay, some silt	
10						ML	Stiff, moist, brown to gray, low plastic, SILT (ML)	
						ML		
						ML		
15						SM	Dense, moist, grayish brown, fine grained, Silty SAND (SM)	
						SM		
						SM		
20	24	24	1982			SP	Loose, dry, gray, fine grained, SAND (SP)	Petroleum - like odor present
						SP		
						SP		
25	48	44	1267			SP	Becomes medium dense	Collected Sudan kit at 12'
						SP		
						SP		
30	48	44	1851			SP		Collected Sudan kit at 18' Sampled GP-9-18 for VOC at 1250
						SP		
						SP		
35	48	44	1808			SP		
						SP		
						SP		
40	48	44	1704			SP		
						SP		
						SP		
45	48	44	1663			SP		
						SP		
						SP		
50	48	44	1459			SP	Becomes wet, with silt	Collected Sudan kit at 23'
						SP		
						SP		

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. Miller/W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING GP-9

LOG OF BORING GP-9												
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion	Coordinates				
							Date: 8/25/09 Casing Elevation: 442.41 Ground Elevation: 442.71	Northing: 792931.19 Easting: 2322420.46				
							DESCRIPTION	NOTES				
30	48	40	192			SP	Becomes medium dense, dry, brown, fine to medium grained, silt grades out	Collected Sudan kit at 27'				
			185									
	48	40	831									
			1315									
35	48	40	1511			CL	Soft, moist, greenish gray, low plastic, Sandy CLAY (CL)	Slight sheen Collected Sudan kit at 31'				
			1139			Medium dense, dry, brown, fine to medium grained, SAND (SP)						
	48	40	1233						SP	Trace clay lenses for 6" Becomes moist, fine to coarse grained	Slight sheen, petroleum - like odor Sampled GP-9-37 for VOC at 1255 Collected Sudan kit at 37'	
			1217							2" clay		
40	48	40	1387					SP		Becomes dense, wet		Strong petroleum like - odor
			1250									
	48	48	1187								Collected Sudan kit at 44'	
			1350									
45	48	48								Bottom of boring at 48' bgs		Install piezometer GP-9-PZ at 48' bgs with 10" screen

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. Miller/W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING GP-10

							LOG OF BORING GP-10			
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/24/09 Casing Elevation: Ground Elevation: 445.39		Coordinates · Northing:794064.87 Easting:2321752.05	
							DESCRIPTION		NOTES	
5	36	24	6.3			CL	Soft, moist, brown, low plastic, Silty CLAY (CL)		Boring advanced to a depth of 5' via air knife to clear utilities, then continued with direct push dual tube	
10	48	34	7.6				Loose to medium dense, moist, brown, fine grained, SAND (SP), some silt			
							Silt grades out			
15	48	33	6.2							
							6.0			
20	48	42	5.2			SP				
							4.3			
	48	40	7.5				Becomes medium dense, fine to medium grained			
							7.2			
							Becomes wet 1.5" clayey sand to sandy clay			

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. Miller/W. PenningtonWater Depth: 46 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☐ Split spoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# URS

# LOG OF BORING GP-10

							LOG OF BORING GP-10	
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/24/09 Casing Elevation: Ground Elevation: 445.39	Coordinates Northing: 794064.87 Easting: 2321752.05
							DESCRIPTION	NOTES
30	48	39	5.0			SP	Same: Medium dense, wet, brown, fine to medium grained, SAND (SP)	
			7.2					
	48	37	5.5			CL	Soft, moist to wet, brown, low plastic, CLAY (CL), some sand and silt	
			7.8			SP	Medium dense, moist, grayish brown, medium to coarse grained, SAND (SP)	
35	48	39	6.5			CL	Soft, moist to wet, brown, low plastic, Silty CLAY (CL)	
			7.0			Medium dense, moist, grayish brown, medium to coarse grained, SAND (SP)		
	48	36	6.4			SP		
			5.0					
40	48	35	7.3			SP		
			7.6					
	48	38	4.9				Becomes gray	
			3.9				Becomes wet at 46' bgs	
							Bottom of boring at 48' bgs	

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. Miller/W. PenningtonWater Depth: 46 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

















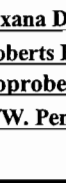
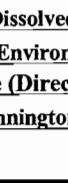


☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger- ☒ 3" Clear Acetate Liner☐ Soil samples not collected

USC based on field visual observations

# URS



# LOG OF BORING GP-11

LOG OF BORING GP-11												
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/24/09 Casing Elevation: Ground Elevation: 442.25			Coordinates Northing: 793595.19 Easting: 2321767.31		
							DESCRIPTION			NOTES		
5						FILL	Asphalt and gravel, FILL (FILL)			Boring advanced to a depth of 5' via air knife to clear utilities, then continued with direct push dual tube		
						CL	Stiff, moist, brown, low plastic, CLAY (CL), with silt and sand					
						SM	Loose, moist to dry, brown, fine grained, Silty SAND (SM)					
10	36	18	0.4			SP	Loose, dry, light brown, fine grained, SAND (SP)					
						CL	Soft, moist, brown, low plastic, Sandy CLAY (CL)					
							Loose, dry, light brown, fine grained, SAND (SP)					
15	48	40	3.2									
20	48	40	3.1									
25	48	40	4.5									
30	48	35	2.5			SP	Becomes fine to medium grained					
35	48	42	6.1									
40	48	42	5.1									
45	48	42	3.9				Becomes fine grained, with silt					
50	48	42	3.5									

Completion Depth: 44.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: M. Miller/W. PenningtonWater Depth: 43 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Air Rotary☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations

# LOG OF BORING GP-11

LOG OF BORING GP-11							
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion
							Date: 8/24/09 Casing Elevation: Ground Elevation: 442.25
DESCRIPTION							NOTES
30	48	36	2.9			SP	Same: Loose, dry, light brown, fine grained, SAND (SP), with silt
			4.7				
	48	48	5.2			CL	Medium stiff, wet, gray, low plastic, Silty CLAY (CL)
			3.6				
35	48	38	15.9			ML-SM	Soft, moist, grayish brown, Sandy SILT (ML) to Silty SAND (SM)
			8.0				
	48	48	10.4			SP	Medium stiff, moist to dry, fine grained, SAND (SP)
			6.8				
40	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48	42	16.7			SP	Medium dense, moist, brown, fine to medium grained, SAND (SP)
			54.8				
45	48	48	10.4			CL	Soft, wet, gray, low plastic, CLAY (CL)
			6.8				
	48						

# LOG OF BORING GP-12

Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/25/09 Casing Elevation: Ground Elevation: 443.24		Coordinates Northing: 793749.46 Easting: 2322024.18	
							DESCRIPTION		NOTES	
5	36	30	8.8			CL	Soft, moist, brown, low plastic, Silty CLAY (CL)		Boring advanced to a depth of 5' via air knife to clear utilities, then continued with direct push dual tube	
10	48	36	6.8			SP	Loose to medium dense, moist, brown, fine to medium grained, SAND (SP)			
			7.4							
15	48	35	7.0							
			6.1							
20	48	35	0.9			SP	Becomes grayish brown, fines grades out			
			7.7							
	48	34	9.4							
			7.3							

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☐ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler ☐ Air Rotary☐ Hollow Stem Auger- ☒ 3" Clear Acetate Liner

Soil samples not collected

USC based on field visual observations

# URS

# LOG OF BORING GP-12

							LOG OF BORING GP-12				
Depth In feet	Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion		Coordinates		
							Date: 8/25/09		Northing: 793749.46	Easting: 2322024.18	
							Casing Elevation:				
							Ground Elevation: 443.24				
							DESCRIPTION	NOTES			
30	48	36	9.7				Loose to medium dense, moist, grayish brown, medium grained, SAND (SP)				
			8.0								
	48	35	12.1								
			9.3								
35	48	36	9.1				Trace black banding				
			10.8								
	48	34	8.0			SP	Becomes coarse grained				
			6.8								
40	48	38	10.4								
			9.0								
	48	43	9.3				Becomes wet		▽		
			8.1								
45	48	43	9.3				Trace black banding				
			8.1								
								Bottom of boring at 48' bgs			

Completion Depth: 48.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Geoprobe (Direct Push Dual Tube)Logged by: W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler ☒ Air Rotary☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
USC based on field  
visual observations



LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-1												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 7/31/09 Casing Elevation: Ground Elevation: 443.20	Coordinates Northing:793900.00 Easting:2322219.75
	VMP-1-5	VMP-1-8.5	VMP-1-23.5	VMP-1-38.5							DESCRIPTION	NOTES
										FILL	Dark brown, low plastic, silty clay to clay, with silt, FILL (FILL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
										CL	Stiff, moist, brown, low plastic, CLAY (CL), trace silt	
5					24	17	2.0			ML	Soft, moist, brown, low plastic, Clayey SILT (ML), trace fine sand	
					24	24	4.0					
10					24	23	4.2				Medium dense, moist, brown, fine grained, SAND (SP), trace silt	
											Becomes loose, dry	
					24	21	NR				Becomes moist	
											Silt grades out	
15					24	20	1.0					
					24	21	3.4			SP		
					24	21	1.5				Becomes medium dense	
20					24	22	3.2					
					24	21	4.3				Becomes silty for 3"	
					24	23	5.7					

Completion Depth: 45.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: J. Adams/W. PenningtonWater Depth: 43.5 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling☒ Water level after drilling

ATD - At time of drilling

☒ Splitspoon Sampler☒ Hollow Stem Auger-

Soil samples not collected

☒ Geoprobe Macro Sampler☒ Air Knife/Hand Auger Sampler☒ 3" Clear Acetate Liner

Unified Soil Classification based on field visual observations.


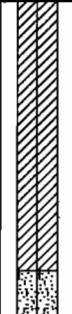



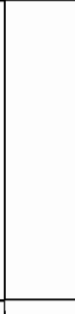





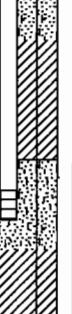
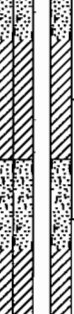


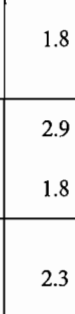

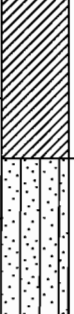
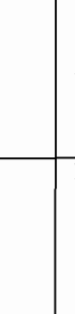




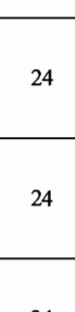

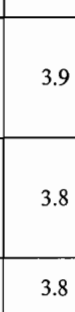

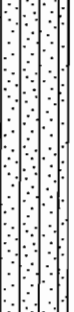





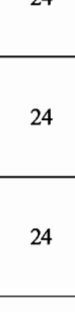
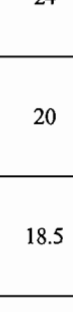
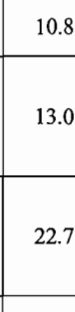

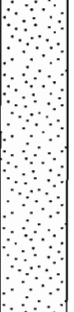

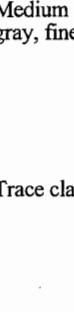
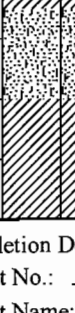
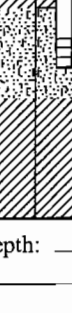


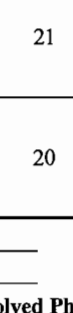
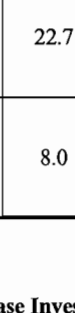
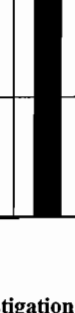
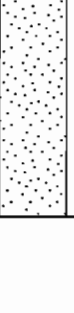


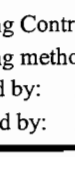
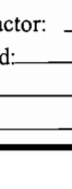
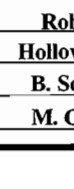
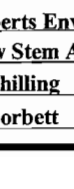
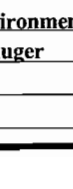
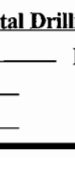
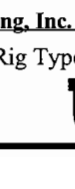



**URS**

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-1																						
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion	Coordinates										
	VMP-1-5	VMP-1-8.5	VMP-1-23.5	VMP-1-38.5							Date: 7/31/09	Northing: 793900.00										
											Casing Elevation:	Easting: 2322219.75										
											Ground Elevation: 443.20											
											DESCRIPTION	NOTES										
30					24	23	4.0			SP	4" silty sand Becomes fine grained, some silt	Petroleum - like odor.										
					24	24	5.2						CL	Medium stiff, moist, brown, low plastic, Silty CLAY (CL), trace fine sand Becomes wet Becomes black, clayey silt								
					24	24	11.0						SP	Medium dense, moist, light gray, fine grained, SAND (SP), some silt								
					24	24	99.3															
					24	24	76.1															
					24	22	43.8							Becomes grayish brown, fine to medium grained								
					35									24	20	36.8			ML	Soft, moist to wet, gray, SILT (ML), trace sand		
														24	23	143					SP	Medium dense, moist, grayish brown, medium grained, SAND (SP)
														24	20	104						3" wet, gray, silt
														24	18	213						Becomes wet
45										Bottom of boring at 45' bgs												

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: J. Adams/W. Pennington

Water Depth: 43.5 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations.  
 Soil samples not collected

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-2														
	VMP-2-5	VMP-2-8.5	VMP-2-22	VMP-2-42							Completion Date: 7/28/09		Coordinates												
											Casing Elevation: 443.56		Northing: 793747.43 Easting: 2322220.16												
DESCRIPTION											NOTES														
5											CL	Medium stiff, moist, light brown, low plastic, Silty CLAY (CL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA												
												With sand													
												10												SM	Medium dense, moist, light brown, Silty SAND (SM)
																									Becomes gray, trace black banding
15											SP		Medium dense, moist, light brownish gray, fine grained, SAND (SP)												
													Trace clay												
												20											SP		
25											SP														
30											SP														
35											SP														
40											SP														
45											SP														
50											SP														
55											SP														
60											SP														

Completion Depth: 49.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: M. Corbett

Water Depth: 47 ft., After ATD hrs.  
 Water Depth:        ft., After        hrs.  
☐ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger- Soil samples not collected  
 Unified Soil Classification based on field visual observations.











**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-2			
	VMP-2-5	VMP-2-8.5	VMP-2-22	VMP-2-42							Completion Date: 7/28/09	Coordinates		
											Casing Elevation: Ground Elevation: 443.56	Northing: 793747.43 Easting: 2322220.16		
DESCRIPTION											NOTES			
30					24	23	3.5			SP	Same: Medium dense, moist, light brownish gray, fine grained, SAND (SP), trace clay			
					24	24	7.4				Becomes light gray			
					24	22	16.6				Becomes light brownish gray			
					24	24	12.4				Becomes very moist			
					24	21	28.0				Some clay			
35					24	20	4.1				Becomes wet Becomes moist, fine to medium grained			
					24	20	105				SP		Medium stiff, moist, medium plastic, CLAY (CL) Medium dense, moist, light gray, fine grained, SAND (SP), trace clay	
					24	17	44.5						Becomes fine to medium grained, clay grades out	
					24	17	7.8				SC		Medium stiff, moist, gray, low plastic, Sandy CLAY (SC)	
					24	19	89.3				CL		Medium stiff, moist, gray, medium plastic, CLAY (CL)	
40					24	19	89.3				Medium dense, wet, gray, Clayey SAND (SC) 2" clay			
					24	22	86.4				SP		Medium dense, very moist, brownish gray, fine to medium grained, SAND (SP)	
					24	17	780				CL		Medium stiff, moist, gray, medium plastic, CLAY (CL)	
					24	17	780				SC		Medium dense, moist, gray, Clayey SAND (SC)	
					24	17	780				SP		Medium dense, wet, brownish gray, SAND (SP)	
45											Bottom of boring at 49' bgs			

Completion Depth: 49.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: M. Corbett

Water Depth: 47 ft., After ATD hrs.  
 Water Depth:          ft., After          hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☐ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations  
 Soil samples not collected

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-3																																																																																																																																																																																																																																																																																																	
	VMP-3-5	VMP-3-22	VMP-3-31.5	VMP-3-39							Completion		Coordinates																																																																																																																																																																																																																																																																																															
											Date: 7/29/09		Northing: 793442.63																																																																																																																																																																																																																																																																																															
											Casing Elevation: Ground Elevation: 442.21		Easting: 2322229.28																																																																																																																																																																																																																																																																																															
DESCRIPTION											NOTES																																																																																																																																																																																																																																																																																																	
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Completion Depth: 47.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: B. SchillingLogged by: M. CorbettWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**



Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-3	
	VMP-3-5	VMP-3-22	VMP-3-31.5	VMP-3-39							Completion	Coordinates
											Date: 7/29/09 Casing Elevation: Ground Elevation: 442.21	Northing: 793442.63 Easting: 2322229.28
DESCRIPTION											NOTES	
30					24	18	117			SM	Dense, moist, light brown, fine grained, Silty SAND (SM)  Becomes medium dense  Becomes light gray  Becomes dense	
					24	14	45.2				Medium dense, moist, light brown, fine grained, SAND (SP)	
					24	15	81.9				Beomes brownish gray, silty	
35					24	16	525			CL	Stiff, moist, brownish gray, low plastic, Silty CLAY (CL)	
					24	14	57.1				Medium dense, moist, brownish gray, Silty SAND (SM)	
					24	16	184				Medium dense, moist, brownish gray, fine grained, SAND (SP), trace silt  Becomes dense Becomes medium dense Becomes fine to medium grained	
40					24	18	345			SP	Stiff, moist, gray, Sandy CLAY (CL)	
					24	16	693				Medium dense, very moist, brownish gray, Silty SAND (SM), trace clay	
					24	21	187				Medium dense, moist, grayish brown, fine to medium grained, SAND (SP)  Becomes wet, brownish gray	
45					24	19	793			SP		
					24	24	863					
Bottom of boring at 47'											VMP-3-22 was installed in an adjacent hole due to complications during installation	

Completion Depth: 47.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: M. Corbett

Water Depth: 44 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler  
☐ Hollow Stem Auger-  
 Soil samples not collected  
☒ 3" Clear Acetate Liner  
 Unified Soil Classification based on field visual observations.

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-4	
	VMP-4-5	VMP-4-12	VMP-4-23.5	VMP-4-39							Completion Date: 8/3/09 Casing Elevation: Ground Elevation: 443.09	Coordinates Northing:791350.45 Easting:2322236.36
											DESCRIPTION	NOTES
5  <												

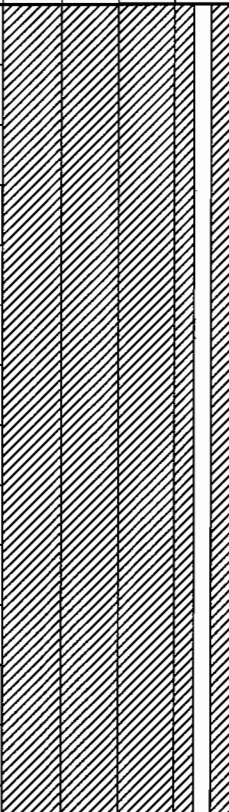






Completion Depth: 45.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☐ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-4		
	VMP-4-5	VMP-4-12	VMP-4-23.5	VMP-4-39							Completion		Coordinates
											Date: 8/3/09	Casing Elevation:	Northing: 791350.45
											Ground Elevation: 443.09	Easting: 2322236.36	
											DESCRIPTION	NOTES	
30						24	19	1279			SP	Same: Medium dense, moist, grayish brown, fine to medium grained, SAND (SP)	Strong petroleum - like odor
						24	21	1277					
						24	19	1210					
						24	24	957					
						24	24	1263					
						24	24	1642					
						24	20	1379					
						24	24	733					
						24	23	121					
						24	21	1018					
45											Bottom of boring at 45' bgs	▽	

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: W. Pennington

Water Depth: 44 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler  
☐ Hollow Stem Auger-  
 Soil samples not collected  
☒ 3" Clear Acetate Liner  
 Unified Soil Classification based on field visual observations.

**URS**

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-5												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/4/09 Casing Elevation: Ground Elevation: 444.59	Coordinates Northing:792842.78 Easting:2322246.59
	VMP-5-5	VMP-5-12.5	VMP-5-31	VMP-5-40							DESCRIPTION	NOTES
										FILL	Stiff, moist, dark brown to brown, low plastic, silty clay, trace gravel, FILL (FILL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
5					24	16	20.1			CL	Stiff, moist, brown to red brown, low plastic, Sandy CLAY (CL)	
					24	18	16.2			SP	Loose, moist, brown, fine grained, SAND (SP), trace clay	
					24	20	11.9				Becomes grayish brown, fine to medium grained	
10					24	18	107			CL	Soft, moist, brown, low plastic, Silty CLAY (CL), trace sand	
					24	20	334			SP	Loose, moist, grayish brown, fine to medium grained, SAND (SP)	
15					24	20	338					
					24	22	77.7					
20					24	22	61.0					
					24	22	11.5				Becomes vey moist to wet	
					24	24	13.1			CL	Soft, moist, brown, low plastic, CLAY (CL), with silt	
					24	24	9.9				Becomes gray, silt grades out	
					24	24	11.8					

Completion Depth: 47.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 45 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-5													
Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion	Coordinates	
	VMP-5-5	VMP-5-12.5	VMP-5-31	VMP-5-40							Date: 8/4/09	Northing: 792842.78	
											Casing Elevation:	Easting: 2322246.59	
											Ground Elevation: 444.59		
											DESCRIPTION	NOTES	
30					24	22	30.1			CL	Becomes medium stiff		
							108			SP	Loose to medium dense, moist, brownish gray, fine to medium grained, SAND (SP)		
					24	24	22.4			CL	Soft to medium stiff, moist, gray and brown, low plastic, CLAY (CL)		
					24	24	47.9						
35							93.3			SP	Medium dense, moist, grayish brown, medium grained, SAND (SP)		
					24	23	659				Becomes medium to coarse grained		
					24	18	70.5				Trace black banding		
					24	22	715						
40					24	20	675						
					24	20	469						
					24	21	1545						
					24	19	1149						
45					24	18	450						Becomes wet
											Bottom of boring at 47' bgs		

Completion Depth: 47.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: W. Pennington

**URS**

Water Depth: 45 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations.  
 Soil samples not collected



LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-6												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/5/09 Casing Elevation: Ground Elevation: 444.18	Coordinates Northing: 792537.27 Easting: 2322252.38
	VMP-6-5	VMP-6-10	VMP-6-31.5	VMP-6-39							DESCRIPTION	NOTES
5  												

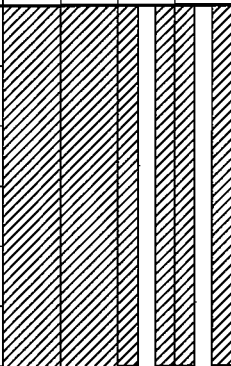

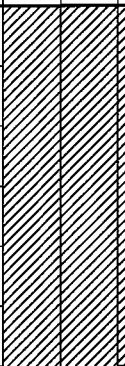
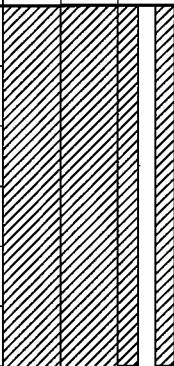


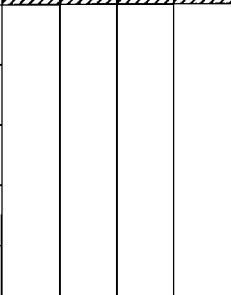
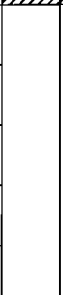
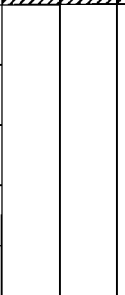
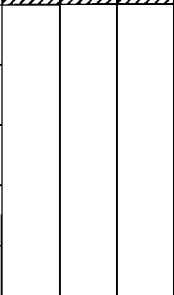
Completion Depth: 45.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 44 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-6		
	VMP-6-5	VMP-6-10	VMP-6-31.5	VMP-6-39							Completion		Coordinates
											Date: 8/5/09	Casing Elevation:	Northing:792537.27
											Ground Elevation: 444.18	Easting:2322252.38	
											DESCRIPTION	NOTES	
30					24	24	1267			SP	Same: Medium dense, moist, brownish gray, fine to medium grained, SAND (SP)  Trace black banding          Becomes medium dense to dense		
					24	20	1103						
					24	24	1397						
					24	21	2167						
					24	20	1658						
					24	20	630						
					24	24	605						
					24	24	5102						
					24	23	3251						
					24	24	397						
45											Bottom of boring at 45' bgs		

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: W. Pennington

**URS**

Water Depth: 44 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☐ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger-Soil samples not collected  
 Unified Soil Classification based on field visual observations.

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-7											
	VMP-7-5	VMP-7-13.5	VMP-7-29.5	VMP-7-38							Completion		Coordinates									
											Date: 8/10/09	Casing Elevation: 493.63	Ground Elevation: 493.63	Northing: 792370.64	Easting: 2322259.85							
DESCRIPTION											NOTES											
5										CL	Silty CLAY (CL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA										
											Becomes sandy											
											SP		Loose, moist, brown, fine grained, SAND (SP), with silt									
											10											
15																						
20																						

Completion Depth: 45.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: B. SchillingLogged by: M. CorbettWater Depth: 43 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling






















☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-7	
	VMP-7-5	VMP-7-13.5	VMP-7-29.5	VMP-7-38							Completion Date: 8/10/09	Coordinates
											Casing Elevation: Ground Elevation: 493.63	Northing: 792370.64 Easting: 2322259.85
DESCRIPTION											NOTES	
					24	19	4.8				Becomes light grayish brown	
					24	19	3.9					
30					24	20	78.8					
					24	20	31.2					
					24	18	54.7				Trace black staining Becomes fine to medium grained Becomes fine grained	
35					24	20	32.8			SP		
					24	18	98.5				Becomes light gray Trace black banding	
40					24	24	114					
					24	18	76.0					
					24	16	27.0				Becomes wet	▽
45							53.4				Becomes brownish gray, fine to medium grained, trace coarse sand Bottom of boring at 45' bgs	

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: M. Corbett

Water Depth: 43 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger-Soil samples not collected ☒ Unified Soil Classification based on field visual observations.

**URS**

Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-8										
	VMP-8-5	VMP-8-9.5	VMP-8-23.5	VMP-8-35.5							Completion Date: 8/12/09 Casing Elevation: Ground Elevation: 441.65		Coordinates Northing:792230.50 Easting:2321996.05								
											DESCRIPTION										
5										CL	Soft, moist, brown, low plastic, Silty CLAY (CL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA									
											Becomes sandy, some silt										
					24	12	1.1														
					24	14	2.1														
					10									24	20	2.0			SP	Loose, moist, brown, fine grained, SAND (SP), some silt	2" sandy clay
														24	18	2.4					
														24	19	3.3					
														24	20	3.8				Trace silt	
														24	20	3.0					
														15							
24	20	2.7																			
20								24	22	2.4					SP						

Completion Depth: 43.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: M. CorbettWater Depth: 40.5 ft., After ATD hrs.

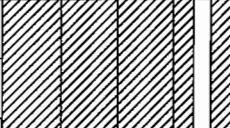
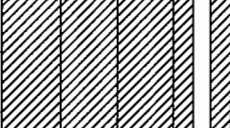
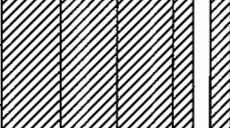
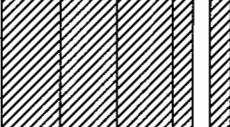




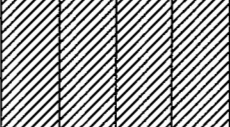
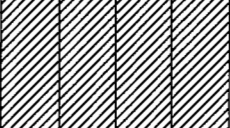


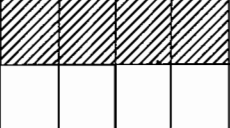
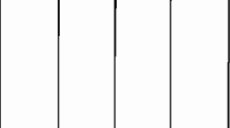
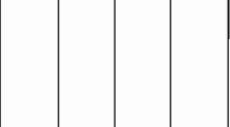


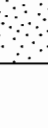
Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☐ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**



Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-8		
	VMP-8-5	VMP-8-9.5	VMP-8-23.5	VMP-8-35.5							Completion		Coordinates
											Date: 8/12/09	Casing Elevation:	Northing: 792230.50
											Ground Elevation: 441.65	Easting: 2321996.05	
											DESCRIPTION	NOTES	
30					24	18	4.0			SP	Same: Loose, moist, brown, fine grained, SAND (SP), trace medium grains, trace silt		
					24	19	1.2						
					24	20	2.8						
					24	22	2.4						
					24	20	2.7						
					24	24	2.0						
					24	22	2.0						
					24	18	2.6						
40					24	18	0.7			SP	Becomes wet Becomes brownish gray, fine grained	▽	
					24	18	0.7						
45					24	18	0.7			SP	Becomes medium grained, with fine grains		
					24	18	0.7						
45					24	18	0.7			SP	Bottom of boring at 43' bgs		
					24	18	0.7						

Completion Depth: 43.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: M. Corbett

Water Depth: 40.5 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger-Soil samples not collected  
 Unified Soil Classification based on field visual observations.

**URS**

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-9												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 8/11/09 Casing Elevation: Ground Elevation: 444.23	Coordinates Northing:792229.76 Easting:232257.58
	VMP-9-5	VMP-9-11.5	VMP-9-23.5	VMP-9-38.5							DESCRIPTION	NOTES
											Silty CLAY (CL)	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
										CL		
5					24	17	2.3				Loose, moist, brown, fine to medium grained, SAND (SP), with silt	
					24	18	1.7					
10					24	19	1.8				Becomes light brown	
					24	16	2.4				Trace clay 0.5" gray clay Becomes light brownish gray	
15					24	18	2.3			SP	Trace clay	
					24	13	6.2					
					24	18	9.4					
20					24	18	4.4				1" gray clay	
					24	18	4.1					
					24	19	7.5				Trace clay layers	

Completion Depth: 45.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: M. CorbettWater Depth: 43.5 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-9	
	VMP-9-5	VMP-9-11.5	VMP-9-25.5	VMP-9-38.5							Completion	Coordinates
											Date: 8/11/09 Casing Elevation: Ground Elevation: 444.23	Northing: 792229.76 Easting: 2322257.58
DESCRIPTION											NOTES	
30   												

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: M. Corbett

Water Depth: 43.5 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger-Soil samples not collected  
 Unified Soil Classification based on field visual observations.

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-10		
	VMP-10-5	VMP-10-10	VMP-10-20	VMP-10-30							Completion Date: 7/13/09 Casing Elevation: Ground Elevation: 434.72		Coordinates Northing: 792030.76 Easting: 2321968.56
											DESCRIPTION		NOTES
											Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA	
5					24	12	0.0			CL	Soft, moist, brown, low plastic, CLAY (CL)		
					24	20	0.1			SP	Loose, moist, brown, fine to medium grained, SAND (SP)		
							0.9			CL	Soft, moist, brown, low plastic, CLAY (CL), trace sand		
10					24	18	0.5			SP	Loose, moist, brown, fine to medium grained, SAND (SP)		
					24	18	0.4				1" clay		
					24	20	0.4				1" clay		
15											Becomes loose to medium dense, grayish brown		
					24	22	0.6				1" clay		
					24	20	0.5				1" clay		
					24	20	0.1						
20					24	20	0.4						
					24	20	0.4						
					24	19	0.4						

Completion Depth: 37.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 35 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-10	
	VMP-10-5	VMP-10-10	VMP-10-20	VMP-10-30							Completion	Coordinates
											Date: 7/13/09	Northing: 792030.76
											Casing Elevation:	Easting: 2321968.56
											Ground Elevation: 434.72	
											DESCRIPTION	NOTES
30					24	24	0.2			SP	Same: Loose to medium dense, moist, grayish brown, fine to medium grained, SAND (SP) Becomes medium dense, gray, some brown, fine to coarse grained	
					24	24	0.1					
					24	23	0.2					
					24	23	0.5					
					24	23	36.9					
					24	20	970					
35										Becomes wet	▽	
40										Bottom of boring at 37' bgs		
45												

Completion Depth: 37.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: W. Pennington

**URS**

Water Depth: 35 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger- Unified Soil Classification based on field visual observations.  
 Soil samples not collected



LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-11												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 7/10/09 Casing Elevation: Ground Elevation: 443.46	Coordinates Northing:792019.42 Easting:2322153.40
	VMP-11-5	VMP-11-8	VMP-11-29	VMP-11-38							DESCRIPTION	NOTES
											Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
5					24	5	0.0			CL	Medium stiff, moist, light brown, low plastic, CLAY (CL)	
					24	15	0.1				Loose, moist to dry, light brown, fine grained, SAND (SP)	
											Becomes moist	
10					24	16	0.0					
					24	16.5	0.0				Becomes medium dense	
					24	17.5	0.0					
15					24	15	0.0			SP	0.5" clay 2" clayey sand	
					24	19	0.0				With silt	
20					24	19.5	0.0				Trace silt	
					24	18	0.0					
					24	17.5	6.0					

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: P. Seymour  
 Logged by: M. Corbett/M. Miller

Water Depth: 43 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☐ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☒ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☒ Hollow Stem Auger-Soil samples not collected  
 Unified Soil Classification based on field visual observations.

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-11	
	VMP-11-5	VMP-11-8	VMP-11-29	VMP-11-38							Completion	
											Date: 7/10/09	Coordinates
					Casing Elevation:		Ground Elevation: 443.46		Northing: 792019.42		Easting: 2322153.40	
											DESCRIPTION	NOTES
30   <												

Completion Depth: 45.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: P. Seymour  
 Logged by: M. Corbett/M. Miller

**URS**

Water Depth: 43 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 ▽ Water level at time of drilling ☒ Geoprobe Macro Sampler  
 ▼ Water level after drilling ☐ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☐ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations  
 Soil samples not collected

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-12		
	VMP-12-5	VMP-12-11.5	VMP-12-25	VMP-12-39							Completion Date: 7/24/09 Casing Elevation: Ground Elevation: 444.46		Coordinates Northing: 792002.74 Easting: 2322353.25
											DESCRIPTION		NOTES
										FILL	Gray, silt, with sand, trace gravel, FILL (FILL)	Boring advanced to a depth of 10' via air knife to clear utilities, then continued with 4.25" HSA	
5										CL	Gray, Silty CLAY (CL), some gravel		
10					24	12	124			SP-SC	Becomes soft, moist, low plastic, sandy, silt grades out Loose, moist, fine grained, SAND (SP) with clay to clayey SAND (SC)	Petroleum - like odor.	
					24	21	315			SP	Loose to medium dense, moist, gray, fine to medium grained, SAND (SP)		
					24	24	439				Becomes grayish brown		
					24	17	639						
					24	19	653						
20					24	21	342				1" clay		
					24	24	375				Strong petroleum - like odor.		

Completion Depth: 46.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: W. Pennington

Water Depth: 44 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☐ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations  
 Soil samples not collected

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-12		
	VMP-12-5	VMP-12-11.5	VMP-12-25	VMP-12-39							Completion Date: 7/24/09		Coordinates
											Casing Elevation:	Northing: 792002.74	
Ground Elevation: 444.46											Easting: 2322353.25	DESCRIPTION	NOTES
30   <													

Completion Depth: 46.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: W. Pennington

**URS**

Water Depth: 44 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☐ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification based on field visual observations.  
 Soil samples not collected

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-13												
Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion Date: 7/15/09 Casing Elevation: Ground Elevation: 435.53	Coordinates Northing:79899.30 Easting:2322084.39
	VMP-13-5	VMP-13-10.5	VMP-13-21.5	VMP-13-29.5							DESCRIPTION	NOTES
											Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA
5					24	17	5.2			SP	Loose to medium dense, moist, brown, fine to medium grained, SAND (SP)	
					24	21	6.4					
					24	21	8.9			CL	Soft, moist, brown with gray, low plastic, Sandy CLAY (CL)	
10							9.3				Loose to medium dense, moist, reddish brown, fine to medium grained, SAND (SP)	
					24	20	5.8					
					24	20	65.9					
15					24	18	59.1					
					24	19	407			SP	Becomes grayish brown	
					24	18	472				Becomes gray, trace black banding	
20					24	22	336					
					24	20	383				Petroleum - like odor.	

Completion Depth: 35.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 34.5 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling


☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**



LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-13												
Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion	
	VMP-13-5	VMP-13-10.5	VMP-13-21.5	VMP-13-29.5							Date: 7/15/09	Coordinates
										Casing Elevation:	Northing: 79899.30	
										Ground Elevation: 435.53	Easting: 2322084.39	
										DESCRIPTION	NOTES	
					24	19	1043				Same: Loose to medium dense, moist, gray, fine to medium grained, SAND (SP)	Strong petroleum - like odor.
					24	20	1112					
30					24	20	695			SP		
					24	20	506					
					24	21	1475					
35											Becomes wet	▽
											Bottom of boring at 35' bgs	
40												
45												

Completion Depth: <u>35.00 Ft bgs</u>	Water Depth: <u>34.5</u> ft., After <u>ATD</u> hrs.
Project No.: <u>21562289</u>	Water Depth: _____ ft., After _____ hrs.
Project Name: <u>Roxana Dissolved Phase Investigation</u>	<input checked="" type="checkbox"/> Water level at time of drilling <input checked="" type="checkbox"/> Geoprobe Macro Sampler
Drilling Contractor: <u>Roberts Environmental Drilling, Inc.</u>	<input checked="" type="checkbox"/> Water level after drilling <input checked="" type="checkbox"/> Air Knife/Hand Auger Sampler
Drilling method: <u>Hollow Stem Auger</u> Rig Type: <u>CME-75</u>	ATD - At time of drilling
Drilled by: <u>E. Wetzel</u>	<input type="checkbox"/> Splitspoon Sampler
Logged by: <u>W. Pennington</u>	<input type="checkbox"/> Hollow Stem Auger- Soil samples not collected
	<input type="checkbox"/> 3" Clear Acetate Liner Unified Soil Classification based on field visual observations.

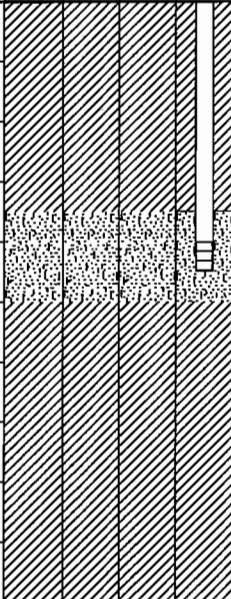
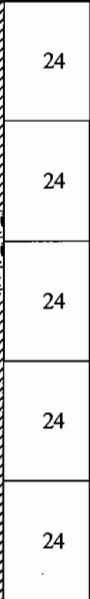

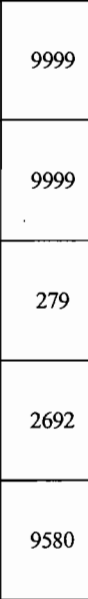

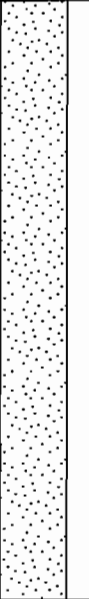


Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-14		
	VMP-14-5	VMP-14-11.5	VMP-14-20	VMP-14-29							Completion Date: 7/14/09 Casing Elevation: Ground Elevation: 434.94		Coordinates Northing:791842.10 Easting:2321971.92
											DESCRIPTION		NOTES
											Not logged	Boring advanced to a depth of 5' via air knife to clear utilities, then continued with 4.25" HSA	
5					24	24	0.0			FILL	Soft, moist, brown, silty clay, FILL (FILL)		
					24	21	0.0						
							0.4						
10					24	24	51.1			CL	Soft, moist, gray and brown, low plastic, Silty CLAY (CL), mottled Becomes soft to medium stiff, gray, with sand, silt grades out		
					24	24	1093				Medium dense, moist, black to brownish gray, fine to medium grained, SAND (SP), trace clay	Strong petroleum - like odor	
					24	22	1290				Clay grades out		
15					24	22	4589						
					24	22	9999			SP	Becomes grayish brown		
20					24	20	9999						
					24	20	9999						
					24	20	9999				Becomes fine grained		

Completion Depth: 35.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: E. Wetzel  
 Logged by: W. Pennington

Water Depth: 34 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☐ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☐ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling  
☐ Splitspoon Sampler ☒ 3" Clear Acetate Liner  
☐ Hollow Stem Auger- Unified Soil Classification  
 Soil samples not collected based on field visual observations.

**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-14		
	VMP-14-5	VMP-14-11.5	VMP-14-20	VMP-14-29							Completion Date: 7/14/09 Casing Elevation: Ground Elevation: 434.94		Coordinates Northing:791842.10 Easting:2321971.92
											DESCRIPTION		NOTES
30					24	22	9999			SP	Becomes reddish brown		
					24	19	9999						
					24	20	279						
					24	22	2692						
					24	24	9580						
35											Becomes wet	▽	
40											Bottom of boring at 35' bgs		
45													

Completion Depth: 35.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: E. WetzelLogged by: W. PenningtonWater Depth: 34 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

▽ Water level at time of drilling ☒ Geoprobe Macro Sampler▼ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☒ Splitspoon Sampler☒ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-15		
	VMP-15-5	VMP-15-21.5	VMP-15-25.5	VMP-15-29							Completion Date: 7/20/09 Casing Elevation: Ground Elevation: 433.46		Coordinates Northing:791664.43 Easting:2322006.54
											DESCRIPTION		NOTES
											Not logged	Boring advanced to a depth of 10' via air knife to clear utilities, then continued with 4.25" HSA	
5													
10					24	3	0.3				Medium dense, moist to wet, gray, medium plastic, CLAY (CL)		
					24	24	0.6						
15					24	23	1.0				Trace brown mottling		
					24	24	4.1			CL			







Completion Depth: 36.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: B. SchillingLogged by: W. PenningtonWater Depth: 34 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler☐ Hollow Stem Auger-  
Soil samples not collected☒ 3" Clear Acetate Liner  
Unified Soil Classification  
based on field visual  
observations.**URS**

Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-15			
	VMP-15-5	VMP-15-21.5	VMP-15-25.5	VMP-15-29							Completion		Coordinates	
											Date: 7/20/09		Northing: 791664.43	
Casing Elevation: 433.46											Easting: 2322006.54			
Ground Elevation: 433.46											DESCRIPTION		NOTES	
30					24	14	33.4			SP	Loose to medium dense, moist, grayish brown, fine to medium grained, SAND (SP)			
					24	18	20.2				Some coarse grains			
					24	24	26.5				Becomes reddish brown			
					24	22	55.9							
					24	18	56.5							
					24	16					Becomes wet, grayish brown, medium to coarse grained			
35										Bottom of boring at 36'				
40														
45														

Completion Depth: 36.00 Ft bgs  
 Project No.: 21562289  
 Project Name: Roxana Dissolved Phase Investigation  
 Drilling Contractor: Roberts Environmental Drilling, Inc.  
 Drilling method: Hollow Stem Auger Rig Type: CME-75  
 Drilled by: B. Schilling  
 Logged by: W. Pennington

**URS**

Water Depth: 34 ft., After ATD hrs.  
 Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
☒ Water level at time of drilling ☒ Geoprobe Macro Sampler  
☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler  
 ATD - At time of drilling ☒ 3" Clear Acetate Liner  
☒ Splitspoon Sampler  
☒ Hollow Stem Auger-  
 Soil samples not collected  
 Unified Soil Classification based on field visual observations.



Depth In feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-16			
	VMP-16-5	VMP-16-13.5	VMP-16-19	VMP-16-31							Completion Date: 7/22/09		Coordinates	
											Casing Elevation: 436.95		Northing: 791667.47 Easting: 232236.35	
DESCRIPTION											NOTES			
5   														

Completion Depth: 38.00 Ft bgsProject No.: 21562289Project Name: Roxana Dissolved Phase InvestigationDrilling Contractor: Roberts Environmental Drilling, Inc.Drilling method: Hollow Stem Auger Rig Type: CME-75Drilled by: B. SchillingLogged by: M. CorbettWater Depth: 36 ft., After ATD hrs.

Water Depth: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

☒ Water level at time of drilling ☒ Geoprobe Macro Sampler☒ Water level after drilling ☒ Air Knife/Hand Auger Sampler

ATD - At time of drilling

☐ Splitspoon Sampler ☒ 3" Clear Acetate Liner☐ Hollow Stem Auger-  
Soil samples not collectedUnified Soil Classification  
based on field visual  
observations.**URS**

LOG OF BORING AND WELL CONSTRUCTION DETAIL VMP-16												
Depth in feet	VMP Construction				Inches Driven	Inches Recovered	PID (ppm)	Sampler Graphic	Symbol	USCS	Completion	Coordinates
	VMP-16-5	VMP-16-13.5	VMP-16-19	VMP-16-31							Date: 7/22/09	Northing: 791667.47
											Casing Elevation:	Easting: 232236.35
											Ground Elevation: 436.95	
											DESCRIPTION	NOTES
30					24	19	29.9			SP	Same: Medium dense, moist, grayish brown, fine to medium grained, SAND (SP)	
					24	21	39.6					
					24	21	27.8					
					24	18	59.1					
					24	18	1810					
					24	18	1876					
35					24	18	1876			SP	Becomes medium grained, trace gravel	
					24	19.5	1472				Becomes dense, fine to medium grained	
40										SP	Becomes medium dense, wet, medium grained	
45										SP	Bottom of boring at 38' bgs	

Completion Depth: 38.00 Ft bgs

Project No.: 21562289

Project Name: Roxana Dissolved Phase Investigation

Drilling Contractor: Roberts Environmental Drilling, Inc.

Drilling method: Hollow Stem Auger Rig Type: CME-75

Drilled by: B. Schilling

Logged by: M. Corbett

Water Depth: 36 ft., After ATD hrs.

Water Depth:          ft., After          hrs.

☒ Water level at time of drilling

☒ Water level after drilling

ATD - At time of drilling

☐ Splitspoon Sampler

☐ Hollow Stem Auger-  
Soil samples not collected

☒ Geoprobe Macro Sampler

☐ Air Knife/Hand Auger Sampler

☐ 3" Clear Acetate Liner

Unified Soil Classification based on field visual observations.



**Groundwater Profiling**  
**Field Sheets**

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Wendy Pennington

DATE: 9/2/09 WEATHER: Sunny, 70s

MONITORING WELL ID: GP-1-34 SAMPLE ID: GP-1-34

## INITIAL DATA

Well Diameter: 1 in  
 Total Well Depth (btoc): 36.00 ft  
 Depth to Water (btoc): 31.50 ft  
 Depth to LNAPL/DNAPL (btoc):        ft  
 Depth to Top of Screen (btoc): 32.00 ft  
 Screen Length: 4.00 ft

Water Column Height (do not include LNAPL or DNAPL): 31.50 4.50 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 34.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) =        ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft =        ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.3 ppm  
 Wellbore PID/FID Reading: 0.4 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
6,000*	1105	N/A	light brown	slight hydroc.	6.58	20.92	1.501	804.4	2.44	-157.0
7,200	1109				6.61	20.89	1.486	712.4	2.69	-161.2
8,400	1113				6.62	20.76	1.463	662.6	1.80	-166.1
9,600	1117				6.63	20.66	1.447	644.0	1.59	-167.0
10,800	1121				6.63	20.57	1.422	492.7	0.68	-171.0
12,000	1125				6.62	20.43	1.416	458.7	1.09	-171.5
13,200	1129				6.61	20.26	1.391	375.2	0.43	-172.6
14,400	1133				6.60	20.18	1.383	376.7	-0.33	-159.7
15,600	1137				6.59	20.10	1.376	398.8	-0.21	-148.1
16,800	1141				NO MEASUREMENT - CLEANED FLOW-THROUGH CELL					
18,000	1145				6.55	19.20	1.340	265.0	0.15	-137.8
19,200	1149				6.55	19.52	1.336	237.7	-0.30	-144.9
20,400	1153				6.53	19.59	1.340	244.0	0.31	-147.7
21,600	1157				6.51	19.69	1.343	268.8	0.83	-151.6
22,800	1201				6.50	19.70	1.341	250.7	1.35	-152.5
24,000	1205				6.50	19.67	1.338	258.9	1.63	-153.7

Start Time: 1105 Elapsed Time (min): 60 min Water Quality Meter ID: YSI 6620

Stop Time: 1205 Average Purge Rate (mL/min): 300 Date Calibrated: 9/2/09

## SAMPLING DATA

Sample Date: 9/2/09 Sample Time: 1210 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 300 QA/QC Samples: MS/MSD - GP-1-34 MS

VOA Vials, No Headspace ☒ Initials: MC GP-1-34 MSD

## COMMENTS:

\* Began taking readings after purge water became sediment-free.

Total Purge Volume: 24,000 mL



# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Wendy Pennington

DATE: 9/2/09 WEATHER: sunny to partly cloudy, 75°

MONITORING WELL ID: GP-1-42 SAMPLE ID: GP-1-42

## INITIAL DATA

Well Diameter: 1 in  
 Total Well Depth (btoc): 44.00 ft  
 Depth to Water (btoc): 33.00 ft  
 Depth to LNAPL/DNAPL (btoc):      ft  
 Depth to Top of Screen (btoc): 40.00 ft  
 Screen Length: 4.00 ft

Water Column Height (do not include LNAPL or DNAPL): 11.00 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 42.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) =      ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft =      ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.1 ppm  
 Wellbore PID/FID Reading: 0.2 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
4,500*	1305	N/A	light brown	sl. petr-like	6.82	19.30	0.983	468.9	2.47	-109.2
5,200	1309				6.61	19.68	0.985	384.9	2.23	-113.7
6,900	1313				6.55	19.81	0.992	398.8	2.74	-118.7
8,100	1317				6.54	19.88	0.995	359.0	2.54	-122.2
9,300	1321				6.55	19.83	0.997	370.7	2.34	-123.7
10,500	1324				6.53	19.78	0.997	330.1	2.78	-125.4
11,700	1328				6.53	19.82	0.996	314.4	2.33	-126.1
12,900	1332				6.53	19.82	0.996	303.5	2.47	-126.2
14,100	1336				6.52	19.74	0.994	268.1	2.32	-126.3
15,300	1340				6.51	19.70	0.994	248.7	2.17	-126.2
16,500	1344				6.51	19.81	0.993	225.6	2.18	-126.4
17,700	1348				6.51	19.96	0.994	211.7	1.99	-126.9
18,900	1352				6.51	19.86	0.994	206.8	2.34	-127.0
20,100	1356				6.51	19.78	0.993	201.1	2.02	-126.9
21,300	1400				6.50	19.73	0.994	177.2	2.05	-127.0
22,500	1404				6.51	19.88	0.995	177.8	1.96	-126.8

Start Time: 1305 Elapsed Time (min): 60 Water Quality Meter ID: YSI 6820  
 Stop Time: 1405 Average Purge Rate (mL/min): 300 Date Calibrated: 9/2/09

## SAMPLING DATA

Sample Date: 9-2-09 Sample Time: 1405 Lab Analysis: VOC, SVOC  
 Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 300 QA/QC Samples: none  
 VOA Vials, No Headspace ☒ Initials: MC

## COMMENTS:

\* Began taking readings after purge water became sediment-free.

Total Purge Volume: 22,500 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Kelly Hurst

DATE: 9/1/09 WEATHER: Sunny, 70s

MONITORING WELL ID: GP-4-34 SAMPLE ID: GP-4-34

## INITIAL DATA

Well Diameter: 1 in  
 Total Well Depth (btoc): 36.00 ft  
 Depth to Water (btoc): 32.00 ft  
 Depth to LNAPL/DNAPL (btoc): — ft  
 Depth to Top of Screen (btoc): 32.00 ft  
 Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 7.00 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 34.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.0 ppm  
 Wellbore PID/FID Reading: 0.0 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
4,500*	0954		grayish brown	hydrocarbon	6.72	19.01	1.022	413.6	1.75	-162.4
5,700	0958		↓	↓	6.79	19.00	1.019	440.6	2.03	-179.4
6,900	1002		↓	↓	6.80	18.97	1.011	456.0	1.45	-180.8
8,100	1006		light brown	↓	6.80	18.98	1.009	440.1	1.42	-181.7
9,300	1010		↓	↓	6.79	19.01	1.001	389.2	1.33	-180.0
10,500	1014		↓	slight hydrocarb.	6.77	19.02	0.998	341.1	1.29	-179.4
11,700	1018		↓	↓	6.76	19.03	0.992	307.7	1.25	-178.9
12,900	1022		↓	↓	6.74	19.12	0.989	255.5	0.85	-175.6
14,100	1026		↓	↓	6.73	19.11	0.985	251.0	0.77	-173.4
15,300	1030		↓	↓	6.71	19.09	0.981	206.6	0.69	-170.9
16,500	1034		↓	↓	6.70	19.07	0.980	194.6	0.61	-168.5
17,700	1038		↓	↓	6.68	19.17	0.977	195.8	0.30	-162.9
18,900	1042		↓	↓	6.67	19.19	0.975	178.7	0.27	-158.1
20,100	1046		↓	↓	6.67	19.20	0.972	166.4	0.27	-156.3
21,300	1050		↓	↓	6.66	19.22	0.970	151.0	0.26	-155.9
22,500	1054		↓	↓	6.66	19.19	0.970	157.0	0.23	-154.3

Start Time: 0954 Elapsed Time (min): 60 Water Quality Meter ID: YSI 6820

Stop Time: 1054 Average Purge Rate (mL/min): 300 Date Calibrated: 09/01/09

## SAMPLING DATA

Sample Date: 9/1/09 Sample Time: 1100 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 300 QA/QC Samples: Duplicate -

VOA Vials, No Headspace ☒ Initials: MC GP-4-34-D

## COMMENTS:

\* Readings were recorded after <sup>Purge</sup> groundwater became sediment-free.  
 Headspace PID reading: 7.8 ppm

Total Purge Volume: 22,500 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Kelly Hurst

DATE: 9/1/09 WEATHER: sunny, 70s

MONITORING WELL ID: GP-4-42 SAMPLE ID: GP-4-42

## INITIAL DATA

Well Diameter: 1 in  
 Total Well Depth (btoc): 44.00 ft  
 Depth to Water (btoc): 32.00 ft  
 Depth to LNAPL/DNAPL (btoc): — ft  
 Depth to Top of Screen (btoc): 40.00 ft  
 Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 12.00 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 42.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.2 ppm  
 Wellbore PID/FID Reading: 0.0 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
3,600*	1146		light brown	slight hydrocarb.	6.97	20.13	0.766	481.8	0.97	-160.7
4,800	1150				6.97	20.08	0.764	411.0	0.76	-163.9
6,000	1154				6.96	19.97	0.762	300.3	0.52	-168.3
7,200	1157				6.96	20.02	0.759	168.5	0.57	-168.4
8,400	1200				6.95	20.03	0.685	167.3	0.44	-168.3
9,600	1203				6.95	19.91	0.682	110.7	0.38	-167.7
10,800	1206				6.94	19.92	0.681	106.9	0.35	-164.9
12,000	1209				6.93	19.87	0.681	111.8	0.21	-165.9
13,200	1212		↓		6.92	19.87	0.679	145.9	0.29	-165.3
14,400	1215		clearing		6.92	19.82	0.677	144.3	0.23	-164.5
15,600	1218		colorless		6.91	19.81	0.676	137.0	0.19	-163.4
16,800	1221				6.91	19.74	0.674	122.7	0.02	-162.9
18,000	1224				6.91	19.71	0.673	124.9	0.04	-162.8
19,200	1227				6.92	19.43	0.670	109.2	0.04	-162.1
20,400	1230				6.93	19.33	0.668	117.0	0.13	-161.6
21,600	1233		↓	↓	6.94	19.51	0.671	100.5	0.15	-162.2

Start Time: 1146 Elapsed Time (min): 60 Water Quality Meter ID: YSI 6820

Stop Time: 1246 Average Purge Rate (mL/min): 400 Date Calibrated: 9/1/09

## SAMPLING DATA

Sample Date: 9/1/09 Sample Time: 1250 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 400 QA/QC Samples: None

VOA Vials, No Headspace ☒ Initials: MC

## COMMENTS:

\* Readings were recorded after purge water became sediment free.  
 Headspace PID reading: 18.8 ppm

Total Purge Volume: 26,400 mL

URGE DATA CONTINUED: GP-4-42

[illegible]**COMMENTS:**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Wendy Pennington and Neels Satom

MONITORING WELL ID: GWP-1-50

SAMPLE ID: GNP-1-50

Well Diameter): 1.5 in  
Total Well Depth (btoc): 52 ft  
Depth to Water (btoc): 47.47 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 48.0 ft  
Screen Length): 1.0 ft

Water Column Height (do not include LNAPL or DNAPL): 4.53 ft btoe  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4-feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoe  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are (4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
 If Screen Length and/or water column height is < 4 ft. Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell: 1,150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Ambient PID/FID Reading: Bkg. 0.0 ppm  
Wellbore PID/FID Reading: Background 0.0 ppm

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ **Nattero**

[illegible]

Start Time: 1050

Elapsed Time (min): 1:06

Water Quality Meter ID: YSI 6820

Stop Time: 1156

Average Purge Rate (mL/min): 100 mL/min

Date Calibrated: 7-27-09

Sample Date: 7-27-09

Sample Method: ~~Monsoon / Low Flow~~ **Wattera**

Sample Time: 1150

Lab Analysis: VOC, SVOC

VOA Vials, No Headspace ☒ Initials: **NLS**

Sample Flow Rate (mL/min): 100 mL/min

QA/QC Samples: None.

Water intake @ 50 ft bgs. Set intake point at 50' due to groundwater recharge issues  
bottom of the well @ 52 ft bgs

Total Purge Volume: ~ 4.0 M ml g ethanol  
~ 6600 ml



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Wendy Kemington and N. Salam  
DATE: 7/27/01 WEATHER: 290°F Sunny  
MONITORING WELL ID: GWP-1-58 SAMPLE ID: GWP-1-58

Well Diameter: 1.5 in  
Total Well Depth (btoc): 60 ft  
Depth to Water (btoc): 48.33 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 56 ft  
Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 11.67 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.0 ppm  
Wellbore PID/FID Reading: 0.0 ppm

**Pump Type:** \_\_\_\_\_ Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 1352 1356 Elapsed Time (min): \_\_\_\_\_ Water Quality Meter ID: YSI 6820

Stop Time: 1500 Average Purge Rate (mL/min): 100 Date Calibrated: 7-27-09

Sample Date: 7-27-09 Sample Time: 1500 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 100 QA/QC Samples: none  
VOA Vials, No Headspace ☒ Initials: NJ

**COMMENTS:**

Total Purge Volume: 16400 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salem

DATE: 7/28/9 WEATHER: 1180'F. Sunny

MONITORING WELL ID: GWP-2-~~45~~50 SAMPLE ID: GWP-2-~~45~~50

Well Diameter): 1.5 in  
Total Well Depth (btoc) 52 ft  
Depth to Water (btoc): 43.3 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 44 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 4.7 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell): 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: Backflow ppm  
Wellbore PID/FID Reading: Backflow ppm

Pump Type: Monsoon Stainless Steel Submersible Pump **Wattera**

[illegible]

Water Quality Data parameter NOT STABLE. Well sampled after 1 hr purge complete

Start Time: 0958 Elapsed Time (min): 45 Water Quality Meter ID: YSI 6820

Stop Time: 1058 Average Purge Rate (mL/min): 150 mL/min Date Calibrated: 7/28/9

Sample Date: 7/28/09 Sample Time: 1058 Lab Analysis: VOC, SVOC

Sample Method: ~~Monsoon / Low Flow~~ **Watters** Sample Flow Rate (mL/min): **150 ml / min** QA/QC Samples: **None**

VOA Vials, No Headspace ☒ Initials: ME

COMMENTS: Water intake point @ 46' Bottom rods @ 48' Hole went dry. Redrilled to 52 feet - Water intake at 50 ft. Total Purge Volume: 9000 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salerni

DATE: 7/28/9 WEATHER: 285°F. Overcast

MONITORING WELL ID: GWP-3-50 SAMPLE ID: GWP-3-50

Well Diameter): 1.5 in  
Total Well Depth (btoe): 52 ft  
Depth to Water (btoe): 45.2 ft  
Depth to LNAPL/DNAPL (btoe): - ft  
Depth to Top of Screen (btoe): 48 ft  
Screen Length): 4 ft

Water Column Height (do not include LNAPL or DNAPL): 14.8 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell): 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: Background 0.2 ppm  
Wellbore PID/FID Reading: Background 1.8 ppm  
Purge Bucket

Pump Type: Monsoon Stainless Steel Submersible Pump Water

[illegible]

Start Time: 1355 Elapsed Time (min): Water Quality Meter ID: YSI 6820

Stop Time: \_\_\_\_\_ Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/28/9

Sample Date: 7/28/19 Sample Time: 1455 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow      Sample Flow Rate (mL/min): 1000      QA/QC Samples: 1

VOA Vials, No Headspace ☒ Initials: **AK**

**COMMENTS:**

COMMENTS: Bottom of rods @ 52.0'. Pump intake at ~50'. One time product zone with interface probe  
punch to community purging. Possible very slight show on top of purge water

Total Purge Volume: or 6000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam

MONITORING WELL ID: GW-4- GWP-3-58 SAMPLE ID: GWP-3-58

Well Diameter): 0+1.5 in

Total Well Depth (btoc): 60 ft

Depth to Water (btoc): 45.8 ft

Depth to LNAPL/DNAPL (btoc): - ft

Depth to Top of Screen (btoc): 54 ft

Screen Length): 4 ft

Water Column Height (do not include LNAPL or DNAPL): 14.2 ft btoC

If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoC

If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoC

If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoC

Volume of Flow Through Cell): 1,150 mL

Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL

Ambient PID/FID Reading: 0.1 ppm

Wellbore PID/FID Reading: 0.8 ppm

Purge bucket

Pump Type: Monsoon Stainless Steel Submersible Pump *Water*

[illegible]

Start Time: 1520 Elapsed Time (min): 1 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1620 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/28/19

Sample Date: 7/28/99 Sample Time: 1620 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Watters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
VOA Vials, No Headspace ☒ Initials: X

COMMENTS: Bottom of the beds at 60 ft - Pump intake at 58 ft - Possible very light - Shown over water

Total Purge Volume: ~ 6000 mL



**LOW FLOW GROUNDWATER SAMPLING DATA SHEET**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Sataro  
 DATE: 7/29/09 WEATHER: ~ 80°F, Sunny  
 MONITORING WELL ID: GWP-4-50 SAMPLE ID: GWP-4-50

**INITIAL DATA**

Well Diameter: 1.5 in Water Column Height (do not include LNAPL or DNAPL): 5.3 ft btoc Volume of Flow Through Cell: 1.150 mL  
 Total Well Depth (btoc): 52 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Depth to Water (btoc): 46.7 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoc Ambient PID/FID Reading: 0.0 ppm  
 Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft, Wellbore PID/FID Reading: 5.1 ppm  
 Depth to Top of Screen (btoc): 48 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = 50.5 ft btoc *Purge Bucket*  
 Screen Length: 4.0 ft If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc *wall*

**PURGE DATA**

Pump Type: Monsoon Stainless Steel Submersible Pump Wattera

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
1000	0943	NA	Dark brown	petroleum like	5.31	24.81	1.342	261	6.40	-413.6
2200	0957		Dark brown		6.73	24.66	1.345	152.8	7.16	-369.7
3400	1009		Light brown		6.65	22.52	1.317	101.3	7.65	-353.5
4600	1021		Light brown		6.34	22.32	1.075	90.6	4.41	-294.3
5600	1033		Light brown		6.48	21.6	1.046	28.3	4.96	-248.6
Water Quality parameters NOT stable. Sample collected after 1 hr purge										

Start Time: 0935 Elapsed Time (min): 1 hr Water Quality Meter ID: YSI 6820  
 Stop Time: 1035m 1040 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/29/09

**SAMPLING DATA**

Sample Date: 7/29/09 Sample Time: 1040 Lab Analysis: VOC, SVOC  
 Sample Method: Monsoon / Low Flow Wattera Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: -

VOA Vials, No Headspace ☒ Initials: NS - one vials (see field book)  
inner walls of vial has faint bubbles

**COMMENTS:**

groundwater draw down during initial purge. Had to let screen at 50' to get a constant purge. without  
possible slight shimmer on top of purge water. Probe did not indicate presence of product during water  
level measurement. Measured turbidity of water purged out of tubing (disconnected by Total Purge Volume: ~6500 mL  
Turbidity 3.2 NTU (clear yellow through (not) flow through) or

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salero

DATE: 7/29/09 WEATHER: N. 85° F sunny

MONITORING WELL ID: GWP-4-58 SAMPLE ID: GWP-4-58

## INITIAL DATA

Well Diameter: 1.5 in Water Column Height (do not include LNAPL or DNAPL): 14.68 ft btoc Volume of Flow Through Cell: 1,150 mL  
 Total Well Depth (btoc): 60 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
 Depth to Water (btoc): 45.32 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoc Ambient PID/FID Reading: 0.0 ppm  
 Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft, Wellbore PID/FID Reading: 2.4 ppm  
 Depth to Top of Screen (btoc): 54.56 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = 58.4 ft btoc  
 Screen Length: 4 ft If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

*Purge water*

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump Watterg

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
500	11:20	NA	dark brown	Very mild	6.13	19.90	1.390	1120	5.04	-235.6
1700	11:32		light brown	petroleum	5.20	19.48	1.320	880	11.43	-137.6
2900	11:44		light brown	odor	5.55	19.15	1.312	414.2	4.36	-143.6
4100	11:56		light brown		5.96	18.95	1.310	218.3	8.40	-149.3
5300	12:08		light brown		6.07	19.68	1.308	201.8	6.44	-114.6
6500	12:20-12:15		light brown							

Start Time: 11:15 Elapsed Time (min): 1:05 hr Water Quality Meter ID: YSI 6820

Stop Time: 12:15 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/29/09

## SAMPLING DATA

Sample Date: 7/29/09 Sample Time: 12:20 Lab Analysis: VOC, SVOC

Sample Method: Monsoon Low Flow Watterg Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: -

VOA Vials, No Headspace ☒ Initials: NS

## COMMENTS:

Water intake point 58' Rods at 60'

Total Purge Volume: ~ 6,000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam

MONITORING WELL ID: GWP-5-50 SAMPLE ID: GWP-5-50

Well Diameter): 6-1.5 in  
Total Well Depth (btoc): 52 ft  
Depth to Water (btoc): 45.36 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 48 ft  
Screen Length): 4 ft

Water Column Height (do not include LNAPL or DNAPL): 6.64 ft btoe  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 5.0 ft btoe  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = 5.04 ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 15.2 ppm

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ **Water**

[illegible]

Water Quality Meter ID: YSI 6820

Date Calibrated: 7/30/17

Sample Date: 7/30/11

Lab Analysis: VOC, SVOC

QA/QC Samples: \_\_\_\_\_

COMMENTS:

Tutake point - 50'

Total Purge Volume: 6500 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salem  
DATE: 2/30/09 WEATHER: 2 78°F overcast sky  
MONITORING WELL ID: GW-5-58 SAMPLE ID: GW-5-58

Well Diameter: 1.5 in  
Total Well Depth (btoe): 60 ft  
Depth to Water (btoe): 42.6 ft  
Depth to LNAPL/DNAPL (btoe): - ft  
Depth to Top of Screen (btoe): 58.48 ft  
Screen Length: 9 ft 56

Water Column Height (do not include LNAPL or DNAPL): 17.4 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = 58 ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 16.7 ppm

**Pump Type:** ~~Monsoon Stainless Steel Submersible Pump~~ **Watering**

[illegible]

Start Time: 1600 Elapsed Time (min): 1 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1700 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/30/09

Sample Date: 7/30/09 Sample Time: 1700 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Hatterg Sample Flow Rate (mL/min): 100 mL/hr QA/QC Samples: \_\_\_\_\_  
VOA Vials, No Headspace ☐ Initials: \_\_\_\_\_

COMMENTS: Mild petroleum odor. No indication of product being water level measured

Total Purge Volume: 6000 mL





**LOW FLOW GROUNDWATER SAMPLING DATA SHEET**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salas  
 DATE: 7/29/19 WEATHER: ~ 85°F, Sunny  
 MONITORING WELL ID: GWP-6-58 SAMPLE ID: GWP-6-58

**INITIAL DATA**

Well Diameter: 1.5 in Water Column Height (do not include LNAPL or DNAPL): 14.68 ft btoc  
 Total Well Depth (btoc): 60 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Depth to Water (btoc): 45.32 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoc  
 Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
 Depth to Top of Screen (btoc): 58.6 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = 58.6 ft btoc  
 Screen Length: 4 ft If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Volume of Flow Through Cell: 1,150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
 Ambient PID/FID Reading: 0.0 ppm  
 Wellbore PID/FID Reading: 42.5 ppm  
 Purge Bucket

**PURGE DATA**

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
500	1655	NA	Dark brown	Petroleum	6.31	22.7	1.194	158.9	4.15	-96.6
1500	1600		Dark brown		5.71	20.55	1.183	103.5	6.32	-95.5
2000	1619		Brown		5.65	20.42	1.181	104.2	9.36	-97.7
4100	1631		Light Brown		5.96	20.89	1.179	102.0	22.76	-113.6
5300	1643				6.00	20.09	1.181	119.0	18.68	-115.6
5800	1650				6.18	20.25	1.115	1694	11.21	-124.6

Start Time: 1650 Elapsed Time (min): 1:05 hr Water Quality Meter ID: YSI 6820  
 Stop Time: 1755 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/29/19

**SAMPLING DATA**

Sample Date: 7/29/19 Sample Time: 1700 Lab Analysis: VOC, SVOC  
 Sample Method: Monsoon Low Flow Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: -  
 VOA Vials, No Headspace ☒ Initials: JS

**COMMENTS:**

Very slight sheen on purge water. Distinct petroleum odor. Probe gave product tone @ 45.32 ft. No product tone on subsequent attempts to gauge. No sheen on probe tip.

Total Purge Volume: 6500 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Sater

DATE: 7-30-01 WEATHER: 80°F partly sunny

MONITORING WELL ID: GWP-7 -50 SAMPLE ID: GWP-7 -50

### INITIAL DATA

Well Diameter): <u>4.5 in</u>	Water Column Height (do not include LNAPL or DNAPL): <u>8.43</u> ft btoc	Volume of Flow Through Cell): <u>1.150</u> mL
Total Well Depth (btoc): <u>52.0</u> ft	If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,	Minimum Purge Volume = (3 x Flow Cell Volume): <u>3.450</u> mL
Depth to Water (btoc): <u>43.57</u> ft	Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = <u>50</u> ft btoc	Ambient PID/FID Reading: <u>0.5</u> ppm
Depth to LNAPL/DNAPL (btoc): <u>-</u> ft	If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,	<del>Well</del> PID/FID Reading: <u>44.6</u> ppm
Depth to Top of Screen (btoc): <u>48</u> ft	Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = <u>50.4</u> ft btoc	<u>Purge water</u>
Screen Length): <u>4</u> ft	If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = <u>-</u> ft btoc	

### PURGE DATA

**Pump Type:** Monsoon Stainless Steel Submersible Pump **Wattage**

[illegible]

Start Time: 0950 Elapsed Time (min): 1:05 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1100 AM Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/21/19 7/30/19

## SAMPLING DATA

Sample Date: 7/30/19 Sample Time: 1100 PM Lab Analysis: VOC, SVOC  
Sample Method: Monsoon Low Flow Watters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: MS and MSD collected  
VOA Vials, No Headspace ☒ Initials: JB GWP-7-50-MS

COMMENTS:

NO visible chem on pure water.

Total Purge Volume: 6500 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: V. Satam

DATE: 7/29/9 WEATHER: ~ 85F partly overcast

MONITORING WELL ID: GW-7-58 SAMPLE ID: GW-7-58

Well Diameter): 1.5 0.4 in Water Column Height (do not include LNAPL or DNAPL): 14.82 ft btoc  
Total Well Depth (btoc): 60 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Volume of Flow Through Cell): 1.150 mL  
Depth to Water (btoc): 45.18 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoc Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft, Ambient PID/FID Reading: 0.3 ppm  
Depth to Top of Screen (btoc): 48.7 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc Wellbore PID/FID Reading: 42.6 ppm  
Screen Length): 4 ft 56 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = 58.2 ft btoc  
*Purge backflow*

**PURGE DATA**      Pump Type: \_\_\_\_\_ Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 1250 1150 Elapsed Time (min): 65 mins Water Quality Meter ID: YSI 6820  
Stop Time: 1300 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/20/9

Sample Date: 7/30/19 Sample Time: 1300 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Water Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
VOA Vials, No Headspace ☐ Initials: h

COMMENTS: Petroleum like odor and very slight sheen on purge water. Water level measurement did not indicate presence of product.

Total Purge Volume: ~ 6000 mL

Total Purge Volume: 6000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: W. Pennington

DATE: 7-31-09 WEATHER: 70s ~~sunny~~ part cloudy

MONITORING WELL ID: GWP-8-50 SAMPLE ID: GWP-8-50

Well Diameter): 1.5 in  
Total Well Depth (btoc): 52 ft  
Depth to Water (btoc): 45.37 ft  
Depth to LNAPL/DNAPL (btoc): — ft  
Depth to Top of Screen (btoc): 48 ft  
Screen Length): 4 ft

Water Column Height (do not include LNAPL or DNAPL): 6.63 ft btoc  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoc  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): 1,150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Ambient PID/FID Reading: 0.1 ppm  
~~Wellbore~~ PID/FID Reading: 23.4 ppm  
*Purge bucket*

**Pump Type:** Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: WMP 1015 1022 Elapsed Time (min): 600 Water Quality Meter ID: YSI 6820

Stop Time: 1122 Average Purge Rate (mL/min): 150 Date Calibrated: 7-31-09

Sample Date: 8-7-31-09 Sample Time: 1122 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 150 QA/QC Samples: 10

VOA Vials, No Headspace ☒ Initials: 11/11/11

**COMMENTS:**

Total Purge Volume: 7000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salim

DATE: 7/31/09 WEATHER: 87 F Sunny

MONITORING WELL ID: GWP-8-58 SAMPLE ID: GWP-8-58

Well Diameter: 1.5 in  
Total Well Depth (btoC): 60 ft  
Depth to Water (btoC): 44.5 ft  
Depth to LNAPL/DNAPL (btoC): — ft  
Depth to Top of Screen (btoC): 54.5 ft  
Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 15.49 ft btoC  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoC  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoC  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoC

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.1 ppm  
Wellbore PID/FID Reading: 10.3 ppm

**Pump Type:** Monsoon Stainless Steel Submersible Pump **Watters**

[illegible]

Start Time: 1300 Elapsed Time (min): 1:00 hr Water Quality Meter ID: YSI 6820

Stop Time: 1400 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 7/31/19

Sample Date: 3/3/11 Sample Time: 1400 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow *blattn* Sample Flow Rate (mL/min): *100 mL/min* QA/QC Samples: *EB after hsm*

VOA Vials, No Headspace ☒ Initials: MS

**COMMENTS:**

Total Purge Volume: 6000 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satom  
DATE: 8/3/19 WEATHER: N 85°F, partly Sunny  
MONITORING WELL ID: GWP-9-50 SAMPLE ID: GWP-9-50

Well Diameter): 1.5 in  
Total Well Depth (btoc): 52.0 ft  
Depth to Water (btoc): 44.98 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 48.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 7.02 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell): 1,150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Ambient PID/FID Reading: 0.3 ppm  
~~Wellbore~~ PID/FID Reading: 3.8 ppm  
*Purge Water*

[illegible]

Start Time: 103026 Elapsed Time (min): 1:10 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1036 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/3/19

Sample Date: 8/3/19 Sample Time: 1036 Lab Analysis: VOC, SVOC  
Sample Method: Mesonon / Low Flow Nattua Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Draw down observed. pump turned up to continue purge

Total Purge Volume: 7000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salem

MONITORING WELL ID: GWP-9-58 SAMPLE ID: GWP-9-58

Well Diameter): 1.5 in  
Total Well Depth (btoc): 60.0 ft  
Depth to Water (btoc): 45.80 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 56.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 14.20 ft btoC  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58.0 ft btoC  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoC  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoC

Volume of Flow Through Cell): 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 2.7 ppm  
*Purge water*

**Pump Type:** ~~Monsoon Stainless Steel Submersible Pump~~ **Wattera**

[illegible]

Start Time: 1100 Elapsed Time (min): 1:05 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1200 Average Purge Rate (mL/min): 100 mL/hr Date Calibrated: 8/3/09

Sample Date: 8/31/09 Sample Time: 1200 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Wattersa Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —

VOA Vials, No Headspace ☒ Initials: NS

Total Purge Volume: 50.0 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salas

MONITORING WELL ID: GWP-10-50 SAMPLE ID: GWP-10-50

Well Diameter): 15 in Water Column Height (do not include LNAPL or DNAPL): 8.06 ft btoc Volume of Flow Through Cell): 1.150 mL  
Total Well Depth (btoc): 52.0 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Depth to Water (btoc): 43.94 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoc Ambient PID/FID Reading: 0.3 ppm  
Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft, Wellbore PID/FID Reading: 8.2 ppm  
Depth to Top of Screen (btoc): 56.0 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
Screen Length): 4.0 ft If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Pump Type: Monsoon Stainless Steel Submersible Pump Water

[illegible]

Start Time: 1448 Elapsed Time (min): 1:02 Water Quality Meter ID: YSI 6820  
Stop Time: 1550 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/3/19

Sample Date: 8/3/19 Sample Time: 1550 Lab Analysis: VOC, SVOC  
 Sample Method: Monsoon / Low Flow Watters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
 VOA Vials, No Headspace ☒ Initials: dt

**COMMENTS:**

Total Purge Volume: 6000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Sotero

DATE: 8/3/9 WEATHER: N 90°F, Sunny

MONITORING WELL ID: GWP-10-58 SAMPLE ID: GWP-10-58

Well Diameter): 1.5 in 60  
Total Well Depth (btoc): 44.11 ft  
Depth to Water (btoc): 44.11 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 56.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 15.81 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58.0 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 23.7 ppm

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ Watera

[illegible]

Start Time: 1612 Elapsed Time (min): 1:02 Water Quality Meter ID: YSI 6820

Stop Time: 1715 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/3/09

Sample Date: 8/3/9 Sample Time: 1715 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Wattersa Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples:                     

VOA Vials, No Headspace ☒ Initials: **NS**

COMMENTS: PID reading for purge water within the 5 mins from the time purging commenced 32.6

Total Purge Volume: 6200 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salem

DATE: 08/06/09 WEATHER: ~ 85°F, Sunny

MONITORING WELL ID: GWP-11-50 SAMPLE ID: GWP-11-50

INITIAL DATA

Well Diameter): <u>0D - 1.5</u> in	Water Column Height (do not include LNAPL or DNAPL): <u>7.03</u> ft btoc	Volume of Flow Through Cell): <u>1.150</u> mL
Total Well Depth (btoc): <u>52</u> ft	If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,	Minimum Purge Volume = (3 x Flow Cell Volume): <u>3.450</u> mL
Depth to Water (btoc): <u>44.97</u> ft	Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = <u>50</u> ft btoc	Ambient PID/FID Reading: <u>0.3</u> ppm
Depth to LNAPL/DNAPL (btoc): <u>-</u> ft	If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,	Wellbore PID/FID Reading: <u>0.3</u> ppm
Depth to Top of Screen (btoc): <u>48.0</u> ft	Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = <u>-</u> ft btoc	
Screen Length): <u>4.0</u> ft	If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = <u>-</u> ft btoc	

Pump Type: Monsoon Stainless Steel Submersible Pump Wattera

[illegible]

Start Time: 1012 Elapsed Time (min): 1:03 Water Quality Meter ID: YSI 6820

Stop Time: 1115 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/06/09

SAMPLE DATE: 08/06/09 Sample Time: 1115 Lab Analysis: VOC, SVOC Sampled for VOC only

Sample Method: Monsoon / Low Flow Wattera Sample Flow Rate (mL/min): 100 mL / min QA/QC Samples:                     

VOA Vials, No Headspace ☒ Initials: *ML*

COMMENTS: Set tubing @ midpoint of the water column. Draw down observed. Set tubing intake point @ 50' to be able to purge & sample.

Total Purge Volume: 6300 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salano

MONITORING WELL ID: GWP-11-58 SAMPLE ID: GWP-11-58

Well Diameter): 0.5 in Water Column Height (do not include LNAPL or DNAPL): 12.64 ft btoc Volume of Flow Through Cell: 1,150 mL  
Total Well Depth (btoc): 60.0 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Depth to Water (btoc): 47.36 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoc Ambient PID/FID Reading: 0.3 ppm  
Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft, Wellbore PID/FID Reading: 0.4 ppm  
Depth to Top of Screen (btoc): 54.0 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
Screen Length): 4.0 ft 56 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Pump Type: Monsoon Stainless Steel Submersible Pump Wattera

[illegible]

Stop Time: 1240 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/07/09

Sample Date: 08/06/09 Sample Time: 1240 Lab Analysis: VOC, ~~SVOC~~ Sampled for VOCs only

VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Intake point - 58'.

Total Purge Volume: 7200 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NUMBER: 21562175

FIELD PERSONNEL: N. Salim

DATE: 8/4/09 WEATHER: N 85 F, overcast, rain

MONITORING WELL ID: GW P-12-50

SAMPLE ID: GWP-12-50

## INITIAL DATA

Well Diameter): 1.5 in  
Total Well Depth (btoc): 52.0 ft  
Depth to Water (btoc): 44.03 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 48.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 7.97 ft btoe

If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoe

If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoe

If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.5 ppm  
Wellbore PID/FID Reading: \_\_\_\_\_ ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump Watterq

[illegible]

Start Time: 1024

Elapsed Time (min): \_\_\_\_\_

Water Quality Meter ID: YSI 6820

**Stop Time:** \_\_\_\_\_

Average Purge Rate (mL/min): \_\_\_\_\_

Date Calibrated: 8/4/09

## SAMPLING DATA

**Sample Date:** \_\_\_\_\_

Sample Time: \_\_\_\_\_

Lab Analysis: VOC, SVOC

Sample Method: ~~Monsoon~~ / Low Flow *Watters*

Sample Flow Rate (mL/min):

QA/QC Samples:

VOA Vials, No Headspace ☐ Initials:

**COMMENTS:**

Initial purge rate 300 ml/min. Purge water very Silty. Will wait for purge water to clear and then connect to flow through cell

Unable to sample @ 50 - Issues with tubing (

Total Purge Volume: m

Unable to sample @ 50. Issues with tubing. Total Purge Volume: mL

Unable to sample the location. Geoprobe advanced to 60'.

Unable to sample groundwater. Sampled @ 58'. After sampling @ 58'. Screen pulled up (return  
and col @ 50'. Screen lowered to another data si

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salam

DATE: 8/4/09 WEATHER: overcast ~ 85°F

MONITORING WELL ID: GWP-12-50 SAMPLE ID: GWP-12-50

Well Diameter: (0.0) 1.5 in Water Column Height (do not include LNAPL or DNAPL): 4.03 ~~12.03~~ ft btoc Volume of Flow Through Cell: 1,150 mL  
Total Well Depth (btoc): 52.0 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Depth to Water (btoc): 47.97 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 54.0 ft btoc Ambient PID/FID Reading: 0.7 ppm  
Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft, Wellbore PID/FID Reading: 2.5 ppm  
Depth to Top of Screen (btoc): 54.48 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
Screen Length: 4.6 ft 56" If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc  
*Purge water*

**Pump Type:** ~~Monsoon Stainless Steel Submersible Pump~~ *Walter*

[illegible]

Start Time: 1530 Elapsed Time (min): 1:10 Water Quality Meter ID: YSI 6820

Stop Time: 10/6/0 1700 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/4/09

Sample Date: 8/4/09 Sample Time: 16:40 1700 Lab Analysis: VOC, SVOC

Sample Method: ~~Monsoon / Low Flow~~ Wet Season Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples:           

VOA Vials, No Headspace ☒ Initials: MS

COMMENTS: Location was just sampled for 58' (deeper interval). After sampling @ 58' Screen and rods were pulled up to a depth of 52'. Screen set at 52'-48'. Sample collected @ 50'.  
Total Purge Volume: 78000 ml.

N. Salām

8/4/09

GWP-12-58

## INITIAL DATA

Well Diameter: (OD) 1.5 in  
Total Well Depth (btoc): 60 ft  
Depth to Water (btoc): 47.99 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 54 ft  
Screen Length: 4.0 ft 56

Water Column Height (do not include LNAPL or DNAPL): 12.03 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 56.54 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Volume of Flow Through Cell): 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.7 ppm  
~~Wellbore PID/FID Reading: 1.6 ppm~~  
Purge water

## PURGE DATA

**Pump Type:** Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 1412

1:03

: YSI 6820

Stop Time: 1515

150 ml/ml

8/4/9

## SAMPLING DATA

Sample Date: 8/4/09

1515

**VOC, SVOC**

Sample Method: **Meneen / Low Flow** *Walters*

150 ml/min.

None

VOA Vials, No Headspace ☒ Initials: NS

**COMMENTS:**

Total Purge Volume: 9600 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam

DATE: 8/5/09 WEATHER: 87°F, Sunny

MONITORING WELL ID: GWP-13-50 SAMPLE ID: GWP-13-50

## INITIAL DATA

Well Diameter: 1.5 in  
Total Well Depth (btoC): 52 ft  
Depth to Water (btoC): 41.79 ft  
Depth to LNAPL/DNAPL (btoC): - ft  
Depth to Top of Screen (btoC): 48.0 ft  
Screen Length: 52.0 ft

Water Column Height (do not include LNAPL or DNAPL): 10.21 ft btoC  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoC  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoC  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoC

Volume of Flow Through Cell: 1,150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Ambient PID/FID Reading: 0.5 ppm  
Wellbore PID/FID Reading: 6.3 ppm  
*Purge Water*

### PURGE DATA

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ **Watter**

[illegible]

Start Time: 0936 Elapsed Time (min): 1:10 Water Quality Meter ID: YSI 6820

Stop Time: 1050 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/5/09

## SAMPLING DATA

Sample Date: 8/5/09 Sample Time: 1050 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Wattay Sample Flow Rate (mL/min): 1.00 mL/min QA/QC Samples:           

VOA Vials, No Headspace ☒ Initials: NS

**COMMENTS:**

COMMENTS: Purge water very silty. Tubing connected to flow through cell after purge water cleared slightly. Intake point set up 2 ft above the bottom of the screen.

Total Purge Volume: 7200 ml

Total Purge Volume: 7200 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salam

MONITORING WELL ID: GWP-13-58 SAMPLE ID: GWP-13-58

Well Diameter: 10.5 in  
Total Well Depth (btoc): 60 ft  
Depth to Water (btoc): 44.03 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 56 ft  
Screen Length: 4 ft

If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = **58.0** ft btoc

If Depth to Top of Screen Is < Depth to Water AND Water Column Height and Screen Length are < 4ft,

Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = \_\_\_\_\_ ft btoc

If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = 1 ft btoc

Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL

Ambient PID/FID Reading: 0.3 ppm

Wellbore PID/FID Reading: 16.3 ppm

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ Wattana

Water Quality Parameters STABLE

Stop Time: 1215 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/5/09

Sample Date: 8/05/09 Sample Time: 1215 Lab Analysis: VOC, SVOC

Sample Method: ~~Monsoon / Low Flow~~ Watters Sample Flow Rate (mL/min): 100 ml/min QA/QC Samples:           

VOA Vials, No Headspace ☒ Initials: 23

Total Purge Volume: 6200 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N - Salem  
DATE: 8/05/09 WEATHER: ~ 90°F, Sunny  
MONITORING WELL ID: GWP-14-50 SAMPLE ID: GWP-14-50

INITIAL DATA  
Well Diameter): DB - 1.5 in  
Total Well Depth (btoc): 52 ft  
Depth to Water (btoc): 43.68 ft  
Depth to LNAPL/DNAPL (btoc): — ft  
Depth to Top of Screen (btoc): 48 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 8.42 ft btoC  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoC  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoC  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoC

Volume of Flow Through Cell): 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 10.1 ppm

# Waters

[illegible]

Start Time: 1324 Elapsed Time (min): 1:01 Water Quality Meter ID: YSI 6820  
Stop Time: 1425 Average Purge Rate (mL/min): 100<sup>m</sup> / hr mL/min Date Calibrated: 08/05/09

Sample Date: 08/05/09 Sample Time: 1425 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon/Low Flow Water Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
VOA Vials, No Headspace ☒ Initials: NB

COMMENTS: Sel- intake point at ~50'. Intake point not set at the mid point of the water column because draw down in water table was observed at location GWP-7 (~100 ft E of GWP-14)

Total Purge Volume: 6100 mL

**LOW FLOW GROUNDWATER SAMPLING DATA SHEET**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam  
 DATE: 08/05/09 WEATHER: ~90°F Sunny  
 MONITORING WELL ID: GWP-13-60<sup>W</sup> GWP-14-58<sup>W</sup> SAMPLE ID: GWP-14-58<sup>W</sup> GWP-14-58

**INITIAL DATA**  
 Well Diameter: 00-0.5 in Water Column Height (do not include LNAPL or DNAPL): 15.10 ft btoc Volume of Flow Through Cell: 1.150 mL  
 Total Well Depth (btoc): 60 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Depth to Water (btoc): 45.90 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoc Ambient PID/FID Reading: 0.8 ppm  
 Depth to LNAPL/DNAPL (btoc): - ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft, Wellbore PID/FID Reading: 10.1 ppm  
 Depth to Top of Screen (btoc): 56.0 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
 Screen Length: 4.0 ft If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

**PURGE DATA** Pump Type: Monsoon Stainless Steel Submersible Pump Wattara

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
1200	1500	NA	Gray-Brown	6.40 No	6.40	19.83	1.212	210.0	7.63	-80.6
2400	1512		light gray	Mild hydrocarbon	5.86	19.18	1.148	550.0	5.39	-62.0
3600	1524			Odor ↓	5.99	18.58	1.112	298.0	5.40	-71.6
4800	1536				6.14	18.71	1.103	224.0	4.78	-78.4
6000	1548				6.10	18.91	1.096	345.2	5.33	-79.1

Start Time: 1448 Elapsed Time (min): 1:02 Water Quality Meter ID: YSI 6820  
 Stop Time: 1550 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/05/09

**SAMPLING DATA**  
 Sample Date: 08/05/09 Sample Time: 1550 Lab Analysis: VOC, SVOC NS only Sampled for VOCs  
 Sample Method: Monsoon Low Flow Wattara Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: -  
 VOA Vials, No Headspace ☒ Initials: NS

**COMMENTS:**

Total Purge Volume: 6200 mL

**LOW FLOW GROUNDWATER SAMPLING DATA SHEET**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salam

DATE: 08/06/09 WEATHER: N 85° F, Sunny

MONITORING WELL ID: GWP-15-50 SAMPLE ID: GWP-15-50

**INITIAL DATA**

Well Diameter: 0D - 1.5 in  
 Total Well Depth (btoc): 52.0 ft  
 Depth to Water (btoc): 44.82 ft  
 Depth to LNAPL/DNAPL (btoc): - ft  
 Depth to Top of Screen (btoc): 48.0 ft  
 Screen Length: 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 7.18 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.4 ppm  
 Wellbore PID/FID Reading: 0.7 ppm

**PURGE DATA**

Pump Type: Monsoon Stainless Steel Submersible Pump Watters

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
1200	14:24	NA	light Gray	None	5.82	25.06	1.957	1435.1	6.33	-68.2
2400	14:36	NA	light Gray	None	5.92	23.05	1.955	1114.0	6.19	-64.6
3600	14:48	NA	light Gray	None	5.90	21.80	1.955	632.0	6.13	-65.8
4800	15:00	NA	clearing	None	6.00	20.38	1.933	423.0	6.02	-68.5
6000	15:12	NA	clearing	None	5.91	20.0	1.929	360.0	6.17	-68.1

Start Time: 1412 Elapsed Time (min): 1:02 Water Quality Meter ID: YSI 6820  
 Stop Time: 1515 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/06/09

**SAMPLING DATA**

Sample Date: 08/06/09 Sample Time: 1515 Lab Analysis: VOC, SVOC  
 Sample Method: Monsoon/Low Flow Watters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: GWP-15-50EB  
 VOA Vials, No Headspace ☒ Initials: N Equipment rinsed blank at 1315

COMMENTS: Intake point at 50'. Intake point not set at midpoint of water column due to draw down  
Watters

Total Purge Volume: 6200 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salano

DATE: 08/06/09 WEATHER: ~ 85°F Sunny

MONITORING WELL ID: GWP-15-58 SAMPLE ID: GWP-15-58

Well Diameter): 0.05 in <sup>AS</sup>  
 Total Well Depth (btoc): 60.47 ft  
 Depth to Water (btoc): 47.20 ft  
 Depth to LNAPL/DNAPL (btoc): - ft  
 Depth to Top of Screen (btoc): 56.0 ft  
 Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 12.8 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58.0 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.3 ppm  
Wellbore PID/FID Reading: 0.5 ppm

Pump Type: Monsoon Stainless Steel Submersible Pump *Watera*

[illegible]

Start Time: 1530

Elapsed Time (min): 1:05

Water Quality Meter ID: YSI 6820

Stop Time: 1630

Average Purge Rate (mL/min): 100 mL/min

Date Calibrated: 08/07/09

## SAMPLING DATA

Sample Date: 08/07/09

Sample Time: ~~1640~~ 1630

Lab Analysis: VOC, SVOC

Sample Method: ~~Monsoon / Low Flow~~ Wet Season

Sample Flow Rate (mL/min): 1000 mL/min

QA/QCSamples: \_\_\_\_\_

VOA Vials, No Headspace ☒ Initials: **NS**

**COMMENTS:**

Total Purge Volume: 6000 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salano

MONITORING WELL ID: GWP-16-50 SAMPLE ID: GWP-16-50

INITIAL DATA  
Well Diameter: DD-1.5 in  
Total Well Depth (btoc): 52.0 ft  
Depth to Water (btoc): 45.29 ft  
Depth to LNAPL/DNAPL (btoc): — ft  
Depth to Top of Screen (btoc): 48.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 6.71 ft btoc  
If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoc  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): 1,150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
Ambient PID/FID Reading: 0.1 ppm  
Wellbore PID/FID Reading: 0.3 ppm  
*Purge water jar headspace*

Pump Type: ~~Monsoon Stainless Steel Submersible Pump~~ *Waltera*

[illegible]

Start Time: 0930 Elapsed Time (min): 1:00 Water Quality Meter ID: YSI 6820

Stop Time: 1030 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/07/09

Sample Date: 08/07/09 Sample Time: 1030 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow *Wattera* Sample Flow Rate (mL/min): *100 mL/min* QA/QC Samples: *—*

VOA Vials, No Headspace ☒ Initials: *NS*

COMMENTS: Initial purge rate  $\sim 250$  ml/min to clear silty water from the tubing. Purge rate lowered to 100 ml/min after 6 mins.

Total Purge Volume: 6000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam  
DATE: 08/07/09 WEATHER: ~ 85°F, Sunny  
MONITORING WELL ID: GWP-16-58 SAMPLE ID: GWP-16-58

INITIAL DATA  
Well Diameter: 0.0 - 1.5 in  
Total Well Depth (btoc): 60 ft  
Depth to Water (btoc): 46.03 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 56 ft  
Screen Length: 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 13.97 ft btoe  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58 ft btoe  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoe  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.1 ppm  
Wellbore PID/FID Reading: 0.2 ppm  
headspace jar

**Pump Type:** Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 1055 Elapsed Time (min): 1:05 Water Quality Meter ID: YSI 6820  
Stop Time: 1200 Average Purge Rate (mL/min): 100 mL/hr Date Calibrated: 08/07/09

Sample Date: 08/07/09 Sample Time: 1200 Lab Analysis: VOC, ~~SVOC~~ NS  
 Sample Method: Monsoon / Low Flow Wattera Sample Flow Rate (mL/min): 100 mL / min QA/QC Samples:         
 VOA Vials, No Headspace ☒ Initials: NS

**COMMENTS:**

Total Purge Volume: 7000 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam

DATE: 8/10/09 WEATHER: ~ 89°F, Sunny

MONITORING WELL ID: GWP-17-#50 SAMPLE ID: GWP-17-50

## INITIAL DATA

Well Diameter: 0D - 1.5 in Water Column Height (do not include LNAPL or DNAPL): 7.42 ft btoc  
 Total Well Depth (btoc): 52 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet, Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoc  
 Depth to Water (btoc): 44.58 ft Volume of Flow Through Cell: 1,150 mL  
 Depth to LNAPL/DNAPL (btoc): - ft Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
 Depth to Top of Screen (btoc): 48.0 ft Ambient PID/FID Reading: 0.0 ppm  
 Screen Length: 4.0 ft Wellbore PID/FID Reading: 0.6 ppm  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft, Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoc  
For head space for purge water

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump Klaterna

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
<u>1200</u>	<u>14:22</u>	<u>NA</u>	<u>Light Gray</u>	<u>None</u>	<u>6.05</u>	<u>20.31</u>	<u>1.189</u>	<u>218.0</u>	<u>3</u>	<u>-37.6</u>
<u>1200</u>	<u>15:48</u>	<u>NA</u>	<u>Gray-Brown</u>	<u>None</u>	<u>7.19</u>	<u>23.20</u>	<u>1.294</u>	<u>1129.0</u>	<u>21.86</u>	<u>-70.0</u>
<u>2400</u>	<u>16:00</u>	<u>↓</u>	<u>Gray-Brown</u>	<u>↓</u>	<u>6.19</u>	<u>22.79</u>	<u>1.297</u>	<u>978.0</u>	<u>24.25</u>	<u>-78.0</u>
<u>3600</u>	<u>16:12</u>	<u>↓</u>	<u>↓</u>	<u>↓</u>	<u>6.14</u>	<u>23.63</u>	<u>1.296</u>	<u>1057.0</u>	<u>26.92</u>	<u>-103.6</u>
<u>4800</u>	<u>16:24</u>	<u>↓</u>	<u>Clearing</u>	<u>↓</u>	<u>6.22</u>	<u>20.88</u>	<u>1.272</u>	<u>486</u>	<u>38.15</u>	<u>-111.0</u>
<u>6000</u>	<u>16:38</u>	<u>↓</u>	<u>↓</u>	<u>↓</u>	<u>6.27</u>	<u>21.11</u>	<u>1.268</u>	<u>488</u>	<u>32.99</u>	<u>-117.0</u>

Start Time: 12:45 → 1535 Elapsed Time (min): 1:05 Water Quality Meter ID: YSI 6820  
 Stop Time: 1640 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/10/09

## SAMPLING DATA

Sample Date: 08/10/09 Sample Time: 1640 Lab Analysis: VOC, SVOC NB  
 Sample Method: Monsoon Low Flow Klaterna Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: -  
 VOA Vials, No Headspace ☒ Initials: NB

COMMENTS: Initial purge rate 200 mL/min. Waited for 5 mins for water to clear up. Adjusted purge rate to 100 mL/min. High DO reading probe cleaned and new vial used. Cleaned V@ 16:30  
 Total Purge Volume: 6000 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salas  
DATE: 08/10/09 WEATHER: 80° F, Sunny  
MONITORING WELL ID: GWP-17-58 SAMPLE ID: GWP-17-58

Tar head space  
for purge water

Start Time: 1355 Elapsed Time (min): 1:05 hr Water Quality Meter ID: YSI 6820

Stop Time: 1300 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/10/09

COMMENTS: very high DO readings - cleaned flow through cell and probe @ 1440. Sand deposited on the bottom of flow through cell. Some silt on probe cleaned up.

Total Purge Volume: \_\_\_\_\_ mL

COMMENTS: Initial purge rate set @ 250 mL/min to clear out the silty water from the screen. Issues with flow through cell taking. Flow through cell leakage fixed. DO readings continue to be high.

Total Purge Volume: 8500 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. S. S. S.

MONITORING WELL ID: GWP-18-58 SAMPLE ID: GWP-18-58

Well Diameter): <u>1.5 in</u>	Water Column Height (do not include LNAPL or DNAPL): <u>13.18</u>	ft btoc	Volume of Flow Through Cell): <u>1.150</u>	mL
Total Well Depth (btoc): <u>146.82</u>	If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,		Minimum Purge Volume = (3 x Flow Cell Volume): <u>3.450</u>	mL
Depth to Water (btoc): <u>46.82</u>	Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = <u>58</u>	ft btoc	Ambient PID/FID Reading: <u>0.0</u>	ppm
Depth to LNAPL/DNAPL (btoc): <u>—</u>	If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,		Wellbore PID/FID Reading: <u>0.5</u>	ppm
Depth to Top of Screen (btoc): <u>56</u>	Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = <u>—</u>	ft btoc		
Screen Length): <u>4.0</u>	If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = <u>—</u>	ft btoc		

**Pump Type:** Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 1100 Elapsed Time (min): 1215 1:35 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1215 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 8/11/09

Sample Date: 8/11/09 Sample Time: 1215 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Wattera Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: Field Duplicate  
VOA Vials, No Headspace ☒ Initials: NS GWP-18-58D

**COMMENTS:**

COMMENTS: Initial purge water very silty. <sup>no</sup> Allowed to Purged water at initial flow rate of 250-300 ml/min to clear screen. Commenced water quality measurement 26 mins later. Adjusted flow rate at 100 ml/min

Total Purge Volume: 11050 mL



PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Sotom  
DATE: 08/24/09 WEATHER: N 85° F, Sunny  
MONITORING WELL ID: GWP-19-50 SAMPLE ID: GWP-19-50

Well Diameter): ED 6.5 in  
Total Well Depth (btoc): 52 ft  
Depth to Water (btoc): 43.77 ft  
Depth to LNAPL/DNAPL (btoc): - ft  
Depth to Top of Screen (btoc): 48.0 ft  
Screen Length): 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 8.23 ft btoe

If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50 ft btoe

If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,  
Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = - ft btoe

If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = - ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.0 ppm  
Wellbore PID/FID Reading: 0.7 ppm

Purge water - Tar heads pool

Pump Type: Monsoon Stainless Steel Submersible Pump Wattera

[illegible]

Start Time: 0850 Elapsed Time (min): 1:00 Water Quality Meter ID: YSI 6820  
Stop Time: 0950 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/12/09

Sample Date: 08/12/09 Sample Time: 0950 Lab Analysis: VOC, ~~SVOC~~  
Sample Method: Monsoon / Low Flow Walters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: —  
VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Initial flow rate ~ 300 ml/min to clean out silt inside the screen. Reduced flow rate @ 100 ml/min very high DO readings. Issues with sand/silt depositing inside flow through cell. Cleaned flow through cell three during the purge time. Total Purge Volume: ~ 8000 ml

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Satam  
DATE: 08/12/09 WEATHER: ~ 85°F, Sunny  
MONITORING WELL ID: GWP-19-58 SAMPLE ID: GWP-19-58

Well Diameter: 2.0 in Water Column Height (do not include LNAPL or DNAPL): 15.06 ft btoe  
 Total Well Depth (btoe): 60.0 ft If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Volume of Flow Through Cell: 1,150 mL  
 Depth to Water (btoe): 44.94 ft Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 58.0 ft btoe Minimum Purge Volume = (3 x Flow Cell Volume): 3,450 mL  
 Depth to LNAPL/DNAPL (btoe): — ft If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft, Ambient PID/FID Reading: 0.0 ppm  
 Depth to Top of Screen (btoe): 54.0 ft Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoe Wellbore PID/FID Reading: 0.8 ppm  
 Screen Length: 4.0 ft 56 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoe

**Pump Type:** ~~Monsoon Stainless Steel Submersible Pump~~ *Watera*

[illegible]

Start Time: 1015 Elapsed Time (min): 1:00 hr Water Quality Meter ID: YSI 6820  
Stop Time: 1115 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/12/09

Sample Date: 08/12/09 Sample Time: 1115 Lab Analysis: VOC, SVOC  
Sample Method: Monsoon / Low Flow Walters Sample Flow Rate (mL/min): 100 mL / hr QA/QC Samples: None  
VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Initial purge rate ~300 ml/min to clean off screen. Purge water very silty. Reduced purge rate to ~100 ml/min after connected to flow through cell.

Total Purge Volume: 7800 mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N - Salams  
DATE: 08/12/09 WEATHER: at 85°F, Sunny  
MONITORING WELL ID: GWP-20-50 SAMPLE ID: GWP-20-50

Well Diameter: 0.15 in  
Total Well Depth (btoe): 52.0 ft  
Depth to Water (btoe): 42.93 ft  
Depth to LNAPL/DNAPL (btoe): — ft  
Depth to Top of Screen (btoe): 48.0 ft  
Screen Length: 4.0 ft

Water Column Height (do not include LNAPL or DNAPL): 4.07 ft btoe  
If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet, Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 50.0 ft btoe  
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft, Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoe  
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoe

Volume of Flow Through Cell: 1.150 mL  
Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
Ambient PID/FID Reading: 0.0 ppm  
Wellbore PID/FID Reading: 0.9 ppm

[illegible]

Sample Date: 08/12/09 Sample Time: 1325 Lab Analysis: VOC, ~~SVOC~~ <sup>NS</sup>  
Sample Method: Monsieon / Low Flow Watters Sample Flow Rate (mL/min): 100 mL/min QA/QC Samples: None  
VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Initial purge rate ~300 mL/min to help clear sand/silt from the screen. - Tubing not connected to flow through cell. Purge rate reduced to 100 mL/min after 12 min - Tubing connected to flow through cell. Unusually high DO and turbidity readings after 30 min of purge. <sup>Flow</sup> Water in tubing appears clear. Cleared silt/sand deposit inside <sup>at</sup> flow through cell. Total Purge Volume: mL

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N - Salem

MONITORING WELL ID: GWP-20-58 SAMPLE ID: GWP-20-58

INITIAL DATA

Well Diameter): <u>0.5</u> in	Water Column Height (do not include LNAPL or DNAPL): <u>16.72</u> ft btoc	Volume of Flow Through Cell): <u>1.150</u> mL
Total Well Depth (btoc): <u>60</u> ft	If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,	Minimum Purge Volume = (3 x Flow Cell Volume): <u>3.450</u> mL
Depth to Water (btoc): <u>43.28</u> ft	Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = <u>58</u> ft btoc	Ambient PID/FID Reading: <u>0.0</u> ppm
Depth to LNAPL/DNAPL (btoc): <u>—</u> ft	If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,	Wellbore PID/FID Reading: <u>0.8</u> ppm
Depth to Top of Screen (btoc): <u>56.0</u> ft	Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = <u>—</u> ft btoc	
Screen Length): <u>4.0</u> ft	If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = <u>—</u> ft btoc	

Pump Type: Monsoon Stainless Steel Submersible Pump *Walter*

[illegible]

Start Time: 1350 Elapsed Time (min): 1:10 Water Quality Meter ID: YSI 6820  
Stop Time: 1500 Average Purge Rate (mL/min): 100 mL/min Date Calibrated: 08/12/09

SAMPLE NO. DATA

Sample Date:	08/12/09	Sample Time:	1500	Lab Analysis:	VOC, SVOC <i>ns</i>
Sample Method:	Monsoon / Low Flow - <i>Wattara</i>	Sample Flow Rate (mL/min):	100 mL/min	QA/QC Samples:	<i>None</i>
VOA Vials, No Headspace <input checked="" type="checkbox"/> Initials:	<i>YS</i>				

COMMENTS: Initial purge rate 300 mL/min. Purge water very silty. Allowed to purge for 10 min for sediments clear. Reduced flow rate to 100 mL/min. High DO after 30 min purge. Cleared flow through cell, silt deposit observed at the bottom of flow through cell. Cleared flow through cell @ 1445

Total Purge Volume: 9000 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Kelly Hurst

DATE: 9/3/09 WEATHER: Sunny, 70s

MONITORING WELL ID: GWP-21-34 SAMPLE ID: GWP-21-34

## INITIAL DATA

Well Diameter: 1.5 in  
 Total Well Depth (btoc): 36.00 ft  
 Depth to Water (btoc): 31.50 ft  
 Depth to LNAPL/DNAPL (btoc): — ft  
 Depth to Top of Screen (btoc): 32.00 ft  
 Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 4.50 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is (4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 34.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are (4 ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.1 ppm  
 Wellbore PID/FID Reading: 0.1 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
6,000 *	1000	N/A	light brown	slight hydrocarb	6.33	18.82	1.484	174.1	1.45	-106.7
7,200	1004				6.28	18.82	1.485	138.8	1.14	-109.3
8,400	1008				6.27	18.83	1.485	106.1	1.15	-110.0
9,600	1012			none	6.27	18.80	1.484	76.5	1.39	-112.6
10,800	1016				6.27	18.81	1.485	76.2	1.37	-113.4
12,000	1020				6.27	18.85	1.487	76.7	1.45	-114.3
13,200	1024				6.26	18.78	1.487	69.8	1.53	-115.1
14,400	1028				6.26	18.72	1.487	70.6	1.53	-115.5
15,600	1032				6.26	18.75	1.487	67.1	1.49	-115.8
16,800	1036		colorless		6.26	18.80	1.488	60.5	1.52	-116.0
18,000	1040				6.26	18.98	1.488	54.0	1.60	-116.3
19,200	1044				6.26	19.03	1.489	53.5	1.63	-116.3
20,400	1048				6.26	19.20	1.490	52.4	1.50	-116.5
21,600	1052				6.26	19.33	1.491	53.9	1.62	-116.6
22,800	1056				6.26	19.51	1.493	55.5	1.51	-116.8
24,000	1100				6.26	19.61	1.496	57.6	1.41	-117.0

Start Time: 1000 Elapsed Time (min): 60 min. Water Quality Meter ID: YSI 6820

Stop Time: 1100 Average Purge Rate (mL/min): 300 Date Calibrated: 9/3/09

## SAMPLING DATA

Sample Date: 9/3/09 Sample Time: 1105 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 300 QA/QC Samples: EB before this sample -

VOA Vials, No Headspace ☒ Initials: MC GWP-21-34EB

## COMMENTS:

\* Began taking readings after purge water became sediment-free.

Total Purge Volume: 24,000 mL

# LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: Mike Corbett, Kelly Hurst

DATE: 9/3/09 WEATHER: Sunny, 80°

MONITORING WELL ID: GWP-21-42 SAMPLE ID: GWP-21-42

## INITIAL DATA

Well Diameter: 1.5 in  
 Total Well Depth (btoc): 44.00 ft  
 Depth to Water (btoc): 32.00 ft  
 Depth to LNAPL/DNAPL (btoc): — ft  
 Depth to Top of Screen (btoc): 40.00 ft  
 Screen Length: 4 ft

Water Column Height (do not include LNAPL or DNAPL): 12.00 ft btoc  
 If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,  
 Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = 42.00 ft btoc  
 If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4 ft,  
 Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc  
 If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell: 1.150 mL  
 Minimum Purge Volume = (3 x Flow Cell Volume): 3.450 mL  
 Ambient PID/FID Reading: 0.2 ppm  
 Wellbore PID/FID Reading: 0.2 ppm

## PURGE DATA

Pump Type: Monsoon Stainless Steel Submersible Pump

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)
4,500*	1152	N/A	light brown	hydrocarbon	6.52	20.00	1.546	377.4	0.35	-112.1
5,700	1156				6.53	20.07	1.543	401.3	0.71	-115.4
6,900	1200				6.51	20.15	1.534	296.0	3.13	-122.1
8,100	1204				6.51	20.10	1.533	280.1	1.69	-122.4
9,300	1208				6.51	20.07	1.532	276.2	1.76	-122.6
10,500	1212				6.51	19.96	1.531	286.4	1.81	-123.2
11,700	1216				6.51	19.90	1.529	278.5	1.88	-123.7
12,900	1220				6.51	19.81	1.527	260.4	2.00	-124.4
14,100	1224				6.51	19.83	1.525	239.4	2.20	-124.6
15,300	1228				6.50	19.80	1.524	218.3	2.13	-124.9
16,500	1232				6.50	19.77	1.523	202.6	2.09	-125.0
17,700	1236				6.50	19.80	1.523	197.7	2.34	-125.1
18,900	1240				6.50	19.81	1.523	183.1	2.66	-125.0
20,100	1244				6.50	19.87	1.523	179.4	2.53	-125.0
21,300	1248				6.49	19.92	1.525	159.6	1.90	-125.1
22,500	1252	✓	✓	✓	6.49	19.88	1.524	164.9	2.38	-125.0

Start Time: 1152 Elapsed Time (min): 60 Water Quality Meter ID: YSI 6820

Stop Time: 1252 Average Purge Rate (mL/min): 300 Date Calibrated: 9/3/09

## SAMPLING DATA

Sample Date: 9/3/09 Sample Time: 1300 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow Sample Flow Rate (mL/min): 300 QA/QC Samples: Duplicate - GWP-21-42D

VOA Vials, No Headspace ☒ Initials: MC

## COMMENTS:

\*Began taking readings after purge water became sediment-free.

Total Purge Volume: 22,500 mL



**Monitoring Well  
Development Sheets**

## GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW InvestigationPROJECT NUMBER: 21562175DATE: 10/06/09WEATHER: 116°F rain/showersFIELD PERSONNEL: N. Salam and A. BrooksMONITORING WELL ID: MW-7

## INITIAL DATA

Well Diameter: 8.2 in.Gallons/Lin.Ft': 0.163Ambient PID/FID Reading: 0.1 ppmTotal Depth of Well: 42.31 <sup>N1</sup> 52.73 ft Bottom HardVol. Of Water Column: 1.70 gallonsWellbore PID/FID Reading: 4778 ppmDepth to Water: 42.31 ftVol of water used in drilling - 50 gallon  
Min. Purge Volume: 5(1.70) + 5(50) gallons (2 Volumes)  
250 + 8.53 = 258.53 galLNAPL / DNAPL — ftHeight of Water Column: 10.47 ftDepth to Top of Screen: 43 ft

10.163 gallons/ft for 2 inch well, 0.653 gallons/ft for 4-inch well

## PURGE DATA

Purge Method: Permican

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
26	1435	42.33	Clear	hydrocarbon like	7.19	18.69	1.317	Not recorded	11.12	-41.9
28	1437				6.99	18.22	1.281		9.55	-30.5
30	1439				6.89	18.12	1.273		8.69	-21.5
32	1441				6.86	18.11	1.280		7.46	-20.4
34	1443				6.84	18.09	1.280		7.42	-18.8
36	1445				6.85	18.08	1.275		7.40	-16.3

Start Time: 1227

Purge Stop Time: \_\_\_\_\_

Elapsed Time: \_\_\_\_\_

Total Volume Purged: \_\_\_\_\_ gallons

Average Purge Rate (gallons/min): 1 gal/min

Well Volumes Purged: \_\_\_\_\_

Water Quality Meter ID: \_\_\_\_\_

Calibrated on: 10/06/09

## SAMPLING DATA

Sampling Method: \_\_\_\_\_

Sample Date: \_\_\_\_\_

Sample Time: \_\_\_\_\_

Analysis: \_\_\_\_\_

## COMMENTS:

Water ~50 gal water added during drilling. 250 gallons of water will be purge over addition to  
5 well volumes

## GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW InvestigationPROJECT NUMBER: 21562175DATE: 10/12/09WEATHER: cloudy / rainy 50°FFIELD PERSONNEL: Drew Brook and Nathan McNurtenMONITORING WELL ID: MW-7 (continuation of 10/6/09 Development)

## INITIAL DATA

Well Diameter: 2 in.Gallons/Lin.Ft': 0.163

Ambient PID/FID Reading: \_\_\_\_\_ ppm

Total Depth of Well: ~ 52.78 ftVol. Of Water Column: 1.70 gallons Wellbore PID/FID Reading: \_\_\_\_\_ ppmDepth to Water: ~ 42.31 ftMin. Purge Volume: (see sheet 1) gallons (5 volumes) LNAPL / DNAPL \_\_\_\_\_ ftHeight of Water Column: 10.47 ftDepth to Top of Screen: 43 ft

1 0.163 gallons/ft for 2 inch well, 0.653 gallons/ft for 4-inch well

## PURGE DATA

Purge Method: \_\_\_\_\_

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor <u>yes</u>	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
6	9:15		cloudy	<del>hydrocarbon</del>	6.79	15.71	1.239	-	1.84	-107.5
18	9:25		clear	yes	6.89	16.73	1.253	-	4.11	-138.7
30	9:35		-	yes	6.70	17.01	0.664	-	2.91	-163.6
42	9:45		-	-	6.60	17.55	1.284	-	2.51	-143.4
54	9:55		-	-	6.61	17.71	1.285	-	3.01	-150.0
66	10:05		-	-	6.71	17.11	1.305	-	1.67	-169.0
78	10:15		-	-	6.70	17.45	1.284	-	2.24	-187.5
90	10:25		-	-	6.67	17.58	1.288	-	2.87	-146.9
102	10:35		-	-	6.73	17.47	1.289	-	2.86	-187.0
114	10:45		-	-	6.69	17.31	1.304	-	3.19	-140.6

Start Time: 9:10 Purge Stop Time: 12:25 Elapsed Time: \_\_\_\_\_ Total Volume Purged: \_\_\_\_\_ gallons

Average Purge Rate (gallons/min): \_\_\_\_\_ Well Volumes Purged: \_\_\_\_\_ Water Quality Meter ID: \_\_\_\_\_ Calibrated on: \_\_\_\_\_

## SAMPLING DATA

Sampling Method: \_\_\_\_\_

Sample Date: \_\_\_\_\_ Sample Time: \_\_\_\_\_ Analysis: \_\_\_\_\_

## COMMENTS:

Purging additional 222 gals <sup>(min.)</sup> to reach 5 well volumes per water added during drilling

## GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW PROJECT NUMBER: 21562175  
 DATE: 10/06/09 10/12/09  
 WEATHER: Cloudy / Rain 50°F  
 FIELD PERSONNEL: Drew Brunk and Nathan McNewlen  
 MONITORING WELL ID: MW-1

## INITIAL DATA

Well Diameter: 2 in.  
 Total Depth of Well: 52.78 ft  
 Depth to Water: 242.3 ft  
 Height of Water Column: 10.47 ft  
 1 0.163 gallons/ft for 2 inch well, 0.653 gallons/ft for 4-inch well

Gallons/Lin.Ft': 0.163  
 Vol. Of Water Column: 1.70 gallons  
 Min. Purge Volume: \_\_\_\_\_ gallons (3 volumes)  
 Depth to Top of Screen: 43 ft

Ambient PID/FID Reading: \_\_\_\_\_ ppm  
 Wellbore PID/FID Reading: \_\_\_\_\_ ppm  
 LNAPL / DNAPL \_\_\_\_\_ ft

## PURGE DATA

Purge Method: \_\_\_\_\_

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	DO Turbidity (mg/L) (NTUs)	DO (mg/l)	ORP (mv)
126	1055	NM	Clear	Yes	6.66	13.36	1.294	2.70	2	-130.6
138	1105				6.72	17.66	1.301	3.00		-124.7 -291.7
150	1305				6.60	17.80	1.293	2.79		-173.4
162	1125				6.64	17.88	1.302	1.66		-227.0
174	1135				6.57	18.14	1.302	2.55		-223.4
186	1145				6.50	18.17	1.310	2.73		-248.7
198	1155				6.46	18.11	1.307	2.57		-234.0
210	1205				6.46	18.01	1.301	2.37		-235.6
222	1215				6.56	17.96	1.307	2.30		-245.0
234	1225				6.47	17.77	1.311	1.74		-243.0

Start Time: \_\_\_\_\_ Purge Stop Time: \_\_\_\_\_ Elapsed Time: \_\_\_\_\_ Total Volume Purged: \_\_\_\_\_ gallons  
 Average Purge Rate (gallons/min): \_\_\_\_\_ Well Volumes Purged: \_\_\_\_\_ Water Quality Meter ID: \_\_\_\_\_ Calibrated on: \_\_\_\_\_

## SAMPLING DATA

Sampling Method: \_\_\_\_\_

Sample Date: \_\_\_\_\_ Sample Time: \_\_\_\_\_ Analysis: \_\_\_\_\_

## COMMENTS:

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Pg 2 of 2

## GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Dissolved Phase GW Investigation

PROJECT NUMBER: 21562175

DATE: 10/06/09

WEATHER: N 60°F, Rain

FIELD PERSONNEL: N. Salam and D. Bratko

MONITORING WELL ID: MW-8

## INITIAL DATA

Well Diameter: \_\_\_\_\_ in.

Gallons/Lin.Ft: 0.163

Ambient PID/FID Reading: 0.2 ppm

Total Depth of Well: 43.59 ft (Bottom Handed)

Vol. Of Water Column: 1.69 gallons

Wellbore PID/FID Reading: 9.75 ppm

Depth to Water: 33.20 ft

Min. Purge Volume: 8.4 gallons (5 volumes)

LNAPL / DNAPL: - ft

Height of Water Column: 10.39 ft

Depth to Top of Screen: 37.5 ft bgs

0.163 gallons/ft for 2 inch well, 0.653 gallons/ft for 4-inch well

## PURGE DATA

Purge Method:

Hurricane Pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (umhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
8	1014	33.33	Gray	mild	7.25	17.69	2.892	—	3.46	157.0
10	1016	33.33	Clearing	hydrocarbon	—	17.60	2.905	—	2.91	117.0
12	1018	33.33	Clearing	hydrocarbon	—	17.65	2.930	—	2.93	76.7
		Missed reading	—	attempting to surge well						
14.22	1028	33.33			6.30	17.65	2.463		4.75	3.9
28	1034	33.33			6.32	17.68	2.973		3.45	-3.6
29	1035	33.33			6.30	17.83	2.001		2.46	53.9
30	1036	33.33			6.35	17.80	3.001		2.54	-4.5

Start Time: 1006

Purge Stop Time: 1036

Elapsed Time: 0.5 hr 30 mins Total Volume Purged: \_\_\_\_\_ gallons

Average Purge Rate (gallons/min): 1 gal/min

Well Volumes Purged: 15

Water Quality Meter ID: \_\_\_\_\_ Calibrated on: 10/06/09

## SAMPLING DATA

Sampling Method:

Sample Date:

Sample Time:

Analysis:

## COMMENTS:

Purge water did not appear very silty at the time of starting purge  
 Surge well pump intermittently

Total Well depth - 43.60  
 water level 33.33

stopped pumping on 10/6/09 (will remove additional 55gal that were added during drilling later)

PURGE DATA CONTINUED:

**COMMENTS:**

MENTS:  
Purge rate at 1.5 gal per min  
Sheet 2 for extra amount taken out due to drillers water added



**Monitoring Well  
Sampling Sheets**

PROJECT NAME: Dissolved Phase GW Investigation PROJECT NUMBER: 21562175 FIELD PERSONNEL: N. Salas

DATE: 10/23/09 WEATHER: ~50°F, slight Rain

MONITORING WELL ID: 31N-87 SAMPLE ID: MW-7-102309

Well Diameter): <u>2</u> in	Water Column Height (do not include LNAPL or DNAPL): <u>10.18</u> ft btoc	Volume of Flow Through Cell): <u>1.150</u> mL
Total Well Depth (btoc): <u>52.35</u> ft	If Depth to Top of Screen is > Depth to Water AND Screen Length is < 4 feet,	Minimum Purge Volume = (3 x Flow Cell Volume): <u>3.450</u> mL
Depth to Water (btoc): <u>42.65</u> ft	Place Pump at: Total Well Depth - 0.5 (Screen Length + DNAPL Column Height) = <u>~ 48.0</u> ft btoc	Ambient PID/FID Reading: <u>0.2</u> ppm
Depth to LNAPL/DNAPL (btoc): <u>-</u> ft	If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,	Wellbore PID/FID Reading: <u>2.665</u> ppm
Depth to Top of Screen (btoc): <u>43</u> ft	Place Pump at: Total Well Depth - (0.5 X Water Column Height + DNAPL Column Height) = <u>-</u> ft btoc	
Screen Length): <u>10</u> ft	If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = <u>-</u> ft btoc	

**Pump Type:** Monsoon Stainless Steel Submersible Pump

[illegible]

Start Time: 0915 Elapsed Time (min): 60 min Water Quality Meter ID: YSI 6820

Stop Time: 1030 Average Purge Rate (mL/min): *Initial 225 mL/min* Date Calibrated: 10/23/09

Sample Date: 10/23/09 Sample Time: 1030 Lab Analysis: VOC, SVOC

Sample Method: Monsoon / Low Flow      Sample Flow Rate (mL/min): 200 mL/min      QA/QCSamples: —

VOA Vials, No Headspace ☒ Initials: NS

COMMENTS: Purge stopped - tubing disconnected @ 0925. Restart purge at 0935. Purge rate 250 ml/min. Issues with pencil probe (water level meter) unable to gauge water. Probe giving false tone for water at ~20 ft. Each time pencil probe was suspended down the well. Total Purge Volume: 13000 ml.



**Monitoring Wells**

MW-7

MW-8

**Vapor Monitoring Points**

VMP-1

VMP-2

VMP-3

VMP-4

VMP-5

VMP-6

VMP-7

VMP-8

VMP-9

VMP-10

VMP-11

VMP-12

VMP-13

VMP-14

VMP-15

VMP-16

# **Monitoring Well Construction Diagrams**

**Monitoring Well Installation Details**  
**Flush Mount Monitoring Well Construction Diagram**



Project:	Roxana Dissolved Phase Investigation			Well ID:	MW-7
Project Location:	Roxana, IL	Date Started:	7/9/2009		
Well Location:	Roxana, IL	Date Completed:	7/9/2009	Boring ID:	B-7
Drilling Contractor:	Roberts Environmental Drilling, Inc	Time Seal Set:	1215	Northing:	792024.62
Driller:	P. Seymour	Type of Rig:	CME-75	Easting:	2322181.25
Consulting Firm:	URS Corporation	Drilling Method:	Hollow Stem Auger	Elevation Datum:	443.46
Geologist:	M. Corbett / W. Pennington	Completion Zone:	Main Stratum		

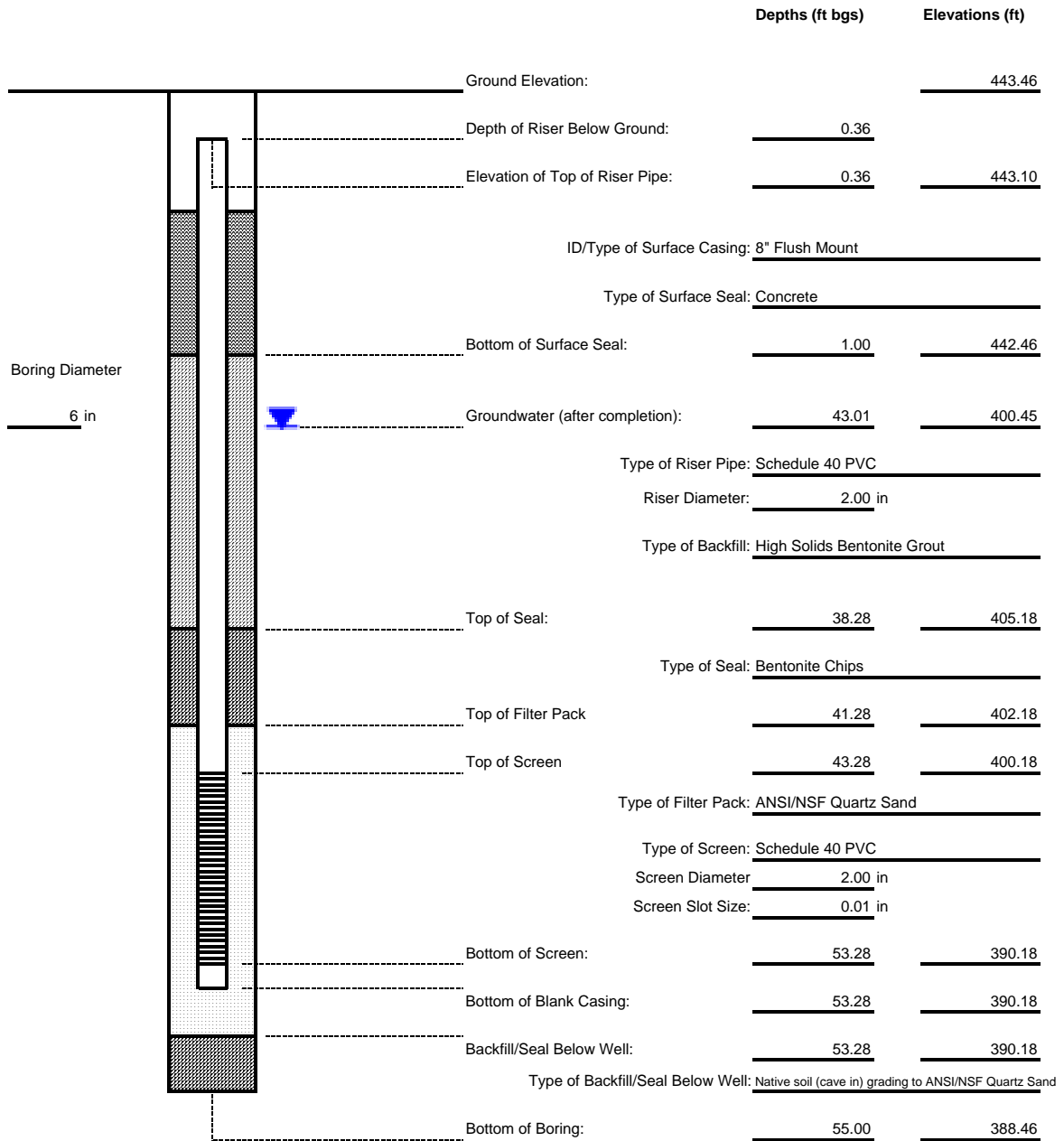


DIAGRAM IS NOT TO SCALE



**Monitoring Well Installation Details**  
**Flush Mount Monitoring Well Construction Diagram**



Project:	Roxana Dissolved Phase Investigation			Well ID:	MW-8
Project Location:	Roxana, IL	Date Started:	7/6/2009		
Well Location:	Roxana, IL	Date Completed:	7/6/2009	Boring ID:	B-8
Drilling Contractor:	Roberts Environmental Drilling, Inc	Time Seal Set:	1615	Northing:	797930.86
Driller:	P. Seymour	Type of Rig:	CME-55	Easting:	2321984.79
Consulting Firm:	URS Corporation	Drilling Method:	Hollow Stem Auger	Elevation Datum:	434.40
Geologist:	W. Pennington / C. Smith	Completion Zone:	Main Stratum		

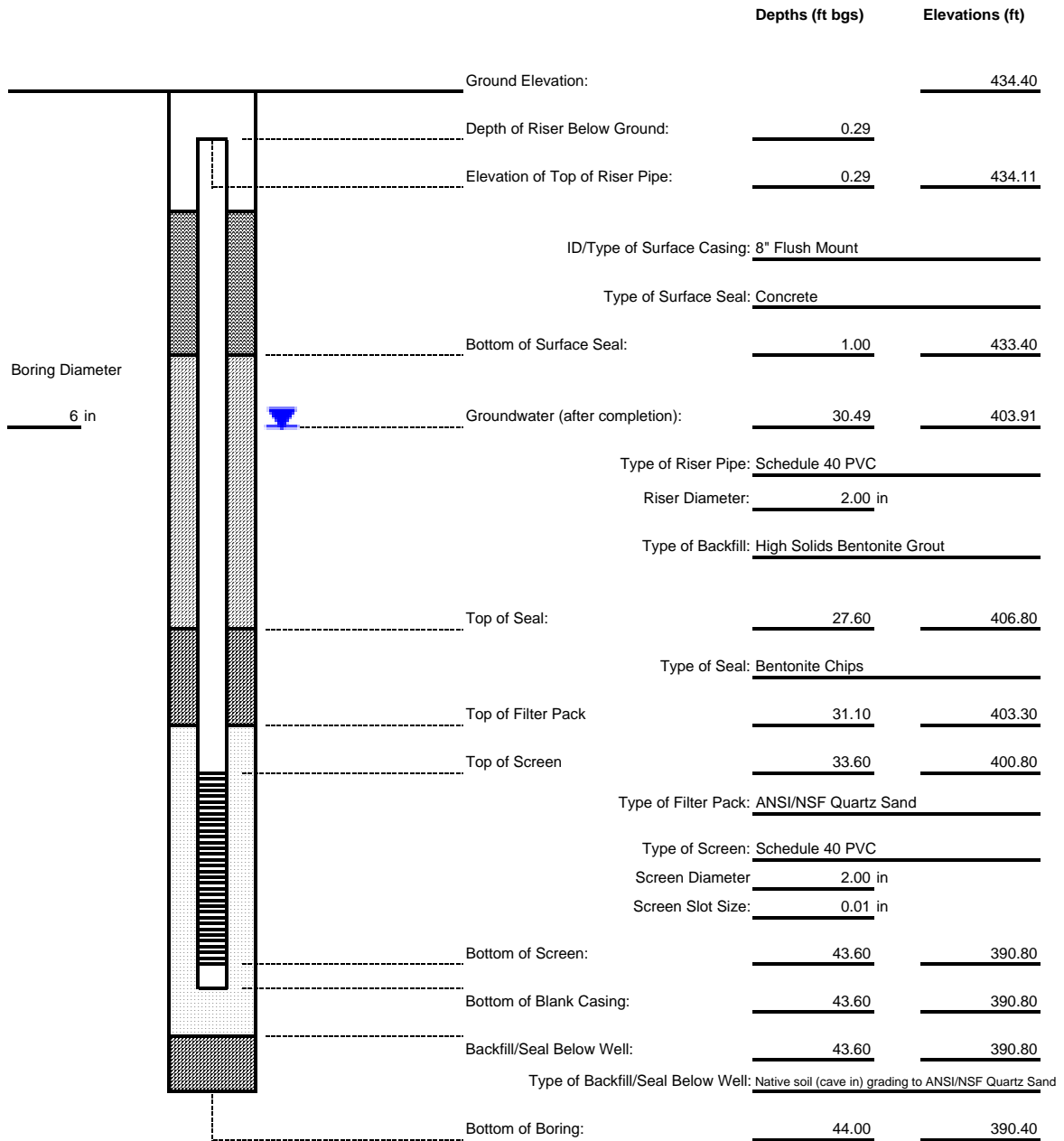


DIAGRAM IS NOT TO SCALE

# **Vapor Monitoring Point Construction Diagrams**

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **443.20**

JOB NUMBER 21562289

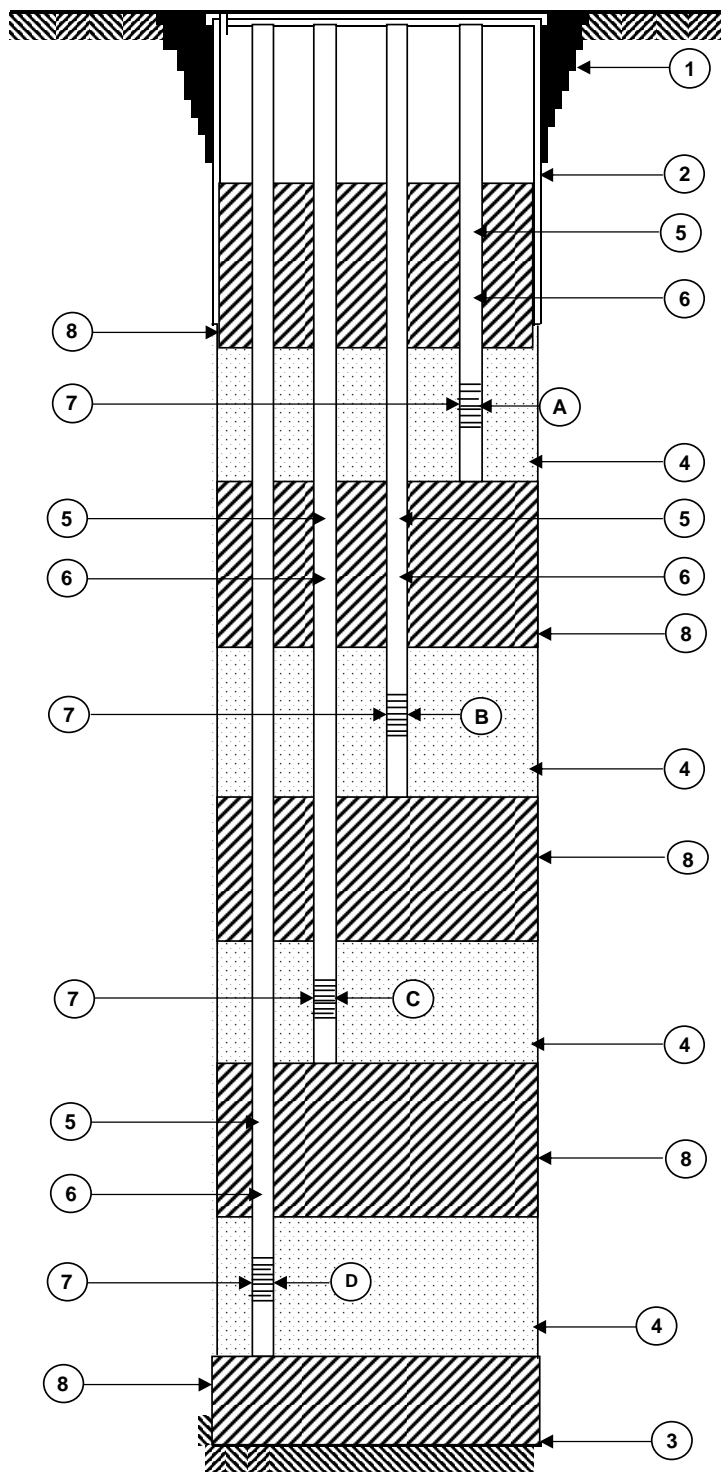
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-1**

DATUM                      1988 USGS

INSTALLATION DATE **7/31/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	9.5	8.0	9.0	8.5	0.5	0.5	0.010
C	24.5	23.0	24.0	23.5	0.5	0.5	0.010
D	39.5	38.0	39.0	38.5	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

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## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **443.56**

JOB NUMBER 21562289

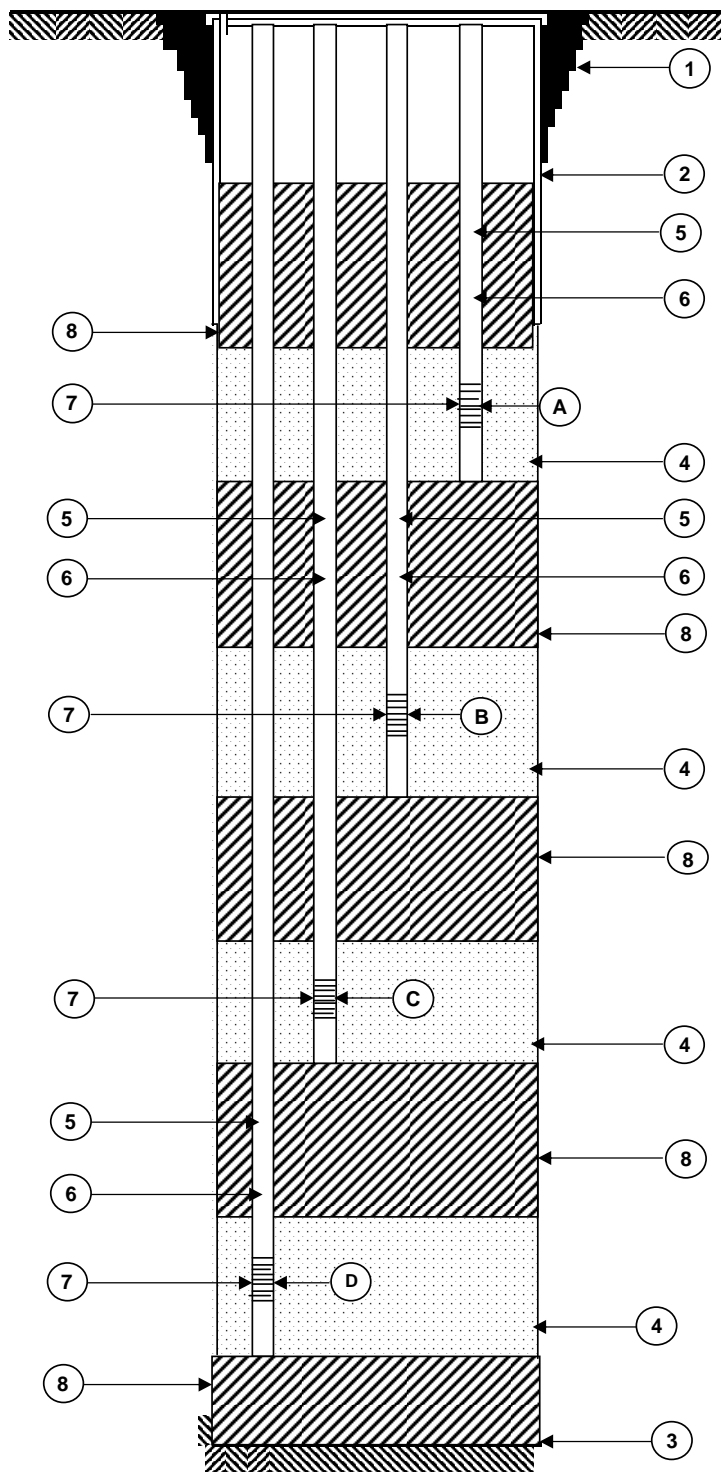
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-2**

DATUM                      1988 USGS

INSTALLATION DATE **7/27/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	9.5	8.0	9.0	8.5	0.5	0.5	0.010
C	23.0	21.5	22.5	22.0	0.5	0.5	0.010
D	43.0	41.5	42.5	42.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>49.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

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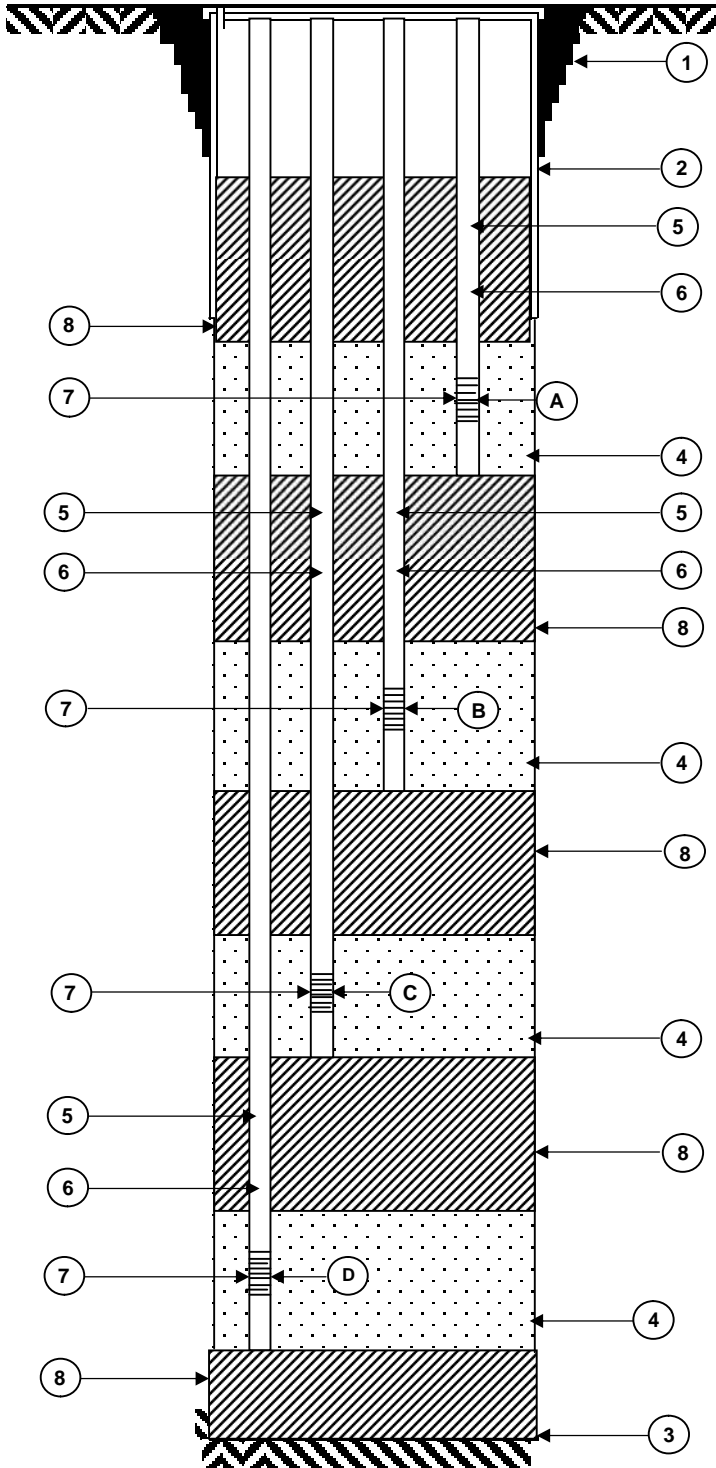
## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) 442.22 JOB NUMBER 21562289

TOP OF INNER WELL CASING ELEVATION	NA	BORING NUMBER	VMP-3
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DATUM	<b>1988 USGS</b>	INSTALLATION DATE	<b>7/29/2009</b>
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LOCATION Roxana, Illinois



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
<b>A</b>	6.0	4.5	5.5	5.0	0.5	0.5	0.010
<b>B</b>	23.0	21.5	22.5	22.0	0.5	0.5	0.010
<b>C</b>	32.5	31.0	32.0	31.5	0.5	0.5	0.010
<b>D</b>	40.0	38.5	39.5	39.0	0.5	0.5	0.010

- |   |                            |   |        |              |
|---|----------------------------|---|--------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO     | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>47.0</u>   | FEET*  |              |
|   |                            | ANSI/NSF  |        |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |        |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |        |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |        |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |        |              |

\* (DEPTH FROM GROUND SURFACE)

NOTES: 1) DRAWING NOT TO SCALE  
2) VMP-3-22 was installed in an adjacent hole due to complications during installation.

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## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **443.09**

JOB NUMBER 21562289

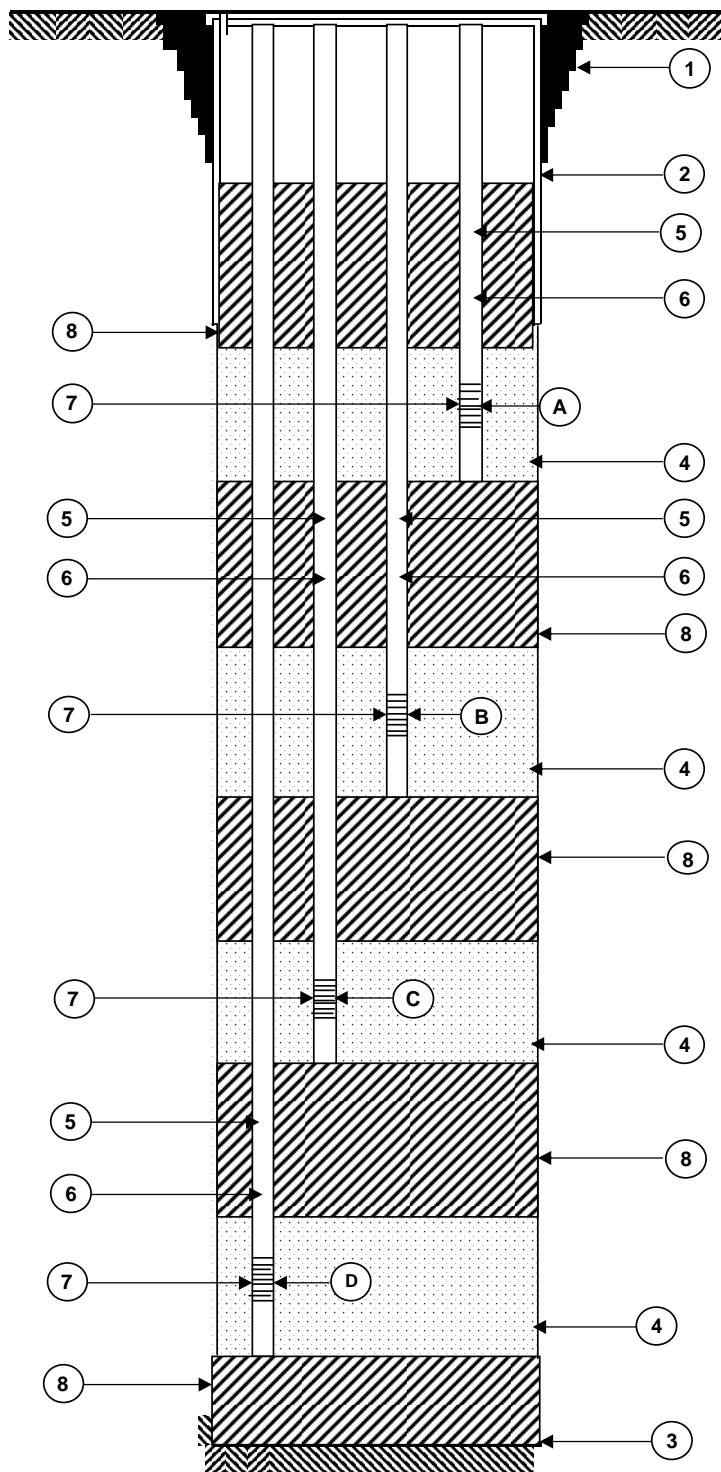
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-4**

DATUM                      1988 USGS

INSTALLATION DATE **8/3/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	13.0	11.5	12.5	12.0	0.5	0.5	0.010
C	24.5	23.0	24.0	23.5	0.5	0.5	0.010
D	40.0	38.5	39.5	39.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

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## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) 444.59

JOB NUMBER 21562289

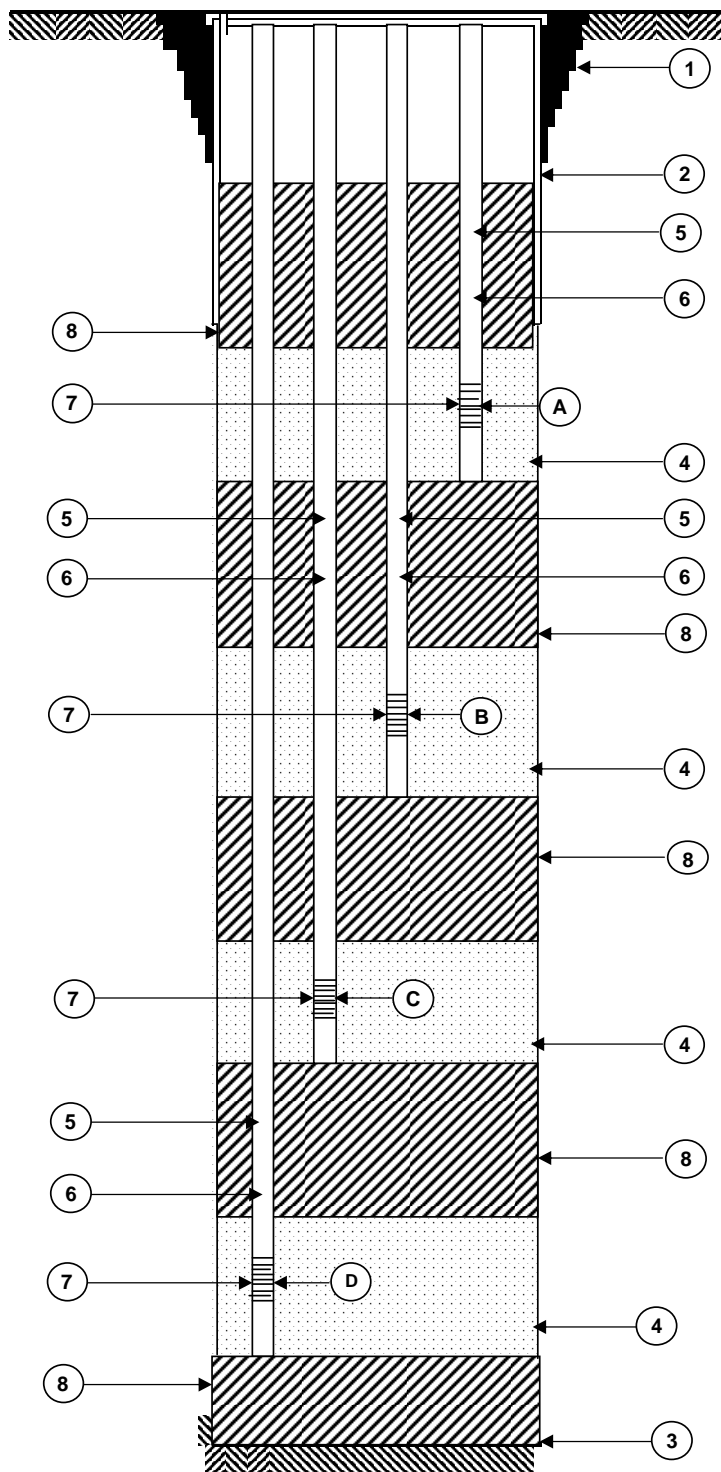
TOP OF INNER WELL CASING ELEVATION NA

BORING NUMBER **VMP-5**

DATUM                      1988 USGS

INSTALLATION DATE **8/4/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	13.5	12.0	13.0	12.5	0.5	0.5	0.010
C	32.0	30.5	31.5	31.0	0.5	0.5	0.010
D	41.0	39.5	40.5	40.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>47.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **444.18**

JOB NUMBER 21562289

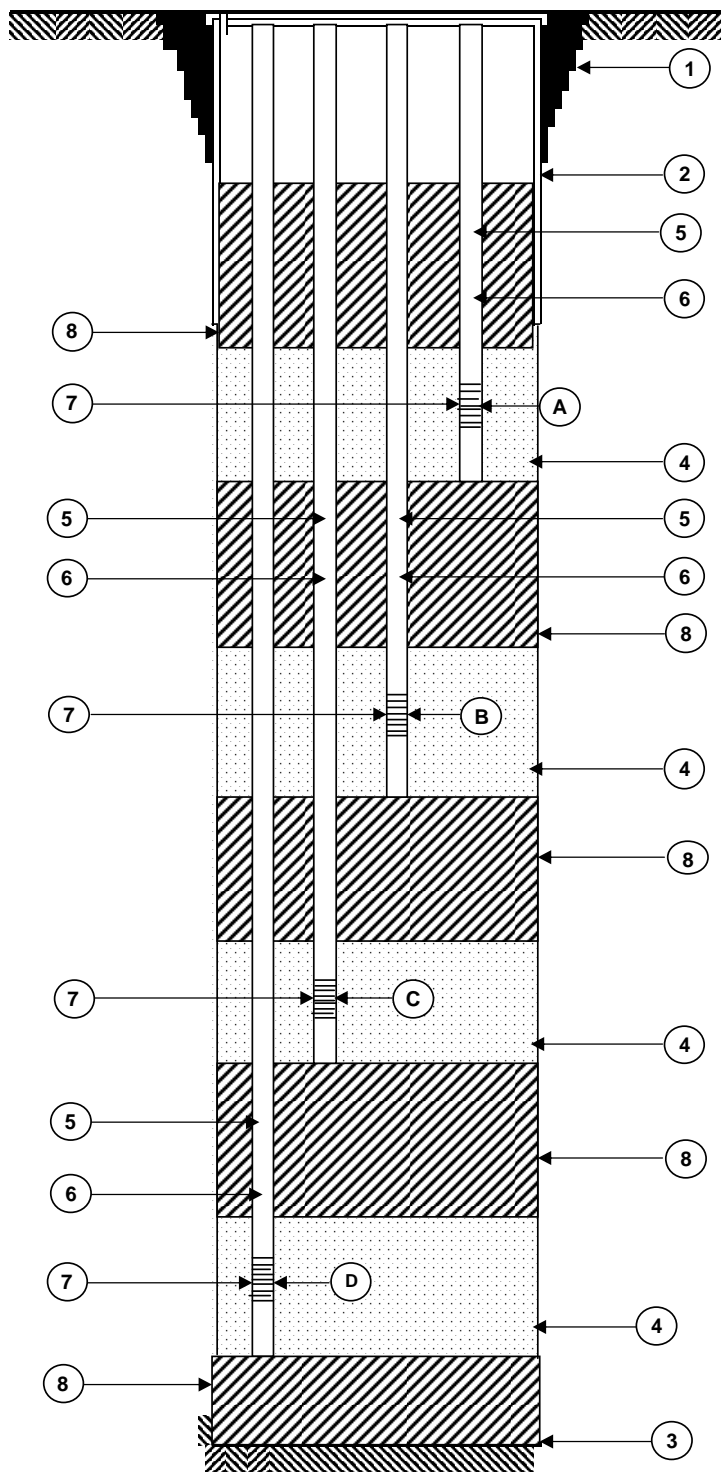
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-6**

DATUM                      1988 USGS

INSTALLATION DATE **8/10/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	11.0	9.5	10.5	10.0	0.5	0.5	0.010
C	32.5	31.0	32.0	31.5	0.5	0.5	0.010
D	40.0	38.5	39.5	39.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **443.68**

JOB NUMBER 21562289

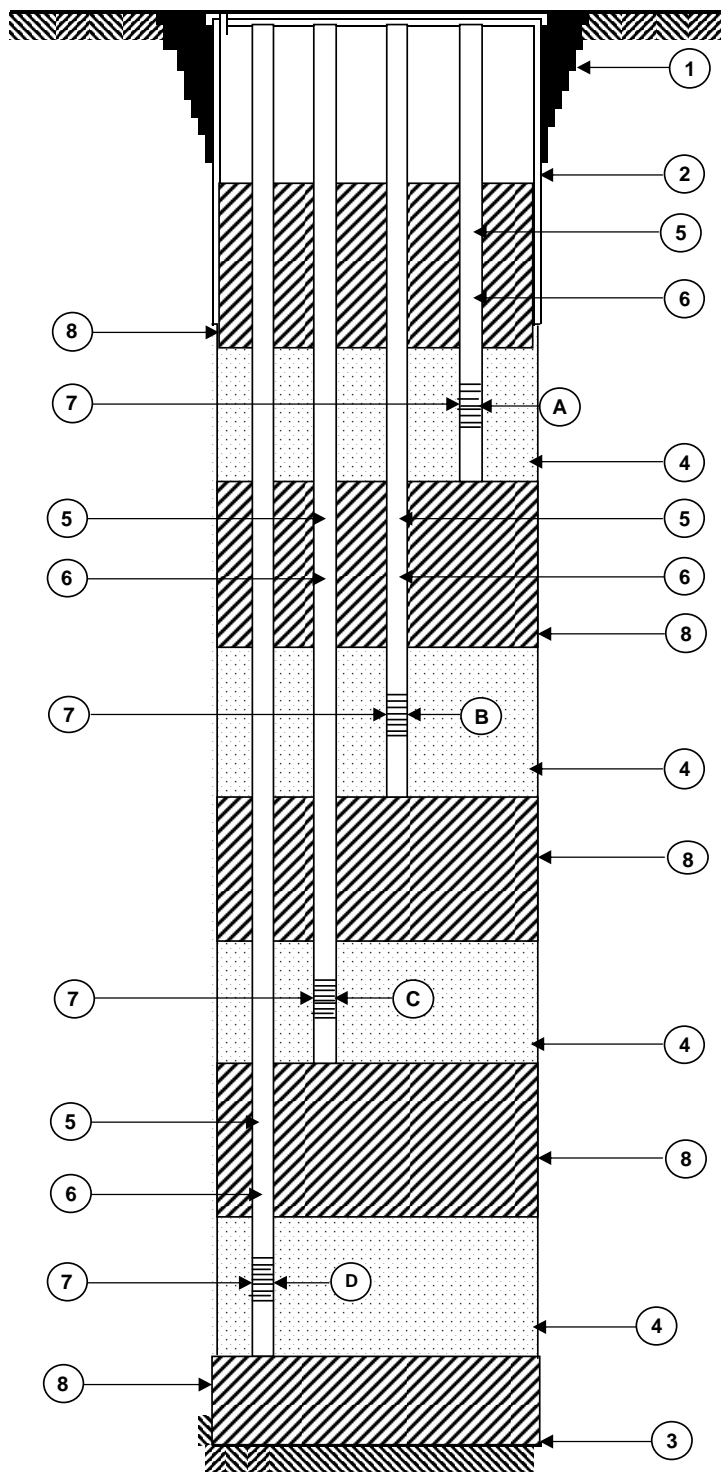
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-7**

DATUM                      1988 USGS

INSTALLATION DATE **8/10/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	14.5	13.0	14.0	13.5	0.5	0.5	0.010
C	30.5	29.0	30.0	29.5	0.5	0.5	0.010
D	39.0	37.5	38.5	38.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **441.65**

JOB NUMBER **21562289**

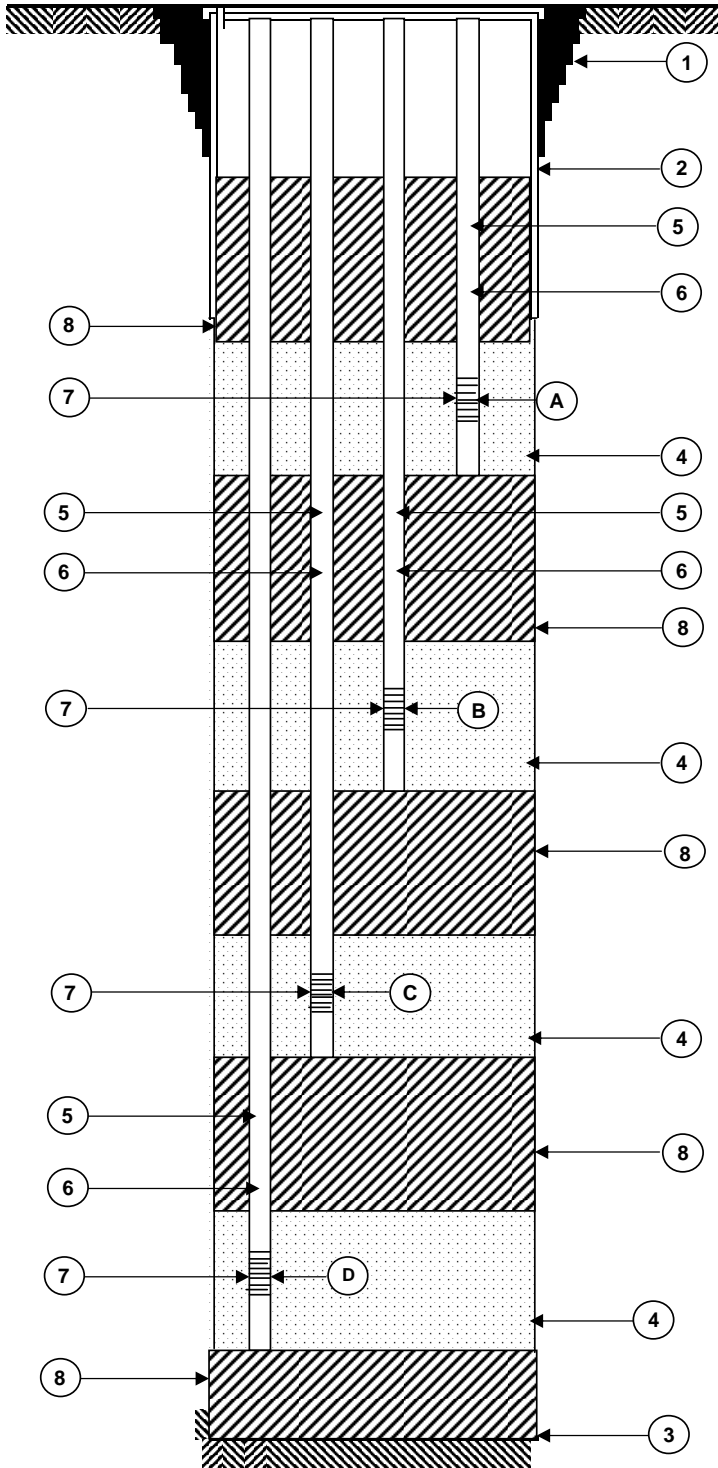
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-8**

DATUM 1988 USGS

INSTALLATION DATE 8/12/2009

LOCATION Roxana, Illinois



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	10.5	9.0	10.0	9.5	0.5	0.5	0.010
C	24.5	23.0	24.0	23.5	0.5	0.5	0.010
D	36.5	35.0	36.0	35.5	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>43.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | <u>Bentonite Chips</u>  |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **444.23**

JOB NUMBER **21562289**

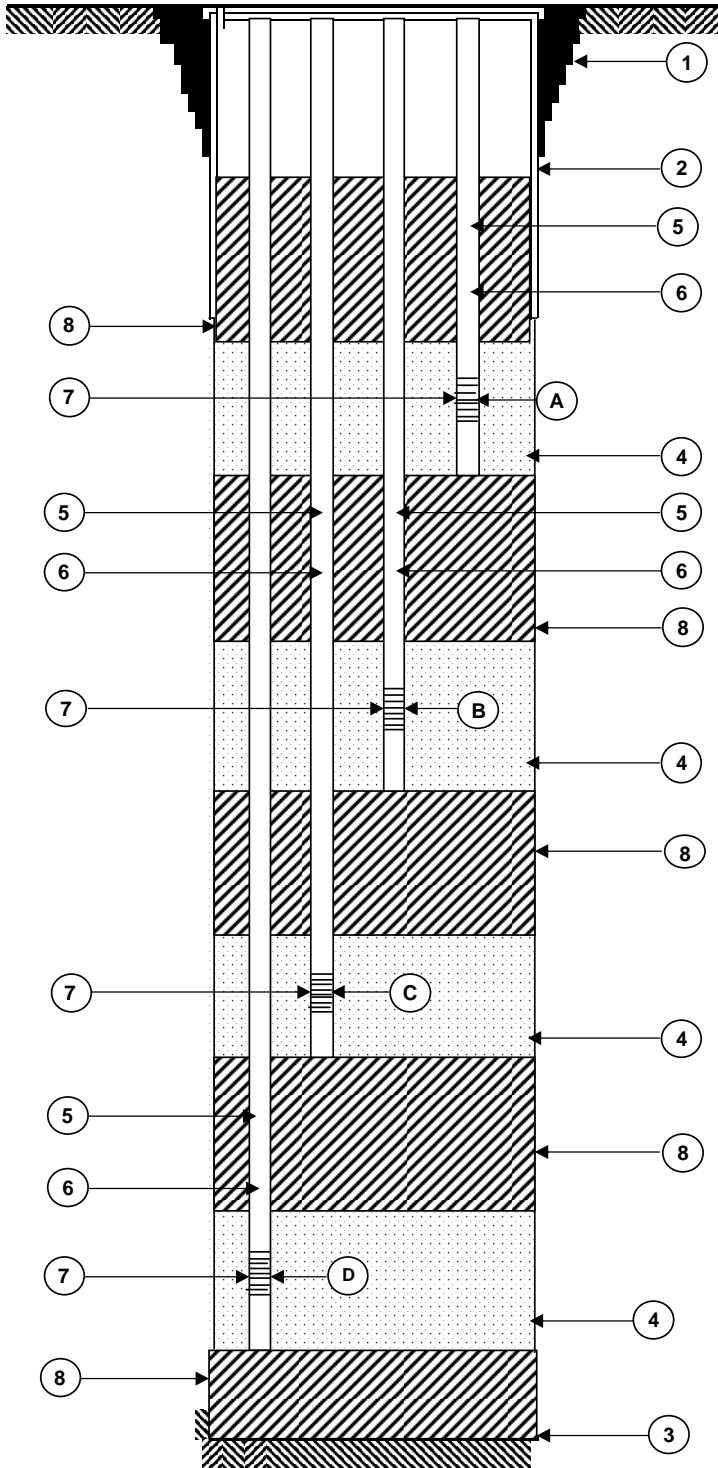
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-9**

DATUM 1988 USGS

INSTALLATION DATE 8/12/2009

LOCATION Roxana, Illinois



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
<b>A</b>	6.0	4.5	5.5	5.0	0.5	0.5	0.010
<b>B</b>	12.5	11.0	12.0	11.5	0.5	0.5	0.010
<b>C</b>	26.5	25.0	26.0	25.5	0.5	0.5	0.010
<b>D</b>	39.5	38.0	39.0	38.5	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | <u>Bentonite Chips</u>  |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **434.72**

JOB NUMBER 21562289

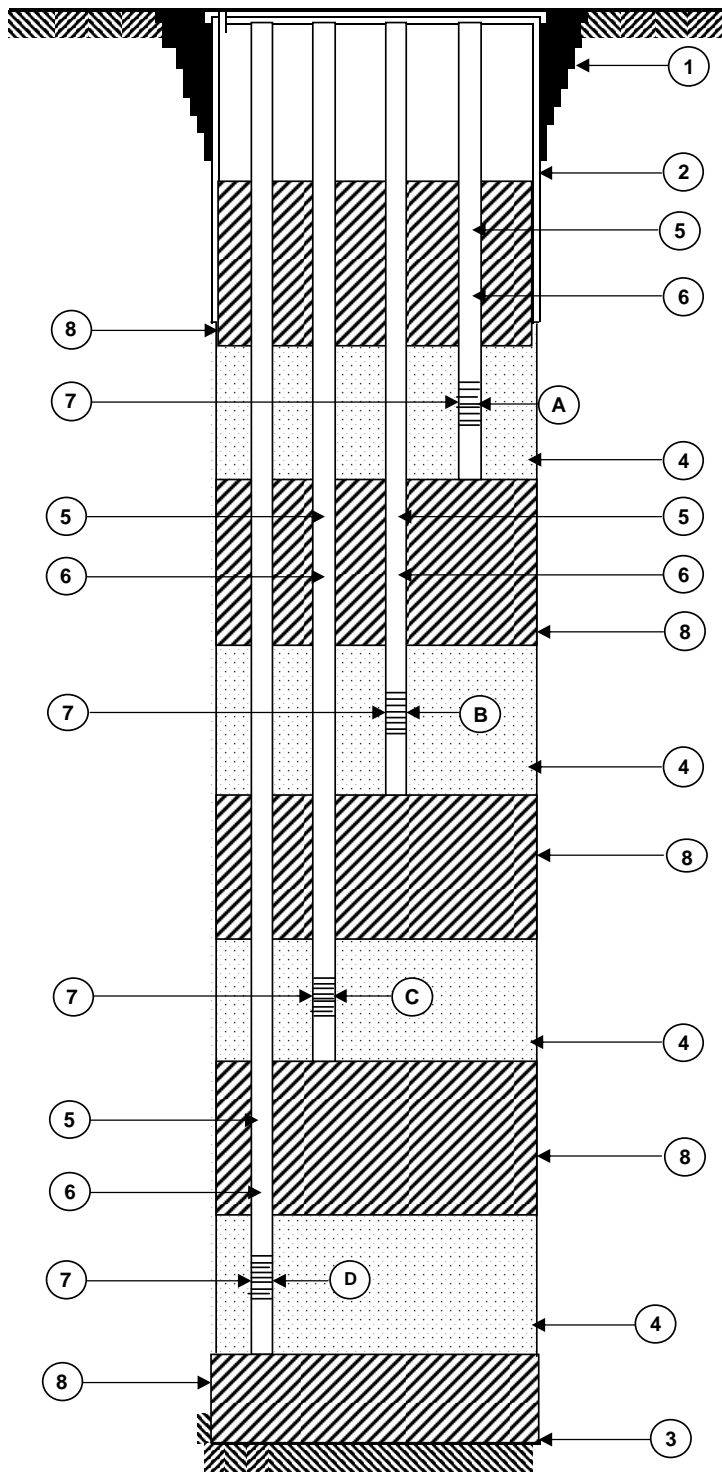
TOP OF INNER WELL CASING ELEVATION NA

BORING NUMBER **VMP-10**

DATUM 1988 USGS

INSTALLATION DATE **7/13/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
<b>A</b>	6.0	4.5	5.5	5.0	0.5	0.5	0.010
<b>B</b>	11.0	9.5	10.5	10.0	0.5	0.5	0.010
<b>C</b>	21.0	19.5	20.5	20.0	0.5	0.5	0.010
<b>D</b>	31.0	29.5	30.5	30.0	0.5	0.5	0.010

- |   |                            |   |        |              |
|---|----------------------------|---|--------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO     | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>37.0</u>   | FEET*  |              |
|   |                            | ANSI/NSF  |        |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |        |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |        |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |        |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |        |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation



## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **443.46**

JOB NUMBER 21562289

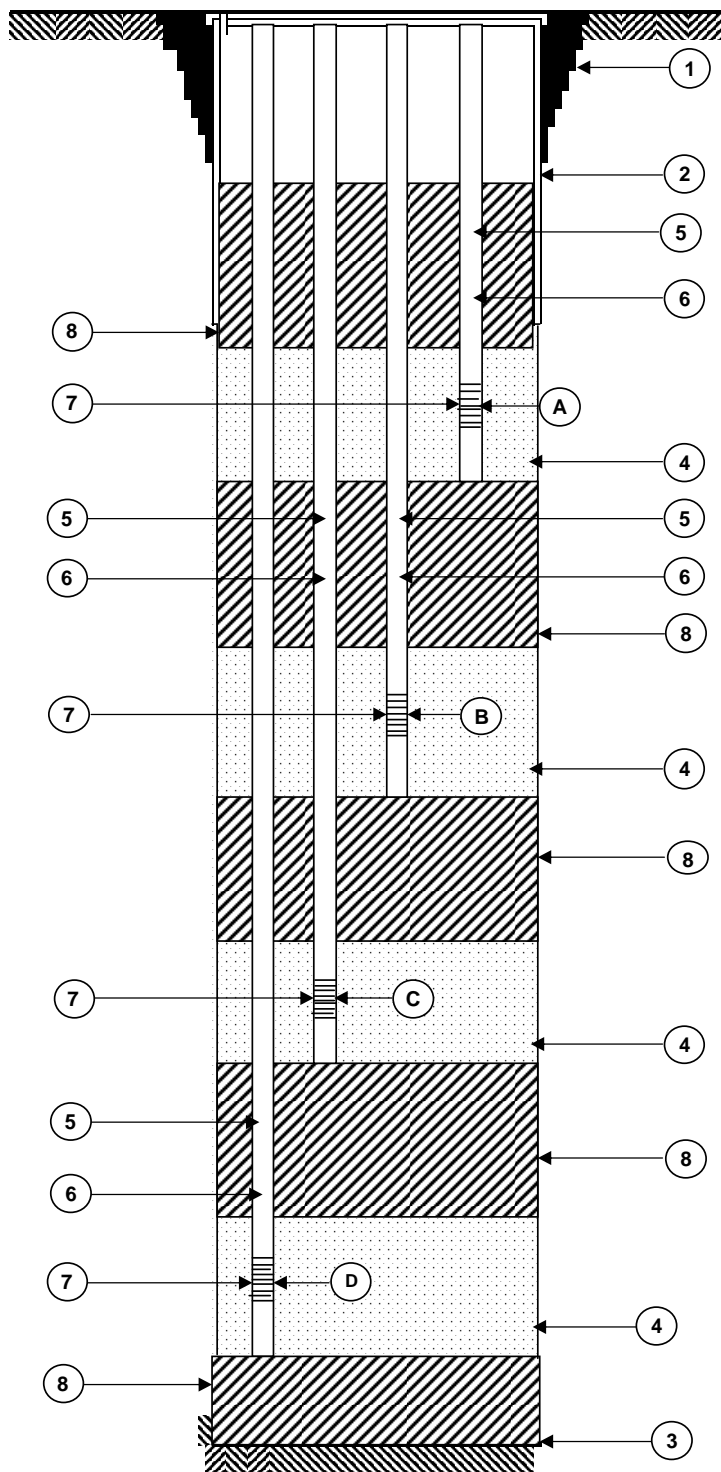
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-11**

DATUM                      1988 USGS

INSTALLATION DATE **7/10/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	9.0	7.5	8.5	8.0	0.5	0.5	0.010
C	30.0	28.5	29.5	29.0	0.5	0.5	0.010
D	39.0	37.5	38.5	38.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>45.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) 444.46

JOB NUMBER 21562289

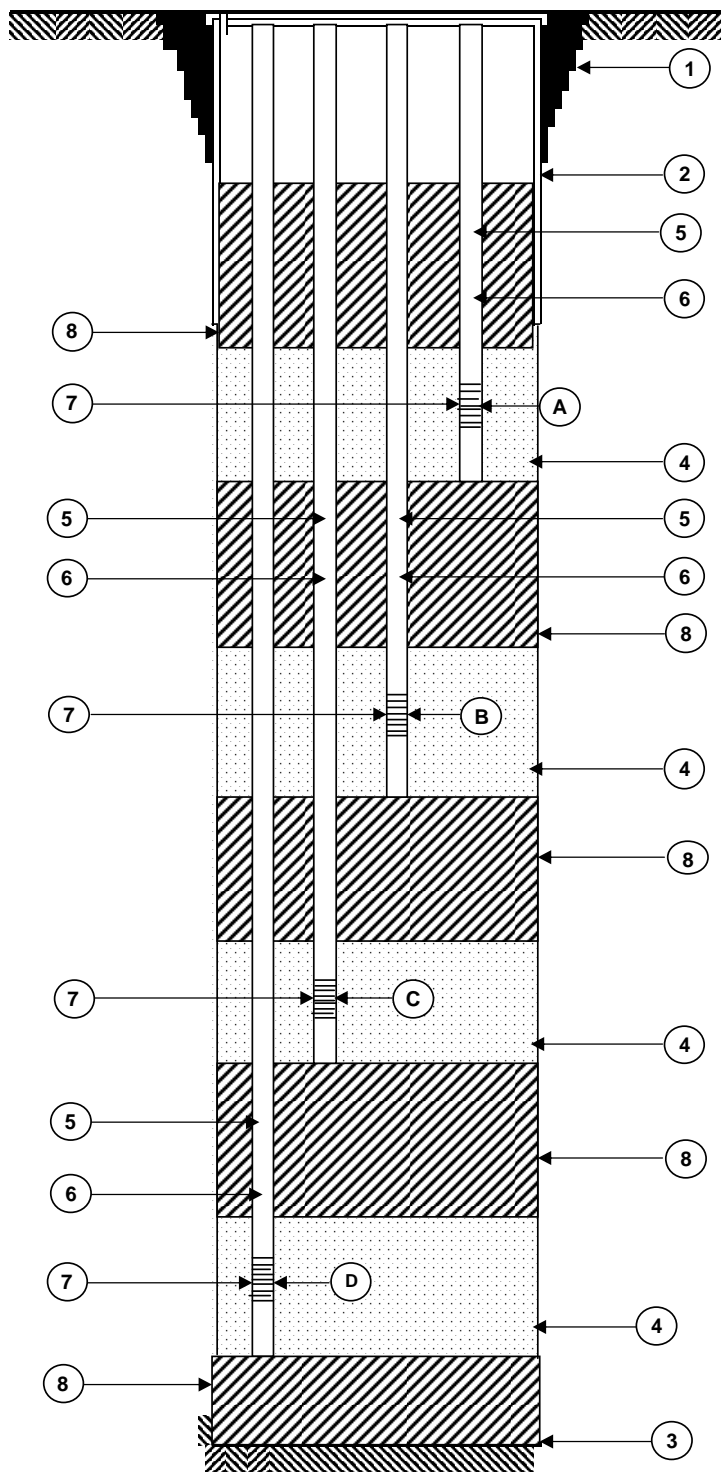
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-12**

DATUM                      1988 USGS

INSTALLATION DATE **7/23/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	12.5	11.0	12.0	11.5	0.5	0.5	0.010
C	26.0	24.5	25.5	25.0	0.5	0.5	0.010
D	40.0	38.5	39.5	39.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>46.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **435.53**

JOB NUMBER 21562289

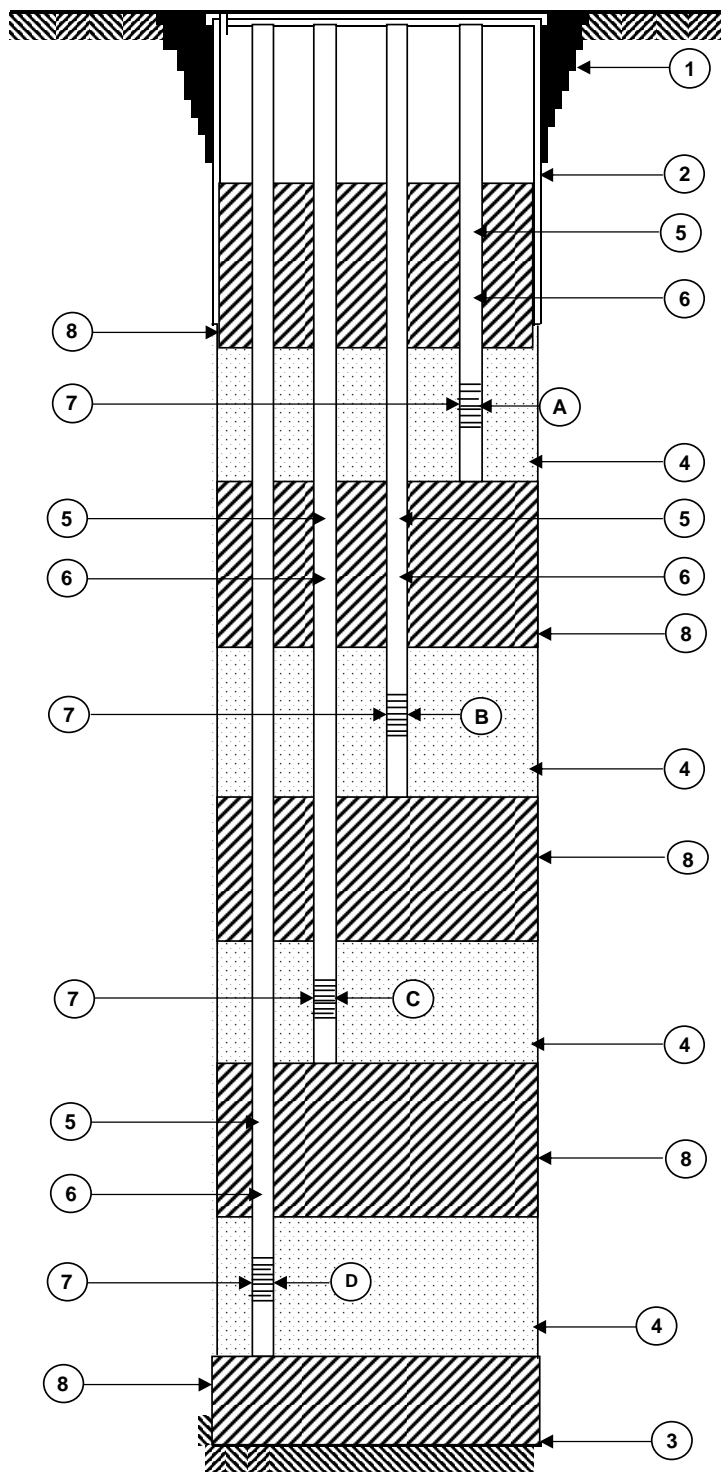
TOP OF INNER WELL CASING ELEVATION **NA**

BORING NUMBER **VMP-13**

DATUM                      1988 USGS

INSTALLATION DATE **7/15/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	11.5	10.0	11.0	10.5	0.5	0.5	0.010
C	22.5	21.0	22.0	21.5	0.5	0.5	0.010
D	30.5	29.0	30.0	29.5	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>35.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

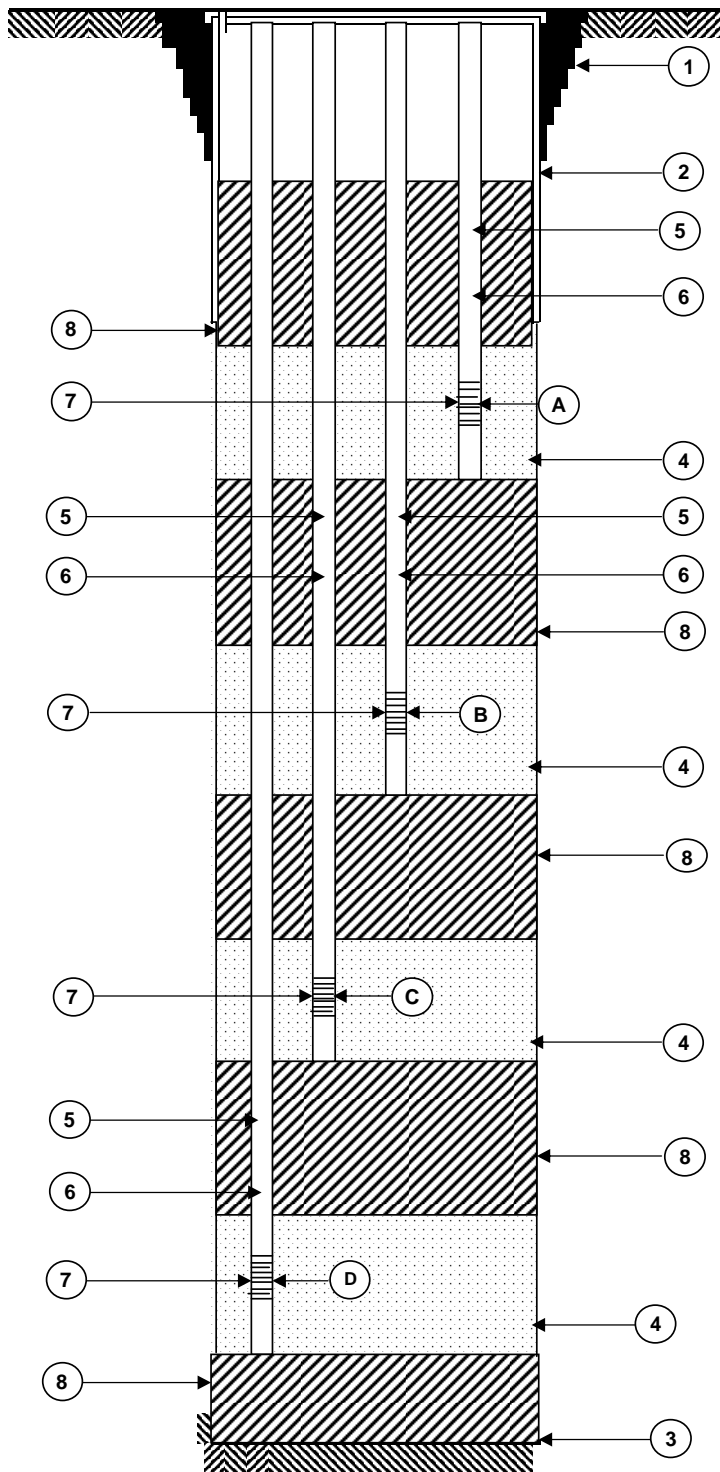
\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

# VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) 434.94 JOB NUMBER 21562289  
 TOP OF INNER WELL CASING ELEVATION NA BORING NUMBER VMP-14  
 DATUM 1988 USGS INSTALLATION DATE 7/14/2009  
 LOCATION Roxana, Illinois



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	12.5	11.0	12.0	11.5	0.5	0.5	0.010
C	21.0	19.5	20.5	20.0	0.5	0.5	0.010
D	30.0	28.5	29.5	29.0	0.5	0.5	0.010

- 1 CONCRETE CAP? ☒ YES ☐ NO (CIRCLE ONE)  
 2 BOREHOLE DIAMETER 8.75 INCHES  
 3 TOTAL DEPTH OF BOREHOLE 35.0 FEET\*  
 4 TYPE OF PACK AROUND SCREEN ANSI/NSF Quartz Sand  
 5 RISER MATERIAL Stainless Steel  
 6 RISER DIAMETER 0.125 INCHES  
 7 SCREEN MATERIAL Stainless Steel  
 8 TYPE OF SEAL Bentonite Chips

\*(DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET), 433.46

JOB NUMBER 21562289

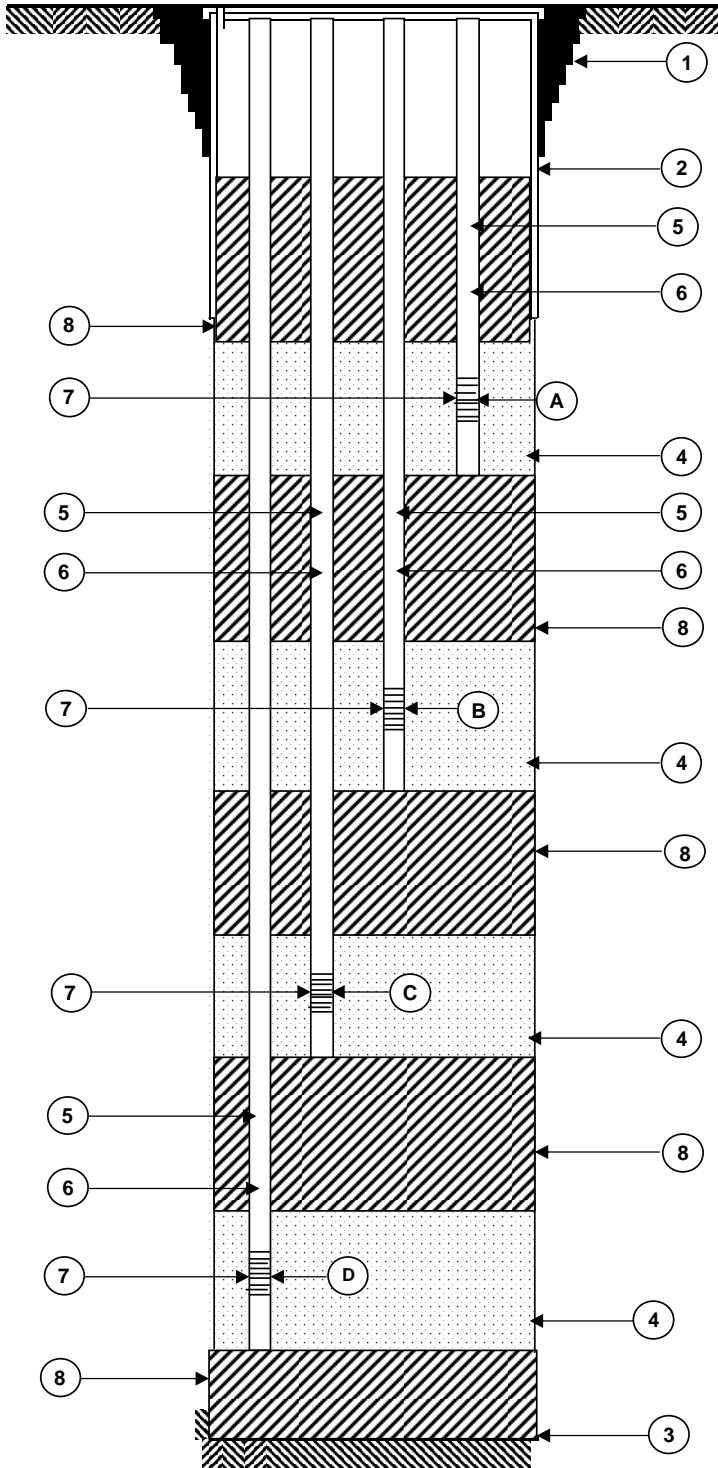
TOP OF INNER WELL CASING ELEVATION	NA
------------------------------------	----

BORING NUMBER VMP-15

DATUM 1988 USGS

INSTALLATION DATE 7/20/2009

LOCATION Roxana, Illinois



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
<b>A</b>	6.0	4.5	5.5	5.0	0.5	0.5	0.010
<b>B</b>	22.5	21.0	22.0	21.5	0.5	0.5	0.010
<b>C</b>	26.5	25.0	26.0	25.5	0.5	0.5	0.010
<b>D</b>	30.0	28.5	29.5	29.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>36.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | <u>Bentonite Chips</u>  |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
Corporation

## VAPOR MONITORING POINT CONSTRUCTION DIAGRAM

GROUND SURFACE ELEVATION (FEET) **436.95**

JOB NUMBER 21562289

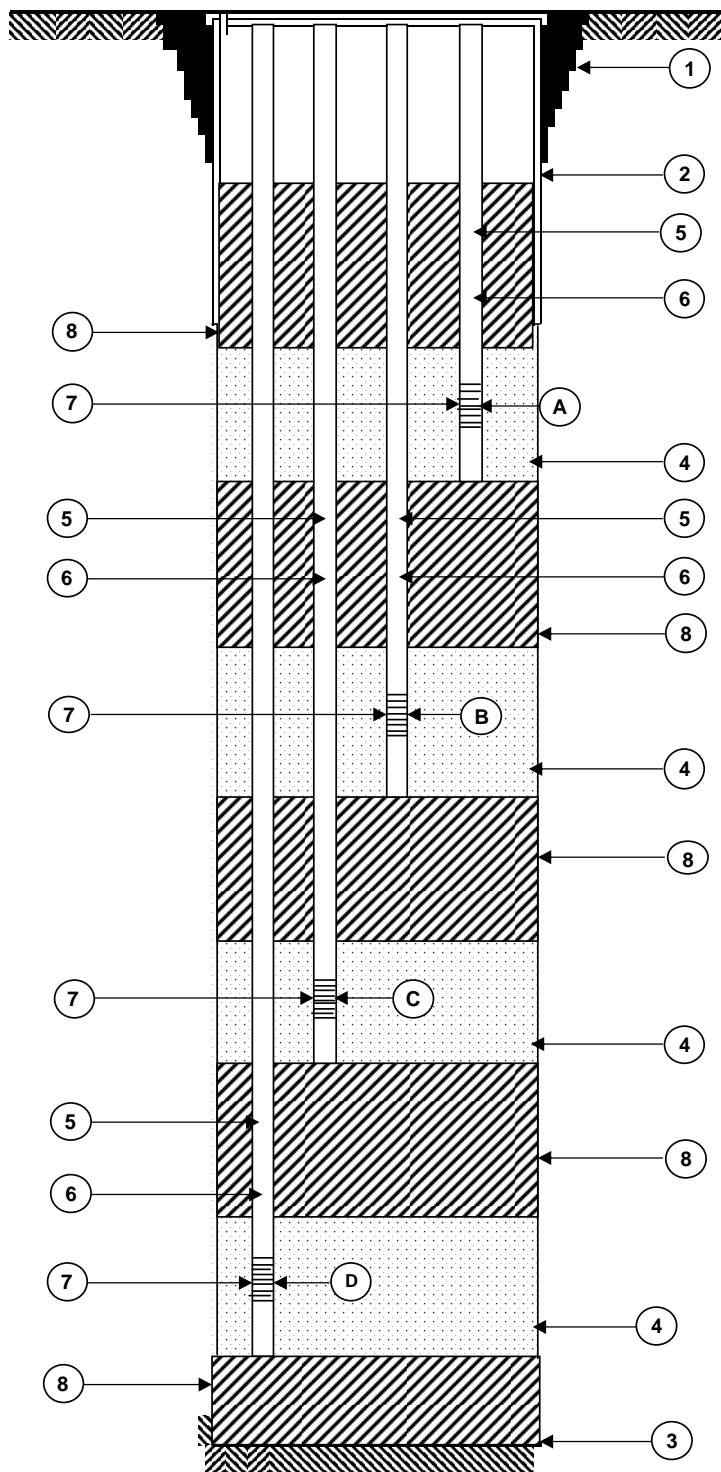
TOP OF INNER WELL CASING ELEVATION NA

BORING NUMBER **VMP-16**

DATUM **1988 USGS**

INSTALLATION DATE **7/22/2009**

LOCATION **Roxana, Illinois**



## VAPOR MONITORING PORT INSTALLATION DETAILS

SCREEN	DEPTH TO BOTTOM OF SAND (FEET*)	DEPTH TO TOP OF SAND (FEET*)	DEPTH TO BOTTOM OF SCREEN (FEET*)	DEPTH TO TOP OF SCREEN (FEET*)	LENGTH OF SCREEN (FEET)	DIAMETER OF SCREEN (INCHES)	SLOT SIZE (INCHES)
A	6.0	4.5	5.5	5.0	0.5	0.5	0.010
B	14.5	13.0	14.0	13.5	0.5	0.5	0.010
C	20.0	18.5	19.5	19.0	0.5	0.5	0.010
D	32.0	30.5	31.5	31.0	0.5	0.5	0.010

- |   |                            |   |          |              |
|---|----------------------------|---|----------|--------------|
| 1 | CONCRETE CAP?              | <div style="border: 1px solid black; padding: 2px;">YES</div> | NO       | (CIRCLE ONE) |
| 2 | BOREHOLE DIAMETER          | <u>8.75</u>   | INCHES   |              |
| 3 | TOTAL DEPTH OF BOREHOLE    | <u>38.0</u>   | FEET*    |              |
|   |                            |   | ANSI/NSF |              |
| 4 | TYPE OF PACK AROUND SCREEN | <u>Quartz Sand</u>  |          |              |
| 5 | RISER MATERIAL             | <u>Stainless Steel</u>  |          |              |
| 6 | RISER DIAMETER             | <u>0.125</u>  | INCHES   |              |
| 7 | SCREEN MATERIAL            | <u>Stainless Steel</u>  |          |              |
| 8 | TYPE OF SEAL               | Bentonite Chips   |          |              |

\* (DEPTH FROM GROUND SURFACE)

NOTE: DRAWING NOT TO SCALE

**URS**  
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**TABLE G-1**  
**SOIL VAPOR DEVELOPMENT & PURGING INFORMATION**

LOCATION	ID	ID Color	Bottom of Screen	Tubing Volume	Sand Pack Volume	Sample Train Volume	Target Development Purge Volume	Actual Development Purge Volume	Target Sampling Purge Volume	Actual Sampling Purge Volume
				mL						
VMP-1	VMP-1-5	yellow	5.5	18.08	18,765	9.65	56,378.18	60,000	83.18	90
	VMP-1-8.5	blue	9	26.51	18,765	9.65	56,403.48	60,000	108.48	120
	VMP-1-23.5	green	24	62.66	18,765	9.65	56,511.93	60,000	216.93	225
	VMP-1-38.5	red	39	98.81	18,765	9.65	56,620.38	70,000	325.38	345
VMP-2	VMP-2-5	yellow	5.5	18.08	18,765	9.65	56,378.18	60,000	83.18	90
	VMP-2-8.5	blue	9	26.51	18,765	9.65	56,403.48	60,000	108.48	120
	VMP-2-22	green	22.5	59.05	18,765	9.65	56,501.09	60,000	206.09	225
	VMP-2-42	red	42.5	107.25	18,765	9.65	56,645.69	62,000	350.69	375
VMP-3	VMP-3-5	yellow	5.5	18.08	18,765	9.65	56,378.18	64,000	83.18	90
	VMP-3-22	blue	22.5	59.05	18,765	9.65	56,501.09	60,000	206.09	225
	VMP-3-31.5	green	32	81.94	18,765	9.65	56,569.77	66,000	274.77	360
	VMP-3-39	red	39.5	100.02	18,765	9.65	56,624.00	80,000	329.00	450
VMP-4	VMP-4-5	yellow	5.5	18.08	18,765	9.65	56,378.18	62,000	83.18	105
	VMP-4-12	blue	12.5	34.95	18,765	9.65	56,428.79	72,000	133.79	150
	VMP-4-23.5	green	24	62.66	18,765	9.65	56,511.93	76,000	216.93	225
	VMP-4-39	red	39.5	100.02	18,765	9.65	56,624.00	82,000	329.00	330
VMP-5	VMP-5-5	yellow	5.5	18.08	18,765	9.65	56,378.18	80,000	83.18	90
	VMP-5-12.5	blue	13	36.15	18,765	9.65	56,432.40	66,000	137.40	165
	VMP-5-31	green	31.5	80.74	18,765	9.65	56,566.16	66,000	271.16	300
	VMP-5-40	red	40.5	102.43	18,765	9.65	56,631.23	68,000	336.23	360
VMP-6	VMP-6-5	yellow	5.5	18.08	18,765	9.65	56,378.18	76,000	83.18	105
	VMP-6-10	blue	10.5	30.13	18,765	9.65	56,414.33	70,000	119.33	135
	VMP-6-31.5	green	32	81.94	18,765	9.65	56,569.77	70,000	274.77	285
	VMP-6-39	red	39.5	100.02	18,765	9.65	56,624.00	74,000	329.00	330
VMP-7	VMP-7-5	yellow	5.5	18.08	18,765	9.65	56,378.18	66,000	83.18	120
	VMP-7-13.5	blue	14	38.56	18,765	9.65	56,439.63	60,000	144.63	165
	VMP-7-29.5	green	30	77.12	18,765	9.65	56,555.31	62,000	260.31	270
	VMP-7-38	red	38.5	97.61	18,765	9.65	56,616.77	88,000	321.77	330
VMP-8	VMP-8-5	yellow	5.5	18.08	18,765	9.65	56,378.18	72,000	83.18	105
	VMP-8-9.5	blue	10	28.92	18,765	9.65	56,410.71	60,000	115.71	120
	VMP-8-23.5	green	24	62.66	18,765	9.65	56,511.93	62,000	216.93	225
	VMP-8-35.5	red	36	91.58	18,765	9.65	56,598.69	72,000	303.69	315
VMP-9	VMP-9-5	yellow	5.5	18.08	18,765	9.65	56,378.18	70,000	83.18	90
	VMP-9-11.5	blue	12	33.74	18,765	9.65	56,425.17	60,000	130.17	150
	VMP-9-25.5	green	26	67.48	18,765	9.65	56,526.39	62,000	231.39	255
	VMP-9-38.5	red	39	98.81	18,765	9.65	56,620.38	64,000	325.38	330
VMP-10	VMP-10-5	yellow	5.5	18.08	18,765	9.65	56,378.18	64,000	83.18	90
	VMP-10-10	blue	10.5	30.13	18,765	9.65	56,414.33	60,000	119.33	120
	VMP-10-20	green	20.5	54.23	18,765	9.65	56,486.63	62,000	191.63	210
	VMP-10-30	red	30.5	78.33	18,765	9.65	56,558.93	60,000	263.93	270
VMP-11	VMP-11-5	yellow	5.5	18.08	18,765	9.65	56,378.18	60,000	83.18	105
	VMP-11-8	blue	8.5	25.31	18,765	9.65	56,399.87	62,000	104.87	120
	VMP-11-29	green	29.5	75.92	18,765	9.65	56,551.70	60,000	256.70	270
	VMP-11-38	red	38.5	97.61	18,765	9.65	56,616.77	60,000	321.77	345
VMP-12	VMP-12-5	yellow	5.5	18.08	18,765	9.65	56,378.18	60,000	83.18	105
	VMP-12-11.5	blue	12	33.74	18,765	9.65	56,425.17	68,000	130.17	135
	VMP-12-25	green	25.5	66.28	18,765	9.65	56,522.78	70,000	227.78	255
	VMP-12-39	red	39.5	100.02	18,765	9.65	56,624.00	66,000	329.00	330
VMP-13	VMP-13-5	yellow	5.5	18.08	18,765	9.65	56,378.18	64,000	83.18	105
	VMP-13-10.5	blue	11	31.33	18,765	9.65	56,417.94	60,000	122.94	135
	VMP-13-21.5	green	22	57.84	18,765	9.65	56,497.47	60,000	202.47	210
	VMP-13-29.5	red	30	77.12	18,765	9.65	56,555.31	60,000	260.31	300
VMP-14	VMP-14-5	yellow	5.5	18.08	18,765	9.65	56,378.18	80,000	83.18	90
	VMP-14-11.5	blue	12	33.74	18,765	9.65	56,425.17	70,000	130.17	135
	VMP-14-20	green	20.5	54.23	18,765	9.65	56,486.63	70,000	191.63	195
	VMP-14-29	red	29.5	75.92	18,765	9.65	56,551.70	80,000	256.70	285
VMP-15	VMP-15-5	yellow	5.5	18.08	18,765	9.65	56,378.18	60,000	83.18	105
	VMP-15-21.5	blue	22	57.84	18,765	9.65	56,497.47	66,000	202.47	225
	VMP-15-25.5	green	26	67.48	18,765	9.65	56,526.39	66,000	231.39	255
	VMP-15-29	red	29.5	75.92	18,765	9.65	56,551.70	64,000	256.70	285
VMP-16	VMP-16-5	yellow	5.5	18.08	18,765	9.65	56,378.18	72,000	83.18	105
	VMP-16-13.5	blue	14	38.56	18,765	9.65	56,439.63	66,000	144.63	180
	VMP-16-19	green	19.5	51.82	18,765	9.65	56,479.40	60,000	184.40	210
	VMP-16-31	red	31.5	80.74	18,765	9.65	56,566.16	66,000	271.16	300

**NOTES:**

- 1) The sand pack volume shown on this table is the volume of the entire sand pack, not just the pore space volume within the sand pack.
- 2) The target development purge volume is equal to 3 times the combined volume of the port tubing, sand pack, and sample train.
- 3) The target sampling purge volume is equal to 3 times the combined volume of the port tubing and sample train.

## **SOP No. 44**

# **Soil Vapor Purging and Sampling**

**1. Objective**

This document defines the standard operating procedure (SOP) and necessary equipment for collection of soil vapor samples from vapor monitoring point sampling ports using Summa canisters.

SOPs providing additional related guidance are listed below:

- SOP No. 3 – Calibration and Maintenance of Field Instruments
- SOP No. 4 – Decontamination
- SOP No. 8 – Field Reporting and Documentation.
- SOP No. 24 – Sample Classification, Packaging and Shipping (DOT)
- SOP No. 25 – Sample Containers, Preservation, and Holding Times
- SOP No. 26 – Sample Control and Custody Procedures.

**2. Equipment**

Personnel implementing this guideline must ensure that the following are in place:

- Field book
- Disposable nitrile gloves
- Ultra-fine permanent marker
- Paper towels or Kimwipes
- Calculator
- Decontamination equipment
- Soil vapor sampling logs
- Small brush or broom
- Plastic sheeting
- 15 mL hand pump with gauge
- Peristaltic pump
- Rotometer or equivalent
- PID and 4-gas meter (e.g., Mini-RAE, QRAE)
- Summa canisters with flow controllers (supplied by the laboratory)
- Tedlar bags
- Swagelok<sup>®</sup> T-Connectors (2) – 1/4" ID

- Swagelok<sup>®</sup> Ball Valves (3) – ¼” ID
- Swagelok<sup>®</sup> Barb Connectors (2) – ¼” ID
- Swagelok<sup>®</sup> Port Connectors (4) – ¼” ID
- Swagelok<sup>®</sup> Ferrules – ¼” ID
- Swagelok<sup>®</sup> Nuts – ¼” ID
- Teflon<sup>®</sup> tubing (food- or laboratory-grade)
- Tygon<sup>®</sup> tubing (food- or laboratory-grade)
- Tracer gas
- Tracer gas shroud (e.g., plastic tote)
- Tracer gas meter (e.g., Dielectric Technologies MGD-2002)
- Watch or timer
- Standard field tools (e.g., ratchet set, safety cutting tools, pry bar, etc.)
- Shipping supplies (e.g., UN boxes, shipping labels, hazard labels, packing tape)

### **3. Sampling**

1. Open vapor point vault to check integrity of individual soil vapor monitoring port(s) (VMP). Each port should be closed with it's cap in place
2. Perform Summa Canister Vacuum Check, per the steps listed in **Section 4** of this SOP.
3. Remove port cap and set up the sample train configuration as shown in **Figure 1**. Teflon<sup>®</sup> tubing will be connected directly using Swagelok<sup>®</sup> ferrule connections. The flow controller (one for each Summa canister provided by the laboratory) will be connected to the Summa canister inlet. **Do not reuse flow controllers** between locations. Each flow controller is pre-set by the laboratory to collect the sample over a half-hour period. Flow controllers can be set to a different rate if desired by project, depending on size of container to be filled. For a 1-Liter Summa canister, a half-hour is a standard collection time (~33 ml/min).
4. Perform Sample Train Leak Check, per the steps listed in **Section 4** of this SOP.
5. Calculate Purge volume:
  - Vapor Port tubing (1/8-in diameter): 2.41 mL/foot (single volume)
  - Sample train assembly (1/4-in diameter): 9.65 mL/foot (single volume)
  - Sand Pack: 18,765 mL (4.95 gallons) (single volume)

6. Open Valve #1 and Valve #2 to purge the appropriate volume from the vapor monitoring port.
  - If the port has been newly installed, the port must first be developed by purging 3 volumes of the sampling assembly including 3 volumes of the sand pack using a peristaltic pump (or equivalent) at a calibrated rate of not more than 2 L/min.
  - If the port has previously been developed, purge 3 volumes from VMP using the 15 mL hand pump. If the pump pulls back and purge cannot be completed, the VMP screen may be saturated with water and will not yield a representative sample. If this happens, do not sample the VMP. Similarly, if water is pulled out during the purge, do not sample the VMP.
7. Connect peristaltic pump to the purge tubing at Valve #2 to collect a sample in a Tedlar bag. The Tedlar bag should be filled at a rate no faster than 200 ml/min.
8. From the soil vapor in the Tedlar bag obtain readings for helium with helium gas detector.
9. Close Valve #2.
10. Open Summa canister valve completely and record the time.
11. After half-hour, or if the vacuum gauge reading drops below 5 inches Hg before a half-hour, close the Summa canister valve completely. Record the time. Vacuum gauge should not be allowed to drop below 2 inches of Hg.
12. Connect peristaltic pump to the purge tubing and open Valve #3 to collect a sample in a Tedlar bag. Tedlar bag should be filled at a rate no faster than 200 ml/min.
13. From the soil vapor in the Tedlar bag obtain readings for total volatile organics with a photoionization detector (PID), for H<sub>2</sub>S, CO, oxygen (O<sub>2</sub>), and lower explosive limit (% CH<sub>4</sub>) with a 4-gas meter. Record readings, and for helium with helium gas detector.
14. Disassemble the sample train. Replace Swagelok<sup>®</sup> plug on the vapor monitoring port.
15. Perform Summa canister vacuum check, per the steps listed in **Section 4** of this SOP.
16. Replace vapor point vault cover or move to next depth.
17. Decontaminate any non-designated equipment (e.g., Swagelok<sup>®</sup> connectors and valves) following procedures listed in **Section 5**.



**4. *Quality Control***

Quality control procedures have been developed to verify equipment integrity, sample quality, and sample repeatability.

In addition to the procedures listed below, the following items are also of concern:

- Care should be taken to keep all sampling equipment, especially the Summa canisters, safe from damage.
- No samples are to be collected in an area where vehicle or other equipment exhaust is being discharged.

**Field Duplicates**

A field duplicate will be collected for 10% of the samples collected.

Field duplicates are collected by attaching a T-fitting to the end of the tubing prior to the flow controller. A Summa canister with a flow controller is attached to each end of the T-fitting. For sampling, both Summa canister valves are opened and closed simultaneously. Use the procedure described above to collect samples.

**Summa Canister Vacuum Check**

The Summa canister vacuum check will be performed for 100% of the Summa canisters.

**Prior to Sampling**

1. Attach the pressure gauge provided by the laboratory to the Summa canister inlet.
2. Open valve completely.
3. Record reading. The canister should show a vacuum of approximately 28 inches of mercury (Hg). If the canister does not show a vacuum or shows a vacuum of less than 25 inches of Hg, discard the canister.
4. Close valve completely.
5. Remove the pressure gauge.

**After Sampling**

1. Attach the pressure gauge provided by the laboratory to the Summa canister inlet.
2. Open valve completely.

3. Record reading. There should still be a slight vacuum in the Summa canister. If the canister does not show a significant net loss in vacuum after sampling, evaluate and document the problem. If necessary, contact the project manager immediately to determine the value of using another Summa canister to recollect the sample.
4. Close valve completely.
5. Remove the pressure gauge.

### **Sample Train Vacuum Leak Check**

The sample train leak check will be performed for 100% of the samples collected.

1. Assemble the sampling apparatus as shown in **Figure 1** from Valve 1 forward.
2. Keep the Summa canister, Valve #1 and Valve #3 in the “off” or “closed” position. Valve #2 should be in the “open” position.
3. Attach the 15 mL hand pump to sample train where indicated.
4. Withdraw air from the sampling apparatus until a vacuum of at least 10 inches Hg is achieved. Observe the induced vacuum for at least five minutes.
5. If the change in vacuum over five minutes is equal to or less than 0.5 inch Hg, the system leak rate is acceptable.
6. If the change in vacuum over five minutes is greater than 0.5 inch Hg, check, tighten or replace the fittings and connections and repeat the leak check.

### **Helium Leak Check**

Ten percent of the samples will be collected using a tracer compound.

1. A helium tracer gas should be introduced near the VMP to test the integrity of the probe seal and the above ground connections.
2. Place a clear plastic enclosure of  $\geq 40\text{L}$  volume over the VMP and assembled sample train as shown in **Figure 1**. The enclosure should have at least two small openings: one for introduction of tracer gas and one open to the atmosphere for pressure relief and access of a tracer gas monitoring device. The base of the enclosure will sit in a bed of hydrated bentonite.
3. Introduce helium gas into the enclosure at a known rate until the atmosphere within the enclosure has a concentration at least 10% more than an order of magnitude greater than the detection limit of the instrument used to monitor the tracer gas concentration.

4. Connect peristaltic pump to the purge tubing and open either Valve #2 (prior to Summa collection) or Valve #3 (after Summa collection) to collect a sample in a Tedlar bag. Tedlar bag should be filled at a rate no faster than 200 ml/min.
5. Check the concentration of helium from a Tedlar bag using a portable, field analyzer (e.g., Dielectric Technologies MGD-2002).
  - a. If the concentration of the tracer gas in the sample is  $\leq 10\%$  of the concentration of the tracer gas in the enclosure, the sample is acceptable.
  - b. If the concentration of the tracer gas in the sample is  $>10\%$  of the concentration of the tracer gas in the enclosure, collect a second Tedlar bag without the enclosure. If the concentration is still high, the results may be biased high by methane.
6. Collect the soil vapor sample per procedures 7 through 11 in **Section 3**. Helium will be added to the ASTM D-1946 analytical list.
7. Check the concentration of helium from a Tedlar bag using a portable, field analyzer (e.g., Dielectric Technologies MGD-2002 or equivalent).
  - a. If the concentration of the tracer gas in the sample is  $\leq 10\%$  of the concentration of the tracer gas in the enclosure, the sample is acceptable.
  - b. If the concentration of the tracer gas in the sample is  $>10\%$  of the concentration of the tracer gas in the enclosure, collect an additional Tedlar bag without the enclosure after sampling is completed. If the concentration is still high, the results may be biased high by methane.

## **5. Decontamination**

- Non-designated stainless steel Swagelok<sup>®</sup> connectors will be thoroughly decontaminated using an Alconox<sup>®</sup> wash followed by a distilled water rinse. The connectors will then be purged with air a minimum of 15 pumps to draw any remaining moisture off the parts.
- Multiple sets of stainless steel Swagelok connectors will be available to sample crews to allow for equipment to be cleaned and dried sufficiently before being reused.

## **6. Shipping**

- Samples information shall be recorded on a chain of custody for the laboratory following procedures outlined in SOP No. 26.

- Samples will be shipped to the laboratory following DOT regulations. If there is the possibility that samples may be classified as hazardous, samples must be shipped as such. For procedures see SOP No. 24 and check with one of the office hazardous shipping personnel.

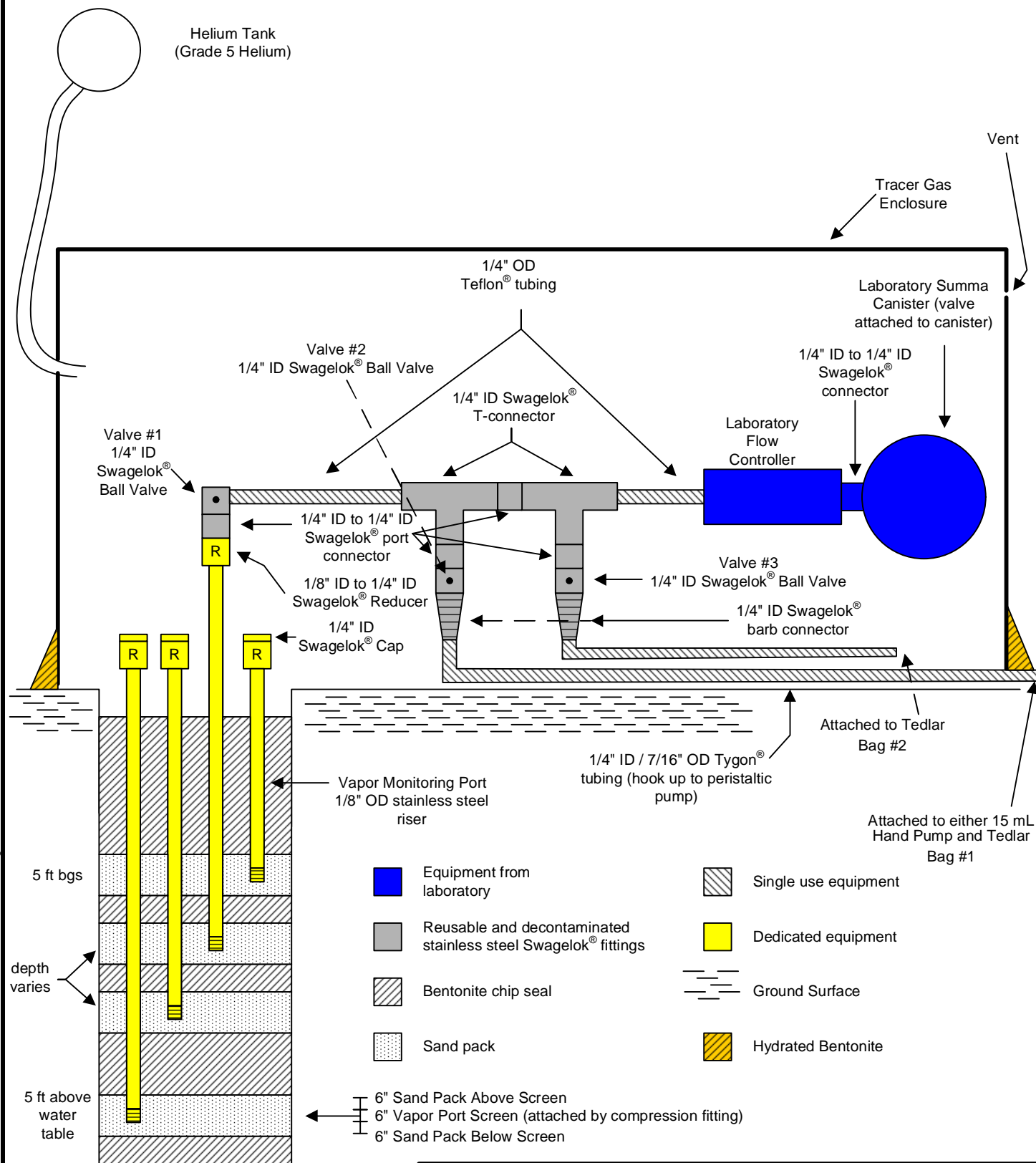


Figure not to scale.

SOP 44R  
Soil Vapor Purging and Sampling – Roxana

PROJECT NO.  
21562289

**URS**

DRN. BY: mpm 01/15/10  
DSGN. BY: mpm  
CHKD. BY:

Soil Vapor Sampling Configuration

FIG. NO.  
1

**Soil Vapor Sampling  
Field Sheets**



# SOIL VAPOR SAMPLING – CANISTER SAMPLING DATA

Date	Port ID	Required Purge (mL)	15 mL Hand Pumps	Number of Hand Pumps Achieved	Canister ID	Flow Controller ID	Vacuum Leak Check OK (Y/N)	Helium Leak Check OK (Y/N)	Initial Vacuum	Time Start	Final Vacuum	Time Finish	
11/2/09	VMP-1-5	83.18	6	6	000 000 0789	FC 00 325	Y	Yes	-30	0942	-5	1004	y
11/2/09	VMP-1-8.5	108.48	8	8	000 000 2724	40686	Yes	Yes	-30	1040	-3	1110	b
11/2/09	VMP-1-23.5	216.93	16	15	000 000 1960	40830	Yes	Yes	-30	1149 1145	-5	1217	g
11/2/09	VMP-1-38.5	325.38	22	23	000 00 2153	FC 00 323	Yes	Yes	-30	1304	-3	1330	r
11/2/09	VMP-2-5	83.18	6	6	000 00 8194	FC 00 434	Yes	Yes	-30	1459	-4	1521	y
11/03/09	VMP-2-8.5	108.48	8	8	000 002 042	FC 00 587	Yes	Yes	-30	0841	-4 <sup>NS</sup> -3	0910	b
11/03/09	VMP-2-22	206.09	14	15	000 000 2388	FC 009 81	Yes	Yes	-30	0957	-4	1021	g
11/03/09	VMP-2-42	350.69	24	25	000 000 2698	FC00941	Yes	Yes	-30	1101	-5	1123	r
11/03/09	VMP-3-5	83.18	6	6	000 000 3271	FC 00 646	Yes	Yes	-30	1308	-8	1338	y
11/03/09	VMP-3-22	206.09	14	15	000 000 0000001485	FC0076	Yes	Yes	-30	1004	-5	1024	b
11/04/09	VMP-3-31.5	274.77	19	24	000 000 2216	FC00926	Yes	Yes	-29	1110	-6	1140	g
11/04/09	VMP-3-39	329.00	22	30	000 000 5834	FC00604	Yes	Yes	-30	1230	-6	1253	r
11/05/09	VMP-4-5	83.18	6	7	000 000 2710	000 000 6668	Yes	Yes	-30	0900	-8.5	0935	y
11/05/09	VMP-4-12	133.79	9	10	000 000 5825	FC 00 142	Yes	Yes	-30	1028	-7	1058	b
11/05/09	VMP-4-23.5	216.93	15	15	000 000 1999	000 000 6843	Yes	Yes	-30	1142	-4	1208	g
11/05/09	VMP-4-39	329.00	22	02	000 000 5173	FC00782	Yes	Yes	-30	1246	-6	1303	r
11/3/09	VMP-2-8.5-D	108.48	8	8	000 002 174	FC 00 389	Yes	Yes	-30	0841	-4	0910	

CHECK  
Direct  
Port  
Read

# SOIL VAPOR SAMPLING – CANISTER SAMPLING DATA

Date	Port ID	Required Purge (mL)	15 mL Hand Pumps	Number of Hand Pumps Achieved	Canister ID	Flow Controller ID	Leak Check OK (Y/N)	Helium Leak Check OK (Y/N)	Initial Vacuum	Time Start	Final Vacuum	Time Finish	
11/5/09	VMP-5-5	83.18	6	6	000 000 1937	FC-00 128	OK	OK	-30 <del>30</del> <sup>NS</sup>	1449	-5	1511	y
11/6/09	VMP-5-12.5	137.40	10	11	000 000 5821	FC 00000 6488	OK	Yes	-30	0926	-8.5	0956	b
11/6/09	VMP-5-31	271.16	19	20	000 000 2817	40677	Yes	Yes	-30	1034	-5 <del>10</del> <sup>NS</sup>	1104	g
11/6/09	VMP-5-40	336.23	23	24	000 000 3276	FC-00 479	Yes	Yes	-30	1139	-11	1209	r
11/06/09	VMP-6-5	83.18	6	7	000 000 3246	000 000 6839	Yes	Yes	-30	1311	-5 <del>13</del> <sup>NS</sup>	1341	y
11/6/09	VMP-6-10	119.33	8	9	000 000 1523	FC00 -310	Yes	Yes	-30	1415	-6	1445	b
11/9/09	VMP-6-31.5	274.77	19	19	000 000 1089	FC00 375	yes	Yes	-30	0941	-4	1010	g
11/09/09	VMP-6-38	329.00	22	22	000 000 0643	FC00 229	yes	Yes	-30	1045	-4	1102	r
11/09/09	VMP-7-5	83.18	6	8	000 000 6232	FC00h1	yes	Yes	-30	1145	-5	1215	y
11/9/09	VMP-7-13.5	144.63	10	11	000 000 1439	000 00 0 6749	yes	yes	-30	1252	-3	1310	b
11/9/09	VMP-7-29.5	280.31	18	18	000 000 0369	FC00355	yes	yes	-30	1355	-4	1413	g
11/09/09	VMP-7-38	321.77	22	22	000 000 1139	000 000 0671	yes	yes	-30	1511	-5	1541	r
11/10/09	VMP-8-5	83.18	6	7	000 000 3720	FC 00 247	yes	Yes	-30	0905	-5	0918	y
11/10/09	VMP-8-9.5	115.71	8	8	000 000 2689	FC 0034	yes	yes	-30	0950	-4.5	1011	b
11/10/09	VMP-8-23.5	216.93	15	15	000 000 2420	FC00383	yes	yes	-30	1051	-5	1111	g
11/10/09	VMP-8-35.5	303.69	21	21	NA	NA	NA	NA	NA	NA	NA	NA	r

Deep  
Collectors

+ See  
Field  
Log

# SOIL VAPOR SAMPLING – CANISTER SAMPLING DATA

Date	Port ID	Required Purge (mL)	15 mL Hand Pumps	Number of Hand Pumps Achieved	Canister ID	Flow Controller ID	Leak Check OK (Y/N)	Helium Leak Check OK (Y/N)	Initial Vacuum	Time Start	Final Vacuum	Time Finish	
11/11/09	VMP-9-5	83.18	8	6	000000 3915	FC00413	yes	yes	-30	0949	-4	1006	y
11/11/09	VMP-9-11.5	130.17	9	10	000000 5869	40831	yes	yes	-30	0843	-9	0916	b
11/10/09	VMP-9-25.5	231.39	16	17	000000 2709	000000 6801	yes	yes	-30	1439	-3	1455	g
11/10/09	VMP-9-38.5	325.38	22	22	000000 0835	FC00795	yes	yes	-30	1333	-3	1354	r
11/11/09	VMP-10-5	83.18	8	6	000000 2516	FC00530	yes	yes	-30	1207	-2	1225	y
11/11/09	VMP-10-10	119.33	8	8	000000 2085	000000 6468	yes	yes	-30	1312	-5	1336	b
11/11/09	VMP-10-20	191.63	13	14	000000 2723	FC 00217	Y	Y	-30	1413	-3.5	1431	g
11/13/09	VMP-10-30	263.93	16	18	000000 2215	FC00454	yes	Y	-30	1436 1444	-5.5	1514	r
11/17/09	VMP-11-5	83.18	8	7	000000 3702	FC00 339	Y	Y	-30	1413	-4	1443	y
11/17/09	VMP-11-8	104.87	7	8	000000 5800	000000 0836	Y	Y	-30	1509	-7	1539	b
11/18/09	VMP-11-29	256.70	18	18	000000 5624	FC00577	Y	Y	-30	0840	-5	0910	g
11/18/09	VMP-11-38	321.77	22	23	000000 404	000000 40826	Y	Y	-30	0941	-11	1017	r
11/13/09	VMP-12-5	83.18	8	7	000000 3916	FC00 989	yes	yes	-30	1009	-6	1030	y
11/13/09	VMP-12-11.5	130.17	9	9	000000 3257	FC00481	yes	yes	-30	1106	-2.5	1130	b
11/13/09	VMP-12-25	227.78	16	17	000000 3834	FC00900	yes	yes	-30	1203	-3.5	1217	g
11/13/09	VMP-12-39	329.00	22	22	000000 1146 000000 2102	FC00391 FC00 893	yes	yes	-30	1257	-4.5	1317	r

# SOIL VAPOR SAMPLING - CANISTER SAMPLING DATA

Date	Port ID	Required Purge (mL)	15 mL Hand Pumps	Number of Hand Pumps Achieved	Canister ID	Flow Controller ID	Leak Check OK (Y/N)	Helium Leak Check OK (Y/N)	Initial Vacuum	Time Start	Final Vacuum	Time Finish	
11/16/09	VMP-13-5	83.18	6	7	000000 5813	FC 662	Y	Y	-30	1515	-5	1544	y
11/17/09	VMP-13-10.5	122.94	9	9	000000 9532	FC 08796	Y	Y	-30	0844	-5.5	0912	b
11/17/09	VMP-13-21.5	202.47	14	14	000000 3451	FC 08796	Y	Y	-30	1000	-2.5	1036	g
11/17/09	VMP-13-29.5	260.31	18	20	000000 5817	FC 00563	Y	Y	-30	1110	-6.5	1140	r
11/16/09	VMP-14-5	83.18	6	6	000000 3803	FC 060551	Y	N	-36	0837	-6	0907	y
11/16/09	VMP-14-11.5	130.17	9	9	000000 8131	FC 00060	Y	Y	-30	0949	-6	1019	b
11/16/09	VMP-14-20	191.63	13	13	000000 3958	FC 00031p	Y	Y	-30	1123	-5	1153	g
11/16/09	VMP-14-29	256.70	18	19	000000 2205	FC 00754	Y	Y	-30	1314	-5	1344	r
11/18/09	VMP-15-5	83.18	6	7	000000 2169	FC 00000	N	Y	-30	1305	-7.5	1335	y
11/18/09	VMP-15-21.5	202.47	14	15	000000 2504	FC 00807	Y	Y	-30	1401	-5	1433	b
11/18/09	VMP-15-25.5	231.39	16	17	000000 0570	FC 00779	Y	Y	-30	1505	-6	1535	g
11/19/09	VMP-15-29	256.70	18	19	000000 5803	FC 00735	Y	Y	-30	0819	-6.5	0839	r
11/19/09	VMP-16-5	83.18	6	7	000000 2174	FC 00388	Y		-30	1014	-7	1055	y
11/19/09	VMP-16-13.5	144.63	10	12	000000 5627	FC 00255	Y	Y	-30	1142	-5.5	1218	b
11/19/09	VMP-16-19	184.40	13	14	000000 3280	FC 00396	Y	Y	-30	1253	-7	1323	g
11/19/09	VMP-16-31	271.16	19	20	000000 2133	FC 00556	Y	Y	-30	1347	-7.5	1422	r
11/20/09	VMP-16-5	83.18	6	7	000000 2208	FC 00266	Y		-30	0851	-8	0922	
Resampled VMP-16-5 and VMP-14-5													
	VMP-14-5	256.70	6	7	000000 1470	FC 00266	Y	Y	-30	1117	-8	1147	

# SOIL VAPOR SAMPLING – CANISTER SAMPLING DATA

Date	Port ID	Required Purge (mL)	15 mL Hand Pumps	Number of Hand Pumps Achieved	Canister ID	Flow Controller ID	Leak Check OK (Y/N)	Helium Leak Check OK (Y/N)	Initial Vacuum	Time Start	Final Vacuum	Time Finish
11/3/09	VMP-2-8.5-D	108.48	8	8	00000 2174	FC00389	Y	Y	-30	0841	-4	0910
11/6/09	VMP-5-12.5-D	137.40	10	11	00000 1487	40794	Y	Y	-30	0926	-5	0946
11/10/09	VMP-9-25.5-D	231.39	16	17	00000 0728	FC00622	Y	Y	-30	1439	-4	1509
11/11/09	VMP-10-20-D	191.63	13	14	00000 3741	FC00948	Y	Y	-30	1413	-6	1444
<del>11/13/09</del>	<del>VMP-12-37-D</del>	<del>329.00</del>	<del>22</del>		<del>00000 2102</del>	<del>FC00843</del>			<del>-30</del>			
<del>11/13/09</del>	<del>VMP-10-30-D</del>	<del>263.93</del>	<del>18</del>		<del>00000 5820</del>	<del>40670</del>	<del>YES</del>		<del>-30</del>			
<del>11/14/09</del>	<del>VMP-14-20-D</del>	<del>191.63</del>	<del>13</del>	<del>13</del>	<del>00000 1912</del>	<del>FC00479</del>	<del>Y</del>	<del>Y</del>	<del>-30</del>	<del>1423</del>	<del>-5</del>	<del>1153</del>
11/17/09	VMP-13-10.5-D	122.94	9	9	00000 0724	FC00845	Y	Y	-30	0844	-8.5	0909
11/18/09	VMP-15-5-D	83.18	6	7	00000 2213	FC00245	Y	Y	-30	1305	-7	1335
11/19	VMP-16-81-D	271.16	19	20	00000 3843	FC00604	Y	Y	-30	1347	-4	1420

CANISTER READ BEING VACUUM IN THE FIELD (Y/N)  
Same as above  
D up was removed due to miss use of canister on different port

# SOIL VAPOR SAMPLING – TEDLAR SAMPLING DATA

Teller													Shroud		Direct Port Medium in Shroud 3	Readings
Date	Port ID	PID (PPM)	CO (ppm)	CO2 (ppm)	H2S (ppm)	LEL (%)	O2 (%)	Helium Before	Helium After	Helium in Shroud 1	Helium in Shroud 2					
11/2/09	VMP-1-5	98.2	4	OVR	0	35	11.1	9500 ppm	2.2%	63%	62%	—			—	y
11/2/09	VMP-1-8.5	87.5	4	OVR	0	25	1.2%	0 ppm	8300 ppm	68%	44%	—			—	b
11/2/09	VMP-1-23.5	83.2	5	OVR	0	100	8.2%	0 ppm	9500 ppm	64%	56%	—			—	g
11/2/09	VMP-1-38.5	63.0	4	OVR	0	31	1.3%	8575 ppm	8900 ppm	58%	48%	—			—	r
11/12/09	VMP-2-5	770	1	OVR	0	100%	10.0	0 ppm	3.2%	67%	58%	—			—	y
11/03/09	VMP-2-8.5	12.0	0	2.43%	Neg	Neg(0)	16.1%	75 ppm	2.9%	69%	40%	—			—	b
11/03/09	VMP-2-22	118	0	OVR	0	21%	3.4%	0 ppm	2425 ppm	60%	49%	—			—	g
11/03/09	VMP-2-42	708	193	OVR	0	38%	0.8%	2.1%	95.5 ppm	80%	58%	—			—	r
11/3/09	VMP-3-5	706	3	OVR	0	5%	6.0%	0 ppm	2700 ppm	68%	49.8%	—			—	y
11/04/09	VMP-3-22	101	142	OVR	0	100 over	0.9%	3800 ppm	4.2%	58%	51%	—			—	b
11/4/09	VMP-3-31.5	631	3	OVR	0	over	0.9%	10% 10%	10% 10%	62%	44%	11%			11%	
11/04/09	VMP-3-39	114	195	4.72	0	0	0.9	11%	11%	59%	40%	10%			10%	r
11/05/09	VMP-4-5	24	0	600 ppm	0	0	6.0%	1725 ppm 17%	30%	59%	39%	32%			32%	y
11/05/09	VMP-4-12	150	126	OVR	0	14	1.4	1250 ppm	2200 ppm	60%	41%	—			—	b
11/5/09	VMP-4-23.5	340	134	2.2%	6	86	6	9%	10%	62%	39%	10.6%			10.6%	g
11/5/09	VMP-4-39	327	1154	4.95%	2	74	0.9	9% 9%	4300 ppm	59%	34%	10%			10%	r
11/03/09	VMP-2-8 ED	12	0	2.43%	0	Neg(0)	16.1%	75 ppm	2.9%	69%	40%	—			—	b



# SOIL VAPOR SAMPLING – TEDLAR SAMPLING DATA

Date	Port ID	PID (PPM)	CO (ppm)	CO2 (ppm)	H2S (ppm)	LEL (%)	O2 (%)	Helium Before	Helium After	Helium in Shroud 1	Helium in Shroud 2	Helium in Shroud 3	
11/05/09	VMP-5-5	197	5	4.50%	0	35	0	0 ppm	45000	37%	28%	—	y
11/06/09	VMP-5-12.5	41.5	153	OVR	0	100 over	2.0%	1425	3050	45%	39%	—	b
11/06/09	VMP-5-31	31.5	947	OVR	7	0 over 100%	1.8%	1.9%	2.1%	46%	35%	—	g
11/6/09	VMP-5-40	28.6	913	OVR	0	Over 100%	0.4	4.1%	2.7	51%	38.7%	—	r
11/06/09	VMP-6-5	161	27.0	OVR	3	85%	0.9	0 ppm	9825	55%	39%	—	y
11/06/09	VMP-6-10	183	27.0	OVR	3	over 100%	0.4	2325	775	54%	54%	—	b
11/9/09	VMP-6-31.5	445	86.0	OVR	3	over 100%	0.3	0 ppm	0.0	58%	47%	—	g
11/9/09	VMP-6-39	55	8	OVR	5	over 100	0.2	16050 ppm	15475	60%	48%	—	r
11/9/09	VMP-7-5	0.8	4	OVR	0	NEG	12.3	3.4%	2.5%	64%	50%	—	y
11/9/09	VMP-7-13.5	5.3	6	OVR	0	0	5.2	0 ppm	4500 ppm	60%	46%	—	b
11/9/09	VMP-7-29.5	89	132	OVR	4	13	4.5	5375 ppm	3650 ppm	62%	49%	—	g
11/09	VMP-7-38	15.8	4	OVR	3	75%	1.8	0 ppm	5975	52%	45%	—	r
11/10/09	VMP-8-5	0.0	1	OVR	0	0	15.5	1500 ppm	0 ppm	63%	45%	—	y
11/10/09	VMP-8-9.5	0.0	0	OVR	0	0	11.2	0 ppm	0 ppm	63%	45%	—	b
11/10/09	VMP-8-23.5	0.0	82	OVR	0	0	11.2	0 ppm	0 ppm	60%	46%	—	g
11/10/09	VMP-8-35.5	NA	NA	NA	NA	NA	NA	NA	NA	53%	NA	—	r

See field log

# SOIL VAPOR SAMPLING - TEDLAR SAMPLING DATA

Direct Connect Reading

Date	Port ID	PID (PPM)	CO (ppm)	CO2 (ppm)	H2S (ppm)	LEL (%)	O2 (%)	Helium Before	Helium After	Helium in Shroud 1	Helium in Shroud 2	Helium in Shroud 3	
11/11/09	VMP-9-5	0.0	2	3.45%	0	0	15.0	10.4%	4.6%	<del>55%</del>	49%	4.5%	y
11/11/09	VMP-9-11.5	0	0	ovr	6	0	5.2 74.6	18975ppm	8500	61%	39%	-	b
11/10/09	VMP-9-25.5	145	11	ovr	0	60	2.1	3375ppm	50ppm	56%	41%	-	g
11/10/09	VMP-9-38.5	130	11	ovr	0	33	3.1	0.0ppm	225ppm	60%	47%	-	r
11/11/09	VMP-10-5	0.0	0	ovr	0	0	13.5	0.0ppm	0.0ppm	65%	56%	-	y
11/11/09	VMP-10-10	0.0	0	ovr	0	0	11.7	0.0ppm	0.0ppm	58%	44%	-	b
11/11/09	VMP-10-20	0	2	470	0	0	20.9	0ppm	2475	60%	38%	-	g
11/13/09	VMP-10-30	0	0	ovr	0	0	6.7	0ppm	0	60%	50%	-	r
11/17/09	VMP-11-5	5	0	ovr	0	24	7	0ppm	0ppm	50%	31%	-	y
11/17/09	VMP-11-8	4.0	0	ovr	0	2	7.3	0ppm	0ppm	50%	37%	-	b
11/18/09	VMP-11-29	over 2000	3	ovr	0	16	4.5	0ppm	450ppm	53%	45%	-	g
11/18/09	VMP-11-38	over 2000	2	ovr	0	28	4.6	0ppm	0ppm	50%	40%	-	r
11/13/09	VMP-12-5	857	120	ovr	2	over 100%	1.8	6%	5.8%	56%	42%	7.0%	y
11/13/09	VMP-12-11.5	97	68	ovr	2	0	4.2	0ppm	5.5%	55%	45%	0ppm	b
11/13/09	VMP-12-25	332	142	2.33	2	92	2.9	6.5%	6.4%	47%	36%	6.9%	g
11/13/09	VMP-12-39	1805	93	2700	1	7	4.3	6.5%	7.8%	56%	44%	7.2%	r

# SOIL VAPOR SAMPLING - TEDLAR SAMPLING DATA

Date	Port ID	PID (PPM)	CO (ppm)	CO2 (ppm)	H2S (ppm)	LEL (%)	O2 (%)	Helium Before	Helium After	Helium in Shroud 1	Helium in Shroud 2	Direct Port Helium in Shroud 3	
11/16/09	VMP-13-5	957	4	ovr	0	26	1.6 62.1	0ppm	0	39%	22%		y
11/17/09	VMP-13-10.5	12.0	2	1030	0	0	20.9	0	400	40%	29%		b
11/17/09	VMP-13-21.5	25.40 25.45	27	ovr	0	38	4.2	0ppm	32%	43%	0ppm		g
11/17/09	VMP-13-29.5	2000	8	ovr	0	47	4.8	0ppm	0ppm	40%	32%		r
11/16/09	VMP-14-5	43.9 <sup>kt</sup>	26 <sup>kt</sup>	ovr <sup>kt</sup>	4 <sup>kt</sup>	17 <sup>kt</sup>	6.1 <sup>kt</sup>	0ppm		54%	42%		y
11/16/09	VMP-14-11.5	43.9	25	ovr	4	17	6.1	2.5%	2.3%	55%	22%	16500ppm	b
11/16/09	VMP-14-20	104	100+	ovr	0	0	4.2	2.4%	19475ppm	32%	27%	9100ppm	g
11/16/09	VMP-14-29	286	37	ovr	0	over 100%	3-7	16000	16975 2475	36% 50%	29%		r
11/18/09	VMP-15-5	25.6	0	ovr	0	3	7.5	0	125ppm	46%	32%		y
11/18/09	VMP-15-21.5	47	5	ovr	6	over 100%	3.6	4%	4.2%	66%	60%	4.7%	b
11/18/09	VMP-15-25.5	49.9	6	ovr	6	over 100%	5.6	5.1%	4.8%	60%	51%	5.7%	g
11/19/09	VMP-15-29	116	26	ovr	3.2	over 100%	1.0	4242	5.2%	56%	45%	5.9%	r
11/19/09	VMP-16-5	5.6	11	1350	0	0	15.2	33%	23%	52%	34%	5%	y
11/19/09	VMP-16-13.5	74	0	1.39%	0	48	14.6	17%	16%	60%	56%	16%	b
11/19/09	VMP-16-19	36	17	633%	0	over 100%	11.6	18%	9%	57%	53%	13%	g
11/19/09	VMP-16-31	38	18	ovr	0	over 100%	14.5	10%	6%	55%	41%	9.5%	r
11/20/09	VMP-16-5	8.6	5	880	0	NEG	7.0	16%	46%	67%	58%	40%	← *

Resampled VMP-16-5 and VMP-14-5

11/20/09	VMP-14-5	1.4	0	1.89	0	0	10.5	0ppm	0ppm	62%	58%	—	
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# SOIL VAPOR SAMPLING – TEDLAR SAMPLING DATA

Date	Port ID	PID (PPM)	CO (ppm)	CO2 (ppm)	H2S (ppm)	LEL (%)	O2 (%)	Helium Before	Helium After	Helium In Shroud 1	Helium In Shroud 2	Direct Port <del>Helium In Shroud 2</del>
11/03/09	VMP-2-85-D	12	0	2.413%	0	Neg (0)	16.1	75 ppm	2.7%	69%	40%	—
11/06/09	VMP-5-12-5-D	41.5	153	0VR	0	1000VR	2.0	1425	3050	45%	39%	—
11/10/09	VMP-9-25.5-D	145	1	0VR	0	60	2.1	2375PPM	50 ppm	56%	41%	—
11/11/09	VMP-10-20-D	0	2	470	0	0	20.9	0 ppm	2475	60%	38%	—
		<del>332</del> 142	142	2.33	2	92	2.9					
11/13/09	VMP-12-39-D							6.5%		56%		
11/13/09	VMP-10-30									60%		
11/16/09	VMP-14-20	104	100+	0VR	0	0	4.2	2.4%	19475PPM	32%	27%	19600PPM
11/17/09	VMP-13-10.5	12.0	2	1030	0	0	20.9	0	400	40%	29%	
11/18/09	VMP-15-36-D	5.6	5.6	0VR	0VR	3	7.6	0	125 ppm	46%	32%	
	VMP-16-31-D	38	18	0VR	0	100%	14.5	10%	6%	55%	41%	9.5%

MS  
 cannot get  
 zero vacuum  
 in the field (Samp as above)  
 Dup. was removed due to miss use of combination of different port



**Soil IDW Characterization Results**

**337484 (Air Knife Cuttings in Village)**

**338903 (Air Knife & Soil Cuttings Inside Refinery)**

**340203 (Soil Cuttings in Village)**



# Analytical Report 337484

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S Central Avenue**

**Route 111 & Rand Ave Vicinity/21561979**

**16-JUL-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Miramar (EPA Lab code: FL01246): Florida (E86349)

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Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Houston - Dallas - San Antonio - Tampa - Miami - Midland - Corpus Christi - Atlanta - Latin America



16-JUL-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **337484**  
**900 S Central Avenue**  
Project Address: Roxana, IL 62084

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 337484. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 337484 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

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## Sample Cross Reference 337484



**URS Corporation-St. Louis, St. Louis, MO**

900 S Central Avenue

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
20521 Soil	S	Jul-08-09 15:45		337484-001



## CASE NARRATIVE

**Client Name:** URS Corporation-St. Louis

**Project Name:** 900 S Central Avenue

**Project ID:** Route 111 & Rand Ave Vic

**Work Order Number:** 337484

**Report Date:** 16-JUL-09

**Date Received:** 07/09/2009

---

**Sample receipt non conformances and Comments:**

None

---

**Sample receipt Non Conformances and Comments per Sample:**

None

**Analytical Non Conformances and Comments:**

**Batch:** LBA-764959 Soil pH by SW-846 9045C

None

**Batch:** LBA-765136 Cyanide by EPA 9010

None

**Batch:** LBA-765143 Sulfides by SW-846 9030

None

**Batch:** LBA-765419 Metals per ICP-MS by SW 6020A

Selenium recovered below QC limits in the Matrix Spike.

Samples affected are: 337484-001.

The Laboratory Control Sample for Selenium is within laboratory Control Limits

**Batch:** LBA-765473 Chlorinated Herbicides By GC U by SW-846 8151

None

**Batch:** LBA-765475 Organochlorine Pesticides by SW-846 8081A

Chlordane, Toxaphene recovered below QC limits in the Matrix Spike.

Samples affected are: 337484-001.

The Laboratory Control Sample for Chlordane, Toxaphene is within laboratory Control Limits

**Batch:** LBA-765481 Flash Point (CC) SW-846 1010

None

**Batch:** LBA-765558 VOAs by SW-846 8260B

Vinyl Chloride recovered above QC limits in the Matrix Spike. Vinyl Chloride RPD was outside QC limits in the Matrix Spike/Matrix Spike Duplicate.

Samples affected are: 337484-001.

The Laboratory Control Sample for Vinyl Chloride is within laboratory Control Limits



## **CASE NARRATIVE**

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S Central Avenue*

*Project ID: Route 111 & Rand Ave Vic*

*Work Order Number: 337484*

*Report Date: 16-JUL-09*

*Date Received: 07/09/2009*

---

*Batch: LBA-765629 SVOCs by SW-846 8270C*

*Pyridine RPD on BS/BSD was outside laboratory control limits. However, recoveries are within control limits and there were no hits on sample 337484-001.*



# Certificate of Analysis Summary 337484

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Project Name:** 900 S Central Avenue

**Date Received in Lab:** Thu Jul-09-09 08:30 am

**Contact:** Wendy Pennington

**Report Date:** 16-JUL-09

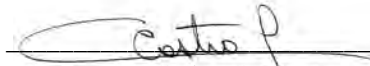
**Project Location:** Roxana, IL 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 337484-001 <b>Field Id:</b> 20521 Soil <b>Depth:</b> <b>Matrix:</b> SOIL <b>Sampled:</b> Jul-08-09 15:45					
<b>TCLP SVOCs</b>	<b>Extracted:</b> Jul-11-09 09:52 <b>Analyzed:</b> Jul-15-09 15:38 <b>Units/RL:</b> mg/L RL					
1,4-Dichlorobenzene	U 0.050					
2,4-Dinitrotoluene	U 0.050					
Hexachlorobenzene	U 0.050					
Hexachlorobutadiene	U 0.050					
Hexachloroethane	U 0.050					
2-methylphenol	U 0.050					
3&4-Methylphenol	U 0.050					
Nitrobenzene	U 0.050					
Pentachlorophenol	U 0.050					
Pyridine	U 0.050					
2,4,5-Trichlorophenol	U 0.050					
2,4,6-Trichlorophenol	U 0.050					
<b>TCLP Herbicides by SW8151</b>	<b>Extracted:</b> Jul-11-09 10:15 <b>Analyzed:</b> Jul-13-09 19:56 <b>Units/RL:</b> ug/L RL					
2,4,5-Tp	U 2.50					
2,4-D	U 2.50					

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Carlos Castro  
Managing Director, Texas



# Certificate of Analysis Summary 337484

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Project Name:** 900 S Central Avenue

**Date Received in Lab:** Thu Jul-09-09 08:30 am

**Contact:** Wendy Pennington

**Report Date:** 16-JUL-09

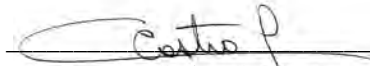
**Project Location:** Roxana, IL 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 337484-001 <b>Field Id:</b> 20521 Soil <b>Depth:</b> <b>Matrix:</b> SOIL <b>Sampled:</b> Jul-08-09 15:45					
<b>TCLP Metals per ICP/MS by EPA 6020</b>	<b>Extracted:</b> Jul-14-09 09:50 <b>Analyzed:</b> Jul-14-09 18:24 <b>Units/RL:</b> mg/L RL					
Arsenic	U 0.002					
Barium	0.909 0.005					
Cadmium	0.002 0.001					
Chromium	0.012 0.003					
Lead	0.002 J 0.002					
Mercury *	U 0.0004					
Selenium	U 0.003					
Silver	U 0.002					
<b>TCLP Pesticides by SW8081A</b>	<b>Extracted:</b> Jul-11-09 09:57 <b>Analyzed:</b> Jul-14-09 00:40 <b>Units/RL:</b> ug/L RL					
Heptachlor Epoxide	U 0.250					
Chlordane	U 2.50					
Endrin	U 0.250					
Gamma-BHC (Lindane)	0.090 J 0.250					
Heptachlor	0.080 J 0.250					
Methoxychlor	U 0.250					
Toxaphene	U 2.50					

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# Certificate of Analysis Summary 337484

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Project Name:** 900 S Central Avenue

**Date Received in Lab:** Thu Jul-09-09 08:30 am

**Contact:** Wendy Pennington

**Report Date:** 16-JUL-09

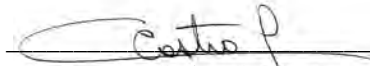
**Project Location:** Roxana, IL 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b>	337484-001					
	<b>Field Id:</b>	20521 Soil					
	<b>Depth:</b>						
	<b>Matrix:</b>	SOIL					
	<b>Sampled:</b>	Jul-08-09 15:45					
<b>VOA TCLP List</b>	<b>Extracted:</b>	Jul-15-09 10:24					
	<b>Analyzed:</b>	Jul-15-09 14:04					
	<b>Units/RL:</b>	mg/L RL					
Benzene			U	0.005			
Methyl ethyl ketone			U	0.050			
Carbon Tetrachloride			U	0.005			
Chlorobenzene			U	0.005			
Chloroform			U	0.005			
1,2-Dichloroethane			U	0.005			
1,1-Dichloroethene			U	0.005			
Tetrachloroethylene			U	0.005			
Trichloroethylene			U	0.005			
Vinyl Chloride			U	0.002			

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Managing Director, Texas



# Certificate of Analysis Summary 337484

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Project Name:** 900 S Central Avenue

**Date Received in Lab:** Thu Jul-09-09 08:30 am

**Contact:** Wendy Pennington

**Report Date:** 16-JUL-09

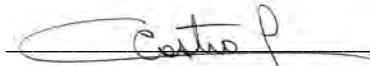
**Project Location:** Roxana, IL 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 337484-001 <b>Field Id:</b> 20521 Soil <b>Depth:</b> <b>Matrix:</b> SOIL <b>Sampled:</b> Jul-08-09 15:45					
<b>Flash Point (Closed Cup Tester)</b>	<b>Extracted:</b> <b>Analyzed:</b> Jul-15-09 08:30 <b>Units/RL:</b> Deg F RL					
Flash Point	> 150 75.0					
<b>Reactive Cyanide (Colorimetric, Manual)</b>	<b>Extracted:</b> <b>Analyzed:</b> Jul-10-09 16:10 <b>Units/RL:</b> mg/kg RL					
Cyanide	U 0.200					
<b>Reactive Sulfide</b>	<b>Extracted:</b> <b>Analyzed:</b> Jul-10-09 17:06 <b>Units/RL:</b> mg/kg RL					
Sulfide	U 50.0					
<b>Soil pH</b>	<b>Extracted:</b> <b>Analyzed:</b> Jul-09-09 14:02 <b>Units/RL:</b> SU RL					
pH	7.47					

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**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Flash Point (Closed Cup Tester)

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009				Jul.15, 2009	30	7	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Metals per ICP/MS by EPA 6020

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009	Jul. 14, 2009	180	6	Jul.14, 2009	180	0	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Pesticides by SW8081A

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009	Jul. 11, 2009	7	3	Jul.14, 2009	40	3	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Herbicides by SW8151

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009	Jul. 11, 2009	7	3	Jul.13, 2009	7	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : VOA TCLP List

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009				Jul.15, 2009	14	7	P





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP SVOCs

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009	Jul. 11, 2009	7	3	Jul.15, 2009	40	4	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Cyanide (Colorimetric, Manual)

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009				Jul.10, 2009	14	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Sulfide

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009				Jul.10, 2009	14	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Soil pH

Client : URS Corporation-St. Louis

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20521 Soil	Jul. 8, 2009	Jul. 9, 2009				Jul.9, 2009	28	1	P

F = These samples were analyzed outside the recommended holding time.

P = Samples analyzed within the recommended holding time.

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 765473

Sample: 533448-1-BLK / BLK

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/13/09 17:26

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	1.68	2.00	84	44-131	

Lab Batch #: 765473

Sample: 533448-1-BKS / BKS

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/13/09 18:16

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	1.44	2.00	72	44-131	

Lab Batch #: 765473

Sample: 533448-1-BSD / BSD

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/13/09 19:06

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	1.55	2.00	78	44-131	

Lab Batch #: 765473

Sample: 337484-001 / SMP

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 07/13/09 19:56

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	7.90	10.0	79	44-131	

Lab Batch #: 765473

Sample: 337484-001 S / MS

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 07/13/09 20:46

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	7.23	10.0	72	44-131	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 765475

Sample: 533447-1-BLK / BLK

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/13/09 22:51

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	0.990	1.00	99	53-119	
Tetrachloro-m-xylene	1.05	1.00	105	72-114	

Lab Batch #: 765475

Sample: 533447-1-BKS / BKS

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/13/09 23:45

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	0.900	1.00	90	53-119	
Tetrachloro-m-xylene	0.940	1.00	94	72-114	

Lab Batch #: 765475

Sample: 533447-1-BSD / BSD

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 07/14/09 00:13

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	0.920	1.00	92	53-119	
Tetrachloro-m-xylene	0.930	1.00	93	72-114	

Lab Batch #: 765475

Sample: 337484-001 / SMP

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 07/14/09 00:40

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	2.95	5.00	59	53-119	
Tetrachloro-m-xylene	4.65	5.00	93	72-114	

Lab Batch #: 765475

Sample: 337484-001 S / MS

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 07/14/09 01:07

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	2.90	5.00	58	53-119	
Tetrachloro-m-xylene	4.50	5.00	90	72-114	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.





## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 765629

Sample: 533449-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/15/09 13:00

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.044	0.050	88	43-116	
2-Fluorophenol	0.028	0.050	56	21-100	
Nitrobenzene-d5	0.038	0.050	76	35-114	
Phenol-d6	0.014	0.050	28	10-94	
Terphenyl-D14	0.047	0.050	94	33-141	
2,4,6-Tribromophenol	0.029	0.050	58	10-123	

Lab Batch #: 765629

Sample: 533449-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/15/09 13:39

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.043	0.050	86	43-116	
2-Fluorophenol	0.031	0.050	62	21-100	
Nitrobenzene-d5	0.041	0.050	82	35-114	
Phenol-d6	0.025	0.050	50	10-94	
Terphenyl-D14	0.048	0.050	96	33-141	
2,4,6-Tribromophenol	0.037	0.050	74	10-123	

Lab Batch #: 765629

Sample: 533449-1-BSD / BSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/15/09 14:19

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.044	0.050	88	43-116	
2-Fluorophenol	0.029	0.050	58	21-100	
Nitrobenzene-d5	0.042	0.050	84	35-114	
Phenol-d6	0.021	0.050	42	10-94	
Terphenyl-D14	0.048	0.050	96	33-141	
2,4,6-Tribromophenol	0.038	0.050	76	10-123	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 765629

Sample: 337484-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 07/15/09 15:38

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.198	0.250	79	43-116	
2-Fluorophenol	0.160	0.250	64	21-100	
Nitrobenzene-d5	0.180	0.250	72	35-114	
Phenol-d6	0.109	0.250	44	10-94	
Terphenyl-D14	0.223	0.250	89	33-141	
2,4,6-Tribromophenol	0.148	0.250	59	10-123	

Lab Batch #: 765629

Sample: 337484-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 07/15/09 16:18

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.194	0.250	78	43-116	
2-Fluorophenol	0.169	0.250	68	21-100	
Nitrobenzene-d5	0.188	0.250	75	35-114	
Phenol-d6	0.157	0.250	63	10-94	
Terphenyl-D14	0.231	0.250	92	33-141	
2,4,6-Tribromophenol	0.181	0.250	72	10-123	

Lab Batch #: 765558

Sample: 533707-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/15/09 11:52

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0490	0.0500	98	86-115	
Dibromofluoromethane	0.0509	0.0500	102	86-118	
1,2-Dichloroethane-D4	0.0453	0.0500	91	80-120	
Toluene-D8	0.0507	0.0500	101	88-110	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 765558

Sample: 533707-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/15/09 13:39

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0460	0.0500	92	86-115	
Dibromofluoromethane	0.0516	0.0500	103	86-118	
1,2-Dichloroethane-D4	0.0477	0.0500	95	80-120	
Toluene-D8	0.0503	0.0500	101	88-110	

Lab Batch #: 765558

Sample: 337484-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 07/15/09 14:04

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0487	0.0500	97	86-115	
Dibromofluoromethane	0.0516	0.0500	103	86-118	
1,2-Dichloroethane-D4	0.0500	0.0500	100	80-120	
Toluene-D8	0.0509	0.0500	102	88-110	

Lab Batch #: 765558

Sample: 337484-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 07/15/09 14:55

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0507	0.0500	101	86-115	
Dibromofluoromethane	0.0513	0.0500	103	86-118	
1,2-Dichloroethane-D4	0.0496	0.0500	99	80-120	
Toluene-D8	0.0519	0.0500	104	88-110	

Lab Batch #: 765558

Sample: 337484-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 07/15/09 15:20

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0479	0.0500	96	86-115	
Dibromofluoromethane	0.0492	0.0500	98	86-118	
1,2-Dichloroethane-D4	0.0463	0.0500	93	80-120	
Toluene-D8	0.0508	0.0500	102	88-110	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S Central Avenue

Work Orders : 337484,

Lab Batch #: 765246

Sample: ICB-BLK / ICB

Project ID: Route 111 & Rand Ave Vicinity/21561979

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 07/09/09 15:46

### SURROGATE RECOVERY STUDY

VOAs by SW-846 8260B  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0487	0.0500	97	86-115	
Dibromofluoromethane	0.0503	0.0500	101	86-118	
1,2-Dichloroethane-D4	0.0485	0.0500	97	80-120	
Toluene-D8	0.0507	0.0500	101	88-110	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.

**Project Name: 900 S Central Avenue**

**Work Order #: 337484**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Lab Batch #: 765136**

**Sample: 765136-1-BKS**

**Matrix: Solid**

**Date Analyzed: 07/10/2009**

**Date Prepared: 07/10/2009**

**Analyst: MOR**

**Reporting Units: mg/kg**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Reactive Cyanide (Colorimetric, Manual)</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Cyanide	<0.018	0.200	0.227	114	80-120	

**Lab Batch #: 765143**

**Sample: 765143-1-BKS**

**Matrix: Solid**

**Date Analyzed: 07/10/2009**

**Date Prepared: 07/10/2009**

**Analyst: MOR**

**Reporting Units: mg/kg**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Reactive Sulfide</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Sulfide	<5.00	1000	896	90	60-120	

**Lab Batch #: 765419**

**Sample: 533563-1-BKS**

**Matrix: Water**

**Date Analyzed: 07/14/2009**

**Date Prepared: 07/14/2009**

**Analyst: HAT**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>TCLP Metals per ICP/MS by EPA 6020</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Arsenic	<0.002	0.050	0.049	98	75-125	
Barium	<0.001	0.050	0.051	102	75-125	
Cadmium	<0.001	0.020	0.019	95	75-125	
Chromium	0.001	0.050	0.047	94	75-125	
Lead	<0.001	0.050	0.048	96	75-125	
Mercury	<0.0001	0.0010	0.0008	80	75-125	
Selenium	<0.001	0.050	0.047	94	75-125	
Silver	<0.001	0.020	0.017	85	75-125	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit

**Project Name: 900 S Central Avenue**

**Work Order #: 337484**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Lab Batch #: 765558**

**Sample: 533707-1-BKS**

**Matrix: Water**

**Date Analyzed: 07/15/2009**

**Date Prepared: 07/15/2009**

**Analyst: ZHO**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

VOA TCLP List  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Benzene	<0.001	0.050	0.049	98	66-142	
Methyl ethyl ketone	<0.010	0.500	0.306	61	60-140	
Carbon Tetrachloride	<0.001	0.050	0.051	102	62-125	
Chlorobenzene	<0.001	0.050	0.045	90	60-133	
Chloroform	<0.001	0.050	0.050	100	74-125	
1,2-Dichloroethane	<0.001	0.050	0.052	104	68-127	
1,1-Dichloroethene	<0.001	0.050	0.052	104	59-172	
Tetrachloroethylene	<0.001	0.050	0.047	94	71-125	
Trichloroethylene	<0.001	0.050	0.047	94	62-137	
Vinyl Chloride	<0.001	0.050	0.056	112	75-125	

Blank Spike Recovery [D] =  $100 * [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## BS / BSD Recoveries



**Project Name: 900 S Central Avenue**

**Work Order #: 337484**

**Analyst: JLA**

**Date Prepared: 07/11/2009**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Date Analyzed: 07/13/2009**

**Lab Batch ID: 765473**

**Sample: 533448-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: ug/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TCLP Herbicides by SW8151	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
2,4,5-Tp	<0.093	1.00	0.831	83	1	0.918	92	10	32-140	25	
2,4-D	<0.052	1.00	0.832	83	1	0.927	93	11	10-189	25	

**Analyst: JLA**

**Date Prepared: 07/11/2009**

**Date Analyzed: 07/13/2009**

**Lab Batch ID: 765475**

**Sample: 533447-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: ug/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TCLP Pesticides by SW8081A	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Heptachlor Epoxide	<0.009	1.00	1.00	100	1	1.01	101	1	40-130	20	
Endrin	<0.006	1.00	1.17	117	1	1.17	117	0	43-134	20	
Gamma-BHC (Lindane)	<0.005	1.00	1.08	108	1	1.08	108	0	73-125	20	
Heptachlor	<0.005	1.00	0.990	99	1	1.01	101	2	45-128	20	
Methoxychlor	<0.006	1.00	1.05	105	1	1.07	107	2	73-142	20	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes





## BS / BSD Recoveries



**Project Name: 900 S Central Avenue**

**Work Order #: 337484**

**Analyst: CLR**

**Date Prepared: 07/11/2009**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Date Analyzed: 07/15/2009**

**Lab Batch ID: 765629**

**Sample: 533449-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TCLP SVOCs	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
1,4-Dichlorobenzene	<0.001	0.050	0.042	84	0.05	0.041	82	2	19-121	28	
2,4-Dinitrotoluene	<0.001	0.050	0.047	94	0.05	0.048	96	2	22-135	38	
Hexachlorobenzene	<0.001	0.050	0.045	90	0.05	0.047	94	4	46-133	25	
Hexachlorobutadiene	<0.001	0.050	0.041	82	0.05	0.042	84	2	44-125	25	
Hexachloroethane	<0.001	0.050	0.043	86	0.05	0.042	84	2	25-153	25	
2-methylphenol	<0.001	0.050	0.040	80	0.05	0.040	80	0	14-176	25	
3&4-Methylphenol	<0.002	0.100	0.081	81	0.1	0.079	79	3	14-176	25	
Nitrobenzene	<0.001	0.050	0.042	84	0.05	0.044	88	5	65-135	25	
Pentachlorophenol	<0.001	0.050	0.029	58	0.05	0.022	44	27	17-117	50	
Pyridine	<0.004	0.050	0.032	64	0.05	0.020	40	46	16-86	28	F
2,4,5-Trichlorophenol	<0.001	0.050	0.041	82	0.05	0.042	84	2	65-135	25	
2,4,6-Trichlorophenol	<0.001	0.050	0.044	88	0.05	0.045	90	2	65-135	25	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes



## Form 3 - MS Recoveries



Project Name: 900 S Central Avenue

Work Order #: 337484

Lab Batch #: 765473

Date Analyzed: 07/13/2009

QC- Sample ID: 337484-001 S

Reporting Units: ug/L

Date Prepared: 07/11/2009

Batch #: 1

Project ID: Route 111 & Rand Ave Vicinity/21561

Analyst: JLA

Matrix: Soil

MATRIX / MATRIX SPIKE RECOVERY STUDY						
TCLP Herbicides by SW8151	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
2,4,5-Tp	<2.50	5.00	4.13	83	32-140	
2,4-D	<2.50	5.00	4.55	91	10-189	

Lab Batch #: 765475

Date Analyzed: 07/14/2009

QC- Sample ID: 337484-001 S

Reporting Units: ug/L

Date Prepared: 07/11/2009

Batch #: 1

Analyst: JLA

Matrix: Soil

MATRIX / MATRIX SPIKE RECOVERY STUDY						
TCLP Pesticides by SW8081A	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Heptachlor Epoxide	<0.250	5.00	4.60	92	40-130	
Endrin	<0.250	5.00	5.45	109	43-134	
Gamma-BHC (Lindane)	0.090	5.00	4.95	97	73-125	
Heptachlor	0.080	5.00	5.35	105	45-128	
Methoxychlor	<0.250	5.00	4.95	99	73-142	

Matrix Spike Percent Recovery [D] =  $100 \times (C-A)/B$

Relative Percent Difference [E] =  $200 \times (C-A)/(C+B)$

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Form 3 - MS Recoveries



Project Name: 900 S Central Avenue

Work Order #: 337484

Lab Batch #: 765629

Date Analyzed: 07/15/2009

Date Prepared: 07/11/2009

Project ID: Route 111 & Rand Ave Vicinity/21561

Analyst: CLR

QC- Sample ID: 337484-001 S

Batch #: 1

Matrix: Soil

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C  Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
1,4-Dichlorobenzene	<0.050	0.250	0.182	73	19-121	
2,4-Dinitrotoluene	<0.050	0.250	0.231	92	22-135	
Hexachlorobenzene	<0.050	0.250	0.212	85	46-133	
Hexachlorobutadiene	<0.050	0.250	0.183	73	44-125	
Hexachloroethane	<0.050	0.250	0.180	72	25-153	
2-methylphenol	<0.050	0.250	0.185	74	14-176	
3&4-Methylphenol	<0.050	0.500	0.376	75	14-176	
Nitrobenzene	<0.050	0.250	0.196	78	65-135	
Pentachlorophenol	<0.050	0.250	0.175	70	17-117	
Pyridine	<0.050	0.250	0.154	62	16-86	
2,4,5-Trichlorophenol	<0.050	0.250	0.191	76	65-135	
2,4,6-Trichlorophenol	<0.050	0.250	0.204	82	65-135	

Matrix Spike Percent Recovery [D] =  $100 \times (C-A)/B$

Relative Percent Difference [E] =  $200 \times (C-A)/(C+B)$

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S Central Avenue

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch ID: 765419

QC- Sample ID: 337564-001 S

Batch #: 1 Matrix: Sludge

Date Analyzed: 07/14/2009

Date Prepared: 07/14/2009

Analyst: HAT

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
TCLP Metals per ICP/MS by EPA 6020 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Arsenic	0.022	0.250	0.232	84	0.250	0.260	95	11	75-125	25	
Barium	0.270	0.250	0.499	92	0.250	0.572	121	14	75-125	25	
Cadmium	<0.005	0.100	0.081	81	0.100	0.092	92	13	75-125	25	
Chromium	0.018	0.250	0.233	86	0.250	0.261	97	11	75-125	25	
Lead	<0.010	0.250	0.229	92	0.250	0.261	104	13	75-125	25	
Mercury	<0.0020	0.0050	0.0045	90	0.0050	0.0050	100	11	75-125	25	
Selenium	<0.015	0.250	0.182	73	0.250	0.191	76	5	75-125	25	X
Silver	<0.010	0.100	0.084	84	0.100	0.095	95	12	75-125	25	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not

ApplicableN = See Narrative, EQL = Estimated Quantitation Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S Central Avenue

Work Order #: 337484

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch ID: 765558

QC- Sample ID: 337484-001 S

Batch #: 1 Matrix: Soil

Date Analyzed: 07/15/2009

Date Prepared: 07/15/2009

Analyst: ZHO

Reporting Units: mg/L

VOA TCLP List  Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.005	0.050	0.049	98	0.050	0.050	100	2	66-142	21	
Methyl ethyl ketone	<0.050	0.500	0.422	84	0.500	0.404	81	4	60-140	20	
Carbon Tetrachloride	<0.005	0.050	0.049	98	0.050	0.051	102	4	62-125	20	
Chlorobenzene	<0.005	0.050	0.046	92	0.050	0.048	96	4	60-133	21	
Chloroform	<0.005	0.050	0.053	106	0.050	0.053	106	0	74-125	20	
1,2-Dichloroethane	<0.005	0.050	0.057	114	0.050	0.059	118	3	68-127	20	
1,1-Dichloroethene	<0.005	0.050	0.056	112	0.050	0.055	110	2	59-172	22	
Tetrachloroethylene	<0.005	0.050	0.050	100	0.050	0.053	106	6	71-125	20	
Trichloroethylene	<0.005	0.050	0.051	102	0.050	0.053	106	4	62-137	24	
Vinyl Chloride	<0.002	0.050	0.074	148	0.050	0.060	120	21	75-125	20	XF

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * [(C - F) / (C + F)]$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable  
N = See Narrative, EQL = Estimated Quantitation Limit

**Project Name: 900 S Central Avenue**

**Work Order #: 337484**

**Lab Batch #: 765481**

**Date Analyzed: 07/15/2009**

**QC- Sample ID: 337484-001 D**

**Reporting Units: Deg F**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Analyst: MOR**

**Batch #: 1**

**Matrix: Soil**

**SAMPLE / SAMPLE DUPLICATE RECOVERY**

Flash Point (Closed Cup Tester)	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Flash Point	> 150	> 150	0	25	

**Lab Batch #: 765136**

**Date Analyzed: 07/10/2009**

**QC- Sample ID: 337484-001 D**

**Reporting Units: mg/kg**

**Date Prepared: 07/10/2009**

**Analyst: MOR**

**Batch #: 1**

**Matrix: Soil**

**SAMPLE / SAMPLE DUPLICATE RECOVERY**

Reactive Cyanide (Colorimetric, Manual)	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Cyanide	<0.200	<0.200	NC	20	

**Lab Batch #: 765143**

**Date Analyzed: 07/10/2009**

**QC- Sample ID: 337484-001 D**

**Reporting Units: mg/kg**

**Date Prepared: 07/10/2009**

**Analyst: MOR**

**Batch #: 1**

**Matrix: Soil**

**SAMPLE / SAMPLE DUPLICATE RECOVERY**

Reactive Sulfide	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Sulfide	<50.0	<50.0	NC	20	

**Lab Batch #: 764959**

**Date Analyzed: 07/09/2009**

**QC- Sample ID: 337484-001 D**

**Reporting Units: SU**

**Date Prepared: 07/09/2009**

**Analyst: MOR**

**Batch #: 1**

**Matrix: Soil**

**SAMPLE / SAMPLE DUPLICATE RECOVERY**

Soil pH	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
pH	7.47	7.45	0	20	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## Sample Duplicate Recovery



**Project Name:** 900 S Central Avenue

**Work Order #:** 337484

**Lab Batch #:** 765419

**Date Analyzed:** 07/14/2009

**QC- Sample ID:** 337564-001 D

**Reporting Units:** mg/L

**Date Prepared:** 07/14/2009

**Batch #:** 1

**Project ID:** Route 111 & Rand Ave Vicinity/21561979

**Analyst:** HAT

**Matrix:** Sludge

### SAMPLE / SAMPLE DUPLICATE RECOVERY

TCLP Metals per ICP/MS by EPA 6020	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Arsenic	0.022	0.022	0	25	
Barium	0.270	0.273	1	25	
Cadmium	<0.005	<0.005	NC	25	
Chromium	0.018	0.019	5	25	
Lead	<0.010	<0.010	NC	25	
Mercury	<0.0020	<0.0020	NC	25	
Selenium	<0.015	<0.015	NC	25	
Silver	<0.010	<0.010	NC	25	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit







## Prelogin / Nonconformance Report - Sample Log-In

Client: URS  
Date/Time: 07/09/09  
Lab ID #: 337484  
Initials: JC

### Sample Receipt Checklist

1. Samples on ice?	Blue	<u>Water</u>	No	
2. Shipping container in good condition?	<u>Yes</u>	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	<u>Yes</u>	No	N/A	
4. Chain of Custody present?	<u>Yes</u>	No		
5. Sample instructions complete on chain of custody?	<u>Yes</u>	No		
6. Any missing / extra samples?	Yes	<u>No</u>		
7. Chain of custody signed when relinquished / received?	<u>Yes</u>	No		
8. Chain of custody agrees with sample label(s)?	<u>Yes</u>	No		
9. Container labels legible and intact?	<u>Yes</u>	No		
10. Sample matrix / properties agree with chain of custody?	<u>Yes</u>	No		
11. Samples in proper container / bottle?	<u>Yes</u>	No		
12. Samples properly preserved?	<u>Yes</u>	No	N/A	
13. Sample container intact?	<u>Yes</u>	No		
14. Sufficient sample amount for indicated test(s)?	<u>Yes</u>	No		
15. All samples received within sufficient hold time?	<u>Yes</u>	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	Yes	No	<u>N/A</u>	
18. Cooler 1 No. <u>32</u>	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
<u>32</u> lbs <u>2.8</u> °C	lbs °C	lbs °C	lbs °C	lbs °C

### Nonconformance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

Check all that apply: ☐ Client understands and would like to proceed with analysis  
☐ Cooling process had begun shortly after sampling event

*Handwritten signature*

# Analytical Report 338903

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S. Central Avenue**

**Rte 111 & Rand Ave Vicinity/21561979**

**10-AUG-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Miramar (EPA Lab code: FL01246): Florida (E86349)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

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10-AUG-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **338903**  
**900 S. Central Avenue**  
Project Address: Roxana, IL 62084

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 338903. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 338903 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

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## Sample Cross Reference 338903



**URS Corporation-St. Louis, St. Louis, MO**

900 S. Central Avenue

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
20391 Soil	S	Jul-24-09 12:45		338903-001



## **CASE NARRATIVE**

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S. Central Avenue*

*Project ID: Rte 111 & Rand Ave Vicin*

*Work Order Number: 338903*

*Report Date: 10-AUG-09*

*Date Received: 07/25/2009*

---

**Sample receipt non conformances and Comments:**

*None*

---

**Sample receipt Non Conformances and Comments per Sample:**

*None*

**Analytical Non Conformances and Comments:**

*Batch: LBA-767822 VOAs by SW-846 8260B*

*None*



# Certificate of Analysis Summary 338903

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Rte 111 & Rand Ave Vicinity/21561979

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Sat Jul-25-09 09:00 am

**Contact:** Wendy Pennington

**Report Date:** 10-AUG-09

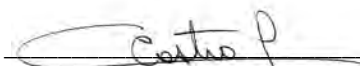
**Project Location:** Roxana, IL 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b>	338903-001					
	<b>Field Id:</b>	20391 Soil					
	<b>Depth:</b>						
	<b>Matrix:</b>	SOIL					
	<b>Sampled:</b>	Jul-24-09 12:45					
<b>VOA TCLP List</b>	<b>Extracted:</b>	Aug-04-09 09:12					
	<b>Analyzed:</b>	Aug-04-09 11:54					
	<b>Units/RL:</b>	mg/L RL					
Benzene		0.006 0.005					

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use.  
The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories.  
XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented.  
Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Carlos Castro  
Managing Director, Texas





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : VOA TCLP List

Client : URS Corporation-St. Louis

Work Order #: 338903

Project ID: Rte 111 & Rand Ave Vicinity/

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20391 Soil	Jul. 24, 2009	Jul. 25, 2009				Aug.4, 2009	14	11	P

F = These samples were analyzed outside the recommended holding time.

P = Samples analyzed within the recommended holding time.

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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 2505 North Falkenburg Rd, Tampa, FL 33619  
 5757 NW 158th St, Miami Lakes, FL 33014  
 12600 West I-20 East, Odessa, TX 79765  
 842 Cantwell Lane, Corpus Christi, TX 78408

Phone	Fax
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(214) 902 0300	(214) 351-9139
(210) 509-3334	(210) 509-3335
(813) 620-2000	(813) 620-2033
(305) 823-8500	(305) 823-8555
(432) 563-1800	(432) 563-1713
(361) 884-0371	(361) 884-9116



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 338903,

Project ID: Rte 111 & Rand Ave Vicinity/21561979

Lab Batch #: 767822

Sample: 534982-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/04/09 10:16

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0495	0.0500	99	86-115	
Dibromofluoromethane	0.0516	0.0500	103	86-118	
1,2-Dichloroethane-D4	0.0501	0.0500	100	80-120	
Toluene-D8	0.0472	0.0500	94	88-110	

Lab Batch #: 767822

Sample: 534982-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/04/09 11:05

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0492	0.0500	98	86-115	
Dibromofluoromethane	0.0518	0.0500	104	86-118	
1,2-Dichloroethane-D4	0.0507	0.0500	101	80-120	
Toluene-D8	0.0465	0.0500	93	88-110	

Lab Batch #: 767822

Sample: 338903-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/04/09 11:54

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0495	0.0500	99	86-115	
Dibromofluoromethane	0.0549	0.0500	110	86-118	
1,2-Dichloroethane-D4	0.0551	0.0500	110	80-120	
Toluene-D8	0.0469	0.0500	94	88-110	

Lab Batch #: 767822

Sample: 338903-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/04/09 12:43

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0510	0.0500	102	86-115	
Dibromofluoromethane	0.0539	0.0500	108	86-118	
1,2-Dichloroethane-D4	0.0594	0.0500	119	80-120	
Toluene-D8	0.0458	0.0500	92	88-110	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 338903,

Project ID: Rte 111 & Rand Ave Vicinity/21561979

Lab Batch #: 767822

Sample: 338903-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/04/09 13:07

### SURROGATE RECOVERY STUDY

VOA TCLP List  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0499	0.0500	100	86-115	
Dibromofluoromethane	0.0515	0.0500	103	86-118	
1,2-Dichloroethane-D4	0.0548	0.0500	110	80-120	
Toluene-D8	0.0471	0.0500	94	88-110	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



# Blank Spike Recovery



**Project Name: 900 S. Central Avenue**

**Work Order #: 338903**

**Project ID: Rte 111 & Rand Ave Vicinity/21561979**

**Lab Batch #: 767822**

**Sample: 534982-1-BKS**

**Matrix: Water**

**Date Analyzed: 08/04/2009**

**Date Prepared: 08/04/2009**

**Analyst: KHM**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

VOA TCLP List  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Benzene	<0.001	0.100	0.104	104	66-142	

Blank Spike Recovery [D] =  $100 * [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order #: 338903

Project ID: Rte 111 & Rand Ave Vicinity/21561979

Lab Batch ID: 767822

QC- Sample ID: 338903-001 S

Batch #: 1 Matrix: Soil

Date Analyzed: 08/04/2009

Date Prepared: 08/04/2009

Analyst: KHM

Reporting Units: mg/L

VOA TCLP List  Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	0.006	0.100	0.114	108	0.100	0.110	104	4	66-142	21	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit







## Prelogin / Nonconformance Report - Sample Log-In

Client: URS  
Date/Time: 07/25/09  
Lab ID #: 338903  
Initials: PC

### Sample Receipt Checklist

1. Samples on ice?	Blue	<u>Water</u>	No	
2. Shipping container in good condition?	<u>Yes</u>	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	<u>Yes</u>	No	N/A	
4. Chain of Custody present?	<u>Yes</u>	No		
5. Sample instructions complete on chain of custody?	<u>Yes</u>	No		
6. Any missing / extra samples?	Yes	<u>No</u>		
7. Chain of custody signed when relinquished / received?	<u>Yes</u>	No		
8. Chain of custody agrees with sample label(s)?	<u>Yes</u>	No		
9. Container labels legible and intact?	<u>Yes</u>	No		
10. Sample matrix / properties agree with chain of custody?	<u>Yes</u>	No		
11. Samples in proper container / bottle?	<u>Yes</u>	No		
12. Samples properly preserved?	<u>Yes</u>	No	N/A	
13. Sample container intact?	<u>Yes</u>	No		
14. Sufficient sample amount for indicated test(s)?	<u>Yes</u>	No		
15. All samples received within sufficient hold time?	<u>Yes</u>	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	<u>Yes</u>	No	<u>N/A</u>	
18. Cooler 1 No. <u>02</u>	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
<u>12</u> lbs <u>3.4</u> °C	lbs °C	lbs °C	lbs °C	lbs °C

### Nonconformance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

Check all that apply: ☐ Client understands and would like to proceed with analysis  
☐ Cooling process had begun shortly after sampling event

*am*

# Analytical Report 340203

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S. Central Ave.**

**Route 111 & Rand Ave Vicinity/21561979**

**14-AUG-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Miramar (EPA Lab code: FL01246): Florida (E86349)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Houston - Dallas - San Antonio - Tampa - Miami - Midland - Corpus Christi - Atlanta - Latin America



14-AUG-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **340203**  
**900 S. Central Ave.**  
Project Address: Roxana, Illinois

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 340203. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 340203 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

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## Sample Cross Reference 340203



**URS Corporation-St. Louis, St. Louis, MO**

900 S. Central Ave.

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
20436 Soil	S	Aug-06-09 15:15		340203-001



## CASE NARRATIVE

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S. Central Ave.*

*Project ID: Route 111 & Rand Ave Vic*

*Work Order Number: 340203*

*Report Date: 14-AUG-09*

*Date Received: 08/07/2009*

---

**Sample receipt non conformances and Comments:**

None

---

**Sample receipt Non Conformances and Comments per Sample:**

None

**Analytical Non Conformances and Comments:**

*Batch: LBA-768105 Soil pH by SW-846 9045C*

None

*Batch: LBA-768117 Cyanide by EPA 9010*

None

*Batch: LBA-768120 Sulfides by SW 9030B*

None

*Batch: LBA-768319 SVOCs by SW-846 8270C*

None

*Batch: LBA-768407 Chlorinated Herbicides By GC U by SW-846 8151*

None

*Batch: LBA-768420 Organochlorine Pesticides by SW-846 8081A*

None

*Batch: LBA-768429 Flash Point (CC) SW-846 1010*

None

*Batch: LBA-768505 VOAs by SW-846 8260B*

None

*Batch: LBA-768542 Metals per ICP-MS by SW 6020A*

*Selenium recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate. Mercury recovered below QC limits in the Matrix Spike Duplicate.*

*Samples affected are: 340203-001.*

*The Laboratory Control Sample for Selenium, Mercury is within laboratory Control Limits*



# Certificate of Analysis Summary 340203

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Contact:** Wendy Pennington

**Project Name:** 900 S. Central Ave.

**Date Received in Lab:** Fri Aug-07-09 09:30 am

**Report Date:** 14-AUG-09

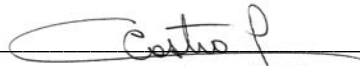
**Project Location:** Roxana, Illinois

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> <b>Field Id:</b> <b>Depth:</b> <b>Matrix:</b> <b>Sampled:</b>	340203-001 20436 Soil  SOIL Aug-06-09 15:15					
<b>TCLP SVOCs</b>	<b>Extracted:</b> <b>Analyzed:</b> <b>Units/RL:</b>	Aug-11-09 09:42 Aug-11-09 18:44 mg/L      RL					
1,4-Dichlorobenzene		U    0.050					
2,4-Dinitrotoluene		U    0.050					
Hexachlorobenzene		U    0.050					
Hexachlorobutadiene		U    0.050					
Hexachloroethane		U    0.050					
2-methylphenol		U    0.050					
3&4-Methylphenol		U    0.050					
Nitrobenzene		U    0.050					
Pentachlorophenol		U    0.050					
Pyridine		U    0.050					
2,4,5-Trichlorophenol		U    0.050					
2,4,6-Trichlorophenol		U    0.050					
<b>TCLP Herbicides by SW8151</b>	<b>Extracted:</b> <b>Analyzed:</b> <b>Units/RL:</b>	Aug-11-09 12:39 Aug-11-09 21:13 ug/L      RL					
2,4,5-Tp		U    2.50					
2,4-D		U    2.50					

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Carlos Castro  
Managing Director, Texas



# Certificate of Analysis Summary 340203

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Contact:** Wendy Pennington

**Project Name:** 900 S. Central Ave.

**Date Received in Lab:** Fri Aug-07-09 09:30 am

**Report Date:** 14-AUG-09


**Project Location:** Roxana, Illinois

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b>	340203-001					
	<b>Field Id:</b>	20436 Soil					
	<b>Depth:</b>						
	<b>Matrix:</b>	SOIL					
	<b>Sampled:</b>	Aug-06-09 15:15					
<b>TCLP Metals per ICP/MS by EPA 6020</b>	<b>Extracted:</b>	Aug-12-09 13:25					
	<b>Analyzed:</b>	Aug-14-09 11:16					
	<b>Units/RL:</b>	mg/L RL					
Arsenic		U 0.002					
Barium		0.522 0.005					
Cadmium		0.002 0.001					
Chromium		0.011 0.003					
Lead		0.004 0.002					
Mercury *		0.0001 J 0.0004					
Selenium		U 0.003					
Silver		U 0.002					
<b>TCLP Pesticides by SW8081A</b>	<b>Extracted:</b>	Aug-11-09 09:48					
	<b>Analyzed:</b>	Aug-13-09 13:38					
	<b>Units/RL:</b>	ug/L RL					
Heptachlor Epoxide		U 0.250					
Chlordane		U 2.50					
Endrin		U 0.250					
Gamma-BHC (Lindane)		U 0.250					
Heptachlor		U 0.250					
Methoxychlor		U 0.250					
Toxaphene		U 2.50					

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Carlos Castro  
Managing Director, Texas





# Certificate of Analysis Summary 340203

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Project Name:** 900 S. Central Ave.

**Date Received in Lab:** Fri Aug-07-09 09:30 am

**Contact:** Wendy Pennington

**Report Date:** 14-AUG-09


**Project Location:** Roxana, Illinois

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 340203-001 <b>Field Id:</b> 20436 Soil <b>Depth:</b> <b>Matrix:</b> SOIL <b>Sampled:</b> Aug-06-09 15:15					
<b>VOA TCLP List</b>	<b>Extracted:</b> Aug-13-09 17:06 <b>Analyzed:</b> Aug-13-09 20:35 <b>Units/RL:</b> mg/L RL					
Benzene	U 0.005					
Methyl ethyl ketone	U 0.050					
Carbon Tetrachloride	U 0.005					
Chlorobenzene	U 0.005					
Chloroform	U 0.005					
1,2-Dichloroethane	U 0.005					
1,1-Dichloroethene	U 0.005					
Tetrachloroethylene	U 0.005					
Trichloroethylene	U 0.005					
Vinyl Chloride	U 0.002					

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Managing Director, Texas



# Certificate of Analysis Summary 340203

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/2156197

**Contact:** Wendy Pennington

**Project Name:** 900 S. Central Ave.

**Date Received in Lab:** Fri Aug-07-09 09:30 am

**Report Date:** 14-AUG-09


**Project Location:** Roxana, Illinois

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 340203-001 <b>Field Id:</b> 20436 Soil <b>Depth:</b> <b>Matrix:</b> SOIL <b>Sampled:</b> Aug-06-09 15:15					
<b>Flash Point (CC) SW-846 1010</b>	<b>Extracted:</b> <b>Analyzed:</b> Aug-13-09 12:30 <b>Units/RL:</b> Deg F RL					
Flash Point	> 150 75.0					
<b>Reactive Cyanide (Colorimetric, Manual)</b>	<b>Extracted:</b> <b>Analyzed:</b> Aug-10-09 14:30 <b>Units/RL:</b> mg/kg RL					
Cyanide	U 0.200					
<b>Reactive Sulfide</b>	<b>Extracted:</b> <b>Analyzed:</b> Aug-10-09 15:22 <b>Units/RL:</b> mg/kg RL					
Sulfide	U 50.0					
<b>Soil pH</b>	<b>Extracted:</b> <b>Analyzed:</b> Aug-10-09 13:06 <b>Units/RL:</b> SU RL					
pH	8.51					

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**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Flash Point (CC) SW-846 1010

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009				Aug.13, 2009	30	7	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Metals per ICP/MS by EPA 6020

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009	Aug. 12, 2009	180	6	Aug.14, 2009	180	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Pesticides by SW8081A

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009	Aug. 11, 2009	7	5	Aug.13, 2009	40	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Herbicides by SW8151

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009	Aug. 11, 2009	7	5	Aug.11, 2009	7	0	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : VOA TCLP List

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009				Aug.13, 2009	14	7	P





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP SVOCs

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009	Aug. 11, 2009	7	5	Aug.11, 2009	40	0	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Cyanide (Colorimetric, Manual)

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009				Aug.10, 2009	14	4	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Sulfide

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009				Aug.10, 2009	14	4	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Soil pH

Client : URS Corporation-St. Louis

Work Order #: 340203

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
20436 Soil	Aug. 6, 2009	Aug. 7, 2009				Aug.10, 2009	28	4	P

F = These samples were analyzed outside the recommended holding time.

P = Samples analyzed within the recommended holding time.

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 768407

Sample: 535186-1-BLK / BLK

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/11/09 18:44

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	8.41	10.0	84	44-131	

Lab Batch #: 768407

Sample: 535186-1-BKS / BKS

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/11/09 19:34

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	9.08	10.0	91	44-131	

Lab Batch #: 768407

Sample: 535186-1-BSD / BSD

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/11/09 20:24

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	7.44	10.0	74	44-131	

Lab Batch #: 768407

Sample: 340203-001 / SMP

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 08/11/09 21:13

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	6.92	10.0	69	44-131	

Lab Batch #: 768407

Sample: 340203-001 S / MS

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 08/11/09 22:02

### SURROGATE RECOVERY STUDY

TCLP Herbicides by SW8151 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2,4-Dichlorophenylacetic Acid	5.69	10.0	57	44-131	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 768420

Sample: 535176-1-BLK / BLK

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/13/09 11:49

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	1.13	1.00	113	53-119	
Tetrachloro-m-xylene	1.10	1.00	110	72-114	

Lab Batch #: 768420

Sample: 535176-1-BKS / BKS

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/13/09 12:43

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	0.940	1.00	94	53-119	
Tetrachloro-m-xylene	0.960	1.00	96	72-114	

Lab Batch #: 768420

Sample: 535176-1-BSD / BSD

Batch: 1 Matrix: Water

Units: ug/L

Date Analyzed: 08/13/09 13:10

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	0.910	1.00	91	53-119	
Tetrachloro-m-xylene	0.950	1.00	95	72-114	

Lab Batch #: 768420

Sample: 340203-001 / SMP

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 08/13/09 13:38

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	4.20	5.00	84	53-119	
Tetrachloro-m-xylene	4.30	5.00	86	72-114	

Lab Batch #: 768420

Sample: 340203-001 S / MS

Batch: 1 Matrix: Soil

Units: ug/L

Date Analyzed: 08/13/09 14:05

### SURROGATE RECOVERY STUDY

TCLP Pesticides by SW8081A Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Decachlorobiphenyl	4.55	5.00	91	53-119	
Tetrachloro-m-xylene	4.60	5.00	92	72-114	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.





## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 768319

Sample: 535180-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/11/09 16:55

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.035	0.050	70	43-116	
2-Fluorophenol	0.024	0.050	48	21-100	
Nitrobenzene-d5	0.034	0.050	68	35-114	
Phenol-d6	0.016	0.050	32	10-94	
Terphenyl-D14	0.040	0.050	80	33-141	
2,4,6-Tribromophenol	0.026	0.050	52	10-123	

Lab Batch #: 768319

Sample: 535180-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/11/09 17:32

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.036	0.050	72	43-116	
2-Fluorophenol	0.020	0.050	40	21-100	
Nitrobenzene-d5	0.036	0.050	72	35-114	
Phenol-d6	0.017	0.050	34	10-94	
Terphenyl-D14	0.037	0.050	74	33-141	
2,4,6-Tribromophenol	0.030	0.050	60	10-123	

Lab Batch #: 768319

Sample: 535180-1-BSD / BSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/11/09 18:08

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.035	0.050	70	43-116	
2-Fluorophenol	0.022	0.050	44	21-100	
Nitrobenzene-d5	0.035	0.050	70	35-114	
Phenol-d6	0.016	0.050	32	10-94	
Terphenyl-D14	0.037	0.050	74	33-141	
2,4,6-Tribromophenol	0.030	0.050	60	10-123	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 768319

Sample: 340203-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/11/09 18:44

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.165	0.250	66	43-116	
2-Fluorophenol	0.142	0.250	57	21-100	
Nitrobenzene-d5	0.162	0.250	65	35-114	
Phenol-d6	0.122	0.250	49	10-94	
Terphenyl-D14	0.191	0.250	76	33-141	
2,4,6-Tribromophenol	0.144	0.250	58	10-123	

Lab Batch #: 768319

Sample: 340203-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/11/09 19:21

### SURROGATE RECOVERY STUDY

TCLP SVOCs Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.177	0.250	71	43-116	
2-Fluorophenol	0.125	0.250	50	21-100	
Nitrobenzene-d5	0.174	0.250	70	35-114	
Phenol-d6	0.117	0.250	47	10-94	
Terphenyl-D14	0.184	0.250	74	33-141	
2,4,6-Tribromophenol	0.157	0.250	63	10-123	

Lab Batch #: 768505

Sample: 535373-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/13/09 19:04

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0506	0.0500	101	74-124	
Dibromofluoromethane	0.0547	0.0500	109	75-131	
1,2-Dichloroethane-D4	0.0561	0.0500	112	63-144	
Toluene-D8	0.0508	0.0500	102	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch #: 768505

Sample: 535373-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/13/09 20:13

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0505	0.0500	101	74-124	
Dibromofluoromethane	0.0535	0.0500	107	75-131	
1,2-Dichloroethane-D4	0.0568	0.0500	114	63-144	
Toluene-D8	0.0479	0.0500	96	80-117	

Lab Batch #: 768505

Sample: 340203-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/13/09 20:35

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0502	0.0500	100	74-124	
Dibromofluoromethane	0.0534	0.0500	107	75-131	
1,2-Dichloroethane-D4	0.0489	0.0500	98	63-144	
Toluene-D8	0.0478	0.0500	96	80-117	

Lab Batch #: 768505

Sample: 340203-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/13/09 21:44

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0523	0.0500	105	74-124	
Dibromofluoromethane	0.0526	0.0500	105	75-131	
1,2-Dichloroethane-D4	0.0496	0.0500	99	63-144	
Toluene-D8	0.0490	0.0500	98	80-117	

Lab Batch #: 768505

Sample: 340203-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/L

Date Analyzed: 08/13/09 22:07

### SURROGATE RECOVERY STUDY

VOA TCLP List Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0508	0.0500	102	74-124	
Dibromofluoromethane	0.0540	0.0500	108	75-131	
1,2-Dichloroethane-D4	0.0508	0.0500	102	63-144	
Toluene-D8	0.0497	0.0500	99	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Ave.

Work Orders : 340203,

Lab Batch #: 768501

Sample: ICB-01 / ICB

Project ID: Route 111 & Rand Ave Vicinity/21561979

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 08/13/09 18:42

### SURROGATE RECOVERY STUDY

VOAs by SW-846 8260B  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0522	0.0500	104	74-124	
Dibromofluoromethane	0.0441	0.0500	88	75-131	
1,2-Dichloroethane-D4	0.0492	0.0500	98	63-144	
Toluene-D8	0.0528	0.0500	106	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.

**Project Name: 900 S. Central Ave.**

**Work Order #: 340203**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Lab Batch #: 768117**

**Sample: 768117-1-BKS**

**Matrix: Solid**

**Date Analyzed: 08/10/2009**

**Date Prepared: 08/10/2009**

**Analyst: AMB**

**Reporting Units: mg/kg**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

Reactive Cyanide (Colorimetric, Manual)	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Analytes						
Cyanide	<0.018	0.200	0.228	114	80-120	

**Lab Batch #: 768120**

**Sample: 768120-1-BKS**

**Matrix: Solid**

**Date Analyzed: 08/10/2009**

**Date Prepared: 08/10/2009**

**Analyst: AMB**

**Reporting Units: mg/kg**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

Reactive Sulfide	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Analytes						
Sulfide	<5.00	1000	876	88	60-120	

**Lab Batch #: 768542**

**Sample: 535247-1-BKS**

**Matrix: Water**

**Date Analyzed: 08/14/2009**

**Date Prepared: 08/12/2009**

**Analyst: HAT**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

TCLP Metals per ICP/MS by EPA 6020	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Analytes						
Arsenic	<0.002	0.050	0.049	98	75-125	
Barium	<0.001	0.050	0.048	96	75-125	
Cadmium	<0.001	0.020	0.019	95	75-125	
Chromium	<0.001	0.050	0.045	90	75-125	
Lead	<0.001	0.050	0.046	92	75-125	
Mercury	<0.0001	0.0010	0.0009	90	75-125	
Selenium	<0.001	0.050	0.044	88	75-125	
Silver	<0.001	0.020	0.020	100	75-125	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit

**Project Name: 900 S. Central Ave.**

**Work Order #: 340203**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Lab Batch #: 768505**

**Sample: 535373-1-BKS**

**Matrix: Water**

**Date Analyzed: 08/13/2009**

**Date Prepared: 08/13/2009**

**Analyst: PBU**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

VOA TCLP List  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Benzene	<0.001	0.050	0.055	110	66-142	
Methyl ethyl ketone	<0.010	0.500	0.367	73	60-140	
Carbon Tetrachloride	<0.001	0.050	0.043	86	62-125	
Chlorobenzene	<0.001	0.050	0.052	104	60-133	
Chloroform	<0.001	0.050	0.057	114	74-125	
1,2-Dichloroethane	<0.001	0.050	0.050	100	68-127	
1,1-Dichloroethene	<0.001	0.050	0.060	120	59-172	
Tetrachloroethylene	<0.001	0.050	0.048	96	71-125	
Trichloroethylene	<0.001	0.050	0.051	102	62-137	
Vinyl Chloride	<0.001	0.050	0.051	102	75-125	

Blank Spike Recovery [D] =  $100 \times [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## BS / BSD Recoveries



**Project Name: 900 S. Central Ave.**

**Work Order #:** 340203

**Analyst:** JLA

**Date Prepared:** 08/11/2009

**Project ID:** Route 111 & Rand Ave Vicinity/21561979

**Date Analyzed:** 08/11/2009

**Lab Batch ID:** 768407

**Sample:** 535186-1-BKS

**Batch #:** 1

**Matrix:** Water

**Units:** ug/L

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

<b>TCLP Herbicides by SW8151</b>	<b>Blank Sample Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Spike Added [E]</b>	<b>Blank Spike Duplicate Result [F]</b>	<b>Blk. Spk Dup. %R [G]</b>	<b>RPD %</b>	<b>Control Limits %R</b>	<b>Control Limits %RPD</b>	<b>Flag</b>
<b>Analytes</b>											
2,4,5-Tp	<0.465	5.00	5.02	100	5	4.42	88	13	32-140	25	
2,4-D	<0.260	5.00	4.80	96	5	4.44	89	8	10-189	25	

**Analyst:** JLA

**Date Prepared:** 08/11/2009

**Date Analyzed:** 08/13/2009

**Lab Batch ID:** 768420

**Sample:** 535176-1-BKS

**Batch #:** 1

**Matrix:** Water

**Units:** ug/L

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

<b>TCLP Pesticides by SW8081A</b>	<b>Blank Sample Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Spike Added [E]</b>	<b>Blank Spike Duplicate Result [F]</b>	<b>Blk. Spk Dup. %R [G]</b>	<b>RPD %</b>	<b>Control Limits %R</b>	<b>Control Limits %RPD</b>	<b>Flag</b>
<b>Analytes</b>											
Heptachlor Epoxide	<0.009	1.00	0.900	90	1	0.890	89	1	40-130	20	
Endrin	<0.006	1.00	1.01	101	1	1.01	101	0	43-134	20	
Gamma-BHC (Lindane)	<0.005	1.00	1.02	102	1	1.01	101	1	73-125	20	
Heptachlor	<0.005	1.00	1.07	107	1	1.02	102	5	45-128	20	
Methoxychlor	<0.006	1.00	0.990	99	1	1.00	100	1	73-142	20	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes





## BS / BSD Recoveries



**Project Name: 900 S. Central Ave.**

**Work Order #: 340203**

**Analyst: KAN**

**Date Prepared: 08/11/2009**

**Project ID: Route 111 & Rand Ave Vicinity/21561979**

**Date Analyzed: 08/11/2009**

**Lab Batch ID: 768319**

**Sample: 535180-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TCLP SVOCs  Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
1,4-Dichlorobenzene	<0.001	0.050	0.036	72	0.05	0.036	72	0	19-121	28	
2,4-Dinitrotoluene	<0.001	0.050	0.035	70	0.05	0.034	68	3	22-135	38	
Hexachlorobenzene	<0.001	0.050	0.037	74	0.05	0.037	74	0	46-133	25	
Hexachlorobutadiene	<0.001	0.050	0.039	78	0.05	0.039	78	0	44-125	25	
Hexachloroethane	<0.001	0.050	0.038	76	0.05	0.037	74	3	25-153	25	
2-methylphenol	<0.001	0.050	0.046	92	0.05	0.048	96	4	14-176	25	
3&4-Methylphenol	<0.002	0.100	0.076	76	0.1	0.081	81	6	14-176	25	
Nitrobenzene	<0.001	0.050	0.037	74	0.05	0.037	74	0	65-135	25	
Pentachlorophenol	<0.001	0.050	0.037	74	0.05	0.034	68	8	17-117	50	
Pyridine	<0.004	0.050	0.020	40	0.05	0.022	44	10	16-86	28	
2,4,5-Trichlorophenol	<0.001	0.050	0.034	68	0.05	0.034	68	0	65-135	25	
2,4,6-Trichlorophenol	<0.001	0.050	0.033	66	0.05	0.034	68	3	65-135	25	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes



## Form 3 - MS Recoveries



Project Name: 900 S. Central Ave.

Work Order #: 340203

Lab Batch #: 768407

Date Analyzed: 08/11/2009

QC- Sample ID: 340203-001 S

Reporting Units: ug/L

Date Prepared: 08/11/2009

Batch #: 1

Project ID: Route 111 & Rand Ave Vicinity/21561

Analyst: JLA

Matrix: Soil

MATRIX / MATRIX SPIKE RECOVERY STUDY						
TCLP Herbicides by SW8151	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
2,4,5-Tp	<2.50	5.00	4.37	87	32-140	
2,4-D	<2.50	5.00	4.41	88	10-189	

Lab Batch #: 768420

Date Analyzed: 08/13/2009

QC- Sample ID: 340203-001 S

Reporting Units: ug/L

Date Prepared: 08/11/2009

Batch #: 1

Analyst: JLA

Matrix: Soil

MATRIX / MATRIX SPIKE RECOVERY STUDY						
TCLP Pesticides by SW8081A	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Heptachlor Epoxide	<0.250	5.00	4.45	89	40-130	
Endrin	<0.250	5.00	5.10	102	43-134	
Gamma-BHC (Lindane)	<0.250	5.00	5.05	101	73-125	
Heptachlor	<0.250	5.00	5.55	111	45-128	
Methoxychlor	<0.250	5.00	4.90	98	73-142	

Matrix Spike Percent Recovery [D] =  $100 \times (C-A)/B$

Relative Percent Difference [E] =  $200 \times (C-A)/(C+B)$

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



## Form 3 - MS Recoveries



Project Name: 900 S. Central Ave.

Work Order #: 340203

Lab Batch #: 768319

Date Analyzed: 08/11/2009

Date Prepared: 08/11/2009

Project ID: Route 111 & Rand Ave Vicinity/21561

Analyst: KAN

QC- Sample ID: 340203-001 S

Batch #: 1

Matrix: Soil

Reporting Units: mg/L

### MATRIX / MATRIX SPIKE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C  Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
1,4-Dichlorobenzene	<0.050	0.250	0.182	73	19-121	
2,4-Dinitrotoluene	<0.050	0.250	0.169	68	22-135	
Hexachlorobenzene	<0.050	0.250	0.183	73	46-133	
Hexachlorobutadiene	<0.050	0.250	0.195	78	44-125	
Hexachloroethane	<0.050	0.250	0.187	75	25-153	
2-methylphenol	<0.050	0.250	0.152	61	14-176	
3&4-Methylphenol	<0.050	0.500	0.324	65	14-176	
Nitrobenzene	<0.050	0.250	0.182	73	65-135	
Pentachlorophenol	<0.050	0.250	0.218	87	17-117	
Pyridine	<0.050	0.250	0.092	37	16-86	
2,4,5-Trichlorophenol	<0.050	0.250	0.179	72	65-135	
2,4,6-Trichlorophenol	<0.050	0.250	0.173	69	65-135	

Matrix Spike Percent Recovery [D] =  $100 \times (C-A)/B$

Relative Percent Difference [E] =  $200 \times (C-A)/(C+B)$

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Ave.

Work Order # : 340203

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch ID: 768542

QC- Sample ID: 339086-001 S

Batch #: 1 Matrix: Soil

Date Analyzed: 08/14/2009

Date Prepared: 08/12/2009

Analyst: HAT

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
TCLP Metals per ICP/MS by EPA 6020 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Arsenic	0.040	0.250	0.258	87	0.250	0.244	82	6	75-125	25	
Barium	<0.500	0.250	0.287	115	0.250	0.274	110	5	75-125	25	
Cadmium	<0.100	0.100	0.095	95	0.100	0.094	94	1	75-125	25	
Chromium	<0.300	0.250	0.256	102	0.250	0.247	99	4	75-125	25	
Lead	0.020	0.250	0.265	98	0.250	0.256	94	3	75-125	25	
Mercury	0.1900	0.0050	0.1950	100	0.0050	0.1855	0	5	75-125	25	X
Selenium	0.050	0.250	0.187	55	0.250	0.174	50	7	75-125	25	X
Silver	<0.200	0.100	0.098	98	0.100	0.093	93	5	75-125	25	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * [(C - F) / (C + F)]$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Ave.

Work Order # : 340203

Project ID: Route 111 & Rand Ave Vicinity/21561979

Lab Batch ID: 768505

QC- Sample ID: 340203-001 S

Batch #: 1 Matrix: Soil

Date Analyzed: 08/13/2009

Date Prepared: 08/13/2009

Analyst: PBU

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
VOA TCLP List Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.005	0.050	0.051	102	0.050	0.046	92	10	66-142	21	
Methyl ethyl ketone	<0.050	0.500	0.361	72	0.500	0.363	73	1	60-140	20	
Carbon Tetrachloride	<0.005	0.050	0.046	92	0.050	0.041	82	11	62-125	20	
Chlorobenzene	<0.005	0.050	0.052	104	0.050	0.050	100	4	60-133	21	
Chloroform	<0.005	0.050	0.059	118	0.050	0.056	112	5	74-125	20	
1,2-Dichloroethane	<0.005	0.050	0.057	114	0.050	0.054	108	5	68-127	20	
1,1-Dichloroethene	<0.005	0.050	0.058	116	0.050	0.053	106	9	59-172	22	
Tetrachloroethylene	<0.005	0.050	0.049	98	0.050	0.047	94	4	71-125	20	
Trichloroethylene	<0.005	0.050	0.053	106	0.050	0.047	94	12	62-137	24	
Vinyl Chloride	<0.002	0.050	0.052	104	0.050	0.051	102	2	75-125	20	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * [(C - F) / (C + F)]$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

**Project Name:** 900 S. Central Ave.

**Work Order #:** 340203

**Lab Batch #:** 768429

**Date Analyzed:** 08/13/2009

**QC- Sample ID:** 340203-001 D

**Reporting Units:** Deg F

**Project ID:** Route 111 & Rand Ave Vicinity/21561979

**Analyst:** CRU

**Date Prepared:** 08/13/2009

**Batch #:** 1

**Matrix:** Soil

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Flash Point (CC) SW-846 1010	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Flash Point	> 150	> 150	0	25	

**Lab Batch #:** 768117

**Date Analyzed:** 08/10/2009

**QC- Sample ID:** 339885-001 D

**Reporting Units:** mg/kg

**Date Prepared:** 08/10/2009

**Analyst:** AMB

**Batch #:** 1

**Matrix:** Soil

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Reactive Cyanide (Colorimetric, Manual)	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Cyanide	<0.200	<0.200	NC	20	

**Lab Batch #:** 768120

**Date Analyzed:** 08/10/2009

**QC- Sample ID:** 339885-001 D

**Reporting Units:** mg/kg

**Date Prepared:** 08/10/2009

**Analyst:** AMB

**Batch #:** 1

**Matrix:** Soil

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Reactive Sulfide	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Sulfide	<50.0	<50.0	NC	20	

**Lab Batch #:** 768105

**Date Analyzed:** 08/10/2009

**QC- Sample ID:** 339885-001 D

**Reporting Units:** SU

**Date Prepared:** 08/10/2009

**Analyst:** MOR

**Batch #:** 1

**Matrix:** Soil

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Soil pH	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
pH	8.28	8.20	1	20	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit

**Project Name:** 900 S. Central Ave.

**Work Order #:** 340203

**Lab Batch #:** 768105

**Date Analyzed:** 08/10/2009

**QC- Sample ID:** 340238-012 D

**Reporting Units:** SU

**Project ID:** Route 111 & Rand Ave Vicinity/21561979

**Analyst:** MOR

**Date Prepared:** 08/10/2009

**Batch #:** 1

**Matrix:** Soil

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Soil pH	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
pH	8.34	8.25	1	20	

**Lab Batch #:** 768542

**Date Analyzed:** 08/14/2009

**QC- Sample ID:** 339086-001 D

**Reporting Units:** mg/L

**Date Prepared:** 08/12/2009

**Analyst:** HAT

**Batch #:** 1

**Matrix:** Soil

SAMPLE / SAMPLE DUPLICATE RECOVERY					
TCLP Metals per ICP/MS by EPA 6020	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Arsenic	0.040	<0.010	NC	25	
Barium	<0.500	<0.025	NC	25	
Cadmium	<0.100	<0.005	NC	25	
Chromium	<0.300	<0.015	NC	25	
Lead	0.020	<0.010	NC	25	
Mercury	0.1900	0.1675	13	25	
Selenium	0.050	<0.015	NC	25	
Silver	<0.200	<0.010	NC	25	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## **Water IDW Characterization Results**

**345279**

**(Groundwater Profiling Purge Water)**

**348290**

**(Development & Purge Water from Monitoring Wells)**

**355933**

**(Groundwater Profiling Purge Water)**

# Analytical Report 345279

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S. Central Avenue**

**Route 111& Rand Ave Vicinity/21561979**

**28-SEP-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Xenco-Boca Raton (EPA Lab Code: FL00449): Florida(E86240),

South Carolina(96031001), Louisiana(04154), Georgia(917)



28-SEP-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **345279**  
**900 S. Central Avenue**  
Project Address: Roxana, Illinois 62084

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 345279. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 345279 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

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## Sample Cross Reference 345279



**URS Corporation-St. Louis, St. Louis, MO**

900 S. Central Avenue

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
P4375 Water	W	Sep-17-09 13:30		345279-001
TB091709	W	Sep-17-09 00:00		345279-002



## CASE NARRATIVE

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S. Central Avenue*

*Project ID: Route 111 & Rand Ave Vic.*

*Work Order Number: 345279*

*Report Date: 28-SEP-09*

*Date Received: 09/19/2009*

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**Sample receipt non conformances and Comments:**

None

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**Sample receipt Non Conformances and Comments per Sample:**

None

**Analytical Non Conformances and Comments:**

*Batch: LBA-773209 Inorganic Anions by EPA 300*

None

*Batch: LBA-773250 pH, Electrometric by EPA 150.2*

None

*Batch: LBA-773671 Chemical Oxygen Demand by HACH 8000*

None

*Batch: LBA-773697 TSS by SM2540D*

None

*Batch: LBA-773766 n-Hexane Extractable Material by EPA 1664A*

None

*Batch: LBA-773884 CBOD by SM5210B*

None

*Batch: LBA-773983 TPH DRO by EPA 8015 M*

None

*Batch: LBA-774204 TPH GRO by EPA 8015 Modified*

*TPH-GRO (Gasoline Range Organics) recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate.*

*Samples affected are: 345279-001.*

*The Laboratory Control Sample for TPH-GRO (Gasoline Range Organics) is within laboratory Control Limits*

*Batch: LBA-774257 VOAs by SW-846 8260B*

None



## **CASE NARRATIVE**

***Client Name: URS Corporation-St. Louis***

***Project Name: 900 S. Central Avenue***

***Project ID:***                      ***Route 111 & Rand Ave Vic.***

***Work Order Number:*** ***345279***

***Report Date:*** ***28-SEP-09***

***Date Received:*** ***09/19/2009***

---

***Batch: LBA-774361 Metals per ICP-MS by SW 6020A***

***None***

***Batch: LBA-774432 BTEX by SW 8260B***

***None***



# Certificate of Analysis Summary 345279

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111& Rand Ave Vicinity/21561979

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Sat Sep-19-09 09:00 am

**Contact:** Wendy Pennington

**Report Date:** 28-SEP-09

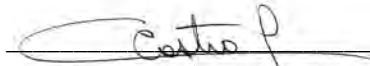
**Project Location:** Roxana, Illinois 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b>	345279-001	345279-002				
	<b>Field Id:</b>	P4375 Water	TB091709				
	<b>Depth:</b>						
	<b>Matrix:</b>	WATER	WATER				
	<b>Sampled:</b>	Sep-17-09 13:30	Sep-17-09 00:00				
<b>BTEX-MTBE by SW 8260B</b>	<b>Extracted:</b>	Sep-25-09 10:32	Sep-24-09 11:10				
	<b>Analyzed:</b>	Sep-25-09 11:52	Sep-24-09 13:12				
	<b>Units/RL:</b>	mg/L RL	mg/L RL				
MTBE		U 0.0050	U 0.0050				
Benzene		U 0.0010	U 0.0010				
Toluene		U 0.0010	U 0.0010				
Ethylbenzene		U 0.0010	U 0.0010				
m,p-Xylene		U 0.0020	U 0.0020				
o-Xylene		U 0.0010	U 0.0010				
Total Xylenes		U 0.001	U 0.001				
Total BTEX		U 0.001	U 0.001				
<b>Biochemical Oxygen Demand, BOD</b>	<b>Extracted:</b>						
	<b>Analyzed:</b>	Sep-19-09 10:34					
	<b>Units/RL:</b>	mg/L RL					
Biochemical Oxygen Demand, 5 day		20.0 2.00					
<b>Chemical Oxygen Demand by HACH 8000</b>	<b>Extracted:</b>						
	<b>Analyzed:</b>	Sep-22-09 15:17					
	<b>Units/RL:</b>	mg/L RL					
COD - Chemical Oxygen Demand		73.0 20.0					
<b>Oil and Grease by EPA 1664A</b>	<b>Extracted:</b>						
	<b>Analyzed:</b>	Sep-23-09 08:44					
	<b>Units/RL:</b>	mg/L RL					
Oil & Grease, Total Recovered		3.52 J 5.00					

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Carlos Castro  
Managing Director, Texas





# Certificate of Analysis Summary 345279

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111& Rand Ave Vicinity/21561979

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Sat Sep-19-09 09:00 am

**Contact:** Wendy Pennington

**Report Date:** 28-SEP-09

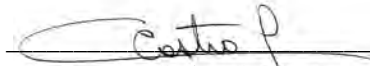
**Project Location:** Roxana, Illinois 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 345279-001 <b>Field Id:</b> P4375 Water <b>Depth:</b> <b>Matrix:</b> WATER <b>Sampled:</b> Sep-17-09 13:30	345279-002 TB091709 WATER Sep-17-09 00:00				
<b>TPH Diesel Range Organics per EPA 8015 Modified</b>	<b>Extracted:</b> Sep-20-09 14:28 <b>Analyzed:</b> Sep-24-09 11:00 <b>Units/RL:</b> mg/L RL					
TPH-DRO (Diesel Range Organics)	12.0 0.500					
<b>TPH Gasoline Range Organics by SW 8015</b>	<b>Extracted:</b> Sep-24-09 08:28 <b>Analyzed:</b> Sep-24-09 14:47 <b>Units/RL:</b> mg/L RL					
TPH-GRO (Gasoline Range Organics)	0.629 0.050					
<b>TSS by SM2540D</b>	<b>Extracted:</b> <b>Analyzed:</b> Sep-22-09 17:05 <b>Units/RL:</b> mg/L RL					
TSS	12100 4.00					
<b>Total Metals by SW6020</b>	<b>Extracted:</b> Sep-22-09 14:30 <b>Analyzed:</b> Sep-25-09 12:02 <b>Units/RL:</b> mg/L RL					
Lead	0.002 0.002					

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Managing Director, Texas



# Certificate of Analysis Summary 345279

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111& Rand Ave Vicinity/21561979

**Project Name:** 900 S. Central Avenue

**Contact:** Wendy Pennington

**Date Received in Lab:** Sat Sep-19-09 09:00 am

**Project Location:** Roxana, Illinois 62084

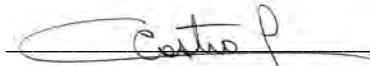
**Report Date:** 28-SEP-09

**Project Manager:** Debbie Simmons

<b><i>Analysis Requested</i></b>	<b><i>Lab Id:</i></b> <b><i>Field Id:</i></b> <b><i>Depth:</i></b> <b><i>Matrix:</i></b> <b><i>Sampled:</i></b>	345279-001 P4375 Water  WATER Sep-17-09 13:30	345279-002 TB091709  WATER Sep-17-09 00:00				
<b>Inorganic Anions by EPA 300</b>	<b><i>Extracted:</i></b> <b><i>Analyzed:</i></b> <b><i>Units/RL:</i></b>	Sep-19-09 12:21 mg/L RL					
Nitrate as N		U 0.113					
<b>pH, Electrometric by EPA 150.2</b>	<b><i>Extracted:</i></b> <b><i>Analyzed:</i></b> <b><i>Units/RL:</i></b>	Sep-19-09 10:40 SU RL					
pH		7.97					

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Carlos Castro  
Managing Director, Texas



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : pH, Electrometric by EPA 150.2

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.19, 2009	1	2	F



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Oil and Grease by EPA 1664A

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.23, 2009	28	6	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Inorganic Anions by EPA 300

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.19, 2009	28	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Chemical Oxygen Demand by HACH 80

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.22, 2009	28	5	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TSS by SM2540D

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.22, 2009	7	5	P





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Biochemical Oxygen Demand, BOD

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.19, 2009	2	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Total Metals by SW6020

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009	Sep. 22, 2009	180	5	Sep.25, 2009	180	3	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TPH Diesel Range Organics per EPA 80

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009	Sep. 20, 2009	7	3	Sep.24, 2009	40	4	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TPH Gasoline Range Organics by SW 80

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.24, 2009	14	7	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : BTEX-MTBE by SW 8260B

Client : URS Corporation-St. Louis

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinit

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water	Sep. 17, 2009	Sep. 19, 2009				Sep.25, 2009	14	8	P
TB091709	Sep. 17, 2009	Sep. 19, 2009				Sep.24, 2009	14	7	P

F = These samples were analyzed outside the recommended holding time.

P = Samples analyzed within the recommended holding time.

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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(210) 509-3334	(210) 509-3335
(813) 620-2000	(813) 620-2033
(305) 823-8500	(305) 823-8555
(432) 563-1800	(432) 563-1713
(361) 884-0371	(361) 884-9116



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 345279,

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch #: 774257

Sample: 538856-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 11:59

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0523	0.0500	105	74-124	
Dibromofluoromethane	0.0479	0.0500	96	75-131	
1,2-Dichloroethane-D4	0.0478	0.0500	96	63-144	
Toluene-D8	0.0538	0.0500	108	80-117	

Lab Batch #: 774257

Sample: 538856-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 12:49

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0504	0.0500	101	74-124	
Dibromofluoromethane	0.0482	0.0500	96	75-131	
1,2-Dichloroethane-D4	0.0485	0.0500	97	63-144	
Toluene-D8	0.0527	0.0500	105	80-117	

Lab Batch #: 774257

Sample: 345279-002 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 13:12

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0517	0.0500	103	74-124	
Dibromofluoromethane	0.0496	0.0500	99	75-131	
1,2-Dichloroethane-D4	0.0468	0.0500	94	63-144	
Toluene-D8	0.0530	0.0500	106	80-117	

Lab Batch #: 774257

Sample: 344606-002 S / MS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 15:33

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0503	0.0500	101	74-124	
Dibromofluoromethane	0.0500	0.0500	100	75-131	
1,2-Dichloroethane-D4	0.0451	0.0500	90	63-144	
Toluene-D8	0.0508	0.0500	102	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.





## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 345279,

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch #: 774257

Sample: 344606-002 SD / MSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 15:56

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0501	0.0500	100	74-124	
Dibromofluoromethane	0.0527	0.0500	105	75-131	
1,2-Dichloroethane-D4	0.0544	0.0500	109	63-144	
Toluene-D8	0.0507	0.0500	101	80-117	

Lab Batch #: 774432

Sample: 538945-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/25/09 09:35

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0502	0.0500	100	74-124	
Dibromofluoromethane	0.0443	0.0500	89	75-131	
1,2-Dichloroethane-D4	0.0411	0.0500	82	63-144	
Toluene-D8	0.0513	0.0500	103	80-117	

Lab Batch #: 774432

Sample: 538945-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/25/09 10:37

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0507	0.0500	101	74-124	
Dibromofluoromethane	0.0480	0.0500	96	75-131	
1,2-Dichloroethane-D4	0.0480	0.0500	96	63-144	
Toluene-D8	0.0523	0.0500	105	80-117	

Lab Batch #: 774432

Sample: 345279-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/25/09 11:52

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0504	0.0500	101	74-124	
Dibromofluoromethane	0.0464	0.0500	93	75-131	
1,2-Dichloroethane-D4	0.0463	0.0500	93	63-144	
Toluene-D8	0.0487	0.0500	97	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 345279,

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch #: 774432

Sample: 345483-001 S / MS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/25/09 13:25

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0520	0.0500	104	74-124	
Dibromofluoromethane	0.0469	0.0500	94	75-131	
1,2-Dichloroethane-D4	0.0454	0.0500	91	63-144	
Toluene-D8	0.0499	0.0500	100	80-117	

Lab Batch #: 774432

Sample: 345483-001 SD / MSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/25/09 13:48

### SURROGATE RECOVERY STUDY

BTEX-MTBE by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0511	0.0500	102	74-124	
Dibromofluoromethane	0.0487	0.0500	97	75-131	
1,2-Dichloroethane-D4	0.0442	0.0500	88	63-144	
Toluene-D8	0.0488	0.0500	98	80-117	

Lab Batch #: 773983

Sample: 538696-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/23/09 12:58

### SURROGATE RECOVERY STUDY

TPH Diesel Range Organics per EPA 8015 Modified Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Pentacosane	0.043	0.050	86	60-120	

Lab Batch #: 773983

Sample: 538696-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/23/09 13:24

### SURROGATE RECOVERY STUDY

TPH Diesel Range Organics per EPA 8015 Modified Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Pentacosane	0.041	0.050	82	60-120	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 345279,

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch #: 773983

Sample: 538696-1-BSD / BSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/23/09 13:50

### SURROGATE RECOVERY STUDY

TPH Diesel Range Organics per EPA 8015 Modified Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Pentacosane	0.042	0.050	84	60-120	

Lab Batch #: 773983

Sample: 345279-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 11:00

### SURROGATE RECOVERY STUDY

TPH Diesel Range Organics per EPA 8015 Modified Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
Pentacosane	0.046	0.050	92	60-120	

Lab Batch #: 771180

Sample: ICB-01 / ICB

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/04/09 14:28

### SURROGATE RECOVERY STUDY

TPH GRO by EPA 8015 Mod.  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0327	0.0300	109	80-120	
1,4-Difluorobenzene	0.0314	0.0300	105	80-120	

Lab Batch #: 774204

Sample: 538828-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 09:55

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0297	0.0300	99	80-120	
1,4-Difluorobenzene	0.0282	0.0300	94	80-120	

Lab Batch #: 774204

Sample: 538828-1-BSD / BSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 10:19

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0326	0.0300	109	80-120	
1,4-Difluorobenzene	0.0294	0.0300	98	80-120	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 345279,

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch #: 774204

Sample: 538828-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 11:07

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0319	0.0300	106	80-120	
1,4-Difluorobenzene	0.0301	0.0300	100	80-120	

Lab Batch #: 774204

Sample: 345279-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 14:47

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0339	0.0300	113	80-120	
1,4-Difluorobenzene	0.0278	0.0300	93	80-120	

Lab Batch #: 774204

Sample: 345497-002 S / MS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 16:22

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0317	0.0300	106	80-120	
1,4-Difluorobenzene	0.0291	0.0300	97	80-120	

Lab Batch #: 774204

Sample: 345497-002 SD / MSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/24/09 16:46

### SURROGATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0321	0.0300	107	80-120	
1,4-Difluorobenzene	0.0288	0.0300	96	80-120	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.

**Project Name: 900 S. Central Avenue**

**Work Order #: 345279**

**Project ID: Route 111& Rand Ave Vicinity/21561979**

**Lab Batch #: 774257**

**Sample: 538856-1-BKS**

**Matrix: Water**

**Date Analyzed: 09/24/2009**

**Date Prepared: 09/24/2009**

**Analyst: CAA**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>BTEX-MTBE by SW 8260B</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
MTBE	<0.0025	0.5000	0.4830	97	65-135	
Benzene	<0.0005	0.1000	0.1050	105	66-142	
Toluene	<0.0005	0.1000	0.1110	111	59-139	
Ethylbenzene	<0.0005	0.1000	0.1060	106	75-125	
m,p-Xylene	<0.0010	0.2000	0.2190	110	75-125	
o-Xylene	<0.0005	0.1000	0.1090	109	75-125	

**Lab Batch #: 774432**

**Sample: 538945-1-BKS**

**Matrix: Water**

**Date Analyzed: 09/25/2009**

**Date Prepared: 09/25/2009**

**Analyst: CAA**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>BTEX-MTBE by SW 8260B</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
MTBE	<0.0025	0.5000	0.4082	82	65-135	
Benzene	<0.0005	0.1000	0.0886	89	66-142	
Toluene	<0.0005	0.1000	0.0988	99	59-139	
Ethylbenzene	<0.0005	0.1000	0.0968	97	75-125	
m,p-Xylene	<0.0010	0.2000	0.1995	100	75-125	
o-Xylene	<0.0005	0.1000	0.1037	104	75-125	

**Lab Batch #: 773209**

**Sample: 773209-1-BKS**

**Matrix: Water**

**Date Analyzed: 09/19/2009**

**Date Prepared: 09/19/2009**

**Analyst: MAB**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Inorganic Anions by EPA 300</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Nitrate as N	<0.002	1.13	1.12	99	80-120	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



# Blank Spike Recovery



**Project Name: 900 S. Central Avenue**

**Work Order #:** 345279

**Project ID:** Route 111& Rand Ave Vicinity/21561979

**Lab Batch #:** 774361

**Sample:** 538569-1-BKS

**Matrix:** Water

**Date Analyzed:** 09/25/2009

**Date Prepared:** 09/22/2009

**Analyst:** HAT

**Reporting Units:** mg/L

**Batch #:** 1

## BLANK /BLANK SPIKE RECOVERY STUDY

Total Metals by SW6020  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Lead	<0.001	0.050	0.049	98	75-125	

Blank Spike Recovery [D] =  $100 * [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



## BS / BSD Recoveries



**Project Name: 900 S. Central Avenue**

**Work Order #: 345279**

**Analyst: MOR**

**Date Prepared: 09/19/2009**

**Project ID: Route 111& Rand Ave Vicinity/21561979**

**Date Analyzed: 09/19/2009**

**Lab Batch ID: 773884**

**Sample: 773884-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Biochemical Oxygen Demand, BOD	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Biochemical Oxygen Demand, 5 day	<1.50	200	214	107	200	211	106	1	70-120	20	

**Analyst: ALA**

**Date Prepared: 09/22/2009**

**Date Analyzed: 09/22/2009**

**Lab Batch ID: 773671**

**Sample: 773671-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chemical Oxygen Demand by HACH 8000	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
COD - Chemical Oxygen Demand	<5.04	100	98.0	98	100	99.0	99	1	90-110	20	

**Analyst: JAH**

**Date Prepared: 09/20/2009**

**Date Analyzed: 09/23/2009**

**Lab Batch ID: 773983**

**Sample: 538696-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH Diesel Range Organics per EPA 8015 Modified	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
TPH-DRO (Diesel Range Organics)	<0.013	1.00	0.902	90	1	0.978	98	8	70-130	35	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes





## BS / BSD Recoveries



**Project Name: 900 S. Central Avenue**

**Work Order #: 345279**

**Analyst: RMU**

**Date Prepared: 09/24/2009**

**Project ID: Route 111& Rand Ave Vicinity/21561979**

**Date Analyzed: 09/24/2009**

**Lab Batch ID: 774204**

**Sample: 538828-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH Gasoline Range Organics by SW 8015	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
TPH-GRO (Gasoline Range Organics)	<0.025	0.500	0.408	82	0.5	0.446	89	9	75-125	35	

**Analyst: ALA**

**Date Prepared: 09/22/2009**

**Date Analyzed: 09/22/2009**

**Lab Batch ID: 773697**

**Sample: 773697-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TSS by SM2540D	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
TSS	<3.50	100	99.0	99	100	97.0	97	2	80-120	20	

**Analyst: MOR**

**Date Prepared: 09/23/2009**

**Date Analyzed: 09/23/2009**

**Lab Batch ID: 773766**

**Sample: 773766-1-BKS**

**Batch #: 1**

**Matrix: Water**

**Units: mg/L**

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Oil and Grease by EPA 1664A	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Oil & Grease, Total Recovered	<1.16	40.0	40.3	101	40	39.4	99	2	78-114	18	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order # : 345279

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch ID: 774257

QC- Sample ID: 344606-002 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/24/2009

Date Prepared: 09/24/2009

Analyst: CAA

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
BTEX-MTBE by SW 8260B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
MTBE	0.0134	0.5000	0.5145	100	0.5000	0.5328	104	3	65-135	20	
Benzene	<0.0050	0.1000	0.0996	100	0.1000	0.1026	103	3	66-142	20	
Toluene	<0.0050	0.1000	0.1033	103	0.1000	0.1090	109	5	59-139	20	
Ethylbenzene	<0.0050	0.1000	0.1018	102	0.1000	0.1042	104	2	75-125	20	
m,p-Xylene	<0.0100	0.2000	0.2131	107	0.2000	0.2182	109	2	75-125	20	
o-Xylene	<0.0050	0.1000	0.1084	108	0.1000	0.1137	114	5	75-125	20	

Lab Batch ID: 774432

QC- Sample ID: 345483-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/25/2009

Date Prepared: 09/25/2009

Analyst: CAA

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
BTEX-MTBE by SW 8260B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
MTBE	0.1003	0.5000	0.5155	83	0.5000	0.5353	87	4	65-135	20	
Benzene	0.1436	0.1000	0.2245	81	0.1000	0.2189	75	3	66-142	20	
Toluene	0.0044	0.1000	0.1028	98	0.1000	0.1021	98	1	59-139	20	
Ethylbenzene	0.0384	0.1000	0.1325	94	0.1000	0.1304	92	2	75-125	20	
m,p-Xylene	0.0286	0.2000	0.2308	101	0.2000	0.2233	97	3	75-125	20	
o-Xylene	0.0076	0.1000	0.1117	104	0.1000	0.1093	102	2	75-125	20	

Matrix Spike Percent Recovery  $[D] = 100 \times (C-A)/B$   
Relative Percent Difference  $RPD = 200 \times |(C-F)/(C+F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 \times (F-A)/E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not

ApplicableN = See Narrative, EQL = Estimated Quantitation Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order #: 345279

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch ID: 773671

QC- Sample ID: 344707-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/22/2009

Date Prepared: 09/22/2009

Analyst: ALA

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
Chemical Oxygen Demand by HACH 8000	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
COD - Chemical Oxygen Demand	11.0	100	110	99	100	109	98	1	90-110	20	

Lab Batch ID: 773209

QC- Sample ID: 345279-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/19/2009

Date Prepared: 09/19/2009

Analyst: MAB

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
Inorganic Anions by EPA 300	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Nitrate as N	<0.113	1.13	1.07	95	1.13	1.07	95	0	80-120	20	

Lab Batch ID: 774204

QC- Sample ID: 345497-002 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/24/2009

Date Prepared: 09/24/2009

Analyst: RMU

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
TPH Gasoline Range Organics by SW 8015	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
TPH-GRO (Gasoline Range Organics)	0.972	0.500	1.17	40	0.500	1.14	34	3	75-125	35	X

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not

ApplicableN = See Narrative, EQL = Estimated Quantitation Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order # : 345279

Project ID: Route 111& Rand Ave Vicinity/21561979

Lab Batch ID: 774361

QC- Sample ID: 345279-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 09/25/2009

Date Prepared: 09/22/2009

Analyst: HAT

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
Total Metals by SW6020  Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Lead	0.002	0.050	0.052	100	0.050	0.051	98	2	75-125	25	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 345279**

**Lab Batch #: 773884**

**Date Analyzed: 09/19/2009**

**QC- Sample ID: 345101-001 D**

**Reporting Units: mg/L**

**Date Prepared: 09/19/2009**

**Batch #: 1**

**Project ID: Route 111& Rand Ave Vicinity/21561979**

**Analyst: MOR**

**Matrix: Water**

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Biochemical Oxygen Demand, BOD	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Biochemical Oxygen Demand, 5 day	40.5	36.4	11	20	

**Lab Batch #: 773671**

**Date Analyzed: 09/22/2009**

**QC- Sample ID: 344707-001 D**

**Reporting Units: mg/L**

**Date Prepared: 09/22/2009**

**Batch #: 1**

**Analyst: ALA**

**Matrix: Water**

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Chemical Oxygen Demand by HACH 8000	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
COD - Chemical Oxygen Demand	11.0	11.0	NC	20	

**Lab Batch #: 773209**

**Date Analyzed: 09/19/2009**

**QC- Sample ID: 345279-001 D**

**Reporting Units: mg/L**

**Date Prepared: 09/19/2009**

**Batch #: 1**

**Analyst: MAB**

**Matrix: Water**

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Inorganic Anions by EPA 300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Nitrate as N	<0.113	<0.113	NC	20	

**Lab Batch #: 773766**

**Date Analyzed: 09/23/2009**

**QC- Sample ID: 345037-001 D**

**Reporting Units: mg/L**

**Date Prepared: 09/23/2009**

**Batch #: 1**

**Analyst: MOR**

**Matrix: Water**

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Oil and Grease by EPA 1664A	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Oil & Grease, Total Recovered	14.8	15.5	5	18	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$   
 All Results are based on MDL and validated for QC purposes.  
 BRL - Below Reporting Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 345279**

**Lab Batch #: 773697**

**Project ID: Route 111& Rand Ave Vicinity/21561979**

**Date Analyzed: 09/22/2009**

**Date Prepared: 09/22/2009**

**Analyst: ALA**

**QC- Sample ID: 345344-001 D**

**Batch #: 1**

**Matrix: Water**

**Reporting Units: mg/L**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

TSS by SM2540D	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
TSS	<4.00	<4.00	NC	20	

**Lab Batch #: 774361**

**Date Analyzed: 09/25/2009**

**Date Prepared: 09/22/2009**

**Analyst: HAT**

**QC- Sample ID: 345279-001 D**

**Batch #: 1**

**Matrix: Water**

**Reporting Units: mg/L**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Total Metals by SW6020	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Lead	0.002	0.002	0	25	

**Lab Batch #: 773250**

**Date Analyzed: 09/19/2009**

**Date Prepared: 09/19/2009**

**Analyst: MOR**

**QC- Sample ID: 345279-001 D**

**Batch #: 1**

**Matrix: Water**

**Reporting Units: SU**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

pH, Electrometric by EPA 150.2	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
pH	7.97	7.93	1	20	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit

## LAB (LOCATION)

☒ XENCO ( 4143 Greenbrier Dr., Stafford, TX 77477 )  
☐ CALSCIENCE ( P.O. 281240-4200 FAX: 281240-4290 )  
☐ TEST AMERICA ( )  
☐ SPL ( )  
☐ OTHER ( )



## Shell Oil Products Chain Of Custody Record

Please Check Appropriate Box: <input checked="" type="checkbox"/> ENV. SERVICES <input type="checkbox"/> MOTIVA RETAIL <input type="checkbox"/> CONSULTANT <input type="checkbox"/> SHELL PIPELINE		INCIDENT # (ENV SERVICES) 9 7 2 1 6 4 0		DATE: 9-17-09		CHECK IF NO INCIDENT # APPLIES <input type="checkbox"/>	
Print Bill To Contact Name: Wendy Pennington		PO #		SAP #		PAGE: 1 of 1	
CONSULTANT COMPANY: URS CORPORATION		URS CORPORATION - FIELD OFFICE 170 E. RAND AVENUE HARTFORD, ILLINOIS 62048		ROUTE 111 & Rand Ave Vicinity / 21561979		WENDY PENNINGTON	
ADDRESS: 1001 HIGHLANDS PLAZA DRIVE WEST - SUITE 300		CITY: ST. LOUIS, MISSOURI 63110		CONSULTANT PROJECT NAME / NO.: WENDY PENNINGTON		SOPS SITE ADDRESS (Street, City and State): 900 S. CENTRAL AVENUE; ROXANA, ILLINOIS 62084	
TELEPHONE: OFF: 314-743-4166 CELL: 314-452-8929		FAX: OFF: 314-743-4166 CELL: 314-452-8929		E-MAIL: wendy.pennington@ourscorp.com		SAMP. NAME(S) (Print): W.Pennington	
STANDARD (10 DAY) <input checked="" type="checkbox"/> 5 DAYS <input type="checkbox"/> 3 DAYS <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 24 HOURS		RESULTS NEEDED <input type="checkbox"/> ON WEEKEND <input checked="" type="checkbox"/> ON WEEKDAY		LABORATORY USE ONLY 345279-1		LABORATORY NOTES	
DELIVERABLES: <input type="checkbox"/> LEVEL 1 <input checked="" type="checkbox"/> LEVEL 2 <input type="checkbox"/> LEVEL 3 <input type="checkbox"/> LEVEL 4		COOLER #1 2-9-C		COOLER #2 wmp		REQUESTED ANALYSIS	
TEMPERATURE ON RECEIPT C° Cooler #1 Cooler #2		SPECIAL INSTRUCTIONS OR NOTES: Please include "J" values on Level 2 Reports Please provide sample receipt upon login.		SHELL CONTRACT RATE APPLIES <input checked="" type="checkbox"/>		VOC 8260B SVOC/PAH 8270B moisture BTX/MTBE GRO OIL & Grease DRO BOD COD Total Lead Nitrate & PH TSS	
Field Sample Identification P4375 Water IB091709		SAMPLING DATE 9/17/09 1330		MATRIX water ↓		PRESERVATIVE HCL HNO3 H2SO4 NONE OTHER 1 2 3 4 12	
NO. OF CONT. 2		NO. OF CONT. 2		NO. OF CONT. 2		NO. OF CONT. 2	
Relinquished by: (Signature) Wendy Pennington		Received by: (Signature) Fredex		Date: 9-17-09		Time: 1500	
Relinquished by: (Signature) Fredex		Received by: (Signature) Wendy Pennington		Date: 9/17/09		Time: 0900	





## Prelogin / Nonconformance Report - Sample Log-In

Client: URS Corp.  
Date/Time: 9/19/2009  
Lab ID #: 345279  
Initials: JAS.

### Sample Receipt Checklist

1. Samples on ice?	Blue	<u>Water</u>	No	
2. Shipping container in good condition?	<u>Yes</u>	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	<u>Yes</u>	No	N/A	
4. Chain of Custody present?	<u>Yes</u>	No		
5. Sample instructions complete on chain of custody?	<u>Yes</u>	No		
6. Any missing / extra samples?	Yes	<u>No</u>		
7. Chain of custody signed when relinquished / received?	<u>Yes</u>	No		
8. Chain of custody agrees with sample label(s)?	<u>Yes</u>	No		
9. Container labels legible and intact?	<u>Yes</u>	No		
10. Sample matrix / properties agree with chain of custody?	<u>Yes</u>	No		
11. Samples in proper container / bottle?	<u>Yes</u>	No		
12. Samples properly preserved?	<u>Yes</u>	No	N/A	
13. Sample container intact?	<u>Yes</u>	No		
14. Sufficient sample amount for indicated test(s)?	<u>Yes</u>	No		
15. All samples received within sufficient hold time?	<u>Yes</u>	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	<u>Yes</u>	No	N/A	
18. Cooler 1 No. <u>2157</u>	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
<u>20</u> lbs <u>0.9</u> °C	lbs °C	lbs °C	lbs °C	lbs °C

### Nonconformance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

Check all that apply: ☐ Client understands and would like to proceed with analysis  
☐ Cooling process had begun shortly after sampling event

*JAS.*

# Analytical Report 348290

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S. Central Avenue**

**Route 111 & Rand Ave Vicinity/ 21561979**

**21-OCT-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Xenco-Boca Raton (EPA Lab Code: FL00449): Florida(E86240),

South Carolina(96031001), Louisiana(04154), Georgia(917)



21-OCT-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **348290**  
**900 S. Central Avenue**  
Project Address: Roxana, Illinois 62084

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 348290. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 348290 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

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## Sample Cross Reference 348290



**URS Corporation-St. Louis, St. Louis, MO**

900 S. Central Avenue

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
D-01-09 Water	W	Oct-13-09 10:15		348290-001



## **CASE NARRATIVE**

***Client Name: URS Corporation-St. Louis***

***Project Name: 900 S. Central Avenue***

*Project ID: Route 111 & Rand Ave Vic*

*Work Order Number: 348290*

*Report Date: 21-OCT-09*

*Date Received: 10/14/2009*

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***Sample receipt non conformances and Comments:***

*None*

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***Sample receipt Non Conformances and Comments per Sample:***

*None*

***Analytical Non Conformances and Comments:***

*Batch: LBA-777103 pH, Electrometric by EPA 150.2*

*None*

*Batch: LBA-777466 Flash Point (CC) SW-846 1010*

*None*

*Batch: LBA-778093 Metals per ICP-MS by SW 6020A*

*None*

*Batch: LBA-778211 BTEX by SW 8260B*

*None*



# Certificate of Analysis Summary 348290

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/ 2156197

**Contact:** Wendy Pennington

**Project Location:** Roxana, Illinois 62084

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Wed Oct-14-09 08:45 am

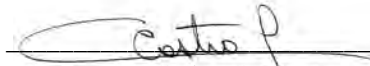
**Report Date:** 21-OCT-09

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 348290-001 <b>Field Id:</b> D-01-09 Water <b>Depth:</b> <b>Matrix:</b> WATER <b>Sampled:</b> Oct-13-09 10:15					
<b>BTEX by SW 8260B</b>	<b>Extracted:</b> Oct-21-09 13:14 <b>Analyzed:</b> Oct-21-09 16:06 <b>Units/RL:</b> mg/L RL					
Benzene	533.5 D 5.000					
Toluene	U 0.5000					
Ethylbenzene	U 0.5000					
m,p-Xylenes	U 1.000					
o-Xylene	U 0.5000					
Total Xylenes	U 0.5000					
Total BTEX	533.5 0.5000					
<b>Flash Point (Closed Cup Tester)</b>	<b>Extracted:</b> <b>Analyzed:</b> Oct-16-09 10:30 <b>Units/RL:</b> Deg F RL					
Flash Point	> 150 75.0					
<b>Total Metals by SW6020</b>	<b>Extracted:</b> Oct-19-09 08:55 <b>Analyzed:</b> Oct-20-09 21:14 <b>Units/RL:</b> mg/L RL					
Lead	0.002 0.002					
<b>pH, Electrometric by EPA 150.2</b>	<b>Extracted:</b> <b>Analyzed:</b> Oct-14-09 15:32 <b>Units/RL:</b> SU RL					
pH	7.16					

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use.  
The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories.  
XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented.  
Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Carlos Castro  
Managing Director, Texas



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : pH, Electrometric by EPA 150.2

Client : URS Corporation-St. Louis

Work Order #: 348290

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
D-01-09 Water	Oct. 13, 2009	Oct. 14, 2009				Oct.14, 2009	1	1	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Flash Point (Closed Cup Tester)

Client : URS Corporation-St. Louis

Work Order #: 348290

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
D-01-09 Water	Oct. 13, 2009	Oct. 14, 2009				Oct.16, 2009	30	3	P





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Total Metals by SW6020

Client : URS Corporation-St. Louis

Work Order #: 348290

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
D-01-09 Water	Oct. 13, 2009	Oct. 14, 2009	Oct. 19, 2009	180	6	Oct.20, 2009	180	1	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : BTEX by SW 8260B

Client : URS Corporation-St. Louis

Work Order #: 348290

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
D-01-09 Water	Oct. 13, 2009	Oct. 14, 2009				Oct.21, 2009	14	8	P

F = These samples were analyzed outside the recommended holding time.

P = Samples analyzed within the recommended holding time.

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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 5757 NW 158th St, Miami Lakes, FL 33014  
 12600 West I-20 East, Odessa, TX 79765  
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(813) 620-2000	(813) 620-2033
(305) 823-8500	(305) 823-8555
(432) 563-1800	(432) 563-1713
(361) 884-0371	(361) 884-9116



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 348290,

Project ID: Route 111 & Rand Ave Vicinity/ 21561979

Lab Batch #: 771176

Sample: ICB-01 / ICB

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 09/04/09 15:08

### SURROGATE RECOVERY STUDY

BTEX by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0486	0.0500	97	74-124	
Dibromofluoromethane	0.0485	0.0500	97	75-131	
1,2-Dichloroethane-D4	0.0519	0.0500	104	63-144	
Toluene-D8	0.0511	0.0500	102	80-117	

Lab Batch #: 778211

Sample: 541153-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 10/21/09 13:55

### SURROGATE RECOVERY STUDY

BTEX by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0499	0.0500	100	74-124	
Dibromofluoromethane	0.0542	0.0500	108	75-131	
1,2-Dichloroethane-D4	0.0533	0.0500	107	63-144	
Toluene-D8	0.0471	0.0500	94	80-117	

Lab Batch #: 778211

Sample: 541153-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 10/21/09 15:01

### SURROGATE RECOVERY STUDY

BTEX by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0503	0.0500	101	74-124	
Dibromofluoromethane	0.0540	0.0500	108	75-131	
1,2-Dichloroethane-D4	0.0541	0.0500	108	63-144	
Toluene-D8	0.0468	0.0500	94	80-117	

Lab Batch #: 778211

Sample: 348290-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 10/21/09 16:06

### SURROGATE RECOVERY STUDY

BTEX by SW 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0501	0.0500	100	74-124	
Dibromofluoromethane	0.0527	0.0500	105	75-131	
1,2-Dichloroethane-D4	0.0489	0.0500	98	63-144	
Toluene-D8	0.0475	0.0500	95	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 348290,

Project ID: Route 111 & Rand Ave Vicinity/ 21561979

Lab Batch #: 778211

Sample: 348290-001 / DL

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 10/21/09 16:35

### SURROGATE RECOVERY STUDY

BTEX by SW 8260B  Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0501	0.0500	100	74-124	
Dibromofluoromethane	0.0515	0.0500	103	75-131	
1,2-Dichloroethane-D4	0.0486	0.0500	97	63-144	
Toluene-D8	0.0488	0.0500	98	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.

**Project Name: 900 S. Central Avenue**

**Work Order #: 348290**

**Project ID: Route 111 & Rand Ave Vicinity/ 21561979**

**Lab Batch #: 778211**

**Sample: 541153-1-BKS**

**Matrix: Water**

**Date Analyzed: 10/21/2009**

**Date Prepared: 10/21/2009**

**Analyst: CAA**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

<b>BTEX by SW 8260B</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Benzene	<0.0005	0.1000	0.0879	88	66-142	
Toluene	<0.0005	0.1000	0.0893	89	59-139	
Ethylbenzene	<0.0005	0.1000	0.0911	91	75-125	
m,p-Xylenes	<0.0010	0.2000	0.1799	90	75-125	
o-Xylene	<0.0005	0.1000	0.0958	96	75-125	

**Lab Batch #: 778093**

**Sample: 540819-1-BKS**

**Matrix: Water**

**Date Analyzed: 10/20/2009**

**Date Prepared: 10/19/2009**

**Analyst: HAT**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

<b>Total Metals by SW6020</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Lead	<0.001	0.050	0.045	90	75-125	

Blank Spike Recovery [D] =  $100 * [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order # : 348290

Project ID: Route 111 & Rand Ave Vicinity/ 21561979

Lab Batch ID: 778093

QC- Sample ID: 348290-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 10/20/2009

Date Prepared: 10/19/2009

Analyst: HAT

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
Total Metals by SW6020 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Lead	0.002	0.050	0.052	100	0.050	0.054	104	4	75-125	25	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 348290**

**Lab Batch #: 777466**

**Date Analyzed: 10/16/2009**

**QC- Sample ID: 348290-001 D**

**Reporting Units: Deg F**

**Date Prepared: 10/16/2009**

**Batch #: 1**

**Project ID: Route 111 & Rand Ave Vicinity/ 21561979**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Flash Point (Closed Cup Tester)	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Flash Point	> 150	> 150	0	25	

**Lab Batch #: 778093**

**Date Analyzed: 10/20/2009**

**QC- Sample ID: 348290-001 D**

**Reporting Units: mg/L**

**Date Prepared: 10/19/2009**

**Batch #: 1**

**Analyst: HAT**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Total Metals by SW6020	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Lead	0.002	<0.002	NC	25	

**Lab Batch #: 777103**

**Date Analyzed: 10/14/2009**

**QC- Sample ID: 348290-001 D**

**Reporting Units: SU**

**Date Prepared: 10/14/2009**

**Batch #: 1**

**Analyst: MAB**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

pH, Electrometric by EPA 150.2	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
pH	7.16	7.11	1	20	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit





# Shell Oil Products Chain Of Custody Record

## LAB (LOCATION)

4143 Greenbrier Dr., Stafford, TX 77477  
XENCO ( ) TEL: 281-260-4200 FAX: 281-260-4280

☐ CALSCIENCE ( )  
☐ TEST AMERICA ( )  
☐ SPL ( )  
☐ OTHER ( )

## Please Check Appropriate Box:

☒ ENV. SERVICES ☐ MOTIVA RETAIL ☐ SHELL RETAIL  
☐ MOTIVA SDCM ☐ CONSULTANT ☐ LUBES  
☐ SHELL PIPELINE ☐ OTHER

## Print Bill To Contact Name:

Wendy Pennington

## INCIDENT # (ENV SERVICES):

9 7 2 1 6 6 4 0

CHECK IF NO INCIDENT # APPLIES

DATE: 10-13-09

PAGE: 1 of 1

## CONSULTANT COMPANY:

URS CORPORATION

URS CORPORATION - FIELD OFFICE

ADDRESS:  
1001 HIGHLANDS PLAZA DRIVE WEST - SUITE 300

170 E. RAND AVENUE

ST. LOUIS, MISSOURI 63110

HARTFORD, ILLINOIS 62048

TELEPHONE: OFF: 314-743-4166

CELL: 314-452-8929

E-MAIL: wendy\_pennington@urscorp.com

TURNAROUND TIME (CALENDAR DAYS):

STANDARD (10 DAY)

3 DAYS

2 DAYS

RESULTS NEEDED ON WEEKEND

DELIVERABLES: ☐ LEVEL 1 ☒ LEVEL 2 ☐ LEVEL 3 ☐ LEVEL 4 ☐ OTHER (SPECIFY) EDD

24 HOURS

OTHER (SPECIFY)

COOLER #3

TEMPERATURE ON RECEIPT C°

COOLER #1

2-5°C

COOLER #2

SPECIAL INSTRUCTIONS OR NOTES:

Please include "J" values on Level 2 Reports

Please provide sample receipt upon login.

☒ SHELL CONTRACT RATE APPLIES

REQUESTED ANALYSIS

LAB USE ONLY

Field Sample Identification

D-01-09 Water

DATE

10/13/09 1015

SAMPLING

TIME

Water

X

X

PRESERVATIVE

HCL

HNO3

H2SO4

NONE

OTHER

X

X

X

6

NO. OF CONT.

SVOC/PAH 8270B

moisture

BTEX 8260

pH

Flash point

Total Lead

X

X

X

LABORATORY NOTES

PID (ppm)

10/13/09

1600

10/14/09

FED EX

Received by: (Signature)

Received by: (Signature)

Received by: (Signature)

Received by: (Signature)

Received by: (Signature)

Wendy Pennington

FedEx

10/13/09

1600

10/14/09

FED EX

Received by: (Signature)

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## Prelogin / Nonconformance Report - Sample Log-In

Client: URS

Date/Time: 10-14-09

Lab ID #: 348290

Initials: TJ

### Sample Receipt Checklist

1. Samples on ice?	Blue	Water	No	
2. Shipping container in good condition?	Yes	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	Yes	No	N/A	
4. Chain of Custody present?	Yes	No		
5. Sample instructions complete on chain of custody?	Yes	No		
6. Any missing / extra samples?	Yes	No		
7. Chain of custody signed when relinquished / received?	Yes	No		
8. Chain of custody agrees with sample label(s)?	Yes	No		
9. Container labels legible and intact?	Yes	No		
10. Sample matrix / properties agree with chain of custody?	Yes	No		
11. Samples in proper container / bottle?	Yes	No		
12. Samples properly preserved?	Yes	No	N/A	
13. Sample container intact?	Yes	No		
14. Sufficient sample amount for indicated test(s)?	Yes	No		
15. All samples received within sufficient hold time?	Yes	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	Yes	No	N/A	
18. Cooler 1 No. <u>2268</u>	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
<u>33</u> lbs <u>2.5</u> °C	lbs °C	lbs °C	lbs °C	lbs °C

### Nonconformance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

Check all that apply: ☐ Client understands and would like to proceed with analysis  
☐ Cooling process had begun shortly after sampling event

# Analytical Report 355933

for

**URS Corporation-St. Louis**

**Project Manager: Wendy Pennington**

**900 S. Central Avenue**

**Route 111 & Rand Ave Vicinity/21561975.00011**

**22-DEC-09**



**4143 Greenbriar Dr., Stafford, TX 77477**

**Ph:(281) 240-4200 Fax:(281) 240-4280**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87429), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Xenco-Boca Raton (EPA Lab Code: FL00449): Florida(E86240),

South Carolina(96031001), Louisiana(04154), Georgia(917)



22-DEC-09

Project Manager: **Wendy Pennington**  
**URS Corporation-St. Louis**  
1001 Highlands Plaza Drive West, Suite 300  
St. Louis, MO 63110

Reference: XENCO Report No: **355933**  
**900 S. Central Avenue**  
Project Address: Roxana, Illinois 62084

**Wendy Pennington:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 355933. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 355933 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Carlos Castro**

Managing Director, Texas

***Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.***

*Certified and approved by numerous States and Agencies.*

*A Small Business and Minority Status Company that delivers SERVICE and QUALITY*

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## Sample Cross Reference 355933



**URS Corporation-St. Louis, St. Louis, MO**

900 S. Central Avenue

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
P4375 Water 2	W	Dec-16-09 14:45		355933-001



## CASE NARRATIVE

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S. Central Avenue*

*Project ID: Route 111 & Rand Ave Vic*

*Work Order Number: 355933*

*Report Date: 22-DEC-09*

*Date Received: 12/17/2009*

---

**Sample receipt non conformances and Comments:**

*None*

---

**Sample receipt Non Conformances and Comments per Sample:**

*None*

**Analytical Non Conformances and Comments:**

*Batch: LBA-786142 Reactive Sulfide by EPA 9030B*

*None*

*Batch: LBA-786144 Reactive Cyanide by EPA 9010B*

*None*

*Batch: LBA-786249 Paint Filter Liquids Test by EPA 9095A*

*None*

*Batch: LBA-786316 TCLP SVOCs by SW-846 8270C*

*Pyridine RPD was outside laboratory control limits.*

*Samples affected are: 355933-001*

*Pyridine recovered below QC limits in the Matrix Spike.*

*Samples affected are: 355933-001.*

*The Laboratory Control Sample for Pyridine is within laboratory Control Limits*

*Batch: LBA-786438 Flash Point by EPA 1010*

*None*

*Batch: LBA-786466 Phenolics Total by EPA 420.1*

*355815 reactive sample*

*Batch: LBA-786515 TCLP VOAs by EPA 8260B*

*None*

*Batch: LBA-786589 TOX by EPA 9020B*

*Total Organic Halides detected in the blank below the MQL but above the SQL;*

*Samples affected are: 355933-001.*



## **CASE NARRATIVE**

*Client Name: URS Corporation-St. Louis*

*Project Name: 900 S. Central Avenue*

*Project ID: Route 111 & Rand Ave Vic*

*Work Order Number: 355933*

*Report Date: 22-DEC-09*

*Date Received: 12/17/2009*

---

*Batch: LBA-786645 TCLP Metals by SW 6020A*

*None*



# Certificate of Analysis Summary 355933

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/21561975

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Thu Dec-17-09 09:15 am

**Contact:** Wendy Pennington

**Report Date:** 22-DEC-09

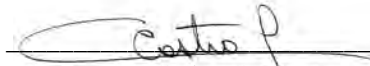
**Project Location:** Roxana, Illinois 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 355933-001 <b>Field Id:</b> P4375 Water 2 <b>Depth:</b> <b>Matrix:</b> WATER <b>Sampled:</b> Dec-16-09 14:45					
<b>Flash Point by EPA 1010</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-18-09 08:30 <b>Units/RL:</b> Deg F RL					
Flash Point	> 150 75.0					
<b>Paint Filter Liquids Test by EPA 9095A</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-18-09 08:00 <b>Units/RL:</b> mg/L RL					
Free Liquids	Fail					
<b>Phenolics Total by EPA 420.1</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-21-09 08:20 <b>Units/RL:</b> mg/L RL					
Phenolic	U 0.050					
<b>Reactive Cyanide by EPA 9010B</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-17-09 09:38 <b>Units/RL:</b> mg/L RL					
Cyanide	U 0.200					
<b>Reactive Sulfide by EPA 9030B</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-17-09 12:04 <b>Units/RL:</b> mg/L RL					
Sulfide	U 50.0					

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Carlos Castro  
Managing Director, Texas





# Certificate of Analysis Summary 355933

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/21561975

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Thu Dec-17-09 09:15 am

**Contact:** Wendy Pennington

**Report Date:** 22-DEC-09

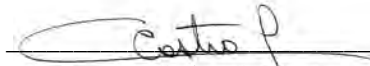
**Project Location:** Roxana, Illinois 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 355933-001 <b>Field Id:</b> P4375 Water 2 <b>Depth:</b> <b>Matrix:</b> WATER <b>Sampled:</b> Dec-16-09 14:45					
<b>TCLP Metals by EPA 6020</b>	<b>Extracted:</b> Dec-18-09 09:10 <b>Analyzed:</b> Dec-21-09 16:53 <b>Units/RL:</b> mg/L RL					
Arsenic	0.008 0.002					
Barium	2.86 0.005					
Cadmium	0.001 0.001					
Chromium	0.009 0.003					
Lead	0.006 0.002					
Mercury *	U 0.0004					
Selenium	U 0.003					
Silver	U 0.002					
<b>TCLP SVOCs by SW-846 8270C</b>	<b>Extracted:</b> Dec-17-09 11:49 <b>Analyzed:</b> Dec-18-09 12:14 <b>Units/RL:</b> mg/L RL					
1,4-Dichlorobenzene	U 0.050					
2,4-Dinitrotoluene	U 0.050					
Hexachlorobenzene	U 0.050					
Hexachlorobutadiene	U 0.050					
Hexachloroethane	U 0.050					
2-methylphenol	U 0.050					
3&4-Methylphenol	U 0.050					
Nitrobenzene	U 0.050					
Pentachlorophenol	U 0.050					
Pyridine	U 0.050					
2,4,5-Trichlorophenol	U 0.050					
2,4,6-Trichlorophenol	U 0.050					

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Carlos Castro  
Managing Director, Texas



# Certificate of Analysis Summary 355933

URS Corporation-St. Louis, St. Louis, MO



**Project Id:** Route 111 & Rand Ave Vicinity/21561975

**Project Name:** 900 S. Central Avenue

**Date Received in Lab:** Thu Dec-17-09 09:15 am

**Contact:** Wendy Pennington

**Report Date:** 22-DEC-09

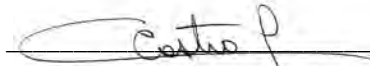
**Project Location:** Roxana, Illinois 62084

**Project Manager:** Debbie Simmons

<b>Analysis Requested</b>	<b>Lab Id:</b> 355933-001 <b>Field Id:</b> P4375 Water 2 <b>Depth:</b> <b>Matrix:</b> WATER <b>Sampled:</b> Dec-16-09 14:45					
<b>TCLP VOAs by EPA 8260B</b>	<b>Extracted:</b> Dec-17-09 14:10 <b>Analyzed:</b> Dec-17-09 20:20 <b>Units/RL:</b> mg/L RL					
Benzene	U 0.005					
2-Butanone	U 0.050					
Carbon Tetrachloride	U 0.005					
Chlorobenzene	U 0.005					
Chloroform	U 0.005					
1,2-Dichloroethane	U 0.005					
1,1-Dichloroethene	U 0.005					
Tetrachloroethylene	U 0.005					
Trichloroethene	U 0.005					
Vinyl Chloride	U 0.002					
<b>TOX by EPA 9020B</b>	<b>Extracted:</b> <b>Analyzed:</b> Dec-21-09 14:04 <b>Units/RL:</b> mg/L RL					
Total Organic Halides	0.259 0.040					

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Carlos Castro  
Managing Director, Texas



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Phenolics Total by EPA 420.1

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.21, 2009	28	5	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Flash Point by EPA 1010

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.18, 2009	30	2	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP Metals by EPA 6020

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009	Dec. 18, 2009	180	2	Dec.21, 2009	180	3	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP VOAs by EPA 8260B

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.17, 2009	14	1	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TCLP SVOCs, Pests & Herbs by EPA 82

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009	Dec. 17, 2009	7	1	Dec.18, 2009	40	1	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Cyanide by EPA 9010B

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.17, 2009	14	1	P





**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : TOX by EPA 9020B

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.21, 2009	28	5	P



**XENCO**  
**CHRONOLOGY OF HOLDING TIMES**

Analytical Method : Reactive Sulfide by EPA 9030B

Client : URS Corporation-St. Louis

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicini

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed (Days)	Q
P4375 Water 2	Dec. 16, 2009	Dec. 17, 2009				Dec.17, 2009	14	1	P

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 355933,

Project ID: Route 111 & Rand Ave Vicinity/21561975.0001

Lab Batch #: 786316

Sample: 545778-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/18/09 10:20

### SURROGATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.050	0.050	100	43-116	
2-Fluorophenol	0.041	0.050	82	21-100	
Nitrobenzene-d5	0.051	0.050	102	35-114	
Phenol-d6	0.026	0.050	52	10-94	
Terphenyl-D14	0.057	0.050	114	33-141	
2,4,6-Tribromophenol	0.052	0.050	104	10-123	

Lab Batch #: 786316

Sample: 545778-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/18/09 10:58

### SURROGATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.044	0.050	88	43-116	
2-Fluorophenol	0.036	0.050	72	21-100	
Nitrobenzene-d5	0.045	0.050	90	35-114	
Phenol-d6	0.026	0.050	52	10-94	
Terphenyl-D14	0.047	0.050	94	33-141	
2,4,6-Tribromophenol	0.046	0.050	92	10-123	

Lab Batch #: 786316

Sample: 545778-1-BSD / BSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/18/09 11:36

### SURROGATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.042	0.050	84	43-116	
2-Fluorophenol	0.034	0.050	68	21-100	
Nitrobenzene-d5	0.043	0.050	86	35-114	
Phenol-d6	0.025	0.050	50	10-94	
Terphenyl-D14	0.044	0.050	88	33-141	
2,4,6-Tribromophenol	0.044	0.050	88	10-123	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 355933,

Project ID: Route 111 & Rand Ave Vicinity/21561975.0001

Lab Batch #: 786316

Sample: 355933-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/18/09 12:14

### SURROGATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.243	0.250	97	43-116	
2-Fluorophenol	0.177	0.250	71	21-100	
Nitrobenzene-d5	0.218	0.250	87	35-114	
Phenol-d6	0.077	0.250	31	10-94	
Terphenyl-D14	0.230	0.250	92	33-141	
2,4,6-Tribromophenol	0.221	0.250	88	10-123	

Lab Batch #: 786316

Sample: 355933-001 S / MS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/18/09 12:53

### SURROGATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
2-Fluorobiphenyl	0.195	0.250	78	43-116	
2-Fluorophenol	0.147	0.250	59	21-100	
Nitrobenzene-d5	0.192	0.250	77	35-114	
Phenol-d6	0.161	0.250	64	10-94	
Terphenyl-D14	0.204	0.250	82	33-141	
2,4,6-Tribromophenol	0.188	0.250	75	10-123	

Lab Batch #: 786515

Sample: 545958-1-BKS / BKS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/17/09 12:44

### SURROGATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0492	0.0500	98	74-124	
Dibromofluoromethane	0.0545	0.0500	109	75-131	
1,2-Dichloroethane-D4	0.0521	0.0500	104	63-144	
Toluene-D8	0.0503	0.0500	101	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.



## Form 2 - Surrogate Recoveries

Project Name: 900 S. Central Avenue

Work Orders : 355933,

Project ID: Route 111 & Rand Ave Vicinity/21561975.0001

Lab Batch #: 786515

Sample: 545958-1-BLK / BLK

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/17/09 13:52

### SURROGATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0474	0.0500	95	74-124	
Dibromofluoromethane	0.0475	0.0500	95	75-131	
1,2-Dichloroethane-D4	0.0460	0.0500	92	63-144	
Toluene-D8	0.0496	0.0500	99	80-117	

Lab Batch #: 786515

Sample: 355933-001 S / MS

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/17/09 19:11

### SURROGATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0520	0.0500	104	74-124	
Dibromofluoromethane	0.0563	0.0500	113	75-131	
1,2-Dichloroethane-D4	0.0536	0.0500	107	63-144	
Toluene-D8	0.0498	0.0500	100	80-117	

Lab Batch #: 786515

Sample: 355933-001 SD / MSD

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/17/09 19:34

### SURROGATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0504	0.0500	101	74-124	
Dibromofluoromethane	0.0565	0.0500	113	75-131	
1,2-Dichloroethane-D4	0.0523	0.0500	105	63-144	
Toluene-D8	0.0494	0.0500	99	80-117	

Lab Batch #: 786515

Sample: 355933-001 / SMP

Batch: 1 Matrix: Water

Units: mg/L

Date Analyzed: 12/17/09 20:20

### SURROGATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
4-Bromofluorobenzene	0.0463	0.0500	93	74-124	
Dibromofluoromethane	0.0487	0.0500	97	75-131	
1,2-Dichloroethane-D4	0.0473	0.0500	95	63-144	
Toluene-D8	0.0499	0.0500	100	80-117	

\* Surrogate outside of Laboratory QC limits

\*\* Surrogates outside limits; data and surrogates confirmed by reanalysis

\*\*\* Poor recoveries due to dilution

Surrogate Recovery [D] =  $100 * A / B$

All results are based on MDL and validated for QC purposes.

**Project Name: 900 S. Central Avenue**

**Work Order #: 355933**

**Project ID: Route 111 & Rand Ave Vicinity/21561975.00011**

**Lab Batch #: 786466**

**Sample: 786466-1-BKS**

**Matrix: Water**

**Date Analyzed: 12/21/2009**

**Date Prepared: 12/21/2009**

**Analyst: MOR**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Phenolics Total by EPA 420.1</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Phenolic	<0.011	0.500	0.478	96	80-120	

**Lab Batch #: 786144**

**Sample: 786144-1-BKS**

**Matrix: Water**

**Date Analyzed: 12/17/2009**

**Date Prepared: 12/17/2009**

**Analyst: MOR**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Reactive Cyanide by EPA 9010B</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Cyanide	<0.018	0.200	0.197	99	80-120	

**Lab Batch #: 786142**

**Sample: 786142-1-BKS**

**Matrix: Water**

**Date Analyzed: 12/17/2009**

**Date Prepared: 12/17/2009**

**Analyst: MOR**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>Reactive Sulfide by EPA 9030B</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Sulfide	<5.00	978	915	94	60-120	

**Lab Batch #: 786645**

**Sample: 545942-1-BKS**

**Matrix: Water**

**Date Analyzed: 12/21/2009**

**Date Prepared: 12/18/2009**

**Analyst: HAT**

**Reporting Units: mg/L**

**Batch #: 1**

**BLANK /BLANK SPIKE RECOVERY STUDY**

<b>TCLP Metals by EPA 6020</b>	<b>Blank Result [A]</b>	<b>Spike Added [B]</b>	<b>Blank Spike Result [C]</b>	<b>Blank Spike %R [D]</b>	<b>Control Limits %R</b>	<b>Flags</b>
<b>Analytes</b>						
Arsenic	<0.002	0.050	0.050	100	75-125	
Barium	<0.001	0.050	0.051	102	75-125	
Cadmium	<0.001	0.020	0.021	105	75-125	
Chromium	<0.001	0.050	0.051	102	75-125	
Lead	<0.001	0.050	0.048	96	75-125	
Mercury	<0.0001	0.0010	0.0008	80	75-125	
Selenium	<0.001	0.050	0.052	104	75-125	
Silver	<0.001	0.020	0.021	105	75-125	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 355933**

**Project ID: Route 111 & Rand Ave Vicinity/21561975.00011**

**Lab Batch #: 786515**

**Sample: 545958-1-BKS**

**Matrix: Water**

**Date Analyzed: 12/17/2009**

**Date Prepared: 12/17/2009**

**Analyst: KHM**

**Reporting Units: mg/L**

**Batch #: 1**

## BLANK /BLANK SPIKE RECOVERY STUDY

TCLP VOAs by EPA 8260B  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Benzene	<0.001	0.050	0.039	78	66-142	
2-Butanone	<0.010	0.500	0.421	84	60-140	
Carbon Tetrachloride	<0.001	0.050	0.037	74	62-125	
Chlorobenzene	<0.001	0.050	0.050	100	60-133	
Chloroform	<0.001	0.050	0.046	92	74-125	
1,2-Dichloroethane	<0.001	0.050	0.041	82	68-127	
1,1-Dichloroethene	<0.001	0.050	0.047	94	59-172	
Tetrachloroethylene	<0.001	0.050	0.049	98	71-125	
Trichloroethene	<0.001	0.050	0.044	88	62-137	
Vinyl Chloride	<0.001	0.050	0.039	78	75-125	

Blank Spike Recovery [D] =  $100 \times [C] / [B]$

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit





## BS / BSD Recoveries



**Project Name:** 900 S. Central Avenue

**Work Order #:** 355933

**Analyst:** KAN

**Date Prepared:** 12/17/2009

**Project ID:** Route 111 & Rand Ave Vicinity/21561975.00011

**Date Analyzed:** 12/18/2009

**Lab Batch ID:** 786316

**Sample:** 545778-1-BKS

**Batch #:** 1

**Matrix:** Water

**Units:** mg/L

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
1,4-Dichlorobenzene	<0.001	0.050	0.044	88	0.05	0.043	86	2	54-105	28	
2,4-Dinitrotoluene	<0.001	0.050	0.048	96	0.05	0.047	94	2	60-116	38	
Hexachlorobenzene	<0.001	0.050	0.046	92	0.05	0.046	92	0	60-109	25	
Hexachlorobutadiene	<0.001	0.050	0.045	90	0.05	0.045	90	0	52-107	25	
Hexachloroethane	<0.001	0.050	0.044	88	0.05	0.043	86	2	46-115	25	
2-methylphenol	<0.001	0.050	0.044	88	0.05	0.042	84	5	52-106	25	
3&4-Methylphenol	<0.002	0.100	0.084	84	0.1	0.081	81	4	23-140	25	
Nitrobenzene	<0.001	0.050	0.045	90	0.05	0.044	88	2	56-107	25	
Pentachlorophenol	<0.001	0.050	0.030	60	0.05	0.029	58	3	36-132	50	
Pyridine	<0.004	0.050	0.026	52	0.05	0.019	38	31	5-94	28	F
2,4,5-Trichlorophenol	<0.001	0.050	0.046	92	0.05	0.045	90	2	55-114	25	
2,4,6-Trichlorophenol	<0.001	0.050	0.047	94	0.05	0.046	92	2	57-113	25	

**Analyst:** MAB

**Date Prepared:** 12/21/2009

**Date Analyzed:** 12/21/2009

**Lab Batch ID:** 786589

**Sample:** 786589-1-BKS

**Batch #:** 1

**Matrix:** Water

**Units:** mg/L

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TOX by EPA 9020B	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Total Organic Halides	0.011	0.200	0.214	107	0.2	0.229	115	7	75-125	30	

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$

Blank Spike Recovery [D] =  $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes



# Form 3 - MS Recoveries



Project Name: 900 S. Central Avenue

Work Order #: 355933

Lab Batch #: 786316

Date Analyzed: 12/18/2009

Date Prepared: 12/17/2009

Project ID: Route 111 & Rand Ave Vicinity/21561

Analyst: KAN

QC- Sample ID: 355933-001 S

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

TCLP SVOCs by SW-846 8270C	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
1,4-Dichlorobenzene	<0.050	0.250	0.187	75	54-105	
2,4-Dinitrotoluene	<0.050	0.250	0.229	92	60-116	
Hexachlorobenzene	<0.050	0.250	0.203	81	60-109	
Hexachlorobutadiene	<0.050	0.250	0.198	79	52-107	
Hexachloroethane	<0.050	0.250	0.172	69	46-115	
2-methylphenol	<0.050	0.250	0.220	88	52-106	
3&4-Methylphenol	<0.050	0.500	0.444	89	23-140	
Nitrobenzene	<0.050	0.250	0.195	78	56-107	
Pentachlorophenol	<0.050	0.250	0.136	54	36-132	
Pyridine	<0.050	0.250	<0.050	0	5-94	X
2,4,5-Trichlorophenol	<0.050	0.250	0.201	80	55-114	
2,4,6-Trichlorophenol	<0.050	0.250	0.196	78	57-113	

Matrix Spike Percent Recovery [D] =  $100 \times (C-A)/B$

Relative Percent Difference [E] =  $200 \times (C-A)/(C+B)$

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order #: 355933

Project ID: Route 111 & Rand Ave Vicinity/21561975.00011

Lab Batch ID: 786466

QC- Sample ID: 355039-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 12/21/2009

Date Prepared: 12/21/2009

Analyst: MOR

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
Phenolics Total by EPA 420.1	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Phenolic	<0.050	0.500	0.460	92	0.500	0.460	92	0	80-120	20	

Lab Batch ID: 786645

QC- Sample ID: 355842-007 S

Batch #: 1 Matrix: Soil

Date Analyzed: 12/21/2009

Date Prepared: 12/18/2009

Analyst: HAT

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY											
TCLP Metals by EPA 6020	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes											
Arsenic	0.019	0.250	0.253	94	0.250	0.262	97	3	75-125	25	
Barium	0.860	0.250	1.15	116	0.250	1.14	112	1	75-125	25	
Cadmium	<0.005	0.100	0.093	93	0.100	0.097	97	4	75-125	25	
Chromium	0.013	0.250	0.260	99	0.250	0.274	104	5	75-125	25	
Lead	<0.010	0.250	0.237	95	0.250	0.246	98	4	75-125	25	
Mercury	<0.0020	0.0050	0.0050	100	0.0050	0.0055	110	10	75-125	25	
Selenium	<0.015	0.250	0.234	94	0.250	0.245	98	5	75-125	25	
Silver	<0.010	0.100	0.093	93	0.100	0.098	98	5	75-125	25	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * |(C - F) / (C + F)|$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not

ApplicableN = See Narrative, EQL = Estimated Quantitation Limit



# Form 3 - MS / MSD Recoveries



Project Name: 900 S. Central Avenue

Work Order # : 355933

Project ID: Route 111 & Rand Ave Vicinity/21561975.00011

Lab Batch ID: 786515

QC- Sample ID: 355933-001 S

Batch #: 1 Matrix: Water

Date Analyzed: 12/17/2009

Date Prepared: 12/17/2009

Analyst: KHM

Reporting Units: mg/L

## MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TCLP VOAs by EPA 8260B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.005	0.050	0.046	92	0.050	0.044	88	4	66-142	21	
2-Butanone	<0.050	0.500	0.392	78	0.500	0.374	75	5	60-140	20	
Carbon Tetrachloride	<0.005	0.050	0.048	96	0.050	0.048	96	0	62-125	20	
Chlorobenzene	<0.005	0.050	0.056	112	0.050	0.055	110	2	60-133	21	
Chloroform	<0.005	0.050	0.054	108	0.050	0.054	108	0	74-125	20	
1,2-Dichloroethane	<0.005	0.050	0.048	96	0.050	0.047	94	2	68-127	20	
1,1-Dichloroethene	<0.005	0.050	0.059	118	0.050	0.058	116	2	59-172	22	
Tetrachloroethylene	<0.005	0.050	0.056	112	0.050	0.056	112	0	71-125	20	
Trichloroethene	<0.005	0.050	0.052	104	0.050	0.052	104	0	62-137	24	
Vinyl Chloride	<0.002	0.050	0.043	86	0.050	0.045	90	5	75-125	20	

Matrix Spike Percent Recovery  $[D] = 100 * (C - A) / B$   
Relative Percent Difference  $RPD = 200 * [(C - F) / (C + F)]$

Matrix Spike Duplicate Percent Recovery  $[G] = 100 * (F - A) / E$

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not  
ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 355933**

**Lab Batch #: 786438**

**Date Analyzed: 12/18/2009**

**QC- Sample ID: 355933-001 D**

**Reporting Units: Deg F**

**Date Prepared: 12/18/2009**

**Batch #: 1**

**Project ID: Route 111 & Rand Ave Vicinity/21561975.00011**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Flash Point by EPA 1010	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Flash Point	> 150	> 150	0	25	

**Lab Batch #: 786249**

**Date Analyzed: 12/18/2009**

**QC- Sample ID: 355933-001 D**

**Reporting Units: mg/L**

**Date Prepared: 12/18/2009**

**Batch #: 1**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Paint Filter Liquids Test by EPA 9095A	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Free Liquids	Fail	Fail	0		

**Lab Batch #: 786466**

**Date Analyzed: 12/21/2009**

**QC- Sample ID: 355039-001 D**

**Reporting Units: mg/L**

**Date Prepared: 12/21/2009**

**Batch #: 1**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Phenolics Total by EPA 420.1	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Phenolic	<0.050	<0.050	NC	20	

**Lab Batch #: 786144**

**Date Analyzed: 12/17/2009**

**QC- Sample ID: 355933-001 D**

**Reporting Units: mg/L**

**Date Prepared: 12/17/2009**

**Batch #: 1**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Reactive Cyanide by EPA 9010B	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Cyanide	<0.200	<0.200	NC	20	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$   
 All Results are based on MDL and validated for QC purposes.  
 BRL - Below Reporting Limit

**Project Name: 900 S. Central Avenue**

**Work Order #: 355933**

**Lab Batch #: 786142**

**Date Analyzed: 12/17/2009**

**QC- Sample ID: 355933-001 D**

**Reporting Units: mg/L**

**Date Prepared: 12/17/2009**

**Batch #: 1**

**Project ID: Route 111 & Rand Ave Vicinity/21561975.00011**

**Analyst: MOR**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Reactive Sulfide by EPA 9030B	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Sulfide	<50.0	<50.0	NC	20	

**Lab Batch #: 786645**

**Date Analyzed: 12/21/2009**

**QC- Sample ID: 355842-007 D**

**Reporting Units: ug/L**

**Date Prepared: 12/18/2009**

**Batch #: 1**

**Analyst: HAT**

**Matrix: Soil**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

TCLP Metals by EPA 6020	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Arsenic	18.5	17.5	6	25	
Barium	860	873	2	25	
Cadmium	<5.00	<5.00	NC	25	
Chromium	13.0	<15.0	NC	25	
Lead	<10.0	<10.0	NC	25	
Mercury	<2.000	<2.000	NC	25	
Selenium	<15.0	<15.0	NC	25	
Silver	<10.0	<10.0	NC	25	

**Lab Batch #: 786589**

**Date Analyzed: 12/21/2009**

**QC- Sample ID: 355933-001 D**

**Reporting Units: mg/L**

**Date Prepared: 12/21/2009**

**Batch #: 1**

**Analyst: MAB**

**Matrix: Water**

## SAMPLE / SAMPLE DUPLICATE RECOVERY

TOX by EPA 9020B	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total Organic Halides	0.259	0.242	7	30	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit





## Prelogin / Nonconformance Report - Sample Log-In

Client: URS Corp  
Date/Time: 12-16-09  
Lab ID #: 355433  
Initials: IA

### Sample Receipt Checklist

1. Samples on ice?	Blue	<u>Water</u>	No	
2. Shipping container in good condition?	<u>Yes</u>	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	<u>Yes</u>	No	N/A	
4. Chain of Custody present?	<u>Yes</u>	No		
5. Sample instructions complete on chain of custody?	<u>Yes</u>	No		
6. Any missing / extra samples?	Yes	<u>No</u>		
7. Chain of custody signed when relinquished / received?	<u>Yes</u>	No		
8. Chain of custody agrees with sample label(s)?	<u>Yes</u>	No		
9. Container labels legible and intact?	<u>Yes</u>	No		
10. Sample matrix / properties agree with chain of custody?	<u>Yes</u>	No		
11. Samples in proper container / bottle?	<u>Yes</u>	No		
12. Samples properly preserved?	<u>Yes</u>	No	N/A	
13. Sample container intact?	<u>Yes</u>	No		
14. Sufficient sample amount for indicated test(s)?	<u>Yes</u>	No		
15. All samples received within sufficient hold time?	<u>Yes</u>	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	<u>Yes</u>	No	N/A	
18. Cooler 1 No. <u>5383</u>	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
<u>39</u> lbs	<u>1.9</u> °C	lbs °C	lbs °C	lbs °C

### Nonconformance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

Check all that apply: ☐ Client understands and would like to proceed with analysis  
☐ Cooling process had begun shortly after sampling event