Project 4460
Doc 1943473

REMEDIATION SUMMARY REPORT

UPRC 9-9K, 10K TANK BATTERY
WELD COUNTY, COLORADO

APRIL 2009

Prepared for:

NOBLE ENERGY, INC.
Platteville, Colorado

REMEDIATION SUMMARY REPORT

UPRC 9-9K, 10K TANK BATTERY
WELD COUNTY, COLORADO

APRIL 2009

Prepared for:

NOBLE ENERGY, INC.
804 Grand Avenue
Platteville, Colorado 80651

Prepared by:

LT ENVIRONMENTAL, INC.
4600 West 60th Avenue
Arvada, Colorado 80003
(303) 433-9788

TABLE OF CONTENTS

TABLE

FIGURES

APPENDICES

EXECUTIVE SUMMARY

This report was prepared by LT Environmental, Inc. (LTE), on behalf of Noble Energy, Inc. (Noble), to document remediation activities at the UPRC 9-9K, 10K Tank Battery (Site).

The Site is located 0.4 miles southwest of the intersection of Weld County Road (WCR) 34 and WCR 31 near Platteville, Colorado. The legal description of the Site is the northeast quarter of the southeast quarter of Section 9, Township 3 North, Range 66 West of the Sixth Principal Meridian, in Weld County, Colorado (Figure 1).

The scope of work for this project included mitigation of petroleum hydrocarbon impacts following the identification of a tank release. This work included the excavation/removal of hydrocarbon impacted soils and groundwater, confirmation sampling and analysis, application of a groundwater amendment, documentation, and health and safety monitoring. The Site is bordered to the north by an irrigation ditch, and by agricultural land on all other sides.

Noble contractors excavated impacted soil at the site on March 9, 2009 and March 11, 2009. Noble and LTE personnel were onsite for field observation, documentation, collecting soil samples, and oversight activities including directing soil and groundwater removal from the excavated area, and application of a groundwater amendment. Impacted soils were hauled offsite to the Noble Land Treatment Facility in Weld County, Colorado. The excavation was backfilled with clean fill from the Varra Companies, Inc. of Greeley, Colorado. A total volume of 560 cubic yards of impacted soil were excavated and removed during this project. A total volume of 435 barrels (18,270 gallons) of impacted groundwater were removed from the excavation and transported to the Conquest Disposal Facility located in Weld County, Colorado. Following the completion of source removal activities, a groundwater remediation amendment was installed in the base of the excavation to mitigate any residual hydrocarbons remaining from source removal activities.

Based on field indicators and the analytical results of the wall confirmation samples collected following excavation activities, the remaining soil has been remediated to below the Colorado Oil and Gas Conservation Commission (COGCC) Standard.

LTE is in the process of scheduling the installation and sampling of performance groundwater monitoring wells to determine if residual groundwater impacts exist at the Site. It is anticipated that the monitoring well installation and the first quarterly monitoring event will be conducted in April 2009.

LTE, on behalf of Noble, will conduct quarterly monitoring with the goal of observing four consecutive quarters of analytical data in compliance with regulatory standards. When this goal is achieved, a No Further Action request will be submitted to the COGCC.

SECTION 1.0

INTRODUCTION

This report was prepared by LT Environmental, Inc. (LTE) for Noble Energy, Inc. (Noble) to document excavation activities at the UPRC 9-9K, 10K Tank Battery (Site). The purpose of this project was to remove hydrocarbon impacted soils and groundwater from the Site.

1.1 SITE DESCRIPTION

The Site is located in the northeast quarter of the southeast quarter of Section 9, Township 3 North, Range 66 West of the Sixth Principal Meridian (Figure 1). The Site is located 0.4 miles southwest of the intersection of Weld County Road (WCR) 34 and WCR 31 near Platteville, Colorado.

The Site geology was predominantly observed as clayey sand and sandy clay that extended from the ground surface to approximately 12 feet below ground surface (bgs). Beneath the clayey sand/sandy clay was a poorly sorted, unconsolidated sand, though groundwater rushed into the excavation too quickly for soil to be properly identified. Groundwater at the Site is approximately 6 feet bgs.

The Site is located at an elevation of approximately 4,830 feet above mean sea level in an area with topography that gently slopes to the southwest. Surface topography in the area is modified for farming purposes. The Site is bordered to the north by an irrigation ditch, and by agricultural land on all other sides.

1.2 SCOPE OF WORK

The scope of work for this remediation project included the removal of impacted soils and groundwater. Impacted soils were hauled offsite to the Noble Land Treatment Facility and replaced with clean fill from the Varra Companies, Inc. (Varra) of Greeley, Colorado. Impacted groundwater was transported to Conquest Disposal (Conquest) located in Weld County, Colorado. A groundwater amendment (activated carbon remediation mixture) was installed in the base of the excavation to reduce the potential for groundwater impact resulting from residual hydrocarbons.

During onsite activities, Noble and LTE personnel conducted field screening of soils, soil sampling, oversight of the excavation, health and safety monitoring, installation of the groundwater amendment, and documentation activities.

A summary of field activities, analytical results from soil sampling, and conclusions is presented in the subsequent sections.

SECTION 2.0

SUMMARY OF FIELD ACTIVITIES

2.1 EXCAVATION ACTIVITIES

Impacted Soil Removal

Excavation activities were initiated on March 9, 2009. On March 9, 2009 and March 11, 2009, Noble contractors removed impacted soils and groundwater. On March 13, 2009 Noble contractors installed the groundwater amendment in the base of the excavation.

LTE personnel conducted field screening of organic vapor concentrations using a photoionization detector (PID) and collected confirmation soil samples to document excavation activities. Photographs of excavation activities are included as Appendix A.

The final dimensions of the northern excavation were approximately 35 feet long by 20 feet wide, and the total depth of the excavation varied between 6 feet to 14 feet bgs. A total volume of 560 cubic yards of impacted soil were excavated and transported offsite to the Noble Land Treatment Facility located in Weld County, Colorado.

Soil samples were collected from the smear zone along the walls of the excavation. Each sample was field-screened for organic vapor concentrations with a PID to determine if additional excavation was required. Once PID measurements indicated that impacted soil had been removed, a confirmation sample was collected for submittal to an analytical laboratory.

Excavation floor samples were not collected from the excavation because the final excavation depth extended to or below the static water level. The potential for residual hydrocarbon impact below the water table in the excavation will be characterized through collection and analysis of groundwater samples to be presented in future monitoring reports.

Figure 2 presents the excavation extent, the location of the soil samples, and analytical results from the collected in the excavation.

A total of 12 samples were collected from the excavation. Of the 12 soil samples collected, 8 were submitted to Origins Laboratory, Inc. (Origins) of Denver, Colorado for analysis of total volatile hydrocarbons - gasoline range organics (TVH-GRO) using Environmental Protection Agency (EPA) Modified Method 8015. The remaining four sample locations exhibited impacts during field screening and were over-excavated. Subsequent samples were collected and submitted to Origins.

After field screening indicated the impacted soils had been removed, the excavation was backfilled with clean fill provided by Varra.

Impacted Groundwater Removal

During excavation activities, 435 barrels (18,270 gallons) of groundwater were removed from the excavation. Groundwater was removed by a Northern Plains Transport truck, with final disposal at Conquest.

2.2 GROUNDWATER AMENDMENT APPLICATION

Groundwater was observed at the Site at approximately 6 feet bgs. To reduce the potential for any further groundwater impact resulting from residual hydrocarbons, a groundwater amendment was applied to the entire base of the excavation after field indicators and confirmation sample results demonstrated the impacted soils were removed. Approximately 100 pounds of the groundwater amendment were applied to the base of the excavation.

The remediation amendment is activated carbon inoculated with electron acceptors (nitrate and sulfate) and nutrients (phosphorus and nitrogen) designed to biodegrade petroleum hydrocarbons.

SECTION 3.0

ANALYTICAL RESULTS

Soil samples were collected to define the extent of the excavation and confirm that impact above regulatory standards was removed. Confirmation soil samples were collected from the smear zone along the walls of the excavation. Soil sample locations and analytical results are illustrated on Figure 2. Soil samples were sent to Origins for analysis of TVH-GRO using EPA Modified Method 8015.

Analytical results indicate TVH-GRO was not detected above the COGCC Standard of 500 mg/kg or the laboratory method detection limit of 50 mg/kg in all samples collected from the excavation sidewalls except S-11. Soil sample S-11, from the north wall, exhibited a TVH-GRO concentration of 157.7 mg/kg, well below the COGCC standard.

Soil sample analytical results are summarized in Table 1. Copies of the laboratory analytical reports are included as Appendix B.

SECTION 4.0

SUMMARY AND CONCLUSIONS

On March 9, 2009 and March 11, 2009, Noble excavated and removed 560 cubic yards of impacted soil and 435 barrels (18,270 gallons) of impacted groundwater from the excavation at the Site.

During remediation activities, evidence of impact to the subsurface was observed ranging in depth from 3 feet to 14 feet bgs. LTE conducted field-screening of organic vapor concentrations and collection of soil confirmation samples for laboratory analysis from the excavated area.

Impacted soils were excavated and transported to the Noble Land Treatment Facility. Clean fill material was brought from Varra for use as backfill in the excavation. Impacted groundwater was transported by Northern Plains Transport for final disposal at Conquest Disposal.

LTE collected confirmation soil samples following completion of the soil excavation activities. Analytical results from soil samples collected from the smear zone along the walls of the excavation indicated that the petroleum impacted soils had been removed to below the COGCC Standard.

To prevent any future impact from residual hydrocarbons in the northern excavation, 100 pounds of a hydrocarbon degrading amendment were applied to the base of the excavation.

LTE is in the process of scheduling groundwater monitoring well installation activities at the Site. LTE personnel will oversee the installation of the monitoring wells, which will be used to conduct groundwater performance monitoring at the Site. A summary of the monitoring well installation and groundwater analytical results will be included with the first quarterly groundwater monitoring report.

TABLE

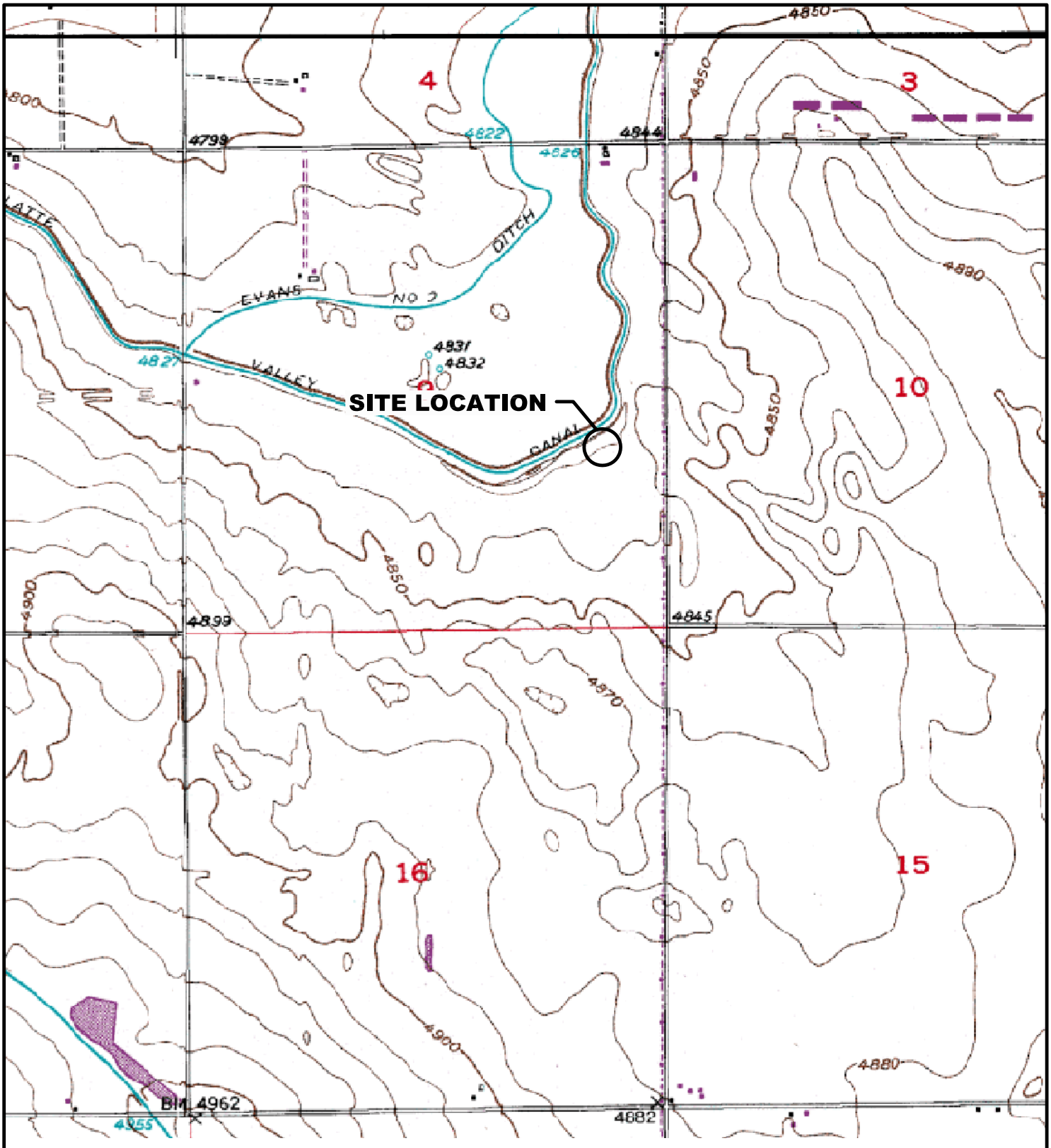
TABLE 1

SOIL ANALYTICAL RESULTS
UPRC 9-9K, 10K
WELD COUNTY, COLORADO
NOBLE ENERGY, INC.

Sample ID (ft. bgs)	Date Sampled	TVH-GRO (mg/kg)
SS02 (4')	3/9/2009	<50
SS03 (4')	3/9/2009	<50
SS07 (5')	3/11/2009	<50
SS08 (5')	3/11/2009	<50
SS09 (5')	3/11/2009	<50
SS10 (5')	3/11/2009	<50
SS11 (5')	3/11/2009	157.7
SS12 (5')	3/11/2009	<50
COGCC Standard		**500**

Notes:
ft. bgs - feet below ground surface
mg/kg - milligrams per kilogram
< indicates result is less than the stated laboratory method detection limit
TVH-GRO - Total Volatile Hydrocarbons - Gasoline Range Organics
TVH-GRO by EPA Modified Method 8015
COGCC - Colorado Oil & Gas Conservation Commission

FIGURES



LEGEND

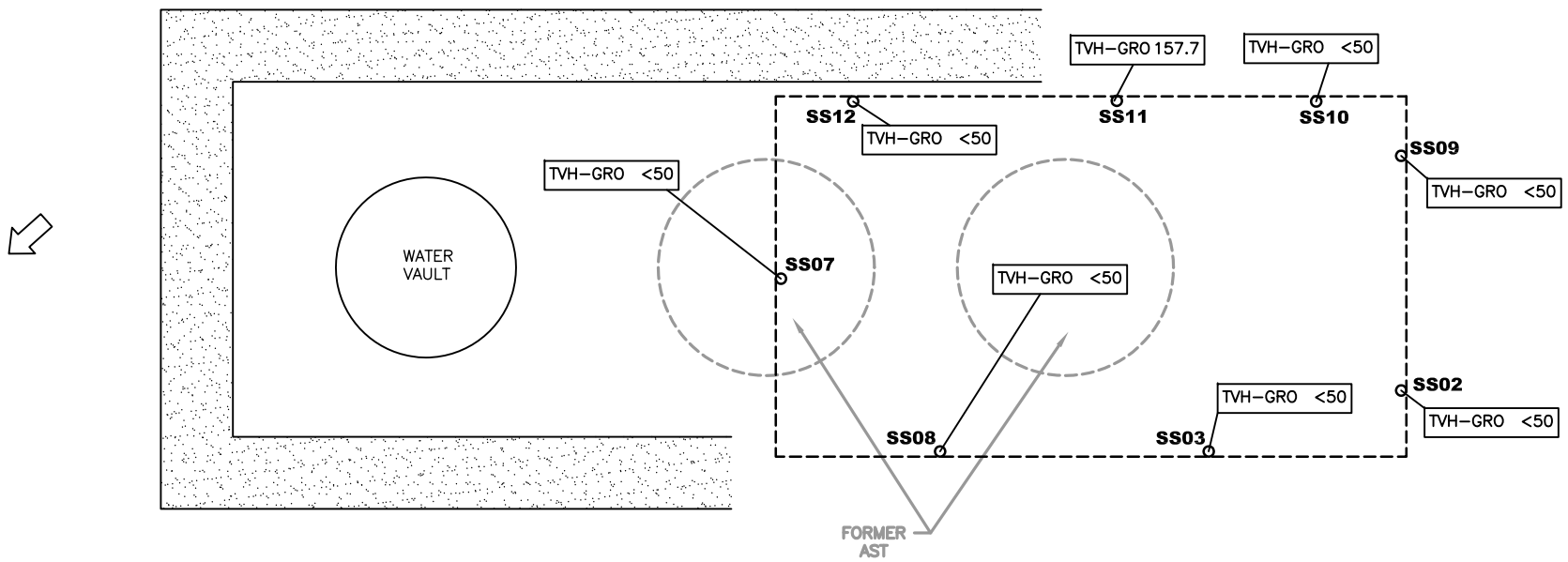
○ SITE LOCATION

0 375 750 1500
FEET

SOURCE: TOPOZONE.COM
USGS 7.5' QUADRANGLE
(NAD27)

FIGURE 1
SITE LOCATION MAP
UPRC 9-9K, 10K
WELD COUNTY, CO
NOBLE ENERGY, INC.

NEP090401_SL 3/09



LEGEND

SS02 — SOIL SAMPLE LOCATION

BERM

EXTENT OF EXCAVATION

ESTIMATED GROUNDWATER FLOW DIRECTION

AST — ABOVEGROUND STORAGE TANK

TVH-GRO TOTAL VOLATILE HYDROCARBONS-GASOLINE RANGE ORGANICS

ANALYTICAL RESULTS ARE REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)

SAMPLES COLLECTED 3/9/09 & 3/11/09

FIGURE 2
SOIL SAMPLE LOCATIONS MAP
UPRC 9-9K, 10K
WELD COUNTY, CO
NOBLE ENERGY, INC.

NEP090401 3/09

APPENDIX A

SITE PHOTOGRAPHS

UPRC 9-9K, 10K Tank Battery Site Excavation

Photograph 1: Backfilling of the excavation. View is northeast.

Photograph 2: Backfilling of the excavation. View is southeast.

APPENDIX B

LABORATORY ANALYTICAL REPORTS

4640 Pecos Street | Unit C | Denver, Colorado 80211
303.433.1322 Phone 303.265.9645 Fax

March 12, 2009

LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Dodek
Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Attached are the analytical results for Noble - UPRC 9, 9k- 10k received by Origins Laboratory, Inc. 3/11/2009 4:30:00PM. Please let us know if you have any questions, or if we can help with anything at all.

Laboratory Manager

David P Mathis For
Noelle E Doyle

The analytical results in the following report were analyzed under the guidlines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. This laboratory report is intended solely for the above addressee and it is only to be used and or reproduced in its entireity.

4640 Pecos Street | Unit C
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303.265.9645 | Fax

LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
SS07 (5')	X903030-01	Soil	3/11/2009 9:47:00AM	03/11/2009 16:30
SS08 (5')	X903030-02	Soil	3/11/2009 11:25:00AM	03/11/2009 16:30
SS09 (5')	X903030-03	Soil	3/11/2009 1:20:00PM	03/11/2009 16:30
SS10 (5')	X903030-04	Soil	3/11/2009 1:30:00PM	03/11/2009 16:30
SS11 (5')	X903030-05	Soil	3/11/2009 1:00:00PM	03/11/2009 16:30
SS12 (5')	X903030-06	Soil	3/11/2009 1:10:00PM	03/11/2009 16:30

Origins Laboratory, Inc.

David P r

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LT Environmental, Inc.
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Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Origins Laboratory, Inc.

David P [illegible]r

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LT Environmental, Inc.
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Arvada CO 80003

Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS07 (5')

X903030-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc.

Gasoline Range Organics (GRO) by EPA 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P [illegible]r

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS08 (5')

X903030-02 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P [illegible]r

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS09 (5')

X903030-03 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P [illegible]r

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Brian Dodek
Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS10 (5')

X903030-04 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc.

Gasoline Range Organics (GRO) by EPA 8015M

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P r

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS11 (5')

X903030-05 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	**157.7**	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P r

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Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS12 (5')

X903030-06 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C11004	03/11/2009	03/12/2009	

Origins Laboratory, Inc.

David P [illegible]r

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Extractable Petroleum Hydrocarbons by 8015M - Quality Control

Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9C11004 - Default Prep GC-Semi										
Blank (9C11004-BLK1)						Prepared: 03/11/2009 Analyzed: 03/12/2009				
Gasoline (C6-C10)	ND	50.0	mg/kg							
LCS (9C11004-BS1)						Prepared: 03/11/2009 Analyzed: 03/12/2009				
Gasoline (C6-C10)	644.5	50.0	mg/kg	500		129	65-135			
LCS Dup (9C11004-BSD1)						Prepared: 03/11/2009 Analyzed: 03/12/2009				
Gasoline (C6-C10)	584.5	50.0	mg/kg	500		117	65-135	9.76	25	

Origins Laboratory, Inc.

David P r

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Notes and Definitions

ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Origins Laboratory, Inc.

David P r

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March 11, 2009

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Arvada CO 80003

Brian Dodek
Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Attached are the analytical results for Noble - UPRC 9, 9k- 10k received by Origins Laboratory, Inc. 3/10/2009 8:45:00AM. Please let us know if you have any questions, or if we can help with anything at all.

Laboratory Manager

Noelle E Doyle

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Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
SS02 (4')	X903027-01	Soil	3/9/2009 11:05:00AM	03/10/2009 08:45
SS03 (4')	X903027-02	Soil	3/9/2009 11:10:00AM	03/10/2009 08:45

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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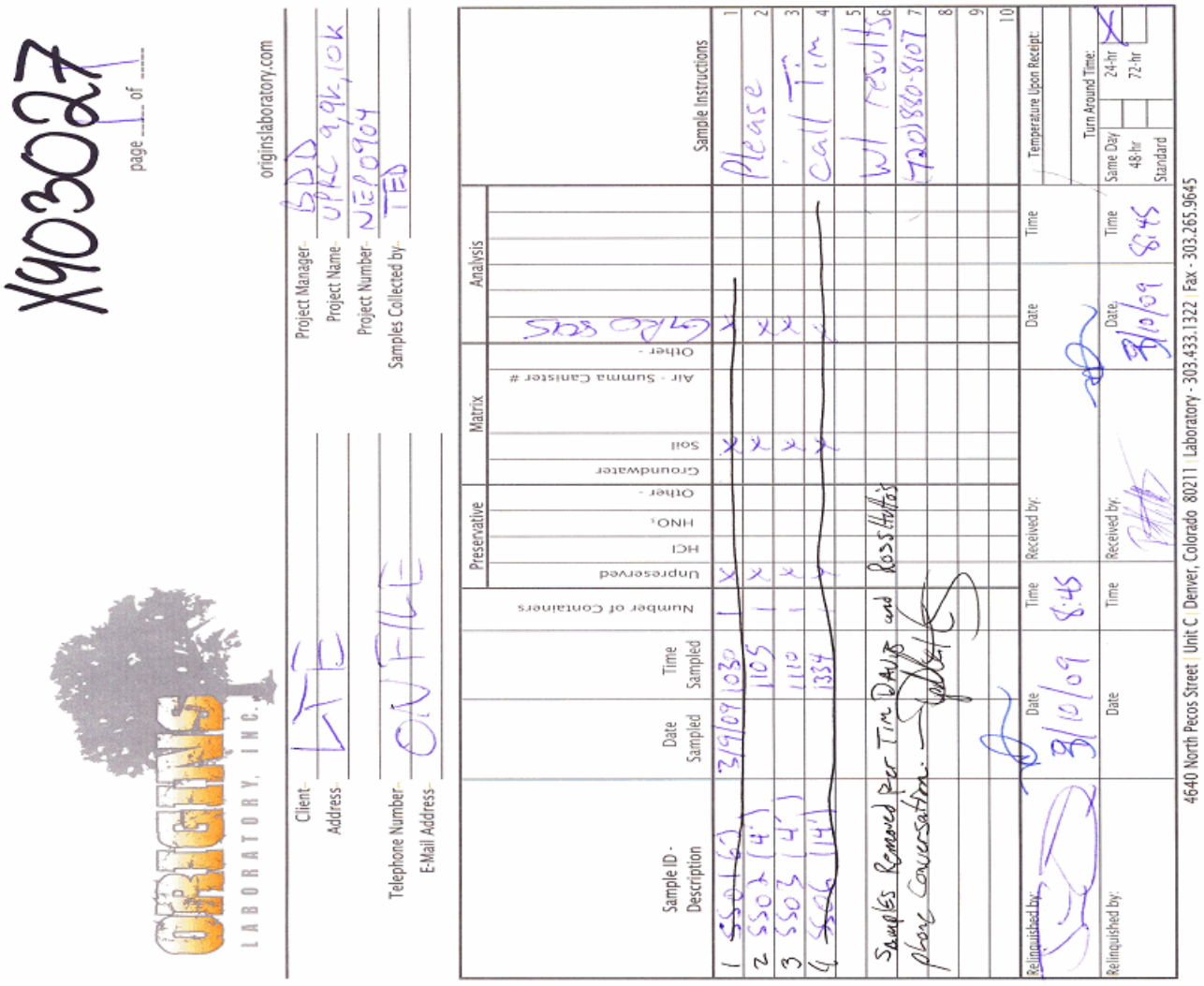
Project: Noble - UPRC 9, 9k- 10k



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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS02 (4')

X903027-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C10001	03/10/2009	03/10/2009	

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

SS03 (4')

X903027-02 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Origins Laboratory, Inc.								
Gasoline Range Organics (GRO) by EPA 8015M								
Gasoline (C6-C10)	ND	50.0	mg/kg	1	9C10001	03/10/2009	03/10/2009	

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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Arvada CO 80003

Brian Dodek
Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Extractable Petroleum Hydrocarbons by 8015M - Quality Control

Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9C10001 - Default Prep GC-Semi										
Blank (9C10001-BLK1)					Prepared: 03/10/2009 Analyzed: 03/10/2009					
Gasoline (C6-C10)	ND	50.0	mg/kg							
LCS (9C10001-BS1)					Prepared: 03/10/2009 Analyzed: 03/10/2009					
Gasoline (C6-C10)	487	50.0	mg/kg	500		97.4	65-135			
Matrix Spike (9C10001-MS1)		Source: X903028-12			Prepared: 03/10/2009 Analyzed: 03/10/2009					
Gasoline (C6-C10)	482	50.0	mg/kg	500	ND	96.4	65-135			
Matrix Spike Dup (9C10001-MSD1)		Source: X903028-12			Prepared: 03/10/2009 Analyzed: 03/10/2009					
Gasoline (C6-C10)	500	50.0	mg/kg	500	ND	99.9	65-135	3.62	25	

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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

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Brian Dodek

Project Number: NEP0904
Project: Noble - UPRC 9, 9k- 10k

Notes and Definitions

ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Origins Laboratory, Inc.

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