



January 9, 2009

Mr. Mike Cox  
Environmental Coordinator  
Noble Energy, Inc.  
804 Grand Avenue  
Platteville, Colorado 80651

Mr. Bill Farmer  
Foundation Energy Company  
444 South 2nd Street  
La Salle, Colorado 80645

RE: Remediation System Installation, Startup, and Groundwater Sampling Results  
Becky #2-6 Natural Gas Wellhead Site  
Weld County, Colorado

Dear Mr. Cox and Mr. Farmer:

LT Environmental, Inc. (LTE) was retained by Noble Energy, Inc. (Noble) to conduct corrective actions at the Becky #2-6 natural gas wellhead site (Site) located approximately 3.5 miles west of the intersection of Interstate 25 and Weld County Road (WCR) 52 in Weld County, Colorado. A Site Map is provided as Figure 1.

LTE, on behalf of Noble, has completed system design, installation, and startup of the air sparging/soil vapor extraction (AS/SVE) remediation system. Site assessment results were previously discussed in the *Limited Environmental Site Assessment Results* correspondence, dated September 11, 2008. LTE is also continuing to conduct groundwater monitoring at the Site to evaluate previously documented groundwater impact. This correspondence describes activities performed at the Site from July 1, 2008 through December 31, 2008. Activities conducted during the reporting period and summarized in this report include the design, installation, startup, and operations of the remediation system; and the results of the baseline groundwater sampling event conducted on November 10, 2008 and November 13, 2008.

## REMEDATION SYSTEM DESCRIPTION

Design of the AS/SVE remediation system was conducted from August 2008 to November 2008. The AS system is designed to introduce ambient air into the subsurface water column for dissolved hydrocarbon volatilization and to promote aerobic microbial decomposition of petroleum constituents (Figure 2). The SVE system is designed to volatilize petroleum constituents adsorbed onto soil particles and to remove petroleum vapors released from the groundwater by the AS process (Figure 3). AS and SVE wells are connected to a remediation equipment trailer housing the equipment for the AS/SVE systems.



The SVE system includes subsurface vertical wells and aboveground horizontal extraction piping connected to a vapor extraction blower. The distribution and spacing of these wells are based on site-specific soil analytical data, geological characteristics, experience with similar systems, and the location and influence area of AS wells (Figure 4). Site-specific soil and groundwater conditions govern the operational parameters of the remediation system.

The SVE system includes eight vertical SVE wells constructed of a 2-inch diameter schedule 40 polyvinyl chloride (PVC) pipe screened with a 36-inch length of 0.02-inch slot well screen placed in the impacted soil interval. The SVE wells were installed to a depth of six feet below ground surface (bgs) and are connected to an equipment enclosure via aboveground 2-inch diameter high density polyethylene (HDPE) piping.

The AS system includes 39 vertical AS wells constructed of 1-inch diameter schedule 40 PVC pipe with an 18-inch length of 0.01-inch slot well screen for diffusion of sparging air. The AS wells were installed to a depth of 16 feet bgs and are connected to the equipment enclosure via aboveground 1-inch diameter HDPE piping.

## **REMEDIATION SYSTEM INSTALLATION**

The installation of the AS/SVE system was completed from October 30, 2008 through November 17, 2008. Installation of the AS/SVE system included drilling and installing remediation wells, piping the remediation wells to the equipment trailer location, piping a gas line from the separator onsite to the equipment trailer, mobilizing the remediation trailer to the Site, and making the final piping and electrical connections. Drilling activities were conducted from October 30, 2008 through November 7, 2008. Drilling was conducted by Dakota Drilling with oversight by LTE. Well completion information for the AS and SVE wells is included as Attachment 1. Onsite construction was conducted from November 10, 2008 through November 17, 2008. The system layout is illustrated on Figures 2 and 3.

## **REMEDIATION SYSTEM STARTUP AND OPERATION AND MAINTENANCE**

From November 17 through November 21, 2008, LTE conducted initial startup procedures for the AS/SVE system and initiated operation and maintenance (O&M) activities for the system. Startup activities included initiating remediation activities, leveling of equipment trailer, adjusting pressures and flow rates, setting up the cycle schedule, and ensuring equipment is operating within manufacturer's specifications. Following system startup, the AS/SVE remediation system has operated continuously throughout the reporting period with occasional shutdowns due to loss of gas pressure from the separator, low generator battery charge alarms, low coolant level on the generator, and routine maintenance activities.

O&M activities conducted in the reporting period included:

- Completion of routine, weekly O&M checks to monitor and adjust system performance;
- Manual cycling of the AS system;
- Replacement of the SVE system blower/motor belt;



- Replacement of the AS system over-pressure shutoff switch;
- Field screening the exhaust for air emissions;
- Collecting air samples for emissions analysis;
- Replacement of solenoid valve diaphragms; and
- Generator maintenance, which included replacing the alternator, battery, and fluid hoses.

## **GROUNDWATER SAMPLING PROCEDURES**

Groundwater was sampled at the Site on November 10, 2008 and November 13, 2008, to provide a baseline sampling event prior to remediation system operation. Prior to sampling each well, headspace vapor was measured with a photoionization detector (PID), the down well dissolved oxygen concentration was collected, and the depth to groundwater was measured and recorded for calculating purge volumes (Table 1). PID headspace and DO data were collected to assess system performance and will be discussed in future reports.

Each well was purged of three casing volumes prior to collection of groundwater samples. Groundwater samples were collected from the well points by advancing disposable 3/16-inch diameter PVC tubing inside the 1-inch diameter PVC well casing and extending the tubing to below the groundwater table. A peristaltic pump was utilized to collect the groundwater samples prior to placement into laboratory prepared sample bottles. Groundwater samples were collected in 40-milliliter vials, placed on ice, and delivered under chain-of-custody (COC) protocol to Origins Laboratory located in Denver, Colorado. Samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency Method 8260B.

## **HYDROGEOLOGY**

During the November 2008 sampling event, the depths to static groundwater level ranged from 7.48 feet below top of casing (TOC) in SB-11/MW-11 to 10.27 feet below TOC in SB-17/MW-17 (Table 1). The groundwater flow direction was to the north with an average hydraulic gradient of approximately 0.0095 feet per foot (ft/ft).

## **GROUNDWATER ANALYTICAL RESULTS**

The Colorado Department of Public Health and Environment has established Colorado Groundwater Quality Standards (CGWQS) for BTEX of 5.0 micrograms per liter (ug/L), 1,000 ug/L, 700 ug/L, and 1,400 ug/L, respectively. Table 1 summarizes groundwater analytical results for samples collected during all monitoring events. Laboratory analytical reports, laboratory quality assurance/quality control data, and COC documentation are presented in Attachment 2.

Twenty-one groundwater samples were collected during the November 10, 2008 sampling event. Two monitoring wells were found to contain free-phase petroleum product (MW-10 and MW-16). The free-phase product thickness was removed with a 1-inch disposable bailer. Upon



returning to the Site on November 13, 2008, well gauging indicated that the free-phase product had returned to MW-10, but not to MW-16. A sample was collected from MW-16 on November 13, 2008 and was submitted to Origins Laboratory for BTEX analysis. Groundwater analytical results indicated that benzene was detected above the CGWQS in monitoring wells MW-7, MW-9, MW-13, MW-25, MW-26, and MW-34 at concentrations ranging from 47.5 ug/L at MW-25 to 725 ug/L at MW-7. Results indicated that the total xylene concentration of 6,008.8 ug/L detected in monitoring well MW-7 was also above the CGWQS. Detectable concentrations of BTEX compounds below the regulatory standards were also found in MW-3, MW-11, MW-16, MW-18, MW-23, MW-24, MW-27, and MW-30. BTEX compounds were not detected above regulatory standards in the remaining samples. Groundwater analytical results for the November 2008 sampling event are summarized in Table 2 and illustrated on Figure 5.

## SUMMARY AND CONCLUSIONS

Current data suggest a continued general decrease in BTEX concentrations since the initial site assessment. However, as seen in the attached Table 1, elevated concentrations of benzene are present at the Site. Free-phase hydrocarbon thickness was measured in two monitoring wells on November 10, 2008. LTE will conduct groundwater sampling in February 2009 to assess remediation system performance. LTE recommends continued groundwater monitoring at the Site on a quarterly basis.

LTE appreciates the opportunity to provide environmental services to Noble. Please call us at 303-433-9788 if you have any questions or comments regarding this report.

Sincerely,

LT ENVIRONMENTAL, INC.

Matthew R. Vielhaber, P.E.  
Project Manager

Steve D. Kahn, P.E.  
Senior Engineer

## Attachments

Table 1: Groundwater Elevation, Dissolved Oxygen, Photoionization Detector,  
and Analytical Results Summary

Figure 1: Site Map

Figure 2: Air Sparging System Layout

Figure 3: Soil Vapor Extraction System Layout

Figure 4: Radius of Influence Map

Figure 5: Groundwater Analytical Results – November 10 & 13, 2008

Attachment 1: Well Completion Diagrams

Attachment 2: Laboratory Analytical Reports

## TABLE

TABLE 1

## GROUNDWATER ELEVATION, DISSOLVED OXYGEN, PHOTOIONIZATION DETECTOR, AND ANALYTICAL RESULTS SUMMARY

BECKY #2-6

WELD COUNTY, COLORADO

NOBLE ENERGY, INC.

Well ID	Date	Depth to Product (feet btoc)	Depth to Water (feet btoc)	Product Thickness (feet)	DO (g/L)	PID (ppm)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
MW-1	6/24/2008		7.92				3.52	<1.00	55.05	25.16
	11/10/2008		7.66		2.74	0.0	<1.00	<1.00	<1.00	<3.00
MW-2	6/24/2008		8.01				<1.00	<1.00	<1.00	<3.00
MW-3	6/24/2008		8.09				6.43	<1.00	<1.00	5.15
	11/10/2008		7.83		0.28	0.0	1.26	<1.00	<1.00	<3.00
MW-4	6/24/2008		7.88				<1.00	<1.00	<1.00	<3.00
	11/10/2008		7.73		1.20	0.0	<1.00	<1.00	<1.00	<3.00
MW-5	6/24/2008		8.08				<1.00	<1.00	<1.00	<3.00
MW-6	6/24/2008		7.85				<1.00	<1.00	<1.00	<3.00
MW-7	6/24/2008		8.10				358.40	1.02	277.60	3,120.29
	11/10/2008		7.98		0.17	325	725	<1.00	493	6,008.8
MW-8	6/24/2008		7.60				<1.00	<1.00	<1.00	<3.00
	11/10/2008		7.59		0.36	0.0	<1.00	<1.00	<1.00	<3.00
MW-9	6/24/2008		8.45				430.20	<1.00	35.57	396.80
	11/10/2008		8.32		1.13	94.5	175	<1.00	24.7	77.90
MW-10	6/24/2008		8.26				1,254.2	1.84	223.60	2,373.80
	11/10/2008	8.13	8.63	0.50	NM	305	NA	NA	NA	NA
	11/13/2008	8.21	8.44	0.23			NA	NA	NA	NA
MW-11	6/24/2008		7.52				<1.00	<1.00	1.35	14.70
	11/10/2008		7.48		0.78	0.0	<1.00	<1.00	<1.00	5.00



TABLE 1 (Continued)

## GROUNDWATER ELEVATION, DISSOLVED OXYGEN, PHOTOIONIZATION DETECTOR, AND ANALYTICAL RESULTS SUMMARY

BECKY #2-6

WELD COUNTY, COLORADO

NOBLE ENERGY, INC.

Well ID	Date	Depth to Product (feet btoc)	Depth to Water (feet btoc)	Product Thickness (feet)	DO (g/L)	PID (ppm)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
MW-12	6/24/2008		7.70				<1.00	<1.00	<1.00	<3.00
MW-13	6/24/2008		8.68				1,616.2	<1.00	249.20	3,551.0
	11/10/2008		8.85		0.46	0.0	684	<1.00	84.0	152.11
MW-14	6/24/2008		9.35				3.66	1.26	1.69	21.65
	11/10/2008		9.56		0.34	0.0	<1.00	<1.00	<1.00	<3.00
MW-15	6/24/2008		9.34				<1.00	<1.00	<1.00	4.31
	11/10/2008		9.89		2.16	0.0	<1.00	<1.00	<1.00	<3.00
MW-16	6/24/2008		9.19				6.28	<1.00	170.65	1,998.36
	11/10/2008	9.83	9.84	0.01	NM	634	NA	NA	NA	NA
	11/13/2008		9.88				<1.00	<1.00	<1.00	220.86
MW-17	6/24/2008		9.16				<1.00	<1.00	<1.00	13.46
	11/10/2008		10.27		4.11	0.0	<1.00	<1.00	<1.00	<3.00
MW-18	6/24/2008		9.37				<1.00	<1.00	<1.00	3.24
	11/10/2008		10.13		0.36	0.0	<1.00	<1.00	<1.00	3.36
MW-19	6/24/2008		8.73				<1.00	<1.00	<1.00	3.53
MW-20	6/24/2008		8.52				<1.00	<1.00	<1.00	<3.00
MW-21	6/24/2008		8.20				<1.00	<1.00	<1.00	<3.00



TABLE 1 (Continued)

## GROUNDWATER ELEVATION, DISSOLVED OXYGEN, PHOTOIONIZATION DETECTOR, AND ANALYTICAL RESULTS SUMMARY

BECKY #2-6

WELD COUNTY, COLORADO

NOBLE ENERGY, INC.

Well ID	Date	Depth to Product (feet btoc)	Depth to Water (feet btoc)	Product Thickness (feet)	DO (g/L)	PID (ppm)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
MW-22	6/24/2008		8.66				<1.00	<1.00	<1.00	<3.00
MW-23	6/24/2008		9.14				83.13	1.43	164.46	1,283
	11/10/2008		8.95		4.12	1.8	1.46	<1.00	1.54	<3.00
MW-24	6/24/2008		9.00				<1.00	<1.00	<1.00	<3.00
	11/10/2008		8.85		4.31	0.0	<1.00	<1.00	<1.00	6.27
MW-25	6/24/2008		8.86				120.95	<1.00	17.52	602.10
	11/10/2008		8.85		4.12	0.0	47.5	<1.00	7.73	28.8
MW-26	6/24/2008		8.35				75.72	<1.00	71.24	598.70
	11/10/2008		8.47		0.60	0.0	57.4	<1.00	36.4	47.60
MW-27	6/24/2008		8.73				<1.00	<1.00	<1.00	<3.00
	11/10/2008		9.07		0.87	0.0	1.72	<1.00	<1.00	18.4
MW-28	6/24/2008		8.85				<1.00	<1.00	<1.00	2.97
MW-29	6/24/2008		8.89				<1.00	<1.00	<1.00	<3.00
	11/10/2008		9.69		0.17	0.0	<1.00	<1.00	<1.00	<3.00
MW-30	6/24/2008		8.57				<1.00	<1.00	<1.00	<3.00
	11/10/2008		8.56		1.52	0.0	<1.00	<1.00	<1.00	2.88
MW-31	6/24/2008		7.94				<1.00	<1.00	<1.00	<3.00
MW-32	7/7/2008		NA				<1.0	<1.0	<1.0	<1.0
	11/10/2008		9.57		0.86	0.0	<1.00	<1.00	<1.00	<3.00





**TABLE 1 (Continued)**

**GROUNDWATER ELEVATION, DISSOLVED OXYGEN, PHOTOIONIZATION DETECTOR, AND ANALYTICAL RESULTS SUMMARY**

**BECKY #2-6**

**WELD COUNTY, COLORADO**

**NOBLE ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet btoc)</b>	<b>Depth to Water (feet btoc)</b>	<b>Product Thickness (feet)</b>	<b>DO (g/L)</b>	<b>PID (ppm)</b>	<b>Benzene (ug/L)</b>	<b>Toluene (ug/L)</b>	<b>Ethylbenzene (ug/L)</b>	<b>Total Xylenes (ug/L)</b>
MW-33	7/7/2008		NA				1.4	<1.0	10	5.9
MW-34	7/7/2008		NA				160	<1.00	370	2,800
	11/10/2008		8.13		0.71	215	85.7	<1.00	89.4	108
<b>Colorado Groundwater Quality Standards</b>							<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>1,400</b>

**NOTES:**

Benzene, toluene, ethylbenzene, total xylenes analyzed by EPA Method 8260B

btoc - below top of casing

ug/L - micrograms per liter

DO - dissolved oxygen

PID - photoionization detector

< indicates result is less than the stated laboratory method detection limit

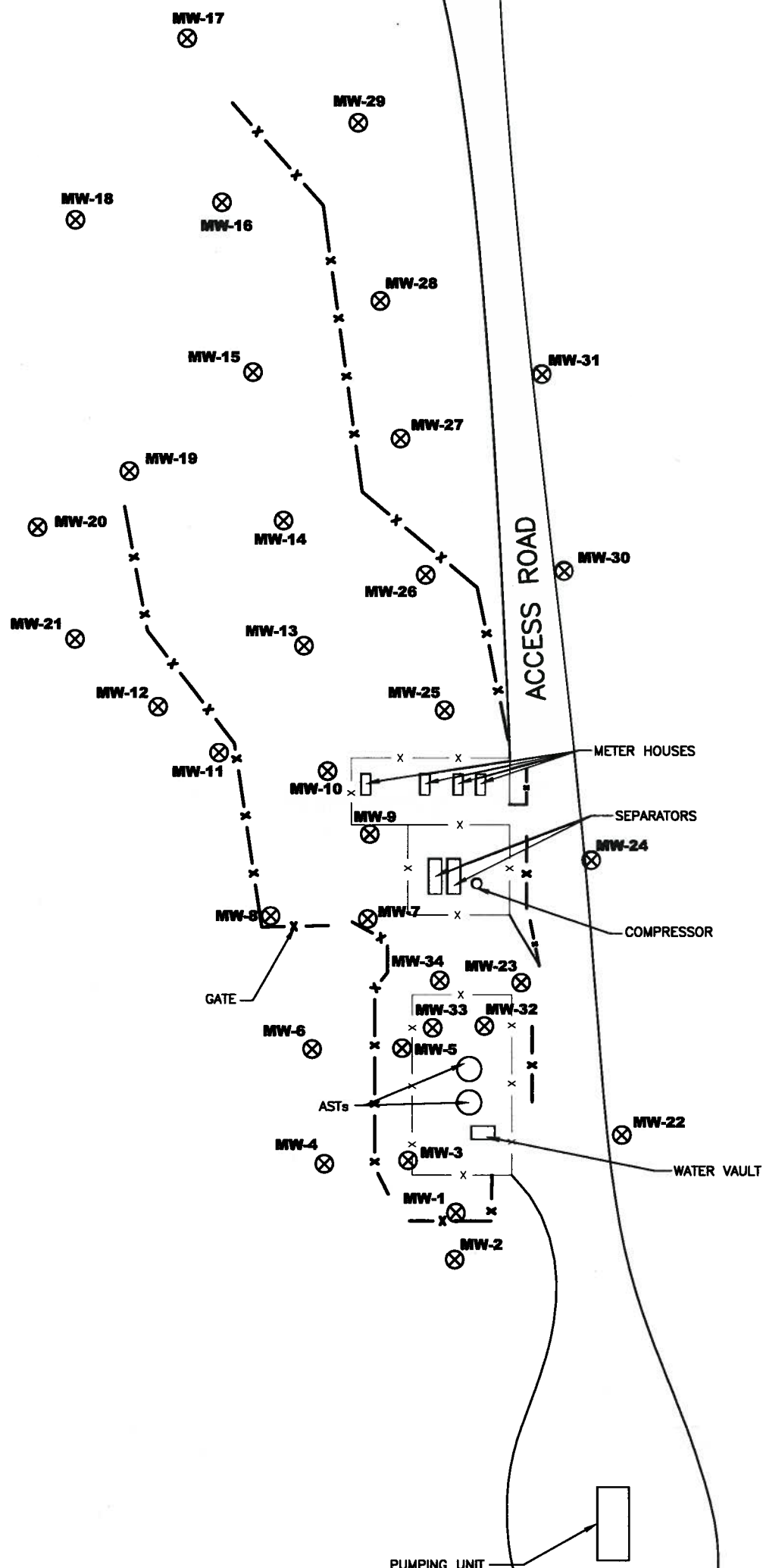
NA - not analyzed

NM - not measured due to free-phase hydrocarbons in monitoring well



## FIGURES

COUNTY ROAD 52

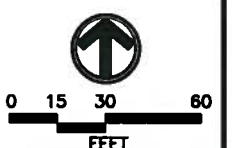


**LEGEND**

- MW-1 ⊗ MONITORING WELL LOCATION (FORMERLY SOIL BORING LOCATION (SB-1))
- x — EXISTING FENCE
- x — NEW FENCE
- AST ABOVEGROUND STORAGE TANK

SOURCE:  
LTE SITE SKETCH

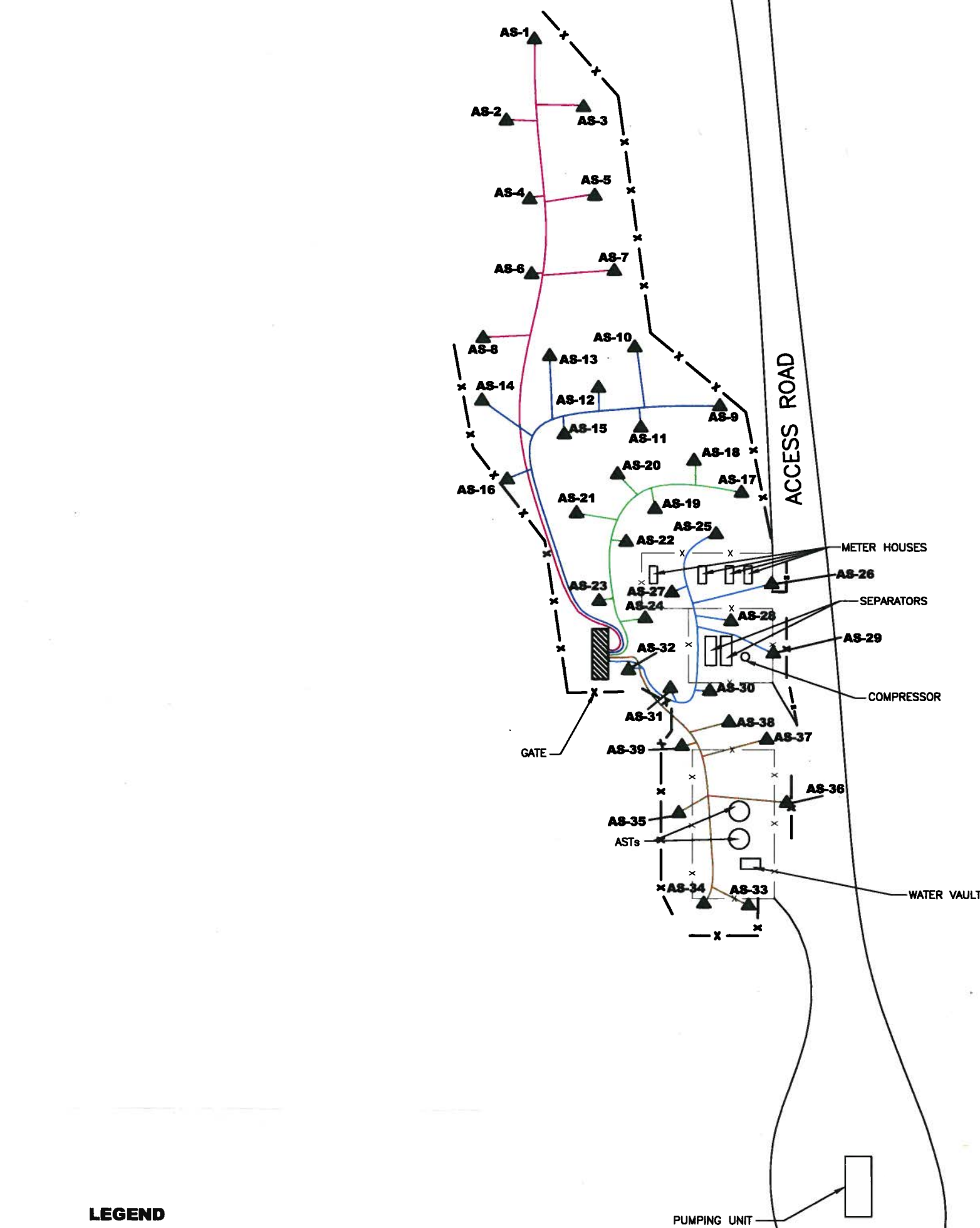
**FIGURE 1**  
**SITE MAP**  
**BECKY #2-6**  
**WELD COUNTY, COLORADO**  
**NOBLE ENERGY, INC.**



12/08\NEP082601

COUNTY ROAD 52

ACCESS ROAD

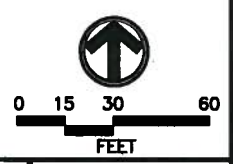


**LEGEND**

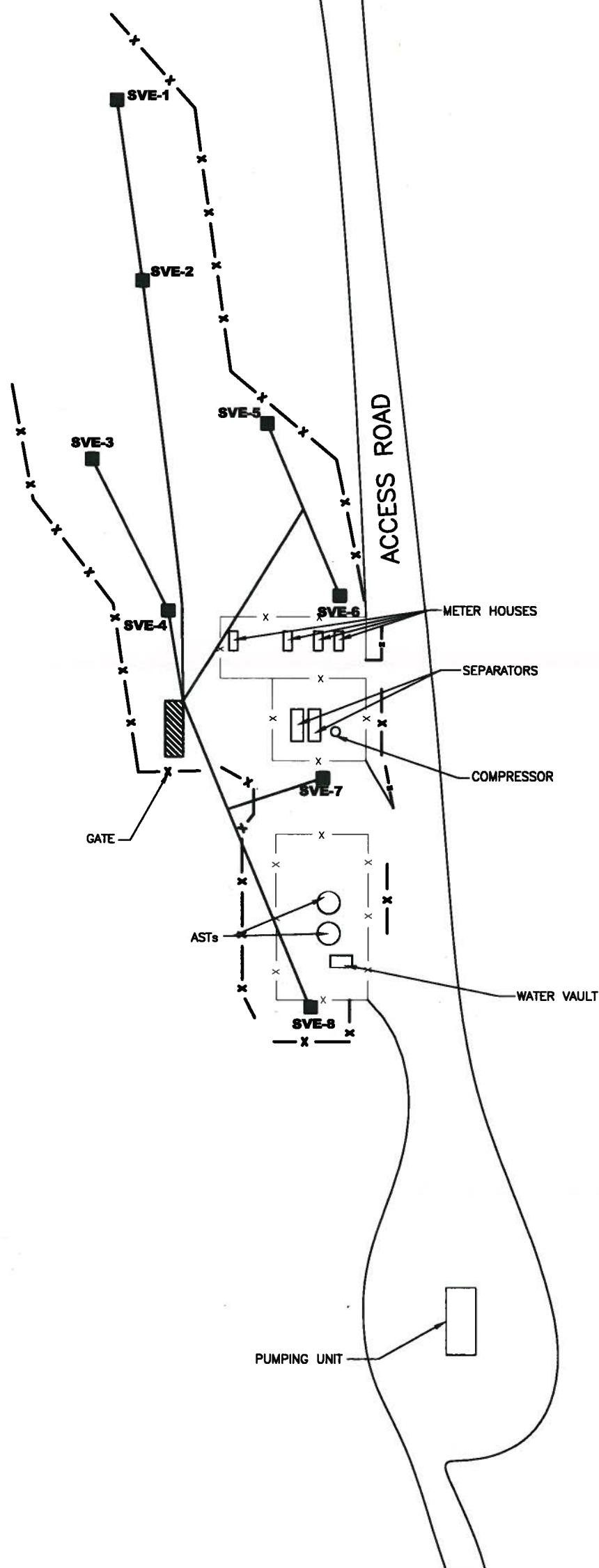
- x — EXISTING FENCE
- x — NEW FENCE
- AS-1 ▲ AIR SPARGING WELL LOCATION
- ▨ REMEDIATION EQUIPMENT TRAILER
- SYSTEM PIPING (ZONE 1)
- SYSTEM PIPING (ZONE 2)
- SYSTEM PIPING (ZONE 3)
- SYSTEM PIPING (ZONE 4)
- SYSTEM PIPING (ZONE 5)
- AST ABOVEGROUND STORAGE TANK

SOURCE:  
LTE SITE SKETCH

**FIGURE 2**  
**AIR SPARGING SYSTEM LAYOUT**  
**BECKY #2-6**  
**WELD COUNTY, COLORADO**  
**NOBLE ENERGY, INC.**



COUNTY ROAD 52

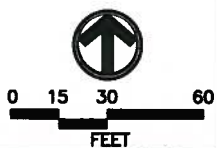


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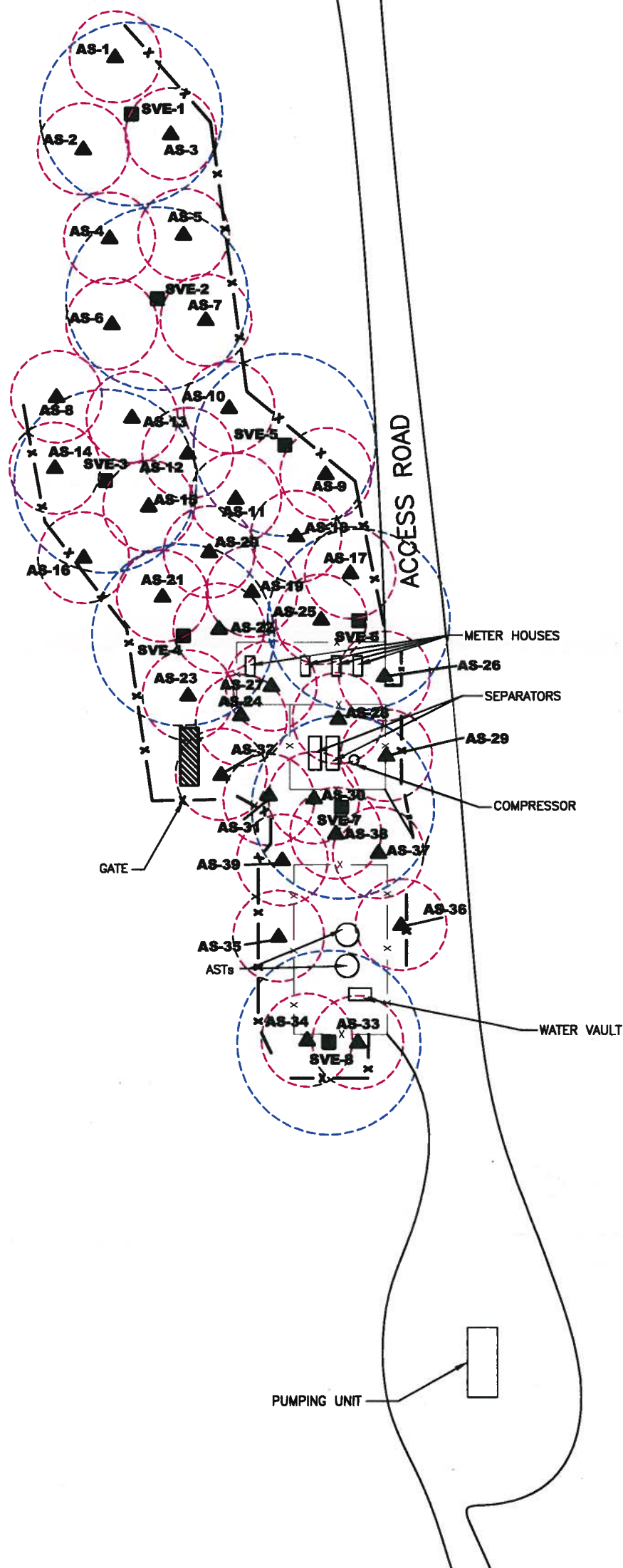
- x — EXISTING FENCE
- x — NEW FENCE
- SVE-1** ■ SOIL VAPOR EXTRACTION WELL LOCATION
- ▨ REMEDIATION EQUIPMENT TRAILER
- SYSTEM PIPING
- AST ABOVEGROUND STORAGE TANK

SOURCE:  
LTE SITE SKETCH

**FIGURE 3**  
**SOIL VAPOR EXTRACTION SYSTEM LAYOUT**  
**BECKY #2-6**  
**WELD COUNTY, COLORADO**  
**NOBLE ENERGY, INC.**



COUNTY ROAD 52

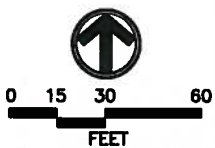


LEGEND

- x — EXISTING FENCE
- x — NEW FENCE
- AS-1 ▲ AIR SPARGING WELL LOCATION
- SVE-1 ■ SOIL VAPOR EXTRACTION WELL LOCATION
- REMEDATION EQUIPMENT TRAILER
- AIR SPARGING RADIUS OF INFLUENCE (20 FEET)
- SOIL VAPOR RADIUS OF INFLUENCE (40 FEET)
- AST ABOVEGROUND STORAGE TANK

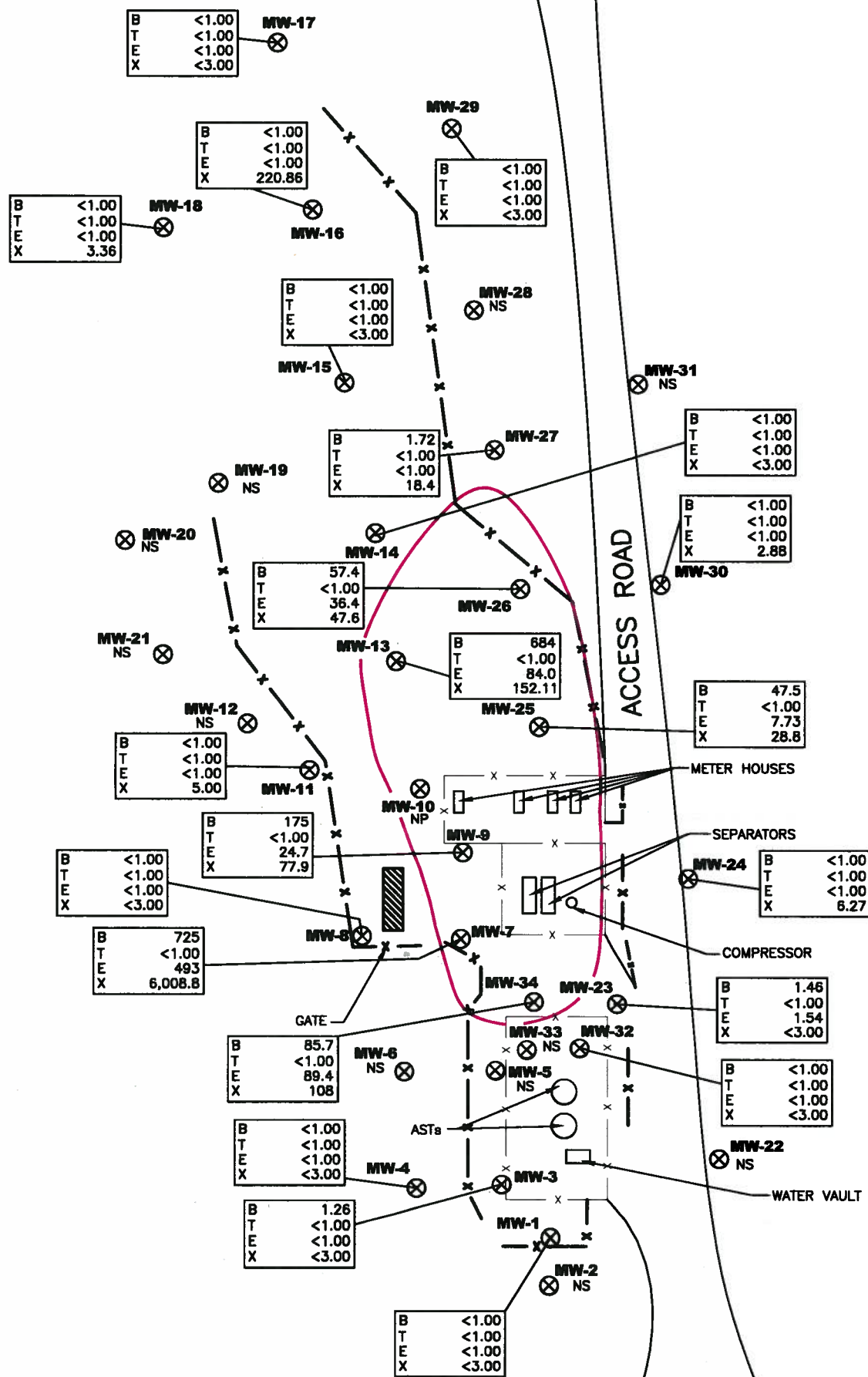
SOURCE:  
LTE SITE SKETCH

FIGURE 4  
RADIUS OF INFLUENCE MAP  
BECKY #2-6  
WELD COUNTY, COLORADO  
NOBLE ENERGY, INC.





# COUNTY ROAD 52



## LEGEND

MW-1 ⊗ MONITORING WELL LOCATION (FORMERLY SOIL BORING LOCATION (SB-1))

— x — EXISTING FENCE

— x — NEW FENCE

AST ABOVEGROUND STORAGE TANK

— 5.0 — BENZENE ISOCONCENTRATION LINE IN MICROGRAMS PER LITER (µg/L)

B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES

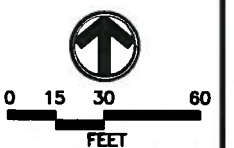
ANALYTICAL RESULTS ARE REPORTED IN MICROGRAMS PER LITER (µg/L)

NS NOT SAMPLED

NP NOT SAMPLED DUE TO FREE PRODUCT

SOURCE:  
LTE SITE SKETCH

**FIGURE 5**  
**GROUNDWATER ANALYTICAL RESULTS**  
**NOVEMBER 10 & 13, 2008**  
**BECKY #2-6**  
**WELD COUNTY, COLORADO**  
**NOBLE ENERGY, INC.**



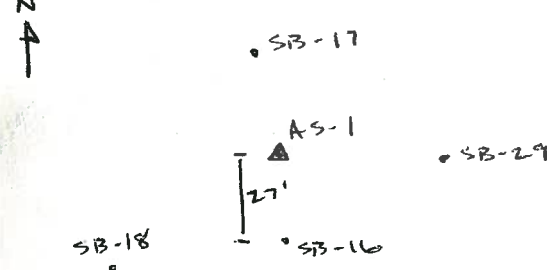
12/08/NEP082801

**ATTACHMENT 1**  
**WELL COMPLETION DIAGRAMS**





Well Location Sketch:



Compliance · Engineering · Remediation

LT Environmental, Inc.

4600 W. 60th Avenue

Arvada, Colorado 80003

## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: AS-1	Project: NEP0826				
Date: 10-30-08	Project Number: NOBLE BECKY #2-6				
Logged By: James F.	Drilled By: Gabe (Dakota Dr.)				
Drilling Method: HSA	Sampling Method: Cuttings				
Seal: Rentonite Chips	Grout: Portland				
Casing Type: Sch 40 PVC	Diameter: 1"	Length: 18'	Hole Diameter: 8"	Depth to Liquid: —	
Screen Type: Sch 40 PVC	Slot: 0.01"	Diameter: 1"	Length: 18'	Total Depth: 16'	Depth to Water: ~ 8'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	Moist		2					SC	Sand, fg-mg, clayey, brown no odor/staining.	
					2					
					4					
					6			SM	Gray staining & strong odor	
	1045		Y		8				Sand, fg-mg, silty, gray, strong staining & odor, wet @ ~ 8-9'	
					10					
	Wet (?)				12					
					14				staining ends @ some point ~ 13'-14'.	
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

NOTES:

Page of

Well Location Sketch:



• SB-29

• SB-16

▲ AS-3

• SB-18

25'



Compliance • Engineering • Remediation

LT Environmental, Inc.

4600 W. 60th Avenue

Arvada, Colorado 80003

## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-3

Project:

Noble Bucky # 2-6

Date:

10-30-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Pattled

Elevation:

Detector:

MiniRau PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

Diameter:

1"

Length:

Diameter:

1"

Length:

Diameter:

1"

Length:

Diameter:

1"

Length:

Diameter:

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-4

Project:

Noble Bury #2-6

Date:

10-30-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland

Elevation:

Detector:

Mini Roc PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

~ 11'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	Moist				2			SC	Sand, fg-mg, clayey, brown, moist.	
					4					
					6					
					8			SM	Sand, fg-mg, silty, moist, gray-black staining & strong odor. Wet @ ~ 11'(?).	
		907	Y		10					
	Wet				12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: AS-5	Project: Noble Buckey #2-6
Date: 10-30-08	Project Number: NEPO826
Logged By: James F.	Drilled By: Gabe (Dakota)
Drilling Method: HSA	Sampling Method: Cuttings
Seal: Bentonite Chips	Grout: Portland
Gravel Pack: Colorado Silica #10-20	Hole Diameter: 8"
Casing Type: Sch. 40 PVC	Depth to Liquid: 11'
Screen Type: Sch. 40 PVC	Depth to Water: ~ 11'
Slot: 0.01"	
Diameter: 1"	
Length: 18'	
Total Depth: 16'	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist.	
					4				stained w/ odor ~ 4'	
					6					
					8				staining ends ~ 8'	
					10					
					12			SM	Sand, fg-mg, silty, driller reports gravelly but none came up, net.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-6

Project:

Noble Bucky #2-6

Date:

10-30-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland Cement Chips

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

~10'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	moist		N		2			SC	Sand, fg-mg, clayey, brown, moist.	
					4				-staining & odor @ 4'	
		436	Y		6					
					8					
	wt				10			SM	Sad, fg-mg, silty wet, gray-black stained w/ odor.	
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-7

Project:

Noble Beauty

Date:

10-31-08

Project Number:

NEP 0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist.	
					4				gray staining & odor	
					6					
					8					
					10					
					12			SM	Sand, silty, w/ gravel. Did not come up in cuttings.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-8

Project:

Noble Bucky

Date:

10-31-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland

Elevation:

Detector:

Mini Rac PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18'

Total Depth:

16'

Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brownish moist	
					4					
					6				staining & odor below 4'	
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-9

Project:

Noble Bucky

Date:

10-31-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18'

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist	
					4					
					6				staining & odor below ~6'	
		68.3	Y		8					
					10			GM	Assumed	
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-10

Project:

Noble Becky

Date:

10-31-08

Project Number:

NEPO826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #1020

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	Moist		N		2			SL	Sand, fg-mg, clayey, brown, moist.	
					4					
					6				gray staining staining & stain	
		431	Y		8					
					10					
	7 wet				12			SM	Assumed from change in average resistance.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-11

Project:

Noble Becky

Date:

11-3-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Sam Gabe (Dakota)

Drilling Method:

ASA

Sampling Method:

Cuttings

Elevation:

Detector:

Mini Rat PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

Length:

1"

18"

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist	
					4					
					6				gray-black staining & odor.	
		498			8					
					10			SM	Accumulated	
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-12

Project:

Noble Bucky

Date:

10-31-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Cohn (Dakota)

Elevation:

Detector:

Mini Rasc PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mey, clayey, brown moist	
					4					
					6				gray staining & odor below ~5'	
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-14

Project:

Noble Bucky #2-16

Date:

10-31-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

MiniRae PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Silica Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fgy-mg, clayey, brown moist.	
					4					
					6					
					8				streaks of clayey below 8'	
		108	Y		10					
					12			SM	Assumed, no cuttings below ~10'.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-15

Project:

Noble Bucky

Date:

11-3-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bastard Chips

Grout:

Portland

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch 40 PVC

Diameter:

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch 40 PVC

Slot:

0.01"

Diameter:

Length:

1"

18"

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, w/ gravel, moist, brown. FILL? cl. damp	
					4					
					6			SC	Sand, fg-mg, clayey, <del>moist</del> , moist, gray stained, w/ odor.	
	277				8					
					10					
		234			12				-staining ends @ ~13'	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-16

Project:

Noble Becky

Date:

11-5-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland

Elevation:

Detector:

Mini Rae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

7'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, sl. moist.	
					4					
					6				gray chaining & odor	
		534	Y		8			SM	Sand, fg-mg, silty, very moist to wet, black stained w/ strong odor.	
					10					
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-17

Project:

Noble Beauty

Date:

11-4-08

Project Number:

NEPO 826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Batonite Chips

Grout:

Portland

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist	
					4					
					6					
					8				gray staining & odor	
		373	Y		10					
					12			SM	Assumed - no cuttings	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-19

Project:

Noble Bucky

Date:

11-4-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

Total Depth:

16'

Depth to Water:

~9'

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	moist		Z		2			SC	Sand, fg-mg, clayey, brown, moist	
					4					
					6				gray staining & odor	
		372	Y		8				wet @ ~9'	
	wet				10					
		423			12			SM	Sand, fg-mg, silty, some clay, gray stained, wet.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-20

Project:

Noble Bucky

Date:

11-3-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonic Chiipe

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	moist				2			SC	Sand, fg-mey, clayey, brown, moist	
					4					
					6				gray staining & odor	
		702			8				wet	
	wet				10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-21

Project:

Noble Bucky

Date:

11-3-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

MiniRae PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18'

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-ny, clayey, brown moist.	
					4					
					6				gray <del>clay</del> staining & mod. odor	
					8					
					10			SM	Assumed - no cuttings	
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-23

Project:

Noble Bucky

Date:

11-4-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite chips

Grout:

Portland

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, moist	
					4					
					6				gray staining & odor	
		583			8					
					10					
					12			SM	Assumed - no cuttings	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-25

Project:

Noble Buley

Date:

11-4-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch 40 PVC

Diameter:

1"

Length:

1"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

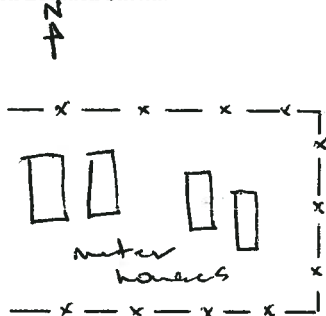
Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, black stained & strong odor, <del>acid</del> below ~1'	
					4					
					6					
					8					
					10					
					12			SM	Sand, fg-mg, silty, light brown, no odor, wet.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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AS-26



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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-26

Project:

Noble Beauty

Date:

11-7-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRac PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bestonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

?

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16"

Depth to Water:

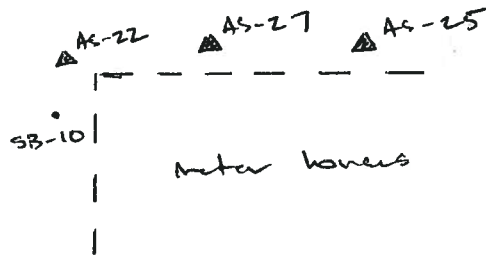
?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, no odor.	
					4				gray staining & odor	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-27

Project:

Noble Bucky

Date:

11-7-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite chips

Grout:

Portland

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Total Depth:

16

Depth to Water:

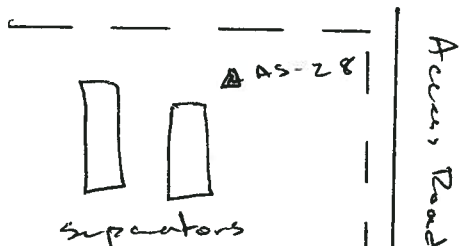
?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown, no odor.	
					4				gray-black staining	
					6					
					8					
					10			SM	Sand, fg-mg, silty, gray stained.	
					12					
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-28

Project:

Noble Beauty

Date:

11-6-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Seal:

Bentonite Chips

Grout:

Portland

Elevation:

Detector:

Mini Race PID

Gravel Pack:

Colorado Silica #10-20

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fgyng, clayey, brown	
					4				gray stained	
					6					
					8					
					10					
					12			sm	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-29

Project:

Noble Building

Date:

11-7-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

Mini Rec PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Buton'h Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1" 2 1/2"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1" 2 1/2"

Length:

18" 3"

Total Depth:

16'

Depth to Water:

?

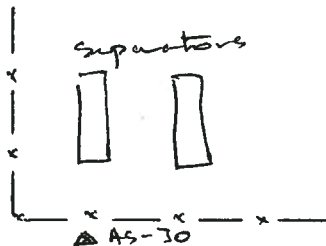
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown	
					4				gray-black staining	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: AS-30	Project: Noble Beauty
Date: 11-5-08	Project Number: NEP0826
Logged By: James F.	Drilled By: Gabe (Dakota)

Elevation: _____	Detector: Mini-Ram PID	Drilling Method: Bahonik Chiping	Sampling Method: Cuttings
---------------------	---------------------------	-------------------------------------	------------------------------

Gravel Pack: Colorado Silica #10-20	Seal: HSA	Grout: Portland
--	--------------	--------------------

Casing Type: Sch 40 PVC	Diameter: 1"	Length: 16.5'	Hole Diameter: 8"	Depth to Liquid: _____
----------------------------	-----------------	------------------	----------------------	---------------------------

Screen Type: Sch. 40 PVC	Slot: 0.02"	Diameter: 1"	Length: 18"	Total Depth: 16'	Depth to Water: 7'
-----------------------------	----------------	-----------------	----------------	---------------------	-----------------------

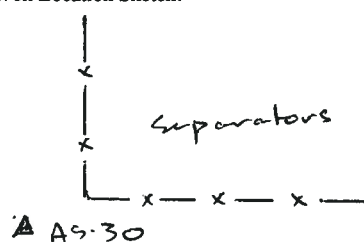
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown	
					4					
					6				gray stained	
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

A9-31

Project:

Noble Beckey

Date:

11-7-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

Mini-Rae PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Butonite Chips

Grout:

Portland

Casing Type:

Sch 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown.	
					4				gray clayey	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-232

Project:

Noble Beauty

Date:

11-4-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRae PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Batonite Chips

Grout:

Portland

Casing Type:

Sch 40 PVC

Diameter:

1"

Length:

18"

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch 40 PVC

Slot:

0.01"

Diameter:

1"

Length:

18"

Total Depth:

16'

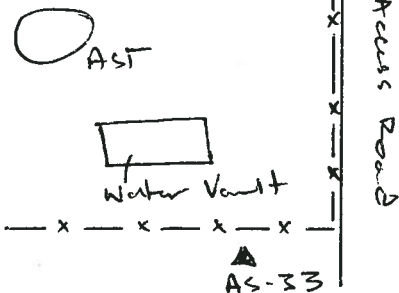
Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
	Moist		N		2			SC	Sand, fg-mg, clayey, brown, moist	
			Y		4				gray chaining 4' down	
		762			6					
					8					
	Wet ?				10				wet @ ~9' (?)	
			N		12			sm	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: AS-33	Project: Noble Bucky
Date: 11-2-08	Project Number: NEP0826
Logged By: James F.	Drilled By: Gabe (Dakota)

Elevation: _____	Detector: MiniRae PID	Drilling Method: HSA	Sampling Method: Cuttings
---------------------	--------------------------	-------------------------	------------------------------

Gravel Pack: Colorado Silica #10-20	Seal: Bentonite Chips	Grout: Portland
--	--------------------------	--------------------

Casing Type: Sch. 40 PVC	Diameter: 1"	Length: 16.5'	Hole Diameter: 8"	Depth to Liquid: _____
-----------------------------	-----------------	------------------	----------------------	---------------------------

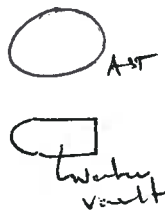
Screen Type: Sch. 40 PVC	Slot: 0.02"	Diameter: 1"	Length: 18"	Total Depth: 16'	Depth to Water: ?
-----------------------------	----------------	-----------------	----------------	---------------------	----------------------

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown	
					4				- gray stained	
		187			6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-34

Project:

Noble Bucky

Date:

11-6-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

HSA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRam PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

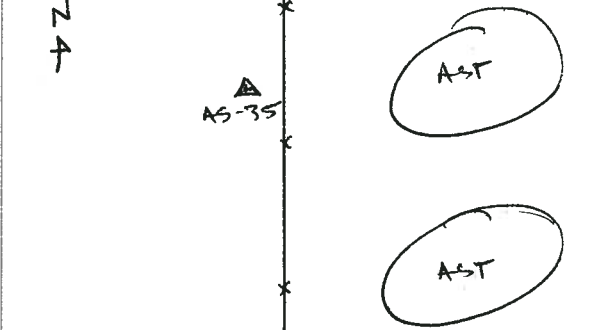
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown	
					4				gray stained @ 4'	
					6					
					8					
					10					
					12			SM	Assumed - no cuttings	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-35

Project:

Noble Bucky

Date:

11-6-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

MiniRae PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fg-mg, clayey, brown.	
					4				- gray staining	
		170			6					
					8					
					10					
					12			SM	Assumed - drill bit a difference.	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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Main Road



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LT Environmental, Inc.

4600 W. 60th Avenue

Arvada, Colorado 80003

## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-36

Project:

Noble Bucky

Date:

11-6-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

MiniRae AD

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fgy, clayey, brown.	
					4				-gray-black staining	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

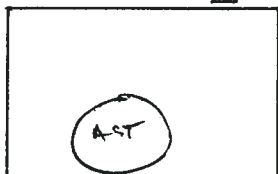
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Arvada, Colorado 80003

## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-37

Project:

Noble Bucky

Date:

11-6-08

Project Number:

NFP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

Mini-Ram P/D

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silicon #10-20

Seal:

Bentonite Shells

Grout:

Portland

Casing Type:

Sch 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, Fg-mg, clayey, brown.	
					4				gray stained	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
					30					
					32					
					34					
					36					
					38					

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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-38

Project:

Noble Bucky

Date:

10-6-08

Project Number:

NEP0826

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Drilling Method:

USA

Sampling Method:

Cuttings

Elevation:

Detector:

MiniRoc PID

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

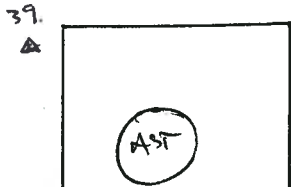
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand; fg-mg, clayey, brown. black-stained @ 2'.	
		157			4					
		148			6					
					8					
					10					
					12			SM		
					14					
					16					
					18					
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## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:

AS-39

Project:

Noble Building

Date:

11-6-08

Project Number:

NEP08216

Logged By:

James F.

Drilled By:

Gabe (Dakota)

Elevation:

Detector:

MiniRae PID

Drilling Method:

HSA

Sampling Method:

Cuttings

Gravel Pack:

Colorado Silica #10-20

Seal:

Bentonite Chips

Grout:

Portland

Casing Type:

Sch. 40 PVC

Diameter:

1"

Length:

16.5'

Hole Diameter:

8"

Depth to Liquid:

Screen Type:

Sch. 40 PVC

Slot:

0.02"

Diameter:

1"

Length:

18"

Total Depth:

16'

Depth to Water:

?

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Diagram
					2			SC	Sand, fq-mg, clayey, brown.	
					4				gray stained	
					6					
					8					
					10					
					12			SM	Assumed	
					14					
					16					
					18					
					20					
					22					
					24					
					26					
					28					
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					32					
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