



Environmental Technologies, Inc.

2060 W. Littleton Boulevard ★ Littleton, Colorado 80120 ★ 303-795-2500 ★ Fax 303-795-7746

Mr. Rick Eggleston - Senior Advisor, TLM
Petro-Canada Resources (USA), Inc.
999 18th Street, Suite 600
Denver, Colorado 80202

GROUND WATER ASSESSMENT REPORT
PETRO-CANADA RESOURCES (USA) INC. - QUICK #21-13 WELL SITE
TOWNSHIP 5 NORTH, RANGE 65 WEST, SECTION 21
WELD COUNTY, COLORADO

Western Project #08127

January 5, 2009

Dear Mr. Eggleston:

Western Environmental Technologies, Inc. (Western) managed the cleanup of an accidental spill at the subject site. The site area is located in a wooded area surrounded by undeveloped land. The site includes a producing oil and gas well, gathering lines, separator equipment and a tank battery which are operated and maintained by Petro-Canada Resources (USA) Inc. (PCR). The site is located approximately 0.6 miles east of the City of Greeley, Colorado, south of Highway 34.

A possible release of produced water was discovered by field crews working on the location. The crews were upgrading the production site with new equipment and environmental protection devices. A corroded pipe was observed within a buried steel flow line. The produced water leaked through the flow line and was visible in soil near the source. The suspected release of produced water was discovered on November 13, 2008 by field personnel.

PCR personnel immediately shut down production at the location and began a soil cleanup. Excavating near site production equipment indicated that an unknown volume of produced water did leak from a broken flow line. Soil removals began on November 14, 2008 and were completed on November 19, 2008. The final size of the soil cleanup excavation was measured to be 70x75x4 feet. A total of 777 cubic yards of petroleum soil was removed and disposed at a permitted treatment facility.

GROUND WATER SAMPLING AND TESTING

PCR wished to determine the vertical and horizontal extent of the produced water in soil and ground water at the location. Western performed soil testing and ground water testing to document the progress of the soil cleanup and also to determine the quality of ground water underlying the spill area during and after cleanup activities.

During the site cleanup, Western personnel obtained a sample of ground water from within the soil removal excavation. Ground water is approximately three feet below the surface of the site. The laboratory testing documented that ground water had been impacted from the release of produced water. Ground water sample REGW was documented by testing to contain 31 ppb Benzene, 209 ppb Toluene, 2,290 ppb Xylenes and 20.4 ppm TRPH compounds.

Western then drilled test seven soil borings and installed temporary piezometer wells to further define the extent of the release in subsurface soil and within area ground water. Site Services, Inc. located in Golden, Colorado performed the drilling. A truck mounted GeoProbe drill rig was used to drill borings and obtain test cores from areas adjacent to the spill area. The temporary piezometer wells were completed as 1" diameter wells. The seven temporary wells were sampled on November 18, 2008. One of the temporary wells tested to have Benzene concentrations above COGCC limits.

PCR wished to then install permanent ground water monitoring wells. Western mobilized a CME 75 auger drill rig to the location. A total of six test borings were drilled into the water table. Soil cores were recovered and examined. The soil near the release area was described as coarse sand and gravel.

Each soil core obtained while drilling was tested in the field using a calibrated Photoionization detector. Trace volatile organics were detected in some of the soil core samples. No oil staining was present. Each boring was completed as a permanent 2" diameter monitor well. A steel well protector was installed on each permanent well. Wells were located in all directions around the soil cleanup area. Monitor Well #4 was installed furthest downgradient from the site.

The new monitoring wells were then developed, purged and sampled. Sampling of the permanent monitor wells was first performed on December 12, 2008. Each ground water sample was analyzed for BTEX compounds. Each ground water sample was obtained using laboratory chain-of-custody documentation. Ground water samples were placed into 40 ml VOA vials and immediately labelled. Ground water samples were submitted to Technology Laboratory, Inc. located in Fort Collins, Colorado for testing.

Ground water samples were prepared and tested for BTEX compounds using EPA Method #8260B. All samples were tested well within their allowable holding times. There were no laboratory QA/QC analytical issues. There were some Xylene compounds documented in ground water samples obtained during this event. However, the trace Xylene compounds are well below allowable COGCC ground water quality limits.

King Surveyors, Inc. of Windsor, Colorado completed elevation surveys of the monitor wells located at the site. USGS elevations were determined for certain reference points on each well. Prior to testing the wells, Western personnel completed water elevation surveys within the wells. An electronic level measured the distance to the ground water. A ground water elevation contour map has been prepared for each testing event. Ground water flows to the southeast near the spill cleanup area.

REMEDIATION AND ENVIRONMENTAL ASSESSMENT SUMMARY

Site sampling and testing of soil was performed during and after a cleanup of this site. Three of four excavation soil samples did not contain any TRPH compounds after the cleanup project. One soil sample from the south end of the excavation contained 20.4 mg/Kg (ppm) TRPH compounds. The soil removals had achieved cleanup limits for a Sensitive Area site.

Ground water in the vicinity of the spill area and downgradient of the site was initially impacted above COGCC quality limits for a Sensitive Area site, during initial permanent monitor well testing performed on December 12, 2008. Ground water from permanent monitor well MW6 contained 16 µg/L (ppb) of Benzene. An additional quarterly ground water testing event was also completed on February 19, 2009.

The ground water samples obtained from the second testing event were within limits for a Sensitive Area site when last tested. Ground water samples from the February 19, 2009 testing event contained no BTEX compounds. The water table underlying the location dropped 0.33 feet in elevation since the last ground water elevation survey on December 16, 2008.

During soil cleanups, a total of 777 cubic yards of petroleum contaminated soil were removed and disposed. To expedite cleanup of the location, PCR also pumped large quantities of ground water from the soil removal excavation. Removal of ground water continued until the water within the excavation appeared clean. A total of 1,920 barrels of ground water were also removed and disposed off-site.

Clean soil was imported to the site and used to backfill the soil removal excavation. New flow lines have been installed and the tank battery upgraded with new equipment. The PCR Quick #21-13 well has been put back into production. The removal of the large volumes of petroleum soil and ground water have restored the environmental quality of both soil and ground water on the site to COGCC limits for a Sensitive Area site.

The ground water underlying the spill area is now within applicable standards for BTEX compounds. PCR will continue to test the permanent wells installed at this location for a period of one year, on a quarterly basis. Upon one year of testing within quality standards, PCR will request closure of the site.

Please contact us with any questions which you may have.

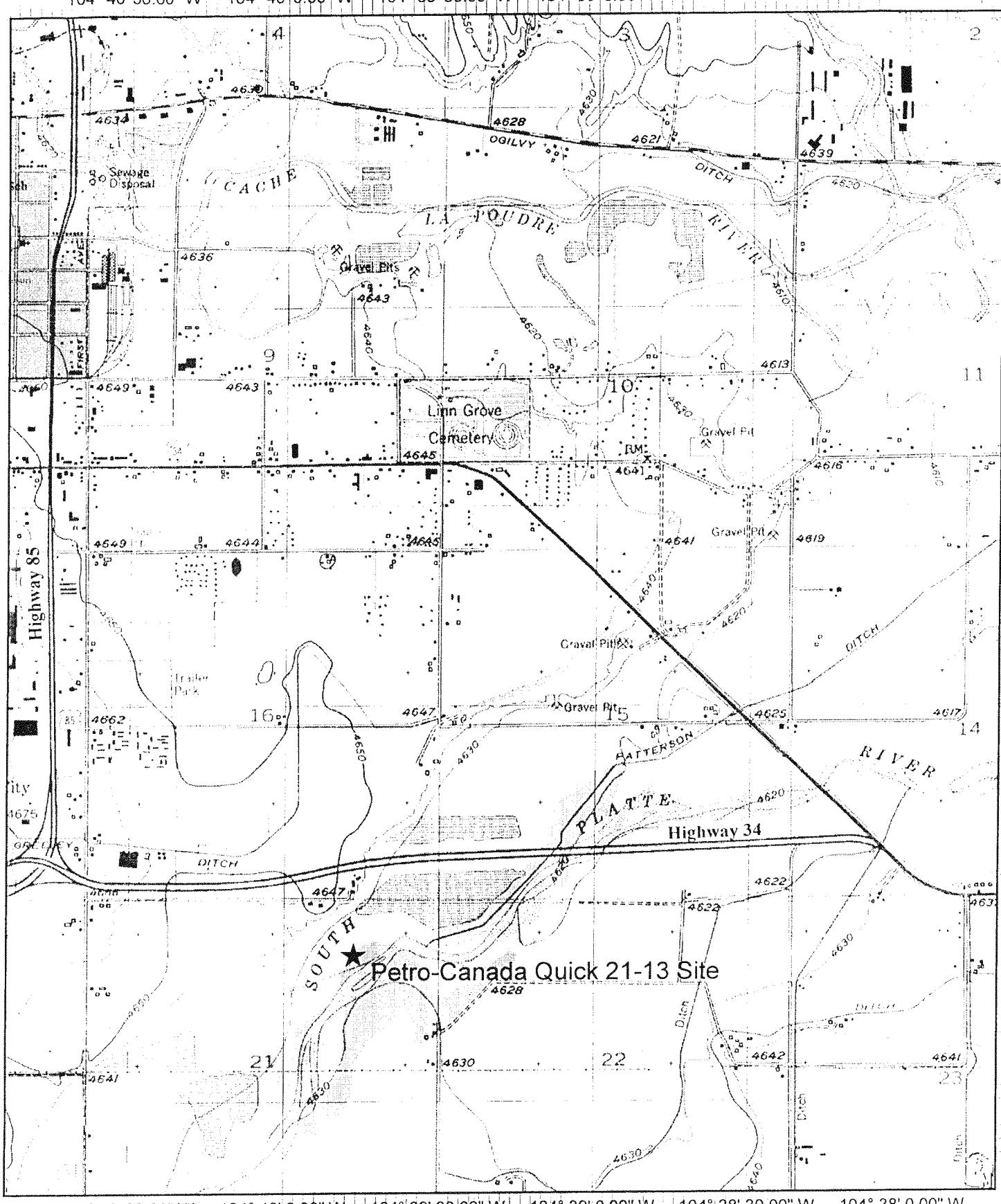
Sincerely,



Mark H. Bailey, CHMM, PG, REP - Senior Environmental Scientist
Western Environmental Technologies, Inc.

xc: Mr. John Axelson - Colorado Oil & Gas Conservation Commission

Attachments:	Site Location and Area Topographic Map	(1 page)
	Sample Location and Site Features Map	(1 page)
	Piezometer Well Location Map	(1 page)
	Monitor Well Location Map	(1 page)
	Ground Water Elevation Contour Map - December, 2008	(1 page)
	Ground Water Elevation Contour Map - February, 2009	(1 page)
	King Surveyors, Inc. Elevation Survey Map	(1 page)
	Ground Water Test Summary Tables One & Two	(1 page)
	Technology Laboratory Data Reports	(12 pages)



104° 40' 30.00" W | 104° 40' 0.00" W | 104° 39' 30.00" W | 104° 39' 0.00" W | 104° 38' 30.00" W | 104° 38' 0.00" W

<Default> - 1 Markers, Length = 0 feet

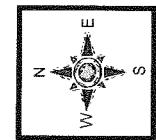
Petro-Canada Quick 21-13 Site - 040° 23' 21.3" N, 104° 39' 46.3" W

**SITE LOCATION AND AREA TOPOGRAPHIC MAP
PETRO-CANADA RESOURCES - QUICK #21-13 SITE
T5N - R65W-SECTION 21, WELD COUNTY, COLORADO
Western Project #08127**

Map Scale 1"=2,000 feet

Copyright (C) 1997, Maptech, Inc.

Farm Fields



SAMPLE LOCATION AND SITE FEATURES MAP	
Petro Canada Resources (USA), Inc.	
Quick 21-13 Site	
T5N, R65W, Sec 21	
Weld County, Colorado	
Project No. 08-27	Prepared By CCC
Date 11/29/08	Reviewed By MHB

813n\location\petroquick2.cdr

Map Scale
1 = 50 ft.

Quick 21-13
Well Head
REW-4
REGW
REE-4
Soil Removal
Excavation
Meter
House
Pipe
Leak
REW-3
RES-3

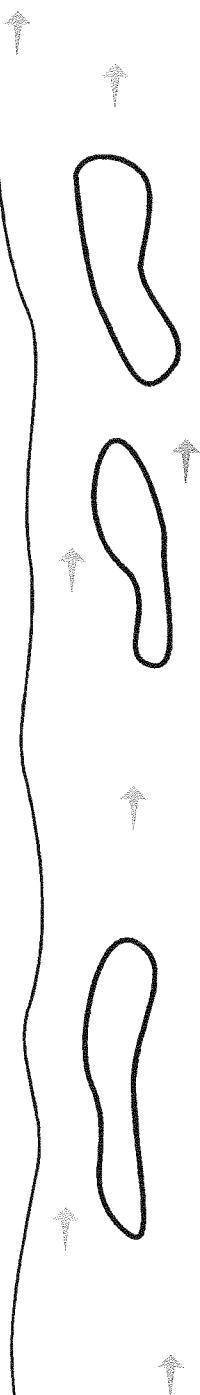
Earthen Berm
Oil Tank
Wooded Area

Access Road (Gravel)

Wooded Area

South Platte River

P21C



Farm Fields

PIEZOMETER WELL LOCATIONS AND SITE FEATURES MAP			
Petro Canada Resources (USA), Inc.			
Quick 21-13 Site			
T5N, R65W, Sec 21			
Weld County, Colorado			
Project No.	Prepared By	Reviewed By	WHS/HRN
08127	CCC	MHB	
Date	11/24/08		
B:\9\location\petro\quick1.cdr			

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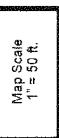
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Farm Fields



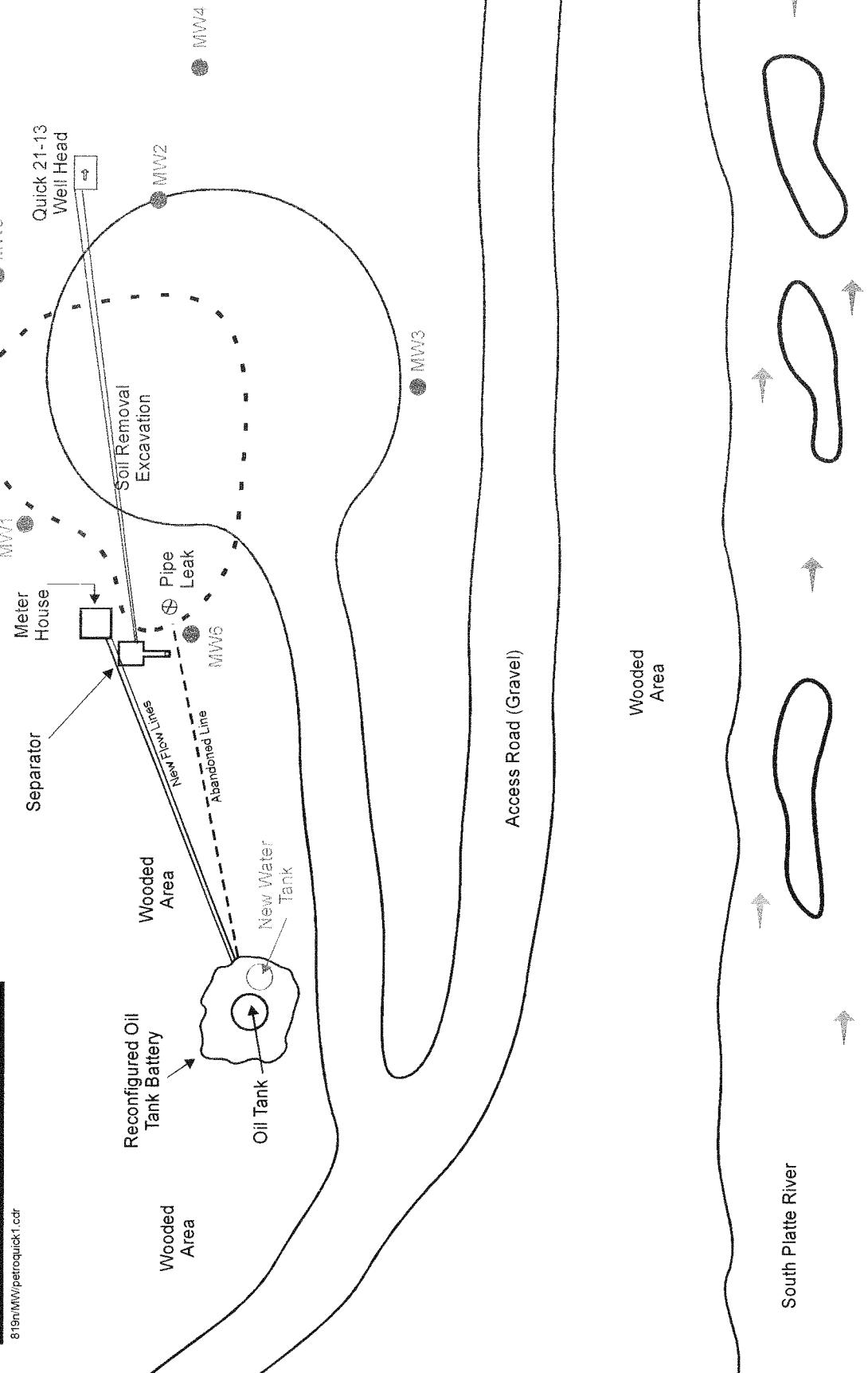
MONITOR WELL LOCATIONS
AND SITE FEATURES MAP
Petro Canada Resources (USA), Inc.

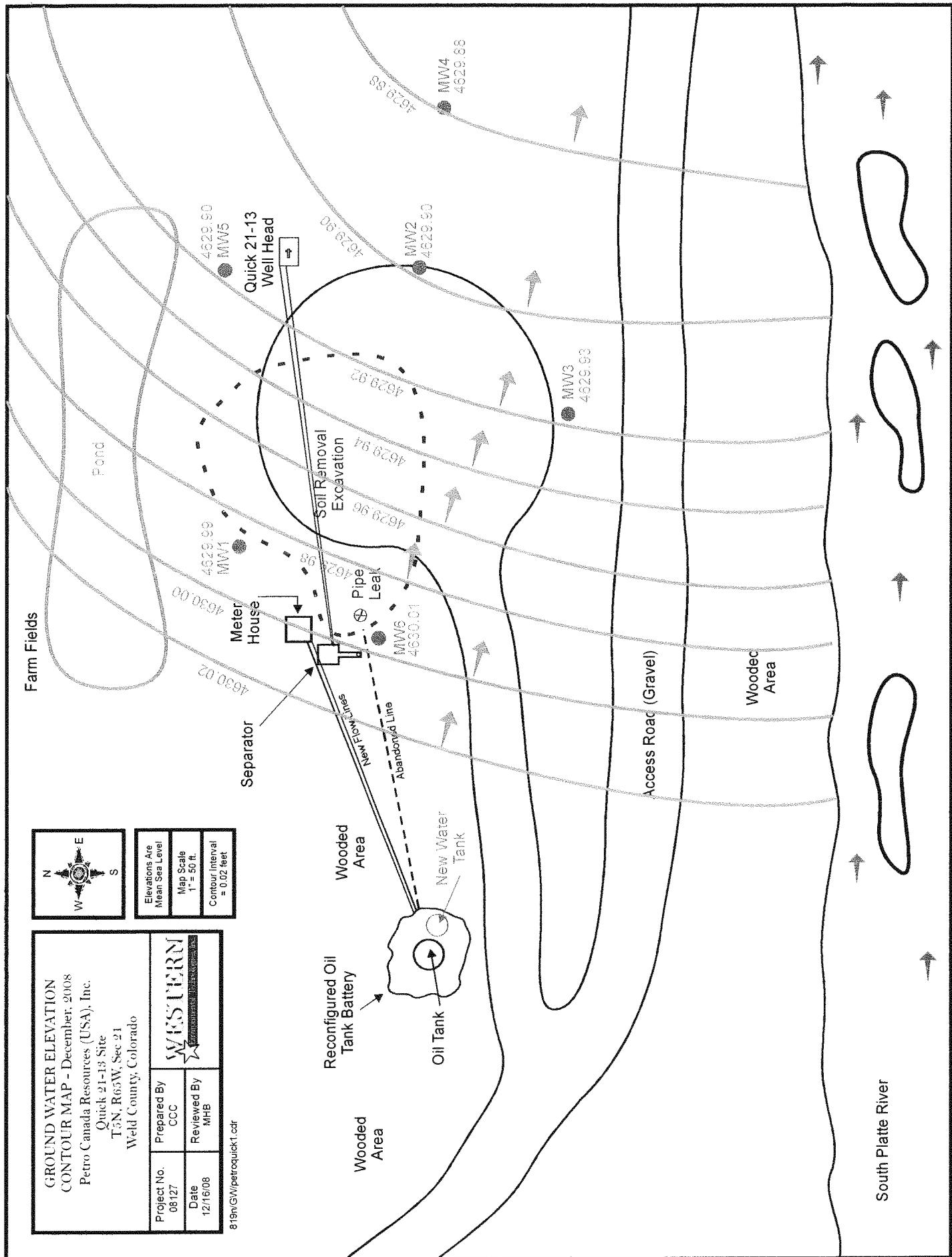
Quick 21-13 Site

T5N, R6E, Sec 21
Weld County, Colorado

Project No.	Prepared By	Reviewed By
08-127	CCC	MHB

819n1MW/petroquick1.cdr





Project No.		Prepared By	Reviewed By
08127	CCC	MHB	
Date	02/16/08		
815nGw/petroquick2.cdr			



Elevations Are Mean Sea Level
Map Scale 1 = 50 ft.
Contour Interval = 0.10 feet

Farm Fields

Pond

4629.68
MW5

Quick 21-13
Well Head

Separator

Meter
House

Reconfigured Oil
Tank Battery

Wooded
Area

Wooded
Area

New Water
Tank

Oil Tank

New Flow Lines

Abandoned Line

MW6

4629.81

MW6

TABLE ONE - DECEMBER, 2008
EXCAVATION AND PIEZOMETER WELL GROUND WATER TEST RESULTS TABLE
PETRO-CANADA RESOURCES (USA) QUICK 21-13 SITE, T5N-R65W-SEC 21

WELD COUNTY, COLORADO

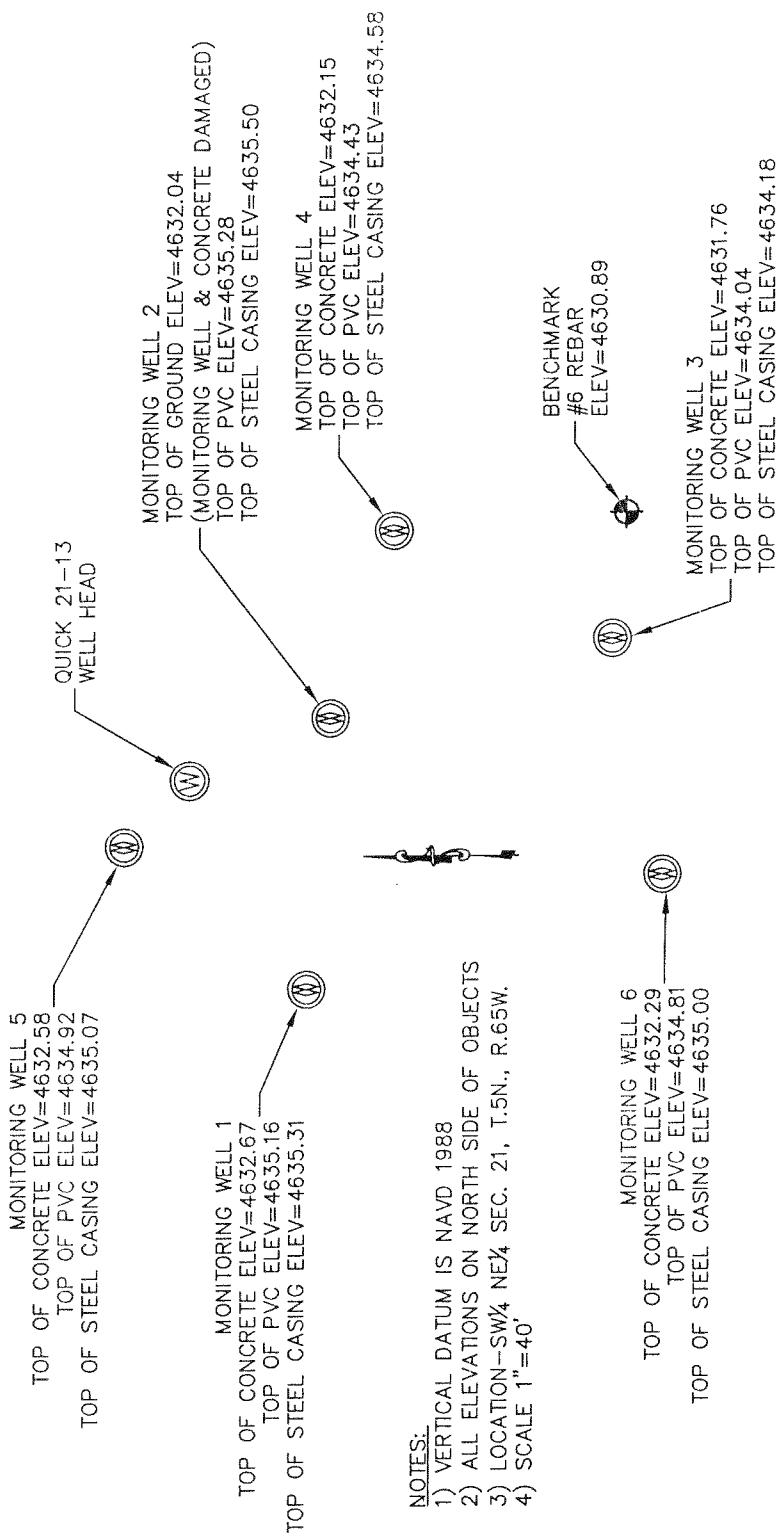
Sample Number	Sample Date	Benzene in $\mu\text{g}/\text{Kg}$	Toluene in $\mu\text{g}/\text{Kg}$	Ethylbenzene in $\mu\text{g}/\text{Kg}$	Xylenes in $\mu\text{g}/\text{Kg}$
REGW	11/24/08	31	209	ND	2,290
MW1-GW	11/18/08	ND*	ND	ND	ND
MW2-GW	11/18/08	ND	ND	ND	ND
MW3-GW	11/18/08	ND	ND	ND	ND
MW4-GW	11/18/08	2	ND	ND	ND
MW5-GW	11/18/08	ND	ND	ND	ND
MW6-GW	11/18/08	16	ND	ND	ND
MW7-GW	11/18/08	ND	ND	ND	ND

ND* = Compound analyzed for in ground water sample, but not detected.

TABLE TWO - DECEMBER, 2008 THROUGH FEBRUARY, 2009
PERMANENT MONITOR WELL GROUND WATER TEST RESULTS TABLE
PETRO-CANADA RESOURCES (USA) QUICK 21-13 SITE, T5N-R65W-SEC 21

WELD COUNTY, COLORADO

Sample Number	Sample Date	Benzene in $\mu\text{g}/\text{L}$	Toluene in $\mu\text{g}/\text{L}$	Ethylbenzene in $\mu\text{g}/\text{L}$	Xylenes in $\mu\text{g}/\text{L}$
MW1-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	1.0 ND
MW2-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	ND ND
MW3-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	2.0 ND
MW4-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	1.0 ND
MW5-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	ND ND
MW6-GW	12/12/08 2/19/09	ND ND	ND ND	ND ND	17.0 ND





TECHNOLOGY LABORATORY, INC.

**1012 CENTRE AVENUE
FORT COLLINS, CO 80524
Phone: (970) 490-1414 Fax: (970) 4
www.techlabusa.com sales@techlabusa.com**

W.O. NUMBER

CHAIN-OF-CUSTODY REPORT



TECHNOLOGY LABORATORY, INC.
CENTRE PROFESSIONAL PARK

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

CERTIFICATE OF ANALYSIS

Date Received 11/19/08
Matrix: Water
Project No.: 08127

<u>Lab ID</u>	<u>Sample ID</u>	<u>Date Sampled</u>	<u>Date Analyzed</u>	<u>Benzene</u> <u>mg/L</u>	<u>Toluene</u> <u>mg/L</u>	<u>Ethylbenzene</u> <u>mg/L</u>	<u>Total Xylenes</u> <u>mg/L</u>
7351-01	MW-1-GW	11/18/08	11/19/08	< 0.001	< 0.001	< 0.001	< 0.001
7351-02	MW-2-GW	11/18/08	11/19/08	< 0.001	< 0.001	< 0.001	< 0.001
7351-03	MW-3-GW	11/18/08	11/19/08	< 0.001	< 0.001	< 0.001	< 0.001
7351-04	MW-4-GW	11/18/08	11/19/08	0.002	< 0.001	< 0.001	< 0.001
7351-05	MW-5-GW	11/18/08	11/19/08	< 0.001	< 0.001	< 0.001	< 0.001
7351-06	MW-6-GW	11/18/08	11/19/08	0.016	< 0.001	< 0.001	< 0.001
7351-07	MW-7-GW	11/18/08	11/19/08	< 0.001	< 0.001	< 0.001	< 0.001

BTEX Method:

EPA-8260B

TECHNOLOGY LABORATORY, INC.**CENTRE PROFESSIONAL PARK**

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

CERTIFICATE OF ANALYSIS

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

QA/QC SURROGATE RECOVERY

Date Received: 11/19/08

Matrix: Water

Project No.: 08127

(% Recovery)

Lab ID	Sample ID	Bromo Fluorobenzene Limits {70-113%}	Dibromo Fluoromethane Limits {68-120%}	Toluene-d8 Limits {81-128%}
7351-01	MW-1-GW	85	98	99
7351-02	MW-2-GW	81	100	97
7351-03	MW-3-GW	83	97	97
7351-04	MW-4-GW	85	97	99
7351-05	MW-5-GW	85	99	99
7351-06	MW-6-GW	85	100	99
7351-07	MW-7-GW	87	98	100



TECHNOLOGY LABORATORY, INC.

CENTRE PROFESSIONAL PARK

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

CERTIFICATE OF ANALYSIS

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

Sampled: 11/24/08

Received: 11/25/08

Sample ID: REGW

Project No.: 08127

Laboratory ID 7377-01

Matrix: Water

<u>CAS Number</u>	<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Date Analyzed</u>
71-43-2	Benzene	0.031	mg/L	EPA-8260B	12/01/08
108-88-3	Toluene	0.209	mg/L	EPA-8260B	12/01/08
100-41-4	Ethylbenzene	< 0.001	mg/L	EPA-8260B	12/01/08
1330-20-7	Total Xylenes	2.29	mg/L	EPA-8260B	12/01/08

QA/QC SURROGATE RECOVERIES

<u>Compound</u>	<u>% Recovery</u>	<u>% Rec. Limits</u>
Dibromofluoromethane	97	68-120
Toluene-d8	102	81-128
Bromofluorobenzene	87	70-113



TECHNOLOGY LABORATORY, INC.

CENTRE PROFESSIONAL PARK

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

CERTIFICATE OF ANALYSIS

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

Date Received: 11/25/08
Matrix: Soil
Project No.: 08127

<u>Lab ID</u>	<u>Sample ID</u>	<u>Date Sampled</u>	<u>Date Analyzed</u>	<u>TRPH mg/Kg</u>
7377-02	RES-3'	11/24/08	12/03/08	20.4
7377-03	REE-4'	11/24/08	12/03/08	< 5.0
7377-04	REW-3'	11/24/08	12/03/08	< 5.0
7377-05	REN-4'	11/24/08	12/03/08	< 5.0

TRPH Method:

EPA-418.1



TECHNOLOGY LABORATORY, INC.
CENTRE PROFESSIONAL PARK
10112 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

CERTIFICATE OF ANALYSIS

Date Received: 12/15/08

Matrix: Water

Project No.: 08127

Lab ID	Sample ID	Date Sampled	Date Analyzed	Benzene <u>mg/L</u>	Toluene <u>mg/L</u>	Ethylbenzene <u>mg/L</u>	Total Xylenes <u>mg/L</u>
7499-01	MW1	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	0.001
7499-02	MW2	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	< 0.001
7499-03	MW3	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	0.002
7499-04	MW4	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	0.001
7499-05	MW5	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	< 0.001
7499-06	MW6	12/12/08	12/16/08	< 0.001	< 0.001	< 0.001	0.017

BTEX Method:

EPA-8260B



TECHNOLOGY LABORATORY, INC.
CENTRE PROFESSIONAL PARK

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

CERTIFICATE OF ANALYSIS

QA/QC SURROGATE RECOVERY

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

Date Received: 12/15/08
Matrix: Water
Project No.: 08127

(% Recovery)

Lab ID	Sample ID	Bromofluorobenzene Limits (70-113%)	Dibromofluoromethane Limits (68-120%)	Toluene-d8 Limits (81-128%)
7499-01	MW1	98	95	94
7499-02	MW2	98	96	94
7499-03	MW3	98	96	95
7499-04	MW4	98	98	95
7499-05	MW5	96	93	95
7499-06	MW6	96	96	94

Petro/Durcik

TECHNOLOGY LABORATORY, INC.
CENTRE PROFESSIONAL PARK

1012 Centre Avenue
 Fort Collins, Colorado 80526
 (970) 490-1414

CERTIFICATE OF ANALYSIS

Western Environmental Technologies, Inc.
 2050 West Littleton Blvd
 Littleton, CO 80120

Date Received: 02/23/09
 Matrix: Water
 Project No.: 08127

<u>Lab ID</u>	<u>Sample ID</u>	<u>Date Sampled</u>	<u>Date Analyzed</u>	<u>Benzene</u> <u>mg/L</u>	<u>Toluene</u> <u>mg/L</u>	<u>Ethylbenzene</u> <u>mg/L</u>	<u>Total Xylenes</u> <u>mg/L</u>
7838-01	MW1	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001
7838-02	MW2	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001
7838-03	MW3	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001
7838-04	MW4	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001
7838-05	MW5	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001
7838-06	MW6	02/19/09	02/23/09	< 0.001	< 0.001	< 0.001	< 0.001

EPA-8260B

BTEX Method:

TECHNOLOGY LABORATORY, INC.

CENTRE PROFESSIONAL PARK

1012 Centre Avenue
Fort Collins, Colorado 80526
(970) 490-1414

CERTIFICATE OF ANALYSIS

QA/QC SURROGATE RECOVERY

Western Environmental Technologies, Inc.
2060 West Littleton Blvd
Littleton, CO 80120

Date Received 02/23/09
Matrix: Water
Project No.: 08127

(% Recovery)

Lab ID	Sample ID	Bromoform	Dibromoformmethane	Toluene-d8
		Limits (70-113%)	Limits (68-120%)	Limits (81-128%)
7838-01	MW1	100	110	97
7838-02	MW2	100	110	95
7838-03	MW3	100	114	96
7838-04	MW4	98	111	97
7838-05	MW5	98	112	95
7838-06	MW6	100	115	96

Bill Lauer