

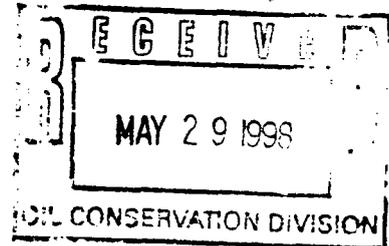
BURLINGTON RESOURCES

SAN JUAN DIVISION

May 28, 1998

Certified: P 103 693 121

Bill Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505



**RE: Hampton 4M - Groundwater Contamination
Unit Letter N, Section 13, Township 30N, Range 11W**

Dear Mr. Olson:

As requested in your April 7, 1998 letter, the following is a status report on the soil/groundwater investigation and remediation activities that have been conducted at the Hampton 4M gas production location. This report addresses the activity by Burlington Resources Oil and Gas Company (BR) near our area of operations. Details on earlier investigation work were submitted to you on July 30, 1997 and January 30, 1998, and will not be repeated in this report. A site diagram showing the location of the discussed monitoring wells and soil excavation is included in Attachment #1.

Additional Monitor Well Installation

As required in your April 7 letter, BR installed additional monitor wells near the locations of the former temporary boreholes TPW-1 and TPW-2. On May 11, 1998, Philip Services Corporation drilled and completed both monitor wells (identified as MW-9 and MW-10). The geologic logs and well completion diagrams for these wells are included in Attachment #2.

Monitoring Well Sampling

Since the last report on January 30, 1998, the monitor wells have been sampled twice, first on April 14, 1998 and again on May 12, 1998. The details of the sample results, along with earlier sample results, are shown in Table 1. Due to MW-3 showing "non-detect" for BTEX components over the last five sampling events, it was not sampled during the last sampling event.

**Table 1
Groundwater Sampling Summary
BTEX (ppb)**

	MW-1	MW-3	MW-4	MW-8	MW-9	MW-10
1/31/97		ND	2651.3			
5/1/97		ND	3477.0			
10/30/97	5.8	ND				
1/12/98	8.8	ND	1362.0	33,801		
4/14/98	2.3	ND	1147.2	0.37 ft		
5/12/98	ND	Not sampled	1024.8	0.29 ft	10.5	1.41 ft

NOTE: The shaded areas indicate the thickness of free phase hydrocarbons.

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The well development details and analytical results of the May 12 sampling event are included in Attachment #3. PNM collected the April 14 samples and BR does not have copies of the laboratory reports. In addition to the BTEX components, the water was also analyzed for New Mexico Water Quality Control Commission (WQCC) metals and cations and anions pursuant to your April 7 letter.

PNM had all the monitoring wells surveyed for location and groundwater elevation on January 12, 1998. The direction and magnitude of the hydraulic gradient, using this data, is shown in Attachment #4. The map, which was provided to BR from PNM, also details the analytical results of the sampling events up through April 14, 1998. The most recent monitor wells (MW-9 and MW-10) have not been surveyed for location or elevation yet and are not included on this groundwater contour map.

Ongoing Remediation/Investigation

The excavation created during BR's source removal work in December 1997 remains open to allow air to contact the groundwater. This should continue the improvement of the quality of groundwater. PNM sampled the water from this excavation in February 1998 and total BTEX was 4920 ppb. No further sampling has taken place.

In addition to the source removal work that BR performed in the southeast corner of the location, BR has tested both our well bore and the underground flowline from the well to our separation equipment for mechanical integrity. Both tests showed we have mechanical integrity with no indication of leakage.

Conclusions

The water quality of the upgradient well (MW#1) indicates the likelihood that groundwater contamination is not coming from an off site source. The quality of the water from the monitoring well, located approximately 50 feet south of the location, has been tested four times and is within water quality standards.

The groundwater in MW-3 and the recently installed MW-9 has shown to be below regulatory limits. This indicates that the potential plume is relatively narrow and does not travel to the west. The fact that water was not encountered in TPW-3 indicates that the potential plume does not leave location to the east.

The BTEX level in MW-4, located near BR's excavation, continues to drop. Since the last sample prior to our source removal work, the BTEX level in MW-4 has dropped over 70 percent (from 3477.0 ppb to 1024.8 ppb). The BTEX level dropped a little over 10 percent in less than a month between the last two sampling events. It appears that the source removal in the southeast portion of the location is having a positive impact on groundwater.

Less than five inches of free phase hydrocarbons were detected in MW-8 during the April (4.44") and May (3.48") sampling events. BR anticipates the level of free phase will continue to decrease and the groundwater will clean up over time due to the source removal work.

The recently installed MW-10, located near PNM's operations, had 1.41 feet of free phase hydrocarbons on May 12, 1998. Attachment #5 shows an approximate cross section from MW-4 to PNM's MW-2 (including MW-8 and MW-10). The cross section shows that the elevation of the hydrocarbons in MW-10

is less than the level in PNM's MW-2. The progressively increased thickness of "free product" towards PNM's operations implicates at a minimum either an active source of free phase hydrocarbons or unresolved soil contamination. Depending on the source of this hydrocarbon, it can clearly migrate in a contrary direction to groundwater flow until it reaches a static level. Based upon the close proximity to PNM's equipment and that the free phase hydrocarbons are at a lower elevation, BR feels the contamination present in MW-10 is directly related to the contamination under and around PNM's operations.

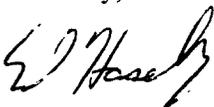
Plan of Action

Given the continued improvement shown in MW-4, BR's plans are to continue to leave the source removal excavation open for a period of time while we monitor the contaminant levels in the monitor wells.

As the downward trend of contaminant levels continues to progress in the wells near Burlington's source removal area, the excavation will be backfilled with clean soils. A monitoring well will then be installed in the source area. Water quality from the source well and the other monitor wells will be tested periodically to show improvement in water quality.

The Hampton 4M location continues to require monitoring and potentially further remediation. BR's source removal in the southeast corner of the location should continue to have a positive impact on the situation. If you have questions or additional information is needed, please contact me at (505) 326-9841.

Sincerely,



Ed Hasely
Sr. Staff Environmental Representative

Enclosures: Attachment #1: Hampton 4M Site Diagram
Attachment #2: Geologic Logs and Well Completion Diagrams
Attachment #3: Well Development Laboratory Results
Attachment #4: Groundwater Contour Map
Attachment #5: Cross Section from MW-4 to MW-2

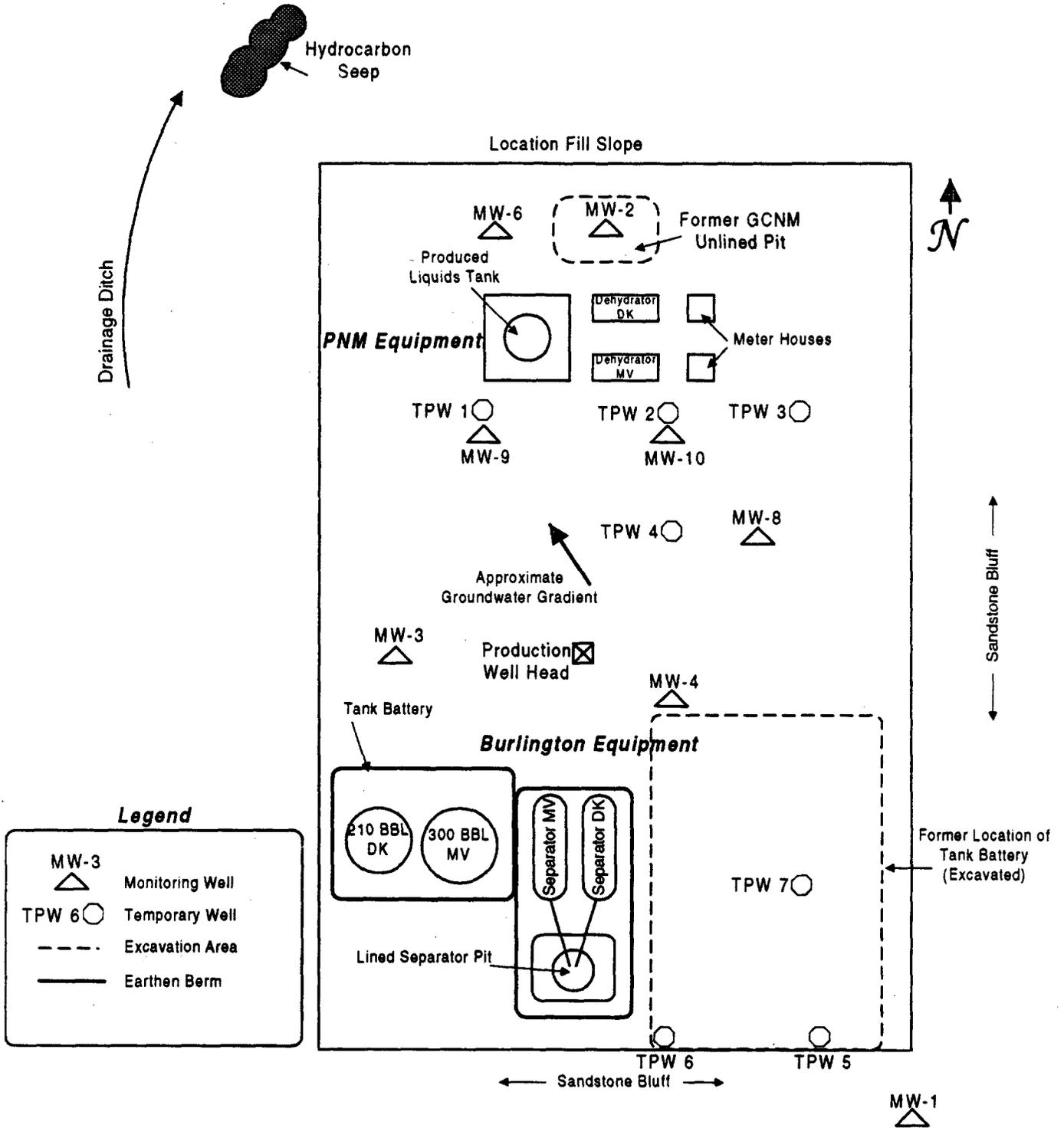
cc: Denny Foust - NMOCD Aztec
Johnny Ellis - BR
Ken Raybon - BR
Bruce Gantner - BR
John Bemis - BR
Denver Bearden - PNM Farmington
Maurene Gannon - PNM Albuquerque
Hampton 4M File

ATTACHMENT #1

SITE DIAGRAM

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Hampton 4M Site Diagram



Legend

- MW-3 Monitoring Well
- TPW 6 Temporary Well
- - - - - Excavation Area
- — — — — Earthen Berm

001465

ATTACHMENT #2

GEOLOGIC LOGS
AND
WELL COMPLETION DIAGRAMS

RECORD OF SUBSURFACE EXPLORATION

PHILIP SERVICES CORP.

4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # BH-1-511
Well # MW9
Page 1 of

Project Number 19584 Phase 6000.77
Project Name Burlington Resources Hampton 4M
Project Location Hampton 4M

Elevation _____
Borehole Location LTR: S: T: R: S. of Production Pit
GWL Depth 22.7' BGS
Drilled By K. PADILLA
Well Logged By C. CHANCE
Date Started 5/11/98
Date Completed 5/11/98

Drilling Method 4 1/4 ID HSA
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	SLGS	
0										
5	1	5-7	24	Lt Br clayey SAND, F-med sand, tr coarse, loose, dry			0	0	0	0905hr
10	2	10-12	18	Lt Br silty SAND, med-coarse sand, loose, dry			0	0	0	0911
15	3	15-17	18	Br sandy CLAY, med vF sand, low plastic, stiff, dry			0	0	0	0918hr
20	4	20-	12	Br clayey SAND, vF-F sand, dens, moist			0	0	0	0925hr
25	5	25-	6	Gr weathered SANDSTONE med sand, poorly cemented, tr dry, moist			0	0	0	0939
30	6	30-32	24	Gr SAND, coarse, well sorted v dense, SATURATED			0	0	NA	0952
35				TDB 33.5						
40										

Comments: GW @ 22.7' @ 0952hr. GW @ 22.7' after setting 10 min. Will set well @ ~ 33' BGS

Geologist Signature

Coy Chance

MONITOR WELL INSTALLATION FORM

Borehole # BH1-511
 Well # MW9
 Page 1 of 1

Philip Services Corp.
 4000 Monroe Rd.
 Farmington, NM 87401
 (505) 326-2262 FAX (505) 326-2388

Project Name BR HAMPTON 4M
 Project Number 19584 Phase 6000
 Site Location Hampton 4M

Elevation _____
 Well Location S. of Production 17
 GWL Depth 22.7
 Installed By K PADILLA

On-Site Geologist C CHANCE
 Personnel On-Site _____
 Contractors On-Site _____
 Client Personnel On-Site ED Hasley

Date/Time Started 5/11/98
 Date/Time Completed 5/11/98

Depths in Reference to Ground Surface				
Item	Material	Depth (feet)		
Top of Protective Casing		0	Top of Protective Casing	<u>0</u>
Bottom of Protective Casing		1	Top of Riser (survey elev.)	<u>-0.3</u>
Top of Permanent Borehole Casing		NA	Ground Surface	<u>0</u>
Bottom of Permanent Borehole Casing		NA		
Top of Concrete		0		
Bottom of Concrete		1		
Top of Grout		1		
Bottom of Grout		13		
Top of Well Riser		.30		
Bottom of Well Riser		18 <u>0.18</u>		
Top of Well Screen		18	Top of Seal	<u>13</u>
Bottom of Well Screen		33		
Top of Peltonite Seal		13	Top of Gravel Pack	<u>15</u>
Bottom of Peltonite Seal		15		
Top of Gravel Pack		15	Top of Screen	<u>18</u>
Bottom of Gravel Pack		33		
Top of Natural Cave-In		33		
Bottom of Natural Cave-In		33.5		
Top of Groundwater		22.7	Bottom of Screen	<u>33</u>
Total Depth of Borehole		33.5	Bottom of Borehole	<u>33.5</u>

Comments Set well @ 33' BGS. Seal hydrated w/ 10 gal potable water. Set as Flush mount w/ locking well cap + padlock
 Geologist Signature Cory Chance

0701469

RECORD OF SUBSURFACE EXPLORATION

PHILIP SERVICES CORP.

4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388



Borehole # BH-2-511
Well # MW10
Page 1 of

Project Number 19584 Phase 6000.77
Project Name Burlington Resources Hampton 4M
Project Location Hampton 4M

Elevation _____
Borehole Location LTR: S: T: R: S. of Dehy
GWL Depth 24.7'
Drilled By K. PADILLA
Well Logged By C. CHANCE
Date Started 5/11/98
Date Completed 5/11/98

Drilling Method 4 1/4 ID HSA
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	S/H ₅	
0										
5	1	5-7	24	Br silty SAND, f-med sand, abnt silt, loose, dry			0	0	0	1213h
10	2	10-12	12	Br silty SAND, f-med sand, tr coarse, mod silt, dense, dry			0	0	0	1218h
15	3	15-16	5	Redish Br/Gry SAND, med-coarse, sand, mod silt, tr cementation, dense, dry			0	0	5/33	1225h
20	4	20-21	5	Redish br/gry clayey SAND, f-med sand, dense, dry			0	0	39/43	1235h
25	5	25-26	4	Gray SAND, med-coarse, well sorted, v. dense, saturated			0	220	5/66	1245h
	6	26-27	5	Greysilty CLAY, v stiff, nonplastic, dry					5/667	Hard doling 1307h
30				TOB 27'						
35										
40										

Comments: GW @ 24.7 after setting 10 min Will set well @ 27'.

Geologist Signature Cory Chance

MONITOR WELL INSTALLATION FORM

Borehole # BR2-511
 Well # MW10
 Page 1 of 1

Philip Services Corp.
 4000 Monroe Rd.
 Farmington, NM 87401
 (505) 326-2262 FAX (505) 326-2388

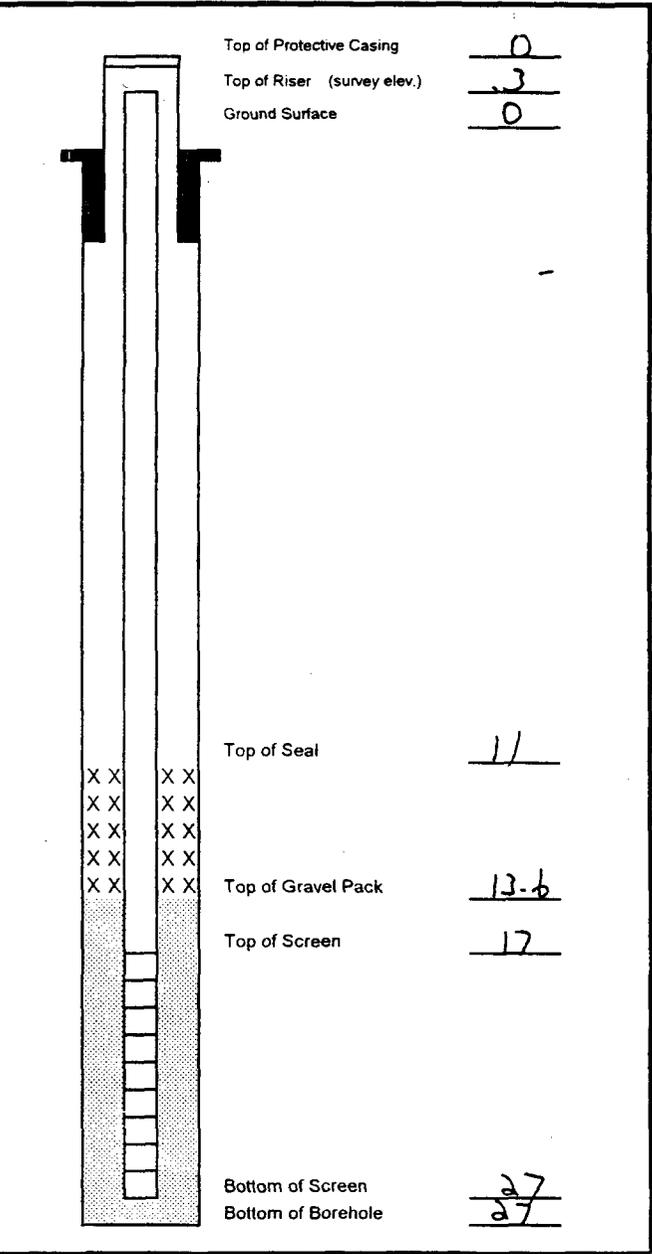
Project Name BR HAMPTON 4M
 Project Number 19584 Phase 6000
 Site Location Hampton 4M

Elevation _____
 Well Location S. of Deby
 GWL Depth 24.7
 Installed By K PADILLA

On-Site Geologist C CHANCE
 Personnel On-Site _____
 Contractors On-Site _____
 Client Personnel On-Site ED Hasley

Date/Time Started 5/11/98
 Date/Time Completed 5/11/98

Depths in Reference to Ground Surface		
Item	Material	Depth (feet)
Top of Protective Casing		0
Bottom of Protective Casing		1
Top of Permanent Borehole Casing		NA
Bottom of Permanent Borehole Casing		NA
Top of Concrete		0
Bottom of Concrete		1
Top of Grout		1
Bottom of Grout		11
Top of Well Riser		.3
Bottom of Well Riser		17
Top of Well Screen		17
Bottom of Well Screen		27
Top of Peltonite Seal		11
Bottom of Peltonite Seal		13.6
Top of Gravel Pack		13.6
Bottom of Gravel Pack		27
Top of Natural Cave-In		27
Bottom of Natural Cave-In		27
Top of Groundwater		24.7
Total Depth of Borehole		27



Comments Well set @ 27' BGS. Seal hydrated w/ 10 gal potable water
Well set w/ flush mount valve, well cap & pad lock
 Geologist Signature C. Chance

ATTACHMENT #3

WELL DEVELOPMENT
and
LABORATORY RESULTS

Serial No. WOD-

Page 1 of 1

Project Name BR Hampton 4M

Project No. 19584

Project Manager R. Thompson

Phase/Task No.

Client Company Burlington Resources

Date 5/12/98

Site Name Hampton 4M

Depth Measurement Instrument Type Keck

Well or Piezometer	Time	Result Not Measured	Depth to Floating Product (feet)	TOR Depth to Water (feet)	Depth to Sinking Product (feet)	Total well Depth (feet)	Floating product Thickness (feet)	Sinking Product Thickness (feet)	Comments
MW-1			-	41.98	-	47.69			
MW-4			-	16.67	-	34.29			
MW-8			17.93	18.22	-	NA	.29		
MW-9			-	21.79	-	33.08			
MW-10	5/28/98		23.09	21.68		27.0	1.91		
MW-10			21.68	23.09	-	27.0	1.41		

CMC

Post-it Fax Note 7671

Date	# of pages 1
To ED Hasely	From Cory Chance
Co./Dept.	Co.
Phone #	Phone #
Fax # 326 9725	Fax #

Reason Not Measured: D = Dry; O = Obstructed; N = Not Accessible

Comments All depths measured to Top of Riser (TOR)

Signature Cory Chance Date 5/28/98 Reviewer _____ Date _____

001472

Well Number MW-1

Development
 Purgining

WELL DEVELOPMENT AND PURGING DATA

Serial No. WDPD. _____

Page 1 of 1

Project Name BR Hampton YM

Project Manager Thompson

Project No. 19584

Client Company Burlington Resources

Site Address 1

Phase/Task No. _____

Development Criteria

- 5 Casing Volumes of Water Removal
- Stabilization of Indicator Parameters
- Other _____

Methods of Development

- Pump
 - Centrifugal
 - Submersible
 - Peristaltic
 - Other _____
- Boiler
 - Bottom Valve
 - Double Check Valve
 - Stainless-steel Kemmerer

Water Volume Calculation

Initial Depth of Well (feet) 47.69'
 Initial Depth to Water (feet) 41.98'
 Height of Water Column in Well (feet) 5.71'
 Diameter (inches): Well 2" Gravel Pack _____

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing		<u>.93</u>	<u>.93</u>
Gravel Pack			<u>2.79</u>
Drilling Fluids			
Total			<u>2.79</u>

Instruments

- pH Meter
- DO Monitor
- Conductivity Meter
- Temperature Meter
- Other _____

Water Disposal

On ground on site

Water Removal Data

Date	Time	Development Method	Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons)		Product Volume Removed (gallons)		Temperature (°C)	pH	Conductivity (µmhos/cm)	Dissolved Oxygen (mg/l)	Comments
						Incremental	Cumulative	Incremental	Cumulative					
5/12/98	0850	✓				1	1			14.1	6.24	294		4 Br
	0854					1	2			13.6	6.27	268		5 clear
	0859					1	3			13.5	6.29	267		AA

Circle the date and time that the development criteria are met.

Comments _____

Developer's Signature(s) [Signature]

Date 5/12/98

Reviewer _____

Date _____

001473



Water Sampling Data

Location No. MW-1Serial No. WSD-Group List Number Sample Type: Groundwater Surface Water Other Date 5/12/98Project Name BR Hampton 4M Project No. 19584Project Manager R. Thompson Phase/Task No. Site Name Hampton 4M

Sampling Specifications

Requested Sampling Depth Interval (feet) Top 3'
Requested Wait Following Development/Purging (hours) NA

Initial Measurements

Time Elapsed From Final Development/Purging (hours) NA
Initial Water Depth (feet) 41.98
Nonaqueous Liquids Present (Describe) NA

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data				Notes - (Explain in Comments Below)	
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail		Final Water Depth (feet)
<u>SEE Development Form</u>												

Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
<u>BTEX</u>	<u>2</u>	<u>V</u>	<u>40</u>		<u>✓</u>	<u>-</u>	<u>✓</u>		
<u>Metals</u>	<u>1</u>	<u>P</u>	<u>250</u>		<u>✓</u>	<u>HNO₃</u>	<u>✓</u>		
<u>Cation/Anion</u>	<u>1</u>	<u>P</u>	<u>1000</u>		<u>✓</u>	<u>-</u>	<u>✓</u>		

Filter Type Chain-of-Custody Form Number C3192Comments Signature Cory Chase Date 5/12/98 Reviewer Date



FARMINGTON LABORATORY
 807 S. CARLTON
 FARMINGTON, NM 87499-1289
 (505) 326-2588

Water Analysis
 Burlington Resources, Inc.

Sample ID: MW - 1
 Matrix: Water
 Lab ID: 9805054-01

Date Reported: 05/20/98
 Date Sampled: 05/12/98
 Date Received: 05/12/98

Parameter	Analytical Result	Units
-----------	-------------------	-------

General

pH	4.78	s.u.
Conductivity	2,790	µmohs/cm
Specific Gravity	1.005	
TDS (calc)	3,100	mg/L
TDS (Measured)	3,330	mg/L

Cations

Hardness	2,100	mg/L
Calcium	600	mg/L
Magnesium	147	mg/L
Sodium	113	mg/L
Potassium	7.0	mg/L

Anions

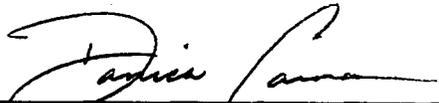
Alkalinity	12.5	mg/L
Carbonate	1.0	mg/L
Bicarbonate	11.5	mg/L
Hydroxide	<1.0	mg/L
Chloride	47.5	mg/L
Sulfate	2,180	mg/L

Data Validation

% Difference cations/anions meq/l	0.20
TDS Ratio	1.1

Acceptable Limits

+/- 2 - 5 %
1.0 - 1.2


 Danica Garman, Lab Manager

001475



Certificate of Analysis No. 9805054-01

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project: BR Hampton 4M
Site: Farmington
Sampled By: C. Chance
Sample ID: MW - 1

Project No: 19584
Matrix: Water
Date Sampled: 05/12/98
Date Received: 05/12/98

Analytical Data

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Benzene	ND	1.0	µg/L
Toluene	ND	1.0	µg/L
Ethylbenzene	ND	1.0	µg/L
Total Xylene	ND	1.0	µg/L
Total Volatile Aromatic Hydrocarbons	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	107
4-Bromofluorobenzene	97

Method 8020A***
Analyzed by: VHZ
Date: 05/14/98

ND-Not Detected

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th Ed
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

Danica Garman, Lab Director

001476



Certificate of Analysis No. 9805054-01

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd.
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project: BR Hampton 4M	Project No: 19584
Site: Farmington	Matrix: Water
Sampled By: C. Chance	Date Sampled: 05/12/98
Sample ID: MW - 1	Date Received: 05/12/98

Analytical Data

PARAMETER	RESULTS	Detection Limit	UNITS
Dissolved Metals			
Arsenic	ND	0.1	mg/L
Barium	0.006	0.005	mg/L
Cadmium	ND	0.005	mg/L
Chromium	ND	0.01	mg/L
Copper	ND	0.01	mg/L
Iron	4.50	0.02	mg/L
Lead	ND	0.05	mg/L
Manganese	3.12	0.005	mg/L
Selenium	ND	0.1	mg/L
Silver	ND	0.01	mg/L

Method 6010B ***

Analyzed by: JM

Date: 5/19/98

Mercury	ND	0.0002	mg/L
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Method 7470A ***

Analyzed by: AG

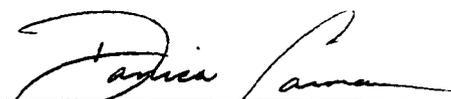
Date: 5/15/98

ND-Not Detected

Notes:

- *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
- **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
- ***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.


 Danica Carman, Lab Manager

001477

Well Number MW-4

Development
 Purging

WELL DEVELOPMENT AND PURGING DATA

Serial No. WDPD-_____

Page 1 of 1

Project Name BR Hampton 4M

Project Manager R. Thompson

Project No. 19584

Client Company Berlington Resources

Site Address _____

Phase/Task No. _____

Site Name Hampton 4M

Site Address _____

Development Criteria

- 3 to 5 Casing Volumes of Water Removal
- Stabilization of Indicator Parameters
- Other _____

Water Volume Calculation

Initial Depth of Well (feet) 34.29
 Initial Depth to Water (feet) 16.67
 Height of Water Column in Well (feet) 17.62
 Diameter (inches): Well 2 Gravel Pack _____

Instruments

Serial No. (if applicable) _____

- pH Meter Dyster
- DO Monitor _____
- Conductivity Meter _____
- Temperature Meter _____
- Other _____

Water Disposal

On site

Water Removal Data

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing		<u>2.8</u>	<u>2.6</u>
Gravel Pack			
Drilling Fluids			
Total			<u>2.6</u>

Date	Time	Development Method Pump / Baller	Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons)		Product Volume Removed (gallons)		Temperature (°C)	pH	Conductivity (mmho/cm)	Dissolved Oxygen (mg/l)	Comments
						Increment	Cumulative	Increment	Cumulative					
<u>5/12/98</u>	<u>0936</u>					<u>2.5</u>	<u>2.5</u>			<u>13.8</u>	<u>6.20</u>	<u>242</u>		<u>black, sil silty</u>
	<u>0944</u>					<u>2.5</u>	<u>5.0</u>			<u>13.9</u>	<u>6.55</u>	<u>250</u>		
	<u>0951</u>					<u>2.5</u>	<u>7.5</u>			<u>13.9</u>	<u>6.67</u>	<u>268</u>		
	<u>0958</u>					<u>2.0</u>	<u>9.0</u>			<u>14.0</u>	<u>6.75</u>	<u>298</u>		<u>AT less silty</u>

Circle the date and time that the development criteria are met.

Comments _____

Developer's Signature(s) _____

Date 5/12/98

Reviewer _____

Date _____

8LH100



Water Sampling Data

Location No. MW-4

Serial No. WSD-

Group List Number _____

Sample Type: Groundwater Surface Water Other _____

Date 5/12/98

Project Name BR Hampton 4M

Project No. 19584

Project Manager R. Thompson

Phase/Task No. _____

Site Name Hampton 4M

Sampling Specifications

Requested Sampling

Depth Interval (feet) NA Top 3'

Requested Wait Following

Development/Purging (hours) NA

Initial Measurements

Time Elapsed From Final Development/Purging (hours) _____

Initial Water Depth (feet) 16.67

Nonaqueous Liquids Present (Describe) NA

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data				Notes (Explain in Comments Below)	
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail		Final Water Depth (feet)
SEE Develop & Purge FORM												

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)

Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Sample Containers

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
BTEX	2	V	40		✓	-	✓		
Metals	1	P	250		✓	HNO ₃	✓		
Anion/Cations	1	P	1000		✓	-	✓		

Filter Type _____

Chain-of-Custody Form Number C-3192

Comments _____

Signature Coy Chau

Date 5/12/98

Reviewer _____

Date _____



FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Water Analysis
Burlington Resources, Inc.

Sample ID: MW - 4
Matrix: Water
Lab ID: 9805054-02

Date Reported: 05/20/98
Date Sampled: 05/12/98
Date Received: 05/12/98

Parameter	Analytical Result	Units
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General

pH	7.07	s.u.
Conductivity	3,280	µmohs/cm
Specific Gravity	1.006	
TDS (calc)	3,480	mg/L
TDS (Measured)	3,950	mg/L

Cations

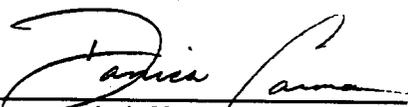
Hardness	2,300	mg/L
Calcium	620	mg/L
Magnesium	183	mg/L
Sodium	179	mg/L
Potassium	5.0	mg/L

Anions

Alkalinity	183	mg/L
Carbonate	15.7	mg/L
Bicarbonate	167	mg/L
Hydroxide	<1.0	mg/L
Chloride	45.0	mg/L
Sulfate	2,340	mg/L

Data Validation

		Acceptable Limits
% Difference cations/anions meq/l	0.20	+/- 2 - 5 %
TDS Ratio	1.1	1.0 - 1.2


Danica Carman, Lab Manager

001480



Certificate of Analysis No. 9805054-02

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project: BR Hampton 4M	Project No: 19584
Site: Farmington	Matrix: Water
Sampled By: C. Chance	Date Sampled: 05/12/98
Sample ID: MW - 4	Date Received: 05/12/98

Analytical Data

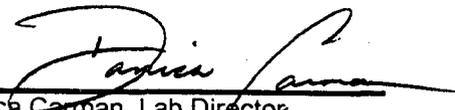
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Benzene	1000	10.0	µg/L
Toluene	1.8	1.0	µg/L
Ethylbenzene	20	1.0	µg/L
Total Xylene	3.0	1.0	µg/L
Total Volatile Aromatic Hydrocarbons	1024.8		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	107
4-Bromofluorobenzene	93

Method 8020A***
Analyzed by: VHZ
Date: 05/15/98

ND-Not Detected

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
 **Ref: Standard Methods for Examination of Water & Wastewater, 18th Ed
 ***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.


 Danica Carman, Lab Director

001481



Certificate of Analysis No. 9805054-02

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd.
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project: BR Hampton 4M
Site: Farmington
Sampled By: C. Chance
Sample ID: MW - 4

Project No: 19584
Matrix: Water
Date Sampled: 05/12/98
Date Received: 05/12/98

Analytical Data

PARAMETER	RESULTS	Detection Limit	UNITS
Dissolved Metals			
Arsenic	ND	0.1	mg/L
Barium	0.009	0.005	mg/L
Cadmium	ND	0.005	mg/L
Chromium	ND	0.01	mg/L
Copper	ND	0.01	mg/L
Iron	4.87	0.02	mg/L
Lead	ND	0.05	mg/L
Manganese	5.80	0.005	mg/L
Selenium	ND	0.1	mg/L
Silver	ND	0.01	mg/L

Method 6010B ***

Analyzed by: JM

Date: 5/19/98

Mercury

0.0002

0.0002

mg/L

Method 7470A ***

Analyzed by: AG

Date: 5/15/98

ND-Not Detected

Notes:

*Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

Danica Carman, Lab Manager

001482

Well Number MW-9

Development
 Purging

WELL DEVELOPMENT AND PURGING DATA

Serial No. WDPD

Page 1 of 1

Project Name BR Hampton 4M

Project Manager R Thompson

Project No. 19584

Client Company Burlington Resources

Phase/Task No. _____

Site Name Hampton 4M

Site Address _____

Development Criteria

- 3 to 6 Casing Volumes of Water Removal
 Stabilization of Indicator Parameters
 Other _____

Water Volume Calculation

Initial Depth of Well (feet) 33.08
 Height of Water Column in Well (feet) 21.79
 Diameter (inches): Well 2" Gravel Pack _____

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing		1.8	5.59
Gravel Pack			
Drilling Fluids			
Total			5.59

Instruments

Serial No. (if applicable) _____

- pH Meter
 DO Monitor
 Conductivity Meter
 Temperature Meter
 Other _____

Water Disposal

On Site

Water Removal Data

Date	Time	Development Method		Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons)		Product Volume Removed (gallons)		Temperature (°C)	pH	Conductivity (µmhos/cm) X10	Dissolved Oxygen (mg/l)	Comments
		Pump	Boiler				Incremental	Cumulative	Incremental	Cumulative					
5/12/98	1034						2.5	2.5			15.1	6.67	260		1 + Br
	1041						2.5	5.0			15.5	6.65	262		AA
	1050						2.5	7.5			15.2	6.67	269		AA
	1059						2.5	10.0			16.5	6.70	260		AA

Circle the date and time that the development criteria are met.

Comments _____

Developer's Signature(s) _____

Date 5/12/98

Reviewer _____

Date _____

001483



Water Sampling Data

Location No. MW-9Serial No. WSD-

Group List Number _____

Sample Type: Groundwater Surface Water Other _____ Date 5/12/98Project Name BR Hampton 4M Project No. 19584Project Manager R. Thompson Phase/Task No. _____Site Name Hampton 4M

Sampling Specifications

Requested Sampling
Depth Interval (feet) NA Top 3'
Requested Wait Following
Development/Purging (hours) NA

Initial Measurements

Time Elapsed From Final Development/Purging (hours) _____
Initial Water Depth (feet) 21.79
Nonaqueous Liquids Present (Describe) NA

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	
<u>SEE Develop & Purge FORM</u>												

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); -- = None

Sample Containers

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
<u>BTEX</u>	<u>2</u>	<u>V</u>	<u>40</u>		<input checked="" type="checkbox"/>	<u>-</u>	<input checked="" type="checkbox"/>		
<u>Metals</u>	<u>1</u>	<u>P</u>	<u>250</u>		<input checked="" type="checkbox"/>	<u>HNO₃</u>	<input checked="" type="checkbox"/>		
<u>Anion/Cations</u>	<u>1</u>	<u>P</u>	<u>1000</u>		<input checked="" type="checkbox"/>	<u>-</u>	<input checked="" type="checkbox"/>		

Filter Type _____ Chain-of-Custody Form Number C-3192

Comments _____

Signature Cory Chase Date 5/12/98 Reviewer _____ Date _____



FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Water Analysis
Burlington Resources, Inc.

Sample ID: MW - 9
Matrix: Water
Lab ID: 9805054-03

Date Reported: 05/20/98
Date Sampled: 05/12/98
Date Received: 05/12/98

Parameter	Analytical Result	Units
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General

pH	6.14	s.u.
Conductivity	3,530	µmohs/cm
Specific Gravity	1.006	
TDS (calc)	3,710	mg/L
TDS (Measured)	4,080	mg/L

Cations

Hardness	2,450	mg/L
Calcium	560	mg/L
Magnesium	256	mg/L
Sodium	166	mg/L
Potassium	9.0	mg/L

Anions

Alkalinity	92.5	mg/L
Carbonate	19.4	mg/L
Bicarbonate	73.1	mg/L
Hydroxide	<1.0	mg/L
Chloride	272	mg/L
Sulfate	2,390	mg/L

Data Validation

% Difference cations/anions meq/l
TDS Ratio

2.52
1.1

Acceptable Limits

+/- 2 - 5 %
1.0 - 1.2

Danica Garman, Lab Manager

001485



Certificate of Analysis No. 9805054-03

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project:	BR Hampton 4M	Project No:	19584
Site:	Farmington	Matrix:	Water
Sampled By:	C. Chance	Date Sampled:	05/12/98
Sample ID:	MW - 9	Date Received:	05/12/98

Analytical Data

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Benzene	6.7	1.0	µg/L
Toluene	1.1	1.0	- µg/L
Ethylbenzene	ND	1.0	µg/L
Total Xylene	2.7	1.0	µg/L
Total Volatile Aromatic Hydrocarbons	10.5		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	100
4-Bromofluorobenzene	93

Method 8020A***

Analyzed by: VHZ

Date: 05/15/98

ND-Not Detected

Notes:

*Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th Ed

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

Danica Carman, Lab Director

001486



Certificate of Analysis No. 9805054-03

FARMINGTON LABORATORY

807 S. CARLTON
FARMINGTON, NM 87499-1289
(505) 326-2588

Philip Environmental
4000 Monroe Rd.
Farmington, NM 87401
Attn: Robert Thompson

Date: 05/20/98

Project:	BR Hampton 4M	Project No:	19584
Site:	Farmington	Matrix:	Water
Sampled By:	C. Chance	Date Sampled:	05/12/98
Sample ID:	MW - 9	Date Received:	05/12/98

Analytical Data

PARAMETER	RESULTS	Detection Limit	UNITS
Dissolved Metals			
Arsenic	ND	0.1	- mg/L
Barium	0.024	0.005	mg/L
Cadmium	ND	0.005	mg/L
Chromium	ND	0.01	mg/L
Copper	ND	0.01	mg/L
Iron	6.38	0.02	mg/L
Lead	ND	0.05	mg/L
Manganese	9.90	0.005	mg/L
Selenium	ND	0.1	mg/L
Silver	ND	0.01	mg/L

Method 6010B ***

Analyzed by: JM

Date: 5/19/98

Mercury	0.0002	0.0002	mg/L
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Method 7470A ***

Analyzed by: AG

Date: 5/15/98

ND-Not Detected

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
 **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.



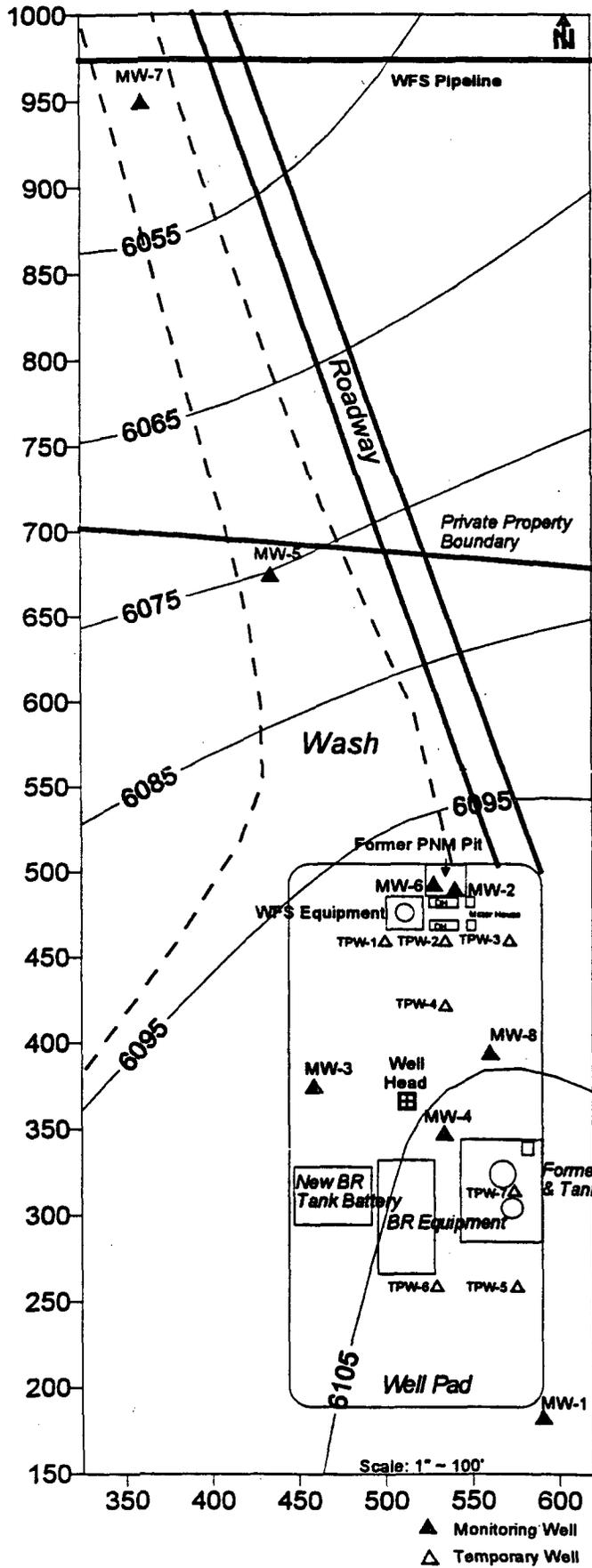
 Danica Carman, Lab Manager

001484

ATTACHMENT #4
GROUNDWATER CONTOUR MAP

Hampton 4M Site Map and Analytical Results (Concentrations in ppb) Groundwater Contour Map (January, 1998)

△
EB - Private Well
(Not to Scale)



Well #	Date	B	T	E	X
MW-1	10/30/97	2.4	2.3	<0.2	1.1
MW-1	1/12/98	4.3	3.3	0.2	1
MW-1	4/14/98	1	1.3	<0.5	<1.5
MW-2	1/12/98	4.41 feet of product			
MW-2	4/14/98	2.59 feet of product			
MW-3	1/31/97	<0.2	<0.2	<0.2	<0.2
MW-3	1/12/98	<0.2	<0.2	<0.2	<0.2
MW-3	4/14/98	<0.5	<0.5	<0.5	<1.5
MW-4	1/31/97	811.7	1420.5	31.0	388.1
MW-4	1/12/98	1251	6	81	24
MW-4	4/14/98	1100	7.2	28	12
MW-5	10/29/97	5934	10024	709	8188
MW-5	1/12/98	7521	11213	779	8436
MW-5	4/14/98	7000	11000	720	7800
MW-6	1/12/98	4.71 feet of product			
MW-6	4/14/98	Product Recovery (pump in well)			
MW-7	1/12/98	780	246	258	3942
MW-7	4/14/98	820	340	190	2450
MW-8	1/12/98	6410	17301	693	9397
MW-8	4/14/98	0.37 feet of product			
EB-Well	11/25/97	<0.2	<0.2	<0.2	<0.2
TPW-1	6/5/97	20	<1.0	<1.0	<1.0
TPW-2	6/9/97	2.48 feet of product			
TPW-3	6/5/97	No Groundwater Water			
TPW-4	6/6/97	2000	57	3100	810
TPW-5	6/6/97	5800	460	16000	7000
TPW-6	6/6/97	1600	48	3400	690
TPW-7	6/6/97	5300	620	18000	9300

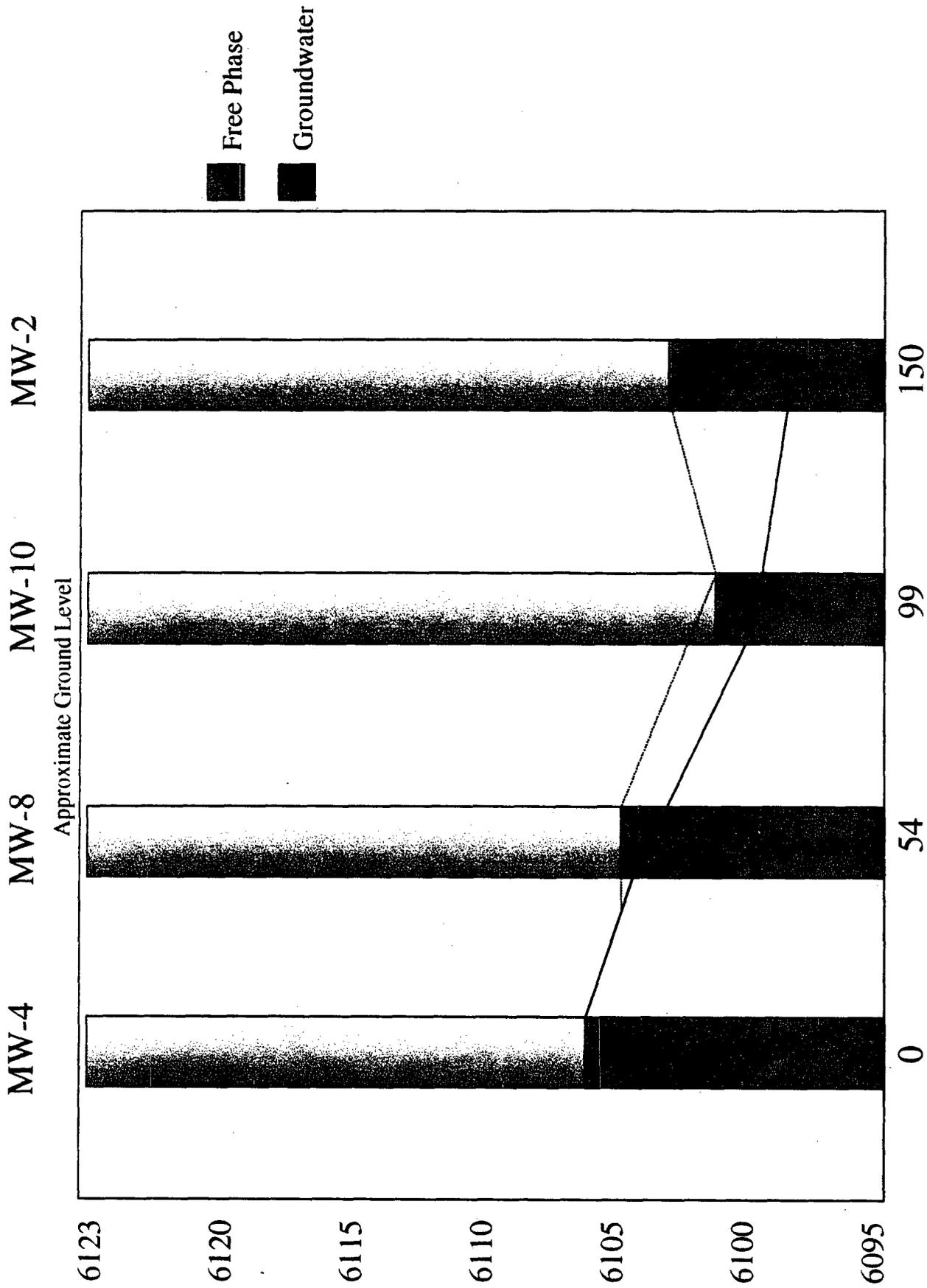
001490



ATTACHMENT #5

CROSS SECTION FROM MW-4 TO MW-2

CROSS SECTION FROM MW-4 TO MW-2



26/11/14