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.

EXHIBIT
PMI 43

3535 East 30th St., 87402-8801, P.O. Box 4289, Farmington, New Mexico 87499-4289, Telephone 505-326-9700, Fax 505-326-9833

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

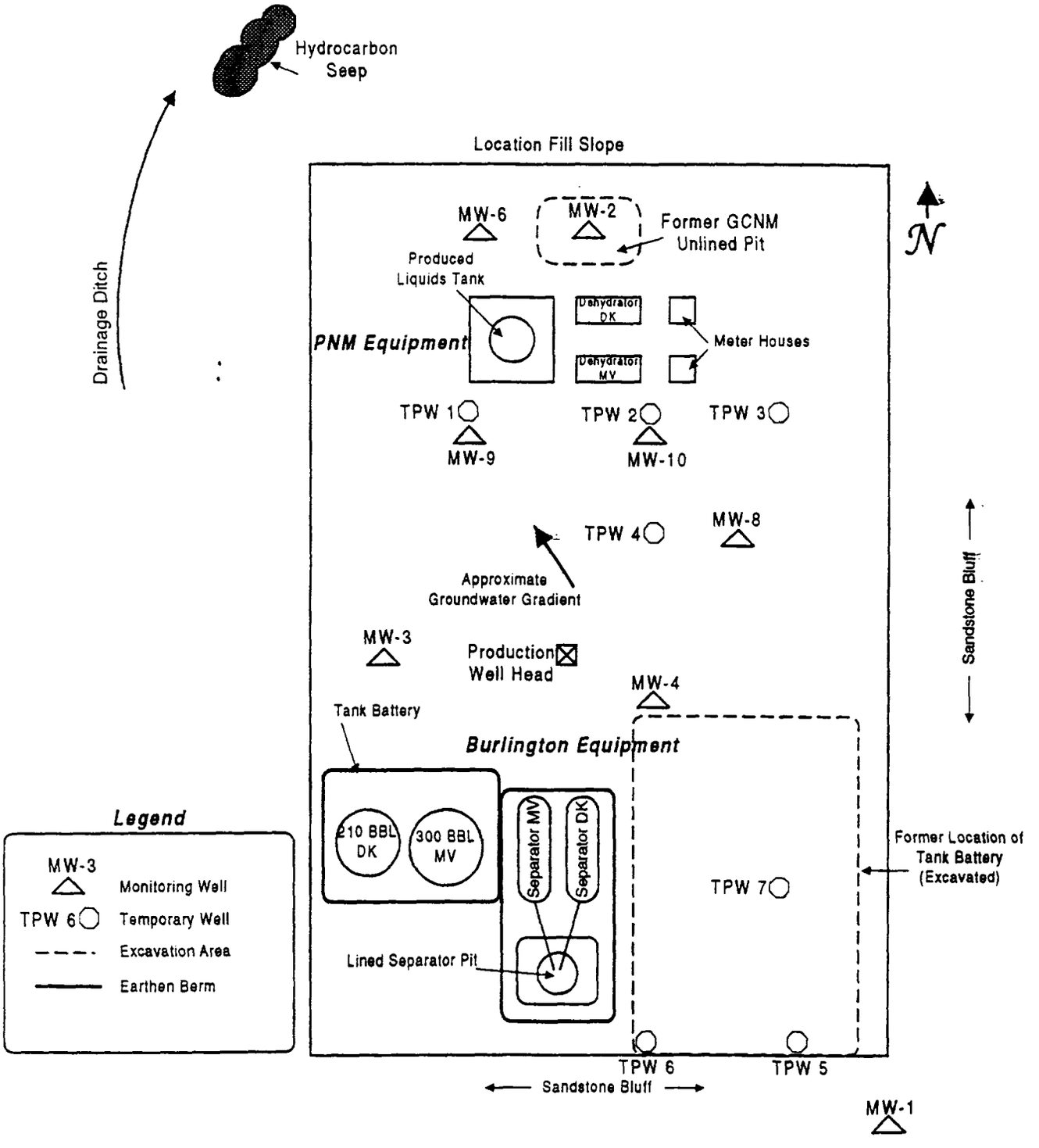
cc: Denny Foust - NMOCD Aztec
Johnny Ellis - BR
Ken Raybon - BR
Bruce Gantner - BR
John Bemis - BR
Denver Bearden - PNM Farmington
Maurene Gannon - PNM Albuquerque
Hampton 4M File

S: / grndwatr/facility/hampton/985ocd.doc

ATTACHMENT #1

SITE DIAGRAM

Hampton 4M Site Diagram



ATTACHMENT #2

GEOLOGIC LOGS
AND
WELL COMPLETION DIAGRAMS

RECORD OF SUBSURFACE EXPLORATION

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

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

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 BZ	BH	S/HS	Drilling Conditions & Blow Counts
0										
5	1	5-7	24	Lt Br clayey SAND, f-med sand, tr coarse, loose, dry			0	0	0/0	-0905hr
10	2	10-12	18	Lt Br silty SAND, med-coarse sand, loose, dry			0	0	0/0	-0911
15	3	15-17	18	Br sandy CLAY, mod vf sand, low plastic, stiff, dry			0	0	0/0	-0918hr
20	4	20-	12	Br clayey SAND, vf-f sand, dense, moist			0	0	0/0	-0925hr
25	5	25-	6	Gry weathered SANDSTONE med sand, poorly cemented, trdy moist			0	0	0/0	-0939
30	6	30-32	24	Gry SAND, coarse, well sorted v dense, saturated			0	0	NA	-0952
35				TDB 33.5						
40										

Comments: GW@22.7' @ 0953 hrs. GW@22.7 after setting 10 min. Will set well @ ~ 33' BGS

Geologist Signature Cory Chance

5/8/98\Drillog

MONITOR WELL INSTALLATION FORM

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

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

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

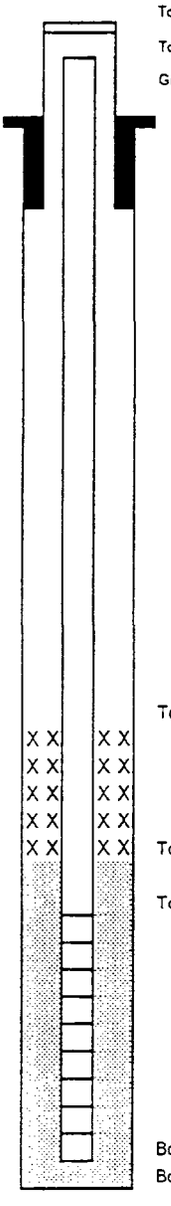
Elevation
Well Location S. of Production Pit
GWL Depth 22.7
Installed By K PADILLA

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

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

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		13
Top of Well Riser		.30
Bottom of Well Riser		18 ~~18~~
Top of Well Screen		18
Bottom of Well Screen		33
Top of Peltonite Seal		13
Bottom of Peltonite Seal		15
Top of Gravel Pack		15
Bottom of Gravel Pack		33
Top of Natural Cave-In		33
Bottom of Natural Cave-In		33.5
Top of Groundwater		22.7
Total Depth of Borehole		33.5



Top of Protective Casing 0
Top of Riser (survey elev.) -.3
Ground Surface 0

Top of Seal 13
Top of Gravel Pack 15
Top of Screen 18
Bottom of Screen 33
Bottom of Borehole 33.5

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

MWINSTAL.wk1

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 BZ	BH	S/HS	Drilling Conditions & Blow Counts
0										
5	1	5-7	24	Br silty SAND, f-med sand, abnt silt, loose, dry			0	0	0/0	1513 hr
10	2	10-12	12	Br silty SAND, f-med sand, tr coarse, mod silt, dense, dry			0	0	0/0	1218 hr
15	3	15-16	5	Redish Br/Gry SAND, med-coarse, sand, mod silt, tr cementation, dense, dry			0	0	5/33	1228 hr
20	4	20 21	8	Redish br/Gry clayey SAND, F-med sand, dense, dry			0	0	39/43	1235 hr
25	5	25-26	4	Gry SAND, med-coarse, well sorted, v. dense, saturated			0	220	5/667 cmc	1245 hr
	6	26-27	5	Grysilty CLAY, v stiff, nonplastic, dry AA					5/667	Hard drlg 1307 hr
30				TDB 27'						
35										
40										

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

Geologist Signature

5/8/98\Drillog

MONITOR WELL INSTALLATION FORM

Borehole # BH2-511
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

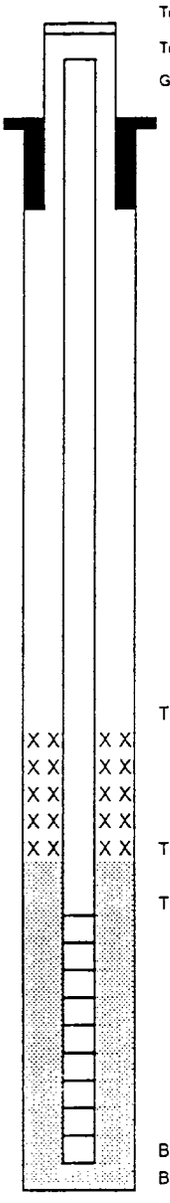
Elevation
Well Location S. of Derby
GWL Depth 24.7
Installed By K PADILLA

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

On-Site Geologist C CHANCE
Personnel On-Site
Contractors On-Site
Client Personnel On-Site Ed Hasley

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



Top of Protective Casing 0
Top of Riser (survey elev.) .3
Ground Surface 0
Top of Seal 11
Top of Gravel Pack 13.6
Top of Screen 17
Bottom of Screen 27
Bottom of Borehole 27

Comments Well set @ 27' BGS. Seal hydrated w/ 10 gal potable water
Well set w/ Flush mount vault, well cap & padlock

Geologist Signature Cory Chance

MWINSTAL.wk1

ATTACHMENT #3

WELL DEVELOPMENT
and
LABORATORY RESULTS

PHILIP ENVIRONMENTAL

WELL OBSERVATION DATA

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	Reason 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			
CMC 5/28/98 MW-10			23.09	21.68		27.0	1.57		
MW-10			21.68	23.09	—	27.0	1.41		

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 [signature] Date 5/28/98 Reviewer Date

PHILIP ENVIRONMENTAL

Well Number MW-1

☐ Development ☑ Purging

WELL DEVELOPMENT AND PURGING DATA

Serial No. WDPD-

Project Name BR Hampton 4M Project Manager Thompson Project No. 19584

Client Company Burlington Resources Phase.Task No.

Site Name Site Address

Development Criteria

☑ 3 to 5 Casing Volumes of Water Removal
☐ Stabilization of Indicator Parameters
☐ Other

Methods of Development

Pump	Bailer
☐ Centrifugal	☑ Bottom Valve
☐ Submersible	☐ Double Check Valve
☐ Peristaltic	☐ Stainless-steel Kemmerer

☐ Other

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: Cubic Feet	Water Volume in Well: Gallons	Gallons to be Removed
Well Casing		.93	~~.93~~ 2.79
Gravel Pack			
Drilling Fluids			
Total			2.79

Instruments

Serial No. (if applicable)

☑ pH Meter
☐ DO Monitor
☑ Conductivity Meter
☑ Temperature Meter
☐ Other

Water Disposal

On ground on site

Water Removal Data

Date	Time	Development Method: Pump	Development Method: Bailer	Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons): Increment	Water Volume Removed (gallons): Cumulative	Product Volume Removed (gallons): Increment	Product Volume Removed (gallons): Cumulative	Temperature (°C)	pH	Conductivity (mmhos/cm) X10	Dissolved Oxygen (mg/L)	Comments
5/12/98	0850		✓				1	1			14.1	6.24	294		Lt Br
	0854						1	2			13.6	6.27	268		sl cleaner
	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) Cory Chance Date 5/12/98 Reviewer Date

PHILIP ENVIRONMENTAL Water Sampling Data

Location No. MW-1

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) 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: Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Water Collection Data: Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	Notes – (Explain in Comments Below)
		SEE Development Form										

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

Sample Containers

Preservatives: H = HCl; N = HNO_3; S = H_2SO_4; A = NaOH; O = Other (Specify); – = None

Analytical Parameter List	Container: Number	Type	Volume (mL)	Field Filtered: Yes	No	Preserved	Cooled During Collection: Yes	No	Comments
BTEX	2	V	40		✓	–	✓		
Metals	1	P	250		✓	HNO_3	✓		
Cation/Anion	1	P	1000		✓	–	✓		

Filter Type _____ Chain-of-Custody Form Number C3192

Comments _____

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

Form A0202 Rev. 02/25/94

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

Water Analysis

Burlington Resources, Inc.

Sample ID:	MW - 1	Date Reported:	05/20/98
Matrix:	Water	Date Sampled:	05/12/98
Lab ID:	9805054-01	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		Acceptable Limits
% Difference cations/anions meq/l	0.20	+/- 2 - 5 %
TDS Ratio	1.1	1.0 - 1.2

Danica Carman, Lab Manager

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

Certificate of Analysis No. 9805054-01

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
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 Carman, Lab Director

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

Certificate of Analysis No. 9805054-01

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
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.

Daniel Carman, Lab Manager

PHILIP ENVIRONMENTAL

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 Burlington Resources Phase.Task No.

Site Name Hampton 4M Site Address

Development Criteria

☑ ③ to 5 Casing Volumes of Water Removal
☐ Stabilization of Indicator Parameters
☐ Other

Methods of Development

Pump	Bailer
☐ Centrifugal	☑ Bottom Valve
☐ Submersible	☐ Double Check Valve
☐ Peristaltic	☐ Stainless-steel Kemmerer

☐ 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

Item	Water Volume in Well: Cubic Feet	Water Volume in Well: Gallons	Gallons to be Removed
Well Casing		2.8	8.6
Gravel Pack			
Drilling Fluids			
Total			8.6

Instruments

Serial No. (If applicable)

☑ pH Meter — Oyster
☐ DO Monitor
☑ Conductivity Meter
☑ Temperature Meter
☐ Other

Water Disposal

On site

Water Removal Data

Date	Time	Development Method: Pump	Development Method: Bailer	Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons): Increment	Water Volume Removed (gallons): Cumulative	Product Volume Removed (gallons): Increment	Product Volume Removed (gallons): Cumulative	Temperature (°C)	pH	Conductivity (mmhos/cm) x10	Dissolved Oxygen (mg/L)	Comments
5/12/98	0936						2.5	2.5			13.8	6.20	242		Black, sl silty
	0944						2.5	5.0			13.9	6.55	250		AA
	0951						2.5	7.0			13.9	6.67	268		AA
	0958						2.0	9.0			14.0	6.75	298		AA less silt

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

Comments

Developer's Signature(s) Tony Chavez Date 5/12/98 Reviewer Date

PHILIP ENVIRONMENTAL

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

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

Sample Containers

Preservatives: H = HCl; N = HNO_3; S = H_2SO_4; A = NaOH; O = Other (Specify); — = None.

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

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

Comments

Signature Cory Thomas Date 5/12/98 Reviewer Date

Form A0202 Rev. 02/24/94

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

Water Analysis

Burlington Resources, Inc.

Sample ID:	MW - 4	Date Reported:	05/20/98
Matrix:	Water	Date Sampled:	05/12/98
Lab ID:	9805054-02	Date Received:	05/12/98

Parameter	Analytical Result	Units
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

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

Certificate of Analysis No. 9805054-02

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

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

Certificate of Analysis No. 9805054-02

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
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

PHILIP ENVIRONMENTAL

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 (5) Casing Volumes of Water Removal
☐ Stabilization of Indicator Parameters
☐ Other

Methods of Development

Pump	Bailer
☐ Centrifugal	☑ Bottom Valve
☐ Submersible	☐ Double Check Valve
☐ Peristaltic	☐ Stainless-steel Kemmerer

☐ Other

Water Volume Calculation

Initial Depth of Well (feet) 33.08
Initial Depth to Water (feet) 21.79
Height of Water Column in Well (feet) 11.29
Diameter (inches): Well 2" Gravel Pack

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing		1.8	~~5.5~~ 9
Gravel Pack			
Drilling Fluids			
Total			~~5.5~~ 9

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: Pump	Development Method: Bailer	Removal Rate (gal/min)	Intake Depth (feet)	Ending Water Depth (feet)	Water Volume Removed (gallons): Increment	Water Volume Removed (gallons): Cumulative	Product Volume Removed (gallons): Increment	Product Volume Removed (gallons): Cumulative	Temperature (°C)	pH	Conductivity (mmhos/cm) x10	Dissolved Oxygen (mg/L)	Comments
5/12/98	1034						2.5	2.5			15.1	6.67	260		Ir 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) Cory Chance Date 5/12/98 Reviewer Date

PHILIP ENVIRONMENTAL

Water Sampling Data

Location No. MW-9

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) 21.79

Nonaqueous Liquids Present (Describe) NA

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings: Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Water Collection Data: Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	Notes – (Explain in Comments Below)
			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 = HNO_3; S = H_2SO_4; A = NaOH; O = Other (Specify); – = None

Sample Containers

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

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

Comments _____

Signature Craig Chang Date 5/12/98 Reviewer _____ Date _____

Form A0202 Rev. 02/24/94

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

Water Analysis

Burlington Resources, Inc.

Sample ID:	MW - 9	Date Reported:	05/20/98
Matrix:	Water	Date Sampled:	05/12/98
Lab ID:	9805054-03	Date Received:	05/12/98

Parameter	Analytical Result	Units
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		Acceptable Limits
% Difference cations/anions meq/l	2.52	+/- 2 - 5 %
TDS Ratio	1.1	1.0 - 1.2

Danica Carman, Lab Manager

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

Certificate of Analysis No. 9805054-03

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

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

Certificate of Analysis No. 9805054-03

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
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

9805054

Chain of Custody Record

PHILIP ENVIRONMENTAL
4000 Monroe Road
Farmington, NM 87401
(505) 326-2262 Phone
(505) 326-2388 FAX

COC Serial No. C 3192

Project Name: BR Hampton 4M
Project Number: 19584 Phase . Task: 6000 .771
Samplers: CM Chance
Laboratory Name: SPL
Laboratory Location: Farmington

Sample Number (and depth)	Date	Time	Matrix	Total Number of Bottles	Type of Analysis and Bottle: BTEX 8020	WQCC Metals	Cations/Anions	Comments
MW-1	5/12/98	0910	Water	4	✓	✓	✓	
MW-4	↓	1010	↓	4	✓	✓	✓	
MW-9	↓	1110	↓	4	✓	✓	✓	

CMC 5/12/98

Relinquished by:

Signature	Date	Time
Cmg Chance	5/12/98	

Received By:

Signature	Date	Time
Patricia Lyman	5/12	1:50

Samples Iced: ☑ Yes ☐ No

Preservatives (ONLY for Water Samples)
- ☐ Cyanide ..... Sodium hyroxide (NaOH)
- ☐ Volatile Organic Analysis ..... Hydrochloric acid (HCl)
- ☐ Metals ..... Nitric acid (HNO_3)
- ☐ TPH (418.1) ..... Sulfuric acid (H_2SO_4)
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

Carrier: Hand Delivered
Airbill No.

Shipping and Lab Notes: Invoice: ED Hasley
Burlington Resources
PO Box 4289
Farmington NM 87499

Send results to Robert Thompson at above address

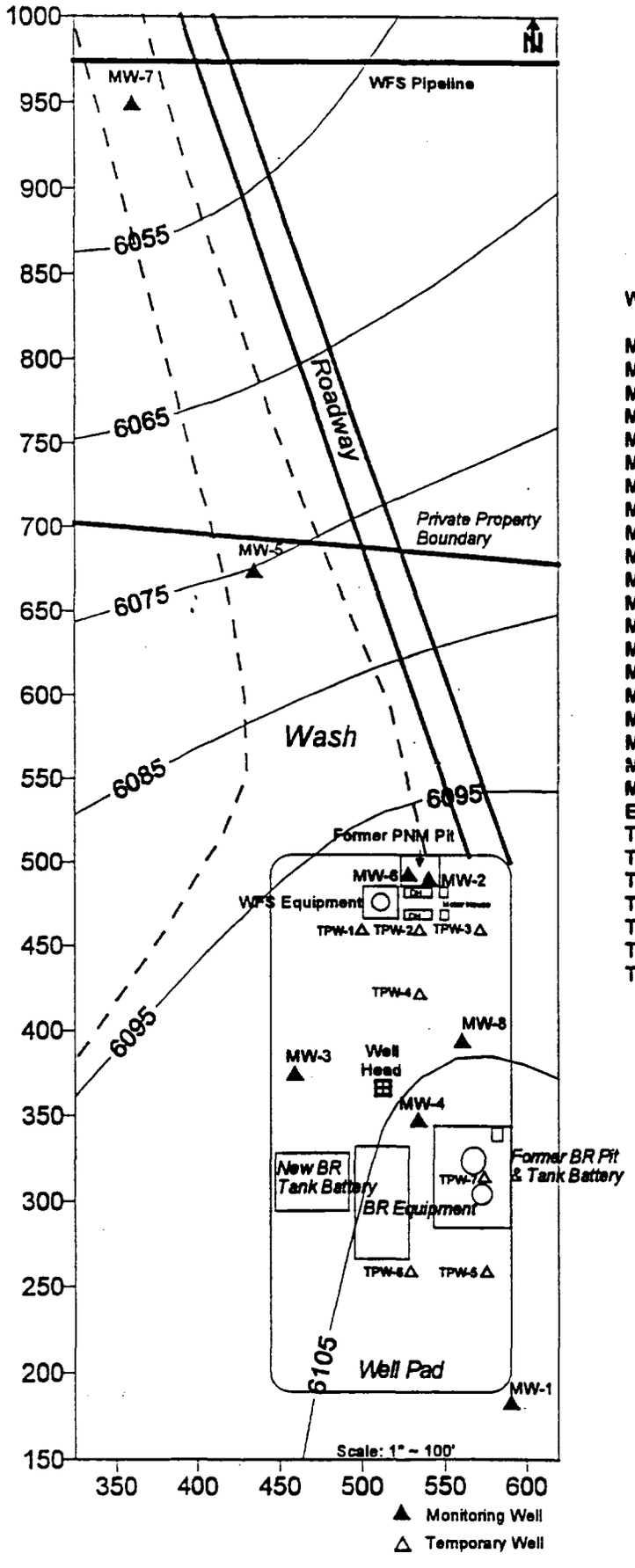
PE-176 4/95

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	5410	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

Ham210map.srf rev4/19/98

ATTACHMENT #5

CROSS SECTION FROM MW-4 TO MW-2

CROSS SECTION FROM MW-4 TO MW-2