3R - 302

GENERAL CORRESPONDENCE

YEAR(S):
1998

Roger Anderson ?

PHILLIPS PETROLEUM COMPANY
FARMINGTON, NEW MEXICO 87401
5525 HWY. 64 NBU 3004

6 May 1998

Mr. Bill Liese
U.S. Department of Interior
Bureau of Land Management
Farmington District

Dear Mr. Liese,

Enclosed is the proposed remediation plan associated with the Phillips Petroleum Company's 30-5 # 242 produced water pipeline spill. Details of the remediation plan are enclosed for your review. Phillips Petroleum Company is prepared to institute the remediation plan upon approval from regulatory agencies.

If you have any questions or if I may be of further service concerning this issue, please feel free to contact me at (505) 599-3462.

Regards,

Robert A. Wirtanen, C.S.P.
Senior Safety and Environmental Specialist

cc: Denny Foust, NMOCD (2)

PHILLIPS PETROLEUM COMPANY

SAN JUAN 30-5 # 242

PRODUCED WATER SPILL

PROPOSED REMEDIATION PLAN

Prepared By:
Cimarron Oilfield Services
Environmental Division
Farmington, New Mexico

May 6, 1998

INTRODUCTION:

Phillips Petroleum Company, San Juan 30-5 # 242 was reported to have spilled produced water from the well's produced water pipeline. The spill was identified on April 16, 1998 and was reported on April 17, 1998. The well is located in Unit Letter L of Section 34, Township 30 North and Range 5 West of the New Mexico Prime Meridian (NMPM), Rio Arriba County, New Mexico. The produced water spill occurred in Unit Letter "F" (1600' FNL & 2800' FWL) of Section 34, Township 30 North and Range 5 West. The initial estimate of the spill was 2250 barrels. Upon further investigation, evidence provided an estimate of 650 barrels.

The spill area is approximately 400 feet long by 35 feet (average) wide. Vegetation in the area is distressed (See vegetation survey attached). Slope of the area is moderate to none.

General soils in this area are the Travesilla-Weska-Rock outcrop complex. This unit is on upland hills, breaks, and mesas. Slope is 0 to 30 percent. The native vegetation is mainly pinyon, juniper, and grass. Elevation is 6400 to 7200 feet. The average annual precipitation is about 12 inches, the average annual air temperature is 50 degrees Fahrenheit, and the average frost-free period is about 135 days.

This unit is 40 percent Travesilla sandy loam, 30 percent Weska clay loam, and 25percent Rock outcrop.

Included in this unit are small areas of Buckle soils in upland valleys and on fans, Penistaja soils on mesas and plateaus, Twick soil on hills, and alluvial deposits of gravel and cobble in drainageways. Included areas make up about 5 percent of the total acreage.

The Travesilla soil is very shallow and shallow and is well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is brown sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Travesilla soil is moderately rapid. Water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. Where this soil has a native vegetation, the average wetting depth is 6 to 12 inches.

The Weska soil is very shallow and shallow and is well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 1 inch thick. The underlying material to a depth of 9 inches is light olive brown clay loam. Shale is at a depth of 9 inches.

Permeability of the Weska soil is moderately slow. Available water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. Where this soil has a cover of native vegetation, the average annual wetting depth is 6 to 9 inches.

Rock outcrop is exposures of barren sandstone on benches, ridges, and breaks.

The soils encountered during the assessment were primarily clay loam.

ASSESSMENT:

On April 23rd and 24th of 1998, Cimarron Oilfield Services began assessment of the San Juan 30-5 # 242 produced water spill. Eight test holes were utilized in assessing the vertical and lateral extents of the staining. Two test holes (one upstream and one downstream) were utilized for background (see attached maps). Each test hole was split spoon sampled to refusal (bedrock). Each sample was tested for pH levels in the field. Samples from bore hole # 7 and # 10 were sent to Intermountain Laboratories for pH, Electrical Conductivity (EC), Sodium Absorption Rate (SAR), Calcium, Magnesium, Sodium, Available Sodium, Exchangeable Sodium, Cation Exchange Capacity (CEC), and Exchangeable Sodium Percentage (ESP) analysis.

ASSESSMENT RESULTS:

Samples of the spill medium were sent to Intermountain Laboratories for analysis. Preliminary results of the assessment indicated a minimal depth of staining occurring within the spill area. Field testing of the soil pH levels ranged from 10-11 at the surface to 7.0-7.5 in lower depths (see attached table). Surface pH levels of 10-11 were found primarily in the small drainage centered in the spill area. Laboratory results of the assessment are attached and confirm preliminary assumptions.

PROPOSED REMEDIATION:

Reclamation of soil impacted by salt requires the removal of soluble salt, exchangeable sodium or both to the extent necessary to return soil to a productive state. Soluble salts are rather easily removed from saline soil if the salts can be leached with water to a depth beyond the rooting zone. Saline soil can heal within a few years without mitigative treatment if abundant precipitation flushes the soil (Auchmoody and Walters, 1988). Arid regions require active measures to be taken.

Exchangeable sodium is displaced from sodic soils by adding an amendment that supplies soluble calcium. The calcium replaces excess sodium in exchangeable sites within the soil. Free sodium then becomes a part of the soil solution and can be removed by leaching with water.

The kind and amount of chemical amendment to be used for the replacement of exchangeable sodium in soils depend upon the soil characteristics, the desired rate of replacement, and economic considerations.

Common chemical amendments that are applied to alkali soils are of three types:

Amendments for alkali soils:	*Chemicals*
Soluble calcium salts	Calcium chloride
	Gypsum
Acids or acid formers	Sulfur
	Sulfuric acid
	Iron Sulfate
	Aluminum sulfate
	Lime-sulfur
Calcium salts of low solubility	Ground limestone
	By-product lime from sugar factories

While each type of amendment has a place in reclamation, effectiveness under different soil conditions is governed by several factors, the principal ones being the alkaline-earth carbonate content and the pH reading. From the standpoint of their response to the various types of amendments, alkali soils may be divided into three classes: (1) Soils containing alkaline-earth carbonates, (2) soils having a pH greater than 7.5 but practically free of alkaline earth carbonates, and (3) soils having a pH reading of less than 7.5 and containing no alkaline-earth carbonates.

The use of amendments other than gypsum has been eliminated due to availability, economic considerations and handling procedures.

The following chemical equation illustrates the manner in which gypsum reacts in the different classes of alkali soils. In the equation the letter X represents the soil exchange complex.

$$2NaX + CaSO_4 \longrightarrow CaX_2 + Na_2SO_4$$

The addition of gypsum as a soil amendment will require 1,780 pounds per acre of gypsum added to the soil.

The San Juan 30-5 # 242 produced water spill has effected approximately one-half (1/2) acre. The spill area contains a bedrock liner ranging in depths of 8.25 feet to 18 feet. Groundwater is estimated to be between 200 and 260 feet based on cathodic well information within the area.

Requested remediation of the site includes several steps:

1. It is requested that the trees affected by the spill will be cut down as close to ground level as possible. The cut trees will be disposed in a manner suitable to the US Department of Interior, Bureau of Land Management (BLM). All other vegetation will remain intact to provide shading, and erosion control for nearby and surviving vegetation.

2. It is requested that a holding tank, pump, irrigation pipe, and sprinklers be established to provide water for the leaching of the soils. Phillips Petroleum Company requests that access to the holding tank be permitted along the established pipeline right-of-way (approx. 210 feet from the existing road). Leaching of the sodium into groundwater poses no threat to human health or environment due to the presence of the bedrock liner and the depth to groundwater (200-260 feet).

3. A physical inspection (April 28, 1998) by Mr. Rick Arnold (BS-Agronomy, MS-Pest Management, soil and weed specialist) recommended Nutri-cal in place of gypsum (See attachments). Calcium sulfate, or gypsum, is inexpensive. The companion anion causes no problems, but the compound is not very soluble. For every six inches of water applied to a field, only about 500 pounds of pure calcium sulfate dissolve per acre. This means huge quantities of water are needed to dissolve enough calcium sulfate to provide enough calcium ions to replace the sodium and correct the sodic conditions. Requested application of the Nutri-cal is 10 gallons per 322 barrels of water. There are no problems associated with the handling of Nutri-cal. Nutri-cal is organic, non-corrosive, nonflammable, and can be stored in any type storage tank. This makes it much easier than sulfuric acid or ammonium polysulfide. There is no risk of burns or equipment damage

4. It is requested that the area of greater impact be roto-tilled.

5. Phillips Petroleum Company requests seeding with BLM approved seed take place, utilizing a range drill seeder, as soon as possible. Inclusion of salt tolerant grass seed may be included, pending BLM approval.

6. It is requested that the area be watered (322 barrels) utilizing the fresh water/Nutri-cal mixture and sprinkler system. Water will not be allowed to migrate laterally and will have to be maintained to ensure proper application.

7. Phillips Petroleum Company requests that one-month after application, a second application will be administered to ensure proper reclamation.

8. It is requested that upon completion of the second application of fresh water/Nutri-cal mixture, all equipment will be removed from the area.

9. Phillips Petroleum Company requests that a visual inspection will proceed for approximately one year.

10. Due to the small area, limited disturbance during remediation, and the area being confined on all borders (2 Pipeline Right of Ways, and a Road) it is requested that a cultural survey may not be required.

Vegetation Survey
Provided for
Phillips Petroleum Company
April 27, 1998

On Friday, April 24, 1998 a Vegetation Survey was performed by Maria Adkins of Cimarron Environmental Service Company on the area of distressed vegetation related to the San Juan 30-5 #232 water spill. The area included a 100 ft. buffer zone outside the affected area. The spill is located in unit letter "F" (1600' FNL & 2800' FWL) of Section 34, Township 30 N, Range 5 W, of the New Mexico Prime Meridian (NMPM), Rio Arriba County, New Mexico. The area of distressed vegetation is approximately 400 ft. long by 35 ft. wide. Drainage is south 60 degrees east of the suspected area. New grass is coming up within the confines of the spill around the sagebrush.

The vegetation found on the site consist primarily of:

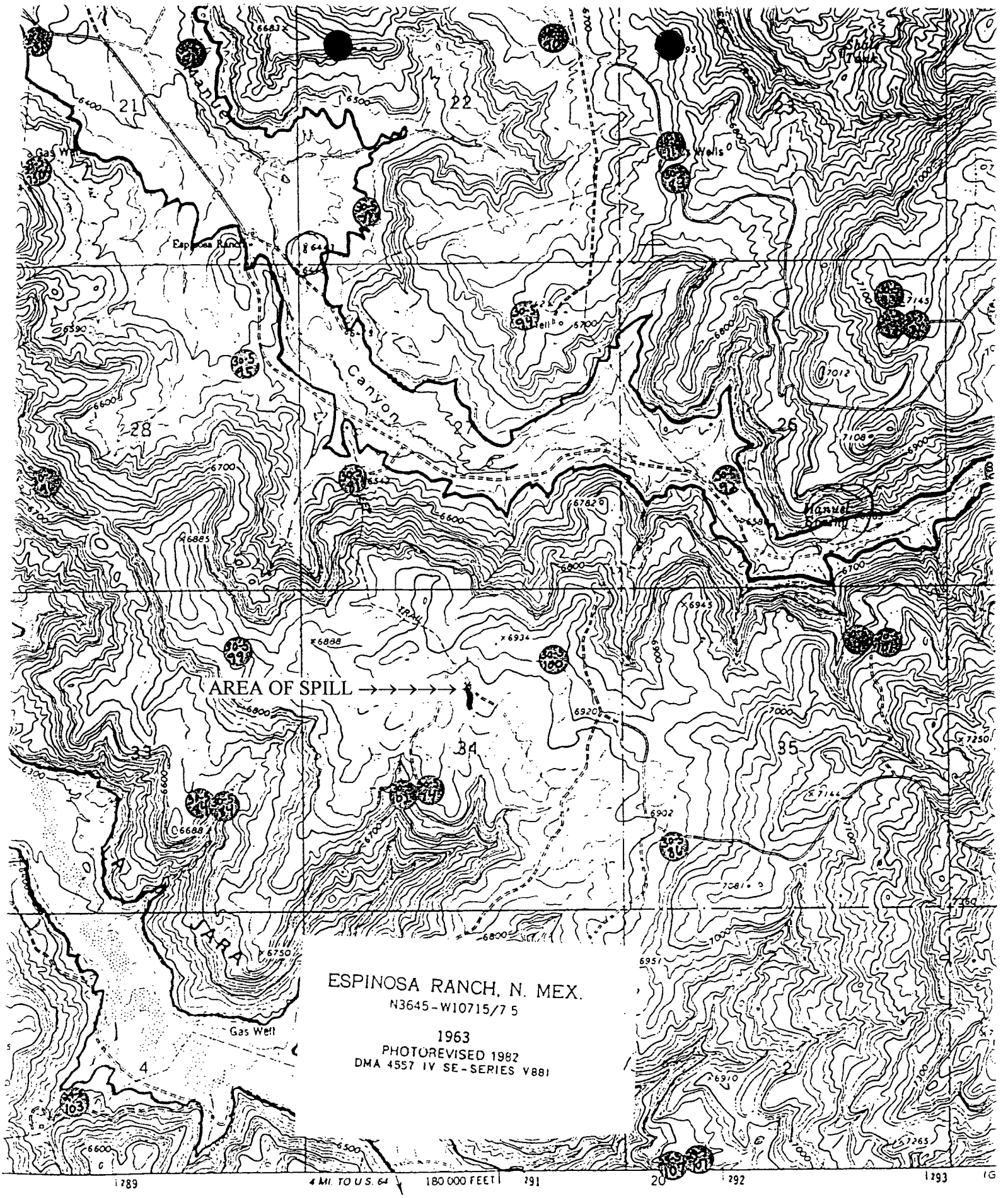
TREES
Pinon Pine (*Pinus edulis*)
Utah juniper (*Juniperus osteosperma*)

SHRUBS
Big sagebrush (*Artemisia tridentata*),
Common sagewort (*Artemisia campestris*),
Rubber rabbitbrush (*Chrysothamnus nauseosus*)

FORBS
Long-leaved Phlox (*Phlox longifolia*),
Mormon-tea (*Ephedra torreyana*)
Paintbrush (*Castilleja scabrida*)
Tansey mustard (*Descurainia pinnata*)
Tumblemustard (*Sisymbrium altissimum* L.)

GRASSES
Blue grama (*Bouteloua gracilis*)
Cheatgrass (*Bromus tectorum*)

CACTUS/YUCCA
Purple Prickly pear (*Opuntia violacea*)
Fendler's Hedgehog (*Echinocereus fendleri*)
Cushion cactus (*Coryphantha vivipara*)
Soapweed (*Yucca angustissima*)



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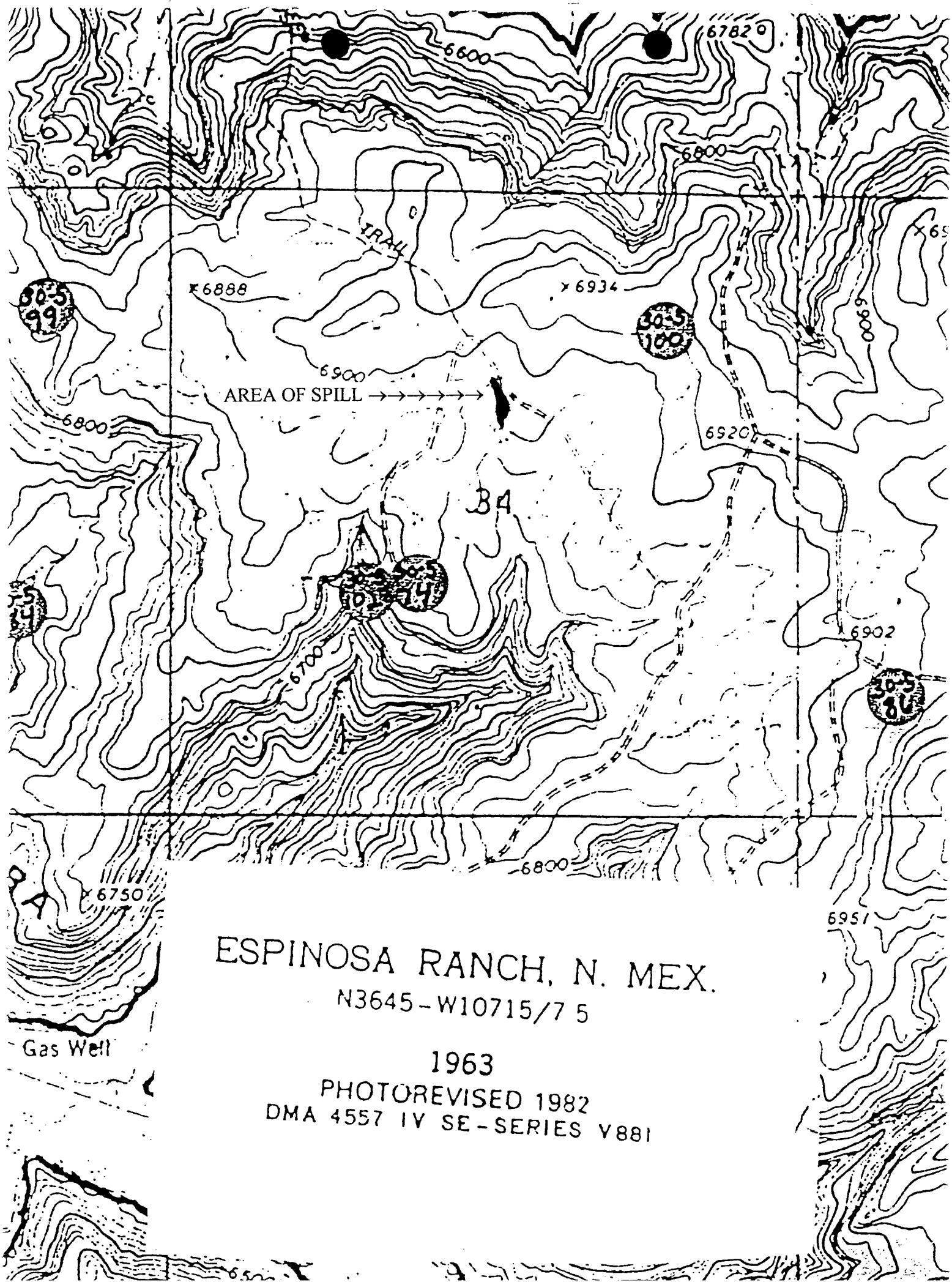

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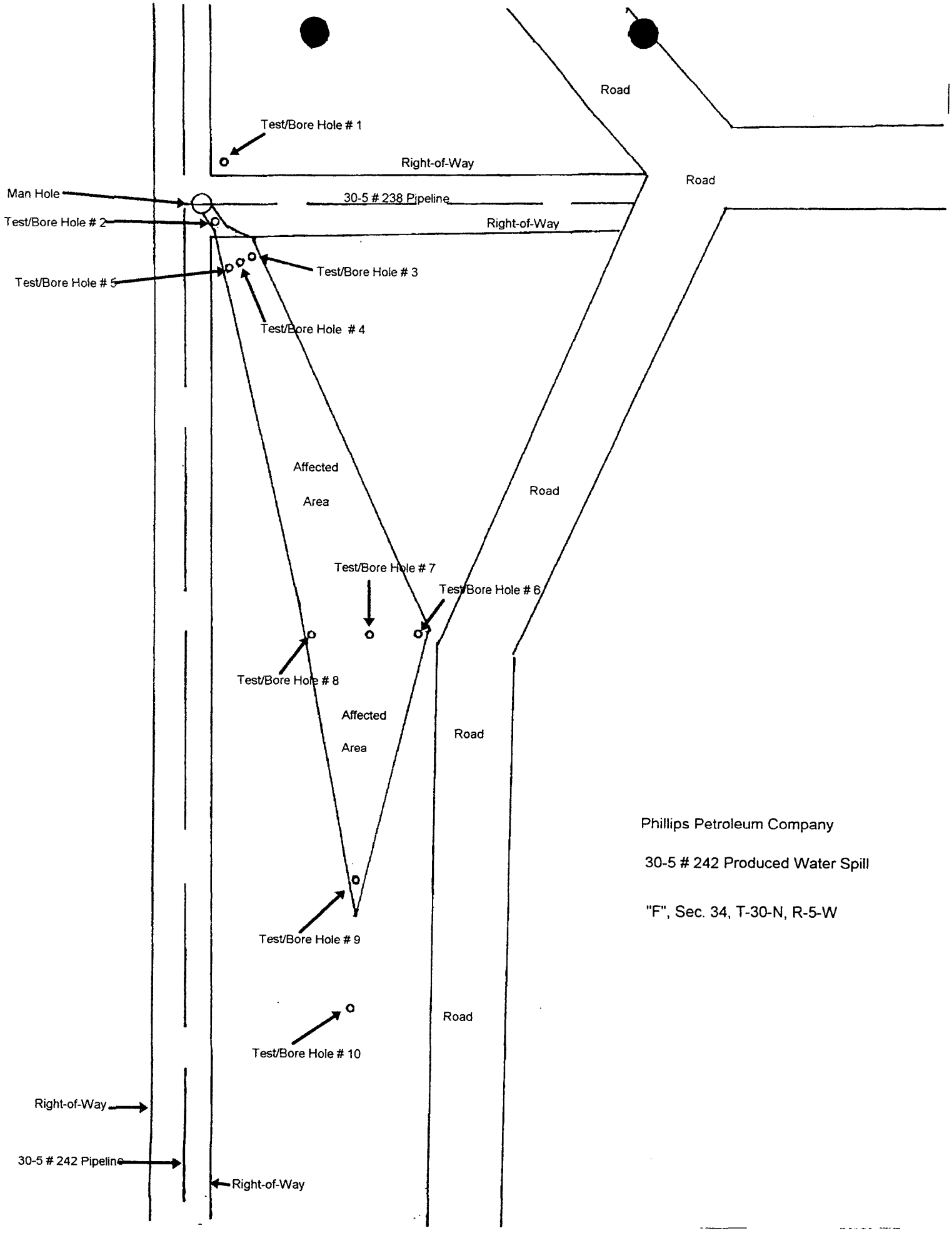

Phillips Petroleum Company

30-5 # 242 Produced Water Spill

"F", Sec. 34, T-30-N, R-5-W

imi
Inter- Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSES / PARAMETERS
Phillips Petroleum	SJ 30-5 #242 H_2O Spill	
Sampler: (Signature)	**Chain of Custody Tape No.**	

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	Remarks
						5 day rush
Bore Hole #10	4/14/98					TU, GC, GAR,
Surface	4/24/98					Available Na,
0-5 ft	4/24/98					Cyl. Na,
5 - 10½ ft	4/24/98					CEC, ESP

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	4/22/98	14:25			
Relinquished by: (Signature)	**Date**	**Time**	**Received by: (Signature)**	**Date**	**Time**
Relinquished by: (Signature)	**Date**	**Time**	**Received by laboratory: (Signature)**	**Date**	**Time**
				4/23/98	1012

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, Wyoming 82801
Telephone (307) 672-8945

1701 Phillips Circle
Gillette, Wyoming 82718
Telephone (307) 682-8945

2506 West Main Street
Farmington, NM 87401
Telephone (505) 326-4737

1160 Research Drive
Bozeman, Montana 59718
Telephone (406) 586-8450

11183 State Hwy. 30
College Station, TX 77845
Telephone (409) 776-8945

54690

inl
Inter- Mountain
Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSES / PARAMETERS
Phillips Petroleum	SJ 30-5 #242 H_2O Still	
Sampler: (Signature)	**Chain of Custody Tape No.**	

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	Remarks
Bore Hole #7	~~4/24/18~~					5 day rush EB
Surface	4/24/18			Soil	1	pH, EC, CaR, Available Na,
0-6 ft	4/24/18			Soil	1	Text Na,
6-12 ft	4/24/18			Soil	1	CEC, ESP
12-18½ ft	4/24/18			Soil	1	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	4/24/18	14:13			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time
				4/25/18	1413

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1633 Terra Avenue
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Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Phillips Petroleum Co.

Farmington, NM

Client Project ID: 30-5 #242 Water

IML Project #0398S02347

Date received: 04/28/98

Report Date: 05/05/98

Lab Id	Sample Id	Depths	pH	EC	Saturation	Ca	Mg	Na	SAR	Available Na	Cation Exch. Cap.	Exch. Na Percentage	
			s.u.	mmhos/cm	%	meq/L	meq/L	meq/L		meq/100g	meq/100g		
0398S02347	Bore Hole #7	Surface -	9.9	38.8	45	0.59	0.088	460	791	240	13.0	1710	Prelim.
0398S02348	Bore Hole #7	0 - 6	7.8	3.35	51	3.6	2.2	26	15	6.3	14.0	35.5	
0398S02349	Bore Hole #7	6 - 12	7.6	1.59	60	6.7	4.9	5.8	2	2.0	20.5	8.22	
0398S02350	Bore Hole #7	12 - 18.5	7.6	0.63	55	1.8	1.7	2.7	2	1.5	27.7	5.02	

iml

Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Phillips Petroleum Co.

Farmington, NM

Client Project ID: 30-5 #242 Water

IML Project #0398S02352

Date received: 04/28/98

Report Date: 05/05/98

Lab Id	Sample Id	Depths	pH	EC	Saturation	Ca	Mg	Na	SAR	Available Na	Cation Exch. Cap.	Exch. Na Percentage
			s.u.	mmhos/cm	%	meq/L	meq/L	meq/L		meq/100g	meq/100g	
0398S02352	Bore Hole #10	Surface -	5.8	0.20	35	0.84	0.41	0.50	1	0.46	10.1	4.36
0398S02353	Bore Hole #10	0 - 6	7.3	0.81	50	3.1	1.1	4.0	3	1.4	14.6	8.33
0398S02354	Bore Hole #10	6 - 10.5	7.6	1.79	46	7.6	2.1	9.3	4	1.7	12.3	10.3

Phillips Petroleum Company

30-5 # 242 Water Spill

Bore Hole # 1		Bore Hole # 2		Bore Hole # 3		Bore Hole # 4		Bore Hole # 5	
Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH
0	7.5 - 8.0	0	10 - 11	0	10 - 11	0	10 - 11	0	8.5 - 9.0
5 - 6	7.5 - 8.0	5 - 6	8.0 - 8.5	2	8.0 - 8.5	2	7.5 - 8.0	2	7.5 - 8.0
10 - 11.5	7.5 - 8.0	10	7.5 - 8.0	4	8.0 - 8.5	4	7.5 - 8.0	4	8.0 - 8.5
11.5	Bedrock	10	Bedrock	6	7.5 - 8.0	6	7.5 - 8.0	6	7.5 - 8.0
				8	7.5 - 8.0	8	7.5 - 8.0	8	7.5 - 8.0
				8.25	7.5 - 8.0	8.25	7.5 - 8.0	8.25	7.5 - 8.0
				8.25	Bedrock	8.25	Bedrock	8.25	Bedrock

Bore Hole # 6		Bore Hole # 7		Bore Hole # 8		Bore Hole # 9		Bore Hole # 10	
Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH	Depth (ft)	pH
0	8.5 - 9.0	0	10 - 11	0	7.0 - 7.5	0	7.0 - 7.5	0	7.0 - 7.5
2	7.0 - 7.5	2	7.5 - 8.0	2	7.5 - 8.0	2	7.0 - 7.5	2	7.0 - 7.5
4	7.0 - 7.5	4	7.0 - 7.5	4	7.5 - 8.0	4	7.0 - 7.5	4	7.0 - 7.5
6	7.0 - 7.5	6	7.0 - 7.5	6	7.0 - 7.5	6	7.0 - 7.5	6	7.0 - 7.5
8	7.0 - 7.5	8	7.0 - 7.5	8	7.0 - 7.5	8	7.0 - 7.5	8	7.5 - 8.0
10	7.5 - 8.0	10	7.5 - 8.0	10	7.0 - 7.5	10	7.5 - 8.0	10	7.5 - 8.0
12	7.5 - 8.0	12	7.5 - 8.0	12	7.0 - 7.5	12	7.0 - 7.5	10.5	7.5 - 8.0
14	7.5 - 8.0	14	7.5 - 8.0	14	7.0 - 7.5	14	7.0 - 7.5	10.5	Bedrock
16	7.0 - 7.5	16	7.0 - 7.5	16	7.0 - 7.5	16	7.5 - 8.0		
18	7.0 - 7.5	18	7.0 - 7.5	18	7.0 - 7.5	17	7.5 - 8.0		
18	Bedrock	18.5	7.0 - 7.5	18	Bedrock	17	Bedrock		
		18.5	Bedrock						

*NOTE: Bore Holes 6, 7, and 8 contained a gray shale 1 foot in depth average at 13 to 14 feet.

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 1

Slightly moist	0 ft
Dry	2 ft
Brown Clay-Loam	4 ft
	6 ft
Shale	8 ft
	10 ft
Bedrock	11.5 ft

pH = 7.5-8.0

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 2

Moist Clay Loam	0 ft	pH = 10-11
	2 ft	
	4 ft	
		pH = 8.0-8.5
	6 ft	
	8 ft	
		pH = 7.5-8.0
Bedrock	10 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 3

Moist Clay Loam	0 ft	pH = 10-11
	2 ft	pH = 8.0-8.5
	4 ft	
	6 ft	pH = 7.5-8.0
	8 ft	
Bedrock	8.25 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 4

	0 ft	pH = 10-11
Very Moist Clay Loam	2 ft	pH = 7.5-8.0
	4 ft	
Moist Clay Loam		
	6 ft	pH = 7.5-8.0
Clay Loam	8 ft	
Bedrock	8.25 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 5

Dry	0 ft	pH = 8.5-9.0
Clay-Loam	2 ft	pH = 7.5-8.0
	4 ft	pH = 8.0-8.5
	6 ft	pH = 7.5-8.0
	8 ft	
Bedrock	8.25 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 6

Dry	0 ft	pH = 8.5-9.0
Clay-Loam	2 ft	pH = 7.0-7.5
	4 ft	
	6 ft	
	8 ft	
	10 ft	pH = 7.5-8.0
	12 ft	
Gray Shale		
	14 ft	pH = 7.0-7.5
	16 ft	
	18 ft	
Bedrock	18.5 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 7

Dry	0 ft	pH = 10-11
Clay-Loam	2 ft	pH = 7.5-8.0
Moist Clay-Loam	4 ft	pH = 7.0-7.5
	6 ft	
Dry		
	8 ft	
	10 ft	pH = 7.5-8.0
	12 ft	
Gray Shale		
	14 ft	pH = 7.0-7.5
	16 ft	
	18 ft	
Bedrock	18.5 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 8

Dry	0 ft	pH = 7.0-7.5
Clay-Loam	2 ft	pH = 7.5-8.0
Moist Clay-Loam	4 ft	
	6 ft	pH = 7.0-7.5
Dry	8 ft	
	10 ft	
	12 ft	
Gray Shale	14 ft	
	16 ft	
Bedrock	18 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 9

Dry	0 ft	pH = 7.0-7.5
Clay-Loam	2 ft	
Moist Clay-Loam	4 ft	
	6 ft	
Dry		
	8 ft	
	10 ft	pH = 7.5-8.0
	12 ft	pH = 7.0-7.5
	14 ft	
Gray Shale		
	16 ft	pH = 7.5-8.0
Bedrock	17 ft	

Phillips Petroleum Company
SJ 30-5 # 242 Spill
Drill Log
Test Hole # 10

Dry	0 ft	pH = 7.0-7.5
Clay-Loam	2 ft	
Moist Clay-Loam	4 ft	
	6 ft	
Dry		
	8 ft	pH = 7.5-8.0
	10 ft	
Bedrock	10.5 ft	