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REPORTS

DATE:
JAN 1995

PRODUCED WATER PIPELINE RELEASE INVESTIGATION STINKING DRAW, EDDY COUNTY, NEW MEXICO

by

RE/SPEC Inc.
4775 Indian School Road, NE
Suite 300
Albuquerque, New Mexico 87110

prepared for

Yates Petroleum Corporation
105 South 4th Street
Artesia, New Mexico 88210

January 1995

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1.0 INTRODUCTION

On November 7, 1994, Yates Petroleum Corporation reported a produced water release from a buried eight-inch pipeline which passes through Stinking Draw, a tributary to the Pecos River, northwest of Carlsbad, New Mexico. The approximate coordinates of the release are the NE/4 of Section 2, T21 S, R23 E, Eddy County. The loss was estimated at approximately 18,000 barrels and was reported to both the U.S. Bureau of Land Management in Carlsbad and the New Mexico Oil Conservation Division in Artesia. The pipe failed due to subsidence, and its contents were released entirely to the subsurface beneath the dry arroyo. A water analysis of two typical gas wells providing water to the pipeline taken five days before the release averaged 10,275 mg/L total dissolved.

A second release of about 500 barrels occurred at this location on December 7, 1994, due to excessive pressure. Produced water from this break flowed at the surface approximately 50 feet downstream before being contained. About 110 barrels of ponded water were pumped into trucks for proper disposal.

Subsequent to the first release, RE/SPEC Inc. (RSI) was retained to investigate the severity of subsurface soil contamination at the location and to evaluate the potential for groundwater quality impacts. Site visits were made the afternoon of November 9 and on December 1, 1994. This report presents a summary of the investigation and results of soil and groundwater sampling performed at the site and nearby locations.

2.0 HYDROGEOLOGIC SETTING

The release site (Figure 1) is located in West Central Eddy County, approximately 21 miles northwest of Carlsbad and 11 miles west of the settlement known as Seven Rivers. The release location, Stinking Draw, is a tributary of South Seven Rivers which, in turn, is a tributary to the Pecos River. However, with the recent completion of Brantley Dam, the South Seven Rivers flows directly into Brantley Lake. The site is in an area of moderate relief forming an eastward-sloping plain which is cut by frequent east-west drainages to the Pecos River. The general topographic name given to this area is the "Diamond 'A' Plain" (Hendrickson and Jones, 1952).

Watercourses in this area are dry except in direct response to precipitation. Precipitation is infrequent; average yearly rainfall in this area is from 14 to 16 inches, occurring mainly in the form of light showers in the winter and thunderstorms during the summer months which can be locally heavy. The presence of cobbles and large rocks in the watercourses attest to the high energy runoff produced by the large storms.

Near-surface geology of the area includes the Permian Chalk Bluff formation and more recent Quaternary alluvium. The Chalk Bluff outcrops on the surface in the area except where overlain by alluvium in the drainageways. The thickness of the formation in the vicinity of Lakewood near old Lake McMillan is estimated at 40 to 600 feet. The Seven Rivers member of the formation is exposed at the surface in the vicinity of the site. It consists mainly of anhydrite, gypsum, redbeds, and some interbedded limestone and dolomite. The Queen sandstone exists at depth and in turn is underlain by a basal limestone which is an important source of groundwater in vicinity of the site. This limestone (which is the equivalent to the Goat Seep limestone further south) overlies the San Andres formation.

The groundwater potentiometric surface beneath the site is at an estimated depth of between 220 and 230 feet. This was calculated using well and groundwater information provided by Hendrickson and Jones for locations east and west of the site and interpolating the groundwater gradient (approximately 14 feet per mile). As reported by those authors, groundwater in the southern part of the Roswell artesian basin does not vary widely between well locations, and groundwater elevations at a given location can be predicted with a fair degree of accuracy. Groundwater movement at the site is to the northeast generally in the direction of the South Seven Rivers (Hendrickson and Jones, Plate 3).

Two nearby wells to the north of the site had depths to water ranging from 300 to 350 feet but are located at a higher elevation on the plain. These wells are completed in limestone which is probably the basal limestone of the Chalk Bluff formation. Water in this limestone in some areas in the southern Roswell basin is confined by the less permeable beds of the Chalk Bluff and exhibits artesian properties. Whether this is the case in the vicinity of the release site is unknown. However, the relatively low permeability of the overlying rocks and the presence of artesian properties in other wells in the same formation leads to the inference that groundwater beneath the site is confined with the potentiometric surface at a higher elevation than the actual water bearing zone. If this is the case, groundwater is separated from any shallow alluvial water and protected from a transient surface release to the alluvial system.

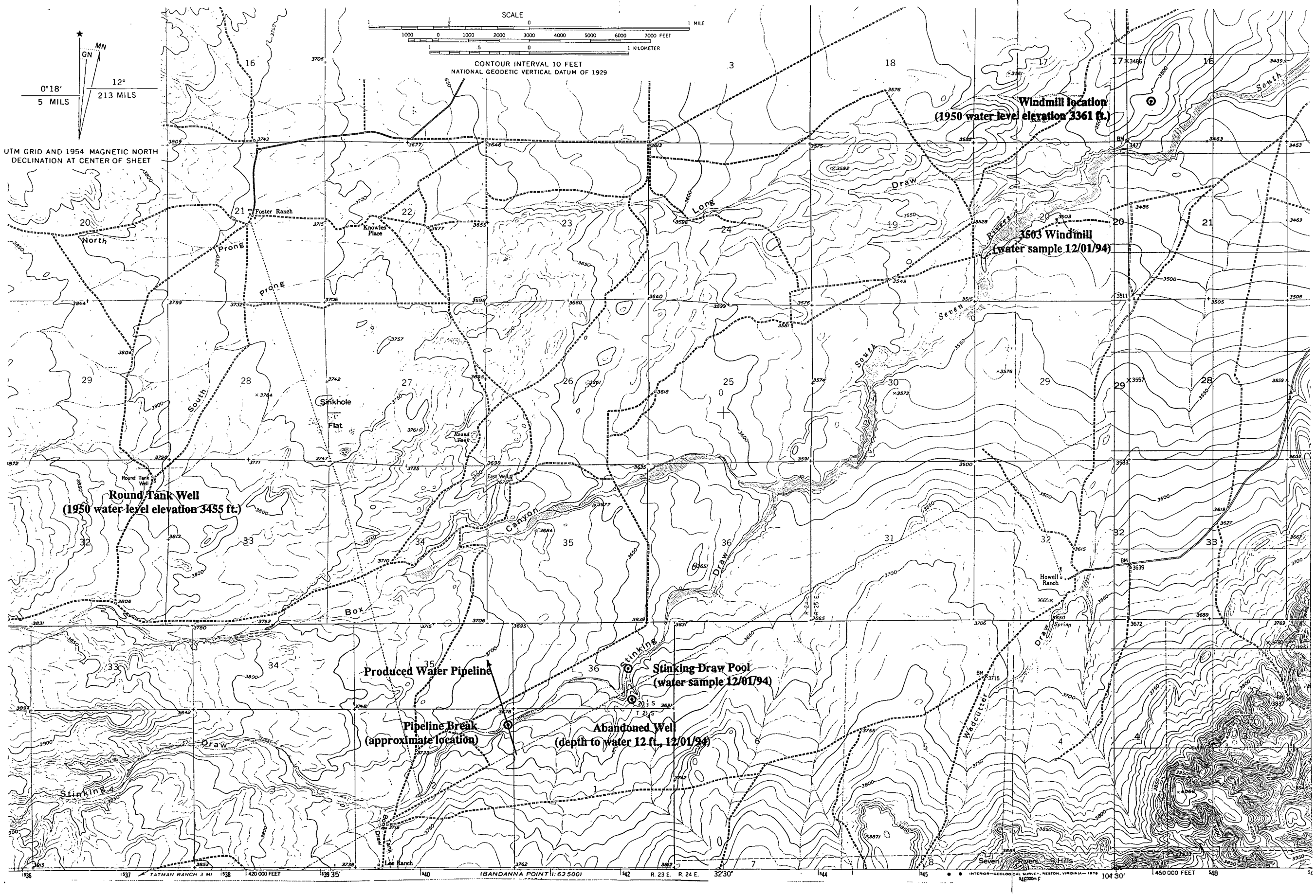

Figure 1. Location Map of Stinking Draw Produced Water Release Site and Vicinity

3.0 FIELD INVESTIGATION

The field investigation by RSI consisted of a brief site visit by David Boyer on November 9, 1994, followed by a day-long investigation on December 1. The first visit was to view the ditch containing the pipeline and adjacent exposed soils and to obtain a sample of the produced water for analysis. The December 1 investigation included soil sampling from an exploratory hole drilled by a solid-stem auger, investigation of downstream surface conditions, and groundwater sampling of a downgradient well.

On November 9, the plastic pipe was exposed in an excavated ditch approximately 50 feet long that ranged from about 3 to 16 feet in depth. Soil adjacent to the pipe was moist and exhibited a strong hydrocarbon odor. No standing water was observed. A sample of the produced water was collected from an access value approximately one-quarter mile to the north of the break point. This sample was analyzed for total dissolved solids and major ionic constituents.

Major soils and water sampling occurred on December 1. These were performed by RSI staff David Boyer and Ron Parsons. After clearing a site for equipment access, a hole was drilled on the north side of the arroyo a distance of 42 feet east and downgradient of the break. The hole was drilled using a solid-stem auger from Frank's Rathole Service of Artesia. Drilling commenced about 11 a.m. was completed about 1:30 p.m.

Samples were collected at frequent intervals from the auger cuttings and observed for lithology, moisture, and odor. Soil collected from discrete intervals was placed in plastic bags for later scanning by a photoionization detector (PID) and also placed in glass jars for possible laboratory analysis for organic hydrocarbons. At the conclusion of the drilling, the bagged samples, which had been allowed to remain at room temperature for a minimum of 15 minutes, were scanned by the PID. Samples having significantly elevated PID readings were selected for organic analysis together with some samples exhibiting an odor. For comparison purposes, a sample having no odor or PID reading was also submitted for laboratory analysis.

At the conclusion of the drilling, Stinking Draw was examined immediately downstream of the site for any evidence of produced water surfacing in the arroyo. No surface evidence of the spill was located. However, one pool of standing water was located approximately one-half mile downstream from the site and sampled. The pool was located in a scoured depression in bedrock which appears to be gypsum interbedded with limestone seams.

The pool was located below the confluence of a side arroyo from the south which was wet and had some seeps and standing water. An abandoned water well was located on the west embankment of the tributary arroyo with standing water about 12 feet beneath the ground surface and a total depth of 19 feet. The elevation of this water is above the elevation of the surface of Stinking Draw nearby indicating that the water is perched. Water from the side arroyo apparently is prevented from migrating downward by the consolidated gypsum and limestone rock and resides in the thin alluvium, emerging as seeps and springs at the confluence of the two drainages.

A second sample was obtained from the produced water pipeline and analyzed for water chemistry and volatile organic compounds (BTEX). Later in the afternoon, a windmill located on the south side of Stinking Draw approximately 4 miles downstream of the spill site was sampled to provide water quality information on groundwater adjacent to the Stinking Draw drainage. The windmill has a surface elevation of 3503 feet, but well depth and depth to water information were not available due to insulation surrounding the casing that prevented access to the well bore for measurements.

4.0 RESULTS

Analysis of soil samples collected during the coring operation indicate the presence of petroleum hydrocarbons in subsurface soils beginning at approximately 13 feet and continuing until boring total depth of 40 feet (Table 1). Total petroleum hydrocarbon concentrations were significantly elevated in four samples collected at depths from 24 to 37 feet. However, significantly elevated concentrations of volatile aromatics (benzene, toluene, ethyl-benzene, and xylenes, or BTEX) were found only for samples taken at 24 and 37 feet, depths where samples also exhibited significantly elevated PID readings. Benzene concentrations never exceeded 200 ug/kg (ppb) and were less than 100 ug/kg in all samples except for the sample collected at 24 feet. In addition, benzene was not detected in two of four samples collected at depths from 24 to 37 feet. Benzene also was not detected at a minimum detection limit of 1 ug/kg in the lowest interval (40 feet) sampled. This indicates that the bulk of the soil contamination is likely at an elevation less than 40 feet beneath the surface.

Groundwater was not encountered during the drilling, although a moist and wet zone up to six inches thick was observed in cuttings from a depth of approximately 20 feet. Lower intervals were either dry or only slightly moist. Moisture from the damp zone was observed to migrate to the bottom of the hole but did not pond to any significant depth during the time the hole was open. This zone was either a naturally wet perched moisture zone or was saturated by water released by the pipeline rupture. In any event, the amount of water available to the borehole was minuscule.

Water chemistry samples obtained from the produced water pipeline averaged 7,125 mg/L total dissolved solids (TDS) (Table 2). This classifies the water as brackish, but it does not exhibit the very high concentrations of salts typically associated with oilfield-produced waters. However, the water did contain significant concentrations of dissolved volatile organics with benzene having a concentration of 2,120 ug/L, and toluene and xylenes having similarly high values.

Water in the Stinking Draw pool also had elevated TDS, but in contrast to the produced water the sodium/potassium and chloride concentrations were exceeded by calcium/magnesium and sulfate concentrations. A comparison of the concentrations, especially sodium, indicates that the source rock for the two types of water differs and that commingling of water in the surface pool with produce water has not occurred. Similarly, water in the 3503 windmill is exceptionally low in sodium and chloride.

The lack of these constituents in the 3503 windmill lends credence to the hypothesis proposed by Hendrickson and Jones that the groundwater in this area is contained in the basal limestone described above and is essentially isolated from or has only minimal contact with water originating from the near-surface rocks above. The likely separation of near surface water from deeper subsurface groundwater in this area also will prevent an occasional transient release of produced water from impacting the regional water table.

Table 1. Soil Data Summary -- Yates Produced Water Release Study

Sample No.	Depth (ft.)	Lithology (samples recovered from auger flight)	Odor	Moisture (%)	PID Reading (ppm)	Benzene (ug/kg)	Toluene (ug/kg)	Ethyl-Benzene (ug/kg)	Xylenes (ug/kg)	Total BTEX (ug/kg)	TPH (mg/kg)
--	0 - 6	Surface gravels	None	--							
1	8	Silty Sand, dark brown	None	--	0	--	--	--	--	--	--
2	13	Silty sand w/white rock fragments on auger flight	None	5	0	ND	ND	ND	ND	ND	18
3	14	Silty sand, slightly moist	Slight	--	0	--	--	--	--	--	--
4	15	Sandy silt, brownish, greenish, slightly moist	Slight	--	0	--	--	--	--	--	--
5	17	Sandy silt w/some green clay	--	12.5	0	ND	ND	ND	ND	ND	14
6	18	Silty clay, gray/brown, moist, plastic	Strong	18.5	0	ND	ND	ND	2.3	2.3	ND
7	20	Silty clay, brown w/gray streaks, wet	--	18.3	0	9.0	ND	2.1	21.7	32.8	22
8	24	Silt, gray, dry, may be powdered rock	Slight	5.8	210	<200	<200	<200	<530	--	1170
9	25	Silt, light gray, dry (source rock fragment may be shale or mudstone)	--	7.4	20	ND	11	10	25	46	513
10	30	Silt, dark gray, slightly moist	None	11.1	6	ND	3.1	1.9	4.2	9.2	415
11	31	Silt, light gray	--	--	12	--	--	--	--	--	--
12	37	Silt, dark gray	Slight	6.7	83	<100	<100	<100	<530	--	939
13	40	Hard rock (limestone or gypsum?), light gray	--	2.8	6	ND	1.6	ND	8.9	10.5	71

Notes:
PID - Photoionization Detector; TPH - Total Petroleum Hydrocarbons

Table 2. Water Quality Data Summary -- Yates Produced Water Release Study

Sample Date	Sample Identification	TDS (mg/L)	Calcium + Magnesium (mg/L)	Sodium + Potassium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylenes (mg/L)	TPH (mg/L)
11/09/94	Pipeline Produced Water	5,410	604	1,378	1,380	1,920	--	--	--	--	--
12/01/94	Pipeline Produced Water	8,840	633	2,632	3,510	1,930	2.12	4.14	<0.200	2.17	0.160
12/01/94	Stinking Draw Pool	6,460	1,334	475	1,580	2,650	--	--	--	--	--
12/01/94	3503 Windmill	2,360	601	32	18	1,590	--	--	--	--	--
--	NMWQCC Ground Water Standards	1000	--	--	250	600	0.01	0.75	0.75	0.62	--

Notes:
NMWQCC - New Mexico Water Quality Control Commission (standards shown for comparision purposes)
TPH - Total Petroleum Hydrocarbons

5.0 DISCUSSION

The pipeline break released water containing elevated concentrations of both organic and inorganic constituents into a generally dry subsurface environment. A number of mechanisms occur in the subsurface to naturally attenuate these constituents.

When passing through unsaturated materials with low moisture contents, the water must first overcome capillary forces which will capture and retain moisture until an equilibrium is reached in the soil pores. Only then will significant amounts of water be transmitted through the subsurface. This process of absorbing moisture will reduce the volume of water available to migrate downward through the subsurface. Additionally, the presence of bedded rock material in the subsurface will retard downward water movement and spread moisture horizontally where it will come in contact with a larger mass of unwetted material, further reducing the volume of water available to migrate downward.

The mass of dissolved organic constituents in the water will be further attenuated through several additional mechanisms. These include volatilization, sorption on clays and other fine-grained materials, and decomposition through biological and chemical reactions. Benzene, especially, is subject to decomposition through these commonly occurring mechanisms. Such decomposition is enhanced when the original source of the hydrocarbons (such as petroleum condensate) is not present to continually replenish hydrocarbons decomposed by these mechanisms.

The depth of groundwater beneath the site (>220 feet) and the presence of rocks having relatively low permeability make it unlikely that produced water from this transient spill has or will reach the groundwater surface. This conclusion is supported by the documented artesian conditions in wells completed in the Chalk Bluff limestone and the dissimilarity between water found in the shallow pool and the 3503 windmill. However, if such contact were to be made, the impact on the groundwater quality would be minimal. The additional attenuation mechanism of hydrodynamic dispersion will mix and dilute the produced water. Further, dissolved organic constituents will continue to be subject to attenuation mechanisms including volatilization, sorption, and decomposition.

6.0 CONCLUSIONS

1. Except for a wet zone approximately six inches thick at a depth of about 20 feet, no groundwater was encountered to the final boring depth of 40 feet.

2. Most zones were dry; many recovered samples were powdery and likely residue from boring through hard, consolidated rock.

3. Hydrocarbon odors were detected beginning at 13 feet. PID readings were obtained beginning at 24 feet.

4. BTEX was detected in soil beginning at 18 feet, with the highest concentrations found at 24 and 37 feet. Elevated concentrations of TPH greater than 100 mg/kg were found from 24 to 37 feet.

5. The dry and fine-grained nature of the soil material makes it ideal for sorption of moisture and capture and attenuation of BTEX organics.

6. The groundwater potentiometric surface beneath the site is estimated to be at a depth in excess of 220 feet. Groundwater in the vicinity is found in a basal Chalk Bluff limestone that exhibits artesian conditions.

7. Rocks beneath the site include redbeds, gypsum and limestone. Except for the basal limestone, these rocks generally are non-water bearing and not water transmissive.

8. A surface water pool located approximately one-half mile downstream from the spill location was sampled and contains naturally high concentrations of calcium/magnesium and sulfate salts which differ in composition from the produced water salts. Immediately upstream of this pool, springs and seeps were observed emanating from a side arroyo to the south where perched water discharges from water-bearing zones on top of consolidated bedrock.

9. A windmill approximately four miles east of the site has groundwater with significantly different water quality characteristics. The water has only minimal quantities of sodium and chloride, which support published information that water in contact with surface rocks is not vertically connected to any great extent with groundwater in the deeper rocks.

10. Although the spilled produced water contained hydrocarbons, they were dissolved in the water and provided a finite mass available for degradation by natural mechanisms. By contrast, a spill of hydrocarbon product into water continues to provide a hydrocarbon source, making degradation by naturally occurring mechanisms much more difficult and lengthy.

11. The combination of deep groundwater, poorly transmissive intermediate rocks, and the lack of a hydrocarbon source in the subsurface to continually leach organics makes it unlikely that groundwater contamination has resulted or will result in the future from this incident. In the event such contamination did occur, the minimal nature of the release, plus dispersive forces in the moving groundwater, would limit spill impacts.

12. The lack of major surface impacts and the absence of near-surface groundwater lead to a conclusion that further remediation of soils would not provide any additional protection for groundwater and therefore is unnecessary.

7.0 REFERENCES

Hendrickson, G.E. and R.S. Jones, 1952. "Geology and Ground-Water Resources of Eddy County, New Mexico", *Ground-Water Report 3*, N.M. Bureau of Mines and Mineral Resources, Socorro, 169 pages, 4 plates.

Appendix A

Field Investigation Photograph Log

Photograph Log
Yates Produced Water Release Investigation
Stinking Draw, Eddy County, New Mexico
December 1, 1994

Photograph 1: Stinking Draw looking east (downstream)

Photograph 2: Solid-stem auger drilling rig used to obtain soil samples.

Photograph Log
Yates Produced Water Release Investigation
Stinking Draw, Eddy County, New Mexico
December 1, 1994

Photograph 3: Replacement section of wastewater pipeline looking north. Above-ground portion of line connects with buried line in open trench shown in distance.

Photograph 4: View of drilling rig showing proximity to pipeline. North bank of Stinking Draw is to right of ice-chest.

Photograph Log
Yates Produced Water Release Investigation
Stinking Draw, Eddy County, New Mexico
December 1, 1994

Photograph 5: Close-up of auger bit showing the generally dry nature of the subsurface materials.

Appendix B

Soil and Water Analytical Results

imL

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
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Phone (409) 776-8945 FAX (409) 774-4705

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

David Boyer
RE/SPEC
4775 Indian School Road
NE Ste. 300
Albuquerque, New Mexico 87110-3927

December 22, 1994

Dear Mr. Boyer,

On November 14, 1994, one water sample was received, cool and intact, by Inter-Mountain Laboratories - College Station. Analysis for general chemistry parameters were performed as requested on the accompanying chain of custody. Enclosed are results for the water sample identified as Yates Pipeline - Artesia, NM "PW (Produced Water)."

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analysis of the sample reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, 1986 and Final Update I, July 1992. All reports in this package reference the methods utilized.

All detection limits are practical quantitation limits (PQLs). PQLs have been corrected for dilutions, volume of the sample analyzed, sample dry weight and the final volume of the extract analyzed.

Quality Control reports have been included for your information and use. These reports appear at the end of the analytical package and may be identified by title. If there are any questions regarding the information presented in this package, feel free to call at your convenience.

Sincerely,

Ramona R. Dennis

Ramona R. Dennis
Organic Laboratory Manager

NAV2169

Inter-Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name: Yates Pipeline

Project Location: Artesia NM

Sampler: (Signature) [signature]

Chain of Custody Tape No.

ANALYSES / PARAMETERS

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	Gen Chem				Remarks
PW (produced water)	11/9/94	1722	[illegible]W[illegible]9	water	1	X				

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	11/10/94	1000	[signature]	11/11/94	0915
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

Inter-Mountain Laboratories, Inc.

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

☐ 1714 Phillips Circle, Gillette, Wyoming 82716, Telephone (307) 682-8945

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

☐ 1160 Research Dr., Bozeman, Montana 59715, Telephone (406) 586-8450

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imi

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WATER QUALITY REPORT

Client: Yates Petroleum
Project: Yates Pipeline
Sample ID: PW
Lab ID: 0494W10227/0694W02169
Matrix: Water
Condition: Intact

Report Date: 01/12/95
Receipt Date: 11/15/94
Sample Date: 11/09/94

Parameter	Concentration	PQL	Method
pH (Lab)	8.5 s.u.	0.1	SW-846 9040
Conductivity (Lab)	8050 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180 C)	5410 mg/L	10	EPA 340.2
Total Alkalinity (as CaCO3)	782 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1680 mg/L	1	Calculation
Fluoride	3.4 mg/L	0.1	EPA 340.2

Calcium	497 mg/L	24.80 meq/L	1 mg/L	SW-846 6010A
Magnesium	107 mg/L	8.82 meq/L	1 mg/L	SW-846 6010A
Potassium	48 mg/L	1.24 meq/L	1 mg/L	SW-846 6010A
Sodium	1330 mg/L	57.96 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	953 mg/L	15.63 meq/L	1 mg/L	EPA 310.1
Carbonate	NR*	0.00	1 mg/L	EPA 310.1
Chloride	1380 mg/L	39.46 meq/L	1 mg/L	SW-846 9251
Sulfate	1920 mg/L	39.85 meq/L	5 mg/L	SW-846 9036
Cation Sum	92.78 meq/L		N/A	Calculation
Anion Sum	94.45 meq/L		N/A	Calculation
Cat/Anion Balance	-0.89 % Diff		N/A	Calculation

*NR - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

Gary L. Pudge
Director, Soil Laboratory

imd
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WATER QUALITY REPORT
QUALITY CONTROL

12/19/94

CLIENT:
PROJECT: YATES PIPELINE

ANALYTE	REFERENCE I.D.	FOUND CONCENTRATION	KNOWN CONCENTRATION
Conductivity	ICVSM	830.	825.
Calcium	ICVSM	37.	40.
Magnesium	ICVSM	21.	20.
Potassium	ICVSM	9.	10.
Sodium	ICVSM	103.	100.
Chloride	ICVSM	129.	129.
Sulfate	ICVSM	95.	100.
Fluoride	ICVSM	0.4	0.4

Reviewed by:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

Mr. David Boyer
RE/SPEC
4775 Indian School Road
NE Ste. 300
Albuquerque, New Mexico 87110-3927

December 29, 1994

Dear Mr. Boyer,

On December 03, 1994, nine soil samples three water samples and one trip blank was received, cool and intact, by Inter-Mountain Laboratories - College Station. Analyses for BTEX, TPH, moisture content and general water chemistry were performed as requested on the accompanying chains of custody.

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analysis of the sample reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, Final Update I, July 1992. All reports in this package reference the methods utilized.

Quality Control reports have been included for your information and use. These reports appear at the end of the analytical package and may be identified by title. If there are any questions regarding the information presented in this package, feel free to call at your convenience.

Sincerely,

Ramona R. Dennis

Ramona R. Dennis
Organics Laboratory Manager

NAV2291

Inter- Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
YATES - STINKING DRAW	ARTESIA

Sampler: (Signature)	Chain of Custody Tape No.
W J Rouse	

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	BTEX	TPH	Water chemistry		Remarks
STINKING DRAW #2	12/01/94	1118	0607K1-2291	Soil	1	✓	✓			Moisture Content for Soils
#5	"	1141	2292		1	✓	✓			"
#6		1148	2293		1	✓	✓			"
#7		1153	2294		1	✓	✓			"
#8		1158	2295		1	✓	✓			"
#9		1205	2296		1	✓	✓			"
#10		1239	2297		1	✓	✓			"
#12		1300	2298		1	✓	✓			"
#13		1319	2299	Soil	1	✓	✓			"
Pipeline Produced Water		1415	2300	Water	4	✓	✓	✓		
STINKING DRAW Pool	12/01/94	1510	2301		1			✓		
3503 Windmill	"	1605	2302		1			✓		
~~Field Blank~~										
TRIP BLANK			2303	Water	1	✓				

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
W J Rouse	12/01/94	1900	Lisa R Mayfield	12/2/94	11:00 AM
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

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PERCENT MOISTURE

Client:	**RE/SPEC**		
Project:	Yates -Stinking Draw / Artesia, NM	Date Reported :	12/19/94
Matrix:	Soil	Date Sampled :	12/01/94
Condition:	Intact	Date Received :	12/03/94
		Date Analyzed :	12/12/94

Sample ID	Laboratory ID	% Moisture
Stinking Draw #2	0694G02291	5.0%
Stinking Draw #5	0694G02292	12.5%
Stinking Draw #6	0694G02293	18.5%
Stinking Draw #7	0694G02294	18.3%
Stinking Draw #8	0694G02295	5.8%
Stinking Draw #9	0694G02296	7.4%
Stinking Draw #10	0694G02297	11.1%
Stinking Draw #12	0694G02298	6.7%
Stinking Draw #13	0694G02299	2.8%
Stinking Draw #13	0694G02299 DUP	2.7%

Reference:

Test Methods for Evaluating Solid Waste, SW - 846,
United States Environmental Protection Agency, Final Update I,
July 1992.

Comments:

Bonnie Glazier
Analyst

Wendi M Hogan
Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 2	Date Sampled:	12/01/94
Sample Number:	0694G02291	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	10:12 AM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-xylene	ND	1.0
o-xylene	ND	1.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	82%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendell M Key

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 2	Date Sampled:	12/01/94
Laboratory ID:	0694G02291	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	18	11

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 5	Date Sampled:	12/01/94
Sample Number:	0694G02292	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	10:54 AM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	ND	1.1
Toluene	ND	1.1
Ethylbenzene	ND	1.1
p,m-xylene	ND	1.1
o-xylene	ND	1.1

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	85%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wanda M Rogers

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 5	Date Sampled:	12/01/94
Laboratory ID:	0694G02292	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	14	11

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

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College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX DUPLICATE
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID:	Matrix Duplicate	Report Date:	12/13/94
Laboratory ID:	0694G02298 Dup	Date Sampled:	12/01/94
Sample Matrix:	Soil	Date Received:	12/03/94
Preservative:	Cool	Date Extracted:	12/12/94
Condition:	Intact	Date Analyzed:	12/13/94

Parameter	Sample Result (mg/Kg)	Duplicate Result (mg/Kg)	Percent Difference
Total Recoverable Petroleum Hydrocarbons	939	900	4%

ND - Parameter not detected at established detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 6	Date Sampled:	12/01/94
Sample Number:	0694G02293	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	11:36 AM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	ND	1.2
Toluene	ND	1.2
Ethylbenzene	ND	1.2
p,m-xylene	2.3	1.2
o-xylene	ND	1.2

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	101%	75 - 125%
Bromofluorobenzene	85%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Hoy

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 6	Date Sampled:	12/01/94
Laboratory ID:	0694G02293	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	ND	12

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 7	Date Sampled:	12/01/94
Sample Number:	0694G02294	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	12:17 PM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	9.0	1.2
Toluene	ND	1.2
Ethylbenzene	2.1	1.2
p,m-xylene	21.7	1.2
o-xylene	ND	1.2

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	101%	75 - 125%
Bromofluorobenzene	95%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendy M Key

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 7	Date Sampled:	12/01/94
Laboratory ID:	0694G02294	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	22	11

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/08/94
Sample ID:	Stinking Draw # 8	Date Sampled:	12/01/94
Sample Number:	0694G02295	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/08/94
Preservative:	Cool	Date Analyzed:	12/08/94
Condition:	Intact	Time Analyzed:	1:57 PM

Analyte	Concentration (ug/Kg)	Detection Limit * (ug/Kg)
Benzene	ND	200 **
Toluene	ND	200 **
Ethylbenzene	ND	200 **
p,m-xylene	ND	530
o-xylene	ND	530

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	100% **	75 - 125%
Bromofluorobenzene	115%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

* Detection limit elevated due to matrix interference.
** Concentrations from analysis performed on 12/8/94 at 12:31.

Analyst J L Lehmann

Review Wendi M Log

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 8	Date Sampled:	12/01/94
Laboratory ID:	0694G02295	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	1170	27

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 9	Date Sampled:	12/01/94
Sample Number:	0694G02296	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	2:33 PM

Analyte	Concentration (ug/Kg)	Detection Limit * (ug/Kg)
Benzene	ND	5
Toluene	11	5
Ethylbenzene	10	5
p,m-xylene	19	5
o-xylene	6	5

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	104%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: * Elevated detection limit to quantitate within calibration range.

Analyst J. L. Lehmann

Review Wendi M Rog

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 9	Date Sampled:	12/01/94
Laboratory ID:	0694G02296	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	513	27

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 10	Date Sampled:	12/01/94
Sample Number:	0694G02297	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	3:15 PM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	ND	1.1
Toluene	3.1	1.1
Ethylbenzene	1.9	1.1
p,m-xylene	3.1	1.1
o-xylene	1.1	1.1

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	92%	75 - 125%
Bromofluorobenzene	89%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Rey

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 10	Date Sampled:	12/01/94
Laboratory ID:	0694G02297	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	415	28

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/08/94
Sample ID:	Stinking Draw # 12	Date Sampled:	12/01/94
Sample Number:	0694G02298	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/08/94
Preservative:	Cool	Date Analyzed:	12/08/94
Condition:	Intact	Time Analyzed:	11:48 AM

Analyte	Concentration (ug/Kg)	Detection Limit * (ug/Kg)
Benzene	ND	100 **
Toluene	ND	100 **
Ethylbenzene	ND	100 **
p,m-xylene	ND	530
o-xylene	ND	530

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	95% **	75 - 125%
Bromofluorobenzene	97%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

* Elevated detection limit due to matrix interference.
** Concentrations from analysis performed on 12/8/94 at 14:40.

Analyst J. R. Lehmann

Review Wendell M Rey

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 12	Date Sampled:	12/01/94
Laboratory ID:	0694G02298	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	939	27

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/06/94
Sample ID:	Stinking Draw # 13	Date Sampled:	12/01/94
Sample Number:	0694G02299	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/06/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact	Time Analyzed:	3:57 PM

Analyte	Concentration (ug/Kg)	Detection Limit (ug/Kg)
Benzene	ND	1.0
Toluene	1.6	1.0
Ethylbenzene	ND	1.0
p,m-xylene	5.2	1.0
o-xylene	3.7	1.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	100%	75 - 125%
Bromofluorobenzene	90%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Key

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates Stinking Draw / Artesia,NM	Report Date:	12/13/94
Sample ID:	Stinking Draw # 13	Date Sampled:	12/01/94
Laboratory ID:	0694G02299	Date Received:	12/03/94
Sample Matrix:	Soil	Date Extracted:	12/12/94
Preservative:	Cool	Date Analyzed:	12/13/94
Condition:	Intact		

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	71	10

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/07/94
Sample ID:	Pipeline Produced Water	Date Sampled:	12/01/94
Sample Number:	0694G02300	Date Received:	12/03/94
Sample Matrix:	Water	Date Extracted:	12/07/94
Preservative:	Cool, HCl	Date Analyzed:	12/07/94
Condition:	Intact, pH < 2	Time Analyzed:	3:04 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	2120	200
Toluene	4140	200
Ethylbenzene	ND	200
p,m-xylene	1780	200
o-xylene	390	200

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	98%	75 - 125%
Bromofluorobenzene	91%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Rog

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

TPH
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Client:	**RE/SPEC**		
Project:	Yates - Stinking Draw / Artesia, NM	Report Date:	12/13/94
Sample ID:	Pipeline Produced Water	Date Sampled:	12/01/94
Laboratory ID:	0694G02300	Date Received:	12/03/94
Sample Matrix:	Water	Date Extracted:	12/10/94
Preservative:	Cool, HCl	Date Analyzed:	12/10/94
Condition:	Intact, pH < 2		

Parameter	Concentration (mg/L)	Detection Limit (mg/L)
Total Recoverable Petroleum Hydrocarbons	160	10

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.

Comments:

Analyst

Review

imi

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
11183 SH 30 College Station, Texas 77845
Phone (409) 776-8945 FAX (409) 774-4705

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

WATER QUALITY REPORT

Client: Yates Petroleum
Project: Yates Pipeline
Sample ID: PIPE LINE PRODUCED WATER
Lab ID: 0494W10952/0694G02300
Matrix: Water
Condition: Intact

Report Date: 01/12/95
Receipt Date: 12/05/94
Sample Date: 12/01/94

Parameter	Concentration		PQL	Method
pH (Lab)	8.6 s.u.		0.1	SW-846 9040
Conductivity (Lab)	13500 µmhos/cm		1	SW-846 9050
Total Dissolved Solids (180 C)	8840 mg/L		10	EPA 160.1
Total Alkalinity (as CaCO3)	619 mg/L		1	EPA 310.1
Calcium	516 mg/L	25.75 meq/L	1 mg/L	SW-846 6010A
Magnesium	117 mg/L	9.62 meq/L	1 mg/L	SW-846 6010A
Potassium	52 mg/L	1.33 meq/L	1 mg/L	SW-846 6010A
Sodium	2580 mg/L	112.19 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	755 mg/L	12.38 meq/L	1 mg/L	EPA 310.1
Chloride	3510 mg/L	100.30 meq/L	1 mg/L	SW-846 9251
Sulfate	1930 mg/L	40.08 meq/L	5 mg/L	SW-846 9036
Cation Sum	148.89 meq/L		N/A	Calculation
Anion Sum	151.42 meq/L		N/A	Calculation
Cat/Anion Balance	-0.84 % Diff		N/A	Calculation

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

Gary L. Pudge
Director, Soil Laboratory

imi

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
11183 SH 30 College Station, Texas 77845
Phone (409) 776-8945 FAX (409) 774-4705

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

WATER QUALITY REPORT

Client: Yates Petroleum
Project: Yates Pipeline
Sample ID: STINKING DRAW POOL
Lab ID: 0494W10953/0694G02301
Matrix: Water
Condition: Intact

Report Date: 01/12/95
Receipt Date: 12/05/94
Sample Date: 12/01/94

Parameter	Concentration	PQL	Method
pH (Lab)	7.8 s.u.	0.1	SW-846 9040
Conductivity (Lab)	8290 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180 C)	6460 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	75 mg/L	1	EPA 310.1

Calcium	925 mg/L	46.16 meq/L	1 mg/L	SW-846 6010A
Magnesium	409 mg/L	33.62 meq/L	1 mg/L	SW-846 6010A
Potassium	23 mg/L	0.59 meq/L	1 mg/L	SW-846 6010A
Sodium	452 mg/L	19.66 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	91 mg/L	1.49 meq/L	1 mg/L	EPA 310.1
Chloride	1580 mg/L	45.13 meq/L	1 mg/L	SW-846 9251
Sulfate	2650 mg/L	55.18 meq/L	5 mg/L	SW-846 9036
Cation Sum	100.07 meq/L		N/A	Calculation
Anion Sum	101.24 meq/L		N/A	Calculation
Cat/Anion Balance	-0.58 % Diff		N/A	Calculation

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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WATER QUALITY REPORT

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

Client: Yates Petroleum
Project: Yates Pipeline
Sample ID: 3503 WINDMILL
Lab ID: 0494W10954/0694G02302
Matrix: Water
Condition: Intact

Report Date: 01/12/95
Receipt Date: 12/05/94
Sample Date: 12/01/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.5	s.u.			0.1	SW-846 9040
Conductivity (Lab)	2560	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180 C)	2360	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	147	mg/L			1	EPA 310.1
Calcium	458	mg/L	22.85	meq/L	1 mg/L	SW-846 6010A
Magnesium	143	mg/L	11.75	meq/L	1 mg/L	SW-846 6010A
Potassium	2	mg/L	0.05	meq/L	1 mg/L	SW-846 6010A
Sodium	30.0	mg/L	1.31	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	179	mg/L	2.94	meq/L	1 mg/L	EPA 310.1
Chloride	18.0	mg/L	0.51	meq/L	1 mg/L	SW-846 9251
Sulfate	1590	mg/L	33.01	meq/L	5 mg/L	SW-846 9036
Cation Sum	35.97	meq/L			N/A	Calculation
Anion Sum	36.48	meq/L			N/A	Calculation
Cat/Anion Balance	-0.70	% Diff			N/A	Calculation

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

Gary L. Pudge
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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**RE/SPEC**		
Project Name:	Yates Pipeline - Stinking Draw / Artesia	Report Date:	12/07/94
Sample ID:	Trip Blank	Date Sampled:	NA
Sample Number:	0694G02303	Date Received:	12/03/94
Sample Matrix:	Water	Date Extracted:	12/07/94
Preservative:	Cool, HCl	Date Analyzed:	12/07/94
Condition:	Intact, pH < 2	Time Analyzed:	11:14 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-xylene	ND	1.0
o-xylene	ND	1.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	75%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Loz

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number: MB1206V1
Sample Matrix: Water

Report Date: 12/06/94
Date Analyzed: 12/06/94
Time Analyzed: 9:31 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-Xylene	ND	1.0
o-Xylene	ND	1.0

ND - Analyte not detected at stated detection limit

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	88%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I,
United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendy M Log

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QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number: MB1207V1
Sample Matrix: Water

Report Date: 12/07/94
Date Analyzed: 12/07/94
Time Analyzed: 9:31 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-Xylene	ND	1.0
o-Xylene	ND	1.0

ND - Analyte not detected at stated detection limit

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	98%	75 - 125%
Bromofluorobenzene	79%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I,
United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wanda M Rogers

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QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number: MB1208V1
Sample Matrix: Water

Report Date: 12/08/94
Date Analyzed: 12/08/94
Time Analyzed: 9:38 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-Xylene	ND	1.0
o-Xylene	ND	1.0

ND - Analyte not detected at stated detection limit

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	98%	75 - 125%
Bromofluorobenzene	81%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I,
United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wanda M Rog

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QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number: MB1207ME1
Sample Matrix: Water

Report Date: 12/07/94
Date Analyzed: 12/07/94
Time Analyzed: 10:22 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	25
Toluene	ND	25
Ethylbenzene	ND	25
p,m-Xylene	ND	25
o-Xylene	ND	25

ND - Analyte not detected at stated detection limit

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	97%	75 - 125%
Bromofluorobenzene	91%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I,
United States Environmental Protection Agency, July 1992.

Comments: 200 uL of purge and trap grade methanol added to reagent water.

Analyst J. L. Lehmann

Review Wanda M Log

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QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number: MB1208ME1
Sample Matrix: Water

Report Date: 12/08/94
Date Analyzed: 12/08/94
Time Analyzed: 10:21 AM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	50
Toluene	ND	50
Ethylbenzene	ND	50
p,m-Xylene	ND	50
o-Xylene	ND	50

ND - Analyte not detected at stated detection limit

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	92%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I,
United States Environmental Protection Agency, July 1992.

Comments: 200 uL of purge and trap grade methanol added to reagent water.

Analyst J. L. Lehmann

Review Wendi M Rog

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QUALITY CONTROL REPORT - BLANK SPIKE
VOLATILE AROMATIC HYDROCARBONS

Sample Number: BS1208V1
Sample Matrix: Water
Preservative: NA
Condition: NA

Report Date: 12/08/94
Date Sampled: NA
Date Received: NA
Date Extracted: 12/08/94
Date Analyzed: 12/08/94
Time Analyzed: 4:48 PM

Analyte	Spike Added (ug/L)	Sample Result (ug/L)	Spike Result (ug/L)	Percent Recovery	Accept-ance Limit
Benzene	10.0	ND	11.1	111%	39-150%
Toluene	10.0	ND	10.9	109%	46-148%
Ethylbenzene	10.0	ND	11.0	110%	32-160%
p,m-Xylene	20.0	ND	22.0	110%	50-150%
o-Xylene	10.0	ND	10.2	102%	50-150%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	96%	75 - 125%
Bromofluorobenzene	98%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Log

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0694G02293 SPIKE	Report Date:	12/06/94
Sample Matrix:	Soil	Date Sampled:	12/01/94
Preservative:	Cool	Date Received:	12/03/94
Condition:	Intact	Date Extracted:	12/06/94
		Date Analyzed:	12/06/94
		Time Analyzed:	4:59 PM

Analyte	Spike Added (ug/Kg)	Sample Result (ug/Kg)	Spike Result (ug/Kg)	Percent Recovery	Accept-ance Limit
Benzene	9.8	ND	13.9	140%	39-150%
Toluene	9.8	ND	13.0	132%	46-148%
Ethylbenzene	9.8	ND	13.4	136%	32-160%
p,m-Xylene	19.7	1.9	28.4	135%	50-150%
o-Xylene	9.8	ND	13.6	130%	50-150%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	102%	75 - 125%
Bromofluorobenzene	94%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendy M Ley

Inter·Mountain Laboratories, Inc.

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College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE DUPLICATE
VOLATILE AROMATIC HYDROCARBONS

Sample Number: 0694G02293 SPK DUP
Sample Matrix: Soil
Preservative: Cool
Condition: Intact

Report Date: 12/06/94
Date Sampled: 12/01/94
Date Received: 12/03/94
Date Extracted: 12/06/94
Date Analyzed: 12/06/94
Time Analyzed: 5:51 PM

Analyte	Spike Recovery (%)	Duplicate Recovery (%)	Percent Difference
Benzene	140%	139%	1%
Toluene	132%	131%	1%
Ethylbenzene	136%	134%	2%
p,m-Xylene	135%	132%	2%
o-Xylene	130%	128%	2%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	102%	75 - 125%
Bromofluorobenzene	98%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Rog

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College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0694G02298 SPIKE	Report Date:	12/08/94
Sample Matrix:	Soil	Date Sampled:	12/01/94
Preservative:	Cool	Date Received:	12/03/94
Condition:	Intact	Date Extracted:	12/08/94
		Date Analyzed:	12/08/94
		Time Analyzed:	5:30 PM

Analyte	Spike Added (ug/Kg)	Sample Result (ug/Kg)	Spike Result (ug/Kg)	Percent Recovery	Accept-ance Limit
Benzene	5960	ND	5610	94%	39-150%
Toluene	5960	ND	5720	96%	46-148%
Ethylbenzene	5960	ND	5800	97%	32-160%
p,m-Xylene	11900	ND	11500	96%	50-150%
o-Xylene	5960	ND	5690	95%	50-150%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	97%	75 - 125%
Bromofluorobenzene	104%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review

Inter·Mountain Laboratories, Inc.

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QUALITY CONTROL REPORT - MATRIX SPIKE DUPLICATE
VOLATILE AROMATIC HYDROCARBONS

Sample Number: 0694G02298 SPK DUP
Sample Matrix: Soil
Preservative: Cool
Condition: Intact

Report Date: 12/08/94
Date Sampled: 12/01/94
Date Received: 12/03/94
Date Extracted: 12/08/94
Date Analyzed: 12/08/94
Time Analyzed: 11:47 PM

Analyte	Spike Recovery (%)	Duplicate Recovery (%)	Percent Difference
Benzene	94%	102%	8%
Toluene	96%	103%	7%
Ethylbenzene	97%	104%	7%
p,m-Xylene	96%	103%	7%
o-Xylene	95%	101%	6%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	96%	75 - 125%
Bromofluorobenzene	109%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendi M Key

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College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0694G02300 SPIKE	Report Date:	12/07/94
Sample Matrix:	Water	Date Sampled:	12/01/94
Preservative:	Cool, HCl	Date Received:	12/03/94
Condition:	Intact, pH < 2	Date Extracted:	12/07/94
		Date Analyzed:	12/07/94
		Time Analyzed:	3:55 PM

Analyte	Spike Added (ug/L)	Sample Result (ug/L)	Spike Result (ug/L)	Percent Recovery	Accept-ance Limit
Benzene	5000	2120	7400	106%	39-150%
Toluene	5000	4140	9400	105%	46-148%
Ethylbenzene	5000	ND	5390	106%	32-160%
p,m-Xylene	10000	1780	12500	107%	50-150%
o-Xylene	5000	ND	5440	101%	50-150%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	97%	75 - 125%
Bromofluorobenzene	96%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wanda M Rose

Inter-Mountain Laboratories, Inc.

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QUALITY CONTROL REPORT - MATRIX SPIKE DUPLICATE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0694G02300 SPK DUP	Report Date:	12/07/94
Sample Matrix:	Water	Date Sampled:	12/01/94
Preservative:	Cool, HCl	Date Received:	12/03/94
Condition:	Intact, pH < 2	Date Extracted:	12/07/94
		Date Analyzed:	12/07/94
		Time Analyzed:	4:52 PM

Analyte	Spike Recovery (%)	Duplicate Recovery (%)	Percent Difference
Benzene	106%	99%	6%
Toluene	105%	96%	9%
Ethylbenzene	106%	103%	3%
p,m-Xylene	107%	103%	4%
o-Xylene	101%	95%	6%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	96%	75 - 125%
Bromofluorobenzene	91%	70 - 120%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Waste, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst J. L. Lehmann

Review Wendy M Rogers

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID: Method Blank
Laboratory ID: MB 449
Sample Matrix: Water
Preservative: N/A
Condition: N/A

Report Date: 12/13/94
Date Extracted: 12/10/94
Date Analyzed: 12/10/94

Parameter	Concentration (mg/L)	Detection Limit (mg/L)
Total Recoverable Petroleum Hydrocarbons	ND	0.5

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - BLANK SPIKE
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID:	Blank Spike	Report Date:	12/13/94
Laboratory ID:	DI 448	Date Sampled:	NA
Sample Matrix:	Water	Date Received:	NA
Preservative:	N/A	Date Extracted:	12/10/94
Condition:	N/A	Date Analyzed:	12/10/94

Parameter	Spike Added (mg/L)	Sample Result (mg/L)	Spiked Sample Result (mg/L)	Percent Recovery
Total Recoverable Petroleum Hydrocarbons	10.0	ND	9.7	97%

ND - Parameter not detected at established detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID: Method Blank
Laboratory ID: MB 456
Sample Matrix: Soil
Preservative: N/A
Condition: N/A

Report Date: 12/13/94
Date Extracted: 12/12/94
Date Analyzed: 12/13/94

Parameter	Concentration (mg/Kg)	Detection Limit (mg/Kg)
Total Recoverable Petroleum Hydrocarbons	ND	10

ND - Parameter not detected at stated detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - BLANK SPIKE
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID:	Blank Spike	Report Date:	12/13/94
Laboratory ID:	BSPK 455	Date Sampled:	NA
Sample Matrix:	Soil	Date Received:	NA
Preservative:	N/A	Date Extracted:	12/12/94
Condition:	N/A	Date Analyzed:	12/13/94

Parameter	Spike Added (mg/Kg)	Sample Result (mg/Kg)	Spiked Sample Result (mg/Kg)	Percent Recovery
Total Recoverable Petroleum Hydrocarbons	498	ND	496	100%

ND - Parameter not detected at established detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

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College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID:	Matrix Spike	Report Date:	12/13/94
Laboratory ID:	0694G02293 Spk	Date Sampled:	12/01/94
Sample Matrix:	Soil	Date Received:	12/03/94
Preservative:	Cool	Date Extracted:	12/12/94
Condition:	Intact	Date Analyzed:	12/13/94

Parameter	Spike Added (mg/Kg)	Sample Result (mg/Kg)	Spiked Sample Result (mg/Kg)	Percent Recovery
Total Recoverable Petroleum Hydrocarbons	612	ND	603	99%

ND - Parameter not detected at established detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX DUPLICATE
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample ID:	Matrix Duplicate	Report Date:	12/13/94
Laboratory ID:	0694G02298 Dup	Date Sampled:	12/01/94
Sample Matrix:	Soil	Date Received:	12/03/94
Preservative:	Cool	Date Extracted:	12/12/94
Condition:	Intact	Date Analyzed:	12/13/94

Parameter	Sample Result (mg/Kg)	Duplicate Result (mg/Kg)	Percent Difference
Total Recoverable Petroleum Hydrocarbons	939	900	4%

ND - Parameter not detected at established detection limit

Reference: Method 418.1 - Petroleum Hydrocarbons, Total Recoverable Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 1978.
Method 3550A: Ultrasonic Extraction, Test Methods for Evaluating Solid Waste, 3rd Edition, Final Update I, USEPA, July 1992.

Comments:

Analyst

Review