3R - 57

REPORTS

DATE:

9/1993

ENVIROTECH INC.

LIMITED SITE ASSESSMENT

WOOD WN FEDERAL COM #1
(B) SECTION 21, T29N, R10W, NMPM
SAN JUAN COUNTY, BLANCO, NEW MEXICO

PREPARED FOR:

ARCO OIL & GAS COMPANY

SEPTEMBER 1993

PROJECT: 93183

5796 U.S. HIGHWAY 64 - 3014 • FARMINGTON, NEW MEXICO 87401 • PHONE: (505) 632-0615

LIMITED SITE ASSESSMENT

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(B) SECTION 21, T29N, R10W, NMPM
SAN JUAN COUNTY, BLANCO, NEW MEXICO

PREPARED FOR:
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SEPTEMBER 1993

ENVIROTECH, INC.
Environmental Scientists & Engineers
5796 U.S. Highway 64-3014
Farmington, New Mexico

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(B) SECTION 21, T29N, R10W, NMPM
SAN JUAN COUNTY, BLANCO, NEW MEXICO

PROJECT No. 93183

SEPTEMBER 1993 **PROJECT NO: 93183**

LIMITED SITE ASSESSMENT
WOOD WN FEDERAL COM #1
(B) SECTION 21, T29N, R10W, NMPM
SAN JUAN COUNTY, BLANCO, NEW MEXICO

INTRODUCTION

Arco Oil & Gas Company retained Envirotech, Inc. to perform a limited site assessment of suspected hydrocarbon contamination at the Wood WN Federal Com No: 1 well location. The well is currently operated by Arco. This assessment is a follow up to previous field screening conducted by Flint Engineering for CONOCO which identified hydrocarbon contamination in the area of an unlined separator pit.

The goal of this site assessment was to screen the area previously identified as having possible hydrocarbon contamination, establish the extent of any contamination, and to make recommendations to abate any contamination.

SCOPE OF WORK

Following the New Mexico Oil Conservation Division's (NMOCD) protocol for surface impoundment closures[1] and Bureau of Land Management (BLM) guidelines[2], the scope of this assessment consisted of:

A. Conducting a limited field exploratory program using a mobil drill rig to determine subsurface soil and groundwater conditions.

B. Install groundwater monitor wells at select locations to establish site specific hydrology, and groundwater quality and properties.

C. Field screening and laboratory testing of samples considered representative of the soil and groundwater obtained during the field exploration. All testing was for target hydrocarbons considered most likely to be of concern.

D. Evaluation of the data obtained from the exploration and testing programs, and review of applicable regulatory standards.

E. Preparation of this report to document the findings of the site assessment and to outline possible remedial action to abate any significant contamination problems.

CONCLUSIONS

Based on the findings of this and the previous assessments, the following conclusions may be drawn:

1) Hydrocarbon contamination of soil and groundwater above current regulatory action levels is present in the area of the unlined earthen separator pit. This hydrocarbon contamination appears to have originated from the normal E & P operation of the separator equipment on the location. Given the well's production, the hydrocarbons are most probably condensate.

2) The contamination appears to be limited to the well location, involving an area of 5000 square feet. Refer to the Site Plan (Appendix A: Sheet 2).

3) In the area of the pit, soil contamination extends from the pit bottom to groundwater (approximately 27.5 feet below the ground surface). Beyond the pit area, only the vadoze zone soils immediately above the groundwater are contaminated (Refer to profile on the Site Plan, Appendix A: Sheet 2).

4) No free product was observed. Significant dissolved phase contamination of groundwater appears to be limited to the immediate area below the pit.

5) Groundwater slopes toward the south-southwest at approximately 0.010 feet/foot.

6) Subsurface soils are typical alluvium, predominately sands with interbedded silt and clay horizons.

7) The vertical and lateral extent of contamination appears to be relatively limited as noted previously. Therefore, impacted groundwater does not appear to poses an eminent threat or risk to human health or the environment.

SITE DESCRIPTION

Wood WN Federal Com #1 well is located in the Northwest ¼ of the Northeast ¼ (Unit B), of Section 21, Township 29N, Range 10W, NMPM, San Juan County, New Mexico. The site is located ½ mile north of U.S. Highway 64, and 3.5 miles southeast of Blanco, New Mexico. Refer to the attached Vicinity Map (Sheet 1).

The site is an active gas well, producing from the Dakota Formation. The well is reportedly drilled and completed in June 1968. Surface equipment and improvements at the site during field assessment consists of a well head, 200 barrel produced liquid storage tank, and separator with a 1000 gallon steel pit. The steel pit replaced an unlined earthen pit. Access to the site is available off US Highway 64 by dirt oilfield roads.

The subject well site is located on property managed by the Farmington District of the Bureau of Land Management. Private ranch land is located approximately ¼ mile south of the site.

Topographically, the well site is relatively planar with a slight slope toward the south-southwest. Northeast of the location the site slopes steeply along the wash. The natural ground surface along the wash drains to the south at approximately 0.010 feet/foot.

GEOLOGY AND HYDROLOGY

The site is situated near the west edge of the San Juan Basin in the Colorado Plateau physiographic province. The basin is a structural depression containing deep Tertiary fill covering rocks of the Late Cretaceous age. The geomorphology of the site may be generally classified as alluvial fan and flood plains in the narrow drainages and associated ephemeral river system of the San Juan River.

The site is located approximately 100 feet in elevation above and 1.2 miles north of the San Juan River. The site is situated on the east edge of Slane Canyon, approximately 200 feet from the ephemeral stream channel.

The Citizens Ditch is located approximately 0.3 miles south of the site, but is reportedly lined in the Slane Canyon area. This ditch is used as a source of irrigation water.

Available records of water well with the New Mexico State Engineers Office were reviewed and there appears to be only one private water wells within one mile of the site (Permit No: SJ-1474, Ralph Jaramillo). The well is located approximately 3/4 mile south of the site, at the mouth of Slane Canyon in the floodplain of the San Juan River. Depth to groundwater is reported as 25 feet, and use is noted as domestic.

SITE ASSESSMENT

This site assessment was conducted on September 24 through 26, 1993. Mr. Michael K. Lane of Envirotech was the Principal Investigator. Also present on site during the field exploration was Mr. Rick Renick of Arco.

Field Exploration:

The field exploration consisted of 8 test borings drilled to depths ranging from 23.5 to 33 feet below existing ground surface. The borings were drilled with a CME 55 truck mounted drilling rig using eight inch (8") diameter hollow stem auger. Locations of the borings are presented on the Site Plan (Appendix A: Sheet 2).

A five foot continuous split-tube sampler was used to collected soil samples at selected depths from the surface to groundwater during drilling. The split-tube soil samples along with cuttings developed during drilling were classified in accordance with the Unified Soil Classification System (ASTM: D-2487). Logs of the borings are included in Appendix A and while the noted stratification lines represent approximate boundaries between soil types, the transitions may be gradual.

All auger, drill rod and bits were power wash cleaned prior to drilling and between borings to minimize the possibility of cross-contamination.

Completion of Borings:

Three of the test borings were completed as permanent groundwater monitor wells [T-1, T-4, and T-5]. The monitor wells were constructed using two inch (2") diameter threaded-coupling schedule 40 PVC casing. The top of the screen section (0.02" slot size) was set approximately five feet (5') above the groundwater level encountered during drilling. The screened interval was sand filter packed to one foot (1') above the top of the slotted interval with 8-12 gradation silica sand and sealed with 3/8" bentonite pellets. Blank PVC was used to complete the wells to approximately two feet (2') above site grade. Each monitor well was secured with locking cap. Refer to Appendix A: Sheet 11 for monitor well construction details.

Those borings not completed as monitor wells were plugged and abandoned using grout cement with five percent (5%) bentonite and cuttings.

Following drilling and construction of the wells, all boring locations were surveyed and well head elevations measured. The surface flange of the gas well head was used as a bench mark (Relative Elevation: 100.00').

Water Level Measurements:

The groundwater levels reported on the boring logs (Appendix A) were obtained during drilling and the monitor wells were constructed based on these measured water elevations. All monitor wells were developed for subsequent sampling and groundwater analysis. The wells were developed by removing approximately three well bore volumes or until the bore hole was pumped off. A compressed air well developer and disposable bailers were used. The pH and conductivity were field measured during development.

After well construction, completion and development, all monitor wells were permitted to equilibrate. Water levels were measured on September 25, 1993 with an electronic interface probe prior to sampling. No free product was detected. Liquid levels were measured to the nearest 0.01 of a foot from the surveyed well head measuring point. The measured water levels are noted on the Site Plan (Appendix A: Sheet 2).

Soil and Groundwater Sampling:

Grab portions of split-tube soil samples and soil cuttings collected during drilling were field tested for volatile hydrocarbons.

Groundwater sampling and testing was conducted following the development of each monitor well on September 25, 1992. Groundwater samples were collected from the monitor wells using NMOCD and EPA SW-846 protocol. Prior to sampling, each well was purged a minimum of three well volumes with a disposable bailer. Duplicate samples were taken and placed in new 40 ml VOA vial supplied by the laboratory. The samples were preserved with mercuric chloride and placed on ice until delivery to the laboratory.

All sampling tools were decontaminated to minimize the possibility of cross-contamination. Decontamination consisted of washing with a nonphosphate soap and a triple rinse with tap and deionized water.

ANALYTICAL RESULTS

The concentration of volatile hydrocarbons in soil samples was determined by the Headspace Field Method[1] using a photoionization detector (PID), Model 580-B Organic Vapor Meter (OVM) manufactured by Thermo Environmental Instruments. The results of these screening measurements are presented on the boring logs, Appendix A.

The water samples submitted for laboratory analyses were tested for Aromatic Volatile Organics [specifically; Benzene, Toluene, Ethylbenzene, and total Xylene (BTEX)] per EPA Method 8020. Table 1 summarizes the BTEX analyses.

Copies if the laboratory results for the groundwater analyses, the Laboratory QC/QA, and Chain-of-Custody are presented in Appendix B.

TABLE 1

SUMMARY OF LABORATORY RESULTS
WOOD WN FEDERAL COM No 1
SITE ASSESSMENT
September 1993

SAMPLE ID	MATRIX	EPA METHOD	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	TOTAL XYLENE (µg/L)
PIT	Water	8020	1200	1560	530	1850
MW #1	Water	8020	0.9	6.6	1.0	2.9
MW #2	Water	8020	1.0	6.9	1.2	5.5
MW #3	Water	8020	0.4	5.4	1.7	11.4

NOTES:
1) ND - Parameter not detected at method detection limit
2) Total Xylene - summation of m, p-Xylene and o-Xylene
3) µg/kg - equivalent to parts per billion
4) PIT - Water sample collect 9-15-93 from temporary monitor well in separator pit, installed by Flint Engineering.

CLEAN UP STANDARDS

The maximum allowable concentrations for hydrocarbon contamination of soils as outlined in the New Mexico Oil Conservation Division[1] for a site with shallow are summarized in Table 2.

The current maximum allowable concentrations for groundwater contamination as outlined by the State of New Mexico Water Quality Control Commission [NMWQCC] (August 18, 1991) are summarized in Table 2.

TABLE 2

HYDROCARBON SOIL & GROUNDWATER CONTAMINATION STANDARDS STATE OF NEW MEXICO

Parameter	Maximum Allowable Limits soil (µg/kg)	groundwater (µg/l)
Benzene	10,000	10
Toluene	-	750
Ethylbenzene	-	750
Total Xylene	-	620
Total Aromatics	50,000	-
Total Petroleum Hydrocarbons	100,000	-

Notes:
1) µg/kg or µg/l - equivalent to parts per billion.
2) Maximum allowable soil limits based on the ranking criteria for the subject site with a total score greater than 19.

REMEDIAL ACTION ALTERNATIVES

Various remedial action technologies have been proven as successful for the abatement of hydrocarbon contamination similar to the Wood Federal No 1 site. The following alternatives are suggested, based on the findings of this assessment, estimated cost and completion time of various remediation alternatives, and the anticipated custody transfer.

No Action with Monitoring:

Given the relatively limited extent of contamination, and definition with soil borings and monitor well, a no action alternative may be appropriate. Semi-annual monitor of groundwater would be needed to verify that the contamination was not moving. For groundwater monitoring:

A) Water samples would need to be collected in a similar manner to those collected as part of this assessment from the three monitor wells.

B) Water samples would be analyzed for BTEX per EPA Method 8020.

C) An annual report would need to provided to the NMOCD and BLM summarizing the monitoring results.

D) Upon completion of moniotring the monitor wells will be abandoned by removal of casing and bentonite rich grout.

It is anticipated monitoring could be terminated within one year, if no significant contamination is observed in the montior wells. If elevated levels of contamination are observed moving into the monitor wells, this would indicate migration of contamination. Additional remedial action most probably would be required by the regulatory agencies.

Removal and Exsitu Treatment:

Based on the assessment, the majority of soil contamination is in the immediate area of the pit. It is estimated approximately 350 to 450 cubic yards of soil are included (21' X 21' X 23'). As this is the suspected point source, removal and treatment of the highly contaminated soil should abate the most significant portion of the contamination and greatly reduce the possibility of additional contamination of groundwater. The removal process should involve:

A) REMOVAL OF HEAVILY CONTAMINATED SOILS: Remove the heavily hydrocarbon contaminated soils in the immediate area of the pit to groundwater. Excavation to be continued until visible soil discoloration and/or field screening by OVM is below an action level of 100 ppm, or

where there is over five feet of uncontaminated overburden. Once completed the excavation to be backfilled with clean similar soil material.

B) TREATMENT OF CONTAMINATED SOIL: Onsite landfarming or composting is not desired due to the shallow depth to groundwater and anticipated custody transfer. Therefor, it is recommended that removed soils be transported to Envirotech's Soil Remediation Facility located at Hilltop, New Mexico. This facility is permitted and regulated by the NMOCD for landfarming treatment of E&P non-hazardous wastes.

C) FIELD ASSESSMENT: To verify the abatement effort, field assessment will be provided by qualified and experienced persons. Field assessment should include field screening of volatile organic by the Field Headspace Method and testing of Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1. No groundwater samples would be collected.

D) CLOSURE & MONITORING: As outline in the "No Action Alternative" groundwater sampling would be necessary following the removal effort. It is anticipated that monitoring would be conducted bi-annually for one year. Closure would be recommended if the results of the groundwater monitoring show contamination levels were below current standards.

Insitu Bioremediation:

No screening for soil bioactivity was conducted as part of this assessment. It has been our experience that indigenous (ie. insitu naturally occurring) hydrocarbon degrading microbes as present at most contaminated sites. Augmentation of the indigenous system by the addition of nutrients (fertilizers) and oxygen is another alternative method. Additional soil sampling for microbes and nutrients would be needed to define the amount of augmentation that effort needed. This alternative is not suggested at this time given Arco's current position with regards to future operation of the well site.

Pump & Treatment of Groundwater:

Another alternative is a pump and treat system for the groundwater contamination. A system of this type would consist of a down-gradient recovery well, water treatment system (air stripper), and injection gallery. Could be used to enhance the remediation of the soil contamination in the area of the pit. This alternative would require discharge permitting and relatively extensive design prior

to installation. Our experience with systems of this type indicates that clean up may be achieve on the order of two to ten years. Monitoring and testing is required to assure the system is operating properly. Considering the extent of contamination and Arco's needs this alternative has not been fully developed and is not suggested at this time.

LIMITATIONS AND CLOSURE

The conclusions and recommendations given in this report are based on the limited site assessment, field exploration, laboratory test results, information provided by Arco Oil & Gas, and the NMOCD and BLM regulatory limits for soil and groundwater.

All soil and groundwater contamination is believed to be caused by petroleum discharges associated with hydrocarbons products at typical oil field service company facilities. No hazardous wastes are believed to be present or involve with the subject spill as defined per RCRA (40 CFR 261).

Full implementation of any remedial action would need the NMOCD and BLM concurrent.

This site characterization, conclusions and recommendations have been prepared for the exclusive use of Arco Oil & Gas Company as it pertains to the Wood WN Federal Com No:1 well site located in (B) Section 21, Township 29N, Range 10W, NMPM, San Juan County, New Mexico.

I certify that I am personally familiar with the investigation work at the site, the site conditions as reported and this report.

Respectfully Submitted,
ENVIROTECH, INC.

Michael K. Lane, P.E.
Geological Engineer

Reviewed By:

Morris D. Young
President

REFERENCES: (1) "UNLINED SURFACE IMPOUNDMENT CLOSURE GUIDELINES," New Mexico Oil Conservation Division, February 1993.

(2) "Unlined Pit Remediation & Closure Program For the Farmington & Albuquerque Districts," Environmental Assessment (NM-070-93-3004, Bureau of Land Management, Farmington, New Mexico, July 1993.

APPENDICES

REFERENCE: USGS 7.5 min QUAD BLOOMFIELD 36107-F8-TF-024

ARCO OIL & GAS COMPANY

WOOD NM FEDERAL COM No. 1
LEASE No. SF-078066
(B) SEC. 21, T29N, R10W, NMPM

SITE ASSESSMENT

PROJECT NO. 95182

ENVIROTECH INC.

ENVIRONMENTAL SCIENTISTS & ENGINEERS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE 505 632-0615

VICINITY MAP

SHEET 1 of 1
DRAWN BY M. LANE
FILE WOODCHT1

SCALE

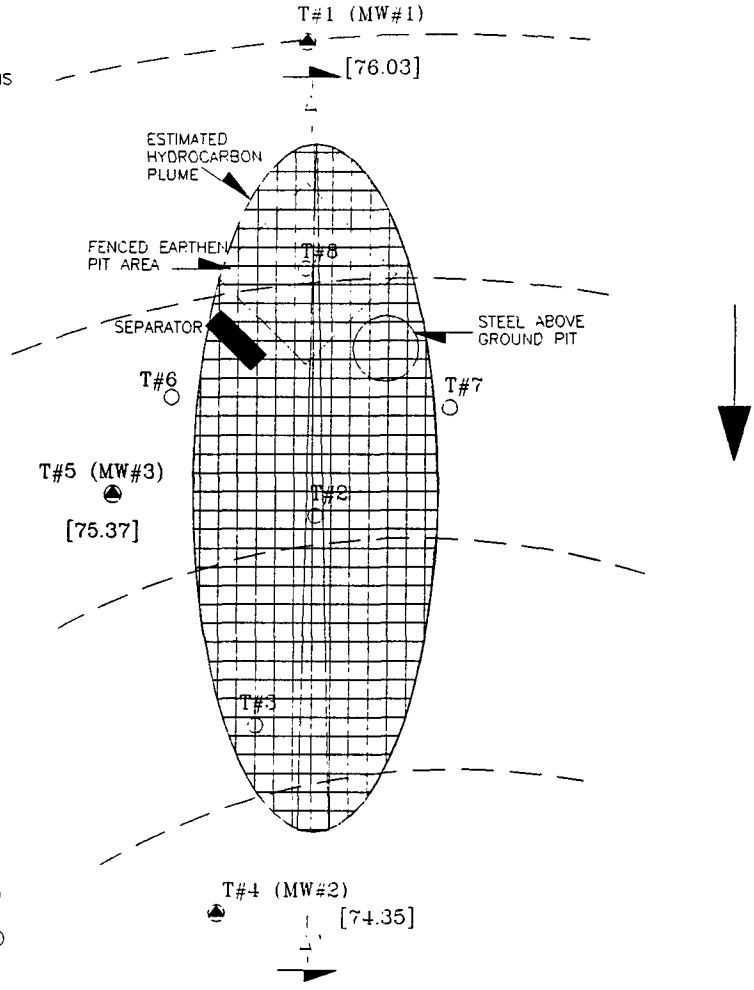
20 0 50 ft

[75.00']: GROUNDWATER DEPTH MEASURED ON 9/26/93. ELEVATIONS RELATIVE TO WELLHEAD FLANGE (100.00').

T#0 APPROXIMATE TEST BORING LOCATION

MW#0 MONITOR WELL

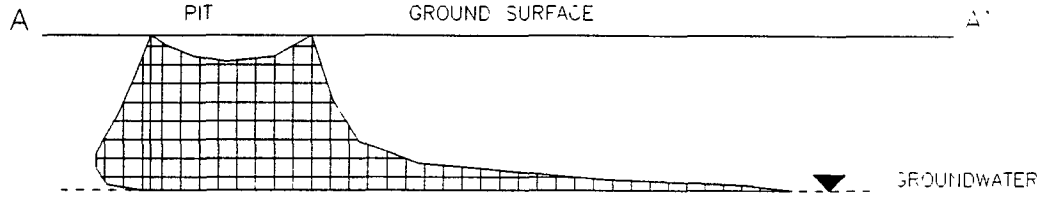
ESTIMATED HYDROCARBON PLUME



ALL DISTANCE AND ELEVATIONS HAVE BEEN DETERMINED BY SIGHTING, PACING, AND CONSTRUCTION SURVEY MEASUREMENTS ARE ACCURATE TO THE DEGREE IMPLIED BY THE INTENT AND METHOD USED.

WELL HEAD

EAST PROFILE



ARCO OIL & GAS COMPANY

WOOD WM FEDERAL COM No. 1
LEASE No. SF-078266
(B) SEC 21, T29N,R10W,NMPM

SITE ASSESSMENT PROJECT NO: 93183

ENVIROTECH INC.

ENVIRONMENTAL SCIENTISTS & ENGINEERS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: 505) 632-0615

SITE PLAN

SHEET 4c
DRWN BY MK LANE
FILE 3183SHT2

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T1
JOB No: 93133
PAGE No: SHT 3
LOCATION: REF TO SHT A2
DATE START: 9-24-93
DATE FINISH: 9-24-93
OPERATOR: MD
PREPARED BY: MRL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: AMOCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w/ 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX 101.6'
	ML/SM	1.4	CORE	1/5	YELLOWISH BROWN FINE SANDY SILT, SL. PLASTIC, MOIST, FIRM, MINOR CALICHE IN SOIL CRACKS (SMALL ROOTS TO 4').
10	SP	1.1	CORE	4/5	YELLOWISH ORANGE TO LT. BROWN MEDIUM TO FINE SAND w/ SMALL GRAVEL, NON-COHESIVE, SL. MOIST, DENSE.
		0.7	CORE	2/5	
20		0.7	CORE	4/5	
	ML/SM	0.7	CORE	1/5	MOTTLED OLIVE BROWN TO DARK YELLOW BROWN, SANDY SILT TO SILTY FINE SAND, PLASTIC, MOIST TO WET, STIFF
	SP				MODERATE YELLOW BROWN FINE SAND, NON-COHESIVE, WET TO SATURATED, DENSE.
30					
40					

TOTAL DEPTH: 33.33 FEET
GROUNDWATER DEPTH: 27.62 FEET @ 14:35 9/24/93

COMPLETION: GROUNDWATER MONITOR WELL
MW #1, REF DETAIL SHEET 11

NOTES:
SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID).

DRAWING 3183T1
DATE 9-29-93
DWN BY MRL

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T2
JOB No: 93193
PAGE No: SHT 4
LOCATION: REF TO SHT A2
DATE START: 9-24-93
DATE FINISH: 9-24-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: APCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w. 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX 99.4
	SP	ND	CUT'G		YELLOWISH BROWN TO LT. BROWN MEDIUM TO FINE SAND, NON-COHESIVE, MOIST, DENSE.
		1.0	CORE	2/5	
	ML/CL				DUSKY BROWN TO OLIVE BROWN FINE SANDY SILT TO CLAY, PLASTIC, MOIST, STIFF
10					
	SP	1.4	CORE	4/5	SAA (0-6').
		AVG. 646 PK: 713	CORE	3.5	
	SM/SP				GREY TO DARK GREY SILTY SAND TO MEDIUM-FINE SAND, SL. PLASTC, MOIST, STIFF, STRONG PETROLEUM ODOR.
20					
30					
40					

TOTAL DEPTH: 18.5 FEET
GROUNDWATER DEPTH: NOT REACHED

COMPLETION: PLUGGED AND ABANDONED

NOTES:

SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
CUT'G - SOIL SAMPLE OF DRILL CUTTINGS
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID).
PK - PEAK OVM READING
AVG - AVERAGE OF OVM READINGS FOR 1 MINUTE MEASUREMENT.

DRAWING: 3183T2
DATE: 9-29-93
DWN BY: MKL

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T3
JOB No: 93183
PAGE No: SHT 5
LOCATION: REF TO SHT: A2
DATE START: 9-24-93
DATE FINISH: 9-24-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: APCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w/ 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX. 99.7'
	SM/SP	2.1	CUT'G		YELLOWISH BROWN TO LT. BROWN SILTY SAND TO MEDIUM SAND, NON-COHESIVE, MOIST, DENSE.
		3.0	CUT'G		
10			CORE	3.5	
		1.7			
			CORE	4.5	
		1.0			
	SM/SC				MOTTLED YELLOW TO MODERATE REDDISH BROWN AND GREY, SILTY CLAYEY SAND, SL. PLASTIC, MOIST, FIRM TO STIFF, NO ODOR.
20		5 -			
	ML/CL SP	AVG: 299 PK: 45	CORE	4.5	MOTTLED GREY TO DARK GREY INTERBEDDED SAND, SILT AND CLAY, PLASTIC, MOIST, STIFF. CONTAMINATION MOST SIGNIFICANT IN SAND STRINGERS
30					
40					

TOTAL DEPTH 23.5 FEET
GROUNDWATER DEPTH: NOT REACHED

COMPLETION: PLUGGED AND ABANDONED

NOTES:

SAA – SAME SOIL TYPE AS DESCRIBED ABOVE
CUT'G – SOIL SAMPLE OF DRILL CUTTINGS
ND – NONE DETECTED
OVM – SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID).
PK – PEAK OVM READING
AVG – AVERAGE OF OVM READINGS FOR 1 MINUTE MEASUREMENT.

DRAWING: 9183T3
DATE: 9-29-93
DWN BY: MKL

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T4 (MW2)
JOB No: 93193
PAGE No: SHT 3
LOCATION: REF TO SHT A2
DATE START: 9-24-93
DATE FINISH: 9-24-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: AMOCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w/ 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)
	SP/SW	ND	CUT'G	
		ND	CUT'G	
10		0.7	CORE	3/5
		0.3	CORE	4, 5
20		0.3	CORE	4/5
	ML/SM SP	0.3	CORE	3/5
30				
40				

FIELD CLASSIFICATION AND REMARKS

SURFACE ELEVATION: APPROX. 100.6'

YELLOWISH BROWN TO LT. BROWN MEDIUM TO FINE SAND, NON-COHESIVE, MOIST, FIRM TO DENSE.

THIN SILT STRINGERS (2")

SAA, MOTTLED BROWNISH GRAY TO YELLOWISH ORANGE, MINERALIZATION IN SOIL CRACKS, NO ODOR.

YELLOW BROWN TO OLIVE BROWN SANDY SILT TO SILTY FINE SAND, SL. PLASTIC, WET TO SATURATED, FIRM TO STIFF.

TOTAL DEPTH: 31 FEET
GROUNDWATER DEPTH: 26.45 FEET @ 17:15 (9-24-93)

COMPLETION: GROUNDWATER MONITOR WELL
MW #2: REF DETAIL SHEET 11

NOTES:

SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
CUT'G - SOIL SAMPLE FROM CUTTINGS
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID).

DRAWING: 3183T4
DATE: 9-29-93
DWN BY: MKL

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T5 (MW3)
JOB No: 93182
PAGE No: SHT 7
LOCATION: REF TO SHT A2
DATE START: 9-25-93
DATE FINISH: 9-25-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: APCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w/ 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX. 100.5'
	SM/SP	ND	CUT'G		YELLOWISH BROWN TO LT BROWN SILTY SAND TO MEDIUM SAND, NON-COHESIVE, MOIST, DENSE.
		0.7	CUT'G		LARGE COBBLES.
10	ML/SM	0.3	CUT'G		DUSKY BROWN TO YELLOW BROWN SANDY SILT TO SILTY SAND, SL. PLASTIC, SL. MOIST, FIRM.
	SW				YELLOWISH ORANGE TO LT. BROWN WELL GRADED SAND WITH GRAVEL, NON-COHESIVE, SL. MOIST, DENSE.
			CORE	4/5	
		0.5			GRAVEL OR COBBLES.
20			CORE	4/5	DUSKY BROWN TO OLIVE BROWN CLAYEY TO SILTY FINE SAND, PLASTIC, STIFF, MOIST TO WET.
	SC/SM	0.3			
			CORE	4/5	INTERBEDDED FINE SAND AND CLAY LAYERS, PLASTIC, WET TO SATURATED, STIFF AND DENSE. CALICHE IN CLAY LAYERS.
		0.3			
30					
40					

TOTAL DEPTH: 30.5 FEET
GROUNDWATER DEPTH: 27.2 FEET @ 14:30 (9/25/93)

COMPLETION: GROUNDWATER MONITOR WELL
MW #3: REF. DETAIL SHEET 11

NOTES.

SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
CUT'G - SOIL SAMPLE OF DRILL CUTTINGS
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID)

DRAWING: 31837E
DATE: 9-29-93
DWN BY: MKL

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T6
JOB No: 93183
PAGE No: SHT 8
LOCATION: REF TO SHT A2
DATE START: 9-25-93
DATE FINISH: 9-25-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: APCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w. 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX 99.7'
	SM/SP	ND	CUT'G		YELLOWISH BROWN TO LT BROWN SILTY SAND TO MEDIUM SAND, NON-COHESIVE, MOIST, DENSE.
		ND	CUT'G		
10		ND	CUT'G		
	ML				DUSKY BROWN TO YELLOW BROWN SANDY SILT, SL PLASTIC, SL MOIST, STIFF.
	SW		CORE	3/5	
		ND			YELLOWISN BROWN TO LT. BROWN WELL GRADED SAND WITH GRAVEL, NON-COHESIVE, MOIST, DENSE.
20			CORE	4/5	SILT LAYERS (2" THICK)
		ND			
30					
40					

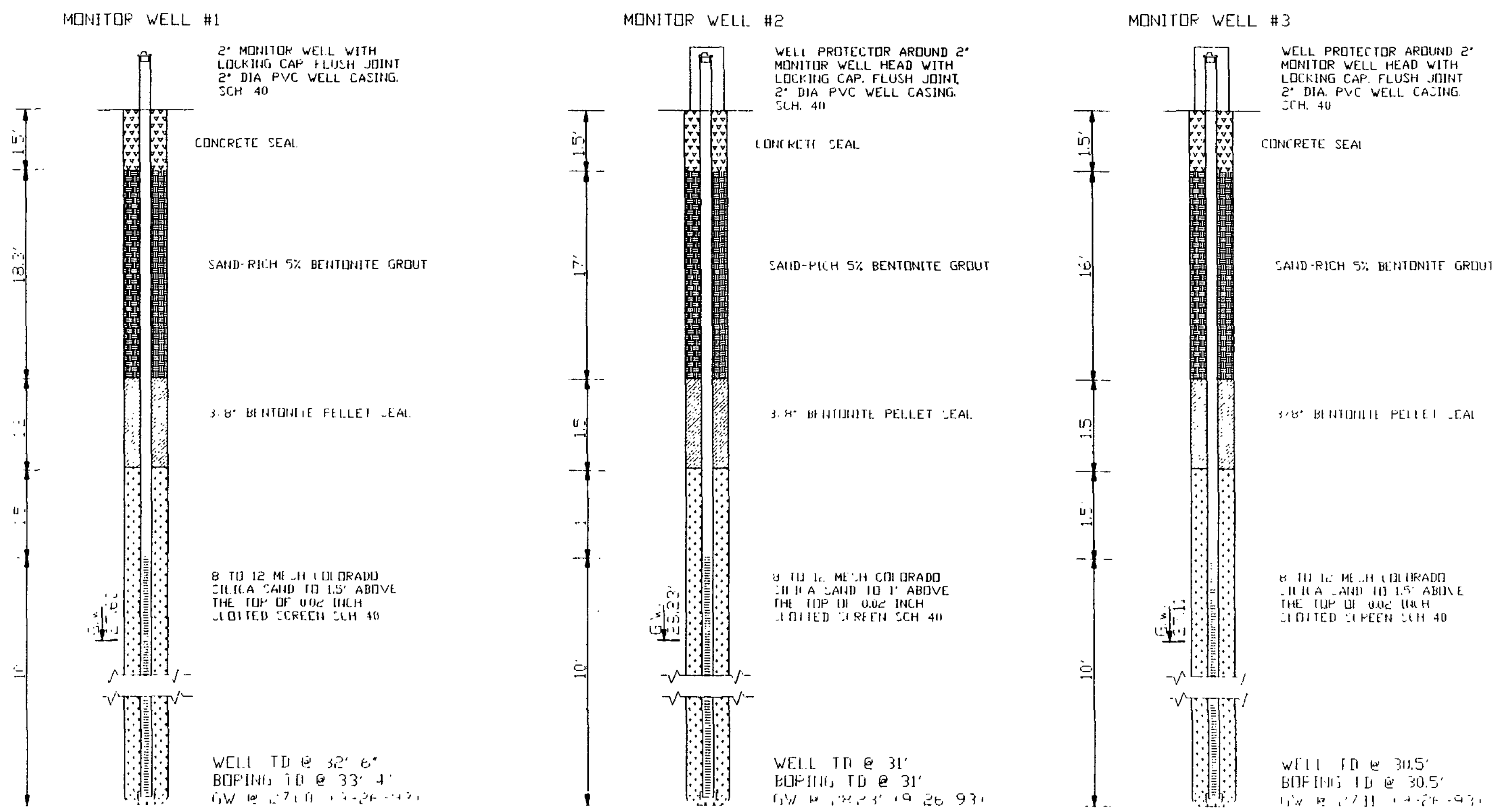
TOTAL DEPTH: 23.5 FEET
GROUNDWATER DEPTH: NOT REACHED

COMPLETION: PLUGGED AND ABANDONED

NOTES:

SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
CUT'G - SOIL SAMPLE OF DRILL CUTTINGS
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER TIMCO HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID)

DRAWING: 3183T6
DATE: 9-29-93
DWN BY: MKL



MONITOR WELL DETAIL
... & GAS COMPANY
WOOD WM FEDERAL COM NO. 1
(B) SEC 21, T29N, R10W, NMPM

ENVIROTECH INC

ENVIRONMENTAL SCIENTISTS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

ENGINEER:
DRAFTER:
DATE: 9-28-93
MONITOR WELLS: #1, #2, #3
SHEET: # 11

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

BORE HOLE REPORT

BORING No: T8
JOB No: 93183
PAGE No: SHT 10
LOCATION: REF TO SHT: A2
DATE START: 9-25-93
DATE FINISH: 9-25-93
OPERATOR: MD
PREPARED BY: MKL

PROJECT: WOOD WN FEDERAL COM No 1, SITE ASSESSMENT
CLIENT: ARCO OIL & GAS COMPANY
CONTRACTOR: ENVIROTECH INC.
EQUIPMENT USED: CME-55 MOBIL DRILL RIG w/ 8" HSA

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	RECOVERY (ft/ft)	FIELD CLASSIFICATION AND REMARKS
					SURFACE ELEVATION: APPROX. 101.4'
	SM				YELLOWISH BROWN SILTY SAND. FILL TO PERMIT DRILLING.
	SP/SM	AVG: 187 PK: 583	CORE	2/5	GREY TO DARK GREY SILTY SAND TO MEDIUM SAND, SL. PLASTC, MOIST, DENSE, STRONG PETROLEUM ODOR.
	SW				MEDIUM GREY WELL GRADED SAND. NON-COHESIVE, MOIST, DENSE, STRONG PETROLEUM ODOR.
10		AVG: 267 PK: 545	CORE	4/5	COBBLE &/or GRAVELS
		AVG: 333 PK: 599			SAA, MOTTLED LIGHT TO DARK GRAY STREAKS, SILTY LAYERS.
		AVG: 290 PK: 540	CORE	3/5	
20					
30					
40					

TOTAL DEPTH: 18.5 FEET
GROUNDWATER DEPTH: NOT REACHED

COMPLETION: PLUGGED AND ABANDONED

NOTES:

SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
CUTTG - SOIL SAMPLE OF DRILL CUTTINGS
ND - NONE DETECTED
OVM - SOIL SAMPLE COLLECTED DURING DRILLING ANALYZED FOR ORGANIC VAPORS PER NMOCD HEADSPACE FIELD METHOD USING THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580-B ORGANIC VAPOR METER (PID).
PK - PEAK OVM READING
AVG - AVERAGE OF OVM READINGS FOR 1 MINUTE MEASUREMENT.

DRAWING: 3183T8
DATE: 9-29-93
DWN BY: MKL

ENVIROTECH LABS

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PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020
AROMATIC VOLATILE ORGANICS

Client:	ARCO Oil & Gas Co.	Project #:	93183
Sample ID:	MW # 1	Date Reported:	09-27-93
Laboratory Number:	6187	Date Sampled:	09-26-93
Sample Matrix:	Water	Date Received:	09-27-93
Preservative:	HgCl and Cool	Date Analyzed:	09-27-93
Condition:	Cool and Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Benzene	0.9	0.2
Toluene	6.6	0.4
Ethylbenzene	1.0	0.2
p,m-Xylene	1.9	0.4
o-Xylene	1.0	0.3

SURROGATE RECOVERIES:

Parameter	Percent Recovery
Trifluorotoluene	104 %
Bromofluorobenzene	100 %

Method: Method 5030A, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: Wood Fed #1 Separator Pit Assessment

Analyst

Review

ENVIROTECH LABS

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EPA METHOD 8020
AROMATIC VOLATILE ORGANICS

Client:	ARCO Oil & Gas Co.	Project #:	93183
Sample ID:	MW # 2	Date Reported:	09-27-93
Laboratory Number:	6188	Date Sampled:	09-26-93
Sample Matrix:	Water	Date Received:	09-27-93
Preservative:	HgCl and Cool	Date Analyzed:	09-27-93
Condition:	Cool and Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Benzene	1.0	0.2
Toluene	6.9	0.4
Ethylbenzene	1.2	0.2
p,m-Xylene	4.0	0.4
o-Xylene	1.5	0.3

SURROGATE RECOVERIES:

Parameter	Percent Recovery
Trifluorotoluene	98 %
Bromofluorobenzene	100 %

Method: Method 5030A, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: Wood Fed #1 Separator Pit Assessment

Analyst

Review

ENVIROTECH LABS

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PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020
AROMATIC VOLATILE ORGANICS

Client:	ARCO Oil & Gas Co.	Project #:	93183
Sample ID:	MW # 3	Date Reported:	09-27-93
Laboratory Number:	6189	Date Sampled:	09-26-93
Sample Matrix:	Water	Date Received:	09-27-93
Preservative:	HgCl and Cool	Date Analyzed:	09-27-93
Condition:	Cool and Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Benzene	0.4	0.2
Toluene	5.4	0.4
Ethylbenzene	1.7	0.2
p,m-Xylene	7.8	0.4
o-Xylene	3.6	0.3

SURROGATE RECOVERIES:

Parameter	Percent Recovery
Trifluorotoluene	101 %
Bromofluorobenzene	100 %

Method: Method 5030A, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: Wood Fed #1 Separator Pit Assessment

Analyst

Review

ENVIROTECH LABORATORIES

5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

QUALITY ASSURANCE/QUALITY CONTROL

DOCUMENTATION

ENVIROTECH LABS

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PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020
AROMATIC VOLATILE ORGANICS

Client:	NA	Project #:	NA
Sample ID:	Laboratory Blank	Date Reported:	09-27-93
Laboratory Number:	0927AM.BLK	Date Sampled:	NA
Sample Matrix:	Water	Date Received:	NA
Preservative:	NA	Date Analyzed:	09-27-93
Condition:	NA	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Benzene	ND	0.2
Toluene	ND	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	ND	0.4
o-Xylene	ND	0.3

SURROGATE RECOVERIES:

Parameter	Percent Recovery
Trifluorotoluene	101 %
Bromofluorobenzene	108 %

Method: Method 5030A, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments:

Analyst

Review

ENVIROTECH LABS

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PHONE: (505) 632-0615 • FAX: (505) 632-1865

** QUALITY ASSURANCE EPA METHOD 8020
MATRIX SPIKE - AROMATIC VOLATILE ORGANICS

Client:	NA	Project #:	NA
Sample ID:	Sample Spike	Date Reported:	09-27-93
Laboratory Number:	6187-S-BTEX.	Date Sampled:	09-26-93
Sample Matrix:	Water	Date Received:	09-27-93
Analysis Requested:	BTEX	Date Analyzed:	09-27-93
Condition:	NA		

Parameter	Sample Result (ug/L)	Spike Added (ug/L)	Spiked Sample Result (ug/L)	Det. Limit (ug/L)	Percent Recovery	SW-846 % Rec. Accept. Range
Benzene	0.9	20.0	21.0	0.2	100	39-150
Toluene	6.6	20.0	27.2	0.4	102	46-148
Ethylbenzene	1.0	20.0	20.9	0.2	100	32-160
p,m-Xylene	1.9	20.0	22.1	0.4	101	46-148
o-Xylene	1.0	20.0	21.0	0.3	100	46-148

Method: Method 5030A, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments:

Analyst

Review

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CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSIS/PARAMETERS
93183 ARCO Oil & Gas Co.	Wood Fed #1 Separator Pit Assessment	
Sampler: (Signature) Michael K. Lane	Chain of Custody Tape No.	

Sample No./ Identification	Sample Date	Sample Time	Lab Number	Sample Matrix	No. of Containers	BTEX EPA 8020						Remarks
MW #1	9/26/93	1745	6187	Water	2	✓						Due 9/28/93
MW #2	"	1750	6188	"	2	✓						"
MW #3	"	1800	6189	"	2	✓						"

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael K. Lane	9/27/93	710	[signature]	9-27-93	0715
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

ENVIROTECH INC.
5796 U.S. Highway 64-3014
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