GW - 170

REPORTS

YEAR(S):

1993

GW-170

SUBSURFACE INVESTIGATION
ARTESIA PUMPING STATION
ARTESIA, NEW MEXICO

Prepared for:
AMOCO PIPELINE COMPANY
ARTESIA, NEW MEXICO

October 1993
Laguna Hills, California

Project No.: 2436-01

Prepared by:

Mittelhauser
CORPORATION

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1.0 INTRODUCTION

Mittelhauser Corporation (Mittelhauser) performed a subsurface investigation to delineate the extent of a free phase product plume and characterize the groundwater at Amoco's Artesia pumping station in New Mexico.

The site is located in the Empire oil field, approximately 8 miles southeast of the city of Artesia in Eddy County, New Mexico. A site location map is presented as Figure 1. The site is utilized as a crude oil pumping station. The site occupies slightly more than five acres and is surrounded by a barbed wire fence. Three utility buildings are located in the northeast area of the site. An active 30,000 barrel crude oil storage tank is located in the southwest corner of the site and surrounded by an earthen berm. A second bermed area is located immediately to the north of the tank berm and surrounds an area of black stained soil. A portion of the eastern berm has been breached with soil staining leading out to Scoggin Draw. Two groundwater monitoring wells are located within the site boundaries; one at the southwest corner and one just south of the center of the site within the tank berm. A third monitoring well is located approximately 80 feet east of the southeast corner of the site. A site map is presented as Figure 2.

1.1 *BACKGROUND*

An initial investigation was performed by CURA, Inc., in May of 1993, following the discovery of a leaking crude oil storage tank at the Amoco Artesia Station.

Four borings were advanced, three of which were converted to groundwater monitoring wells during the drilling investigation. The borings were advanced to evaluate the occurrence of hydrocarbon product in the subsurface soil and groundwater.

Hydrocarbon concentrations were detected in soil during the drilling the investigation. Free product ranging in thickness from 0.21 to 1.75 feet was encountered in the three completed groundwater monitoring wells.

2.0 SCOPE OF WORK

The scope of work performed by Mittelhauser consisted of the following tasks:

- Develop site-specific Health and Safety Plan.
- Advance soil borings to delineate the occurrence of free-phase hydrocarbons.
- Install a minimum of 4 groundwater monitoring wells and sample the groundwater for BETX.
- Evaluate free product and groundwater data and report results.
- Prepare of a hydrocarbon delineation report including groundwater and free-phase data.

2.1 *HEALTH AND SAFETY PLAN*

A site-specific health and safety plan was prepared prior to initiating any field work. All parties involved in the field work reviewed and signed the health and safety plan certifying that the plan had been read and understood. In addition, prior to the initiation of the field work, a representative of Amoco reviewed the Amoco safety regulations with the field crew. A copy of the health and safety plan is presented as Appendix A.

2.2 *SOIL BORINGS*

Twenty-three soil borings were advanced on August 23 through 29, 1993 to delineate the extent of the free-phase product. The boring locations are presented in Figure 3. The borings were advanced using 6-inch hollow-stem augers.

Originally, the scope of work called for advancing the augers to a depth of 15 feet below ground surface and then continuously cored until groundwater was encountered. Continuous coring through the gypsum encountered at the site was not possible utilizing the hollow-stem auger/continuous core system. Continuous sampling using a split-spoon sampler was attempted. However, the gypsum was virtually impenetrable and would not yield a representative sample. All borings were advanced by utilizing hollow-stem augers until a drilling break was encountered, which signified a possible fractured or water bearing zone. Once a water bearing zone was encountered, the split spoon sampler was used to sample the zone.

The borings ranged in depth from 20.0 to 66.5 feet below ground surface (bgs). The borings were advanced to approximately 2.5 feet into the water bearing zone, if encountered. If an impermeable barrier (aquitard) was encountered below the fractured water bearing zone, drilling was terminated at that point. Copies of the boring logs are presented in Appendix B.

All clean cuttings were placed on plastic placed adjacent to the boring locations. Impacted soil encountered during drilling activities were placed in 55-gallon DOT approved drums and stored onsite temporarily prior to disposal.

The soil cuttings and any material retrieved from the split-spoon sampler was screened using a Photo-vac photoionization detector (PID) to screen for volatile organics, which were measured in parts per million. A combination hydrogen sulphide (H_2S), oxygen, and LEL meter was also used to monitor the cuttings for H_2S concentrations during

all drilling activities. Both the PID and H_2S meters were also used to monitor the breathing zone as specified in the health and safety plan.

The borings were backfilled from total depth to the top of any water encountered using bentonite chips. An eight-percent bentonite cement-grout slurry was then utilized to complete the open bore holes to ground surface.

2.3 *WELL INSTALLATION*

A total of four groundwater monitoring wells were installed on August 29, 1993. Borings B-6, B-18 and B-23 were converted to groundwater monitoring wells with two wells installed at the B-18 location. A thin fractured zone was encountered above the main water bearing zone in B-18, however, it was not determined if the zone would yield a significant amount of water. In an effort not to interconnect and risk cross-contamination within the two zones, two wells were installed at the B-18 location with different screened intervals. No water was produced in the upper zone after the well was installed. The wells were designated MW-4 through MW-7 since three wells were previously installed at the site.

Monitoring well MW-4 (B-6) was screened from 24.5 to 34.5 feet bgs. MW-5 (B-18) was screened from 22.3 to 25.3 feet bgs and MW-6 (B-18) was screened from 8.9 to 18.9 feet bgs. The screen interval in MW-7 (B-23) was located from 51.1 to 53.1 feet bgs. The screened intervals correspond to water-bearing zones encountered in what appear to be a confined aquifer. Copies of the well construction reports are presented in Appendix C.

All wells except MW-6 were surged and developed using a hand bailer. A monitoring well was not developed due to very low fluid content. A minimum of three well volumes were removed from each well while monitoring the physiochemical parameters of Ph, conductivity, temperature and salinity. Turbidity was not measured

in NTUs since the clarity of the water did not fall below the instruments maximum of 200 NTUs. Copies of the well development/sampling data sheets are included in Appendix C.

2.3.1 Chemical Analysis

After the wells were developed and allowed to recover a minimum of 24 hours, water samples were collected and sampled for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8020, and at the request of the William Olson of the Oil Conservation Division, polynuclear aromatics (PNAs) by EPA Method 8270.

Groundwater samples were collected from groundwater monitoring wells MW-4, MW-5 and MW-7. Monitoring well MW-6 was dry, it was therefore not sampled. The samples were collected using disposable bailers to avoid the possibility of cross contamination. The first water collected from each well was placed in 40 milliliter glass volatile organic analysis (VOA) vials for BTEX analysis. Samples were then collected for PNA analysis in 1.0-liter amber glass bottles.

All samples were placed on ice and transported to BC Analytical in Anaheim, California for analysis following proper chain of custody procedures.

3.0 INVESTIGATION RESULTS

3.1 *GEOLOGY/HYDROGEOLOGY*

The site is located within the Pecos River Valley drainage basin, approximately 2.6 miles east-northeast of the Pecos River. The subsurface geology in the immediate area of the site consists primarily of gypsum from the Yates Formation of middle Permian Age. Layers of silts, clays and limestone are interbedded in the gypsum. A silty, very fine sand zone underlies the gypsum.

A shallow intermittent water-bearing zone, which appears to be a perched zone, was encountered in 18 of the 23 borings. This intermittent zone was encountered along bedding planes and coincident to a fractured zone of the gypsum. The apparent groundwater gradient of the perched zone appears to be to the south-southwest, following the direction of Scoggin Draw. No significant wet fractured zone was encountered in borings B-8, B-17, B-19, B-20 or B-21. A second water-bearing zone was encountered underlying the gypsum in the silty-sand layer. Two cross sections are discussed in Section 3.1.1 which provide details of subsurface lithology.

Groundwater gradient was not evaluated precisely during this field effort, which primarily focused on delineating free phase hydrocarbons. The newly installed groundwater monitoring wells have not been surveyed to date. Elevations of many of the borings were measured against a site datum to allow rough lithology correlations. A licensed surveyor will survey well elevations during the next mobilization phase.

3.1.1 Free Phase Product Occurrence

Free product thicknesses were measured in the three existing monitoring wells on site. Product thicknesses ranged from 0.83 feet to 1.63 feet. The new groundwater monitoring wells were specifically placed outside of the free phase product pool.

Free phase hydrocarbon product was found in the fractured gypsum perched water zone in seven borings mostly to the south-southwest of the site, ranging in thickness from a residue to 1.5 feet thick. Hydrocarbon product was identified in boring B-12, however, the thickness could not be measured for health and safety reasons. During field installation, measured H_2S concentrations exceeded maximum safe levels, and all activities at this groundwater monitoring well were suspended. Further downstream air monitoring indicated that additional groundwater well work associated with the well was unsafe during the short period available to complete the work. High PID and

H_2S concentrations were identified in four additional borings. Table 1 presents a summary of product or PID/H_2S concentrations identified in each boring.

Figure 4 identifies the location of the two cross sections, A-A' and B-B', that have been prepared as a visual indication of free product, lithology, and groundwater geometry and occurrence. Figures 5 and 6 present the north-south (A-A') and east-west (B-B') cross sections.

A fractured gypsum zone appears to be a conduit for the hydrocarbon product. The fractured zone roughly correlates with surface topography as shown in the cross sections, as does the "slope" of the underlying gypsum contact. As the sampling technique did not allow for continuous coring, and as the collected samples were generally not intact, the orientation or presence of any sedimentary bedding planes is not known. However, we can infer that the gypsum contact noted during drilling is related to weathering; the contact slopes into Scoggin's Draw from both the East and West.

The A-A' cross section illustrates the relative elevations of groundwater and free product across Scoggins Draw. Boring B-16 has been incorporated into the A-A' cross section. The topographically higher B-16 has a correspondingly higher free product zone, which correlates to the gypsum contact discussed above. The occurrence of free product on this contact indicates that permeability either decreases rapidly below the contact zone, or that enhanced permeability exists along this zone, or that both conditions exist. The free-phase hydrocarbon product seems to be limited to the fractured gypsum zone (perched aquifer) and is migrating down the slope (west of the facility) into Scoggin Draw.

Cross section A-A' is oriented along Scoggin Draw. Free product impacting the Draw from the facility extends southward some 1700 feet, and likely mirrors the

topographic grade. The approximate extent of the hydrocarbon plume identified on the perched groundwater zone is presented as Figure 7.

3.2 *CHEMICAL ANALYSIS RESULTS*

Soil samples were not collected during the investigation due to the nature of lithology and the occurrence of the contaminant. Free product was associated with fracture zones which were not easily monitored during drilling. Samples from impacted areas were not likely to yield valuable information unless a fracture was intercepted by the sample tube.

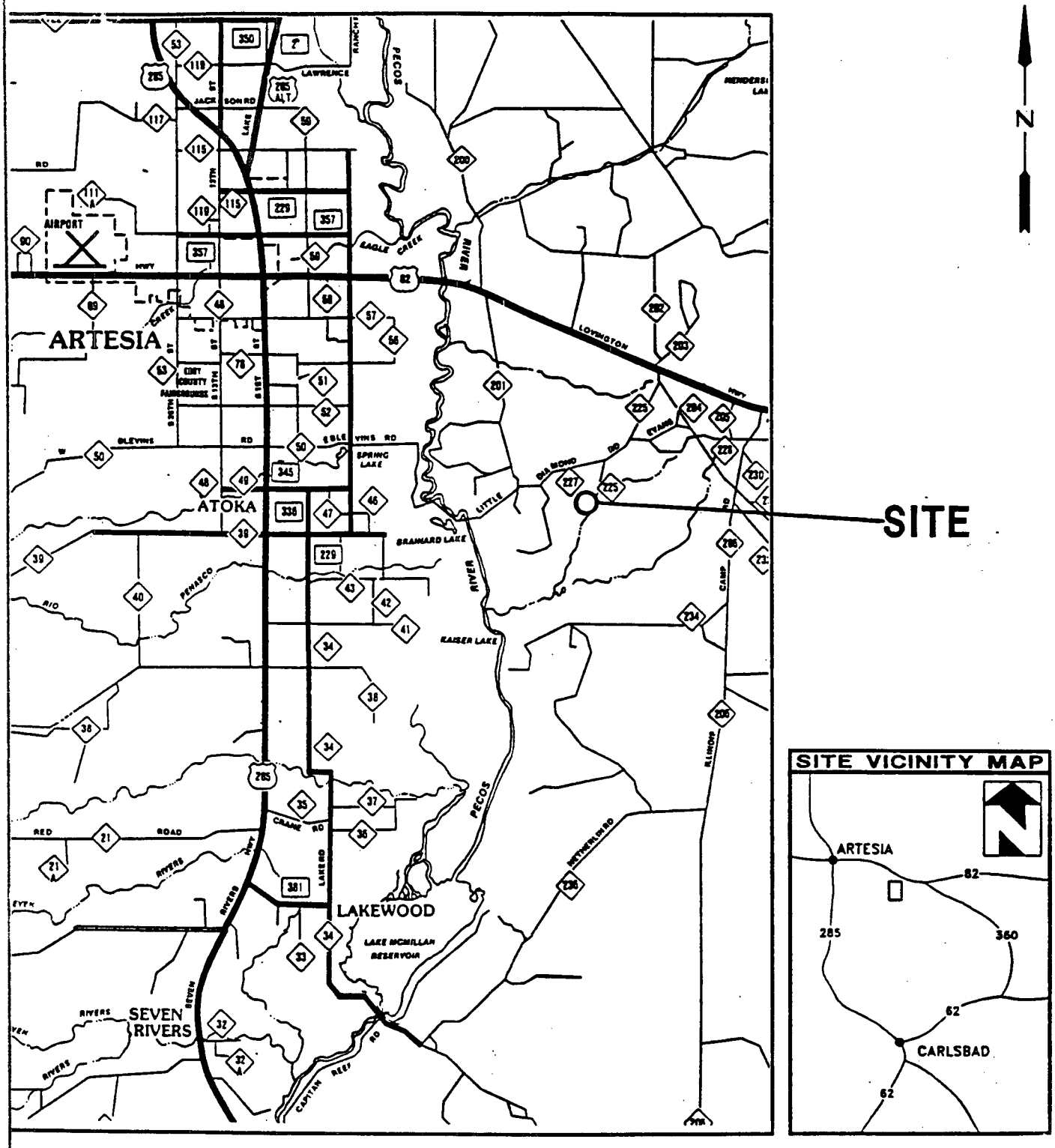
Groundwater analysis results from this investigation are listed in Table 1. Results of the analyses from groundwater monitoring well MW-5 indicate the presence of benzene at 1500 micrograms per liter (ug/l), ethylbenzene at 94 ug/l, toluene at 290 ug/l and total xylenes at 480 ug/l. Naphthalene was also identified in the sample collected from MW-5 at a concentration of 5.9 ug/l. No BTEX or PNA concentrations were identified in the samples collected from MW-4 or MW-7. Copies of the laboratory analytical report and chain of custody form are included as Appendix D.

4.0 CONCLUSIONS

Free product has been found west and south of the Amoco Artesia facility, and appears to have migrated along a fractured gypsum zone underlying Scoggin Draw.

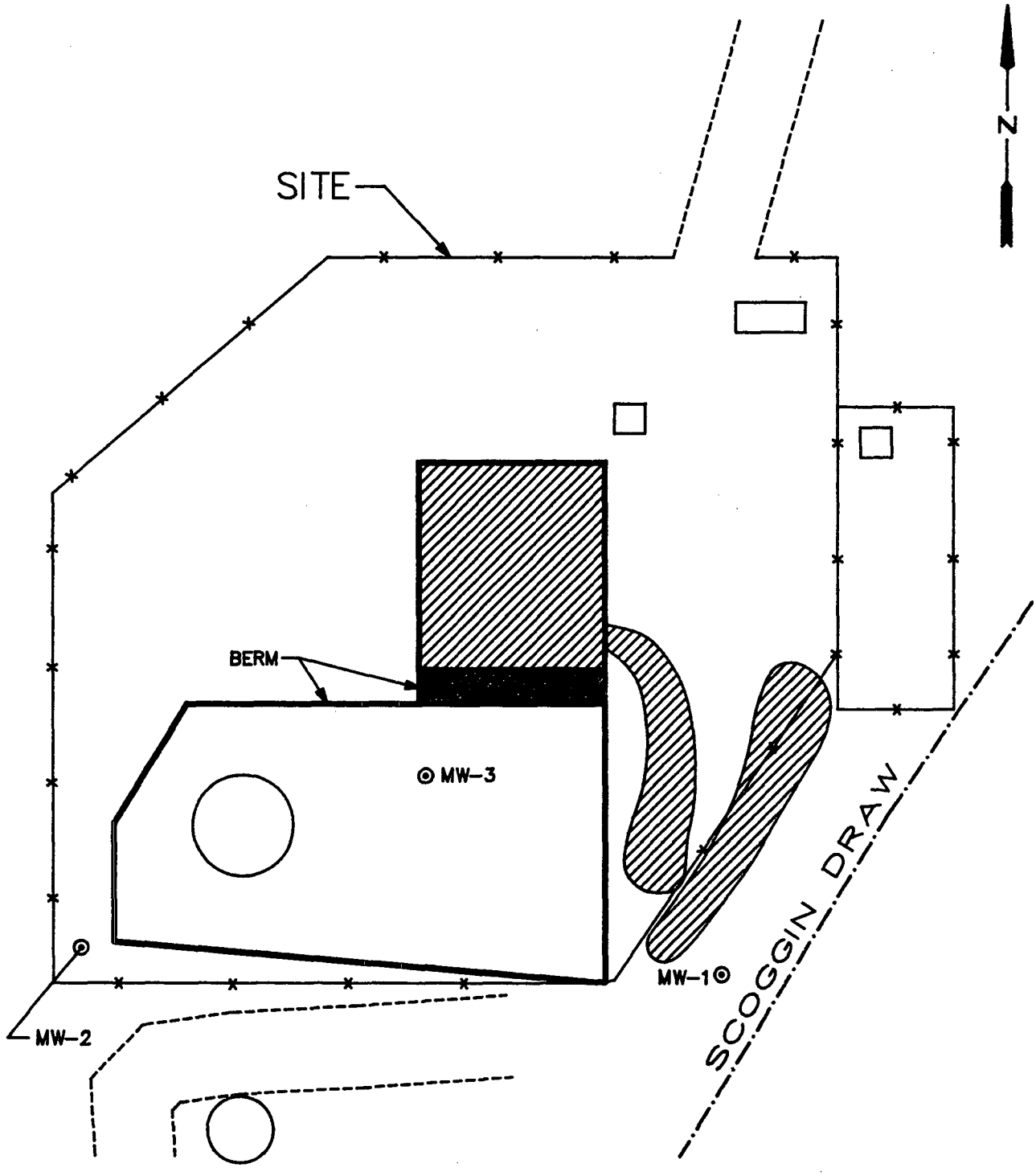
Four monitoring wells have been installed at the site. Groundwater Monitoring wells MW-4 and MW-7 appear to lie outside of the impacted area to the north and east, respectively. A groundwater monitoring well was not completed to define the western extent of the hydrocarbon occurrence due to the absence of perched water in this area. Groundwater monitoring well MW-6, completed adjacent to MW-5, but in a shallower zone, did not yield sufficient water to develop or sample. Groundwater monitoring well MW-5, also completed downgradient of the free phase pool, encountered dissolved hydrocarbon constituents.

FIGURES



REF: CURA PRELIMINARY SUBSURFACE INVESTIGATION, JUNE 1993

DES EJC	MITTELHAUSER corporation	SITE MAP AMOCO OIL PIPELINE CO. ARTESIA, NEW MEXICO
CHK BY		
APP BY		
DRAWN BXB		
DATE 10/1/93		
SCALE AS SHOWN		
CAD NO 24360010		
FILE NO 2436-01	DWG NO. FIGURE 1	REV A



EXPLANATION

MW-1 ⊙ PREVIOUSLY INSTALLED MONITORING WELL

DIRT ROAD

STAINED SOIL

CHAIN-LINK FENCE

BUILDING

CONTOUR INTERVAL: 10 FEET

100 0 100

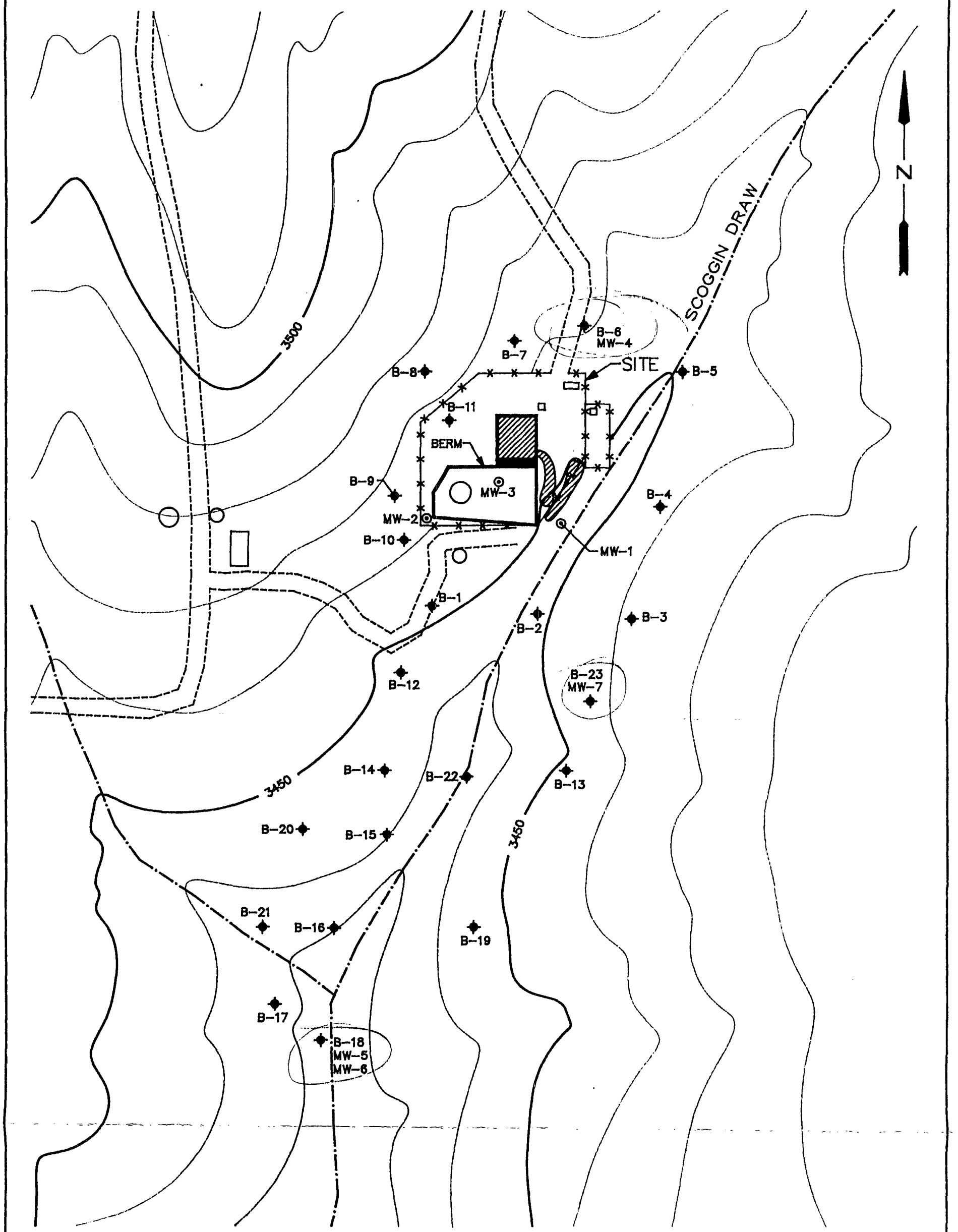
APPROXIMATE SCALE IN FEET

DRN BY	EJC
CHK BY	
APP BY	
DRAWN	KYM
DATE	9/20/93
SCALE	AS SHOWN
CAD NO	24360002
FILE NO	2436-01

SITE MAP
AMOCO OIL PIPELINE CO.
ARTESIA, NEW MEXICO

MITTELHAUSER Corporation

DWG NO. FIGURE 2 REV A



EXPLANATION

- B-21 ✦ MITTELHAUSER BORING LOCATION AND DESIGNATION
- MW-4 ⊙ PREVIOUSLY INSTALLED MONITORING WELL
- DIRT ROAD
- STAINED SOIL
- CHAIN-LINK FENCE
- BUILDING

CONTOUR INTERVAL: 10 FEET

300 0 300

APPROXIMATE SCALE IN FEET

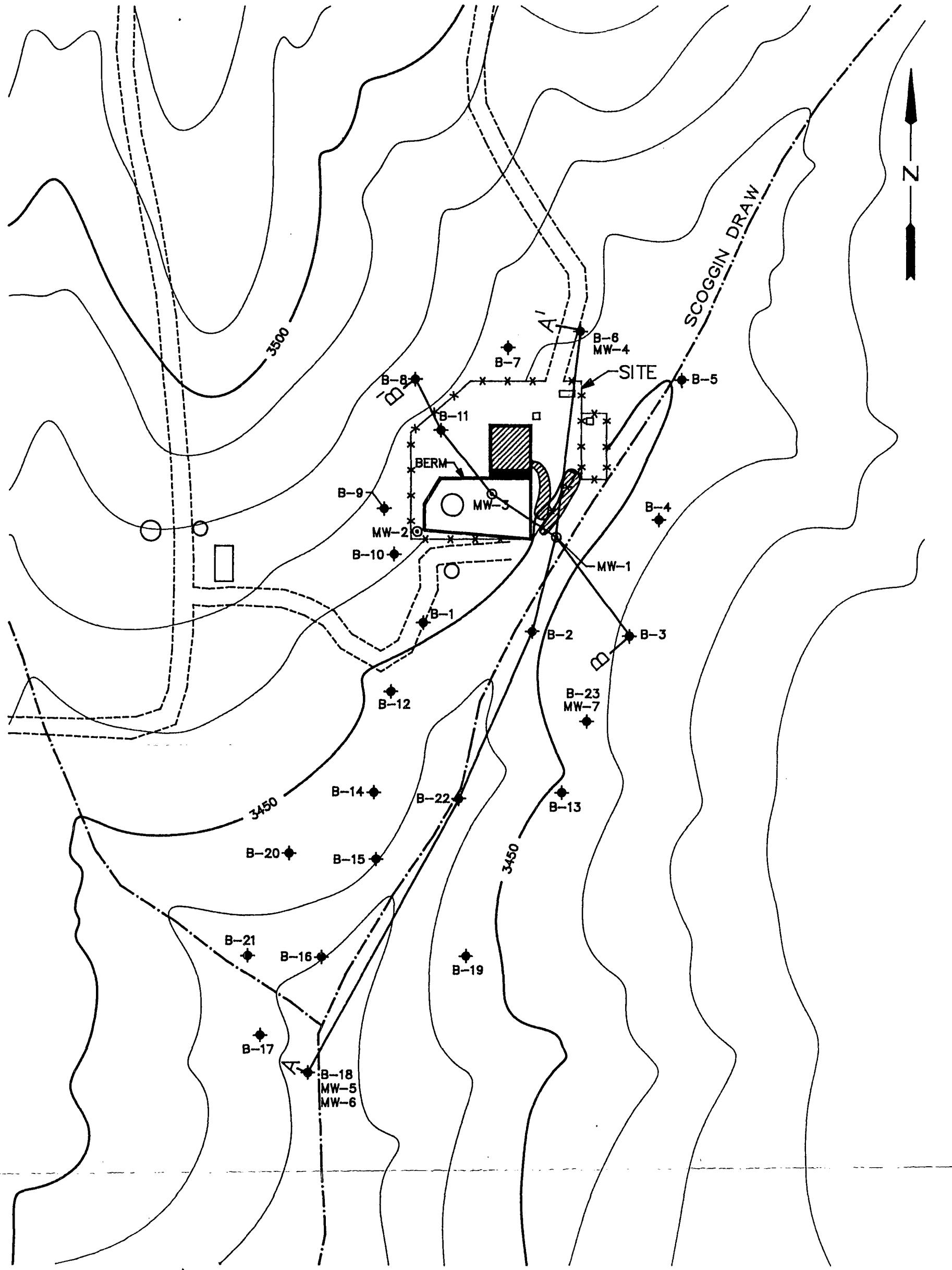
DRAWN	EJC
CHECKED BY	
APPROVED BY	
DRAWING	KYM
DATE	9/13/93
SCALE	AS SHOWN
JOB NO	24380001
DWG NO	2436-01

BORING LOCATION MAP
AMOCO OIL PIPELINE CO.
ARTESIA, NEW MEXICO

MITTELHAUSER corporation

DWG NO. FIGURE 3

REV A



EXPLANATION

- B-21 ✦ MITTELHAUSER BORING LOCATION AND DESIGNATION
- MW-4 ⊙ PREVIOUSLY INSTALLED MONITORING WELL
- DIRT ROAD
- STAINED SOIL
- CHAIN-LINK FENCE
- BUILDING

CONTOUR INTERVAL: 10 FEET

300 0 300

APPROXIMATE SCALE IN FEET

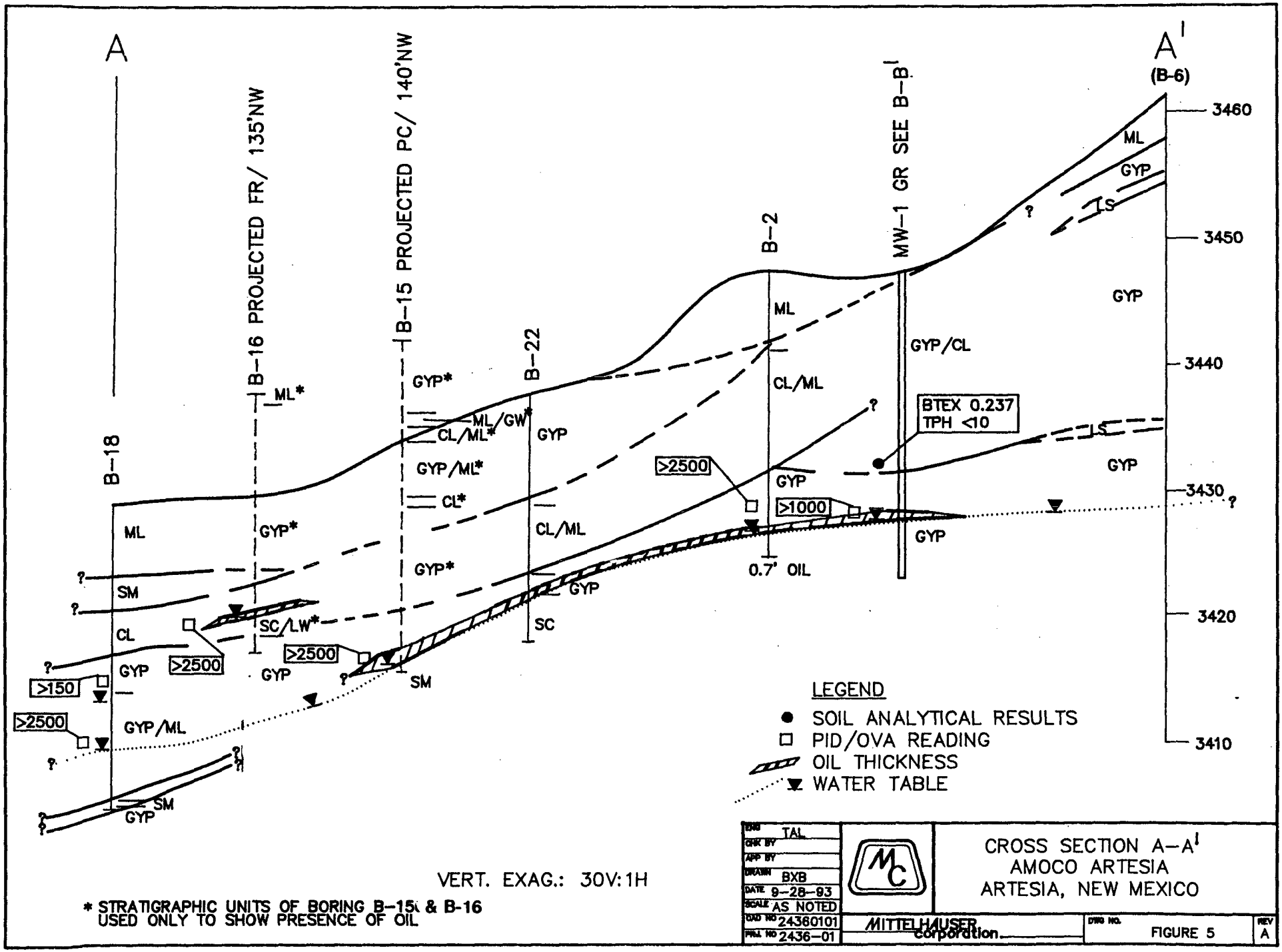
DRAWN	EJC
CHK BY	
APP BY	
DRAWN	BXB
DATE	9/29/03
SCALE	AS SHOWN
CAD NO	24360001
FILE NO	2436-01

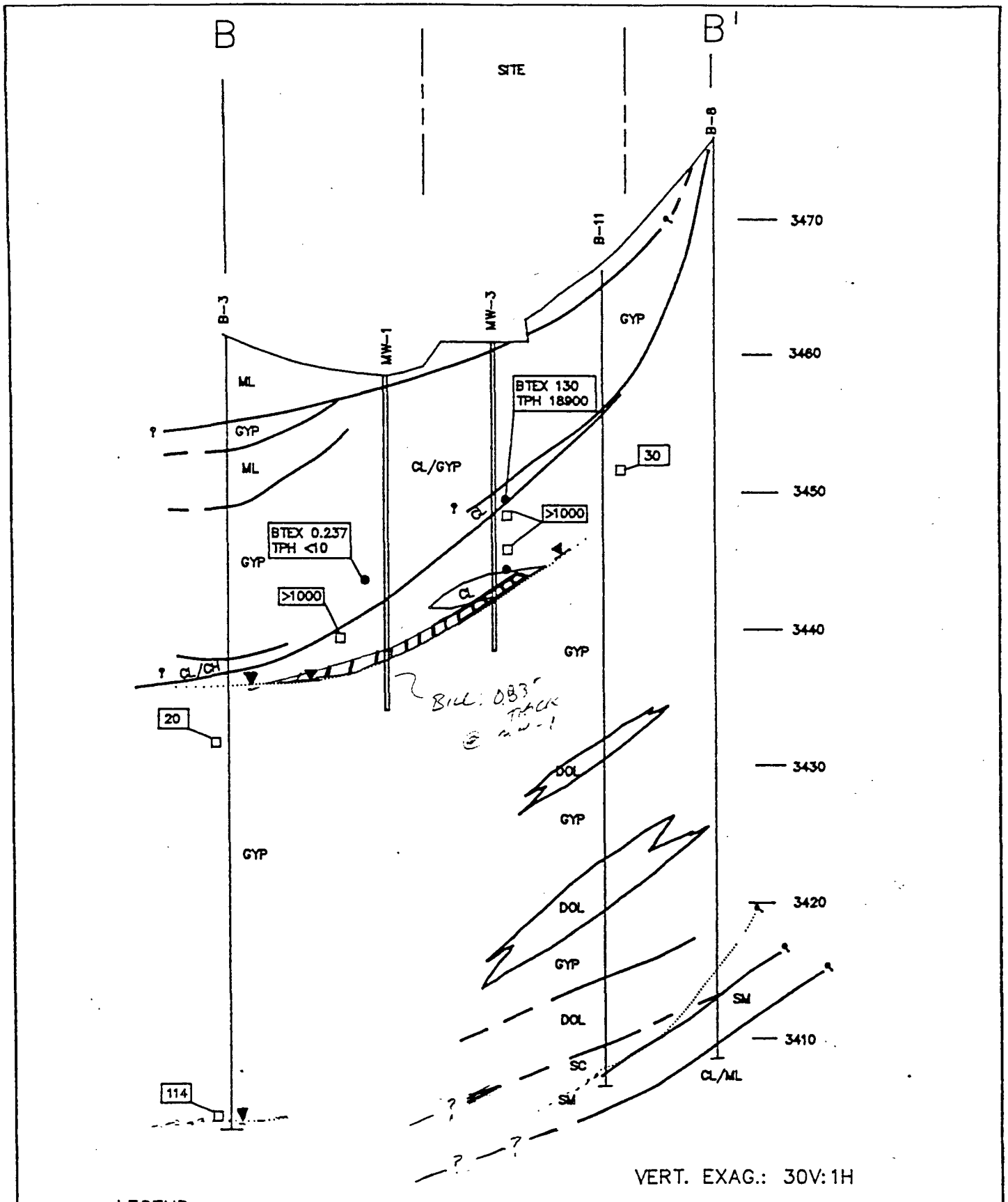
CROSS SECTION LOCATION MAP
AMOCO OIL PIPELINE CO.
ARTESIA, NEW MEXICO

MITTELHAUSER Corporation

DWG NO. FIGURE 4

REV A


A
A'
(B-6)
B-18
B-16 PROJECTED FR/ 135'NW
B-15 PROJECTED PC/ 140'NW
B-22
B-2
MW-1 GR SEE B-B'
3460
3450
3440
3430
3420
3410
ML
GYP
SM
CL
SC
SC/LW*
ML*
GYP*
ML/GW*
CL/ML*
GYP/ML*
CL*
CL/ML
GYP/CL
BTEX 0.237
TPH <10
>2500
>1000
>150
0.7' OIL
GYP/ML
LEGEND
SOIL ANALYTICAL RESULTS
PID/OVA READING
OIL THICKNESS
WATER TABLE
VERT. EXAG.: 30V:1H
* STRATIGRAPHIC UNITS OF BORING B-15 & B-16
USED ONLY TO SHOW PRESENCE OF OIL
DRN BY TAL
CHK BY
APP BY
DRAWN BXB
DATE 9-28-93
SCALE AS NOTED
CAD NO 24360101
PROJ NO 2436-01
CROSS SECTION A-A'
AMOCO ARTESIA
ARTESIA, NEW MEXICO
MITTELHAUSER corporation
DWG NO. FIGURE 5
REV A



LEGEND

- ● SOIL ANALYTICAL RESULTS
- □ PID/OVA READING
- OIL THICKNESS
- ▼ WATER TABLE

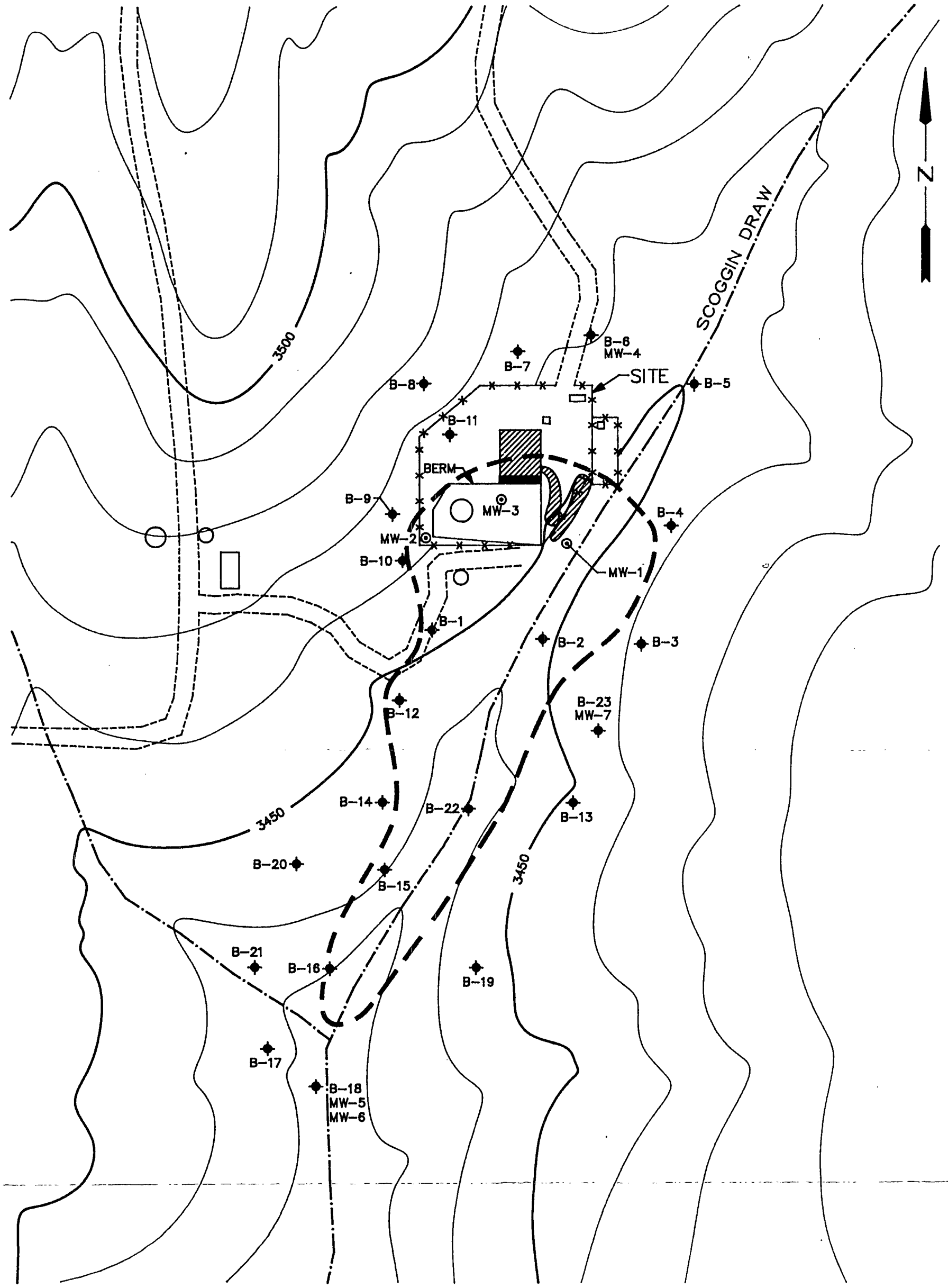
DRAWN	TAL
CHK BY	
APP BY	
DRAWN	BXB
DATE	9-28-93
SCALE	AS NOTED
CAD NO	24360108
PROJ NO	2436-01

CROSS SECTION B-B'
AMOCO ARTESIA
ARTESIA, NEW MEXICO

MITTELHAUSER corporation

DWG NO. FIGURE 6

REV A



EXPLANATION

- B-21 ✦ MITTELHAUSER BORING LOCATION AND DESIGNATION
- MW-4 ⊙ PREVIOUSLY INSTALLED MONITORING WELL
- DIRT ROAD
- STAINED SOIL
- CHAIN-LINK FENCE
- BUILDING
- ESTIMATED FREE PHASE HYDROCARBON EXTENT

CONTOUR INTERVAL: 10 FEET

300 0 300

APPROXIMATE SCALE IN FEET

DES	EJC
CHK BY	
APP BY	
DRAWN	BXB
DATE	10/1/93
SCALE	AS SHOWN
JOB NO	24360003
FILE NO	2436-01

MITTELHAUSER Corporation

ESTIMATED FREE PHASE HYDROCARBON EXTENT
AMOCO OIL PIPELINE CO.
ARTESIA, NEW MEXICO

DWG NO. FIGURE 7

REV A

TABLES

TABLE 1
AMOCO OIL COMPANY
FREE PHASE HYDROCARBON VERIFICATION

BORING	TOTAL DEPTH (IN FEET)	FREE PHASE HYDROCARBON	PRODUCT THICKNESS (IN FEET)	COMMENTS
B-1	26.0	YES	0.3	–
B-2	22.5	YES	0.69	–
B-3	58.0	NO	–	SLIGHT ODOR
B-4	51.8	YES	RESIDUE	VERY HIGH PID & H2S
B-5	61.0	NO	–	–
B-6	35.0	NO	–	–
B-7	33.5	NO	–	–
B-8	66.5	NO	–	–
B-9	43.0	NO	–	–
B-10	33.0	NO	–	VERY HIGH PID & H2S
B-11	59.5	NO	–	–
B-12	29.0	YES	NM	VERY HIGH PID & H2S
B-13	55.5	NO	–	–
B-14	31.5	NO	–	VERY HIGH PID & H2S
B-15	26.5	YES	1.5	–
B-16	20.0	YES	0.125	–
B-17	29.5	NO	–	–
B-18	25.0	NO	–	SLIGHT ODOR & HIGH PID
B-19	38.0	NO	–	–
B-20	50.0	NO	–	–
B-21	28.5	NO	–	–
B-22	20.0	YES	1.5	–
B-23	53.4	NO	–	–

NM – B-12 WAS NOT MEASURED FOR HEALTH AND SAFETY REASONS

TABLE 2
AMOCO OIL COMPANY
BTEX AND PNA ANALYTICAL
SAMPLE RESULTS

SAMPLE NUMBER	POLYNUCLEAR AROMATICS EPA Method 8270		PURGEABLE AROMATICS EPA Method 8020 (BTEX)			
	Analyte	Concentration	Benzene	Toluene	Ethylbenzene	Xylenes
MW-4-01	--	--	--	--	--	--
MW-5-01	Napthalene	5.9	1500	290	94	480
MW-7-01	--	--	--	--	--	--
DETECTION LIMITS (in ug/kg):		5.0	0.5	0.5	0.5	0.5

-- NONE DETECTED

APPENDICES

APPENDIX A

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

AMOCO ARTESIA STATION
SITE INVESTIGATION

Plan Prepared by:

Mittelhauser Corporation
Laguna Hills Office
23272 Mill Creek Drive
Laguna Hills, California
(714) 472-2444

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1.0 ADMINISTRATIVE INFORMATION

1.1 PROJECT DESCRIPTION

Project Name: AMOCO ARTESIA STATION

Project No.: 2436

Site Location: Section 10, T18S, R27E, Eddy County, New Mexico

Work Summary: Collect advance soil borings to delinate the occurrence of free phase hydrocarbons. Install a minimum of 4 monitoring wells, and sample the wells for BTEX and conduct a pump test (if necessary).

Comments:

Prepared by: Tim Eyres **Date:** 8-2-93

Proposed Date(s) of Operation: 8-9-93 to 8-9-94

Approvals: (Project Manager and one of the other three)

Project Manager: Tim Lester [signature] FOR TAL Date: 8/20/93

OHSO/A: ______________________ Date: ________

CHSO: ______________________ Date: ________

CIH: Irene Fenelli [signature] Date: 8/19/93

Date of Issue: ______________ Date of Expiration: ______________

1.2 SCOPE OF SAFETY PLAN

This site-specific safety plan is intended to meet the requirements of 29 CFR Part 1910.120 and the EPA Standard Operating Safety Guides for Hazardous Waste Operations (1986). All employees involved in field work at this site have completed the required 40 hours initial training, maintain qualification through annual refresher training, are under a program of medical monitoring, and are certified to wear respiratory protection, as specified in 29 CFR part 1910.134 and 8CCR 5144.

This plan was prepared from the best available evidence concerning site conditions. It is recognized that conditions on a site may change or that more information may become available during the operation. Unless specified in this site-specific safety plan, the field team does not have the option to modify the levels of personal protection in any way. If during the operation, it is determined that the protection specified in the site-specific safety plan requires modifications, work will cease, and the site safety officer (SSO) will contact the project manager and/or Safety Representative. Work will not resume until authorized.

1.3 FIELD TEAM ASSIGNMENTS

DUTY	NAME
TEAM LEADER	Eric Conard
SITE SAFETY	Eric Conard
DECONTAMINATION	Tim Eyres

1.4 SUBCONTRACTORS

The following subcontractors will perform work during this operation. All employees of subcontractors performing work with the potential for exposure to hazardous waste shall meet the requirements of 29 CFR 1910.120 and 8CCR 5144.

1. **Name:** Harrison Drilling

   Telephone No: (505) 397-6437

   Address: PO Box 70, Hobbs New Mexico 88241-0070

   Authorized Representative: Claiborne Harrison

   Services Provided: Drilling

   Contract No: **Date:**

2. **Name:**

   Telephone No:

   Address:

   Authorized Representative:

   Services Provided:

   Contract No: **Date:**

3. **Name:**

   Telephone No:

   Address:

   Authorized Representative:

   Services Provided:

   Contract No: **Date:**

1.5 SAFETY COMPLIANCE AGREEMENT FORM

Site: AMOCO ARTESIA STATION

Project No.: 2436

I the undersigned, acknowledge that I have attended the safety meeting, and received a copy of this site-specific safety plan. I have read and understood the safety plan, and do agree to adhere to the requirements specified by it. I understand that I may be prohibited from continuing work on the project for failing to comply with this safety plan.

Signature (Print name below)	Company	Date
(CLAYBRIDGE HARRISON)	HARRISON DRILLING	8/23/93
(PAT BROWN)	HARRISON RIG 3	8-23-93
(Donny Reza)	Harrison Daly	8-23-93
(TOM EYLES)	MITTELHAUSER	8-23-93
(ERIC CONARD)	MITTELHAUSER	8-23-93
(JOHN D. GUY)	HARRISON	8-26-93
( )		
( )		
( )		
( )		

Meeting Conducted by: ERIC CONARD
Signature

1.6 SUBCONTRACTOR COMPLIANCE AGREEMENT

Project Name: Amoco Artesia Station

Project Number: 2436

Company Name: Harrison Drilling

Telephone Number: (505) 397-6437

I acknowledge that as an authorized representative of this company, I have read and understood the Site-Specific Safety Plan to be used for these site activities. I understand that hazardous materials and activities may be encountered during this operation, and that the scope of these operations are covered by 29 CFR 1910.120.

I certify that all employees of this company which will be assigned to this operation will be under the company safety program which is in compliance with all federal and local regulations.

Name (Printed): C H Harrison (Claiborne Harrison)

Title: President

Signature: C H Harrison

Date: 8/23/93

2.0 DESCRIPTION OF WORK TO BE PERFORMED (The tasks involved)

Task 1) DELINATION OF THE OCCURRENCE OF FREE PRODUCT- Approximately 30 to 45 soil borings will be taken to delineate the extent of the free phase product.

Task 2) INSTALLATION AND SAMPLING OF GROUNDWATER MONITORING WELLS- A total of four 4-inch PVC groundwater monitoring wells will be installed, developed, and sampled.

Task 3) CONDUCT A PUMP TEST (IF NECESSARY) -Dependent upon findings during Task 2

3.0 SITE BACKGROUND

The facility is a crude oil pipeline pump station operated by Amoco Pipeline Company. Subsurface pipelines, aboveground storage tanks, and sumps containing crude oil are located on site.

3.1 SITE PHYSICAL DESCRIPTION

Amoco Artesia Station is utilized as a crude oil pipeline pumping station in which subsurface crude oil field lines from various oil field leases are manifolded into two main subsurface discharge pipelines operated by Amoco Pipeline Company. One currently inactive 30,00 barrel aboveground crude oil storage tank(Tank 7264) is located near the southwestern corner of the site. The tank is approximately 25 years old and is surrounded by an earthen dike (approximately 200 feet by 300 feet). Seven tempoary crude oil storage tanks (500 barrel tanks) are located near the center of the site within another diked area adjacent to the earthen dike surrounding Tank 7264. The pumping station is located along the east-central portion of the site.

Amoco Artesia Station is surrounded by barbed-wire fencing with a cattleguard entrance located near the northeast corner of the site boundary. The site is located in a rural area within the Empire Oil Field. No residences, public buildings, or surface bodies of water were observed within a one-half mile radius of the facility. A dry arroyo, Scoggin Draw, is located along the eastern boundary and drains from the northeast to southwest. A crude oil pipeline booster station operated by Pride Petroleum is located near the eastern boundary of the site with a subsurface pipeline that runs north-south along the east side of Scoggin Draw. An offsite produced water booster station operated by Arco Oil and Gas Company is located adjacent to the southwest boundary of the site.

3.2 SITE HISTORY (ACTIVITIES, INCIDENTS, ETC.)

3.3 TYPES OF MATERIALS KNOWN TO HAVE BEEN USED ON THE SITE

Chemical Type: Crude Oil

3.4 MATERIALS KNOWN OR SUSPECTED TO REMAIN ONSITE

Chemical Type: Crude Oil

3.5 SITE STATUS (ACTIVE/INACTIVE, AGENCY ACTIONS)

Active pump station

Has the site been characterized to the best of your knowledge?

Yes XXX **No** ____

4.0 HAZARDOUS EVALUATION

Summary of anticipated hazards:
(Please check appropriate box.)

(xx)	Physical Hazards inherent to the site
(xx)	Physical hazards related to the operations
(xx)	Chemical Hazards
( )	Community Hazards
(xx)	Electrical Hazards
(xx)	Mechanical Hazards
(xx)	Biohazards
( )	Radiation Hazards
(xx)	Heat Stress
( )	Confined Space Entry
(xx)	Noise Hazards
( )	Cold Stress
( )	Other

Comments: Drilling operations could present physical threats normally associated with such operations. These include hazards associated with operation of heavy equipment. All equipment should be placed no closer than 15-feet from any overhead electric line. All construction on site should adhere to 29 CFR 1926. Another physical hazard associated with drilling and sampling operations is injury due to vehicular traffic around the site. In addition, proper work procedures , should be observed with reguard to hot and cold weather conditions.

4.1 CHEMICAL HAZARDS (ATTACH REFERENCES)

	Chemical	Range of Conc. in (A)ir, (W)ater, (S)oil	Mode of Intake	Limits (PEL/TLV)	IDLH Level of Concern (H/M/L)
1.	Crude Oil	W, S, Free Product	I, S	N/A	L
2.	Hydrogen Sulfide (H2S)	A, S	I, C	10 ppm	H
3.	Benzene	W, S, A	I, S	1 ppm	H
4.					
5.					
6.					
7.					

* (I) Inhalation (S) Skin Contact (C) Ingestion

Identify locations where the contaminants are of greatest concern on the site:

Comments: Crude oil Liquid and vapors also present a posioning hazard, if exposure is excessive.

References used:

XXX NIOSH/OSHA XXX ACGIH (TLV) ____ SAX

____ PATTY ____ OHS

Describe other:

4.2.1 Physical Hazards Inherent to the Site:

XXX	Fire	XXX	Explosion	____	Anoxia
XXX	Heat Stress	____	Cold Stress	XXX	Noise
____	Radiation	XXX	Biohazards		

Describe Other:

Comments:

4.2.2 Physical Hazards Related to the Operations

XXX	Heat Stress	____	Cold Stress
____	Trenching	XXX	Drilling

Describe Other:

Comments: See section 4.0 for drilling hazards

4.3 COMMUNITY HAZARDS

None

4.3.1 Potential for Contaminant Migration

None

4.3.2 Potential for Community Exposure

None

5.0 HAZARDOUS WASTE FIELD SAFETY DIRECTIVES

- No eating or smoking onsite.
- No contact lenses.
- Hard hats and steel-toed boots will be worn at all times.
- Site access will be restricted to authorized personnel only.

- All operations will have first aid kits, eye washes, and fire extinguishers available.
- No facial hair is allowed that will interfere with the respirator face seal.
- Emergency information will be posted (Section 7.0).
- Safety plan will be available onsite at all times.

5.1 MECHANICAL HAZARDS

- Do not stand near backhoe buckets and earth moving equipment.
- Verify that all equipment is in good condition.
- Do not stand or walk under elevated loads or ladders.
- Do not stand near unguarded excavation and trenches.
- Do not enter excavation or trenches over 5 feet deep that are not properly guarded, shored or sloped.
- Appropriate guards must be used if equipment has potentially hazardous moving parts.

5.2 ELECTRICAL HAZARDS

- Locate and mark buried utilities before drilling or digging.
- Maintain at least 10 foot clearance from overhead power lines.
- Contact utility company for minimum clearance from high voltage power lines.
- If unavoidably close to buried or overhead power lines, have power turned off, with circuit breaker locked and tagged.
- Properly ground all electrical equipment.
- Avoid standing in water when operating electrical equipment.
- If equipment must be connected by splicing wires, make sure all connections are properly taped.
- Be familiar with specific operating instructions for each piece of equipment.

5.3 CHEMICAL HAZARDS

- Conduct direct reading air monitoring on initial entry and periodically at both the work area and downwind to evaluate respiratory and explosion hazards.
- Use water to keep dust under control during all operations.

5.4 HEAT STRESS

- When temperature exceeds 70 degrees F, take frequent breaks in shaded area. Unzip or remove coveralls during breaks. Have cool water or electrolyte replenishment solution available. Drink small amounts frequently to avoid dehydration. Count the pulse rate for 30 seconds as early as possible in the rest period. If the pulse rate exceeds 110 beats per minute at the beginning of the rest period, shorten the work cycle by one third.

5.5 COLD STRESS

- Wear multilayer cold weather outfits. The outer layer should be of wind resistant fabric. 0 degrees to 30 degrees F total work time is 4 hours. Alternate 1 hour in and 1 hour out of the low temperature area. Below 30 degrees F, consult industrial hygienist. Drink warm fluid. Provide warm shelter for resting. Use buddy system. Avoid heavy sweating.

5.6 NOISE HAZARDS

- Use earplugs or earmuffs when noise level prevents conversation in normal voice at distance of three feet. Use hand signals.

5.7 CONFINED SPACE ENTRY

- Confined spaces include trenches, pits, sumps, elevator shafts, tunnels, or any other area where circulation of fresh air is restricted or ability to readily escape from the area is restricted.

- Consult HSO, Corporate Health and Safety Policy, or Certified Industrial Hygienist prior to entering confined space. If confined space entry is required, a confined space entry checklist must be completed, and a permit must be obtained from the OHSO.

5.8 RADIATION HAZARDS

- If radiation meter indicates 2 mR/hr or more, leave the area and consult HSO.

5.9 BIOHAZARDS

- Poison oak, poison ivy.
- Infectious waste.
- Rabid animals.
- Ticks, mosquitoes, and other insects (disease carriers or poisonous).
- Avoid breathing dust in dry desert or central valley areas (valley fever).
- Biological or animal laboratories.
- Venemous reptiles and spiders

6.0 PLANNING/SITE SETUP

6.1 SITE SETUP

Onsite communication method: Line of site

Offsite communication method: Cellular Phone

Site security: N/A

Identify the water and electrical locations:

6.2 LEVELS OF PROTECTION AVAILABLE OR USED

A___ B___ C_X_ D_X_

Modifications/Additions:

6.3 AIR MONITORING GUIDELINES

Device	Action Level	Action to be Taken
OVA	* 25ppm	Upgrade to level "C"
Drager Pump	* 1ppm	Upgrade to level "C"
H2S Monitor	* 10ppm	Stop work/Leave Area

* In breathing zone; stable for 5 secs
** Anywhere in work area
*** Perimeter monitoring

Comments:

6.4 MEASURES TO CONTROL OFFSITE MIGRATION & EXPOSURE

N/A

6.5 SPECIAL SITE CONSIDERATIONS

N/A

7.0 FIELD ACTIVITIES

7.1 SITE ENTRY AND SETUP

To be determined at site

Initial level of protection: "D"

Modifications: Wear sample gloves underneath work gloves

Special Procedures, Precautions, Equipment:

7.2 SITE ACTIVITIES (GENERAL)

Task1- DELINATION OF THE OCCURRENCE OF FREE PRODUCT

Initial level of Protection: "D"

Modifications: Nitrile gloves to be used when handling soil.

Special Procedures, Precautions, Equipment: Personnel must be aware of the physical dangers of drilling operations.

Task 2- INSTALLATION AND SAMPLING OF GROUNDWATER MONITORING WELLS

Initial level of Protection: "D"

Modifications: Sample gloves to be worn underneath work gloves.

Special Procedures, Precautions, Equipment: Personnel must be aware of thephysical dangers of drilling operations.

Task 3- CONDUCT PUMP TEST (IF NECESSARY)

Initial level of Protection: "D"

Modifications: Nitrile gloves and coated tyvek are to be worn during pump test.

Special Procedures, Precautions, Equipment:

7.3 SITE EXIT (SPECIAL PATHWAYS, PROCEDURES, EMERGENCY ACTIONS, ETC.)

Special Procedures, Precautions, Equipment:

7.4 DECONTAMINATION (TO BE COMPLETED PRIOR TO LEAVING SITE)

Personnel: Wash hands And face
Instrumentation: Wipe down
Sampling Equipment: Alconox wash, double rinse with clean water
Heavy Equipment: Wash down affected areas
General LOP for Decontamination: "D", sample gloves, rubber boots
Comments:
Disposal of Investigation-derived materials
Solids: Cover with plastic, sketch layout, and leave on site
Liquids: Drum, label and leave on site

7.5 SAMPLE HANDLING AND PRECAUTIONS

Personnel will wear gloves and other protective equipment as necessary during the handling of contaminated samples. Any analytical or geotechnical laboratory used for this project will be notified prior to shipment of the suspected contaminants at this site.

Sample containers will be decontaminated prior to shipping. Sample containers will be protected from breakage by wrapping in bubble wrap, etc., if required, placed in zip-lock bags, and packed in absorbent material. Shipping containers will be clearly labeled. Samples will be shipped under full chain of custody procedures.

8.0 EQUIPMENT LISTS

Personal Protective Equipment
Place an "X" at the level chosen, and a * (X) at the alternate.

LEVEL A		**LEVEL B**	
SCBA		SCBA	
Spare SCBA Tanks		Spare SCBA Tanks	
Cascade System		Manifold System	
Encapsulated Suit		Cascade System	
Surgical Gloves		Surgical Gloves	
Outer Work Gloves Type:		Outer Work Gloves Type:	
Neoprene Safety Boots	*	Protective Clothing Type: Hooded	
Safety Boots	*	Rain Suit	
Boot Covers		Butyl Apron	
Hard Hat		Hard Hat w/Face Shield	
		Neoprene Safety Boots	
		Steel-Toed Boots	
		Boot Covers	
		Hearing Protection	

LEVEL C		LEVEL D	
APR		APR	
Full Face		Full Face	
Half Mask Cartridge Type:Organic	XXX	Half Mask Cartridge Type:	
Escape Air Pack		Escape Pack	
Surgical Gloves	XXX	Surgical Gloves	
Outer Work Gloves	XXX	Outer Work Gloves	XXX
Type:Nitriles	XXX	Type:Nitriles	XXX
Protective Clothing Type:Coated tyvek Hooded:	XXX 	Protective Clothing Type: Hooded	
Rain Suit		Rain Suit	
Butyl Apron		Butyl Apron	
Safety Glasses	XXX	Safety Glasses	XXX
Hard Hat	XXX	Hard Hat	XXX
Neoprene Safety Boots		Neoprene Safety Boots	
Steel-Toed Boots	XXX	Steel-Toed Boots	XXX
Boot Covers		Boot Covers	
Hearing Protection	XXX	Hearing Protection	XXX

INSTRUMENTATION		FIRST AID EQUIPMENT/SUPPLIES	
OVA	XXX	First Aid Kit	XXX
HNU		Oxygen	
OVM		Eye wash	XXX
TIP		Stretcher	
Oxygen/explosimeter		Tool Kit	XXX
Drager kit:	XXX	Thermometer(s)	
Tubes used: Benzene	XXX	Tables Chairs	
Low flow air pumps		Sampler Rack	
High flow air pumps		Fire Extinguishers	XXX
Radiation Monitor-4			
Radiation dosimeters			
Noise meter			
WBGT			
pH meter			
Magnetometer			
GPR			
EM			
H2S Monitor	XXX		

DECONTAMINATION EQUIPMENT		OTHER EQUIPMENT	
Plastic Sheeting	XXX	Blood Pressure Monitor	
Large Washtubs		Drinking Water	XXX
Small Washtubs	XXX	Camera	XXX
Scrub Brushes	XXX	Film	XXX
Pressurized Sprayers		Drum Dolly	
Solvent Sprayer(s)		Trowels	
Plastic Trash Cans		Pick	
Trash Bags	XXX	Site Security	
Water Bottles	XXX	Shovels	XXX
Paper Towels	XXX	Binoculars	
Duct Tape	XXX	Traffic Cones	XXX
Masking Tape		Megaphone	
Ziploc Bags	XXX	Banner Tape	XXX
Detergent	XXX	Radio/Mobil Telephone	XXX
TSP		Flagging Tape	XXX
Sodium Hypochlorite		Fencing	
Sodium Bicarbonate		Warning Signs	
Bleach		Thieving Rods	
Hand Soap	XXX	Waste Drum Labels	XXX
Solvent Rinse		Bung Wrench (Brass)	
Acetone		Security Guard	
Hexane		Step Ladder	
Methanol		Bailers	XXX
Other		Rope	XXX

9.0 EMERGENCY INFORMATION
(Post Onsite)

ACUTE SYMPTOMS*	FIRST AID
Dizziness, Nausea	Rest, Shade, Fresh AiR
Unconsciousness	Get Medical Help

HOSPITAL

Name: Artesia General Hospital,702 North 13 TH. Street, Atesia,New Mexico (505)-748-3333

Take route 82 east (approx. 1.6 miles)
Go past route 285 into Atresia
Route 82 turns into Main St.
Go to 13 TH. St. Hospital is on north corner of 13 TH. & Main
Directions to Hospital: (include map of site and hospital location

Local Resources: 911

Ambulance: 911

Hospital Emergency Room: (505)-748-3333

Law Enforcement: 911

Fire Department: 911

Explosives Unit: 911

Poison Control Center: 1-800-432-6866

Agency Contact:

Client Contact:

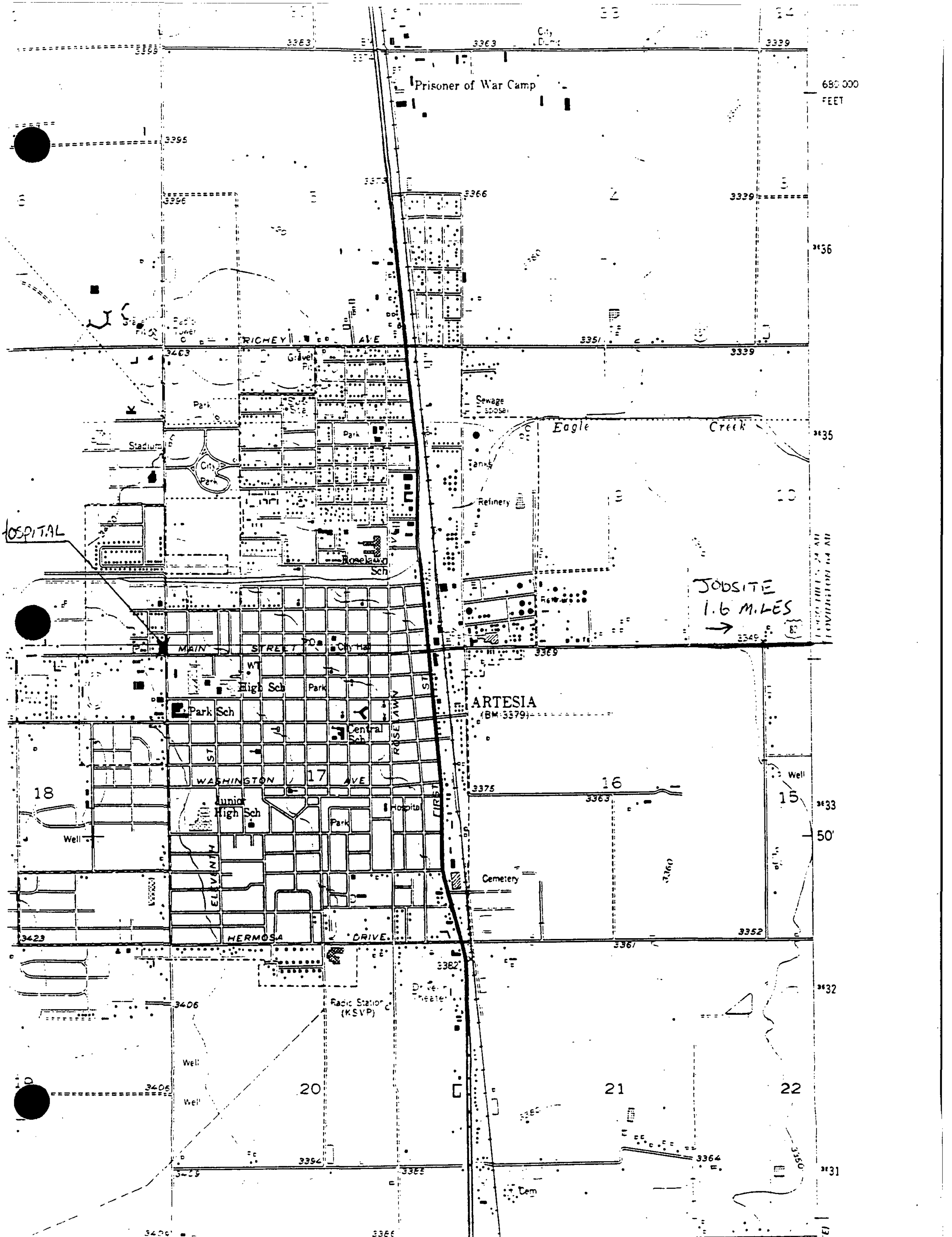
Laboratory:

UPS/Federal Express: 1-800-238-5355 Call before 12:00 noon for same day pick up. Nearest office 260 East College Roswell, N.M.
M-F 8:00am to 5:00pm Sat. 8:00am to 1:00pm

COMPANY RESOURCES

Project Manager: Tim Lester (714) 587-2159

Industrial Hygienist: Irene Fanelli (415) 347-9205


Prisoner of War Camp
City Dump
680 000 FEET
RICHEY AVE
Gravel Pit
Park
Stadium
City Park
Sewage Disposal
Eagle Creek
Tanks
Refinery
HOSPITAL
Roselawn Sch
JOBSITE 1.6 MILES
MAIN STREET
City Hall
High Sch
Park Sch
ARTESIA
(BM 3379)
Central Sch
WASHINGTON AVE
ROSELAWN
FIRST ST
ELEVENTH
Junior High Sch
Hospital
Park
Well
Cemetery
HERMOSA DRIVE
Drive-in Theater
Radio Station (KSVP)
Cem
50'

MITTELHAUSER corporation

TAILGATE SAFETY MEETING MINUTES

PROJECT NO.: 2364 DATE: 8/23/93

PROJECT NAME: AMOCO

LOCATION: ARTESIA PUMP STATION

NATURE OF WORK TO BE PERFORMED: COMPLETE SOIL BORINGS & INSTALL G.W. MONITORING WELLS.

ISSUES DISCUSSED/REVIEWED: POSSIBLE ENCOUNTER OF CRUDE OIL/ PRODUCT. WILL MONITOR W/ PHOTOVAC PID & H_2S METER. WEAR APPROPRIATE SAFETY GEAR. (HARD HAT, GLASSES, BOOTS). EAR HEARING PROTECTION SUGGESTED. NO EATING, SMOKING, OR DRINKING NEAR WORK AREA. FOLOW SAFE WORK PRACTICES.

EMPLOYEE SAFETY SUGGESTIONS:

ATTENDANCE RECORD:

COMPANY	NAME	SIGNATURE	DATE
MITTELHAUSER	Tim Ellis		8-25-93
HARRISON DRILLING	C.J. Harrison		8-23-93
Harrison Drilling	Jimmy Rea		8-23-93
Harrison Drilling	Paul Brown		8-23-93
HARRISON DRILLING	JOHN GUY		8-26-93

ERIC GNARD
MITTELHAUSER REPRESENTATIVE

8-23-93
DATE

APPENDIX B

BORING LOGS

Boring No. : B-1
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 26.0
Logged By : EJC
Started : 8-23-93 1015

Project No. : 2436
Location : South of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 23.5
Checked By : Tim Lester
Finished : 8-23-93 1235

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				SM	0 - SANDY SILT
						GY	.3"-4' GYPSUM: Off-White, very hard, dry.
5		0				ML	4-6.5' CLAYEY SILT: Olive/Lt. Brown, soft, moist.
		0					6.5-7' GYPSUM: White, dry/slightly moist.
10		0					9' - grades to Off-White/Grey.
		0					
15		0			115 for 3"	GY	
		0			100 for 3"		
20		0					
	▽	2500					23.5' - becomes moist/wet, 2" zone, odor. 23.8' - becomes dry, 2" Zone, odor. 24.6' - Dark Grey, strong odor, wet, encounter water, appears to be oily residue. Auger refusal.
25							TOTAL DEPTH = 26.0 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
30							
35							

Boring No. : B-2
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 22.5
Logged By : EJC
Started : 8-23-93 1338

Project No. : 2436
Location : South of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 22.0
Checked By : Tim Lester
Finished : 8-23-93 1500

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
						SM	0-5.5' SILT: Reddish Brown, dry, some calcarious cemented frags, trace to some very fine and fine sand, soft.
5		0					
						ML	5.5-16.0' CLAYEY SILT: Reddish Brown, moist, soft, low plasticity (almost none). 10.5' Gypsum pieces in cuttings.
10		0					
15		0					
						GY	16-16.5' GYPSUM: Off-White, gray. 17' no recovery from sample attempt.
20	▽	2500					19' cuttings up moist, odor. 21' becomes dry.
		0					22' Wet with ~0.7' of oil.
25							TOTAL DEPTH = 22.5 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
30							

Boring No. : B-3
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 58
Logged By : EJC
Started : 8-23-93 1538

Project No. : 2436
Location : South East of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 57.5
Checked By : Tim Lester
Finished : 8-23-93 1752

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				ML	0-6.5' SILT: Reddish Brown, dry, medium stiff, some calcareous & gypsum frags (f ine gravel size).
5		0				GY	6.5-7.5' - GYPSUM: Pink/White, dry.
		0				LS	7.5-8' - Calcareous layer, Reddish/Brown.
10		0				CL	8.0-8.5' - Clay: Olive/Brown, moist, soft.
						ML	8.5' - SILT: Reddish/Brown, dry, some some calcareous frags, <1.0 Cm, no odor.
15		20				LS	11.0' - Lt. Brown.
						GY	13.0' - Limestone.
20							14' - GYPSUM: Yellow/Grey, dry.
							15.5' - becomes Grey/White.
25		0				CL	23.5-24' - CLAY: Brown/Dark Brown, moist, thin layer, no odor.
						GY	24-28.5' GYPSUM: Grey/White, dry.
30		0				SM	28.5-30.0' SAND/SILT: gypsiferous, calcareous, moderate moderate brown, moist, no odor.
35		0					30-57.5' GYPSUM: White/Grey, dry.
40		0					
45		0				GY	
50		0					
55	▽	114					
60						SM	57.5' - SILTY SAND: coarse, very slight odor, coarse grained, wet, possible fractured zone.
							TOTAL DEPTH = 58 FEET
65							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
70							

Boring No. : B-4
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 51.8
Logged By : EJC
Started : 8-24-93 0730

Project No. : 2436
Location :
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 50.5
Checked By : Tim Lester
Finished : 8-24-93 0925

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
0		0				ML	0-3.0' SILT: Reddish Brown, dry, medium stiff, with fine gravel.
5						LS	3.0' - becomes Lt. Brown/Tan, dry, trace to some fine gravel.
							3.5-4' - LIMESTONE.
10		0				GY	4.0-6.5' -SILT: becomes Lt. Brown/Tan, dry, trace to some fine gravel.
							6.5 -18.0' - GYPSUM: White/Grey.
15		0					
20						CL	18.5-22.0' - CLAY: Mod. Brown/Grey-Blue mottled, moist, stiff, low to non plastic.
						GY	22.0' - GYPSUM: Grey/White.
25		0					
30		0					
		0					33.5-34' - Consolidated Layer (Limestone)
35							
40		0					
45		0					
50	▽	>2500				ML	50.5' - SILT: Gypsum fragments.
						GM	50.8' - SILTY SANDY GRAVEL: Grey/Dark Grey, Wet with oil, Gypsum fragments, strong odor, max OVA and H2S meters (fractured zone).
55							
60							TOTAL DEPTH = 51.8 FEET
							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
65							

Boring No. : B-5
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 61.0
Logged By : EJC
Started : 8-24-93 1030

Project No. : 2436
Location : 300' West of N. Fence Corner
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : Not Encountered
Checked By : Tim Lester
Finished : 8-24-93 1238

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				ML	0-7' SILT: Reddish Brown, dry, gypsum fragments.
5		0					
10						GY	7.0-60' - GYPSUM: White/Grey, silty with fragments, dry.
15		0					15' - LIMESTONE layer (0.5')
20		0					
25		0					
30		0					
35		0					33' - LIMESTONE layer, moist (0.5').
40		0					
45		0					
50		0					
55		0					
60		0			133 for 12"		60' - SILTY SAND: Reddish/Moderately Brown, moist, very dense, very fine sand, with silt.
65							TOTAL DEPTH = 61.0 FEET
70							BACKFILLED WITH 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.

Boring No. : B-6
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 35.0
Logged By : EJC
Started : 8-24-93 1345

Project No. : 2436
Location : North of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 33.5
Checked By : Tim Lester
Finished : 8-24-93 1535

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				ML	0-3' SILT: Reddish Brown, dry.
5		0				GY	3.0' - GYPSUM: White/Grey, dry, (B. powder) some fragments. 6-7' - Consolidated Layer, limestone fragments in cuttings. 7' - GYPSUM: White/Light Grey, dry.
10		0					
15		0					
20		0					
25		0					26' - Consolidated Layer: Limestone frags in cuttings.
30		0			100 for 3"		30' - becomes Light Brown/White.
35	▽						33.5' - GYPSUM: fractured, wet, silty with w/gravel size fragments, no odor, no H2S. (PID malfunctioning)
40							TOTAL DEPTH = 35.0 FEET BORING CONVERTED TO MW-4. SEE WELL CONSTRUCTION LOG FOR DETAILS.

Boring No. : B-7
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 33.5
Logged By : EJC
Started : 8-24-93 1630

Project No. : 2436
Location : North of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 27.8
Checked By : Tim Lester
Finished : 8-24-93

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
		0				ML	0-16.5' SILT: Orange/Reddish Brown, dry, some gypsum and calcium carbonate fragments.
5		0					
10		0					
15		0					
20		>2500				GY	16.5' - GYPSUM: White/Grey, dry, some fine gravel size fragments (fresh).
		0					22.0' - GYPSUM: becomes Light Brown.
25							23.5' - Grades to White/Grey.
	▽	>2500			100 for 3"		27.5' - Black Staining and strong odor.
		H2S 6.7					27.8' - Wet
30					100 for 2"		(~1" recovered Black Stained w/ Strong odor)
						LS	29' - White/Grey, dry.
							29.6-33.5' - LIMESTONE Layer.
35							TOTAL DEPTH = 33.5 FEET LET BORING STAND OVERNIGHT, NO WATER WAS PRODUCED. BACKFILLED WITH BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
40							

Boring No. : B-8
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 66.5
Logged By : EJC
Started : 8-25-93 0900

Project No. : 2436
Location : North West of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 59
Checked By : Tim Lester
Finished : 8-25-93 1230

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
						ML	0-5' - SILT: Reddish/Brown, dry, with some gypsum.
5		0					5' GYPSUM: White/Grey, dry, fine gravel size frags in cuttings.
10		0					6.0' Grades to Yellowish White/Lt. Brown.
15		0					8.5' - White/Grey.
20		0					17.0' - Consolidated Layer: Grades to Medium Grey, with gravel size fragments.
25		0					19' - White/Grey.
30		0					
35		0				GY	
40		0					37' - Slightly moist cuttings.
45		0					
50		0					
55		0					
60	▽	0					59-60' - Dark Brown Layer.
65				100 for 10"		SM	62.5' - SILTY SAND: Red/Brown, wet, very fine sand with little silt.
						ML	65' - CLAYEY SILT: Red/Brown, moist, hard.
70							TOTAL DEPTH = 66.5 FEET
75							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO SURFACE.

Boring No. : B-9
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 43
Logged By : EJC
Started : 8-25-93 1425

Project No. : 2436
Location : West of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 40
Checked By : Tim Lester
Finished : 8-25-93 1540

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
5		0					0' - GYPSUM: White/Grey.
10		0					
15		0					16' Grades to grey, slighty moist.
20		0				GY	19.0' becomes White/Grey, dry.
25		0					
30		0					
35		0					
40	▽	H2S 0.1			100 for 2"		40' Wet, fractured zone, no odor, no PID, no oil.
45							TOTAL DEPTH = 43 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
50							

Boring No. : B-10
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 33
Logged By : EJC
Started : 8-25-93 1630

Project No. : 2436
Location : South West of F.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 30
Checked By : Tim Lester
Finished : 8-25-93 1730

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0						ML	0-.2' - SILT: Reddish/Brown, dry.
						LS	0.2-0.3' ROCK: Limestone.
						GY	.3' GYPSUM: White/Grey, dry.
5		0					
						LS	8.5-9' LIMESTONE.
		0				GY	
						LS	9.0' GYPSUM: White/Grey, dry.
							10.0' LIMESTONE.
15		0					11' GYPSUM: Grey, moist, no odor.
							14' White/Grey, dry.
20		0					
						GY	
25		0					
30	▽	>2500 H2S >100			100 for 2"		30' Fractured: Wet, Dark Grey, stained, very strong odor, max PID & H2S. No evidence of oil.
							TOTAL DEPTH = 33 FEET
							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO GROUND SURFACE.
40							

Boring No. : B-11
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 59.5
Logged By : EJC
Started : 8-26-93 0743

Project No. : 2436
Location : North West Inside F.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 58.5
Checked By : Tim Lester
Finished : 8-26-93 1030

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0						ML	0' - SILT: Reddish-Pink/Brown, slighty moist, with gypsum fragments.
5		0				GY	0.5' - GYPSUM: White/Grey, dry.
10		0				CL	9.5' - Grey, moist.
15		0 10 30				GY	10' CLAY: Dark Yellowish/Orange, moist, soft-medium stiff, medium plasticity. 10.2' GYPSUM: White/Grey, dry, fine gravel size frags, very slight odor.
20		0					
25		0					
30		0					29.0' - LIMESTONE (~0.2').
35		0				SS	33.5' - LIMESTONE (~1.0').
40		0				GY	34.5' - GYPSUM: White/Grey, dry. 37.0' - cuttings moist.
45		0				LS	42-46' - LIMESTONE.
50						GY	46-51' - GYPSUM: White/Grey, dry.
55						LS	51' - LIMESTONE.
60	▽	0			100 for 10"	CL SM	56' - SILTY CLAY: Reddish/Brown, slighty moist, hard. 58' - Grades to Silty Sand: Reddish/Brown, wet, very fine sand.
65							TOTAL DEPTH = 59.5 FEET
70							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT TO GROUND SURFACE.
75							

Boring No. : B-12
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 29
Logged By : EJC
Started : 8-26-93 1220

Project No. : 2436
Location : South of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 26
Checked By : Tim Lester
Finished : 8-26-93 1430

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
		0				ML	0-0.5' SILT: Reddish/Brown, dry, gypsiferous.
							0.5' GYPSUM: White/Grey, dry.
		0					
5							
10		0					
15		0				GY	
20		30					20' odor.
		80					
25							
	▽	>2500			100 for 2"		26' coarse sand size particles (fractured), Grey, wet, little fine gravel size fragments, oil present, very strong odor.
		H2S 248					
30							TOTAL DEPTH = 29 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
35							
40							

Boring No. : B-13
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 55.5
Logged By : EJC
Started : 8-26-93 1510

Project No. : 2436
Location : South/SE of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 20.4
Checked By : Tim Lester
Finished : 8-27-93 0930

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0						ML	0-0.5' SILT:
		0				GY	0.5' GYPSUM: Yellowish/Brown/White, slight moist.
5		0				LS	4' Grades to Light Brown, slighty moist, trace fine gravel, some silt.
						CL	6-6.5' LIMESTONE.
10		0				GY	6.5' SILTY CLAY: Dark Yellowish/Orange, slightly moist, soft-medium stiff, medium plasticity.
15		0					6.7' GYPSUM: White/Grey, dry.
20	▽	0			100 for 10"	CL	20' CLAY: Moderate Brown, moist, soft, moderate plasticity, no odor. (~5" layer)
							20.4' GYPSUM: Factured, wet, 2" zone, no odor, no PID readings, some sand (coarse).
25		0					20.6' GYPSUM: White/Grey, dry.
30		0					26-28' - Thin Brown Clay lenses.
							33' - Cuttings moist.
35		0					34.5' - dry
						GY	
40							
45							
50							
55						SP	55' - SILTY SAND: Grey, wet, coarse grained with some fine-grained gravel & silt. (Not fractured gypsum zone). Sampled.
60							TOTAL DEPTH = 55.5 FEET
							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT GROUT TO SURFACE.
65							
70							

Boring No. : B-14
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 31.5
Logged By : EJC
Started : 8-27-93 0936

Project No. : 2436
Location : SW of Prop
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 29
Checked By : Tim Lester
Finished : 8-27-93 1100

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				GY	0' GYPSUM: Light Grey, dry.
5		0					
						LS	7' LIMESTONE.
10		0					8.5' GYPSUM: Light Grey, dry.
15							
20						GY	
25							
30	▽	>2500 H2S>100				LS	29.0' Fractured zone, Grey, wet/moist, coarse-grained, very strong odor, no oil.
							31.5' LIMESTONE.
40							TOTAL DEPTH = 31.5 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.

Boring No. : B-15
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 26.5
Logged By : EJC
Started : 8-27-93 1225

Project No. : 2436
Location : SW of P.L.
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 26
Checked By : Tim Lester
Finished : 8-27-93 1411

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
		0				GY	0-6.0' GYPSUM: Light Grey, dry.
5		0				GM ML	6.0' GRAVELLY SILT: Light Brown/Grey, moist, coarse-grained with gypsum silt.
		0				GY	7' CLAYEY SILT: Light Brown, moist, with fine gravel
10		0				CL	8.0' GYPSUM: Light Grey, dry.
15		0				GY	12.5' CLAY: Olive Grey, moist, soft, medium plasticity. 13.0' GYPSUM: White/Light Grey, dry.
20		0					
25	▽	>2500 H2S 19.6			100 for 8"	GM	26.0' Fractured zone, Grey, wet, fine to coarse-grained sand, fine gravel fragments and with some silt, odor.
30							TOTAL DEPTH = 26.5 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
35							
40							

Boring No. : B-16
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : 5'8" Lower the B-15
Total Depth : 20.5
Logged By : EJC
Started : 8-27-93 1522

Project No. : 2436
Location : SW of Site
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 17.5
Checked By : Tim Lester
Finished : 8-27-93 1612

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				ML	0-0.5' SILT: Lt./moderate Brown, moist.
							0.5' GYPSUM: Tan/Lt Grey, slightly moist.
5		0					
							7.0' White/Light Grey, dry.
						GY	
10		0					
							14' Color Grade to Gray, slight odor, slightly moist.
15		0					
	▽						
		>2500 H2S BB			100 for 12"	GM	17.5 GRAVELLY SANDY CLAY: (Fractured zone) Grey, moist/wet, odor and oil residue, zone appears to be ~1.0' thick.
20						GY	
							19.0' GYPSUM: White/Lt. Grey
25							TOTAL DEPTH = 20.5 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
30							
35							
40							

Boring No. : B-17
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : 4" Less than B-16
Total Depth : 29.5
Logged By : EJC
Started : 8-27-93 1635

Project No. : 2436
Location : SW of Site
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 28.1
Checked By : Tim Lester
Finished : 8-27-93 1742

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							0' CLAYEY SILT: Lt./moderate Brown, dry/ moist, clean, soft.
		0					
5						ML	
		0					
10							
		0			70 for 24"		
15						SM	15.0' SILTY SAND: Grey/Black stained, slightly moist, fine-coarse sand, with trace gravel, mild odor. (No PID or H2S)
						ML	
		>2500			100 for 12"	GY	
20							16-17.0' CLAYEY SILT: Reddish/Brown grading to moderate Brown, moist, Black staining at 16.8, odor.
						LS	17.0' GYPSUM: White/Lt. Grey, dry.
							18.5' LIMESTONE.
25							18.7' GYPSUM: White/Lt. Grey, dry.
	▽				100	SM	26.0' SILTY SAND: Reddish Brown, moist, very fine sand.
30							28.0' wet.
							TOTAL DEPTH = 29.5 FEET
							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
40							

Boring No. : B-18
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 25
Logged By : EJC
Started : 8-27-93 1800

Project No. : 2436
Location : 350 E & 100 S of B-17
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 17.2
Checked By : Tim Lester
Finished : 8-27-93

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
		0				ML	0' SILT: Reddish Brown, dry/slightly moist, no odor.
5		0					
						SM	7.0' SILTY SAND: Reddish-Brown, dry/moist, very fine sand with clay.
10		0				CL	9.5' SANDY SILTY CLAY:
							12.0' moist/wet.
						LS	13' becomes Lt. Brown.
15		150					13.5-15.5' LIMESTONE LAYER: dry.
	▽	1200					15.0' GYPSUM: Lt. Brown/Grey, dry/moist, hydrocarbon-odor, no apparent oil, no staining.
20		>2500				CY	20.0' dry.
		0					
25		0			100 for 4"		24.0' wet, water rose to 21.15'.
							24.5' Fractured zone, wet, coarse-grained sand size, with fine gravel fragments.
30							25.0' GYPSUM: Lt. Grey/White, dry.
							TOTAL DEPTH = 25 FEET
							CONSTURCTED MW-5 AND MW-6. SEE WELL CONSTRUCTION LOG FOR DETAILS.
40							

Boring No. : B-19
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 38
Logged By : EJC
Started : 8-28-93 0907

Project No. : 2436
Location : 450 E of B-16
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 38
Checked By : Tim Lester
Finished : 8-28-93 1050

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				ML	0' SANDY SILT: Reddish Brown, dry, very fine to fine sand.
5		0				LS	6-8.0' LIMESTONE.
10		0				SC	8-12.0' CLAYEY SAND: Reddish/Brown, dry, fine to medium grained.
15		0				GY	12.0' GYPSUM: White/Lt. Grey, dry.
						CL	16.5' Grades to Lt. Brown.
20		0					17.0' CLAY: Lt Brown/Brown, moist, soft.
25		0				GY	18.0' GYPSUM: White/Lt. Grey, dry.
30		0					
35		0					
	▽	0				SW	38.0' SAND: wet, very fine to coarse with little fine gravel, trace silt, well-graded.
40							TOTAL DEPTH = 38 FEET
45							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
50							

Boring No. : B-20
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 50
Logged By : EJC
Started : 8-28-93 1220

Project No. : 2436
Location : 250 W of B-15
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 49.8
Checked By : Tim Lester
Finished : 8-28-93 1439

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							0' GYPSUM: White/Lt. Grey, dry.
5		0					
10		0					8.0' Red Clay stringer.
15		0					12.0' slightly moist. 13.0' dry.
20		0					20.0' Slight odor, could not retrieve a sample.
25		0				GY	
30		0					
35		0					
40		0					
45		0					
50	▽	0				SM	48.0' SILTY SAND: Red, moist, very fine grained with some silt. 49.8' wet.
55							TOTAL DEPTH = 50 FEET
60							BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
65							

Boring No. : B-21
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 28.5
Logged By : EJC
Started : 8-28-93 1520

Project No. : 2436
Location : 225 W of B-16
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 27
Checked By : Tim Lester
Finished : 8-28-93 1636

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
						LS	0-4.0' FRACTURE LIMESTONE & GYPSUM: Grey/Brown, dry.
5		0				GY	4.0' GYPSUM: White, dry.
		0					
10							
		>2500			100 for 12"	SM	13.0' SILTY SAND: Grey, moist, fine grained.
15						ML	14.6' CLAYEY SILT: Grey/Black, moist, odor.
							15.0' Moderate Brown, moist.
							15.2' Dark Grey/Black, moist, odor.
20		0				GY	15.5' GYPSUM: White, dry.
							22.0' 0.5' limestone.
25		0					
	▽	0			100 for 12"	SM	26.5' SILTY SAND: Red/Brown, dry, very fine grained.
							27.0' wet.
30							TOTAL DEPTH = 28.5 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
35							
40							

Boring No. : B-22
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 20
Logged By : EJC
Started : 8-28-93 1705

Project No. : 2436
Location : 270 E of B-14
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 19
Checked By : Tim Lester
Finished : 8-28-93 1820

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0							
		0				ML	0' SILT: Red-Red/Brown, dry, trace clay. - 4.0' Moist.
5		0					 - 7.5' Gypsum fragments.
10		0					- 10.0' CLAYEY SILT: Red/Brown, dry.
		>2500 H2S 44			100 for 12"	CL	- 13.0' Black with Gypsum fragments, moist, odor.
15		>2500			100 for 0"	GY	14.1' Black grading to Grey clay, strong odor, oil present, moist, no H20.
	▽	>2500 H2S 50			100 for 5"	CL	15.1' GYPSUM: White, dry. 16.0' GYPSUM: Black/Grey, moist, strong odor. 17.1' GYPSUM: White, dry. 18.5-19.0' SANDY CLAY: Grey/Black, wet/oily, very strong odor.
20							TOTAL DEPTH = 20 FEET BACKFILLED WITH BENTONITE CHIPS TO TOP OF WATER AND 8% BENTONITE/CEMENT SLURRY TO GROUND SURFACE.
25							
30							
35							
40							

Boring No. : B-23
Project Name: AMOCO Artesia
Drilling Co.: Harrison
Rig : Mobile B-61
Elevation : Not Available
Total Depth : 53.4
Logged By : EJC
Started : 8-29-93 1530

Project No. : 2436
Location : 225 NE of B-13 Towards B-4
Driller : Paul Brow
Bedrock Depth: Not Encountered
First Water : 52.5
Checked By : Tim Lester
Finished : 8-29-93 1900

DEPTH (ft)	WELL CONSTRUCTION LOG	SAMPLE OVA	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE BLOW COUNT	USCS	DESCRIPTION
0		0				GY	0' - GYPSUM: Lt. Brown, dry.
5		0				CL / LS	6.0' - SILTY CLAY: Red/Brown, moist, medium dense.
10		0				LS	6.5' - LIMESTONE:
						GY	8.0' - GYPSUM: White/Grey, dry.
15		0					
20		0					
25		0				LS	26.0' - LIMESTONE.
						GY	27.0' - GYPSUM: Lt. Brown/Grey, dry.
30		0				LS	27.5' - Grades to White/Lt. Grey, dry.
						GY	28.0' - LIMESTONE.
						LS	28.5' - GYPSUM: White/Lt. Grey, dry.
35		0					34.0' - LIMESTONE.
						GY	36.0' GYPSUM: White/Lt. Gray, dry.
40		0					
45						LS	44.5-46.0' - LIMESTONE: (Sandy)
						GY	46.0' GYPSUM: White/Lt. Grey, dry.
50		0					
	▽				100 for 8"		52.0' - Fractured zone, wet, coarse-grained sand, with fine gravel fragments and trace silt.
55							TOTAL DEPTH = 53.4 FEET
							CONVERTED TO MW-7. SEE WELL CONSTRUCTION LOG FOR DETAILS.
60							
65							

APPENDIX C

WELL CONSTRUCTION LOGS AND

DEVELOP/SAMPLING SHEETS

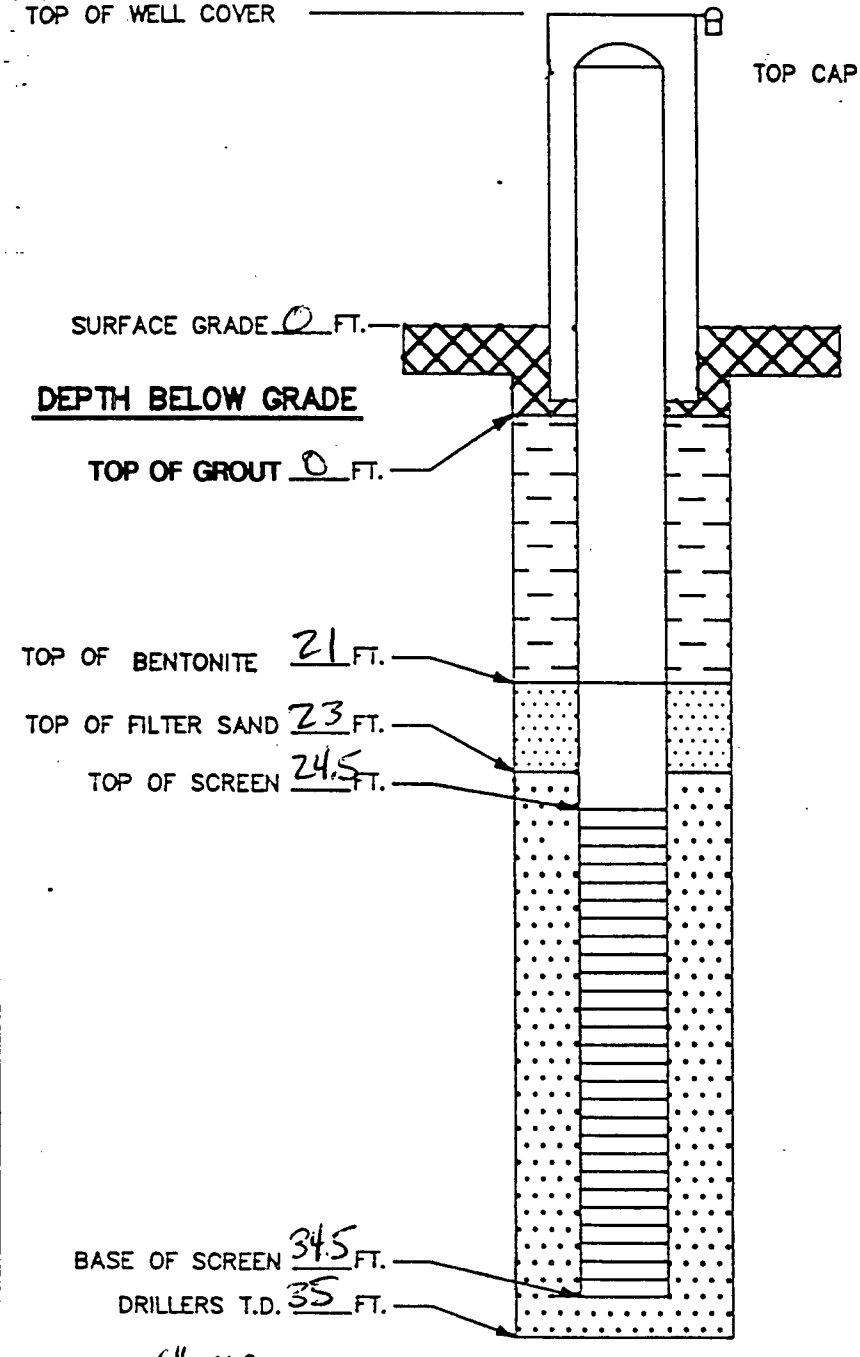
CAD NO. MONWELL1

MITTELHAUSER corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

MONITORING WELL INSTALLATION REPORT

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 2436
DATE: 8-29-93
RIG-UP TIME: ✓
RIG-DOWN TIME: ✓

WELL NO.: MW-4 (B-6)
GEOLOGIST: EJC
AUGER O.D.: 10.25"
DRILLING CO.: HARRISON
DRILLER: PAUL BROW



WELL COVER

TOP CAP (SLIP/FLUSH/(LOCKING)): —

BLANK CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
CASING SECTION: 3 X 10 FT.
— X 6 FT.
— X 5 FT.
— X 2.5 FT.

GROUT MIXTURE

VOLCLAY: —
CEMENT TYPE: 8% BENT./CEMENT
CEMENT (SACKS): NA
BENTONITE (SACKS): 2 MED. CH.PS
WATER (GALS): —
TREMIE PIPE (Y/N): AUGERS

SAND FILTER PACK

BRAND NAME: TEXAS MINING CO.
TYPE: SILICA
SIZE: 8/16 (1.39-1.42mm)
NO. OF BAGS: 5
TREMIE PIPE (Y/N): AUGERS

SCREEN CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
SLOT SIZE: 0.02"
CENTRALIZERS (Y/N): NO
CASING SECTION: — X 20 FT.
1 X 10 FT.
— X 5 FT.
— X — FT.

BARRELS OF CUTTINGS: NA
END CAP (SLIP/FLUSH): THREADED

MITTELHAUSER corporation

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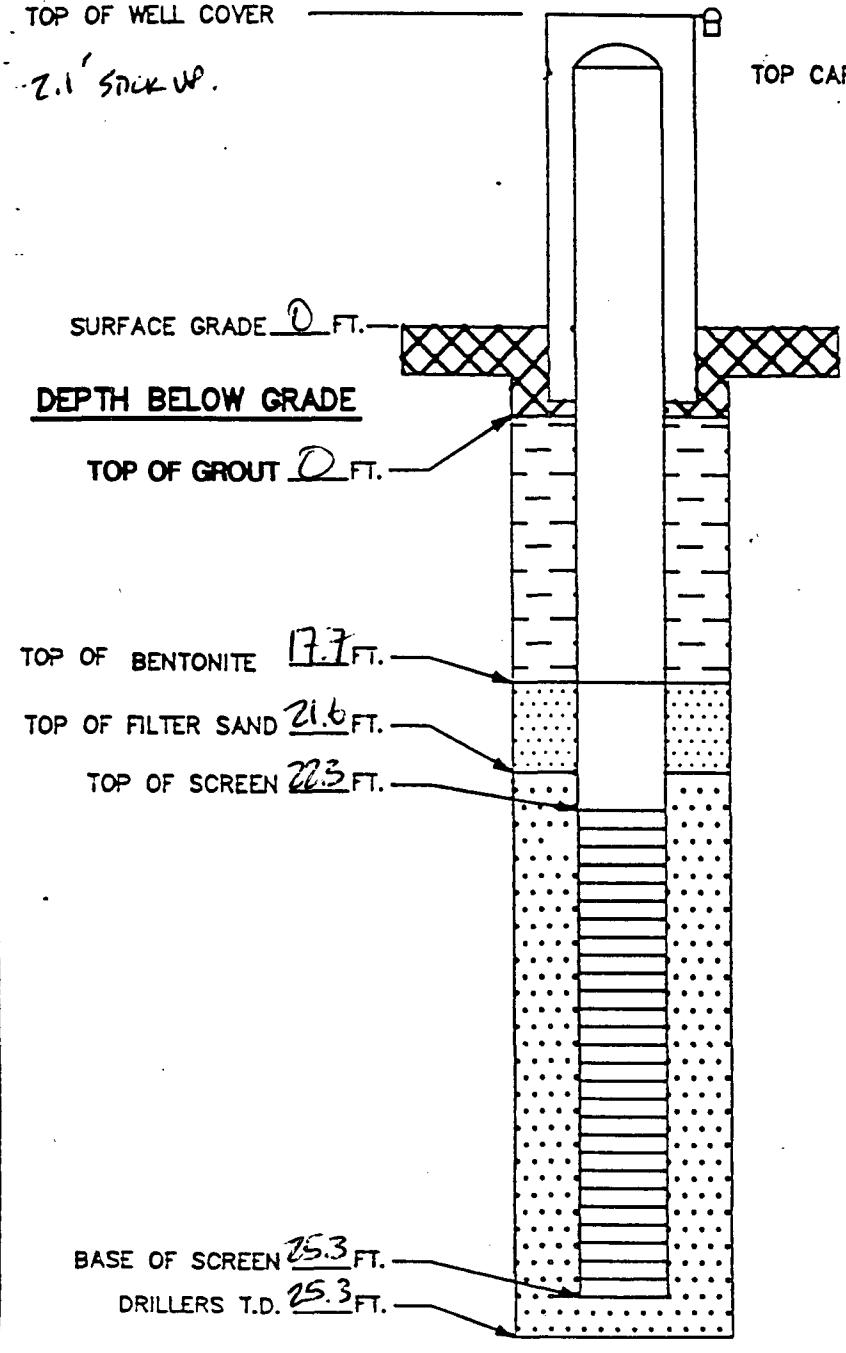
CAD NO. MONWELL1

MONITORING WELL INSTALLATION REPORT

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 2436
DATE: 8-29-93
RIG-UP TIME: —
RIG-DOWN TIME: —

WELL NO.: MW-5 (B18)
GEOLOGIST: EJC
AUGER O.D.: 10.25"
DRILLING CO.: HARRISON
DRILLER: PAUL BROW



WELL COVER

TOP CAP (SLIP/FLUSH/LOCKING): —

BLANK CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
CASING SECTION: 2 X 10 FT.
— X 6 FT.
1 X 5 FT.
— X 2.5 FT.

GROUT MIXTURE

VOLCLAY: —
CEMENT TYPE: 95% BENT./CEMENT
CEMENT (SACKS): NA
BENTONITE (SACKS): 2 MED CHIPS
WATER (GALS): NC
TREMIE PIPE (Y/N): AUGERS

SAND FILTER PACK

BRAND NAME: TEXAS MINING CO
TYPE: SILICA
SIZE: 8/16
NO. OF BAGS: 2
TREMIE PIPE (Y/N): AUGER

SCREEN CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
SLOT SIZE: 0.02
CENTRALIZERS (Y/N): NO
CASING SECTION: — X 20 FT.
— X 10 FT.
— X 5 FT.
1 X 3 FT.

BARRELS OF CUTTINGS: NA
END CAP (SLIP/FLUSH): EXPAND.

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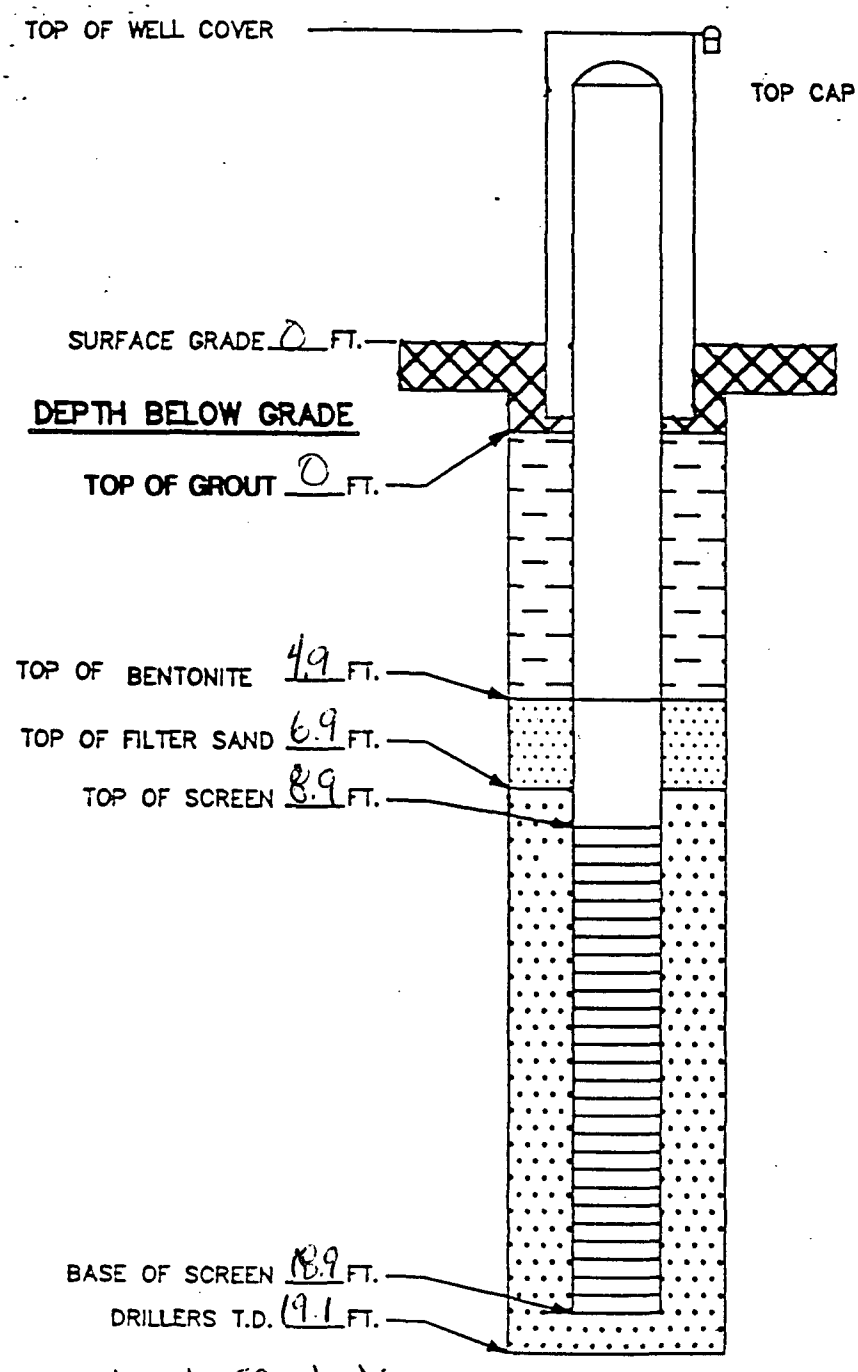
LAGUNA HILLS, CA. 92653

CAD NO. MONWELL1

MONITORING WELL INSTALLATION REPORT

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 2436-01
DATE: 8-29-93
RIG-UP TIME: /
RIG-DOWN TIME: /

WELL NO.: MW-6 (B-18 SHALLOW)
GEOLOGIST: EJC
AUGER O.D.: 10.25"
DRILLING CO.: HARRISON
DRILLER: PAUL BROW



WELL COVER

TOP CAP (SLIP/FLUSH/LOCKING): —

BLANK CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
CASING SECTION: 1 X 10 FT.
— X 6 FT.
— X 5 FT.
— X 2.5 FT.

GROUT MIXTURE

VOLCLAY: —
CEMENT TYPE: B&B BENT./CEMENT
CEMENT (SACKS): —
BENTONITE (SACKS): 2 MED CHIPS
WATER (GALS): NO
TREMIE PIPE (Y/N): AUGERS

SAND FILTER PACK

BRAND NAME: TEXAS MINING CO.
TYPE: SILICA
SIZE: 8/16
NO. OF BAGS: 5.5
TREMIE PIPE (Y/N): AUGERS

SCREEN CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
SLOT SIZE: 0.02"
CENTRALIZERS (Y/N): NO
CASING SECTION: — X 20 FT.
1 X 10 FT.
— X 5 FT.
— X — FT.

BARRELS OF CUTTINGS: NA

END CAP (SLIP/FLUSH): THREADED

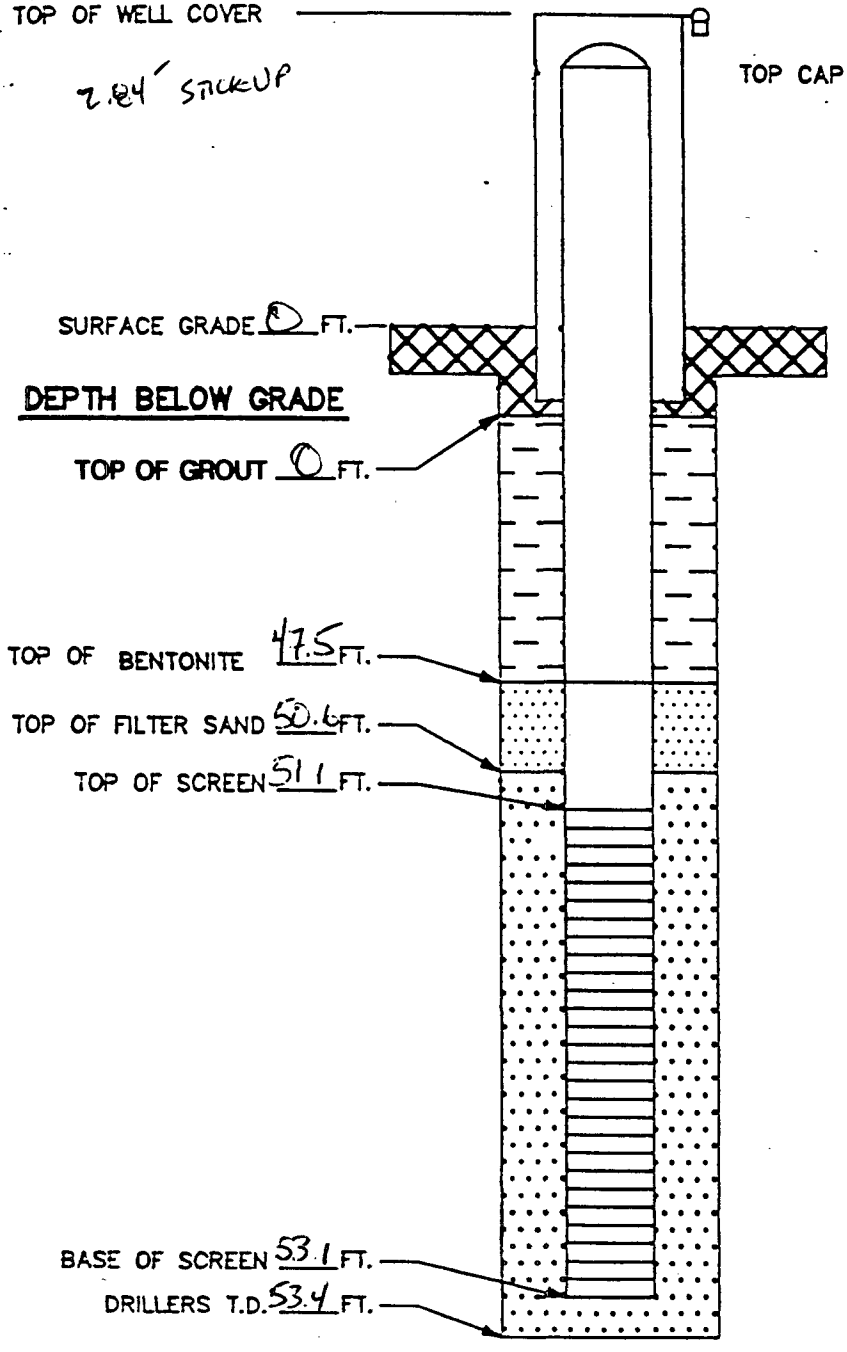
CAD NO. MONWELL1

MITTELHAUSER corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

MONITORING WELL INSTALLATION REPORT

PROJECT NAME: AMOCO-ARTESIA
PROJECT NO.: 2436
DATE: 8-24-93
RIG-UP TIME: —
RIG-DOWN TIME: —

WELL NO.: MW-7 (B-23)
GEOLOGIST: EJL
AUGER O.D.: 10.25"
DRILLING CO.: HARRISON
DRILLER: PAUL BROW



WELL COVER

TOP CAP (SLIP/FLUSH/LOCKING): —

BLANK CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
CASING SECTION: 5 X 10 FT.
— X 6 FT.
1 X 5 FT.
— X 2.5 FT.

GROUT MIXTURE

VOLCLAY: —
CEMENT TYPE: 5% BENT/CEMENT
CEMENT (SACKS): —
BENTONITE (SACKS): 2 MED CHIPS
WATER (GALS): NO
TREMIE PIPE (Y/N): AUGERS

SAND FILTER PACK

BRAND NAME: TEXAS MINING CO.
TYPE: SILICA
SIZE: 8/16
NO. OF BAGS: 2
TREMIE PIPE (Y/N): AUGERS

SCREEN CASING

TYPE: PVC
SCHEDULE: 40
I.D.: 4.0"
THREADS: —
SLOT SIZE: 0.02"
CENTRALIZERS (Y/N): NO
CASING SECTION: — X 20 FT.
— X 10 FT.
— X 5 FT.
— X 2 FT.

BARRELS OF CUTTINGS: —
END CAP (SLIP/FLUSH): EXPAND

MITTELHAUSER Corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

CAD NO. WELLDVLP
SHEET 1 OF 1

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 2436-01
DATE: 8-30-93
RIG-UP TIME: —
RIG-DOWN TIME: —
PID/FID READING: 0.0

WELL NO.: MW-4 (B-6)
GEOLOGIST: EJC
CONTRACTOR: HARRISON
DEVELOPMENT: YES
SAMPLING: YES
TYPE OF RIG: NA

FLUID LEVEL MEASUREMENTS

	START		FINISH	
DEPTH TO PRODUCT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
DEPTH TO GROUNDWATER:	DEPTH: 33.38	TIME: 1537	DEPTH: DRY	TIME: 1920
DEPTH TO SEDIMENT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
BOTTOM OF CASING:	DEPTH: 34.5	TIME: —	DEPTH: —	TIME: —

PURGING METHOD

METHOD (PUMP/BAIL): —
PUMP SIZE AND TYPE: NA
MANUFACTURE/MODEL: NA
PUMP RATE: NA
PUMPING ELAPSED TIME: NA
METHOD USED TO OBTAIN PUMP RATE: NA

VOLUME PRODUCED WATER

CASING ID (INCH): 4.0
LINEAR FEET OF WATER: 1.12
WELL VOLUME (GAL): 0.74
VOLUME WATER PRODUCED: 11.4
WELL VOLUMES PRODUCED: 15.4

PHYSICOCHEMICAL PARAMETERS

	TIME (24 HOUR)	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	WATER LEVEL DEPTH (ft.)	IMHOFF CONE (ml/l)	TEMP. (°C)	SALINITY (0/00)	CONDUCTIVITY (u mhos/cm) X 100	pH	WATER CLARITY
8/29	BAILED	3 GAL	—	—	—	—	—	—	—	SILTY
8/30	1540	4	—	—	—	—	—	—	—	SILTY
	STOP.	7	—	—	—	—	—	—	—	SILTY
RESUME	1915	8	—	—	—	21	3.8	58	6.97	SILTY
	1916	9	—	—	—	21	3.5	55	6.86	SILTY
	1918	10	—	—	—	21	3.5	55	6.84	SILTY
	1920	11.4	—	—	—	21	3.5	55	6.84	SILTY

STARTING TIME: 1540
STOPPING TIME: 1920

NOTES: WELL CONTINUES TO BE BAILED DRY. BAILED 3 GAL INITIALLY ON 8/29.

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23272 MILL CREEK RD. SUITE 100
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CAD NO. WELLDVLP
SHEET 1 OF 2

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 243E-01
DATE: 8-30-93
RIG-UP TIME: /
RIG-DOWN TIME: /
PID/FID READING: 696

WELL NO.: MW-5 (B-18)
GEOLOGIST: ETL
CONTRACTOR: HARRISON
DEVELOPMENT: VES
SAMPLING: VES
TYPE OF RIG: —

FLUID LEVEL MEASUREMENTS

	START		FINISH	
DEPTH TO PRODUCT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
DEPTH TO GROUNDWATER:	DEPTH: 19.49	TIME: 1745	DEPTH: 19.7	TIME: 1850
DEPTH TO SEDIMENT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
BOTTOM OF CASING:	DEPTH: 25.3	TIME: 1746	DEPTH: 25.3	TIME: 1851

PURGING METHOD

METHOD (PUMP/BAIL): —
PUMP SIZE AND TYPE: — MANUFACTURE/MODEL: NA
PUMP RATE: NA PUMPING ELAPSED TIME: NA
METHOD USED TO OBTAIN PUMP RATE: NA

VOLUME PRODUCED WATER

CASING ID (INCH): 4.0" LINEAR FEET OF WATER: 5.81
WELL VOLUME (GAL): 3.83
VOLUME WATER PRODUCED: 55 WELL VOLUMES PRODUCED: 14.3

PHYSICOCHEMICAL PARAMETERS

TIME (24 HOUR)	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	WATER LEVEL DEPTH (ft.)	IMHOFF CONE (ml/l)	TEMP. (°C)	SALINITY (0/00)	CONDUCTIVITY (u mhos/cm) x.00	pH	WATER CLARITY
1751	1.0	/	/	/	18.5	3.0	45	7.09	SILTY/MILKY
1757	5.0	/	/	/	18.0	2.9	41	6.07	" "
1803	10.0	/	/	/	18.0	2.9	42	6.09	" "
1807	15.0	/	/	/	18.0	2.9	42	6.74	MILKY
1810	20.0	/	/	/	18.0	2.9	45	6.65	SILTY/MILKY
1814	25.0	/	/	/	18.0	2.9	43	6.59	" "
1818	30.0	/	/	/	18.0	3	45	6.35	" "
1823	35.0	/	/	/	18.0	3	45	6.52	" "
1826	40.0	/	/	/	18.0	3	45	6.79	" "

STARTING TIME: 1751
STOPPING TIME: 1810

NOTES: pH METER IS QUESTIONABLE. GETTING SHEEN ON H2O SURFACE.

MITTELHAUSER corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

CAD NO. 15810701
SHEET 2 OF 2

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: _____
PROJECT NO.: _____
DATE: _____
PID/FID READING: _____
WELL NO.: MW-5 (CONT)

GEOLOGIST: _____
CONTRACTOR: _____
DEVELOPMENT: _____
SAMPLING: _____
TYPE OF RIG: _____

PURGING METHOD

METHOD (PUMP/BAIL): _____
PUMP SIZE AND TYPE: N/A MANUFACTURE/MODEL: _____
PUMP RATE: _____ PUMPING ELAPSED TIME: _____
METHOD USED TO OBTAIN PUMP RATE: _____

VOLUME PRODUCED WATER

DEPTH TO GROUNDWATER: SEE PAGE 1
START DEPTH: _____ TIME: _____ FINISH DEPTH: _____ TIME: _____
CASING ID (INCH): _____ LINEAR FEET OF WATER: _____
WELL VOLUME (GAL.): _____
VOLUME WATER PRODUCED: _____ WELL VOLUMES PRODUCED: _____

PHYSICOCHEMICAL PARAMETERS

TIME (24 HOUR)	DATE	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	SURGE EVENT	TEMP. (°C)	TDS (g/l)	CONDUCTIVITY (mS/cm) x100	pH	WATER CLARITY (NTU)
1829	8/30/93	45.0	/	/	18.0	/	45	6.58	MILKY/SILTY
1833	"	50.0	/	/	18.0	/	45	6.60	" "
1836	"	55.0	/	/	18.0	/	45	6.68	" "

STARTING TIME: /
STOPPING TIME: /

NOTES: SEE PAGE 1

MITTELHAUSER Corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

CAD NO. WELLDVLP
SHEET ____ OF ____

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: AMOCO - ARTESIA
PROJECT NO.: 2436-01
DATE: 8-30-93
RIG-UP TIME: —
RIG-DOWN TIME: —
PID/FID READING: 0.0

WELL NO.: MW-6 (B-18)
GEOLOGIST: CJC
CONTRACTOR: HARRISEN
DEVELOPMENT: YES
SAMPLING: YES
TYPE OF RIG: —

FLUID LEVEL MEASUREMENTS

	START		FINISH	
DEPTH TO PRODUCT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
DEPTH TO GROUNDWATER:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
DEPTH TO SEDIMENT:	DEPTH: —	TIME: —	DEPTH: —	TIME: —
BOTTOM OF CASING:	DEPTH: 18.9	TIME: —	DEPTH: 18.9	TIME: —

PURGING METHOD

METHOD (PUMP/BAIL): —
PUMP SIZE AND TYPE: — MANUFACTURE/MODEL: —
PUMP RATE: — PUMPING ELAPSED TIME: —
METHOD USED TO OBTAIN PUMP RATE: —

VOLUME PRODUCED WATER

CASING ID (INCH): — LINEAR FEET OF WATER: —
WELL VOLUME (GAL.): —
VOLUME WATER PRODUCED: — WELL VOLUMES PRODUCED: —

PHYSICOCHEMICAL PARAMETERS

TIME (24 HOUR)	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	WATER LEVEL DEPTH (ft.)	IMHOFF CONE (ml/l)	TEMP. (°C)	SALINITY (0/00)	CONDUCTIVITY (u mhos/cm)	pH	WATER CLARITY
	WELL		IS	DRY					

STARTING TIME: —
STOPPING TIME: —

NOTES:

MITTELHAUSER Corporation
23272 MILL CREEK RD. SUITE 100
LAGUNA HILLS, CA. 92653

CAD NO. WELLDVLP
SHEET 1 OF 2

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: AMOCO-ARTESIA
PROJECT NO.: 2436
DATE: 8-30-93
RIG-UP TIME: —
RIG-DOWN TIME: —
PID/FID READING: 0.0

WELL NO.: MW-7 (B-23)
GEOLOGIST: EJC
CONTRACTOR: HARRISON
DEVELOPMENT: YES
SAMPLING: YES
TYPE OF RIG: —

FLUID LEVEL MEASUREMENTS

	START	FINISH
DEPTH TO PRODUCT:	DEPTH: — TIME: —	DEPTH: — TIME: —
DEPTH TO GROUNDWATER:	DEPTH: 38.0 TIME: 1606	DEPTH: 43 (CASING) TIME: 1726
DEPTH TO SEDIMENT:	DEPTH: — TIME: —	DEPTH: — TIME: —
BOTTOM OF CASING:	DEPTH: 55.94 TIME: 1607	DEPTH: 53.1 TIME: 1726

(FROM T.O.C.)

PURGING METHOD

METHOD (PUMP/BAIL): —
PUMP SIZE AND TYPE: NA
MANUFACTURE/MODEL: NA
PUMP RATE: NA
PUMPING ELAPSED TIME: NA
METHOD USED TO OBTAIN PUMP RATE: NA

VOLUME PRODUCED WATER

CASING ID (INCH): 4.0
LINEAR FEET OF WATER: 17.94
WELL VOLUME (GAL.): 11.84
VOLUME WATER PRODUCED: 60
WELL VOLUMES PRODUCED: 5.1

PHYSICOCHEMICAL PARAMETERS

TIME (24 HOUR)	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	WATER LEVEL DEPTH (ft.)	IMHOFF CONE (ml/l)	TEMP. (°C)	SALINITY (0/00)	CONDUCTIVITY (u mhos/cm) x 100	pH	WATER CLARITY
1619	5	/	/	/	23	3	49	7.77	SILTY/MUDDY
1625	11	/	/	/	21	3	49	7.29	"
1630	14	/	/	/	20	3	49	7.15	"
1639	19	/	/	/	20	3	43	7.19	"
1645	25	/	/	/	20	2.9	40	7.14	"
1651	30	/	/	/	20	3	42	7.09	"
1656	35	/	/	/	19	3	43	8.85	"
1703	40	/	/	/	20	2.9	42	8.88	"
1709	45	/	/	/	20	2.9	42	8.90	"

STARTING TIME: 1615
STOPPING TIME: 1726

NOTES: SURGED W/ BAILER @ SCREEN INTERVAL.

APPENDIX D

LABORATORY ANALYTICAL RESULTS

AND CHAIN OF CUSTODY

MITTELHAUSER Corporation
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LAGUNA HILLS, CA. 92653

CAD NO. WELLDVLP
SHEET 2 OF 2

WELL DEVELOPMENT AND/OR GROUNDWATER SAMPLING DATA

PROJECT NAME: AMOCO ARTESIA
PROJECT NO.: 2436
DATE: 8-30-93
RIG-UP TIME: /
RIG-DOWN TIME: /
PID/FID READING: 0.0

WELL NO.: -
GEOLOGIST: -
CONTRACTOR: SEE PAGE 1
DEVELOPMENT: -
SAMPLING: -
TYPE OF RIG: -

FLUID LEVEL MEASUREMENTS

	START		FINISH	
DEPTH TO PRODUCT:	DEPTH: /	TIME: /	DEPTH: /	TIME: /
DEPTH TO GROUNDWATER:	DEPTH: /	TIME: /	DEPTH: /	TIME: /
DEPTH TO SEDIMENT:	DEPTH: /	TIME: /	DEPTH: /	TIME: /
BOTTOM OF CASING:	DEPTH: /	TIME: /	DEPTH: /	TIME: /

PURGING METHOD

METHOD (PUMP/BAIL): /
PUMP SIZE AND TYPE: / MANUFACTURE/MODEL: /
PUMP RATE: / PUMPING ELAPSED TIME: /
METHOD USED TO OBTAIN PUMP RATE: /

VOLUME PRODUCED WATER

CASING ID (INCH): SEE PAGE 1 LINEAR FEET OF WATER: /
WELL VOLUME (GAL): /
VOLUME WATER PRODUCED: / WELL VOLUMES PRODUCED: /

PHYSICOCHEMICAL PARAMETERS

TIME (24 HOUR)	TOTAL VOLUME WATER (gal.)	PUMP INTAKE DEPTH (ft.)	WATER LEVEL DEPTH (ft.)	IMHOFF CONE (ml/l)	TEMP. (°C)	SALINITY (0/00)	CONDUCTIVITY (u mhos/cm) X100	pH	WATER CLARITY
1716	50	/	/	/	20	2.9	42	8.89	SLIGHTLY CLOUDY
1722	55	/	/	/	20	2.9	42	8.88	"
1726	60	/	/	/	20	2.9	42	8.89	"

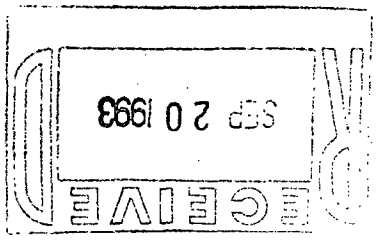
STARTING TIME: 1615
STOPPING TIME: 1726

NOTES:

B C Analytical

1200 Gene Autry Way
Anaheim, CA 92805
714/978-0113
Fax: 714/978-9284

ANALYTICAL REPORT



LOG NO: A93-09-012

Received: 02 SEP 93

Mailed: 9/17/93

Mr. Eric Conard
Mittelhauser Corporation
23272 Mill Creek Dr. Suite 300
Laguna Hills, CA 92653

Project: 2436-1

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
09-012-1	MW-4-01	31 AUG 93
09-012-2	MW-5-01	31 AUG 93
09-012-3	MW-7-01	31 AUG 93

PARAMETER	09-012-1	09-012-2	09-012-3
Polynuclear Aromatics			
Date Analyzed	09/09/93	09/09/93	09/09/93
Date Extracted	09/02/93	09/02/93	09/02/93
Dilution Factor, Times	1	1	1
Acenaphthene, ug/L	<5	<5	<5
Acenaphthylene, ug/L	<5	<5	<5
Anthracene, ug/L	<5	<5	<5
Benzo(a)anthracene, ug/L	<5	<5	<5
Benzo(a)pyrene, ug/L	<5	<5	<5
Benzo(b)fluoranthene, ug/L	<10	<10	<10
Benzo(g,h,i)perylene, ug/L	<10	<10	<10
Benzo(k)fluoranthene, ug/L	<10	<10	<10
Chrysene, ug/L	<5	<5	<5
Dibenzo(a,h)anthracene, ug/L	<5	<5	<5
Fluoranthene, ug/L	<5	<5	<5
Fluorene, ug/L	<5	<5	<5
Indeno(1,2,3-c,d)pyrene, ug/L	<10	<10	<10
Naphthalene, ug/L	<5	5.9	<5
Phenanthrene, ug/L	<5	<5	<5
Pyrene, ug/L	<10	<10	<10

BCA

B C Analytical

1200 Gene Autry Way
Anaheim, CA 92805
714/978-0113
Fax: 714/978-9284

LOG NO: A93-09-012

Received: 02 SEP 93

Mr. Eric Conard
Mittelhauser Corporation
23272 Mill Creek Dr. Suite 300
Laguna Hills, CA 92653

Project: 2436-1

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
09-012-1	MW-4-01	31 AUG 93
09-012-2	MW-5-01	31 AUG 93
09-012-3	MW-7-01	31 AUG 93

PARAMETER	09-012-1	09-012-2	09-012-3
EPA Method 8020			
Date Analyzed	09/09/93	09/09/93	09/09/93
Date Confirmed	09/09/93	09/09/93	09/09/93
Dilution Factor, Times	1	20	1
1,2-Dichlorobenzene, ug/L	<0.5	<10	<0.5
1,3-Dichlorobenzene, ug/L	<0.5	<10	<0.5
1,4-Dichlorobenzene, ug/L	<0.5	<10	<0.5
Benzene, ug/L	<0.5	1500	<0.5
Chlorobenzene, ug/L	<0.5	<10	<0.5
Ethylbenzene, ug/L	<0.5	94	<0.5
Toluene, ug/L	<0.5	290	<0.5
Total Xylene Isomers, ug/L	<0.5	480	<0.5

Frederick W. Haley for JH
James C. Hein, Laboratory Director

BCA

A93-09-[illegible]2

MITTELHAUSER corporation
5300 OFFICE PARK DRIVE, SUITE 200
BAKERSFIELD, CA 93309
(805) 631-5757

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 2436-1

PROJECT NAME: AMOCO-ARTESIA

SAMPLED BY: (PRINTED AND SIGNATURE) ERIC CONARD / [signature]

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): 8020 (BTEX)	PAHS					PRESERVATIVE	REMARKS
1	MW-4-01	8/31/93	1114	H20	MW-4	3	X	X					ICE	REQUEST
2	MW-5-01	8/31/93	1148	"	MW-5	3	X	X					(	NORMAL T-A-T
3	MW-7-01	8/31/93	1132	"	MW-7	3	X	X						

REMARKS (continued): PLEASE CONTACT BILL OLSEN @ (505) 827-5885 FOR PAH SPECIFICS

PAHS by 8270 OK'd [illegible] Kathy Brown [illegible] Bill Olsen E. Strahan 9/7/93

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)		
[signature]	9/1/93		~~ ~~	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 3	LABORATORY: BCA
~~ ~~			~~ ~~	TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 9	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: ERIC STRAHAN	LABORATORY PHONE NUMBER: (714) 978-0113
RELINQUISHED BY: (SIGNATURE)	DATE 9/1/93	TIME 1:29	RECEIVED FOR LABORATORY BY: (SIGNATURE) [signature] BCA	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (X)NO	

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PINK, CLIENT
GOLD, PROJECT FILE

REMARKS: PLEASE FAX RESULTS TO ERIC CONARD @ (714) 472-2418 ASAP.