

**GW - 20**

---

**REPORTS**

**YEAR(S):**

---

**2002**

April 24, 2002

Mr. Wayne Price  
NM Energy, Minerals, and Natural Resources Department  
Oil Conservation Division  
1220 South St. Francis Drive  
Santa Fe, NM 87504

**RE: Conoco Maljamar Gas Plant, Maljamar, New Mexico  
Vadose Zone Investigation of South Storage Area  
Maxim Project No. 2007216**

Dear Mr. Price:

Maxim Technologies, Inc. (Maxim) is submitting this correspondence on behalf of Conoco Inc. (Conoco). This letter discusses findings of additional soil boring work conducted by Maxim at the Conoco Maljamar Gas Plant South Storage Area on May 21, 2001. Other investigations carried out during the May site visit to the gas plant are discussed in separate communications. A potential path forward for the South Storage Area is proposed herein.

### **BACKGROUND**

In May 2000 the Oil Conservation Division (OCD) conducted an inspection of the South Storage Area adjacent to the Maljamar Gas Plant. Historically, Conoco used the land for storage of non-essential and out-of-service equipment. OCD expressed concerns about possible subsurface impacts at the site, which prompted Conoco to request Maxim visit the site, develop a plan to determine if impacts have occurred, and characterize any potential impacts. Maxim initially visited the site on June 22, 2000, and noted several meter houses, an empty 200-gallon storage tank, and assorted soil stockpiles in the area. The stockpiled soil was derived from cleanup of a condensate release and was stored on bermed, plastic-lined containment areas. At the time of the initial vadose zone investigation (September 28, 2000), the South Storage Area had been completely cleared of all equipment and soil piles. There was no evidence of surficial soil staining in the storage area.

Ten borings were advanced in or near areas of current or historical storage activity. Soil samples were collected from each of the borings. Results of the initial round of borings indicated an area roughly in the center of the South Storage Area was impacted by hydrocarbons (Figure 1). Borehole B-6-B contained stained soil from just below surface to approximately 11 feet below ground surface (bgs). Borehole B-7-B contained stained soil from 3 feet bgs to approximately 15.5 feet bgs. Laboratory analyses from boreholes B-6-B and B-7-B indicated the stained soil contained elevated total petroleum hydrocarbons (TPH) in sampled strata (Table 1).



Maxim proposed a plan to Conoco to further delineate the area that included installation of three additional borings with laboratory analysis for TPH and benzene, toluene, ethylbenzene and total xylenes (BTEX), as well as synthetic precipitation leaching procedure (SPLP). SPLP analysis was proposed in order to develop mobility data for the constituents of concern in this environment. An additional monitor well was planned for the area downgradient of the site to determine if groundwater is being affected by the impacts.

## **SOIL ASSESSMENT**

Maxim returned to the site on May 21, 2001, to install the additional borings. Borehole B-12-B was installed on an approximate centerline between boreholes B-6-B and B-7-B (Figure 1). Borehole B-12-B yielded impacted core from 6 to 9 feet bgs, and 11 to 14 feet bgs (Table 1). Two more boreholes, intended to approximately delineate the extent of impacts north and south of the known impacts, were installed based on presence/absence of soil impacts (stained soil) within five feet of the surface in the area. Potential drilling locations were screened by first boring to 5 feet bgs with a hand auger. If any stained soil was encountered, the site was rejected and another hand boring was advanced further north or south from the point of known concentration.

Borehole B-13-B was installed approximately 110 feet north of B-12-B. It contained impacted soil from approximately 9 feet bgs to approximately 10.6 feet bgs. Borehole B-11-B was installed 70 feet south of the original impact area and did not yield any impacted soil. The edge of impact to the south was identified as the last surface hand boring that contained stained soil (approximately 60 feet south of the original impact area). Exact edges of impacts to the east and west of boreholes B-6-B and B-7-B have not been delineated; however, based on available data, Maxim is projecting that subsurface soil impacts in the South Storage Area cover approximately 3,700 square feet. Due to widely varying vertical extents of stained and impacted soil, Maxim has not projected the volume of impacted soil.

Soil samples collected from boreholes installed at Maljamar were sampled for TPH identified as gasoline-range organics (GRO) and diesel-range organics (DRO). The soil was also tested for BTEX. The impacted soil analyses (for all samples except B-11-B) indicated TPH values in excess of recommended remediation action levels, as determined from guidance in *Guidelines for Remediation of Leaks, Spills and Releases, New Mexico Environmental Bureau, Oil Conservation Division, August 13, 1993*. There were no exceedances of BTEX or benzene remediation action levels reported for the soil samples (Table 1).

Samples of stained soil were forwarded to STL laboratories for SPLP testing. The SPLP results would provide an indication of whether the soil impacts could potentially produce leachate that could adversely impact groundwater quality. SPLP analysis of the three soil samples obtained from the site resulted in one sample with a benzene concentration of 0.015 milligram per liter (mg/L). This value is slightly elevated over the New Mexico Water Quality Control Commission groundwater standard for benzene of 0.010 mg/L. However, while the SPLP results indicate an exceedance in one sample, that exceedance is for a groundwater standard. There is a significant distance between soil impacts at 6 to 9 feet bgs and groundwater (approximately 86 feet bgs in the area). It is unlikely that soil pore water with a benzene concentration of 0.15 mg/L could migrate to groundwater without measurable

Mr. Wayne Price  
Oil Conservation Division  
April 24, 2002  
Page 3 of 3

decreases in the benzene concentration due to degradation, dilution, and other naturally-occurring attenuation mechanisms. All other SPLP results were either lower than groundwater standards or were non-detect. Maxim has attached boring logs and laboratory sample analysis results from the original boreholes installed at the site in September 2000 and laboratory sample analysis results from samples collected at the site during boring done in May 2001 (Attachment A).

### **RECOMMENDATIONS**

Analytical data indicate that the soil in the South Storage Area is impacted with TPH (primarily DRO and, to a lesser extent, GRO) and low levels of BTEX. However, SPLP analysis indicated that the leachability of the material is low (Table 2), and the impacts are unlikely to adversely impact underlying groundwater. These data, coupled with the depth to groundwater in the area, led Maxim to propose the following steps to close the South Storage Area in a manner that is protective of subsurface soil and groundwater resources. Since the horizontal extent of the impacts to the east and west of boreholes B-6-B and B-7-B has not been confirmed, the first step of the proposed site treatment is, in part, intended to close that data gap.

Proposed activities intended to achieve a protective site closure include the following:

- Propose site treatment including:
  - ♦ Delineate vertical and horizontal extent of the impact area by removal of overlying soil. Depending upon impact level in overburden, it will be sent offsite for disposal or staged nearby for reuse as a cap.
  - ♦ Fill the excavation with low-permeability material.
  - ♦ Top dress with native soils for natural vegetation.

If you have any questions regarding this communication, please contact Clyde Yancey or Tom Tangen at 505-237-8440.

Sincerely,

**MAXIM TECHNOLOGIES, INC.**



Tom Tangen  
Environmental Engineer

Cc: Mr. Neal Goates, Conoco Inc.  
Clyde Yancey, Maxim Technologies, Inc.

Enclosures: Figure 1  
Tables 1 & 2  
Attachment A

Table 1  
 Conoco Inc.  
 Majamar Gas Plant  
 South Storage Area Sampling Event  
 21-May-01

SOIL SAMPLING RESULTS									
Sample #	Description	Sample Interval (bgs)	TPH		BTEX				Xylenes mg/kg
			DRO mg/kg	GRO mg/kg	Benzene mg/kg	Ethylbenzene mg/kg	Toluene mg/kg		
B-11-B	Boring south of impacted area	14 ft - 16 ft	3.1	<0.1	<0.001	<0.001	<0.001		<0.003
B-12-B	Boring between B-6-B and B-7-B	6 ft - 9 ft	4200	410	0.34	11	0.42		10
B-12-B	Boring between B-6-B and B-7-B	11 ft - 14 ft	1900	17	0.012	0.87	0.029		0.95
B-13-B	Boring on north edge of impact	9 ft - 10.6 ft	1600	380	0.11	11	0.39		12
B-6-B*	Boring on west edge of impacted area	5 ft - 7 ft	2700	480	<1.5	16	<1.5		14
B-7-B*	Boring on east edge of impacted area	5 ft - 7 ft	3800	170	<0.3	3	<0.3		2.3

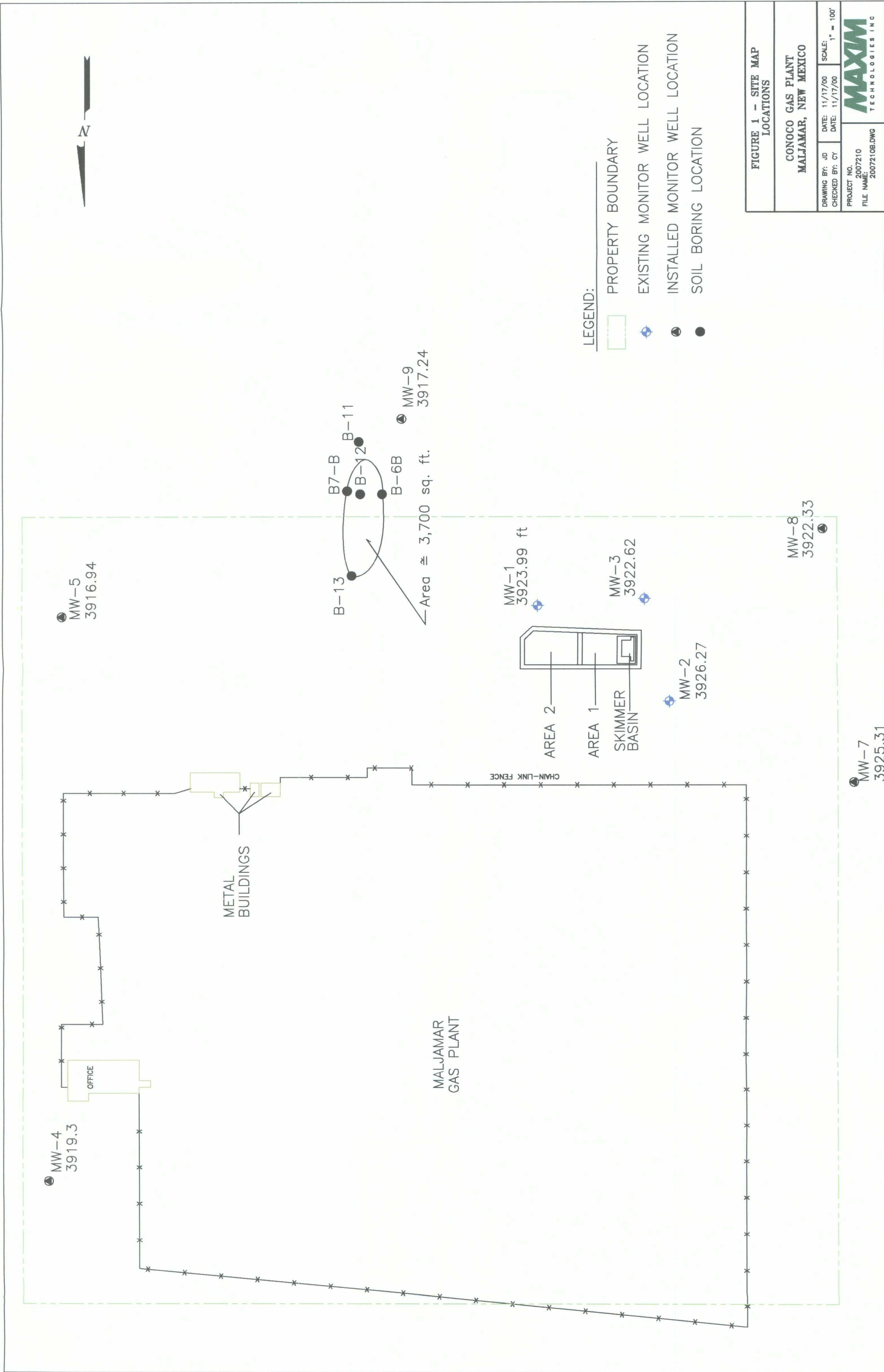
\*sampled September 28, 2000

Table 2  
Conoco Inc.  
Maljamar Gas Plant  
South Storage Area Sampling Event  
21-May-01

SPLP SOIL SAMPLING RESULTS

Sample #	Description	Sample Interval	Benzene	n-Butylbenzene	sec-Butylbenzene	Ethylbenzene	Hexachlorobutadiene	Isopropylbenzene	p-Isopropyltoluene	Naphthalene	n-Propylbenzene	Toluene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2,5-Trimethylbenzene
		(bgs)	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
B-12-B	Boring between B-6-B and B-7-B	6 ft - 9 ft	0.015	0.0063	0.0065	0.028*	<0.005	0.031	<0.005	0.032	0.036	.022*	<0.005	<0.005	0.085	0.021
B-12-B	Boring between B-6-B and B-7-B	11 ft - 14 ft	<0.005	0.0059	<0.005	0.037*	<0.005	0.01	<0.005	0.012	0.015	<0.005	<0.005	<0.005	0.023	0.006
B-13-B	Boring on north edge of impact	9 ft - 10.6 ft	0.0053	0.011	0.0085	.18*	0.011	0.025	0.0062	0.033	0.031	.016*	0.007	0.0077	0.08	0.024

\* Method blank contamination. The associated method blank contains the target analyte at a reportable level  
mg/L = milligrams per liter (parts per million)



# **ATTACHMENT A**

# SOIL BORING LOG

BORING/WELL #: B-1  
 PROJECT NO.: 2007207  
 LOCATION: MALJAMAR, NEW MEXICO  
 TOTAL DEPTH: 20.0'  
 SURFACE ELEV.:  
 SCREEN: DIA: LENGTH: SIZE:  
 CASING: DIA: LENGTH: TYPE:  
 DRILLING METHOD(S):

CLIENT: CONOCO, INC.  
 PROJECT: MALJAMAR GAS PLANT  
 WATER LEVEL: INITIAL: N/A 24 HOURS: N/A  
 BORE HOLE DIAMETER:  
 DRILLING COMPANY: HARRISON & COOPER  
 DATE DRILLED: 9/28/00  
 DRILLER:  
 OVERSIGHT: TANGEN




DEPTH FEET	SOIL DESCRIPTION	DESCRIPTION INTERVAL	SAMPLE INTERVAL	CORE Y N	OVM or Hnu (PPM)	GRAPHIC LOG	WELL DESIGN	DEPTH FEET
	SAND, brown, dry	0.0'-2.0'	0.0'-0.5'	C	0.4			
			0.5'-2.0'	C	0.4			
	SAND, brown, moist	2.0'-18.0'	2.0'-5.0'	C	0.5			
5								5
10								10
			13.0'		0.8			
15			13.0-15.0'	SS	0.4			15
20	CALICHE, white	18.0-20.0'	18.0-20.0'	SS	0.5			20
	Boring terminated at 20.0'							
25								25
30								30
35								35

SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE  
 RC - ROCK CORE  
 CT - 5 FT CONTINUOUS SAMPLER  
 NR - NO READINGS TAKEN

HSA - HOLLOW STEM AUGER  
 CFA - CONTINUOUS FLIGHT AUGERS  
 MD - MUD DRILLING  
 AD - AIR DRILLING  
 C - CUTTINGS

WATER LEVEL  
 AT COMPLETION  
 AFTER HOURS  
 SOIL SAMPLE  
 SUBMITTED TO LAB

 BOTTOM CAP  
 SAND PACK  
 BENTONITE SEAL

 FACTORY - SLOTTED  
 WELL SCREEN  
 WELL CASING  
 BENTONITE/CEMENT  
 GROUT SEAL

# SOIL BORING LOG

BORING/WELL #: B-2  
 PROJECT NO.: 2007207  
 LOCATION: MALJAMAR, NEW MEXICO  
 TOTAL DEPTH: 20.0'  
 SURFACE ELEV:  
 SCREEN: DIA: LENGTH: SIZE:  
 CASING: DIA: LENGTH: TYPE:  
 DRILLING METHOD(S):

CLIENT: CONOCO, INC.  
 PROJECT: MALJAMAR GAS PLANT  
 WATER LEVEL: INITIAL: N/A 24 HOURS: N/A  
 BORE HOLE DIAMETER:  
 DRILLING COMPANY: HARRISON & COOPER  
 DATE DRILLED: 9/28/00  
 DRILLER:  
 OVERSIGHT: TANGEN

DEPTH FEET	SOIL DESCRIPTION	DESCRIPTION INTERVAL	SAMPLE INTERVAL	CORE Y N	OVM or Hnu (PPM)	GRAPHIC LOG	WELL DESIGN	DEPTH FEET
	SAND, dry	0.0'-2.0'	0.0'-2.0'	C	0.0			
5	SAND, brown, dry	2.0'-8.0'	5.0'	C	0.8			5
10	SAND, brown, moist	8.0'-13.0'	8.0'-10.0'	C	0.8			10
15	SAND, brown, moist	13.0'-15.0'	13.0'-15.0'	SS	0.9			15
	SAND, brown, dry	15.0'-20.0'	18.0'-20.0'	SS	0.6			20
20	Boring terminated at 20.0'							20
25								25
30								30
35								35

SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE  
 RC - ROCK CORE  
 CT - 5 FT CONTINUOUS SAMPLER  
 NR - NO READINGS TAKEN

HSA - HOLLOW STEM AUGER  
 CFA - CONTINUOUS FLIGHT AUGERS  
 MD - MUD DRILLING  
 AD - AIR DRILLING  
 C - CUTTINGS

WATER LEVEL  
 ∇ AT COMPLETION  
 ∇ AFTER HOURS  
 ■ SOIL SAMPLE  
 SUBMITTED TO LAB

BOTTOM CAP  
 SAND PACK  
 BENTONITE SEAL

FACTORY - SLOTTED  
 WELL SCREEN  
 WELL CASING  
 BENTONITE/CEMENT  
 GROUT SEAL

# SOIL BORING LOG

BORING/WELL #: B-3  
 PROJECT NO.: 2007207  
 LOCATION: MALJAMAR, NEW MEXICO  
 TOTAL DEPTH: 30.0'  
 SURFACE ELEV.:  
 SCREEN: DIA: LENGTH: SIZE:  
 CASING: DIA: LENGTH: TYPE:  
 DRILLING METHOD(S):

CLIENT: CONOCO, INC.  
 PROJECT: MALJAMAR GAS PLANT  
 WATER LEVEL: INITIAL: N/A 24 HOURS: N/A  
 BORE HOLE DIAMETER:  
 DRILLING COMPANY: HARRISON & COOPER  
 DATE DRILLED: 9/28/00  
 DRILLER:  
 OVERSIGHT: TANGEN




DEPTH FEET	SOIL DESCRIPTION	DESCRIPTION INTERVAL	SAMPLE INTERVAL	CORE Y N	OVM or Hru (PPM)	GRAPHIC LOG	WELL DESIGN	DEPTH FEET
5	SAND, tan, dry	0.0'-15.0'	0.0'-5.0'	C	1.1			5
10			8.0'-10.0'	SS	7.9			10
15			15.0'	C	3.4			15
20	SAND with rock fragments, dry	15.0-20.0'	20.0'	C	5.6			20
25	SAND with rock fragments, moist	20.0-25.0'	25.0'	C	0.6			25
30	SAND with rock fragments, brown, moist	25.0-30.0'	30.0'	C	0.5			30
35	Boring terminated at 30.0'							35

SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE  
 RC - ROCK CORE  
 CT - 5 FT CONTINUOUS SAMPLER  
 NR - NO READINGS TAKEN

HSA - HOLLOW STEM AUGER  
 CFA - CONTINUOUS FLIGHT AUGERS  
 MD - MUD DRILLING  
 AD - AIR DRILLING  
 C - CUTTINGS

WATER LEVEL  
 AT COMPLETION  
 AFTER HOURS  
 SOIL SAMPLE  
 SUBMITTED TO LAB

 BOTTOM CAP  
 SAND PACK  
 BENTONITE SEAL

 FACTORY - SLOTTED  
 WELL SCREEN  
 WELL CASING  
 BENTONITE/CEMENT  
 GROUT SEAL