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REPORTS

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ENVIRONMENTAL INVESTIGATION
CHEVRON U.S.A., INC.
HELBING FEDERAL GAS WELL SITE
EDDY COUNTY, NEW MEXICO

Prepared for:

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ENVIRONMENTAL INVESTIGATION
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1.0 INTRODUCTION

This report presents the findings of the environmental investigation conducted at the Chevron, U.S.A., Inc. (Chevron) Helbing Federal Gas Well (Site) located in Eddy County, New Mexico. The location of the subject Site is shown on Figure 1. The investigation was conducted to evaluate the extent and source of a condensate seep (Figure 2) which was observed in a dry arroyo located adjacent to the Site.

As shown on Figure 2, the Site is comprised of a gas well (Helbing Federal); a storage tank; and a glycol unit, separator, and a stack pac (collectively referred to herein as the Stack Pac). Located approximately 300 feet southeast of the Stack Pac is a pipeline junction box. Underground pipelines connect the equipment listed above, as shown on Figure 2. A north-south and northeast trending surface drainage is present due north of the Stack Pac. Two (2) dry arroyos, one (1) located approximately 500 feet to the northwest and the other located approximately 300 feet northeast of the Stack Pac are shown on Figure 2. The arroyos are normally dry, but surface water will flow in these arroyos during significant rainfall events. The condensate seep was originally identified

where the north-south trending surface drainage meets the northwest trending arroyo, approximately 380 feet northeast of the Site.

The environmental investigation was conducted by Roberts\Schornick and Associates (RSA) and Chevron personnel between April 12 and 13, 1993. The investigation consisted of a Site reconnaissance, an electromagnetic terrain conductivity (EM) survey, and a soil gas survey.

2.0 SITE INVESTIGATION

2.1 Site Reconnaissance

Prior to conducting the EM and soil gas surveys, a 100 foot by 100 foot field grid was established at the Site. The grid was laid out utilizing a hand transit (Lietz) and a measuring wheel. The grid was established in a north-to-south and west-to-east orientation, with the origin located 100 feet west and 100 feet south of the gas well. The grid was utilized throughout the investigation to establish accurate locations for EM and soil gas survey data points.

In addition to establishing a grid at the Site, the hand transit was utilized to measure conjugate joint orientations which were observed in sandstone and dolomite outcrops in the Site vicinity. Conjugate joint orientations are important in evaluating possible routes of groundwater and condensate migration through the subsurface.

Conjugate joint orientations measured are listed on Table 1 and are shown on Figure 2. Conjugate joint orientations were observed to trend in two (2) primary directions which ranged from approximately N18W to N44W and N35E to N48E. As shown on Figure 2, arroyos and surface water drainages appear to trend in similar orientations as the conjugate joints.

2.2 Soil Gas Survey

A soil gas survey was conducted at the Site with the RSA soil probe rig. The soil gas survey was conducted to evaluate the extent of relative hydrocarbon concentrations in soil pores (or rock fractures) at the Site. In the unsaturated zone, hydrocarbons can exist in the vapor phase in soil pores, adsorbed onto soil particles, or can exist as free hydrocarbon liquid in the soil pores. Hydrocarbons in soils in the saturated zone are typically adsorbed onto the soil particles, or may exist as free liquid in the soil pore.

The soil gas survey was conducted with an apparatus consisting of a hollow steel shaft equipped with a stainless steel sampling point (probe). The survey is performed by hydraulically pushing the probe into the ground at various depths. Once the desired depth is achieved, the probe is retracted approximately 2-inches, exposing a screen inside the probe tip. Soil gas vapors are drawn into the hollow tube through the screen with a vacuum pump, and then analyzed at the surface with an organic vapor monitor (OVM).

The OVM detector was calibrated to a known isobutylene standard prior conducting the soil gas survey and calibration was confirmed between each soil probe location. The OVM detector has a limit of detection of 0.1 relative parts per million (volume/volume) of total ionizable hydrocarbon. All soil probes and sampling equipment were decontaminated with Alconox and deionized water

between sample locations. The soil probe was advanced to depths between 0 (bedrock outcrops) and 4.0 feet below ground surface. Results of the soil gas survey are presented on Table 2. In addition, soil probe locations and maximum soil gas concentrations are shown on Figure 3.

In areas inaccessible to the soil probe rig, a head space soil gas survey was conducted. The ambient temperature headspace method (Van Zyl, 1987) consisted of collecting composite soil samples from soils at the base of the arroyo, placing the soil into a glass container (with a vacant headspace in the container), and placing aluminum foil and a cap over the container. The headspace gas in each container was tested at least 30 minutes after sample collection by using the OVM detector probe to pierce the aluminum foil and an organic vapor headspace reading was obtained. The resulting OVM headspace gas readings were in parts per million (ppm) of total ionizable hydrocarbon based on an isobutylene standard.

Soil gas headspace samples were collected within the arroyo in the locations shown on Figure 4. Soil sample depths ranged from 0.3 foot (sample S-6) to 1.4 foot (sample S-4) below ground surface. A shovel was utilized to obtain soil samples at each location. Soil samples were composited from the ground surface to bedrock or to refusal. Samples were placed into a glass container for head space analysis. Soil gas headspace readings obtained at the Site are

listed on Table 3. Soil headspace gas sample locations and values are also shown on Figures 3 and 4. Results of both the soil probe and soil headspace gas surveys are discussed in Sections 8.1 and 8.2.

2.3 EM Survey

An EM survey was conducted at the Site on April 12 and 13, 1993 in the areas shown on Figure 5. The EM survey was conducted utilizing a Geonics EM-31. The EM-31 contains a transmitter coil which is energized with an alternating current at an audio frequency, and a receiver coil which is located a short distance away. The time-varying magnetic field arising from the alternating current in the transmitter coil induces very small currents in the earth. These currents generate a secondary magnetic field which is detected by the receiver coil. The resultant data, which represents ground or terrain conductivity (in units of mmhos/m), is then plotted on a base map and contoured to evaluate areas of potential impact. Areas of high relative terrain conductivity can be related to high total dissolved solids plumes in soils and groundwater which could result from a brine release. The EM survey was conducted because brine would likely be released along with condensate from a piping or equipment release. The effective depth of investigation for the EM-31 is approximately 6 meters (20 feet). Values measured in the field with the EM-31 are listed on Table 4 and are shown on Figure 5. Results of the EM survey are discussed in Section 8.3.

3.0 REGIONAL TOPOGRAPHY AND PHYSIOGRAPHY

The Site is located within the Seven Rivers Embayment which is an area of moderate relief (Bjorklund, 1959). Surface elevations in the vicinity of the Facility range from approximately 4120 to 4040 feet AMSL, as shown on Figure 2. The Seven Rivers Embayment is bounded to the west by the Huapache monocline; and to the east by the Seven Rivers Hills, the Azotea Mesa, and the East and West Hess Hills. It is characterized by shallow swales and gently rounded hills.

4.0 SURFACE WATER DRAINAGE

Drainage in the Seven Rivers Embayment area consists of superimposed consequent streams which have excavated Rocky Arroyo and Last Chance Canyon; and a series of streams and arroyos generally paralleling the strike of the resistant beds of dolomite (Bjorklund, 1959). Arroyos in the vicinity of the Site drain towards the northeast through Dunnaway Draw to Rocky Arroyo. Rocky Arroyo drains towards the northeast to the Pecos River.

5.0 SOILS

Soils in the Site area comprise Ector Extremely Rocky Loam and Ector Stony Loam soils (USDA, 1971). The Ector series consists of very shallow, well drained, calcareous, and very rocky soils. At the subject Site, soils were observed to be predominantly less than approximately 4-inches thick.

6.0 REGIONAL GEOLOGY

A geologic map for the Site vicinity is presented on Figure 6. A stratigraphic column and explanation for Figure 6 is presented on Figure 7. Figure 6 shows that strata in the vicinity of the Site are comprised of the Permian-age Guadalupe Series which includes the Tansill, Yates, Seven Rivers, Queen, Grayburg, and San Andres formations. As shown on the geologic cross-sections on Figure 8 and Figure 9, strata which outcrop at the subject Site are part of the Queen formation. West to east geological cross-section A-A' (Figure 8) shows that the Helbing Federal well is located in the outcrop of the Queen formation. Geological cross section B-B' (Figure 9) also shows that the strata beneath the Site is part of the Queen formation. The Queen formation is underlain by the Grayburg formation. A regional geologic map is presented on Figure 10 with an explanation included on Figure 11. Figure 10 also shows that strata at the Site are part of the Queen formation. In addition, Figure 10 shows that an exposure of Grayburg formation strata is exposed within the arroyo located approximately 500 feet northwest of the Site. Each of the formations of the Guadalupe Series in the area of the Site is comprised of two (2) major facies: the carbonate shelf facies and the evaporate shelf facies, both of which were deposited landward of the Guadalupe reef complex.

The evaporite facies is composed primarily of gypsum, anhydrite, and other evaporite rocks interbedded with beds of siltstone and sandstone. Gypsum

typically occurs nearer the surface, and is an alteration product of anhydrite. The conversion process from anhydrite to gypsum is accompanied by an increase in volume and porosity which makes gypsum susceptible to solution by groundwater. Because of the increased porosity, areas underlain by the gypsum subfacies generally are good recharge areas (Bjorklund, 1959). The nearest evaporite facies rocks to the Site, according to Bjorklund, 1959, are present approximately 2 miles to the west of the Site and are part of the Queen formation.

The carbonate facies is composed primarily of interbedded limestone, dolomite, and sandstone, with a predominance of carbonate rocks. The rocks at the subject Site are part of the carbonate facies of the Queen formation. As shown on Figure 8, the Queen formation is comprised of dolomite interbedded with many thin sandstone and siltstone beds. The Grayburg formation, which is exposed approximately 500 feet northwest of the Site is also composed of interbedded dolomite, sandstone, and siltstone.

Alluvial sediments overlie shelf deposits along major streams and arroyos in the area. Alluvium typically consists of caliche and limestone conglomerate with some eolian material. No significant quantities of alluvium were observed in arroyos located immediately adjacent to the subject Site.

Regionally, strike of the Queen formation is towards the northeast and dip is to the southeast. Near-vertical joints observed in the Queen formation in all parts of the area have two (2) prominent trends, N40-50W and N30-40E. In many places in the shelf, jointing passes through carbonate rocks, but stops at sandstones and siltstones, the possible result of intergranular movement of the clastic grains and recementing by calcareous cement.

Conjugate joints measured in the Queen formation at the Site were found to range from N18W to N44W and N35E to N48E. Orientations of conjugate joints are listed on Table 1, and shown on Figure 2. This is consistent with published regional information.

7.0 HYDROGEOLOGY

A study by the State of New Mexico (Collins, 1987) indicates that there are three (3) separate aquifers in the vicinity of the Site. These include an alluvial aquifer, an upper Queen aquifer, and a lower Queen aquifer. The alluvial aquifer is thin and found primarily on valley or arroyo floors and alluvial fans. An alluvial aquifer is not present at the subject Site.

As shown on cross-section B-B' on Figure 9 (prepared by Collins, 1987), the upper aquifer in the Queen formation is not present in the vicinity of the Site. Figures 12, 13, and 14 present a groundwater potentiometric surface map for the region, a map showing groundwater flow directions, and a groundwater availability map, respectively. An explanation for Figure 14 is shown on Figure 15. As shown on Figures 12 and 13, the regional groundwater flow direction is towards the northeast (parallel to strike) at an approximate gradient of 0.02 feet per foot. Figure 12 shows that several of the wells within a 2.5 mile radius of the Site are completed within the Queen aquifer. Depth to groundwater in wells within approximately 2.5 miles of the Site ranged from approximately 59 feet (2.5 miles southeast of the Site) to 472 feet (1.5 miles southeast of the Site) below ground surface, as shown on Figure 14. Depth to groundwater within the Seven Rivers Embayment is highly variable and difficult to predict. However, the regional groundwater potentiometric surface map on Figure 12 suggests that the groundwater elevation within the Queen

aquifer beneath the Site is present at approximately 3750 feet AMSL. Based on a surface elevation of approximately 4100 feet, the depth to groundwater may be approximately 350 feet below ground surface at the Site.

Groundwater flows through solution joints and fractures through the carbonate facies. Interbeds of siltstone and sandstone regionally can act as aquicludes. Recharge of the lower Queen aquifer likely occurs through gypsum outcrops located west of the Site as well as through vertical surface water seepage through joints and fractures.

The quality of groundwater pumped from shelf aquifers depends largely on whether a well taps the carbonate or evaporite facies of the formation. The carbonate rocks typically yield small quantities of water satisfactory for domestic or stock use. Evaporite rocks typically yield water which is satisfactory for livestock or limited domestic use.

8.0 INVESTIGATION FINDINGS

8.1 Soil Gas Survey

8.1.1 Soil Probe Survey Results

The soil gas survey was conducted at the Site on April 12 and 13, 1993. Data was gathered for the soil gas survey with both the soil probe rig and by collecting soil gas headspace samples. Section 2.2 describes the methodologies utilized in conducting the soil probe and soil gas headspace investigations. The soil probe survey was conducted over an area which was measured into 100 foot by 100 foot grids (in order to locate soil probe stations at the Site). Approximately 55 soil probe measurements were attempted at the Site. Due to bedrock outcrops, successful soil gas measurements were made at only 46 stations. Soil probes were advanced to depths between 0.4 and 4.0 feet. Only 17 of the soil probe stations. Soil probes were successfully advanced to at least 1.0 feet due to the presence of shallow bedrock. Soil probe grid locations and OVM values are listed on Table 2 and shown on Figure 3. Soil probe readings were measured at levels which ranged from 0 parts per million (ppm) throughout most of the Site area, to 196.5 ppm immediately adjacent to the flow line.

8.1.2 Soil Gas Headspace Results

Soil gas head space samples were obtained along the arroyo in areas which were inaccessible to the soil probe rig. Soil gas head space samples were

collected at the locations shown on Figure 4 (samples S-1 through S-20) to assess the lateral extent of impact along the arroyo. Samples were composited from sediments overlying bedrock at each location, placed into clean glass jars, sealed with aluminum foil, and capped. All soil gas head space samples were allowed to sit for at least 30 minutes prior to testing with an OVM. Soil sample composite depths ranged from 0.3 foot (sample S-6) to 1.4 foot (sample S-4) below ground surface. No sample was obtained at sample location S-12 due to the presence of a bedrock outcrop.

Soil gas headspace samples readings were found to range from 0 ppm (samples S-17 and S-18) to 719 ppm (sample S-1). Soil gas headspace readings are listed on Table 3. Sample locations and soil gas headspace values are shown on Figure 4.

8.2 Soil Gas Isopleth Maps

Soil gas values from both the soil probe survey and the headspace gas survey are plotted and contoured on Figure 3. A detail of the arroyo sample locations is presented on Figure 4. Figure 3 shows that the highest soil gas levels were measured at the base of the arroyo in the vicinity of the seep. The highest soil gas level was measured at a level of 719 ppm in sample S-1, which was located in the drainage just east of the road (where the drainage meets the arroyo), where the seep was first observed. Based on the soil gas isopleth map

(Figure 4), impacts from the seep extend approximately 280 feet along the base of the arroyo.

As shown on Figure 3, outside the arroyo the highest soil gas reading (196.5 ppm) was measured in the pipeline backfill, approximately 110 feet east of the Stack Pac. In addition, soil gas levels of 34 and 12 ppm were measured in the pipeline backfill in the vicinity of the pipeline junction box. The pipeline may be a source for impacts observed at the Site.

Measurable soil gas levels (above background) were detected approximately 250 feet north (23.3 ppm) and approximately 300 feet northeast (2.2 ppm) of the Stack Pac. Soil probes attempted in the vicinity of the Stack Pac, the Helbing Federal well, and the storage tank were either unsuccessful due to bedrock outcrops or measured no detectable soil gas levels.

Based on published data and Site observations, near-surface brine/condensate releases and/or precipitation would be expected to rapidly infiltrate (vertically) through bedrock due to the well developed system of conjugate joints in the area. Downward migration would likely continue until a less fractured or less permeable zone was encountered (Bjorklund, 1959, suggests that sandstone and siltstone interbeds act as aquitards across many areas of the shelf including the Site area). Horizontal spreading would then likely occur when less

permeable zones (sandstone/siltstone interbeds) were encountered at depth. In other words, a slow condensate release would likely migrate vertically through joints or fractures until a less-permeable material was encountered (sandstone or siltstone). Upon encountering the low-permeability material, the condensate release would then begin to migrate laterally on top of the low-permeable material. Sandstone was observed in many areas within the arroyo including the seep area, and may provide a possible pathway for lateral migration of condensate at the Site. Other potential migration pathways at the Site include the ground surface and the top of bedrock. The fact that elevated soil gas levels were not measured between the possible source of impact (the pipeline) and the seep suggests that the primary route of condensate migration may be vertically from the source through bedrock fractures, until a sandstone/siltstone unit was encountered. Upon encountering the sandstone/siltstone, the condensate would then migrate along the top of this unit until it outcrops in the arroyo. A possible migration pathway is shown on Figure 16. Further, the lower soil gas levels measured along the pipeline as compared to the seep suggests that impacts may be due to a release which is no long occurring.

8.3 EM Survey

An EM survey was conducted at the Site with a Geonics EM 31. The EM 31 measures relative ground or terrain conductivity to a depth of approximately 6

meters (20 feet). Table 4 presents a list of readings measured. Survey stations with corresponding terrain conductivity readings are shown on Figure 5 (readings which were definitely influenced by surface interferences are shown with an "I"). As shown on Figure 5, terrain conductivity readings were found to range from approximately 2 mmhos/m along the northeast trending arroyo to 28 mmhos/m in the vicinity of the seep. The background terrain conductivity at the Site was found to range from approximately 2 mmhos/m to 10 mmhos/m.

Elevated terrain conductivities were noted in several areas of the Site as shown on Figure 5. The most notable of these areas is the area in the vicinity of the seep where terrain conductivities were measured at levels up to 28 mmhos/m. Another area is located northwest of the Stack Pac, where terrain conductivities were measured at levels up to 20 mmhos/m. However, the area northwest of the Stack Pac contains a significant amount of metal which could have influenced readings. Several elevated terrain conductivity readings were measured along the pipeline (up to 19 mmhos/m). Elevated terrain conductivities were also measured in the drainage 100 feet north of the Stack Pac (17 mmhos/m), and in the arroyo approximately 350 feet upstream of the seep (21 mmhos/m). In addition, terrain conductivities up to approximately 15 mmhos/m were observed approximately 360 feet northwest of the Stack Pac.

In general, terrain conductivity readings in the Site vicinity were very low. A sample of the ponded water within the arroyo (in the area of the condensate seep) was obtained in order to measure its conductivity. The water sample was measured to have a conductivity of 2050 μmhos/cm (205 mmhos/m). Based on this conductivity, the seep water sample should have a total dissolved solids level of approximately 1435 mg/l. Accordingly, soil porewater containing similar fluids should have a much greater measured terrain conductivity value then that measured outside the seep location. Referring to Figure 5, the colored areas represent areas where the terrain conductivity may be elevated over background. These areas may be representative of areas where soil porewater contains fluids with higher conductivity as compared to adjacent areas. The higher conductivity fluids could have originated from a release at the Site.

Significant anomalies are located in the seepage areas, north and west of the Stack Pac, in the areas of the junction box, and northeast of the junction box in the arroyo. A plausible interpretation of the EM map would be that a release of condensate containing brine occurred either from the Stack Pac area or along the pipeline near the junction box. This release migrated vertically until a unit with a lower permeability (probably the sandstone outcropping in the arroyo) was encountered. The condensate brine release then migrated on top of the sandstone until it discharged at the seep.

Based upon the soil gas investigation and the EM survey results, the most likely release areas are either the Stack Pac, junction box, or the pipeline. No evidence of contaminant migration from off-site areas was found. In fact, the EM survey primarily detected only background terrain conductivities (10 mmhos/m or lower) north and east of the main seep area as shown on Figure 5.

9.0 CONCLUSIONS

The conclusions of the environmental investigation conducted at the Helbing Federal Well Site include the following:

1. The Site is located within the Seven Rivers Embayment which is an area of moderate relief. Surface elevations in the vicinity of the Facility range from approximately 4120 to 4040 feet AMSL.

2. Arroyos in the vicinity of the Site drain towards the northeast through Dunnaway Draw to Rocky Arroyo. Rocky Arroyo drains towards the northeast to the Pecos River.

3. Soils in the Site area comprise Ector Extremely Rocky Loam and Ector Stony Loam soils.

4. The strata at the subject Site are part of the carbonate facies of the Queen formation. The Queen formation is comprised of dolomite interbedded with many thin sandstone and siltstone beds.

5. No significant quantities of alluvium were observed in arroyos located immediately adjacent to the subject Site.

6. Regionally, rocks strike to the northeast and dip towards the southeast. Conjugate joints measured at the Site were found to range from N18W to N44W, and N35E to N48E.

7. There are three (3) separate aquifers in the vicinity of the Site. These include an alluvial aquifer, an upper Queen aquifer, and a lower Queen aquifer. Neither the alluvial aquifer nor the upper aquifer in the Queen formation are present in the vicinity of the Site.

9. The regional groundwater flow direction is towards the northeast at an approximate gradient of 0.02 feet per foot. The depth to groundwater at the Site may be approximately 350 feet below ground surface, as estimated from a published groundwater potentiometric surface map (Bjorklund, 1959).

10. Groundwater flows through solution joints and fractures through the carbonate facies. Interbeds of siltstone and sandstone regionally can act as aquitards. Recharge of the lower Queen aquifer likely occurs through gypsum outcrops located west of the Site as well as through water seepage through joints and fractures.

11. The highest soil gas levels were measured at the base of the arroyo in the vicinity of the seep. Impacts from the seep extend approximately 280 feet along the base of the arroyo.

12. Outside the arroyo, the highest soil gas reading (196.5 ppm) was measured in the pipeline backfill, approximately 110 feet east of the Stack Pac. In addition, soil gas levels of 34 and 12 ppm were measured in the pipeline backfill in the vicinity of the pipeline junction box. The pipeline may be a source for impacts observed at the Site.

13. Measurable soil gas levels (above background) were detected approximately 250 feet north (23.3 ppm) and approximately 300 feet northeast (2.2 ppm) of the Stack Pac.

14. Published data and Site observations suggest that any near-surface releases and/or precipitation would be expected to rapidly infiltrate through bedrock due to the well development system of conjugate joints in the area. Downward migration would likely continue until a less fractured or less permeable zone was encountered, such as the sandstone that outcrops in the arroyo near the seep.

15. Potential contaminant migration pathways at the Site include the ground surface, the top of bedrock, and through bedrock fractures. Soil gas data suggest that the primary route of migration may be through bedrock fractures or bedding planes.

16. Sandstone was observed in many areas within the arroyo including the seep area, and may provide a possible route for lateral migration at the Site, especially during periods of significant rainfall infiltration.

17. Several areas of the Site were measured with elevated terrain conductivities in the vicinity of the seep; along the pipeline; northwest of the Stack Pac; over a sandstone outcrop within the arroyo approximately 350 feet upstream of the seep location; within the surface drainage approximately 100 feet north of the Stack Pac; and approximately 360 feet northwest of the Stack Pac.

18. In general, terrain conductivity readings in the Site vicinity were very low. A sample of the water within the seep in the arroyo was measured to have a conductivity of 2050 μmhos/cm (205 mmhos/m). Based on this conductivity, the seep water sample should have a total dissolved solids level of approximately 1435 mg/L.

19. Based upon the soil gas investigation and EM survey results, the most likely release areas are either the Stack Pac, junction box, or the pipeline.

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FIGURES

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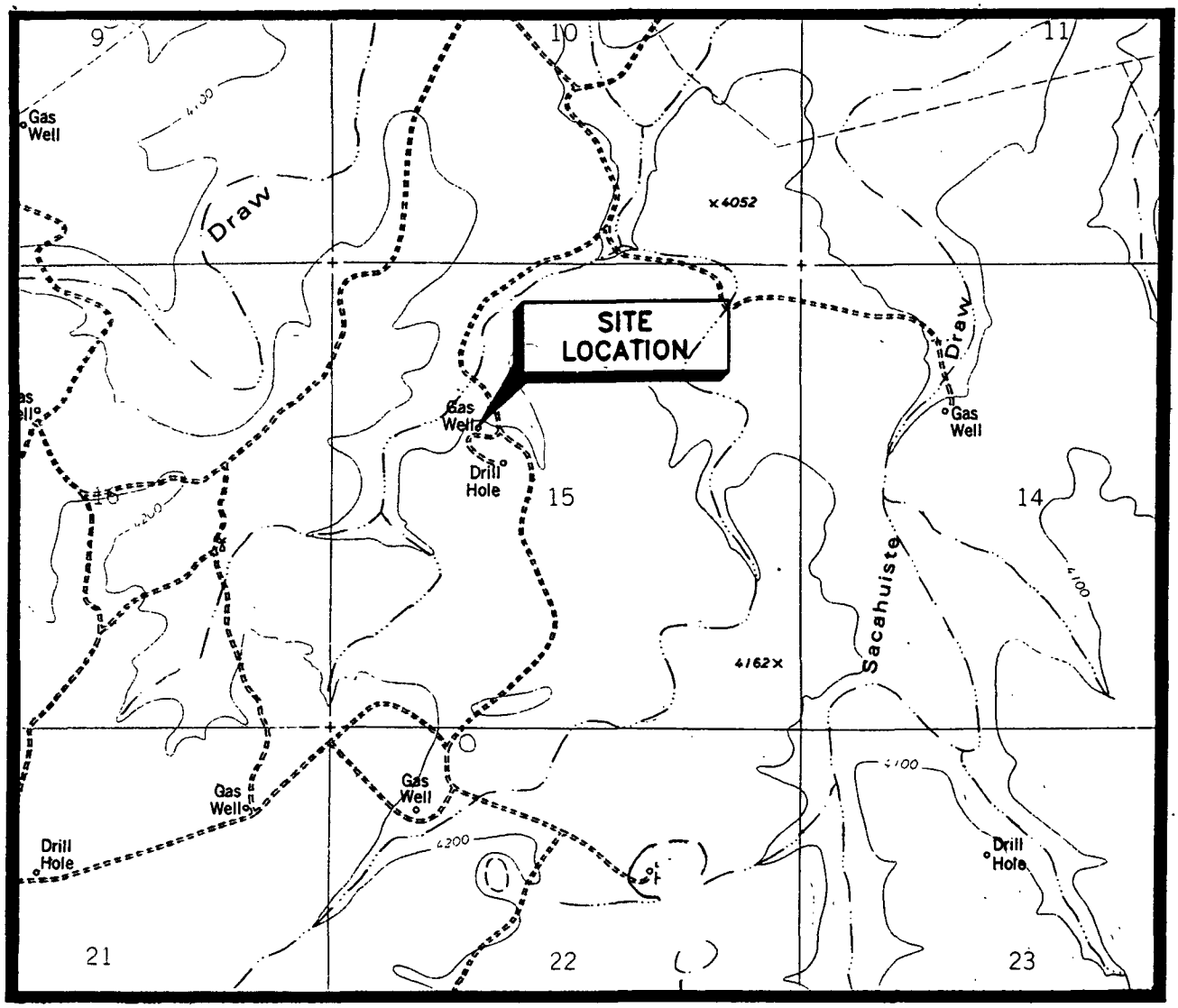

T 22 S

AFTER U.S.G.S. 7.5 MIN. TOPO. QUAD.,MARTHA CREEK, NEW MEXICO, 1978

SCALE
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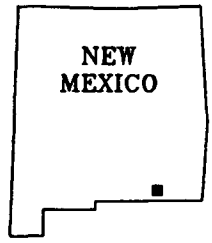

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Figure Title: SITE LOCATION AND TOPOGRAPHIC MAP	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

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DATE: 4/21/93	PREPARED BY: WEP
SCALE: AS SHOWN	CHECKED BY: BJS
	DRAFTED BY: BDR
PROJECT NO: 93052.01 F01	FIGURE NO.: 1

TABLES

TABLE 1: CONJUGATE JOINT ORIENTATIONS, CHEVRON USA, INC., EDDY COUNTY, NEW MEXICO

LOCATION	#1 ORIENTATION	#2 ORIENTATION
200, 0	N44W	N48E
710, 10	N25W	N45E
660, 100	N22W	N43E
600, 160	N22W	N35E
360, 400	N18W	N43E
200, 570	N46W	N40E
230, 110	N27W	N43E

TABLE 2: SOIL PROBE GRID LOCATIONS AND SOIL GAS READINGS, CHEVRON, USA, INC., EDDY COUNTY, NEW MEXICO

GRID POINT	BACKGROUND OVM, PPM	PROBE DEPTH, FEET	MAXIMUM OVM READING, PPM*	CALIBRATION CHECK, PPM
0,0	---	BR	---	---
0,200	0.0	0.7	0.0	---
0,300	0.0	1.3	0.0	99.9
0,400	0.0	0.9	0.0	---
0,500	0.0	0.8	0.0	99.9
100,0	---	BR	---	---
100,230	0.0	0.6	0.0	---
100,300	0.0	0.6	0.0	99.9
100,400	0.0	0.7	0.0	99.9
100,500	---	BR	---	---
150,250	1.0	0.7	1.0	99.9
150,300	0.0	0.5	0.0	99.9
170,-10	1.0	0.9	1.0	99.9
200,0	---	BR	---	---
200,100	---	BR	0.0	---
200,200	0.0	1.4	0.0	99.9
200,250	0.7	0.5	3.0	99.9
200,300	0.0	0.7	23.3	---
200,300	0.0	0.4	5.2	---
200,350	0.7	2.0	0.0	99.9
200,400	0.0	1.7	0.0	---
200,500	0.7	1.7	0.0	99.9
247,100	1.0	0.4	1.0	99.9
250,300	0.7	0.9	0.0	99.9
250,350	1.0	0.5	1.0	99.9
300,0	2.2	0.4	2.2	---
300,100	0.0	BR	---	---
300,200	0.0	1.8	0.0	99.9
300,275	0.7	0.7	0.0	99.9
300,300	0.0	1.7	0.0	99.9
300,400	0.0	0.6	0.0	---
300,425	0.7	2.0	0.0	99.9
300,45	1.0	0.7	1.0	99.9
300,70	1.0	0.5	1.0	99.9
350,45	1.0	1.5	1.0	99.9
350,70	---	BR	---	---
400,0	2.2	0.7	0.7	---
400,100	0.0	0.5	0.0	99.9
400,200	0.0	1.6	0.0	---
400,30	1.0	3.0	196.5	99.9
400,300	0.7	1.0	2.2	99.9
400,325	0.7	0.4	0.0	---
400,70	---	BR	---	---
420,5	1.0	3.5	9.1	99.9
450,25	1.0	0.5	1.0	99.9
460,-30	1.0	1.1	1.0	99.9
500,-100	0.7	0.4	0.7	99.6
500,-60	1.0	4.0	34.0	99.9
500,-60	1.0	3.0	1.0	99.9
500,0	0.7	0.4	0.7	99.9
500,150	0.7	0.7	0.7	---
550,-90	1.0	1.9	12.0	99.9
600,-100	---	BR	---	---
600,0	0.7	0.5	0.7	---
600,100	0.7	0.9	0.7	99.9

NOTES:
OVM = ORGANIC VAPOR MONITOR
BG = BELOW GROUND
PPM = PARTS PER MILLION

TABLE 3: SOIL GAS HEADSPACE READINGS, CHEVRON USA, INC.
EDDY COUNTY, NEW MEXICO

SAMPLE NUMBER	DEPTH INTERVAL, FEET	SOIL GAS CONCENTRATION, PPM
S-1	0 - 0.7	719
S-2	0 - 0.5	399
S-3	0 - 0.5	589
S-4	0 - 1.4	335
S-5	0 - 0.4	16
S-6	0 - 0.3	35
S-7	0 - 0.7	409
S-8	0 - 0.5	385
S-9	0 - 1.0	313
S-10	0 - 0.4	154
S-11	0 - 0.7	118
S-12	BR	NS
S-13	0 - 0.6	604
S-14	0 - 0.6	374
S-15	0 - 1.0	0.7
S-16	0 - 0.4	0.7
S-17	0 - 0.7	0.0
S-18	0 - 0.5	0.0
S-19	0 - 0.5	5
S-20	0 - 0.5	12

NOTES:
BR = BEDROCK OUTCROP
NS = NO SAMPLE OBTAINED
PPM = PARTS PER MILLION

TABLE 4: EM-31 GROUND CONDUCTIVITY READINGS, CHEVRON, USA
EDDY COUNTY, NEW MEXICO

STATION NUMBER	LINE 0 PERPENDICULAR/PARALLEL MMHOS/M.	STATION NUMBER	LINE 1 PERPENDICULAR/PARALLEL MMHOS/M
1	4.8/5.1	1	10.3/9.7
2	4.4/4.4	2	6.8
3	4.5/4.5	3	5.9/6.7
4	4.3/4.4	4	6.6/6.9
5	4.9/4.9	5	7.6/7.8
6	4.9/4.9 (HORIZ: 2.9/2.9)	6	7.5/8.1
7	4.7/4.8	7	8.1/8.0
8	4.9/4.9	8	7.3/7.0
9	5.1/5.1	9	6.8/6.8
10	5.4/5.4	10	6.6/6.6
11	5.9/6.0 (PT: 200,0)	11	6.3/6.3
12	5.1/5.1	12	6.2/6.3
13	6.1/6.1	13	6.1/6.2
14	7.3/7.4	14	6.2/6.2
15	20.9/11.2 (I)	15	6.4/6.3
16	10.4/10.1	16	6.4/6.5
17	15.0/11.5	17	6.5/6.3
18	9.2/8.9	18	8.1/8.2
19	9.6/9.9	19	13.7/12.5
20	10.8/11.1 (HORIZ: 2.9/2.6)	20	12.8/11.3
21	12.7/14.3	21	11.5/26.4 (I)
22	6.9/16.7 (I)	22	ND (I)
23	10.6/12.0	23	16.1/16.4
24	11.3/12.6	24	15.2/19.6
25	9.9/12.4	25	8.4/8.2
26	11.4/12.6	26	10.2/10.2
27	12.4/13.7	27	19.7/20.3
28	14.3/15.0 (NEAR JUNCTION BOX)	28	8.2/8.5
29	17.2/18.5 (ADJ TO GAS LINE)	29	9.8/9.8
30	8.3/8.7	30	9.6/9.7
31	5.9/6.9	31	5.3/5.8
32	5.4/6.2		

NOTE:

1. ND : NO DATA.
2. (I): READING DEFINITELY INFLUENCED BY INTERFERENCES.

TABLE 4: CONTINUED

STATION NUMBER	LINE 2 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 2 CONTINUED PERPENDICULAR/PARALLEL MMHOS/M
1	9.4/9.8	55	5.0/4.9
2	9.3/9.8	56	5.2/5.3
3	8.6/9.3	57	5.3/5.5
4	8.8/9.4	58	5.6/5.6
5	8.1/8.9	59	6.3/6.4
6	6.9/6.7	60	9.5/8.5
7	6.9/6.8	61	6.9/7.6
8	7.1/6.9	62	4.8/4.9
9	7.0/7.0	63	4.6/4.6
10	6.9/7.0	64	4.5/4.6
11	6.8/6.9	65	4.3/4.5
12	7.0/7.2	66	4.4/4.5 (HORIZ: 2.3/2.4)
13	7.4/7.6	67	4.4/4.3
14	8.2/8.2	68	4.3/4.3
15	8.4/8.5	69	4.2/4.3
16	8.2/8.1	70	4.2/4.2
17	8.1/8.5	71	4.1/4.2
18	6.5/6.6 (NORTH OF STACK PAC)	72	4.1/4.2
19	6.0/6.2	73	4.2/4.3
20	6.1/6.2	74	4.3/4.3
21	5.6/5.8	75	4.4/4.6
22	6.4/6.4	76	4.5/4.6
23	5.9/5.9	77	4.9/5.1
24	6.4/6.5	78	5.9/6.2
25	6.9/6.9	79	6.4/6.7
26	7.6/7.8	80	6.3/6.6
27	7.9/8.2	81	6.3/6.6
28	8.6/8.9	82	6.2/6.4
29	9.3/9.5	83	5.6/6.4
30	10.1/10.2	84	5.4/6.0
31	9.8/10.5	85	5.4/6.2
32	10.8/11.4	86	5.6/6.3
33	10.4/11.0	87	6.4/7.0
34	10.6/11.3	88	6.8/7.3
35	10.6/11.3	89	6.6/7.2
36	10.7/11.6	90	6.7/7.2
37	10.8/11.5	91	6.6/7.5
38	10.7/11.6	92	6.9/7.4
39	9.3/10.6	93	6.9/7.6
40	8.8/9.0		
41	8.2/8.4		
42	7.9/8.2		
43	7.8/8.0		
44	8.9/8.9		
45	9.5/7.1		
46	8.6/8.9		
47	7.0/7.5		
48	6.8/7.2		
49	6.5/6.6		
50	6.7/6.9		
51	8.1/8.5		
52	8.4/8.5		
53	7.7/8.0		
54	8.0/7.9		

TABLE 4: CONTINUED

STATION NUMBER	LINE 3 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 3B PERPENDICULAR/PARALLEL MMHOS/M
1	18.6/17.6	1	5.5/5.7
2	12.9/13.4	2	5.3/5.4
3	10.6/10.7	3	6.1/6.3
4	12.7/12.8	4	6.5/6.4
5	8.7/9.1	5	7.4/7.3
6	7.9/8.5	6	8.2/8.3
7	6.9/7.5	7	8.7/8.9
8	6.4/6.9	8	8.1/8.1
9	5.6/6.3	9	7.5/7.6
10	5.8/6.4	10	7.8/8.1
11	5.6/6.4	11	8.3/8.4
12	4.4/5.9	12	8.7/8.9
13	4.4/6.0	13	8.9/8.9
14	5.8/5.4	14	9.5/9.4
15	8.8/9.0	15	10.1/10.2
16	11.3/11.3	16	9.8/9.7
17	13.4/13.2	17	9.8/9.9
18	16.9/16.8	18	9.7/9.7
19	13.9/12.5	19	10.7/10.8
20	12.4/12.6	20	10.0/10.0
21	11.6/11.9		
22	11.8/11.9		
23	11.9/12.0)		
24	11.2/11.6		
25	12.8/12.7		
26	12.5/12.4		
27	12.6/12.8		
28	12.1/11.8		
29	10.6/10.4		
30	10.4/10.8		
31	10.5/10.2		
32	10.8/10.7		
33	10.9/10.7		
34	12.5/12.1		
35	12.6/12.6		
36	12.9/13.1		
37	11.2/11.9		
38	11.5/12.2		
39	10.4/11.2		
40	9.9/10.6		

TABLE 4: CONTINUED

STATION NUMBER	LINE 4 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 5 PERPENDICULAR/PARALLEL MMHOS/M
1	5.2/4.9	1	2.9/2.9
2	5.6/5.2	2	3.2/3.1
3	5.8/5.9	3	2.5/2.9
4	6.9/7.3	4	2.9/3.3
5	8.4/8.4	5	3.4/3.7
6	11.2/10.6	6	5.2/5.2
7	12.9/12.9 (HORIZ: 8.9/8.6)	7	9.9/9.2
8	12.3/12.7	8	12.2/12.3
9	11.9/12.1	9	13.2/13.3
10	12.5/12.7	10	14.3/13.9
11	11.2/11.1	11	13.7/13.7
12	10.9/11.0	12	13.1/13.2
13	11.2/11.1	13	13.5/12.0
14	11.7/11.8	14	9.5/9.2
15	13.7/14.0	15	7.3/7.8
16	12.8/12.7	16	6.9/7.4
17	14.2/14.4	17	7.9/8.4
18	16.7/16.6	18	7.8/8.4
19	20.1/19.9		
20	21.1/20.1		
21	22.7/22.1		
22	28.2/26.9		

TABLE 4: CONTINUED

STATION NUMBER	LINE 6 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 7 PERPENDICULAR/PARALLEL MMHOS/M
1	2.5/2.5	1	8.2/8.3
2	2.4/2.4	2	8.7/8.9
3	2.6/2.5	3	9.1/9.1
4	2.9/2.8	4	8.8/9.3
5	3.4/3.2	5	10.6/10.4
6	3.2/2.9	6	11.2/11.5
7	3.0/2.9	7	11.6/12.2
8	2.7/2.8	8	9.8/10.6
9	3.2/3.4	9	8.2/9.0
10	2.8/2.8	10	9.2/9.4
11	2.8/2.7	11	9.4/9.4
12	2.4/2.4	12	11.3/11.7
13	2.4/2.4	13	11.5/12.1
14	2.3/2.3	14	12.7/12.7
15	2.3/2.4	15	11.3/11.9
16	2.3/2.4	16	12.8/13.1
17	2.4/2.4	17	12.8/13.0
18	2.7/2.6	18	13.4/13.5
19	2.5/2.4	19	14.3/14.2
20	2.6/2.6	20	12.8/12.9
21	2.4/2.5	21	10.5/10.7
22	2.4/2.5	22	9.8/10.1
23	2.1/2.4	23	10.4/10.6
24	2.1/2.3	24	10.5/10.8
25	2.1/2.2	25	11.2/9.0
26	2.1/2.1	26	10.0/10.4
27	2.2/2.4	27	9.9/10.1
28	2.1/2.2	28	9.8/10.0
29	1.9/2.1	29	9.6/9.9
30	1.9/2.1	30	9.3/9.6
		31	9.5/9.9
		32	9.4/10.0
		33	10.5/11.1
		34	11.5/11.6
		35	10.3/10.8
		36	11.6/11.9
		37	8.9/9.3
		38	9.3/9.9
		39	9.4/9.9
		40	9.7/9.9
		41	9.1/9.3
		42	8.2/8.5
		43	7.7/7.9
		44	7.9/7.9
		45	7.9/8.1
		46	7.5/7.5
		47	7.3/7.6

TABLE 4: CONTINUED

STATION NUMBER	LINE 8 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 9 PERPENDICULAR/PARALLEL MMHOS/M
1	2.4/2.6	1	9.2/9.5
2	3.0/3.0	2	8.5/8.6
3	3.8/3.6	3	10.8/10.6
4	4.2/4.0	4	12.5/12.2
5	5.5/5.1	5	17.2/16.2
6	7.1/6.5	6	16.8/16.9
7	9.3/8.6	7	16.3/16.2
8	12.7/12.6	8	16.0/15.0
9	17.5/15.2	9	14.8/13.9
10	773 (I)	10	12.2/11.8
11	625 (I)	11	11.6/11.4
12	410 (I)	12	11.4/11.7
13	343 (I)	13	11.0/11.2
14	270 (I)	14	11.3/11.2
15	567/286 (I)	15	11.9/11.9
16	594/210 (I)		
17	454/178 (I)		
18	321/152 (I)		
19	182 (I)		
20	289 (I)		
21	302 (I)		
22	326 (I)		
23	216 (I)		
24	160 (I)		
25	26.1 (I)		
26	14.7/14.2		
27	12.0/11.8		
28	13.2/13.1		
29	11.2/11.3		
30	11.9/11.5		
31	12.1/12.2		
32	12.5/12.2		
33	12.4/12.2		
34	13.4/13.0		
35	10.9/10.5		
36	10.6/10.6		
37	11.7/11.5		
38	11.5/11.6		
39	11.8/11.7		
40	11.9/11.8		
41	13.7/14.1		
42	14.4/14.6		
43	13.6/13.9		
44	10.0/10.6		
45	10.2/11.2		
46	11.6/10.5		

TABLE 4: CONTINUED

STATION NUMBER	LINE 10 PERPENDICULAR/PARALLEL MMHOS/M	STATION NUMBER	LINE 11 PERPENDICULAR/PARALLEL MMHOS/M
1	6.4/6.5	1	15.2/14.0
2	7.2/7.1	2	10.7/10.5
3	7.0/7.3	3	10.5/10.3
4	7.4/7.5	4	9.1/9.3
5	7.2/7.3	5	9.7/9.2
6	7.1/7.2	6	9.8/9.4
7	7.3/7.6	7	9.8/9.4
8	7.4/7.4	8	9.3/9.0
9	7.6/7.8	9	9.3/9.2
10	8.0/7.8	10	9.8/9.7
11	7.8/7.9	11	11.3/11.1
12	8.3/8.0	12	11.1/11.0
13	7.9/8.8	13	12.2/12.4
14	7.8/9.0	14	12.6/12.2
15	7.2/7.5	15	20.5/19.6
16	7.5/8.3	16	17.4/16.0
17	7.2/7.9		
18	6.8/7.0		
19	7.1/6.9		
20	7.1/7.0		
21	8.2/8.2		
22	7.5/9.5		
23	11.7/11.2		
24	11.0/10.9		
25	10.9/11.1		
26	8.4/8.5		

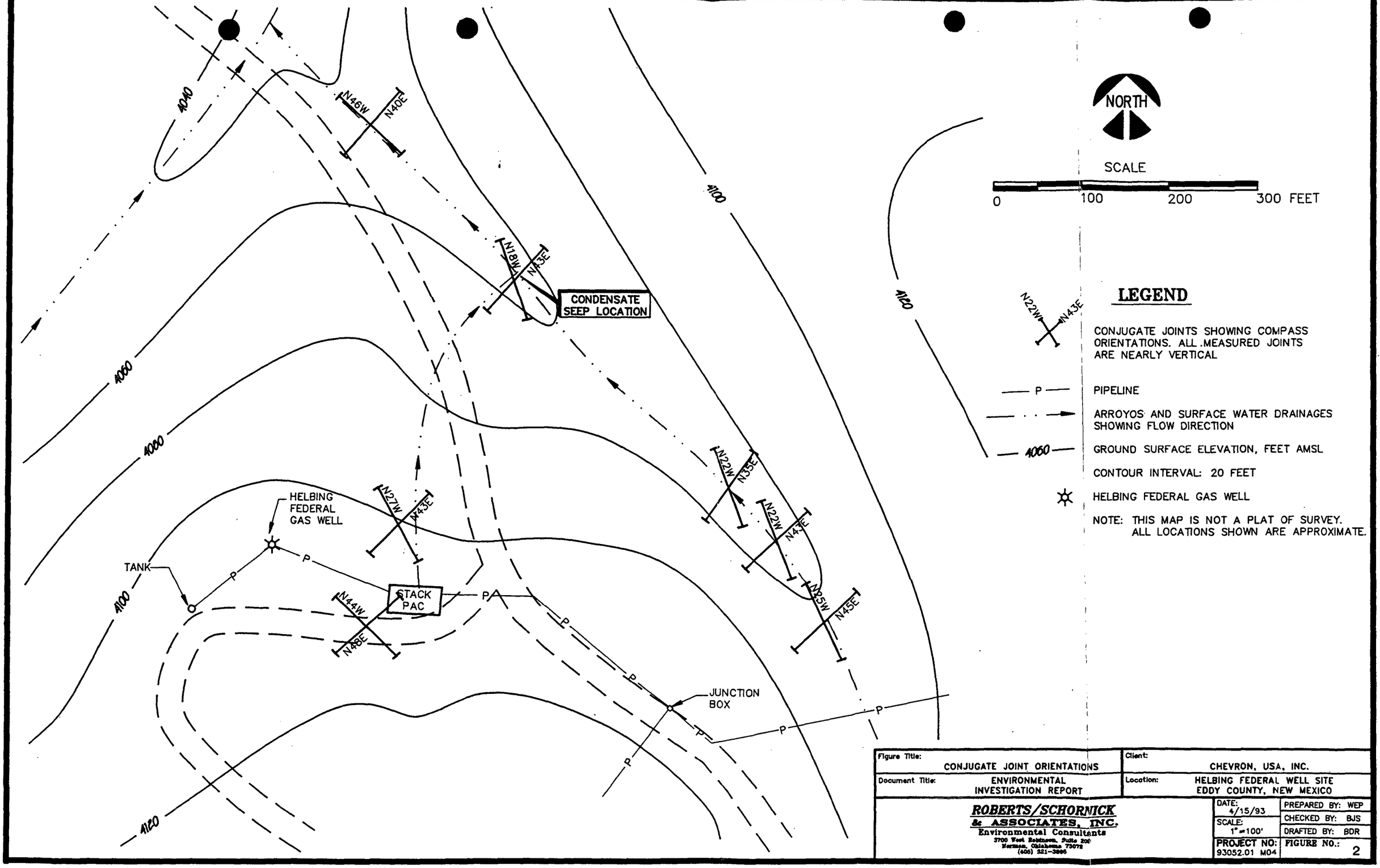


Figure Title: CONJUGATE JOINT ORIENTATIONS	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3886

DATE: 4/15/93	PREPARED BY: WEP
SCALE: 1" = 100'	CHECKED BY: BJS
	DRAFTED BY: BDR
PROJECT NO: 93052.01 M04	FIGURE NO.: 2

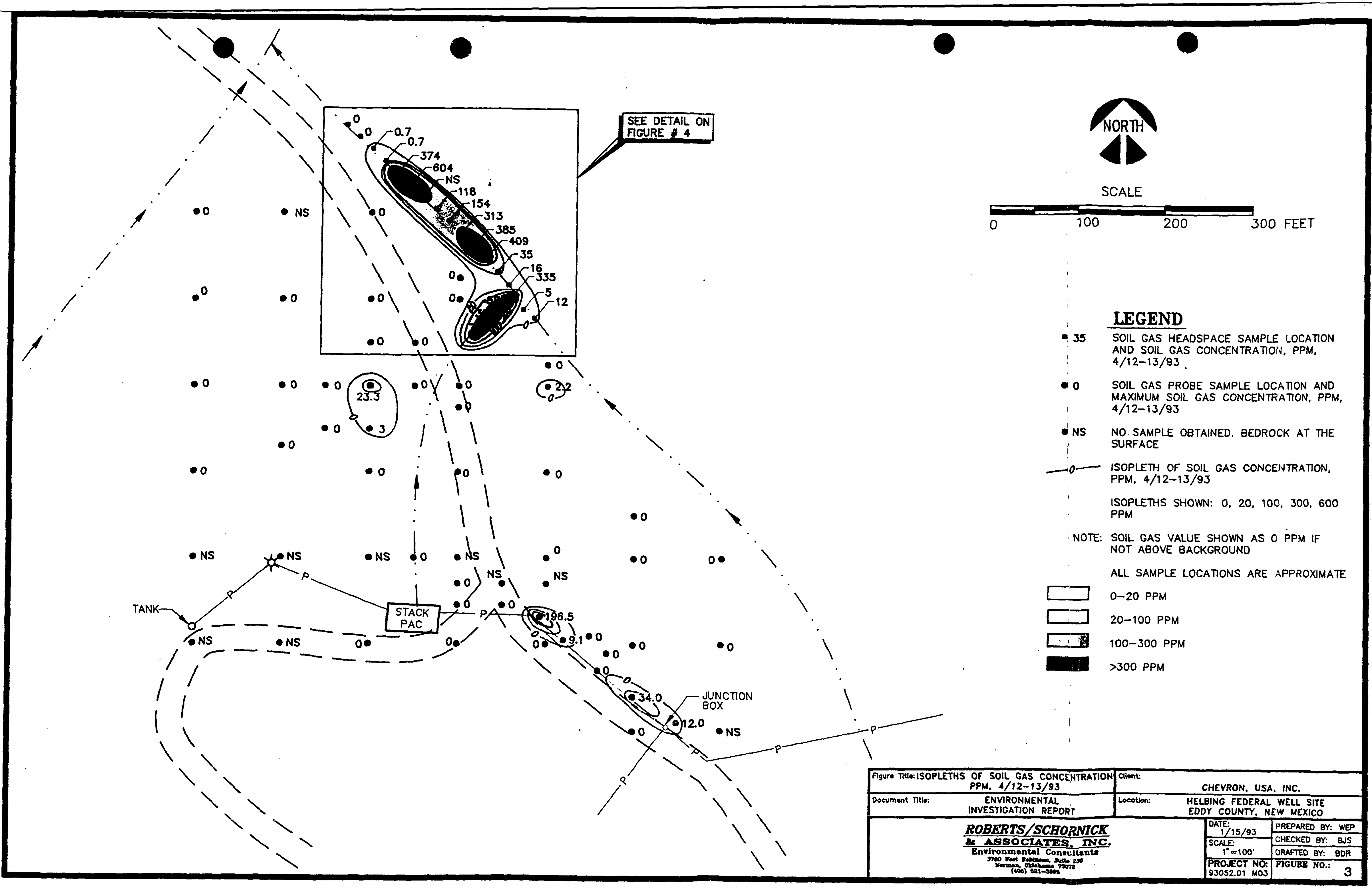
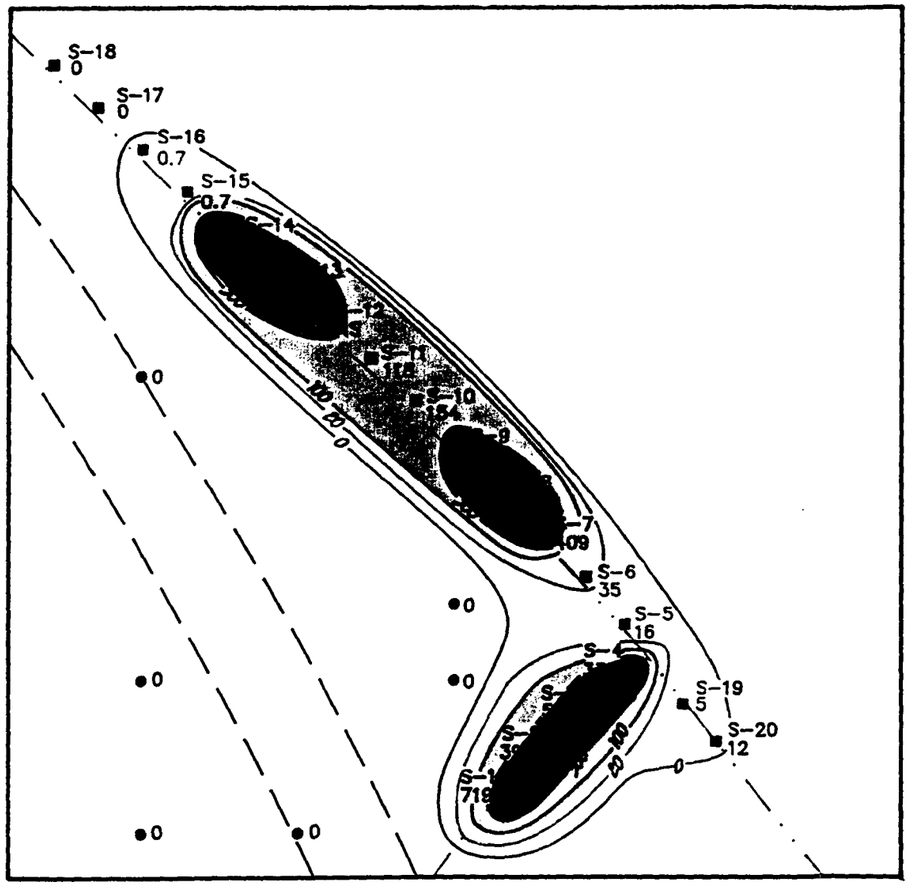


Figure Title: ISOPLETHS OF SOIL GAS CONCENTRATION PPM, 4/12-13/93		Client: CHEVRON, USA, INC.	
Document Title: ENVIRONMENTAL INVESTIGATION REPORT		Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO	
ROBERTS/SCHORNICK & ASSOCIATES, INC. Environmental Consultants 3700 West Robinson, Suite 200 Norman, Oklahoma 73072 (405) 321-3895		DATE: 1/15/93	PREPARED BY: WEP
		SCALE: 1"=100'	CHECKED BY: BJS
			DRAFTED BY: BDR
		PROJECT NO: 93052.01 M03	FIGURE NO.: 3

DETAIL FROM FIGURE #3



NORTH

SCALE

0 50 100 FEET

LEGEND

■ S-6 35	SOIL GAS HEADSPACE SAMPLE LOCATION AND SOIL GAS CONGENTRATION, PPM, 4/12-13/93
● 0	SOIL GAS PROBE SAMPLE LOCATION AND MAXIMUM SOIL GAS CONCENTRATION, PPM, 4/12-13/93
● NS	NO SAMPLE OBTAINED. BEDROCK AT SURFACE
—0—	ISOPLETH OF SOIL GAS CONCENTRATION PPM, 4/12-13/93
	ISOPLETHS SHOWN: 0, 20, 100, 300, 600 PPM

NOTE: SOIL GAS VALUE SHOWN AS 0 PPM IF NOT ABOVE BACKGROUND

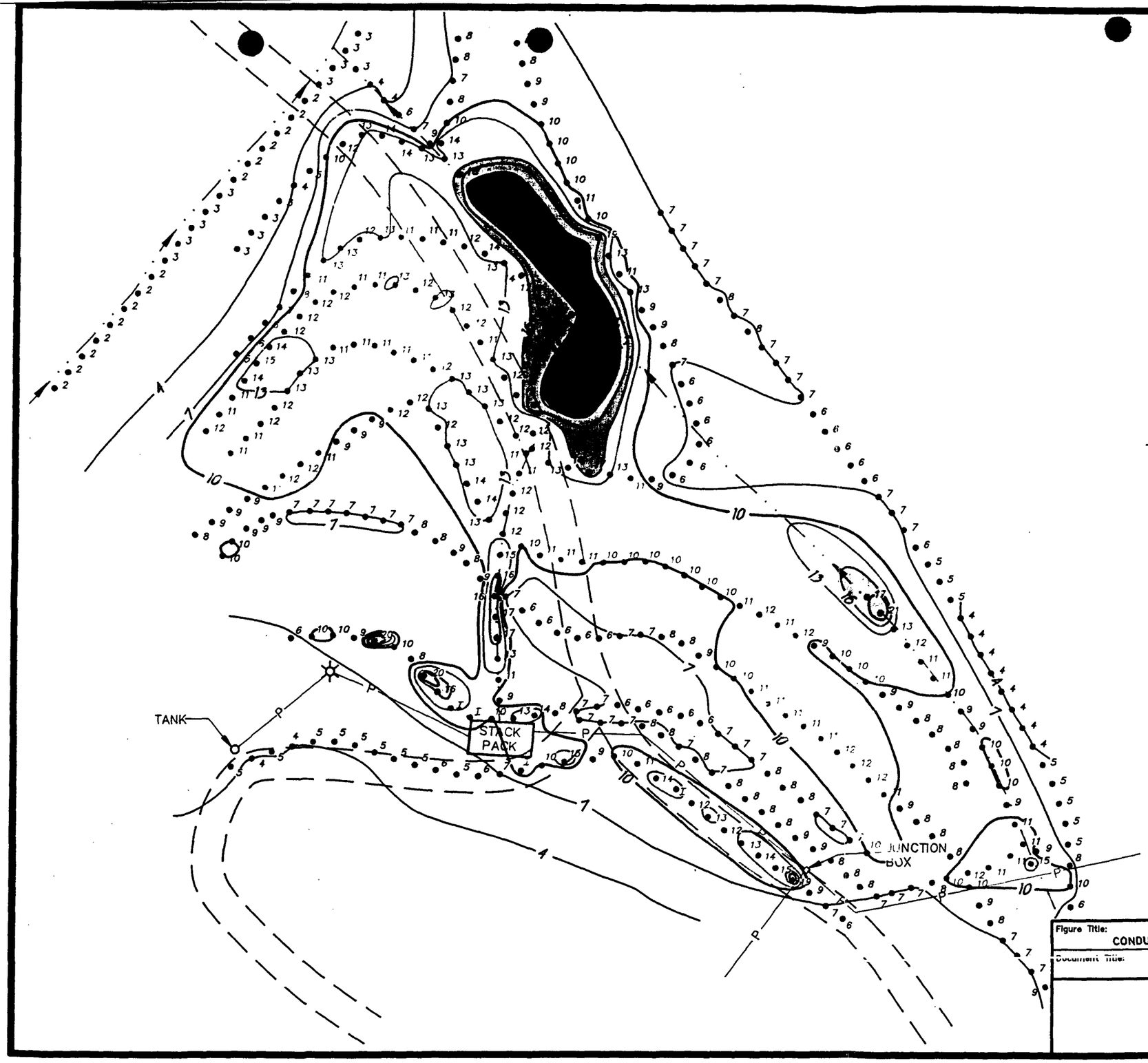
ALL SAMPLE LOCATIONS ARE APPROXIMATE

- 0-20 PPM
- 20-100 PPM
- 100-300 PPM
- >300 PPM

Figure Title:	DETAIL SHOWING SOIL GAS HEADSPACE SAMPLE LOCATIONS	Client:	CHEVRON, USA, INC.
Document Title:	ENVIRONMENTAL INVESTIGATION REPORT	Location:	HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/29/93	PREPARED BY: WEP
SCALE: 1"=50'	CHECKED BY: BJS
	DRAFTED BY: BDR
PROJECT NO: 93052.01 M05	FIGURE NO.: 4



NORTH

SCALE

0 100 200 300 FEET

LEGEND

— P — PIPELINES

ARROYOS AND SURFACE WATER DRAINAGES SHOWING FLOW DIRECTION

CONTOUR INTERVAL: 20 FEET

HELBING FEDERAL GAS WELL

6 EM-31 SURVEY LINE SHOWING DATA POINTS, MMHOS/M, 4/12-13/93

ISOPLETHS SHOWN: 4, 7, 10, 13, 16, 19, 22, AND >100 MMHOS/M, 4/12-13/93

—10— ISOPLETHS OF ELECTROMAGNETIC TERRAIN CONDUCTIVITY MEASUREMENT, MMHOS/M, 4/12-13/93

NOTE: THIS MAP IS NOT A PLAT OF SURVEY. ALL LOCATIONS SHOWN ARE APPROXIMATE.

I NO READING OBTAINED DUE TO INTERFERENCE

EXPLORATION DEPTH 20 FEET

10-16 MMHOS/M

16-22 MMHOS/M

>22 MMHOS/M

Figure Title: ISOPLETHS OF TERRAIN CONDUCTIVITY, MMHOS/M, 4/12-13/93	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3896

DATE: 1/15/93	PREPARED BY: WEP
SCALE: 1"=100'	CHECKED BY: BJS
	DRAFTED BY: BDR
PROJECT NO: 93052.01 M02	FIGURE NO.: 5

EXPLANATION

AVAILABILITY OF GROUND WATER BY AREAS

AREA 1. GUADALUPE MOUNTAINS:

a. Azotea Mesa: Stock and domestic supplies generally available at depths of less than 300 feet in Carlsbad limestone; perched water available locally in arroyo gravels. Irrigation supplies obtainable from Carlsbad limestone and overlying alluvium in La Huerta and Happy Valley, but shallow water in these areas is generally impotable.

b. Guadalupe Ridge and Mountains proper: Potable but generally hard water in small quantities available at depths of several hundred feet in uplands; shallow water available locally in arroyo gravels. Small springs from perched water southeast of White City on Guadalupe Ridge.

c. Seven Rivers embayment: Depths to water cannot be predicted accurately. Shallow wells can be obtained locally along arroyos, but most produce from Queen Sandstone member of Goat Seep limestone at depths as great as 900 feet. Water generally potable. Quantity generally sufficient for stock and domestic supplies.

AREA 2. ALLUVIUM SOUTH OF CARLSBAD:

a. Irrigation supplies generally obtainable. Generally impotable.

b. Stock and domestic supplies generally available at depths ranging from 100 to 225 feet.

AREA 3. BETWEEN GUADALUPE MOUNTAINS AND PECOS RIVER AND SOUTH OF LATITUDE 32°15′:

a. Stock and domestic supplies and, locally, irrigation supplies, obtainable from alluvium at depths generally less than 200 feet.

b. Stock and domestic supplies generally available in gypsum of Castile formation. Impotable over most of eastern part of area but usable for stock.

AFTER G.E. HENDRICKSON AND R.S. JONES, 1952

Figure Title: EXPLANATION FOR FIGURE 14	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
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Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/29/93	PREPARED BY: W.E.P.
	CHECKED BY: B.J.S.
SCALE: NTS	DRAFTED BY: TAH
PROJECT NO: 9305201 F02	FIGURE NO.: 15

EXPLANATION

AREA 4. ROSWELL BASIN:

a. Stock and domestic water available from alluvium or limestones of Chalk Bluff and San Andres formation at depths less than 50 feet on the east to 400 feet in west. Irrigation water available in eastern part.

b. Stock and domestic water available from limestone of San Andres formation at depths from 400 feet on the east to more than 800 feet on the west.

AREA 5. EAST OF PECOS RIVER:

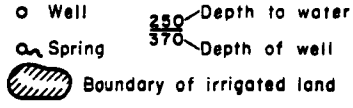
a. Stock and domestic supplies available at depths less than 200 feet in Chalk Bluff formation or Whitehorse group; locally impotable.

b. Stock water generally obtainable at depths less than 250 feet in Rustler formation; generally impotable and locally unfit for livestock.

c. Stock and domestic supplies available at depths less than 300 feet in Triassic redbeds; quality generally fair but locally impotable.

d. Potable water obtainable from sand and gravel or from underlying redbeds at a depth of about 300 feet.

EXPLANATION



AFTER G.E. HENDRICKSON AND R.S. JONES, 1952

Figure Title: EXPLANATION FOR FIGURE 14	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/29/93	PREPARED BY: W.E.P.
	CHECKED BY: B.J.S.
SCALE: NTS	DRAFTED BY: TAH
PROJECT NO: 9305201 F02	FIGURE NO.: 15

AFTER VINCENT C. KELLY, 1971

SCALE

0 5 10

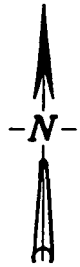


Figure Title: GUADALUPE MOUNTAINS–CARLSBAD REGIONAL GEOLOGY	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/28/93	PREPARED BY: W.E.P.
SCALE: AS SHOWN	CHECKED BY: B.J.S.
	DRAFTED BY: TAH
PROJECT NO: 9305201 F03	FIGURE NO.: 10

EXPLANATION

Surficial deposits

Gatuna Formation

Santa Rosa Formation

Dewey Lake Formation

Rustler Formation

Salado Formation

Castile Formation

Tansill Formation

Yates Formation

Seven Rivers Formation

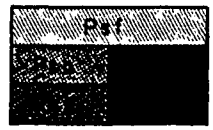
Capitan Limestone

Bell Canyon Formation

Queen Formation

Goat Seep Formation

Grayburg Formation



San Andres Formation
Psf – Fourmile Draw Member
Psb – Bonney Canyon Member
Psr – Rio Bonito Member

Yeso Formation

IGNEOUS ROCKS

Dikes

AFTER VINCENT C. KELLY, 1971

Figure Title: EXPLANATION FOR FIGURE 10	Client: CHEVRON, USA, INC.
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ROBERTS/SCHORNICK & ASSOCIATES, INC.
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3700 West Robinson, Suite 200
Norman, Oklahoma 73072
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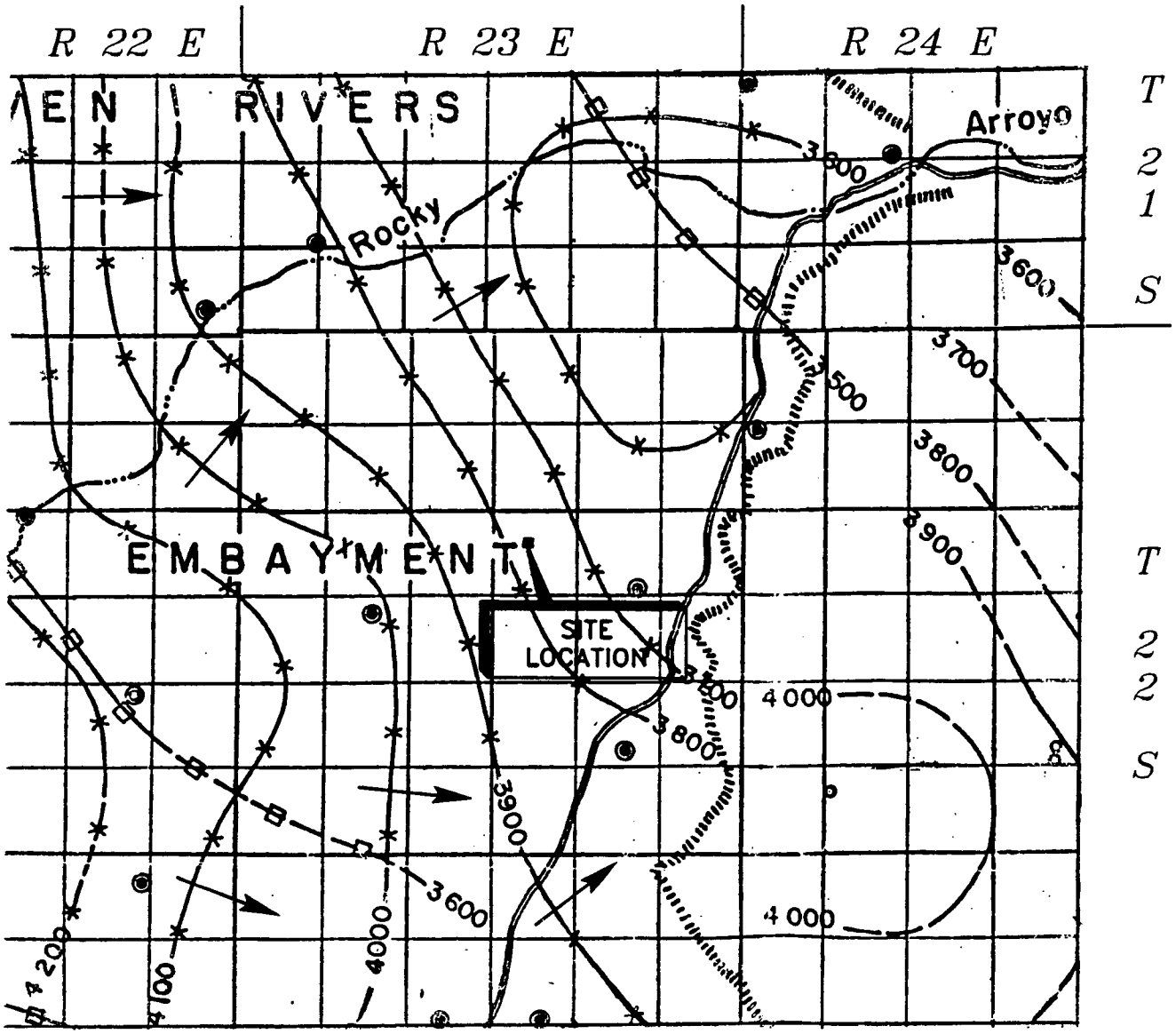
DATE: 4/29/93	PREPARED BY: W.E.P.
	CHECKED BY: B.J.S.
SCALE: NTS	DRAFTED BY: TAH
PROJECT NO: 9305201 F02	FIGURE NO.: 11

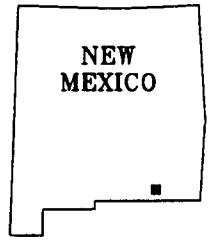


AFTER BJORKLUND AND MOTTS, 1959

- WATER WELL COMPLETED IN QUEEN–GRAYBURG FORMATION
- WATER WELL COMPLETED IN SAN ANDRES FORMATION
- WATER WELL COMPLETED IN YATES FORMATION
- GROUNDWATER POTENTIOMETRIC SURFACE , FEET AMSL, IN YATES FORMATION
- GROUNDWATER POTENTIOMETRIC SURFACE, FEET AMSL, IN SAN ANDRES FORMATION
- GROUNDWATER POTENTIOMETRIC SURFACE, FEET AMSL, IN QUEEN–GRAYBURG FORMATION
- DIRECTION OF GROUNDWATER FLOW IN QUEEN FORMATION

NOTE: DASHED WHERE APPROXIMATE

SCALE
0 1 2
MILES



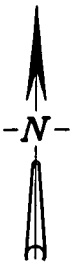
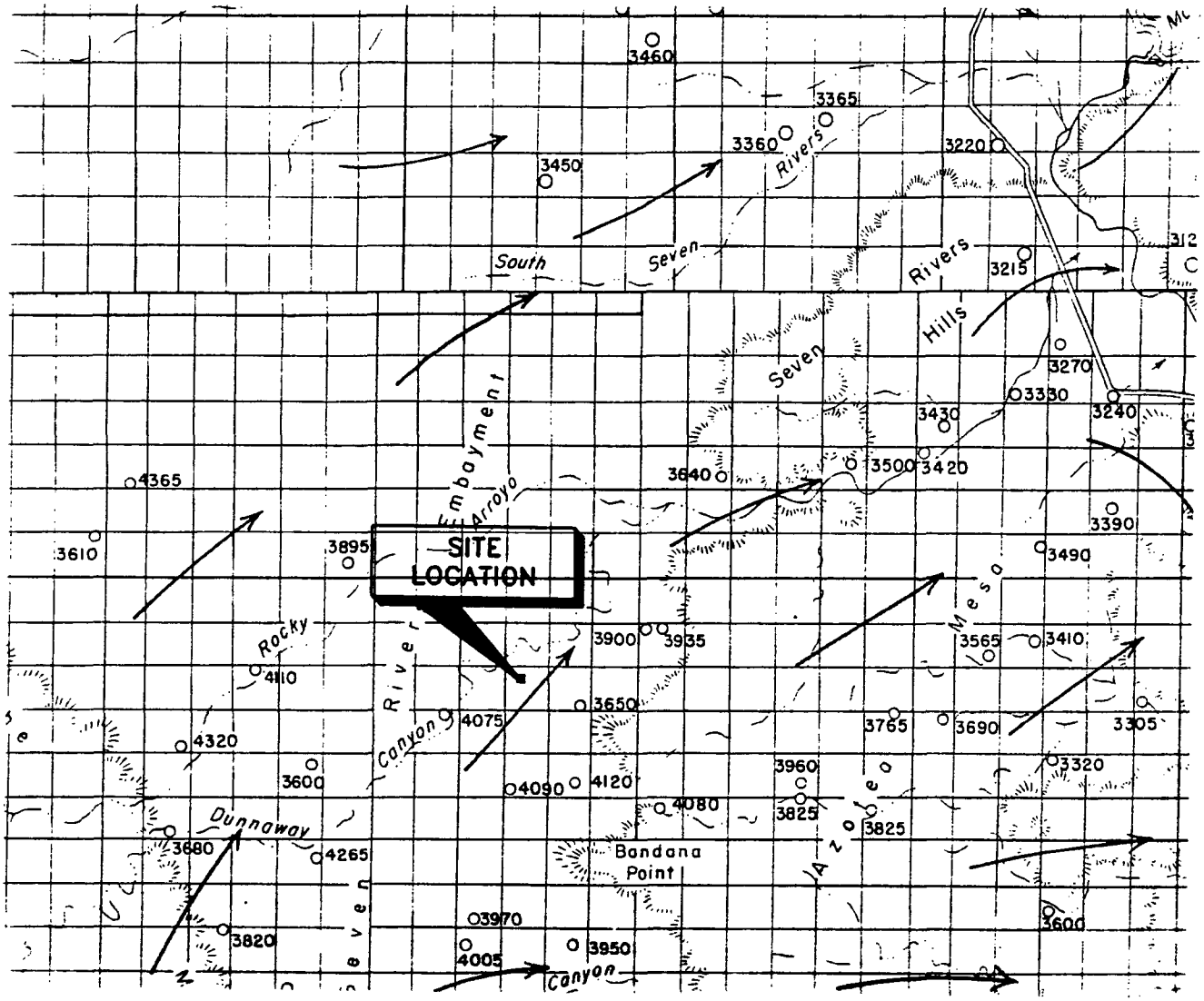


Figure Title: REGIONAL GROUNDWATER POTENTIOMETRIC SURFACE	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/28/93	PREPARED BY: W.E.P.
SCALE: AS SHOWN	CHECKED BY: B.J.S.
	DRAFTED BY: TAH
PROJECT NO: 9305201 F03	FIGURE NO.: 12



AFTER G.E. HENDRICKSON & R.S. JONES, 1952

3895 ○ WELL LOCATION AND GROUNDWATER ELEVATION, FEET AMSL

→ DIRECTION OF GROUNDWATER MOVEMENT

SCALE

0 5 10 MILES

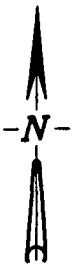
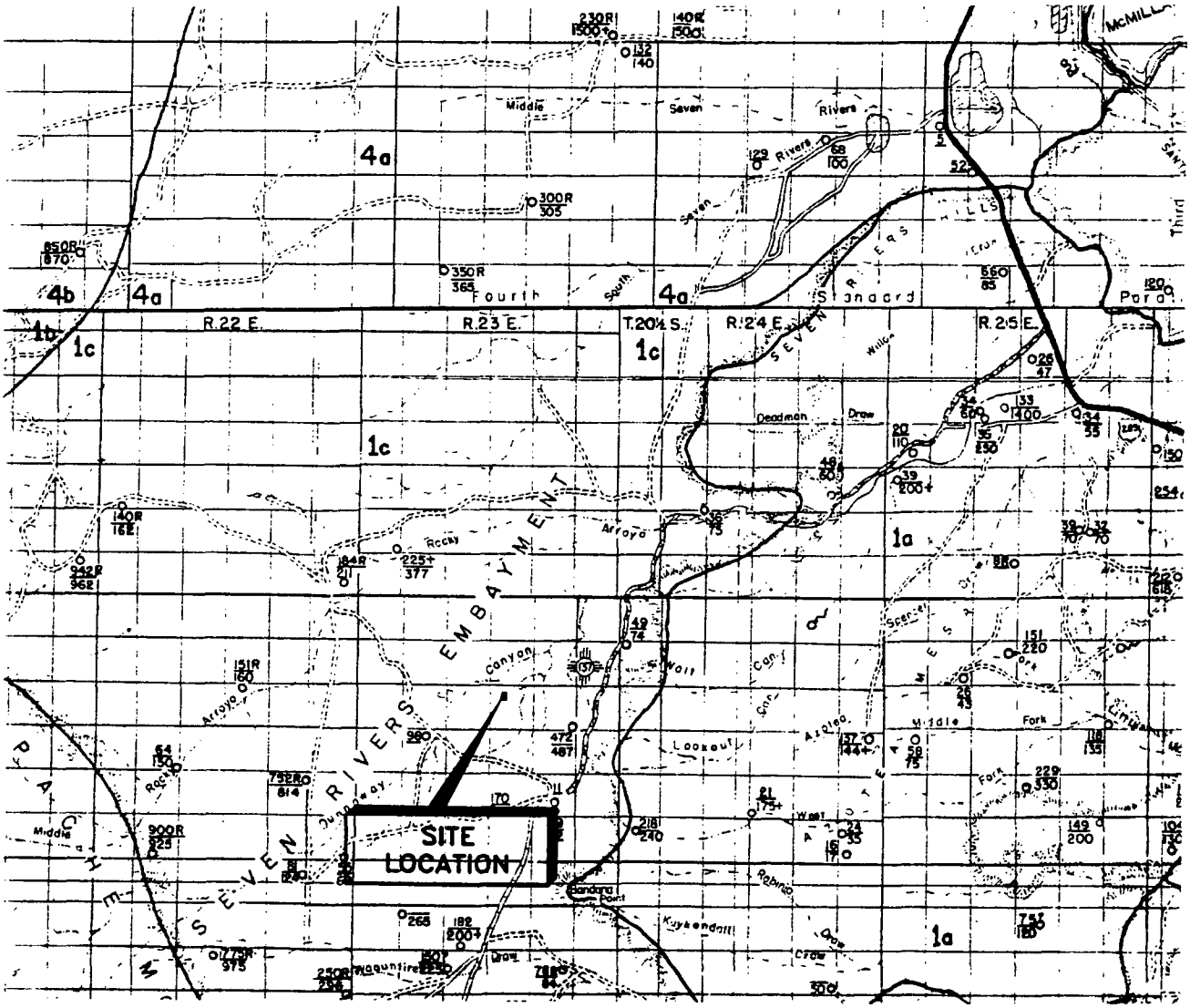


Figure Title: GENERAL DIRECTION OF MOVEMENT OF GROUNDWATER	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

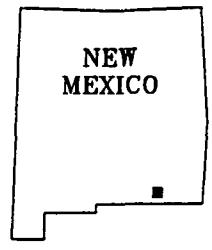
DATE: 4/28/93	PREPARED BY: W.E.P.
SCALE: AS SHOWN	CHECKED BY: B.J.S.
	DRAFTED BY: TAH
PROJECT NO: 9305201 F03	FIGURE NO.: 13



AFTER G.E. HENDRICKSON & R.S. JONES, 1952

SCALE

0 5 10 MILES



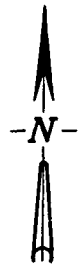
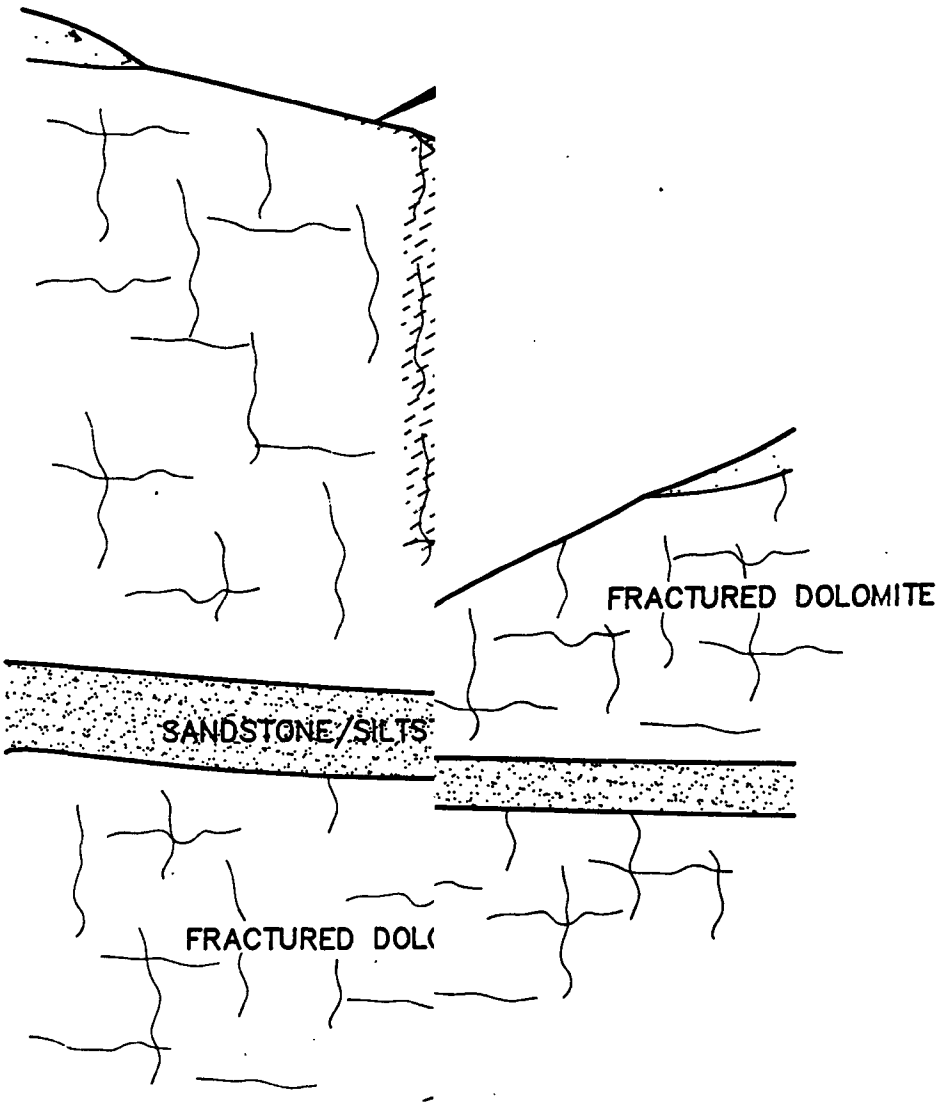


Figure Title: AVAILABILITY OF GROUNDWATER FOR EXPLANATION SEE FIGURE 15	Client: CHEVRON, USA, INC.
Document Title: ENVIRONMENTAL INVESTIGATION REPORT	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 4/28/93	PREPARED BY: W.E.P.
SCALE: AS SHOWN	CHECKED BY: B.J.S.
	DRAFTED BY: TAH
PROJECT NO: 9305201 F01	FIGURE NO.: 14



/AY	Client: CHEVRON, USA. INC.	
	Location: HELBING FEDERAL WELL SITE EDDY COUNTY, NEW MEXICO	
RNICK INC. ltants 200	DATE: 5/7/93	PREPARED BY: WEP
	SCALE: N.T.S.	CHECKED BY: BJS
	PROJECT NO: 93052.01 M08	DRAFTED BY: RML
		FIGURE NO.: 16

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Carlsbad Resource Area Headquarters
P.O. Box 1778
Carlsbad, New Mexico 88221-1778

TAKE PRIDE IN AMERICA

3162 (067)
SW-326

FEB 0 9 1993

CERTIFIED--RETURN RECEIPT REQUESTED
P 135 580 058

Chevron U.S.A. Production Company
Attn: Donald R. Griffin
P. O. Box 670
Hobbs, NM 88240

RE: SW-326/NM068032; Helbing Gas Com
SENW, Sec. 15, T22S, R23E
Eddy County, New Mexico

Gentlemen:

On Feb. 21, 1992, Marathon Oil Company notified the Bureau of Land Management (BLM) of a spill which occured on the above referenced lease. The initial inspection performed by the BLM and Marathon indicated a potential dumping of tank bottoms by a third party. Marathon (Indian Basin Gas Plant Operator), conducted initial clean-up of the spill site.

Follow-ups conducted after the initial clean-up found additional product seeping into the ravine and fresh water. This was treated numerours times. To date we still have a problem which needs to be resolved.

At this time you are ordered (43 CFR 3162.1a, 43 CFR 3162.5-1) to submit a plan for approval. This plan is to be submitted within twenty (20) business days from receipt of this notice and should address the exploration of the site in determining the source and extent of contamination.

After the source and extent of contamination is determined, a plan is to be submitted on how the site will be remediated. All actions should be cleared with our archaeological and right-of-way staffs.

Failure to comply with the above order will result in an Incident of Noncompliance and assessments under 43 CFR 3163.1.

If you have any questions feel free to contact Jim Amos at (505) 887-6544.

In accordance to 43 CFR 3165.3(b), you have the right to a State Director Review (SDR) which must be filed within twenty (20) business days from receipt of this notice. All SDR requests must be filed to the BLM State Director, P. O. Box 27115, Santa Fe, New Mexico, 87502-0115, Attn.: (922).

Sincerely,

Richard L. Manus
Area Manager, CRA

Form NM 3162-1
(July 1991)

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Land Management
New Mexico State Office

REPORT OF UNDESIRABLE EVENT

DATE OF OCCURRENCE/DISCOVERY: 3-8-92 TIME OF OCCURRENCE: 10:00AM

DATE REPORTED TO BLM: 3-9-92 TIME REPORTED: 11:00 AM

BLM OFFICE REPORTED TO: (RESOURCE AREA/DISTRICT/OTHER): CRA

LOCATION: (¼ ¼) SE NW SECTION 15 T. 22 R. 23 MERIDIAN NMPM

COUNTY: Eddy STATE: NM WELL NAME Hecking Fed Comm 1

OPERATOR: COMPANY NAME Chevron USA Inc PHONE NO (505) 397-8742
CONTACT PERSON'S NAME

SURFACE OWNER: FED MINERAL OWNER: FED
(FEDERAL/INDIAN/FEE/STATE)

LEASE NO.: SW 326 RIGHT-OF-WAY NO.:

UNIT NAME / COMMUNITIZATION AGREEMENT No.:

TYPE OF EVENT, CIRCLE APPROPRIATE ITEM(S):

BLOWOUT, FIRE, FATALITY, INJURY, PROPERTY DAMAGE, OIL SPILL, SALTWATER SPILL, (OIL AND SALTWATER SPILL), TOXIC FLUID SPILL, HAZARDOUS MATERIAL SPILL, UNCONTROLLED FLOW OF WELLBORE FLUIDS, OTHER (SPECIFY):

CAUSE OF EVENT: Hole in float on high level shut dn. Prevent shut dn & caused over flow of separator out vent

HazMat Notified: (for spills) AL Cowan not in 3-10-92

Law Enforcement Notified: (for thefts) N/A

CAUSE AND EXTENT OF PERSONAL INJURIES/CAUSE OF DEATH(S):
N/A
Safety Officer Notified: N/A

EFFECTS OF EVENT: Condensate & produced water ran dn toward BLM. of ravine

ACTION TAKEN TO CONTROL EVENT: Shut in well & replace float

LENGTH OF TIME TO CONTROL BLOWOUT OR FIRE: No Blowout or Fire

VOLUMES DISCHARGED: OIL & WATER 10-15 BBLS ~~WATER~~ GAS

OTHER AGENCIES NOTIFIED: OCD

NEW MEXICO OIL CONSERVATION COMMISSION

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

NAME OF OPERATOR	CHEVRON U.S.A.				ADDRESS	1216 W. LEA (505)	
REPORT OF	FIRE	BREAK	SPILL ✓	LEAK	BLOWOUT	OTHER*	
TYPE OF FACILITY	DRLG WELL	PROD WELL ✓	TANK BTTY	PIPE LINE	GASO PLNT	OIL RFY	OTHER*
NAME OF FACILITY	HELBING FEDERAL COMM #1						
LOCATION OF FACILITY (QUARTER/QUARTER SECTION OR FOOTAGE DESCRIPTION)	SENW	UNIT F	SEC. 15	TWP. 22S	RGE. 23E	C	
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK	APPROX 8 MILES SOUTH OF MARATHON GAS PLA						
DATE AND HOUR OF OCCURENCE	3-8-92 10 AM				DATE AND HOUR OF DISCOVERY	3-8-92 11 AM	
WAS IMMEDIATE NOTICE GIVEN?	YES ✓	NO	NOT REQUIRED		IF YES, TO WHOM	JERRY RAU	
BY WHOM	TIM WINTERS				DATE AND HOUR	3-8-92 1100 AM	
TYPE OF FLUID LOST	CONDENSATE				QUANTITY OF LOSS	10-15 BBLS	VOLUME RECOVERED —
DID ANY FLUIDS REACH A WATERCOURSE?	YES	NO ✓	QUANTITY				

IF YES, DESCRIBE FULLY**

LOW PRESSURE SEPERATOR - HIGH LIQUID LEVE CONTROL FAILU
WELL SHUT INN. REPAIR HIGH LIQUID LEVEL

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN**

LOW PRESSURE SEPERATOR - HIGH LIQUID LEVEL CONTROL FAILURE WEL
REPAIR HIGH LIQUID LEVEL

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**

AREA APPROX 10 X 20 FT
BIOREMEDIATION COMPANY TO TREAT TOP SOIL & MONITOR RESULT

DESCRIPTION OF AREA	FARMING	GRAZING ✓	URBAN	OTHER*			
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY ✓	WET	DRY	SHOU

DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**

CLEAR 60° TO 65°

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

SIGNED Jerry Rau TITLE Operations Supervisor DATE 3-12

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY