C-108 Application for Approval to Drill and Operate a New Well For The Injection of Acid Gas Anadarko San Juan River Natural Gas Processing Plant

(Unit F Section 1, Township 29 N, Range 15 W)

May 11, 2009

Prepared For:

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, Texas 77380

Submitted To:

New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Prepared By:

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GEOLEX
INCORPORATED

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

FORM C-108
Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance __X__ Disposal _____ Storage
Application qualifies for administrative approval? _____ Yes __X__ No

II. OPERATOR: **Anadarko Petroleum Corporation.**
ADDRESS: **1201 Lake Robbins Dr., The Woodlands, TX 77390**
CONTACT PARTY: **Alberto A. Gutierrez, R.G.- GEOLEX, INC.** PHONE: **(505)-842-8000**

III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary. **A CROSS REFERENCE TO THE APPLICABLE SECTIONS OR APPENDICES IN THE ATTACHED C108 APPLICATION FOR EACH ROMAN NUMERAL BELOW IS SPECIFIED BY SECTION AND/OR APPENDIX NUMBERS.**

IV. Is this an expansion of an existing project? _____ Yes __X__ No
If yes, give the Division order number authorizing the project: **N/A**

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review. **SECTIONS. 5 and 6; APPENDICES B, C and D.**

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
SECTIONS 4 and 5; APPENDICES A, B and C.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected; **SECTIONS 1, 2, and 3**
2. Whether the system is open or closed; **SECTION 1, 2 and 4**
3. Proposed average and maximum injection pressure; **SECTIONS 1 and 3**
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and, **SECTION 4 and APPENDIX A**
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.). **SECTIONS 3 and 4; APPENDIX A**

*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval. **SECTION 4 and APPENDIX A**

IX. Describe the proposed stimulation program, if any. **N/A**

*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted). **WELL IS NOT YET DRILLED**

*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken. **SECTION 4 and APPENDIX A.**

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water. **SECTION 7**

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form. **APPENDICES C and D**

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: Alberto A. Gutierrez, C.P.G. TITLE: President, Geolex, Inc.®; Consultant to SUGS

SIGNATURE: _____ DATE: 5-11-2009

E-MAIL ADDRESS: aag@geolex.com

If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: **SEE ATTACHED APPLICATION AND PREVIOUSLY SUBMITTED RENEWAL OF NMOCD DISCHARGE PLAN GW-033**

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section. **SECTIONS 1, 3 and 4.**

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined. **SEE SECTION 3 FOR PROPOSED WELL DESIGN. FINAL DESIGN WILL BE SUBMITTED WHEN PROPOSED WELL IS DRILLED AND COMPLETED.**

(3) A description of the tubing to be used including its size, lining material, and setting depth. **SECTION 3**

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used. **SECTION 3**

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name. **SECTIONS 1 and 4**

(2) The injection interval and whether it is perforated or open-hole. **SECTION 3**

(3) State if the well was drilled for injection or, if not, the original purpose of the well. **N/A- WELL IS NOT YET DRILLED**

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations. **N/A**

(5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any. **SECTIONS 4 and 5; APPENDICES A, B and C**

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location. **SECTION 5; APPENDICES C and D. WE WILL NOTIFY OPERATORS AND LEASEHOLD OWNERS AND SURFACE OWNERS WITHIN THE AREA OF REVIEW PURSUANT TO NMOCD REGULATIONS AND WE WILL SUBMIT AFFIDAVITS OF PUBLICATION OF NOTICE AND CERTIFIED MAIL RETURN RECEIPTS AT HEARING.**

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include: **SEE APPENDICES C and D FOR DRAFT OF PUBLIC NOTICE – AFFIDAVIT OF PUBLICATION OF NOTICE FROM NEWSPAPER WILL BE SUBMITTED AT HEARING.**

(1) The name, address, phone number, and contact party for the applicant;

(2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;

(3) The formation name and depth with expected maximum injection rates and pressures; and,

(4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

SEE SECTION 3 AND FIGURE 5 FOR PROPOSED WELL DESIGN SCHEMATIC

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 EXECUTIVE SUMMARY

On behalf of Anadarko Petroleum Corporation (Anadarko), Geolex®, Inc. (Geolex) has prepared and is hereby submitting a complete C-108 application for approval to drill, complete and operate a combined acid gas injection and CO_2 sequestration well at the Anadarko San Juan River Gas Plant which is located on approximately 320 acres in Section 1, T29S, R15W near Kirtland in San Juan County, New Mexico (Figure 1).

The Anadarko AGI is anticipated to have a total depth of approximately 6800 feet at the base of the Entrada Sandstone. The proposed injection zone will be within the Entrada Sandstone for all or part of its thickness of approximately 200 feet in this location (6500 – 6700 feet). Analysis of the reservoir characteristics of the Entrada in this area confirms that it is an excellent closed-system reservoir that should easily accommodate the future needs of Anadarko for disposal of acid gas and sequestration of CO_2 from the plant. Anadarko needs to safely inject from 1.5 to 5 million standard cubic feet (MMSCF) per day of treated acid gas (TAG) for 30 years. Geologic studies conducted for the selection of this location demonstrate that the proposed injection zone is readily capable of accepting and containing the proposed acid gas and CO_2 injection volumes well within NMOCD's recommended maximum injection pressures.

In preparing this C-108 application, Geolex conducted a detailed examination of all of the elements required to be evaluated in order to prepare and obtain approval for this application for injection. The elements of this evaluation include:

- Identification and characterization of all hydrocarbon-producing zones of wells that surround and are present on the plant site;
- The depths of perforated pay intervals in those wells relative to the depth of the target injection zone (Entrada Sandstone);
- The past and current uses of the Entrada Sandstone;
- Total feet of net porosity in the Entrada;
- The stratigraphic and structural setting of the Entrada relative to any nearby active Entrada wells;
- The identification of and sample notification letter that will be sent to all surface owners within a one mile radius of the proposed injection well;
- The identification of all wells within a two mile radius and of all operators within a one mile radius of the proposed injection well;
- Identification and characterization of all plugged wells within a one mile radius of the proposed injection well;
- The details of the proposed injection operation, including general well design and average and maximum daily rates of injection and injection pressures;
- Sources of injection fluid and compatibility with the formation fluid of the injection zone
- Location and identification of any fresh water bearing zones in the area; the depth and quality of available groundwater in the vicinity of the proposed well, including a determination that there are no structures which could possibly communicate the disposal zone with any known sources of drinking water;
- The preliminary revision of the existing Rule 118 plan for the facility to accommodate the proposed changes in operation and the new AGI facility (to be submitted in final form before commencing injection of acid gas).

Based upon this detailed evaluation, as summarized in this application, Anadarko has determined that the proposed injection well is a safe and environmentally-sound project for the disposal of acid gas.

Furthermore, the project provides additional environmental benefit by permanently sequestering a significant volume of CO_2 which would otherwise continue to be released to the atmosphere through the operation of the existing sulfur reduction unit (SRU) at the Plant.

The primary identified AGI target is the Entrada Sandstone, a thick (up to 200 feet) deposit of Jurassic-Age fine to medium-grained sandstone that lies approximately 6500 feet below the plant. Available geophysical logs indicate that the Entrada exhibits up to 18% porosity and our calculations show a net porosity for the injection zone of approximately 30 feet. The Entrada is effectively sealed on top by the overlying Todilto Limestone and Beclabito siltstones of the Jurassic Wanakah Formation and below by the underlying shales and mudrocks of the Triassic Chinle Formation.

Based on the value of 30 feet of net porosity, a thirty-year period of injection at about 1.5 MMSCF per day (1000 barrels of compressed TAG) would occupy an area of approximately 47 acres, covering a radius of approximately 800 feet around the AGI well. At a rate of 5 MMSCF per day (2000 barrels of compressed TAG), the area would be approximately 140 acres, enclosed within a radius of about 1400 feet from the well. There are currently four permitted and operating salt water disposal (SWD) wells completed in the Entrada in the general area of the plant, but the closest well (Salty Dog #5) is approximately 3.7 miles southeast, well outside the one-mile radius of evaluation within the proposed injection zone and the area of review required for the MNOCD C-108 application. According to NMOCD files, these four SWD wells currently accept from 800 to over 2000 barrels of fluids per day, at pressures below their permitted levels. Based on these data, we have concluded that the Entrada provides ample porosity, permeability and volume to serve Anadarko's injection needs.

Nine wells, of which six are active, are found within the one-mile radius of the proposed AGI well. Only two wells are located within the half-mile circle. These include the Salty Dog SWD 001 salt water disposal well (completed in the Menefee Formation), and the Pittam Pond 001 (completed in the Fruitland Formation). Both are operated by XTO Energy, Inc. Of the seven wells located between the half-mile and one-mile radii, four are active gas wells completed in the Fruitland Formation. Three of these are operated by XTO Energy, Inc., and the remaining active well is operated by Dugan Production Corporation. The two of the three plugged wells were last operated by Lance Oil & Gas Company (both in the Fruitland). The deepest well in the area, the plugged well in the Gallup, was last operated by Dugan Production Company and has a total depth of 4728 feet, well above the anticipated 6500 foot top of the Entrada target. Therefore, there is no indication that AGI activities would cause any impacts to existing production and/or plugged wells. Furthermore, Geolex believes that the geologic environment is ideal to demonstrate the required capture and sequestration of CO_2 to obtain credits or offsets.

Active oil and gas leases in the one-mile area are held by Burlington Resources, XTO Energy, Inc., Dugan Production Corporation, Lance Oil and Gas Co., the Winifred Amsden Trust, Questar Market Resources, Four Star Oil and Gas Co., and Chase Oil Corp.

The nearest body of surface water is the Farmers' Mutual Ditch, an irrigational canal located approximately one mile south of the plant. Seven domestic water wells in the one-mile area were identified in a search of the New Mexico State Engineer's files, in addition to two exploration wells (plugged), 20 mining water-control wells (in the Fruitland), and one observation well (plugged). None of these wells would be potentially impacted by the proposed AGI project.

All surface owners and operators within a one-mile radius of the proposed injection well will be notified at least 20 days prior to the NMOCD hearing pursuant to the requirements of NMOCD.

2.0 INTRODUCTION AND ORGANIZATION OF THIS C-108 APPLICATION

The completed NMOCD Form C-108 is included before the Table of Contents of this document and references appropriate sections where data required to be submitted are included herein.

This application organizes and details all of the information required by NMOCD to evaluate and approve the submitted Form C-108 – Application for Authorization to Inject. This information is presented in the following categories:

- A detailed description of the location, construction and operation of the proposed injection well (Section 3.0)
- A summary of the regional and local geology, the hydrogeology, and the location of drinking water wells within the area of review (Section 4.0)
- The identification, location, status, production zones, and other relevant information on oil and gas wells within the area of review (Section 5.0)
- The identification and required notification for operators and surface land owners that are located within the area of review (Section 6.0)
- An affirmative statement, based on the analysis of geological conditions at the site, that there is no hydraulic connection between the proposed injection zone and any known sources of drinking water (Section 7.0), and

In addition, this application includes the following supporting information:

- Appendix A-1: Entrada Sandstone and Point Lookout Fluid Analysis.
- Appendix A-2: Map Showing Location of Water Wells Within One Mile Area of Review; NM State Engineer's Records Related to Plugged Water Well Within One Mile Area of Review; Available Analysis of Groundwater Samples Within One-Mile Area of Review.
- Appendix B: Maps and spreadsheets showing all active, temporarily abandoned, abandoned and plugged oil and gas wells included within two mile, one mile and half mile areas and associated plugging reports and CD with complete NMOCD file on each plugged well.
- Appendix C: Maps and spreadsheets showing operators in the one-mile radius area of review including a copy of the notification letter that will be sent out to them at least 20 days prior to the NMOCD hearing.
- Appendix D: Maps and spreadsheets showing land ownership in the one-mile radius area of review and including a copy of the notification letters that will be sent out to them at least 20 days prior to the NMOCD hearing.
- Appendix E: Draft Revised Rule 118 Plan for the Anadarko AGI Well.

It is anticipated that this application shall be the subject of a NMOCD hearing in June 2009.

3.0 PROPOSED CONSTRUCTION AND OPERATION OF ANADARKO AGI WELL

The proposed injection well will be drilled on the Anadarko Plant Site in Unit F, Sec 1, T29N, R15W at approximately 2310 FWL, 1650 FNL. Figure 2 is a general plot plan of the Anadarko plant that shows the proposed location of the new well and compression facilities relative to existing features at the site, including the currently functioning sulphur reduction unit (SRU). Anadarko will apply for an operator number and file the required bond for the proposed Anadarko AGI upon approval of this C-108 and prior to commencement of drilling.

The well will be designed and constructed such that it will serve as the injection conduit for a mixed stream of treated acid gas. The treated acid gas stream (TAG) will be approximately of the following composition:

- 90% CO_2
- 10% H_2S
- Trace Components of $C_1 - C_7$

The total volume of TAG to be injected under this scenario will be 2000 bbl/d. Pressure reduction valves will be incorporated to assure that maximum surface injection pressure allowed by NMOCD will not be exceeded.

The calculated maximum allowable injection pressure would be approximately 1985 psi (depending on specific gravity of final TAG stream). We have used the following method approved by NMOCD to calculate the preliminary proposed maximum injection pressure. The final maximum permitted surface injection pressure should be based on the final specific gravity of the injection stream according to the following formula:

$IP_{max} = PG\ (D_{top})$ where: IP_{max}= maximum surface injection pressure (psi)
PG = pressure gradient of mixed injection fluid (psi/ft)
D_{top} = depth at top of perforated interval of injection zone (ft)

and $PG = 0.2 + 0.433\ (1.04 - SG_{tag})$ where: SG_{tag} = specific gravity of treated acid gas

For the maximum requested injection volume, case it is assumed that:

$$SG_{tag} = 0.80$$
$$D_{top} = 6530$$

Therefore:

$$PG = 0.2 + 0.433\ (1.04 - 0.80) = 0.30392$$

$$IP_{max} = PG(D_{top}) = 0.30392(6530) = 1984.6$$

Based on the performance of the existing injection well, it is anticipated that the average injection pressure would not exceed 1900 psi. Based on the above calculations, Anadarko is requesting approval of a maximum injection pressure to be 1985 psi at the surface.

Due to the corrosive nature of the injected fluid, the line that will convey the TAG to the well from the compression facilities will be a 3" steel line (304 or 316). The final design for the compression facilities and associated piping and layout of H_2S alarms and other safety equipment will be submitted for NMOCD review prior to commencement of injection operations. The schematic of the new AGI facilities and tie-in to the existing Anadarko Plant are shown in Figure 3, and the preliminary well design for the injection well is shown on Figure 4. The well will have each string of the telescoping casing cemented to the surface and will include a subsurface safety valve on the production tubing to assure that fluid cannot flow back out of the well in the event of a failure of the injection equipment. In addition, the annular space between the projection tubing and the well bore will be filled with an inert fluid such as diesel fuel as a further safety measure which is consistent with injection well designs which have been previously approved by NMOCD for acid gas injection.

Design and materials considerations include: placement of SSV and the packer, double casing through freshwater resources and shallow production zones (Fruitland Coal and Pictured Cliffs Formation), characterization of the zone of injection, and a total depth (TD) ensuring identification of the basal Chinle/Entrada contact. Three casing strings are proposed (Figure 4):

1. Conductor casing to 50 ft.
2. Surface casing to 600 ft, into the Lewis Shale and the Pictured Cliffs, to protect the Fruitland Coal Formation with double casing. Both of these formations are considered fresh water aquifers and the Fruitland is an active coal mining and natural gas producer.
3. Production casing extending down to the final total depth (6800 – 6900 feet) with the packer set at approximately 6500 feet, just above the Entrada Sandstone injection zone. The packer will be set at this depth and the well will be perforated below this depth throughout the Entrada. TD will extend into the top of the Chinle allowing characterization of the basal cap and ensuring access to full injection zone.

A suitable drilling rig will be chosen for the job that will include a 3,000 psi blowout preventer (minimum) and choke manifold for any unforeseen pressures encountered. The borehole for the conductor casing will be drilled with a 17 ½" bit to a depth of 50 ft, and 13 3/8", 48.0 ppf, H40, STC casing will be installed and cemented to the surface with 30 sacks of cement. The surface hole will be drilled with a 12 ¼" bit to a depth of approximately 1,000 feet. There an 8 5/8", 24.0 ppf, J55, STC surface casing string will be run and cemented to surface with approximately 350 sacks of cement. Visual inspections of cement returns to the surface will be noted in both the conductor and surface pipe casing jobs. Finally, a 7 7/8" bit will be used to drill out the surface casing and run to a TD of approximately 6,900 feet.

The proposed open hole logging suite for the TD run consists of a Dual Induction, Density-Neutron-Gamma Ray Porosity and Fracture Matrix Identification (FMI) log in the Entrada and a portion of the caprock and basal seal formations, with rotary sidewall cores in the Entrada. A conventional core will be collected from the Todilto-Upper Entrada zone to evaluate the permeability of this caprock. Additional sidewall cores may also be obtained from the Entrada to allow more detailed reservoir analysis.

After the logs have been evaluated, the production casing consisting of 6,900 feet of 5 ½", 15.5 ppf, L80 grade will be run and cemented with approximately 1100 sacks of cement. A 30 foot section of Corrosion Resistant Alloy (CRA) material will be inserted into the string at the packer setting depth to provide a corrosion resistant seat for the packer later in the job. In addition, a DV Tool will be inserted in the casing at approximately 5,000 feet to aid the cement job's second stage in reaching the surface.

Once the cement has set up, the tubing adaptor for the wellhead will be welded on the wellhead and the rig will be released. A casing integrity (pressure test) will be performed to test the casing just prior to

releasing the rig. After a successful test and the drilling rig released, a work-over rig will be mobilized to location and a cement bond log will be run to ascertain the quality of the cement bond of the production casing. It is important that a good bond be established around the injection interval as well as below the CRA joint to minimize any chances that acid gases mixed with formation water do not travel up the outside of the casing and negatively impact the integrity of the casing job.

Once the integrity of the cement job has been determined, the Entrada injection interval will be selected from the well logs and the zone will be perforated with four shots per foot. At this location a total of 160 feet of target area is anticipated to be perforated. Once the Entrada has been perforated, the tubing string including a permanent packer, 6,480 feet of 2 7/8", 6.5 ppf, L80 premium thread tubing, and a Subsurface Safety Valve (SSV) will be run into the well. A ¼" stainless steel line will connect the SSV to a hydraulic panel at the surface.

The National Association of Corrosion Engineers (NACE) issues guidelines for metals exposed to various corrosive gases like the ones in this well. For a H2S/CO2 stream of acid gas that is de-watered at the surface through successive stages of compression, downhole components such as the SSV, (subsurface safety valve), and packer need to be constructed of Inconel 925. The CRA joint will be constructed of a similar alloy from a manufacturer such as Sumitomo. A product like SM2550 (with 50% nickel content) will likely be used. The gates, bonnets and valve stems within the Christmas tree will be nickel coated as well.

The rest of the Christmas tree will be made of standard carbon steel components and outfitted with annular pressure gauges that report operating pressure conditions in real time to a gas control center located remotely from the wellhead. In the case of abnormal pressures or any other situation requiring immediate action, the acid gas injection process can be stopped at the compressor and the wellhead shut-in using a hydraulically operated wing valve on the Christmas tree. The SSV provides a redundant safety feature to shut in the well in case the wing valve does not close properly.

After the AGI well is drilled and tested to assure that it will be able to accept the volume of injection fluid (without using acid gas), it will be completed with the approved injection equipment for the acid gas stream. The draft Rule 118 Plan, which is included as Appendix E to this application, will be finalized when the compression facility design and well connection design is complete and will be submitted for NMOCD review and approval prior to commencement of TAG injection into the Anadarko AGI well.

4.0 REGIONAL AND LOCAL GEOLOGY AND HYDROGEOLOGY

4.1 GENERAL GEOLOGIC SETTING

The Anadarko San Juan River Gas Plant is located in Unit F of Section 1, T29S, R15W near Kirtland in San Juan County, New Mexico (Figure 1) in the northwestern San Juan Basin. The majority of the sediments in the San Juan Basin represent cycles of marine to coastal to freshwater deposition during the Pennsylvanian through the Tertiary periods. The Middle Jurassic through Triassic rocks correspond to a major shift from fluvial to eolian (coastal) to marine environments. The northwestern San Juan Basin is a region of natural gas, oil and coal production. Locally, the majority of natural gas is produced from Upper Cretaceous coal beds from the Kirtland Shale down to the Lewis Shale, with some oil and gas production from the Gallup Sandstone (Figure 5). Less active oil and gas production in the Lower Cretaceous Dakota Sandstone and Middle Jurassic Entrada Sandstone occurs in other parts of the San Juan Basin. Coal is mined from the shallow Fruitland Formation in the vicinity of the plant.

4.2 BEDROCK GEOLOGY

Figure 5 is a generalized stratigraphic column showing the formations that underlie the plant site. These include a thick sequence (over 5000 feet) of Cretaceous deposits which lie over approximately 1300 feet of Triassic Age units and 4800 feet of Paleozoic rocks. Natural gas is produced from the Cretaceous Fruitland and Pictured Cliffs Formation 100 to 1000 feet below ground surface (BGS). Coal is produced from the Fruitland Formation by BHP at an adjacent mine located west of the plant. The absence/scarcity of deep production zones in the area has resulted in limited well data at and below the level of the Dakota Sandstone. In the one-mile radius area of review mandated by the NMOCD regulations for AGI permitting (C-108), there is no current or foreseeable production from any deeper units.

4.3 LITHOLOGIC AND RESERVOIR CHARACTERISTICS OF THE ENTRADA SANDSTONE

Based on the geologic analyses of the subsurface at the San Juan River Gas Plant, we recommend acid gas injection and CO_2 sequestration in the Entrada Sandstone. The Entrada has the requisite high porosity and satisfactory caps above and below. While there are no structural traps to restrict lateral migration of injected gas, there are no deep wells or faults that would serve as vertical conduits. The high net porosity of the proposed injection zone indicates that the injected CO_2 and H_2S will be easily contained close to the injection well. The presence of calcareous cements within the Entrada will have the added benefit of neutralizing the acidity of the gas and providing improved porosity and permeability over time as buffering capacity is consumed.

Using formation tops from seven of the deep wells, a SW-NE trending cross-section was constructed across the western San Juan Basin and the location of the San Juan River Gas Plant (Figure 6). In the cross-section, stratigraphic units dip gently to the northeast (Figure 7). This trend is consistent with the observed 0.5° dip of the top of Dakota Sandstone (Figure 8) in the vicinity of the gas plant. No faulting or offsets were identified in the study area that might influence fluid migration. The absence of significant structures (i.e., steeply dipping or faulted units) suggests that injected fluid would spread semi-radially from the point of injection. Local heterogeneities in permeability and porosity are likely to have a more significant control on fluid migration and the overall three-dimensional shape of the injected gas plume. Based on information from available wells, the projected structure of the top of the Entrada Sandstone is shown in Figure 9.

A preliminary geological analysis identified the Entrada Sandstone as the most promising injection zone in the vicinity of the San Juan River Gas Plant. A more detailed analysis revealed that the Entrada has the

requisite high porosity, and is bounded above and below by fine-grained rocks in the Wanakah and Chinle Formation respectively. These are ideal H_2S and CO_2 sequestration conditions.

Wanakah Formation (Middle Jurassic). The Wanakah Formation replaces the Summerville Formation and is commonly separated into two members: the Beclabito and the Todilto Limestone.

> *Beclabito member (Upper Wanakah).* The Beclabito is composed primarily of very-fine grained, quartz-rich, silty sandstone and siltstone that were deposited in a shallow marine environment. The sediments range from slightly to highly calcareous, and are mostly marine in origin. Some interbedded eolian sandstones are found near the top of the member and interbedded clayey siltstone and mudstone occur throughout the member. The base of the Beclabito contains thin lenses of freshwater limestone.
>
> *Todilto Limestone member.* The Todilto consists of thin-bedded limestone. The upper portion has generally been recrystallized to a coarse-grained texture. In contrast, the lower portion consists of interlaminated calcareous siltstone, sandstone and limestone. Basal beds include cross-bedded, fine-grained, calcareous sandstone reworked from the underlying Entrada Sandstone.

Entrada Sandstone (Middle Jurassic). The Entrada Sandstone is now considered to include the overlying Cow Springs Sandstone and the underlying Wingate Formation. The Cow Springs Sandstone is contemporaneous with the Wanakah and corresponds to very fine-grained, near shore eolian sandstones that appear as tongues within the Wanakah Formation. The combined traditional Entrada Sandstone and Wingate Formation are found below the Wanakah.

> *Entrada Sandstone (upper, Rehoboth, and Iyanbito members).* The Entrada consists primarily of eolian, cross-bedded sandstone that was deposited adjacent to a shallow marine environment. The upper through middle portions of the formation are calcareous, whereas, the basal zone is non-calcareous and quartz-rich. Interbedded layers of fine sand and silt that were deposited subaqueously increase towards the middle member and decrease in the lower member.

Chinle Formation (Upper Triassic). The Owl Rock member at the top of the Chinle Formation is composed of cherty and nodular limestone that forms a single thin bed. Below the Owl Rock member is a thick zone (>700' ft. thick) of sandy to clayey siltstone and claystone that is commonly calcareous. This zone includes scattered lenses of poorly sorted, lithic fluvial sandstone and conglomerate. Overall, this package of rocks forms a very competent bottom seal to the Entrada.

The Entrada Sandstone is being used as an injection zone for four SWD wells in area (the Salty Dog #5 API #3004532900; Salty Dog #3 API #3004531274; Sponge Bob SWD #1 API #3004533927; and Big Field SWD #9 API #3004532258); see Figure 10. The closest of these wells, the Salty Dog #5, is located 3.7 miles away from the San Juan River Gas Plant. Well logs for the SWD wells provide detailed information regarding the position and character of the Entrada and adjacent units (Figures 11-12). Projecting from these wells to beneath the gas plant, it is estimated that the top of the Entrada would be located approximately 6530 ft. BGS and the formation would have a thickness of at least 140 ft.

Porosity logs for three of the injection wells, including the most proximal Salty Dog #5 (Figure 12), reveal a zone of high porosity (values ranging to >20%) that corresponds to the lower Todilto member of the Wanakah through to the base of the Entrada Sandstone. Based on these logs, the high porosity zone has an average thickness of approximately 160 feet, with an average porosity of 19%, and a resultant total net porosity of approximately 30 feet.

Above and below the lower Todilto-Entrada are thick layers of sedimentary rock with significantly lower porosity. Immediately overlying the high porosity zone is a roughly 10 ft. thick, tight layer with no apparent porosity that corresponds to the coarsely crystalline limestone at the top of the Todilto. This zone forms the competent caprock seal to the proposed injection zone. Above this, the basal 90 ft. of the Beclabito member of the Wanakah exhibits porosities <10%, likely corresponding to interbedded layers of limestone and silt-claystone. Below the Entrada, the uppermost >70 ft. of the Chinle Formation has an apparent porosity of approximately 6%.

The high values of porosity and permeability indicated for the Entrada are consistent with injection records from the four nearby Entrada SWD wells. According to OCD records, the Salty Dog #5 well injected at 2.36 bbl/min at 1500 psig at the commencement of injection, or an equivalent of 3400 bbl/day. This injection pressure is somewhat higher that the maximum allowable injection pressure for the Salty Dog #5 well (1350 psig). An increase was approved for the Salty Dog #3 well, bringing the maximum allowable injection pressure to 1800 psig.

A maximum allowable surface injection pressure was calculated for the proposed AGI well following the NMOCD approved formula: $IP_{max} = PG\ (D_{top})$, where IP_{max} is the maximum allowed surface injection pressure (psig), PG is the pressure gradient of the injected fluid (psi/ft), and D_{top} is the depth to the top of the perforated zone (ft). Using the estimated depth to the top of the Entrada Sandstone at the San Juan River Gas Plant (6530 ft) and TAG as the injection fluid, the maximum allowable injection pressure would be approximately 1900-2000 psig. This value is significantly higher than the maximum allowable injection pressure for saltwater (approximately 1300 psig), due to the lower specific gravity of TAG.

Using the total porosity determined from well logs, it is possible to estimate the area of injection over a 30-year life span for an AGI well at the San Juan River Gas Plant. Assuming an average injection rate of 1000 bbl/day of compressed TAG, acid gas would spread to cover an area of approximately 47 acres or a circle with a radius of approximately 800 ft.; assuming an injection rate of 3000 bbl/day of compressed TAG, acid gas would spread to approximately 140 acres or a radius of approximately 1400' (Figure 13). These injection rates are consistent with rates from the Entrada SWD wells. Injection of TAG is likely to experience lower pressures as the calcareous cement is dissolved in the reservoir rock.

Calculations of Areas for Injection		
	Lower Est. of Barrels/Day	High Est. of Barrels/Day
Barrels per Day	1,000	3,000
Cubic Feet/Day (5.61 Cubic Feet per Barrel)	5,610	16,830
Cubic Feet/Year (365 Days)	2,047,650	6,142,950
Cubic Feet in 30 Years	61,429,500	184,288,500
Effective Porosity in Feet = 30 feet		
Net Area Consumed (Cubic Ft./30 Ft.)	2,047,650	6,142,950
Net Area in Acres (43560 Sq. Ft./Acre)	47	141
Radius in feet	**807**	**1,398**

While the Entrada Sandstone has all of the characteristics of an excellent candidate for AGI and CO_2 sequestration, there are no other readily apparent candidate injection formations in the vicinity of the San Juan River Gas Plant. Other SWD injection zones in the vicinity (Mesa Verde, Point Lookout) are too shallow to safely dispose of acid gas and sequester CO_2. The Gallup Sandstone is a local producer of oil

and gas. The Dakota Sandstone has been found to be locally tight and a poor choice for injection. The Morrison Formation has numerous high permeability and porosity zones, but is vertically and laterally heterogeneous and porosity and permeability are discontinuous, making it difficult to characterize and estimate its capacity.

4.4 FORMATION FLUID CHEMISTRY

The most recent analysis of fluids from the Entrada was collected in December 2005 from the Salty Dog #5, approximately 3.5 miles southeast from the proposed AGI well. These analyses showed that the formation water had a Total Dissolved Solids of 25,624 mg/L. The primary cation was sodium, and the principal anions were chlorides, sulfate, and bicarbonates (See Appendix A-1). These data demonstrate that the existing formation fluid is compatible with injection of the proposed treated acid gas stream consisting of 90% CO_2 and 10% H_2S.

Other analyses from the overlying Point Lookout Formation (Mesaverde Group), from the Stella Needs A Com 001E (API # 3004524265, Unit D, S36, T30N, R14W) approximately 7 miles east of the proposed AGI well shows a Total Dissolved Solids of 60,209 mg/L. The primary cation was sodium, and the principal anions were chlorides, sulfate, and bicarbonates (See Appendix A-1). This indicates that no fresh-water aquifers exist in other zones above the Entrada.

4.5 GROUNDWATER HYDROLOGY IN THE VICINITY OF THE PROPOSED INJECTON WELL

Within the one mile area of review, only seven drinking-water wells (domestic) were identified in a search of the New Mexico State Engineer's files (See Appendix A-2). The seven domestic wells are all completed in the shallow sands within the Kirtland and Fruitland Formations. The deepest of these wells extends to 150 feet which puts is at least 6350 feet above the proposed acid gas injection zone. The surface casing for the Anadarko AGI Well will extend well below all of these zones, and thus none of these wells would be potentially impacted by the AGI well. Available data indicate that the Total Dissolved Solids concentration in the shallow groundwater ranges from 2700 to 4500 milligrams per Liter (See Appendix A-2).

Other wells in the one-mile area include one observation well drilled by El Paso Natural Gas in 1950. This well reached the Pictured Cliffs at 1005 feet and was plugged and abandoned in 1953 (See Appendix A-2 for plugging records). Two additional exploratory wells were drilled by Western Coal in 1978 to approximately 500 feet in the Fruitland. Records indicate that these wells were plugged in 1979. Twenty mining extractive water wells are located north of the proposed AGI. No water from these wells is used for consumptive purposes.

The nearest body of surface water is the Farmers' Mutual Ditch, an irrigational canal located approximately one mile south of the plant. The water in this canal comes from the Animas and San Juan Rivers. The total depth of this canal is 8 to 10 feet. There would be no impact from the Anadarko AGI well on this irrigation canal since the casing for the AGI well will extend well below (at least 900 feet) the bottom of this ditch.

5.0 OIL AND GAS WELLS IN THE ANADARKO AGI AREA OF REVIEW AND VICINITY

Appendix B contains a complete list based on NMOCD records of all active, temporarily abandoned, abandoned and plugged oil and gas wells within two miles (Figure B1, Table B1) and those within the one-mile radius area of review (Figure B2) of the proposed AGI disposal well.

5.1 ACTIVE OIL AND GAS WELLS

As shown in the Table 2 below, and in the accompanying Figure B2 in Appendix B, there are a total of nine wells in the one mile area of review. Information on the wells in the one mile area of review (see Table 2 below) includes their total depth, production or injection interval and current status. None of the nine wells penetrates the proposed injection zone. There is no potential impact on these wells from the proposed Anadarko AGI well, as the surface casing of the AGI well will extend well below the level of these wells.

Table 2
Wells Within One Mile of Proposed Anadarko AGI #1

API NUMBER	WELL NAME	STATUS	OPERATOR	WELL TYPE	SPUD DATE	PLUG DATE	DEPTH	PRODUCING POOL	Distance (Miles)
3004529946	SALTY DOG SWD 001	ACTIVE	XTO Energy, Inc	SWD	9/3/1999		3420	MENEFEE	0.33
3004523906	PITTAM POND 001	Active	XTO Energy, Inc	GAS	11/27/1979		660	FRUITLAND	0.36
3004531887	WESTERN GAS 002	Active	XTO Energy, Inc.	GAS	1/31/2004		730	FRUITLAND	0.53
3004530358	WF STATE 36 003	Plugged	LANCE OIL & GAS COMPANY, INC.	GAS	9/15/2000	5/27/2007	749	FRUITLAND	0.58
3004525176	PITTAM POND 004	Plugged	DUGAN PRODUCTION CORP	OIL	9/21/1981	8/17/1992	4726	GALLUP	0.63
3004529947	WF STATE 36 001	Plugged	LANCE OIL & GAS COMPANY, INC.	GAS	7/26/1999	4/11/2007	802	FRUITLAND	0.64
3004531725	WF FEDERAL 6 003	Active	XTO Energy, Inc.	GAS	1/13/2004		815	FRUITLAND	0.73
3004531852	WF FEDERAL 6 004	Active	XTO Energy, Inc.	GAS	2/20/2004		770	FRUITLAND	0.88
3004528291	MAYRE 090	Active	DUGAN PRODUCTION CORP	GAS	12/10/1990		760	FRUITLAND	0.99

5.2 PLUGGED OIL AND GAS WELLS

Table 2 includes a list of all plugged and abandoned wells, based on NMOCD records, found within the one mile-radius area of review of the proposed AGI disposal well, and Figure B2 in Appendix B shows the location of these wells. Only three plugged wells (See Table 2 above) were identified within the one-mile radius. Appendix B includes plugging diagrams and supporting data for each of these wells. The deepest plugged well identified (Pittam Pond 004) has a total depth of 4726 feet. This is approximately 1800 feet above the proposed Entrada Sandstone which lies approximately 6500 feet below the surface of the plant. These data show that there is no evidence of improperly plugged or abandoned wells within the area of review which might cause communication between the proposed injection zone in the Entrada and any other unit.

5.3 OTHER WELLS

The Anadarko Plant is located immediately adjacent to BHP's San Juan Coal Mine. As a standard practice, BHP drills vent shafts ahead of the long wall of their mining operation in order to vent methane gas prior to mining the coal in these areas. A number of these vent shafts (perhaps as many as 10 to 15) are within the one-mile area of review. The location and number of these vents is changing constantly, based on the progress of the mining operation; and, there are no licensing requirements for them from any regulatory agency in the State of New Mexico. Once the mining operation moves past these shafts, they are abandoned, and most of the time the casings are pulled. There is no potential impact on these shafts from the proposed Anadarko AGI well, as the surface casing of the AGI well will extend well below the level where these coal formations are located and mined.

6.0 IDENTIFICATION AND REQUIRED NOTIFICATION OF OPERATORS SUBSURFACE LESSEES AND SURFACE OWNERS WITHIN THE AREA OF REVIEW

Geolex contracted with Kingston Consulting of Albuquerque, New Mexico to research land records in San Juan County to obtain a listing of all operators, oil, gas and mineral lessees, and surface owners within a one-mile radius of the proposed AGI well. Appendix C and Appendix D include the data from that search.

Appendix C includes Figure C1 which shows the wells located within the one-mile area of review of the proposed Anadarko AGI well. Table C-1 lists operators within this one-mile radius, and Table C-2 lists the names and addresses of operators and subsurface lessees within the same one mile area of review. As shown in Table C-1, production in the area of review is controlled by 9 operators as currently listed by the NMOCD internet database. Appendix D includes Table D-1 which lists the names and addresses surface owners of record in the area of review, as extracted from the San Juan County land records.

All of these operators, oil, gas and mineral lessees and surface owners within the one-mile area of review will be provided notice and an opportunity to review this application at least 20 days prior to the OCD Hearing, according to the requirements of Section XIV of the C-108 and NMOCD's current policy on applications for acid gas injection wells. A draft copy of this notice is included in both Appendix C and Appendix D. The proposed public notice that will be published in the Farmington Daily Times at least 20 days prior to NMOCD Hearing is also included in Appendix C.

7.0 AFFIRMATIVE STATEMENT OF LACK OF HYDRAULIC CONNECTION BETWEEN PROPOSED INJECTION ZONE AND KNOWN SOURCES OF DRINKING WATER

As part of the work performed to support this application, a detailed investigation of the structure, stratigraphy and hydrogeology of the area surrounding the proposed Anadarko AGI injection well has been performed. The investigation included the analysis of available geologic data and hydrogeologic data from wells and literature identified in Sections 3, 4 and 5 above including related appendices. Based on this investigation and analysis of these date, it is clear that there are no open fractures, faults or other structures which could potentially result in the communication of proposed injection zone with any known sources of drinking water in the vicinity as described above in Sections 4 and 5 of this application.

FIGURES

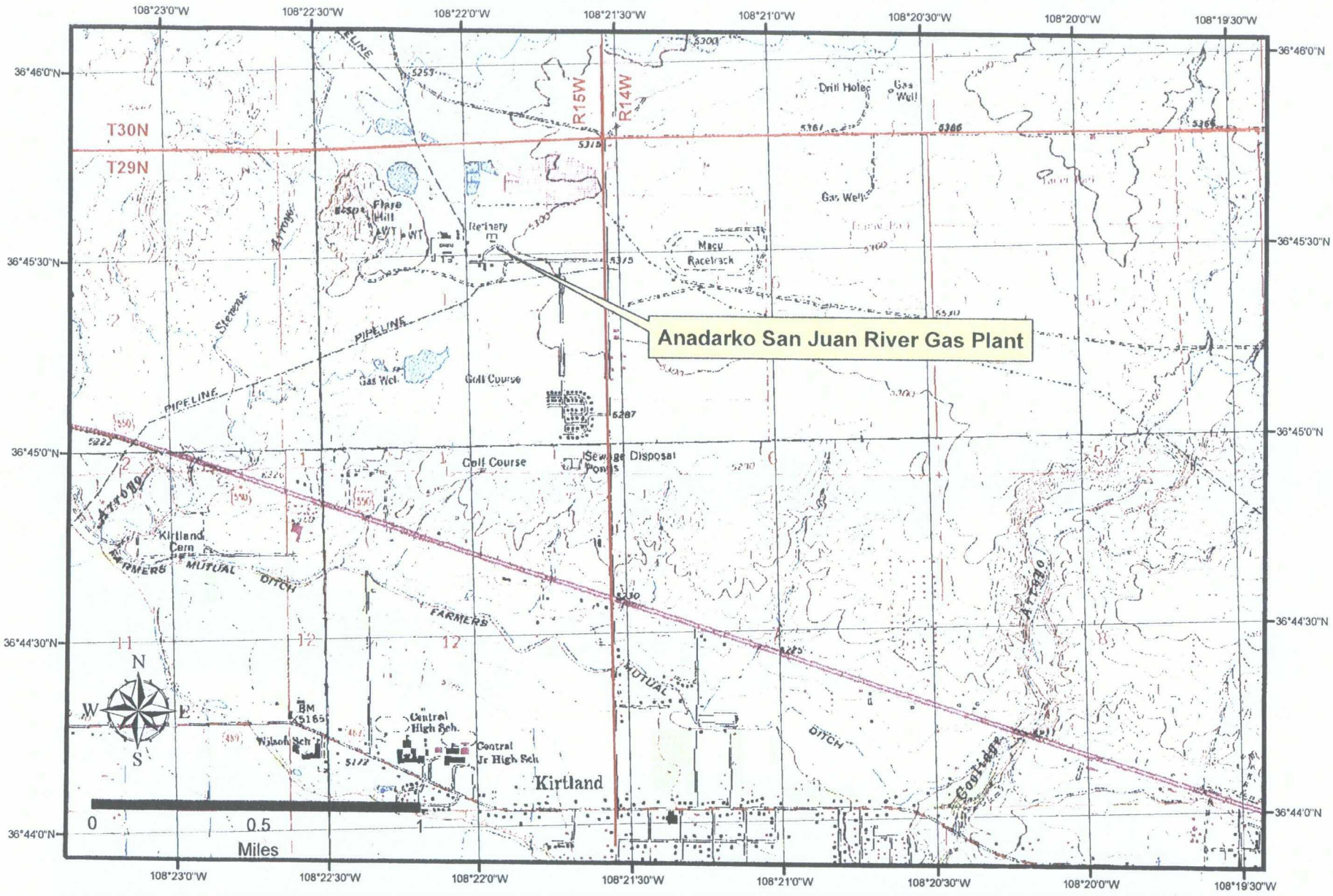


Figure 1: Location of Anadarko San Juan River Gas Plant

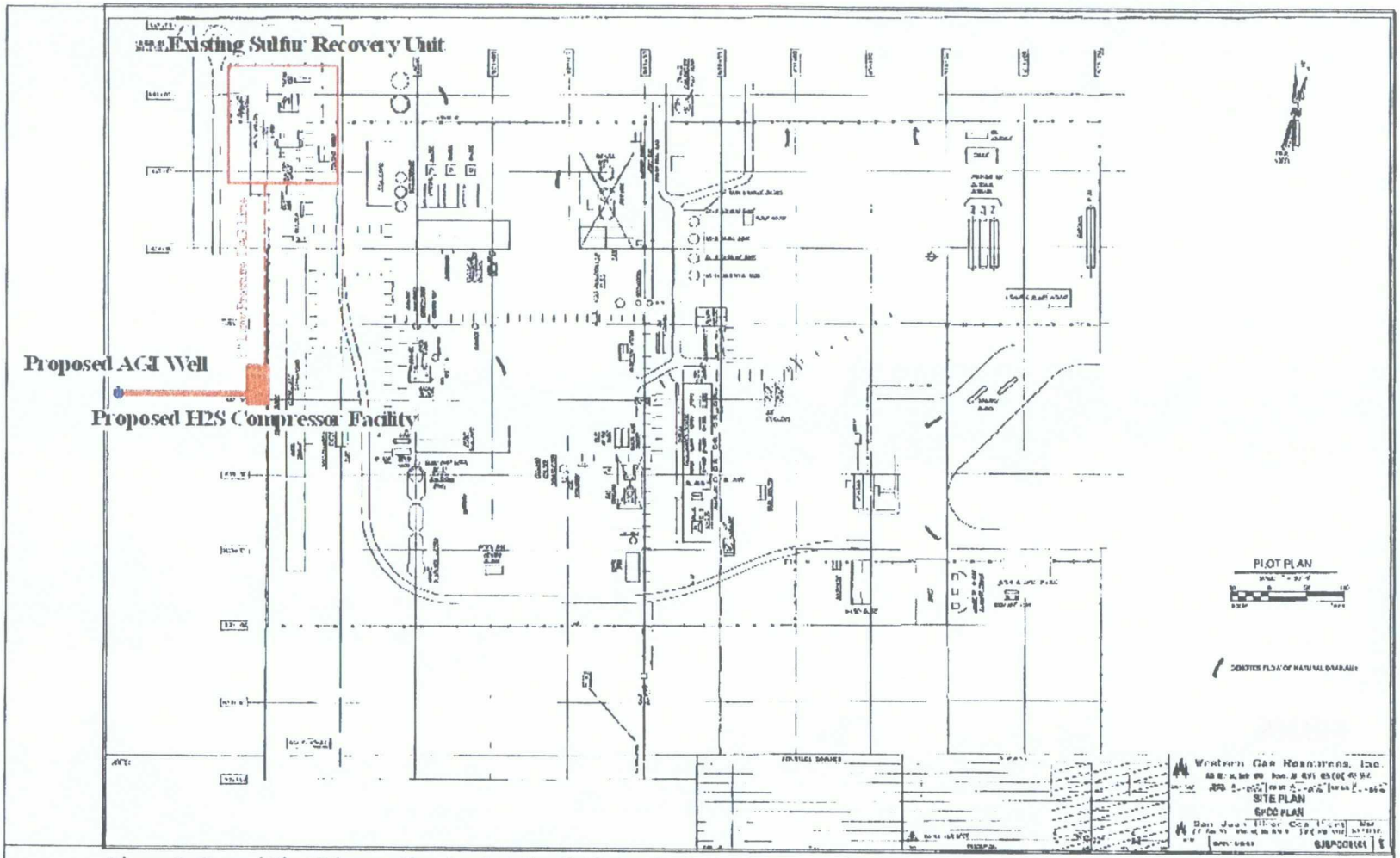


Figure 2: General Plant Diagram Showing Existing Sulfur Reduction Unit, Proposed Compressor Facility, and Proposed AGI Well

Anadarko

GEOLEX INCORPORATED

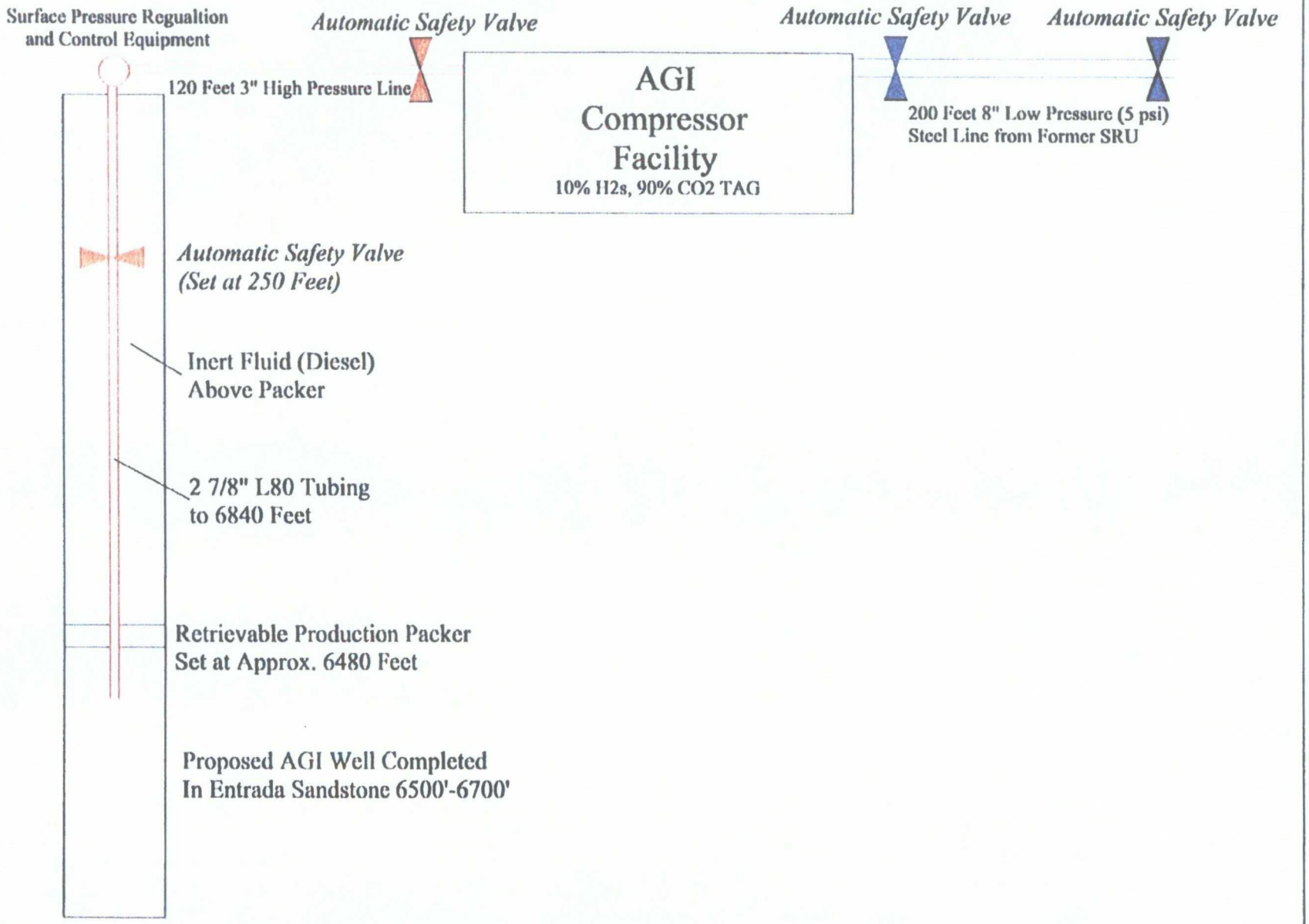
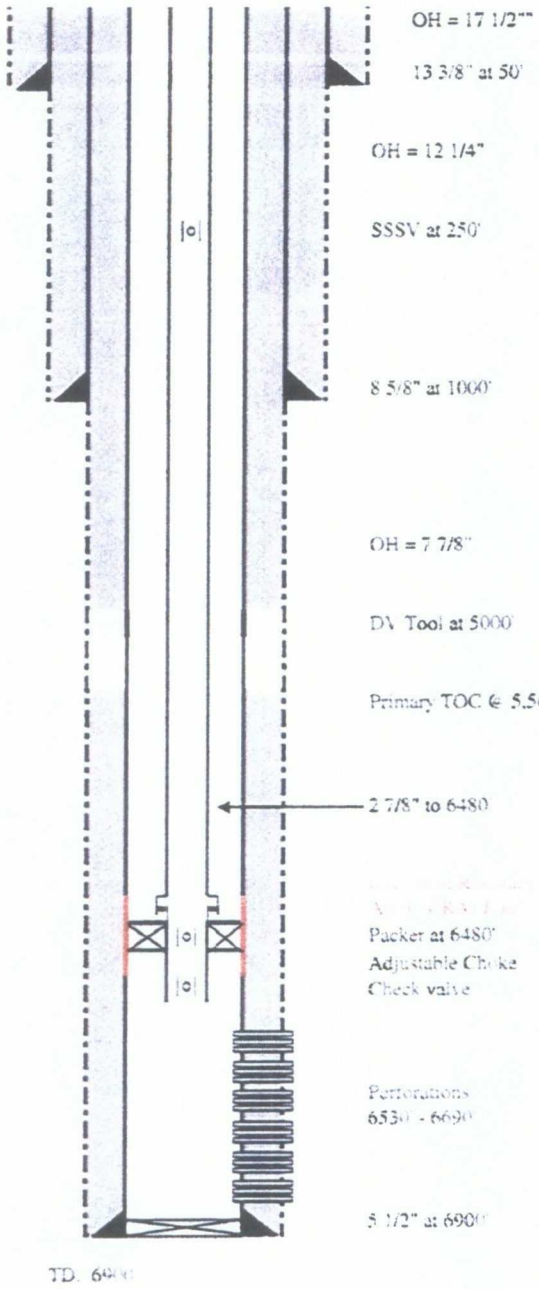


Figure 3: Schematic of Anadarko San Juan River Gas Plant Acid Gas Injection System Components

SAN JUAN RIVER AGI #1
PROPOSED WELLBORE

Location: 2310' FWL & 1650' FNL
STR S1-T29S-R15W
County, St.: SAN JUAN, NEW MEXICO



CONDUCTOR CASING
13 3/8", 48.00#/ft, H40, STC at 50'

SURFACE CASING:
8 5/8", 24.0 #/ft, J55, STC at 1000'

PRODUCTION CASING:
5 1/2", 15.5 #/ft, L80, STC at 6900'

TUBING:
Subsurface Safety Valve at 250 ft
2 7/8", 6.5#/ft, L80, Premium thread at 6480'

PACKER:
Permanent Production Packer
Adjustable Choke (optional)
Check valve (optional)

PERFORATIONS:

Primary Target	Secondary Target
Entrada Sandstone	
6530' - 6690'	

Figure 4: Schematic For Proposed AGI Well

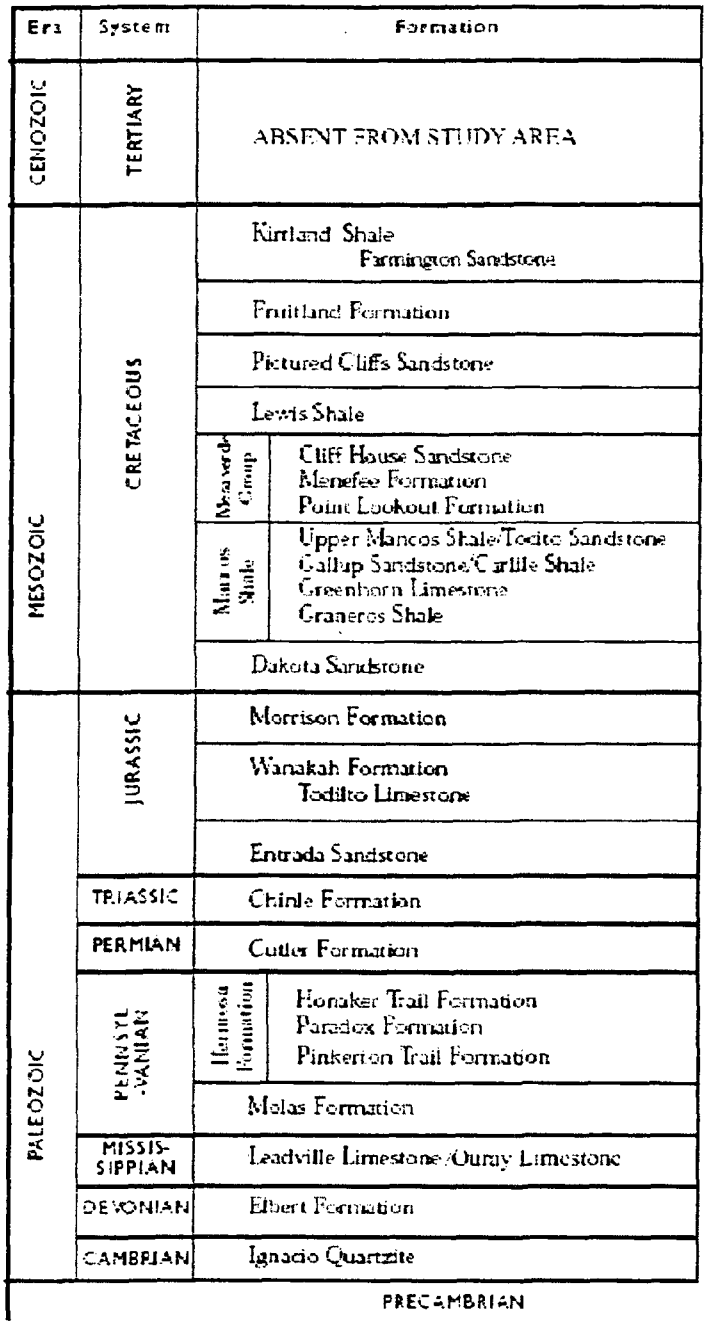
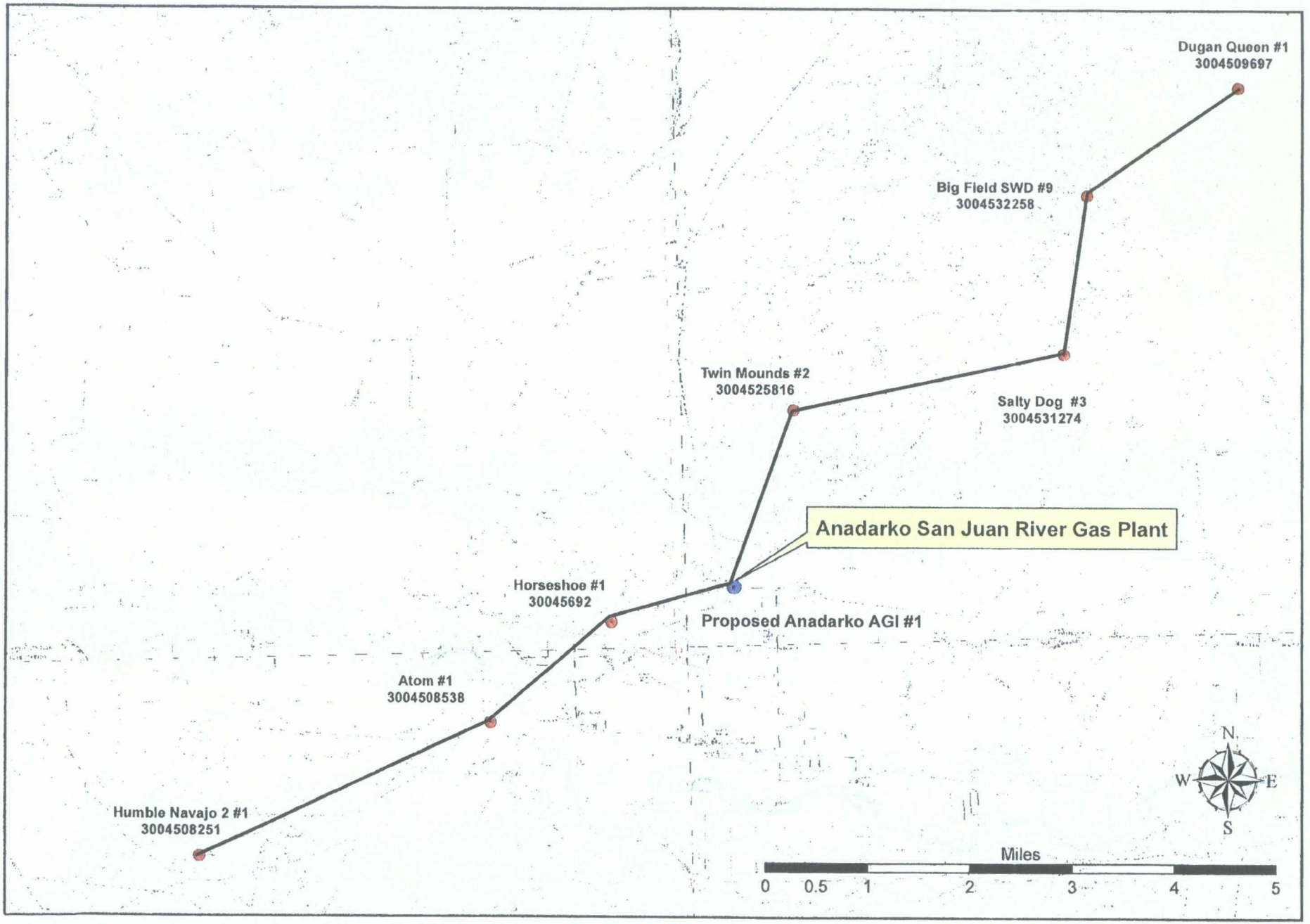


Figure 5: Generalized stratigraphy for the San Juan Basin.



Anadarko Petroleum Corporation

Figure 6: Locations of Wells for Southwest-Northeast Cross Section

GEOLEX INCORPORATED

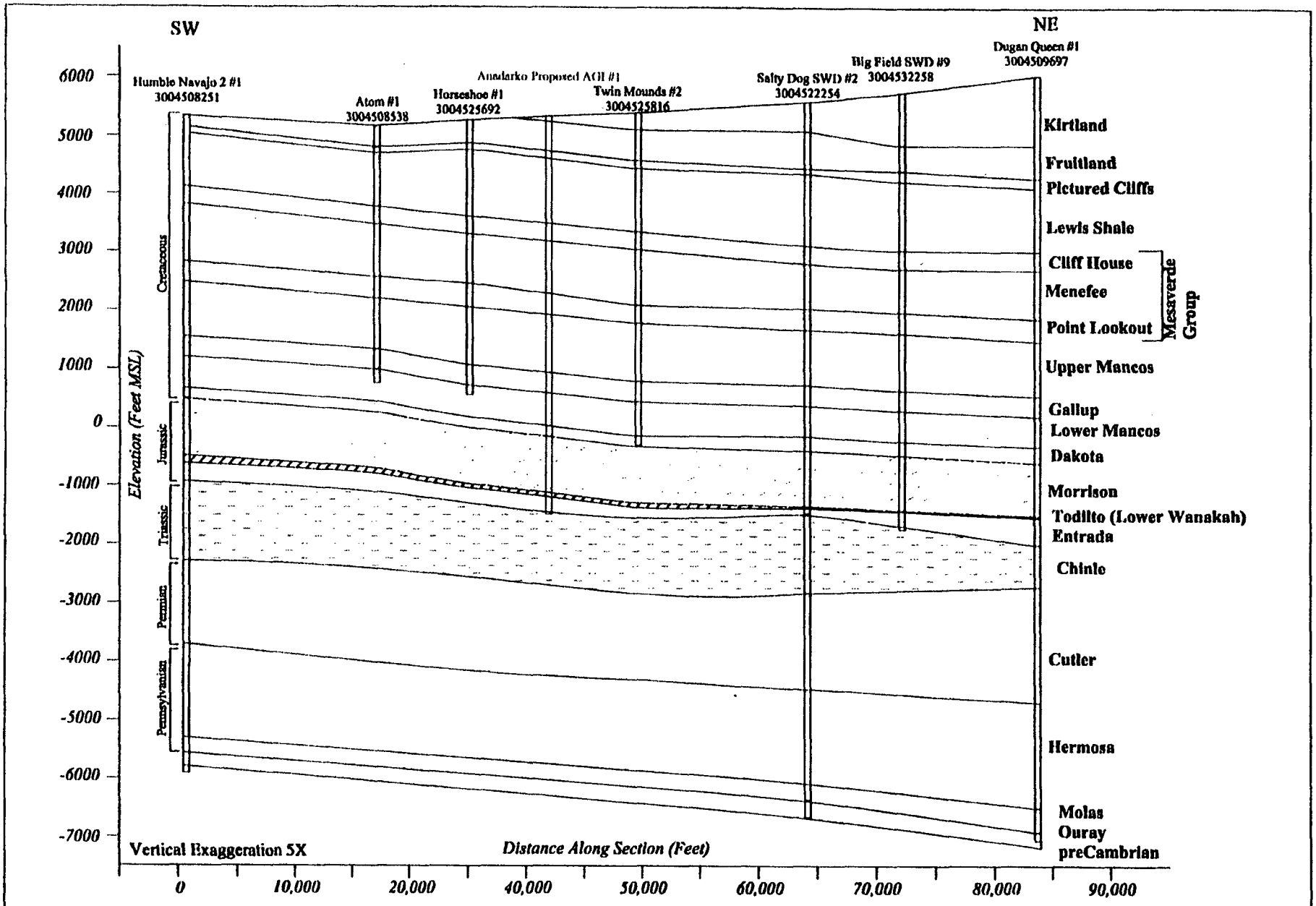


Figure 7: Southwest-Northeast Cross Section Through Area of Anadarko San Juan River Gas Plant

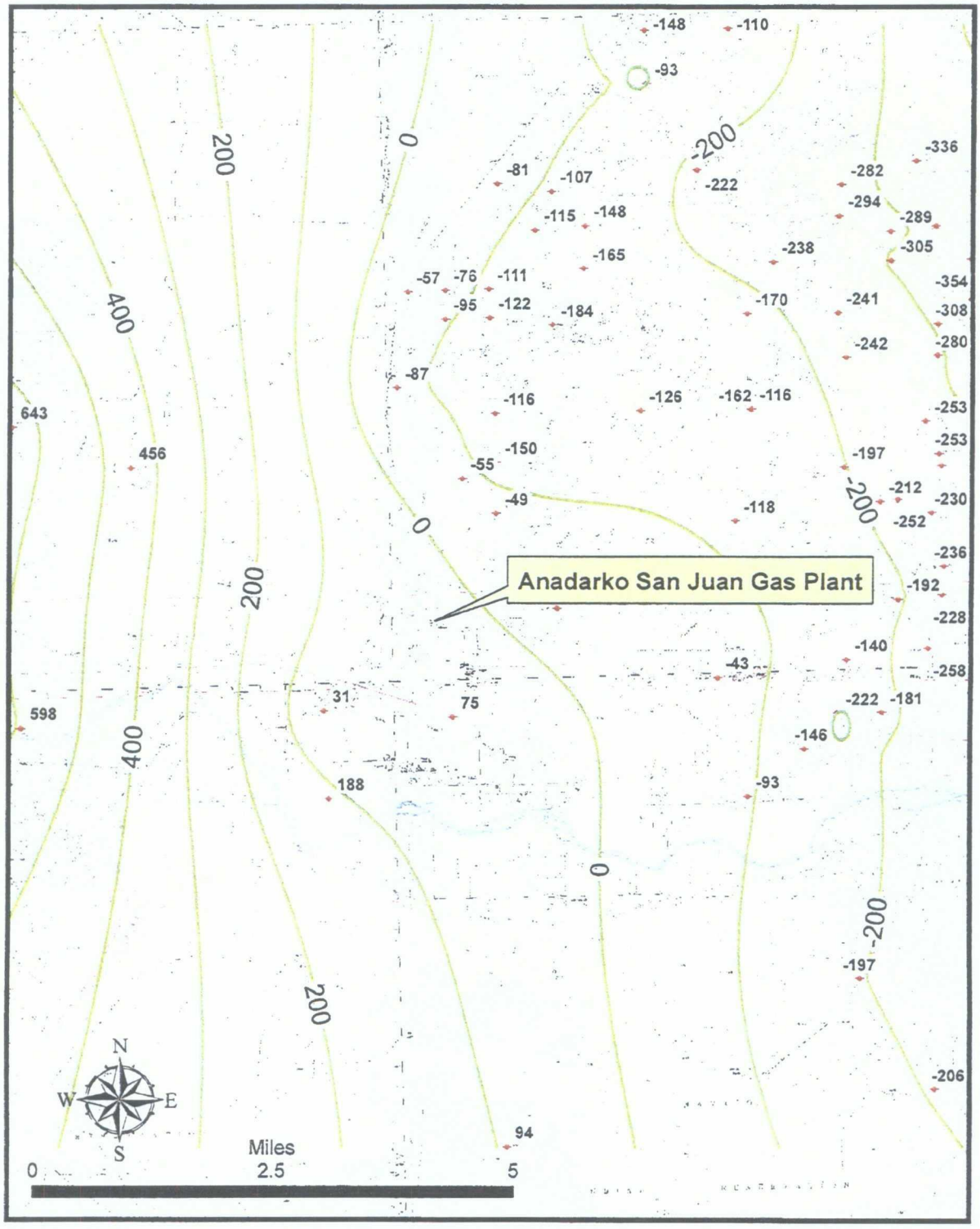


Figure 8: Structure on Top Of Dakota Formation

- Dakota Wells (Elev. in MSL)
- Dakota Structure (Contour Interval 100 Feet, Datum = Sea Level)

Anadarko Petroleum Corporation

GEOLEX INCORPORATED

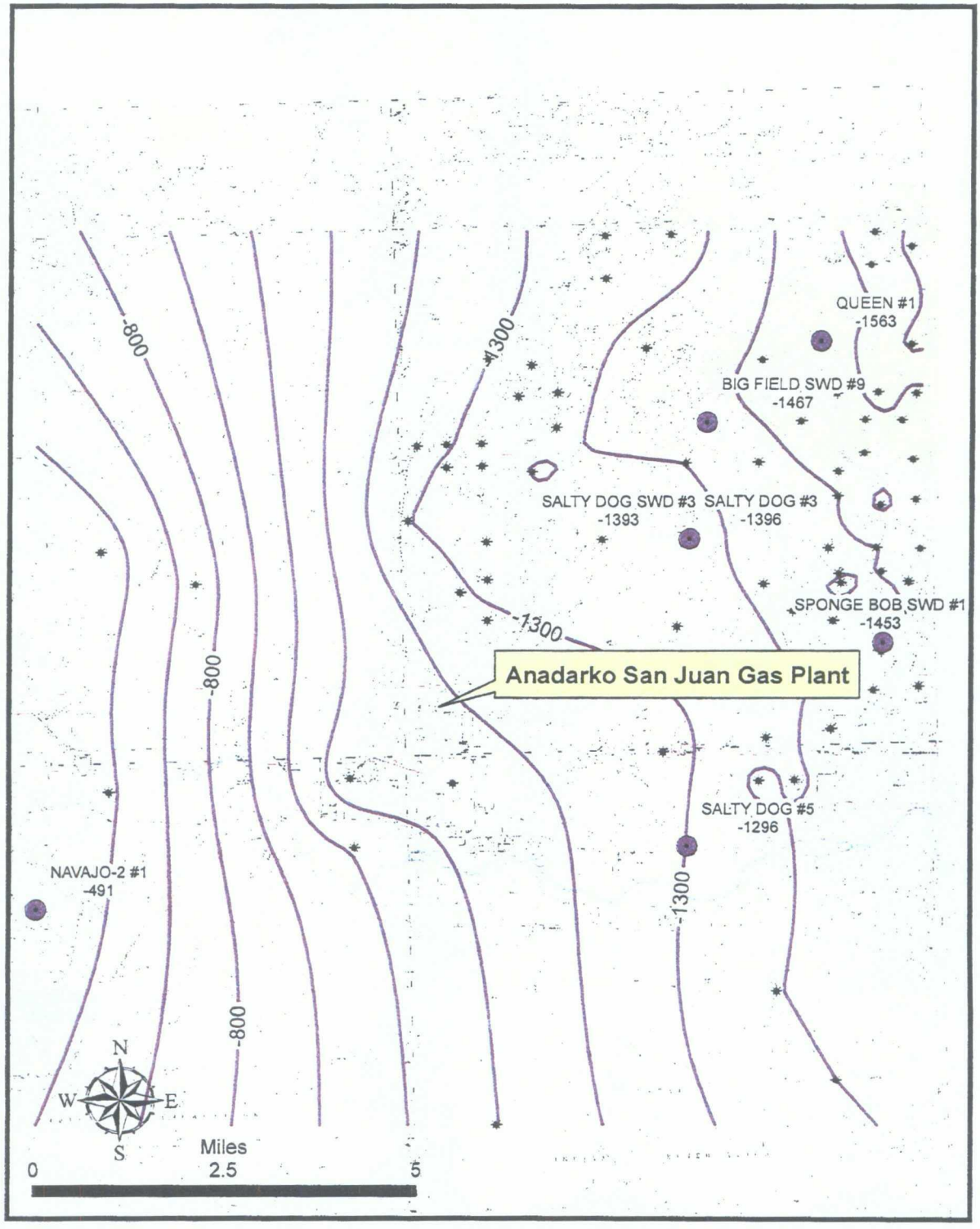


Figure 9: Structure on Top of Entrada Sandstone

- Dakota Wells Used Figure 8
- Entrada Structure (Contour Interval 100 Feet, Datum = Sea Level)
- Wells With Entrada Elevation Data

Anadarko Petroleum Corporation

GEOLEX INCORPORATED

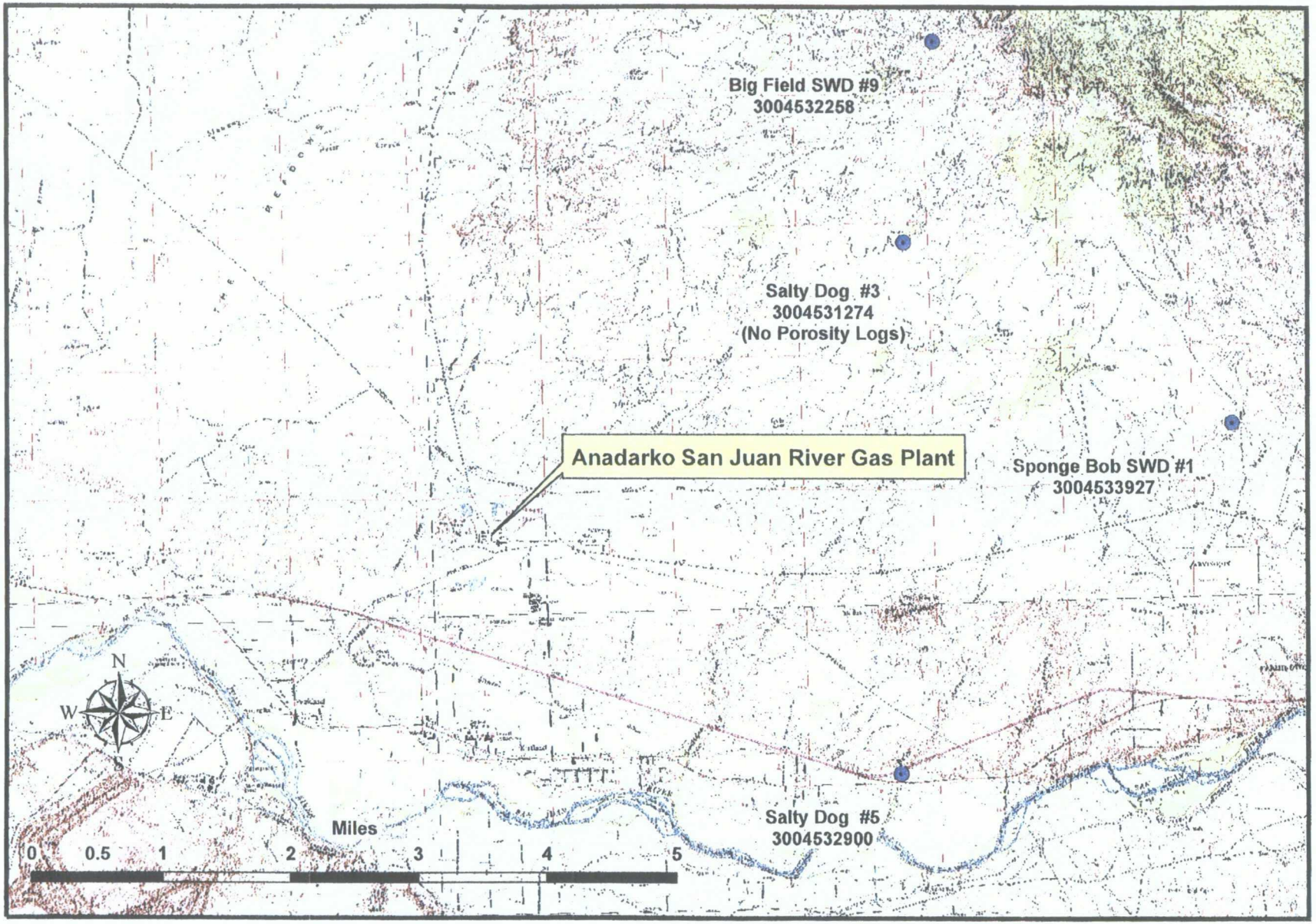
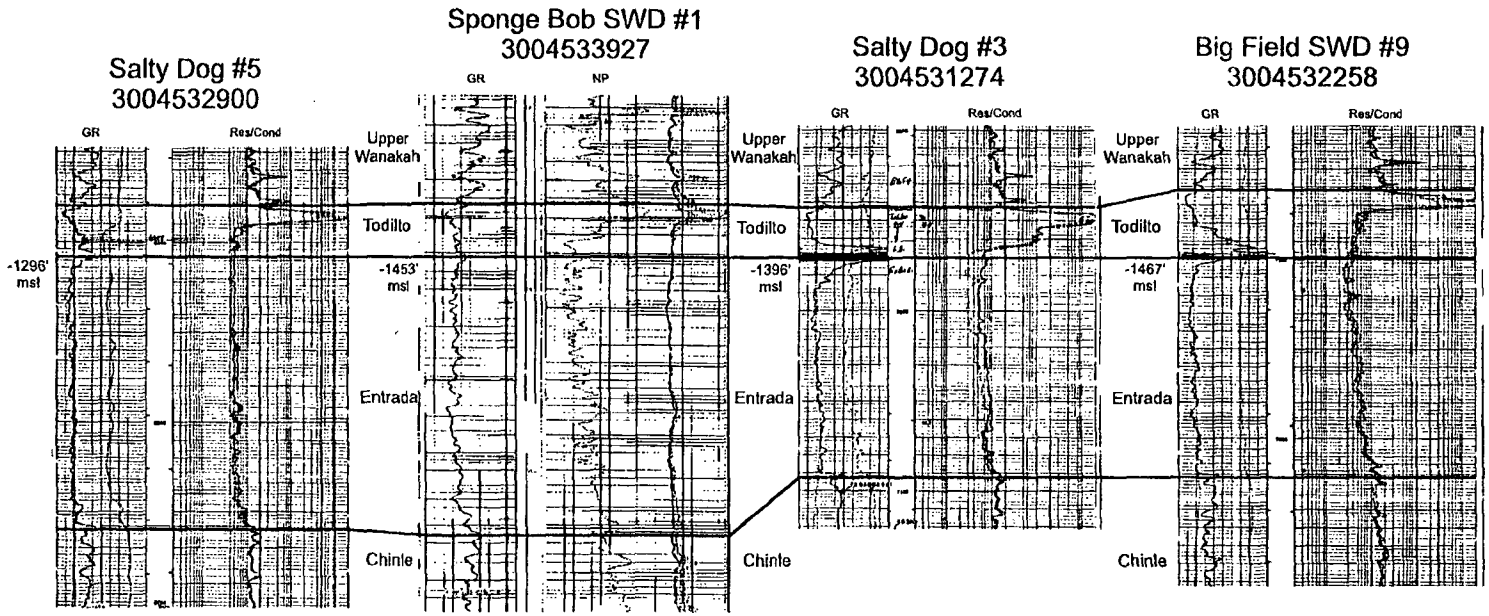


Figure 10: Locations of Entrada SWD Wells in Study Area



Anadarko Petroleum Corporation

GEOLEX INCORPORATED

Figure 11: Stratigraphy of the Entrada Sandstone near Farmington, San Juan County, NM

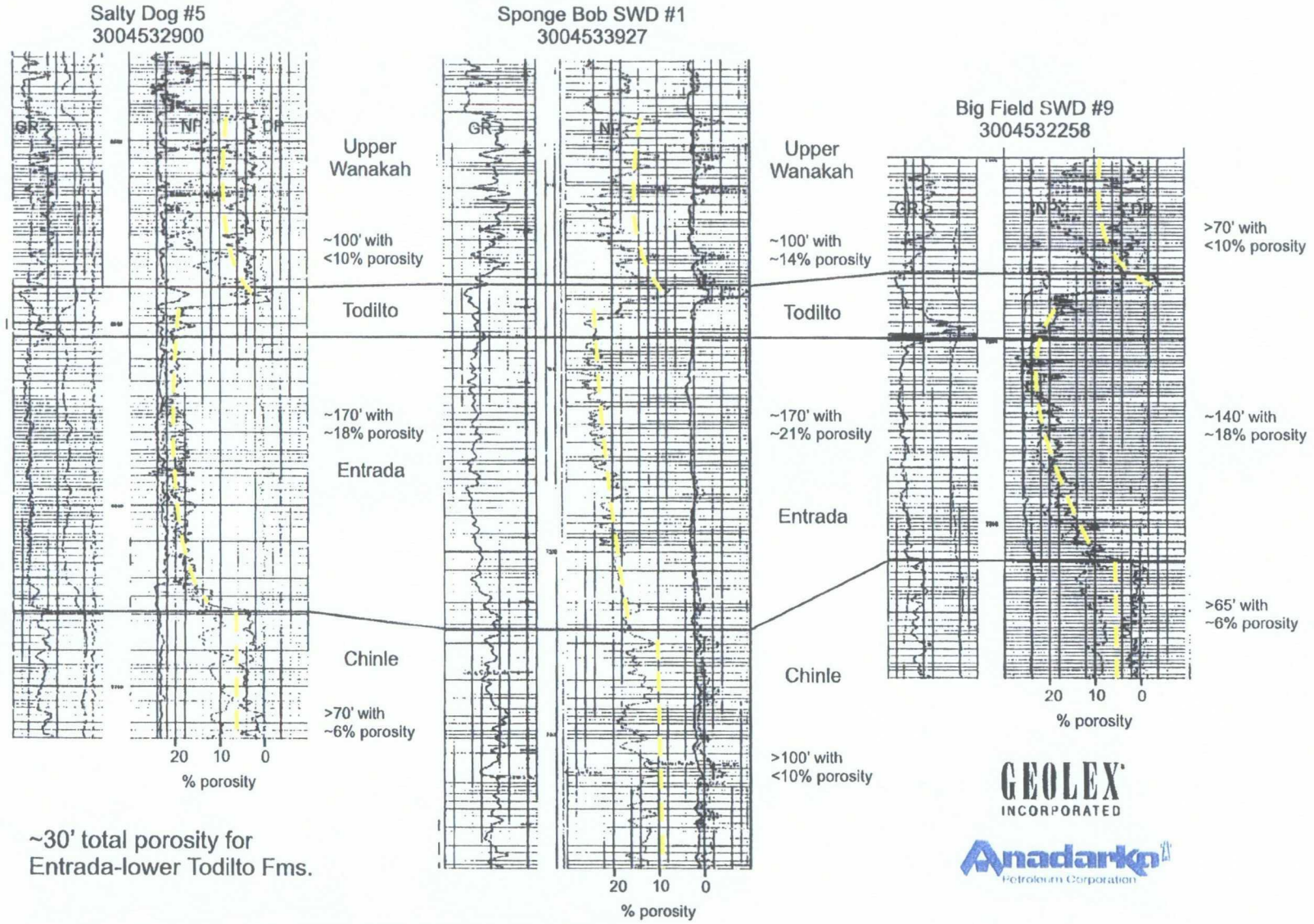


Figure 12: Porosity of the Entrada Sandstone near Farmington, San Juan County, NM

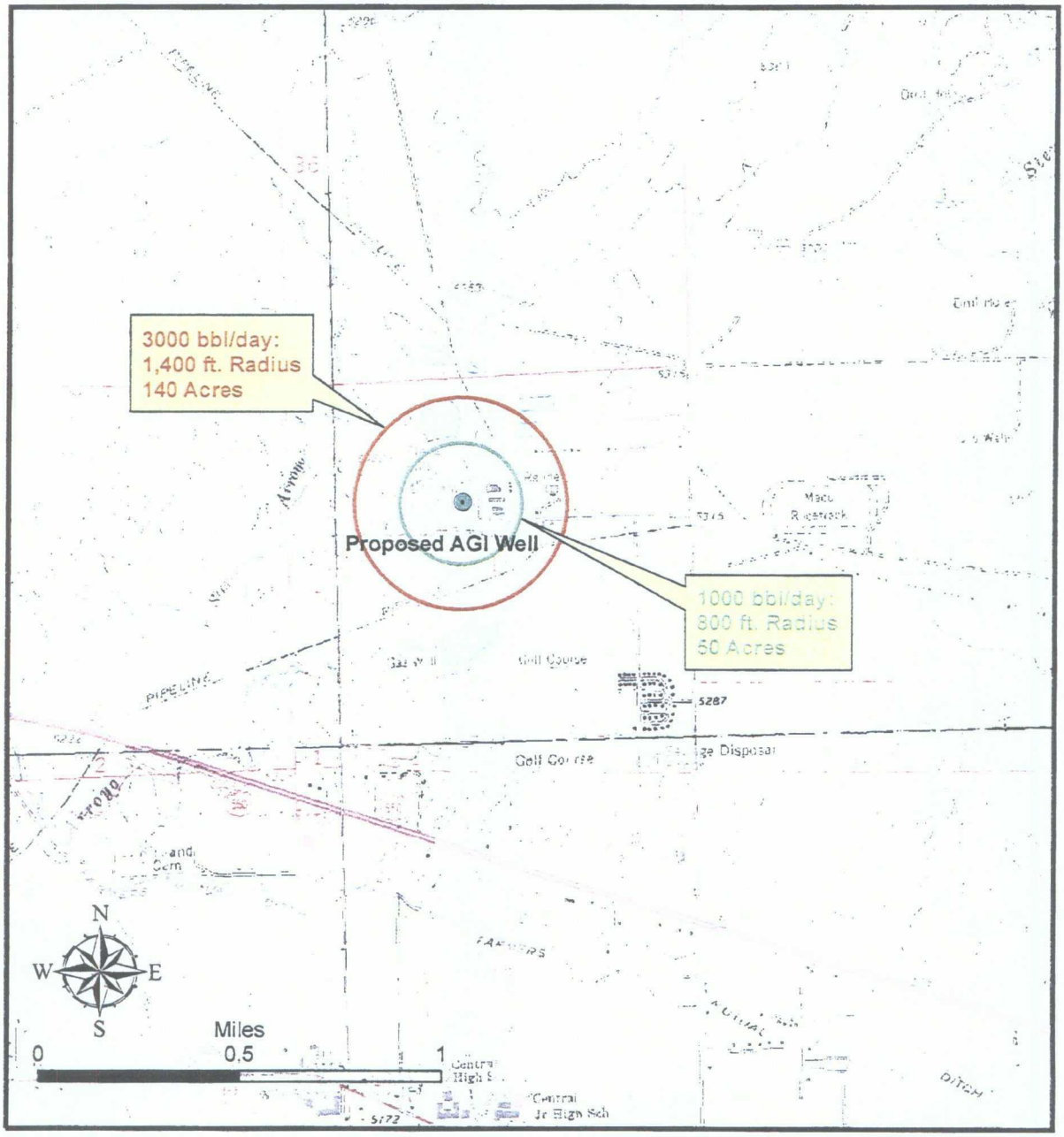


Figure 13: Areas of Injection After 30 Years for AGI Volumes of 1000 Barrels/Day and 3000 Barrels/Day

Injection Area for 1000 bbl/day

Injection Area for 3000 bbl/day

APPENDIX A-1

ENTRADA SANDSTONE and POINT LOOKOUT FLUID ANALYSES

SIERRA CHEMICALS L.C.

Sierra Chemicals L.C.
104 Bison Trail Aztec N.M. 87410
Phone (505)-334-6449 Fax (505)-334-9530

WATER ANALYSIS

Date	**12/15/2005**	Sierra Rep **J.M.**	Code **101024610**
Sampling Point/Date	**7:00 A.M. 12/6/2005**		State **New Mexico**
Company	**Lance Oil & Gas**		County **San Juan**
Formation	**Disposal Well**	Lease **Salty Dog**	Well **#5**

DISSOLVE D SOLIDS

CATIONS	mg/l	me/l
Sodium, Na+ (Calc.)	**8,809**	**383**
Total Hardness as	**400**	**0**
Calcium Ca++	**160**	**8**
Magnesium, Mg++	**146**	**12**
Barium, Ba++	**0**	**0**
Iron (Total) Fe+++*	**1**	**0**
ANIONS		
Chlorides, Cl-	**9,000**	**254**
Sulfate, SO4-	**5,800**	**121**
Carbonate, CO3-	**0**	**0**
Bicarbonates,	**1,708**	**28**
Sulfide, S-*	**0**	**0**
Total Dissolved	**25,624**	

OTHER PROPERTIES

pH*	**7.322**
Specific Gravity,60/60 F.	**1.012**
Turbidity	**99**
Resistivity	**0.0633 Ohms/m @ 77F**

SCALING INDICIES

TEMP, F	CA CO3	CASO4*2H2O	CA SO4	BA SO4
80	**0.2264**	**-0.6197**	**-0.7745**	**-28.7243**
120	**0.5119**	**-0.6298**	**-0.6042**	**-28.9565**
160	**0.9173**	**-0.6042**	**-0.4059**	**-29.1446**

Notes: The scaling indices calculated from this water analysis outline a moderate possibility of forming Calcium Carbonate scale. The likelihood of scale formation increases as temperature rises.

Dugan Production Corp.
Stella Needs A Com No. 1 – Conversion to SWD

MPANY OF NORTH AMERI

API W A T E R A N A L Y S I S

Company:	DUGAN PROD.	W.C.N.A. Sample No.:	S106695
Field:		Legal Description:	
Well:	STELLA NEEDS A COM #1E	Lease or Unit:	
Depth:		Water.B/D:	
Formation:	POINT LOOKOUT/MESA VERDE	Sampling Point:	SWAB
State:	N.M.	Sampled By:	J. ALEXANDER
County:		Date Sampled:	04/24/95

Type of Water(Produced,Supply, ect.):

PROPERTIES

pH:	6.30	Iron, Fe(total):	250
Specific Gravity:	1.050	Sulfide as H2S:	0
Resistivity (ohm-meter):	.13	Total Hardness: (see below)	
Tempature:	78F		

D I S S O L V E D SOLIDS

CATIONS	mg/l		me/l			
Sodium, Na:	20470	:	890			
Calcium, Ca:	2084	:	104	Sample(ml):	1.0 ml of EDTA:	5.20
Magnesium, Mg:	170	:	14	Sample(ml):	1.0 ml of EDTA:	.70
Barium, Ba:	N/A	:	N/A			
Potassium, K:		:				

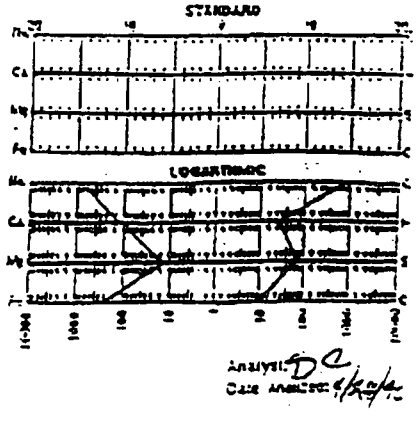
ANIONS	mg/l		me/l			
.5000Chloride, Cl:	31905	:	900	Sample(ml):	1.0 ml of AgNO3:	1.80
Sulfate, SO4:	3750	:	78			
Carbonate, CO3:		:		Sample(ml):	1.0 ml of H2SO4:	
Bicarbonate, HCO3:	1830	:	30	Sample(ml):	1.0 ml of H2SO4:	.30

Total Dissolved Solids (calculated): 60209

Total Hardness: 5900 Sample(ml): 1.0 ml of EDTA:

REMARKS AND RECOMMENDATIONS:

WATER PATTERNS-me/l



Analyst: DC
Date Analyzed: 4/26/95

APPENDIX A-2

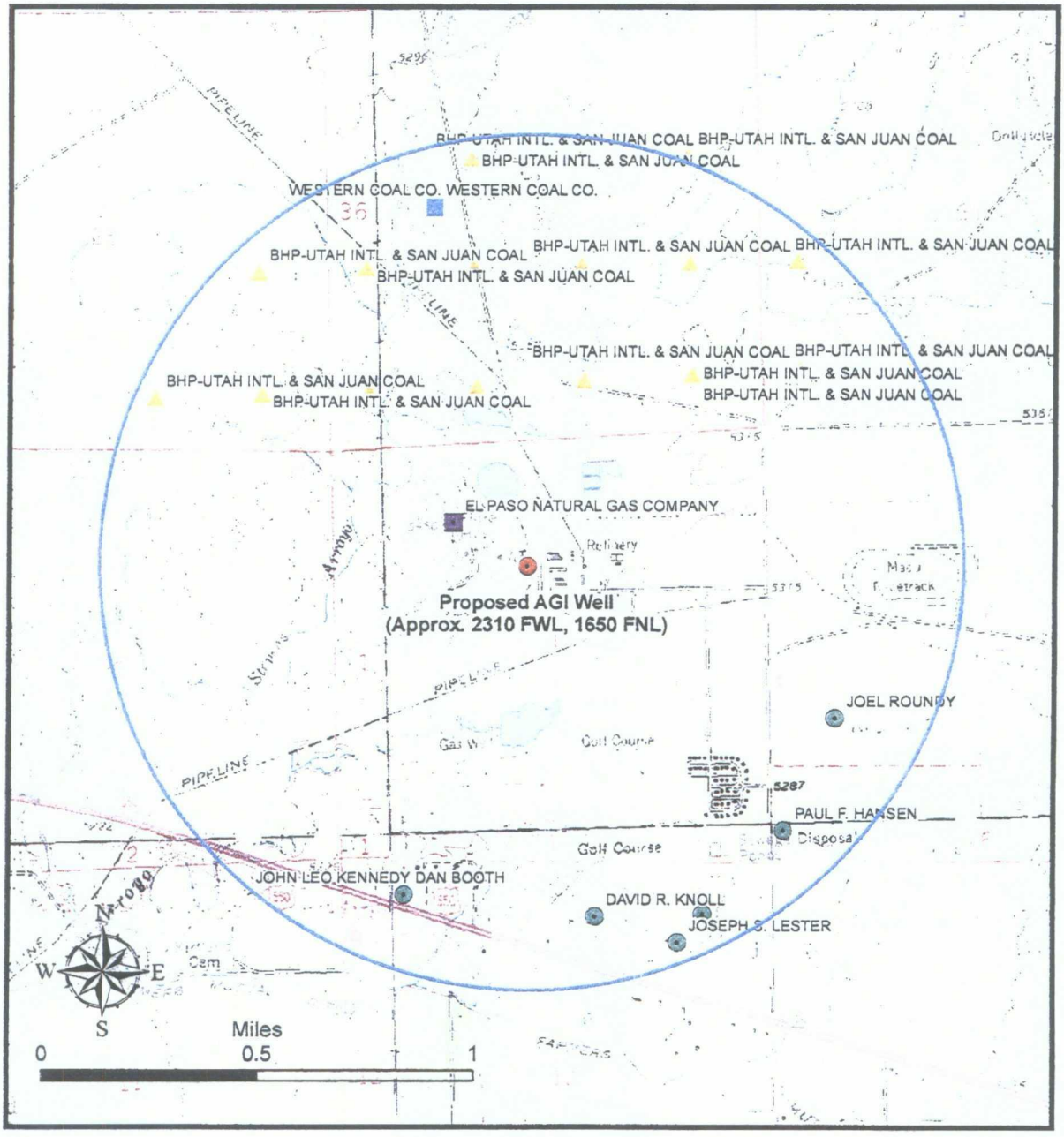
TABLE AND MAP OF WATER WELLS WITHIN ONE MILE AREA OF REVIEW

AVAILABLE ANALYSIS OF GROUNDWATER SAMPLES WITHIN ONE MILE AREA OF REVIEW (From 8/30/2006 Discharge Plan - GW-33)

Table A1: Wells from New Mexico State Engineers' Files Within One Mile of the Proposed AGI

FILE #	USE	OWNER	TWS	RNG	SEC	q1	q2	q3	Easting	Northing	Miles from AGI	Drill Date	Completion date	Well Depth	Water Depth
SJ 03411	DOMESTIC	JOEL ROUNDY	29N	14W	6	3	1	4	200357	4072780	0.80			60	
SJ 02071	DOMESTIC	JOHN LEO KENNEDY	29N	15W	12	1	1	2	198714	4072217	0.82	10/29/1986	10/30/1986	51	32
SJ 02081	DOMESTIC	DAN BOOTH	29N	15W	12	1	1	2	198714	4072217	0.82	11/10/1986	11/11/1986	42	30
SJ 00291	DOMESTIC	DAVID R. KNOLL	29N	15W	12	2	1		199420	4072091	0.84	8/4/1977	8/11/1977		110
SJ 01407	DOMESTIC	PAUL F. HANSEN	29N	14W	6	3	3	3	200141	4072370	0.86	7/1/1981	7/5/1981	70	52
SJ 01136	DOMESTIC	JOSEPH S. LESTER	29N	15W	12	2	2		199822	4072077	0.91	3/18/1980	3/26/1980	150	40
SJ 00225	DOMESTIC	JOSEPH S. LESTER	29N	15W	12	2	2	3	199721	4071976	0.95				
SJ 00971	EXPLORATORY	WESTERN COAL CO.	30N	15W	36	1	4	3	198976	4074792	0.86	4/4/1978	4/12/1978	532	102
SJ 00971	EXPLORATORY	WESTERN COAL CO.	30N	15W	36	1	4	3	198976	4074792	0.86	4/7/1978	4/11/1978	524	131
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	3	4		199097	4074115	0.44				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	3	4		199097	4074115	0.44				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	3		199499	4074111	0.45				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	3		199499	4074111	0.45				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	3	3		198695	4074119	0.55				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	4		199901	4074107	0.59				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	4		199901	4074107	0.59				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	3	2		199111	4074560	0.71				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	1		199514	4074541	0.71				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	35	4	4		198297	4074132	0.73				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	14W	31				200303	4074103	0.78				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	3	1		198709	4074579	0.79				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	4	2		199915	4074523	0.80				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	35	4	2		198310	4074587	0.92				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	14W	31				200317	4074504	0.94				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	35	4	3		197898	4074144	0.95				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	1	4		199124	4074969	0.96				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	2	3		199528	4074948	0.96				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	14W	31				200704	4074084	0.99				
SJ 02197	MINING	BHP-UTAH INTL. & SAN JUAN COAL	30N	15W	36	2	4		199929	4074927	1.02				
SJ 00027	OBSERVATION	EL PASO NATURAL GAS COMPANY	29N	15W	1	1	2	3	198980	4073608	0.20	9/14/1950	10/17/1950	1005	

NOTE: Plugged well shaded



FigureA1: Locations and Identification of Water Wells Within One Mile of Proposed Anadarko AGI Well

- One-Mile Radius from Proposed AGI
- Mining
- Domestic
- Exploration
- Observation

Anadarko Petroleum Corporation

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DISCHARGE PLAN RENEWAL APPLICATION

WESTERN GAS RESOURCES, INC.
SAN JUAN RIVER GAS PLANT
SAN JUAN COUNTY, NEW MEXICO

Submitted to:
New Mexico Energy, Mineral & Natural Resources Department
Oil Conservation Division

Submitted for:
Western Gas Resources, Inc.
1099 18th Street, Suite 1200
Denver, Colorado 80202

August 30, 2006

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

4 SITE CHARACTERISTICS

The physical characteristics of the plant site have been studied in detail as part of a previously completed land application feasibility study completed in 1986 and 1987. Detailed information concerning site soil and ground water characteristics are presented in the Phase I and II feasibility study reports, and should be consulted if more specific information is required than provided in the following summary.

4.1 Hydrologic Features

Surface water run-off from the plant site is expected to follow the local topographic contours. The topography slopes to the northwest across the majority of the site, although a south-southeasterly slope is apparent in the southeastern portion of the site. The topographic gradient across most of the site is relatively flat (on the order of 0.0 1 feet/foot), with the exception of moderate to steep topographic gradients encountered on the flanks of Flare Hill. The infiltration rate of the majority of the surficial deposits is high (Sheppard soil = 8.9 in/hr). Therefore, large-scale overland flow of surface runoff is not anticipated to occur under all but the most extreme storm or flood events.

Surface water bodies within a one-mile radius of the site include 1) the Stevens Arroyo (0.2 miles west), 2) the Farmers Mutual Ditch (0.5 miles south), and 3) small fresh water ponds located on the golf course south of the site. The Stevens Arroyo is an intermittent watercourse. The San Juan River is located greater than one mile south of the plant site.

Based on New Mexico State Engineer well records, ground water wells in the area are generally completed within the shallow alluvial aquifer at approximately 75 feet below ground surface and are permitted for "domestic" water usage. Ground water is anticipated to discharge as a seep approximately 0.75 miles south of the site where the base of the alluvial aquifer is exposed.

Shallow ground water is contained within alluvial terrace gravel deposits beneath the site. The alluvial sediments are underlain by greenish grey sediments of the Lower Shale Member of the Kirtland Shale. The Kirtland Shale is exposed in the extreme northern and western portions of the site, and approximately 0.5 miles south of the site. The thickness of the alluvial sediments varies from zero feet in the extreme northern and western portions of the site, to greater than 70 feet in the southern and eastern portions of the site. Depth to ground water varies across the site. It is estimated to be less than ten feet below the surface in the extreme northern and western portions of the site where the alluvial sediments are thin to nonexistent and greater than 50 feet in the extreme southern and eastern portions of the site. Regional ground water flow is to the southwest beneath the majority of the site, with local south to southeasterly flow in the southeast portion of the site.

4.2 Surface and Groundwater Quality

Groundwater samples from on-site monitoring wells and off-site local wells were analyzed for various water quality parameters as part of the Phase I and II feasibility study in 1987. Results of these analyses indicate that WQCC standards for TDS, sulfate, and manganese are exceeded in on-site wells. TDS, sulfate, and chloride content exceed WQCC standards in all

off-site wells. The average TDS for on-site wells is 4,500 mg/L and is 2,775 mg/L for local wells.

Background ground water quality can be assessed from water quality data obtained from the Daley well (the only local well not located down gradient from the plant site). It is interesting to note that the TDS concentration in the Daley well (4,300 mg/L) is higher than that of the local wells located down gradient of the plant site and is near the average TDS concentration for on-site wells (4,500 mg/L). This fact, in conjunction with the high chloride concentrations in the Daley well, suggests that background water quality is comparable to that beneath the plant site.

Surface water quality samples have been obtained from the Stevens Arroyo located west of the plant site. Background water quality from Stevens Arroyo reportedly exceeds 10,000 mg/L for TDS and, therefore, exceeds the WQCC limit for surface water.

5 CLOSURE PLAN COMMITMENT

WGR will commit to the preparation of a closure plan in accordance with the New Mexico Water Quality Control Commission regulation number 3107A.11. At this time, WGR has no plans to close the existing evaporation pond or the facility.

APPENDIX B

ACTIVE OIL AND GAS WELL DATA

PERMANENTLY PLUGGED OIL AND GAS WELL DATA

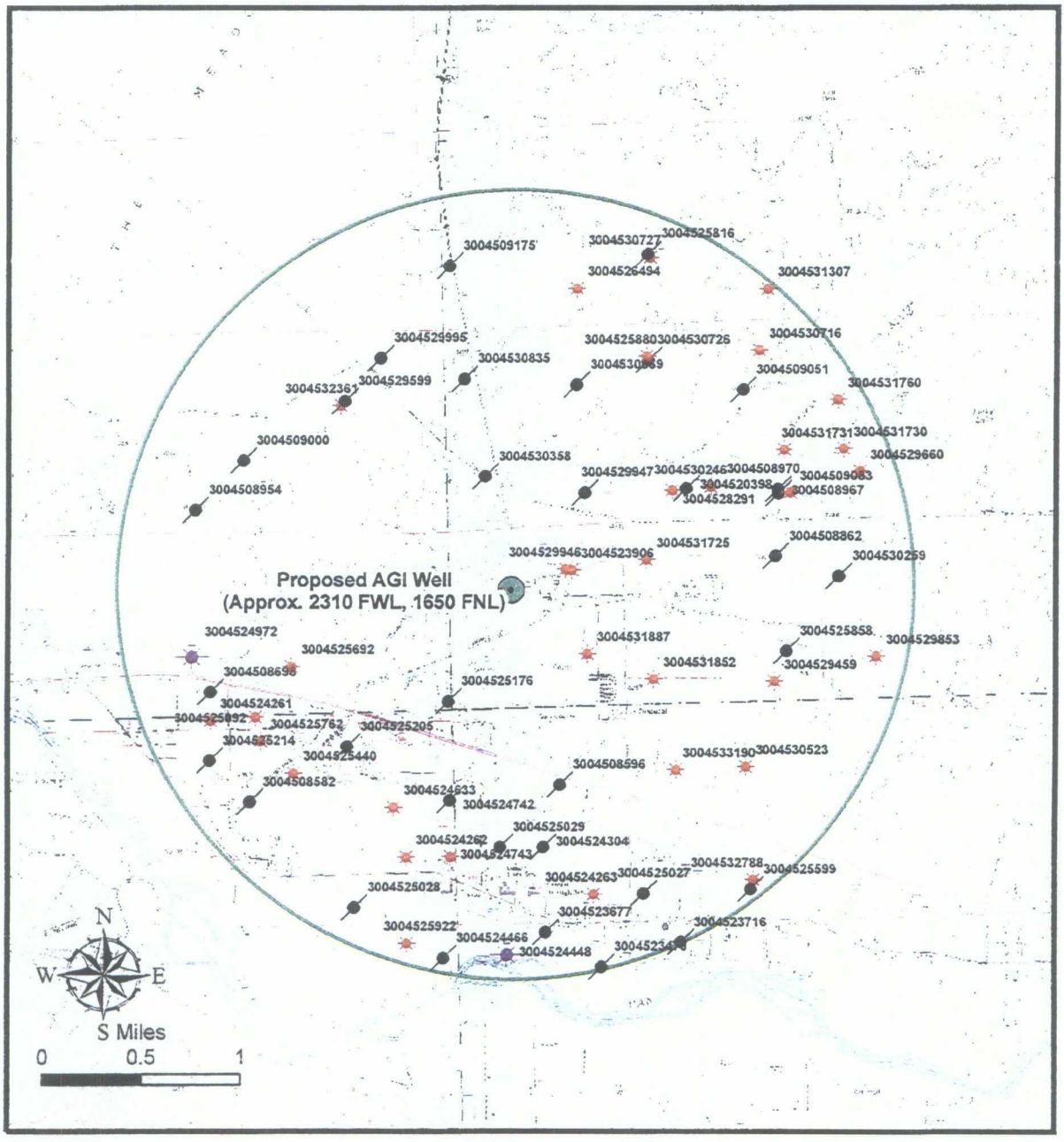

Figure B1: Locations and Identification of Wells Within Two Miles of Proposed Anadarko AGI Well

- Two Mile Circle From Proposed AGI
- Active
- Plugged
- Zone Plugged

Anadarko Petroleum Corporation

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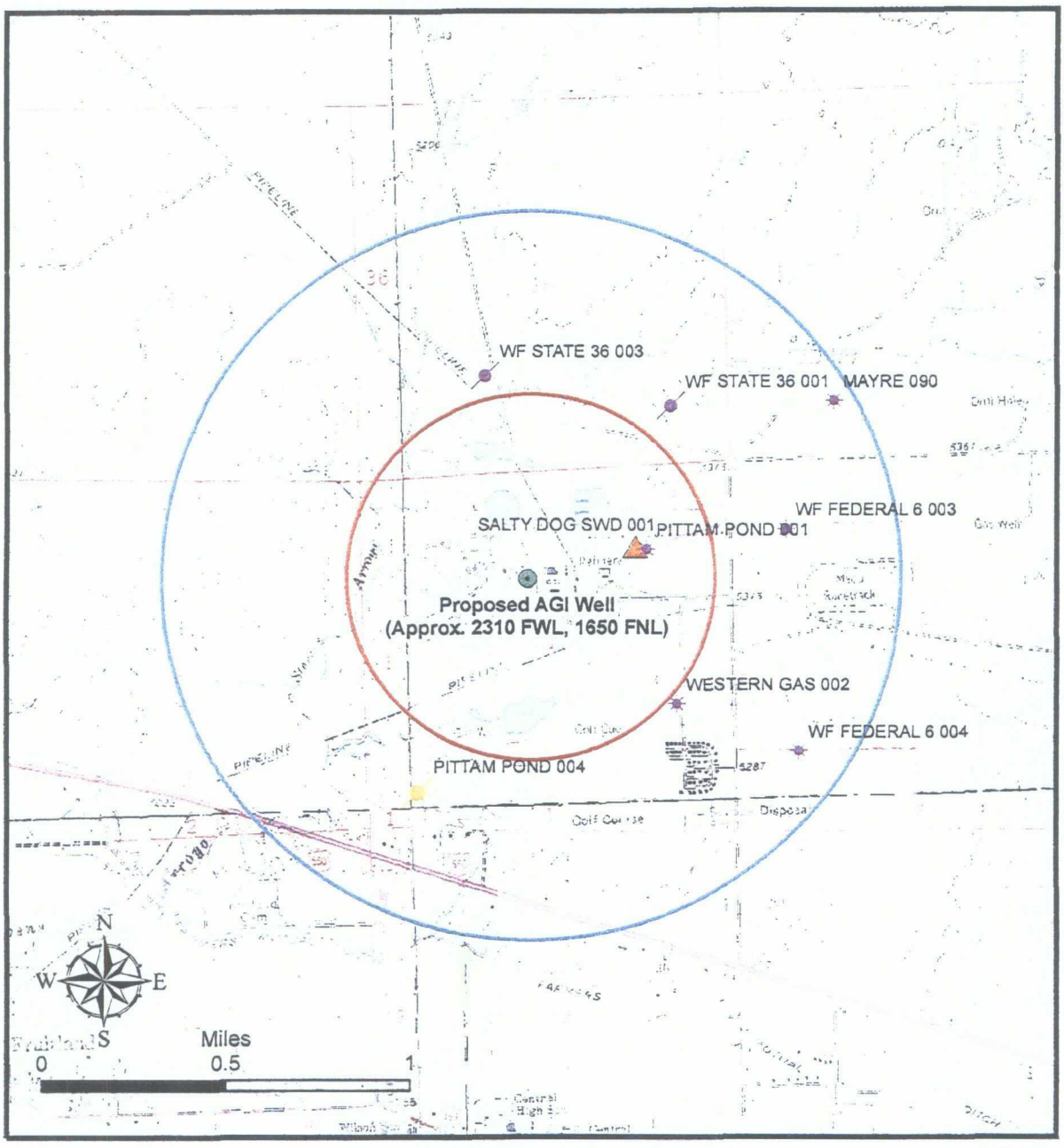

Figure B2: Locations and Identification of Wells Within One Mile of Proposed Anadarko AGI Well

- One-Mile Radius from Proposed AGI
- Half-Mile Radius from Proposed AGI
- FRUITLAND, Active
- FRUITLAND, Plugged
- MENEFEE, Active
- GALLUP, Plugged

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Table B1: List of Wells Within Two Miles of Anadarko Proposed AGI #1												
API NUMBER	WELL NAME	COUNTY	UTMN	UTME			STATUS	OPERATOR	SPUD DATE	PLUG DATE	DEPTH	Distance (Miles)
3004529946	**SALTY DOG SWD 001**	**San Juan**	**4071298.21**	**735328.75**	**527.0263434**	**1728.751812**	**Active**	**XTO Energy, Inc.**	**9/3/1999**		**3420**	**0.33**
3004523906	**PITTAM POND 001**	**San Juan**	**4071290.23**	**735379.49**	**572.8370039**	**1879.01994**	**Active**	**XTO Energy, Inc.**	**11/27/1979**		**660**	**0.36**
3004531887	**WESTERN GAS 002**	**San Juan**	**4070609.62**	**735510.08**	**852.5058304**	**2796.389625**	**Active**	**XTO Energy, Inc.**	**1/31/2004**		**730**	**0.53**
3004530358	**WF STATE 36 003**	**San Juan**	**4072052.9**	**734675.56**	**940.8294232**	**3086.108674**	**Plugged**	**LANCE OIL & GAS COMPANY, INC.**	**9/15/2000**	**5/27/2007**	**749**	**0.58**
3004525176	**PITTAM POND 004**	**San Juan**	**4070217.54**	**734377.9**	**1014.289535**	**3327.072534**	**Plugged**	**DUGAN PRODUCTION CORP**	**9/21/1981**	**8/17/1992**	**4726**	**0.63**
3004529947	**WF STATE 36 001**	**San Juan**	**4071918.88**	**735484.19**	**1028.057698**	**3372.234861**	**Plugged**	**LANCE OIL & GAS COMPANY, INC.**	**7/26/1999**	**4/11/2007**	**802**	**0.64**
3004531725	**WF FEDERAL 6 003**	**San Juan**	**4071377.12**	**735983.73**	**1179.979215**	**3870.56782**	**Active**	**XTO Energy, Inc.**	**1/13/2004**		**815**	**0.73**
3004531852	**WF FEDERAL 6 004**	**San Juan**	**4070400.53**	**736040.07**	**1409.505958**	**4623.461444**	**Active**	**XTO Energy, Inc.**	**2/20/2004**		**770**	**0.88**
3004528291	**MAYRE 090**	**San Juan**	**4071939.55**	**736191.28**	**1585.513602**	**5200.801716**	**Active**	**DUGAN PRODUCTION CORP**	**12/10/1990**		**760**	**0.99**
3004508596	FOUTZ 001	San Juan	4069531.29	735287.29	1657.743083	5437.72886	Plugged	EPNG PRODUCTS CO	7/7/1961	7/30/1961	5367	1.03
3004520398	MAYRE 002	San Juan	4071951.97	736301.22	1686.839124	5533.169694	Plugged	DUGAN PRODUCTION CO	1/28/1969	9/20/1971	749	1.05
3004530835	WF STATE 36 004	San Juan	4072846.36	734500.83	1752.738565	5749.333042	Plugged	LANCE OIL & GAS COMPANY, INC.	1/17/2003	5/49/2007	720	1.09
3004530069	WF STATE 36 002	San Juan	4072797.27	735416.95	1771.954953	5812.366637	Plugged	LANCE OIL & GAS COMPANY, INC.	12/29/1999	4/17/2007	800	1.10
3004524742	MOORE 001	San Juan	4069403.44	734388.73	1777.46212	5830.431245	Plugged	PETRO MEX LLC	6/19/1981	8/19/2004	4700	1.10
3004525205	PITTAM POND 003	San Juan	4069845.14	733562.6	1801.910147	5910.625666	Plugged	DUGAN PRODUCTION CORP	7/7/1982	1/8/1998	4660	1.12
3004525692	HORSESHOE 001	San Juan	4070507.36	733112.72	1825.914929	5989.36615	Active	PETRO ENERGY INC	5/9/1983		4712	1.13
3004530246	MAYRE 090R	San Juan	4071967.61	736497.46	1867.372631	6125.355705	Active	DUGAN PRODUCTION CORP	6/25/2000		820	1.16
3004524633	TRS-EVI 001	San Juan	4069350.22	733939.84	1985.95322	6514.323754	Active	PETRO MEX LLC	10/23/1980		4700	1.23
3004532361	PSEUDO FRUITLAND COAL MINE GAS 002	San Juan	4072631.65	733507.66	2005.298725	6577.780879	Active	DUGAN PRODUCTION CORP			NA	1.25
3004529599	PITTAM POND 005	San Juan	4072664.24	733534.47	2012.523247	6601.478754	Plugged	DUGAN PRODUCTION CORP	6/13/1998	8/13/2004	4835	1.25
3004533190	ROPCO 7 002	San Juan	4069656.86	736224.94	2024.476175	6640.686749	Active	LANCE OIL & GAS COMPANY, INC.	9/13/2005		735	1.26
3004525029	KIRTLAND 009	San Juan	4069021.28	734799.87	2103.950312	6901.377813	Plugged	PETRO MEX LLC	5/28/1981	7/2/2004	4722	1.31
3004524304	KIRTLAND 005	San Juan	4069022.85	735152.3	2126.562558	6975.550502	Plugged	PETRO MEX LLC	5/20/1980	1/13/2005	4700	1.32
3004529995	PITTAM POND 090	San Juan	4073015.9	733823.37	2142.620131	7028.222555	Plugged	DUGAN PRODUCTION CORP	12/13/1999	8/31/2005	476	1.33
3004525880	MESA TWIN MOUNDS 31 001	San Juan	4072999.2	735993.49	2205.449759	7234.3163	Plugged	CONOCO INC	4/13/1984	9/7/1995	5618	1.37
3004508862	NM FEDERAL K 001	San Juan	4071405.22	737025.1	2211.921802	7255.545895	Plugged	SUNRAY MID CON	5/2/1959	5/16/1967	5680	1.37
3004524743	BOB BLANCHE 001	San Juan	4068948.77	734400.47	2218.407783	7276.821211	Active	PETRO MEX LLC	12/31/1980		4670	1.38
3004530726	WF FEDERAL 31 002	San Juan	4073029.4	735983.17	2225.811104	7301.105582	Active	LANCE OIL & GAS COMPANY, INC.	10/18/2001		880	1.38
3004525092	DAVIE 001	San Juan	4070094.29	732826.63	2253.854964	7393.095055	Active	NORTHSTAR OIL & GAS	6/27/1981		4635	1.40
3004525440	HATCH 001	San Juan	4069632.52	733135.64	2258.703628	7408.999641	Active	V & R PRODUCTION, INC	10/13/1982		5174	1.40
3004529459	BUSHMAN FEDERAL 6 001	San Juan	4070383.21	737015.73	2307.227249	7568.166821	Active	LANCE OIL & GAS COMPANY, INC.	5/29/1997		800	1.43
3004525762	GARY C 001	San Juan	4069893.29	732866.4	2318.784743	7606.077714	Active	DUGAN PRODUCTION CORP	7/18/1983		4615	1.44
3004524262	DOROTHY 001	San Juan	4068944.47	734039.12	2319.867456	7609.629231	Active	PETRO MEX LLC	4/25/1980		4670	1.44
3004525858	BUSKEN 001	San Juan	4070630.22	737113.67	2335.677541	7661.489471	Plugged	VERYL F MOORE	12/26/1983	9/21/1991	949	1.45
3004508967	HARRIS ET AL 001	San Juan	4071915.17	737043.84	2349.687106	7707.443644	Plugged	J J HARRIS ET AL	4/26/1955	7/6/1955	2956	1.46
3004508970	PIPKIN 001	San Juan	4071948.65	737039.92	2357.483168	7733.016289	Plugged	CARROLL	4/14/1954	5/2/1965	3615	1.46
3004509000	NM FEDERAL K 003	San Juan	4072181.36	732718.35	2362.030159	7747.931328	Plugged	SUNRAY DX OIL CO	2/22/1963	5/23/1963	4624	1.47
3004530523	ROPCO 7 001	San Juan	4069682.67	736788.82	2431.743198	7976.604038	Active	LANCE OIL & GAS COMPANY, INC.	4/11/2002		690	1.51
3004509083	MAYRE 001	San Juan	4071922.87	737141.67	2444.54339	8018.591228	Active	DUGAN PRODUCTION CORP	11/30/1953		812	1.52
3004508698	DONELLA 001	San Juan	4070292.43	732457.52	2515.269392	8250.58666	Plugged	R A CRANE JR	7/26/1961	1/11/1969	4494	1.56
3004509051	E H PIPKIN 002	San Juan	4072759.35	736755.92	2525.156813	8283.019377	Plugged	L H PIPKIN	10/23/1954	12/18/1963	820	1.57
3004526494	KELLY 001	San Juan	4073587.27	735419.74	2531.676982	8304.406836	Active	REDWOLF PRODUCTION INC	7/31/1985		5634	1.57
3004531731	MAYRE 090S	San Juan	4072272.74	737093	2536.523429	8320.304153	Active	DUGAN PRODUCTION CORP	9/4/2003		940	1.58
3004524972	FRUITLAND 001	San Juan	4070579.6	732308.22	2581.061814	8466.398963	Zone Plugged	PETRO MEX LLC	4/6/1981		4600	1.60
3004508954	NM FEDERAL K 004	San Juan	4071776.37	732330.14	2584.295575	8477.006344	Plugged	SUNRAY DX OIL CO	3/19/1963	5/16/1967	4660	1.61
3004524263	BARBARA 001	San Juan	4068642.77	735562.91	2587.886787	8488.786238	Active	NORTHSTAR OIL & GAS	11/4/1980		4700	1.61
3004524261	NEILSON 001	San Juan	4070063.77	732459.34	2598.264857	8522.828385	Active	V & R PRODUCTION, INC	1/27/1981		4556	1.61
3004509175	G H TALCOTT #1 001	San Juan	4073761.89	734379.72	2675.227562	8775.28145	Plugged	G H TALCOTT	8/15/1943	1/12/2007	800	1.66

Note: Wells Within One Mile Area of Review Are Shaded

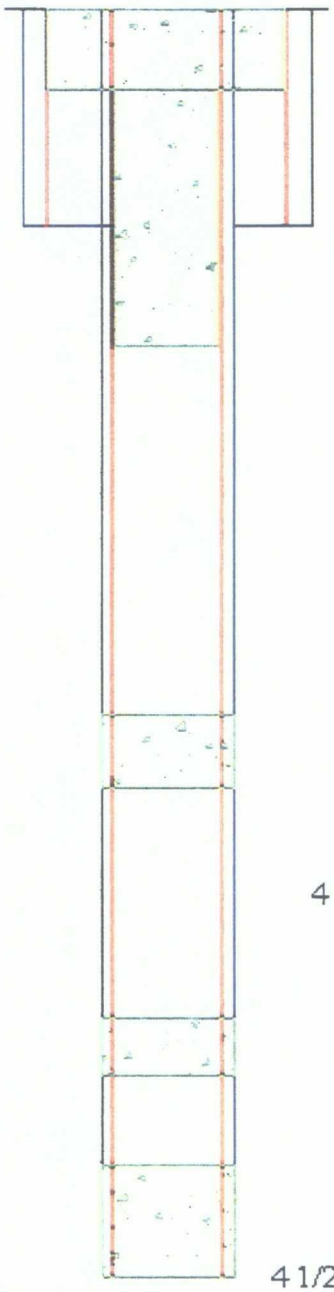
API NUMBER	WELL NAME	COUNTY	UTMN	UTME			STATUS	OPERATOR	SPUD DATE	PLUG DATE	DEPTH	Distance (Miles)
3004508582	BRIMHALL 001	San Juan	4069389.79	732776.61	2689.139642	8820.915855	Plugged	EARL RODMAN	12/6/1961	12/29/1961	4400	1.67
3004530259	WF FEDERAL 5 001	San Juan	4071241.27	737536.68	2708.177058	8883.362384	Plugged	RICHARDSON OPERATING CO	9/11/2000	8/29/2002	905	1.68
3004525027	KIRTLAND 010	San Juan	4068642.64	735967.24	2730.046246	8955.097697	Plugged	PETRO MEX LLC	6/8/1981	1/20/2005	4700	1.70
3004525214	JOHN H. BRIMHALL 001	San Juan	4069728.21	732450.52	2760.019445	9053.415782	Plugged	NASSAU RESOURCES INC	11/30/1981	7/26/1993	4488	1.71
3004523677	KIRTLAND 002	San Juan	4068324.95	735174.74	2821.070221	9253.674538	Plugged	PETRO MEX LLC	8/11/1979	7/26/2004	4672	1.75
3004530716	WF FEDERAL 31 001	San Juan	4073080.75	736887.05	2837.657426	9308.083887	Active	LANCE OIL & GAS COMPANY, INC.	10/8/2001		940	1.76
3004525028	KIRTLAND 008	San Juan	4068528.79	733620.96	2864.350392	9395.642154	Plugged	PETRO MEX LLC	5/11/1981	8/2/2005	4700	1.78
3004530727	WF FEDERAL 30 003	San Juan	4073835.98	736007.36	2955.2048	9693.662785	Active	LANCE OIL & GAS COMPANY, INC.	10/15/2001		1000	1.84
3004525816	MESA TWIN MOUNDS 002	San Juan	4073857.59	735984.99	2966.267188	9729.949629	Plugged	CONOCO INC	10/14/1983	9/14/1995	5700	1.84
3004531730	BI KNOBS COM 003	San Juan	4072280.04	737575.27	2977.437696	9766.591131	Active	DUGAN PRODUCTION CORP	9/23/2003		960	1.85
3004524448	KIRTLAND 006	San Juan	4068136.51	734860.35	2988.63412	9803.31764	Zone Plugged	PETRO MEX LLC	9/5/1980		4700	1.86
3004525922	KIRTLAND 14 001	San Juan	4068238.53	734042.54	2992.219616	9815.078786	Active	PETRO MEX LLC	3/23/1984		4627	1.86
3004529660	BI KNOBS COM 090	San Juan	4072097.4	737707.03	3035.96942	9958.586892	Active	DUGAN PRODUCTION CORP	11/3/1998		915	1.89
3004524466	KIRTLAND 007	San Juan	4068112.25	734341.84	3052.202495	10011.83462	Plugged	PETRO MEX LLC	9/21/1980	8/11/2004	4726	1.90
3004529853	WF FEDERAL 5 002	San Juan	4070586.64	737838.17	3054.980016	10020.94545	Active	LANCE OIL & GAS COMPANY, INC.	1/14/2000		860	1.90
3004532788	ROPCO 7 004	San Juan	4068761.61	736850.32	3108.579347	10196.76197	Active	LANCE OIL & GAS COMPANY, INC.	4/10/2005		692	1.93
3004531760	BI-KNOBS 091S	San Juan	4072680.31	737526.79	3112.27777	10208.89354	Active	DUGAN PRODUCTION CORP	7/22/2003		985	1.93
3004525599	HYNES KENNEDY 7 001	San Juan	4068677.53	736827.67	3158.607366	10360.86388	Plugged	LOBO PRODUCTION	3/11/1983	5/8/1996	4847	1.96
3004523470	KIRTLAND 001	San Juan	4068041.94	735625.72	3183.840266	10443.63284	Plugged	PETRO MEX LLC	4/18/1979	12/20/2004	4670	1.98
3004523716	KIRTLAND 004	San Juan	4068243.02	736264.03	3218.599649	10557.65057	Plugged	PETRO MEX LLC	9/5/1979	1/7/2005	4705	2.00
3004531307	WF FEDERAL 30 002	San Juan	4073582.68	736954.29	3247.853354	10653.60857	Active	LANCE OIL & GAS COMPANY, INC.	2/21/2005		1135	2.02

Note: Wells Within One Mile Area of Review Are Shaded

PLUGGING DOCUMENTATION

Pittam Pond #4
API# 3004525176

Pittam Pond #4
API 3004525176
As Plugged & Abandoned 8/17/1992



67 cu. ft. "B" Cement down Bradenhead to Surface

Surface Elev. 5320' GR

35 cu ft. "B" Cement
140' to 540'

12 1/4" Borehole Surface to 225'
8 5/8" Casing @ 225' w/ 200 SX Concrete

7 7/8." Borehole 225' to 4733'

18 cu ft. "B" Cement
2030' to 2180'

4 1/2" Casing to 4733'

18 cu ft. "B" Cement
4090' to 4190'

24 cu ft. "B" Cement
4240' to 4737'

4 1/2" Set @ 4733 w/1325 cu ft. Cement

Plugging Diagram for Pittam Pond #4 API #3004525176
690' FSL, 690 ' FWL, Sec. 1, T29N, R15W
Cha Cha Gallup Well Drilled 9/21/81, P&A 8/17/1992

5 BLM 1 File 1 Celsius-Den 1 Celsius-SLC

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.: NM 10758
6. If Indian, Allottee or Tribe Name:
7. If Unit or CA, Agreement Designation:

1. Type of Well: [X] Oil Well [ ] Gas Well [ ] Other P&A
8. Well Name and No.: Pittam Pond #4
2. Name of Operator: Dugan Production Corp.
9. API Well No.: 30-045-25176
3. Address and Telephone No.: P.O. Box 420, Farmington, NM 87499 (505) 325-1821
10. Field and Pool, or Exploratory Area: Cha Cha Gallup
4. Location of Well (Footage, Sec., T., R., M., or Survey Description): 690' FSL & 690' FWL Sec. 1, T29N, R15W
11. County or Parish, State: San Juan, NM

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
[ ] Notice of Intent	[X] Abandonment	[ ] Change of Plans
[X] Subsequent Report	[ ] Recompletion	[ ] New Construction
[ ] Final Abandonment Notice	[ ] Plugging Back	[ ] Non-Routine Fracturing
	[ ] Casing Repair	[ ] Water Shut-Off
	[ ] Altering Casing	[ ] Conversion to Injection
	[ ] Other	[ ] Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Plugged well as follows:
1. Load hole with mud.
2. Spot 24 cu. ft. class "B" cement from 4140-3900'. Wait 3 hours. T.I.H. Tag cement top @ 4242'.
3. T.O.H. to 4190'. Spot 18 cu. ft. plug 4190-4090'.
4. T.O.H. to 2180'. Spot 18 cu. ft. plug 2180-2030'.
5. T.O.H. to 540'. Est. rate down bradenhead. 3 BPM @ 300 psi. Spot 35 cu. ft. plug 540-140'.
6. T.O.H. with tubing. Pump 67 cu. ft. down bradenhead.
7. Fill 4½" casing 50' - to surface.
8. Cut off casing and set dry hole marker. Job complete 8-17-92.

Approved as to plugging of the well bore.
Liability under bond is retained until
surface restoration is completed.

92 AUG 21 AM 11:16
070 FARMINGTON, N.M.
RECEIVED
BLM

14. I hereby certify that the foregoing is true and correct
Signed John Alexander (John Alexander) Title Operations Manager Date 8/19/92

(This space for Federal or State office use)

Approved by _____ Title _____ Date _____
Conditions of approval, if any:

APPROVED
AUG 24 1992
AREA MANAGER

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

NMOCD

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5 BLM 1 File 1 Celsius-Den 1 Celsius-SLC

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.: NM 10758
6. If Indian, Allottee or Tribe Name:
7. If Unit or CA, Agreement Designation:

1. Type of Well: [X] Oil Well [ ] Gas Well [ ] Other
2. Name of Operator: Dugan Production Corp.
3. Address and Telephone No.: P.O. Box 420, Farmington, NM 87499 (505) 325-1821
4. Location of Well (Footage, Sec., T., R., M., or Survey Description): 690' FSL & 690' FWL Sec. 1, T29N, R15W
8. Well Name and No.: Pittam Pond #4
9. API Well No.: 30-045-25176
10. Field and Pool, or Exploratory Area: Cha Cha Gallup
11. County or Parish, State: San Juan, NM

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
[X] Notice of Intent	[X] Abandonment	[ ] Change of Plans
[ ] Subsequent Report	[ ] Recompletion	[ ] New Construction
[ ] Final Abandonment Notice	[ ] Plugging Back	[ ] Non-Routine Fracturing
	[ ] Casing Repair	[ ] Water Shut-Off
	[ ] Altering Casing	[ ] Conversion to Injection
	[ ] Other _____	[ ] Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Plug by spotting Class B + 6% gel plugs as follows:

1. 100' plug across Gallup top @ 4140'.
2. 100' plug across Mesa Verde top @ 2180'.
3. 255' plug across Pictured Cliffs top @ 380, Fruitland top @ 350, and surface casing @ 225.
4. 50' surface plug.

Plugs will be spotted using 8.34 lb./gal., 40 sec./qt. viscosity mud. Cha Cha Gallup virgin reservoir pressure was 1630 psi. The 8.34 lb./gal. mud will provide well control.

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

JUL 10 1992
OIL CON. DIV.
DIST. 3

14. I hereby certify that the foregoing is true and correct

Signed John Alexander (John Alexander) Title Operations Manager Date 6/30/92

(This space for Federal or State office use)

Approved by _____ Title _____ Date APPROVED AS AMENDED

Conditions of approval, if any:

JUL 08 1992

AREA MANAGER

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

NMOCD

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IN REPLY REFER TO
(019)

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT
FARMINGTON RESOURCE AREA
1235 LA PLATA HIGHWAY
FARMINGTON, NEW MEXICO 87401

Attachment to Notice of

Intention to Abandon

Re: Permanent Abandonment

Well: 4 Pittam Bond

CONDITIONS OF APPROVAL

1. Plugging operations authorized are subject to the attached "General Requirements for Permanent Abandonment of Wells on Federal Leases."

2. Mark Kelly with the Farmington Office is to be notified at least 24 hours before the plugging operations commence (505) 599-8907.

3. Blowout prevention equipment is required.

4. The following modifications to your plugging program are to be made (when applicable):

a) Spot Precured Cliffs plug from 540 - 175'

b) Place a plug from 0 - 275' outside 4½" Casing

Office Hours: 7:45 a.m. to 4:30 p.m.

GENERAL REQUIREMENTS FOR
PERMANENT ABANDONMENT OF WELLS ON FEDERAL AND INDIAN LEASES
FARMINGTON RESOURCE AREA

1. Secure prior approval either on a Sundry Notice (Form 3160-5) or verbally from the Fluids Drilling & Production Section at this office before changing the approved plugging program.

2. Plugging equipment used shall have separate mixing and displacement pumps and a calibrated tank to assure proper displacement of plugs. The Operator is responsible for providing all measuring devices needed to assure proper measurement of materials being used.

3. A proper tank or pit will be used to contain all fluids pumped from the well during plugging operations. Unattended pits are to be fenced.

4. All cement plugs are to be placed through tubing (or drillpipe) and shall be a minimum of 100 feet in length with 50% excess inside casing or 100% excess when plug is set in open hole or squeezed into perforations. 15.6#/gal slurry weight is to be used when using class B neat cement or when $CaCl_2$ is used. Use the recommended slurry weight of other type cements when they are used (Class C, Pozzolan etc.).

5. Any cement plugs placed when well is not full of fluid, or when well may be taking fluid, (i.e. across perfs-unless bridge plug or retainer is used, across bad csg., or fresh water formations) will be tagged (touched) after cement has set to verify proper location.

5a. Testing The first plug below the surface plug shall generally be tested by either tagging the plug with the working pipe string, or pressuring to a minimum pump (surface) pressure of 1000 psig, with no more than a 10 percent drop during a 15-minute period (cased hole only). If the integrity of any other plug is questioned, it must be tested in the same manner. Also, any cement plug which is the only isolating medium for a fresh water interval or a zone containing a valuable mineral deposit should be tested by tagging with the drill string.

6. Mud must be placed between plugs. Plugging mud is to be made up with a minimum of 15 lbs/bbl of sodium bentonite, and a nonfermenting polymer. Minimum consistency of plugging mud must be 9 lbs/gal and with a minimum viscosity of 50 sec/qt. Fresh water is to be utilized for mixing mud.

7. Following the placement of a cement plug, the withdrawl rate for at least the length of the cement plug shall not exceed 30 ft/min, in order to minimize the contamination of the plug.

8. Within 30 days after plugging work is completed, file a Sundry Notice (Subsequent Report of Abandonment, Form 3160-5), in quintuplicate with Area Manager, Bureau of Land Management, 1235 La Plata Highway, Farmington, NM 87401. The report should give in detail the manner in which the plugging work was carried out, the extent (by depths) of cement plugs placed, and the size and location (by depths) of casing left in the well. Show date well was plugged.

9. All permanently abandoned wells are to be marked with a regulation marker (4" pipe extending 4' above the ground line) containing the information as specified in 43 CFR 3162.6(d). Unless otherwise approved.

10. After plugging work is completed the surface is to be rehabilitated in accord with instructions from the Fluids Surface Management Section of the Farmington Resource Area Office.

All above are minimum requirements. The period of liability under the bond of record will not be terminated until the lease is inspected and surface work approved.

Please advise this office when the well location is ready for final inspection.

Failure to comply with the above conditions of approval may result in an assessment for noncompliance and/or a Shut-in Order being issued pursuant to 43 CFR 3163.1.

You are further advised that any instructions, orders or decisions issued by the Bureau of Land Management are subject to administrative review pursuant to 43 CFR 3165.3 and appeal pursuant to 43 CFR 3165.4 and 43 CFR 4.700.

5 BLM 1 File 1 Celsius-Den 1 Celsius-SLC

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED
BLM

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

070 FARMINGTON, NM

5. Lease Designation and Serial No.
NM 10758

6. If Indian, Allottee or Tribe Name

7. If Unit or CA, Agreement Designation

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other P&A

8. Well Name and No.
Pittam Pond #4

2. Name of Operator
Dugan Production Corp.

9. API Well No.
30-045-25176

3. Address and Telephone No.
P.O. Box 420, Farmington, NM 87499 (505) 325-1821

10. Field and Pool, or Exploratory Area
Cha Cha Gallup

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
690' FSL & 690' FWL
Sec. 1, T29N, R15W

11. County or Parish, State
San Juan, NM

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
☐ Notice of Intent	☐ Abandonment	☐ Change of Plans
	☐ Recompletion	☐ New Construction
☐ Subsequent Report	☐ Plugging Back	☐ Non-Routine Fracturing
	☐ Casing Repair	☐ Water Shut-Off
☒ Final Abandonment Notice	☐ Altering Casing	☐ Conversion to Injection
	☐ Other _____	☐ Dispose Water

(Note: Report results of multiple completions on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

RECEIVED
AUG - 9 1995
OIL CON. DIV.
DIST. 3

Location ready for final abandonment inspection.

14. I hereby certify that the foregoing is true and correct

Signed John Alexander Title Operations Manager ACCEPTED FOR RECORD Date 8/2/95
(This space for Federal or State office use)
John Alexander

Approved by _____ Title _____ Date AUG 7 1995
Conditions of approval, if any:

FARMINGTON DISTRICT OFFICE

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

NMOCD

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PLUGGING DOCUMENTATION

WF State 36 #3
API# 3004530358

WF State 36 #3

Proposed P&A

Basin Fruitland Coal

1385' FSL & 1805' FWL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-30358

Lat: N_____ / Long: W _____

Today's Date: 1/31/07
Spud: 9/5/00
Comp: 2/18/01
Elevation: 5275' Gl
5280' KB

8.75" Hole

TOC at surface, circ 10 bbls.

7", 20#, Casing set @ 130'
50 sxs cement, circulated to surface

Plug #3: TOC – Surface
Type III cement, 25 sxs

Coal Zone Depths from KB - Neutron Log

Fruitland Coal #9 Seam @ 385' to 398'

Plug #2: 503' – 320'
Type III cement, 30 sxs
100% excess with 15%
salt (by weight of water)

Fruitland Coal #8 Seam @ 475' to 500'

Fruitland Coal Perforations:
480' – 495'

Pictured Cliffs @ 506'

Plug #1: PBTD – 503'
Type III cement, 19 sxs

6.25" Hole

4.5", 10.5# Casing @ 794'
Cemented with 80 sxs (138 cf),
Circulate 10 bbls to surface

TD 800'
PBTD 739'

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A-PLUS WELL SERVICE, INC.

P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

PLUG AND ABANDONMENT PROCEDURE

January 31, 2007

WF State 36 #3

Basin Fruitland Coal
1385' FSL and 1805' FWL, Section 36, T30N, R15W
San Juan County, New Mexico / API 30-045-30358
Lat: N _____ / Lat: W _____

Note: The stabilizing wellbore fluid will be: drilling mud with sufficient weight to balance all exposed formation pressures. Cement is ASTM Type III mixed at 14.8 ppg with 1.32 cf/sx; neat or with 15% salt by weight of water (for expansion, MSHA requirement through the mined coal zone). Excess cement volumes are specified for each plug below.

- **All personnel entering the BHP coalmine property must take the Mine Hazards class at the well site at commencement of the project.** (Everyone)
- **A-Plus employees or sub-contractors working on the project will attend field safety training class and receive a 5023 certificate.** (Rig hands, wireline operators, fisherman and Supervisors)
- **All vehicles will be safety inspected daily upon entering the mine.**

PROCEDURE:

1. This project will require a C-103 pit request filed with the NMOCD.

2. Test the rig anchors; replace if necessary. Prepare a lined earthen pit; 10' x 20' x 6' for drilling mud and cementing waste fluid. Set a water storage tank on location and fill with fresh water. Set a mud pit and power swivel on location for drilling operations. Have a portable toilet on location.

3. Comply with all applicable **MSHA**, NMOCD, BLM, Lance and BHP Billiton safety regulations. MOL and RU daylight pulling unit. Conduct safety meeting for all personnel on location. Lay relief line to the pit. Pull rods if present.

4. ND wellhead and install BOP and companion flange. Function test the BOP. TOH and tally 2.375" tubing, total 474'. TIH with tubing from the well and tag PBTD or as deep as possible. If tag depth is not greater than 556', then circulate out fill as necessary.

5. **Plug #1 (Pictured Cliffs top, PBTD – 503'):** With the end of tubing at 556' or deeper, then mix 19 sxs (or less depending on the actual PBTD) Type III neat cement or with 15% salt by weight and spot a balanced plug from PBTD up to 503' to cover the Pictured Cliffs top. PUH and reverse circulate cement well clean at 503'. (Note: the "rathole" interval from 493' to 503' is necessary for the section milling tool to be able to cut out the 4.5" casing in step #10.)

Continued:

6. TOH with 2.375" tubing and stand back. Wait on cement. While WOC pick up a 3-7/8" mill tooth bit, 6 – 3-1/8" drill collars and the 2-3/8" drill pipe. TIH to approximately 500'. Mix mud in steel pit and then circulate the well with 45 vis mud. Tag plug #1 cement with bit after WOC, if above 503' then dress off as necessary. TOH with bit and drill pipe.

7. **Note: The intervals to be mill out below are from ground level – not KB.** Rig up Jet West wireline and run a Gamma – Neutron log and a directional survey log. Adjust the milling intervals as appropriate from these logs.

8. PU a bit or mill and a 3-7/8" section mill and 6 - 3-1/8" drill collars (this is the under reaming bottom hole assembly). TIH with BHA and 2-3/8" drill pipe to 505'. PU the power swivel and establish circulation with mud.

9. **Mill out a 29' section of 4.5" casing from 464' to 493'.** Start milling out the 4.5" casing from 464' down to 493'. Mill per the tool hands instructions for circulation rate, weight on mill and the power swivel's RPM. Circulate well clean. PUH to 384'.

10. **Mill out a 1' section of 4.5" casing from 383' to 384'.** Start milling out the 4.5" casing from 383' down to 384'. Circulate well clean. TOH and LD the drill pipe, drill collars and the BHA.

11. **Plug #2 (Fruitland Coal Interval, 503' – 320'):** TIH with 2.375" tubing to 503' and circulate the well clean with water. Then pump a 5 bbls fresh water spacer ahead of the cement. Mix 30 sxs Type III cement (100% excess) with 15% salt (by weight of water) and spot a balanced plug from 503' up to 100' to cover the PC top and to fill the Fruitland Coal perforations and milled out coal zones. Displace cement with water. TOH with tubing and then squeeze the cement down to approximately 320' inside the 4.5" casing; squeezing 15 sxs outside the casing.

12. WOC. Then TIH with tubing and tag cement. Pressure test the casing to 500#.

13. **Plug #3 (7" Surface casing shoe, from TOC to Surface):** Connect the pump line to the bradenhead valve. Pressure test the BH annulus to 300#; note the fluid volume to load. If the BH annulus tests, then mix approximately 25 sxs Type III neat cement or 15% salt cement and spot a balanced plug inside the 4.5" casing from the TOC of plug #2 up to surface to cover the 7" surface casing shoe. TOH and LD the tubing.
    * If the BH annulus does not test, then perforate at the appropriate depth and fill the bradenhead annulus and 4.5" casing with cement to surface. TOH and LD tubing. Shut in well and WOC.

14. ND BOP and cut off wellhead below surface. Install P&A marker with cement to comply with regulations. RD, MOL. Cut off anchors and clean up location.

WF State 36 #3

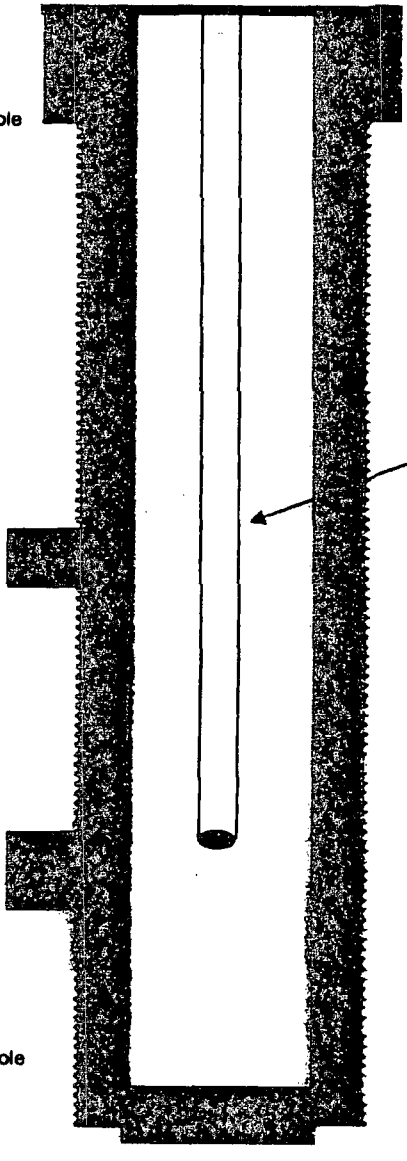
Current

Basin Fruitland Coal

1385' FSL & 1805' FWL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-30358

Lat: N_____ / Long: W _____

Today's Date: 1/31/07
Spud: 9/5/00
Comp: 2/18/01
Elevation: 5275' GL
5280' KB



TOC at surface, circ 10 bbls.

7", 20#, Casing set @ 130'
50 sxs cement, circulated to surface

WELL HISTORY

No Workover of Record

2.375" Tubing set at 474'
(rods and pump)

Fruitland Coal Perforations:
480' – 495'

4.5", 10.5# Casing @ 794'
Cemented with 80 sxs (138 cf),
circ 10 bbls to surface

TD 800'
PBTD 739'

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WF State 36 #3

Proposed P&A

Basin Fruitland Coal

1385' FSL & 1805' FWL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-30358

Lat: N_____ / Long: W _____

Today's Date: **1/31/07**
Spud: 9/5/00
Comp: 2/18/01
Elevation: 5275' GI
5280' KB

8.75" Hole

TOC at surface, circ 10 bbls.

7", 20#, Casing set @ 130'
50 sxs cement, circulated to surface

Plug #3: TOC – Surface
Type III cement, 25 sxs

Coal Zone Depths from KB - Neutron Log

Fruitland Coal #9 Seam @ 385' to 398'

Plug #2: 503' – 320'
Type III cement, 30 sxs
100% excess with 15%
salt (by weight of water)

Fruitland Coal #8 Seam @ 475' to 500'

Fruitland Coal Perforations:
480' – 495'

Pictured Cliffs @ 506'

Plug #1: PBTD – 503'
Type III cement, 19 sxs

6.25" Hole

4.5", 10.5# Casing @ 794'
Cemented with 80 sxs (138 cf),
Circulate 10 bbls to surface

TD 800'
PBTD 739'

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Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO.
30 - 045 - 30358

5. Indicate Type of Lease
STATE X ☐ FEE ☐

6. State Oil & Gas Lease No.
E - 3150

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
WF State 36

1. Type of Well: Oil Well ☐ Gas Well ☐ Other

8. Well Number #3

2. Name of Operator
Lance Oil & Gas Company, Inc.

9. OGRID Number

3. Address of Operator
P.O. Box 70, Kirtland, NM 87417 Attn: Tom Erwin

10. Pool name or Wildcat
Basin Fruitland Coal

4. Well Location
Unit Letter N : 1,385 feet from the South line and 1,805 feet from the West line
Section 36 Township 30N Range 15W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5275' Gl 5280' KB

Pit or Below-grade Tank Application ☒ or Closure ☐

Pit type Lined P&A Pit Depth to Groundwater > 50' Distance from nearest fresh water well > 200' Distance from nearest surface water >200'

Pit Liner Thickness: 12 mil Below-Grade Tank: Volume bbls; Construction Material Impervious Material

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
OTHER:	P&A Pit Permit ☒	OTHER:	☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Lance Oil & Gas Company, Inc. (Lance) requests a revision to the original Sundry Notice submitted by Thomas M. Erwin dated February 7, 2007 and approved by the NMOCD on February 8, 2007. Lance requests a revision to build a small earthen P&A pit (10 ft x 20 ft x 6 ft deep) for drilling mud and cement waste fluid for the plug and abandonment operations.

Your timely approval would be appreciated as a rig is currently available.

RCVD FEB22'07
OIL CONS. DIV.
DIST. 3

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE Thomas M. Erwin TITLE Production Superintendent DATE 2/20/07
Thomas M. Erwin, P.E.
Type or print name E-mail address: tom.erwin@anadarko.com Telephone No. (505) 947-2414

For State Use Only

APPROVED BY: Brandon Powell TITLE DEPUTY OIL & GAS INSPECTOR, DIST. 3 DATE FEB 22 2007
Conditions of Approval (if any):

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Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO.
30-045-30358

5. Indicate Type of Lease
STATE ☒ FEE ☐

6. State Oil & Gas Lease No.
E-3150

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
WF State 36

1. Type of Well: Oil Well ☐ Gas Well ☒ Other

8. Well Number 3

2. Name of Operator
Lance Oil & Gas Company

9. OGRID Number

3. Address of Operator
P.O. Box 70 Kirtland, NM 87417

10. Pool name or Wildcat
Basin Fruitland Coal

4. Well Location
Unit Letter N : 1385 feet from the south line and 1805 feet from the west line
Section 36 Township 30N Range 15W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5275' GL

Pit or Below-grade Tank Application ☐ or Closure ☐

Pit type_____ Depth to Groundwater_____ Distance from nearest fresh water well_____ Distance from nearest surface water_____

Pit Liner Thickness: _____ mil Below-Grade Tank: Volume _____ bbls; Construction Material _____

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☒
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
OTHER: Downhole Commingle ☐		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

On March 5-27, 2007 the WF State 36 #3 was P&A'd per the following:

RCVD APR23'07
OIL CONS. DIV.
DIST. 3

- 33 bbls. of water was pumped into the well bore.
- Cement plug #1 was 9 sacks from 626-530 feet.
- Milled the casing and flushed cuttings from 468-498' GL.
- Cement plug #2 was 45 sacks from 530-310 feet.
- Cement plug #3 was 27 sacks from 310 feet to the surface. Good cement came out the casing valve.
- A P&A marker was installed.

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE Tod H. Haanes TITLE Production Engineer DATE 4/19/2007

Type or print name Tod H. Haanes E-mail address: tod.haanes@anadarko.com Telephone No. (505) 598-5601 ext. 15564

For State Use Only

APPROVED BY: Monica Kuehling TITLE DEPUTY OIL & GAS INSPECTOR, DIST. #3 DATE APR 23 2007

Conditions of Approval (if any):

b

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A-PLUS WELL SERVICE, INC.

P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

Lance Oil and Gas Company, Inc.
WF State 36 #3

March 30, 2007

1385' FSL & 1805' FWL, Section 36, T-30-N, R-15-W
San Juan County, NM
Lease Number: E-3150
API #30-045-30358

Plug & Abandonment Report

Notified NMOCD 3/16/07 and 3/19/07

Summary:

3/5/07 MOL and RU. RU Advanced Safety (H2S supervision). H2S level: 7ppm. Check well pressure: tubing, 10 PSI; casing, 25 PSI. Blow well down to pump truck tubs. Unhang well. Unseat pump. LD polish rod. TOH and LD 21 - ¾" rods and 2" x 1.25" x 14' insert pump. ND wellhead. NU BOP with 5.5' tubing and 8.625" companion flange. PU tongs. SDFD.

3/6/07 Check well pressure: casing, 10 PSI; tubing, 0 PSI. TOH and LD 19 joints 2.375" J-55 tubing, SN and mud anchor. ND BOP. NU wellhead. RD. MOL.

3/19/07 MOL and RU. Check well pressures: casing, 30 PSI; bradenhead, 0 PSI. Blow well down. Advanced Safety on location. H2S alarms went off at 62 ppm. Shut in well. Pump 15 bbls of fresh water down casing to kill well. ND wellhead. NU BOP. Dig out bradenhead and install good 2" valve. PU 2.375" tubing and TIH; tag fill at 634' GL. PUH to 626' GL. Circulate hole clean with 18 bbls of water.
Plug #1 spot 9 sxs Type III cement (12 cf) inside casing from 626' to 494' to cover the Pictured Cliffs interval. PUH to 530' GL. Reverse circulate hole clean for section milling. TOH with tubing. SDFD.

3/20/07 Open well, no pressures. No H2S. Advanced Safety released. PU 3-7/8" Baker section mill, bit sub, 6 – 3.125" drill collars with 2.875" PAC drill pipe. Mill out from 468' GL to 477' GL. Circulate well clean. PUH into 4.5" casing. SDFD.

3/21/07 Open up well. No pressure. No H2S. Mill out to 482' GL. TOH with drill pipe and BHA. Found 1 blade on each arm broken. PU new 3-7/8" section mill and TIH with drill pipe and BHA. Mill to 486' GL. Circulate well clean. PUH 25' into 4.5" casing. SDFD.

3/22/07 Open up well. No pressure. No H2S. Mill section at 486' GL. TOH with drill pipe and BHA. Found all blades missing off arms. PU new 3.875" section mill and TIH with drill pipe and BHA. Mill to 489' GL. PUH 30' in 4.5" casing. SDFD.

3/23/07 Open up well. No pressure. No H2S. RIH to 489'. Mill section at 490' GL. Note: 4.5" casing split below tubing head. Circulate well clean and PUH 30'. Check for gas with monitor. LEL 0%. Call out welder. Issue Hot Work Permit. Repair casing and tubing head. Mill out to 494' GL. Circulate well clean. PUH 30' into 4.5" casing. SDFD.

A-PLUS WELL SERVICE, INC.
P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

Work Summary – Continued:

3/26/07 Open up well. No pressure. No H2S. RIH with 1 joint drill pipe. Mill out to 495' GL. TOH with drill pipe and BHA. Found blades missing off arms. PU new 3.875" section mill and TIH with drill pipe and BHA. Mill to 498' GL. TOH with tubing and LD BHA. TIH with open ended tubing and tag Plug #1 at 530' GL. Attempt to pressure test bradenhead; leak where casing patch welded. Estimate TOC at 12'. Circulate hole clean with 15 bbls of water.
Plug #2 mix and pump 30 sxs Type III cement (40 cf) with 15% salt from 530' to 305' to cover Pictured Cliffs and Fruitland interval.
TOH with tubing. Load casing with 2 bbls of water. Close rams and pump 2.5 bbls of water; squeeze 15 sxs outside 4.5" casing and leave 15 sxs inside casing to 335'. SDFD.

3/27/07 Open up well, no pressures. No H2S. TIH with tubing and tag cement at 310' GL. Circulate well clean with 6 bbls of water. Attempt to pressure test casing to 500 PSI, welding job on wellhead leaking.
Plug #3 mix and pump 27 sxs Type III cement (36 cf) inside casing from 310' to surface, circulate good cement. TOH and LD tubing. ND BOP. Dig out wellhead. Issue Hot Work Permit. Cut off wellhead. Found cement down 20' in 4.5' casing and 15' in 7" casing.
Mix 15 sxs Type II cement (20 cf) and install P&A plate. MOL.

J. Estrada, Baker Tools fisherman, was on location.
T. Erwin, Lance Oil & Gas representative, was on location.
K. Roberts, NMOCD representative, was on location.

I hereby certify that the forgoing is true and correct:

Original signed

William F. Clark
President
A-Plus Well Service, Inc.

PLUGGING DOCUMENTATION

WF State 36 #1
API# 3004529947

WF State 36 #1

Proposed P&A

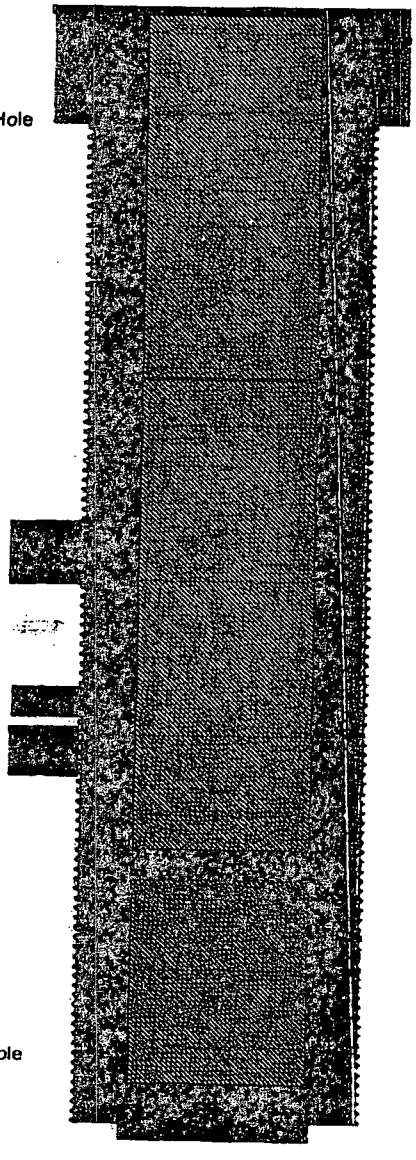
Basin Fruitland Coal

805' FSL & 820' FEL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-29947

Lat: N_____ / Long: W _____

Today's Date: **2/01/07**
Spud: 7/26/99
Comp: PC:12/20/99
FtC: 2/05/03
Elevation: 52960' GL
5301' KB

8.75" Hole



TOC at Surface, Circulate 13 bbls.

7" 20#, Casing set @ 134'
50 sxs cement, Circulated to surface

Plug #3: TOC – Surface
Type III cement or 15% salt cement, 25 sxs

Plug #2: 595' – 300'
Type III cement, 40 sxs
100% excess with 15% salt (by weight of water)

Fruitland Coal #9 Seam @ 490' to 498'

Fruitland Coal #8 Seam @ 564' to 589'

Fruitland Coal Perforations:
565' - 569'
574' - 586'

Set Cement Ret @ 595'

Pictured Cliffs @ 610'

Pictured Cliffs Perforations:
610' – 626'

Plug #1: PBTD – 595'
Type III cement, 20 sxs with 15% salt

6.25" Hole

4.5" 10.5# Casing set @ 775'
Cemented with 116 sxs (181 cf),
Circulate 13 bbls cement to surface

TD 802'
PBTD 714'

Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO.
30-045-29947

5. Indicate Type of Lease
STATE X ☐ FEE ☐

6. State Oil & Gas Lease No.
E – 03150 - 11

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
WF State 36

1. Type of Well: Oil Well ☐ Gas Well ☐ Other

8. Well Number #1

2. Name of Operator
Lance Oil & Gas Company, Inc.

9. OGRID Number

3. Address of Operator
P.O. Box 70, Kirtland, NM 87417 Attn: Tom Erwin

10. Pool name or Wildcat
Basin Fruitland Coal

4. Well Location
Unit Letter P : 805 feet from the South line and 820 feet from the East line
Section 36 Township 30N Range 15W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5296' GL 5301' KB

Pit or Below-grade Tank Application ☐ or Closure ☐

Pit type_____ Depth to Groundwater_____ Distance from nearest fresh water well_____ Distance from nearest surface water_____

Pit Liner Thickness: _____ mil Below-Grade Tank: Volume _____ bbls; Construction Material _____

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	X☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☐
PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
OTHER:	☐			OTHER:	☐		

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Lance Oil & Gas Company, Inc., proposes to plug and abandon the above referenced well according to the attached P&A procedure.

RCVD FEB8'07
OIL CONS. DIV.
DIST. 3

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE Thomas M. Erwin TITLE Production Superintendent DATE 2/07/07
Thomas M. Erwin, P.E. 2/7/07
Type or print name E-mail address: Telephone No.

For State Use Only

APPROVED BY: H. Villanueva TITLE DEPUTY OIL & GAS INSPECTOR, DIST. #3 DATE FEB 08 2007
Conditions of Approval (if any):

b 2/9

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A-PLUS WELL SERVICE, INC.

P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

PLUG AND ABANDONMENT PROCEDURE

February 1, 2007

WF State 36 #1

Basin Fruitland Coal
805' FSL and 820' FEL, Section 36, T30N, R15W
San Juan County, New Mexico / API 30-045-29947
Lat: N _____ / Lat: W _____

Note: The stabilizing wellbore fluid will be: drilling mud with sufficient weight to balance all exposed formation pressures. Cement is ASTM Type III mixed at 14.8 ppg with 1.32 cf/sx; neat or with 15% salt by weight of water (for expansion, MSHA requirement through the mined coal zone). Excess cement volumes are specified for each plug below.

- **All personnel entering the BHP coalmine property must take the Mine Hazards class at the well site at commencement of the project.** (Everyone)
- **A-Plus employees or sub-contractors working on the project will attend field safety training class and receive a 5023 certificate.** (Rig hands, wireline operators, fisherman and Supervisors)
- **All vehicles will be safety inspected daily upon entering the mine.**

PROCEDURE:

1. This project will require a C-103 pit request filed with the NMOCD.

2. Test the rig anchors; replace if necessary. Prepare a lined earthen pit; 10' x 20' x 6' for drilling mud and cementing waste fluid. Set a water storage tank on location and fill with fresh water. Set a mud pit and power swivel on location for drilling operations. Have a portable toilet on location.

3. Comply with all applicable **MSHA**, NMOCD, BLM, Lance and BHP Billiton safety regulations. MOL and RU daylight pulling unit. Conduct safety meeting for all personnel on location. Lay relief line to the pit. Pull rods if present.

4. ND wellhead and install BOP and companion flange. Function test the BOP. TOH and tally 2.375" tubing, total 595'. PU a 3-7/8" bit or mill and TIH with tubing. Establish circulation with water and then drill out the bridge plug at 606' (reported to be a RBP, if it is retrievable then pull; need to review well file). Clean out to PBTD or as deep as possible. Must clean out to 676' or greater. Circulate well clean as necessary.

5. **Plug #1 (Pictured Cliffs perforations, PBTD – 595'):** TIH with 4.5" cement retainer and set at 595' (Note: if CCL log available then set a wireline CR). Establish rate into the PC perforations, then mix 20 sxs Type III neat cement with 15% salt, squeeze all the cement under the CR to fill the Pictured Cliffs perforations. Sting out of the CR and reverse circulate cement well clean at 595'. (Note: the "rathole" interval from 583' to 595' is necessary for the section milling tool to be able to cut out the 4.5" casing in step #10.)

Continued:

6. TOH with setting tool and stand back the tubing. Wait on cement. While WOC pick up a 3-7/8" mill tooth bit, 6 – 3-1/8" drill collars and the 2-3/8" drill pipe. TIH to approximately 500'. Mix mud in steel pit and then circulate the well with 45 Vis mud. Tag the CR at 595'. TOH with bit and drill pipe.

7. **Note: The intervals to be mill out below are from ground level – not KB.** Rig up Jet West wireline and run a Gamma – Neutron log and a directional survey log. Adjust the milling intervals as appropriate from these logs.

8. PU a 3-7/8" section mill and 6 - 3-1/8" drill collars (this is the under reaming bottom hole assembly). TIH with BHA and 2-3/8" drill pipe to 550'. PU the power swivel and establish circulation with mud.

9. **Mill out a 30' section of 4.5" casing from 553' to 583'.** Start milling out the 4.5" casing from 553' down to 583'. Mill per the tool hands instructions for weight on mill, circulation rate and power swivel's RPM. Circulate well clean. PUH to 489'.

10. **Mill out a 1' section of 4.5" casing from 489' to 490'.** Start milling out the 4.5" casing from 489' down to 490'. Circulate well clean. TOH and LD the drill pipe, drill collars and the BHA.

11. **Plug #2 (Fruitland Coal interval, 595' – 300'):** TIH with 2.375" tubing to 595' and circulate the well clean with water. Then pump a 5 bbls fresh water spacer ahead of the cement. Mix 40 sxs Type III cement (100% excess) with 15% salt (by weight of water) and spot a balanced plug from 595' up to 100' to fill the Fruitland Coal perforations and milled intervals. Displace cement with water. TOH with tubing and then squeeze the cement down to approximately 300' inside the 4.5" casing; squeezing 20 sxs outside the casing.

12. WOC. Then TIH with tubing and tag cement. Pressure test the casing to 500#.

13. **Plug #3 (7" Surface casing shoe, from TOC to Surface):** Connect the pump line to the bradenhead valve. Pressure test the BH annulus to 300#; note the fluid volume to load. If the BH annulus tests, then mix approximately 25 sxs Type III neat cement or 15% salt cement and spot a balanced plug inside the 4.5" casing from the TOC of plug #2 up to surface to cover the 7" surface casing shoe. TOH and LD the tubing.

    * If the BH annulus does not test, then perforate at the appropriate depth and fill the bradenhead annulus and 4.5" casing with cement to surface. TOH and LD tubing. Shut in well and WOC.

14. ND BOP and cut off wellhead below surface. Install P&A marker with cement to comply with regulations. RD, MOL. Cut off anchors and clean up location.

WF State 36 #1

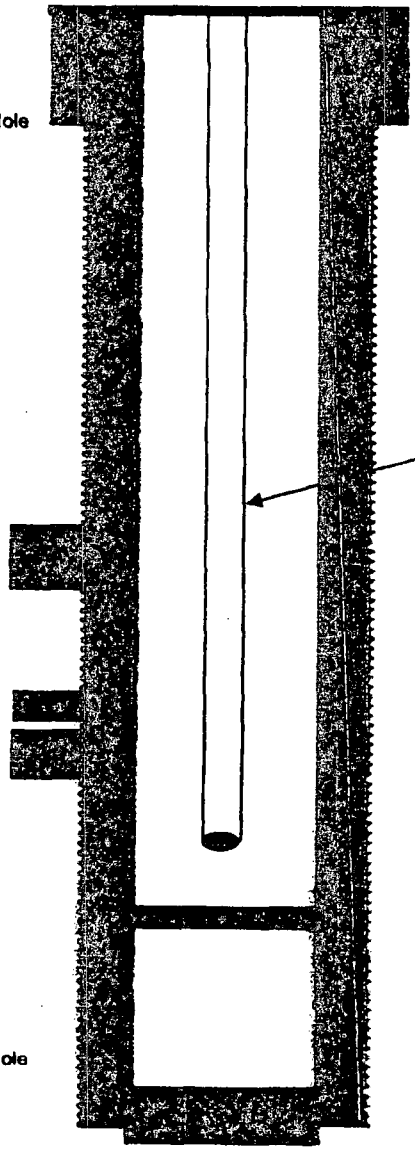
Current

Basin Fruitland Coal

805' FSL & 820' FEL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-29947

Lat: N_____ / Long: W _____

Today's Date: **2/01/07**
Spud: 7/26/99
Comp: PC: 12/20/99
FtC: 2/05/03
Elevation: 5296' GL
5301' KB



TOC at Surface, Circulate 13 bbls.

7" 20#, Casing set @ 134'
50 sxs cement, Circulated to surface

WELL HISTORY

Dec '99: Completed the PC zone.

Fed '03: Set RBP at 606' to TA the PC perforations. Complete the Fruitland zone. Plan to dewater and then commingle.

No Records of RBP being removed.

2.375" Tubing set at 595'

Fruitland Coal Perforations:
565' - 569'
574' - 586'

RBP set @ 606'

Pictured Cliffs Perforations:
610' – 626'

4.5" 10.5# Casing set @ 775'
Cemented with 116 sxs (181 cf),
Circulate 13 bbls cement to surface

TD 802'
PBTD 714'

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WF State 36 #1

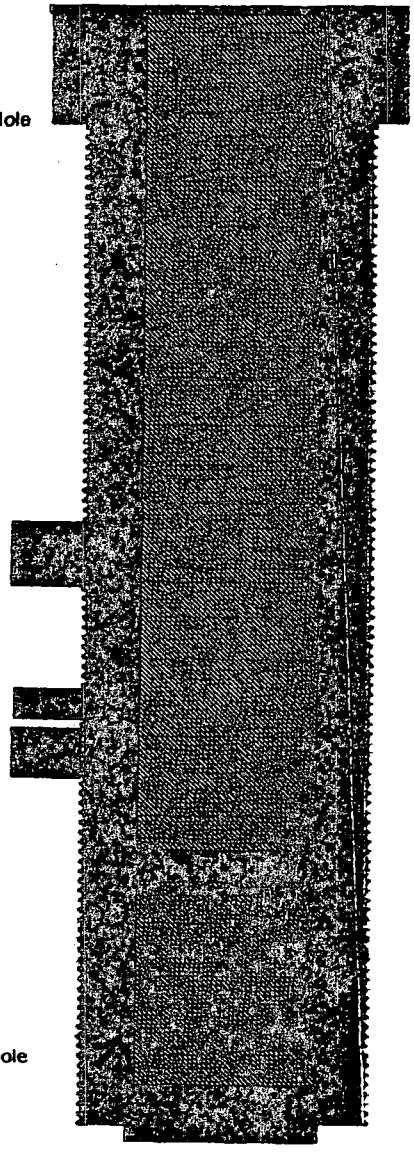
Proposed P&A

Basin Fruitland Coal

805' FSL & 820' FEL, Section 36, T-30-N, R-15-W
San Juan County, NM / API #30-045-29947

Lat: N_____ / Long: W _____

Today's Date: **2/01/07**
Spud: 7/26/99
Comp: PC:12/20/99
FtC: 2/05/03
Elevation: 52960' GL
5301' KB



TOC at Surface, Circulate 13 bbls.

7" 20#, Casing set @ 134'
50 sxs cement, Circulated to surface

Plug #3: TOC – Surface
Type III cement or 15% salt cement, 25 sxs

Plug #2: 595' – 300'
Type III cement, 40 sxs
100% excess with 15% salt (by weight of water)

Fruitland Coal Perforations:
565' - 569'
574' - 586'

Set Cement Ret @ 595'

Pictured Cliffs Perforations:
610' – 626'

Plug #1: PBTD – 595'
Type III cement, 20 sxs with 15% salt

4.5" 10.5# Casing set @ 775'
Cemented with 116 sxs (181 cf),
Circulate 13 bbls cement to surface

TD 802'
PBTD 714'

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Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
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1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO. 30-045-29947	
5. Indicate Type of Lease STATE X ☐ FEE ☐	
6. State Oil & Gas Lease No. E – 03150 - 11	
SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	7. Lease Name or Unit Agreement Name WF State 36
1. Type of Well: Oil Well ☐ Gas Well ☐ Other	8. Well Number #1
2. Name of Operator Lance Oil & Gas Company, Inc.	9. OGRID Number
3. Address of Operator P.O. Box 70, Kirtland, NM 87417 Attn: Tom Erwin	10. Pool name or Wildcat Basin Fruitland Coal
4. Well Location Unit Letter P : 805 feet from the South line and 820 feet from the East line Section 36 Township 30N Range 15W NMPM San Juan County	
	11. Elevation *(Show whether DR, RKB, RT, GR, etc.)* 5296' Gl 5301' KB

Pit or Below-grade Tank Application ☒ or Closure ☐

Pit type Lined P&A Pit Depth to Groundwater >50' Distance from nearest fresh water well >200' Distance from nearest surface water >200'

Pit Liner Thickness: 12 mil Below-Grade Tank: Volume bbls; Construction Material Impervious Material

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
OTHER:	P&A Pit Permit ☒	OTHER:	☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Lance Oil & Gas Company, Inc. (Lance) requests a revision to the original Sundry Notice submitted by Thomas M. Erwin dated February 7, 2007 and approved by the NMOCD on February 8, 2007. Lance requests a revision to build a small earthen P&A pit (10 ft x 20 ft x 6 ft deep) for drilling mud and cement waste fluid for the plug and abandonment operations.

Your timely approval would be appreciated as a rig is currently available.

RCVD FEB22'07
OIL CONS. DIV.
DIST. 3

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE [signature] TITLE Production Superintendent DATE 02/20/07
Thomas M. Erwin, P.E.
Type or print name E-mail address: tom.erwin@anadarko.com Telephone No. (505) 947-2414

For State Use Only

APPROVED BY: [signature] TITLE DEPUTY OIL & GAS INSPECTOR, DIST. #3 DATE FEB 22 2007
Conditions of Approval (if any):

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Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO.
30-045-29947

5. Indicate Type of Lease
STATE ☒ FEE ☐

6. State Oil & Gas Lease No.
E-03150-11

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
WF State 36

1. Type of Well: Oil Well ☐ Gas Well ☒ Other

8. Well Number 1

2. Name of Operator
Lance Oil & Gas Company

9. OGRID Number

3. Address of Operator
P.O. Box 70 Kirtland, NM 87417

10. Pool name or Wildcat
Basin Fruitland Coal

4. Well Location
Unit Letter P : 805 feet from the south line and 820 feet from the east line
Section 36 Township 30N Range 15W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5296' GL

Pit or Below-grade Tank Application ☐ or Closure ☐
Pit type_____ Depth to Groundwater_____ Distance from nearest fresh water well_____ Distance from nearest surface water_____
Pit Liner Thickness: ____ mil Below-Grade Tank: Volume _____ bbls; Construction Material

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☒
PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
OTHER:		Downhole Commingle	☐	OTHER:			☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

On March 6 – April 11, 2007 the WF State 36 #1 was P&A'd per the following:

RCVD APR23'07
OIL CONS. DIV.
DIST. 3

- Set a cement retainer at 599 feet.
- 9 bbls. of water was pumped into the well bore.
- Cement plug #1 was 24 sacks placed below the cement retainer located at 599 feet.
- Milled the casing and flushed cuttings from 548-584.5' GL
- Cement plug #2 was 60 sacks from 599-357 feet.
- Successfully pressure tested well bore above the 357' TOC
- Cement plug #3 was 27 sacks from 357 feet to surface. Good cement came out the casing valve.
- A P&A marker was installed.

I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE Tod H. Haanes TITLE Production Engineer DATE 4/19/2007

Type or print name Tod H. Haanes E-mail address: tod.haanes@anadarko.com Telephone No. (505) 598-5601 ext. 15564

For State Use Only

APPROVED BY: Monica Kuehling TITLE DEPUTY OIL & GAS INSPECTOR, DIST. #3 DATE APR 23 2007

Conditions of Approval (if any):

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A-PLUS WELL SERVICE, INC.

P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

Lance Oil and Gas Company, Inc.
WF State 36 #1

April 12, 2007

805' FSL & 820' FEL, Section 36, T-30-N, R-15-W
San Juan County, NM
Lease Number: E-03150-11
API #30-045-29947

Plug & Abandonment Report

Summary: Notified NMOCD on 3/16/07 and 3/19/07

3/6/07 MOL and RU. Check pressures: casing, 25 PSI; tubing 0 PSI. Blow down well. H_2S level: 2 ppm. Unhang rods and LD polish rod. POH and LD 22 - ¾" rods and 2" x 1.25" x 16' insert pump. ND wellhead. NU BOP with companion flange. TOH and LD 18 joints 2.375" tubing, SN and saw tooth collar; total 566'. Note: bottom 2 joints have corrosion holes. TIH with 20 joints tubing and tag at 603'. Pump 45 bbls water to load casing above the RBP at 606'. TOH and LD tubing. ND BOP. NU wellhead. RD. MOL. Well ready to log.

3/27/07 MOL and RU. Check pressures: casing, 30 PSI; bradenhead, 0 PSI. ND wellhead. NU BOP. PU retrieving head and TIH with 2.375" tubing. Tag fill at 636' and then wash down to Polar RBP at 638'. Note: tagged RBP on 3/6/07 at 603'. TOH and LD RBP. Shut in well. SDFD.

3/28/07 Check pressures: casing, 20 PSI. Blow well down. H_2S level: 0 ppm. TIH with 4.5" DHS CR and set at 599'. Sting out of CR. Load hole and sting into CR. Establish rate below CR into PC perforations at 1-1/2 bpm at 600 PSI.
Plug #1 with CR at 599', mix and pump 24 sxs Type III cement (32 cf) with 15% salt, squeeze below the CR to fill the Pictured Cliffs perforations.
Sting out of CR and reverse circulate with casing clean for section milling. TOH with setting tool and LD. PU 3.875" section mill, bit sub, 6 – 3.125" drill collars and 2.875" PAC drill pipe. TIH to 550'. Establish rate 2.5 bpm at 600 PSI. Attempt to make cut in casing. Section mill not showing any torque or taking weight on casing. TOH with BHA and inspect section mill. Blades not showing any wear. Change out cutting arms on mill. TIH with BHA to 550' and start milling at 550' GL. Attempt to section mill 4.5"casing. Mill not torquing or taking any weight on casing from 550' to 555'. TOH with BHA and section mill. No wear on blades. SDFD.

3/29/07 Open well, no pressure. PU new 3.875" section mill and TIH with 6 drill collars and 2.875" drill pipe. Tag CR at 599'. PUH to 550 and attempt to section mill casing again. Returns contain metal cuttings but still unable to get mill to take weight on casing. PUH to 547' and attempt to make beginning cut; same results. TOH with section mill with opti-cut blades. TIH with different section mill and attempt to make initial cut. Have fine metal cutting in returns, not taking weight. Attempt at several depths: 546', 550', 554'; unsuccessful results. TOH and find section mill showing no wear. Wait on different arms from Baker. TIH with section mill with different arms having metal muncher buttons. Attempt to begin milling at 546', 548', and 558', unsuccessful. TOH with mill. Shut in well and SDFD.

A-PLUS WELL SERVICE, INC.
P.O. BOX 1979
Farmington, New Mexico 87499
505-325-2627 * fax: 505-325-1211

Work Summary – Continued:

4/6/07 Open up well, no pressure. PU section mill with metal muncher buttons and TIH. Mill casing from 573' to 580' GL. Circulate hole clean. TOH with section mill and 3.938" tapered mill on bottom. Section mill looks good. SDFD.

4/9/07 Open up well, no pressure. TIH with section mill with 3.938" tapered mill on bottom. Mill casing from 580' to 582.5" GL. Not making any hole. TOH and found no visible damage to mill. PU new re-dressed 3.875" section mill and TIH. Mill casing from 582.5' to 584.5" GL. Not making any hole. Procedure change approved by John Mercier, BHP representative; milled enough. Circulate hole clean. TOH and LD BHA and section mill. TIH with 19 joints 2.375" tubing to 595'. Connect pump line to the bradenhead valve and load the BH annulus with 1/8 bbl of water. Pressure test BH annulus to 300 PSI, held OK. Circulate 4.5" casing clean with 20 bbls of water. H. Villanueva, NMOCD, was notified about cementing at 8:30 a.m.
Plug #2 with 40 sxs Type III cement (53 cf) with 15% salt filling the inside of the 4.5" casing from 595' up to 6' including the section milled interval from 550' to 584.5', covering the Fruitland coal zones and Fruitland top.
TOH with tubing. Displace cement to 300', squeezing 20 sxs outside into the openhole interval. Shut in well with 600 PSI. SDFD.

4/10/07 Open up well, no pressure. TIH with tubing and tag cement at 357'. Circulate well clean with 6 bbls of water. Pressure test casing to 600 PSI, held OK for 10 minutes.
Plug #3 with 27 sxs Type III cement (36 cf) inside casing from 357' to surface, circulate good cement out casing valve.
TOH and LD all tubing. ND BOP. Dig out wellhead. Issue Hot Work Permit. Cut off wellhead. Found cement down 20' in 4.5" casing and at the surface in the BH annulus. Mix 20 sxs Type II cement (20 cf) and install P&A marker. Too windy to RD rig.

4/11/07 Cut off anchors. RD and MOL.
J. Estrada, Baker Tools fisherman, was on location.

I hereby certify that the forgoing is true and correct.

Christopher Adams
Field Supervisor
A-Plus Well Service, Inc.

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APPENDIX C

OPERATORS AND LEASES IN AREA OF REVIEW

AND

APPLICABLE NOTICES INCLUDING

PROPOSED NOTICE TO OPERATORS AND LEASEHOLDERS
AND
PROPOSED PUBLIC NOTICE

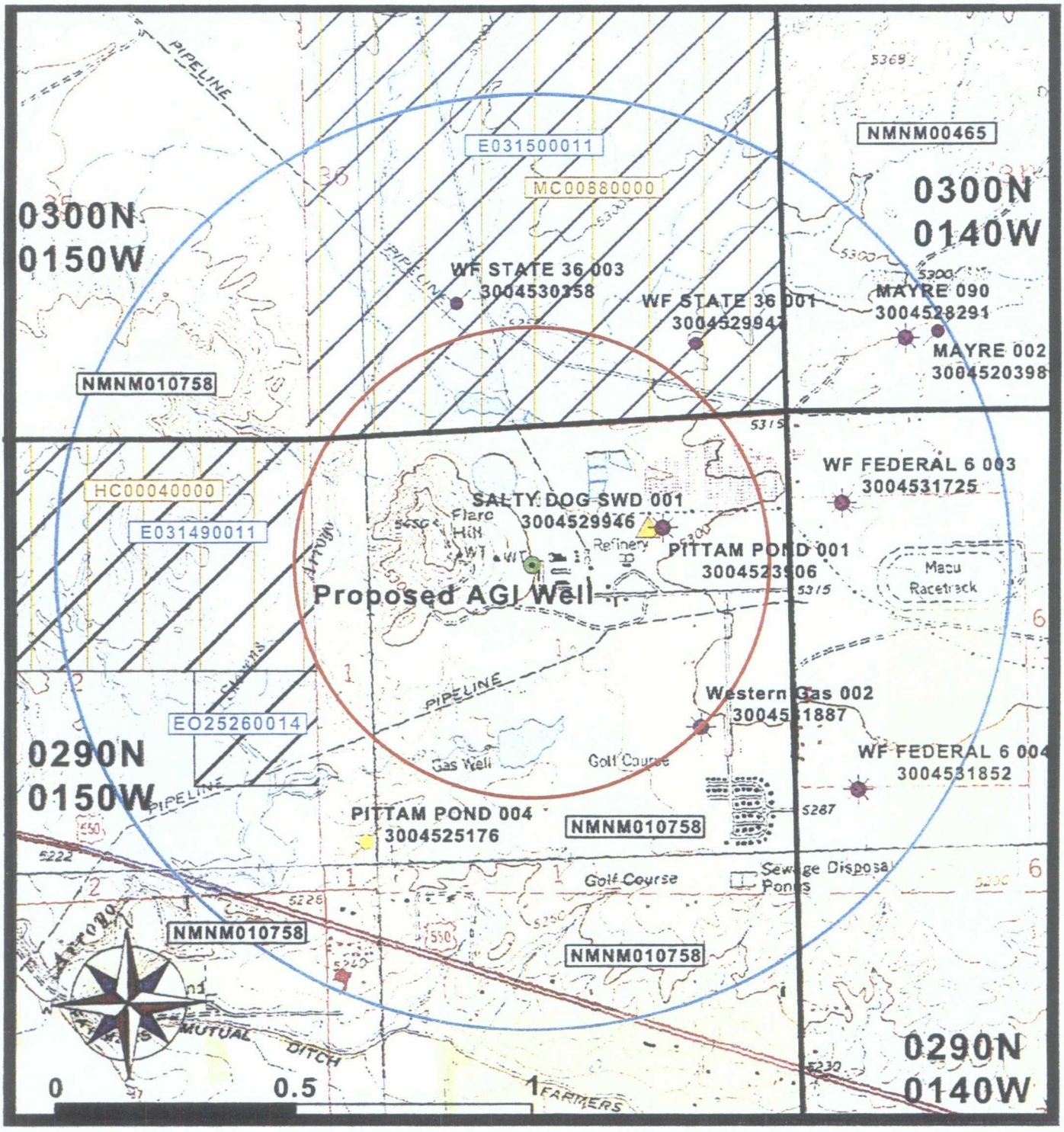

FIGURE C-1: Locations and Identification of Wells Within One Mile of Proposed Anadarko AGI Well

Federal Subsurface Ownership

State Trust Lands Ownership

Minerals Leases

Oil and Gas Leases

FRUITLAND, Active

FRUITLAND, Plugged

MENEFEE, Active

GALLUP, Plugged

One-Mile Radius from Proposed AGI

Half-Mile Radius from Proposed AGI

Table C1

Operators Within Half-Mile and One Mile of Proposed Anadarko AGI #1

API NUMBER	WELL NAME	STATUS	OPERATOR	WELL TYPE	SPUD DATE	PLUG DATE	DEPTH	PRODUCING POOL	Distance (Miles)
3004529946	SALTY DOG SWD 001	Active	XTO Energy, Inc.	SWD	9/3/1999		3420	MENEFEE	0.33
3004523906	PITTAM POND 001	Active	XTO Energy, Inc.	GAS	11/27/1979		660	FRUITLAND	0.36
3004531887	WESTERN GAS 002	Active	XTO Energy, Inc.	GAS	1/31/2004		730	FRUITLAND	0.53
3004530358	WF STATE 36 003	Plugged	LANCE OIL & GAS COMPANY, INC.	GAS	9/15/2000	5/27/2007	749	FRUITLAND	0.58
3004525176	PITTAM POND 004	Plugged	DUGAN PRODUCTION CORP	OIL	9/21/1981	8/17/1992	4726	GALLUP	0.63
3004529947	WF STATE 36 001	Plugged	LANCE OIL & GAS COMPANY, INC.	GAS	7/26/1999	4/11/2007	802	FRUITLAND	0.64
3004531725	WF FEDERAL 6 003	Active	XTO Energy, Inc.	GAS	1/13/2004		815	FRUITLAND	0.73
3004531852	WF FEDERAL 6 004	Active	XTO Energy, Inc.	GAS	2/20/2004		770	FRUITLAND	0.88
3004528291	MAYRE 090	Active	DUGAN PRODUCTION CORP	GAS	12/10/1990		760	FRUITLAND	0.99

Table C-2 Operators and Subsurface Leases within One-Mile Area of Review

Lease/API Number	Type	Owner	Location	Contact Information
Township 30 North, Range 15 West NMPM				
NMNM010758	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	Sec 35 All	BLM (Open Lease)
E03150001	State Surface and Subsurface Ownership Oil and Gas Lease	Burlington Resources Oil and Gas, L.P.	Sec 36 All	Burlington Resources Oil and Gas, L.P. 801 Cherry Street, Ste.200 Fort Worthm TX 76102 OGRID#: 90362
MC00880000	State Surface and Subsurface Ownership Coal Lease	BHP Billiton Limited	Sec 36 All	BHP Billiton Limited 300 W. Arrington Farmington, NM 87401 OGRID#: 132726
3004530358 WF State 36 003	State Gas Lease	Lance Oil and Gas Company	S2SW4 Sec 36	Lance Oil and Gas Company ATTN: LAND DEPT. P.O. Box 70 Kirtland, NM 87417 OGRID#: 233140
3004529947 WF State 36 001	State Gas Lease	Lance Oil and Gas Company	S2SE4 Sec 36	Lance Oil and Gas Company ATTN: LAND DEPT. P.O. Box 70 Kirtland, NM 87417 OGRID#: 233140
Township 30 North, Range 14 West NMPM				
NMNM004465	Federal Subsurface Ownership All Minerals	Dugan Production	Sec 31 All	Dugan Production Corp PO Box 420, Farmington, NM 87499-0420 OGRID#: 6515
3004528291 Mayre 090	Federal Gas Lease	Dugan Production	SE4SW4 Sec 31	Dugan Production Corp PO Box 420, Farmington, NM 87499-0420 OGRID#: 6515
3004520398 Mayre 002	Federal Gas Lease	Dugan Production	SE4SW4 Sec 31	Dugan Production Corp PO Box 420, Farmington, NM 87499-0420 ONGRID: 6515

Anadarko AIG Well

1 Mile Radius Contact Legend

Lease/API Number	Type	Owner	Location	Contact Information
Township 29 North, Range 14 West NMPM				
NMNM010758	Federal Subsurface Ownership All Minerals	Burlington RES Oil and Gas Co. LP	SE4NW4 Sec 6	Burlington RES Oil and Gas Company LP P.O. Box 51810 Midland, TX 797101
3004531725 WF Federal 6 003	Federal Gas Lease	XTO Energy, INC	NW4NW4 Sec 6	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035
3004531852 WF Federal 6 004	Federal Gas Lease	XTO Energy, INC	SW4SW4 Sec 6	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035
200710478 Private QC Deed	Winififred Amsden Trust by Anthony Amsden as Trustee	Anthony A. Amsden and Dorothy C. Amsden as co Trustees of the Anthony and Dorothy Amsden Trust	E2SW4 Sec 6	520 Rim Road Los Alamos, NM 87544
	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	NW4SW4 Sec 6	BLM (Open Lease)
	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	SW4NW4 Sec 6	BLM (Open Lease)
	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	NW4NW4 Sec 6	BLM (Open Lease)
	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	NW4NW4 Sec 7	BLM (Open Lease)
NMNM101551	Federal Subsurface Ownership All Minerals	XTO Energy, INC	E2NW4 Sec 7	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035

*not on map unsure of location in or out of circle

Anadarko AIG Well

1 Mile Radius Contact Legend

Lease/API Number	Type	Owner	Location	Contact Information
Township 29 North, Range 15 West NMPM				
NMNM010758	Federal Subsurface Ownership All Minerals	Questar Market Resources	S2N2, S2, Lot 1,2,3,4 (all) Sec 1	Questar Market Resources 1050 17th Street #500 Denver, CO 80265
30045299946 Salty Dog SWD 001	Federal Lease Other/Injection Well	XTO Energy, INC	NW4NE4 Sec 1	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035
3004523906 Pittam Pond 001	Federal Gas Lease	XTO Energy, INC	NE4NE4 Sec 1	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035
3004531887 Western Gas 002	Federal Gas Lease	XTO Energy, INC	NE4SE4 Sec 1	XTO Energy, INC 810 Houston Street, Suite 2000 Ft. Worth, TX 76102-6298 OGRID#: 197035
3004525176 Pittam Pond 004	Federal Oil Lease	Dugan Production	SW4SW4 Sec 1	Dugan Production Corp PO Box 420, Farmington, NM 87499-0420 OGRID#: 6515
E031490011	State Surface and Subsurface Ownership Oil and Gas Lease	Four Star Oil and Gas CO	N2 Sec 2	Four Star Oil and Gas CO Bruce Isabel 11111 South Wilcrest Houston, TX 77099 OGRID#: 131994
HC0040000	State Surface and Subsurface Ownership Coal Lease	San Juan Coal Company	N2 Sec 2	San Juan Coal Company P.O. Box 561 Waterflow, NM 87421 OGRID#: 168810
E025620014	State Surface and Subsurface Ownership Oil and Gas Lease	Chase Oil Corporation	NE4SE4 Sec 2	Chase Oil Corporation P.O. Box 1767 Artesia, NM 88211 OGRID#: 53773
	State Surface and Subsurface Ownership	State (Open Lease)	W2SE4 Sec 2	State (Open Lease)
	State Surface and Subsurface Ownership	State (Open Lease)	SE4SE4 Sec 2	State (Open Lease)

Anadarko AIG Well

1 Mile Radius Contact Legend

Lease/API Number	Type	Owner	Location	Contact Information
Township 29 North, Range 15 West NMPM (cont)				
NMNM010758	Federal Subsurface Ownership All Minerals	BLM (Open Lease)	NE4NE4 Sec 11	BLM (Open Lease)
NMNM010758	Federal Subsurface Ownership All Minerals	Questar Market Resources	N2N2 Sec 12	Questar Market Resources 1050 17th Street #500 Denver, CO 80265

***This Ownership Report is limited to the information reviewed in the respective County, State and BLM records. As well, the creator assumes no liability as to their accuracy.*

~~DRAFT OF NOTICE TO BE SENT TO ALL OPERATORS, LEASEHOLD OWNERS AND LAND OWNERS AT~~ LEAST 20 DAYS PRIOR TO OCD HEARING

May ___, 2009

Address

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Re: APPLICATION OF ANADARKO PETROLEUM CORPORATION FOR AUTHORIZATION TO INJECT, SAN JUAN COUNTY, NEW MEXICO

Ladies and Gentlemen:

This letter is to advise you that Anadarko Petroleum Corporation has filed an application with the New Mexico Oil Conservation Division (NMOCD) seeking authorization to drill an Acid Gas Injection (AGI) well within the Anadarko San Juan River Gas Plant property near Kirtland in San Juan County, New Mexico. Anadarko's proposed San Juan AGI #1 will be drilled approximately 2310 feet from the West line and 1650 feet from the North line of Section 1, Township 29 North, Range 15 West, NMPM, San Juan County, New Mexico. Anadarko plans to inject up to 2000 barrels per day of acid gas from the Anadarko San Juan River Gas Plant at a maximum pressure of 1985 psi into this well in the Entrada Sandstone approximately 6500 to 6700 feet below the surface. You can view copy of the application that has been filed with the NMOCD for this well on the Geolex website: http//www.geolex.com/Anadarko AGI Application.

This application is set for hearing before a Division Examiner at 8:15 a.m. on Thursday June 11, 2009 at the Oil Conservation Division's Santa Fe office located at 1220 South Saint Francis Drive, Santa Fe, New Mexico 87505. You are not required to attend this hearing, but as an owner of an interest that may be affected by this application, you may appear and present testimony. Failure to appear at that time and become a party of record will preclude you from challenging the matter at a later date.

Parties appearing in cases are required by Division Rule 120.8B to file a Pre-Hearing Statement with the Oil Conservation Division's Santa Fe office, no later than four days in advance of a scheduled hearing, but at least on the Thursday preceding the hearing. This statement must include: the names of the parties and their attorneys; a concise statement of the case; the names of all witnesses the party will call to testify at the hearing; the approximate amount of time the party will need to present its case; and identification of any procedural matters that are to be resolved prior to the hearing.

If you have questions concerning this application, you may contact Mr. Alberto A. Gutiérrez at 500 Marquette Avenue, NW, Suite 1350, Albuquerque, New Mexico 87102, or by phone at (505) 842-8000.

Sincerely,
Geolex, Inc.

Alberto A. Gutiérrez, CPG
Consultant to Anadarko Petroleum

AAG/jwg

Enclosures

PROPOSED PUBLIC NOTICE TO BE PUBLISHED IN THE FARMINGTON DAILY TIMES WHEN HEARING DATE IS SET

CASE#_____:

Application of Anadarko Petroleum Corporation for approval of an acid gas injection well, San Juan County, New Mexico. Applicant seeks approval to drill an acid gas injection well at its Kirtland New Mexico site. Well to be drilled 2310 feet from the West line and 1650 feet from the North line in Unit F, Section 1, Township 29 North, Range 15 West NMPM, to inject up to 2000 barrels of acid gas per day at a maximum pressure of 1985 psi, into the Entrada Formation, at an approximate depth of 6500 feet to 6700 feet. Anadarko may be contacted through its representative, Mr. Alberto Gutiérrez, 500 Marquette Ave NW, Suite 1350, Albuquerque, New Mexico 87102 or (505) 842-8000. Said well is located on the Anadarko San Juan River Gas Plant near Kirtland in San Juan County New Mexico.

CASO #_____:

Aplicación de Anadarko Petroleum Corporation para la aprobación de un pozo de inyección para gas acido, San Juan County, New México. El aspirante intenta la aprobación para perforar un pozo de inyección para gas ácido en su planta ubicada en Kirtland New México. El pozo seria perforado 2310 pies de la línea del oeste y 1650 pies de la línea del norte en la unidad F, Sección 1, Township 29 Norte, Range 15 Oeste NMPM, para inyectar hasta 2000 barriles de gas ácido por día con una presión máxima de 1985 psi, en la formación Entrada, a una profundidad aproximada de 6500 pies a 6700 pies. Ud. puede entrar en contacto con Anadarko a través de su representante, Sr. Alberto Gutiérrez, 500 Marquette Ave NW, Suite 1350, Albuquerque, New México 87102 o (505) 842-8000. Este pozo seria situado en la planta de Anadarko que se llama San Juan River Gas Plant cerca de Kirtland en el condado New México del San Juan.

APPENDIX D

SURFACE OWNERS IN AREA OF REVIEW
AND

APPLICABLE NOTICES INCLUDING

PROPOSED NOTICE TO SURFACE OWNERS
AND
PROPOSED PUBLIC NOTICE

DRAFT OF NOTICE TO BE SENT TO ALL OPERATORS, LEASEHOLD OWNERS AND LAND OWNERS AT LEAST 20 DAYS PRIOR TO OCD HEARING

May ___, 2009

Address

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AAG/jwg

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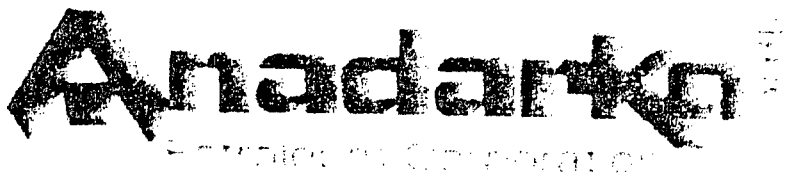
APPENDIX E

H_2S CONTINGENCY PLAN
PURSUANT TO NMOCD RULE 118



H_2S Contingency Plan

Acid Gas Injection Facility
Anadarko San Juan River Gas Plant
Kirtland, New Mexico

April 2009

ANADARKO PETROLEUM CORPORATION
H_2S Contingency Plan
ANADARKO SAN JUAN RIVER GAS PLANT

TABLE OF CONTENTS

Anadarko Petroleum Corporation
Acid Gas Injection Facility
Anadarko San Juan River Gas Plant
Hydrogen Sulfide (H_2S) Contingency Plan

I. INTRODUCTION

Anadarko Petroleum Corporation conducts its business responsibly by providing employees and any other person working or visiting, a safe work place. The Anadarko San Juan River Gas Plant Hydrogen Sulfide Contingency Plan for acid gas injection (AGI) was developed to satisfy the Oil Conservation Division Rule 118; and paragraph 7.6 of the guidelines published by the API in its publication entitled "Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide," RP-55.

This plan provides guidelines to assist in responding to and managing an emergency in the event of an H_2S release from a pipeline or facility. The goals of this plan are to provide tools to enable an efficient, coordinated and effective response to emergencies. This plan contains written guidelines to evaluate and respond to an incident, and to prevent or minimize personal injury or loss, to avoid environmental hazards, and to reduce damage to property.

The Anadarko San Juan gas plant is located in the northern portion of the San Juan Basin near Kirtland, New Mexico, and encompasses approximately 320 acres in the northern half of Section 1, T29S, R15W in San Juan County, NM (see Figure 1).

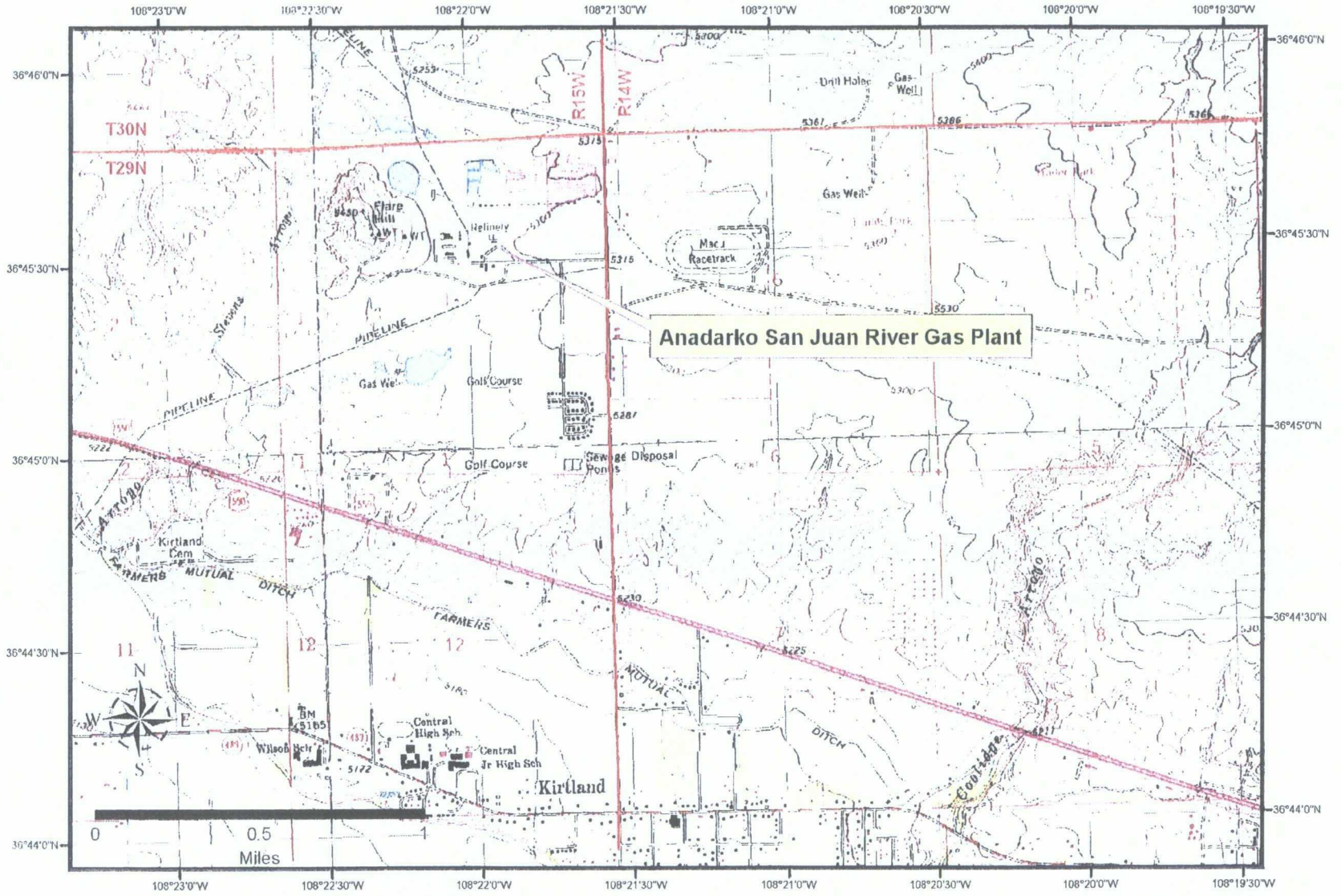


Figure 1: Location of Anadarko San Juan River Gas Plant

II. DEFINITIONS USED IN THIS PLAN

ANSI	The acronym "ANSI" means the American National Standards Institute.
API	The acronym "API" means the American Petroleum Institute.
Area of Exposure (AOE)	The phrase "area of exposure" means the area within a circle constructed with a point of escape at its center and the radius of exposure as its radius.
ASTM	The acronym "ASTM" means the American Society for Testing and Materials.
Dispersion Technique	A "dispersion technique" is a mathematical representation of the physical and chemical transportation characteristics, dilution characteristics and transformation characteristics of hydrogen sulfide gas in the atmosphere.
Division	The "division" return to the N.M. Oil Conservation Division.
Escape Rate	The "escape rate" is the maximum volume (Q) that is used to designate the possible rate of escape of a gaseous mixture containing hydrogen sulfide, as set forth herein. (a) For existing gas facilities or operations, the escape rate shall be calculated using the maximum daily rate of the gaseous mixture produced or handled or the best estimate thereof. For an existing gas well, the escape rate shall be calculated using the current daily absolute open flow rate against atmospheric pressure or the best estimate of that rate. (b) For new gas operations or facilities, the escape rate shall be calculated as the maximum anticipated flow rate through the system. For a new gas well, the escape rate shall be calculated using the maximum open flow rate of offset wells in the pool or reservoir, or the pool or reservoir average of maximum open flow rates. (c) For facilities or operations not mentioned, the escape rate shall be calculated using the actual flow of the gaseous mixture through the system or the best estimate thereof.
GPA	The acronym "GPA" means the Gas Processors Association.
LEPC	The acronym "LEPC" means the Local Emergency Planning Committee established pursuant to the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. Section 11001.
NACE	The acronym "NACE" means the National Association of Corrosion Engineers.
PPM	The acronym "ppm" means "parts per million" by volume.
PHV	Potentially Hazardous Volume means the volume of hydrogen sulfide gas of such concentration that: (a) the 100-ppm radius of exposure includes any public area; (b) the 500-ppm radius of exposure includes any public road; or (c) the 100-ppm radius of exposure exceeds 3,000 feet.
Public Area	A "public area" is any building or structure that is not associated with the well, facility or operation for which the radius of exposure is being calculated and that is used as a dwelling, office, place of business, church, school, hospital, or government building, or any portion of a park, city, town, village or designated school bus stop or other similar area where members of the public may reasonably be expected to be present.
Public Road	A "public road" is any federal, state, municipal or county road or highway.

Radius of Exposure (ROE)

The radius of exposure is that radius constructed with the point of escape as its starting point and its length calculated using the following Pasquill-Gifford derived equation, or by such other method as may be approved by the division:

(a) For determining the 100-ppm radius of exposure: $X= [(1.589)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture, and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psia and 60 degrees F).

(b) For determining the 500-ppm radius of exposure: $X=[(0.4546)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture, and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psia and 60 degrees F).

Regulatory Threshold

(1) Determination of Hydrogen Sulfide Concentration.

(a) Each person, operator or facility shall determine the hydrogen sulfide concentration in the gaseous mixture within each of its wells, facilities or operations either by testing (using a sample from each well, facility or operation), testing a representative sample, or using process knowledge in lieu of testing. If a representative sample or process knowledge is used, the concentration derived from the representative sample or process knowledge must be reasonably representative of the hydrogen sulfide concentration within the well, facility or operation.

(b) The tests used to make the determination referred to in the previous subparagraph shall be conducted in accordance with applicable ASTM or GPA standards or by another method approved by the division.

(c) If a test was conducted prior to the effective date of this section that otherwise meets the requirements of the previous subparagraphs, new testing shall not be required.

(d) If any change or alteration may materially increase the concentration of hydrogen sulfide in a well, facility or operation, a new determination shall be required in accordance with this section.

(2) Concentrations Determined to be Below 100 ppm. If the concentration of hydrogen sulfide in a given well, facility or operation is less than 100 ppm, no further actions shall be required pursuant to this section.

(3) Concentrations Determined to be Above 100 ppm.

(a) If the concentration of hydrogen sulfide in a given well, facility or operation is determined to be 100 ppm or greater, then the person, operator or facility must calculate the radius of exposure and comply with applicable requirements of this section.

(b) If calculation of the radius of exposure reveals that a potentially hazardous volume is present, the results of the determination of the hydrogen sulfide concentration and the calculation of the radius of exposure shall be provided to the division. For a well, facility or operation existing on the effective date of this section, the determination, calculation and submission required herein shall be accomplished within 180 days of the effective date of this section; for any well, facility or operation that commences operations after the effective date of this section, the determination, calculation and submission required herein shall be accomplished before operations begin.

(4) Recalculation. The person, operator or facility shall calculate the radius of exposure if the hydrogen sulfide concentration in a well, facility or operation increases to 100 ppm or greater. The person, operator or facility shall also recalculate the radius of exposure if the actual volume fraction of hydrogen sulfide increases by a factor of twenty-five percent in a well, facility or operation that previously had a hydrogen sulfide concentration of 100 ppm or greater. If calculation or recalculation of the radius of exposure reveals that a potentially hazardous volume is present, the results shall be provided to the division within sixty (60) days.

III. CHARACTERISTICS OF HYDROGEN SULFIDE (H_2S) AND SULFUR DIOXIDE (SO_2)

Hazards of Hydrogen Sulfide

At normal atmospheric conditions, hydrogen sulfide (H_2S) is a colorless gas. It is commonly referred to by other names such as Rotten Egg Gas, Acid Gas, Sour Gas, Sewer Gas, Poison Gas and Sulfur Gas. It has a characteristic "rotten egg" smell at low concentrations. At higher concentrations, it has a sweet odor. At still higher concentrations, an odor cannot be detected at all due to olfactory nerve anesthesia. Odor must *not* be used as means of determining the concentration of H_2S gas! Hydrogen sulfide can form explosive mixtures at concentrations between 4.3% and 46%, by volume. Its auto-ignition temperature is 500 degrees F (260 degrees C). When burning, its flame is practically invisible. It is denser than air (1.19 times heavier than air) and may accumulate in low places. Hydrogen sulfide gas tends to interact with high carbon steel, causing embitterment and fine fractures in metal components and piping.

H_2S acts as a chemical asphyxiate, preventing the body from utilizing oxygen in the tissue. Breathing may stop after a few seconds of exposure to H_2S gas in concentrations of 600-700 ppm. This produces symptoms such as panting, pallor, cramps, dilation of eye pupils and loss of speech. This is generally followed by immediate loss of consciousness. Death may occur quickly from respiratory paralysis and cardiac arrest. The table below illustrates the physical effects of hydrogen sulfide on a healthy adult.

Table 1 Effect of exposure to Hydrogen Sulfide Gas on a Healthy Adult

Concentration			Physical Effects
percent (%)	ppm	Grains per ft³	
0.001	10	0.65	Obvious and unpleasant odor. Safe for 8 hours exposure.
0.01	100	6.48	Kills smell in 3 to 15 minutes; may sting eyes and throat.
0.02	200	12.96	Kills smell shortly; stings eyes and throat.
0.05	500	32.96	Dizziness; breathing ceases in a few minutes; artificial respiration / oxygen must be given promptly.
0.07	700	45.36	**Unconscious quickly; death will result if not rescued promptly.**
0.10	1000	64.80	**Unconscious at once; followed by death within minutes.**

Properties of H_2S

COLOR	Colorless.
ODOR	Very offensive, commonly referred to as the odor of rotten eggs.
VAPOR DENSITY	1.189 (Air=1.0) H_2S is heavier than air.
BOILING POINT	-76 degrees F (-24 degrees C).
EXPLOSIVE LIMITS	4.3 to 46% by volume in air.
IGNITION TEMPERATURE	500 degrees F (260 degrees C).
WATER SOLUBLE	Yes (4 volumes gas in 1 volume water at 32 degrees F (0 degrees C).
FLAMMABILITY CORROSIVE	Forms explosive mixtures with air or oxygen.

Toxicity Table – H_2S

1 ppm = .0001% (1/10,000 of 1%)	Can smell (rotten egg odor).
10 ppm = .001% (1/1000 OF 1%)	Allowable for 8 hours exposure. (PEL & TLV)
100 ppm = .01% (1/100 of 1%)	Kills smell in 3-15 minutes. May burn eyes and throat. Considered to be IDLH atmosphere (Immediately Dangerous to Life and Health).
200 ppm = .03% (2/100 of 1%)	Kills smell rapidly. Burns eyes and throat.
500 ppm = .05% (5/100 of 1%)	Loses sense of reasoning and balance. Respiratory disturbances in 2-15 minutes. Needs prompt artificial resuscitation.
700 ppm = .07% (7/100 of 1%)	Will become unconscious quickly. Breathing will stop and death will result if not rescued promptly. Immediate artificial resuscitation is required.
1000 ppm = .1% (1/10 OF 1%)	Unconscious at once. PERMANENT BRAIN DAMAGE MAY RESULT UNLESS RESCUED PROMPTLY.
	ppm=parts of gas per million parts of air by volume. 1% = 10,000 ppm.

Properties of Sulfur Dioxide SO_2

Sulfur Dioxide - SO_2	Physical and Chemical Properties
Chemical Formula	SO_2
Molecular Weight	64
Boiling Point	14 degrees Fahrenheit
Non-Combustible	Produced by burning of H_2S Gas
Vapor Pressure	>1 atm @ 68 degrees Fahrenheit
Melting Point	-104 degrees Fahrenheit
Specific Gravity	Heavier than air, 2.26 degrees gravity
Colorless gas	SO_2 is colorless gas, very irritating to the eyes and lungs
Odor	Pungent odor and can cause injury or death to persons exposed to it
Reactions	Reacts with water or steam to produce toxic and corrosive gases
Hazards of Sulfur Dioxide	
Toxicity	The physiological effects on humans when inhalation of SO_2 occurs, varies at different levels of concentration and may be as follows
Concentrations SO_2	Physiological Effects SO_2
0.3-1 ppm	Detection level – pungent odor
2 ppm	Threshold Limit Value (TLV) Time Weighted Average (TWA)
5 ppm	15 minute Short Term Exposure Limit (STEL) permitted by OSHA
6 – 12 ppm	Irritation of the throat and nose
20 ppm	Eye irritation
100 ppm	Immediately Dangerous to Life or Health (IDLH) set by NIOSH

IV. EMERGENCY RESPONSE POLICY AND AUTHORITY

It is the policy of Anadarko to take the necessary actions required to safeguard Anadarko personnel and the public from emergency incidents. Such emergency incidents may include fires, hazardous materials releases, and incidents resulting from natural hazards such as tornadoes.

In the event of an emergency incident, Anadarko personnel will take prompt action within their immediate work area to ensure that all appropriate Anadarko personnel, corporate personnel, and the public are alerted or notified that an emergency incident exists.

Whenever possible, personnel will take immediate action to limit the effects of the emergency. Four objectives will be considered when developing an appropriate emergency response. These objectives are:

- Life safety.
- Environmental protection.
- Protection of company and public property.
- Preventing interruption of business and public services such as highway access, water, and utilities.

While all four of the above objectives are important, life safety will always remain the first and highest priority.

All Anadarko personnel have the responsibility, if necessary, to immediately alert Anadarko personnel that an emergency condition exists and to take appropriate action to protect life, property, and the environment. All emergency response actions by Anadarko personnel are voluntary. Emergency response actions taken by individuals should be within the limitations of their training, experience, and physical abilities. At no time will Anadarko San Juan River Gas Plant personnel assume an unreasonable risk during an emergency response. An unreasonable risk exists when:

- The task exceeds the physical abilities of the individual.
- The individual is not properly trained to complete the task.
- The individual does not have adequate experience to complete the task.

V. RESPONSE PROCEDURES FOR UNINTENTIONAL (ACCIDENTAL) RELEASES (SEE ATTACHMENT 8 FOR SIMPLIFIED FLOW CHART)

If an H_2S leak is detected as a result of an accidental release, the following emergency plan of action should be put into effect to adequately ensure the safety of Anadarko employees, contractors and the public. These response sequences should be altered to fit the prevailing situation and event/site-specific requirements.

1. Upon detecting a leak, assess wind direction and immediately move away from the source and attempt to get out of the affected area by moving upwind, or cross wind if travel upwind is not possible.

2. Alert other personnel in the area. Assist personnel in distress if this can be done without endangering yourself. Proceed to the designated emergency assembly area.

3. If injury or death has occurred, immediately call emergency services (911).

4. If possible, take immediate measures by shutting manual valve on AGI line to control present or potential discharge and to eliminate possible ignition sources. Auto control valve may have already activated to shut down flow of acid gas to compressor.

5. Notify the supervisory foreman (this may have occurred via the control room alarm system). The supervisor or their designee will formally assume the role of the Incident Commander (IC). Until relieved by the supervisor, the senior employee having initially discovered the leak should fill the role of IC.

6. If the IC deems it necessary, ensure that steps are taken to stop traffic through the area, most importantly, highway traffic. Roadblocks must be set up at the 10-ppm H_2S boundary. The H_2S boundary shall be delineated by using a calibrated H_2S monitor. Call emergency services (911) for assistance in quarantining the area, if needed. Refer to maps in Section XVII for highway and pipeline locations.

7. The IC will assess the situation and direct further actions to be taken. If assistance is required from law enforcement, safety or medical agencies, consult the emergency services telephone listing under Section XIII. The Division Operations Vice-President or his designee should also be notified.

8. Personnel equipped with self-contained breathing apparatus (SCBA) and portable H_2S monitoring equipment will determine the cause and extent of the leak. Personnel should enter the area from upwind of the site. If a reading of 10 ppm or higher of H_2S is obtained, then backup personnel equipped with SCBA will also be required.

9. Initiate evacuation of employees or any nearby residents, if deemed necessary. Coordinate with emergency services.

10. No one will be intentionally exposed to H_2S concentrations in excess of 10 ppm without proper personal protection equipment (PPE), IC authorization and backup personnel.

11. If possible, de-energize all sources of ignition, using lockout/tagout procedures.

12. If needed, perform shutdown on appropriate equipment and systems.

13. Trained personnel will continuously monitor H_2S concentrations, wind direction and area of exposure and will advise public safety and emergency personnel on current conditions.

14. Protective measures shall be maintained until the threat of injury from H_2S poisoning has been eliminated. The area must be checked with monitoring equipment and cleared below 10 ppm before allowing entry without proper PPE.

15. Notify the Division Health & Safety Manager. See Section XIII Assistance will be provided to ensure all proper notifications and reporting requirements are made to local, state and federal agencies.

16. As soon as possible, **but no more than four hours after plan activation,** notify the New Mexico Oil Conservation Division – San Juan County (See Section XIII). At a minimum, the following information will be needed:

    - The company name.
    - Facility name.
    - Your name and telephone number for them to contact you.
    - The location and source of the discharge.
    - A description of the area affected by the discharge, the probable concentration of H_2S in the region and the wind direction/velocity.
    - If necessary, request additional assistance from the agency.
    - If necessary, and if it is determined that a reportable quantity of H_2S (excess of 100 lbs) has been released, contact the National Response Center a 1-800-424-8802 and report the release.

Note: A simplified version of these steps is shown on a flowchart included as Attachment 8.

VI. EMERGENCY INCIDENT MANAGEMENT

Emergency incident management will follow the Incident Command System (ICS) as described by the Federal Emergency Management Act (FEMA). The intent of using ICS for all emergency incidents provides automatic continuity with outside agencies and assists in establishing a "unified command" of the incident. Anadarko provides instruction and training on the ICS, which is beyond the scope of this contingency plan. However a brief overview of the system is provided below.

The Incident Command System (ICS) utilizes a flexible, modular approach to organizing resources to effectively respond to emergency events. FEMA suggests that the basic Incident Command System has five functional areas:

- Command;
- Operations;
- Planning;
- Logistics; and,
- Finance.

However, for incidents such as those described in this plan, it seems more likely that the basic Incident Command System would be comprised of: 1) Command; 2) Operations Chief; and, 3) Safety Officer. Larger incidents may require additional positions such as Public Information Officer, Logistics Chief, Planning Chief, Finance Chief, Staging Manager, Medical Group Supervisor and Environmental Group Supervisor. The exact number and combination of positions will vary depending upon the type, size and duration of the incident.

In every incident, command must first be established. The first person to discover the problem is, by default, the Incident Commander (IC) until this responsibility is transferred to someone else. This responsibility should be formally transferred to the Facility/Field Supervisor as soon as practical. Who is acting as the IC should be clear and apparent at all times.

The Incident Commander (IC) is responsible for the overall management of the incident. Where the IC does not delegate or assign a position, the IC retains that responsibility. The IC should be careful to have no more than 5 to 8 people reporting directly to him. The IC establishes the strategy and goals for the incident and is ultimately responsible for the safety and success of the response activities.

An Operations Chief (OPS) is responsible for implementing the strategy to accomplish the goals defined by the IC. OPS directs all tactical operations, oversees response personnel and may assist the IC in the development of the action plan.

The Safety Officer is assigned by and reports directly to the IC. This position is responsible for identifying hazardous or unsafe situations, and developing measures necessary to assure the safety of response personnel and any victims of the incident. He/she should ensure that any personnel responding to the incident are using the proper PPE and have adequate training. The Safety Officer has the authority and responsibility to terminate or suspend operations that is believed to be unsafe or will place people in imminent danger.

VII. PERSONNEL VEHICLES AND EQUIPMENT

Plant personnel are equipped with personal H_2S monitors and portable gas detection devices.

The plant has a fully equipped mobile breathing air system with work units. Also, there are self contained breathing apparatus (SCBA's) located strategically throughout the facility (see Attachment 3 for locations). The AGI facility itself has additional H_2S monitoring and alarm monitoring systems, which are integrated with the plant H_2S alarm systems. These systems are described in Attachment 5 and are shown on a map of the AGI facility within the Anadarko San Juan Plant on Attachment 3.

An Emergency Response Kit and Road Block Kits are located at the egress stations for easy access if the facility is evacuated.

Personnel have cellular phones for communication, as well as two-way radios for inter-company communication.

All Anadarko personnel are equipped with personal H_2S monitors and portable gas detection devices are available at the plant site. A detailed description of the H_2S monitoring systems is included as Attachment 5.

Communications to Anadarko field personnel is via mobile cellular telephones or two-way radios.

Each Anadarko field truck is also equipped with a fire extinguisher in order to enable assistance as needed.

Company vehicles are equipped with two-way radios, roadblock kits and mobile phones.

Emergency Equipment on site at the Anadarko Plant

Quantity	Description
2 30# and 70 20#	**Ansul Fire Extinguishers**
7	**Wind Socks**
1	**150# Fire Extinguisher – Wheeled Units**
10	***Fixed Ambient H_2S Monitors***
7 30 minute-6 5 min. escape units	**SCBA – 30-Minute Breathing Air Packs (level A or B)**
5	**First Aid Kits**
3	**Fire Blankets (wool)**
2	**Eye Wash Stations**
2	**Emergency Showers**
2	**PPE Boxes**

VIII. EVACUATION PROCEDURE

Evacuation may become necessary to protect personnel and the public from hazards associated with an incident. Orderly evacuation is essential to protect the general public as well as Anadarko personnel and property.

Anadarko personnel have reviewed the affected area for this plan and have determined the safe evacuation routes and assembly areas to reduce confusion if evacuation becomes necessary. The Anadarko Facility Operator may assign employees to direct evacuation and account for personnel during emergencies. (See Section XIV and Attachment 7 for evacuation routes).

Designated Assembly Areas shall be at a safe distance from the incident in an appropriate direction (upwind, upstream, and upgrade). If the Assembly Areas do not provide adequate shelter, transportation to a central shelter should be arranged after all personnel are accounted for. As the incident progresses, the IC must continuously evaluate the adequacy of the assembly area and necessity of the shelter.

Anadarko personnel evacuating their work areas should evacuate the facility and initiate the plant ESD system, and proceed to the Designated Assembly Area (Attachment 7). Facility personnel will account for all personnel, ensure the evacuated area is secured and report the status of the evacuation to the IC. Evacuated personnel shall remain at the assembly area or shelter until directed otherwise by the IC.

- Local law enforcement and/or emergency management authority must be notified in conjunction with any community evacuation or public protective measures initiated.
- Emergency Response Plan initiated.
- Assess the scene; protect yourself.
- Summon EMS to the scene; provide information on the nature and number of injuries.
- If trained, provide First Aid/CPR as necessary, until EMS arrives at the scene; injured personnel should not be moved unless the situation is life threatening.
- Evacuate unnecessary personnel from the area.
- Establish a secure perimeter around the area to prevent unauthorized entry.
- Initiate the site security plan.
- Notify Facility Supervisor and make appropriate notifications to local Fire and EMS.
- Make other internal management contact as appropriate.

In case of a fatality:

- Do not move the victim.
- Do not release name of victim(s).
- Contact local law enforcement.
- Contact local medical examiner.
- Preserve the accident site.
- Restrict all unauthorized communications concerning the incident.

Make appropriate government agency notification and conduct post-incident activities.

IX. COORDINATION WITH STATE EMERGENCY PLANS

The Hydrogen Sulfide Contingency Plan as described will be coordinated with the New Mexico Oil Conservation Division (NMOCD) and with the New Mexico State Police consistent with the New Mexico Hazardous Materials Emergency Response Plan (HMER). A copy of this plan will be submitted to the New Mexico State Police and Local Emergency Planning Committee for San Juan County.

SAN JUAN COUNTY EMERGENCY PLANNING COMMITTEE

(505) 334-610

NEW MEXICO STATE POLICE
(San Juan County Office)

(505) 827-931

SAN JUAN COUNTY SHERIFF'S OFFICE

(505) 334-610

STATE EMERGENCY RESPONSE COMMISSION
(SERC)

(505) 476-96

NEW MEXICO OFFICE OF EMERGENCY MANAGEMENT

(505) 476-96

NATIONAL RESPONSE CENTER

(800) 424-8

X. NOTIFICATION OF THE OIL CONSERVATION DIVISION

The person, operator or facility shall notify the New Mexico Oil Conservation Division (NMOCD) upon a release of hydrogen sulfide requiring activation of the Hydrogen Sulfide Contingency Plan as soon as possible, but no more than one hour after plan activation, recognizing that a prompt response should supersede notification. The person, operator or facility shall submit a full report of the incident to the NMOCD on Form C-141 no later than fifteen (15) days following the release.

OIL CONSERVATION DIVISION
SAN JUAN COUNTY
AZTEC OFFICE

DURING WORKING HOURS
(505) 334-6178

EMERGENCY NUMBER
(AFTER WORKING HOURS
(505) 344-6178
(FOLLOW INSTRUCTIONS FOR EMERGENCY CALLS

DISTRICT SUPERVISOR MOBILE
(AFTER WORKING HOURS
(505) 320-0291

XI. PLAN ACTIVATION

If a 10 ppm alarm is activated at any monitor within the plant, the supervisory foreman will determine the cause of the alarm and determine if a release has occurred. In the event of an actual release, the supervisory foreman will coordinate with the Incident Commander (IC) to provide them the data necessary to assess the situation. Consistent with the requirements of Rule 118, the Hydrogen Sulfide Contingency Plan shall be activated when the Incident Commander (IC) believes that a release creates a concentration of hydrogen sulfide that exceeds or is likely to exceed the following activation levels:

- 100 ppm in any defined public area;
- 500 ppm at any public road; or
- 100 ppm at a distance greater than 3000 feet from the site of the release.

As soon as this determination is made, the IC will activate and initiate the H_2S Contingency Plan.

XII. TRAINING AND DRILLS

Training for all affected Anadarko personnel will be conducted prior to completion of the project and introduction of product. Training will then be given as needed for any personnel who may later be affected by this project.

This training will include:

- Training on the responsibilities and duties of essential Anadarko personnel.
- On-site or classroom tabletop drills which simulate a release or other situation affecting the facility.
- Annual H_2S Hazard Training.

Initial training is to take place upon employment with the company and refresher training is to be conducted annually – or sooner if there is a change in the plan or the need for training is determined.

All training will be documented and training records will be maintained on file at the Anadarko San Juan Plant EHS office.

All drills will be evaluated and documented including any recommendations resulting from findings. Recommendations will be assigned to Anadarko personnel for completion by an established date. Upon completion, the action plan will be documented and records will be filed at Anadarko San Juan River Gas Plant.

Only trained and certified personnel from responding agencies will participate in any rescue exercise.

The Hydrogen Sulfide Contingency Plan will also provide for training of noted residents in this plan as appropriate on the proper protective measures to be taken in the event of a release, and shall provide for briefing of public officials on issues such as evacuation or shelter-in-place plans. Literature will be passed out to the noted residents with emergency numbers to be utilized in the event of an incident associated with this facility or any Anadarko equipment and/or piping.

XIII. EMERGENCY ANADARKO CONTACT PHONE NUMBERS

Use the following phone number in the event of a catastrophic release and/or emergency situation at the Anadarko San Juan River Acid Gas Injection facility.

Telephone Numbers of ANADARKO Personnel

24 HOUR TELEPHONE NUMBER 800-241-2778
Local Plant Phone Numbers (505)-598-6451 or (505)-598-5601 Ext-15526)

ANADARKO SAN JUAN RIVER PLANT			505-598-5601-15526
NAME	TITLE	HOME	CELLULAR
Kent McEvers	Plant Manager	505-326-4054	505-860-7208
Rick Fetch	Operations Supervisor	505-324-6441	505-947-2416
Rick Fetch	Technical Supervisor	Same	Same
Arlyn Thorson	Maintenance Foreman	505-326-6718	505-947-2417

ANADARKO THE WOODLANDS HEADQUARTERS				(832) 636-1000
NAME	TITLE	OFFICE	HOME	CELLULAR
Mario Reyes	GM of Operations	832-636-3431	281-296-0385	832-636-5446
Tony Marques	Manager of Engineering	832-636-7368		303-945-5086
Mike Gray	Dir. EH&S	832-636-2454	936-271-9869	281-415-6964

ANADARKO San Juan Area Safety Offices Location: San Juan Plant				
NAME	TITLE	OFFICE	HOME	CELLULAR
Jerry Adams	Environmental Manager	832-636-83054	281-363-4693	281-731-5931
Mike Gray	EHS Director	832-636-2454	936-271-9869	281-415-6964
Julie Betik	Envir. Sr Staff Analyst/air	832-636-2609	281-320-2066	281-793-7705
Eric Weaver	Envir. Sr Analyst/soil-water	432-684-2808	432-634-1997	432-413-2494
Kelly Velasquez	PSM Coordinator	720-929-6192		303-358-7858

In case of an emergency at the Anadarko San Juan River Gas Plant requiring assistance for fire, ambulance, medical authorities or HazMat issues – immediately call:

911

Responder Emergency Numbers:

Facility		Kirtland, New Mexico
Fire Department	Farmington	911 or 505-599-1430
Medical Facility	San Juan Regional Medical Center	505-327-2271
State Police	Farmington, NM	505-827-9316
Sheriff Department	Farmington, NM	505-334-6107
Local EPC	Farmington, NM	505-334-6107

Telephone Numbers of Public Agencies

Oil Conservation Division – San Juan County	505-334-6178
State Emergency Response Commission (SERC)	505-476-9681
New Mexico Office of Emergency Management	505-476-9600
Bureau of Land Management –Farmington	505-599-8900

Telephone Numbers of Emergency Resources

Organization	Phone Number
Environmental Consultants	
Geolex, Inc. – Alberto Gutierrez or James Hunter	505-842-8000
ESI, Inc. – Sam Cudney	505-266-6611
Spill – Cleanup Contractors	
IMI Construction	505-325-5005
TRC Construction	505-334-8220
Envirotech	505-632-0615
Heavy Equipment Contractors	
Weeminuche Construction	970-565-7430
Transportation Services	
Key Energy	505-327-0416

Remember – Our FOUR Objectives in an Emergency Are:

1. Life Safety.
2. Environmental Protection.
3. Protection of Company and Public Property.
4. Preventing interruption of business and public services such as Highway Access, Water & Utilities.

Life Safety Will Always Remain the First and Highest Priority!

XIV. DETAIL INFORMATION - POTENTIALLY HAZARDOUS AREAS

Anadarko San Juan River Gas Plant and Anadarko San Juan River AGI #1

DRIVING DIRECTIONS:
From Farmington:
Location: Section 1 T 29 S, R 15 W, San Juan County, NM
Latitude: 36.453 N
Longitude: 108.220 W

EVACUATION ROUTE:

At all times note the wind direction before evacuating procedures begin. The primary evacuation assembly area will be the east entrance to the plan, and then follow the plant road east approximately ¼ mile to County Road 6500, (Area #1) where employees and visitors will assemble to assure that all personnel are accounted for. As necessary, evacuation may then proceed south one mile to Highway 64.

Evacuation for all persons inside of the AGI Facility fences would be west to the west side dirt road and then south to the plant entrance (wind conditions permitting) group assembly area #1 to account for all employees including any visitors (see Attachment 7). Visitor sign in sheet shall be used to account for all visitors.

ROAD BLOCKS:

In emergencies involving a large acid gas pipeline leak near the Anadarko San Juan River Gas Plant, US Highway 64 may be blocked at approximately one mile east and west of the plant.

The unpaved access roads around the Anadarko San Juan River Plant shall be secured in the event of a release that is likely to cause an exceedance of 10ppm H2S in the road area. In this event, appropriate roadblock locations will be established on these roads.

COMMAND POST:

The Command Post will be established at one of the roadblock locations. The site will be dependent of the wind direction.

The Incident Commander, after arriving at the scene, has the authority to assess the situation and determine the severity level of the incident. The Incident Commander may determine that the Contingency Plan as written cannot be activated effectively. The Emergency Response Plan may then be activated depending on the Incident Commander's evaluation of the situation.

PUBLIC RECEPTORS LOCATED INSIDE RADIUS OF EXPOSURE (ROE):

There are no public receptors located within either the 500ppm or the 100ppm radii of exposure. The radii as calculated in Attachment 2 and shown in Attachment 4 are contained within the plant or adjacent unoccupied land.

XV. ANADARKO PUBLIC AWARENESS PROGRAM

Anadarko participates in an extensive annual Public Awareness Program and Damage Prevention Program.

Anadarko installs pipeline markers and signs at all facilities and road crossings to identify our underground pipelines and maintains these markers on an annual schedule. Anadarko installs poison gas signs at periodic intervals on the fence surrounding the Anadarko San Juan River Plant.

XVI. EMERGENCY SHUTDOWN EQUIPMENT

Anadarko has an installed automatic and manually activated emergency shutdown system (ESD) at the Acid Gas Injection Facility at the Anadarko San Juan River Gas Plant. The plant operator and/or Incident Commander (IC) may use these systems to shutdown and isolate the equipment in the facility. This is a fail safe system that will shut valves and equipment if any portion of the system fails. The Acid Gas Injection system will be normally controlled from the Anadarko San Juan River Plant Control Room and shutdown of equipment and ESD valves at the well-site may be accomplished from this system as well as at the well-site.

When activated the ESD shuts an automatic valve on the inlet acid gas feed stream, shuts an automatic valve on the compressed acid gas to the acid gas injection well, and sends a signal to the wellhead panel to shut down automatic valves on the wellhead. The major equipment is shut down. The specific major equipment items at injection well site that are shutdown in an ESD include the acid gas compressors and associated coolers and pumps. The fuel gas, which is used for flare fuel and purge gas is left on-line; however an automatic valve is provided in this line at the well-site that can be actuated separately in the control system to close this valve.

In the wellhead control panel there is a separate shutdown for the subsurface safety valve (SSSV). The SSSV can be closed if required. The SSSV will close automatically upon detection of high pressure in the wellhead piping. The SSSV will shut if there is a fault in the wellhead control panel.

In addition to these systems the well-site facility contains portable fire extinguishers that may be used in an emergency. The well-site facility also has air packs used for escape or rescue located throughout the facility at key locations. The facility also has a breathing air system at the compressor units consisting of air bottles, tubing, and a manifold to connect 5 minute air packs. These are primarily used when performing maintenance work on the compressor units; however, they can also be used during an emergency if required. Refer to the "Emergency Equipment Location Plan" (See Attachment 3) for the location of this equipment.

Anadarko has also installed hydrogen sulfide detectors throughout the Well-Site Facility in key locations to detect possible leaks. Upon detection of hydrogen sulfide at 10 ppm levels at any detector a visible beacon is activated at that detector and an alarm is sounded. Pursuant to the procedures described in sections V, XI and Attachment 8, the supervisory foreman will investigate the alarm and determine if the plan should be activated. In the event of a detection of hydrogen sulfide at 50 ppm levels at any detector, an evacuation alarm is sounded throughout the Facility. All personnel proceed immediately to a designated area near the Facility office outside the fence (or alternate area south of the plant depending on wind direction and their location in the well-site facility).

In addition to sounding evacuation alarm sirens, at concentrations of 50 ppm in the acid gas compressor area the acid gas compressor is shutdown and isolation valves upstream and downstream of the unit are closed, including the wellhead automatic wing valve. Refer to Attachment 3 for the locations of the hydrogen sulfide detectors.

During shut downs of the well-site compression or the injection well the acid gas will be flared at the Anadarko San Juan River Plant, if necessary

The above described system satisfies all requirements under Rule 118 regarding downhole conditions in the AGI. The subsurface safety valve (SSV) and the packer and inert fluid filling the annular space, combined with pressure monitoring will ensure safety and Rule 118 compliance.

XVII. ATTACHMENTS

LISTING OF ATTACHMENTS

1. Description of Worst Case Scenario of H_2S Release
2. Standard Calculations of Radius of Exposure (ROE)
3. Map of Entire Anadarko San Juan River Plant Showing H_2S Monitoring System and Emergency Equipment Locations
4. Map Showing Calculated Radius of Exposure for 100 and 500 ppm H_2S
5 Description of H_2S Monitoring and Alarm Systems at Anadarko Plant
6. Hazardous Material Incident Notification Information Checklist
7. Map Showing Evacuation Routes and Assembly Areas (Wind Conditions Permitting)
8. Simpified H_2S Contingency Plan Flowchart
9. Distribution List

ATTACHMENT 1 Description of Worst Case Scenario of H_2S Release

The basis for worst case calculations is 10% hydrogen sulfide in the acid gas from the Anadarko San Juan River Gas Plant, which is at typical maximum concentration observed at the plant.

Note that essentially all of the hydrogen sulfide in the plant feed gas is separated from the processed gas and becomes the acid gas stream. Therefore, the worst case calculated radius of exposure will be the same for the Acid Gas Injection Facility and for the Anadarko San Juan River Gas Plant as a whole. Furthermore, the worst case scenario is being assumed in the standard calculations since it would be a rupture that results in release of all of the hydrogen sulfide from the acid gas. Calculations using the Pasquill-Gifford equations as described in OCD Rule 118 are presented on the following page (Attachment 2). Also included below is a diagrammatic representation of the AGI system (Figure 5 from C-108 Application).

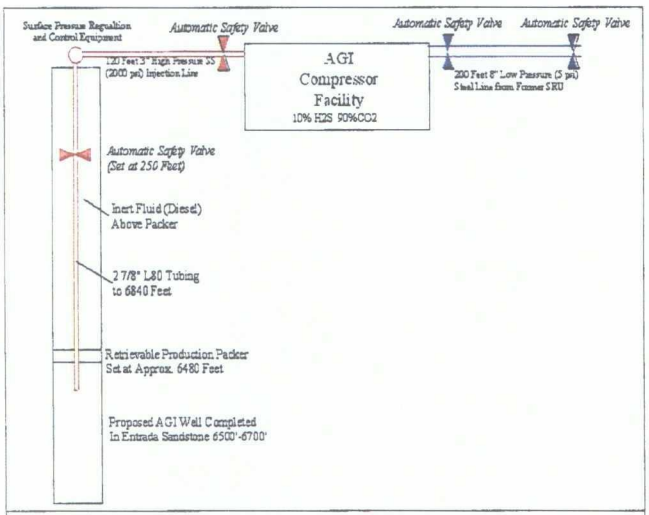


Figure 5: Schematic of Anadarko San Juan River Gas Plant Acid Gas Injection System Components

ATTACHMENT 2

Standard Calculations of Radius of Exposure (ROE)

ATTACHMENT 2

STANDARD CALCULATIONS OF RADIUS OF EXPOSURE

The calculation provided in the regulation assumes an escape rate (Q) that is continuous. However, the anticipated worst-case release for this facility is expected to be a short-term release, as the facility is equipped with automatic safety devices to prevent a continuous release. For this reason, OCD's calculation for ROE cannot be used here.

OCD also states that,

> *For facilities or operations not mentioned, the escape rate shall be calculated using the actual flow of the gaseous mixture through the system or the best estimate thereof.* [19.15.3.118.B.6.e NMAC].

In the case of Anadarko's San Juan Basin Plant, the worst-case anticipated releases of H_2S will be discontinuous, limited to the volume in two discrete sections of pipe:

- **Section 1**: a 120 ft length of 3" line leading from compressor to the well head.
- **Section 2**: a 250 ft section of 2 7/8" tubing in the well.

The Radius of Exposure was calculated for a release from these two segments. These sections are identified in Table 1 of the attached calculation [*Table 1, Calculated Volume of Release*]. Table 1 also describes the assumed temperature and pressure for each section of pipe.

Table 2 of the attached calculation shows the standardization of the release parameters to 60 degrees F and 14.73 psia, per OCD requirements. The standardization is via a method approved by NMED.

The release rate, Q (g/s), is calculated in Table 3 using the Ideal Gas Law, (PV=nRT), where $P_1V_1/T_1 = P_2V_2/T_2$. The time for release to occur is conservatively estimated at 5 minutes. The H_2S percentage for the pipeline is based on assumed worst case values from facility gas analyses.

To calculate the final ROE, we used a variation of the Gaussian distribution equation for ground level releases as described in the *Workbook of Atmospheric Dispersion Estimates* [D. Bruce Turner, 1994, CRC Press]. Copies of referenced pages from the text are attached. The calculation determines the distance to a concentration Level of Concern for a ground level release, as a function of the Pasquill-Gifford Stability classes:

$\sigma_y \sigma_z = Q / (\pi * u * \chi_{LOC})$ (Equation 2.6, page 2-16)

Where

$Q =$ pollutant concentration (calculated in Table 3 of spreadsheet)

$\chi_{LOC} =$ normalized air pollutant concentration at the Level Of Concern (100 ppm and 500 ppm, standardized in Table 2 of spreadsheet)

u = windspeed (assume 1 m/s)

$\sigma_y \sigma_z$ = Gaussian standard deviation product; product of vertical and horizontal dispersion coefficients

Table 4 of the spreadsheet shows the calculation of the distance to the concentration Level Of Concern using the variables assumed above. This equation results in a standard deviation product, $\sigma_y \sigma_z$. For this calculation, we assumed Stability Class F as a conservative measure.

Attachment 2-A is an excerpt from Turner's *Workbook* and shows a tabulation of calculated $\sigma_y \sigma_z$ values vs distance x in 10 m increments. The calculated $\sigma_y \sigma_z$ product results for the release are not exact matches to the tabulated values, so we assumed a linear interpolation between the $\sigma_y \sigma_z$ products to estimate a distance to the Level of Concern. The interpolated distances for 100 ppm and 500 ppm are shown in Table 4.

Anadarko San Juan Basin Plant
H_2S Radius of Exposure Calculations

Table 1: Calculated Volume of Release

Pipe Section	Length of Pipe ft	diameter of pipe ft	volume of pipe ft3	Pipe Section Pressure psi	Pipe Section Temperature F
1	120	0.25	5.89048623	1900	100
2	250	0.24	11.3097336	1900	100.00
3	0	0	0	0	0.00
4	0	0	0	0	0.00

Pipe length, diameter, pressure and temperature are actual values

Table 2: Standarization

Per OCD, release parameters must be standardized to 60F and 14.7 psi

Elevation	5500	5500	ft		
concentration	100	500	ppm		Concentrations of concern selected by OCD
corrected	115084.1	575420.6	$\mu g/m^3$	χ	Concentration corrected for Elevation, using NMED method
χ	0.115084119	0.57542059	g/m^3	χ	$1x10^6$ µg/g
Specific Volume	11.136	11.136	ft^3/lb		Specific Volume of H_2S

Table 3: Release Rate Calculation using Ideal Gas Law

Pipe Section	P1	P2	V1	T1	T2	Standardized Pipe Release Volume V2	H_2S Concentration	H_2S Release Volume	H_2S Release Mass	Time of Release	Release Concentration Q
	psi	psi	ft^3	K	K	ft^3	%	ft^3	lb	min	g/s
1	1914.7	14.7	5.890486225	311.1	288.7	712.053037	10%	71.20530374	6.39415443	5	9.667961499
2	1914.7	14.7	11.30973355	255.5	288.7	1664.38535	10%	166.4385349	14.94598912	5	22.59833555
Release Sum											**32.266297**

Notes

1 Pipeline Volume calculated using ideal gas law, (P1V1)/T1 = (P2V2)/T2, where:
- P1 = Actual pressure + standard pressure (14.7 psi)
- P2 = Standard pressure (14.7 psi)
- V1 = Volume of the pipe section to be released
- V2 = Release volume at standard conditions - equation is solved for this
- T1 = Temperature of gas in pipeline (in Kelvin)
- T2 = Standard Temperature (60F, expressed in Kelvin = 288.7K)
- °C = (°F - 32) x 5/9
- K = C + 273.3

2 H_2S Release volume is H_2S Concentration * Standardized Pipe Release Volume

3 H_2S Release Mass is H_2S Release Volume * Specific Volume of H_2S

4 Time of Release is 5 minutes, as a conservative estimate

5 Release Concentration, Q, is H_2S Mass (lb) * 453 .6 g/lb / (10 min * 60 sec/min)

Table 4: Radius of Impact Distance Calculation

Calculated radius of impact is estimated from equations found in the Workbook of Atmospheric Dispersion Estimates (D. Bruce Turner).

$\sigma_y \sigma_z = Q / \pi u \chi_{LOC}$ D. Bruce Turner, *Workbook of Atmospheric Dispersion Estimates*, Equation 2.6

u = Windspeed, conservative estimate

Q = Pollutant emission rate

χ_{LOC} = Level-of-Concern concentration

x = distance from source

Based on the above calculation, x is interpolated from Table 2.5 of Turner's Workbook (assuming Stability Class F), for the resulting σ_y σ_z..

Pipe Section	Exposure Concentration	u	Q	χ_{LOC}	$\sigma_y \sigma_z$	**Radius of Exposure** x	
	ppm	m/s	g/s	g/m^3	m^2	**m**	
1	100	1	9.67	0.12	26.74		
	500	1	9.67	0.58	5.35		
2	100	1	22.60	0.12	62.50		
	500	1	22.60	0.58	12.50		
Sum	100	1	32.27	0.12	89.24	**368**	radius
	500	1	32.27	0.58	17.85	**144**	radius

Scenario 3 consists of 1 & 2 added together

Workbook of Second Edition

ATMOSPHERIC DISPERSION ESTIMATES

An Introduction to Dispersion Modeling

with floppy diskette

D. Bruce Turner
Trinity Consultants, Inc.
Chapel Hill, North Carolina

LEWIS PUBLISHERS
Boca Raton Ann Arbor London Tokyo

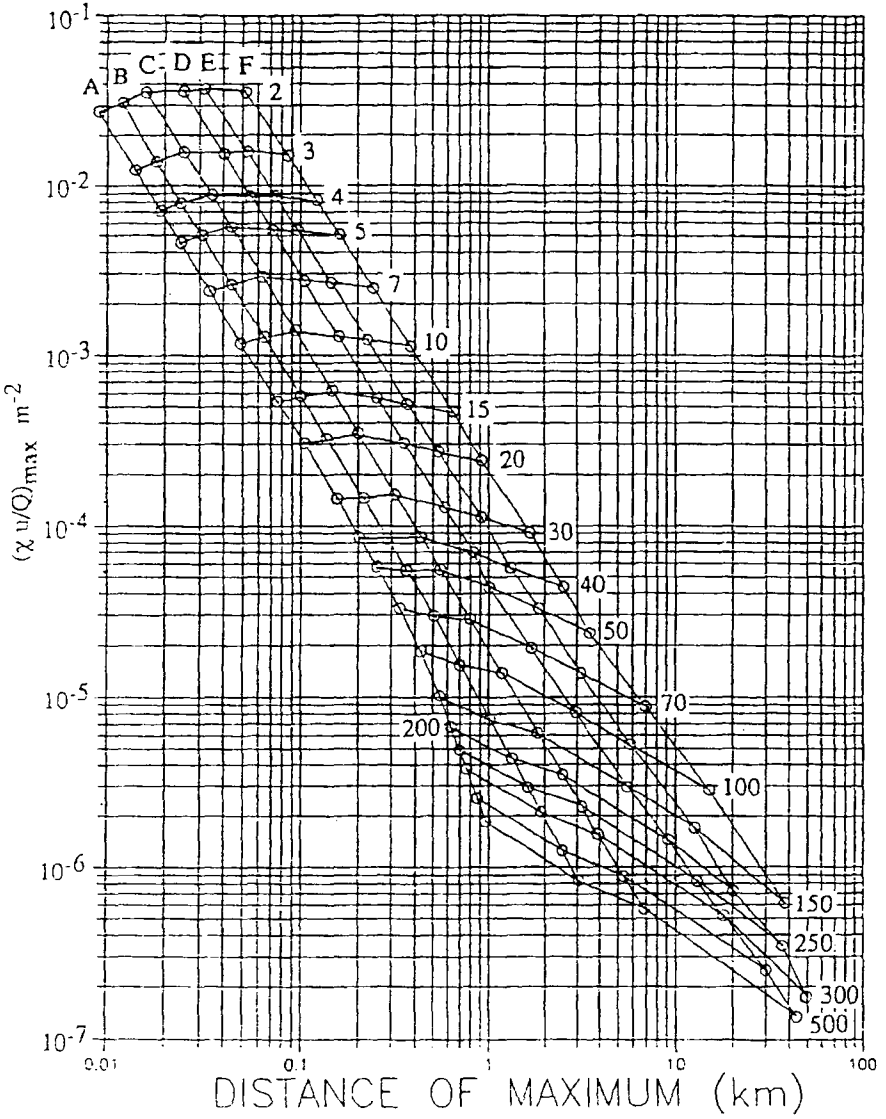


Figure 2.5 Relative maximum concentration normalized for wind speed and distance to maximum concentration as functions of Pasquill stability class and effective height of release.

dispersion parameters we are considering the atmosphere in only six classes while, in reality, it is a continuum. One will note by making sample calculations that considerably different concentrations are calculated with a change of one stability class in the assumptions. The difference is greater at greater distances.

Larger errors in the dispersion parameters, σ_y and σ_z, are expected for the extremes of stability and at larger distances. In some cases the σ_z may be expected to be correct within a factor of two. These are: 1) all stabilities for distance of travel out to a few hundred meters; 2) neutral to moderately unstable conditions for distances out to a few kilometers; and 3) unstable conditions in the lower 1000 meters of the atmosphere, with an inversion limiting the mixing above, for distances out to 10 km or more. Uncertainties in the estimates of σ_y are, in general, less than those of σ_z. The groundlevel centerline concentrations for these three cases (where σ_z can be expected to be within a factor of 2) should be correct within a factor of 3, including errors in σ_y, H, and u. The relative confidence in the σ's is indicated by the solid and dashed lines in Figures 2.3 and 2.4.

It should be noted that the σ_y behavior may not be as neat and orderly as given in Figure 2.3 especially during periods of light winds. There may be some meander (wind direction changes with a longer time period) of the wind under such conditions which will cause an increase in the effective horizontal dispersion that is not really due to turbulent fluctuations. This meander under light wind conditions is not included in the Pasquill-Gifford σ_y's.

The errors that have been discussed are those associated with estimates of the concentrations directly downwind from the point of release. Slight errors in the estimation of wind direction, especially under stable conditions when pollutant plumes are relatively narrow, can result in tremendous errors of concentration where the problem is to estimate the concentration at specific locations. This is also the principal reason why so many hour-to-hour field concentration measurements relate rather poorly with concentration estimates. The estimated plume path dependent on the estimated wind direction is somewhat different than the actual plume path responding to the actual wind direction at the height of the plume centerline. In these cases the magnitude of the highest downwind concentrations under the stated stability and wind speed are estimated quite well, but the location of this maximum may be in error. Therefore, if one is trying to use dispersion estimates to estimate the concentration at specific times and specific locations, it is important to try to make exceptionally good estimates of the wind direction for each time period or expect to put up with large error bounds, perhaps as much as a factor of ten, about the estimated concentrations. See Problem 5e in Chapter 8.

2.12 Determining the Distance to a Concentration Level of Concern for a Groundlevel Release

For a groundlevel release the equation for concentration directly downwind (y = 0) is given by eq. 2.5. In order to determine the distance to a particular value of concentration, call it the Level-of-Concern concentration, χ_{LOC}, this equation can be rearranged to solve for the product of σ_y times σ_z. This is:

$$\sigma_y \sigma_z = \frac{Q}{\pi u \chi_{LOC}} \qquad (2.6)$$

The distance where the product achieves this value can then be approximated by inspection of the right side of Table 2.5 or of Figure 2.6. Of course, the emission rate, Q, and wind speed, u, must be known or closely approximated.

This just gives the distance to the point where the concentration can be expected to drop off to the level of concern. As stated in the above section, the location where this is occurring is highly dependent upon the wind direction. If nothing is known about the wind direction, all that can be said is that there is a circle with a radius equal to the distance to the level-of-concern concentration and the concentrations that are higher are occurring somewhere within this circle. If something more definitive is known about the wind direction at this site for this time interval then the location of the high concentrations can be located more specifically.

The distance to χ_{LOC} can be determined directly from the above procedures for the simplified situation of the groundlevel release. For an elevated release the additional complication of the exponential involving the ratio of H to σ_z occurs. A direct solution is not available and eq. 2.3 must be solved at various downwind distances to determine where the concentration decreases to the LOC. The first estimate can be made with eq. 2.6 however, and then closer distances tried until the proper distance is found.

2.13 Treatment of Effect of Mixing Height

The mixing height according to Holzworth (1972, p 3) is "the height above the surface through which relatively vigorous mixing occurs." Therefore the mixing height is assumed to occur with unstable and neutral conditions and to be undefined when the surface layer is stable. Plume trapping occurs when the plume is trapped between the ground surface and a stable layer aloft. Such a stable layer frequently caps the mixing height. Bierly and Hewson (1962) have suggested the use of an equation that accounts for the multiple eddy reflections from both the ground and the stable layer where z_i is the height of the stable layer and J = 3 or 4 is sufficient to include the reflections of any significance. The principal off-axis position vertically involving the mixing height is the distance from the point of release to the mixing height plus the distance from the mixing height to the receptor height. However, all other possible combinations of multiple eddy reflection between the ground and the mixing height have been included in eq. 2.7. This equation is evaluated for receptors that are close to the source.

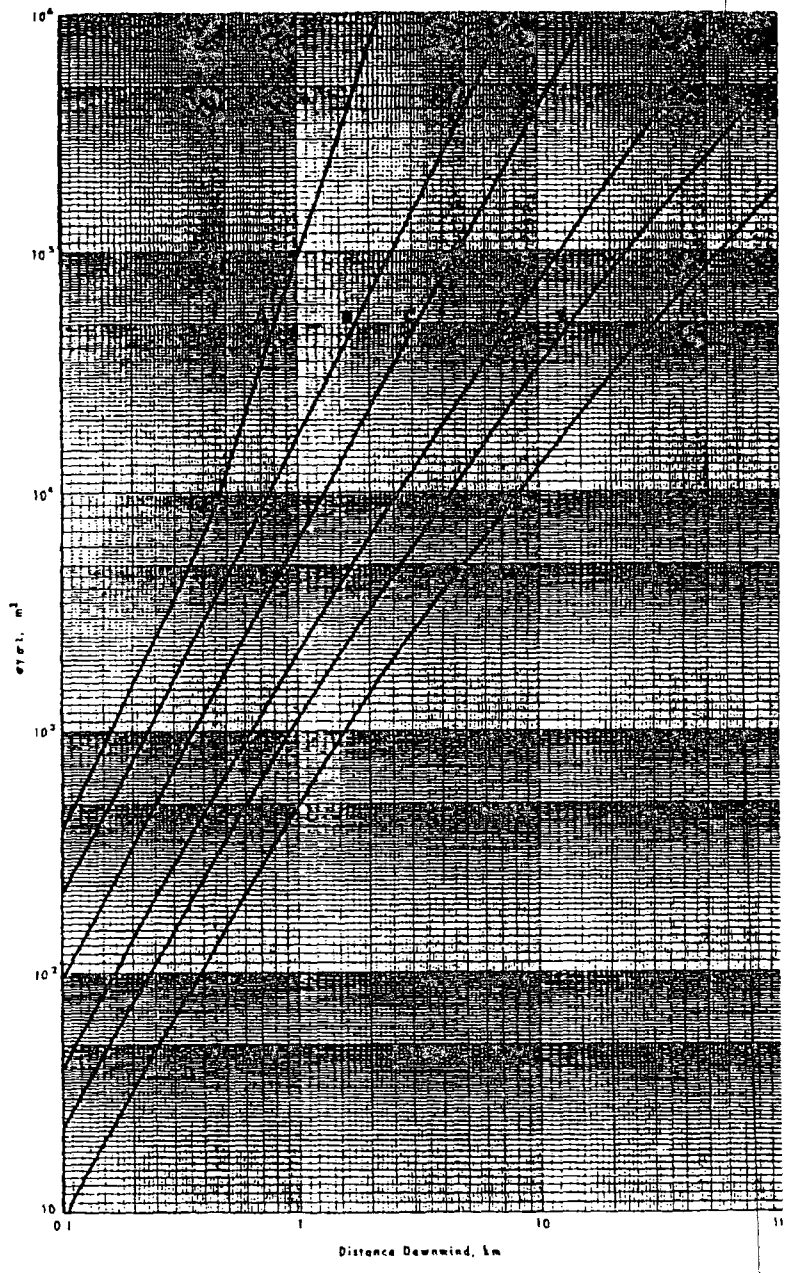


Figure 2.6 The product of $\sigma_y \sigma_z$ as a function of downwind distance from the source.

Table 2.5 (Part 1) Pasquill-Gifford Dispersion Parameters

x, km	Sigma-y, meters A	B	C	D	E	F	Sigma-z, meters A	B	C	D	E	F	Sigma-y times Sigma-z A	B	C	D	E	F
0.01	3.36	2.34	1.47	0.96	0.72	0.48	1.58	1.24	0.91	0.63	0.51	0.36	5.32	2.90	1.33	0.60	0.37	0.17
0.02	6.29	4.42	2.80	1.84	1.37	0.91	3.05	2.37	1.71	1.15	0.92	0.63	19.2	10.5	4.78	2.11	1.26	0.57
0.03	9.08	6.41	4.08	2.68	2.00	1.33	4.47	3.45	2.47	1.63	1.29	0.87	40.6	22.1	10.1	4.37	2.58	1.16
0.04	11.8	8.34	5.33	3.50	2.61	1.74	5.87	4.51	3.22	2.10	1.64	1.10	69.1	37.7	17.2	7.34	4.29	1.91
0.05	14.4	10.2	6.56	4.31	3.22	2.14	7.25	5.56	3.95	2.55	1.98	1.32	104.	56.9	25.9	11.0	6.37	2.82
0.06	17.0	12.1	7.77	5.11	3.81	2.53	8.61	6.59	4.66	2.98	2.31	1.53	146.	79.6	36.2	15.2	8.79	3.88
0.07	19.5	13.9	8.96	5.89	4.40	2.92	9.96	7.61	5.37	3.41	2.62	1.74	194.	106.	48.1	20.1	11.5	5.08
0.08	22.0	15.7	10.1	6.67	4.98	3.31	11.3	8.61	6.07	3.83	2.93	1.94	248.	135.	61.5	25.5	14.6	6.41
0.09	24.4	17.5	11.3	7.44	5.55	3.69	12.6	9.61	6.76	4.24	3.24	2.13	308.	168.	76.4	31.6	18.0	7.88
0.10	26.9	19.3	12.5	8.20	6.12	4.07	13.9	10.6	7.44	4.65	3.53	2.33	375.	204.	92.7	38.1	21.6	9.46
0.11	29.3	21.0	13.6	8.96	6.69	4.45	15.4	11.6	8.12	5.05	3.82	2.51	451.	244.	111.	45.3	25.6	11.2
0.12	31.6	22.7	14.7	9.71	7.25	4.82	16.9	12.6	8.79	5.45	4.10	2.70	535.	286.	130.	52.9	29.8	13.0
0.13	34.0	24.5	15.9	10.5	7.81	5.19	18.4	13.5	9.46	5.84	4.38	2.88	625.	331.	150.	61.1	34.2	14.9
0.14	36.3	26.2	17.0	11.2	8.36	5.56	19.9	14.5	10.1	6.23	4.66	3.06	722.	380.	172.	69.8	38.9	17.0
0.15	38.6	27.9	18.1	11.9	8.91	5.92	21.4	15.5	10.8	6.62	4.93	3.24	826.	431.	195.	79.0	43.9	19.2
0.16	40.9	29.5	19.2	12.7	9.46	6.29	23.0	16.4	11.4	7.00	5.20	3.41	940.	485.	220.	88.7	49.2	21.5
0.17	43.2	31.2	20.3	13.4	10.0	6.65	24.5	17.4	12.1	7.38	5.46	3.58	1.06E+03	543.	246.	98.8	54.6	23.8
0.18	45.5	32.9	21.4	14.1	10.5	7.01	26.1	18.3	12.7	7.76	5.72	3.76	1.19E+03	603.	273.	110.	60.4	26.3
0.19	47.7	34.5	22.5	14.8	11.1	7.37	27.7	19.3	13.4	8.13	5.98	3.93	1.32E+03	666.	302.	121.	66.3	28.9
0.20	50.0	36.2	23.6	15.6	11.6	7.73	29.3	20.2	14.0	8.50	6.24	4.09	1.46E+03	732.	331.	132.	72.5	31.6
0.21	52.2	37.8	24.7	16.3	12.2	8.08	31.0	21.2	14.7	8.87	6.49	4.25	1.62E+03	802.	362.	144.	79.0	34.4
0.22	54.4	39.4	25.8	17.0	12.7	8.44	32.6	22.2	15.3	9.23	6.75	4.41	1.78E+03	876.	395.	157.	85.6	37.2
0.23	56.6	41.0	26.9	17.7	13.2	8.79	34.3	23.2	15.9	9.60	7.00	4.57	1.94E+03	953.	428.	170.	92.5	40.2
0.24	58.8	42.7	27.9	18.4	13.8	9.14	36.0	24.2	16.6	9.96	7.24	4.72	2.12E+03	1.03E+03	463.	183.	99.6	43.2
0.25	61.0	44.3	29.0	19.1	14.3	9.50	37.7	25.2	17.2	10.3	7.49	4.88	2.30E+03	1.12E+03	499.	197.	107.	46.3
0.26	63.2	45.9	30.1	19.8	14.8	9.85	39.6	26.2	17.8	10.7	7.74	5.03	2.50E+03	1.20E+03	536.	212.	115.	49.5
0.27	65.3	47.5	31.1	20.5	15.3	10.2	41.5	27.2	18.5	11.0	7.98	5.18	2.71E+03	1.29E+03	575.	226.	122.	52.8
0.28	67.5	49.0	32.2	21.2	15.9	10.5	43.5	28.2	19.1	11.4	8.22	5.33	2.93E+03	1.38E+03	614.	242.	130.	56.2
0.29	69.6	50.6	33.2	21.9	16.4	10.9	45.5	29.2	19.7	11.7	8.46	5.48	3.16E+03	1.48E+03	655.	257.	139.	59.6
0.30	71.8	52.2	34.3	22.6	16.9	11.2	47.4	30.1	20.3	12.1	8.70	5.62	3.40E+03	1.57E+03	697.	273.	147.	63.2

Table 2.5 (Part 2) Pasquill-Gifford Dispersion Parameters

x, km	Sigma-y, meters A	B	C	D	E	F	Sigma-z, meters A	B	C	D	E	F	Sigma-y times Sigma-z A	B	C	D	E	F
0.31	73.9	53.8	35.3	23.3	17.4	11.6	49.7	31.1	20.9	12.4	8.92	5.77	3.67E+03	1.67E+03	740.	289.	155.	66.8
0.32	76.0	55.3	36.4	24.0	17.9	11.9	52.0	32.1	21.6	12.7	9.13	5.92	3.95E+03	1.78E+03	785.	306.	164.	70.5
0.33	78.1	56.9	37.4	24.7	18.4	12.3	54.3	33.1	22.2	13.1	9.35	6.06	4.24E+03	1.88E+03	830.	322.	172.	74.3
0.34	80.2	58.5	38.5	25.4	19.0	12.6	56.6	34.1	22.8	13.4	9.56	6.20	4.54E+03	1.99E+03	877.	340.	181.	78.2
0.35	82.3	60.0	39.5	26.1	19.5	12.9	59.0	35.1	23.4	13.7	9.77	6.35	4.85E+03	2.10E+03	925.	357.	190.	82.2
0.36	84.4	61.5	40.5	26.7	20.0	13.3	61.3	36.1	24.0	14.0	9.98	6.49	5.18E+03	2.22E+03	974.	375.	199.	86.2
0.37	86.5	63.1	41.6	27.4	20.5	13.6	63.8	37.0	24.6	14.3	10.2	6.63	5.52E+03	2.34E+03	1.02E+03	393.	209.	90.3
0.38	88.6	64.6	42.6	28.1	21.0	14.0	66.2	38.0	25.2	14.6	10.4	6.77	5.86E+03	2.46E+03	1.07E+03	412.	218.	94.5
0.39	90.6	66.2	43.6	28.8	21.5	14.3	68.7	39.0	25.8	15.0	10.6	6.91	6.22E+03	2.58E+03	1.13E+03	430.	228.	98.8
0.40	92.7	67.7	44.6	29.5	22.0	14.6	71.2	40.0	26.4	15.3	10.8	7.05	6.60E+03	2.71E+03	1.18E+03	450.	238.	103.
0.41	94.8	69.2	45.7	30.1	22.5	15.0	74.3	41.1	27.0	15.6	11.0	7.19	7.04E+03	2.84E+03	1.24E+03	469.	248.	108.
0.42	96.8	70.7	46.7	30.8	23.0	15.3	77.4	42.2	27.7	15.9	11.2	7.32	7.50E+03	2.98E+03	1.29E+03	489.	258.	112.
0.43	98.9	72.2	47.7	31.5	23.5	15.6	80.6	43.3	28.3	16.2	11.4	7.46	7.97E+03	3.13E+03	1.35E+03	510.	269.	117.
0.44	101.	73.8	48.7	32.1	24.0	16.0	83.9	44.4	28.9	16.5	11.6	7.59	8.47E+03	3.28E+03	1.41E+03	530.	279.	121.
0.45	103.	75.3	49.7	32.8	24.5	16.3	87.2	45.5	29.5	16.8	11.8	7.73	8.98E+03	3.43E+03	1.46E+03	551.	290.	126.
0.46	105.	76.8	50.7	33.5	25.0	16.6	90.6	46.6	30.1	17.1	12.0	7.86	9.51E+03	3.58E+03	1.53E+03	573.	301.	131.
0.47	107.	78.3	51.8	34.2	25.5	17.0	94.0	47.7	30.6	17.4	12.2	8.00	1.01E+04	3.74E+03	1.59E+03	594.	312.	136.
0.48	109.	79.8	52.8	34.8	26.0	17.3	97.5	48.9	31.2	17.7	12.4	8.13	1.06E+04	3.90E+03	1.65E+03	616.	323.	141.
0.49	111.	81.3	53.8	35.5	26.5	17.6	101.	50.0	31.8	18.0	12.6	8.26	1.12E+04	4.06E+03	1.71E+03	639.	334.	146.
0.50	113.	82.8	54.8	36.1	27.0	18.0	105.	51.1	32.4	18.3	12.8	8.40	1.18E+04	4.23E+03	1.78E+03	661.	346.	151.
0.55	123.	90.2	59.8	39.4	29.5	19.6	128.	56.7	35.4	19.8	13.8	9.05	1.58E+04	5.11E+03	2.11E+03	780.	406.	177.
0.60	133.	97.5	64.7	42.7	31.9	21.2	154.	62.4	38.3	21.2	14.7	9.69	2.05E+04	6.08E+03	2.48E+03	906.	469.	206.
0.65	143.	105.	69.6	46.0	34.4	22.9	182.	68.1	41.2	22.6	15.6	10.3	2.60E+04	7.14E+03	2.87E+03	1.04E+03	536.	236.
0.70	152.	112.	74.5	49.2	36.8	24.5	213.	73.9	44.1	24.0	16.5	10.9	3.25E+04	8.28E+03	3.29E+03	1.18E+03	607.	267.
0.75	162.	119.	79.3	52.4	39.2	26.1	247.	79.7	47.0	25.4	17.4	11.5	4.00E+04	9.50E+03	3.73E+03	1.33E+03	681.	299.
0.80	171.	126.	84.1	55.6	41.5	27.6	283.	85.6	49.9	26.8	18.3	12.0	4.85E+04	1.08E+04	4.19E+03	1.49E+03	759.	331.
0.85	181.	133.	88.9	58.7	43.9	29.2	322.	91.5	52.7	28.1	19.1	12.5	5.82E+04	1.22E+04	4.69E+03	1.65E+03	840.	365.
0.90	190.	140.	93.7	61.9	46.3	30.8	363.	97.4	55.5	29.5	20.0	13.0	6.91E+04	1.37E+04	5.20E+03	1.82E+03	924.	400.
0.95	199.	147.	98.4	65.0	48.6	32.3	407.	103.	58.3	30.8	20.8	13.5	8.12E+04	1.52E+04	5.74E+03	2.00E+03	1.01E+03	436.
1.00	209.	154.	103.	68.1	50.9	33.9	454.	109.	61.1	32.1	21.6	14.0	9.47E+04	1.68E+04	6.30E+03	2.19E+03	1.10E+03	473.

ATTACHMENT 3

Map of Entire Anadarko San Juan River Plant Showing H2S Monitoring System and Emergency Equipment Locations

ATTACHMENT 3 Locations Of H_2S Monitors, Emergency Equipment Locations

The manufacturer of the gas monitors is Industrial Scientific Cat. No. HKB 0292. The monitors are calibrated low alarm setpoint 10 ppms high alarm setpoint 25 ppms.

The H_2S heads operate by a 4-20 milliamp signal that is sent to a Allen-Bradley controller and a Moore 383 display unit. The Allen-Bradley unit controls the alarm siren and beacon, the Moore 383 interfaces with the control computer and the concentrations are displayed on the operators' control screen.

When the signal reaches 10ppms the beacon starts flashing and the siren alarms. When the signal reaches 25ppms the beacon is still flashing and the siren alarm speeds up.

Locations of the existing and proposed new H_2S heads are shown in Figure 3-1.

The locations of emergency equipment are shown in Figure 3-2.

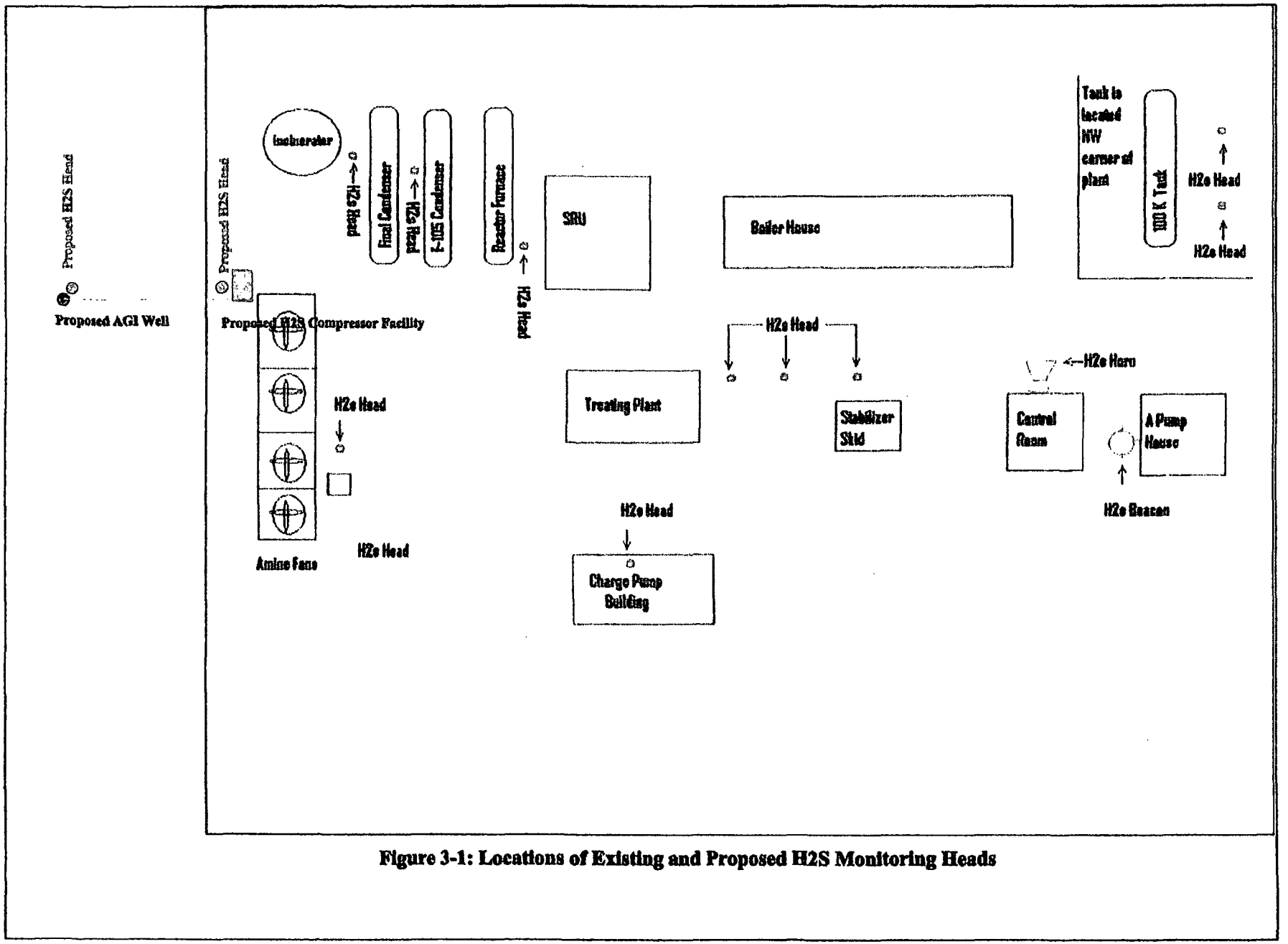


Figure 3-1: Locations of Existing and Proposed H2S Monitoring Heads

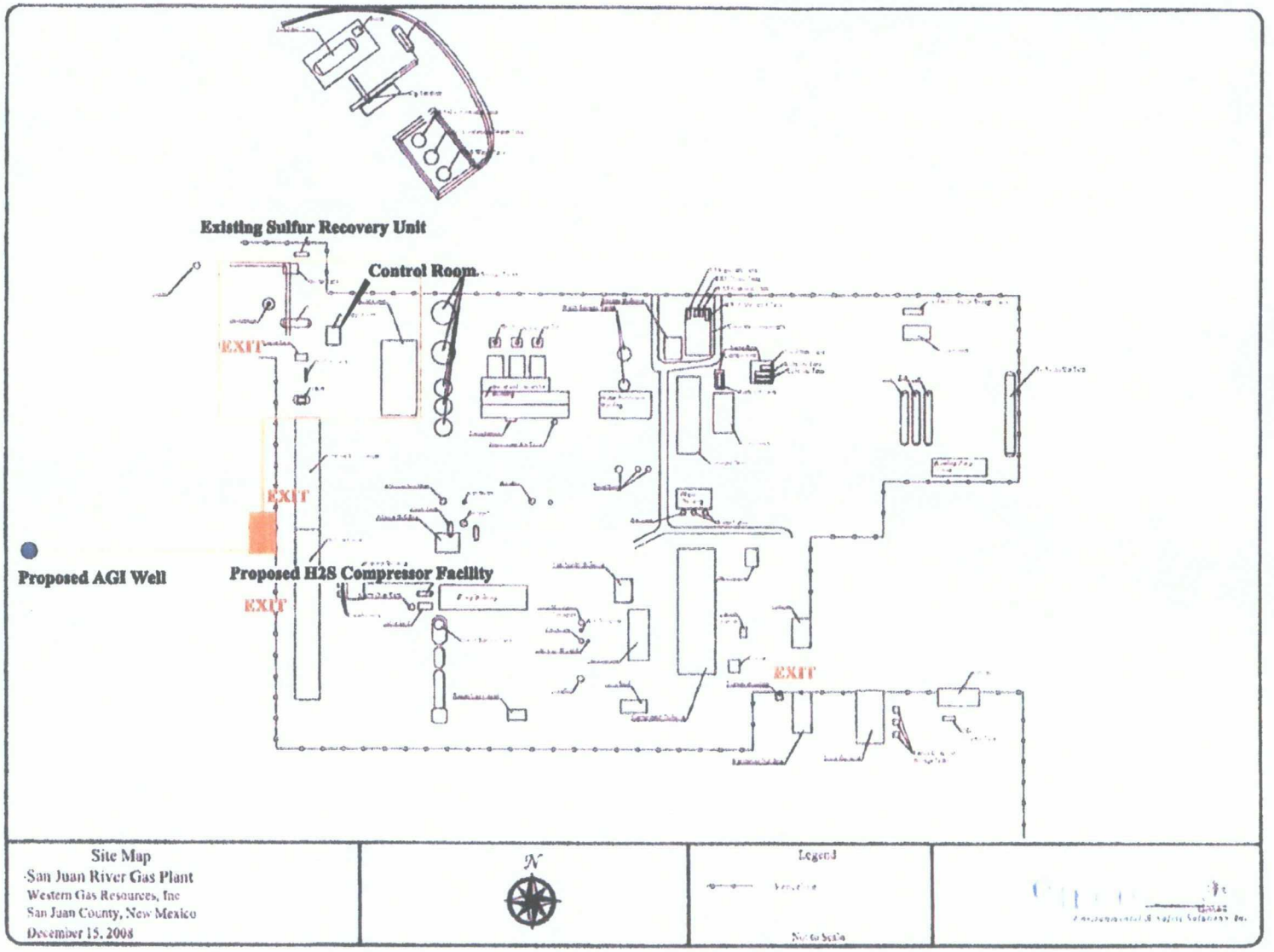


Figure 3-2: Locations of Emergency Equipment and Exits

ATTACHMENT 4

Map Showing Calculated Radius of Exposure for 100 and 500 ppm H2S

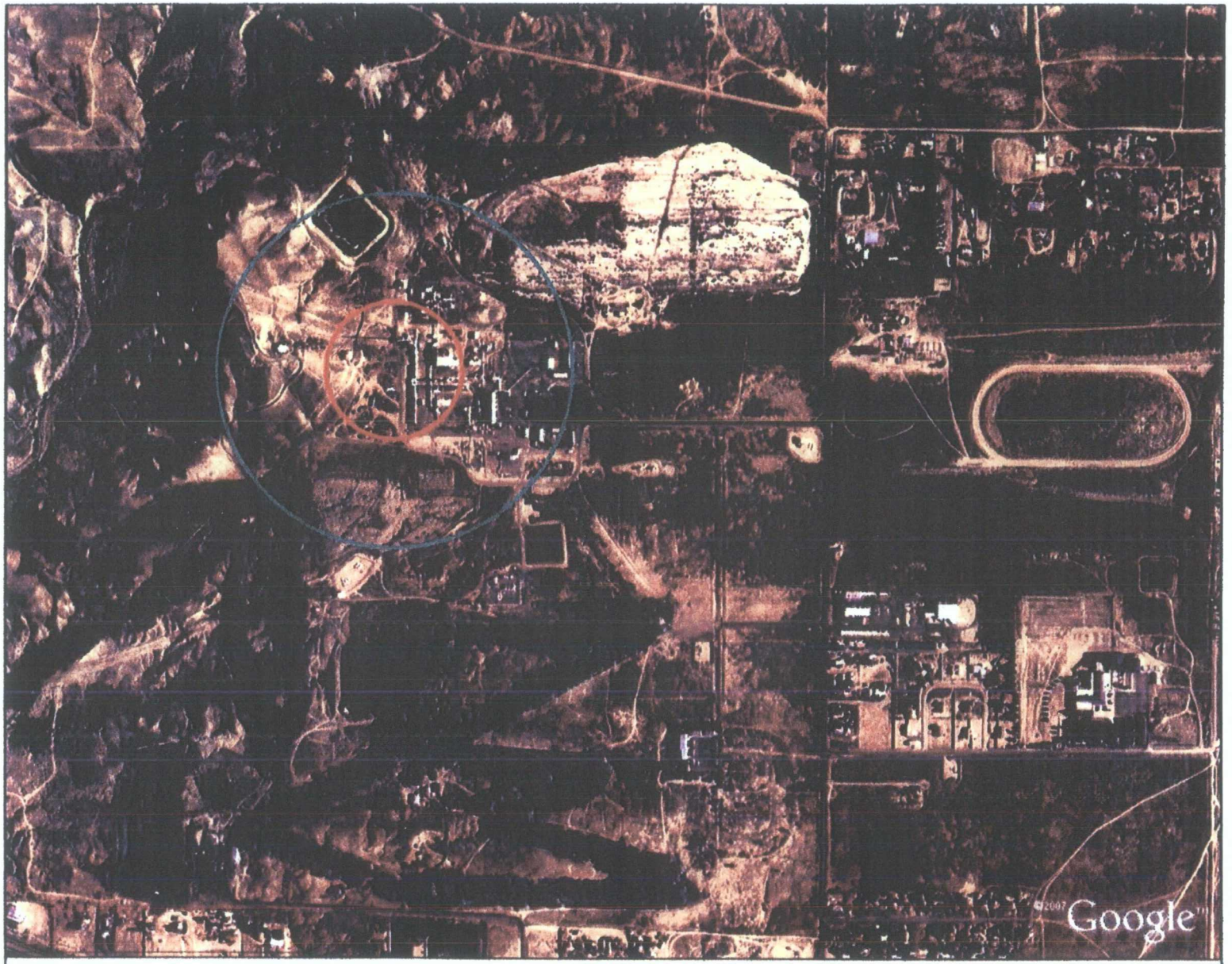


Figure 4-1: Calculated Areas of Hydrogen Sulfide Influence for 100 ppm and 500 ppm

500 ppm Area of Influence

100 ppm Area of Influence

ATTACHMENT 5

Description of H2S Monitoring and Alarm Systems at Anadarko Plant

INDUSTRIAL SCIENTIFIC CORPORATION

4200 SERIES
REMOTE H_2S SENSOR

OPERATION AND MAINTENANCE MANUAL

3700-0355

1.0 INTRODUCTION

The Industrial Scientific Corporation 4200 Series Remote H_2S Sensor is a fixed point monitor designed to detect the presence of Hydrogen Sulfide in ambient air. The monitor operates in a standard two wire current loop system where 4mA is equal to a concentration of zero parts per million (ppm) H_2S and 20mA is equal to the desired full scale range of the monitor, settable from 50 to 200 ppm.

The sensing element is an electrochemical fuel cell which reacts as ambient air diffuses into it and produces a signal directly proportional to the concentration of hydrogen sulfide present. This signal is electronically conditioned to produce the linear 4-20mA current loop output.

A liquid crystal display is standard with the 4200 Series Remote H_2S Sensor; A non-display unit is also available, as is a display option kit for upgrading to a display unit at a later time. The units are designed to be explosion proof for use in Class I, Division 1, Groups B, C, and D hazardous locations.

2.0 INSTALLATION

After unpacking, visually inspect the unit for signs of physical damage. If damage is evident contact the local distributor of ISC gas detection products, or call Industrial Scientific Corporation at:

1-800-338-3287

The 4200 Series Remote H_2S Sensor should be mounted to a flat surface using the mounting flanges located on the outside of the enclosure. The unit should be mounted so that the sensor nose is pointing downward. Because Hydrogen Sulfide is heavier than air, if the unit is being used in an enclosed space it should be mounted at the lowest point of the area. However, in general the unit should be mounted in the location most likely to contain the highest concentration of hydrogen sulfide.

Cable entrance to the remote sensor should be made through the inlet port in the top of the enclosure using 3/4 inch NPT conduit with an approved explosion proof conduit sealing fitting installed within 18 inches of the enclosure.

2.1 Input Connections - Display Model (See Figure 1A)

To make input connections to the unit:

1. Open the enclosure by loosening the set screw and unscrewing the enclosure cover.

2. Remove the snap-on faceplate to expose the display printed circuit board.

3. Using a pair of needle nosed pliars feed the power wires up through the corner cut out in the display (outermost) printed circuit board (See Figure 1A).

Item	Part No.	Description
8	3700-0293	Sensor plug
9	3700-0241	4200 series enclosure
10	3700-0344	Sensor bushing
11	1703-3960	H_2S sensor
12	3700-0268	Sensor cap
13	3700-0352	Flame Arrestor, 100 micron

7.0 OPTIONS

Part No.	Description
3810-0032	4200 Series Remote H_2S w/display
3810-0033	4200 Series Remote H_2S w/o display
3810-0034	4200 Series Display Option Kit

8.0 ACCESSORIES

Part No.	Description
1810-0859	Calibration gas, 25 ppm H_2S
1810-1586	Calibration gas, zero grade air
1810-0883	Calibration regulator, 0.5 liter/minute
3700-0348	Calibration plug
1702-6642	Calibration test cable
1703-7185	Calibration multimeter
3700-0355	Instruction Manual, 4200 Series Remote H_2S

9.0 SPECIFICATIONS

Input Power Supply:	12 -30 Volts DC @ 25mA, Maximum.
Output:	4 -20 mA DC (25mA, MAX, in overange)
Measuring Range:	Standard 0 - 50 ppm H_2S Field settable from 50 - 200 ppm full scale range
Cable Length (18 awg soft copper, with 50 OHM termination in controller)	2000 ft. with 12.0 volt power source 35000 ft. in 24.0 volt power source
Display Increments:	1 ppm
Operating Temperature Range:	-40°C to +40°C (to +55°C for intermittent periods)

Specifications (cont.)

Operating Humidity Range:	5 - 90% RH non-condensing (0 - 99% RH for intermittent periods)
Accuracy:	+/- 5% or 2 ppm which ever is greater at the temperature of calibration +/- 15% or 2 ppm which ever is greater over operating temperature range
Display/current loop Correlation	Maximum error of 1/2 of 1 count.
Sensor:	3 electrode electrochemical
Sensor Life:	Typical 12 - 24 months
Enclosure:	Cast aluminum enclosure w/stainless steel sensor nose
Warranty:	Full warranty covering parts and labor for one year from date of purchase, including sensor.

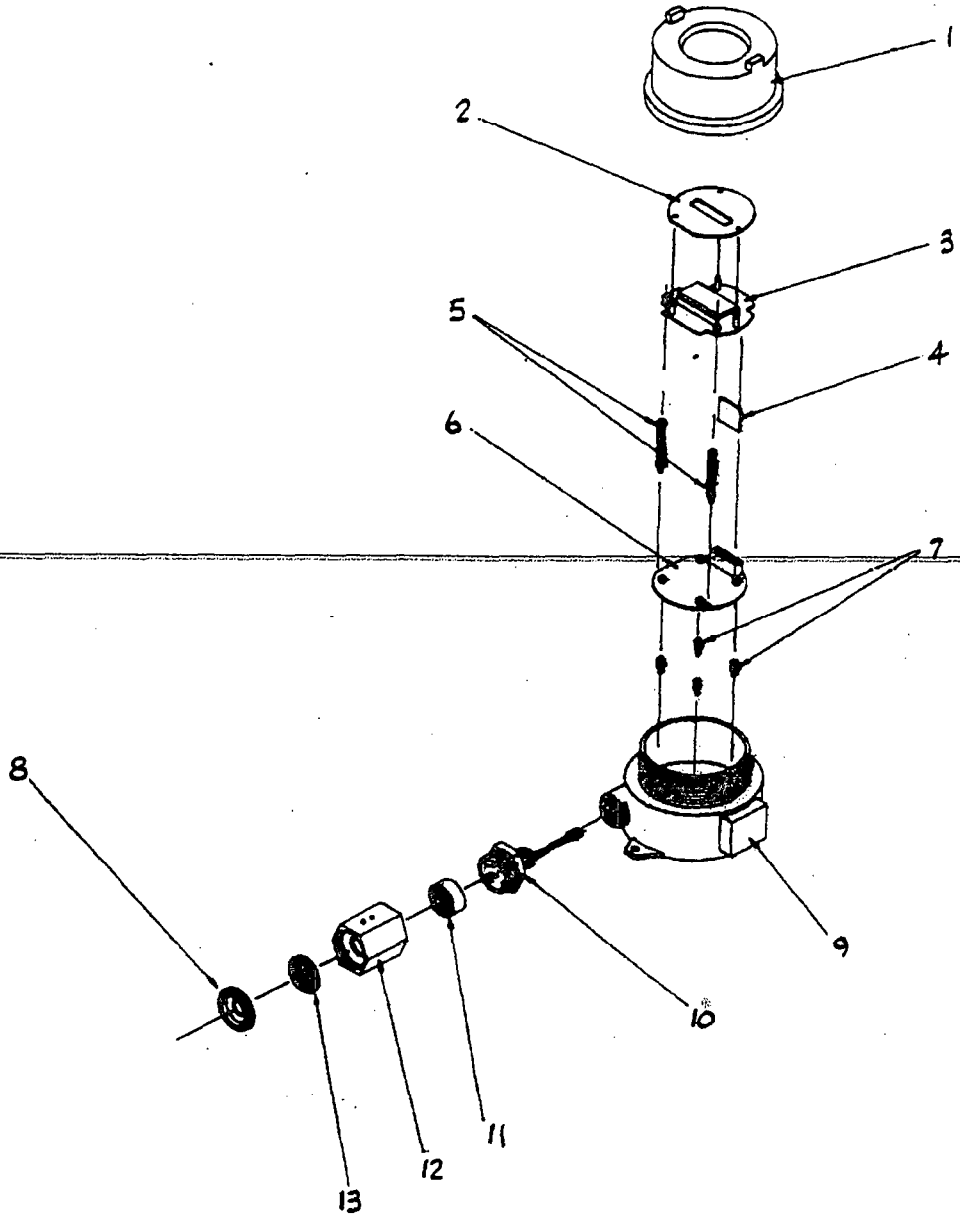
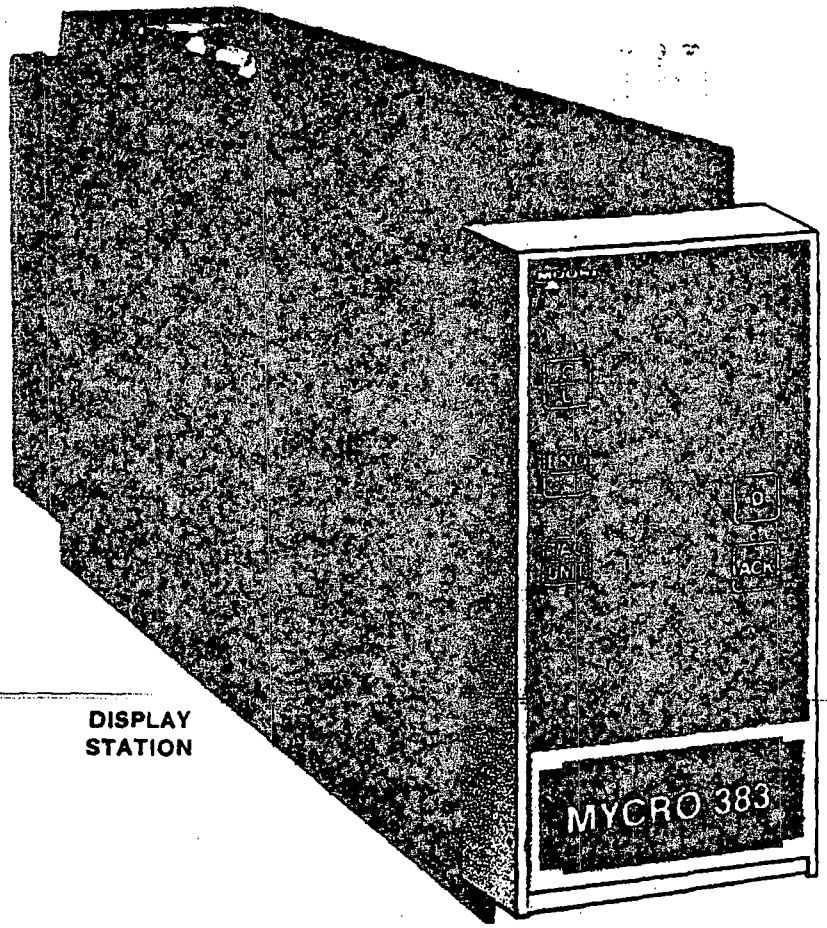
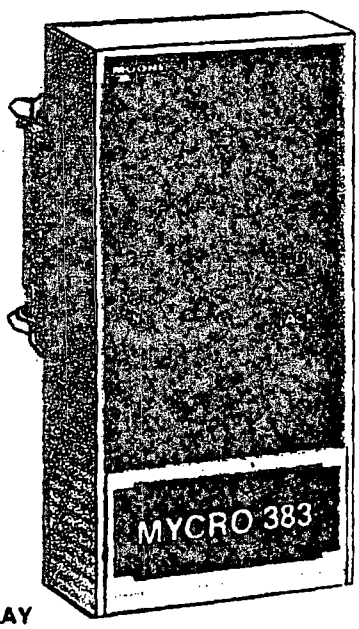


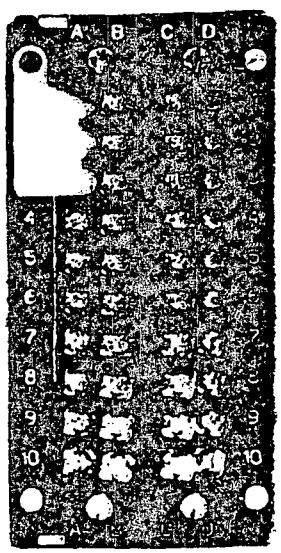
FIGURE 2
4200 SERIES REMOTE H_2S SENSOR



DISPLAY STATION



DISPLAY ASSEMBLY



REAR TERMINALS

FIGURE 1-1 Multi-Point Display Station

DIGITAL OUTPUTS

B4	DO+ (FB04)	Each digital output is connected between a digital output (DO+) terminal and a DOC- terminal. 'ON' saturation voltage is 0.3V at 0 mA or 0.6V at 100 mA, referenced to station common. Voltage source to external load can be +26 Vdc at terminal B5 or a separate power supply. Load must limit current to 100 mA or less. An inductive load must be shunted by a transient suppression diode to prevent damage to Display Station circuits. Refer to Figure 2-6.
B6	DO+ (FB05)	
B7	DOC- (FB04/FB05)	

VOLTAGE EXPANDER BOARD INPUTS

C1	AI+ (FB14)	Voltage inputs are 1-5 Vdc; connect between an AI(+) terminal and an AI(-) terminal for the specified function block. Refer to section 1.4 for specifications.
C2	AIC- (FB14)	
C3	AI+ (FB15)	
C4	AIC- (FB15/16)	
C5	AI+ (FB16)	
C6	AI+ (FB17)	
C7	AIC- (FB17/18)	
C8	AI+ (FB18)	
C9	AI+ (FB19)	
C10	AI- (FB19)	
D1	AI+ (FB20)	
D2	AIC- (FB20)	
D3	AI+ (FB21)	
D4	AIC- (FB21/22)	
D5	AI+ (FB22)	
D6	AI+ (FB23)	
D7	AIC- (FB23/FB24)	
D8	AI+ (FB24)	
D9	AI+ (FB25)	
D10	AIC- (FB25)	

LOCAL INSTRUMENT LINK

B1	LK+ (FB98)	Refer to Figure 2-7 for typical LIL connections and to SD15492 for LIL cable and tap box installation.
B2	LK- (FB98)	

NO CONNECTION

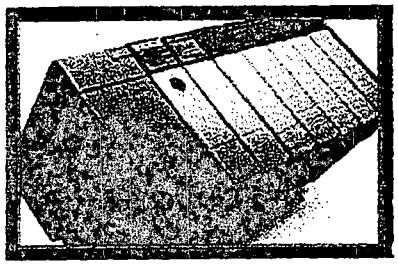
A9	---	Do not connect wires to this terminal.
A10	---	Do not connect wires to this terminal.
B3	---	Do not connect wires to this terminal.
B10	---	Do not connect wires to this terminal.

TABLE 2.1 Rear Terminal Assignments

REAR TERMINAL	TERMINAL ASSIGNMENT	COMMENT
POWER INPUT		
AH	HOT	AC Supply HOT or DC +
AN	NEUTRAL	AC Supply Neutral or DC -
AG	GROUND	Case or Safety Ground
TWO-WIRE TRANSMITTER POWER		
B5	+26V	Supply to power up to four transmitters; 26 Vdc (+/- 7.5%) @ 80 mA maximum, referenced to station common.
ANALOG INPUTS		
A4	AI+ (FB01)	Each analog input is connected between an AI(+) terminal and a common (AIC-) terminal. Terminal A5 (station common) should be connected to user's instrument bus common. Typical input is 1-5 Vdc.
A5	AIC- (FB01/FB02)	
A6	AI+ (FB02)	
ANALOG OUTPUT		
A7	AO+ (FB03)	Standard output is 4-20 mAdc referenced to station common.
A8	AO- (FB03)	
DIGITAL INPUT		
B8	DI+ (FB06)	Connections made between digital input (DI+) terminal and digital input common (DI-). Logic '1' is 15 to 30 Vdc; logic '0' is 0 to 1 Vdc; minimum on and off time is 500 msec. An inductive source must be shunted by a transient suppression diode to prevent damage to Display Station input circuits. Protection required is similar to that shown in Figure 2-6 for digital outputs.
B9	DI- (FB06)	

Rockwell Automation

PROGRAMMABLE LOGIC CONTROLLERS
SLC 500 System



Overview

Power and Flexibility for a Complete Control Solution

The Allen-Bradley SLC 500 is a small, chassis-based, modular family of programmable controllers and I/O. With its multiple processor choices, numerous power supply options and extensive I/O capacity, the SLC 500 allows you to create a system specifically designed for your application.

As one of the first full-featured small controllers on the market, it remains the gold standard in small logic controllers more than a decade after its introduction.

Right For Today. Ready For Tomorrow.

SLC 500 controllers control hundreds of thousands of processes around the world – everything from amusement park rides to pharmaceutical processing.

- 1.6M processors and 12M, I/O modules installed worldwide
- Used by over 75% of companies comprising the Dow Jones Industrial Average (DJIA)
- Large choice of I/O available from Rockwell Automation and third party companies, making these products appropriate for almost any application
- Over 100,000 customers trained in the U.S. alone, making this product one of the most understood of its type
- Proven Reliability. An example is the addition of 1747-BSN Back-Up Scanner, which has grown application base to even more critical areas
- Step Forward program ensures customer can upgrade to latest technology

New Developments Now Available

- MODBUS RTU Master capability: Provides increased compatibility with SCADA applications and 3rd party devices. Compatible with other RA Modbus-compatible products including MicroLogix controllers and PowerFlex drives.
- Improved PID instruction: Provides better accuracy in the PID instruction with the implementation of rational approximation feature.
- 1747-DPS2 RS-232/DF1 Configurable Port Splitter: Allows a single RS-232/DF1 port on a Rockwell Automation controller (e.g. SLC 500, MicroLogix, PLC-5, ControlLogix, CompactLogix) to be expanded (or split) into two ports for communication with a network and an HMI or Programming Station.

A Solid Investment. Today. Tomorrow.

- Excellent quality now and in the future
- Continued support for an enormous installed base
- On-going engineering investment
- Customer advance warning long before any products are no longer available for sale

We are committed to selling & supporting SLCs into the next decade!

Management Statement

ATTACHMENT 6

Hazardous Material Incident Notification Information Checklist

ATTACHMENT 6 Hazardous Materials Incident Notification Information Checklist

The following information should be given to dispatch. Dispatch should be instructed to give all information received to response agencies.

Notification	Time Dispatch Notified: Date: _____
Caller	Caller Name: _____ Caller Location: _____ Caller Phone Number: _____
Hazardous Materials Information	Incident location (Address or Nearest Milepost or Exit) _____ Time Incident Occurred _____ Container Type (Truck, train car, drum storage, Tank, pipeline, etc.) _____ Substance _____ UN Identification Number _____ Other Identification (Placards, shipping papers, etc.) _____ Amount of material spilled/released _____ Current condition of material (Flowing, on fire, vapors present, etc.) _____
Scene Description	Weather conditions (i.e., sunny, overcast, wet, dry, etc.) _____ Wind direction _____ Wind speed _____ Terrain (i.e., valley, stream bed, depression, asphalt, etc.) _____ Environmental Concerns (Streams, sewers, etc.) _____
Affected Population	Number of people affected _____ Condition of people affected _____
Resources	Resources required (EMS, HazMat Team, Fire Department, etc.) _____
Response	Response actions anticipated And/or in progress (i.e., rescue, fire suppression, containment, etc.)
Comments	_____ _____ _____

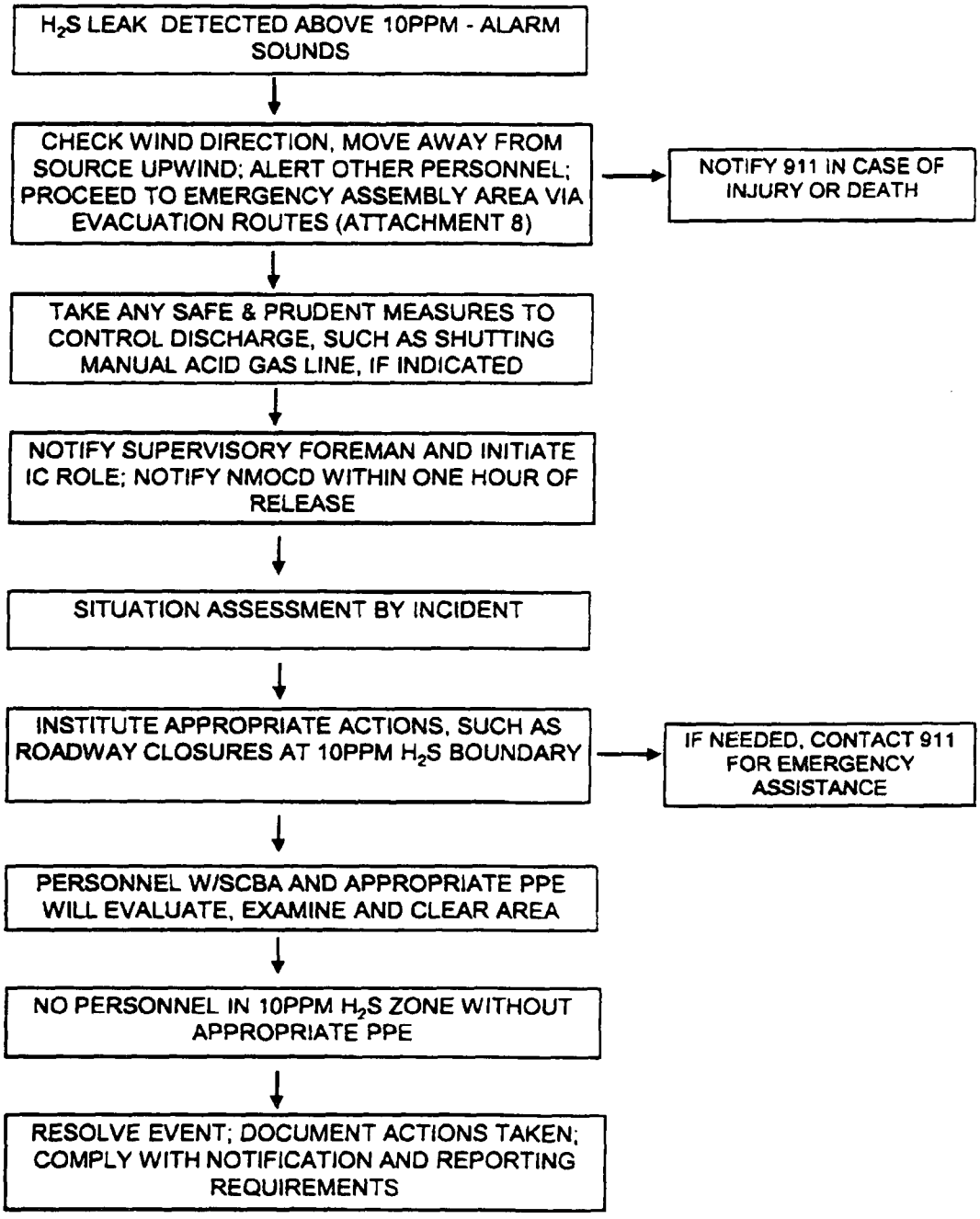
ATTACHMENT 7

Map Showing Evacuation Routes and Assembly Areas (Wind Conditions Permitting)

Figure 7-1:
Map Showing Evacuation Routes and Assembly Area

ATTACHMENT 8
Simplified H2S Contingency Plan Flowchart

ATTACHMENT 8
SIMPLIFIED H_2S CONTINGENCY PLAN FLOWCHART



ATTACHMENT 9

Distribution List

ATTACHMENT 9:
DISTRIBUTION LIST

San Juan Co Sheriff's Department **(also San Juan Emergency Preparedness Coordinator)** Attn: Mr. Bob Melton 211 Oliver St. Aztec, NM 87401 505-334-6107	**Farmington Fire Department** Chief Troy Brown 310 N. Auburn Ave. Farmington, NM 87401
New Mexico State Police Dept. 1025 W. Navajo St. Farmington, NM 87401 505-327-5853	**Farmington Police Department** Chief Jim Runnek 800 Municipal Dr. Farmington, NM 87410 505-599-1070
San Juan Regional Medical Center 801 W. Maple Farmington, NM 87401 505-609-2000	**Anadarko San Juan Plant Office** Mr. Kent McEvers #99 County Rd. 6900 Kirtland, NM 87417 505-598-5601
Anadarko Corporate Office Mr. Chuck Johnson 1202 Lake Robbins Dr. The Woodlands, TX 77380 832-636-1000	