

HOLLAND & HART LLP



William F. Carr  
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May 12, 2009

**VIA HAND DELIVERY**

Mark E. Fesmire, P.E.  
Director  
Oil Conservation Division  
New Mexico Department of Energy,  
Minerals and Natural Resources  
1220 South Saint Francis Drive  
Santa Fe, New Mexico 87505

*Case 14329*

RECEIVED  
2009 MAY 12 PM 3 54

**Re: Application of Anadarko Petroleum Corporation for approval of an acid gas injection well, San Juan County, New Mexico.**

Dear Mr. Fesmire:

Enclosed is an original and one copy of the application of Anadarko Petroleum Corporation in the above-referenced case (Oil Conservation Division Form C-108) as well as a copy of a legal advertisement. By copy of this letter, an additional copy of this Form C-108 is being transmitted to the Oil Conservation Division District Office in Aztec.

Anadarko requests that this matter be placed on the docket for the June 11, 2009 Examiner Hearings.

Very truly yours,

William F. Carr  
Ocean Munds-Dry  
Attorneys for Anadarko Petroleum Corporation

Enclosures

cc: Oil Conservation Division  
District III  
1000 Rio Brazos Road  
Aztec, New Mexico 87410

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Mark E. Fesmire, P.E.

May 12, 2009

Page 2

Alberto Gutierrez  
500 Marquette Ave. NW, Suite 1350  
Albuquerque, New Mexico 87102

CASE 14329 **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. The well will be drilled 1650 feet from the North line and 2310 feet from the West line in Unit F of 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 Gutierrez, 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.



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**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:*

Geolex, Inc.  
500 Marquette Avenue, NE, Suite 1350  
Albuquerque, New Mexico 87102  
Telephone: (505) 842-8000

**GEOLEX**  
INCORPORATED



**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**

### 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 NMCD 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

<b>1.0 EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>2.0 INTRODUCTION AND ORGANIZATION OF THIS C-108 APPLICATION .....</b>	<b>3</b>
<b>3.0 PROPOSED CONSTRUCTION AND OPERATION OF ANADARKO AGI WELL .....</b>	<b>4</b>
<b>4.0 REGIONAL AND LOCAL GEOLOGY AND HYDROGEOLOGY .....</b>	<b>7</b>
4.1 GENERAL GEOLOGIC SETTING .....	7
4.2 BEDROCK GEOLOGY .....	7
4.3 LITHOLOGIC AND RESERVOIR CHARACTERISTICS OF THE ENTRADA SANDSTONE .....	7
4.4 FORMATION FLUID CHEMISTRY .....	10
4.5 GROUNDWATER HYDROLOGY IN THE VICINITY OF THE PROPOSED INJECTOR WELL .....	10
<b>5.0 OIL AND GAS WELLS IN THE ANADARKO AGI AREA OF REVIEW AND VICINITY ...</b>	<b>11</b>
5.1 ACTIVE OIL AND GAS WELLS .....	11
5.2 PLUGGED OIL AND GAS WELLS .....	12
5.3 OTHER WELLS .....	12
<b>6.0 IDENTIFICATION AND REQUIRED NOTIFICATION OF OPERATORS SUBSURFACE     LESSEES AND SURFACE OWNERS WITHIN THE AREA OF REVIEW .....</b>	<b>13</b>
<b>7.0 AFFIRMATIVE STATEMENT OF LACK OF HYDRAULIC CONNECTION BETWEEN ...</b>	<b>14</b>

### LIST OF 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
Figure 3:	Schematic of Anadarko San Juan River Gas Plant Acid Gas Injection System Components
Figure 4:	Schematic for Proposed AGI Well
Figure 5:	Generalized stratigraphy for the San Juan Basin
Figure 6:	Locations of Wells for Southwest-Northeast Cross Section
Figure 7:	Southwest-Northeast Cross Section through Area of Anadarko San Juan River Gas Plant
Figure 8:	Structure on Top of Dakota Formation
Figure 9:	Structure on Top of Entrada Sandstone
Figure 10:	Locations of Entrada SWD Wells in Study Area
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 & 3000 Barrels/Day

### LIST OF APPENDICES

Appendix A-1:	Entrada Sandstone and Point Lookout Fluid Analyses
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 8/30/06 Discharge Plan - GW-33)
Appendix B:	Active Oil and Gas Well Data; Permanently Plugged Oil and Gas Well Data
Appendix C:	Operators and Leases in Area of Review; Applicable Notices Including Proposed Notice to Operators and Leaseholders; and Proposed Public Notice
Appendix D:	Surface Owners in Area of Review; and Applicable Notices Including Proposed Notice To Surface Owners and Proposed Public Notice
Appendix E:	H <sub>2</sub> S Contingency Plan (Pursuant to NMOCD Rule 118)

## 1.0 EXECUTIVE SUMMARY

On behalf of Anadarko Petroleum Corporation (Anadarko), Geolex<sup>®</sup>, 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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> injection volumes well within NMOC'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<sub>2</sub> 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 NMOCD 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<sub>2</sub> 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<sub>2</sub>
- 10% H<sub>2</sub>S
- Trace Components of C<sub>1</sub> – C<sub>7</sub>

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:

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

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

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

$$SG_{\text{tag}} = 0.80$$

$$D_{\text{top}} = 6530$$

Therefore:

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

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

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<sub>2</sub>S 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 1/2" 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 1/4" 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 1/2", 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 1/4" 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 H<sub>2</sub>S/CO<sub>2</sub> 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 NMOC 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<sub>2</sub> 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<sub>2</sub> and H<sub>2</sub>S 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<sub>2</sub>S and CO<sub>2</sub> 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 than 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.

<b>Calculations of Areas for Injection</b>		
	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
<b>Radius in feet</b>	<b>807</b>	<b>1,398</b>

While the Entrada Sandstone has all of the characteristics of an excellent candidate for AGI and CO<sub>2</sub> 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<sub>2</sub>. 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<sub>2</sub> and 10% H<sub>2</sub>S.

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 it 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 NMOC 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	MENESEE	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.

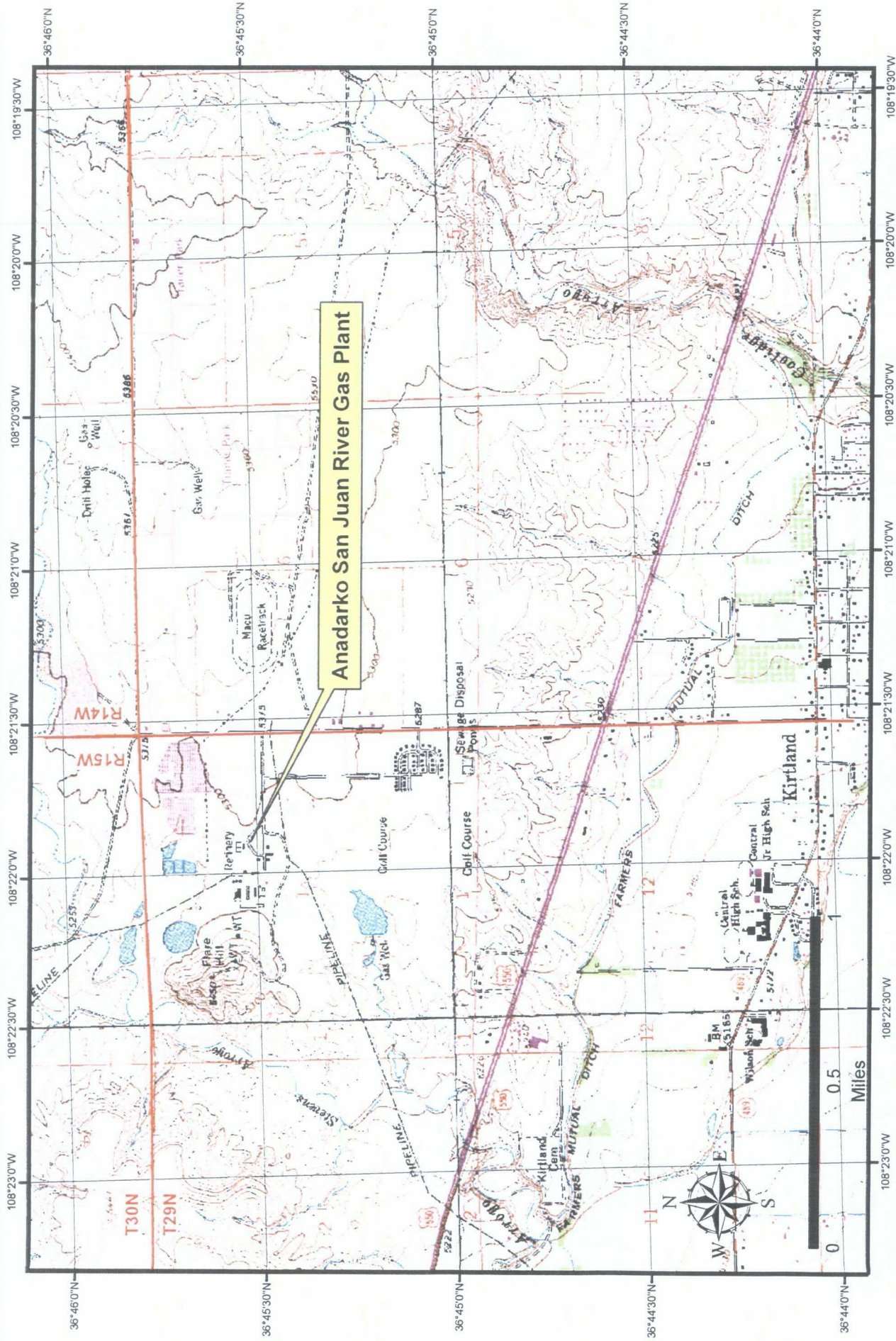
All of these operators, oil, gas and mineral lessees and surface owners within the one-mile area of review will be provided notice and an opportunity to review this application at least 20 days prior to the OCD Hearing, according to the requirements of Section XIV of the C-108 and NMOCD's current policy 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 data, 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.

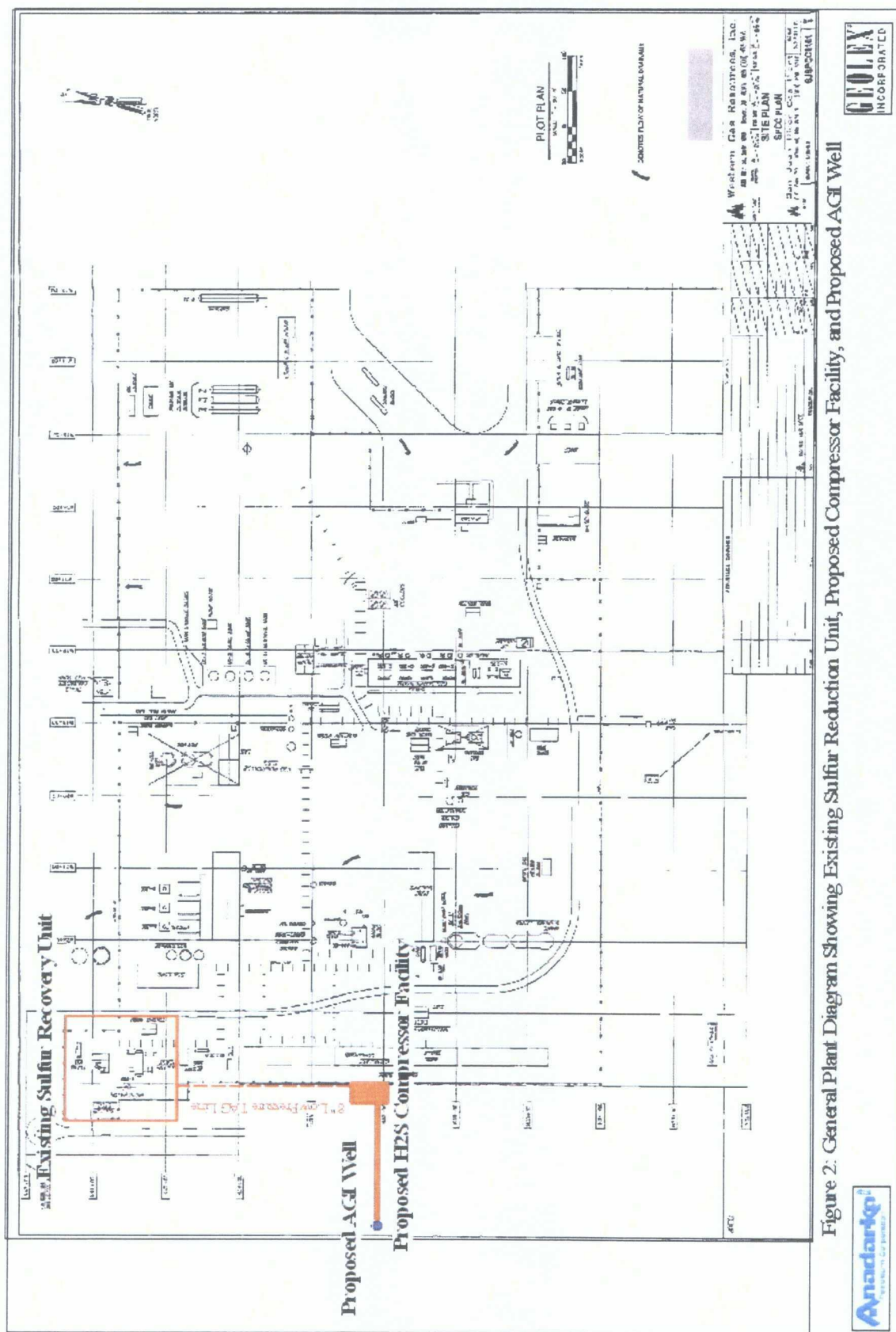
## FIGURES



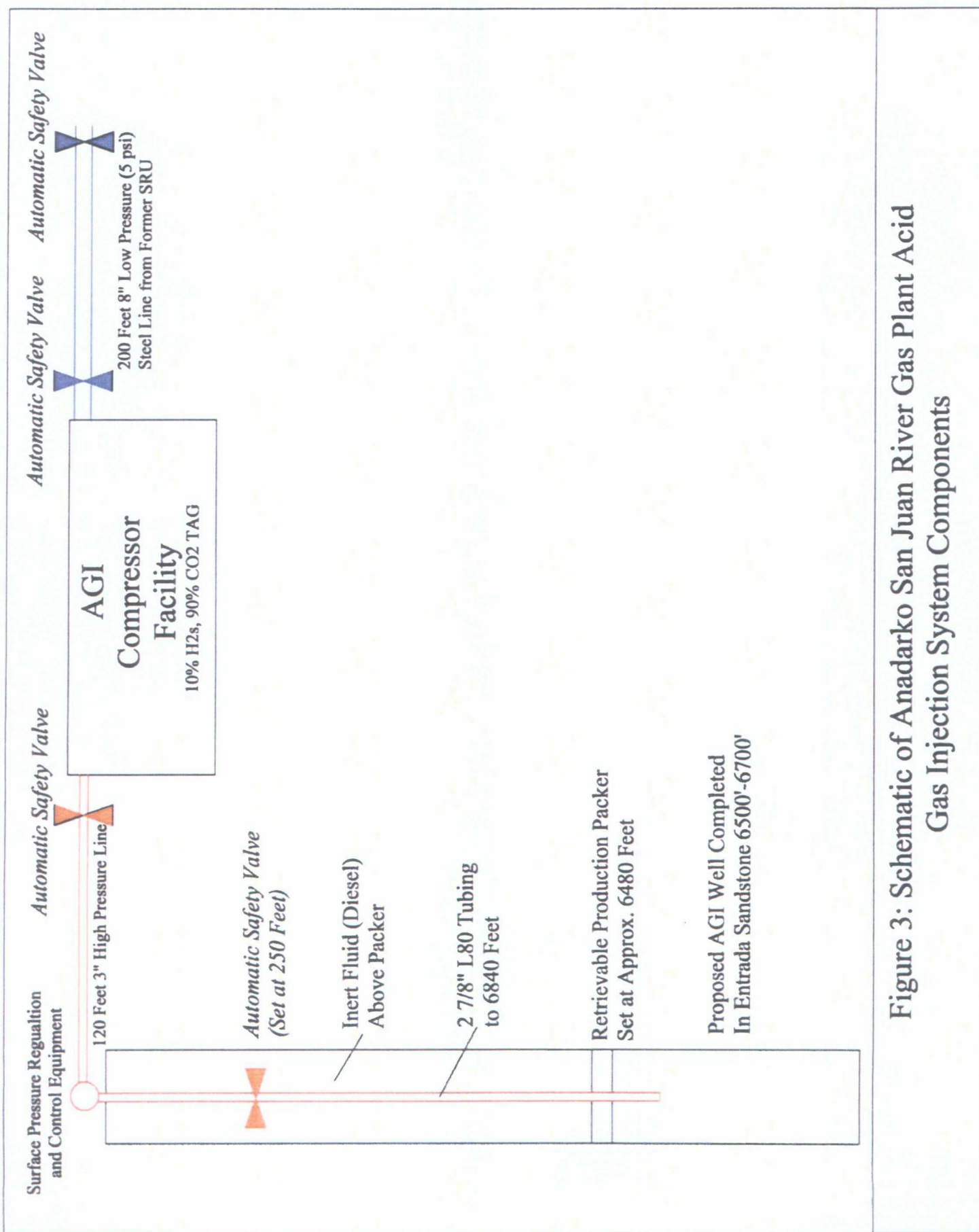
**GEOLEX**  
INCORPORATED

**Figure 1: Location of Anadarko San Juan River Gas Plant**

**Anadarko**  
Petroleum Corporation









Era	System	Formation	
CENOZOIC	TERTIARY	ABSENT FROM STUDY AREA	
MESOZOIC	CRETACEOUS	Kirtland Shale Farmington Sandstone	
		Fruitland Formation	
		Pictured Cliffs Sandstone	
		Lewis Shale	
		Manzanero Group	Cliff House Sandstone Menefee Formation Point Lookout Formation
		Mancos Shale	Upper Mancos Shale/Todito Sandstone Gallup Sandstone/Carlisle Shale Greenhorn Limestone Graneros Shale
		Dakota Sandstone	
PALEOZOIC	JURASSIC	Morrison Formation	
		Wanakah Formation Todito Limestone	
		Entrada Sandstone	
	TRIASSIC	Chinle Formation	
	PERMIAN	Cutler Formation	
	PENNSYLVANIAN	Hermosa Formation	Honaker Trail Formation Paradox Formation Pinkerton Trail Formation
		Molas Formation	
	MISSISSIPPIAN	Leadville Limestone/Ouray Limestone	
	DEVONIAN	Elbert Formation	
	CAMBRIAN	Ignacio Quartzite	
PRECAMBRIAN			

Figure 5: Generalized stratigraphy for the San Juan Basin.

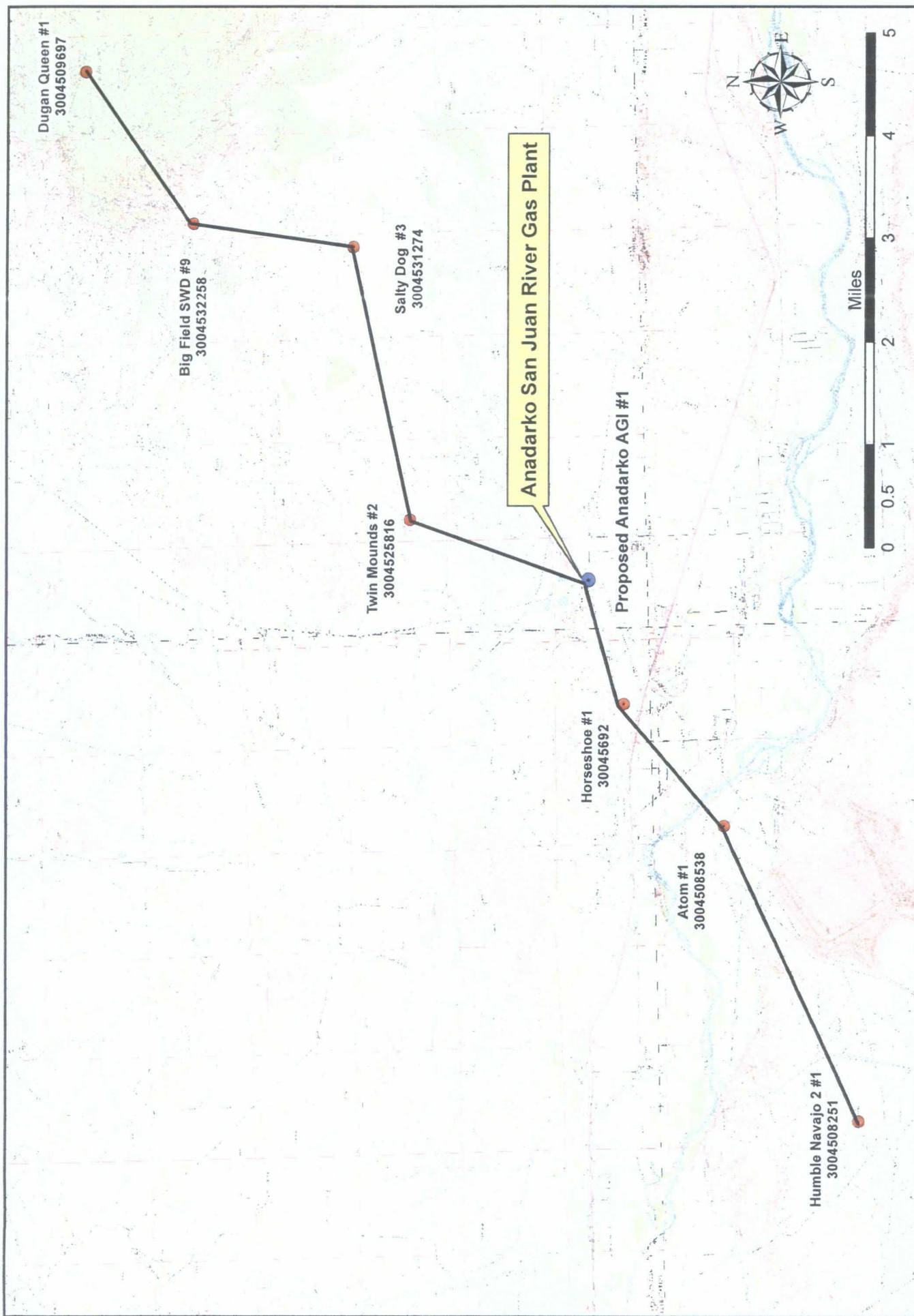


Figure 6: Locations of Wells for Southwest-Northeast Cross Section



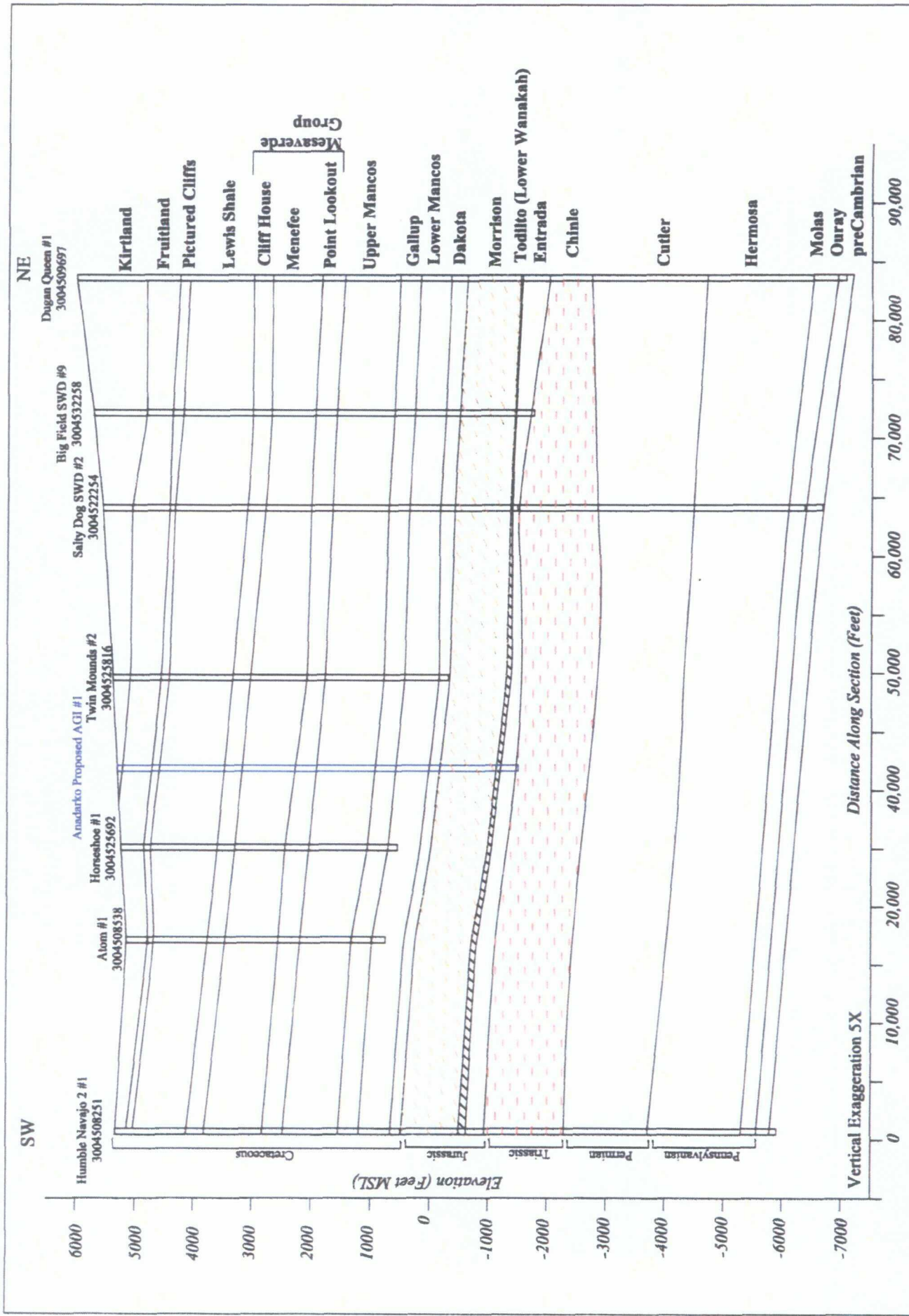
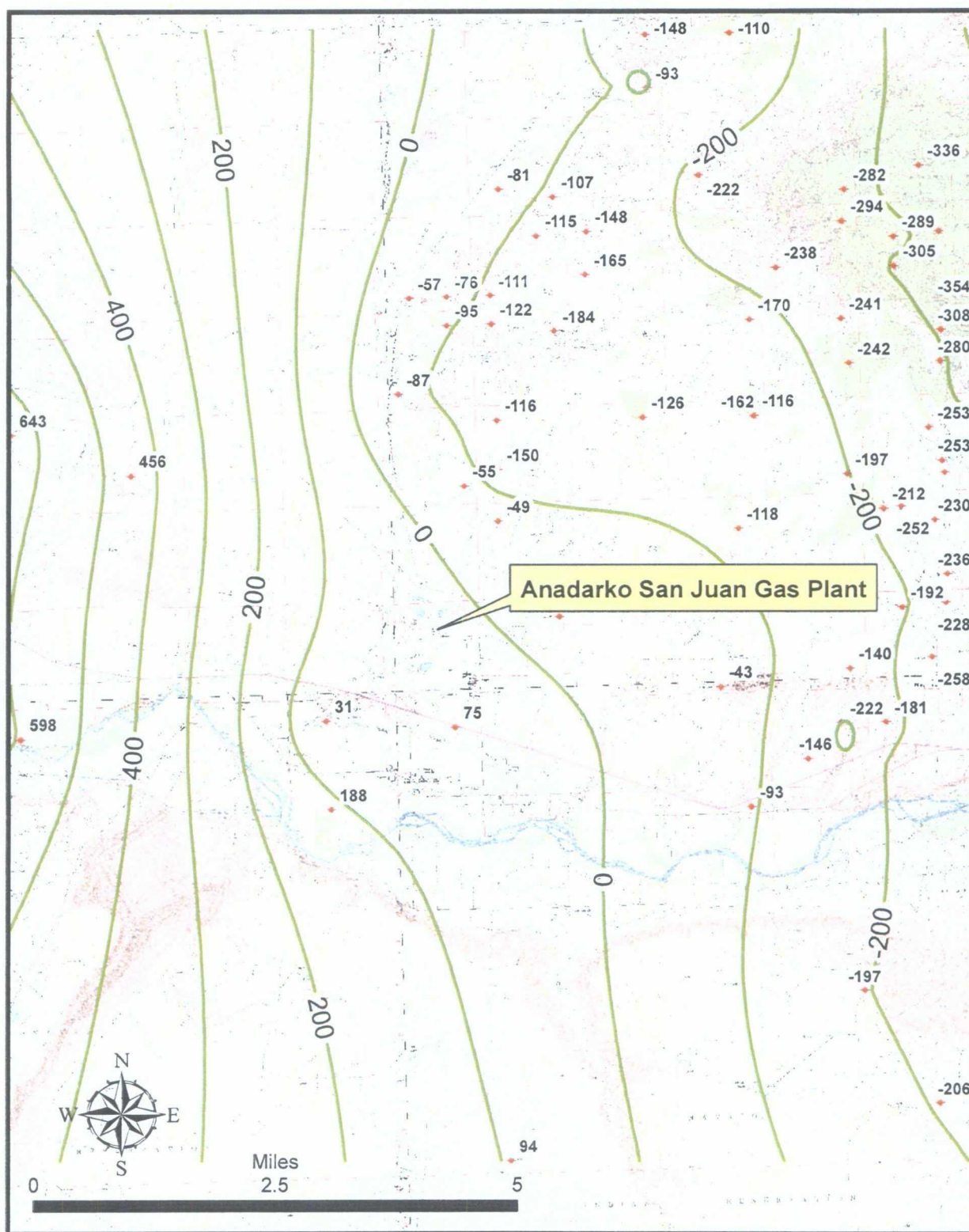


Figure 7: Southwest-Northeast Cross Section Through Area of Anadarko San Juan River Gas Plant

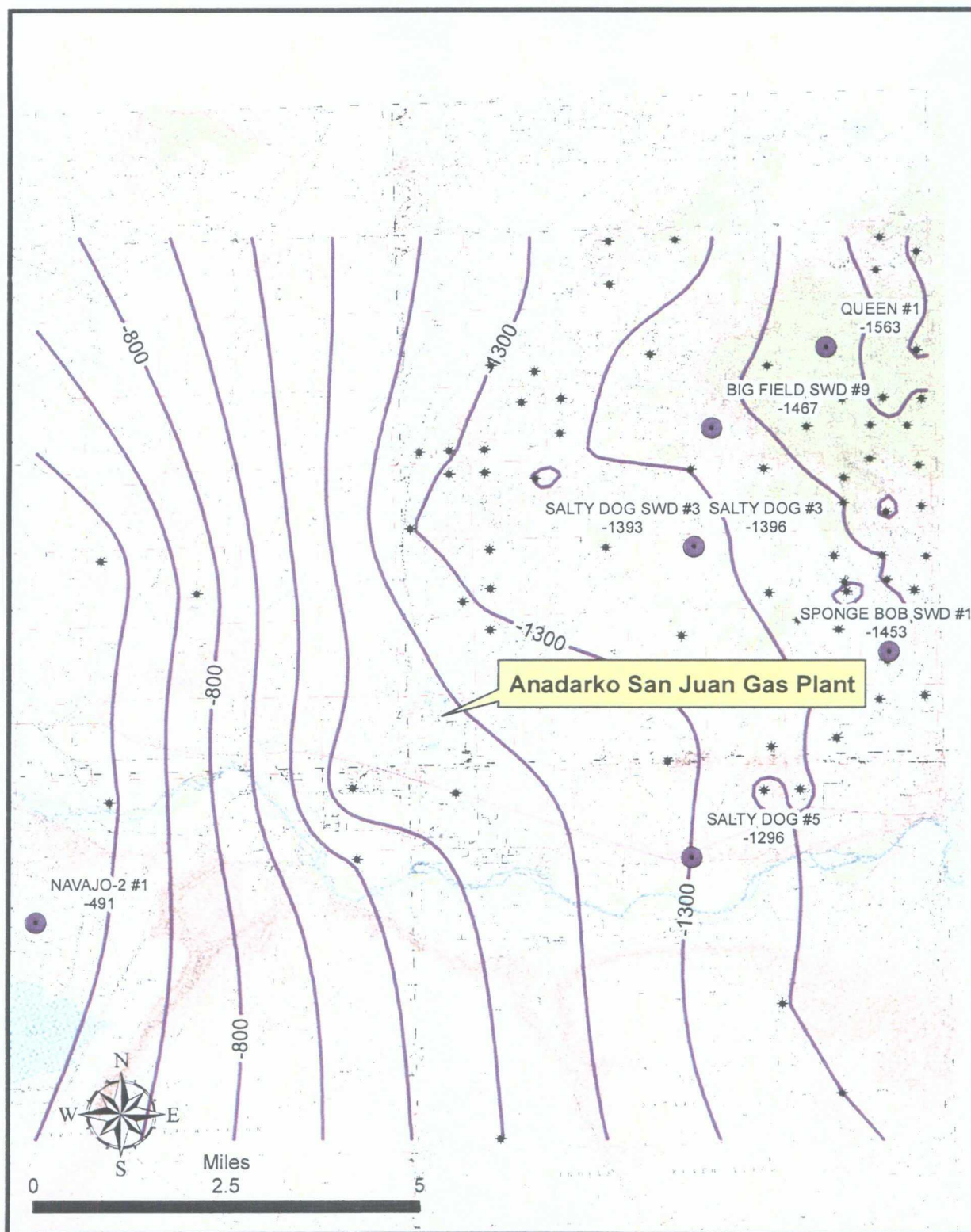




**Figure 8: Structure on Top Of Dakota Formation**

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





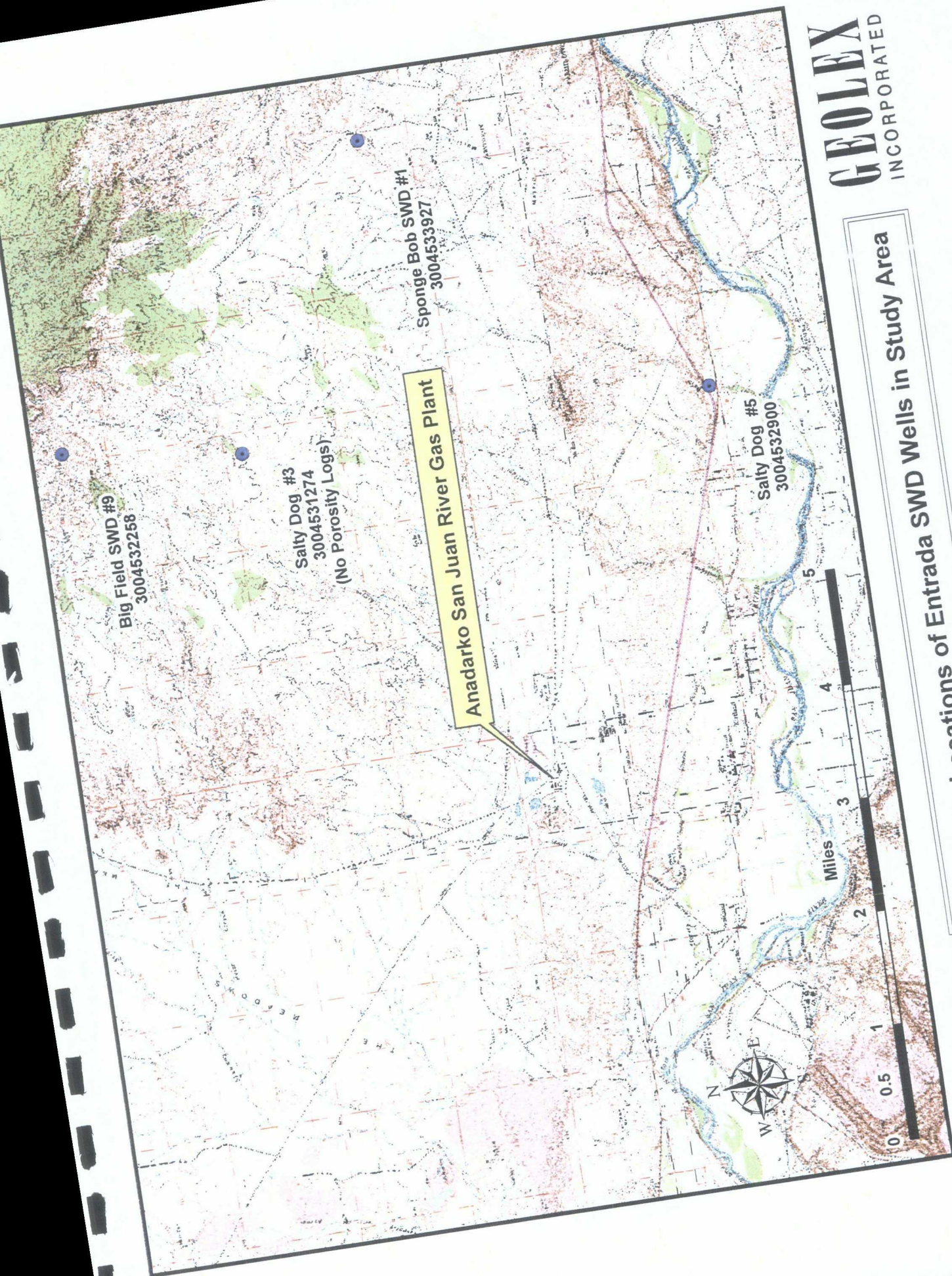
**Figure 9: Structure on Top of Entrada Sandstone**

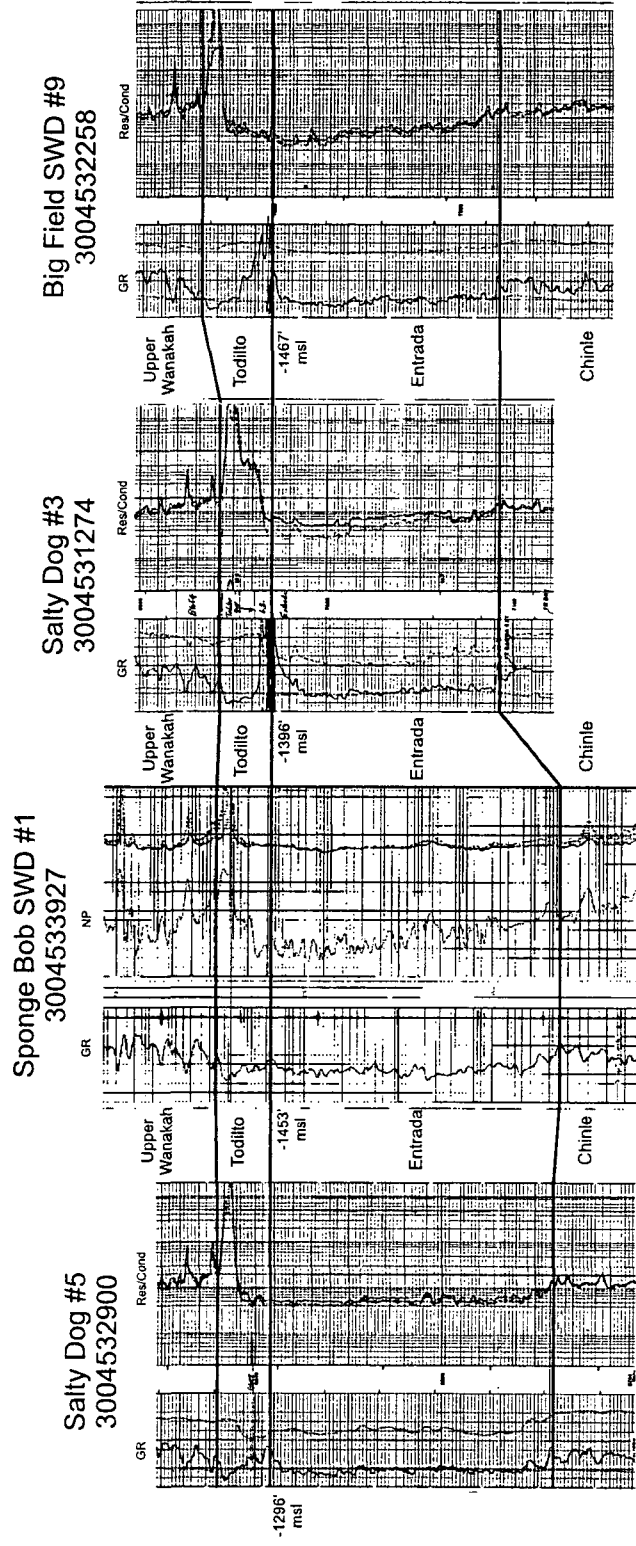
\* Dakota Wells Used Figure 8

— Entrada Structure (Contour Interval 100 Feet, Datum = Sea Level)

● Wells With Entrada Elevation Data







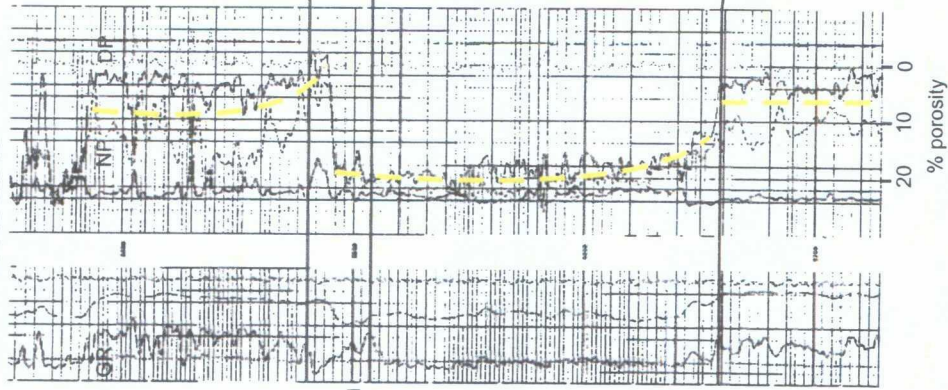
**Anadarko**  
Petroleum Corporation

**GEOLEX**  
INCORPORATED

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

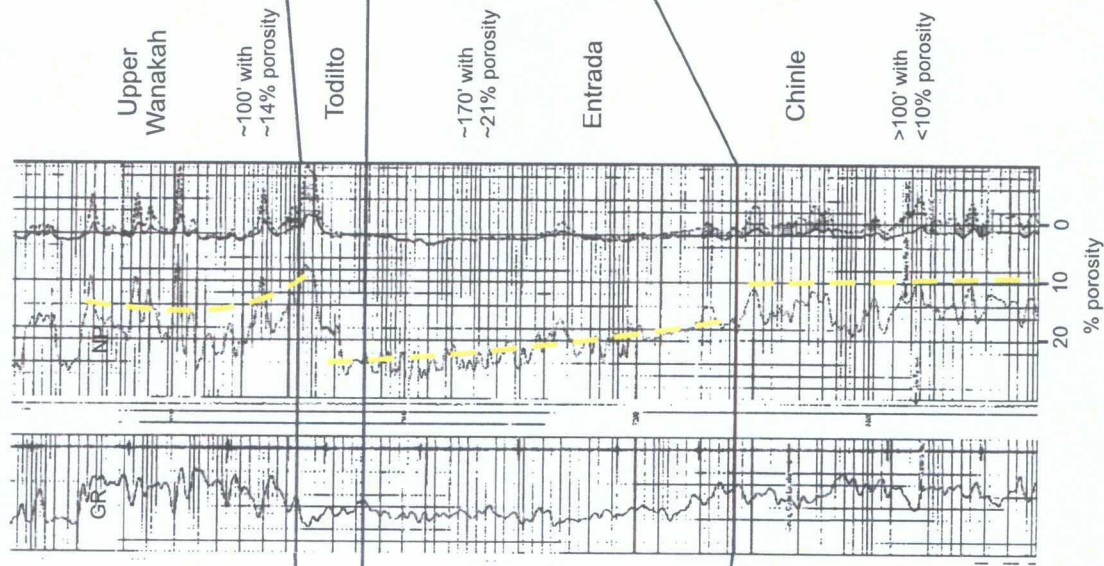


Salty Dog #5  
3004532900

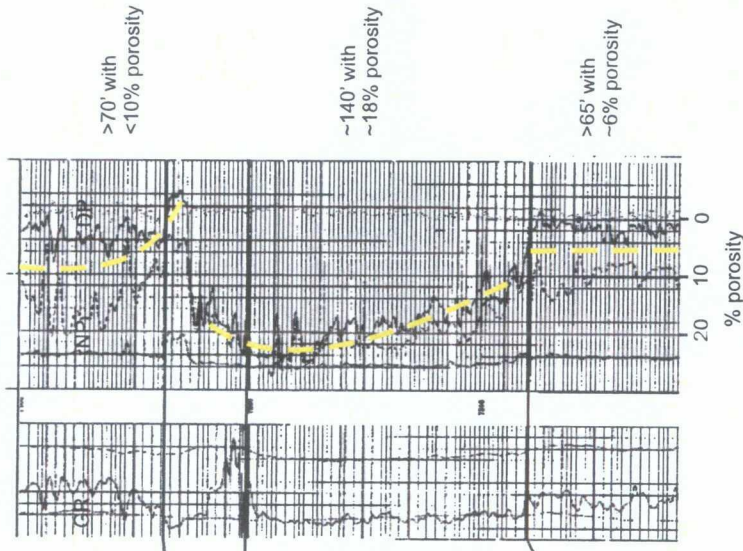


~30' total porosity for  
Entrada-lower Todilto Fms.

Sponge Bob SWD #1  
3004533927



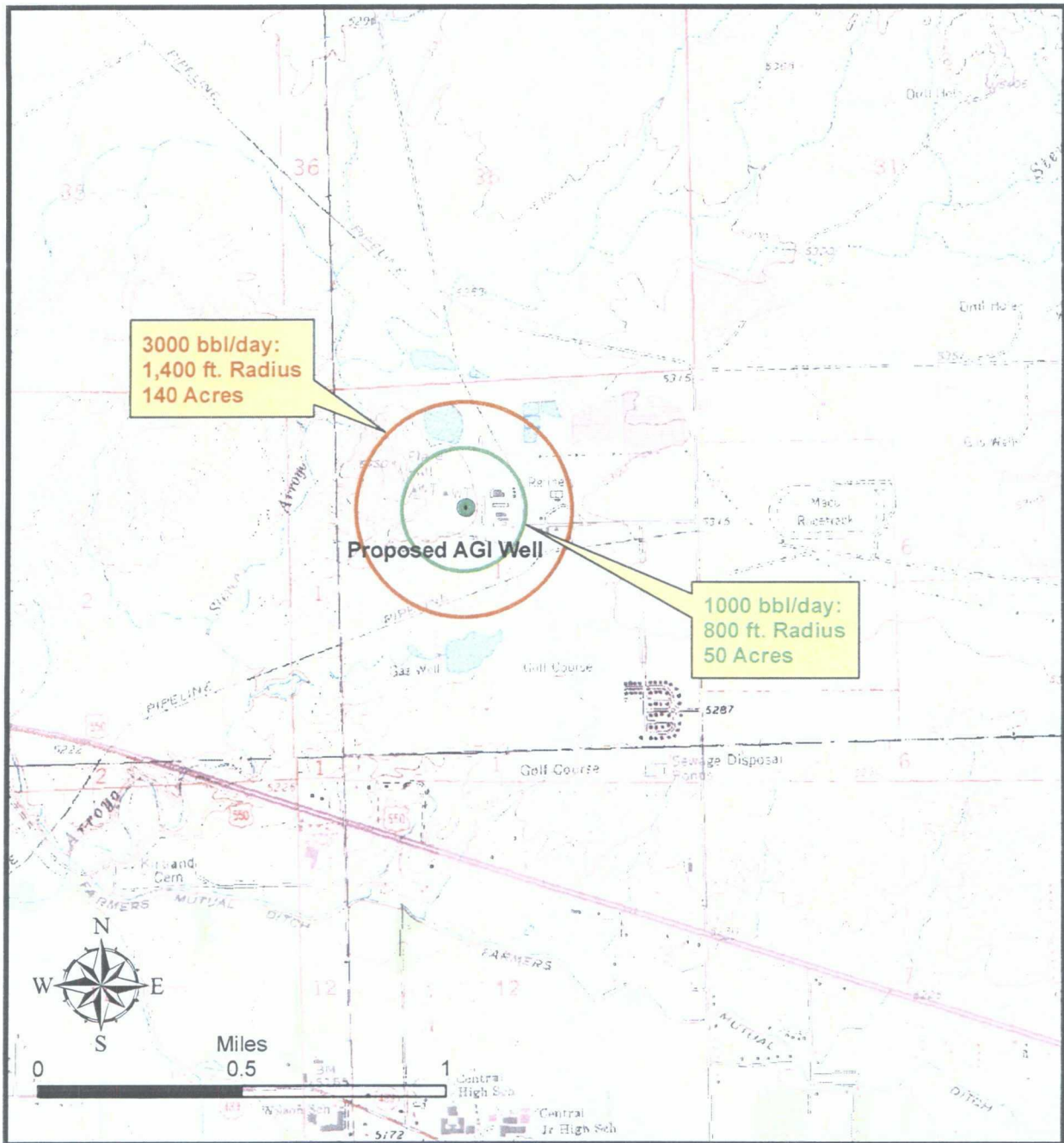
Big Field SWD #9  
3004532258



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Petroleum Corporation

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

## APPENDICES



**APPENDIX A-1**

**ENTRADA SANDSTONE and POINT LOOKOUT FLUID  
ANALYSES**



**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.**  
 Sampling Point/Date **7:00 A.M. 12/6/2005**  
 Company **Lance Oil & Gas**  
 Formation **Disposal Well** Lease **Salty Dog**

Code **101024610**  
 State **New Mexico**  
 County **San Juan**  
 Well **#5**

### DISSOLVE D SOLIDS

<u>CATIONS</u>	mg/l	me/l
Sodium, Na+ (Calc.)	<b>8,809</b>	<b>383</b>
Total Hardness as	<b>400</b>	<b>0</b>
Calcium Ca++	<b>160</b>	<b>8</b>
Magnesium, Mg++	<b>146</b>	<b>12</b>
Barium, Ba++	<b>0</b>	<b>0</b>
Iron (Total) Fe+++*	<b>1</b>	<b>0</b>

### ANIONS

Chlorides, Cl-	<b>9,000</b>	<b>254</b>
Sulfate, SO4-	<b>5,800</b>	<b>121</b>
Carbonate, CO3-	<b>0</b>	<b>0</b>
Bicarbonates,	<b>1,708</b>	<b>28</b>
Sulfide, S-*	<b>0</b>	<b>0</b>
Total Dissolved	<b>25,624</b>	

### OTHER PROPERTIES

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

### SCALING INDICIES

<u>TEMP. F</u>	<u>CA CO3</u>	<u>CASO4*2H2O</u>	<u>CA SO4</u>	<u>BA SO4</u>
<b>80</b>	<b>0.2264</b>	<b>-0.6197</b>	<b>-0.7745</b>	<b>-28.7243</b>
<b>120</b>	<b>0.5119</b>	<b>-0.6298</b>	<b>-0.6042</b>	<b>-28.9565</b>
<b>160</b>	<b>0.9173</b>	<b>-0.6042</b>	<b>-0.4059</b>	<b>-29.1446</b>

**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.

COMPANY OF NORTH AMERICA

Stella Needs A Com No. 1 - Conversion to SWD

API WATER ANALYSIS

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: SWAS

State: N.M.

Sampled By: J. ALEXANDER

County:

Date Sampled: 04/24/95

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

PROPERTIES

pH: 6.30  
Specific Gravity: 1.050  
Resistivity (ohm-meter): .13  
Temperature: 78F

Iron, Fe(total): 250  
Sulfide as H<sub>2</sub>S: 0  
Total Hardness:  
(see below)

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na:	20470	: 890
Calcium, Ca:	2084	: 104
Magnesium, Mg:	170	: 14
Barium, Ba:	N/A	: N/A
Potassium, K:		:

Sample(ml): 1.0 ml of EDTA: 5.20  
Sample(ml): 1.0 ml of EDTA: .70

ANIONS	mg/l	me/l
Chloride, Cl:	31905	: 900
Sulfate, SO <sub>4</sub> :	3750	: 78
Carbonate, CO <sub>3</sub> :		:
Bicarbonate, HCO <sub>3</sub> :	1830	: 30

Sample(ml): 1.0 ml of AgNO<sub>3</sub>: 1.80

Sample(ml): 1.0 ml of H<sub>2</sub>SO<sub>4</sub>:

Sample(ml): 1.0 ml of H<sub>2</sub>SO<sub>4</sub>: .30

Total Dissolved

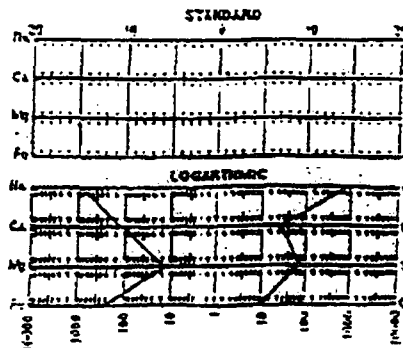
Solids (calculated): 60209

Total Hardness: 5900

Sample(ml): 1.0 ml of EDTA:

REMARKS AND RECOMMENDATIONS:

WATER PATTERNS-me/l



Analyst: DC  
Date Analyzed: 4/24/95

**APPENDIX A-2**

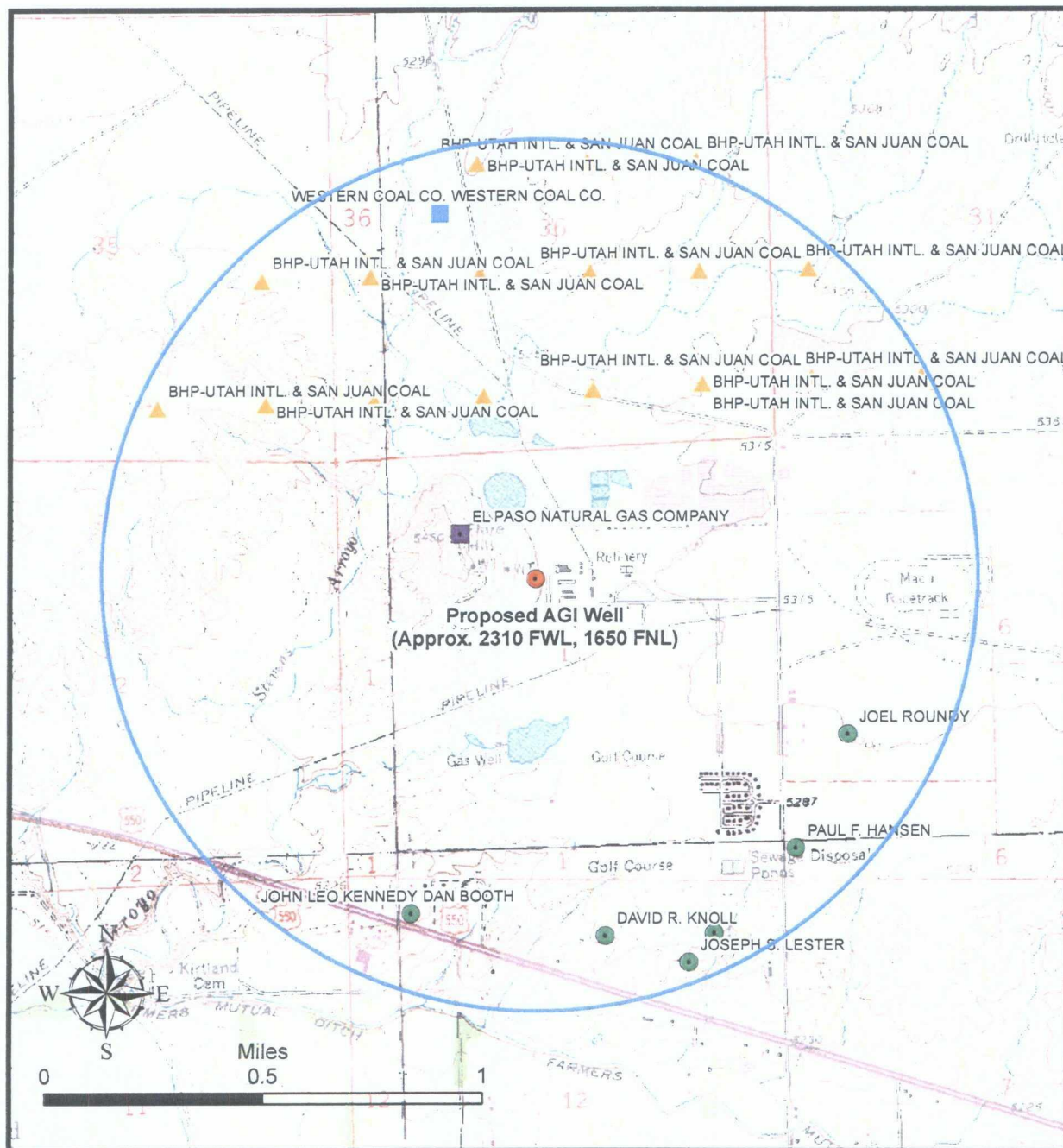
**TABLE AND MAP OF WATER WELLS  
WITHIN ONE MILE AREA OF REVIEW**

**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

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 18<sup>th</sup> Street, Suite 1200  
Denver, Colorado 80202

August 30, 2006

## TABLE OF CONTENTS

	Page
1 GENERAL INFORMATION .....	1
1.1 Western Gas Resources Representatives .....	1
1.2 Location of Discharges .....	1
1.3 San Juan River Plant Operations .....	1
2 PLANT PROCESSES .....	2
2.1 Sources and Quantities of Effluent and Process Fluids .....	2
2.2 Wastewater Characteristics .....	4
2.3 Wastewater Management .....	5
2.4 Spill/Leak Prevention and Housekeeping Procedures .....	5
2.4.1 Monitoring of Wastewater Disposal Systems .....	5
2.4.2 Protection from Spills and Leaks .....	6
2.4.3 Spill Response Measures .....	7
3 WASTEWATER AND SOLID WASTE DISPOSAL .....	8
3.1 On-site Facilities .....	8
3.2 Off-site Disposal - Wastewater .....	9
3.3 Solid Wastes .....	9
3.4 Recycled Materials .....	10
<del>4 SITE CHARACTERISTICS .....</del>	<del>11</del>
<del>    4.1 Hydrologic Features .....</del>	<del>11</del>
<del>    4.2 Surface and Groundwater Quality .....</del>	<del>11</del>
5 CLOSURE PLAN COMMITMENT .....	12

## LIST OF FIGURES

Site Plan  
 Process Flowsheet  
 Evaporation Pond Design Figure 2B  
 Evaporation Pond Design Figure 2C

## LIST OF APPENDICES

Appendix A: Analytical Results  
 Appendix B: Figures  
 Appendix C: Spill Prevention Control & Countermeasure Plan



#### 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 0.01 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

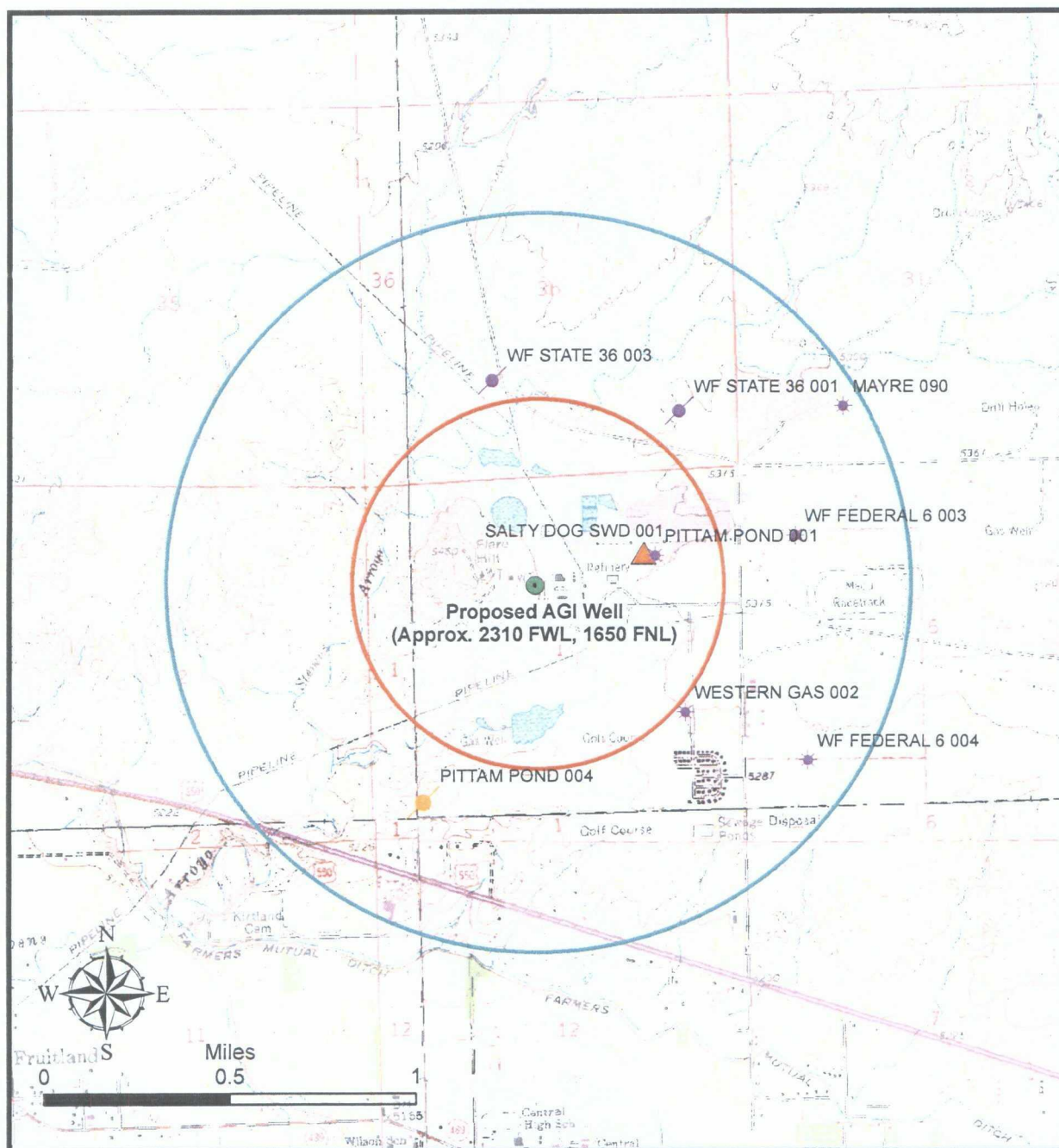
WGR will commit to the preparation of a closure plan in accordance with the New Mexico Water Quality Control Commission regulation number 3107A.11. At this time, WGR has no plans to close the existing evaporation pond or the facility.

**APPENDIX B**

**ACTIVE OIL AND GAS WELL DATA**

**PERMANENTLY PLUGGED OIL AND GAS WELL DATA**





**Figure 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
- ▲ MENELEE, Active
- GALLUP, Plugged



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 (Miles)
3004529946	SALTY DOG SWD 001	San Juan	4071298.21	735328.75	1728.751812	Active	XTO Energy, Inc.	9/3/1999	3420
3004523906	PITTMAN POND 001	San Juan	4071290.23	735379.49	1879.01994	Active	XTO Energy, Inc.	11/27/1979	660
3004531887	WESTERN GAS 002	San Juan	4070609.62	735510.08	852.5058304	Active	XTO Energy, Inc.	1/31/2004	730
3004530358	WF STATE 36 003	San Juan	4072052.9	734675.56	940.8294232	Plugged	LANCE OIL & GAS COMPANY, INC.	9/15/2000	749
3004525176	PITTMAN POND 004	San Juan	4070217.54	734377.9	1014.289535	Plugged	DUGAN PRODUCTION CORP	9/21/1981	4726
3004529947	WF STATE 36 001	San Juan	4071918.88	735484.19	1028.057698	Plugged	LANCE OIL & GAS COMPANY, INC.	5/27/2007	749
3004531725	WF FEDERAL 6 003	San Juan	4071377.12	735983.73	1179.979215	Active	XTO Energy, Inc.	7/26/1999	802
3004531852	WF FEDERAL 6 004	San Juan	4070400.53	736040.07	1409.505958	Active	XTO Energy, Inc.	1/13/2004	815
3004528291	MAYRE 090	San Juan	4071939.55	736191.28	1595.513602	Active	DUGAN PRODUCTION CORP	2/20/2004	770
3004508596	FOUITZ 001	San Juan	4069531.29	735287.29	1657.743083	Plugged	EPNG PRODUCTS CO	12/10/1990	760
3004520398	MAYRE 002	San Juan	4071951.97	736301.22	1686.839124	Plugged	DUGAN PRODUCTION CO	7/7/1961	5367
3004530835	WF STATE 36 004	San Juan	4072846.36	734500.83	1752.738565	Plugged	DUGAN PRODUCTION CO	1/28/1969	749
3004530069	WF STATE 36 002	San Juan	4072797.27	735416.95	1771.954953	Plugged	LANCE OIL & GAS COMPANY, INC.	1/17/2003	720
3004524742	MOORE 001	San Juan	4069403.44	734388.73	1777.46212	Plugged	LANCE OIL & GAS COMPANY, INC.	12/29/1999	800
3004525205	PITTMAN POND 003	San Juan	4069845.14	733562.6	1801.910147	Plugged	PETRO MEX LLC	8/19/2004	4700
3004525692	HORSESHOE 001	San Juan	4070507.36	733112.72	1825.914929	Plugged	DUGAN PRODUCTION CORP	7/7/1982	4660
3004530246	MAYRE 090R	San Juan	4071967.61	736497.46	1867.372631	Active	PETRO ENERGY INC	5/9/1983	4712
3004524633	TRS-EVI 001	San Juan	4069350.22	733939.84	1985.95332	Active	DUGAN PRODUCTION CORP	6/25/2000	820
3004532361	PSEUDO FRUITLAND COAL MINE GAS 002	San Juan	4072631.65	733507.66	2005.298725	Active	PETRO MEX LLC	10/23/1980	4700
3004529599	PITTMAN POND 005	San Juan	4072664.24	733534.47	2012.523247	Active	DUGAN PRODUCTION CORP	6/13/1998	835
3004533190	ROPKO 7 002	San Juan	4069656.86	736224.94	2024.476175	Plugged	LANCE OIL & GAS COMPANY, INC.	9/13/2005	735
3004525029	KIRTLAND 009	San Juan	4069021.28	734799.87	2103.950312	Plugged	PETRO MEX LLC	5/28/1981	4722
3004524304	KIRTLAND 005	San Juan	4069022.85	735152.3	2126.562558	Plugged	PETRO MEX LLC	5/20/1980	4700
3004529995	PITTMAN POND 090	San Juan	4073015.9	733823.37	2142.620131	Plugged	DUGAN PRODUCTION CORP	12/13/1999	476
3004525880	MESA TWIN MOUNDS 31 001	San Juan	4072999.2	735993.49	2205.449759	Plugged	CONOCO INC	4/13/1984	5618
3004508862	NM FEDERAL K 001	San Juan	4071405.21	737025.1	2211.921802	Plugged	SUNRAY MID CON	5/2/1959	5680
3004524743	BOB BLANCHE 001	San Juan	4068948.77	734400.47	2218.407783	Active	PETRO MEX LLC	12/31/1980	4670
3004530726	WF FEDERAL 31 002	San Juan	4073029.4	735983.17	2225.811104	Active	LANCE OIL & GAS COMPANY, INC.	10/18/2001	880
3004525092	DAVIE 001	San Juan	4070094.29	732826.63	2253.854964	Active	NORTHSTAR OIL & GAS	6/27/1981	4635
3004525440	HATCH 001	San Juan	4069632.52	733135.64	2258.703628	Active	V & R PRODUCTION, INC	10/13/1982	5174
3004529459	BUSHMAN FEDERAL 6 001	San Juan	4070383.21	737015.73	2307.227249	Active	LANCE OIL & GAS COMPANY, INC.	5/29/1997	800
3004525762	GARY C 001	San Juan	4068993.29	732866.4	2318.784743	Active	DUGAN PRODUCTION CORP	7/18/1983	4615
3004524762	DOROTHY 001	San Juan	4070630.22	737113.67	2335.677541	Active	PETRO MEX LLC	4/25/1980	4670
3004525858	BUSKEN 001	San Juan	4071915.17	737043.84	2349.687106	Active	VERYL F MOORE	12/26/1983	949
3004508967	HARRIS ET AL 001	San Juan	4071948.65	737039.92	2357.483168	Plugged	J J HARRIS ET AL	4/26/1955	2956
3004508970	PIPKIN 001	San Juan	4072181.36	732718.35	2362.030159	Plugged	CARROLL	4/14/1954	3615
3004509000	NM FEDERAL K 003	San Juan	4069682.67	736788.82	2431.743198	Active	SUNRAY DX OIL CO	2/22/1963	4624
3004530523	ROPKO 7 001	San Juan	4071922.87	737141.67	2444.543339	Active	LANCE OIL & GAS COMPANY, INC.	4/11/2002	690
3004509083	MAYRE 001	San Juan	4070292.43	732457.52	2515.269392	Active	DUGAN PRODUCTION CORP	11/30/1953	812
3004508698	DONELLA 001	San Juan	4072759.35	736755.92	2525.156813	Plugged	R A CRANE JR	7/26/1961	4494
3004509051	E H PIKIN 002	San Juan	4073587.27	735419.74	2531.676982	Active	REDWOLF PRODUCTION INC	10/23/1985	5634
3004526494	KELLY 001	San Juan	4072272.74	737093	2536.523429	Active	DUGAN PRODUCTION CORP	9/4/2003	940
3004531731	MAYRE 090S	San Juan	4070579.6	732308.22	2581.061814	Active	PETRO MEX LLC	4/6/1981	4600
3004524972	FRUITLAND 001	San Juan	4071776.37	732330.14	2584.295575	Plugged	SUNRAY DX OIL CO	3/19/1963	4660
3004508954	NM FEDERAL K 004	San Juan	4068642.77	735562.91	2587.886787	Active	NORTHSTAR OIL & GAS	5/16/1967	4700
3004524263	BARBARA 001	San Juan	4070063.77	732459.34	2598.264857	Active	V & R PRODUCTION, INC	11/4/1980	4556
3004524261	NEILSON 001	San Juan	4073761.89	734379.72	2675.227562	Active	G H TALCOTT	1/27/1981	800
3004509175	G H TALCOTT #1 001	San Juan	4073761.89	734379.72	2675.227562	Plugged	G H TALCOTT	8/15/1943	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'

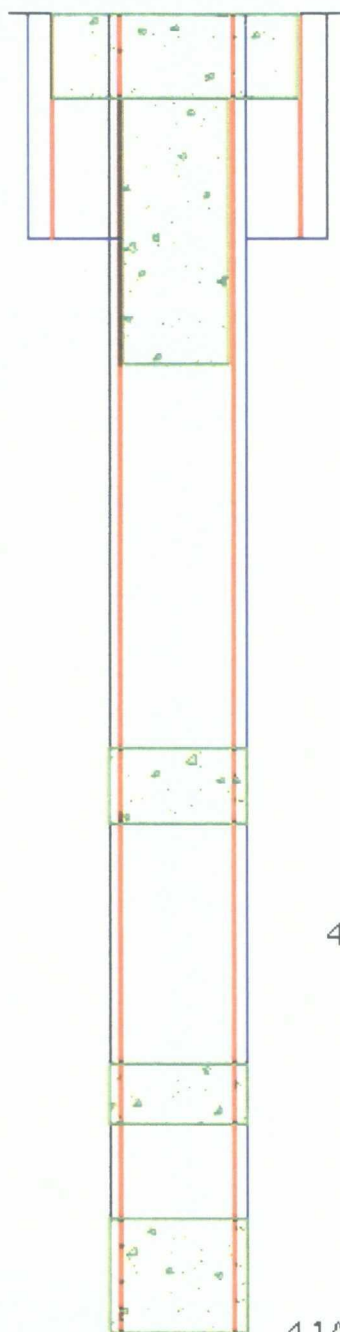
18 cu. ft. "B" Cement  
2030' to 2180'

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

Form 3160-3  
(June 1990)UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENTFORM 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

5. Lease Designation and Serial No.

NM 10758

6. If Indian, Allottee or Tribe Name

7. If Unit or CA, Agreement Designation

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

## SUBMIT IN TRIPLICATE

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other P&A

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

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

## TYPE OF SUBMISSION

☐ Notice of Intent☒ Subsequent Report☐ Final Abandonment Notice

## TYPE OF ACTION

☒ Abandonment☐ Recompletion☐ Plugging Back☐ Casing Repair☐ Altering Casing☐ Other☐ Change of Plans☐ New Construction☐ Non-Routine Fracturing☐ Water Shut-Off☐ Conversion to Injection☐ 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 4 1/2" 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.

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

Signed

John Alexander

Title

Operations Manager

Date

8/19/92

(This space for Federal or State office use)

Approved by

Conditions of approval, if any:

Title

APPROVED

Date

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

Form 3160-5  
(June 1990)UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

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

5. Lease Designation and Serial No.

NM 10758

6. If Indian, Allottee or Tribe Name

7. If Unit or CA, Agreement Designation

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

## SUBMIT IN TRIPLICATE

1. Type of Well

☒ 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

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

## TYPE OF SUBMISSION

☒ Notice of Intent☐ Subsequent Report☐ Final Abandonment Notice

## TYPE OF ACTION

☒ Abandonment☐ Recompletion☐ Plugging Back☐ Casing Repair☐ Altering Casing☐ Other☐ Change of Plans☐ New Construction☐ Non-Routine Fracturing☐ Water Shut-Off☐ Conversion to Injection☐ 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

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

Conditions of approval, if any:

Title

Date

APPROVED  
AS AMENDED

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

WMOOD

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

Re: Permanent Abandonment

Intention to Abandon

Well: 4 Pittman Pond

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 Perched Cliffs plug from 540 - 175'
- b) Place a plug from 0 - 275' outside 4 1/2" 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  $\text{CaCl}_2$  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 withdrawal 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.

Form 3160-5  
(June 1990)UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENTRECEIVED  
BLMFORM 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

1. Type of Well <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other P&A	5. Lease Designation and Serial No. NM 10758
2. Name of Operator Dugan Production Corp.	6. If Indian, Altonce or Tribe Name
3. Address and Telephone No. P.O. Box 420, Farmington, NM 87499 (505) 325-1821	7. If Unit or CA, Agreement Designation
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	
<input type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment	<input type="checkbox"/> Change of Plans
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion	<input type="checkbox"/> New Construction
<input checked="" type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Altering Casing	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Other	<input type="checkbox"/> 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.)\*

Location ready for final abandonment inspection.

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

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

Signed:

Title Operations Manager

Date

8/2/95

(This space for Federal or State Office use)

Approved by:

Title

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

MMOCD



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' 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'

6.25" Hole

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

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

TD 800'  
PBTD 739'

# A-PLUS WELL SERVICE, INC.

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

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## 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 \_\_\_\_\_

Page 1 of 2

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.)

## PLUG AND ABANDONMENT PROCEDURE

January 25, 2007

### WF State 36 #3

Page 2 of 2

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

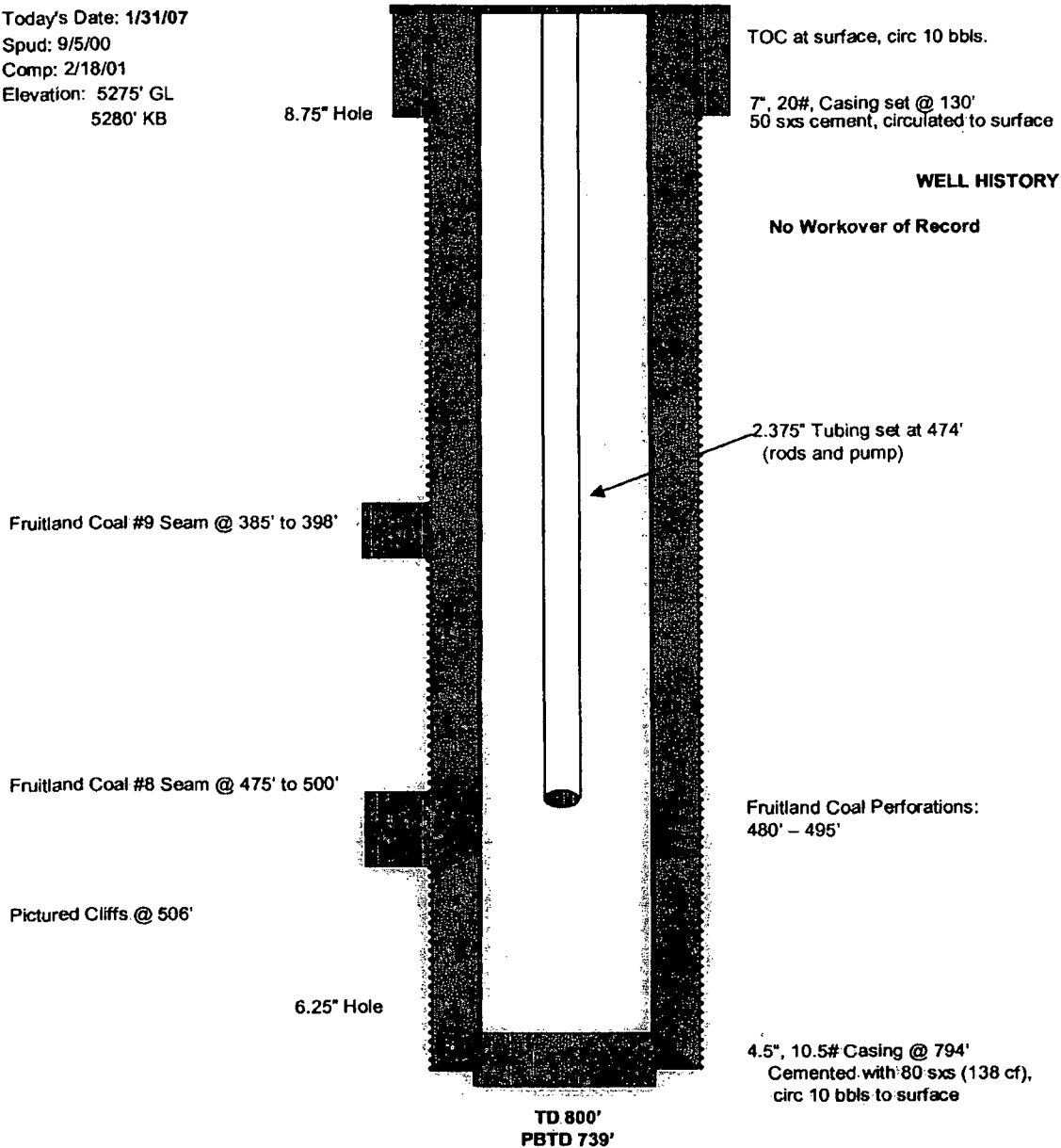
## Current

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





# 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'

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

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

WELL API NO. 30 - 045 - 30358
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. E - 3150
7. Lease Name or Unit Agreement Name WF State 36
8. Well Number #3
9. OGRID Number
10. Pool name or Wildcat Basin Fruitland Coal

**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.)

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

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

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

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' GI 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

<b>NOTICE OF INTENTION TO:</b>		<b>SUBSEQUENT REPORT OF:</b>	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
OTHER: <u>P&amp;A Pit Permit</u> <input checked="" type="checkbox"/>		OTHER: <input type="checkbox"/>	

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: FEB 22 '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 D. [Signature] TITLE DEPUTY OIL & GAS INSPECTOR, DIST. 3 DATE FEB 22 2007  
Conditions of Approval (if any):

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

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

WELL API NO. 30-045-30358	
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>	
6. State Oil & Gas Lease No. E-3150	
7. Lease Name or Unit Agreement Name WF State 36	
8. Well Number 3	
9. OGRID Number	
10. Pool name or Wildcat Basin Fruitland Coal	

**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.)

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

2. Name of Operator  
Lance Oil & Gas Company

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

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**

<b>NOTICE OF INTENTION TO:</b>		<b>SUBSEQUENT REPORT OF:</b>	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input checked="" type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
OTHER: Downhole Commingle <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

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:

- 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.

RCVD APR23'07  
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 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):

# 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  
Page 1 of 2

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 - 3/4" 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

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

March 30, 2007  
Page 2 of 2

**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.

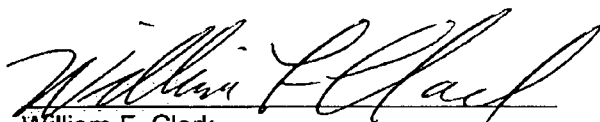
J. Estrada, Baker Tools fisherman, was on location.

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'

6.25" Hole

**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'

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

Form C-103  
May 27, 2004

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

<b>SUNDRY NOTICES AND REPORTS ON WELLS</b> (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.)		WELL API NO. 30-045-29947
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE X <input type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Lance Oil & Gas Company, Inc.		6. State Oil & Gas Lease No. E - 03150 - 11
3. Address of Operator P.O. Box 70, Kirtland, NM 87417 Attn: Tom Erwin		7. Lease Name or Unit Agreement Name WF State 36
4. Well Location Unit Letter <u>P</u> : <u>805</u> feet from the <u>South</u> line and <u>820</u> feet from the <u>East</u> line Section <u>36</u> Township <u>30N</u> Range <u>15W</u> NMPM San Juan County		8. Well Number #1
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 5296' GI 5301' KB		9. OGRID Number
Pit or Below-grade Tank Application <input type="checkbox"/> or Closure <input type="checkbox"/>		10. Pool name or Wildcat Basin Fruitland Coal
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

<b>NOTICE OF INTENTION TO:</b>		<b>SUBSEQUENT REPORT OF:</b>	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON X <input checked="" type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
OTHER: <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

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 FEB 8 '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. Sillanueva TITLE DEPUTY OIL & GAS INSPECTOR, DIST. 3 DATE FEB 08 2007  
Conditions of Approval (if any):

5 2/9

# 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 \_\_\_\_\_

Page 1 of 2

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.)

## PLUG AND ABANDONMENT PROCEDURE

February 1, 2007

### WF State 36 #1

Page 2 of 2

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

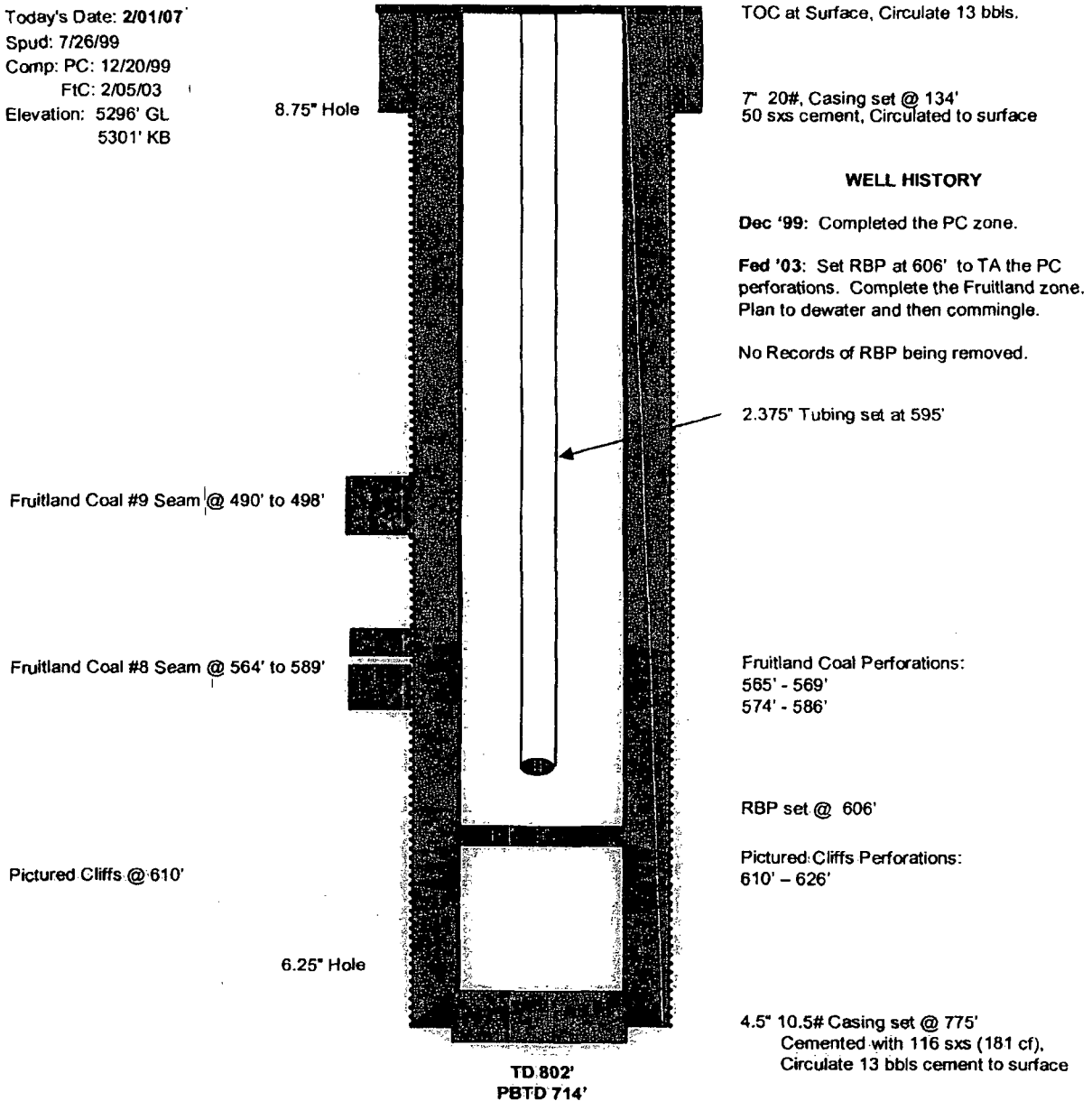
## Current

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





# 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'

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

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

WELL API NO. 30-045-29947	
5. Indicate Type of Lease STATE X <input type="checkbox"/> FEE <input type="checkbox"/>	
6. State Oil & Gas Lease No. E - 03150 - 11	
7. Lease Name or Unit Agreement Name WF State 36	
8. Well Number #1	
9. OGRID Number	
10. Pool name or Wildcat Basin Fruitland Coal	

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.)

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

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

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

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' GI 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:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
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 NMOCDD 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 FEB 22 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 NMOCDD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE Thomas M. Erwin 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: B. J. Pugh TITLE DEPUTY OIL & GAS INSPECTOR, DIST. 3 DATE FEB 22 2007  
Conditions of Approval (if any):

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

Form C-103  
May 27, 2004

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

WELL API NO. 30-045-29947
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. E-03150-11
7. Lease Name or Unit Agreement Name WF State 36
8. Well Number 1
9. OGRID Number
10. Pool name or Wildcat Basin Fruitland Coal

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.)

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

2. Name of Operator  
Lance Oil & Gas Company

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

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:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☒  
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:

- 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.

RCVD APR23'07

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 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):

# 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  
Page 1 of 3

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<sub>2</sub>S level: 2 ppm. Unhang rods and LD polish rod. POH and LD 22 - 3/4" 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<sub>2</sub>S 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

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

April 12, 2007  
Page 2 of 3

## Work Summary – Continued:

- 3/30/07 Open up well, no pressure. No H<sub>2</sub>S. PU unmodified 3.875" section with metal muncher buttons and TIH. Establish rate 2-1/2 bpm at 700 PSI. Attempt to make initial cut in 4.5" casing at 550' and 554'; both unsuccessful. TIH and tag CR at 595' GL. TOH with section mill. Light wear on blades of section mill. Change to opti-cut arms and TIH. Attempt to make initial cut in 4.5" casing at 550'. Rotating at 550' for 2 hours; unable to get weight down on casing. RIH to 587'. Circulate hole clean with fresh water. TOH with mill. RU Blue Jet wireline. Run CBL and multi arm caliper logs. Shut in well. SDFD.
- 4/2/07 Open well, no pressure. H<sub>2</sub>S level: 10 ppm. PU new Baker Oil Tools section mill with 6" arm extensions and TIH. Section mill 4.5" casing from 548' to 554' GL, taking weight OK. Then stopped getting cuttings in returns. TOH with section mill and found one blade missing; wear pattern almost behind arms. PU 3.875" section mill with opti-cut on 6" arms, bit sub. Section mill will not go inside 4.5" casing at surface. Wait on another section mill. PU 3.875" section mill with 5.5" arms dressed with opti-cut. TIH and section mill 4.5" casing from 554' to 555' GL. Circulate hole clean. TOH with section mill with opti-cut. No damage to mill; has pattern from casing. Shut in well. SDFD.
- 4/3/07 Open up well, no pressure. No H<sub>2</sub>S. PU 3.875" section mill with 6" arms dressed with metal muncher buttons and TIH. Mill casing from 555' to 563' GL. Circulate hole clean. LD. TOH with section mill and found on arm busted off mill and blades missing. SDFD.
- 4/4/07 Open up well, no pressure. No H<sub>2</sub>S. PU 3.875" section mill with 5.5" opti-cut arms and TIH. Mill casing from 563' to 564.5' GL. Circulate clean. TOH and PU another section mill with 6" metal muncher arms. TIN and mill casing from 564.5' to 568' GL. Circulate hole clean. TOH with section mill and found blades missing off all arms. Shut in well. SDFD.
- 4/5/07 Open up well. PU 3.875" section mill with metal muncher arms, bit sub. TIH with 3.125" drill collars, 2.875" PAC drill pipe. LD tongs. PU power swivel with 1 joint drill pipe. Establish circulation 2-1/2 bpm at 700 PSI. Mill section from 568' to 570' GL. Note: made 2' in 2-1/2 hours, then 2" in 1 hour. LD 1 joint with power swivel. Hang back power swivel. PU tongs. TOH with 2.875" drill pipe, 3.125" drill collars, bit sub, section mill. One blade missing off an arm; poor pattern on remaining blades. PU section mill with metal muncher buttons, bit sub. TIH with 3.125" drill collars, 2.875" drill pipe. LD tongs. PU power swivel with 1 joint drill pipe. Establish circulation with proper rate. Mill section from 570' to 573' GL. LD 1 joint with power swivel. Hang back power swivel. TOH with drill collars, bit sub, and section mill. Groove in body of section mill, all arms and blades in good shape. Shut in well. SDFD.

**A-PLUS WELL SERVICE, INC.**

P.O. BOX 1979

Farmington, New Mexico 87499

505-325-2627 \* fax: 505-325-1211

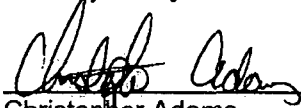
Lance Oil and Gas Company, Inc.  
WF State 36 #1

April 12, 2007  
Page 3 of 3

**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.



**APPENDIX C**

**OPERATORS AND LEASES IN AREA OF REVIEW**

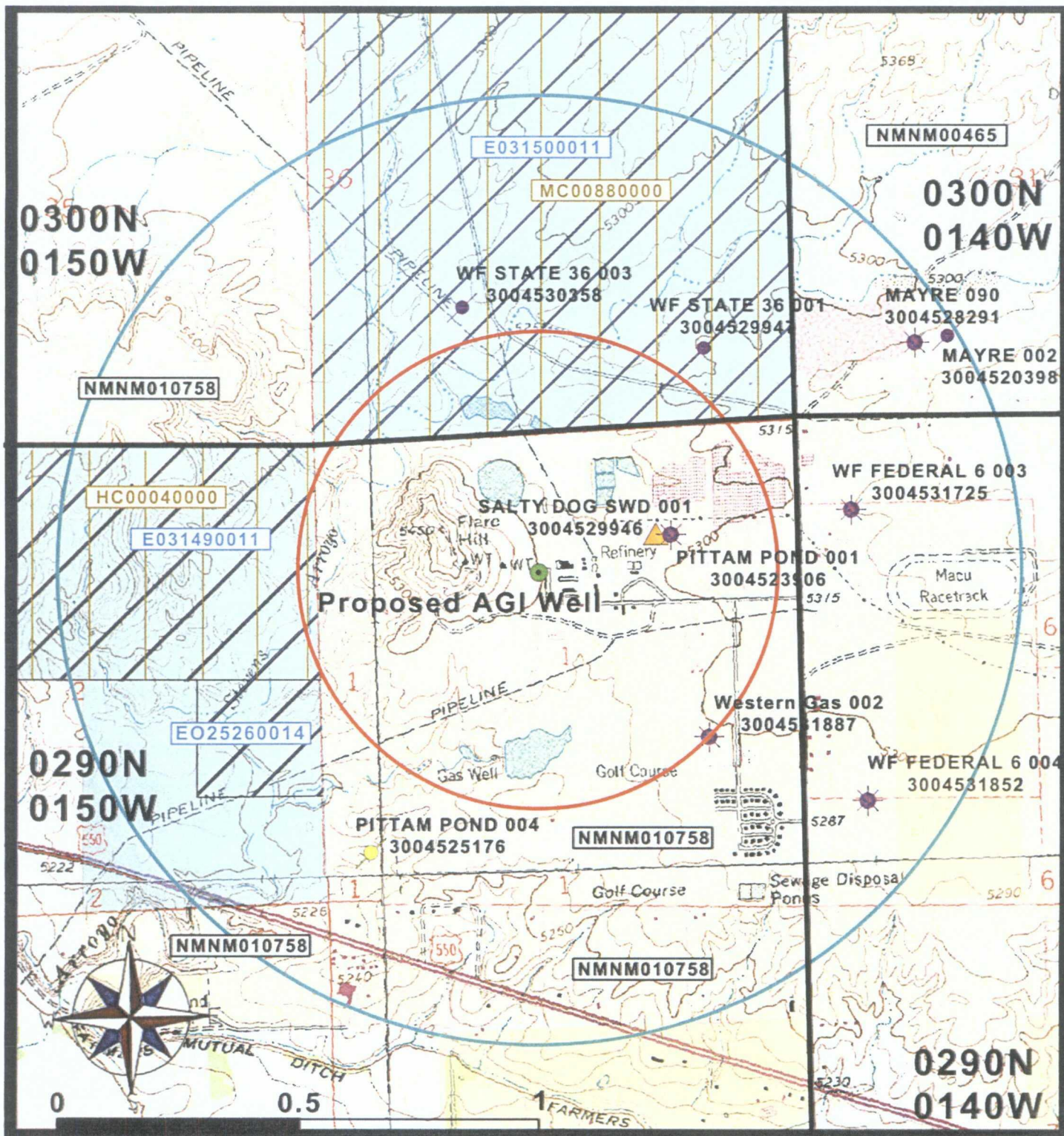
**AND**

**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



MENEFEЕ, 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	MENESEE	0.33
3004523906	PITTM 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	PITTM 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
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## 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 Worth 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	Winifred 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
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### 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](http://www.geolex.com/Anadarko%20AGI%20Application).

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 ácido, 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 sería 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 sería 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

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](http://www.geolex.com/Anadarko%20AGI%20Application).

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**

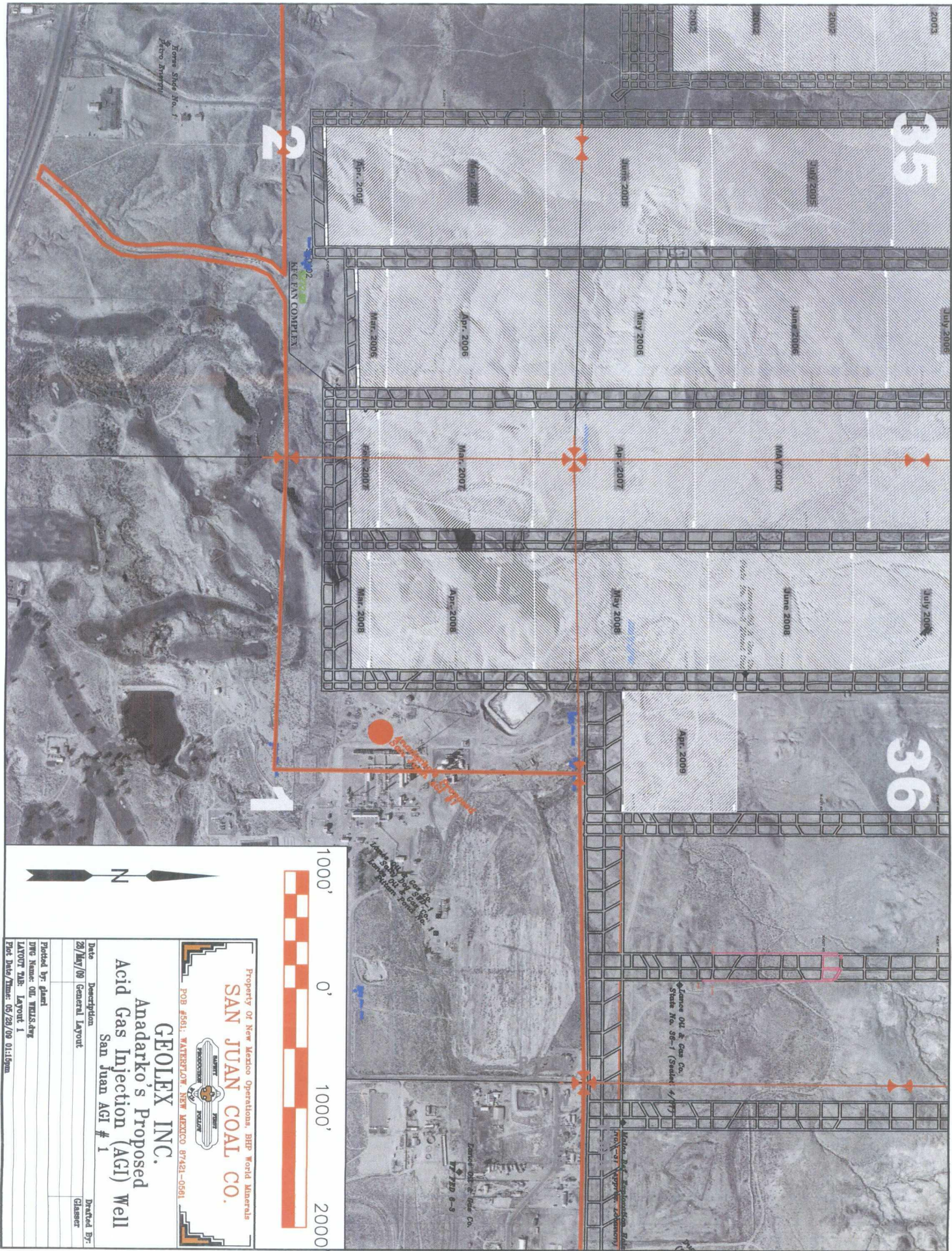
**CASE#\_\_\_\_\_:**

**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 ácido, 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 sería 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 sería 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.





Property Of New Mexico Operations, BHP World Minerals  
**SAN JUAN COAL CO.**  
 POB #561: WATERBURY, NEW MEXICO 87421-0561

**GEOLÉX INC.**  
 Anadarko's Proposed  
 Acid Gas Injection (AGI) Well  
 San Juan AGI # 1

Date	Description	Drawn By:
28/May/09	General Layout	Glaser

Plotted by: glaser  
 DWG Name: OIL WELLS.dwg  
 LAYOUT TAB: Layout 1  
 Plot Date/Time: 05/28/09 01:11pm