

May 16, 2011

Mr. Richard Ezeanyim, PE
Bureau Chief, Engineering & Geological Services
NM Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Case 14664

VIA E-MAIL and FEDERAL EXPRESS

RE: FRONTIER FIELD SERVICES LLC. C-108 APPLICATION FOR MALJAMAR AGI#1

Dear Mr. Ezeanyim:

Pursuant to our conversations and meetings last month enclosed you will find two copies of the above-referenced C-108 application for an acid gas injection well at the Frontier Maljamar Gas Processing Plant located south of Maljamar in Lea County, NM. By copy of this letter a copy of this application is being transmitted also to the Hobbs District Office. Copies of the proposed legal notice and the notice letter to be sent to all required parties are included in Appendix D to the application

As we discussed, Frontier Field Services LLC requests that this application be placed on the docket for the Division Examiner Hearing set for June 23, 2011.

Sincerely,
Geolex, Inc.



Alberto A. Gutiérrez, RG
President
Consultant to Frontier Field Services, LLC.



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Enclosure

cc: w/ enclosure Buddy Holt, NMOCD Hobbs District Office
w/o enclosure Jamie Bailey, NMOCD Director, Santa Fe
w/o enclosure Florene Davidson, NMOCD, Santa Fe
w/enclosure John Prentiss, Frontier Field Services, Maljamar Plant
w/enclosure Matt Franzen, Frontier Field Services, Tulsa OK
w/enclosure Ocean Munds-Dry, Holland and Hart, Santa Fe

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**C-108 Application for Approval to Drill and Operate a New Well
For The Injection of Acid Gas
Frontier Field Services, LLC Maljamar Natural Gas Processing Plant
(Unit O, Section 21, Township 17 S, Range 32 E)**



May 16, 2011

Prepared For:

**Frontier Field Services, LLC
4200 E. Skelly Dr., #700
Tulsa, OK 74135**

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

Case 14661

- I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance X Disposal _____ Storage
Application qualifies for administrative approval? _____ Yes X No
- II. OPERATOR: Frontier Field Services, LLC.
ADDRESS: 4200 Skelly Dr., #700, Tulsa, OK 74135
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; **SECTIONS 1, 2, 4 and 7**
 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. **APPENDIX 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 Frontier Field Services LLC
- SIGNATURE:  DATE: 5/16/11
- 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**

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. **Section 21, T17S, R32 E, 130' FSL, 1813' FEL - 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 AND FIGURE 4 FOR PROPOSED WELL DESIGN**
- (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 NMOC 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.

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- Appendix C: Active Oil and Gas Well Data; Plugged Oil and Gas Well Data; CD copy of NMOCD Files for Wells Penetrating the Wolfcamp
- Appendix D: Identification of Operators, Surface Owners, Lessees, and other Interested Parties for Notices; Copies of Notice Letters and Certified Mail Receipts, and Copies of Draft Public Notices for Hearing

1.0 EXECUTIVE SUMMARY

On behalf of Frontier Field Services, LLC (Frontier), Geolex[®], Inc. (Geolex) has prepared and is hereby submitting a complete C-108 application for approval to drill, complete and operate a combined acid gas injection and CO₂ sequestration well (Maljamar AGI #1) adjacent to the Frontier Gas Plant which is located on approximately 19 acres in Section 21, T17S, R32E near Maljamar in Lea County, New Mexico (Figure 1). The well will be drilled vertically at 130 feet from the south line and 1,813 feet from the east line of Section 21 (Figure 2).

The Maljamar AGI #1 is anticipated to have a total depth of approximately 10,000 feet in the lower Leonard and Wolfcamp series along the northern margin of the Delaware Basin (Permian). The primary proposed injection zone will be within a porous debris and algal mound carbonate facies in the Wolfcamp with secondary potential targets in the lower Leonard. All of these zones are between 9,300 and 10,000 feet. Analysis of the reservoir characteristics of these units confirms that they act as excellent closed-system reservoirs that should easily accommodate the future needs of Frontier for disposal of acid gas and sequestration of CO₂ from the plant. Frontier needs to safely inject up to 2.0 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 CO₂ injection volumes well within NMOCD's recommended maximum injection pressures.

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

- Identification and characterization of all hydrocarbon-producing zones of wells that surround and are present on the plant site;
- The depths of perforated pay intervals in those wells relative to the depth of the target injection zones (lower Leonard and Wolfcamp);
- The past and current uses of the proposed intervals;
- Total feet of net porosity in the Wolfcamp;
- The stratigraphic and structural setting of the targeted zones relative to any nearby active or plugged wells, and other wells penetrating the intervals;
- 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 11 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, Frontier 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 CO₂ which would otherwise continue to be released to the atmosphere and the flaring of H₂S which currently takes place at the Plant. At the expected ratio of 12% H₂S and 88% CO₂, injecting 2.0 MMSCFD will sequester 10.7 tons of H₂S and 101.2 tons of CO₂ per day.

Our research has identified one primary and two secondary AGI targets in the algal-mound and slope-debris facies of the lower Leonard and Wolfcamp intervals, a series of thick (up to 200 feet) porous deposits formed along the former shelf break of the Delaware Basin isolated within tight mudstones and micrites, located approximately 9,000 to 10,000 feet below the plant.

Our geological evaluation shows that the most promising zone is the lower Wolfcamp Reservoir. This unit lies between approximately 9,800 to 10,000 feet, has an area of 190 acres, and an estimated net capacity of 24.2 million barrels of TAG. Additional potential reservoirs lie in the lower Leonard, above the Wolfcamp, and include:

- The lower Leonard Reservoir #1, lying at depths of approximately 9,300 to 9,400 feet, with an extent of 64 acres, a net porosity of 33 feet, and an estimated capacity of 9 million barrels of TAG, and
- The lower Leonard Reservoir #2, at depths from 9,450 to 9,550 feet, with an area of 53 acres, 17 feet of net porosity, and a estimated capacity of 3.8 million barrels of TAG.

Although the Wolfcamp reservoir is our primary target, we will log and, if promising, perforate and test the lower Leonard zones to determine their feasibility for TAG injection.

These reservoirs are effectively sealed laterally and above and below by the much less permeable adjacent facies. These less permeable rocks consist of finer-grained deeper water sediments from the transgressive units that were deposited during and after the deposition of the porous algal mound/detrital facies.

At the anticipated reservoir conditions (130°F and 3400 psi), each million standard cubic feet of TAG will be compressed to 425 barrels (2,387 cubic feet).

As an example of the injectibility of these reservoirs, we have researched the injection capacity of two salt water injection (SWD) wells completed in the lower Wolfcamp located south of the Frontier plant:

- COG Operating LLC Federal BI 001, 0.9 miles south in Section 28 (injected 3,900 BBL/Day in 2010),
- COG Operating LLC Maljamar SWD 29 001, 1.2 miles south in Section 29 (injected 2,500 BBL/Day in 2010)

The performance of these wells clearly demonstrates the capacity of similar, though not connected, units in this formation. Based on these data, we have concluded that the Leonard and Wolfcamp mounds provide ample porosity, permeability and volume to serve Frontier's injection needs.

Although 201 wells are listed within one mile of the proposed AGI, only 12 wells, of which six are active and six plugged, penetrate into or through the Wolfcamp. NMOCD files show that all of the twelve wells have been completed and/or plugged in a manner that will effectively isolate the Wolfcamp interval.

None of the six active wells produce from the Wolfcamp. The nearest well active in the Wolfcamp is the Federal B1 001 salt water injection well, approximately one mile south of the plant. Two other active wells have been plugged back to shallower zones (ie, San Andres), again isolating the Wolfcamp. The remaining two active producing wells are producing from the Devonian (13,600 feet) and the McKee (14,800 feet). Therefore, the proposed AGI activities into the confined lower Wolfcamp algal mound will not cause any impacts to existing production and/or plugged wells.

In addition to providing a safe and adequate reservoir for H₂S and CO₂, the geologic environment is ideal to demonstrate the required capture and sequestration of CO₂ to obtain future credits or offsets.

Active oil and gas leases in the one-mile area are held by ConocoPhillips Company and COG Operating LLC. With the exception of plant property owned by Frontier and Mid-America, all of the adjacent lands within one mile are federal lands administrated by the Bureau of Land Management and some minor amount of state land. 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.

There is no permanent body of surface water within several miles of the plant. A search of the New Mexico State Engineer's files shows that only one water well (owned by Reliant Processing, approximately 0.1 miles southwest of the Gas Plant) lies within one mile of the proposed AGI. This well has a total depth of 158 feet. Available information shows that groundwater occurs at a depth of approximately 70 to 85 feet, and is hosted by the sandstones in the underlying Triassic Dockum Group. The planned well design will completely isolate the fresh water-bearing zones through the Rustler (source of the deepest groundwater) by surface casing that will be cemented to the surface. The proposed injection zone is a closed system, and there are no open faults, fractures, or other structures that could potentially serve as a pathway between the proposed injection zone and any sources of fresh water.

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: Wolfcamp Formation Fluid Analysis and Analyses of Frontier Maljamar Gas Plant TAG.
- Appendix B: Table and Map of Water Wells within One Mile Area of Review and Groundwater Analyses
- Appendix C: Maps and spreadsheets showing all active, temporarily abandoned, abandoned and plugged oil and gas wells included within two mile, and one mile areas and associated plugging reports, and a CD with complete NMOCD file on each plugged and active well penetrating the Wolfcamp within one mile of the proposed AGI.
- Appendix D: Maps and spreadsheets identifying operators, lessees, surface owners and other interested parties for notices, copies of notice letters and certified mail receipts, and copies of the public notices for the hearing.

It is anticipated that this application shall be the subject of a NMOCD hearing on June 23, 2011.

3.0 PROPOSED CONSTRUCTION AND OPERATION OF MALJAMAR AGI #1 WELL

The proposed injection well will be drilled adjacent to the Frontier Plant Site in Unit O, 130 feet from the south line and 1813 feet from the east line of Section 21, T17S, and R32E at. Figure 2 shows the proposed location of the new well. Frontier will apply for an operator number and file the required bond for the proposed Maljamar AGI #1 upon approval of this C-108 and prior to commencement of drilling.

3.1 CALCULATED MAXIMUM INJECTION PRESSURE

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

- 88% CO₂
- 12% H₂S
- Trace Components of C₁ – C₇

The total volume of TAG to be injected under this scenario will be approximately 425 barrels per day for each million cubic feet at reservoir conditions. 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 2,973 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:

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

and $PG = 0.2 + 0.433 (1.04 - SG_{\text{tag}})$ where:

SG_{tag} = specific gravity of treated acid gas (pressure and temperature dependent; calculated as the average density in the tubing, using surface conditions of 100°F and 1,500 psi, and bottom hole conditions of 100°F and 3,400 psi; see Table 1 for details)

For the maximum requested injection volume (2 MMSCF/Day) it is assumed that:

$$\begin{array}{l} SG_{\text{tag}} = 0.78 \\ D_{\text{top}} = 9,500 \text{ feet} \end{array}$$

Therefore:

$$PG = 0.2 + 0.433 (1.04 - 0.78) = 0.313$$

$$IP_{\max} = PG(D_{\text{top}}) = 0.313 \times 9,500 = 2,973 \text{ psi}$$

Based on the performance of the existing injection well, it is anticipated that the average injection pressure would not exceed 2,973 psi. Based on the above calculations, Frontier is requesting approval of a maximum injection pressure to be 2,973 psi at the surface.

Table 1: Pressure and Volume Calculations for TAG, Proposed Frontier Maljamar AGI #1

PROPOSED INJECTION STREAM CHARACTERISTICS

TAG	H ₂ S	CO ₂	H ₂ S	CO ₂	TAG
Gas vol MMSCFD	conc. mol %	conc. mol %	inject rate lb/day	inject rate lb/day	inject rate lb/day
2	12.00	88.00	22781	215734	238516

CONDITIONS AT WELL HEAD

Well Head Conditions		TAG							
Temp F	Pressure psi	Gas vol MMSCFD	Comp CO ₂ :H ₂ S	Inject Rate lb/day	Density ¹ kg/m ³	SG ²	density lb/gal	volume ft ³	volume bbl
100	1500	2	88:12	238516	663.70	0.66	5.54	5754	1025

CONDITIONS AT BOTTOM OF WELL

Injection Zone Conditions					TAG				
Temp F	Pressure ³ psi	Depth _{top} ft	Depth _{bottom} ft	Ave. Thick. ft	Density ¹ kg/m ³	SG ²	density lb/gal	volume ft ³	volume bbl
100	3400	9500	9750	250	896.03	0.90	7.48	4262	759

CONDITIONS IN RESERVOIR AT EQUILIBRIUM

Injection Reservoir Conditions					TAG				
Temp ⁵ F	Pressure ³ psi	Ave. Por. %	Swr	Porosity ⁶ ft	Density ¹ kg/m ³	SG ²	density lb/gal	volume ft ³	volume bbl
130	3400	12	0.45	16.5	799.90	0.80	6.68	4774	850

CONSTANTS

	SCF/mol	
Molar volume at STD	0.7915	
	g/mol	lb/mol
Molar weight of H ₂ S	34.0809	0.0751
Molar weight of CO ₂	44.0096	0.0970
Molar weight of H ₂ O	18.015	0.0397

CALCULATION OF MAXIMUM INJECTION PRESSURE LIMITATION

SG _{TAG}	0.78
PG = 0.2 + 0.433 (1.04-SG _{TAG})	0.313 psi/ft
IP _{max} = PG * Depth	2970 psi

Where: SG_{TAG} is specific gravity of TAG; PG is calculated pressure gradient; and IP_{max} is calculated maximum injection pressure.

CALCULATION OF 30 YEAR AREA OF INJECTION

Cubic Feet/day (5.6146 ft ³ /bbl)	4774 ft ³ /day
Cubic Feet/30 years	52312423 ft ³ /30 years
Area = V/Net Porosity (ft)	3170450 ft ² /30 years
Area = V/Net Porosity (ft) (43560 ft ² /ac)	72.8 acres/30 years
Radius =	1005 ft
	0.19 miles

¹ Density calculated using AQUAlibrium software

² Specific gravity calculated assuming a constant density for water

³ PP is extrapolated using successful Drill Stem Tests at nearby wells

⁴ Thickness is the ave. total thickness of coarse sand units in the reservoir zone

⁵ Reservoir temp. is extrapolated from bottomhole temp. measured at nearby wells

⁶ Porosity is estimated using geophysical logs from nearby wells

Calculations presented in Table 1 (incorporating the compressibility of the TAG at reservoir conditions) show that, given a more detailed calculation of well pressure,. Over 30 years, a daily injection volume of 2 MMSCF/Day of TAG will occupy approximately 52.3 million cubic feet in the reservoir. As discussed in Section 4.3, a calculated gross net porosity of 30 feet in the reservoir is reduced to an effective net porosity of 16.5 feet after correcting for a residual water content of 45%. Based on a net porosity of 16.5 feet, we calculate that the 30-year injection volume will occupy approximately 72.8 acres of the reservoir, with a radius of 0.19 miles.

3.2 WELL DESIGN

While the injected fluid will be dehydrated, the line that will convey the TAG to the well from the compression facilities will be a 3 inch steel line (304 or 316) to provide added corrosion protection. The final design for the compression facilities and associated piping and layout of H₂S alarms and other safety equipment will be submitted for NMOCD review prior to commencement of injection operations as part of a revised Rule 11 plan. The schematic of the new AGI facilities and tie-in to the existing Frontier Plant are shown in Figure 3, and the preliminary design for the injection well is shown on Figure 4.

The proposed well (Maljamar AGI #1) will be a vertical well, spudded on property leased by the Frontier Field Services LLC. This design will allow Frontier to access the primary injection zone and potentially two other zones from this location. The well will be drilled vertically to a final total depth of approximately 10,000 feet.

The well will have each string of the telescoping casing cemented to the surface and will include a subsurface safety valve (SSV) 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 (Dockum and Rustler Group (groundwater), Artesia Group and San Andres-Grayburg (oil and gas production)), characterization of the zone of injection, and a total depth (TD) ensuring identification of the reservoirs. Three casing strings are proposed (Figure 4):

1. Surface casing to approximately 550 feet, beneath the Triassic "Redbeds", to protect the fresh water.
2. Intermediate casing to approximately 4,200 feet, to isolate the Permian salt units (Salado/Castile) and the productive units in the Artesia Group (Yates and Queen) and the San Andres/Grayburg.
3. Production casing extending down to the final total depth (TVD 10,000 feet). Following logging and analysis, the injection intervals will be determined, and the final depth of the long string, perforation zones and packer location will be selected.

A suitable drilling rig will be chosen for the job that will include a 5,000 psi blowout preventer (minimum) and choke manifold for any unforeseen pressures encountered. The borehole for the surface casing will be drilled with a 17 ½ inch bit to a depth of approximately 550 feet, and 13 ⅜ inch, 48.0 ppf, H40, STC casing will be installed and cemented to the surface with approximately 600 sacks of cement (or amount adequate to circulate the cement to the surface). The intermediate hole will be drilled with a 12 ¼ inch bit to a depth of approximately 4,200 feet. There an 8 ⅝ inch, 24.0 ppf, J55, STC surface casing string will be run and cemented to surface with approximately 1,500 sacks of cement. Visual inspections of cement returns to the surface will be noted in both the conductor and surface pipe casing jobs. Casing and cement integrity will be demonstrated by pressure-testing after each cement job.

After verifying the intermediate casing, the well will be drilled to the projected TD of 10,000 feet using a 7 ⁷/₈ inch bit.

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 lower Leonard and the Wolfcamp and a portion of the caprock and basal seal formations, with rotary sidewall cores in the Wolfcamp. A conventional core will be collected from the Wolfcamp zone to evaluate the permeability of this caprock. Additional sidewall cores may also be obtained from the Wolfcamp to allow more detailed reservoir analysis.

After the logs have been evaluated, the production casing consisting of approximately 10,000 feet of 5½ inch, 15.5 ppf, L80 casing grade will be run and cemented with an approximate total of 1500 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. The cementing of the long string will be accomplished in two stages. The first stage will seal the annular space from total depth (approximately 10,000 feet) to a level well above the CRA joint. This stage will employ acid-resistant cement (CORROSACEM™ or equivalent). For the second stage, a DV Tool previously inserted in the casing (at approximately 5000) feet will be used to pump the remaining cement to 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. Following successful testing and the release of the drilling rig, a workover rig will be used 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 assure that acid gas 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 selected injection intervals will be perforated with approximately four shots per foot. At this location a total of 500 feet of target areas may be perforated. A temporary string of removable packer and tubing will be run, and injection tests (step tests) will be performed to determine the final injection pressures and volumes. Once the reservoirs have been tested, the final tubing string including a permanent packer, approximately 9300 feet of 2 ⁷/₈ inch, 6.5 ppf, L80 ULTRA FX premium thread tubing, and an SSV will be run into the well. A ¼ inch inconel steel line will connect the SSV to a hydraulic panel at the surface.

The National Association of Corrosion Engineers (NACE) issues guidelines for metals exposed to various corrosive gases like the ones in this well. For a H₂S/CO₂ stream of acid gas that is de-watered at the surface through successive stages of compression, downhole components such as the SSV 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 Rule 11 Plan will be finalized when the compression facility design and well connection design is complete and will be submitted for NMOCD review and approval prior to commencement of TAG injection into the Frontier AGI well. A Rule 11 Plan for the current facility at Maljamar was submitted on May 10, 2011.

4.0 REGIONAL AND LOCAL GEOLOGY AND HYDROGEOLOGY

4.1 GENERAL GEOLOGIC SETTING

The Frontier Gas Plant is located in the southern half of Section 21, T 17 S, R 32 E, in Lea County, New Mexico, approximately 3 miles southeast of Maljamar (Figure 1). The Plant is located within a physiographic area which has been referred to as the Querecho Plains by various authors including Nicholson & Clebsch (1961). This area is almost entirely covered at the surface by Holocene reddish brown dune sand underlain by a hard caliche surface or calcareous silts which may be found in buried valleys or internally drained Quaternary playas. These dune sands are locally stabilized with shin oak, mesquite and some burr-grass. There are no surface bodies of water or groundwater discharge sites within one mile of the Plant; and where drainages exist in interdunal areas, they are ephemeral, discontinuous, dry washes. A prominent outcrop of the Pliocene Ogallala Formation (Mescalero Ridge) trends to the northwest-southeast, immediately east of Maljamar. Beneath the Holocene and Quaternary deposits lies the underlying Triassic redbeds of the Dockum Group. The Triassic units are in turn underlain by the Rustler Formation and followed by the Ochoa series of evaporites including the Castile and the Salado Formations. Beneath these formations is the Permian sequence of the Delaware Basin described generally below.

4.2 BEDROCK GEOLOGY

Figure 5 is a generalized stratigraphic column showing the Permian Formations that underlie the Plant site. The Plant is located on the northern margin of the Delaware Basin province of the Permian Basin, where Permian rocks generally dip to the south as they transition from a sequence of shelf and shelf-edge carbonates and sandstones to basinal-equivalent shale, sandstones, and limestones to the west. Shallow production in the area is from the Yates, Seven Rivers, Queen, and San Andres Formations. Deeper production has been found in the Permian Paddock, and Yeso/Abo, the Pennsylvanian Cisco, Strawn and Morrow, and other targets in the Devonian and McKee (Ordovician). Please see Appendices A and B for additional information on oil and gas wells within the area of review.

The anticipated depths to formation tops at the proposed well site are:

Formation	Depth (feet)
San Andres	3,880
Glorieta	5,380
Tubbs	6,900
Abo (lower Leonard)	7,580
Wolfcamp	9,550
Pennsylvanian	10,000 (Est. TD at Pennsylvanian top)
Cisco	10,400
Strawn	11,400
Morrow	11,990
Mississippian	12,450
Devonian	13,500

4.3 LITHOLOGIC AND RESERVOIR CHARACTERISTICS OF THE WOLFCAMP

As seen in Figure 6, the area now underlain by the Plant was near to the shelf-basin topographic break in Wolfcamp time (290-270 million years old). Changes in eustatic and tectonic fluctuations in sea levels lead to the formation of numerous algal mound and associated detrital carbonate deposits along the inflection between the shallower shelf and the deeper basin. Higher sea levels favored the formation of algal mounds in this area, while lower sea levels caused the formation of debris fans between and below the mounds. This system has led to the deposition of similar “reef” and fan bodies throughout the Permian system, in the Abo, San Andres and Capitan formations (Figure 7).

The algal mounds and debris fans are tabular bodies, typically elongated along the paleoshoreline, with thickness up to several hundred feet, and lateral extents of hundreds of feet to several miles. Within these units, porosity can be as high as 20%. In the surrounding muddier carbonate lagoon facies, permeability and porosity are much reduced. This geometry creates discrete reservoirs within surrounding seal rocks. These types of reservoirs have produced hydrocarbons, such as in the Abo Empire field, but also have formed barren reservoirs with good potential for AGI development. Other similar, yet isolated and distinct, Wolfcamp mound and fan facies are the three zones completed by COG Operating LLC for two salt water disposal (SWD) wells approximately one mile south of the Frontier Plant (Figure 8).

4.4 SEISMIC INTERPRETATION

Due to the discontinuous nature of the Wolfcamp mounds, we have evaluated 3-D seismic data from a two square-mile area surrounding the Plant to specifically identify and characterize their thickness and lateral extent. Our analyses have allowed us to identify three potential AGI reservoirs (lower Wolfcamp #3, lower Leonard #1, and lower Leonard #2) in the vicinity of the Frontier plant, and to provide quantitative estimates of reservoir extent and volume.

To calibrate the seismic velocities with known log data, three synthetic seismic logs were generated from acoustic logs from wells in the study area (Figure 9). This figure also summarizes a seismic structure interpretation of top of the Wolfcamp. The structure map clearly shows the shelf-basin geometry in this area, and was used as a basic tool in further evaluation of the facies, lithologies and relative porosity of the target units. Seismic analyses, integrated with log data, shows that the Wolfcamp zone has the largest lateral extent and the greatest volume. The lower Leonard units may also have some potential as secondary targets.

Figure 10 is an enhanced seismic cross-section, from the location shown in Figure 9. In this figure, the blue end of the color scale corresponds to high seismic amplitude (denser rocks), while the red end represents low amplitude (more porous units). The three target reservoirs (lower Leonard #1, lower Leonard #2, and lower Wolfcamp #3) are identified by the numbered arrows. Discontinuous low-amplitude events with underlying high-amplitude events, seen along a given horizon, are a good indication of localized porosity. In contrast, persistent low-amplitude events (black arrow in Figure 10) are more consistent with shale beds.

Figures 11 and 12 show the respective time slices and seismic cross-sections for the lower Wolfcamp unit. This unit is the most laterally extensive unit, and has excellent potential for AGI development. Although it trends towards the existing Wolfcamp producing wells to the northeast of the plant (see Figure 8), the seismic data show that there is a clear porosity barrier that isolates this zone.

Figure 13 is a time slice showing the geometry of the lower Leonard #1 (arrow 1 in Figure 10) reservoir in plan view. This map clearly shows the distribution and geometry of the porous facies in this unit, and just importantly shows that the unit is clearly bounded and sealed by much less porous surrounding rocks.

Figure 14 is a time slice showing the distribution of the porosity in the lower Leonard #2 zone (arrow 2 in Figure 10). This map shows that although the lower Leonard #2 unit is smaller and thinner than the lower Leonard #1 it still has useful volume, and is well-isolated by less porous surrounding rocks.

Figure 15 superimposes the areal extents of the three AGI-potential zones, and incorporates the estimated acreage, net porosity, and available capacity of each of the zones. These calculations can be summarized as:

- the primary injection target of lower Wolfcamp Reservoir, at 9,800 to 10,000 feet, has area of 190 acres, and an estimated capacity of 24.2 million barrels of TAG,
- the secondary injection target of the lower Leonard Reservoir #1, lying at depths of approximately 9,300 to 9,400 feet, has an extent of 64 acres, a net porosity of 33 feet, and an estimated capacity of 9 million barrels of TAG,
- the secondary injection target of the lower Leonard Reservoir #2, at depths from 9,450 to 9,550 feet, has an area of 53 acres, 17 feet of net porosity, and a estimated capacity of 3.8 million barrels of TAG.

After analysis of the geophysical logging of the proposed Maljamar AGI #1 well, specific zones will be selected for completion as AGI reservoirs. The seismic evaluation has given us confidence that:

- Effective AGI reservoirs exist in the area of the Frontier gas plant,
- The reservoirs are effectively isolated from any known or potential production in the area, and
- Specific drilling programs, locations and completion targets can be selected in a safe, cost-effective and effective manner.

4.5 CALCULATED AREAS OF FLUID INJECTION

Based on the geology described in Section 4.4, anticipated range of injection volumes, and the injection pressures and temperatures in the reservoir (see Section 3.1 and Table 1) we have calculated the range of injection areas for the anticipated ranges of injection volume, over an estimated 30-year life of the AGI well. These calculations are shown in Table 2, and shown in Figure 156.

As calculated in Section 3.1, each standard million cubic feet (MMSCF) of TAG at the surface will be compressed to approximately 425 barrels of supercritical fluid at reservoir pressures and temperature. Hence, a 30-year lifetime of injection will result in 4.6 million barrels in the reservoir per MMSCFD of TAG. As shown in the Table below, the Wolfcamp zone alone is capable of holding up to 5 times the anticipated injection rate for 30 years.

As shown in Figure 16, the proposed maximum injection rate of 2.0 MMSCFD will generate a “footprint” with an area of approximately 73 acres after considering the effect of irreducible water. This footprint will not impact any of the nearby wells.

Table 2: Calculated Volumes and Areas of TAG in Wolfcamp Reservoir

Daily TAG Injection Volume (MMSCF)	Daily Volume of TAG in Reservoir (BBL/D)	Total TAG Volume in Reservoir after 30 Years (BBL)	Calculated Reservoir Volume in Wolfcamp (BBL)	Percentage of Reservoir Occupied	Calculated Radii of Affected Area of Reservoir (Miles)	Affected Area of Reservoir (Acres)
2.0	850	9.3 Million	24 Million	38.8%	0.19	72.8

4.5 FORMATION FLUID CHEMISTRY

Formation fluid chemistry for the Wolfcamp is available from two nearby wells: Baish A 012 (API # 3002520568) located in Sec. 21, T17S, R32E, approximately 1 mile southwest of the Frontier gas plant, and Baish B 001 (API# 3002500637) located in Sec. 22, T17S, R32E, approximately 1.25 miles northeast of the Frontier gas plant. The reference information for the formation fluids is included in Appendix A.

Parameter	BAISH A 012	BAISH B 001
Mg ⁺⁺	972	680
Na ⁺	52,298	34,704
CO ₃ ⁼	Nd	Nd
HCO ₃ ⁼	1,220	481
SO ₄ ⁼	4,400	3,900
Cl ⁻	50,000	33,000
Fe (free)	11	14
pH	7.6	7.4
CaCO ₃	1.4	0.9

Analyses show that the formation waters are sodium/chloride brines.

4.6 GROUNDWATER HYDROLOGY IN THE VICINITY OF THE PROPOSED INJECTION WELL

In the area of the Frontier Gas Plant, the surficial deposits are relatively thin layers of aeolian sands and both active and stabilized dunes. These materials are described in the *Soil Survey-Lea County, New Mexico* (United States Department of Agriculture, 1974) as the Kermit Dune Lands and the Maljamar Fine Sands. Under these sandy deposits lie the “redbeds” of the Triassic Dockum Group, in which ground water locally occurs in sandier beds of the mudrocks characterizing the Dockum. Local depth to groundwater in the Dockum is reported to be approximately 70 feet. The only significant aquifer in the area is the Pliocene Ogallala Formation, which crops out in the Mescalero Ridge, a prominent landform seen near Maljamar, approximately 3 miles northeast of the Plant (Nicholson and Clebsh, 1961).

As seen in Figure B-1, one water well is reported within one mile of the Plant, with a total depth of 158 feet. The results of a search of the New Mexico State Engineer’s files for registered water wells in this area are included in Appendix B. Also included are the available groundwater analyses for water wells in this area. The nearest well listed is in Section 3, T17S, R32E, approximately 3 miles north of the plant. This well is completed in the Ogallala Formation, and has a Total Dissolved Solids of approximately 500 mg/L (Nicholson and Clebsh, 1961).

5.0 OIL AND GAS WELLS IN THE MALJAMAR AGI #1 AREA OF REVIEW AND VICINITY

Appendix C contains a complete list based on NMOCD records of all active, temporarily abandoned, abandoned and plugged oil and gas wells within two miles (Figure C1, Table C1) and those within the one-mile radius area of review (Figure B2) of the proposed AGI disposal well.

There are 565 recorded wells within two miles of the Plant, of which 351 are active and 214 are listed as plugged and abandoned. Within one mile of the plant, there are 201 wells, of which 139 are active and 62 are plugged and abandoned. These wells are shown in Figure C2.

A review of the available NMOCD data regarding the wells within one mile of the proposed AGI well shows that of the 201 total wells, only 12 intersect and/or penetrate the proposed injection zone in the Wolfcamp. Of the total 201 wells, 148 (74%) are less than 6,000 feet deep. These wells are or were targeted into the San Andres/Grayburg, Glorieta and Paddock zones. An additional 41 wells are drilled between 6,000 feet and 8,933 feet, targeting the Yeso and/or Abo formations. All of these wells' total depths are well above the Wolfcamp, which lies from 9,100 to 9,300 feet in this area.

5.1 STATUS OF WOLFCAMP-PENETRATING WELLS WITHIN ONE MILE OF FRONTIER GAS PLANT

As shown in the Table 3 below, and in the accompanying Figure C3 in Appendix C, there are a total of 12 wells penetrating the Wolfcamp "deep 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. A review of the available data on these wells indicates that they are cased and cemented throughout the Wolfcamp interval, effectively sealing that formation and preventing any migration of injected fluids to deeper or shallower units. A copy of the NMOCD files for these 12 wells is included on the CD in Appendix C.

Table 3: Summary of Wells Penetrating Wolfcamp within One Mile of Frontier Gas Plant

API #	OPERATOR	SPUD DATE	PLUG DATE	TOTAL DEPTH	WELL NAME	WELL TYPE	STATUS	Producing/Target/Injection Zone	Miles From Plant
3002500751 P	CONOCOPHILLIPS COMPANY	9/20/1948 <i>Spud 24 in WC 1982</i>	9/17/2004	10,005	QUEEN B 036 (Baish B 36)	Oil	Plugged	Wolfcamp (Dry Hole) <i>(9965-10,040)</i>	0.37
3002521951 P	PAN AMERICAN PETROLEUM CORP	12/20/1966	1/2/1900	13,735	BAISH B FEDERAL 002	Oil	Plugged	Wolfcamp (Dry Hole)	0.40
3002500622 P	CONOCO INC	11/12/1958	1/2/1900	13,670	BAISH A 008 <i>(Dry in WC)</i>	Oil	Plugged	Cisco/Abo (plugged back)	0.57
3002535252 P	COG OPERATING LLC	11/17/2000	na	15,026	MC FEDERAL 006	Gas	Active	Devonian	0.68
3002500745 P	CONOCOPHILLIPS COMPANY	8/8/1961	na	9,680	MCA UNIT 382	Oil	Active	San Andres (plugged back)	0.70
3002500614 P	CONOCO INC	11/1/1993	3/3/1993	12,778	MCA UNIT 355	Injection	Plugged	Abo/Grayburg (plugged back)	0.73
3002500634 P	CONOCO INC	4/26/1951	1/2/1900	13,573	BAISH B 005	Oil	Plugged	Devonian	0.81
3002527068 P	COG OPERATING LLC	10/14/1980	na	12,992	FEDERAL BI 001	Salt Water Disposal	Active	Wolfcamp (plugged back)	0.86
3002508053 P	CONOCO INC	10/28/1959	9/5/1996	13,965	MCA UNIT 303	Injection	Plugged	Grayburg (plugged back)	0.92
3002520647 P	COG OPERATING LLC	10/25/1964	na	9,958	MC FEDERAL 007	Oil	Active	Paddock (plugged back)	0.94
3002534647 P	COG OPERATING LLC	6/16/1999	na	14,912	MC FEDERAL COM 001	Gas	Active	McKee	0.99
3002520568 P	CONOCOPHILLIPS COMPANY	11/22/1963	na	13,717	BAISH A 012	Oil	Active	Abo (plugged back) <i>(To 9900 P. 220)</i> <i>W.C. 9700-9882</i>	0.99

3002530363 CONOCO D/22

Baish A OIL #14

ACT. ABO/WC

3002500619 CONOCO K/21

Baish A 5

ACT. Yates .47

5.2 CEMENTING, COMPLETION AND PLUGGING

The details of the completion and/or plugging design and construction of these 12 wells are summarized in the diagrams included in Appendix C. Also included are the complete NMOCD files for these wells, in electronic form, in the accompanying CD entitled “NMOCD Files for Wolfcamp-Penetrating Wells within One Mile of the Frontier Gas Plant”. Table 4 below summarizes the casing and cementing information for the plugged deep wells.

Table 4: Casing and Cement Details for Plugged Deep Wells within One Mile of Frontier Gas Plant						
API #	3002500614	3002500622	3002500634	3002500751	3002508053	3002521951
Well Name	MCA UNIT 355	BAISH A 008	BAISH B 005	QUEEN B 036 (Baish B 036)	MCA UNIT 303 *	BAISH B FEDERAL 002
Distance From Plant (miles)	0.73	0.57	0.81	0.37	0.92	0.40
Status	P&A	P&A	P&A	P&A	P&A	P&A
Total Depth (feet)	12,778	13,670	13,939	10,747	13,965	13,735
Conductor Depth (feet)	178	428	100	825	444	390
Intermediate Casing Depth (feet)	4,181	5,052	2,700	4,198	4,740	4,660
Long String Casing Depth (feet)	11,813	13,642	13,562	10,745	Dry, not cased	10,301
Conductor TOC (feet)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)
Intermediate Casing TOC (feet)	Surface (NMOCD Files)	Surface (Calculated)	Surface (NMOCD Files)	3391 feet (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)
Long String Casing TOC (feet)	4,860 feet (NMOCD Files)	5,300 feet (Calculated)	3,000 feet (NMOCD Files)	5,890 feet (NMOCD Files)	Dry Hole, not cased	6,300 feet (Calculated)
Producing/Target/Zone	Grayburg	Cisco/Abo	Devonian	San Andres	Wolfcamp (Dry Hole)	Grayburg
Top Wolfcamp (Depth)	9,200	9,118	9,090	9,320	9,079	9,105

In the cases of Baish A 008 and Baish B Federal 002, documentation was missing for the tops of cement (TOC) of either the intermediate or long string. In these cases, the TOC was calculated using the annular volumes provided in the Halliburton “Red Book” and the amounts (sacks) of cement provided in the NMOCD files. The length of the annulus filled with the cement was calculated using a very conservative cement yield of 1.0 cubic feet per sack. This indicates that all of the plugged wells’ “long string” is effectively isolated from the lower Leonard and Wolfcamp injection zones. Similarly, Table 5 below summarizes the casing and cementing for the six active deep wells within one mile of the Plant. Only well MCA Unit 383 lacked details on the long string top of cement, and a calculated TOC of 7,700 feet was developed using the method described above. This also indicates that all of the active wells’ “long string” is effectively isolated from the lower Leonard and Wolfcamp injection zones.

Table 5: Casing and Cement Details for Active Deep Wells within One Mile of Frontier Gas Plant

API #	3002500745	3002520568	3002520647	3002527068	3002534647	3002535252
WellName	MCA UNIT 382	BAISH A 012	MC FEDERAL 007	FEDERAL BI0 01	MC FEDERAL COM 001	MC FEDERAL 006
Distance From Plant (miles)	0.70	0.99	0.94	0.86	0.99	0.68
Status	Active	Active	Active	Active (SWD)	Active	Active
Total Depth (feet)	9,680	13,717	9,958	12,992	14,912	15,026
Conductor Depth (feet)	360	863	821	723	525	748
Intermediate Casing Depth (feet)	4,576	4,570	4,600	4,500	4,657	4,600
Long String Casing Depth (feet)	9,108	10,825	9,955	12,967	14,909	13,605
Conductor TOC (feet)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)
Intermediate Casing TOC (feet)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)	Surface (NMOCD Files)
Long String Casing TOC (feet)	7700 feet (Calculated)	3000 feet (NMOCD Files)	2200 feet (NMOCD Files)	1345 feet (NMOCD Files)	705 feet (NMOCD Files)	Surface (NMOCD Files)
Producing/Injection Zone	Grayburg-San Andres	Paddock	Paddock	Wolfcamp	McKee	Devonian
Top Wolfcamp (Depth)	9,230	9,170	9,046	9,320	9,050	9,100

To determine the validity of the calculations for TOC based on annular volumes, number of cement sacks, and a yield of 1.0 cubic feet of cement per sack, the same calculations were applied to the wells where known TOC's were available. A complete set of calculations for the long-string TOCs are included as Table C2 in Appendix C.

The results of this evaluation are shown in Table 6 below. Calculated versus measured TOC's are very similar, with only well Queen B 036 showing a measured TOC (5,890 feet) significantly deeper than the estimated TOC of 4,101 feet.

Table 6: Calculated vs Measures Cement Tops, Deep Wells within One Mile of Frontier Gas Plant

Well Name	Reported TOC	Calculated TOC	Depth to Top Wolfcamp	Total Depth
MCA UNIT 355	4,860	4,489	9,200	12,778
BAISH A 008	not reported	5,300	9,118	13,670
BAISH B 005	4,480	5,167	9,090	13,939
QUEEN B 036 (Baish B 036)	5,890	4,101	9,320	10,747
MCA UNIT 303	not completed	not completed	9,079	13,965
BAISH B FEDERAL 002	not reported	6,300	9,105	13,735
MCA UNIT 382	not reported	7,700	9,298	9,680
BAISH A 012	3,000	2,710	9,048	13,717
MC FEDERAL 007	2,200	2,000	9,046	9,958
FEDERAL BI 001	1,345	3,400	9,320	12,992
MC FEDERAL COM 001	705	Surface	9,051	14,912
MC FEDERAL 006	Surface	Surface	9,099	15,026

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

Geolex contracted with MBF Land Services in Roswell, New Mexico to research land records in Lea 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 D includes the data from that search.

Table D-1 lists operators within this one-mile radius, and Table D-2 lists the names and addresses of surface owners within the same one mile area of review. As shown in Table D-1, production in the area of review is controlled by two operators as currently listed by the NMOCD internet database. Appendix D also includes Table D-3 which lists the names and addresses surface lessees of record in the area of review, Table D-4 listing businesses included in the area of review, as extracted from the Lea County land records, and Figure D-1 is a map showing the same data.

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 form of this notice to interested parties is included in Appendix D. The proposed public notice that will be published in the Lovington Daily Leader at least 20 days prior to NMOCD Hearing is also included in Appendix D.

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 Maljamar AGI #1 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. The proposed injection zone is a closed system

FIGURES

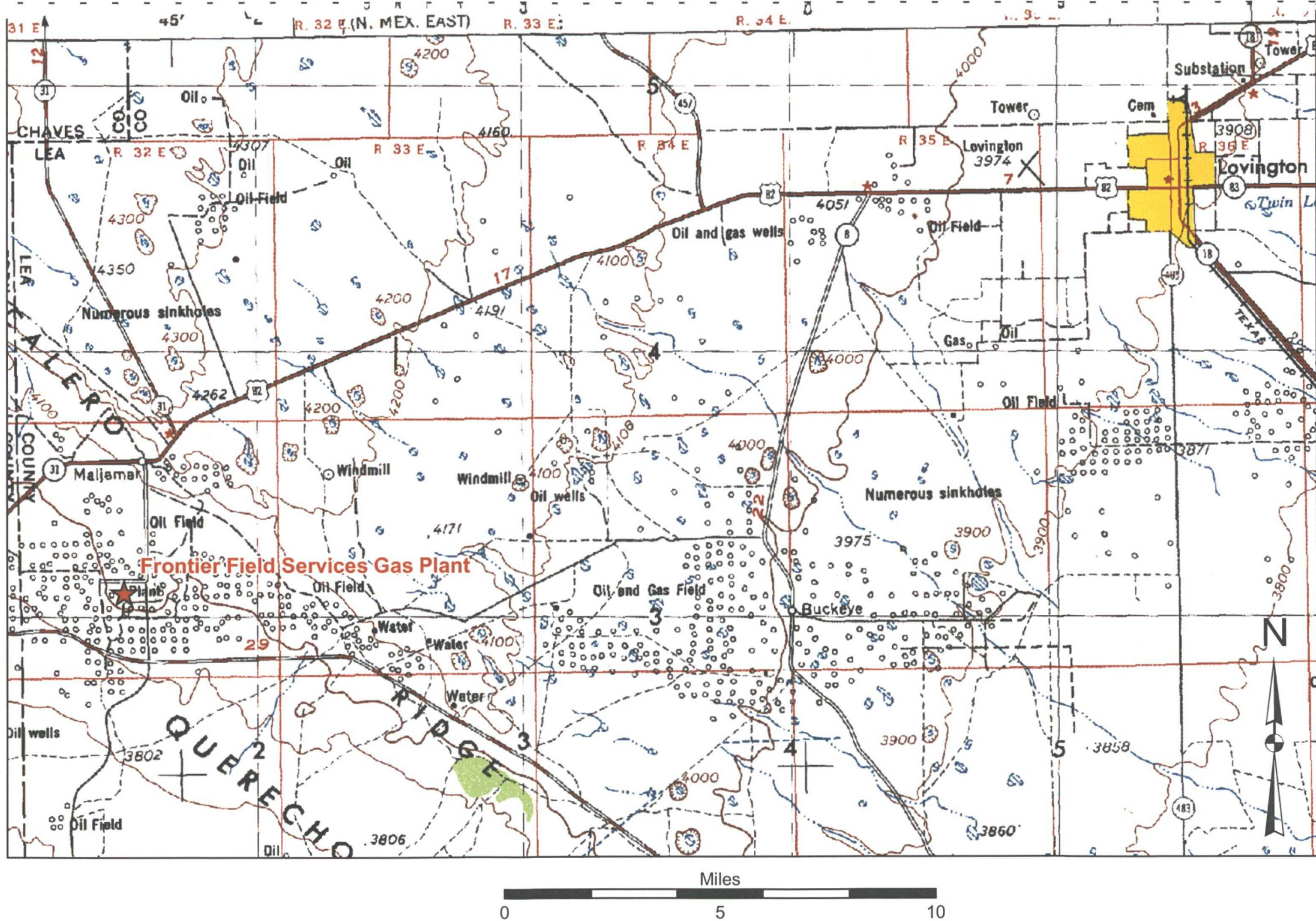


Figure 1: Location of Frontier Field Services, LLC Gas Plant



**Figure 2: Location of Proposed Maljamar AGI #1
(Unit O, Section 21, T17S, R32E, 130 Feet FSL, 1813 Feet FEL, Lea Co., New Mexico))**

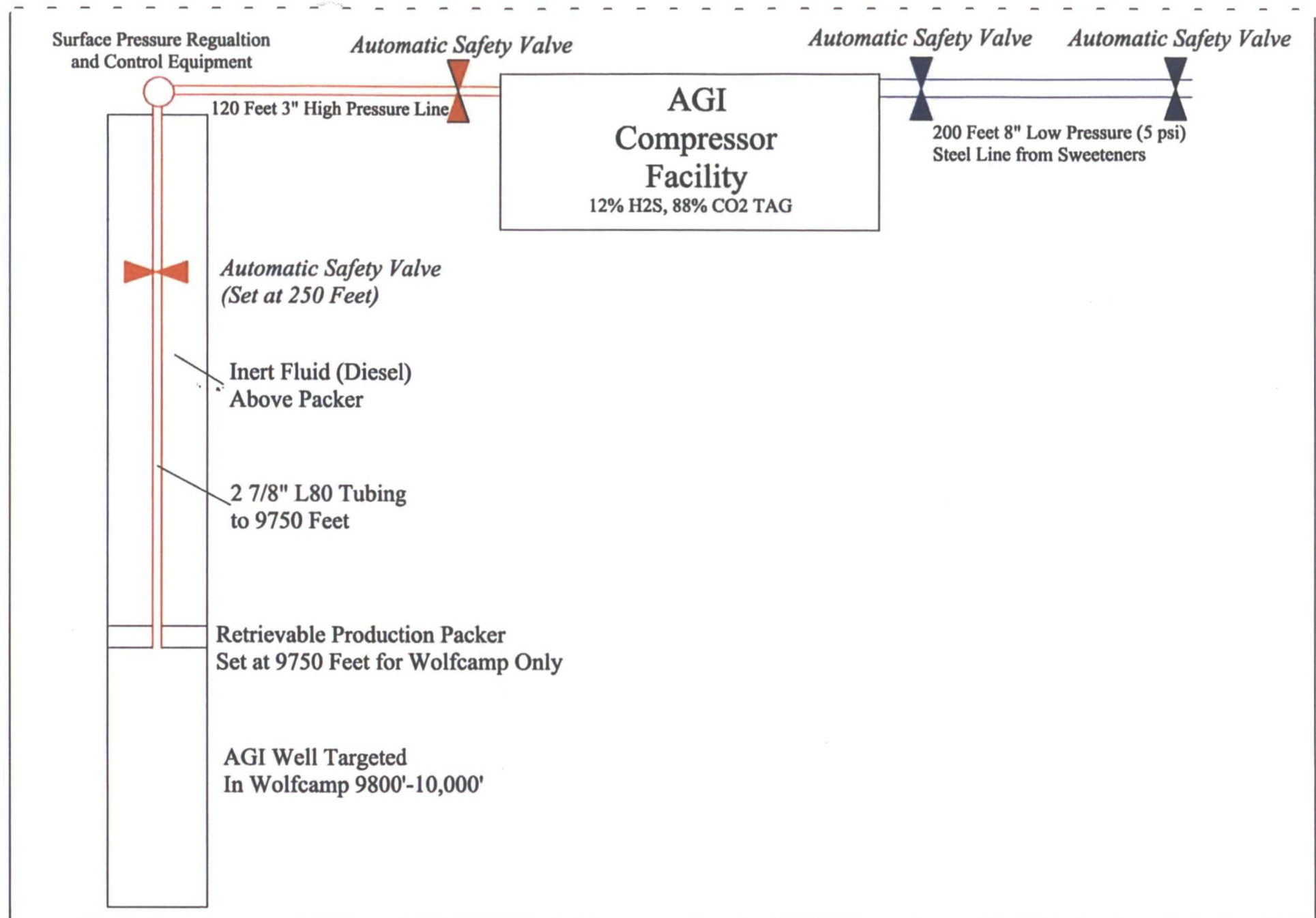


Figure 3: Schematic of Frontier Field Services, LLC Maljamar Gas Plant Acid Gas Injection System Components (Targeted Wolfcamp Completion)

Location: 130' FSL & 1831' FEL
STR S22-T17S-R32E
County, St.: LEA COUNTY, NEW MEXICO

CONDUCTOR CASING
13 3/8", 48.00#/ft, H40, STC at ~550'

SURFACE CASING:
8 5/8", 24.0 #/ft, J55, STC at ~4,200'

PRODUCTION CASING:
5 1/2", 15.5 #/ft, L80, STC at ~10,000'

ANNULAR FLUID:
Diesel Fuel from top of packer to surface

TUBING:
Subsurface Safety Valve at ~250 ft

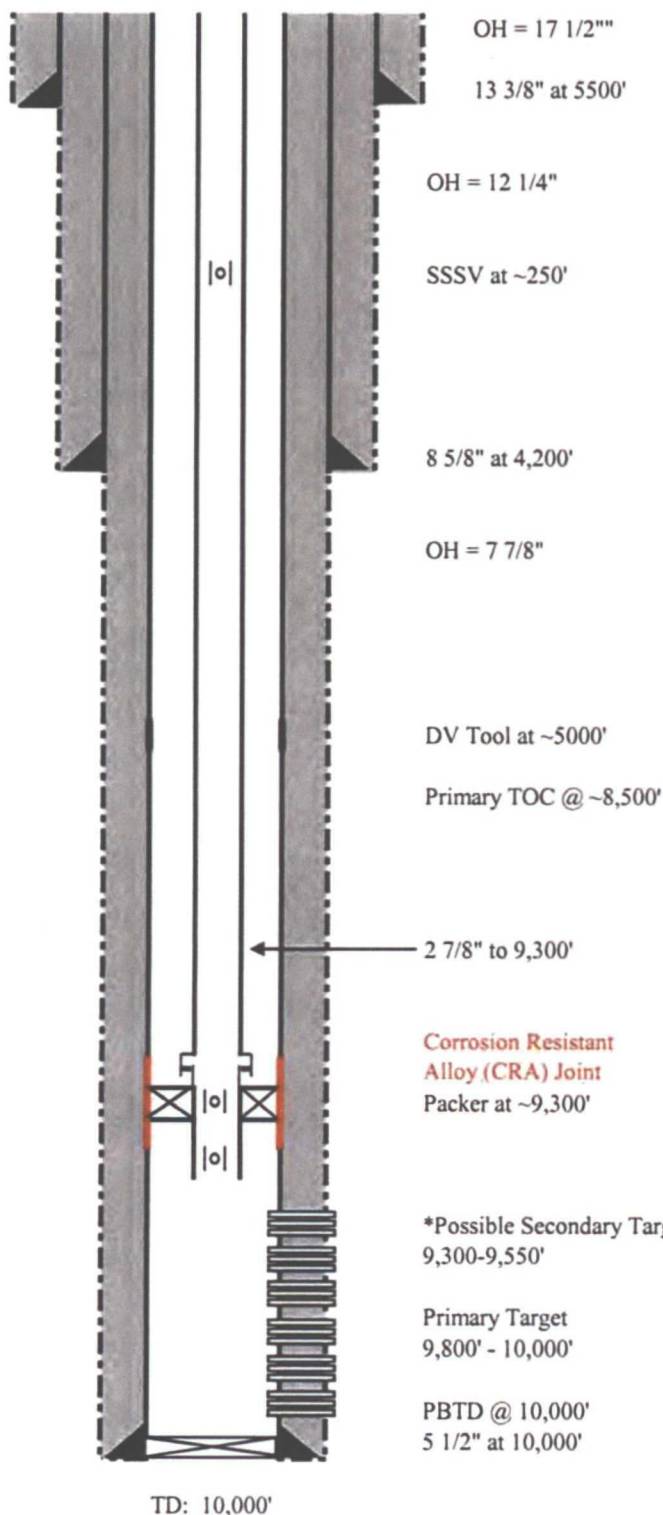
2 7/8", 6.5#/ft, L80, Premium thread at ~9,300'

PACKER:
Permanent Production Packer
Adj. Choke (if needed, placed in nipple below packer)
Check valve (if needed, placed in nipple below packer)

PERFORATIONS:

Primary Target	Secondary Target*
Lower Wolfcamp 9,800' - 10,000'	Lower Leonard #1 9,300' - 9,400'
	Lower Leonard #2 9,450' - 9,550'

* Depending on logging and coring results



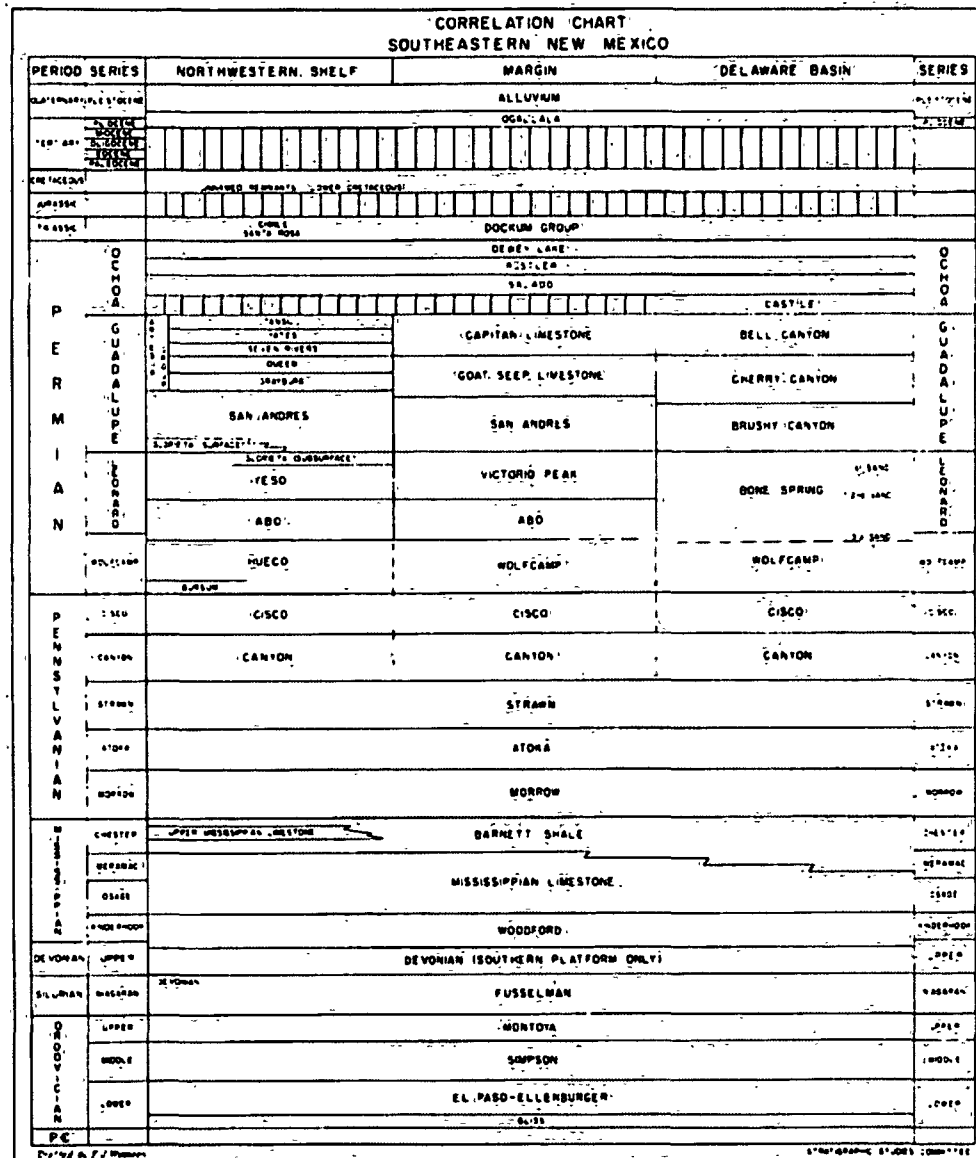


Figure 5: Generalized Stratigraphy for Permian Basin

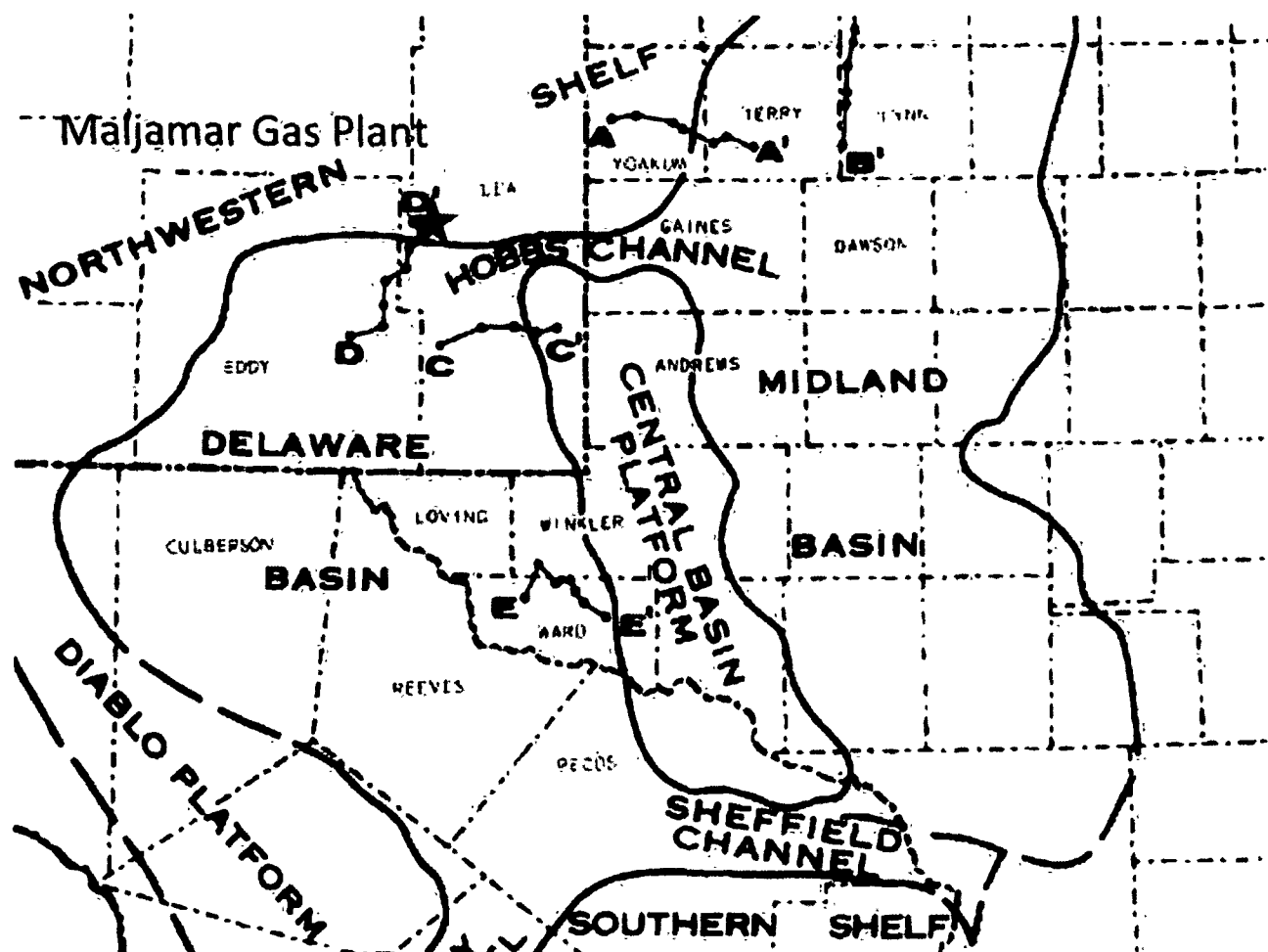


Figure 6: Structural Features of the Permian Basin

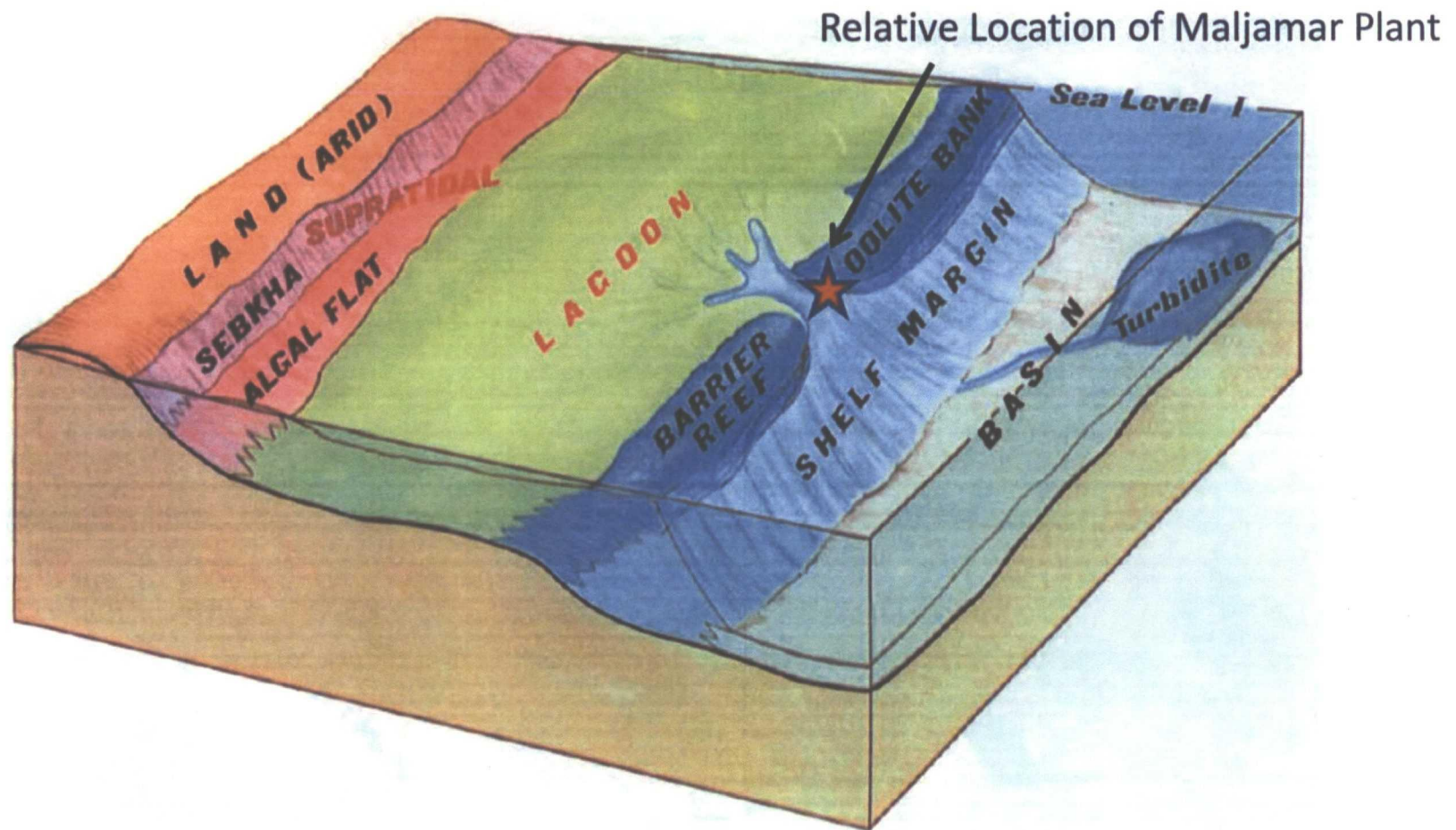
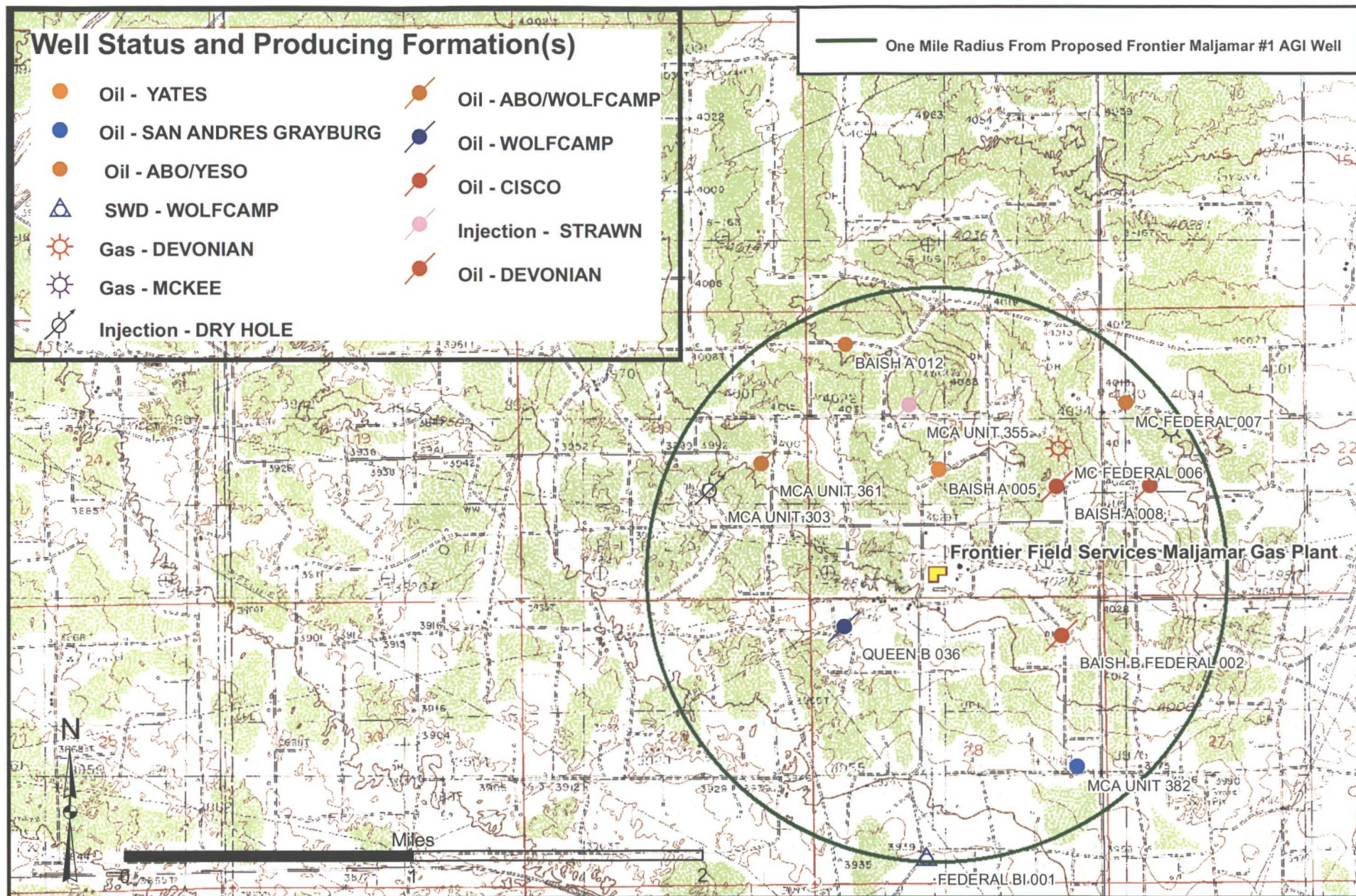


Figure 7: Location of Study Area Relative to Schematic Wolfcamp Depositional Environments

Note: Isolated detrital carbonated and reef mounds in general stratigraphic intervals of lower Leonard and Wolfcamp have limited areal extent and are confined by fine-grained deeper basin sediments.

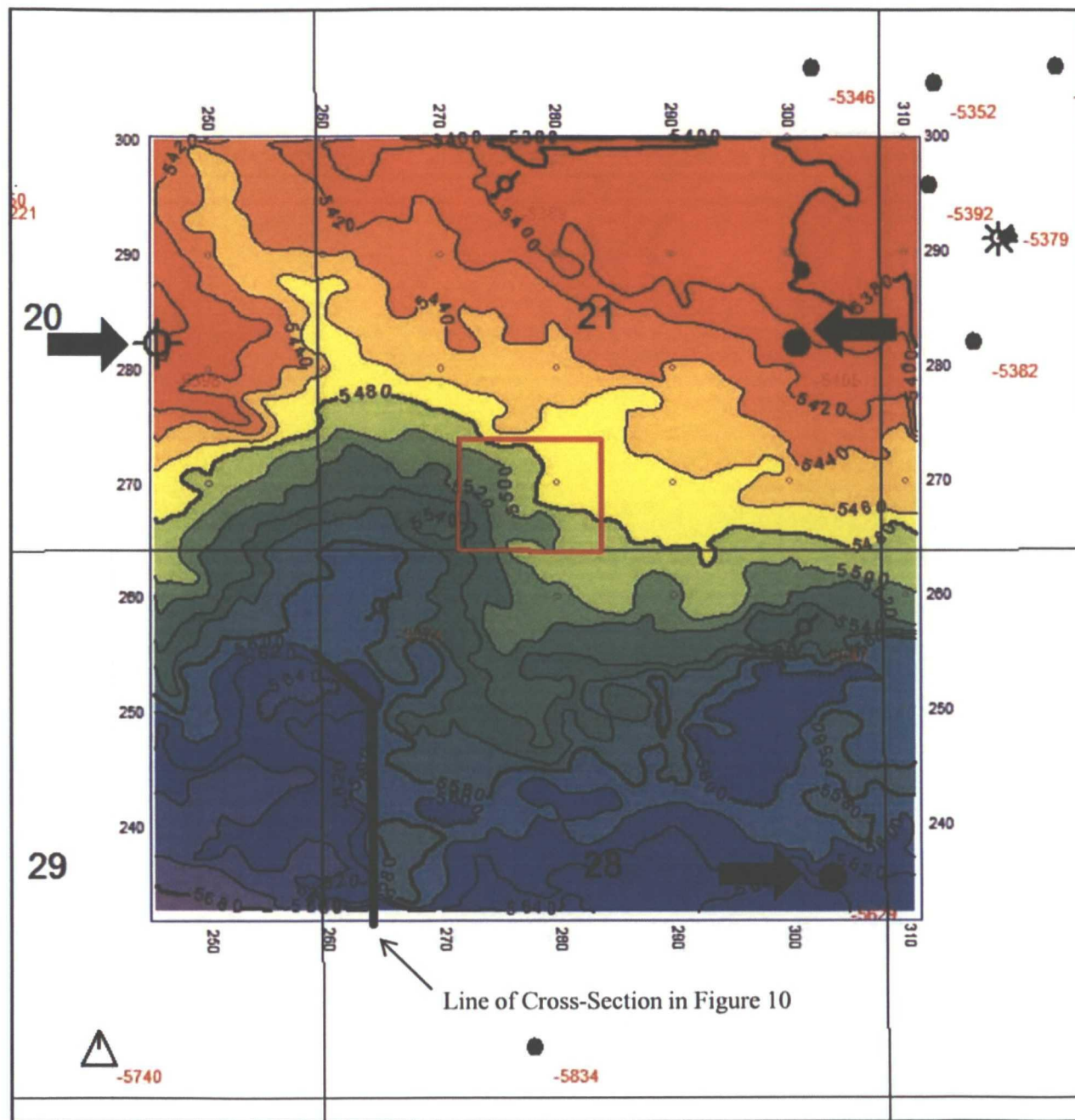


**FIGURE 9: STRUCTURE
ON TOP OF WOLFCAMP
FROM 3-D SEISMIC
INTERPRETATION**

Elevation on top of Wolfcamp
(C. I. = 20 ft).

The location of the Maljamar
Plant is indicated by the red
outline.

Location of control wells where
synthetic seismic profiles were
constructed are indicated with
black arrows.

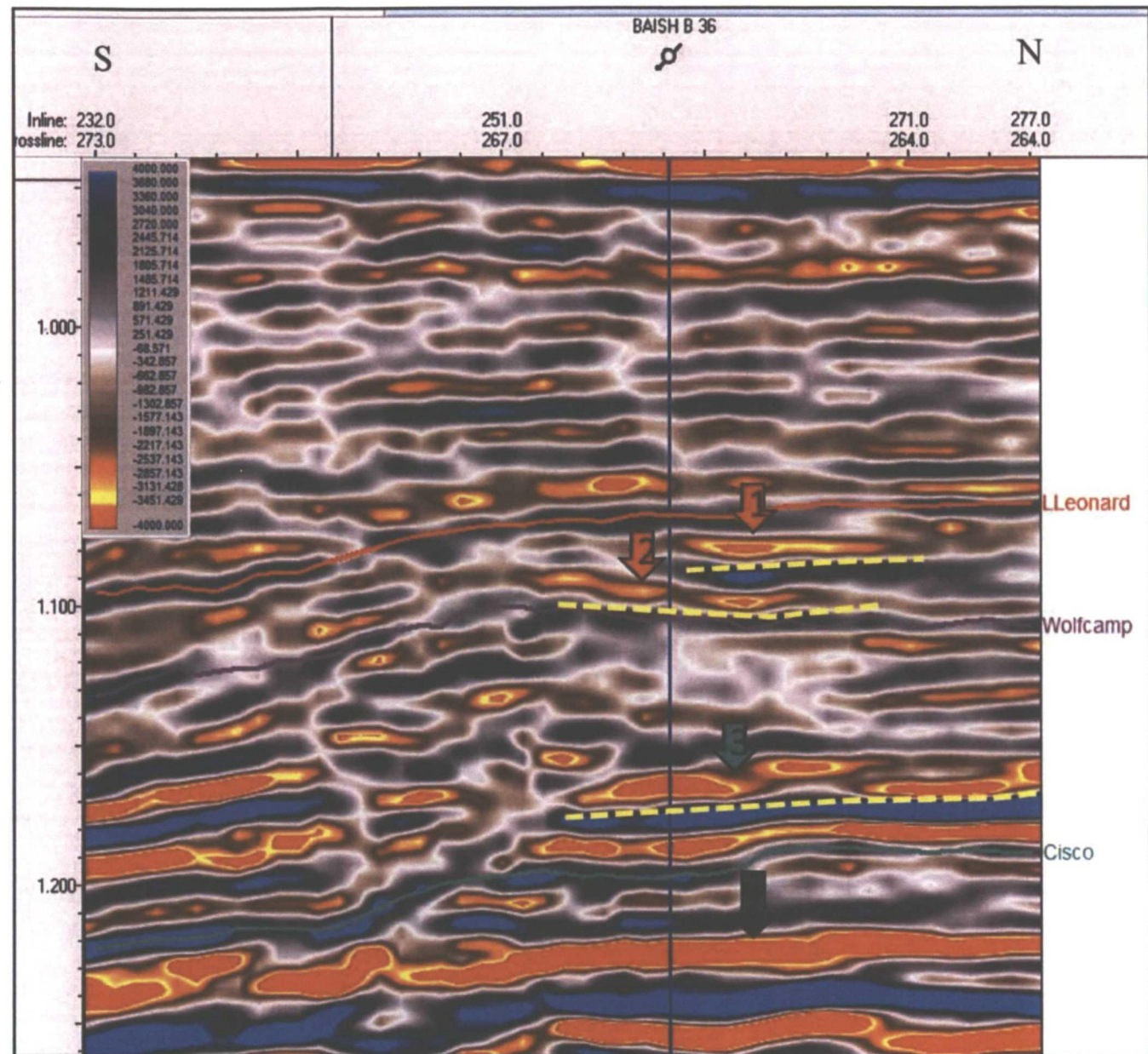


**FIGURE 10:
ENHANCED VERTICAL
SEISMIC SECTION**

Expanded scale, color-enhanced vertical section showing the locations of the three zones of interest (red and green arrows).

Yellow and red correspond to lower-amplitude events that, if sporadically developed along a given horizon, more likely indicate porosity development, as opposed to low-amplitude, persistent events (e.g., black arrow) which indicate shale beds.

Additionally, the presence of a strong, localized peak event directly beneath the low amplitude (porosity) events, as we particularly see under #1 and #3 (yellow dashed lines) shows strong density contrast between beds, which may also indicate development of significant porosity above.



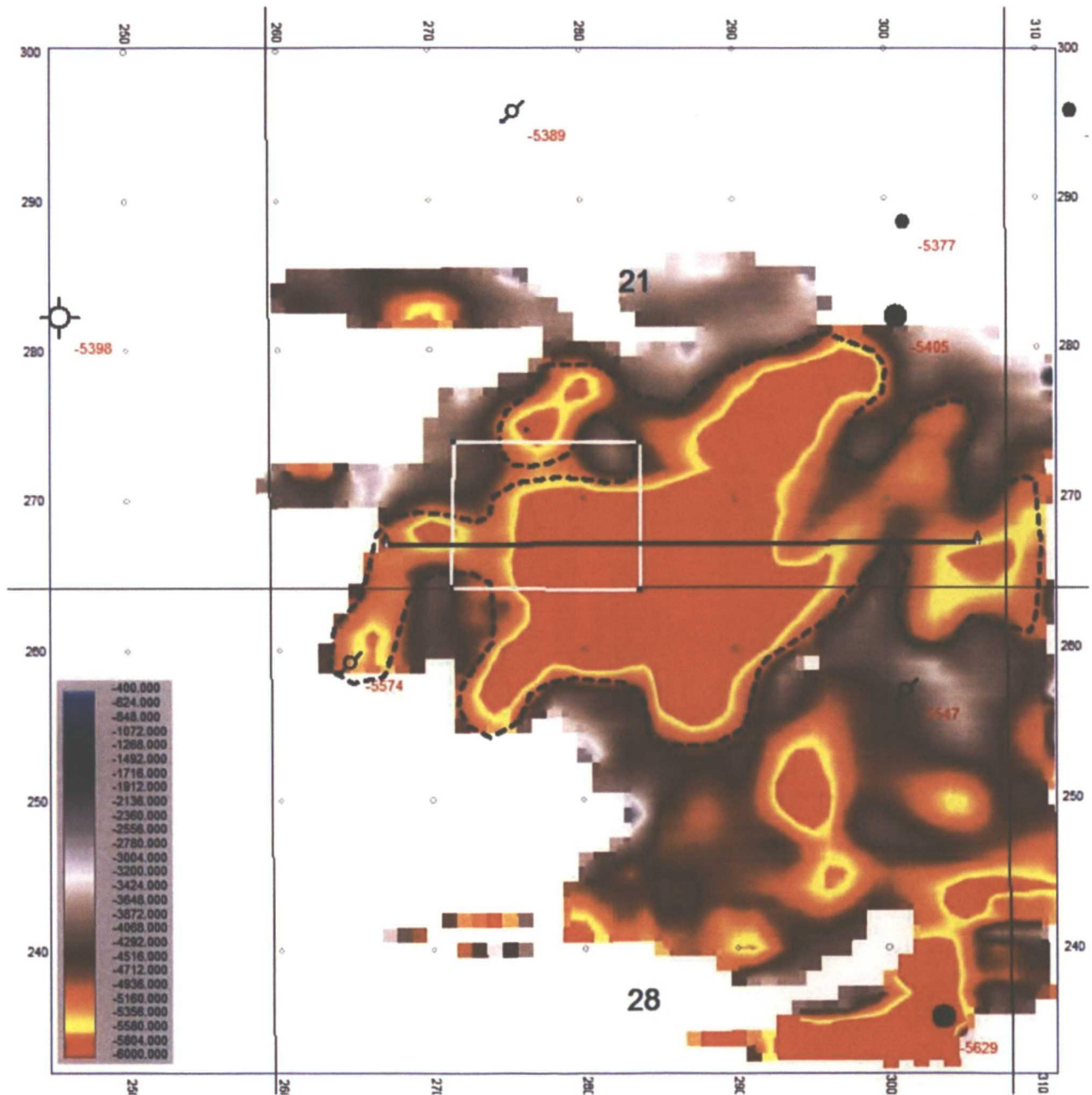
**FIGURE 11: AREAL EXTENT OF
LOWER WOLFCAMP
(Proposed Primary Injection Zone)**

Amplitude map along the lower Wolfcamp porosity zone horizon, approximately 410 feet below the top of the Wolfcamp. The black dashed outline shows a coherent porosity trend that is underlain by a sharply contrasted, high amplitude event, and it covers 189 acres. The limits of this map represent the limits of Zone 3, except for that portion that goes off-survey to the east.

This zone is not laterally connected to the wells to the south that inject saltwater into the Wolfcamp.

The geometry of this zone suggests a possible debris apron fed by a narrow channel on its northeast boundary.

A vertical seismic section, whose trace is shown in black, is presented in the next slide.

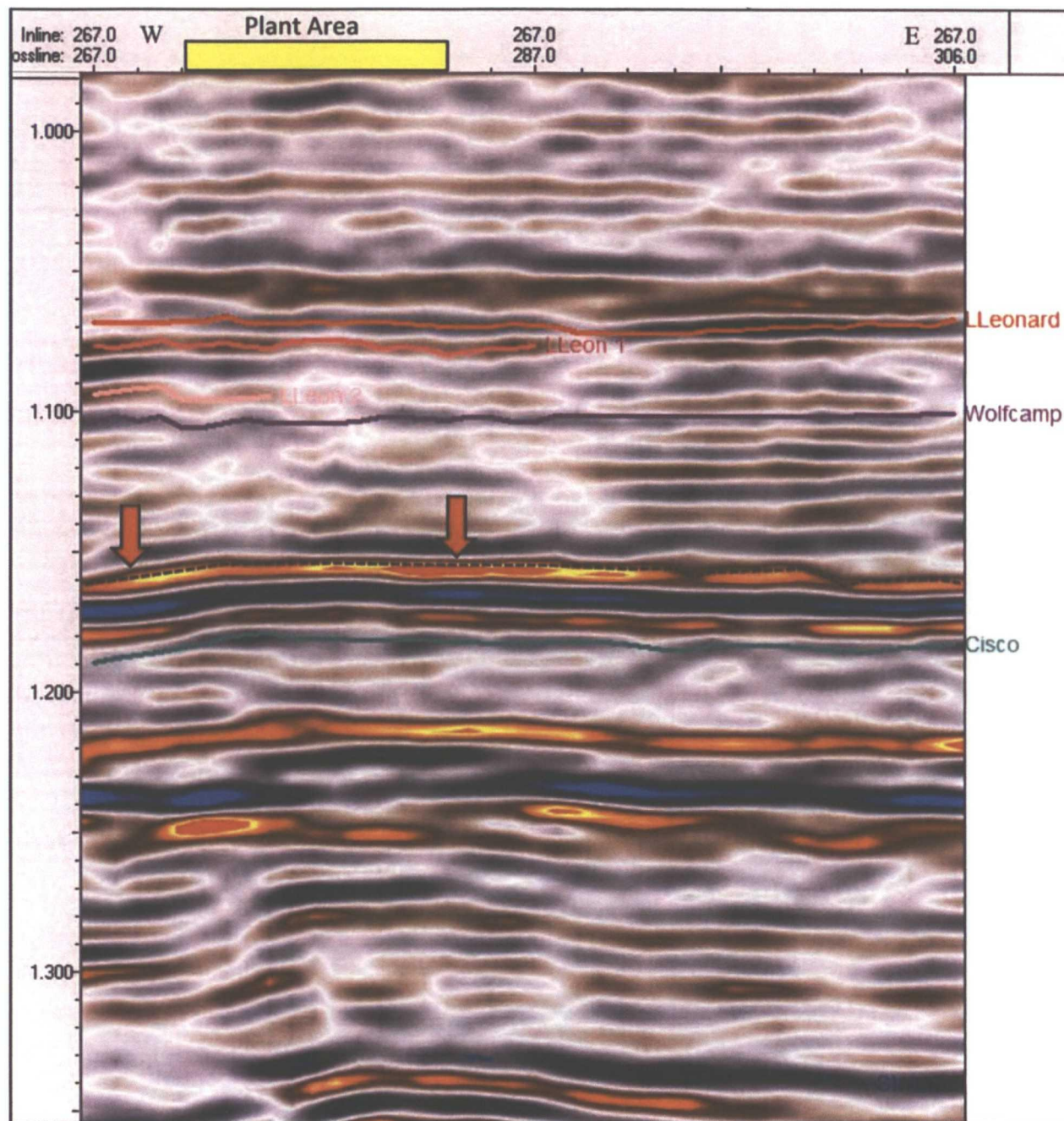


**FIGURE 12: CROSS-SECTION
SHOWING EXTENT OF
PROPOSED PRIMARY INJECTION
ZONE (LOWER WOLFCAMP)**

Vertical seismic section across the plant area (yellow bar), showing the lower Wolfcamp porosity zone (dashed black line).

Within this zone are pockets of higher porosity, noted where there is a sharper amplitude contrast between the zone and the underlying peak reflector (e.g., at red arrows). The warmer colors are thought to denote higher porosity.

The time thickness of this anomaly suggests an average porosity thickness of approximately 30 feet, with a maximum of 50 feet.

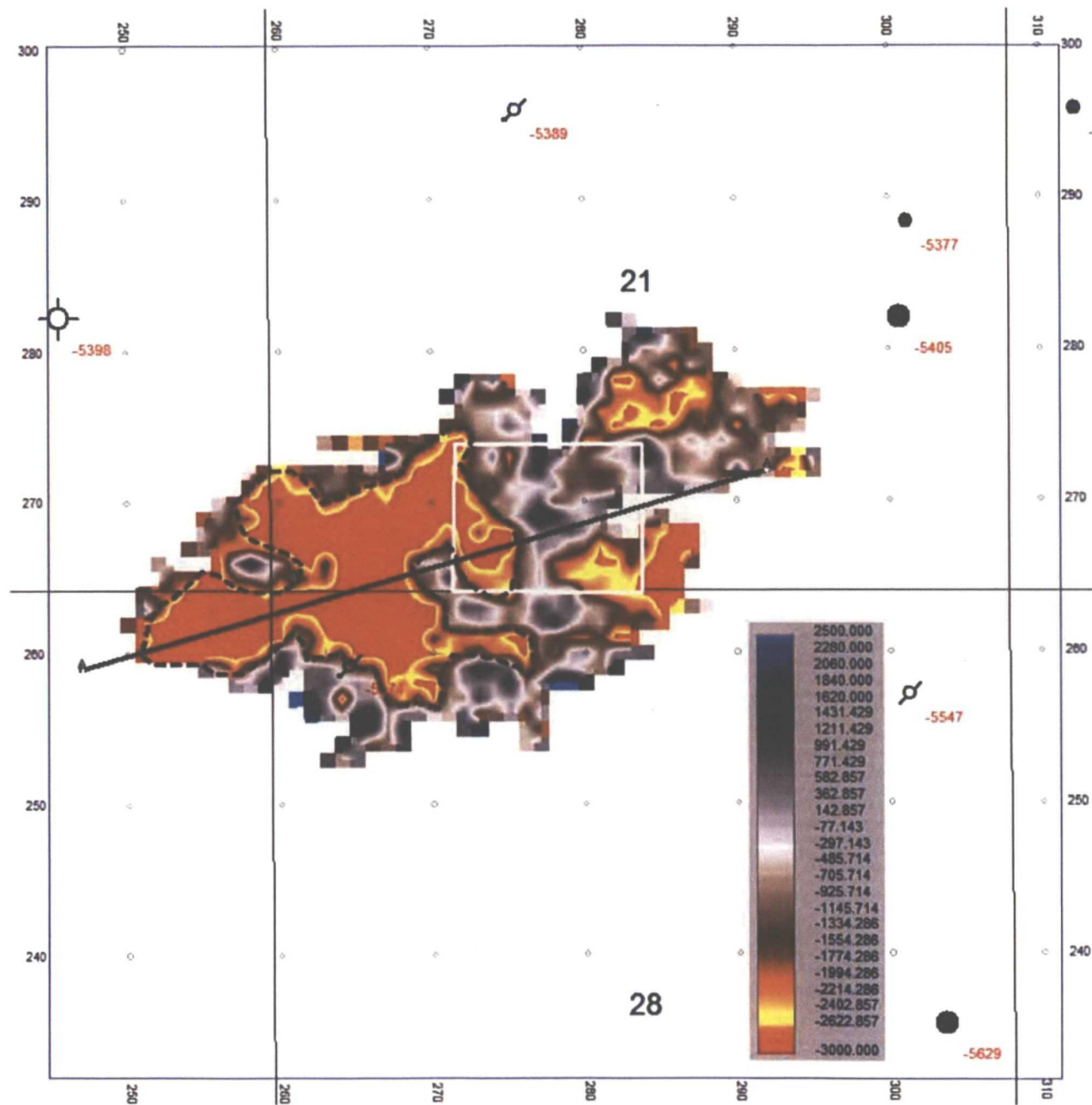


**FIGURE 13: AREAL EXTENT OF
SECONDARY INJECTION TARGET
(LOWER LEONARD ZONE 1)**

Amplitude map along the upper Lower Leonard porosity zone horizon, approximately 225 feet above the top of the Wolfcamp. The white outline shows the plant site. The black dashed outline shows a coherent porosity trend that is underlain by a sharply contrasted, high amplitude event, and it covers 64 acres.

The limits of this map represent the limits of Zone 1. The geometry of this zone suggests a possible debris apron or a lowstand carbonate mound.

A vertical seismic section, whose trace is shown in black, is presented in the next slide.



**FIGURE 14: AREAL EXTENT OF
SECONDARY INJECTION TARGET
(LOWER
LEONARD ZONE 2)**

Amplitude map along the lower Lower Leonard porosity zone horizon, approximately 85 feet above the top of the Wolfcamp.

The white outline shows the plant site. The black dashed outline shows a coherent porosity trend that is underlain by a sharply contrasted, high amplitude event, and it covers 53 acres.

The limits of this map represent the limits of the contiguous portion of Zone 2. The geometry of this zone suggests a composite channelized debris flow. The porosity zone is cut off to the south by the fault that transects the Lower Leonard section.

A vertical seismic section, whose trace is shown in black, is presented in the next slide.

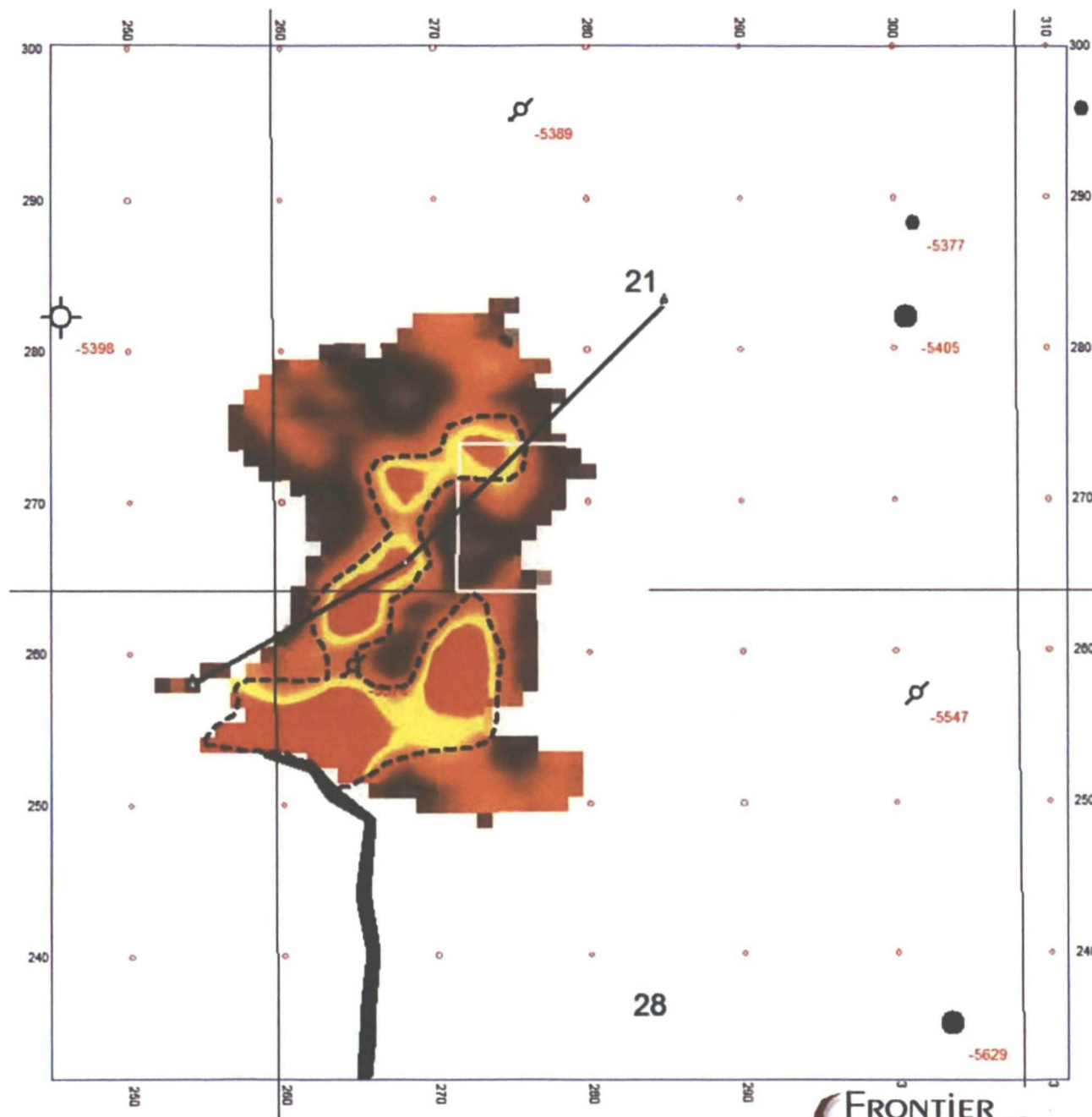


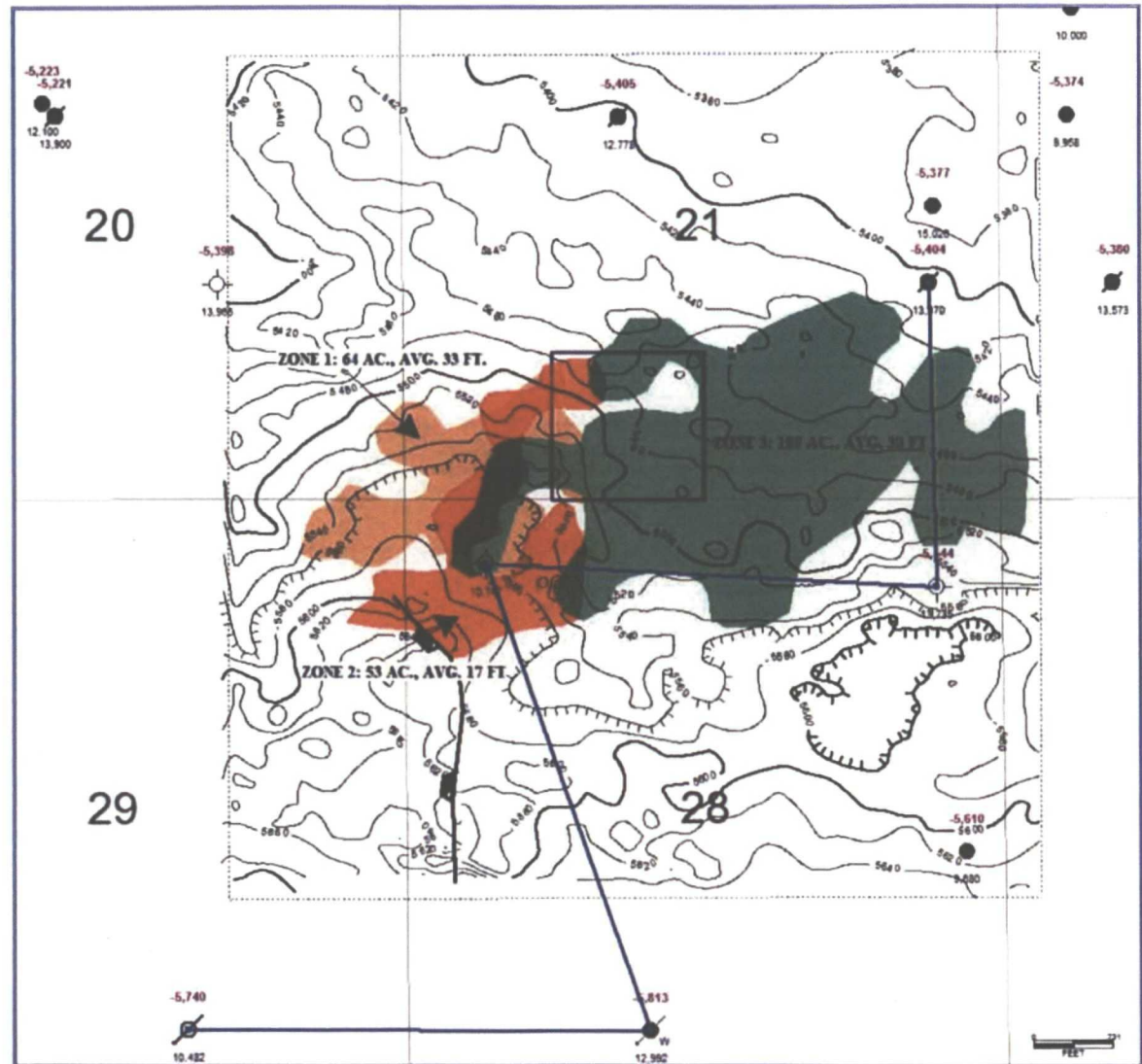
FIGURE 15: SUMMARY OF AREAL EXTENTS OF POTENTIAL AGI RESERVOIRS

Calculated properties are superimposed on the seismic depth map, top of Wolfcamp.

Lower Leonard Zone 1: 64 Acres, average net porosity 33 feet. Capacity 9 million barrels of TAG

Lower Leonard Zone 2: 53 Acres, average net porosity 17 feet. Capacity 3.8 million barrels of TAG

Lower Wolfcamp: 189 Acres, average net porosity 30 feet. Capacity 24.2 million barrels of TAG



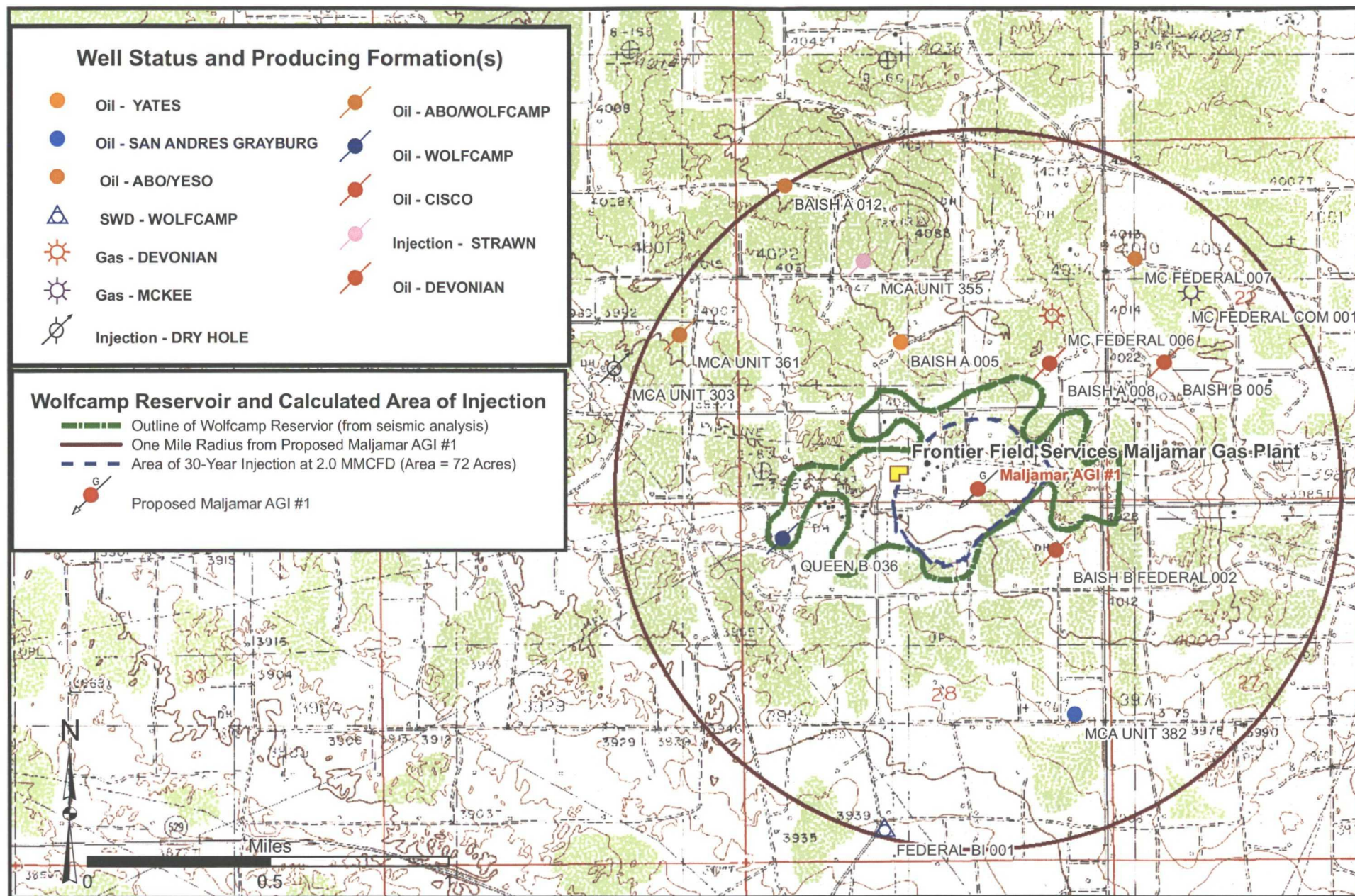


Figure 16: Calculated Area of Injection for 30 Years at 2.0 MMSCFD

APPENDIX A

A-1 Wolfcamp Formation Fluid Analyses and Analyses of Frontier Maljamar Gas Plant TAG

Table A-1. Wolfcamp Formation Fluid Analyses

Parameter	Wolfcamp Formation	
	Baish A - 5/1/81 mg/L	Baish B - 5/1/81 mg/L
Ca ²⁺	972	680
Mg ²⁺	2360	2000
Na ⁺ (calc.)	57,298	34,704
CO ₃ ²⁻	0	0
HCO ₃ ²⁻	1220	481
SO ₄ ²⁻	4400	3900
Cl ⁻	50,000	33,000
H ₂ S	strong	strong
Iron (free)	11	14
pH	7.6	7.4
SG		
O ₂ (free)		
CaCO ₃ S.I.	1.4	0.9
CaSO ₄ S.I.	neg	neg

Data from SWD C-108 application for API # 30-025-00751, NMOCD files

LOCATION

FIELD 1127

LAWRENCE

WATER ANALYSIS

(Ca ⁺⁺)	mg/L	meq/L	mg/L	meq/L	mg/L	meq/L
(Mg ⁺⁺)	972		1080		1507	124
(Na ⁺) Calc.	2460		2000		1723	86
(Na ⁺) Calc.	52298		34704		20655	898
(CO ₃ ⁻)	0		0		0	
(HCO ₃ ⁻)	1220		481		915	15
(SO ₄ ⁻)	4100		3900		1050	21.8
(Cl ⁻)	50000		33000		38000	1071
H ₂ S	512006		STR		1190	693
IRON (Fe ⁺⁺)	11		14		3.8	
PH @ 25°F	7.6		7.4		6.25	
Sp. Gr. @ 25°F					1.04	
O ₂ (Free)	5				9.3	
CaCO ₃ S.I.	1.4		.7		-1.6	
CaSO ₄ S.I.	neg		neg		-1.9	
BY.... DATED	Champion S-1-81	Champion S-1-81	CRD	10-19 81		
	Brick A	Brick B	MCA	Brk 2		

WOLF CAMP WATER
SAMPLE - ZONE
TO BE "DISPOSED"
INTO

MCA UNIT (G-SA)
WATER TO BE
INJECTED

MANLEY GAS TESTING, INC.P.O. DRAWER 193
OFFICE(432)367-3024

FAX(432)367-1166

ODESSA, TEXAS 79760
E-MAIL: MANLEYGAST@AOL.COM

CHARGE..... 150 - 0
REC. NO. 14
TEST NUMBER.. 9693DATE SAMPLED..... 01-24-11
DATE RUN..... 02-02-11
EFFECT. DATE..... 02-01-11

STATION NO. ... 06311001

PRODUCER FRONTIER FIELD SERVICES

SAMPLE NAME.... ACID GAS FLARE

TYPE: SPOT

RECEIVED FROM.. FRONTIER FIELD SERVICES LLC - MALJAMAR

FLOWING PRESSURE 14.1 PSIA

FLOWING TEMPERATURE 87 F

SAMPLED BY: BM

CYLINDER NO. ... 037

FRACTIONAL ANALYSIS
CALCULATED @ 14.650 PSIA AND 60F

	MOL%	GPM (REAL)
HYDROGEN SULFIDE...	11.500	
NITROGEN.....	0.573	
CARBON DIOXIDE.....	85.850	
METHANE.....	1.602	
ETHANE.....	0.296	0.079
PROPANE.....	0.105	0.029
ISO-BUTANE.....	0.007	0.002
NOR-BUTANE.....	0.026	0.008
ISO-PENTANE.....	0.005	0.002
NOR-PENTANE.....	0.007	0.003
HEXANES +.....	0.029	0.013
TOTALS	100.000	0.136

H2S PPMV = 115000

'Z' FACTOR (DRY) = 0.9940

'Z' FACTOR (WET) = 0.9936

CALC. MOL. WT. = 42.30

..CALCULATED SPECIFIC GRAVITIES..

REAL, DRY 1.4690

REAL, WET 1.4549

..CALCULATED GROSS HEATING VALUES..

BTU/CF - REAL, DRY 27

BTU/CF - REAL, WET 27

DISTRIBUTION AND REMARKS:

ENTEREDANALYZED BY: JT
** R **APPROVED: 

APPENDIX B

Table and Map of Water Wells within One Mile Area of Review and Groundwater Analyses

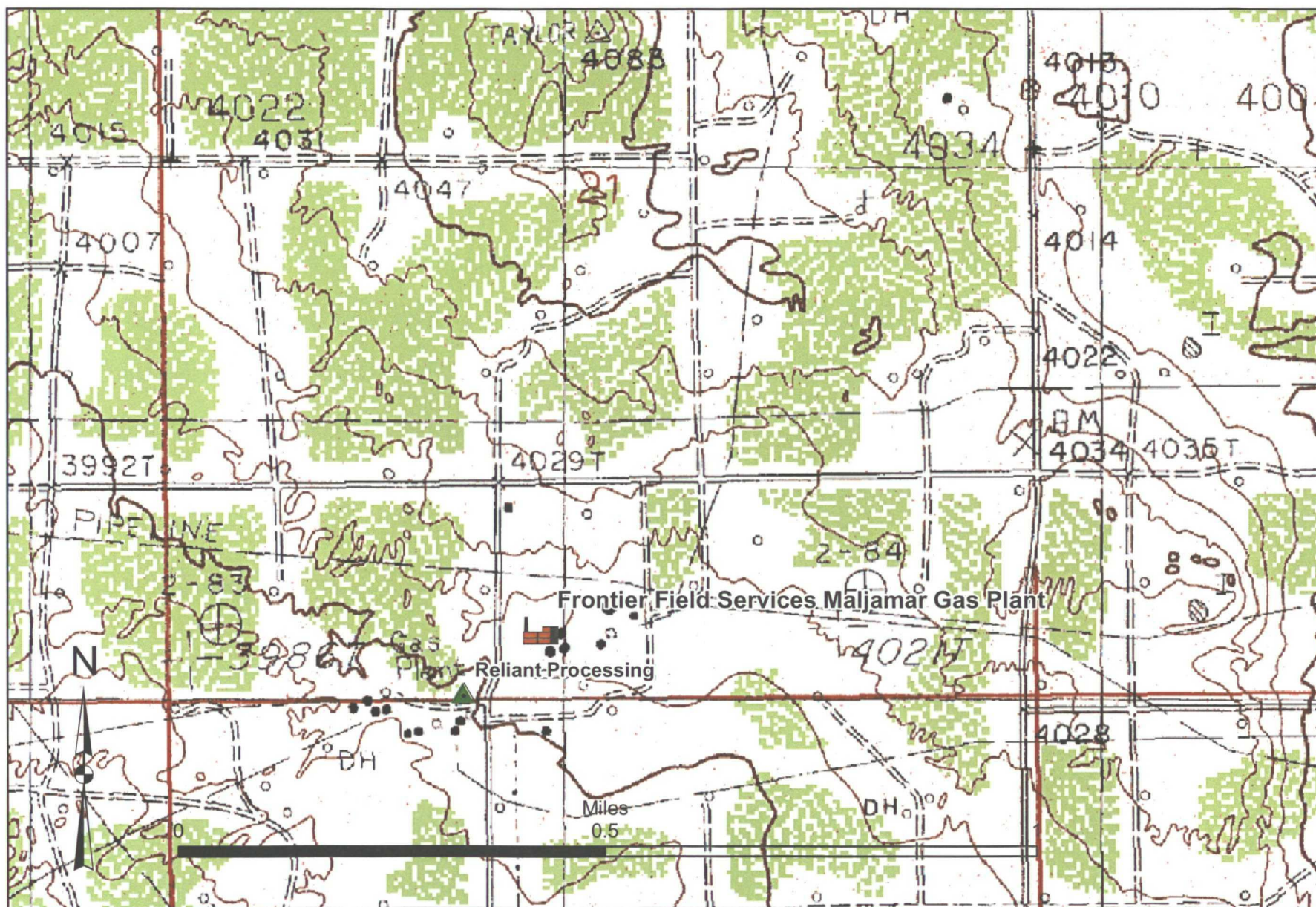


Figure B-1: Location of Known Water Wells Within One Mile of Frontier Field Services, LLC Gas Plant

Table B-1. Water Wells Within a One Mile Radius of Proposed AGI Well

WR File Nbr (POD Number)	Subbasin	Use	Diversion	Owner	County	Source	Depth (feet)	q16	q4	Sec	Tws	Rng	X*	Y*	Distance (miles)
RA 10175		SAN	3	RELIANT PROCESSING FLO CO2	LEA	Shallow	158	2	1	28	17S	32E	614814	3631005	0.1162

*UTM location was derived from PLSS - see Help



New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

POD Number

Q64 Q16 Q4 Sec TwS Rng

X Y

RA 10175

2 1 28 17S 32E

614814 3631005*

x

Driller License: EADES, ALAN G.

Driller Name: EADES, ALAN

Drill Start Date: 02/04/2002

Drill Finish Date: 02/04/2002

Plug Date:

Log File Date: 03/06/2002

PCW Rcv Date:

Source: Shallow

Pump Type:

Pipe Discharge Size:

Estimated Yield:

Casing Size: 5.75

Depth Well: 158 feet

Depth Water:

x

Water Bearing Stratifications:

Top Bottom Description

87 89 Shallow Alluvium/Basin Fill

89 116 Shallow Alluvium/Basin Fill

116 124 Shallow Alluvium/Basin Fill

x

Casing Perforations:

Top Bottom

118 158

x

Meter Number: 5380

Meter Make: SENSUS

Meter Serial Number: 560656282

Meter Multiplier: 10.0000

Number of Dials: 6

Meter Type: Diversion

Unit of Measure: Gallons

Return Flow Percent:

Usage Multiplier:

Reading Frequency: Annual

x

Meter Readings (in Acre-Feet)

Read Date	Year	Mtr Reading	Flag	Rdr	Comment	Mtr Amount
03/20/2002	2002	0	A	RPT		0
05/06/2002	2002	170	A	RPT		0.005
02/13/2003	2002	2410	A	PRT		0.069
02/01/2005	2004	3420	A	ch		0.031

x

**YTD Meter Amounts: Year Amount

2002 0.074

2004 0.031

x

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data

5/3/11 12:10 PM

POINT OF DIVERSION SUMMARY

GROUND-WATER REPORT 6

Geology and Ground-Water Conditions in Southern Lea County, New Mexico

by *ALEXANDER NICHOLSON, Jr.*
and *ALFRED CLEBSCH, JR.*

UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the
New Mexico Institute of Mining and Technology,
State Bureau of Mines and Mineral Resources Division
and the New Mexico State Engineer

1961

STATE BUREAU OF MINES AND MINERAL RESOURCES
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY
CAMPUS STATION SOCORRO, NEW MEXICO

TABLE 8. CHEMICAL ANALYSES OF WATER FROM WELLS IN SOUTHERN LEA COUNTY, N. MEX.
(Analyses by U.S. Geological Survey except as noted; chemical constituents in parts per million and equivalents per million [underscored].)

Sample	Location number	Date of collection	Geologic source†	Depth (ft)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sodium plus potassium (Na+K)	Bicarbonate (HCO ₃)	Carbonate (CO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved solids (sum)	Hardness as CaCO ₃ Calcium Magnesium	Percent sodium	Specific conductance (micro-mhos at 25°C)	pH
1	17.32.9.140	7-21-54	To	—	—	—	<u>2.72</u>	34	194	0	<u>25</u>	<u>17</u>	—	—	—	156	35	419	—
							<u>1.46</u>	<u>5.18</u>	<u>52</u>	<u>48</u>									
2	17.33.18.322	7-19-54	To	220	—	—	<u>9.20</u>	27	177	0	<u>40</u>	<u>23</u>	—	—	—	160	27	442	—
							<u>1.18</u>	<u>2.90</u>	<u>83</u>	<u>65</u>									
3	19.32.8.200	12-9-58	Tr	—	19	10	<u>5.50</u>	13	131	0	<u>74</u>	<u>21</u>	<u>1.2</u>	<u>6.4</u>	426	80	78	682	8.0
							<u>1.10</u>	<u>5.71</u>	<u>5.02</u>	<u>1.54</u>	<u>.59</u>	<u>.06</u>	<u>.10</u>						
4	19.34.9.114	12-9-58	Tr(?)	33	41	430	<u>21.46</u>	65	675	189	<u>1,680</u>	<u>560</u>	<u>3</u>	<u>159</u>	3,680	1,340	.52	4,660	7.1
							<u>5.34</u>	<u>29.33</u>	<u>3.10</u>	<u>34.98</u>	<u>15.79</u>	<u>.02</u>	<u>2.24</u>						
5	19.36.35.123	4-9-58	To	45	—	—	—	—	—	—	<u>212</u>	<u>31</u>	—	—	—	—	—	562	—
											<u>4.41</u>	<u>.87</u>							
6	19.36.32.110	11-20-29	To	32	—	84	<u>4.44</u>	158	261	0	<u>225</u>	<u>79</u>	—	<u>6.8</u>	668	222	—	—	—
							<u>6.86</u>	<u>4.28</u>	<u>4.68</u>	<u>2.23</u>	<u>.11</u>								
7	19.37.4.110	9-19-29	To	29	—	68	<u>5.96</u>	71	307	0	<u>54</u>	<u>32</u>	—	—	383	198	—	—	—
							<u>3.09</u>	<u>5.03</u>	<u>1.12</u>	<u>.90</u>									
8	19.37.29.344a	7-15-54	Qal	30±	—	—	<u>6.44</u>	52	296	0	<u>62</u>	<u>91</u>	—	—	—	322	26	865	—
							<u>2.27</u>	<u>4.85</u>	<u>1.29</u>	<u>2.57</u>									
9	do.	9-9-58	Qal	30±	—	—	<u>5.04</u>	—	215	0	<u>54</u>	<u>73</u>	—	—	—	252	—	678	7.6
									<u>3.52</u>	<u>1.12</u>	<u>2.06</u>								
10	20.36.15.421	3-30-54	Qal	50	—	—	—	—	304	0	<u>1,840</u>	<u>1,080</u>	—	—	—	—	—	6,780	—
									<u>4.98</u>	<u>38.30</u>	<u>30.46</u>								
11	20.36.15.421	9-9-58	Qal	50	—	—	<u>34.40</u>	—	292	0	<u>2,250</u>	<u>1,240</u>	—	—	—	1,720	—	7,500	7.4
									<u>4.79</u>	<u>46.84</u>	<u>34.97</u>								
12	20.37.4.111	4-2-54	Qal	40	—	—	—	—	423	0	<u>67</u>	<u>450</u>	—	—	—	—	—	2,180	—
									<u>6.93</u>	<u>1.39</u>	<u>12.69</u>								
13	20.37.4.111	4-22-55	Qal	40	—	—	<u>13.40</u>	—	438	0	<u>78</u>	<u>425</u>	—	—	—	670	—	2,090	7.2
									<u>7.18</u>	<u>1.62</u>	<u>11.99</u>								
14	20.37.4.111	9-9-58	Qal	40	—	—	<u>9.20</u>	—	318	0	<u>108</u>	<u>425</u>	—	—	—	460	—	1,670	7.3
									<u>5.21</u>	<u>2.25</u>	<u>9.16</u>								

NEW MEXICO BUREAU OF MINES & MINERAL RESOURCES

15	20.37.4.221	4-22-55	Qal	45	—	—	<u>5.56</u>	—	269	0	<u>90</u>	<u>51</u>	—	—	—	278	—	758	8.1
							<u>4.41</u>		<u>4.87</u>	<u>1.44</u>									
16	20.37.4.221	9-9-58	Qal	45	—	—	<u>4.92</u>	—	255	0	<u>87</u>	<u>47</u>	—	—	—	246	—	708	8.0
									<u>4.18</u>	<u>1.69</u>	<u>1.33</u>								
17	20.38.19.320	4-2-54	Qal	115	—	—	—	—	227	0	—	<u>39</u>	—	—	—	—	—	627	—
									<u>3.72</u>	<u>1.10</u>									
18	20.38.19.320	9-9-58	Qal	115	—	—	<u>1.56</u>	—	104	0	<u>23</u>	<u>49</u>	—	—	—	68	—	376	8.1
							<u>1.70</u>		<u>48</u>	<u>1.38</u>									
19	21.33.2.231	9-4-58	Tr	1,150	—	—	<u>.44</u>	—	356	0	<u>95</u>	<u>20</u>	—	—	—	22	—	778	8.0
									<u>5.51</u>	<u>1.98</u>	<u>.56</u>								
20	21.33.2.422	6-28-54	To	120	—	—	—	—	116	0	<u>17</u>	<u>1,020</u>	—	—	—	—	—	3,570	—
									<u>1.90</u>	<u>.35</u>	<u>28.77</u>								
21	21.33.2.422	4-22-55	To	120	—	—	<u>35.40</u>	2.5	115	0	<u>20</u>	<u>1,170</u>	—	<u>13</u>	—	1,770	0.3	3,730	7.3
								<u>.11</u>	<u>1.88</u>	<u>.42</u>	<u>33.00</u>	<u>.21</u>							
22	21.33.2.422	9-4-58	To	120	—	—	<u>48.00</u>	—	109	0	<u>43</u>	<u>1,640</u>	—	—	—	2,400	—	5,070	7.1
									<u>1.79</u>	<u>.90</u>	<u>46.25</u>								
23	21.33.2.442b	4-22-55	To	—	—	—	<u>6.08</u>	—	945	0	<u>15</u>	<u>12</u>	—	—	—	304	—	600	7.4
									<u>5.65</u>	<u>.31</u>	<u>.34</u>								
24	21.33.2.442b	9-4-58	To	—	—	—	<u>6.12</u>	—	354	0	<u>18</u>	<u>7.0</u>	—	—	—	306	—	629	7.5
									<u>5.80</u>	<u>.37</u>	<u>.20</u>								
25	21.35.27.321a	12-8-58	To	—	—	—	<u>4.08</u>	—	301	0	<u>170</u>	<u>44</u>	—	—	—	204	—	995	8.0
									<u>4.93</u>	<u>3.54</u>	<u>1.24</u>								
26	21.36.9.222	7-27-54	Tr	447	—	17	<u>.85</u>	7.8	280	0	<u>216</u>	<u>65</u>	<u>4.4</u>	<u>0.1</u>	803	74	89	1,290	—
							<u>.64</u>	<u>12.18</u>	<u>7.11</u>	<u>4.50</u>	<u>1.83</u>	<u>.23</u>	<u>.00</u>						
27	21.36.9.222	9-8-58	Tr	447	—	—	<u>1.46</u>	—	425	0	<u>213</u>	<u>64</u>	—	—	—	73	—	1,270	8.1
									<u>6.97</u>	<u>4.43</u>	<u>1.80</u>								
28	21.37.33.110	7-18-42	To	130	73	45	<u>2.25</u>	25	96	25	<u>108</u>	<u>68</u>	<u>3.5</u>	<u>10</u>	543	216	—	799	—
							<u>2.06</u>	<u>4.07</u>	<u>2.98</u>	<u>.83</u>	<u>2.25</u>	<u>1.92</u>	<u>.18</u>	<u>.16</u>					
29	21.37.33.111	9-9-58	To	110?	—	—	<u>3.72</u>	—	240	0	<u>108</u>	<u>61</u>	—	—	—	186	—	785	7.7
									<u>3.93</u>	<u>2.25</u>	<u>1.72</u>								
30	21.37.33.210	8-1-42	Tr	350	16	50	—	31	563	0	<u>855</u>	<u>208</u>	<u>1.8</u>	<u>.5</u>	1,400	950	—	2,850	—

GROUND WATER

LEA COUNTY

APPENDIX C

Active Oil and Gas Well Data

Permanently Plugged Oil and Gas Well Data

CD copy of NMOCD Files for Wells Penetrating the Wolfcamp

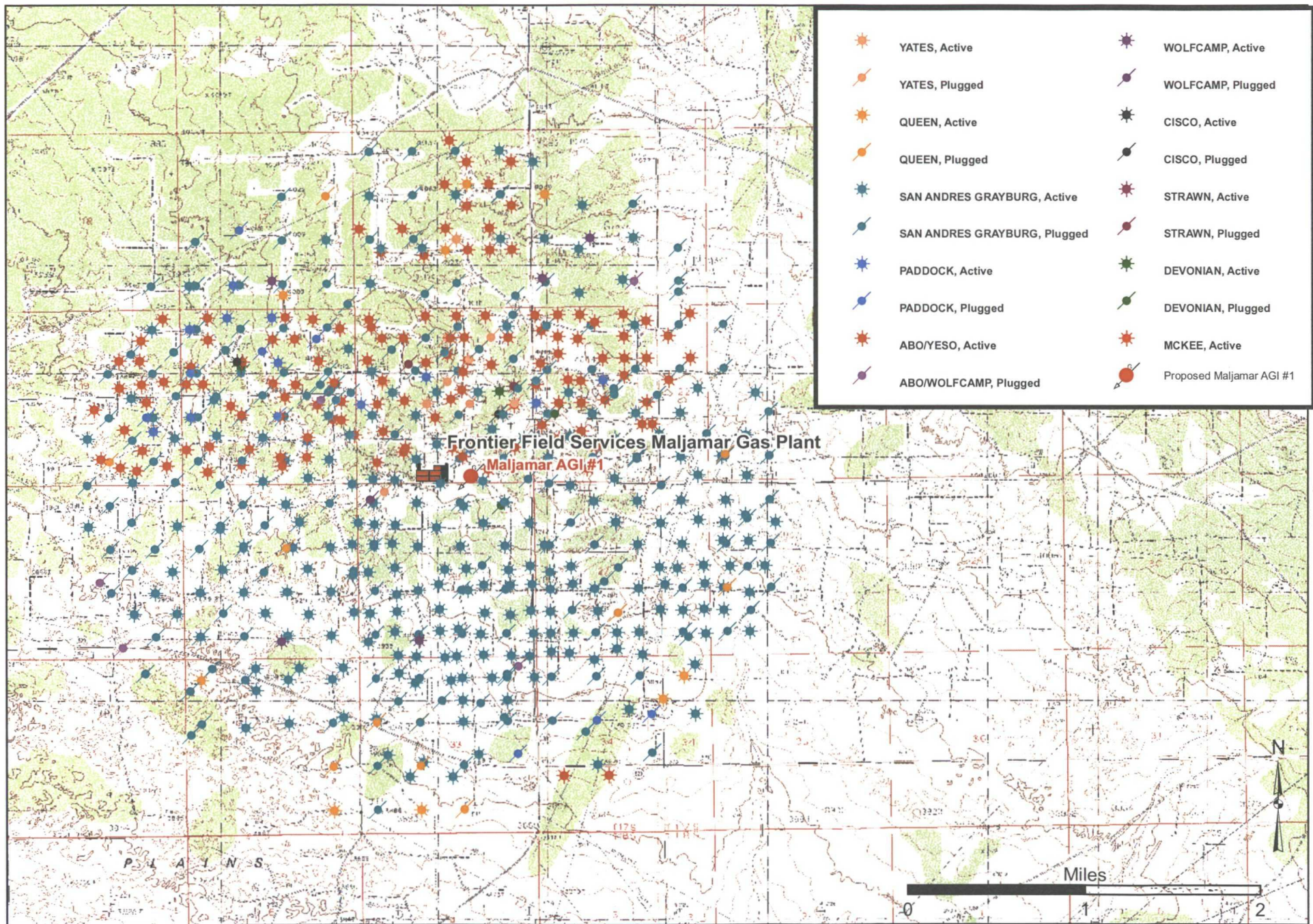


Figure C-1: Wells Within Two Miles of Proposed Maljamar AGI #1 Well

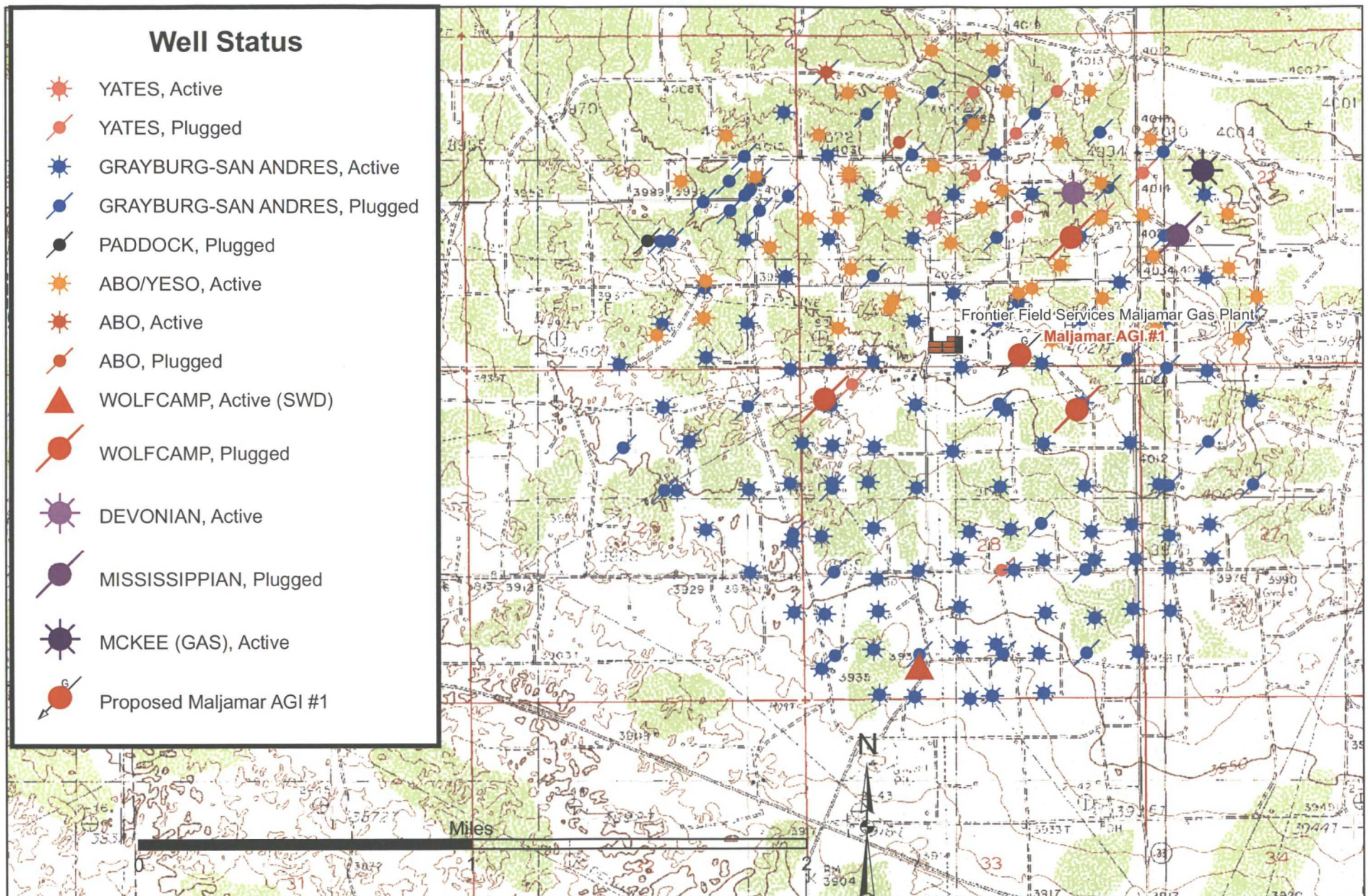


Figure C-2: Location and Status of Wells within One Mile of Proposed Maljamar AGI #1 Well

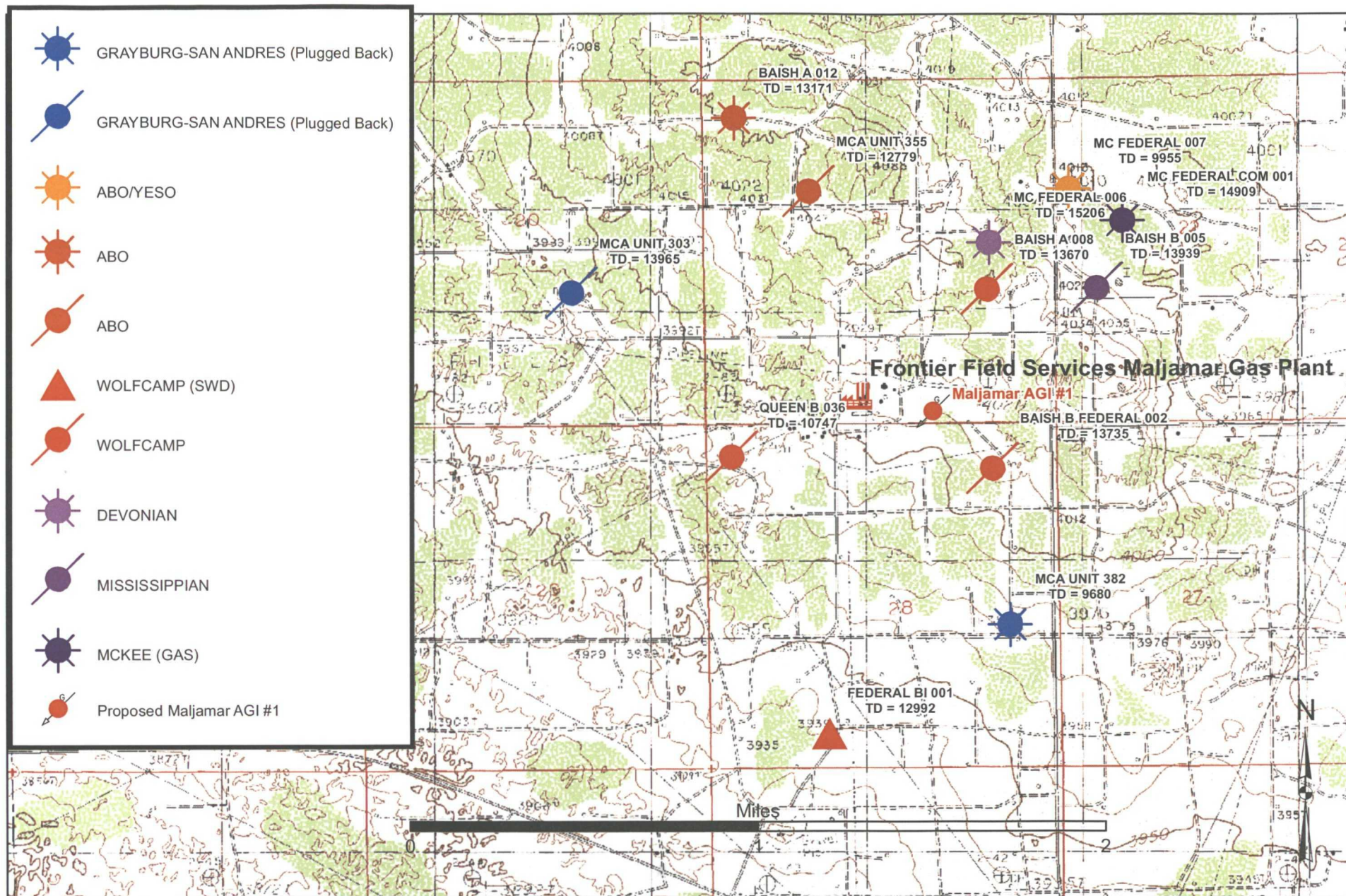


Figure C3: Location and Status of Deep (>9000') Wells within One Mile of Proposed Maljamar AGI #1 Well

MCA Unit 355
API # 3002500614
1780' FNL 1780' FWL, Sec. 21, T17S R32E

GLE: 4029'
17.5" Bore to 179'
13.375" Cag. to 178'
160 Sx. Cmt. to Surface

Feb. 1993: Fill csg & cellar w/cmt, install P&A Marker

Feb. 1993: Spot 110 sx @ 230, Cmt circ to surface

Feb. 1993: Spot 200 sx @ 1325, tag cmt @ 625

Feb. 1993: Spot 220 sx @ 2075, tag cmt @ 1325

Nov. 1974: Retainer @ 2930, Sqz 200 sx in Queen Perfs

August 1969: Perfs 3079-3154 in Queen

Feb. 1993: Spot 100 sx @ 3200, tag cmt @ 2890

Feb. 1993: Spot 175 sx @ 4080, tag cmt @ 3504

Nov. 1974: Drill out Retainer & Cmt. to 4077. Perfs 3716-3820 in Grayburg (Injection Well)

San Andres (3825')

Retainer @ 4090'

12.25" Bore to 4198'
9.625" Cag. to 4181'
3370 Sx. Cmt. to Surface

TOC 4860'

Glorieta (5390')

Spud Date: Nov. 1, 1953
Operator: Buffalo Oil Co.
P&A March 3, 1993
Last Operator: Conoco, Inc.

Tubbs (6890')

Abo (7590')

Sept 1969: Retainer @ 8698, Sqz 100 sx in Abo perfs

Aug. 1954: Perfs in Abo 8980-9002, flowed 177 bbls/24 hrs

August 1963: Sqz 100 sx in Abo perfs, drill out to 8982'

Bridge plug @ 9,500' (Aug. 1954)

Wolfcamp (9200')

Pennsylvanian (9960')

Perfs 9876-9923, Acid inj. failed

Bridge plug @ 10,050' (Aug. 1954)

Perfs 10,102-116, swabbed, dry

Bridge plug @ 10,480' (Aug. 1954)

Perfs 10,771-874, Swabbed 22 bbls/21 hrs

Bridge plug @ 11,300' (Aug. 1954)

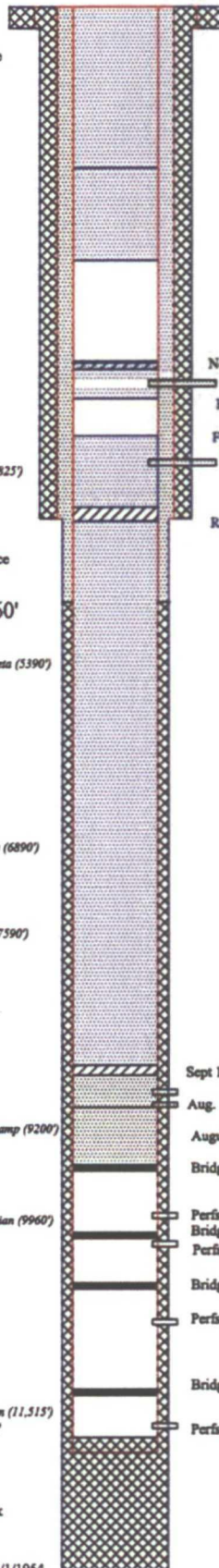
Strom (11,515')

Plugged Back to 11,690'

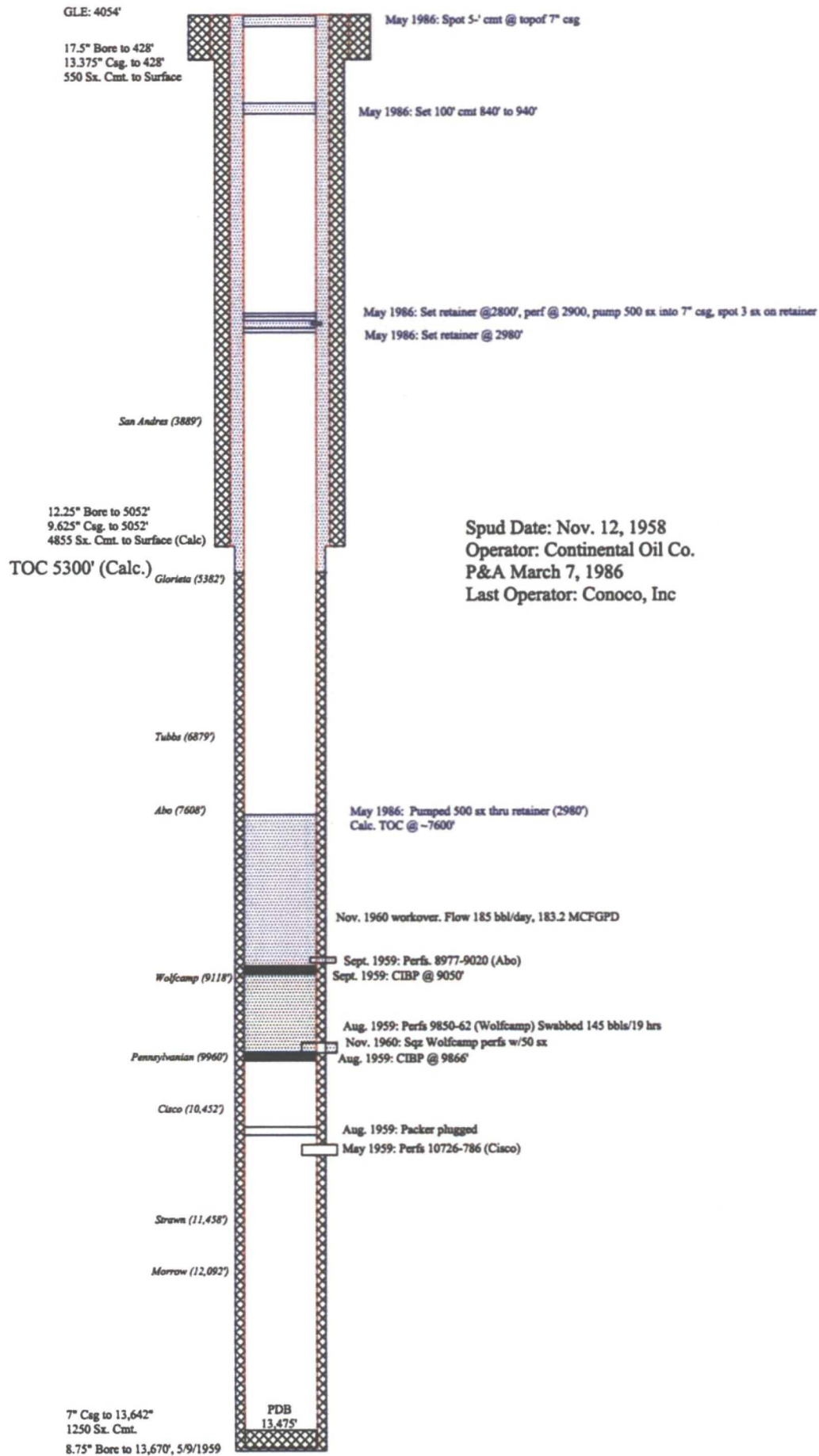
Perfs. 11,616-660' (May 1954)

5.5" Cag to 11,813'
1850 Sx. Cmt.
TOC 4860'
Based on 1.2 CuFt/Sack

8.75" Bore to 12,789', 5/1/1954



BAISH A 008
API # 3002500622
1980' FSL 810' FEL, Sec. 21, T17S R32E



BAISH B 005
API # 3002500634
1980' FSL 860' FWL, Sec. 22, T17S R32E

DF: 4022'

17.5" Bore to 100'
13.375" Cag. to 100'
100 Sx. Cmt. to Surface

12.25" Bore to 2700'
9.625" Cag. to 2700'
1700 Sx. Cmt. to Surface

San Andres (3875')

Glorieta (5375')

Tubbs (6910')

Alto (7578')

Wolfcamp (9090')

Pennsylvanian (9960')

Cinco (10,410')

Strawn (11,395')

Morrow (11,995')

Mississippian (12,454')

5.5" Cag to 13,562"
1390 Sx. Cmt.
7.875" Bore to 13,569', 1/31/1952

Devonian (13,540')

1954-1955: Re-drilled to 13,939
Cmt w/100 sx on 4" cag
Perf 13,750-827'

Jan. 1991: Fill cag to surface w/cmt
Set P&A Marker
Jan. 1991: Perf cag @ 350', pump 120 sx
down 5 1/2" to 9 5/8" cag, circulated

Jan. 1991: Spot 15 sx 915' - 1065'

Jan. 1991: Spot 15 sx 2625' - 2775'

Jan. 1952: Sqz 400 sx; Long String
TOC @ 3000' (TS)

Jan. 1991: Spot 25 sx 3935' - 4200'

July 1975: Repaired cag leak 4280-4310, Sqz 150 sx
Jan. 1952: Long String TOC @ 4480' (TS)

Spud Date: April 26, 1951
Operator: Buffalo Oil Co.
P&A Jan. 11, 1991
Last Operator: Conoco, Inc

July 1975: CIBP @ 9010, spot 2 sx on plug

Nov. 1954: Perf 9930-40' & test Wolfcamp
Sqz perfs w/75 sx, test OK @ 1200 psi

Oct. 1974: Retainer @ 12,243, Sqz 75 sx in Miss., 20 sx on retainer
Feb. 1974: Tests in Mississippian
Perfs 12,522-526, Sqz w/150 sx
Perfs 12310-314, Sqz w/175 sx
Perfs 12412-454, weak gas show, Temp. Aband.

Jan. 1952: 578 BOPD from Devonian
Open hole 13,562-569'
Feb. 1974: Closed perfs in Devonian
13,580-605 Sqz 150 sx

QUEEN B 036
API # 3002500751
554' FNL 554' FWL, Sec. 28, T17S R32E

GLE: 3985'

17.5" Bore to 825'
13.0" Csg. to 825'
175 Sx. Cmt. to Surface

Sept 2004: Sqr 30 sx 50; to surface
Set P&A Marker 9/17/2004

Sept. 2004: Sqr 80 sx 732-875

Sept 2004: Sqr 65 sx 960-1060 (circulated)

Sept. 2004: Sqr 70 sx 1800-1910 (circulated)

TOC Intermediate Csg. 3391'

Sept. 2004, Spot 25 sx 3850-3586

Sept. 2004: Spot 25 sx 4316-4067

11.0" Bore to 4198'
8.625" Csg. to 4198'
200 Sx. Cmt. to 3391' (TS)

Sept. 2004: 25 sx top of CIBP

Sept. 2004: CIBP @ 5278'

Perfs 5335-5422, Sqr 75 sx

Retainer @ 5485'

Perfs 5502, Sqr 75 sx

Long String TOC 5890'

Retainer @ 6548', Perfs 6653-6663, Sqr 50 sx

Bridge Plug @ 6900'

Retainer @ 8834', Perfs 8914-8960, Sqr 50 sx

Retainer @ 8996, Perfs 9020-9076, Sqr 100 sx

Retainer @ 9080', Perfs 9098-9110, Sqr 75 sx

Retainer @ 9170', Perfs 9330-9350, Sqr 100 sx

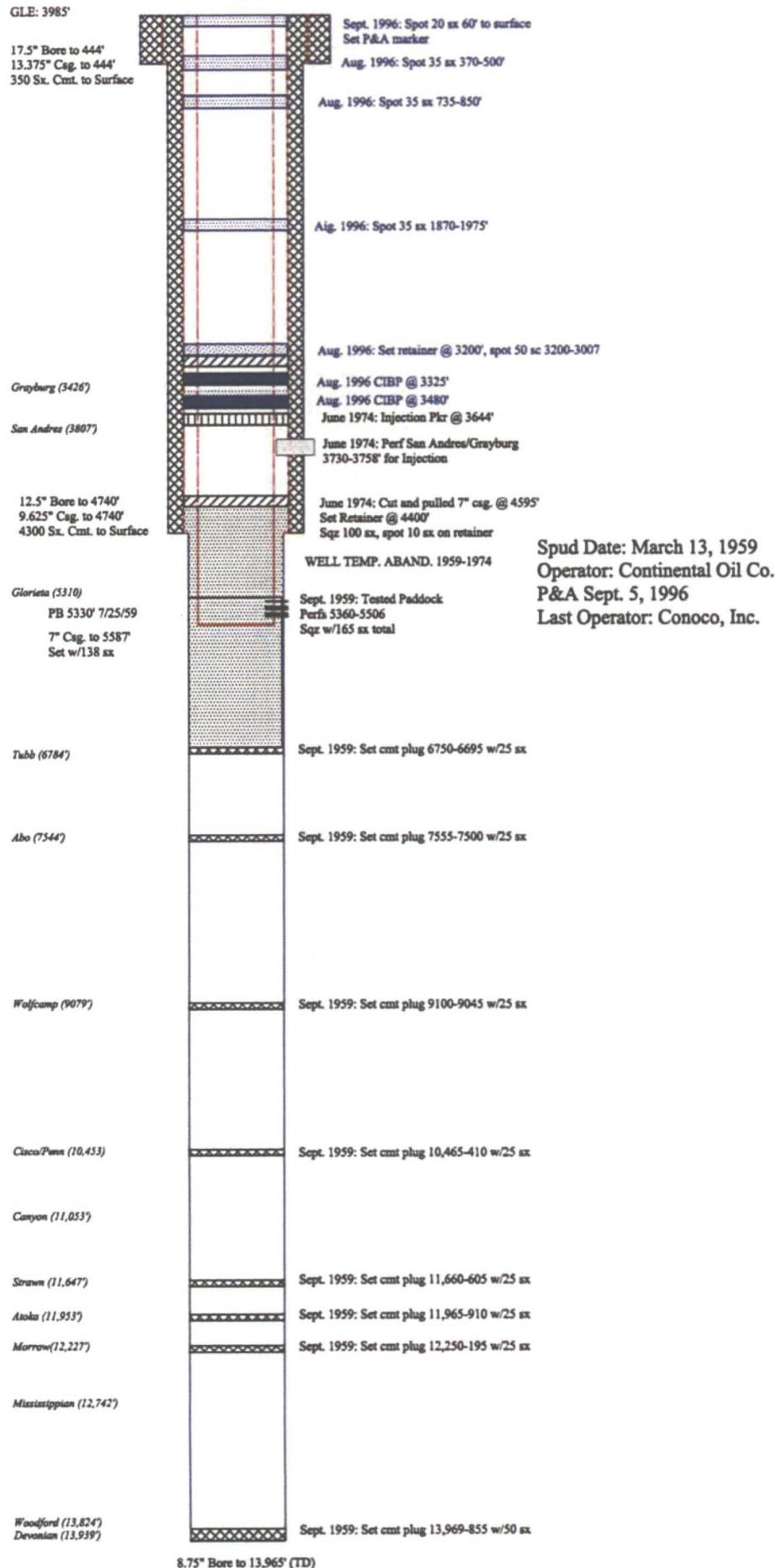
Feb. 1949: Retainer @ 9911'

Perfs 9974-9980, Sqr 75 sx

7.875" Bore to 10,747 (TD)
5.5" csg to 10,745' w/ 200 sx

Spud Date: Sept. 20, 1948
Operator: Kewanee Oil Co.
P&A Sept. 17, 2004
Last Operator: ConocoPhillips Co.

MCA UNIT 303
API # 3002508053
1980' FSL 1830' FEL, Sec. 20, T17S R32E



BAISH B FEDERAL 002
API # 3002521951
760' FNL 760' FEL, Sec. 28, T17S R32E

DF: 4032'

17.5" Bore to 390'
13.375" Cag. to 390'
350 Sx. Cmt. to Surface

Feb. 1968: Spot 20 sx to surface
Set P&A marker 2/15/68
Feb. 1968: Cut and pull 8 5/8" cag @ 185'
Spot 25 sx in & out stub

Grayburg (3662')

11" Bore to 4660'
8.625" Cag. to 4740'
2080 Sx. Cmt. to Surface

Feb. 1968: Spot 25 sx in & out 8 5/8" cag

Glorieta (5290')

Feb. 1968: Spot 40 sx 5250-5350'

CALC. TOC -6300'

Feb. 1968: Cut and pull 5 1/2" cag
from 7005', Spotted 25 sx in and out stub

Abo (7516')

Wolfcamp (9105')

5 1/2" Cag. at 10,301'
670 sx cmt.
Est TOC 5,600' (1.2 cu. ft/sx)

Feb. 1968: Spot 20 sx @ 9870
Mar. 1967: Perf 9780-9800 Wolfcamp test
No shows: Well Shut In

TEMP. ABAND. 3/24/1967

March 1967: Spot 50 sx 11,450-550

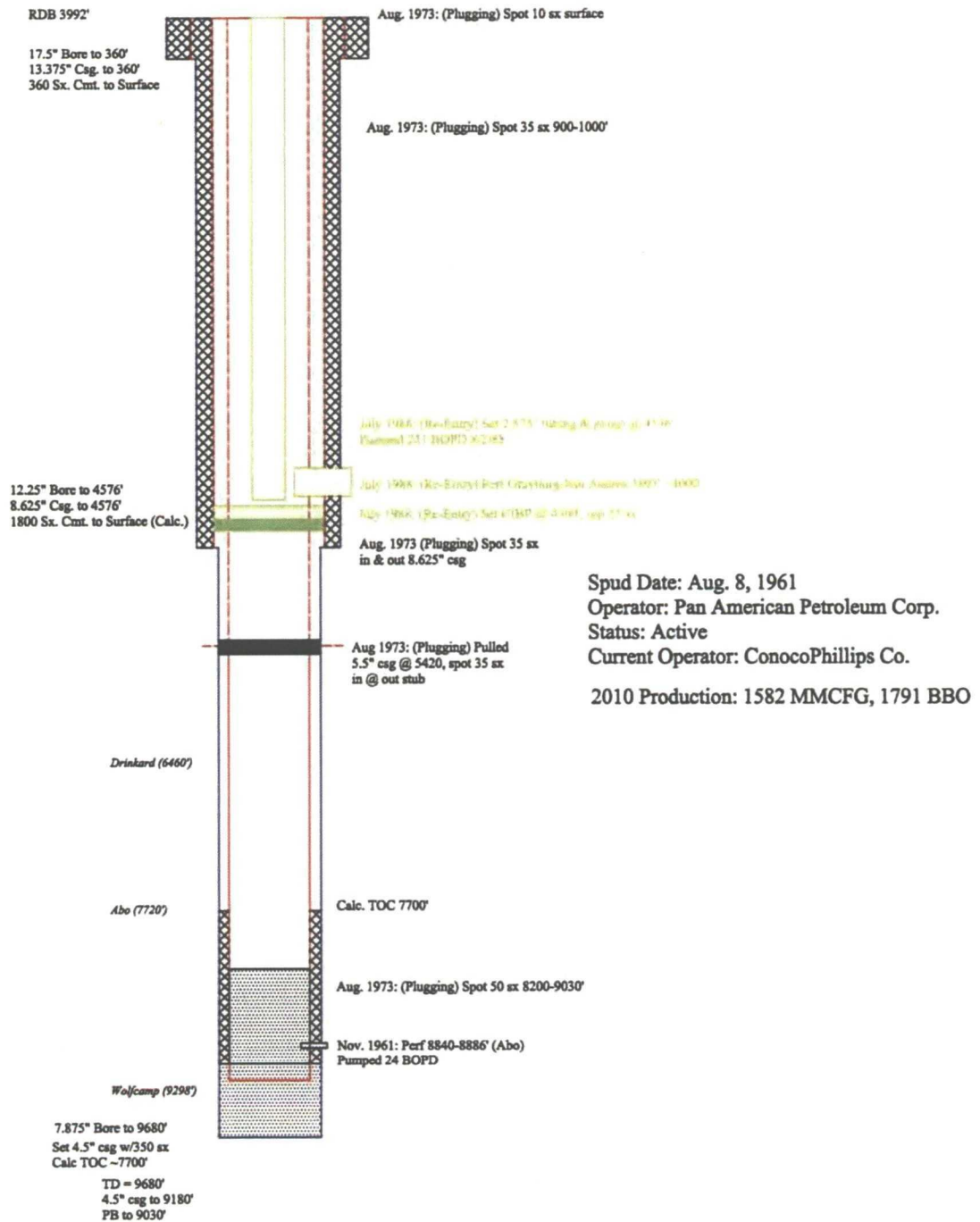
March 1967: Spot 50 sx 12,150-250

March 1967: Spot 50 sx 13,675-635

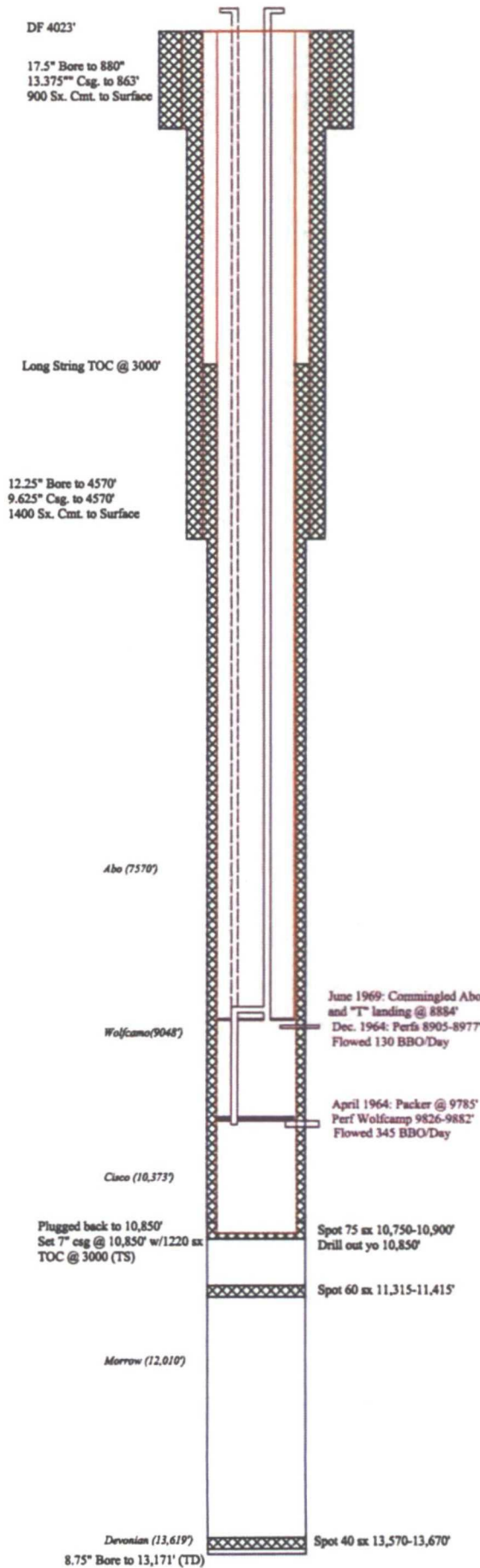
7.875" Bore to 13,735' (TD)
No Oil or Gas Shows

Spud Date: Dec. 20, 1966
Operator: Pan American Corp.
P&A Feb. 15, 1968
Last Operator: Pan American Corp.

MCA UNIT 382
 API # 3002500745
 2120' FSL 519' FEL, Sec. 28, T17S R32E



BAISH A 012
API # 3002520568
660' FNL 660' FEL, Sec. 21, T17S R32E

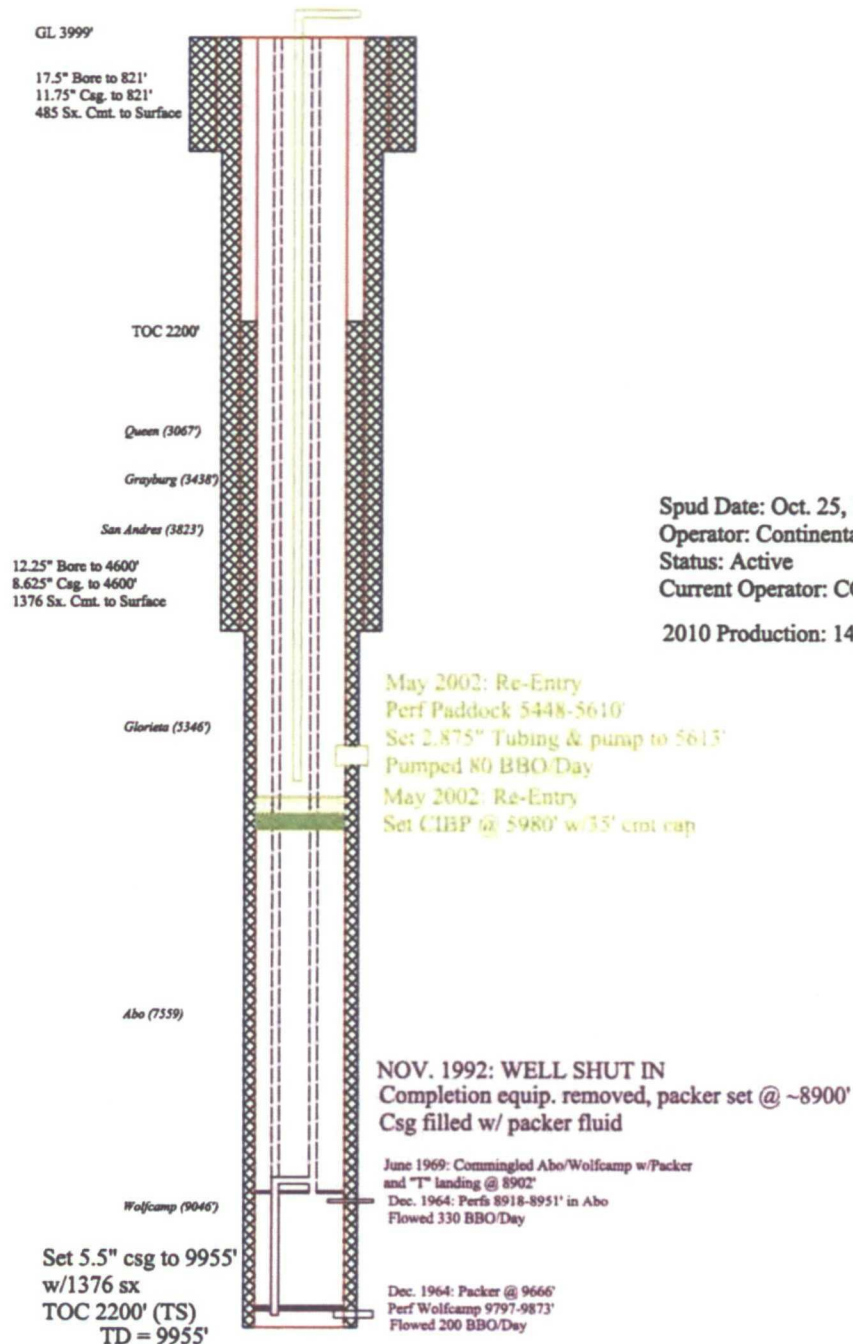


Spud Date: Nov. 22, 1963
Operator: Continental Oil Co.
Status: Active
Current Operator: COG Operating LLC
2010 Production: 4195 MMCFG, 1965 BBO

MC Federal 007 (Formerly BAISH A 013)

API # 3002520647

1780' FNL 460 FWL, Sec. 22, T17S R32E



Spud Date: Oct. 25, 1964
Operator: Continental Oil Co.
Status: Active
Current Operator: COG Operating LLC

2010 Production: 14865 MMCFG, 4443 BBO

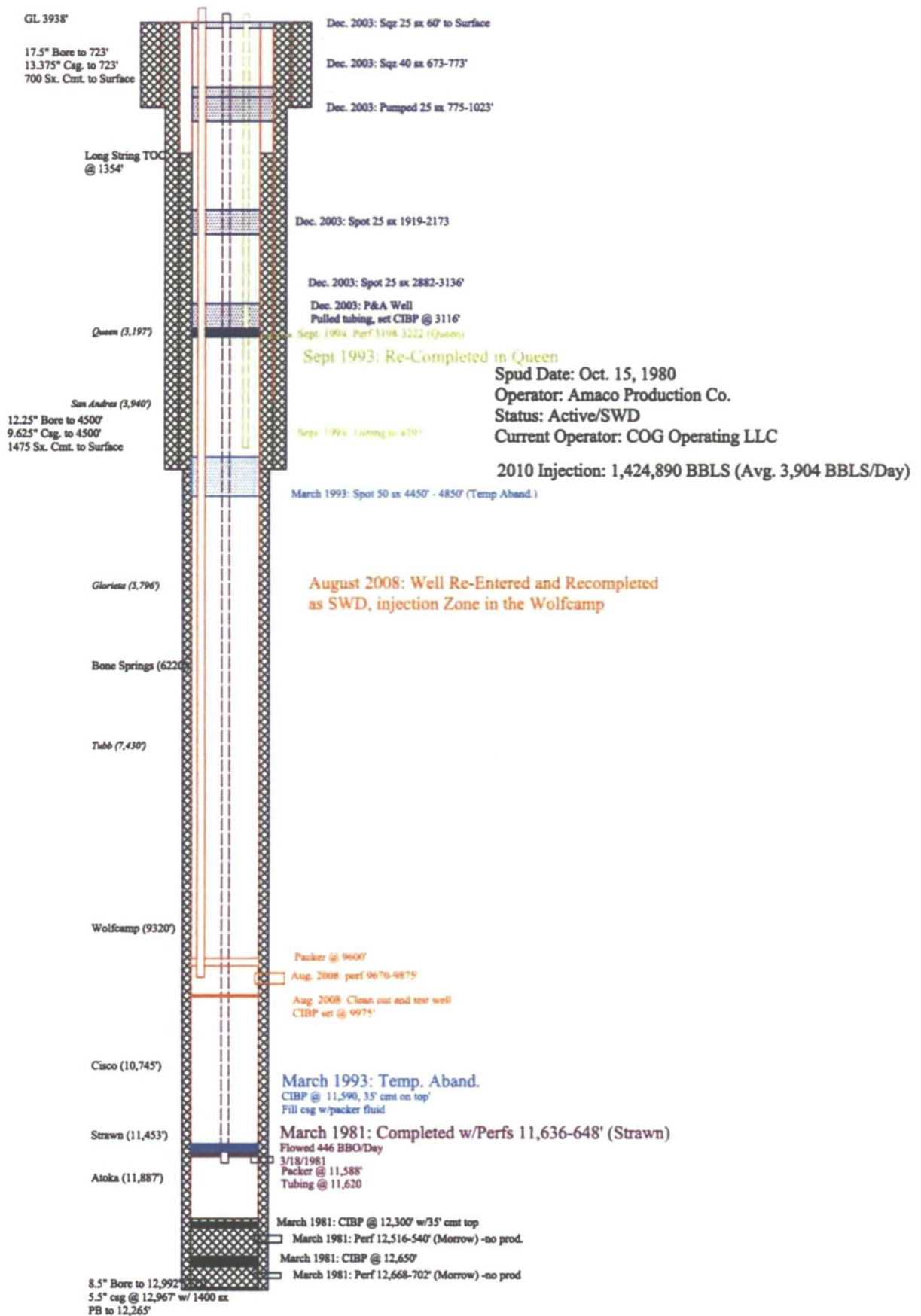
May 2002: Re-Entry
Perf Paddock 5448-5610'
Set 2.875" Tubing & pump to 5613'
Pumped 80 BBO/Day
May 2002: Re-Entry
Set CIBP @ 5980' w/35' cmt cap

NOV. 1992: WELL SHUT IN
Completion equip. removed, packer set @ ~8900'
Csg filled w/ packer fluid

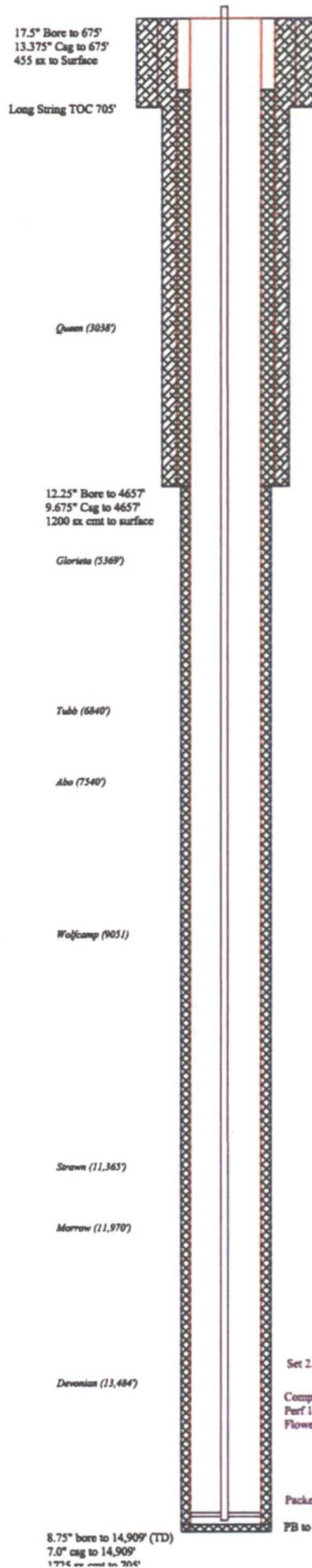
June 1969: Commingled Abo/Wolfcamp w/Packer
and "T" landing @ 8902'
Dec. 1964: Perfs 8918-8951' in Abo
Flowed 330 BBO/Day

Dec. 1964: Packer @ 9666'
Perf Wolfcamp 9797-9873'
Flowed 200 BBO/Day

Federal BI 001
API # 3002527068
480' FSL 1980 FWL, Sec. 28, T17S R32E



MC Federal 001
API # 3002534647
22S° FNL, 1094° FWL, Sec. 22, T17S, R32E



Spud Date: June 19, 1999
Operator: Mack Energy Corp.
Status: Active
Current Operator: COG Operating LLC
2010 Production: 41,589 MMCFG, 596 BBO

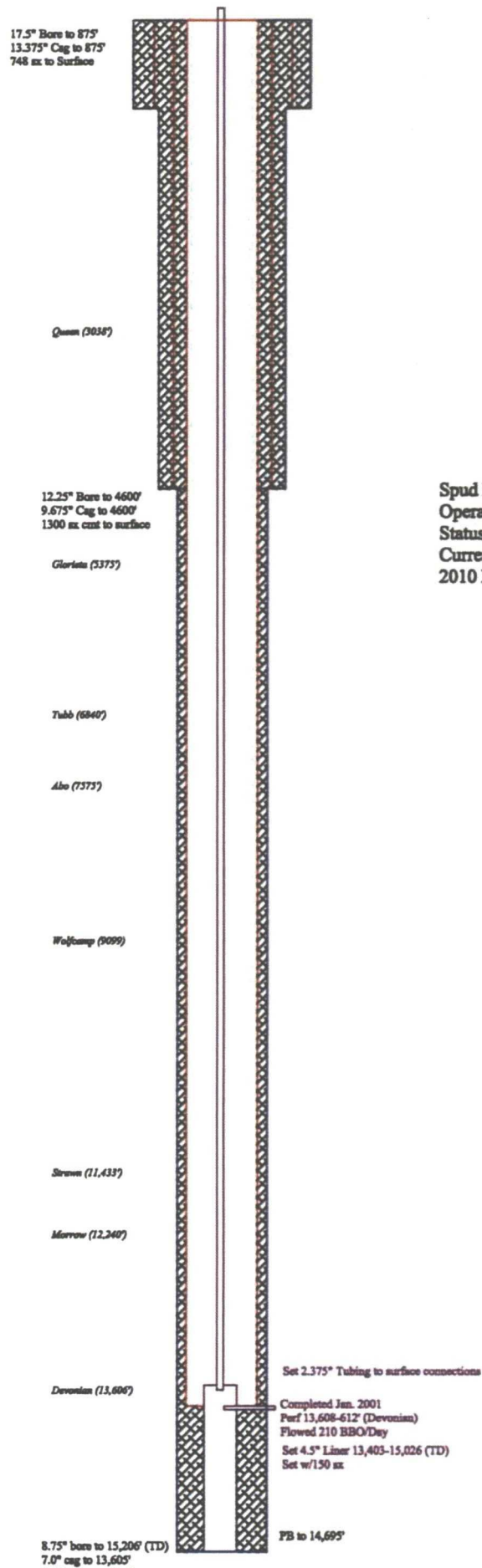
Set 2.875" Tubing to surface connections

Completed Sept. 1999
Perf 14,805-821' (McKee)
Flowed 1.3 MMCFG and 21 BBL Condensate/Day

Packer @ 14,726'

FB to 14,844'

MC Federal 006
API # 3002535252
2600 FNL, 760' FEL, Sec. 21, T17S, R32E



Spud Date: Nov. 17, 2000
Operator: Mack Energy Corp.
Status: Active
Current Operator: COG Operating LLC
2010 Production: 3480 BBO

CD PLACEHOLDER

APPENDIX D

Identification of Operators, Surface Owners, Lessees, and other Interested Parties for Notices; Copies of Notice Letters and Certified Mail Receipts; Copy of Draft Public Notice for Hearing

TABLE D-1

**OPERATORS WITHIN ONE MILE RADIUS
OF PROPOSED MALJAMAR AGI #1**

Conoco Phillips Company
3401 E. 30th Street
Farmington, NM 87402

Endurance Resources, LLC
15455 Dallas Parkway
Suite 600
Addison, TX 75234

TABLE D-2

**SURFACE OWNERS ON WITHIN ONE MILE RADIUS
OF PROPOSED MALJAMAR AGI #1**

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 16, South Half (S/2), 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 17, South Half (S/2), 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 20, ALL, 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

**Section 21, North Half Northwest Quarter Northwest Quarter Southeast Quarter,
(N/2 NW/4 NW/4 SE/4)**

Mid America Pipeline Company LLC
Tax Department
P. O. Box 4018
Houston, TX 77210

Section 21, 19.08 acre tract in South part of Section 21 & North part of Section 28

Frontier Field Services LLC
1900 Dalrock Rd.
Rowlett, TX 75088

Section 21, ALL less & except the above 2 tracts

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 22, ALL, 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 27, ALL, 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 28, ALL, 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 29, ALL, 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 32, North Half (N/2), 17 South, Range 32 East

State of New Mexico
Commissioner of Public Land
310 Old Santa Fe Trail
Santa Fe, NM 87501-2708

Surface Lessee:

Williams & Son Cattle Company
P. O. Box 30
Maljamar, NM 88264

Section 33, North Half (N/2), 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

Section 34, North Half (N/2), 17 South, Range 32 East

Department of the Interior
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, NM 87508

Surface Lessee:

LaDoyce & Olane Caswell
1702 Gillham
Brownfield, TX 79316

TABLE D-3

**LEASE HOLDERS WITHIN ONE MILE RADIUS
OF PROPOSED MALJAMAR AGI #1**

**V-F Petroleum Inc.
P. O. Box 1889
Midland, TX 79702**

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East

**Conoco Phillips Company
3401 E. 30th Street
Farmington, NM 87402**

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East
Section 16, South Half (S/2), 17 South, Range 32 East
Section 17, Southeast Quarter (SE/4), 17 South, Range 32 East
Section 20, (ALL), 17 South, Range 32 East
Section 21, (ALL), 17 South, Range 32 East
Section 22, West Half (W/2), 17 South, Range 32 East
Section 27, ALL, 17 South, Range 32 East
Section 28, ALL, 17 South, Range 32 East
Section 29, ALL, 17 South, Range 32 East
Section 32, North Half (N/2), 17 South, Range 32 East
Section 33, North Half (N/2), 17 South, Range 32 East
Section 34, North Half (N/2), 17 South, Range 32 East

**Cimerax Energy Company of Colorado
600 N. Marienfeld
Suite 600
Midland, TX 79701**

Section 16, South Half (S/2), 17 South, Range 32 East;

COG Operating, LLC
550 W. Texas
Suite 1300
Midland, TX 79701

Section 16, South Half (S/2), 17 South, Range 32 East
Section 17, Southeast Quarter (SE/4), 17 South, Range 32 East
Section 20, (ALL), 17 South, Range 32 East
Section 21, (ALL), 17 South, Range 32 East
Section 22, West Half (W/2), 17 South, Range 32 East
Section 28, ALL, 17 South, Range 32 East
Section 29, ALL, 17 South, Range 32 East
Section 32, North Half (N/2), 17 South, Range 32 East
Section 33, North Half (N/2), 17 South, Range 32 East
Section 34, North Half (N/2), 17 South, Range 32 East

Endurance Resources, LLC
15455 Dallas Parkway
Suite 600
Addison, TX 75234

Section 32, North Half (N/2), 17 South, Range 32 East

Lynx Petroleum Consultants, Inc.
P. O. Box 1708
Hobbs, NM 88241

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East

TABLE D-3

**LEASE HOLDERS WITHIN ONE MILE RADIUS
OF PROPOSED MALJAMAR AGI #1**

**V-F Petroleum Inc.
P. O. Box 1889
Midland, TX 79702**

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East

**Conoco Phillips Company
3401 E. 30th Street
Farmington, NM 87402**

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East
Section 16, South Half (S/2), 17 South, Range 32 East
Section 17, Southeast Quarter (SE/4), 17 South, Range 32 East
Section 20, (ALL), 17 South, Range 32 East
Section 21, (ALL), 17 South, Range 32 East
Section 22, West Half (W/2), 17 South, Range 32 East
Section 27, ALL, 17 South, Range 32 East
Section 28, ALL, 17 South, Range 32 East
Section 29, ALL, 17 South, Range 32 East
Section 32, North Half (N/2), 17 South, Range 32 East
Section 33, North Half (N/2), 17 South, Range 32 East
Section 34, North Half (N/2), 17 South, Range 32 East

**Cimerax Energy Company of Colorado
600 N. Marienfeld
Suite 600
Midland, TX 79701**

Section 16, South Half (S/2), 17 South, Range 32 East;

COG Operating, LLC
550 W. Texas
Suite 1300
Midland, TX 79701

Section 16, South Half (S/2), 17 South, Range 32 East
Section 17, Southeast Quarter (SE/4), 17 South, Range 32 East
Section 20, (ALL), 17 South, Range 32 East
Section 21, (ALL), 17 South, Range 32 East
Section 22, West Half (W/2), 17 South, Range 32 East
Section 28, ALL, 17 South, Range 32 East
Section 29, ALL, 17 South, Range 32 East
Section 32, North Half (N/2), 17 South, Range 32 East
Section 33, North Half (N/2), 17 South, Range 32 East
Section 34, North Half (N/2), 17 South, Range 32 East

Endurance Resources, LLC
15455 Dallas Parkway
Suite 600
Addison, TX 75234

Section 32, North Half (N/2), 17 South, Range 32 East

Lynx Petroleum Consultants, Inc.
P. O. Box 1708
Hobbs, NM 88241

Section 15, Southwest Quarter (SW/4), 17 South, Range 32 East

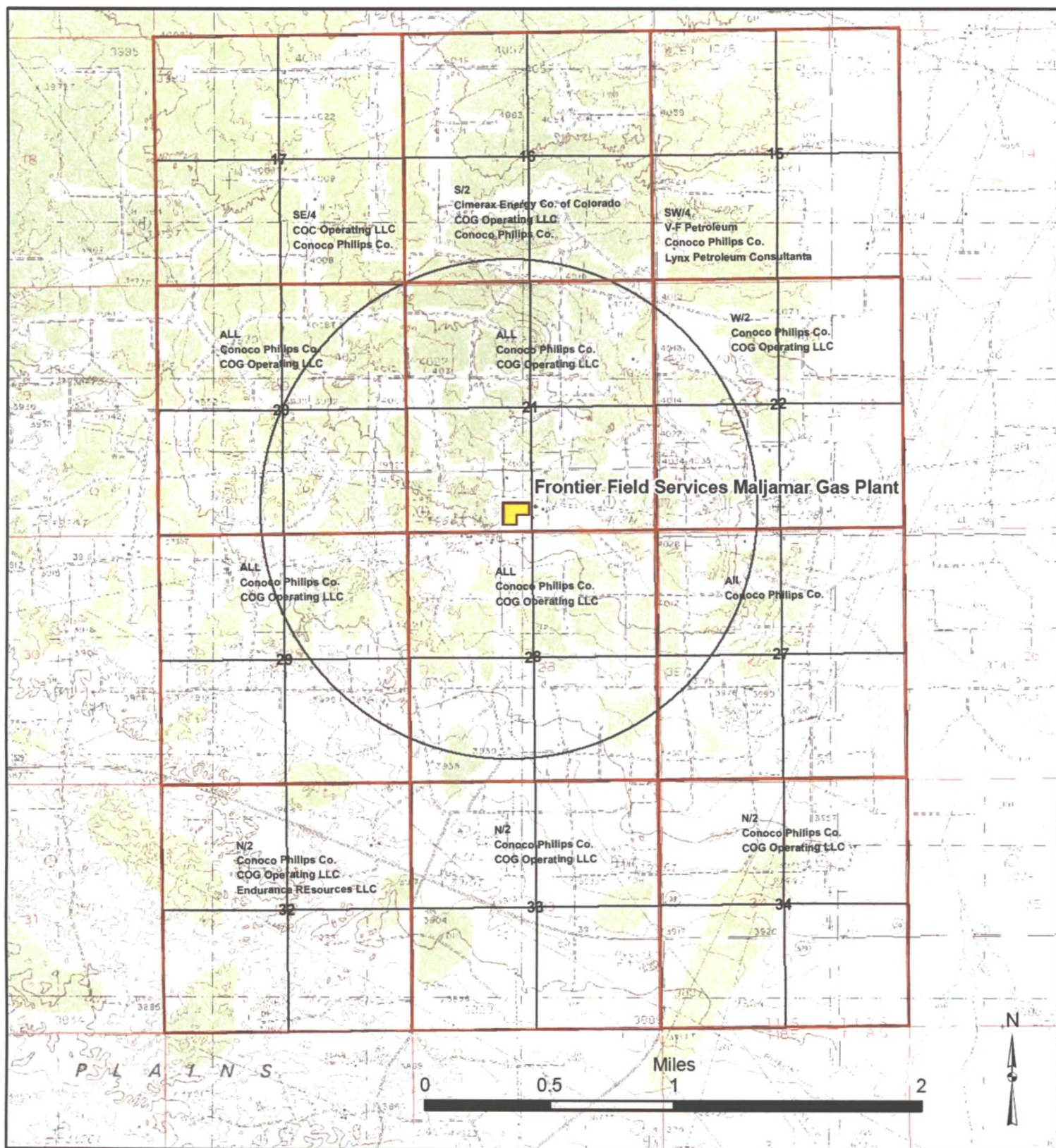


Figure D-1:
Lease owners within one mile of Proposed Maljamar AGI #1 Well

TABLE D-4

**BUSINESSES WITHIN ONE MILE RADIUS
OF PROPOSED MALJAMAR AGI #1**

Gas Processing Plant

Frontier Field Services, LLC
1900 Dalrock
Rowlett, TX 75088

Compressor Station (unmanned)

Mid America Pipeline Company, LLC
Tax Department
P.O. Box 4018
Houston, TX 77210

Conoco Philips Warehouse (unmanned)

Conoco Phillips Company
3401 E 30th Street
Farmington, NM 87402

May 15, 2011

Generic Notified Party
Mailing Address
City, State Zip Code

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RE: Frontier Field Services, LLC Proposed Maljamar AGI #1

This letter is to advise you that Frontier Field Services, LLC ("Frontier") filed the enclosed application on May 15, 2011 with the New Mexico Oil Conservation Division ("NMOCD" or "the Division") seeking authorization to drill an Acid Gas Injection (AGI) well at the Frontier Gas Processing Plant near Maljamar, New Mexico. The proposed well will be located 130 feet from the South line and 1813 feet from the East line of Section 21, Township 17 South, Range 32 East, in Lea County. Frontier plans to inject up to 2MMCFD of acid gas from the Plant at a maximum pressure of 2973 psi into this well into the lower Wolfcamp Formation and possibly into the lower Leonard Formation, approximately 9300 to 10000 feet below the surface. The proposed well will serve as the disposal well for acid gas currently being flared at the Frontier Processing Plant.

This application has been set for hearing before a Division Examiner at 8am on June 23, 2011 in Porter Hall at the NMOCD'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 Frontier's 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 application at a later date.

A party appearing at the hearing is required by the Division's rules to file a Pre-Hearing Statement with the NMOCD's Santa Fe office no later than one week prior to the hearing date. This statement must be served on counsel for Frontier and on all other parties and should include: your name and the name of your attorney, if any; a concise statement of the case; the names of all witnesses you will call to testify at the hearing; the approximate time you will need to present your case; and an identification of any procedural matters that need to be resolved prior to the hearing.

If you have any questions concerning this application, you may contact Mr. Alberto Gutierrez at (505) 842-8000 at Geolex, Inc. 500 Marquette Avenue NW, Suite 1350, Albuquerque, New Mexico 87102.

Sincerely,
Geolex, Inc.

Alberto A. Gutiérrez, C.P.G.
President
Consultant to Frontier Field Services LLC

Enclosure
AAG/lh

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FRONTIER FIELD SERVICES, LLC
DRAFT PUBLIC NOTICE FOR HEARING

Case No. : *Application of Frontier Field Services, LLC for authority to inject, Lea County, New Mexico.* Frontier Field Services, LLC requests an order authorizing it to inject acid gas and carbon dioxide (CO₂) from the Maljamar Processing Plant into its proposed Maljamar AGI#1 well. The well will be located in Section 21, Township 17 South, Range 32 East, NMPM, in Lea County, New Mexico. Frontier Field Services seeks approval to drill and complete a well for injection of acid gas and CO₂ into the lower Leonard and Wolfcamp formations in injection intervals approximately from 9300 feet to 10000 feet, and approval of a maximum injection pressure of 2973 psi and a maximum daily injection rate of 2MMCFD. The proposed Maljamar AGI #1 will be located eight approximately three miles south of the town of Maljamar, New Mexico.