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Case 15193

August 7, 2014

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

Dear Florene:

Enclosed for filing, on behalf of Frontier Field Services, LLC, are six copies of an application for approval of an AGI well, together with a proposed advertisement. The advertisement has also been e-mailed to the Division. Please set this matter for the September 11, 2014 Commission hearing. Thank you.

Very truly yours,

James Bruce
Attorney for Frontier Field Services, LLC

Persons Notified of Hearing

Bureau of Land Management
Carlsbad, New Mexico

Mid-America Pipeline Company, LLC
Houston, Texas

Cimarex Energy Co.
Midland, Texas

COG Operating LLC
Midland, Texas

ConocoPhillips Company
Houston, Texas

Mack Energy Corporation
Artesia, New Mexico

PROPOSED ADVERTISEMENT

Case No. 15193 *:*

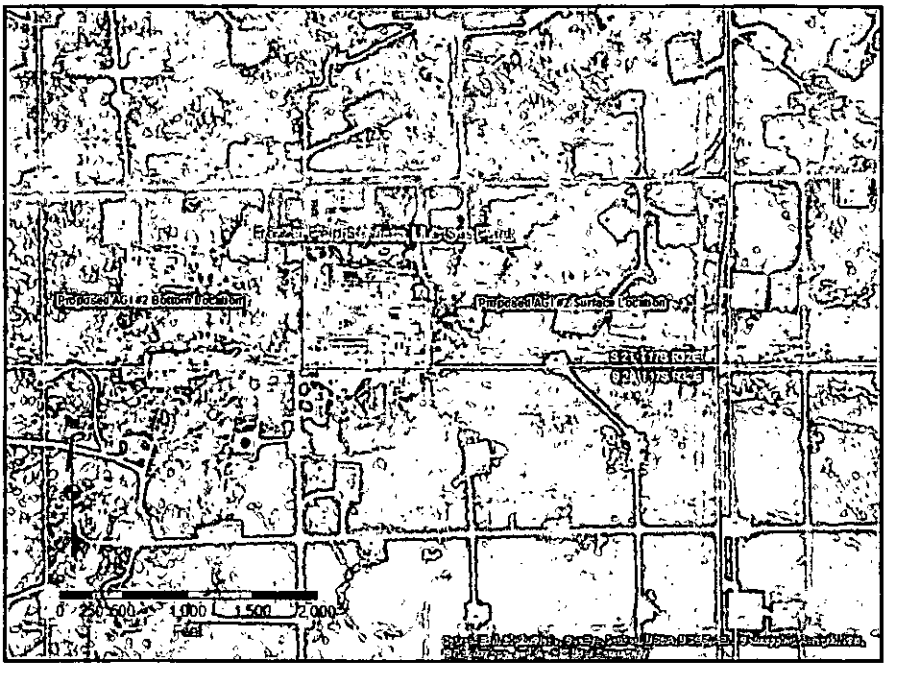
Application of Frontier Field Services, LLC for authorization to inject, Lea County, New Mexico. Applicant Frontier Field Services, LLC seeks authorization to inject acid gas and carbon dioxide from its Maljamar Processing Plant into the proposed Maljamar AGI Well No. 2, to be drilled at a surface location 400 feet from the south line and 2100 feet from the east line of Section 21, Township 17 South, Range 32 East, NMPM, to a bottom hole location 350 feet from the south line and 650 feet from the west line of said Section 21. Applicant proposes to use the Maljamar AGI Well No. 2 to inject acid gas and carbon dioxide into the Wolfcamp formation at depths of approximately 9600-10200 feet subsurface at a maximum injection pressure of 3200 psi and a maximum daily injection rate of 2 MMSCFD. Applicant requests that the maximum daily injection rate apply to the proposed Maljamar AGI Well No. 2 and to the existing Maljamar AGI Well No. 1 (for either well, or both wells combined). The Maljamar AGI Well No. 1 is located 130 from the south line and 1813 feet from the east line of Section 21, Township 17 South, Range 32 East, NMPM. The Maljamar AGI Well No. 2 will be located approximately 3 miles south of Maljamar, New Mexico.

C-108 Application for Authorization to Inject

Frontier Field Services, LLC

Maljamar AGI #2

Surface Location: 400'FSL & 2,100' FEL Section 21, T17S, R32E
Bottom Hole Location: 350' FSL & 650' FWL Section 21, T17S, R32E
Lea County, New Mexico



June 6, 2014

Prepared For:

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

Prepared By:

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

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL
RESOURCES DEPARTMENT

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

FORM C-108
Revised June 10, 2003

Case 15193

APPLICATION FOR AUTHORIZATION TO INJECT

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? ___X___ Yes ___ No **Total Capacity requested 2 MMSCFD**
If yes, give the Division order number authorizing the project: **Order R-13443A**

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; APPENDIX B

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected; **SECTIONS 1 and 3**
2. Whether the system is open or closed; **SECTIONS 1 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, **SECTIONS 3 and 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.). **SECTION 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. **SECTIONS 4 and 5 and APPENDICES A and B**

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 but twin Maljamar AGI #1 (API 3002540420) logs, core and full data on file with Division**

*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 C**

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: 6/6/14

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**

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

III. WELL DATA

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

(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
Surface Location: Section 21, T17S, R32 E, 400' FSL, 2100' FEL - SECTIONS 1, 3 and 4.
Bottom Location: Section 21, T17S, R32 E, 350' FNL, 650' FWL - 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 5 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. See End of Well report dated 1/31/2013 for detailed data on twin Maljamar AGI #1 on file with NMOCD**

(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; APPENDIX B**

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 6; APPENDIX C. WE WILL NOTIFY OPERATORS AND LEASEHOLD OWNERS AND SURFACE OWNERS WITHIN THE AREA OF REVIEW PURSUANT TO NMOCD REGULATIONS AND WE WILL SUBMIT AFFIDAVITS OF PUBLICATION OF NOTICE AND CERTIFIED MAIL RETURN RECEIPTS AT HEARING.**

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include: **SEE APPENDIX C 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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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 redundant Class II acid gas injection (AGI) well (Maljamar AGI #2) located near Maljamar AGI #1 (API # 3002540420) and 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 proposed well will be drilled 400 feet FSL and 2,100 feet FEL of Section 21, T17S, and R32E. The well will be inclined at approximately 29 degrees in a westerly direction, after kickoff below the intermediate casing at approximately 5,820 feet, and will bottom in the Wolfcamp at approximately 350 feet from the south line and 650 feet from the west line of Section 21, T17S and R32E. The surface location will be located approximately 470 feet NNW of the existing Maljamar AGI #1, and the bottom hole location will be approximately 2,500 feet west of the surface location (Figure 2).

The Maljamar AGI #2 is anticipated to have a total vertical depth of approximately 10,306 feet (approximately 11,000 feet measured depth) in the 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. This zone is between approximately 9,600 and 10,200 vertical feet. Analysis of the reservoir characteristics of these units confirms that they act as excellent closed-system reservoirs that should accommodate the future needs of Frontier for disposal of acid gas and sequestration of CO_2 from the plant.

Frontier currently has a permitted AGI well (Maljamar AGI #1) in the same zone and the proposed well is a redundant well to act as backup well to prevent shutting end producers and allowing the plant to operate if there are any problems with Maljamar AGI #1. Frontier needs to safely inject up to 2.0 million standard cubic feet (MMSCF) per day of treated acid gas (TAG) for at least 30 years through either Maljamar AGI #1 and/or Maljamar AGI #2. Geologic studies conducted for the selection of this location demonstrate that the proposed injection zone is readily capable of accepting and containing the proposed acid gas and CO_2 injection volumes well within NMOCD's recommended maximum injection pressures. This well is intended to provide a backup injection well for the existing AGI #1, and Frontier seeks a total capacity of 2 MMCFD combined for both wells.

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 (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 and operating wells penetrating the proposed injection zone 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 existing Rule 11 plan for the facility will be modified to accommodate the proposed changes in operation and the new and redundant AGI well (to be submitted in final form for approval before commencing injection of acid gas).

Based upon this detailed evaluation and data captured from the operation of existing Maljamar AGI #1, Frontier has determined that the proposed redundant injection well is a safe and environmentally-sound project for the disposal of acid gas. The proposed Maljamar AGI #2 would be used in the event of the casing or tubing failure of the existing Maljamar AGI #1 and would be immediately available to continue injection of acid gas and keep the plant running while the Maljamar AGI #1 is repaired or worked over. This project ensures continuation of the additional environmental benefit of permanently sequestering a significant volume of CO_2 which would otherwise continue to be released to the atmosphere and the flaring of H_2S which currently takes place at the Plant. At the expected ratio of 12% H_2S and 88% CO_2, injecting 2.0 MMSCFD will dispose of 13 tons of H_2S and 100 tons of CO_2 per day.

The AGI #1 is currently permitted (under Order R-13443-A) to inject up to 1.8 MMSCFD. Due to changes in the inlet CO_2/H_2S concentrations, Frontier requests that this injection rate be increased to 2.0 MMSCFD for either or both wells combined.

On May 16, 2011, Geolex, on behalf of Frontier, submitted a C-108 Application for Authorization to Inject for an Acid Gas Injection (AGI) Well, to be located near the Frontier Maljamar Gas Plant near Maljamar, New Mexico (Figure 1). The purpose of the existing Maljamar AGI #1 was to replace the existing flare used to incinerate the treated acid gasses (TAG) from the sweetener units. The C-108 Application for Authorization to Inject for Maljamar AGI #1 was approved under Order No. R-14664 on August 11, 2011. Maljamar AGI #1 was completed in June 2012.

In the current Order (R-13443-A) the maximum approved operational pressure (MAOP) for Maljamar AGI #1 was set at 2,973 psi. Following the analyses of step-rate tests and formation pressure characteristics, a request to increase the MAOP to 3,200 psi was sent to NMOCD on September 20, 2013. This request was approved in Administrative Order IPI-454 on October 21, 2013. The same MAOP of 3,200 psi is requested for the AGI #2 since it is in the same zone and depths, approximately 2,650 feet away from the existing well.

At normal operating conditions of 2,200 psi and a compressor outlet temperature of 100 °F, two million standard cubic feet (MMSCFD) of TAG would occupy 4,836 cubic feet, or 861 barrels. At an equilibrated reservoir conditions of 4,800 psi and 132 °F, 2 MMSCFD of TAG would occupy 4,887 cubic feet, or 764 barrels.

Using the anticipated injection rate of 2.0 MMSCFD, after 30 years of plant operations the TAG would occupy a radius of approximately 0.26 miles. Using the 100% safety factor of 4.0 MMSCFD, the TAG would occupy a radius of approximately 0.37 miles.

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 original 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. Logging and testing of the Wolfcamp during drilling, completion and operation of Maljamar AGI #1 verified that the Wolfcamp was an acceptable injection reservoir.

As an example of the injectibility of these reservoirs, we have researched the injection capacity of three 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)
- Cimarex Energy Co. Pearsall Federal SWD 001, 0.5 miles south in Section 28 (injected 1,700 BBL/Day in 2013)

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 Wolfcamp mounds provide sufficient porosity, permeability and volume to serve Frontier's injection needs.

In addition to providing a safe and adequate reservoir for H_2S and CO_2, the geologic environment is ideal to demonstrate the required capture and sequestration of CO_2 to obtain future credits or offsets.

There are 772 recorded wells within two miles of the proposed injection point, of which only 31 penetrate the Wolfcamp. Of these wells, 20 are active and 11 are plugged and abandoned. There are 262 wells listed within one mile of the proposed AGI injection point, of which 137 are active, 64 are plugged and abandoned, and 61 are permitted but not drilled or completed. Within one half mile there are 56 listed wells. Of these, 36 are active, 7 are plugged and abandoned, and 13 are permitted but not drilled or completed. All of the 13 uncompleted wells are permitted to drill to 7,150 feet or less.

None of the active wells within one mile penetrate the injection zone, and none are deeper than 7,150 feet. Six of the seven plugged wells were completed shallower than 4,150 feet; these are all well above the injection zone. The remaining plugged well (Queen B 036) lies approximately 0.17 miles from the injection point. Review of the plugging records of this well show that the plugging effectively isolates the Wolfcamp interval.

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 ½-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 natural surface water within several miles of the plant. A search of the New Mexico State Engineer's files shows no recorded water wells within one mile of the proposed Maljamar AGI #2 injection point. 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 AGI 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)

In addition, this application includes the following supporting information:

- Appendix A: Wolfcamp Formation Fluid Analyses and Analyses of Frontier Maljamar Gas Plant TAG
- Appendix B: Information on Oil and Gas Wells within Two Miles of Proposed Maljamar AGI #2
- Appendix C: 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
- Appendix D: Demonstration of No Recoverable Hydrocarbons, Maljamar AGI #1 (September 25, 2012)

It is anticipated that this application shall be the subject of a NMOCD hearing in Summer 2014.

3.0 PROPOSED CONSTRUCTION AND OPERATION OF MALJAMAR AGI #2 WELL

The proposed well will be drilled 400 feet FSL, 2,100 feet FEL of Section 21, T17S, and R32E. The well will be inclined at approximately 29 degrees in a westerly direction, and after kicking off below the intermediate casing at approximately 5,820 feet will bottom in the Wolfcamp at approximately 350 feet from the south line and 650 feet from the west line of Section 21, T17S and R32E. The surface location will be located 470 feet NNW of the existing Maljamar AGI #1, and the bottom hole location will be approximately 2,500 feet west of the surface well head (Figure 2).

3.1 CALCULATED MAXIMUM INJECTION PRESSURE AND INJECTED AREA

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% CO_2
- 12% H_2S
- Trace Components of $C_1 - C_7$

The total volume of TAG to be injected under this scenario will be approximately 380 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 MAOP for the original well Maljamar AGI #1 was calculated using the following method approved by NMOCD to calculate the preliminary proposed MAOP, and the original MAOP of 2,973 psi was calculated as shown below:

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

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

$SG_{tag} = 0.78$
$D_{top} = 9{,}500$ feet

Therefore:

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

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

Based on the results of post-completion step rate tests and analysis of formation parting pressure, Frontier requested an Administrative Order to increase the MAOP to 3,200 psi. This request was submitted to NMOCD on September 20, 2013. This request was approved in Administrative Order IPI-454 on October 21, 2013. Frontier therefore requests the new MAOP of 3,200 psi be applied to the proposed

Maljamar AGI #2, which will be completed in the same formation at an equivalent depth approximately 2,500 feet away.

Calculations presented in Table 1a (incorporating the compressibility of the TAG at reservoir conditions) show that, over 30 years, a daily injection volume of 2 MMSCFD of TAG will occupy approximately 47 million cubic feet in the reservoir. As discussed in Section 4.3, a calculated gross net porosity of 10.3 feet in the reservoir is reduced to an effective net porosity of 7.8 feet after correcting for a residual water content of 45%. Based on a net porosity of 7.8 feet, we calculate that the 30-year injection volume will occupy approximately 139 acres of the reservoir, with a radius of 0.26 miles.

Table 1b shows the volume, radius area and radius that would be occupied if the well was injected at a 100% increase in volume, or 4.0 MMSCFD. In this case, the final volume would increase to 94 million cubic feet in the reservoir. Based on the same net porosity of 7.8 feet, we calculate that the 30-year injection volume will occupy approximately 278 acres of the reservoir, with a radius of 0.37 miles. The areas calculated are shown in Figure 3.

Table 1a: Calculations for Area of Injection at Estimated Rate of 2.0 MMSCFD (Anticipated Normal Injection Rate)

PROPOSED INJECTION STREAM CHARACTERISTICS

TAG	H_2S	CO_2	H_2S	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_2S	Inject Rate lb/day	Density[1] kg/m^3	SG[2]	density lb/gal	volume ft^3	volume bbl
100	2200	2	88:12	238516	789.60	0.79	6.59	4836	861

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
132	5020	9637	10238	137	934.70	0.93	7.80	4086	728

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
132	4800	10.3	0.45	7.76105	890.75	0.89	7.44	4287	764

CONSTANTS

	SCF/mol	
Molar volume at STD	0.7915	
	g/mol	lb/mol
Molar weight of H_2S	34.0809	0.0751
Molar weight of CO_2	44.0096	0.0970
Molar weight of H_2O	18.015	0.0397

[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

CALCULATION OF MAXIMUM INJECTION PRESSURE LIMITATION

SG_{TAG}	0.86
$PG = 0.2 + 0.433\ (1.04\text{-}SG_{TAG})$	0.277 psi/ft
$IP_{max} = PG * Depth$	2670 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)	4287 ft^3/day
Cubic Feet/30 years	46976938 ft^3/30 years
Area = V/Net Porosity (ft)	6052910 ft^2/30 years
Area = V/Net Porosity (ft) (43560 ft^2/acre)	139.0 acres/30 years
Radius =	1388 ft
	0.26 miles

Table 1b: Calculations for Area of Injection at Estimated Rate of 4.0 MMSCFD (100% Safety Factor)

PROPOSED INJECTION STREAM CHARACTERISTICS

TAG Gas vol MMSCFD	H_2S conc. mol %	CO_2 conc. mol %	H_2S inject rate lb/day	CO_2 inject rate lb/day	TAG inject rate lb/day
4	12.00	88.00	45563	431469	477032

CONDITIONS AT WELL HEAD

Well Head Conditions		TAG							
Temp F	Pressure psi	Gas vol MMSCFD	Comp CO_2:H_2S	Inject Rate lb/day	Density[1] kg/m^3	SG[2]	density lb/gal	volume ft^3	volume bbl
100	2200	4	88:12	477032	789.60	0.79	6.59	9673	1723

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
132	5620	9637	10238	137	934.70	0.93	7.80	8171	1455

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
132	4800	10.3	0.45	7.76105	890.75	0.89	7.44	8574	1527

CONSTANTS

	SCF/mol	
Molar volume at STD	0.7915	
	g/mol	lb/mol
Molar weight of H_2S	34.0809	0.0751
Molar weight of CO_2	44.0096	0.0970
Molar weight of H_2O	18.015	0.0397

CALCULATION OF MAXIMUM INJECTION PRESSURE LIMITATION

SG_{TAG}	0.86
$PG = 0.2 + 0.433\ (1.04\text{-}SG_{TAG})$	0.277 psi/ft
$IP_{max} = PG * Depth$	2670 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)	8574 ft^3/day
Cubic Feet/30 years	93953876 ft^3/30 years
Area = V/Net Porosity (ft)	12105820 ft^3/30 years
Area = V/Net Porosity (ft) (43560 ft^2/acre)	277.9 acre√30 years
Radius =	1963 ft
	0.37 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

3.2 WELL DESIGN

While the injected fluid will be dehydrated, the line that will convey the TAG to the well from the existing compression facilities will be a 3 inch steel line (304 or 316) to provide added corrosion protection. The final design for the associated piping and layout of H_2S 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 4, and the preliminary design for the injection well is shown on Figure 5.

The proposed well (Maljamar AGI #2) will be an deviated well, spudded on property leased from the BLM by Frontier Field Services LLC.

The proposed well (Figure 5) will be drilled vertically to approximately 5,820 feet, and then deviated west northwesterly at approximately 29 degrees from the vertical, reaching a final total vertical depth of approximately 10,300 feet at a point approximately 2,500 feet west of the surface location. The total measured length of the well will be approximately 10,964 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 injection 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 5):

1. Surface casing to approximately 890 feet, beneath the Triassic "Redbeds", to protect the fresh water.
2. Intermediate casing to approximately 5,700 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 ~10,306 feet, TMD ~ 10,964 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 890 feet, and 13 $^{3}/_{8}$ inch, 48.0 ppf, H40, STC casing will be installed and cemented to the surface with approximately 1000 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 5,700 feet. There an 9 $^{5}/_{8}$ inch, 40.0 ppf, J55, LTC surface casing string will be run and cemented to surface with approximately 1,450 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 cement integrity of the intermediate casing, the well will be drilled to the projected TMD of 10,964 feet using an 8 $^{3}/_{4}$ inch bit. We anticipate that the kickoff point for the deviated portion of the well will be at a depth of approximately 5,820 feet, or 120 feet below the base of the intermediate casing.

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. Since cores and detailed lithological analyses were performed in the AGI #1, similar cores will not be needed in this well.

After the logs have been evaluated, the production casing consisting of approximately 11,000 feet of 7 inch casing will be emplaced in 3 sections, shown in TMD distances, as:

1. 7", 26 ppf HCL-80 Premium to ~9,400' (MD 9,925')
2. 7", 26 ppf CRA SM-2535 Premium or equivalent at 9,622' (10,226 MD) (est.), and
3. 7" 26 ppf HCL-80 Premium at ~10,306' (10,994' MD)

To ensure complete cement bonding and filling throughout the inclined section of the production casing, at least one centralizer suitable for horizontal wells will be placed on each joint of casing.

The exact location of the 300 foot section of Corrosion Resistant Alloy (CRA) material (inserted into the string at the packer setting depth to provide a corrosion resistant seat for the packer) will be determined from log interpretation. The anticipated perforation zones will be between 10,238 to 10,886 feet TMD, but the exact zones will be determined after log analyses.

The production casing will be cemented in two stages to ensure zone isolation. After a diverter valve (DV) is placed in the production casing at approximately 9,624' (MD), acid-resistant cement (CORROSACEM™ or equivalent) will be pumped from the total depth (10,964' MD) to the DV, using approximately 250 sacks of cement. The lead of the second stage will be Class C conventional cement, and approximately 1,300 sacks will be pumped to a measured depth of approximately 1,000 feet MD. The final tail of the second stage will consist of approximately 150 sacks of conventional Class H cement, from 1,000 feet 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 360-degree 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 does 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 approximately 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 10,183 feet of $2\ ^{7}/_{8}$ inch, 6.5 ppf, L80 ULTRA FX Premium thread tubing (or equivalent), and an SSV will be run into the well at approximately 295 feet. A ¼ inch Inconel steel line will connect the SSV to a hydraulic panel at the surface. Approximately 2 joints of CRA tubing (SM2535 or equivalent) will be placed immediately above the packer for corrosion prevention.

The National Association of Corrosion Engineers (NACE) issues guidelines for metals exposed to various corrosive gases such as those found in this well. For a H_2S/CO_2 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 625, 925 or equivalent. The CRA joints will be constructed of a similar alloy from a manufacturer such as Sumitomo. A product such as SM2535 (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 existing Rule 11 Plan will be modified 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 #2 well. A Rule 11 Plan for the current facility at Maljamar was approved in 2013. This plan will be modified and resubmitted for approval prior to beginning injection in the AGI #2 to accommodate the additional well and surface piping.

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 three 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 6 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 Appendix C for additional information on oil and gas wells within the area of review. The estimated depths to formation tops based on the existing Maljamar AGI #1 are:

Formation Top	Depth to Top (Vertical Feet)	Depth to Top (Measured Depth)	Resource
Alluvium/Ogallala	0	0	Freshwater
Dockum/Rustler	200	200	Water
Yates	1,267	1,267	None
Seven Rivers	2,207	2,207	Oil/Gas
Queen	3,176	3,176	Oil/Gas
Grayburg	3,537	3,537	Oil/Gas
San Andres	3,931	3,931	Oil/Gas
Glorieta	5,571	5,571	Oil/Gas
Yeso	6,300	6,370	Oil/Gas
Tubbs	7,036	7,214	Oil/Gas
Top Abo	7,667	7,938	Oil/Gas
Top Lower Leonard	9,206	9,703	Barren
Wolfcamp	9,648	10,210	Barren
Cisco	10,238	10,886	Oil/Gas

4.3 LITHOLOGIC AND RESERVOIR CHARACTERISTICS OF THE WOLFCAMP

As seen in Figure 7, 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 8).

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 AND LOG INTERPRETATION

An initial evaluation of the reservoirs was conducted during the planning of Maljamar AGI #1. Due to the discontinuous nature of the Wolfcamp mounds, we 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 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 the 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 shows the net porosity in the Wolfcamp zone. Here, at the location of the proposed AGI #2 injection point, there are 137 feet of reservoir with an average porosity of 10.3%. As seen in Tables 1a and 1b, when corrected for a residual water content of 0.45, this results in an effective net porosity of 7.76 feet.

After analysis of the geophysical and borehole logging of the proposed Maljamar AGI #2 well, specific zones will be selected for completion as AGI reservoirs. The seismic evaluation and log interpretations have 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.
- 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 1a), 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 3.

As calculated in Section 3.1, each standard million cubic feet (MMSCF) of TAG at the surface will be compressed to approximately 764 barrels of supercritical fluid at reservoir pressures and temperature. Hence, a 30-year lifetime of injection will result in 8.4 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 3 times the anticipated injection rate for 30 years.

As shown in Figure 3, the proposed maximum injection rate of 2.0 MMSCFD will generate a "footprint" with an area of approximately 139 acres after considering the effect of irreducible water. This footprint will not impact any of the nearby active wells.

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

Daily TAG Injection Volume (MMSCF)	Daily Volume of TAG in Reservoir (BBLS/D)	Total TAG Volume in Reservoir after 30 Years (BBLS)	Calculated Reservoir Volume in Wolfcamp (BBLS)	Percentage of Reservoir Occupied	Calculated Radii of Affected Area of Reservoir (Miles)	Affected Area of Reservoir (Acres)
2.0	764	8.4 Million	24 Million	35 %	0.26	139

4.6 FORMATION FLUID CHEMISTRY

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

Parameter	BAISH A 012	BAISH B 001	Maljamar AGI #1
Mg^{++}	972	680	401
Na^{+}	52,298	34,704	84,400
$CO_3^{=}$	ND	ND	ND
$HCO_3^{=}$	1,220	481	195
$SO_4^{=}$	4,400	3,900	3340
Cl^{-}	50,000	33,000	132,000
Fe (free)	11	14	ND
pH	7.6	7.4	7.70
$CaCO_3$	1.4	0.9	ND

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

Drilling data and laboratory analyses of formation fluids from the adjacent Maljamar AGI #1 showed that the Wolfcamp zone employed in this well and proposed for the AGI #2 contains no economical,

recoverable hydrocarbons. A copy of the demonstration of this conclusion is included in Appendix D. The formation fluid analyses for Maljamar AGI #1 are included also in Appendix A.

4.7 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 three miles northeast of the Plant (Nicholson and Clebsch, 1961).

The results of a search of the New Mexico State Engineer's online files for registered water wells in this area showed no reported wells within one mile of the injection point. The nearest well listed is in Section 3, T17S, R32E, approximately three 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 Clebsch, 1961).

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

Appendix B contains a complete list based on NMOCD records of all active, temporarily abandoned, abandoned and plugged oil and gas wells within the initial two mile radius area of review of the injection point (bottom hole location) of the proposed AGI #2 (Figure 11, Table B1). There are 772 recorded wells within this area, of which only 31 penetrate the Wolfcamp. Of these wells, 20 are active and 11 are plugged and abandoned.

Within one half mile of the proposed injection point there are only two wells identified that penetrate the Wolfcamp zone (Figure 12). Of these, one is active (the existing Maljamar AGI #1) and one is plugged (Queen B 036).

5.1 STATUS OF THE WOLFCAMP-PENETRATING WELL WITHIN ONE HALF MILE OF FRONTIER GAS PLANT

The Queen B 036 was plugged and abandoned in September 2004 with all original casing strings in place. The Wolfcamp interval was isolated by squeezed cement plugs at 9,974', 9,330' and 9,080'. Additional squeezed plugs were placed at 8,996', 8,834', 6,653', 5,485', and a cast iron bridge plug at 5,278'. Additional cement plugs were placed at 4,316', 3,586', 1,900', 1,060', and 875' and at the surface.

This well was properly plugged and should not act as a conduit from the injection zone.

A copy of the plugging diagrams and records for the Queen B 036 is included in Appendix B.

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

Geolex originally 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 C includes the data from that search. Currently we are in the process of having this land data updated and reviewed by an independent company so that all appropriate parties can be notified as required before the hearing.

Table C-1 lists operators within this one-mile radius, and Table C-2 lists the names and addresses of surface owners within the same one mile area of review. As shown in Table C-1, production in the area of review is controlled by two operators as currently listed by the NMOCD internet database. Appendix C also includes Table C-3 which lists the names and addresses of surface lessees of record in the area of review, Table C-4 lists businesses included in the area of review, as extracted from the Lea County land records, and Figure C-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 (confirmed and updated by the current land work) 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 C. A proposed public notice to be published at least 20 days prior to the NMOCD Hearing is also included in Appendix C.

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

As part of the work performed to support this application, a detailed investigation of the structure, stratigraphy and hydrogeology of the area surrounding the proposed Maljamar AGI #2 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.