

HOBBS OCD

DISTRICT I

1625 N. French Dr., Hobbs, NM 88240
Phone (575) 393-6161 Fax: (575) 393-0720

DISTRICT II

811 S. First St., Artesia, NM 88210
Phone (505) 748-1283 Fax: (505) 748-6170

DISTRICT III

1000 Rio Brazos Rd., Aztec, NM 87410
Phone (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV

1217 S. St. Francis Dr., Santa Fe, NM 87505
Phone (505) 476-3460 Fax: (505) 476-3462State of New Mexico
Energy, Minerals and Natural Resources Department

JUN 10 2015

Form C-102

Revised August 1, 2011

Submit one copy to appropriate
District Office

OIL CONSERVATION DIVISION

1217 South St. Francis Dr.
Santa Fe, New Mexico 87505

RECEIVED

WELL LOCATION AND ACREAGE DEDICATION PLAT

☐ AMENDED REPORT

API Number 30-029-42628	Pool Code 97756	Pool Name AGI; WOLF CAMP
Property Code 39029	Property Name MALJAMARAGI	Well Number 2
OGRID No. 721115	Operator Name FRONTIER ENERGY SERVICES	Elevation 4019

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	21	17 S	32 E		400	SOUTH	2100	EAST	LEA

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	21	17 S	32 E		350	SOUTH	650	WEST	LEA
Dedicated Acres	Joint or Infill	Consolidation Code	Order No.						

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

N.: 665189.8 E.: 711294.9 (NAD 83)	N.: 665196.5 E.: 713935.1 (NAD 83)	N.: 665202.4 E.: 716575.3 (NAD 83)	OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unLEASED mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. Signature _____ Date _____ Printed Name _____ Email Address _____
PROPOSED BOTTOM HOLE LOCATION Lat - N 32°48'49.90" Long - W 103°46'40.47" NMSPCE- N 660264.1 E 711975.4 (NAD-83)	SURFACE LOCATION Lat - N 32°48'50.33" Long - W 103°46'10.81" NMSPCE- N 660320.0 E 714506.3 (NAD-83)	SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. Date Surveyed _____ Signature & Seal of Professional Surveyor _____ Certificate No. 7977	

Diagram showing well location and distances:

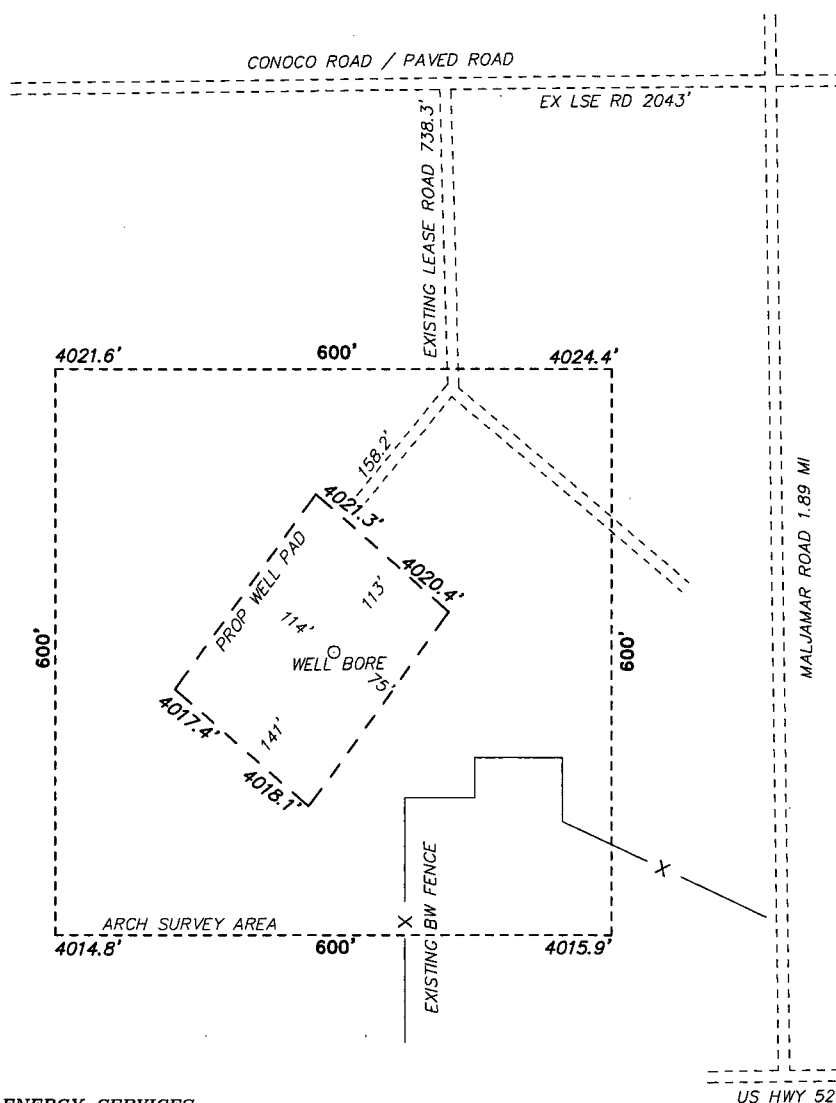
650' 2532.2' 4021.6' 4024.4' 2100' 4014.8' 4015.9' 400' S.L.

Scale: 1" = 1000'

WO Num.: 30504

JUN 11 2015

SECTION 21, TOWNSHIP 17 SOUTH, RANGE 32 EAST. N.M.P.M.,
LEA COUNTY,
NEW MEXICO.



FRONTIER ENERGY SERVICES

AGI #2

ELEV. - 4019'

Lat - N 32°48'50.33"

Long - W 103°46'10.81"

NMSPCE- N 660320.0

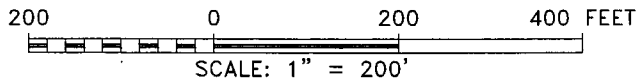
E 714506.3

(NAD-83)

Directions to Location:

FROM US HWY 529 GO NORTH 1.89 MILES, TURN
WEST 2043 FEET, SOUTH ON LEASE ROAD 738.3
FEET, AND SOUTHWEST 158.2 FEET TO PROPOSED
LOCATION.

LOVINGTON, NM IS ±26 MILES TO THE NORTHEAST OF LOCATION.



P.O. Box 1786

1120 N. West County Rd.

Hobbs, New Mexico 88241

(575) 393-7316 - Office

(575) 392-2206 - Fax

basinsurveys.com

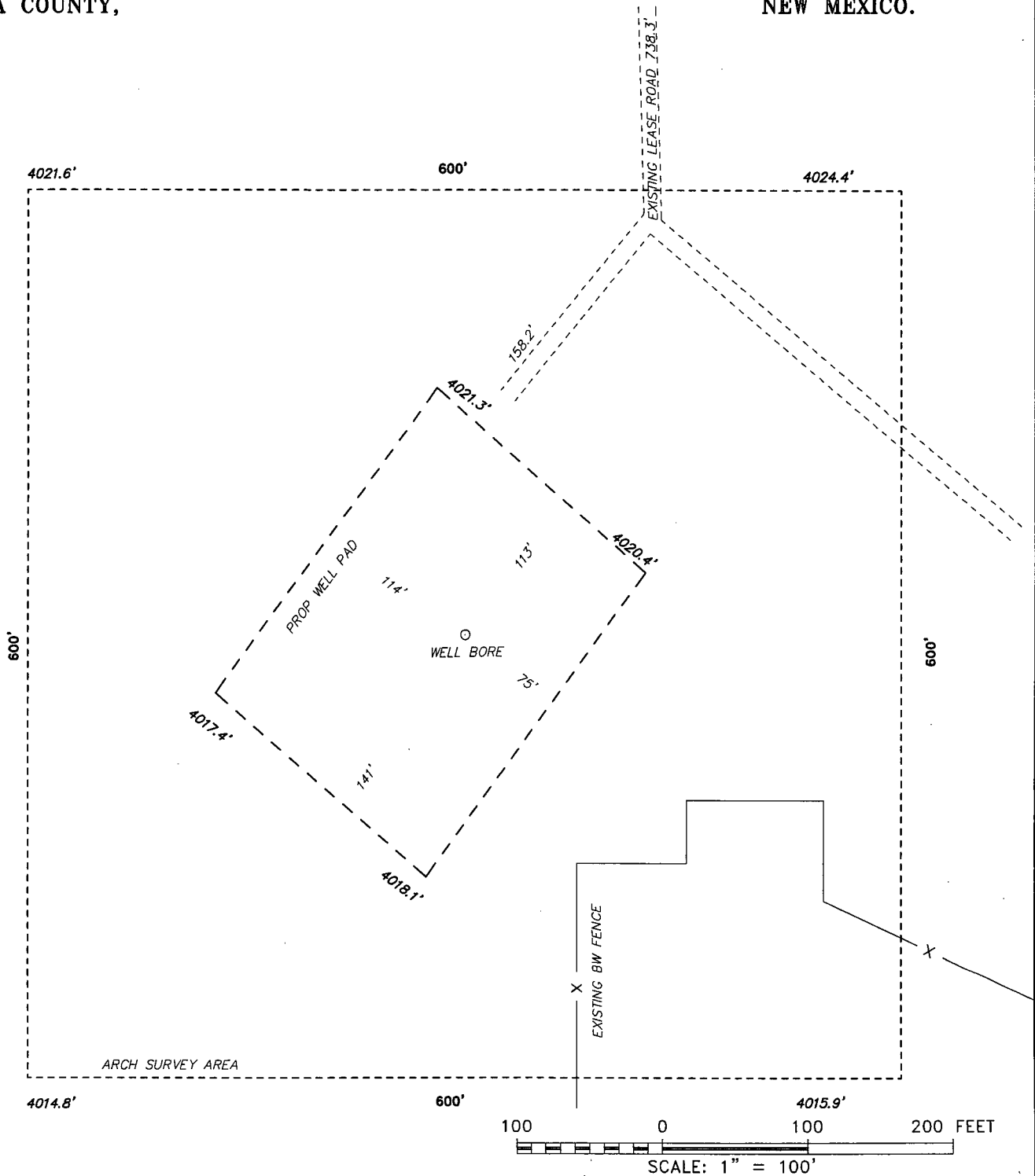


REF: AGI #2 / WELL PAD TOPO

THE AGI #2 LOCATED 400' FROM
THE SOUTH LINE AND 2100' FROM THE EAST LINE OF
SECTION 21, TOWNSHIP 17 SOUTH, RANGE 32 EAST.

N.M.P.M., LEA COUNTY, NEW MEXICO.

SECTION 21, TOWNSHIP 17 SOUTH, RANGE 32 EAST. N.M.P.M.,
LEA COUNTY, NEW MEXICO.



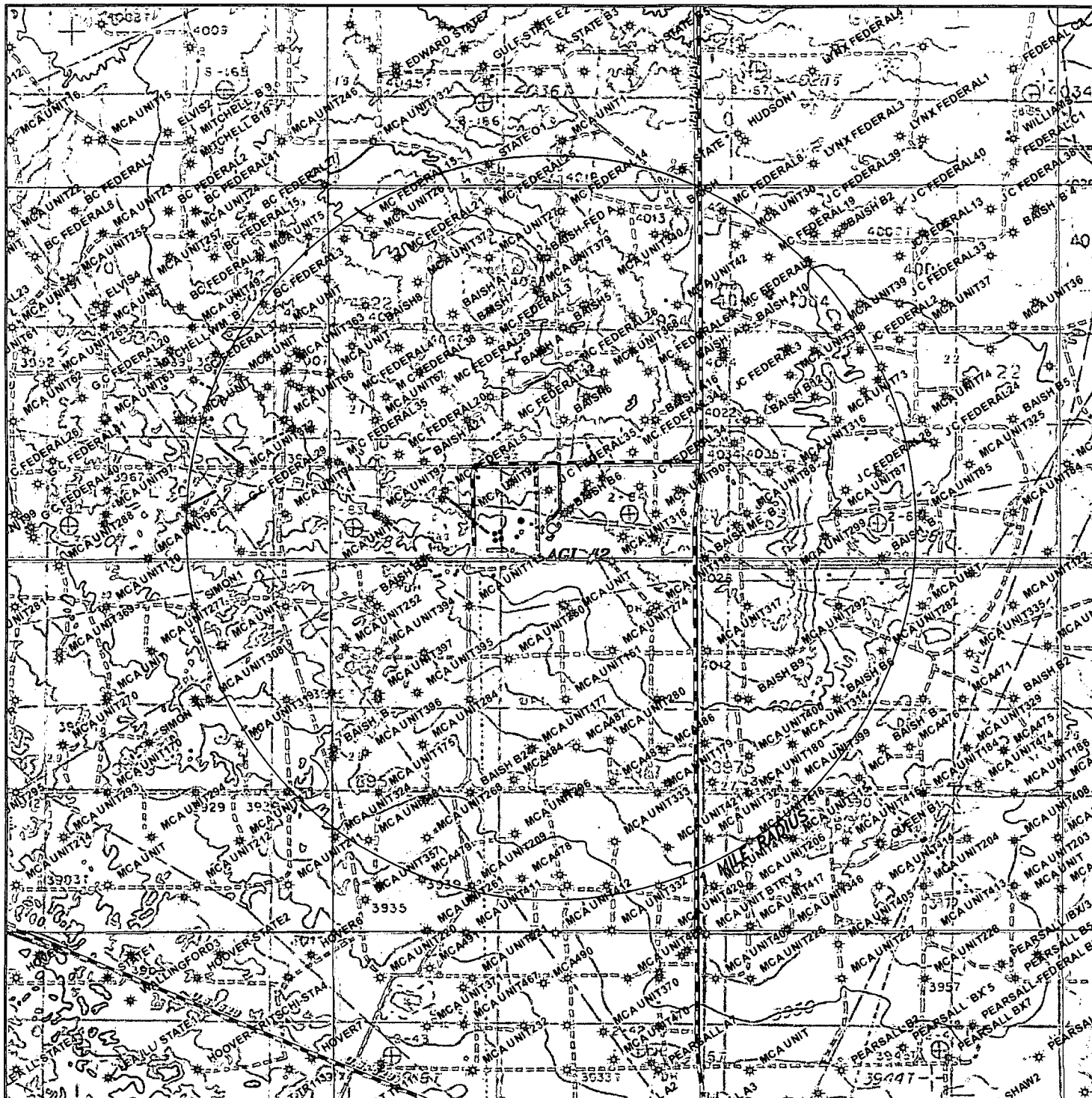
basin surveys
focused on excellence
in the oilfield

P.O. Box 1786
1120 N. West County Rd.
Hobbs, New Mexico 88241
(575) 393-7316 - Office
(575) 392-2206 - Fax
basinsurveys.com



REF: AGI #2 / WELL PAD TOPO

THE AGI #2 LOCATED 400' FROM
THE SOUTH LINE AND 2100' FROM THE EAST LINE OF
SECTION 21, TOWNSHIP 17 SOUTH, RANGE 32 EAST.
N.M.P.M., LEA COUNTY, NEW MEXICO.



AGI #2

Located 400' FSL and 2100' FEL
Section 21, Township 17 South, Range 32 East,
N.M.P.M., Lea County, New Mexico.

basin
surveys

focused on excellence
in the oilfield

P.O. Box 1786
1120 N. West County Rd.
Hobbs, New Mexico 88241
(575) 393-7316 - Office
(575) 392-2206 - Fax
basinsurveys.com

0' 1000' 2000' 3000' 4000'

SCALE: 1" = 2000'

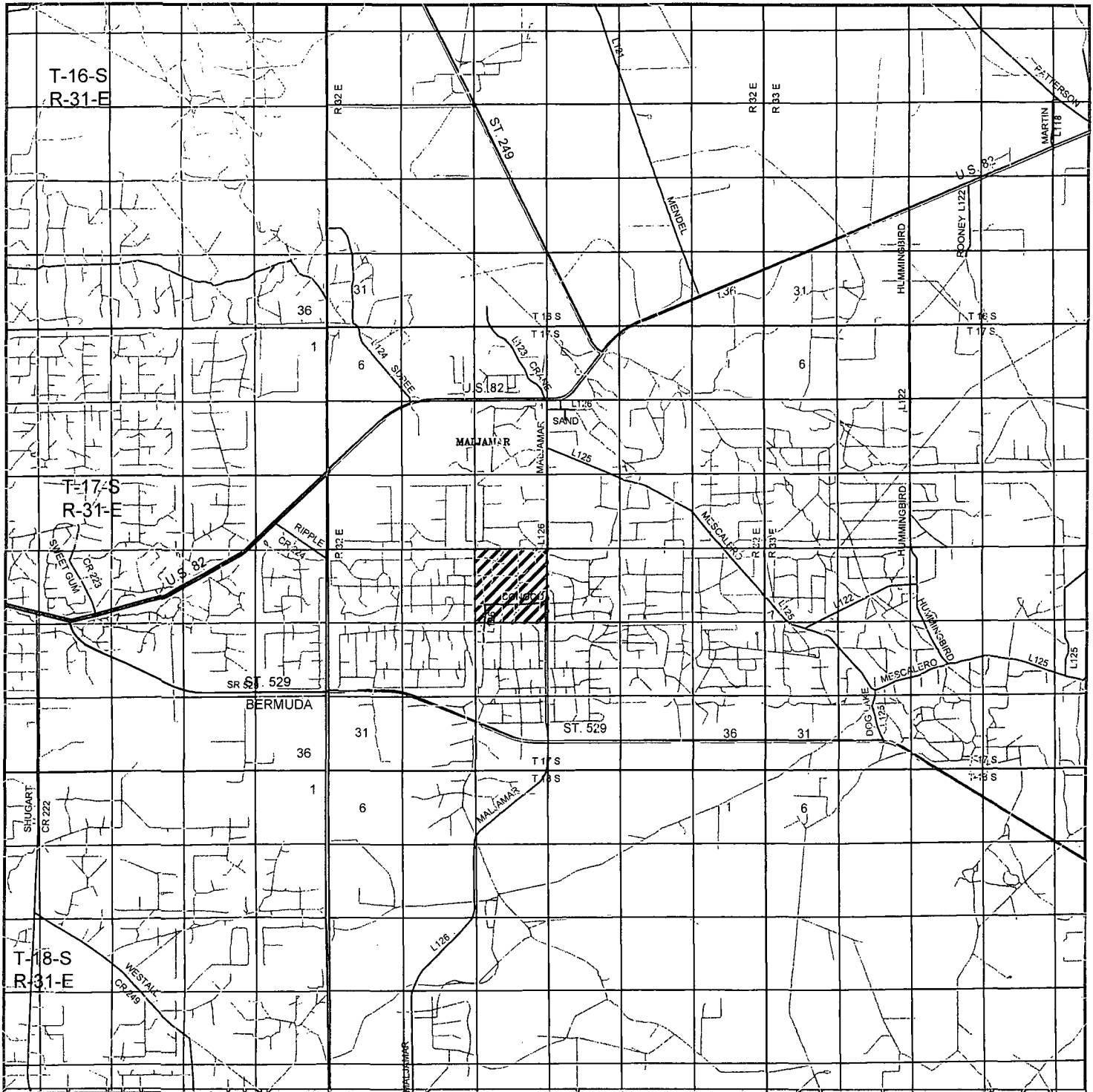
W.O. Number: KAN 30504

Survey Date: 05-30-2014

YELLOW TINT - USA LAND
BLUE TINT - STATE LAND
NATURAL COLOR - FEE LAND

FRONTIER

field services, llc



AGI #2

Located 400' FSL and 2100' FEL
 Section 21, Township 17 South, Range 32 East,
 N.M.P.M., Lea County, New Mexico.

basin
surveys

focused on excellence
 in the oilfield

P.O. Box 1786
 1120 N. West County Rd.
 Hobbs, New Mexico 88241
 (575) 393-7316 - Office
 (575) 392-2206 - Fax
 basinsurveys.com

0 1 MI 2 MI 3 MI 4 MI

SCALE: 1" = 2 MILES

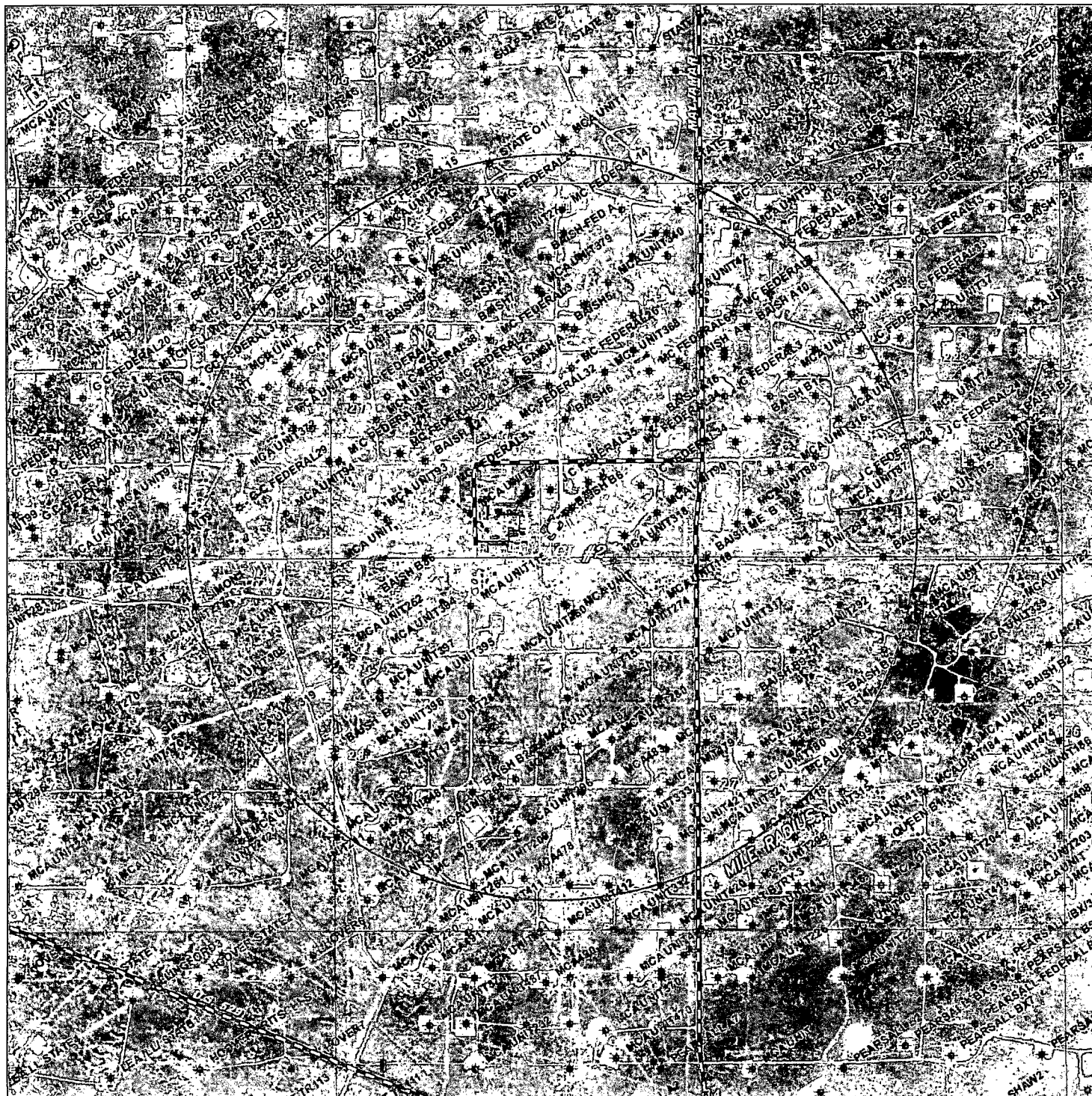
W.O. Number: KAN 30504

Survey Date: 05-30-2014

YELLOW TINT - USA LAND
 BLUE TINT - STATE LAND
 NATURAL COLOR - FEE LAND

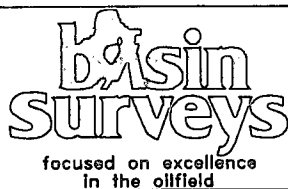
FRONTIER

field services, llc



AGI #2

Located 400' FSL and 2100' FEL
Section 21, Township 17 South, Range 32 East,
N.M.P.M., Lea County, New Mexico.



P.O. Box 1786
1120 N. West County Rd.
Hobbs, New Mexico 88241
(575) 393-7316 - Office
(575) 392-2206 - Fax
basinsurveys.com

0' 1000' 2000' 3000' 4000'

SCALE: 1" = 2000'

W.O. Number: KAN 30504

Survey Date: 05-30-2014

YELLOW TINT - USA LAND
BLUE TINT - STATE LAND
NATURAL COLOR - FEE LAND

FRONTIER

field services, llc

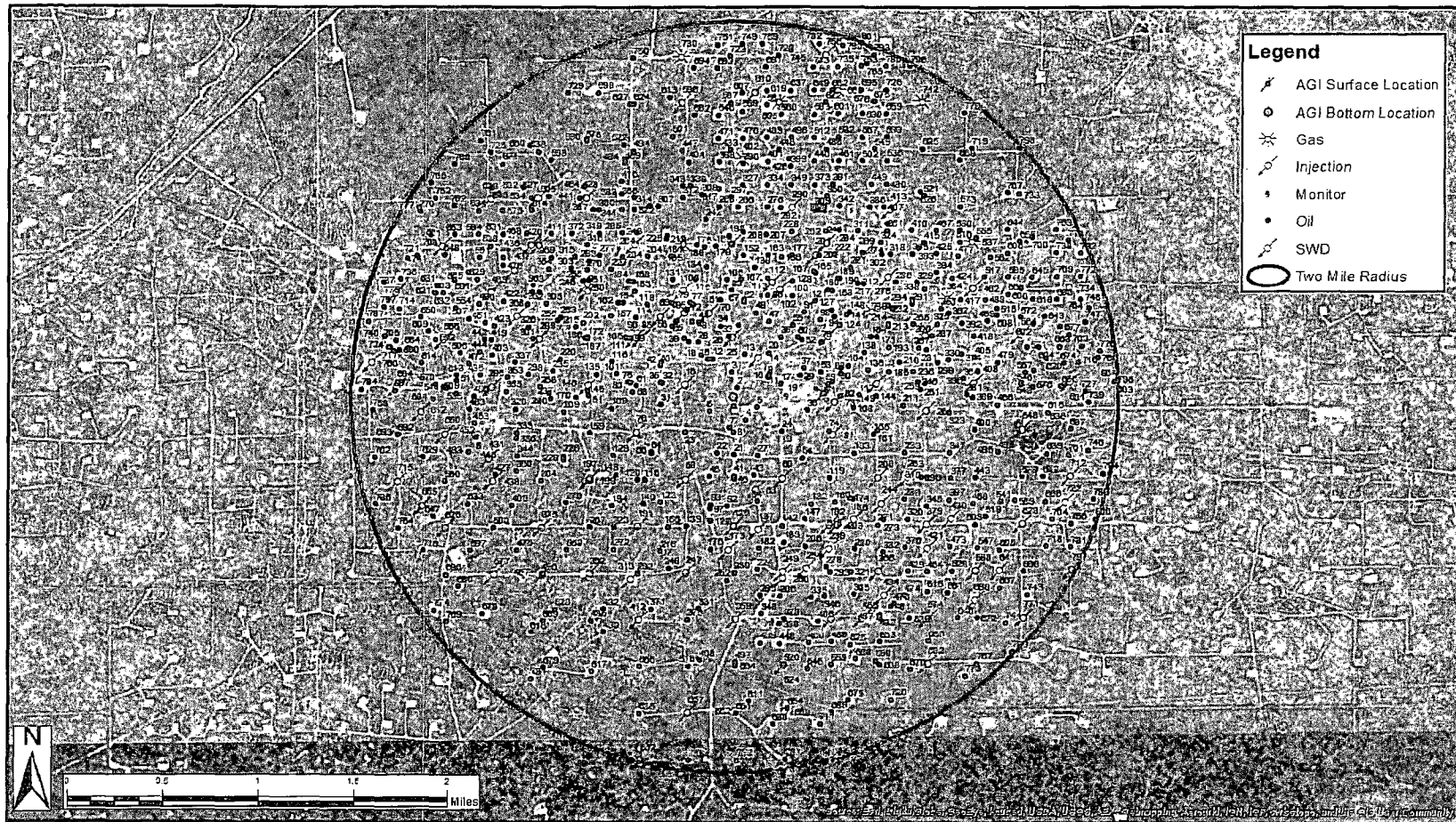


Figure 5: Wells within Two Miles of Bottom Hole Location of Proposed Maljamar AGI #2

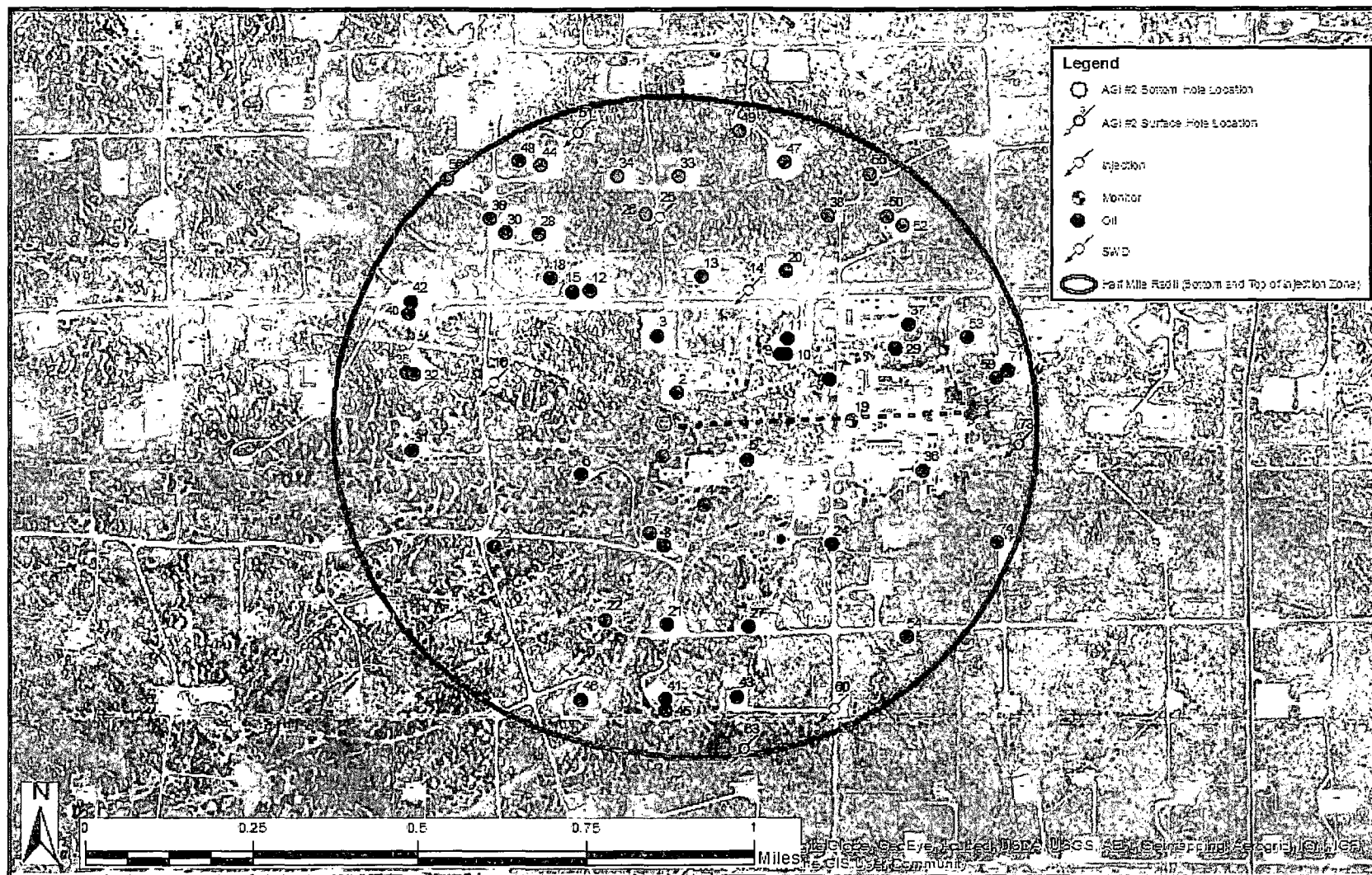


Figure 6: Wells within One-Half Mile of Bottom Hole Location of Proposed Maljamar AGI #2

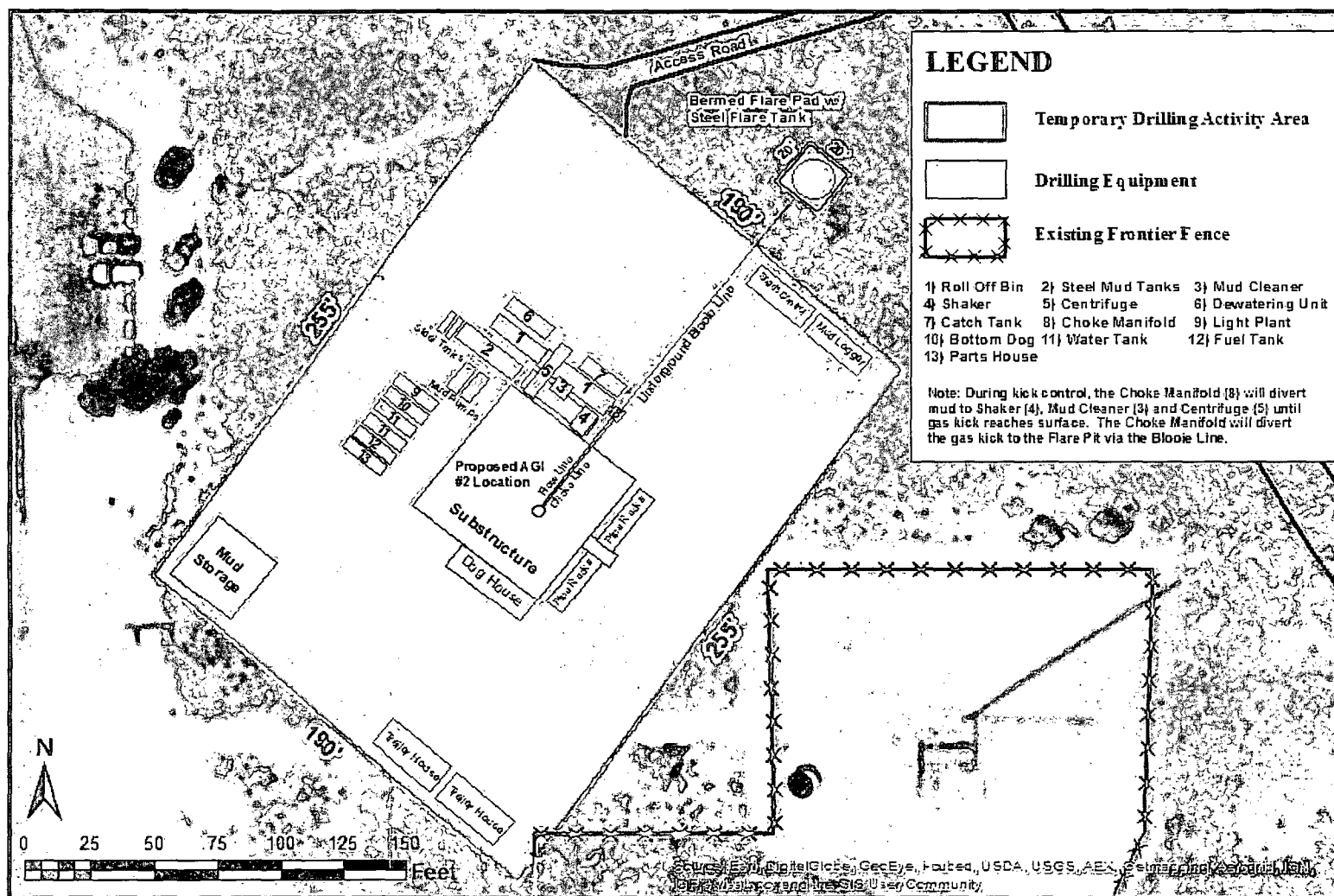


Figure 10: Proposed Well Site Layout, Maljamar AGI #2

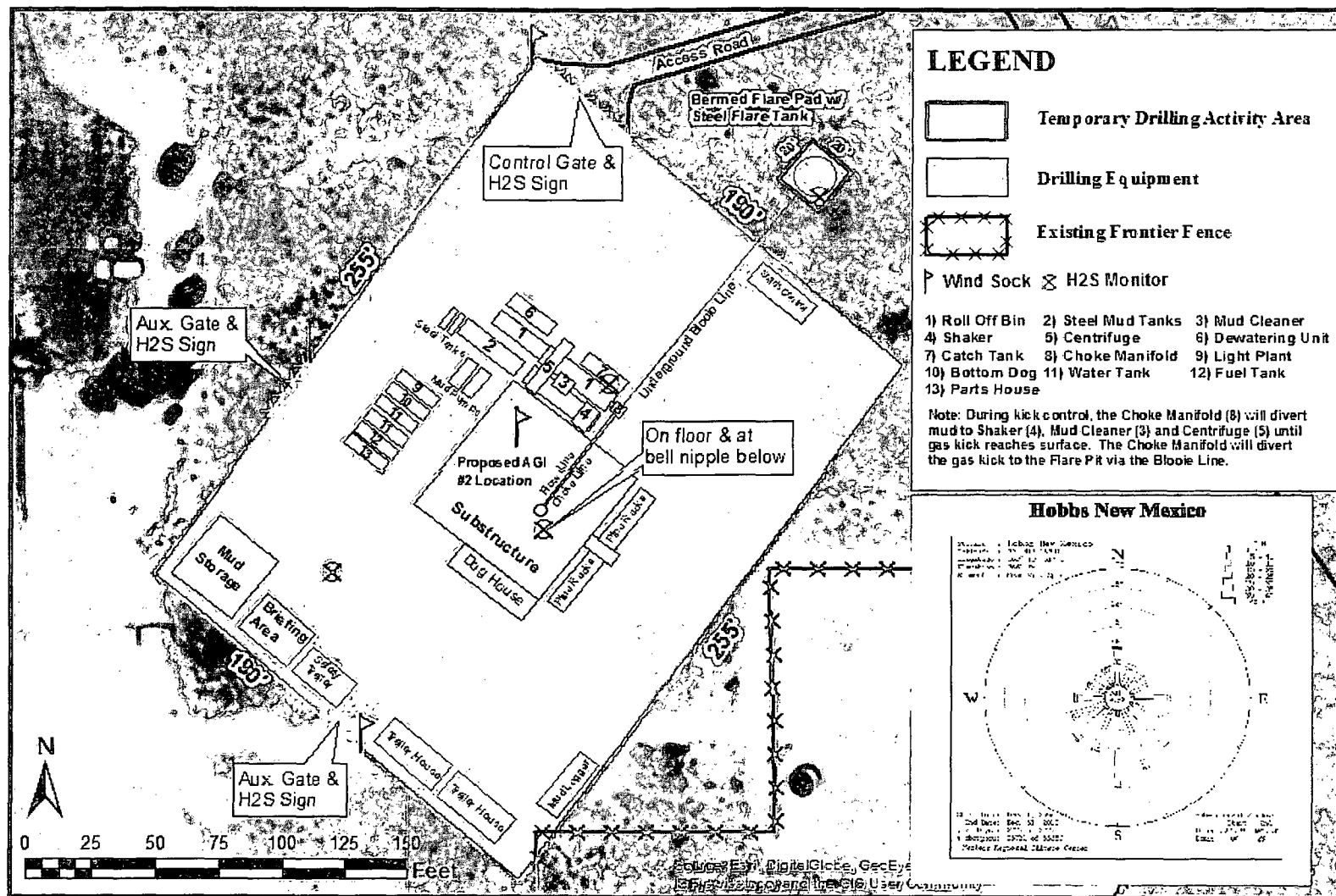


Figure 11: Site Plat Showing H₂S Safety Features and Closed Loop System

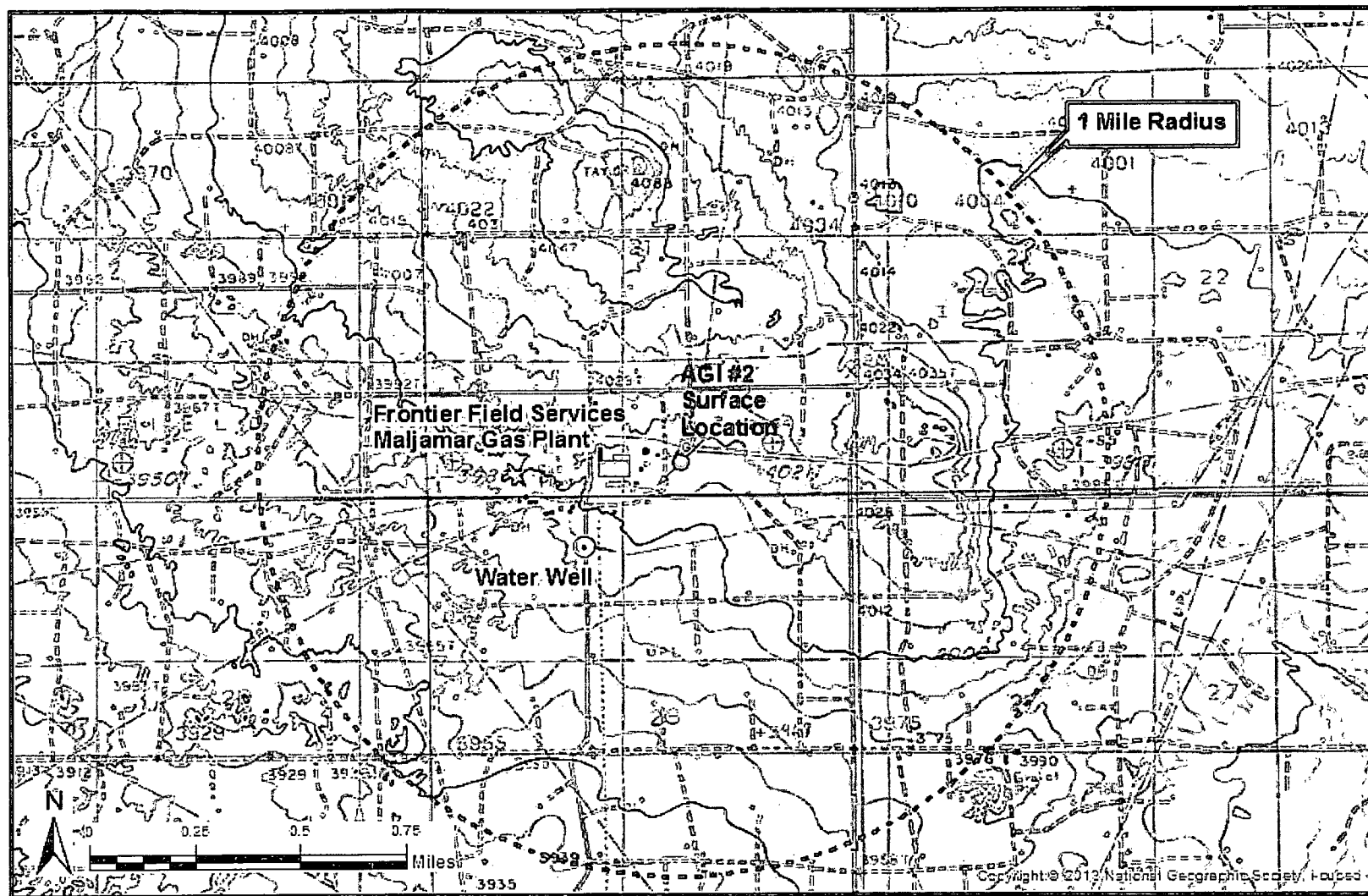


Figure 4: Water Wells Identified by the New Mexico State Engineer's Files within One Mile of the Proposed Maljamar AGI #2

Corrosive environments featuring the combined presence of CO₂ + H₂S + Chloride, in temperatures up to 149 °C, in absence of elemental Sulfur

Its primary function is Tubing and Liner, sections permanently exposed to production fluids

Final material application will depend upon CO₂, H₂S, Temperature, pH and expected Chlorides content. For a more detailed assessment please contact NSSMC engineers
Manufacturing

Process	Description
Steel making	Steel shall be made by electric furnace process followed by Vacuum Oxygen Decarburization (VOD) process &/or Argon Oxygen Decarburization (AOD) Process
Pipe making	Manufactured through Cold working the hot formed tubular product and shall be furnished in a cold worked conditions
Heat treatment	Solution Annealing Process before final cold drawing

HOBBS OCD

JUN 10 2015

Chemical Composition

(mass %)

RECEIVED

C	Si	Mn	Cu	Ni	Cr	Mo
≤ 0.03	≤ 0.50	≤ 1.00	≤ 1.50	29.5 ~ 36.5	24.0 ~ 27.0	2.5 ~ 4.0

UNS Number: N08535

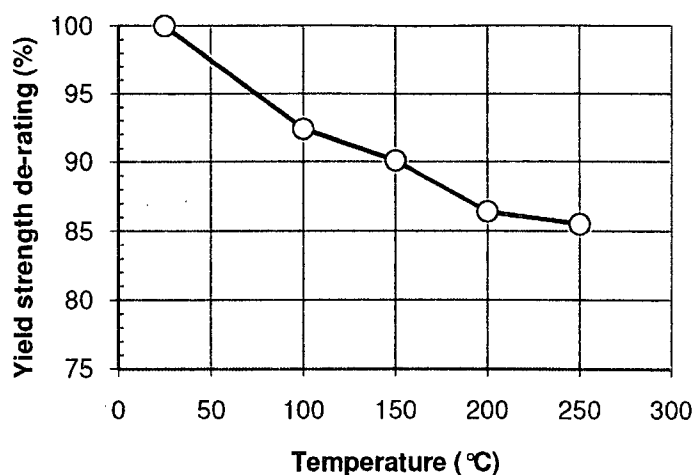
Specified mechanical properties

Yield strength ksi		Tensile strength ksi	Elongation %	Hardness HRC	Technical Note
Min	Max	Min	Min	Max	
110	140	115	12	32.0	-

Physical and thermal properties

	unit	25°C	100°C	150°C	200°C	250°C
Density	Kg/m ³	8000	7980	7960	7940	7930
Young's modulus	GPa	193	190	188	186	184
Poisson's Ratio	-	0.29	0.29	0.29	0.30	0.30
Tensile strength de-rating	%	100.0	93.5	90.1	86.4	85.5
Yield strength de-rating	%	100.0	92.4	90.1	86.3	85.5
Thermal Diffusivity	x10 ⁻⁶ m ² /s	3.02	3.44	3.58	3.67	3.88
Heat Capacity	x10 ⁶ J/m ³ deg.C	3.26	3.21	3.26	3.33	3.43
Thermal Conductivity	W/m deg.C	9.8	11.0	11.7	12.2	13.3
Specific Heat	J/Kg deg.C	407	402	409	420	432
Thermal expansion	x10 ⁻⁶ / deg.C	-	12.5	12.9	13.3	13.6

* Data will be shortly available.



Technical information

In wet combined CO₂ & H₂S environments, usage of SM2535 is recommendable starting from H₂S partial pressure exceeding 0.1 bar:

- for lower H₂S partial pressure ranging between 0.1 to 1.0 bar, these materials should be considered depending upon the combination of critical variables such as pH, Chloride content, S⁰ and temperature.
- for H₂S partial pressures exceeding 1.0 bar the only metallurgical solution to counter corrosion is to consider Austenitic Fe base or Nickel base materials.

Since H₂S is a potent pitting agent, a passivation film composed of Ni-S, Cr-O & Mo-S is required to maintain stability and protect the bulk material from corrosion attack up to a defined temperature threshold in wet combined CO₂ & H₂S environment. This is achieved through alloying of Cr-Ni & Mo.

SM2535 is a nominal 3% Molybdenum material recognized by ISO-13680 as Group 3 Category 25-32-3. This material is referenced as 4c material in NACE MR0175 /ISO 15156-3 (please refer to Fig. 1)

Material types	Cr mass fraction min. %	Ni + Co mass fraction min. %	Mo mass fraction min. %	Mo + W mass fraction min. %	Metallurgical condition
Type 4a	19	29.5	2.5		Solution-annealed or annealed
Type 4b	14.5	52	12		Solution-annealed or annealed
Type 4c	19.5	29.5	2.5		Solution-annealed or annealed or cold-worked
Type 4d	19	45		6	Solution-annealed or annealed or cold-worked
Type 4e	14.5	52	12		Solution-annealed or annealed or cold-worked

Fig 1: NACE MR0175 / ISO 15156-3 2003 Table A12

For this type of material, NACE MR0175 /ISO 15156-3 indicate the following application limits as general guidelines :

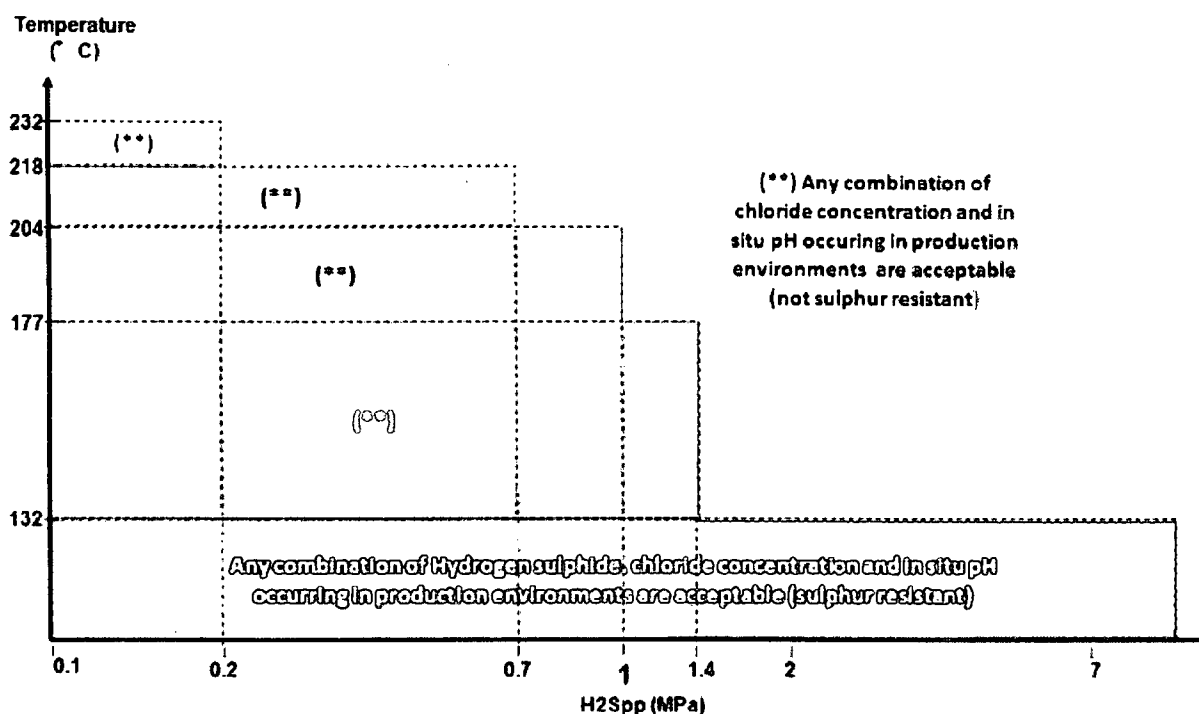


Fig 2: Material 4c application boundaries per NACE MR0175 / ISO 15156-3 2003 (Ref. Table A-14)

According to NACE MR0175 / ISO 15156-3 2003, final material selection for the intended service will be equipment user's responsibility and detailed information exchange with manufacturer is highly recommendable.

NSSMC, in absence of elemental sulfur, recommends usage of SM2535 materials for temperature up to 149°C (300°F) higher than 132°C (270°F) limit specified by ISO 15156-3.

This difference is based on NSSMC's unrivaled know-how in manufacturing austenitic stainless steel since the mid 80's and best-in-class quality control.

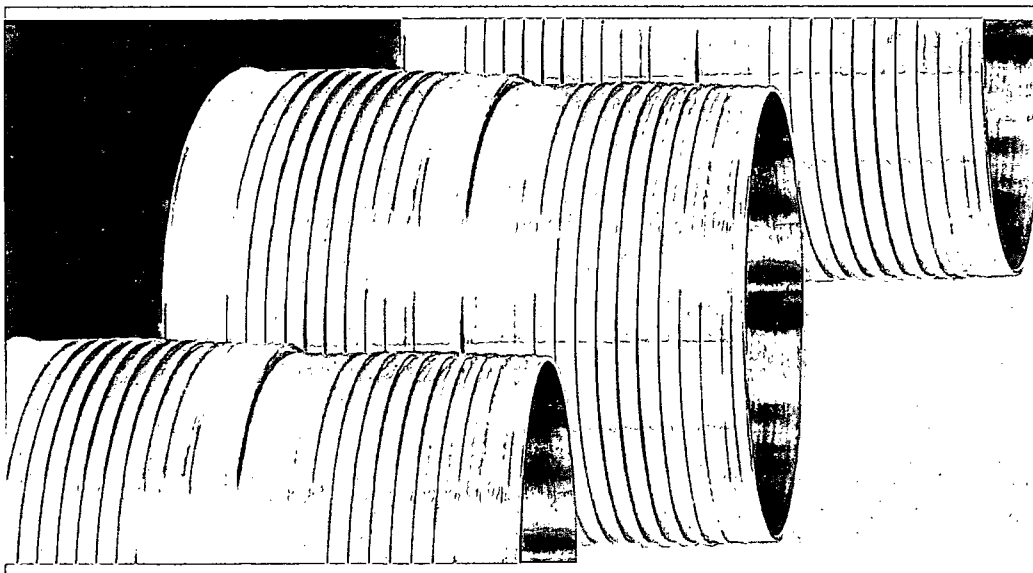
For fit for purpose conditions (** in Fig 2), NSSMC proposes verification test under the actual field condition.

Fig 3 below represents NSSMC SSC limits on various Austenitic materials.

Case history from the field
Storage and handling procedure

- [NSSMC CORPORATE WEBSITE](#)
- [Legal Notice](#)
- [Beware of counterfeit](#)

ULTRA-SF™ Semi-Flush Connection 3 1/2" - 13 5/8"



ULTRA-SF™ Semi-Flush Connection

Performance and Flexibility

The slim-line ULTRA-SF Premium Connection is the strongest semi-flush connection with the highest tensile efficiency of any semi-flush casing connection on the market and equal—or greater—compression efficiency to match. The ULTRA-SF Premium Connection is flexible enough to navigate sharp curves with ease while its locked metal center-shoulder seal maintains gas tightness. As our most popular premium connection, the ULTRA-SF Premium Connection is an integral piece of string designs for both major and independent operators alike.

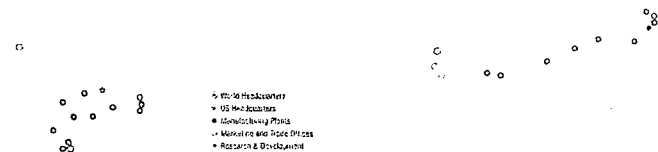
Innovative Solutions

TMK IPSCO realizes that as drilling evolves, the stresses on tubulars are constantly increasing. Our team of technical experts is dedicated to engineering innovative connections to enable operators to tackle their most challenging targets. While traditional connections only offer strength in tension, every ULTRA™ Premium Connection is designed with our patented FullContact™ thread form which provides excellent tensile, compression and bending capacity translating into the flexibility necessary to navigate the curves of modern wells. The portfolio of ULTRA Premium Connections includes formidable threaded and coupled connections as well as slim-profile integral joint connections offering a range of options suited for every drilling application.

Global Strength

TMK IPSCO is one of the largest North American producers of welded and seamless pipe and premium connections dedicated to serving the oil and gas industry and many industrial markets. Our legacy of quality, industry-renowned customer service and focus on innovative products and services allow us to drive unparalleled value for our customers. TMK IPSCO is committed to be North America's energy tubular supplier of choice, with facilities strategically located in the key energy producing areas of North America. We operate eleven downstream pipe, processing and premium connection facilities complete with accessories.

As a part of CAO TMK, one of the world's largest pipe producers, we now offer an expanded range of products to meet all your energy tubular needs.



- World Headquarters
- US Headquarters
- International Plants
- Marketing and Sales Offices
- Research & Development

ULTRA-SF Product Summary: Pipe and Connection Data

For the ULTRA-SF Semi-Flush Connection: *compression* mechanical efficiency $\geq$ *tensile* mechanical efficiency.

Nominal OD in	Nominal Weight lb/ft	PIPE BODY				Average PBA in ²	CONNECTION				Yield Load lbs	L-80		Yield Load lbs	T-85		Yield Load lbs	P-110		Yield Load lbs	Q-125		
		FE Weight lb/ft	Wall Thickness in	Nominal ID in	Drift Dia in		Box OD in	Pin ID in	% Tensile Efficiency	% Compression Efficiency		Makeup Loss in	Reference Depth ft		Parting Load lbs	Reference Depth ft		Parting Load lbs	Reference Depth ft		Parting Load lbs	Reference Depth ft	Parting Load lbs
3 1/2	12.70	12.52	0.375	2.750	2.625	3.682	3.638	2.719	90.0	91.4	5.593	265,000	14,100	308,000	316,000	16,800	343,000	365,000	19,400	407,000	416,000	22,100	443,000
3 1/2	15.50	15.37	0.476	2.548	2.423	4.522	3.669	2.517	90.6	92.0	5.823	329,000	14,200	381,000	391,000	16,900	425,000	452,000	19,600	504,000	514,000	22,200	548,000
3 1/2	17.00	16.83	0.530	2.440	2.315	4.945	3.657	2.409	90.2	91.5	6.392	358,000	14,100	415,000	425,000	16,800	462,000	492,000	19,400	548,000	559,000	22,100	596,000
4	11.60	11.34	0.286	3.428	3.303	3.337	4.154	3.384	90.1	91.7	5.464	242,000	14,200	278,000	287,000	16,800	311,000	332,000	19,500	368,000	377,000	22,100	401,000
4	13.20	12.93	0.330	3.340	3.215	3.805	4.152	3.309	89.7	91.2	5.004	274,000	14,100	316,000	325,000	16,700	352,000	377,000	19,400	418,000	428,000	22,000	455,000
4	14.68	14.68	0.380	3.240	3.115	4.322	4.148	3.209	90.5	92.0	5.809	314,000	14,200	362,000	373,000	16,900	404,000	432,000	19,600	479,000	490,000	22,200	521,000
4 1/2	13.50	13.04	0.290	3.920	3.795	3.836	4.655	3.877	90.0	91.5	5.456	277,000	14,100	318,000	328,000	16,700	355,000	380,000	19,400	421,000	433,000	22,100	458,000
4 1/2	15.10	14.98	0.337	3.826	3.701	4.407	4.645	3.782	91.0	92.5	5.299	322,000	14,300	369,000	382,000	17,000	413,000	442,000	19,600	489,000	503,000	22,300	533,000
4 1/2	16.60	16.52	0.375	3.750	3.625	4.860	4.650	3.719	90.5	91.9	5.782	353,000	14,200	405,000	419,000	16,900	452,000	485,000	19,500	536,000	551,000	22,200	584,000
4 1/2	17.00	16.72	0.380	3.740	3.615	4.918	4.656	3.709	91.4	92.9	5.290	361,000	14,300	414,000	429,000	17,100	463,000	496,000	19,700	548,000	564,000	22,400	597,000
4 1/2	18.80	18.69	0.430	3.640	3.515	5.498	4.659	3.609	86.7	87.0	5.096	383,000	13,600	439,000	455,000	16,200	491,000	527,000	18,700	582,000	599,000	21,300	634,000
5	15.00	14.87	0.296	4.408	4.283	4.374	5.160	4.377	88.7	90.2	5.424	311,000	13,900	355,000	370,000	16,500	398,000	428,000	19,100	471,000	486,000	21,700	513,000
5	18.00	17.93	0.362	4.276	4.151	5.275	5.160	4.245	90.9	92.4	5.651	385,000	14,300	439,000	457,000	16,900	492,000	529,000	19,600	582,000	601,000	22,300	635,000
5	20.30	20.01	0.408	4.184	4.059	5.886	5.180	4.153	88.2	89.6	5.591	416,000	13,800	475,000	495,000	16,400	532,000	573,000	19,000	630,000	651,000	21,600	687,000
5	20.80	20.63	0.422	4.156	4.031	6.069	5.178	4.125	88.4	89.8	5.820	430,000	13,800	491,000	511,000	16,500	550,000	592,000	19,100	651,000	673,000	21,700	710,000
5	21.40	21.30	0.437	4.126	4.001	6.264	5.177	4.095	88.6	90.0	5.368	446,000	13,900	508,000	529,000	16,500	569,000	612,000	19,100	674,000	696,000	21,700	735,000
5	23.20	23.08	0.478	4.044	3.919	6.791	5.171	4.000	90.1	91.5	5.988	491,000	14,100	561,000	583,000	16,800	628,000	676,000	19,500	743,000	768,000	22,100	811,000
5	24.10	24.03	0.500	4.000	3.875	7.069	5.168	3.969	89.1	90.5	6.159	505,000	14,000	577,000	601,000	16,800	646,000	695,000	19,200	765,000	791,000	21,900	834,000
5 1/2	17.00	16.87	0.304	4.892	4.767	4.962	5.663	4.848	91.2	92.8	5.856	363,000	14,300	413,000	432,000	17,000	463,000	500,000	19,700	548,000	567,000	22,400	598,000
5 1/2	20.00	19.81	0.361	4.778	4.653	5.828	5.646	4.734	90.2	91.6	5.471	422,000	14,200	479,000	500,000	16,900	537,000	580,000	19,500	635,000	659,000	22,100	693,000
5 1/2	23.00	22.54	0.415	4.670	4.545	6.630	5.696	4.626	91.6	93.0	5.371	487,000	14,400	553,000	579,000	17,100	620,000	670,000	19,600	734,000	762,000	22,500	801,000
5 1/2	26.00	25.54	0.476	4.548	4.423	7.513	5.688	4.504	92.0	93.4	6.165	555,000	14,400	630,000	659,000	17,200	706,000	763,000	19,900	806,000	836,000	22,600	912,000
5 1/2	26.80	26.70	0.500	4.500	4.375	7.854	5.670	4.469	89.1	90.4	6.165	561,000	14,000	637,000	667,000	16,600	715,000	772,000	19,200	846,000	877,000	21,800	923,000
5 1/2	29.70	29.64	0.562	4.376	4.251	8.718	5.692	4.345	84.5	82.0	5.751	592,000	13,300	672,000	702,000	15,700	753,000	814,000	18,300	891,000	925,000	20,800	973,000
6 5/8	24.00	23.58	0.352	5.921	5.796	6.937	6.789	5.890	89.9	91.4	5.368	501,000	14,100	562,000	594,000	16,700	632,000	689,000	19,400	747,000	782,000	22,100	817,000
6 5/8	28.00	27.65	0.417	5.791	5.666	8.133	6.833	5.760	90.5	91.9	5.343	591,000	14,200	663,000	701,000	16,900	745,000	812,000	19,500	881,000	923,000	22,200	964,000
6 5/8	32.00	31.20	0.475	5.675	5.550	9.177	6.835	5.644	91.7	93.1	6.199	676,000	14,400	759,000	803,000	17,100	853,000	929,000	19,800	1,009,000	1,056,000	22,500	1,103,000
7	23.00	22.63	0.317	6.366	6.241	6.655	7.176	6.335	90.5	92.0	6.081	483,000	14,200	540,000	574,000	16,900	608,000	664,000	19,500	719,000	756,000	22,200	787,000
7	26.00	25.66	0.362	6.276	6.151	7.549	7.157	6.232	90.8	92.2	5.534	550,000	14,200	615,000	653,000	16,900	692,000	756,000	19,600	818,000	859,000	22,300	895,000
7	29.00	28.72	0.408	6.184	6.059	8.449	7.208	6.153	90.4	91.9	5.221	613,000	14,200	686,000	728,000	16,800	772,000	844,000	19,500	912,000	958,000	22,200	999,000
7	32.00	31.67	0.453	6.094	6.000	9.317	7.212	6.071	90.6	92.0	5.934	678,000	14,200	758,000	805,000	16,900	853,000	933,000	19,600	1,009,000	1,060,000	22,300	1,104,000
7	35.00	34.58	0.498	6.004	5.879	10.172	7.180	5.973	89.1	90.4	6.189	728,000	14,000	813,000	864,000	16,600	916,000	1,000,000	19,200	1,082,000	1,137,000	21,900	1,185,000
7	38.00	37.26	0.540	5.920	5.795	10.959	7.240	5.889	87.8	89.0	6.059	772,000	13,800	863,000	917,000	16,400	972,000	1,062,000	19,000	1,149,000	1,207,000	21,500	1,257,000
7	41.00	40.39	0.590	5.820	5.695	11.881	7.243	5.789	88.9	90.2	6.827	848,000	13,900	948,000	1,007,000	16,600	1,067,000	1,167,000	19,200	1,262,000	1,326,000	21,800	1,381,000
7	42.70	42.55	0.625	5.750	5.625	12.517	7.243	5.719	89.6	90.8	7.294	901,000	14,100	1,007,000	1,070,000	16,700	1,133,000	1,238,000	19,300	1,340,000	1,408,000	22,000	1,466,000
7 5/8	26.40	25.56	0.328	6.969	6.844	7.519	7.792	6.938	88.3	89.8	5.974	532,000	13,800	592,000	633,000	16,500	668,000	733,000	19,100	789,000	833,000	21,700	864,000
7 5/8	29.70	29.04	0.375	6.875	6.750	8.541	7.786	6.844	88.6	90.0	5.585	607,000	13,900	675,000	721,000	16,500	761,000	835,000	19,100	899,000	949,000	21,700	985,000
7 5/8	33.70	33.04	0.430	6.765	6.640	9.720	7.839	6.734	91.3	92.7	5.583	712,000	14,300	791,000	846,000	17,000	892,000	979,000	19,700	1,053,000	1,11		

ULTRA-SF™

Semi-Flush Connection

3 1/2" - 13 5/8"

The Strongest Semi-Flush Connection

- Highest tensile efficiency of any semi-flush casing connection
- Compression efficiency equal to or greater than its tensile efficiency
- Pressure ratings exceed API minimum internal yield and collapse pressure

FullContact™ Threads

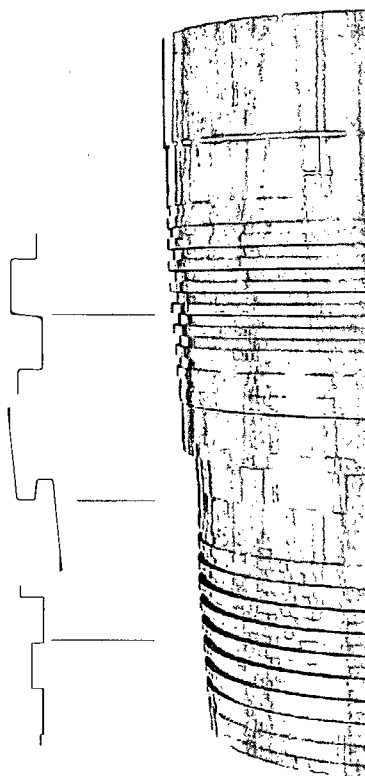
- Highest compression efficiency
- High tension and bending capacity
- Deep, easy stabbing and quick, easy make-up with no cross threading risk

Locked Metal Center-Shoulder Seal

- High torque resistance
- High fatigue resistance
- External factors (axial loads, temperature, dope, make-up torque) do not affect seal performance

Run In/Run-Out Threads

- Maximum critical section area
- Increases overall connection strength



Houston Sales Office
6300 FM 1960 West, Suite 350
Houston, TX 77070
281.949.1023
866.256.2000

Calgary Sales Office
403.536.2182

Technical Support
281.949.1058

Field Services
281.949.1079

© 2014 IPSCO Corporation

Updated 01/11

TABLE 7
Calculations for Area of Injection at Estimated Rate of 2.0 MMSCFD
(Anticipated Normal Injection Rate)

PROPOSED INJECTION STREAM CHARACTERISTICS

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

CONDITIONS AT WELL HEAD

Well Head Conditions			TAG						
Temp	Pressure	Gas vol	Comp	Inject Rate	Density	SG ¹	density	volume	volume
t	psi	MMSCFD	CO ₂ -H ₂ S	lb/day	kg/m ³		lb/gal	ft ³	bbf
100	2200	2	88.12	238516	789.60	0.79	6.59	4836	861

CONDITIONS AT BOTTOM OF WELL

Injection Zone Conditions					TAG				
Temp	Pressure	Depth	Depth	Ave. Thick	Density	SG ¹	density	volume	volume
t	psi	ft	ft	ft	kg/m ³		lb/gal	ft ³	bbf
132	5620	9637	10238	137	934.70	0.93	7.80	4086	728

CONDITIONS IN RESERVOIR AT EQUILIBRIUM

Injection Reservoir Conditions					TAG				
Temp	Pressure	Ave. Por.	SG ²	Porosity	Density	SG ¹	density	volume	volume
t	psi	%		ft	kg/m ³		lb/gal	ft ³	bbf
132	4800	10.3	0.45	7.76105	890.75	0.89	7.44	4287	764

CONSTANTS

	SCF/mol
Molar volume at 14.7	0.7915
	g/mol
	lb/mol
Molar weight of H ₂ S	34.0809
Molar weight of CO ₂	44.0096
Molar weight of H ₂ O	18.015

¹ Density calculated using AQUALIBRIUM software² Specific gravity calculated assuming a constant density for water³ PP is extrapolated using successful Drill Stem Tests at nearby wells⁴ Thickness is the ave. total thickness of coarse sand units in the reservoir zone⁵ Reservoir temp. is extrapolated from bottomhole temp. measured at nearby wells⁶ Porosity is estimated using geophysical logs from nearby wells**CALCULATION OF MAXIMUM INJECTION PRESSURE LIMITATION**

$$SG_{\text{TAG}} = 0.89$$

$$PG = 0.7 \times 0.45 (1.04 - SG_{\text{TAG}}) = 0.277 \text{ psi/ft}$$

$$IP_{\text{max}} = PG \times \text{Depth} = 2670 \text{ psi}$$

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**

$$\text{Cubic feet/day} (5.6146 \text{ ft}^3/\text{bbf}) = 4287 \text{ ft}^3/\text{day}$$

$$\text{Cubic feet/30 years} = 40976938 \text{ ft}^3/30 \text{ years}$$

$$\text{Area} = V/\text{Net Porosity (ft)} = 6052910 \text{ ft}^2/30 \text{ years}$$

$$\text{Area} = V/\text{Net Porosity (ft)} (4.1560 \text{ ft}^2/\text{acre}) = 139.0 \text{ acres/30 years}$$

$$\text{Radius} = 1388 \text{ ft}$$

$$0.26 \text{ miles}$$

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 7, the Wolfcamp alone is capable of holding up to 3 times the anticipated injection rate for 30 years.

As shown in Figure 7, 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 8
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	764	8.4 Million	24 Million	35 %	0.26	139

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, Baish B 001 (API# 3002500637) located in Sec. 22, T17S, R32E, approximately 1.25 miles northeast of the Frontier gas plant, and the recent Maljamar AGI #1, located on the plant. Analyses show that the formation waters are sodium/chloride brines.

TABLE 9 Formation Fluid Chemistry for Nearby Offset Wells			
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.