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September 4, 2018

VIA HAND DELIVERY

Heather Riley
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
1220 South Saint Francis Drive
Santa Fe, New Mexico 87505

16446

Re: Application of Salt Creek Midstream, LLC for Authorization to Inject Acid Gas into the Proposed Leavenworth AGI No. 1 well in Section 23, Township 26 South, Range 36 East, Lea County, New Mexico.

Dear Ms. Riley,

Salt Creek Midstream, LLC requests that the above-referenced application for an order authorizing injection of treated acid gas through its proposed Leavenworth AGI No. 1 well be set for hearing on the next available Commission hearing docket.

Thank you for your attention to this matter and please feel free to call if you have any questions and require additional information.

Sincerely,

Adam G. Rankin

ATTORNEY FOR

SALT CREEK MIDSTREAM, LLC

Holland & Hart LLP

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**STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION**

**APPLICATION OF SALT CREEK
MIDSTREAM, LLC FOR AUTHORIZATION
TO INJECT ACID GAS INTO THE
PROPOSED LEAVENWORTH AGI NO. 1,
SECTION 23, TOWNSHIP 26 SOUTH, RANGE
36 EAST, LEA COUNTY, NEW MEXICO.**

CASE NO. 16446

APPLICATION

SALT CREEK MIDSTREAM, LLC ("Salt Creek") through its undersigned attorneys, hereby makes application to the Oil Conservation Division pursuant to the provisions of NMSA 1978, Sections 70-2-11 and 70-2-12, for authorization to inject acid gas for purposes of disposal through its proposed Leavenworth AGI No. 1 well, to be located in Section 23, Township 26 South, Range 36 East, N.M.P.M., Lea County, New Mexico. In support of this application, Salt Creek states:

1. The proposed Leavenworth AGI No. 1 well will be drilled at a surface location approximately 973 feet from the South line and 1,836 feet from the East line (Unit O) of Section 23 in Township 26 South, Range 36 East, in Lea County.
2. Salt Creek proposes to inject treated acid gas consisting of carbon dioxide and hydrogen sulfide into the well for purposes of disposal.
3. The target injection zone will be from approximately 16,459 to 18,600 feet deep in the Devonian and Fusselman formations and will potentially include the top of the Montoya formation. The well will be drilled as a vertical well with an open hole completion.
4. The maximum allowable surface injection pressure is calculated to be 4,954 psig. The proposed well will inject treated acid gas up to a maximum of 60 MMSCFD at a maximum

surface injection pressure of 2,830 psig. The average daily injection rate is projected to be 25 MMSCFD and the average surface injection pressure is expected to be 2,404 psig.

5. Lonquist & Co., LLC has prepared a Form C-108, attached hereto as **Exhibit A**, on behalf of Applicant. The Form C-108 contains all the information necessary to evaluate and approve the drilling, completion, and operation of the proposed Leavenworth AGI No. 1 well. It also identifies all potentially affected parties within the area of review who will receive direct notice of this application and hearing.

6. The granting of this Application will prevent waste and protect correlative rights.

WHEREFORE, Salt Creek Midstream, LLC requests that this application be set for hearing before the Oil Conservation Division on September 20, 2018, and, after notice and hearing as required by law, the Division grant this application and authorize injection of treated acid gas as proposed in the attached Form C-108.

Respectfully submitted,

HOLLAND & HART, LLP

By: 

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ATTORNEYS FOR SALT CREEK MIDSTREAM, LLC

Case No. 16446

Application of Salt Creek Midstream, LLC for Authorization to Inject Acid Gas into the Proposed Leavenworth AGI No. 1 well in Section 23, Township 26 South, Range 36 East, Lea County, New Mexico. Applicant Salt Creek Midstream, LLC seeks an order from the New Mexico Oil Conservation Division authorizing it to inject treated acid gas for disposal purposes at an approximate depth of 16,459 to 18,600 below the surface in the Devonian and Fusselman formations, potentially including the top of the Montoya formation, at a surface location approximately 973 feet from the South line and 1,836 feet from the East line (Unit O) of Section 23 in Township 26 South, Range 36 East, NMPM, Lea County. The proposed well will inject treated acid gas at a maximum rate of 60 MMSCFD and a maximum surface injection pressure of 2,830 psig. Said area is located approximately 6.5 miles southwest of Jal in Lea County, New Mexico.

EXHIBIT A

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL
RESOURCES DEPARTMENT

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

FORM C-108
Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance _____ ☒ Disposal _____ Storage
Application qualifies for administrative approval? _____ ☒ Yes _____ No
- II. OPERATOR: Salt Creek Midstream, LLC
ADDRESS: 20329 State Highway 249, Houston, TX 77070
CONTACT PARTY: David Martinkewiz PHONE: (713) 628-3952
- 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.
- IV. Is this an expansion of an existing project? _____ Yes _____ ☒ No
If yes, give the Division order number authorizing the project: _____
- 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. **SECTION 4 and 5, APP A and B**
- 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. **SECTION 4**
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected; **SECTION 2**
 2. Whether the system is open or closed;
 3. Proposed average and maximum injection pressure; **SECTION 2**
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and, **SECTION 2.3**
 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.).
- *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 3**
- IX. Describe the proposed stimulation program, if any. **SECTION 2.4 – 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).
N/A – Well not 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 3, 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 6**
- 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: Stephen L. Pattee, P.G.

TITLE: Consulting Engineer – Agent for Salt Creek Midstream, LLC

SIGNATURE: _____

DATE: 08/20/2018

E-MAIL ADDRESS: steve@lonquist.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: _____

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

EXHIBIT A

Side 2

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 2.1**
- (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. **SECTION 2.4**
- (3) A description of the tubing to be used including its size, lining material, and setting depth. **SECTION 2.4**
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used. **SECTION 2.4**

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. **SECTION 1 AND 2**
- (2) The injection interval and whether it is perforated or open-hole. **SECTION 1 AND 2**
- (3) State if the well was drilled for injection or, if not, the original purpose of the well. **SECTION 1**
- (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. **SECTION 3**

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.

APPENDIX C

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: **APPENDIX C**

- (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.

Side 1

OPERATOR: Salt Creek Midstream, LLC

WELL NAME & NUMBER: Leavenworth AGI No. 1

WELL LOCATION: 973' FSL & 1,836 FEL
FOOTAGE LOCATION

WELLBORE SCHEMATIC

UNIT LETTER	SECTION	TOWNSHIP	RANGE
Q	23	26S	36E

WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 30.00"

Casing Size: 24.00"

Cemented with: 7,300 sx.

or _____ ft³

Top of Cement: surface

Method Determined: circulation

1st Intermediate Casing

Hole Size: 20.000"

Casing Size: 16"

Cemented with: 3,800 sx.

or f^3

Top of Cement: surface

Method Determined: circulation

2nd Intermediate Casing

Hole Size: 13.500"

Casing Size: 10.75"

Cemented with: 3,700 sx.

or _____ ft³

Top of Cement: surface

Method Determined: circulation

EXHIBIT A

Production Liner

Hole Size: 9.500"

Casing Size: 7.625"

Cemented with: 1,300 sx.

or _____ ^{ft}3

Top of Cement: 10,300'

Method Determined: calculation

Total Depth: 18,600

Injection Interval

16,459 feet to 18,600 feet

(Open Hole)

EXHIBIT A

Side 2

INJECTION WELL DATA SHEET

Tubing Size: 5.500", 17 lb/ft. 95CR13S (or equivalent), CS Hydril (or equivalent) from 0' - 10,200';
5.500", 17 lb/ft. 95CR13S (or equivalent), Ultra-flush (or equivalent) from 10,200' - 16,400'
Lining Material: N/A

Type of Packer: 7-5/8" Baker 80-40 Model E-22S Anchor Tubing Seal Assembly, Inconel 718 120KSI

Packer Setting Depth: 16,400'

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____ X Yes _____ No

If no, for what purpose was the well originally drilled?

2. Name of the Injection Formation: Siluro-Devonian; Top ~50' of the Montoya

3. Name of Field or Pool (if applicable): _____

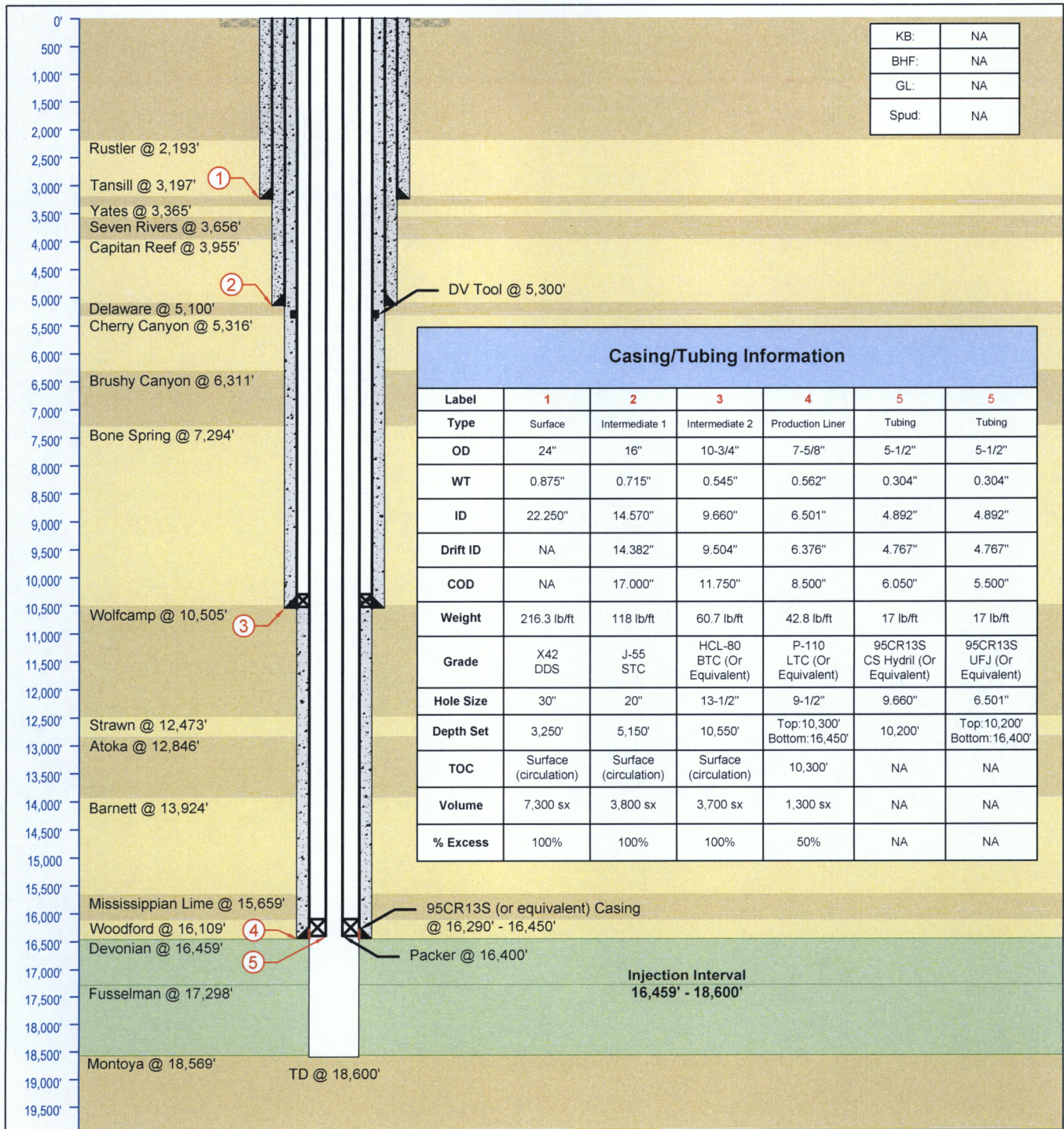
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used.

No, new drill.

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:

Formation	Depth
Delaware	5,100'
Bone Spring	7,294'
Wolfcamp	10,505'
Strawn	12,473'
Atoka	12,846'

EXHIBIT A



LONQUIST & CO. LLC PETROLEUM ENGINEERS ENERGY ADVISORS HOUSTON CALGARY AUSTIN WICHITA DENVER Texas License F-9147 12912 Hill Country Blvd. Ste F-200 Austin, Texas 78738 Tel: 512.732.9812 Fax: 512.732.9816	Salt Creek Midstream		Leavenworth AGI No. 1	
	Country: USA		State/Province: New Mexico	County/Parish: Lea
	Location:		Site:	Survey:
	API No: NA		Field:	Well Type/Status: AGI / New Drill
	RRC District No:		Project No: 1624	Date: 8/20/2018
	Drawn: WHG		Reviewed:	Approved:
	Rev No: 7		Notes:	

EXHIBIT A



**SALT
CREEK
MIDSTREAM**

**Application for Authorization to Inject
Leavenworth AGI #1
Lea County, NM**

August 20, 2018

LONQUIST & CO. LLC

**PETROLEUM
ENGINEERS**

**ENERGY
ADVISORS**

HOUSTON CALGARY
AUSTIN WICHITA DENVER

EXHIBIT A

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EXHIBIT A

Figure 5: Map of Wells within Two Mile, One Mile, and Half Mile AOR Map and Associated Lists

Figure 6: Map of Fresh Water Wells within One Mile of Proposed AGI Well

Figure 7: Map of Lease Tracts within One Mile of Proposed AGI Well and Associated List

APPENDICES:

Appendix A: Information on Water Wells within One Mile of Proposed AGI well

Appendix B: Information on Land Tracts within One Mile of Proposed AGI well

Appendix C: Notice Letters, Documentation and Affidavit of Publication of Newspaper Notice

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

2.0 EXECUTIVE SUMMARY

On behalf of Salt Creek Midstream, LLC (Salt Creek), Lonquist & Co. (Lonquist) is submitting a complete C-108 application for approval to drill, complete and operate a new acid injection well, Leavenworth AGI #1, in Section 23, T26S, R36E approximately 6.5 miles Southwest of Jal in Lea County, New Mexico. The Leavenworth AGI #1 well will be drilled at a surface location approximately 973 feet from the south line (FSL) and 1,836 feet from the east line (FEL) of the section boundary.

Salt Creek plans to safely inject up to a maximum of 60 MMSCFD and an average of 25 MMSCFD of treated acid gas (TAG) for at least 25 years. Geological studies conducted demonstrate the proposed injection zone is able to receive the proposed acid gas injection volumes within the NMOCD's recommended injection pressures.

The proposed injection zone includes both the Devonian and Fusselman formations with potentially the top ~50 feet of the Montoya also in the open hole section. This gross injection interval is proposed to be from approximately 16,459' – 18,600' BGL. Leavenworth AGI #1 will be drilled as a vertical well to a total depth of 18,600 feet and completed as an open hole interval. The proposed well will be constructed with three casing strings cemented to surface and a production liner set.

Lonquist has reviewed all the surface owners, operators, leaseholders and mineral owners within one-mile of the proposed AGI #1 well. A total of 6 impacted parties were identified. There are no wells within the one-mile area of review that penetrate the injection zone. A search of the New Mexico State Engineer's files shows 2 water wells that are located within one mile of the proposed Leavenworth AGI #1 well.

Based on this detailed evaluation, Lonquist and Salt Creek have determined that the proposed AGI well is safe and environmentally sound well for the disposal of acid gas into the injection zone. The carbonate nature of the Devonian and Fusselman formations indicate that a favorable formation chemistry will exist allowing for the acid to be somewhat neutralized over time while at the same time, secondary porosity is created as the formation chemically reacts with the acid being injected.

At the anticipated reservoir conditions of 185° F and 7,930 psi, each MMSCFD of TAG will occupy a volume of 1,976 cubic feet (352 bbls). At the anticipated maximum operational capacity of 60 MMSCFD, the compressed TAG will occupy 129,994 cubic feet (23,153 barrels) per day. After 25 year of operation, the TAG will occupy an area of approximately 7,936 acres in the proposed injection zone, with a dispersed plume radius (1% concentration contour) of approximately 10,022 feet (1.90 miles) from the Leavenworth AGI #1 well, at the end of the proposed 25-year service life. Subsequent drift over the following 25 years, driven by the difference in density between the lighter injected fluid and the connate brine, will distend the plume to the east. The distance from the well to the dispersed (1%) concentration contour is projected to be 10,987 feet at that time.

An H2S contingency plan is currently being prepared and will be submitted prior to the commencement of any injection operations.

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

3.0 PROPOSED WELL CONSTRUCTION AND OPERATION DETAILS

3.1 LOCATION DETAILS:

Well Information	
Lease Name	Leavenworth AGI
Well No.	1
Location	S-23 T-26S R-36E
Footage Location	973' FSL & 1,836' FEL

3.2 CALCULATED MAXIMUM INJECTION PRESSURE

The Leavenworth AGI #1 will be designed to facilitate injection of a stream of treated acid gas (TAG). The treated acid gas stream will be composed of approximately:

- 80% CO₂
- 19.5% H₂S
- Approximately 0.5% Water, Methane, Ethane +

At maximum proposed injection rate, the total volume of TAG will be approximately 352 barrels per day for each million cubic feet at reservoir conditions. Pressure reduction valves will be installed to ensure that the maximum surface injection pressured allowed is not exceeded.

Using the following NMOCD approved formula, the maximum allowable surface injection pressure is calculated to be 4,954 psi. This value is significantly higher the maximum allowable surface pressure for saltwater of 0.2 x top of injection zone (3,292 psi) because of the lower specific gravity of the treated acid gas.

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

where: IP_{\max} = maximum surface injection pressure (psig)

PG = pressure gradient of mixed injection stream fluid (psig/foot)

D_{top} = depth of top of injection interval (feet)

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

SG_{tag} = specific gravity of treated acid gas, calculated as the average density in the tubing, using surface condition assumptions of 120° F and 2,830 psig, and bottom hole conditions of 185° F and 7,930 psi.

At the maximum proposed injection volume of 60 MMSCF/Day, we determine a SG_{tag} of 0.807 and D_{top} of 16,459 feet, resulting in the following calculation:

$$PG = 0.2 + 0.433 (1.04 - 0.807) = 0.301$$

$$IP_{\max} = PG(D_{\text{top}}) = 0.301 \times 16,459 = 4,954 \text{ psig}$$

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

3.3 INJECTION VOLUMES

Using offset log data, we estimate that the gross injection interval will be approximately 16,459' – 18,600' which equates to approximately 2,140 feet of reservoir rock in the proposed injection zone with an average porosity of 8% percent or more. The calculated net available porosity is estimated to be 80.5 feet.

Salt Creek anticipates injecting an average daily volume of 25 MMSCF/D at an injection pressure of 2,402 psi up to a maximum of 60 MMSCF/D at an injection pressure of 2,830 psi. The 25-year radius of injection at the maximum rate of 60 MMSCF/D rate is shown in Table 1.

Table 1: Calculation of Injection Radius for Maximum rate of 60 MMSCF/D

	Units	Value
<u>Injection Zone Properties</u>		
Temperature	°F	185
Pressure	psig	7,930
Net Thickness	feet	80.5
Porosity	%	8
<u>Operating Parameters</u>		
Treated Acid Gas (TAG) Volume Injection Rate	MMscfD	60.51
TAG Mass Injection Rate	pounds per hour	280,242
TAG Density at Formation Conditions	pounds per cubic foot	51.739
<u>Volume and Radius Estimates</u>		
Duration of Injection	years	25
TAG Volume Injected	cubic feet	1,186,195,019
Radius in Formation Occupied by TAG Volume	feet	7,657
Radius of Dispersed Plume (C/C0 = 1%)	feet	10,022

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

3.4 WELL DESIGN

The preliminary well design for the proposed Leavenworth AGI #1 well is shown in Figure 1. The well will have three strings of telescoping casing cemented to the surface and one production liner fully cemented.

The well will be drilled vertically to a projected total depth of 18,600'. The injection zone (16,459' – 18,600') will be completed as an open hole interval into the Devonian and Fusselman formations and very top of the Montoya.

An appropriate drilling rig will be selected and will include appropriate blowout preventer and choke manifold. Visual inspections of cement returns to surface will be noted in the surface, intermediate and production casing jobs. Casing and cement integrity will be validated by pressure tests and cement bond logs after each cement job.

The four proposed casing strings and cement programs are shown in Figure 1, and Tables 2 and 3 below, and summarized as follows:

1. Surface casing will be set below the base of the Rustler Formation, into the Tansill, at approximately 3,250 feet BGL, to protect the fresh water zones. The borehole will be drilled with a 26-inch bit plus 30" hole opener and 24", 216.3 lb/ft, X-42 DDS casing will be run and cemented to surface with approximately 7,300 sacks of HalCem™ Cement or equivalent.
2. The first intermediate casing string will be set 50' into the Delaware, at approximately 5,150 feet to protect any productive sands above the Delaware formation. The borehole will be drilled with a 20" bit and 16" 118 lb/ft, J-55 STC casing will be run and cemented to surface with approximately 3,800 sacks of HalCem™ cement or equivalent.
3. The second intermediate casing string will protect potentially production zones above the Wolfcamp formation. It will be drilled with a 13-1/2" bit to a depth of approximately 10,550 feet. A diverter valve assembly will be installed at approximately 5,300 feet. The 10-3/4", 60.7 lb/ft HCL-80 LTC (or equivalent) casing will be cemented to the surface in two stages, with an approximately total 3,700 sacks of NeoCem™ and HalCem™ cement or equivalent.
4. A production liner will be set just above the top of the Devonian Formation, at approximately 16,450 feet in a 9-1/2" borehole. The 7-5/8" 42.8 lb/ft, P-110 LTC (or equivalent) liner will be hung at the base of the second intermediate string at a depth of 10,300 feet. The production liner will be fully cemented with 1,300 sacks of VersaCem™ cement with acid resistant properties or equivalent. A portion of the 7-5/8" production liner will be comprised of 95CR13S or similar to facilitate the setting of the tubing packer within the well.

The cement for the casing shoe of the production liner will be comprised of a premium cement product which will include additives designed to offer resistance to degradation in an acidic environment.

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

Table 2: Casing Design

Casing Information				
Type	Surface	Intermediate	Intermediate 2	Production Liner
OD	24"	16"	10.75"	7.625"
WT	0.875"	0.715"	0.545"	0.562"
ID	22.250"	14.570"	9.660"	6.501"
Drift ID	N/A	14.382"	9.504"	6.376"
COD	N/A	17.000"	11.750"	8.500"
Weight	216.3 lb/ft	118 lb/ft	60.7 lb/ft	42.8 lb/ft
Grade	X-42	J-55	HCL-80	P-110
Hole Size	30"	20"	13.5"	9.5"
Depth Set	3,250'	5,150'	10,550'	10,300' – 16,450'

Table 3: Cementing Plan

Cement Information (or equivalent products)				
Casing String	Surface	Intermediate	Production	Liner
Lead Cement	HALCEM	HALCEM	Stage 1: NeoCem Stage 2: NeoCem	VERSACEM w/additives
Lead Cement Volume	5,836 sks	3,139 sks	Stage 1: 1,584 sks Stage 2: 967 sks	1,300 sks
Tail Cement	HALCEM	HALCEM	Stage 1: NeoCem Stage 2: HALCEM	-
Tail Cement Volume	1,464 sks	661 sks	Stage 1: 989 sks Stage 2: 160 sks	-
Cement Excess	100%	100%	100%	100%
TOC	Surface	Surface	Surface	10,300'
Method	Circulate to Surface	Circulate to Surface	Circulate to Surface	Logged

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

The proposed open hole logging suite for the Production section includes Dual Induction, Density-Neutron, Gamma Ray, and Sonic logs. This logging suite will provide us with useful information on the proposed injection interval. No stimulation is proposed for this well.

After the production liner is cemented and set, a cement bond log and mechanical integrity test will be run, then an injection step-test will be performed to determine injection pressures and volumes. After testing, the tubing will be installed with a packer set at approximately 16,400 feet as shown in Figure 1 and Table 3. Corrosion-inhibited diesel will fill the annular space between the tubing and the casing.

Table 4: Tubing Design

OD	5.5"	5.5"
WT	0.304"	0.304"
ID	4.892"	4.892"
Drift ID	4.767"	4.767"
Weight	17 lb/ft	17 lb/ft
Grade	95CR13S, CS Hydril (or equivalent)	95CR13S, Ultra Flush (or equiv.)
Depth Set	0'-10,200'	10,200'- 16,400'

As the tubing will be comprised of a chrome-moly alloy or similar, no internal lining will be part of the design. Other considerations taken with the design of the proposed well include the packer and all wetted sections of the wellhead be Inconel clad for acid resistance. The packer to be used will be a Baker 80-40 Model E-22S Anchor Tubing Seal Assembly, Inconel 718 120KSI (or equivalent). The wellhead will be designed to handle greater than maximum allowable surface injection pressure. The wellhead will be equipped with a pressure shut-off valve and monitor to ensure that the MASIP is not exceeded. H₂S gas detection devices will also be installed on and near the wellhead. These sensors will be designed to automatically activate the emergency shutdown valve on the wellhead in the event that H₂S gas is detected. Should this occur, visual and audible alarms will also sound at the facility and appropriate actions taken as outlined in the facility Contingency Plan dictates.

4.0 GEOLOGICAL DATA

The proposed injection interval includes the Devonian and Fusselman formations with the very top (~50') of the Montoya included. Geologic analysis shows that the Devonian is the more optimal formation for acid gas injection but the Fusselman may have some potential. It is desired to drill into the very top of the Montoya to ensure that the entire Fusselman has been opened and to yield an open hole log across the entire injection horizon. Figure 2 shows a structure map of the top of the Devonian formation. Figures 3 and 4 provide cross-sections showing the stratigraphy and relative thickness of the formations in the area of the proposed wells.

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4.1 Devonian/Silurian Lithology:

The Devonian/Silurian section is a dolomitic ramp carbonate sequence that occurs below the Woodford Shale and above the Fusselman Formation. The Woodford is the upper confining layer for the proposed Leavenworth AGI well. The Devonian/Silurian interval is composed of two members: the Thirtyone Formation in the upper part and the lower Wristen Group. The Thirtyone Formation contains two end-member reservoir facies: skeletal packstones/grainstones and spiculitic chert, with most of the porosity and permeability found in coarsely crystalline, cherty dolomite. The Wristen Group is composed of mixed limestone and dolomite lithologies with mudstone, grainstone and boundstone textures. Porosity in the Wristen member is the result of both primary and secondary development. Moldic, vugular, and karst facies (including collapse breccias) have higher porosities and permeabilities. These characteristics allow for the Devonian to be a potentially prolific horizon for disposal. The Devonian section is approximately 800 feet thick at the proposed location.

4.2 Fusselman Formation lithology:

The Silurian/Ordovician Fusselman Formation is stratigraphically below the Wristen Group and is above and separated from the Montoya Formation by the Sylvan Shale. The Sylvan Shale is the lower confining layer for the proposed Leavenworth AGI well. Fusselman facies include a laminated skeletal wackestone in the upper part and a buildup complex in the lower part composed of ooid and bryozoan grainstones. These grainstones can also be potentially prolific zones for disposal. The Fusselman is approximately 1200 feet thick at the proposed location.

The Montoya Group of Late Ordovician age unconformably overlies the Simpson Group. The Montoya is composed of light gray to medium-dark gray, fine- to medium-crystalline, calcareous dolomite, some units of which are interbedded with shale or dark-gray limestone and some units of which contain white to very light-gray chert. The Montoya carbonate limestone dolomite sequence is dense, impermeable, and non-porous.

4.3 Estimated Formation Tops:

Table 5 provides the estimated tops for the formations that are anticipated to be encountered while drilling the Leavenworth AGI No. 1 well based from offset logs and geological analysis.

Table 5: Formation Tops

Formation	Depth
Rustler	2,193'
Tansill	3,197'
Yates	3,365'
Seven Rivers	3,656'
Capitan Reef	3,955'
Delaware	5,100'

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Cherry Canyon	5,316'
Brushy Canyon	6,311'
Bone Spring	7,294'
Wolfcamp	10,505'
Strawn	12,473'
Atoka	12,846'
Barnett	13,924'
Mississippian Lime	15,659'
Woodford	16,109'
Devonian	16,459'
Fusselman	17,298'
Montoya	18,569'

4.4 Groundwater Hydrology Near the Proposed Injection Well

Southern Lea County is at the southeastern corner of New Mexico. Most of the area is in the Pecos Valley section of the Great Plains physiographic province; it also includes the southern margin of the Llano Estacado. There are no perennial streams and no through going surface drainage. The surface sediments in the area of the proposed well are described as the Kermit-Palomas Soils of fine dune sands and the Kermit Soils and Dune Lands according to the US Department of Agriculture web site <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.

Rocks of Quaternary, Tertiary, and Triassic age are exposed and contain the principal aquifers. The most important aquifer is the Ogallala formation. In large parts of southern Lea County the Ogallala has been removed by erosion and in the low-lying areas Quaternary alluvium, derived principally from the Ogallala formation, has been deposited and is the main aquifer. The two aquifers are continuous in the area. Below the Cenozoic rocks are sandstones and shales of the Dockum group (Rustler) of Late Triassic age, from which small quantities of water are obtained. The chemical quality of the ground water from the principal aquifers is generally fair to good.

The top of the Tansill formation is estimated at a depth of 3,197'; therefore, the surface casing is set at 3,250'. There are no sources of drinking water underlying the injection interval.

A search of the New Mexico Water Rights Database shows there are 2 fresh water wells located within a one-mile radius of the proposed Leavenworth AGI #1 well. These fresh water wells are provided in Table 6 and their locations shown in Figure 5. Both wells are owned/operated by Jay Anthony, Anthony Ranch and were drilled prior to 1940. Fresh water samples are being obtained from the two wells. A map and the Water Right Summaries from the New Mexico Office of the State Engineer are included in Appendix A. The chemical analysis of these samples will be provided once the samples are obtained and analysis performed. The shallow aquifers from which these wells are sourced will be protected by the surface, intermediate and production casing strings in the proposed Leavenworth AGI #1 well.

Table 6: Water wells within 1 mile of Leavenworth AGI #1

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WR File Number	Owner	Primary Purpose	Primary Status	X (Nad 83 UTM)	Y (Nad 83 UTM)	Depth (ft)
CP 00859	Jay Anthony, Anthony Ranch	Livestock Watering	Declaration	667175	3545594	UNK
CP 00860	Jay Anthony, Anthony Ranch	Livestock Watering	Declaration	666806	3543576	UNK

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

4.5 Zones that Contain Oil and Gas, Water and/or Mineral Bearing Formations

The proposed Leavenworth well is located 1.5 miles east of the Sioux Field, which produced primarily from the Tansill, Yates and Seven Rivers reservoirs. Only 4 wells are listed as active in 2018. One well did produce 172 MMCFG from the Devonian and was plugged in June 2000.

The Leavenworth well location is in an area well-separated from faulting as indicated by well and 3D seismic data. Seismic mapping at the Devonian level shows the location to be in a graben, downthrown to faults 2.51 miles downdip to the west, 2.9 miles updip to the northeast, and 2.3 miles on strike to the north.

Potential Oil and Gas Bearing Zones within area of well:

Formation	Depth
Delaware	5,100'
Bone Spring	7,294'
Wolfcamp	10,505'
Strawn	12,473'
Atoka	12,846'

5.0 AREA OF REVIEW

Within two miles of the proposed Leavenworth AGI #1 well, there are 80 recorded oil and/or gas wells as shown in Figure 6. Of these only six wells within the one-mile AOR were drilled and the information is included in Table 7. No wells within the AOR penetrate the proposed injection zone.

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

6.0 IDENTIFICATION AND REQUIRED NOTIFICATION OF AFFECTED PARTIES WITHIN THE AREA OF REVIEW

Lonquist has reviewed the land status and operators within one mile of the proposed well location. There are no active operators within the one-mile radius with wells penetrating the injection zone. There are 6 potentially impacted parties with details provided in Appendix B.

A public notification appeared in the Hobbs newspaper on August , 2018 and ran for one day.

Appendix C contains copies of the registered mail receipts, letters and the newspaper affidavit of publication.

7.0 AFFIRMATIVE STATEMENT OF EXAMINATION OF GEOLOGIC AND ENGINEERING DATA

Based on the available engineering and geologic data we find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water. 3D mapping and subsurface well control do not indicate that the regional faulting in the Devonian age rock extend vertically beyond the Pennsylvanian age rock. Therefore there is no apparent hydrologic connection between the disposal zone and any underground sources of drinking water.

8.0 REFERENCES

Geology and Ground-Water Conditions in Southern Lea County, New Mexico GROUND-WATER REPORT 6; 1961; ALEXANDER NICHOLSON, Jr. and ALFRED CLEBSCH, JR.; UNITED STATES GEOLOGICAL SURVEY-New Mexico Institute of Mining and Technology, State Bureau of Mines and Mineral Resources Division and the New Mexico State Engineer.

MIDDLE PERMIAN BASINAL SILICICLASTIC DEPOSITION IN THE DELAWARE BASIN: THE DELAWARE MOUNTAIN GROUP (GUADALUPIAN); 2006; H. S. Nance; Bureau of Economic Geology Jackson School of Geosciences; The University of Texas at Austin; Austin, Texas.

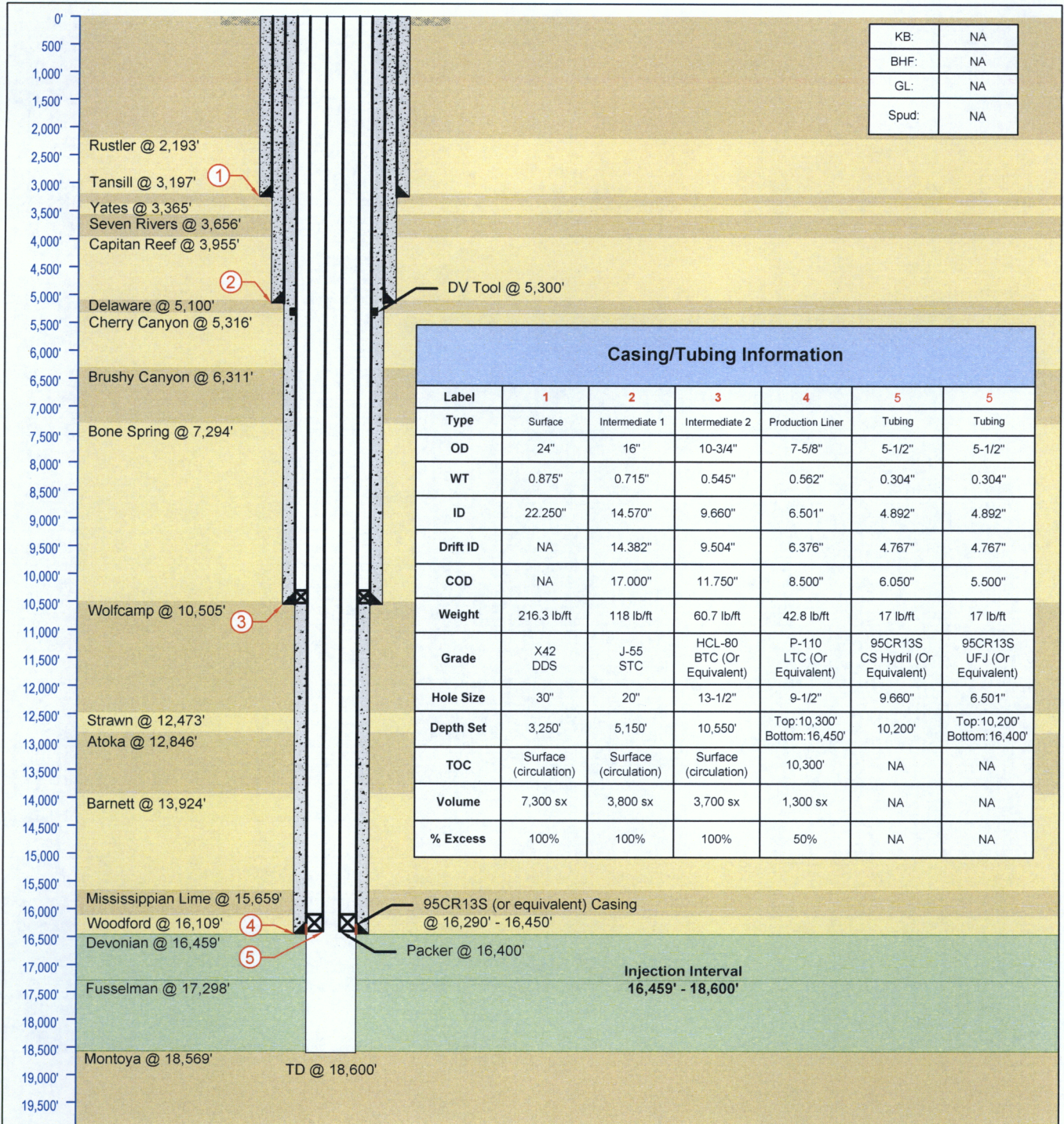
Stratigraphic Analysis of the Upper Devonian Woodford Formation, Permian Basin, West Texas and Southeastern New Mexico, 1991, John B. Comer, Report of Investigations No. 201 Bureau of Economic Geology.

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 1

EXHIBIT A



LONQUIST & CO. LLC PETROLEUM ENGINEERS ENERGY ADVISORS HOUSTON CALGARY AUSTIN WICHITA DENVER	Salt Creek Midstream		Leavenworth AGI No. 1	
	Country: USA		State/Province: New Mexico	County/Parish: Lea
	Location:		Site:	Survey:
	API No: NA		Field:	Well Type/Status: AGI / New Drill
	Texas License F-9147		Project No: 1624	Date: 8/20/2018
12912 Hill Country Blvd. Ste F-200 Austin, Texas 78738 Tel: 512.732.9812 Fax: 512.732.9816	Drawn: WHG		Reviewed:	Approved:
	Rev No: 7		Notes:	

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 2

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 3

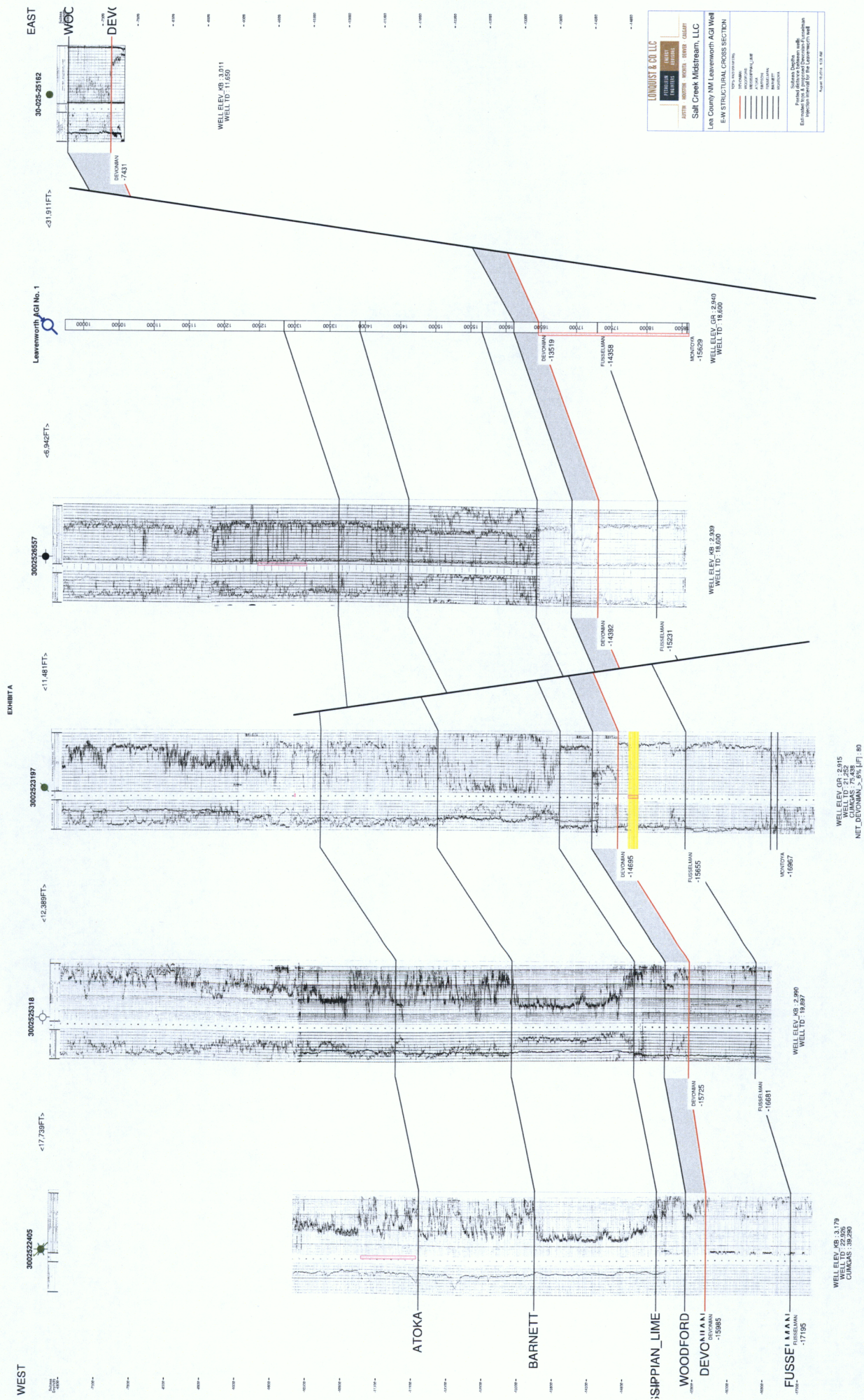


EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

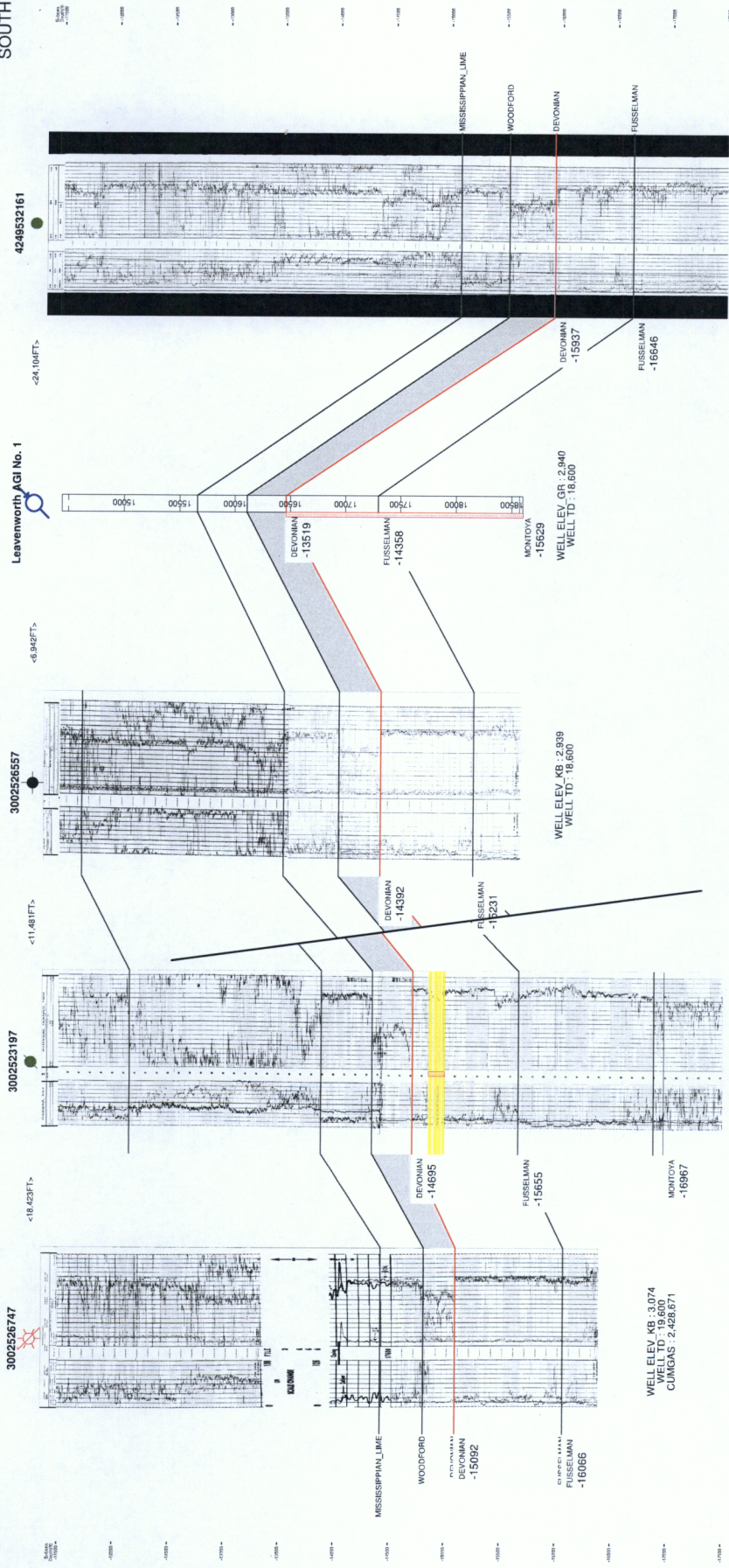
FIGURE 4

3002523197

3002526557

Leavenworth AGI No. 1

SOUTH



WELLELEV GR : 2,915
WELL TD : 21,252
CUMGAS : 75,438
NET_DEVONIAN > 6% [JF] : 80

WELL ELEV_KB : 2,927
WELL TD : 22,300



EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 5

EXHIBIT A

Leavenworth AGI No. 1
1/2-Mile Area of Review List

API (30-025-...)	WELL NAME	WELL TYPE	STATUS	OPERATOR	TVD (FT.)	LATITUDE (NAD 83 DD)	LONGITUDE (NAD 83 DD)	DATE DRILLED
09860	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	3500	32.02408220	-103.22850040	1/1/1900

EXHIBIT A

Leavenworth AGI No. 1 1-Mile Area of Review List

API (30-025-...)	WELL NAME	WELL TYPE	STATUS	OPERATOR	TVD (FT.)	LATITUDE (NAD 83 DD)	LONGITUDE (NAD 83 DD)	DATE DRILLED
09850	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	3304	32.0223732	-103.2178879	1/1/1900
09859	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	3,708	32.0350876	-103.2285080	1/1/1900
09860	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	3,500	32.0240822	-103.2285004	1/1/1900
22401	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	3,502	32.0196686	-103.2423859	1/1/1900
27045	LEA 26 7406 IV-S #001	O	P	BTA OIL PRODUCERS	3,660	32.0193901	-103.2423859	12/31/9999
32053	BEARTOOTH STATE UNIT #001	O	P	EOG Y RESOURCES, INC.	7,725	32.0232964	-103.2423859	7/26/1993

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 6

EXHIBIT A

SALT CREEK MIDSTREAM, LLC – LEAVENWORTH AGI #1

FIGURE 7

Leavenworth AGI No. 1
Offsets Leases
Salt Creek Midstream
Lea Co., NM

PCS: MAD 1983 SPCS NME FPS 3001 (US FL)
Drawn By: ASG Date: 8/16/2018 Approved By: ELR

LONQUIST & CO. LLC
PETROLEUM ENGINEERS ENERGY ADVISORS
AUSTIN · HOUSTON · WICHITA · DENVER · CALGARY

Leavenworth Adit No. 1 SHL
Surface Site (U.S. 50) and [State of New Mexico Property]
BLM Leased
NEED LESSEE INFORMATION
1/2-Mile Radius
2-Mile Radius
Section (NMP-PLSS 2nd Div.)
Section (NMP-PLSS 1st Div.)
TownshipRange (N.M.P.L.S.S.)
Abstract Boundary (Tracts)
County Boundary
Lease Boundary
Label (13)

API (20-425--) SHL Status-Type Count (NM-OCD 2018)
Horizontal Surface Location (13)
Active - Oil (6)
Cancelled APD - Oil (7)
Plugged/Site Released - Injection (6)
Plugged/Site Released - Oil (47)
Plugged/Site Released - SWD (1)
API (20-425--) BHL Status-Type Count
Permitted - Oil (13)
Offset Lease Boundary

Lessee(s)
AMERDEV NEW MEXICO, LLC
AMERDEV OPERATING, LLC
AMERDEV OPERATING, LLC - RMR OPERATING, LLC
APACHE CORP
BLM NON-LEASED LAND
BTA OIL PRODUCERS
BURTLINGTON RES OIL & GAS CO LP
EOG RESOURCES, INC.
EXXON MOBIL CORPORATION
R & R ROYALTY LTD
ROY G. BARTON SR. - OPAL BARTON REV TRUST
STONE CREEK ONE PARTNERS III LP
SHL Source: NM-OCD/NM-BLM/ANASLO (2018)
BHL/Lateral Source: DrillingInfo (2018)

Map Extent
NEW MEXICO TEXAS LOVING WINNIE

Scale: 1" = 2,083' A-1390
1:25,000
0 1/4 1/2 1 Miles

EXHIBIT A

Leavenworth AGI No. 1
1-Mile Offset Lessees List

TOWNSHIP	RANGE	SECTION	QQ UNIT LETTER	MINERAL LESSEE	MINERAL OWNER	ADDRESS 1	ADDRESS 2
26S	36E	13	M	BURLINGTON RES OIL & GAS CO LP	-	PO BOX 51810	MIDLAND TX, 79701810
26S	36E	14	Entire Section	AMERREDEV NEW MEXICO, LLC.	-	5707 SOUTHWEST PARKWAY, BUILDING 1, SUITE 275	AUSTIN, TX 78735
26S	36E	22	A,G,H	AMERREDEV NEW MEXICO, LLC.	-	5707 SOUTHWEST PARKWAY, BUILDING 1, SUITE 275	AUSTIN, TX 78735
26S	36E		I,J,O,P	EOG Y RESOURCES, INC.	-	104 S 4TH ST	ARTESIA, NM 88210
26S	36E	23	Entire Section	AMERREDEV NEW MEXICO, LLC.	-	5707 SOUTHWEST PARKWAY, BUILDING 1, SUITE 275	AUSTIN, TX 78735
26S	36E	24	C,F,G,J,K,N,O	R & R ROYALTY LTD	-	500 N SHORELINE BLVD STE 322	CORPUS CHRISTI TX, 78401
26S	36E		D,E,L,M	NO INFORMATION FOUND	BUREAU OF LAND MANAGEMENT	301 DINOSAUR TRAIL	SANTA FE, NM 87508
26S	36E	25	B,C	R & R ROYALTY LTD	-	500 N SHORELINE BLVD STE 322	CORPUS CHRISTI TX, 78401
26S	36E	25	D,E,F,G,K,L,M	NO INFORMATION FOUND	BUREAU OF LAND MANAGEMENT	301 DINOSAUR TRAIL	SANTA FE, NM 87508
26S	36E	26	A,B,C,D,E,F,G,H,I,J,K,L,M	AMERREDEV NEW MEXICO, LLC.	-	5707 SOUTHWEST PARKWAY, BUILDING 1, SUITE 275	AUSTIN, TX 78735
26S	36E		N,O,P	CHEVRON U S A INC	-	6301 DEALVILLE BLVD	MIDLAND, TX U.S.A. 79706
26S	36E	27	A,B,G,H,I,J,O,P	AMERREDEV NEW MEXICO, LLC.	-	5707 SOUTHWEST PARKWAY, BUILDING 1, SUITE 275	AUSTIN, TX 78735

Leavenworth AGI No. 1
1-Mile Offset Lessees List
NM-OCD/BLM/SLO (2018)