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AUG 27 2014

Dept. of Environment &
Natural Resources
GROUND WATER QUALITY

ROBERT M. ZINKE
PRESIDENT

Zenergy Operating
Company, LLC

August 25, 2014

PMB 2020
SD Department of Environment and Natural Resources
Groundwater Quality Program
523 East Capital Ave. – Joe Foss Building
Pierre, SD 57501

RE: Gunderson 31P-30-19H
API #: 40-063-20761
Sec. 31, T23N-R3E
Harding Co., SD

Dear Mr. Walsh:

Zenergy Operating Company, LLC is respectfully requesting approval for this well to be converted into a disposal well. We have attached the Application along with backup documents, Water Analysis of 2 wells which would inject into the Gunderson along with Form 13, Certification of Applicant. An extra copy of each has also been included.

We have mailed a copy of this application to the surface owner listed below.

<u>Surface Owner Name</u>	<u>Address</u>	<u>Telephone #</u>
Alfred Gunderson Family Trust, Roger Gunderson, Trustee, Two Reverse E LLC, Roger Gunderson, Manager, and Marcella M. Gunderson Revocable Trust u/d/t/ 9/20/2007, Marcella M Gunderson, Trustee	11909 South Dakota Hwy 20, Buffalo, SD 57720	605-580-2011

If you have any questions or need additional information, please let us know. Sean LiSoeey can be reached at 918-488-6482.

Thank you for your consideration.

Sincerely,



Belinda M. Brock
Regulatory/Engineering

STATE OF SOUTH DAKOTA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Application for a Permit to Inject - Class II Underground Injection Control

Return To: PMB 2020
SD Department of Environment and Natural Resources
Ground Water Quality Program
523 East Capitol Ave. - Joe Foss Building
Pierre SD 57501
Telephone 605.773.3296
Fax 605.773.6035

1.0 General Information

1.1 Application Type

- New Permit to Inject
- Major Modification to Existing Permit to Inject
- Minor Modification to Existing Permit to Inject

1.2 If requesting a new permit or major modification, provide a brief description of the new activity or proposed modification (include additional attachments as needed).

The proposed modification is to convert the Gunderson 31P-30-19H into a SWD well. The need for a close disposal well and gathering system will drastically aid in the economics of the existing & future producing source wells. This will not only reduce the cost of SWD but reduce the unwanted truck traffic on the local ranch and county roads

1.3 If requesting a minor modification, select the type(s) of modification requested (ARSD 74:12:07:09)

- Correction of typographical errors and language changes that have no legal or substantive effect
- More frequent monitoring or reporting proposed by the permittee
- A change in ownership or operational control of the well if the secretary determines that no other change in the permit is necessary, provided a written agreement containing a specific date for transfer of responsibility for the injection well, coverage, and liability between the current and new owner or operator has been submitted to the secretary pursuant to ARSD 74:12:07:06
- A change in quantities or types of fluids injected which are within the capacity of the injection well as permitted and, in the judgement of the secretary, would not interfere with the operation of the injection well or its ability to meet conditions described in the permit, and would not change its classification
- A change in construction requirements approved by the secretary pursuant to this chapter if the alteration complies with the conditions of the permit to inject and this section
- Amendment of a plugging and abandonment plan which has been updated pursuant to this article
- Recementing, reworking, or reconditioning a well
- Deepening, extending, or sidetracking an existing well within the permitted injection horizon

As described in ARSD 74:12:07:09, if the department determines that a minor modification request has the potential to degrade or threaten freshwater resources, it will be treated as a major modification and subject to the Notice of Recommendation procedures (ARSD 74:12:09)

1.4 Operator Information (ARSD 74:12:07:03(8))

Name:	Zenergy Operating Company, LLC.
Address:	6100 S. Yale Ave., Tulsa, OK, 74136
Telephone:	(918)488-6482
Email:	sean.lisooey@zenergyok.com

1.5 Basic information about the well(s) covered by the requested permit to inject

API Number	Well Name	Legal Location	Latitude	Longitude
40-063-20761	Gunderson 31P-30-19H	SESE Sec. 31 - T23N - R3E	45°54'31.14"	103°47'43.75"

The information required below should be included as attachments to the application form. The following should be used as a checklist to ensure all necessary material is submitted. The department recommends using the same numbering system as shown in the application form; however, if a different system is used please use the location box to identify the location of the information in the application.

1.6 Affidavit of Delivery (ARSD 74:12:07:04) - Include an affidavit showing the names and addresses of the parties to whom the application has been delivered.

Included

Location:

2.0 Specific Application Requirements

2.1 Maps (ARSD 74:12:07:03(1))

2.1.1 Vertical Wells (ARSD 74:12:07:03(1)(a))

A one-half mile fixed radius area of review plat which shows the location of the injection well or wells, existing or proposed; the location of all oil and gas wells; the location of all water wells, active and abandoned; the location of all other wells, including plugged and abandoned wells; abandoned locations; dry holes; current drilling locations; the names of operators; the surface and mineral owners; and each offset operator

Included

Location:

2.1.2 Horizontal Wells (ARSD 74:12:07:03(1)(b))

A one-half mile fixed radius area of review plat extending in all directions from the horizontal well and any sidetracks. The plat must show the location of the injection well or wells, existing or proposed; the location of all oil and gas wells; the location of all water wells, active and abandoned; the location of all other wells, including plugged and abandoned wells; abandoned locations; dry holes; current drilling locations; the names of operators; the surface and mineral owners; and each offset operator

Included

Location: On Page 1 of the Gunderson 31P-30-19H SWD Application.

2.2 Formation or formations from which oil, gas, and water wells are producing or have produced within the area of review (ARSD 74:12:07:03(2))

Included

Location: On Page 1 of the Gunderson 31P-30-19H SWD Application.

2.3 The name, stratigraphic and structural description, and depth of the receiving formation or formations and the overlying and underlying confining zone(s) or formation(s) (ARSD 74:12:07:03(3))

Included

Location: On Page 2 of the Gunderson 31P-30-19H SWD Application.

2.4 The well type, construction, spud date, total depth, formation tops, record of completion or recompletion, and plugging for all oil, gas, and injection wells within the area of review, **and any additional pertinent information which the secretary determines is necessary to make an informed judgement on the issuance of a permit**, including drill stem tests and well logs for all oil and gas wells identified in the area of review (ARSD 74:12:07:03(4))

Included

Location: On Page 1 of the Gunderson 31P-30-19H SWD Application and on Current WBD.

2.5 Information on abandoned and active water wells within the area of review, as follows (ARSD 74:12:07:03(5))

2.5.1 Abandoned water wells:

- 2.5.1.1 The legal location
- 2.5.1.2 Well name
- 2.5.1.3 Method and supporting information on abandonment, if available

2.5.2 Active Water Wells

- 2.5.2.1 The legal location
- 2.5.2.2 Well name
- 2.5.2.3 An analysis of water quality, including information on total dissolved solids content, chlorides, sodium, sulfates, nitrates, and hydrocarbons
- 2.5.2.4 The construction program, including casing size and type, if available
- 2.5.2.5 Depth of the well, if available
- 2.5.2.6 A geologic / driller's log, if available
- 2.5.2.7 The water level and pump type, if available

Included

Location: On Page 1 of the Gunderson 31P-30-19H SWD Application.

2.6 A description of the injection well's casing and the proposed casing program, and the proposed method for testing the casing for mechanical integrity before use as an injection well (ARSD 74:12:07:03(6))

Included

Location: On Conversion WBD and On Page 6 of the Gunderson 31P-30-19H SWD Application.

2.7 The geologic name and the depth to and interval of all freshwater resources which may be affected by injection (ARSD 74:12:07:03(7))

Included

Location: On Page 3 of the Gunderson 31P-30-19H SWD Application.

2.8 Schematic drawings of the surface and subsurface construction details of the well with detailed drawings of the gauge connections (ARSD 74:12:07:03(9))

Included

Location: On Excel attachments.

2.9 The source and nature of the substance or substances to be injected, its viscosity, its compatibility with the receiving formation, including stability indices, and the estimated average and maximum daily amounts to be injected. If the nature of the injected fluid is produced water, a water quality analysis must be submitted and must include information on total dissolved solids content, chlorides, sodium, sulfates, nitrates, and hydrocarbons. (ARSD 74:12:07:03(10))

Included

Location: Page 4: Gunderson 31P-30-19H SWD Application and Water Analysis's for source wells

2.10 The average and maximum estimated injection pressure (ARSD 74:12:07:03(11))

Included

Location: On Page 4 of the Gunderson 31P-30-19H SWD Application.

2.11 A narrative description of any proposed production stimulation program, including a feasibility study, process description, and an explanation of how the data were determined, such as working calculations (ARSD 74:12:07:03(12))

Included

Location: On Page 6 of the Gunderson 31P-30-19H SWD Application.

2.12 A list of wells identified in subdivision 74:12:07:03(1) in need of corrective action or where corrective action has been performed, and a written justification describing how the corrective action will protect freshwater resources. (ARSD 74:12:07:03(13))

Included

Location: On Page 3 of the Gunderson 31P-30-19H SWD Application.

2.13 The injection zone characteristics including porosity, compressibility, and intrinsic permeability. Please include the reference or source of the information. (ARSD 74:12:07:03(14))

Included

Location: On Page 3 of the Gunderson 31P-30-19H SWD Application.

2.14 The expected project life (ARSD 74:12:07:03(15))

Included

Location: On Page 2 and 4 of the Gunderson 31P-30-19H SWD Application.

2.15 Surface owner name, address, and telephone number (ARSD 74:12:07:03(16))

Included

Location: On Page 7 of the Gunderson 31P-30-19H SWD Application.

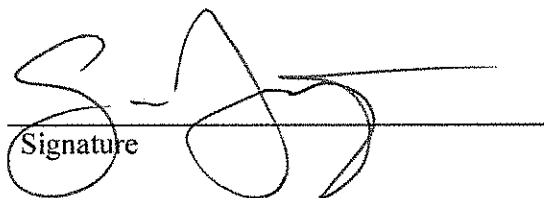
3.0 Certification of Applicant

3.1 Certification of Applicant (Form 13). The applicant is required to submit a notarized Certification of Applicant (Form 13). This form can be found at <http://denr.sd.gov/documents/form13.pdf> or by contacting the Ground Water Quality Program at 605.773.3296.

Included

Location:

3.2 Applicant's Signature


Signature

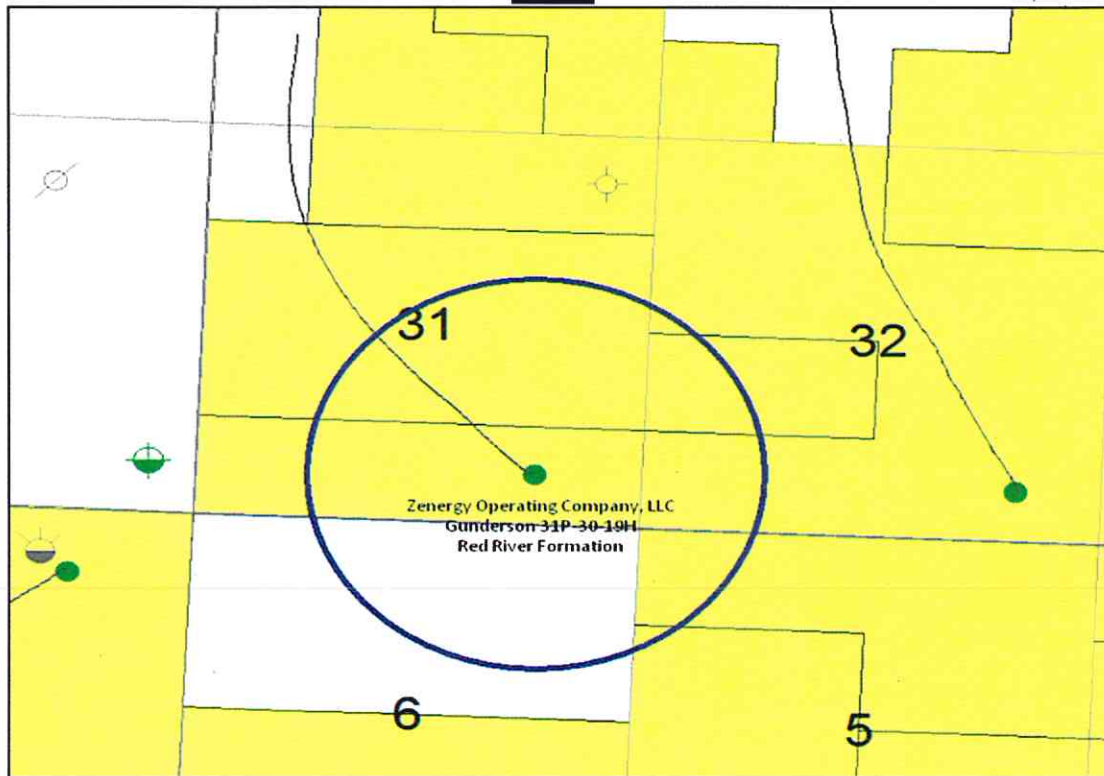
8-25-2014
Date

Sean H. Sasey
Printed Name of Person Signing

Drilling/Production/Operations Engineer I
Title

**Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota**

Maps: One-half mile fixed radius from Area of Review
Plat.



There are no wells (Producers, TA, P&A, or etc.) in the half-mile area of review. Please refer to map.

NOTE: According to SD water well completion reports, there are no active or abandoned water wells within the area of review.

**Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota**

Lithologic Description of Proposed Injection Zone

Dakota Group:

The Dakota Group in this area is approximately ~ 690 ft thick and consists of alternating shale, sandstone and siltstone laminations. The Dakota Group is extremely variable and individual sands cannot be correlated between wells with any degree of certainty. These sands were probably deposited in a fluvial environment which explains the high variability and the unpredictability. Porosity is generally high in the better developed sands (up to 25%) and contains salt water. The Dakota Group (based on the nearby Johnson Federal 31-1 open-hole logs) is confined by the Mowry Shale (± 170 ft thick) above the zone and the Swift Shale (± 90 ft thick) below the injection zone.

**Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota**

Freshwater Resources:

Control Well: Johnson Federal 31-1

<u>Geologic Name</u>	<u>Top of formation</u>	<u>Thickness</u>
Inyan Kara	4251'	130'
Minnelusa	5980'	62'

Note: Formation tops were based on the Johnson Federal 31-1 (Close in proximity) open-hole logs due to logs not ran in the Gunderson 31P-30-19H. TOC behind 7" casing is @ 4100', which is protecting all freshwater zones. See attached bond log. Top of Minnekahta Formation is @ 5799'.

Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota

Brief Description of Proposed Injection Program

The proposed Zenergy Gunderson 31P-30-19H SWD well will handle and dispose of produced water from certain Zenergy horizontal Red River “B” producing wells in South Cedar Creek Field. A local SWD along with associated infrastructure (Electric and Gathering system) could change economics in order to encourage additional development in this area. A list of completed potential source wells for the Gunderson 31P-30-19H SWD is attached. **Note:** The furthest source well at this time is approximately 2 miles away from the proposed SWD.

Produced water from the source wells will be transferred at low pressure via a buried 4” Composite Flex Pipe gathering system to Gunderson 31P-30-19H SWD location. The water will be stored on location, pressurized if necessary and disposed of into the Inyan Kara formation.

The system will need to install Composite Flex Pipe gathering lines from the source wells which would be equipped with a SCADA monitoring system with numerous check valves, control valves and automatic shut-down devices to insure the system’s safety.

The ½ mile area of review currently produces approximately 0 bbls SWPD (salt water per day) but the source wells combined are currently producing ~500 bbls SWPD. Zenergy is investigating alternative means of artificial lift to increase fluid recovery in existing producing wells outside of the area of review. The anticipated increased fluid production could have a dramatic effect on revenues. The need for a close disposal well and gathering system will drastically aid in the economics of the existing & future producing source wells. This will not only reduce the cost of SWD but reduce the unwanted truck traffic on the local ranch and county roads. The anticipated initial average injection rate for this well is 3000 to 3500 bbls water per day with maximum rates and pressures in the range of 6000 BHPD @ 1532 psi.

**Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota**

List of Probable Source Wells

<u>Well Name</u>	<u>Section</u>
Pronghorn 32P-29-20H	Sec 32-T23N-R3E
Tecton 2-1H	Sec 01-T22N-R2E

Note: The expected project life is about 20 years.

Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota

Proposed Plug-Back/SWD Conversion Procedure

1. Notify SD DENR prior to commencing operations.
2. MIRU workover rig. ND WH and Hook up BOP's.
3. TOH w/ rods and pump – Warehouse Rods (Lay down w/ boxes all on one end).
4. TOH w/ 2 7/8" tbg.
5. PU Bit and scraper & TIH to 8607' MD. TOH.
6. PU & TIH w/ 7" CIBP and set @ 8,810' MD, 8,642' TVD. Pressure test to 500 psi.
7. MIRU Cementing vendor equipment. Perform safety meeting.
8. Spot 20 ft cement on top of CIBP. PU and reverse circulate tbg clean.
9. TOH w/ tbg to 6,748'. Set balance plug from 6,648' to 6,748' (100') w/ cmt.
10. PU and reverse circulate tbg clean.
11. TOH w/ tbg to 6,181 ft. Set balance plug from 5,948' to 6,181' (233') w/ cmt.
12. TOH and reverse circulate clean. RD cementing vendor.
13. TOH w/ tbg. MIRU WL. TIH w/ 7" CIBP on WL. Set @ 4,602'. TOH. Pressure test to 500 psi. TOH.
14. TIH w/ perf. Guns and perforate w/ 4 spf from ~4,422' – 4,572' (~150').
15. TIH w/ 2-7/8" tbg & packer. Acidize well. Swab back. Establish injection rate. TOH LD work string.
16. TIH and run 7" coated Baker Lockset injection packer on 3 1/2" seal-tite injection tbg to set packer @ 4,372' MD (+50' above top perforation).
17. Displace annulus with packer fluid and set packer. Nipple up wellhead and pressure test annulus to 1000 psi to check mechanical integrity.
18. Break down with salt water and perform additional stimulation if necessary.
19. Swab well to get sample of formation water. Send water into Astro-Chem to test (Note: Also, need to send in Tecton Federal 2-1H and Pronghorn 32P-29-20H produced water to Astro-Chem for Compatibility Test).
20. RDMO completion unit.
21. Clean up location, build surface facilities and install injection pump. Start up system.

**Zenergy Operating Company, LLC.
Gunderson 31P-30-19H SWD Well Application
SE SE Section 31 – T23N – R3E
Harding County, South Dakota**

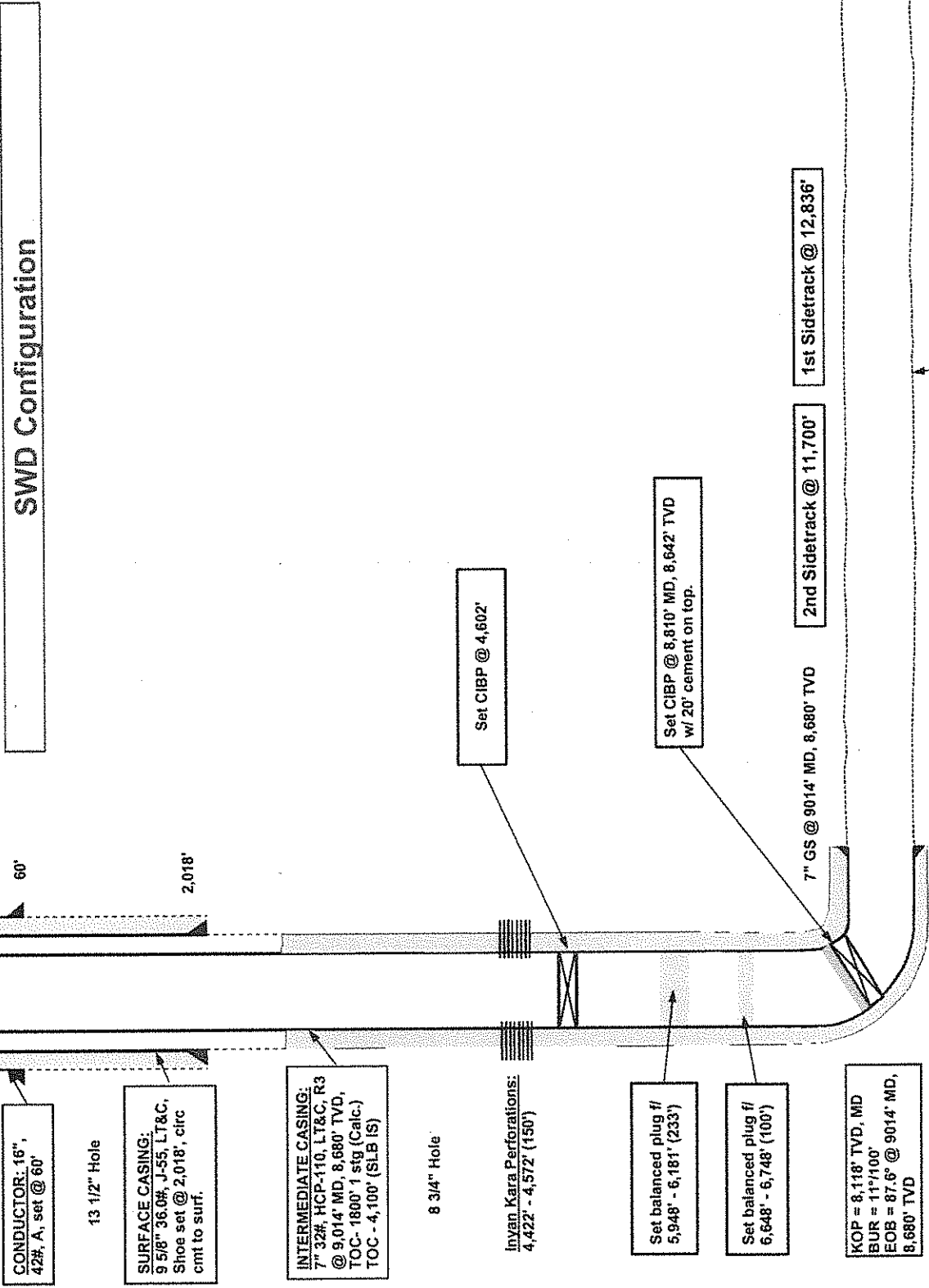
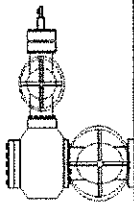
Surface Owner Information

<u>Surface Owner Name</u>	<u>Address</u>	<u>Telephone #</u>
Alfred Gunderson Family Trust, Roger Gunderson, Trustee, Two Reverse E LLC, Roger Gunderson, Manager, and Marcella M. Gunderson Revocable Trust u/d/t/ 9/20/2007, Marcella M Gunderson, Trustee	11909 South Dakota Hwy 20, Buffalo, SD 57720	605-580-2011

ZENERGY, INC.
Gunderson 31P-30-19H
 Sec. 31 - T23N - R03E
 Harding County, South Dakota

SWD Configuration

KB: 3,125'
 KB corr: 21'
 GL: 3,104'
 Spud Date: 3/13/2014
 TD Date: 04/06/2014
 API No. 40-063-20761
 SD DENR Permit No.: 2047
 Drilling Rig: Cyclone Rig #26
 Surface loc.: 31-23N-03E



CONDUCTOR: 16",
 42#, A, set @ 60'

13 1/2" Hole

SURFACE CASING:
 9 5/8" 36.0#, J-55, LT&C,
 Shoe set @ 2,018', circ
 cmt to surf.

INTERMEDIATE CASING:
 7" 32#, HCP-110, LT&C, R3
 @ 9,014' MD, 8,680' TVD,
 TOC - 1800', 1 stg. (Calc.)
 TOC - 4,100' (SLB IS)

8 3/4" Hole

Invan Kara Perforations:
 4,422' - 4,572' (150')

Set balanced plug f/
 5,948' - 6,181' (233')

Set balanced plug f/
 6,648' - 6,748' (100')

KOP = 8,118' TVD, MD
 BUR = 11"/100'
 EOB = 87.6' @ 9014' MD,
 8,680' TVD

Set CIBP @ 4,602'

Set CIBP @ 8,810' MD, 8,642' TVD
 w/ 20' cement on top.

7" GS @ 9014' MD, 8,680' TVD

2nd Sidetrack @ 11,700'

1st Sidetrack @ 12,836'

TD = 15,498' MD
 = 8,709' TVD

6 1/8" Lateral Open Hole

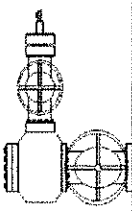
Natural Open-Hole Completion

RED RIVER "B" LATERAL

ZENERGY, INC.
Gunderson 31P-30-19H
 Sec. 31 - T23N - R03E
 Harding County, South Dakota

KB: 3,125'
 KB corr: 21'
 GL: 3,104'
 Spud Date: 3/13/2014
 TD Date: 04/06/2014
 API No. 46-063-20761
 SD DENR Permit No.: 2047
 Drilling Rig: Cyclone Rig #26
 Surface loc.: 31-23N-03E

Red River "B" Natural Open-Hole Completion



CONDUCTOR: 16",
 42#, A, set @ 60'

13 1/2" Hole

SURFACE CASING:
 9 5/8" 36.0#, J-55, LT&C,
 Shoe set @ 2,018', circ
 cmt to surf.

INTERMEDIATE CASING:
 7" 32#, HCP-110, LT&C, R3
 @ 9,014' MD, 8,680' TVD,
 TOC - 1800' 1 stg (Calc.)
 TOC - ?? (SLB IS)

8 3/4" Hole

KOP = 8,118' TVD, MD
 BUR = 11°/100'
 EOB = 87.6° @ 9014' MD,
 8,680' TVD

4/17/2014: PRODUCTION TUBING
 TIH with tubing as followed: 1 - 3 1/2" x 30' sand screen, 1 - 2 7/8" x 6' tubing sub, 18 jls 2 7/8" R-2 6.5# L-80
 8rd EUE tubing, MSN, 4 jls 2 7/8" R-2 6.5# L-80 8rd EUE tubing, 1 - 2 7/8" x 7" TAC, 245 jls 2 7/8" R-2 6.5# L-80
 8rd EUE tubing, set TAC with 35" stretch, 20,000# tension; @ 8,067.66', SN @ 8,197.42', EOT @ 8,786.47'.

4/18/2014: Rods
 Rod string as follows from top to bottom: 1 - 1 1/2" x 30' polish rod, 1 - 1" x 2' and 1 - 1" x 4' pony rods, 110 - 1"
 x 25' S-88 rods, 204 - 7/8" x 25' S-88 rods, 9 - 1 1/2" x 25' K-bars with stabilizer subs between each one, 1 - 2
 1/2" x 1 3/4" x 24' pump with strainer nipple, space rod 44" off bottom.

7" GS @ 9014' MD, 8,680' TVD

2nd Sidetrack @ 11,700'

1st Sidetrack @ 12,836'

TD = 15,498' MD
 = 8,709' TVD

Natural Open-Hole Completion

6 1/8" Lateral Open Hole

RED RIVER "B" LATERAL



JACAM LABORATORIES

DownHole Rx

WATER CHEMISTRY

ZENERGY OPERATING
BART HONEYMAN
HARDING SD

PRONGHORN 32P-29-20H
WELLHEAD

Report Date: 06-13-2014 Sampled: 05-21-2014
Sample #: 2200 at 0000

Sample ID: 72188

CATIONS

Calcium (as Ca)	2137
Magnesium (as Mg)	174.50
Barium (as Ba)	0.204
Strontium (as Sr)	139.10
Sodium (as Na)	16330
Potassium (as K)	1199
Lithium (as Li)	25.67
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	20.65
Manganese (as Mn)	0.256
Zinc (as Zn)	1.24
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	30100
Sulfate (as SO ₄)	1880
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	270.00
Bicarbonate (as HCO ₃)	292.00
Carbonate (as CO ₃)	0.00
Oxalic acid (as C ₂ O ₄)	0.00
Silica (as SiO ₂)	0.00
Phosphate(as PO ₄)	0.00
H ₂ S (as H ₂ S)	5.00
Fluoride (as F)	0.00
Nitrate (as NO ₃)	0.00
Boron (as B)	126.90

PARAMETERS

Calculated T.D.S.	52685
Molar Conductivity	67830
Resistivity	14.74
Sp.Gr.(g/mL)	1.03
Pressure(atm)	1.00
pCO ₂ (atm)	0.0251
pH ₂ S(atm)	0.00315
Temperature (°F)	93.00
pH	6.87

COMMENTS

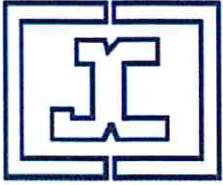
HARDING SD

JACAM LABORATORIES

205 S. Broadway · P.O. Box 96 · Sterling, KS 67579-0096

DownHole SAT™ Water Analysis Report

SYSTEM IDENTIFICATION



JACAM LABORATORIES

ZENERGY OPERATING
 PRONGHORN 32P-29-20H
 BART HONEYMAN
 WELLHEAD
 HARDING SD

Sample ID#: 2200
 ID: 72188
 Report Date: 06-13-2014
 Sample Date: 05-21-2014
 at 0000

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	2137
Magnesium(as Mg)	174.50
Barium(as Ba)	0.204
Strontium(as Sr)	139.10
Sodium(as Na)	16330
Potassium(as K)	1199
Lithium(as Li)	25.67
Iron(as Fe)	20.65
Field Iron(as Fe)	0.00
Ammonia(as NH ₃)	0.00
Aluminum(as Al)	0.00
Manganese(as Mn)	0.256
Zinc(as Zn)	1.24
Lead(as Pb)	0.00

ANIONS

Chloride(as Cl)	30100
Sulfate(as SO ₄)	1880
Bromine(as Br)	0.00
Dissolved CO ₂ (as CO ₂)	270.00
Bicarbonate(as HCO ₃)	292.00
Carbonate(as CO ₃)	0.00
Silica(as SiO ₂)	0.00
Phosphate(as PO ₄)	0.00
H ₂ S (as H ₂ S)	5.00
Fluoride(as F)	0.00
Nitrate(as NO ₃)	0.00
Boron(as B)	126.90

PARAMETERS

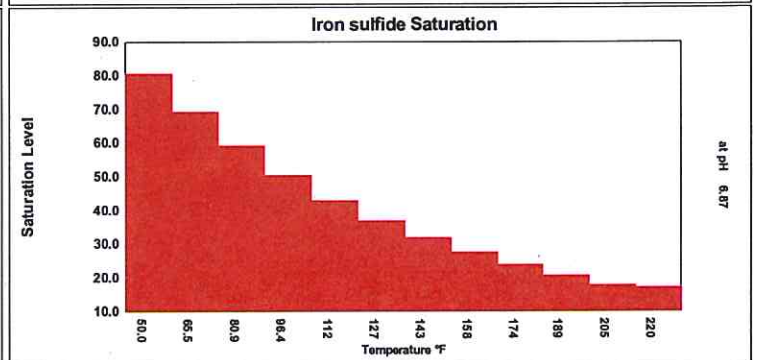
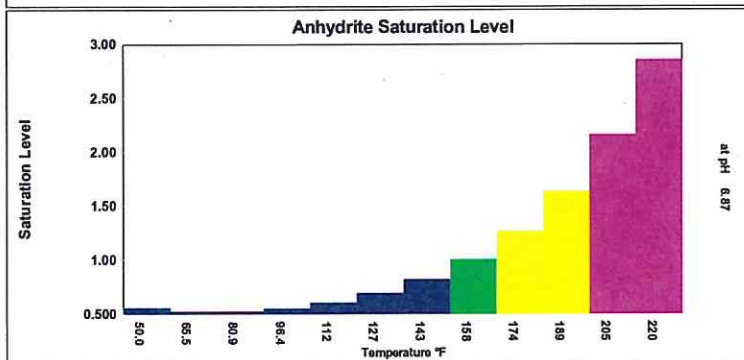
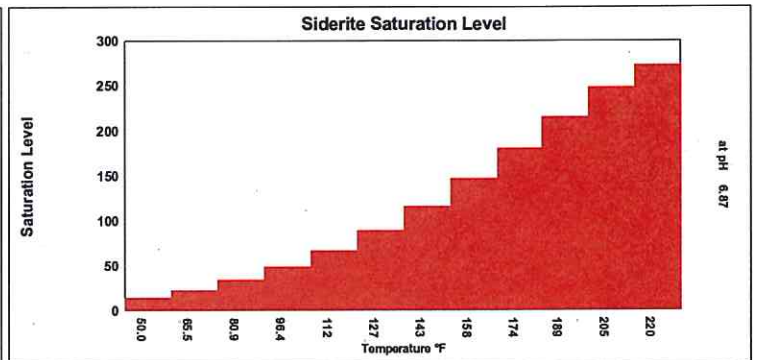
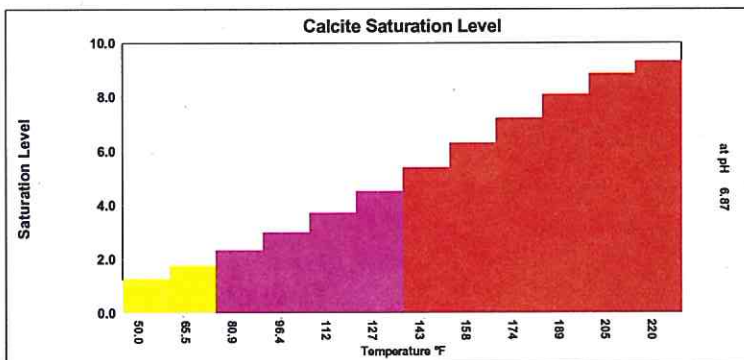
Temperature(°F)	93.00
T.D.S.	52685
Resistivity:	14.74
Sample pH	6.87
Conductivity:	67830

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃	Anhydrite CaSO ₄	Gypsum CaSO ₄ *2H ₂ O	Barite BaSO ₄	Celestite SrSO ₄	Siderite FeCO ₃	Mackawenite FeS	CO ₂ (mpy)	pCO ₂ (atm)							
50.00	0.00	1.22	0.0178	0.554	-334.16	0.941	-32.88	9.60	0.108	2.60	59.32	14.26	0.105	80.52	2.22	0.0314	0.0251
65.45	0.00	1.72	0.0507	0.523	-365.82	0.859	-82.27	6.11	0.101	2.38	55.56	22.61	0.134	69.20	2.17	0.0589	0.0251
80.91	0.00	2.31	0.0823	0.522	-358.73	0.801	-120.23	4.13	0.0916	2.32	54.24	34.00	0.163	59.06	2.11	0.0364	0.0251
96.36	0.00	2.98	0.112	0.549	-319.17	0.761	-147.36	2.95	0.0799	2.33	54.34	48.68	0.191	50.28	2.03	0.0477	0.0251
111.82	0.00	3.70	0.139	0.604	-255.16	0.790	-122.88	2.20	0.0660	2.37	55.06	66.74	0.217	42.87	1.94	0.0500	0.0251
127.27	0.00	4.51	0.166	0.691	-175.33	0.868	-70.28	1.67	0.0483	2.40	55.57	89.04	0.244	36.81	1.84	0.0419	0.0251
142.73	0.00	5.38	0.192	0.820	-87.52	0.945	-27.07	1.27	0.0258	2.42	55.84	115.85	0.271	31.77	1.72	0.0340	0.0251
158.18	0.00	6.30	0.218	1.00	1.32	1.02	8.48	0.979	-0.00258	2.43	55.89	146.76	0.298	27.51	1.61	0.0354	0.0251
173.64	0.00	7.23	0.242	1.26	85.86	1.09	37.79	0.760	-0.0382	2.42	55.73	180.68	0.324	23.82	1.50	0.0367	0.0251
189.09	0.00	8.11	0.264	1.63	162.36	1.16	62.01	0.594	-0.0828	2.41	55.37	215.62	0.347	20.59	1.39	0.0185	0.0251
204.55	0.00	8.87	0.281	2.16	228.72	1.22	82.03	0.467	-0.138	2.38	54.81	248.71	0.366	17.71	1.29	0.0155	0.0251
220.00	0.171	9.34	0.297	2.85	284.12	1.25	92.92	0.362	-0.213	2.29	53.26	273.10	0.384	17.11	1.29	0.0211	0.0293

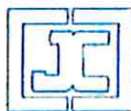
	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT
Calcite	1000		1000		1000		1000		1000		1000		1000	
Anhydrite														
Gypsum														
Barite														
Celestite														
Siderite														
Mackawenite														

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase. Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Water Analysis

Analysis #: 23032



JACAM Chemicals, L. L. C.

205 S. Broadway
P.O. Box 96
STEEHLING, KS 67579
Email: solutions@jacam.com

620-278-3355
Fax 620-278-2112
Web: www.jacam.com

Company: ZENERGY
Field: ZENERGY
Lease: TECTON FEDERAL 2-1A
Location:
Description: STAND ALONE
Well:
Sample Point: TREATER

Date: March 17, 2009

Attention: TJ HONEYMAN

DISSOLVED SOLIDS

CATIONS	mg/l	meq/l
Sodium, Na (calc)	6,650.22	289.14
Calcium, Ca	520.00	25.87
Magnesium, Mg	123.59	10.13
Barium, Ba	125.00	1.82
Iron, Fe	13.25	0.71

ANIONS	mg/l	meq/l
Hydroxyl, OH		
Carbonate, CO3		
Bicarbonate, HCO3	1,000.40	16.37
Sulfate, SO4	3,150.00	64.55
Chloride, Cl	8,400.00	236.62
Sulfide, S	0.15	0.01

OTHER PROPERTIES

pH	7.00
Specific Gravity	
Dissolved Oxygen, (mg/l)	
Dissolved Carbon Dioxide	343.20
Sulfide as H2S, (ppm)	
Sample Temp:	90 F. 32 C.

Total Dissolved Solids (mg/l)	19,982
Total Ionic Strength	0.3762
Maximum CaSO4, (calc.)	1,775
Maximum BaSO4, (calc.)	214
Total Hardness	1,800.00 36.00

ESTIMATED MINERAL CONTENT AT SAMPLE TEMPERATURE

	meq/l	mg/l	lbs/kbbf
CaCO3	0.00	0.00	0.00
CaSO4	26.08	1,775.00	622.00
BaSO4	1.82	214.00	75.00

Note:

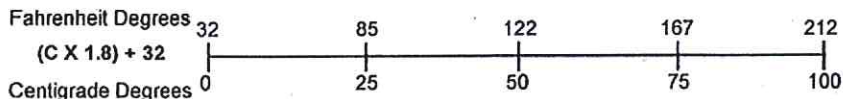
Since scale forming molecules can exist in solution, refer to the CaCO3 saturation index for CaCO3, or the solubilities for CaSO4 and BaSO4, and compare with the calculated amounts above to determine if precipitated scale may be possible.

Conclusion:

Calcium Carbonate scaling index is positive above 13 degrees Centigrade.
Calcium Sulfate scale is indicated. See appropriate chart for temperature ranges.
Barium Sulfate scale is indicated at all temperatures.

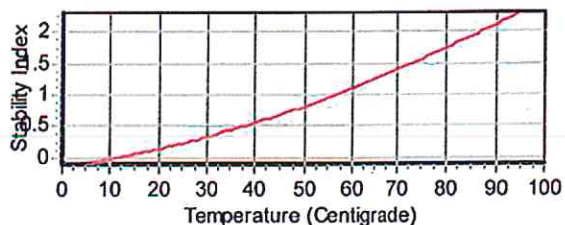
Remarks:

SAMPLE DATE 03/16/09
RECEIVE DATE 03/17/09

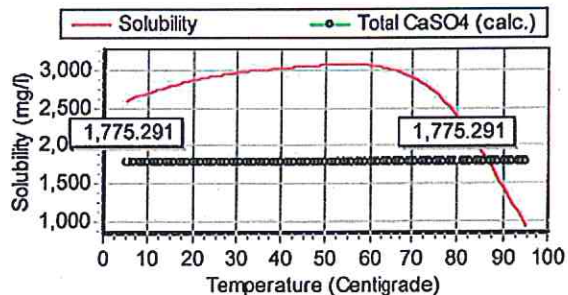


Scaling Indices vs. Temperature

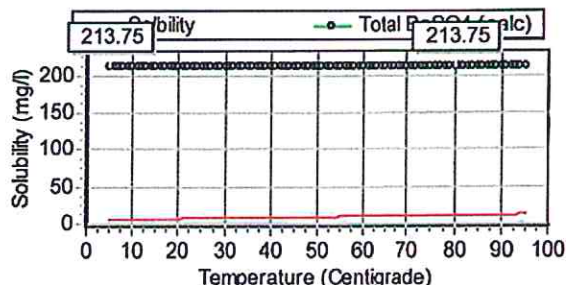
Calcium Carbonate Saturation Index



Calcium Sulfate Solubility



Barium Sulfate Solubility





DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
Minerals & Mining Program
2050 West Main, Suite #1, Rapid City, SD 57702-2493
Telephone: 605-773-4201, FAX: 605-394-5317

FORM 13

**STATE OF SOUTH DAKOTA
BEFORE THE SECRETARY OF
THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

IN THE MATTER OF THE)
APPLICATION OF PERMIT TO INJECT)
ZENERGY OPERATING COMPANY, LLC)

CERTIFICATION OF
APPLICANT

STATE OF OKLAHOMA)
COUNTY OF TULSA) SS
)

I, SEAN LISOOEY, the applicant in the above matter after being duly sworn upon oath hereby certify the following information in regard to this application:

South Dakota Codified Laws Section 1-40-27 provides:

"The secretary may reject an application for any permit filed pursuant to Titles 34A or 45, including any application by any concentrated swine feeding operation for authorization to operate under a general permit, upon making a specific finding that:

(1) The applicant is unsuited or unqualified to perform the obligations of a permit holder based upon a finding that the applicant, any officer, director, partner, or resident general manager of the facility for which application has been made:

- (a) Has intentionally misrepresented a material fact in applying for a permit;*
- (b) Has been convicted of a felony or other crime of moral turpitude;*
- (c) Has habitually and intentionally violated environmental laws of any state or the United States which have caused significant and material environmental damage;*
- (d) Has had any permit revoked under the environmental laws of any state or the United States;*
- (e) Has otherwise demonstrated through clear and convincing evidence of previous actions that the applicant lacks the necessary good character and competency to reliably carry out the obligations imposed by law upon the permit holder; or*

(2) *The application substantially duplicates an application by the same applicant denied within the past five years which denial has not been reversed by a court of competent jurisdiction. Nothing in this subdivision may be construed to prohibit an applicant from submitting a new application for a permit previously denied, if the new application represents a good faith attempt by the applicant to correct the deficiencies that served as the basis for the denial in the original application.*

All applications filed pursuant to Titles 34A and 45 shall include a certification, sworn to under oath and signed by the applicant, that he is not disqualified by reason of this section from obtaining a permit. In the absence of evidence to the contrary, that certification shall constitute a prima facie showing of the suitability and qualification of the applicant. If at any point in the application review recommendation, or hearing process, the secretary finds the applicant has intentionally made any material misrepresentation of fact in regard to this certification, consideration of the application may be suspended and the application may be rejected as provided for under this section.

Applications rejected pursuant to this section constitute final agency action upon that application and may be appealed to circuit court as provided for under chapter 1-26."

Pursuant to SDCL 1-40-27, I certify that I have read the forgoing provision of state law, and that I am not disqualified by reason of that provision from obtaining the permit for which application has been made.

Dated this 25th day of August, 2014.

[Signature]
Applicant

Subscribed and sworn before me this 25th day of August, 2014.

[Signature]
Notary Public

My commission expires: 9/28/2016



(SEAL)

**PLEASE ATTACH SHEET DISCLOSING ALL FACTS PERTAINING TO
SDCL 1-40-27 (1)(a) THROUGH (e).
ALL VIOLATIONS MUST BE DISCLOSED, BUT WILL NOT
AUTOMATICALLY RESULT IN THE REJECTION OF AN APPLICATION.**



DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
 Minerals & Mining Program
 2050 West Main, Suite #1, Rapid City, SD 57702-2493
 Telephone: 605-773-4201, FAX: 605-394-5317

FORM 6

SUNDRY NOTICE AND REPORT ON WELLS

Operator Name: Zenergy Operating Company, LLC.	Telephone: (918)488-6482
Address: 6100 S. Yale, Suite 1700, Tulsa, OK, 74136	

CONFIDENTIAL

Permit No.:	API No.:	Well Name and Number:	Location: (Qtr-Qtr, Sec, Twp, Rge, County)
2047	40-063-20761	Gunderson 31P-30-19H	SESE, Sec. 31, T23N, R3E, Harding

REPORT OF: <input type="checkbox"/> Acidize <input type="checkbox"/> Perforate <input type="checkbox"/> Fracture Treatment <input type="checkbox"/> Change of Operator <input type="checkbox"/> Spud <input type="checkbox"/> Plug and Abandon <input type="checkbox"/> Pull, Alter or Test Casing <input type="checkbox"/> Squeeze Cement <input type="checkbox"/> Change of Elevation <input type="checkbox"/> Mechanical Integrity Test <input type="checkbox"/> Venting or Flaring Gas <input type="checkbox"/> Interim or Final Reclamation <input type="checkbox"/> Spill, Fire, Break, or Blowout <input type="checkbox"/> Drilling Progress <input type="checkbox"/> Working Fluid Level <input type="checkbox"/> Change to Dry Hole Marker	<input type="checkbox"/> Repairs <input type="checkbox"/> Gas/Oil Ratio <input checked="" type="checkbox"/> Work-Over <input type="checkbox"/> Change in Drilling or Casing Program <input type="checkbox"/> Shut-In Pressure <input type="checkbox"/> Work Affecting Different Source of Supply <input type="checkbox"/> BOP Pressure Test/Program <input type="checkbox"/> Tank Battery Meter Tests <input type="checkbox"/> Injection System Problems or Failure <input type="checkbox"/> Commence Injection Operations <input type="checkbox"/> Discontinue Injection Operations <input type="checkbox"/> Directions to Well Site <input checked="" type="checkbox"/> Other: Plug Back	<input type="checkbox"/> Drill without BOP <input type="checkbox"/> Construction of Produced Water Handling Facilities <input type="checkbox"/> Conversion of Mud Pit to Evaporation Pit <input type="checkbox"/> Method of Determining Production from Separate Pools <input type="checkbox"/> Use Produced Water for Dust Suppression <input type="checkbox"/> Change in Method of Annual Gas Well Open Flow Test <input type="checkbox"/> Atmospheric Discharge of Produced Water <input type="checkbox"/> Change of Producing Formation <input type="checkbox"/> Change of Surface Location <input type="checkbox"/> Release of Reclamation Liability <input type="checkbox"/> Dissolve Abandoned Field <input type="checkbox"/> Method of Checking Tank Meters <input type="checkbox"/> Extend Permit Term Beyond 12 months <input type="checkbox"/> Confidentiality of Technical Data <input type="checkbox"/> Change in Injection Fluid, Pressure, or Volume <input type="checkbox"/> Other:
REQUEST FOR APPROVAL: <input type="checkbox"/> Temporarily Abandon <input type="checkbox"/> Proposed Plugging Program <input type="checkbox"/> Changes in Cementing Program		

Describe Proposed or Completed Operations (clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). Use additional page(s) if appropriate.

Please find attached plug back work-over procedure to convert the Gunderson 31P-30-19H to SWD (Inject into Inyan Kara Formation).

I hereby certify that the foregoing as to any work or operation performed is a true and correct report of such work or operation.

	Sean LiSoeey	Drilling/Prod/OP Engr. I	08/25/2014
Signature	Name (Print)	Title	Date

FOR OFFICE USE ONLY (forms will be signed and returned only in cases where approval by DENR is required)

Approved by: _____ Title: _____ Date: _____

Conditions, if any: