Appendix 3.7-B

Well Inventory
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Inventory of Wells within 2 Kilometers of the Dewey-Burdock Project
Edgemont, South Dakota

June 2012

Prepared by
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P.O. Box 812
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INVENTORY OF WELLS WITHIN TWO KILOMETERS OF THE DEWEY-BURDOCK PROJECT AREA

Details available for wells constructed within two kilometers of the Dewey-Burdock Uranium Project are provided in this report. Historical records are reviewed in Section 1.0 and summary tables are provided in Section 2.0. Referenced materials are appended and correspond with sources cited in the summary tables.

1.0 HISTORICAL RECORDS REVIEWED

Silver King Mines, Inc. correspondence, Tennessee Valley Authority correspondence and reports, South Dakota and Wyoming databases, RESPEC’s RSI 2020 report, Powertech (USA) Inc.’s records, and other records were reviewed to inventory water wells within 2 kilometers of the project in the following sections:

- T6S R1E Sections 7 through 10 and 15 through 36
- T6S R2E Sections 30, 31 and 32
- T7S R1E Sections 1 through 24
- T7S R2E Sections 5, 6, 7, 8, 17, 18, and 19

1.1 Silver King Mines, Inc. Records

A letter from Keith Andersen, Silver King Mines, Inc. (SKM), to John Hatch, SD Water Rights Commission, on January 12, 1979 was reviewed. Copies of pump test data and other records from SKM’s files were attached, including an interoffice memorandum from Keith Andersen, SKM, to R. Caywood, SKM, dated December 18, 1978. This memorandum provides references to the following information:

a. Water Wells in the Edgemont Project Area prepared in May 1977: this document shows the location and available information for Hydro IDs 1 through 134; it is provided as Source A

b. Nine wells installed the Fall of 1976 for measuring water levels during the February 1977 pump test: B-1 FR (#672), B-2 (Abandoned November 1978, no Hydro ID identified), B-3 FR (no Hydro ID identified), B-3 (Abandoned November 1978, no Hydro ID identified), B-4 (Abandoned December 1978, no Hydro ID identified), B-5 (Abandoned December 1978, #637), B-6 FR(#659), B-6 (Abandoned Dec 1978, #660), B8 (#661), and Burdock Well (#668)

c. Four additional wells installed August 1977 for November 1977 pump test: B-7 FR (#665), B-7 (#666), B-9 FR (#646), and B-9(#658)
d. Ten wells installed during the Summer of 1978: BPZ 14 (#602), BPZ 15 FR (#601), BPZ 16 (#643), BPZ 17 FR (#644), BPZ 18 (#608), BPZ 19 FR (#607), BPZ 20 (#609), BPZ 21 FR (#610), BPZ 22 (#626), and BPZ 23 FR (#625)

e. Seven replacement wells installed during the Fall of 1978: B-2 LAK (#674), B-2 FU (#673), B-10 FR (#671), B-10 FU (#670), B-10 LAK (#669), B-11 FR (#664), B-11 LAK (#663)

f. Test well constructed January 1977 (#668) used during February and November 1977 pump tests

1.2 Tennessee Valley Authority Records

Tennessee Valley Authority’s (TVA) Draft Environmental Statement (1979) was reviewed. This document was not finalized. Wells referenced are listed below with corresponding Hydro IDs:

p. 51, test well completed near shaft (#668)

p. 52, map showing following the wells: B-9 (BPZ-9 LAK, #658), B9FR (BPZ-9 FR, #646), B-2 (BPZ-2 LAK, #674), B1FR (BPZ-1 FR, #672), B-7 (BPZ-7 LAK, #666), B7FR (BPZ-7 FR, #665), B-6 (BPZ-6 LAK, #660), B6FR (BPZ-6 FR, #659), B-3 (BPZ-3 LAK, no corresponding Hydro ID), B3FR (BPZ-3 FR, no corresponding Hydro ID), B-4 (BPZ-4 LAK, no corresponding Hydro ID), B-5 (BPZ-5, #637), B-8 (BPZ-8 LAK, #661)

p. 53, 61 water wells within 4 miles are summarized on Table 2.5.2-1 (corresponding Hydro IDs were found for all except D-14, which had no information except a location at SESE 12-7S-1E, and E-7, which also had no information except a location at NENE 6-7S-1E; Source B provides the cross-referenced list)

The TVA report “Analysis of Aquifer Tests Conducted at the Proposed Burdock Uranium Mine Site,” WR28-1-520-109, by J.M. Boggs and A.M. Jenkins, May 1980, was reviewed. Wells referenced and corresponding Hydro IDs are: Burdock test well (#668), B-10LAK (#669), B-10FU (#670), B-10FR (#671), B-11LAK (#663), B-11FR (#664), B-9LAK (#658), B-9FR (#646), B-7LAK (#666), B-7FR (#665), and Sundance Well (#662 based on depth but not location).

A letter from Gary Cummings, TVA, to Peter Martin, TVA, on March 23, 1982 regarding water levels at Dewey Pump test monitoring wells was reviewed. Wells referenced and corresponding Hydro IDs are: D-8 (#147), D-6 (#617), D-5 (#616), D-4LK (#622), D-4FR (#623), D-3LK (#657), D-3FR (#436), D-2LK (#612), D-1FU (#614), D-1FR (#613), D-1LK (#615), and Dewey Pumped Well (#611).

A letter from Gary Cummings, TVA, to Peter Martin, TVA, on April 12, 1982 regarding domestic and livestock wells monitored during the Dewey Pump Test was reviewed. Wells referenced are: 119, 103, 104, 39, BPZ 20 FR (#610), BPZ 20 LAK(#609), D-7 (#624), 40U, 40L, 102, 13, 41, 48, BY-1 FR (40U?), BPZ LA 22 (#626), BPZ FR 22 (#625), 99, 96, 106, 107, 115, 147, 148, 38, 49, 109, 110, 111, and 117. Water levels or flow rates are reported. Well locations, construction details and owners are not.
A letter from Gary Cummings, TVA, to Peter Martin, TVA, on July 12, 1982 regarding Dewey observation wells was reviewed. Wells referenced and corresponding Hydro IDs are: Dewey Main Well (#611), D-8 LK (#147), D-5 LK (#616), D-6 LK (#617), D-1 FU (#614), D-1 FR (#613), D-1 LK (#615), D-2 LK (#612), D-3 FR (#436), D-3 LK (#657), D-4 FR (#623), and D-4 LK (#622).

The TVA report “Hydrogeologic Investigations at Proposed Uranium Mine Near Dewey, South Dakota,” WR28-2-520-128, by J.M. Boggs, October 1983, was reviewed. Wells referenced and corresponding Hydro IDs are: D-PW (#611), D-1LK (#615), D-1FU (#614), D-1FR (#613), D-2LK (#612), D-3LK (#657), D-3FR (#436), D-4LK (#622), D-4FR (#623), D-5LK (#616), D-6LK (#617), D-7FR (#624), D-8LK (#147), D-20LK (#609), and D-20FR (#610).

A stand-alone table showing well construction and well locations for the Dewey Pump Test wells was reviewed. The wells referenced and corresponding Hydro IDs are: Dewey Test Well (#611), D-1 FR (#613), D-1FU (#614), D-1LK (#615), D-2LK (#612), D-3FR (#436), D-3LK (#657), D-4FR (#623), D-4LK (#622), D-5LK (#616), D-6LK (#617), and D-7FR (#624).

### 1.3 South Dakota Water Well Records

South Dakota well records were reviewed online. Records were identified for sixty-nine Hydro IDs: 2, 13 recompletion record, 17, 38, BY-1 (possible 40U recompletion), rehabilitation record for 42, 115 replacement record, 147, 220, 429, 431, 432, 433, 436, 510, 609, 610, 611, 612, 613, 614, 615, 616, 617, 622, 623, 624, 631, 657, 662, 663, 664, 668, 669, 670, 671, 673, 674, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 703, 704 Unkapa, 705, 706, 707, 708, 709, and 3026. Seven additional wells with no matching Hydro ID were also identified: SWSW 15-65-1E Spencer, SWNE 18-65-1E BNRR, 20-65-1E SKM, NENE 27-65-1E Smith, NWNE 29-65-1E SKM, 2-75-1E Linch, and 20-75-1E Tubbs. Assignment of Hydro IDs to these wells is pending ongoing field location and verification work. Records found are provided in Source C.

### 1.4 South Dakota Oil and Gas Records

South Dakota oil and gas records were reviewed online. Twelve oil tests were identified within two kilometers of the permit boundary. Of these, three had been converted to water wells (API Numbers 4004720045, 4004705093, and 4004720065, which were converted to Hydro IDs 3, 4, and 5, respectively). Of the nine remaining tests, two had no information regarding plugging and abandonment (API Numbers 4003305219 and 400330521 at 19-65-1E), four were identified as having been plugged and abandoned and a dry hole marker placed at the surface (API Numbers 4004705095 at 2-75-1E, 4004720071 at 11-75-1E, 4004705089 at 21-75-1E, and 40047020077 at 15-75-1E), two were identified as having been plugged and abandoned with no dry hole marker placed per the landowner’s request (API Numbers 4004720085 at 21-75-1E and 4004720074 at 21-75-1E), and one (API 4004705147 at 22-75-1E) was cased to the top of the Spearfish with a cement plug at the base of the casing. The hole is open below the casing to a second cement plug within the 2nd Converse. A steel cap is tack-welded to the surface casing making it available for possible future use as a water-supply well. A dry hole marker was screwed onto the tack-welded cap. Source D provides South Dakota Oil and Gas records for test wells that were not converted to water wells. Completion reports for test wells converted to water wells are provided in Source C.
1.5 South Dakota Water Rights Records

South Dakota water rights were also reviewed online. Three PERMITTED springs (0181-2, 0182-2 and 0183-2) issued to Grand Island and Wyoming Railroad on August 9, 1890 for springs A, B and C in 18-T6S-R1E were identified. One CANCELLED groundwater right was identified for BN Railroad in 19-T6S-R1E. The well associated with this water right was plugged and abandoned on July 31, 1998. A corresponding Hydro ID has not been assigned to it. One LICENSED groundwater right belonging to Henry Hollenbeck, number 380-2, was previously identified by RESPEC and WWC and was confirmed online in NWNW 17-6S-1E. The well associated with this water right still exists and was assigned Hydro ID 710. Coordinates for the well were estimated by Sean Hetrick, Powertech, based on the well’s location on a topographic map: East 1019431, North 459018 NAD 1927, South Dakota State Plane South FIPS 4002 (feet). Mark Hollenbeck, Powertech, subsequently measured the coordinates using a handheld GPS February 27, 2012. The well’s coordinates converted from the handheld GPS are East 1019432, North 459053 NAD 1927, South Dakota State Plane South FIPS 4002 (feet). The surface elevation from a USGS topographic map at the location of a mapped flowing well is 3,767 feet above mean sea level. Inspection of the well by Mark Hollenbeck the same day indicated the well was no longer flowing and is inaccessible by pump due to the casing being filled to the top with rocks. Subsequent research indicated that Silver King Mines, Inc. was also aware of the presence of this well. A water level taken from it in 1980 was below surface (the well was not flowing). The ID assigned to the well by Silver King Mines, Inc. was 149.

1.6 Wyoming Water Rights Records

Wyoming water rights were reviewed online. Water right 183561 belonging to Putnam and Putnam was previously identified by WWC and confirmed online at SWSW 28-41N-60W. This water right was found to correspond with Hydro ID 5002. Information on the water right was obtained from Ms. Krissie Groth at the Wyoming State Engineer’s office in Cheyenne. A second water right, P137.0W for Earl Carr for 2,000 gallons per minute at NENW 21-41N-60W, was identified just outside the 2-kilometer boundary. The status of this water right shows CANCELLED. Further information was not available online, but can be retrieved from the State Engineer’s office, if needed.

1.7 Wyoming Oil and Gas Records

Wyoming oil and gas records were reviewed online. No records were identified within the 2-kilometer area reviewed. This is a bit surprising considering the project rests on the eastern boundary of the Powder River Basin. A number of oil tests were identified northwest and southwest of the 2-kilometer boundary.

1.8 RESPEC Records

Of the 56 pages of other State logs presented in Source A-2 of RSI 2020, 33 pages representing 32 logs have matching Hydro IDs, 4 logs have no matching Hydro ID, 4 logs are duplicates, and 15 pages representing 11 logs are outside the two-kilometer area reviewed. Logs are not labeled with Hydro IDs in the Source. The order is given here for reference: 429, 436, 431, 617, 433, 622, 623, dup 623, 657, 432, 614, 613, 609, 610, dup 610, outside 2-km, outside 2-km, outside 2-km, outside 2-km, 663, 664, 669, 670, 671, 674, 673, 662, 11 (2 pages), 220, 115?, outside 2-km, 8, 38, outside 2-km, no match Smith & Associates, outside 2-km (5 pages for same well), outside 2-km, outside-2km, 510, outside 2-km, outside 2-km, no match Tubbs, 2, 17, 13, dup 13, no match Linch, 116, 631, no match Spencer, and dup 662. These logs are presented again in Appendix 2.2-B of Powertech’s Technical Report, February 2009.

1.9 Powertech (USA) Inc. Records

Attachments and well construction reports provided in Appendix 2.2-B of the Technical Report, February 2009 were reviewed and found to be the same as those presented by RESPEC in RSI 2020.

TR RAIs submitted to NRC in June 2011 and a report by Mike Beshore prepared in October 2011 were reviewed. Following are notes made regarding wells and Hydro IDs:

- Remove #108 from Table TR RAI P&R 10-1; is outside the 2-kilometer area reviewed
- #116 and #506 appear on both Tables TR RAI P&R 10-1 and 2; revise to show on Table 1 only
- #635 is not a well but a pipeline from #5; move to Table 2
- Add a footnote to #651 indicating it is not a well but a stock tank formerly filled by a pipeline from #6 (Fall River); #6 no longer flows and the stock tank is no longer used
- Wells or former wells possibly within 2 kilometers missing from Tables 1, 2 and 3 are: 50, 710, 5002, B-3, B-3FR, B-4, and APIs 4004705089, 4003305219, 4003305221, 4004705095, 4004705147, 4004720071, 4004720074, 4004720077, 4004720085.

1.10 Miscellaneous Records

A Draft Well Test Analysis report prepared by Dan Hoyer on August 20, 2007 regarding the April 1979 Burdock Lakota Pump Test, the July 1979 Burdock Fall River Pump Test 1982, and the February 1982 Dewey Lakota Pump Test was reviewed. Wells referenced and corresponding Hydro IDs are: BPZ-7FR (#665), BPZ-7LAK (#666), BPZ-11LAK (#663), BPZ-11FR (#664), BPZ-10FU (#670), BPZLAK (#669), BPZ-10FR (#671), Burdock Test Well (#668), PBZ-1FU (#673), PBZ-1FR (#674), BPZ-1FR (#672), BPZ-9FR (#646), PBZ-9LAK (#658), DPZ-7FR (#624), Bud Hollenbeck (#115), DPZ-8LAK (#147), D-3LAK (#657), DPZ-3FR (#436), DPZ 4L dewey 9 (#622), DPZ 4FR dewey 8 (#623), DPZ 2 LK dewey 5 (#612), Dewey Pump Well (#611), DPZ 1 LK dewey 2 (#615), DPZ 6 LK dewey 1 (#617), DPZ 5 LK dewey 10 (#616), 6S1E20AD6 (#613), BPZ 20 FR cement plant east (#610), and BPZ 20 LAK (#609).

1.11 Other Records Not Reviewed

Respec reviewed U.S. Geological Survey (USGS) records while preparing the February 2009 TR. Work prepared by Respec regarding USGS records was not reviewed during this inventory except where Hydro IDs within 2 kilometers occurred.
2.0 SUMMARY TABLES

Wells within two kilometers of the Dewey-Burdock project are summarized in Tables 1, 2 and 3 as follows:

- Table 1 summarizes current wells within two kilometers of the project area. These wells have been physically located in the field.

- Table 2 summarizes historical wells noted in data sources within two kilometers of the project area that are no longer present at the surface. These wells were looked for, but were not found.

- Table 3 summarizes plugged and abandoned wells within two kilometers of the project area. These wells have been confirmed by Powertech (USA) Inc. to be plugged and abandoned. Each well was visually inspected and found to have cement within its casing and/or well bore.

Wells have one of the following uses:

- Domestic: Are currently used or can reasonably be expected to be used for drinking water use, including wells that are also used for livestock water.

- Stock: Water of livestock is sole use; well cannot be used for drinking water use (i.e., no piping to domestic water system, etc.).

- Monitor: Sole use is for monitoring.

- Irrigation: Sole use is for crop irrigation.

Sources referenced in tables are appended.
<table>
<thead>
<tr>
<th>Hydro-ID</th>
<th>Date Completed</th>
<th>Total Depth (ft)</th>
<th>Depth to Top of Screws or Bottom of Casing (ft)</th>
<th>Casing Diameter (in)</th>
<th>Flowing Artesian</th>
<th>Aquifer(2)</th>
<th>Use</th>
<th>Other Name</th>
<th>Source</th>
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**Table 1. Current Wells within 2 Kilometers of Project Area**

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<th>Location</th>
<th>3D State Plane NAD 27</th>
<th>NAD27OS</th>
<th>Construction Summary</th>
<th>Flowing Artesian</th>
<th>Aquifer(2)</th>
<th>Use</th>
<th>Other Name</th>
<th>Source</th>
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<td>12 SSWW</td>
<td>103151</td>
<td>427284</td>
<td>Depth to Bottom of Screen or Bottom of Open Hole (ft)</td>
<td>yes</td>
<td>Fall River</td>
<td>Stock</td>
<td>D-17, API 6040-2005</td>
<td>A, B, C, E, downhole tool</td>
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**FALL RIVER**

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<th>Depth to Top of Screws or Bottom of Casing (ft)</th>
<th>Casing Diameter (in)</th>
<th>Flowing Artesian</th>
<th>Aquifer(2)</th>
<th>Use</th>
<th>Other Name</th>
<th>Source</th>
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<td>12 SSWW</td>
<td>103151</td>
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<td>17</td>
<td>12 SSWW</td>
<td>103123</td>
<td>451123</td>
<td>2 inch PVC 0.010 slot 28 to 38</td>
<td>2 inch Schrd-40 PVC 0 to 28</td>
<td>no</td>
<td>Alluvial</td>
<td>Monitor</td>
<td>DB-GW077</td>
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<td>12 SSWW</td>
<td>103123</td>
<td>450607</td>
<td>2 inch PVC 0.010 slot 28 to 38</td>
<td>2 inch Schrd-40 PVC 0 to 28</td>
<td>no</td>
<td>Alluvial</td>
<td>Monitor</td>
<td>DB-GW078</td>
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<td>38</td>
<td>12 SSWW</td>
<td>103123</td>
<td>450607</td>
<td>2 inch PVC 0.010 slot 28 to 38</td>
<td>2 inch Schrd-40 PVC 0 to 28</td>
<td>no</td>
<td>Alluvial</td>
<td>Monitor</td>
<td>DB-GW079</td>
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</table>

**Appendix 3.7-B**
Dewey-Burdock GDP
June 2012

Table 1. Current Wells within 2 Kilometers of Project Area
Legal Location

SD State Plane NAD 27

NGVD29

East (ft)

North (ft)

Surface
Elevation(1)
(ft)

SESE

1022654

449402

3737

UNK

523

26

NWNW

1034335

448992

3744

2/1998

80

1E

2

NENE

1038269

437976

3791

Before 1979

180

6S

1E

32

NENW

1020330

443725

3624

1/27/2008

600

683

6S

1E

29

NESW

1020209

446107

3669

3/4/2008

650

685

6S

1E

32

NWNE

1020687

443415

3626

2/4/2008

595

Hydro ID

T.

R.

Sec. Qtr. Qtr.

628

6S

1E

20

631

6S

1E

638

7S

681

Date Completed

Total Depth
(ft)

3.7-B-11

687

6S

1E

32

NENW

1020078

443730

3626

2/6/2008

605

688

7S

1E

11

NESW

1035027

429974

3687

4/1/2008

255

691

6S

1E

32

NENW

1020366

443706

3626

3/10/2008

505

694

7S

1E

15

NWNW

1028717

426836

3600

3/22/2008

392

695

6S

1E

32

SESE

1022385

439312

3594

3/20/2008

508

698

7S

1E

2

NESW

1035946

436967

3739

3/25/2008

205

706

6S

1E

21

NENE

1028589

453276

3823.29(5)

12/5/2009

328

614

6S

1E

20

NWNE

1022185

453769

3739

9/14/1981

620

Construction Summary
Depth to Bottom of
Depth to Top of Screen
Screen or Bottom of
or Bottom of Casing
Open Hole
(ft)
(ft)
326
5‐inch steel
1/4 x 6 slots
30
UNK
3‐inch PVC
0.020‐slot
585
2‐inch PVC
0.020‐slot
635
2‐inch PVC
0.020‐slot
580
2‐inch PVC
0.020‐slot
590
3‐inch PVC
0.020‐slot
245
3‐inch PVC
0.020‐slot
490
3‐inch PVC
0.020‐slot
377
3‐inch PVC
0.020‐slot
493
3‐inch PVC
0.020‐slot
180
3‐inch PVC
0.020‐slot
284

Casing Diameter
(in)

Flowing
Artesian

Aquifer(2)

Use

Stock

Other Name

Source

GPS,
downhole
tool

523

UNK

no

Fall River

to 70

5‐inch 15.5#/ft steel
0 to 30

no

Fall River

Stock

UNK

2

no

Fall River

Monitor

D‐2

B

to 600

6‐inch SDR21 0 to 585
3‐inch PVC 575 to 585

yes

Fall River

Monitor

DB07‐32‐3C

C

to 650

4‐inch SDR17 0 to 635
2‐inch PVC 625 to 635

no

Fall River

Monitor

DB07‐29‐7

C

to 595

4‐inch SDR17 0 to 580
2‐inch PVC 570 to 580

yes

Fall River

Monitor

DB07‐32‐4C

C

to 605

4‐inch SDR17 0 to 590
2‐inch PVC 580 to 590

yes

Fall River

Monitor

DB07‐32‐5

C

to 255

6‐inch SDR17 0 to 245
3‐inch PVC 235 to 245

no

Fall River

Monitor

DB08‐11‐17

C

to 505

6‐inch SDR17 0 to 490
3‐inch PVC 480 to 490

yes

Fall River

Monitor

DB08‐32‐9C

C

to 392

6‐inch SDR17 0 to 377
3‐inch PVC 367 to 377

yes

Fall River

Monitor

DB08‐15‐3

C

to 508

6‐inch SDR17 0 to 493
3‐inch PVC 483 to 493

yes

Fall River

Monitor

DB08‐32‐13

C

to 205

6‐inch SDR21 0 to 180
3‐inch PVC 170 to 180

no

Fall River

Monitor

DB08‐2‐1

C

to 314

6‐inch SDR17 0 to 284
3‐inch PVC 274 to 284

no

Fall River

Monitor

DB09‐21‐2

C

4‐inch 10#/ft black iron
0 to 609

no

Fuson

Monitor

D‐1FU

C, K, M

Stock

D‐11

C

FUSON
open hole 609

to 620
CHILSON

1

7S

1E

9

SESE

1027696

429227

3624

2

7S

1E

16

SESE

1026724

423922

3554

3

7S

1E

22

SWNW

1028593

421104

3541

1950s
1930s
Recompleted
11/17/1981

Appendix 3.7-B

600

UNK

UNK

4

yes

Chilson

640 original
650 recompleted

4‐inch slotted 10#/ft
black iron 566 to 608

and 629 to 650

4‐inch 10#/ft black iron
0 to 566 and 608 to 629

yes

Chilson

11/28/1970

2400, cement bridge
plug 1030

open hole 367

to 1030

4 1/2‐inch steel 0 to 389 suspended
inside 8 5/8‐inch 20# steel
0 to 367

yes

Chilson

UNK

UNK

4 1/2

yes

Chilson

Stock

D‐7

A, B

open hole 580

to 625

5 1/2‐inch 14# steel
0 to 580

yes

Chilson

Domestic

D‐6, K. Spencer

A, B, C

UNK

UNK

4

no

Chilson

Stock

D‐3

A, B, E

UNK
4‐inch PVC
0.25‐slot
280

UNK
to 300 with
open hole below to
580

4 1/2
4‐inch PVC 0 to 280
8‐inch steel 0 to 220
reduced to 1 1/4‐inch at surface

no

Chilson

Domestic

D‐1, C. Daniel

A, B

yes

Chilson

Domestic

D‐8, L. Putnam

A, B, C

Chilson

Domestic

B‐5, Spencer
Homestead

A, B

Chilson
Chilson
Chilson
Chilson
Chilson

Stock
Stock
Stock
Domestic
Domestic

12

7S

1E

4

SESE

1026978

434378

3641

Late 1960s

730 (source A)
805 (source B)

13

7S

1E

3

NWNW

1028360

438470

3673

1950s Recompleted
10/22/1980

625
280 (source A)
495 (source B)
330

15

7S

1E

2

NENW

1035304

438317

3713

UNK

16

7S

1E

1

NWSE

1041428

434446

3869

42

7S

1E

5

SWNE

1021144

436481

3596

Mid 1970s
1949
Rehabilitated
11/15/2009

43

6S

1E

34

SWSE

1031123

439436

3672

UNK

350

UNK

UNK

4

50
51
61
96
102

41N
7S
7S
41N
6S

60W
1E
1E
60W
1E

28
9
11
22
18

SWNW
SENE
NWSE
SWSW
SWNE

974693
1027411
1036832
1011630
1016825

446835
431487
429987
451853
458312

3677
3615
3740
3664
3708

1930s
1890s
UNK
UNK
UNK

609
550
525
560
267

UNK
UNK
UNK
UNK
UNK

UNK
UNK
UNK
UNK
UNK

4
10
5
5
5

Original 600
Current 580

historically yes until Triangle
Mine dewatered then no,
presently unknown
yes
yes
no
yes
yes

A, B

Domestic D‐20, W. Peterson

A, B, C

D‐24,
API 40 047 20045

A, B, D

Stock

50N
D‐9
D‐12
Dixon

A
A, B
A, B
A
A


Table 1. Current Wells within 2 Kilometers of Project Area

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<tr>
<th>Hydro-ID</th>
<th>R. Dec.</th>
<th>Qt. Dec.</th>
<th>East (ft)</th>
<th>North (ft)</th>
<th>Surface Elevation (ft)</th>
<th>Date Completed</th>
<th>Total Depth (ft)</th>
<th>Depth to Top of Screen or Bottom of Casing (ft)</th>
<th>Depth to Bottom of Screen or Bottom of Open Hole (ft)</th>
<th>Casing Diameter (in)</th>
<th>Flowing Artesian</th>
<th>Aquifer(s)</th>
<th>Use</th>
<th>Other Name</th>
<th>Source</th>
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<td>Chilson</td>
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<td>750</td>
<td>4.5 open hole 0.020 to 750</td>
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<td>4.5</td>
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<td>16</td>
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<td>447808</td>
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<td>453938</td>
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<td>815</td>
<td>8.5/8-inch 0.020-slt galvanized steel 495 to 790</td>
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<td>1021767</td>
<td>454132</td>
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<td>800</td>
<td>open hole 0.020 to 800</td>
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<td>800</td>
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<td>835</td>
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<td>1022776</td>
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<td>627</td>
<td>75</td>
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### Table 1. Current Wells within 2 Kilometers of Project Area

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<th>Res.</th>
<th>Ori. Qtr.</th>
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<th>Flowing</th>
<th>Artesian</th>
<th>Aquifer(2)</th>
<th>Use</th>
<th>Other Name</th>
<th>Source</th>
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<td>795 18 21 NENE 1038064 455354 3825.5305 12/5/2009 3 inch PVC 0.200-in slot 428 to 456 6 inch SDR17 0 to 428 3 inch PVC 618 to 428 no Cheney Monitor DB00-21-1 C</td>
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<td>115 65 1 18 SENE 1017897 457540 3720 Original before 1977 360 4 inch PVC 1/4-slot 200 to 320 and 300 to 360 6 inch yellow iron 0 to 130 4 inch PVC 160 to 200 3 inch PVC 226 to 360 yes Inyan Kara Domestic A, C</td>
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<td>608 75 1 15 NANE 1031029 427450 3622 1/1/1977 574 5/8-inch stainless steel 280 to 335 (100 to 135 source E) and 8-inch stainless steel 480 to 555 (65 ft to 500 source E) yes Inyan Kara Stock Burdock Well C, E, L, O</td>
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<td><strong>SUNDANCE</strong></td>
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<td>662 75 1 11 SSWW 1075181 428028 3670 7/26/1978 880 5 1/2-inch 1 1/4 inch cement plugged 680 to 780 5 1/2 inch 1 1/4 inch steel 0 to 688 yes Sundance Monitor Sundance Monitor C, L, O</td>
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Table 1. Current Wells within 2 Kilometers of Project Area

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Notes:
1. Surface elevations are based on a digital elevation model (DEM), except where noted. Accuracy is plus or minus 15 feet.
2. Hyun Kana indicates screened interval is across Fall River and Chilson.
3. Estimated from Powdertech digital topographic maps.
4. Coordinates and elevation for Hydro ID 116 used for Hydro ID 624 pending field verification.
6. 704 was originally completed in the Unkpapa aquifer. It was recompleted 1/28/2009 in the Chilson aquifer.
9. UNGS 7.5 Minute Series (Topographic), Dewey Quadrangle, Wyoming-South Dakota, 1951.
UNK = Unknown

Sources:
B. Tennessee Valley Authority Draft Environmental Statement, 1979, Table 3.1.2.1.
D. South Dakota Oil and Gas Records.
G. Letter from SMN to TUA, Domestic and Livestock Wells Monitored During Dewey Pump Test, April 12, 1882.
P. Interoffice communication, Leon Eaker, Powderstack (USA) Inc., to Mike Beshore, Powderstack (USA) Inc., May 9, 2011.
Q. South Dakota Water Right 188-2.
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Notes:  
(1) Surface elevations are based on a digital elevation model (DEM), except where noted. Accuracy is plus or minus 15 feet.  
(2) Hydro ID 605 is not a well. It is a pipe from Hydro ID 668.  
(3) Hydro ID 635 is not a well. It is a pipe from 5.  
(4) Hydro ID 651 is not a well. It was historically a pipe from Hydro ID 6. UNK = Unknown  
NA = Not applicable, not a well.
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Notes: (1) Land elevations based on Digital Elevation Model (DEM). UNK = Unknown
SOURCE A

WATER WELLS IN EDGEMONT PROJECT AREA

## WATER WELLS IN EDGEMONT PROJECT AREA

<table>
<thead>
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<th>Well No.</th>
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## Water Wells in Edgerton Project Area

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<th>Depth</th>
<th>Probable Aquifer</th>
<th>Remarks</th>
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<td>Peterson &amp; Son Inc.</td>
<td>Stock</td>
<td>600'</td>
<td>K I</td>
<td>Flowing 1.1 gpm, stopped during test. Casing was cut off closer to ground &amp; flow recovered to 1.3 gpm, 6 wks after test.</td>
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<td>2</td>
<td>Peterson &amp; Son Inc.</td>
<td>Domestic</td>
<td>640</td>
<td>K I</td>
<td>Flowing est. 15 gpm.</td>
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<td>3</td>
<td>Peterson &amp; Son Inc.</td>
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<td>0 Oil Test</td>
<td>K I</td>
<td>Flowing 3 gpm.</td>
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<td>Peterson &amp; Son Inc.</td>
<td>Stock</td>
<td>0 Oil Test</td>
<td>K I</td>
<td>Couldn't measure, broken out around casing. Also used by Glen Peterson for garden.</td>
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<td>5</td>
<td>Peterson &amp; Son Inc.</td>
<td>Stock</td>
<td>Oil Test</td>
<td>K I</td>
<td>Plugged at 850', possible Sundance flow. Flowing 6.6 gpm, slowed to 5 gpm during test</td>
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<td>6</td>
<td>Glen Peterson</td>
<td>Stock</td>
<td>280'</td>
<td>K f</td>
<td>SWL 11'2&quot;, Siphon Arrangement into tank.</td>
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<td>7</td>
<td>Glen Peterson</td>
<td>Domestic</td>
<td>500'</td>
<td>K I</td>
<td>Flowing 4.25 gpm. Slowed to 3.6 during test SWL 12' 8&quot;</td>
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<td>8</td>
<td>Leslie Coates</td>
<td>Domestic</td>
<td>500'</td>
<td>K I</td>
<td>Flowing 4.2 gpm. Flow est. 1 gpm. Pumped to house.</td>
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<td>K f</td>
<td>Flowing 2.5 gpm.</td>
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<td>SWL 78' - New well.</td>
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<td>Flowing 0.6 gpm, slowed to &lt; 0.1 gpm during test. Recovered to 0.3 gpm after 6 weeks.</td>
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<td>Miles Spencer</td>
<td>Domestic</td>
<td>500'</td>
<td>K I</td>
<td>Flowing 2.5 gpm., slowed to 1.2 gpm during test, Recovered to 2.0 gpm after 6 weeks.</td>
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<td>Earl Darrow</td>
<td>Stock</td>
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<td>K I</td>
<td>Barely flowing. Stopped during test. SWL recovered to 1.0 ft.</td>
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<td>New well, SWL 157' 7&quot;</td>
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<td>K f</td>
<td>Windmill, couldn't measure</td>
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<td>Dick Andersen</td>
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<td>Flowing 7.5 gpm.</td>
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<td>19</td>
<td>Dick Andersen</td>
<td>Stock</td>
<td>740</td>
<td>Kf</td>
<td>Pump jack, couldn't measure.</td>
</tr>
<tr>
<td>20</td>
<td>Edwin Andersen</td>
<td>Domestic</td>
<td>530</td>
<td>Kf</td>
<td>Flowing 4.5 gpm.</td>
</tr>
<tr>
<td>21</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td>910</td>
<td>Kf</td>
<td>Flowing 14 gpm.</td>
</tr>
<tr>
<td>22</td>
<td>Coates, Andersen</td>
<td>Stock</td>
<td>800</td>
<td>Kf</td>
<td>Pump jack, reported SWL 30'</td>
</tr>
<tr>
<td>23</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td>600</td>
<td>Kf</td>
<td>Flowing 0.8 gpm.</td>
</tr>
<tr>
<td>24</td>
<td>Tubbs Ranch</td>
<td>Domestic</td>
<td></td>
<td></td>
<td>Siphon arrangement, water level 23'</td>
</tr>
<tr>
<td>25</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Windmill, couldn't measure, reported to barely flow.</td>
</tr>
<tr>
<td>26</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td>350</td>
<td>Kf</td>
<td>Windmill, couldn't measure, reported to barely flow.</td>
</tr>
<tr>
<td>27</td>
<td>Tubbs &amp; Schultz</td>
<td>Stock</td>
<td>900</td>
<td>K1</td>
<td>Submersible pump to pipeline. SWL 15'</td>
</tr>
<tr>
<td>28</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td>300</td>
<td>Kf</td>
<td>Will flow 20 gpm. H2S</td>
</tr>
<tr>
<td>29</td>
<td>B. Childers</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Barely flows, pumped to house.</td>
</tr>
<tr>
<td>30</td>
<td>Harold Dodson</td>
<td>Domestic</td>
<td>120</td>
<td>Kf</td>
<td>Flows 0.75 gpm.</td>
</tr>
<tr>
<td>31</td>
<td>F. A. Heck</td>
<td>Stock</td>
<td>120</td>
<td>Kf</td>
<td>Flows 1.3 gpm.</td>
</tr>
<tr>
<td>32</td>
<td>Tony Bryan</td>
<td>Domestic</td>
<td>104</td>
<td>Kf</td>
<td>Pumped to house, couldn't measure, flow est. 1/2 gpm.</td>
</tr>
<tr>
<td>33</td>
<td>H. P. Heck</td>
<td>Domestic</td>
<td>96</td>
<td>Kf</td>
<td>Piped into house, flowing reported 1.25 gpm</td>
</tr>
<tr>
<td>34</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td>330</td>
<td>K1</td>
<td>2 wells, one no flow &amp; not used, one flows 1.5 gpm.</td>
</tr>
<tr>
<td>35</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td>148</td>
<td>K1</td>
<td>Pumped well, not visited.</td>
</tr>
<tr>
<td>36</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td>255</td>
<td>K1</td>
<td>Flowing 10 gpm.</td>
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<tr>
<td>37</td>
<td>Tony Bryan</td>
<td>Stock</td>
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<td>Pumped well, not visited.</td>
</tr>
<tr>
<td>38</td>
<td>Lloyd Putnam</td>
<td>Stock</td>
<td>550</td>
<td>K1</td>
<td>Flowing 1.5 gpm.</td>
</tr>
<tr>
<td>39</td>
<td>Norris Darrow</td>
<td>Stock</td>
<td>700</td>
<td>K1</td>
<td>Windmill, reported SWL 15'</td>
</tr>
<tr>
<td>40</td>
<td>Norris Darrow</td>
<td>Domestic</td>
<td>660</td>
<td>K1</td>
<td>Two wells piped together, both flow, but couldn't measure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Domestic</td>
<td>700</td>
<td>K1</td>
<td></td>
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</tbody>
</table>
## Water Wells in Edgemont Project Area

<table>
<thead>
<tr>
<th>Map #</th>
<th>Owner</th>
<th>Use</th>
<th>Depth</th>
<th>Aquifer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Robert Bokewell</td>
<td>Domestic</td>
<td></td>
<td></td>
<td>Flows 12 gpm.</td>
</tr>
<tr>
<td>2</td>
<td>Lloyd Putnam</td>
<td>Domestic</td>
<td>600</td>
<td>K 1</td>
<td>Flows est. 25 gpm.</td>
</tr>
<tr>
<td>3</td>
<td>Preston Richardson</td>
<td>Domestic</td>
<td>350</td>
<td>K 1</td>
<td>Submersible pump, couldn't measure, stopped flowing when old Triangle mine dewatered.</td>
</tr>
<tr>
<td>4</td>
<td>Harold Dodson</td>
<td>Stock</td>
<td>130</td>
<td>K f</td>
<td>Will flow est. 40 gpm.</td>
</tr>
<tr>
<td>5</td>
<td>Harold Dodson</td>
<td>Stock</td>
<td>190</td>
<td>K f</td>
<td>Flows 3.1 gpm. H2S</td>
</tr>
<tr>
<td>6</td>
<td>Harold Dodson</td>
<td>Oil test</td>
<td></td>
<td>K f</td>
<td>Plugged at 140', but couldn't measure. Flowing around casing. SWL 10'</td>
</tr>
<tr>
<td>7</td>
<td>Harold Dodson</td>
<td>Stock</td>
<td>90</td>
<td>K f</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Norris Darrow</td>
<td>Stock</td>
<td>725</td>
<td>K 1</td>
<td>Will flow est. 60 gpm.</td>
</tr>
<tr>
<td>9</td>
<td>Norris Darrow</td>
<td>Stock</td>
<td>600</td>
<td>K 1</td>
<td>Flows 5 gpm.</td>
</tr>
<tr>
<td>10</td>
<td>Lloyd Putnam</td>
<td>Stock</td>
<td>609</td>
<td>K 1</td>
<td>Flows 1.5 gpm., may be 2 wells piped together.</td>
</tr>
<tr>
<td>11</td>
<td>Burlington R.R.</td>
<td>Stock</td>
<td>550</td>
<td>K 1</td>
<td>Flows 15.5 gpm., used by Leslie Coates.</td>
</tr>
<tr>
<td>12</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Flows 2.8 gpm.</td>
</tr>
<tr>
<td>13</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td>90</td>
<td>K f</td>
<td>Windmill, couldn't measure.</td>
</tr>
<tr>
<td>15</td>
<td>Effie Gow</td>
<td>Domestic</td>
<td>300</td>
<td>K 1</td>
<td>Broken out around casing, flowing</td>
</tr>
<tr>
<td>16</td>
<td>Effie Gow</td>
<td>Garden</td>
<td>270</td>
<td>K 1</td>
<td>Couldn't measure, reported 100+ gpm. H2S Used by Rev. Brown to irrigate garden.</td>
</tr>
<tr>
<td>17</td>
<td>F. A. Heck</td>
<td>Stock</td>
<td>100+</td>
<td>K f</td>
<td>Flows 4 gpm.</td>
</tr>
<tr>
<td>18</td>
<td>F. A. Heck</td>
<td>Stock</td>
<td>118</td>
<td>K f</td>
<td>Flows 2.8 gpm H2S</td>
</tr>
<tr>
<td>19</td>
<td>F. A. Heck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Windmill, couldn't measure.</td>
</tr>
<tr>
<td>20</td>
<td>Earl Darrow</td>
<td>Stock</td>
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<td>K 1</td>
<td>Pumpjack, couldn't measure.</td>
</tr>
<tr>
<td>21</td>
<td>F. A. Heck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Couldn't measure, flowing est. 2 gpm into covered tank.</td>
</tr>
<tr>
<td>Map #</td>
<td>Owner</td>
<td>Use</td>
<td>Depth</td>
<td>Aquifer</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>------------</td>
<td>-------</td>
<td>---------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>63</td>
<td>Tony Bryan</td>
<td>Stock</td>
<td>100+</td>
<td>K f</td>
<td>Flows 1.5 gpm.</td>
</tr>
<tr>
<td>64</td>
<td>Leonard McElhaney</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Flows 5 gpm H2S, may flow more through big valve.</td>
</tr>
<tr>
<td>65</td>
<td>&quot;</td>
<td>?</td>
<td></td>
<td></td>
<td>2 wells, one windmill, SWL 15', neither apparently used.</td>
</tr>
<tr>
<td>66</td>
<td>&quot;</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Valve at well head shut off except for small line to H. Dodson's stock tank. Reported by Keene as flowing 270 gpm. in 1970</td>
</tr>
<tr>
<td>68</td>
<td>&quot;</td>
<td>Domestic</td>
<td>230</td>
<td>K 1</td>
<td>Piped to house, couldn't measure.</td>
</tr>
<tr>
<td>69</td>
<td>&quot;</td>
<td>Stock</td>
<td>230</td>
<td>K 1</td>
<td>Flows 6 gpm.</td>
</tr>
<tr>
<td>66</td>
<td>&quot;</td>
<td>Stock</td>
<td>130</td>
<td>K f</td>
<td>Flows 1.2 gpm.</td>
</tr>
<tr>
<td>70</td>
<td>H. P. Heck</td>
<td>Stock</td>
<td>375</td>
<td>K f, K l</td>
<td>Flows 1.0 gpm.</td>
</tr>
<tr>
<td>71</td>
<td>Ed Benton</td>
<td>Domestic</td>
<td></td>
<td>K f</td>
<td>Pumped to house, reported to barely flow</td>
</tr>
<tr>
<td>72</td>
<td>Ed Benton</td>
<td>Stock</td>
<td>212</td>
<td>K f</td>
<td>Yard water, Flows 13 gpm H2S</td>
</tr>
<tr>
<td>73</td>
<td>Ed Benton</td>
<td>Stock</td>
<td>560</td>
<td>K 1</td>
<td>Flows 1.6 gpm.</td>
</tr>
<tr>
<td>74</td>
<td>Ed Benton</td>
<td>Stock</td>
<td>305</td>
<td>K f</td>
<td>Casing rusted out, flows, couldn't measure</td>
</tr>
<tr>
<td>75</td>
<td>Ed Benton</td>
<td>Stock</td>
<td>430</td>
<td>K f</td>
<td>Windmill, reported to pump dry</td>
</tr>
<tr>
<td>76</td>
<td>Ed Benton</td>
<td>Stock</td>
<td>420</td>
<td>K f</td>
<td>Broken out around casing, est. 7 or 8 gpm.</td>
</tr>
<tr>
<td>77</td>
<td>Darrell Heldman</td>
<td>Stock</td>
<td>400</td>
<td>K f</td>
<td>Broken out around casing, est. 5 gpm.</td>
</tr>
<tr>
<td>78</td>
<td>&quot;</td>
<td>&quot;</td>
<td>410</td>
<td>K f</td>
<td>Pump jack, Keene reports SWL 30'</td>
</tr>
<tr>
<td>79</td>
<td>B. Childers</td>
<td>Domestic</td>
<td>337</td>
<td>K f</td>
<td>Couldn't measure, pump set at 250'</td>
</tr>
<tr>
<td>80</td>
<td>&quot;</td>
<td>Stock</td>
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<td>K 1</td>
<td>Pump jack, Keene reports SWL 100'</td>
</tr>
<tr>
<td>81</td>
<td>&quot;</td>
<td>&quot;</td>
<td>440</td>
<td>K 1</td>
<td>Flows 4 gpm, sl. H2S</td>
</tr>
<tr>
<td>82</td>
<td>&quot;</td>
<td>&quot;</td>
<td>200</td>
<td>K f</td>
<td>Flows 9 gpm., H2S</td>
</tr>
<tr>
<td>83</td>
<td>&quot;</td>
<td>&quot;</td>
<td>270</td>
<td>K f</td>
<td>Pump jack, couldn't measure.</td>
</tr>
<tr>
<td>Map #</td>
<td>Owner</td>
<td>Use</td>
<td>Depth</td>
<td>Probable Aquifer</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
<td>---------</td>
<td>-------</td>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>84</td>
<td>Dick Miller</td>
<td>Stock</td>
<td>155</td>
<td>K F</td>
<td>Flows 0.25 gpm.</td>
</tr>
<tr>
<td>85</td>
<td>Tubbs Ranch</td>
<td>Domestic</td>
<td>415</td>
<td>K F</td>
<td>Pumped to house, Reported SWL 30'</td>
</tr>
<tr>
<td>86</td>
<td>Tubbs Ranch</td>
<td>Stock</td>
<td>360</td>
<td>K F</td>
<td>Pump jack, SWL reported 20'</td>
</tr>
<tr>
<td>87</td>
<td>Tubbs Ranch</td>
<td>Appears abandoned</td>
<td>380</td>
<td>K F</td>
<td>Plugged with wooden plug, Reported SWL 20'</td>
</tr>
<tr>
<td>88</td>
<td>Tubbs Ranch</td>
<td>Appears abandoned</td>
<td>320</td>
<td>K F</td>
<td>Two wells, one may be caved in, one SWL 10'</td>
</tr>
<tr>
<td>89</td>
<td>Porter &amp; Benton</td>
<td>Pipeline</td>
<td>860</td>
<td>K I</td>
<td>Submersible pump, runs extensive pipeline, SWL reported 5'</td>
</tr>
<tr>
<td>90</td>
<td>B. Childers</td>
<td>Stock</td>
<td>Oil test</td>
<td>K F</td>
<td>SWL 1.0'</td>
</tr>
<tr>
<td>91</td>
<td>Carl Reutter</td>
<td>Stock</td>
<td>150</td>
<td>K F</td>
<td>Windmill SWL 34'</td>
</tr>
<tr>
<td>92</td>
<td>Carl Reutter</td>
<td>Domestic</td>
<td>298</td>
<td>K F</td>
<td>Pumped to house, Keene reports SWL 132'</td>
</tr>
<tr>
<td>93</td>
<td>Bob Runge</td>
<td>Domestic</td>
<td>200</td>
<td>K I</td>
<td>Two wells, couldn't measure, Keene reports SWL 80'</td>
</tr>
<tr>
<td>94</td>
<td>Bob Runge</td>
<td>Stock</td>
<td>200+</td>
<td>K I</td>
<td>Flows 0.75 gpm.</td>
</tr>
<tr>
<td>95</td>
<td>Wayne Jackson</td>
<td>Pipeline</td>
<td>860</td>
<td>K F</td>
<td>Barely flows, submersible pump to pipeline.</td>
</tr>
<tr>
<td>96</td>
<td>Billy Stearns</td>
<td>Domestic</td>
<td>560</td>
<td>K I</td>
<td>Flows 4.8 gpm.</td>
</tr>
<tr>
<td>97</td>
<td>Billy Stearns</td>
<td>Stock</td>
<td>K I</td>
<td>K I</td>
<td>Uranium test cased to 200', hole reported to be caving below that &amp; sealing off flow. Flows</td>
</tr>
<tr>
<td>98</td>
<td>Billy Stearns</td>
<td>Stock</td>
<td>Oil test</td>
<td>K I</td>
<td>Leaking around top of casing, flows est 2 g</td>
</tr>
<tr>
<td>99</td>
<td>Gerald Darrow</td>
<td>Domestic</td>
<td>420</td>
<td>K I</td>
<td>Flows 2.2 gpm.</td>
</tr>
<tr>
<td>100</td>
<td>&quot;</td>
<td>Stock</td>
<td>530</td>
<td>K I</td>
<td>Flows 150 gpm (by Hodson) apparently used to fill water trucks.</td>
</tr>
<tr>
<td>101</td>
<td>&quot;</td>
<td>Morresy Pipeline</td>
<td>665</td>
<td>K I</td>
<td>Pipeline serves ranches west, submersible pump. Hodson reports flow 3 gpm.</td>
</tr>
<tr>
<td>102</td>
<td>Lloyd Darrow</td>
<td>Domestic</td>
<td>267</td>
<td>K I</td>
<td>Will flow est. 100 gpm. Sells water</td>
</tr>
<tr>
<td>103</td>
<td>Lloyd Darrow</td>
<td>Stock</td>
<td>350</td>
<td>K I</td>
<td>Flows 1.3 gpm.</td>
</tr>
</tbody>
</table>
## Water Wells in Edgemont Project Area

<table>
<thead>
<tr>
<th>Map #</th>
<th>Owner</th>
<th>Use</th>
<th>Depth</th>
<th>Probable Aquifer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>Lloyd Darrow</td>
<td>Stock</td>
<td>KJ</td>
<td>Jensen's jack</td>
<td>Reported SWL 6'</td>
</tr>
<tr>
<td>105</td>
<td>Lloyd Darrow</td>
<td>Stock</td>
<td>KJ</td>
<td>Not visited</td>
<td>Reported SWL 8 to 10'</td>
</tr>
<tr>
<td>106</td>
<td>Lloyd Darrow</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Flows 3.5 gpm.</td>
</tr>
<tr>
<td>107</td>
<td>Earl Darrow</td>
<td>Domestic</td>
<td>90</td>
<td>KF</td>
<td>Pumped into house, flow est. 1 gpm.</td>
</tr>
<tr>
<td>108</td>
<td>Chet Taylor</td>
<td>Domestic</td>
<td>90</td>
<td>KF</td>
<td>Taylor lives here part of time. Info</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reported by Earl Darrow. Flow rep. 1 gpm</td>
</tr>
<tr>
<td>109</td>
<td>Vivian Cook</td>
<td>Domestic</td>
<td>220</td>
<td>KI</td>
<td>Reported SWL 22'</td>
</tr>
<tr>
<td>110</td>
<td>Vivian Cook</td>
<td>Stock</td>
<td>240</td>
<td>KJ</td>
<td>Reported SWL 30'</td>
</tr>
<tr>
<td>111</td>
<td>Vivian Cook</td>
<td>Not used</td>
<td>100</td>
<td>KF</td>
<td>Owner plans to develop, reported SWL 5'</td>
</tr>
<tr>
<td>112</td>
<td>Miles Spencer</td>
<td>Stock</td>
<td>120</td>
<td>KF</td>
<td>Windmill, couldn't measure.</td>
</tr>
<tr>
<td>113</td>
<td>Miles Spencer</td>
<td>Stock</td>
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<td>Back up well for Spencer pipeline.</td>
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<tr>
<td>114</td>
<td>No info</td>
<td></td>
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<td>Forest Service.</td>
</tr>
<tr>
<td>115</td>
<td>Bud Hollenbeck</td>
<td>Domestic</td>
<td></td>
<td>KF</td>
<td>Flows 3 gpm.</td>
</tr>
<tr>
<td>116</td>
<td>Bud Hollenbeck</td>
<td></td>
<td></td>
<td>KF</td>
<td>Flows 2.75 gpm. At Dewey Post Office.</td>
</tr>
<tr>
<td>117</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Submersible Pump. SWL 27'</td>
</tr>
<tr>
<td>118</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Oil test. Flowing out of casing at ground level</td>
</tr>
<tr>
<td>119</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Submersible pump, reported SWL 6'</td>
</tr>
<tr>
<td>120</td>
<td>Forest Service</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Pumpjack, couldn't measure.</td>
</tr>
<tr>
<td>121</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td>430</td>
<td>KI</td>
<td>Will Flow?? est. 100 gpm.</td>
</tr>
<tr>
<td>122</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Windmill, couldn't measure.</td>
</tr>
<tr>
<td>123</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Pump jack, couldn't measure.</td>
</tr>
<tr>
<td>124</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Not visited, reported windmill.</td>
</tr>
<tr>
<td>125</td>
<td>Bud Hollenbeck</td>
<td>Stock</td>
<td></td>
<td></td>
<td>Casing rusted off. Flows at ground level.</td>
</tr>
<tr>
<td>126</td>
<td>Francis Carr</td>
<td>Domestic</td>
<td>KJ</td>
<td></td>
<td>Flows, couldn't measure.</td>
</tr>
<tr>
<td>127</td>
<td>Francis Carr</td>
<td>Stock</td>
<td>Oil test KJ</td>
<td>Casing rusted off, flows at ground level.</td>
<td></td>
</tr>
</tbody>
</table>
### Water Wells in Edgemont Project Area

<table>
<thead>
<tr>
<th>Map #</th>
<th>Owner</th>
<th>Use</th>
<th>Depth</th>
<th>Probable Aquifer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>Francis Carr</td>
<td>Stock</td>
<td>Oil test</td>
<td>K1</td>
<td>Couldn't measure, est. 5 gpm.</td>
</tr>
<tr>
<td>129</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There are several old oil tests in this area. The ones reported as being used are reported above. There appears to be some flow from some of these but the casings seem to be bad and all there is now are some marshy areas. Some use of water for stock from these is possible.</td>
</tr>
<tr>
<td>130</td>
<td>Dick Miller</td>
<td>Domestic</td>
<td>155</td>
<td>Kf</td>
<td>?</td>
</tr>
<tr>
<td>131</td>
<td>Dick Miller</td>
<td>Stock</td>
<td>110</td>
<td>Kf</td>
<td>Flows 0.8 gpm</td>
</tr>
<tr>
<td>132</td>
<td>Dick Miller</td>
<td>Stock</td>
<td>300</td>
<td>K1</td>
<td>Flows est. 2 gpm</td>
</tr>
<tr>
<td>133</td>
<td>Dick Miller</td>
<td>Stock</td>
<td>300</td>
<td>K1</td>
<td>Not contacted. Information from Keene</td>
</tr>
<tr>
<td>134</td>
<td>Roberts &amp; Daniels</td>
<td>Stock</td>
<td>860</td>
<td></td>
<td></td>
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<tr>
<td>#</td>
<td>S. to Electricity</td>
<td>Dir.</td>
<td>Condition</td>
<td>Setting, Capacity, Age, etc.</td>
<td>Use</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>------</td>
<td>-----------</td>
<td>------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>$ 300 ft.</td>
<td>4&quot;</td>
<td>25 yrs. - fair</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>D.S.I. 300 ft.</td>
<td>5&quot;</td>
<td>45 yrs. - poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$ 1/2 mile</td>
<td>4&quot;</td>
<td>10 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S.I. 700 ft.</td>
<td>3&quot;</td>
<td>10 yrs. - poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$ 2 miles</td>
<td>5&quot;</td>
<td>10 yrs. - fair</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$ 1 mile</td>
<td>12&quot;</td>
<td>20 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>FR D on site</td>
<td>6&quot;</td>
<td>20 yrs.</td>
<td>jet pump at 25 ft.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>LAK S.I. 's</td>
<td>5&quot;</td>
<td>40 yrs. - poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>FR D on site</td>
<td>6&quot;</td>
<td>45 yrs. - poor</td>
<td>jet pump in basement</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>LAK S.I. on site</td>
<td>6&quot;</td>
<td>45 yrs. - poor</td>
<td>none</td>
<td></td>
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<tr>
<td>9</td>
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<td>6&quot;</td>
<td>10 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>$ 2 miles</td>
<td>8&quot;</td>
<td>2 yrs. - good</td>
<td>pump jack</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>$ 1/2 mile</td>
<td>8&quot;</td>
<td>10 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>$ 2000 ft.</td>
<td>4&quot;</td>
<td>10 yrs. - poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>D.S.I. on site</td>
<td>5&quot;</td>
<td>20 yrs. - fair</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>$ 1/2 mile</td>
<td>4&quot;</td>
<td>poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>$ on site</td>
<td>6&quot;</td>
<td>fair</td>
<td>cylinder type</td>
<td></td>
</tr>
<tr>
<td>Wall D.</td>
<td>Distance to Electricity</td>
<td>Well D.</td>
<td>Age and Condition</td>
<td>Pump Information-Type</td>
<td>Season of Use</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------</td>
<td>---------</td>
<td>-------------------</td>
<td>-----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td>on site</td>
<td>4½</td>
<td>1 yr. - good</td>
<td>no pump installed yet</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>2 miles</td>
<td>UNK.</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>6</td>
<td>D.S.I.</td>
<td>on site</td>
<td>48 yrs.</td>
<td>pressure pump</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>1 mile</td>
<td>6½</td>
<td>16 yrs. - fair</td>
<td>pump jack</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>D.S.I.</td>
<td>on site</td>
<td>51 yrs. - poor</td>
<td>shallow well jet pump</td>
</tr>
<tr>
<td>21</td>
<td>6</td>
<td>1½ mile</td>
<td>7½</td>
<td>65 yrs.</td>
<td>none</td>
</tr>
<tr>
<td>22</td>
<td>6</td>
<td>on site</td>
<td>3</td>
<td>10 yrs. - good</td>
<td>cylinder type</td>
</tr>
<tr>
<td>23</td>
<td>6</td>
<td>1 mile</td>
<td>6</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>6</td>
<td>D.S.I.</td>
<td>on site</td>
<td>3</td>
<td>none</td>
</tr>
<tr>
<td>25</td>
<td>6</td>
<td>2 miles</td>
<td>4½</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>6</td>
<td>1 mile</td>
<td>5</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>6</td>
<td>on site</td>
<td>12</td>
<td>submersible pump</td>
<td>serves pipeline</td>
</tr>
<tr>
<td>28</td>
<td>6</td>
<td>1/2 mile</td>
<td>6</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>29</td>
<td>6</td>
<td>1/2 mile</td>
<td>5</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
<td>D.S.I.</td>
<td>on site</td>
<td>24 yrs.</td>
<td>deep well jet pump</td>
</tr>
<tr>
<td>No.</td>
<td>Distance</td>
<td>Well Dia.</td>
<td>Age and Condition</td>
<td>Pump Information-Type</td>
<td>Season of Water Setting, Capacity, Age, etc.</td>
</tr>
<tr>
<td>-----</td>
<td>----------</td>
<td>-----------</td>
<td>-------------------</td>
<td>-----------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>30</td>
<td>$ on site</td>
<td>6&quot;</td>
<td>cleaned 1977</td>
<td></td>
<td>none</td>
</tr>
<tr>
<td>31</td>
<td>D.S.I. on site</td>
<td>5½&quot;</td>
<td>28 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>D.S.I. on site</td>
<td>6&quot;</td>
<td>pump type unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>D.S. on site</td>
<td>5&quot;</td>
<td>.32 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>$ 1 mile</td>
<td>2½&quot;</td>
<td>none</td>
<td>2 wells - one does not flow and is not used</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>2 miles</td>
<td>8</td>
<td>poor</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>$ 1½ mile</td>
<td>4&quot;</td>
<td>poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>2½ miles</td>
<td>5½</td>
<td>poor</td>
<td>cylinder type</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>$ ½ mile</td>
<td>4&quot;</td>
<td>26 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>$ ½ mile</td>
<td>5½</td>
<td>poor</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>D.S.I. on site</td>
<td>6&quot;</td>
<td>8 yrs.</td>
<td>none</td>
<td>piped together</td>
</tr>
<tr>
<td>41</td>
<td>D.S.I. on site</td>
<td>6&quot;</td>
<td>31 yrs.</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>42</td>
<td>D.S.I. on site</td>
<td>6&quot;</td>
<td>submersible</td>
<td>arsenic pipeline</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>D on site</td>
<td>4&quot;</td>
<td>poor</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>D on site</td>
<td>4&quot;</td>
<td>poor</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>D on site</td>
<td>4&quot;</td>
<td>poor</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>Well No.</td>
<td>Distance to Electricity</td>
<td>Wall Dia.</td>
<td>Age and Condition</td>
<td>Pump Information-Type</td>
<td>Season of Use</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------</td>
<td>-----------</td>
<td>-------------------</td>
<td>-----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>44</td>
<td>S 1/2 mile</td>
<td>6&quot;</td>
<td>20 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>S on site</td>
<td>4&quot;</td>
<td>8 yrs. poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>O.S. 1/2 mile</td>
<td>6&quot;</td>
<td>18 yrs. poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>O.S. on site</td>
<td>6&quot;</td>
<td>18 yrs. fair</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>S on site</td>
<td>2½&quot;</td>
<td>10 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>S 1 mile</td>
<td>4&quot;</td>
<td>3 yrs.</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>50 H</td>
<td>S 2 miles</td>
<td>4&quot;</td>
<td>40 yrs. poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>50 S</td>
<td>S 2 miles</td>
<td>6&quot;</td>
<td>5 yrs. poor</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>S 1 mile</td>
<td>10&quot;</td>
<td>80 yrs. poor</td>
<td>none</td>
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</tr>
<tr>
<td>52</td>
<td>S 1/2 mile</td>
<td>2½&quot;</td>
<td></td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>S 1 mile</td>
<td>6&quot;</td>
<td></td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>S 1500 ft.</td>
<td>6&quot;</td>
<td></td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>S 2000 ft.</td>
<td>6&quot;</td>
<td></td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>56 D.S.</td>
<td>on site</td>
<td>3&quot;</td>
<td>10 yrs. poor</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>57 S.1</td>
<td>1/2 mile</td>
<td>4&quot;</td>
<td></td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>Well #</td>
<td>S.</td>
<td>Distance to Electricity</td>
<td>Well Dia.</td>
<td>Age and Condition</td>
<td>Pump Information-Type Setting, Capacity, Age, etc.</td>
</tr>
<tr>
<td>--------</td>
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<td>----------</td>
<td>------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>58</td>
<td>S</td>
<td>100 ft.</td>
<td>6&quot;</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>S</td>
<td>1500 ft.</td>
<td>4&quot;</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>60</td>
<td>S</td>
<td>1 mile</td>
<td>UNK.</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>U</td>
<td>3 miles</td>
<td>5&quot;</td>
<td>pump jack</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>S</td>
<td>1½ mile</td>
<td>6&quot;</td>
<td>1 yr. good</td>
<td>none</td>
</tr>
<tr>
<td>63</td>
<td>S</td>
<td>2000 ft.</td>
<td>5&quot;</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>S</td>
<td>1/2 mile</td>
<td>2½&quot;</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>65</td>
<td>U</td>
<td>1/2 mile</td>
<td>6&quot;</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>66</td>
<td>S</td>
<td>Approx. ½ mile</td>
<td>5&quot;</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>S</td>
<td>Approx. ½ mile</td>
<td>5&quot;</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>68</td>
<td>D</td>
<td>on site</td>
<td>4&quot;</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>S.1.</td>
<td>on site</td>
<td>4&quot;</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>S</td>
<td>400 ft.</td>
<td>6&quot;</td>
<td>18 yrs.</td>
<td>none</td>
</tr>
<tr>
<td>70</td>
<td>S</td>
<td>2000 ft.</td>
<td>4&quot;</td>
<td>7 yrs. poor</td>
<td>none</td>
</tr>
<tr>
<td>71</td>
<td>D</td>
<td>on site</td>
<td>5&quot;</td>
<td>pump type unknown</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>S. to electricity</td>
<td>Well</td>
<td>Distance</td>
<td>Age and Condition</td>
<td>Pump Information-Type</td>
</tr>
<tr>
<td>----</td>
<td>------------------</td>
<td>------</td>
<td>----------</td>
<td>-------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>72</td>
<td>S.I. on site</td>
<td>6&quot;</td>
<td>32 yrs.</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>73</td>
<td>O.S.I. on site</td>
<td>5&quot;</td>
<td>2 yrs.</td>
<td>good</td>
<td>submersible</td>
</tr>
<tr>
<td>74</td>
<td>S 1/2 mile</td>
<td>5&quot;</td>
<td>30 yrs.</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>75</td>
<td>S Approx. 1 mile</td>
<td>5&quot;</td>
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<td>windmill</td>
</tr>
<tr>
<td>76</td>
<td>S Approx. 1½ mile</td>
<td>7&quot;</td>
<td>18 yrs.</td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>77</td>
<td>S Approx. 1½ Mile</td>
<td>5&quot;</td>
<td></td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>78</td>
<td>O.S. on site</td>
<td>5&quot;</td>
<td></td>
<td>poor</td>
<td>cylinder</td>
</tr>
<tr>
<td>79</td>
<td>O.S.I. on site</td>
<td>6&quot;</td>
<td></td>
<td>submersible</td>
<td>set at 250'</td>
</tr>
<tr>
<td>80</td>
<td>S Approx. 3000 ft.</td>
<td>6&quot;</td>
<td></td>
<td>cylinder</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>S Approx. 1½ mile</td>
<td>4½&quot;</td>
<td></td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>82</td>
<td>S Approx. 1½ mile</td>
<td>4½&quot;</td>
<td></td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>83</td>
<td>S Approx. 1 mile</td>
<td>6&quot;</td>
<td></td>
<td>cylinder</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>S Approx. 1 mile</td>
<td>2&quot;</td>
<td></td>
<td>poor</td>
<td>none</td>
</tr>
<tr>
<td>85</td>
<td>O on site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>S 1/2 mile</td>
<td>4½&quot;</td>
<td>poor</td>
<td>cylinder</td>
<td></td>
</tr>
</tbody>
</table>

stopped flowing when well #66
flowing uncontrolled about 1970
<table>
<thead>
<tr>
<th>Well #</th>
<th>Distance to Electricity</th>
<th>Well</th>
<th>Age and Condition</th>
<th>Pump Information-Type</th>
<th>Season of Water Use</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>U</td>
<td>3/4 mile</td>
<td>4&quot;</td>
<td>poor</td>
<td>none</td>
<td>same as 86</td>
</tr>
<tr>
<td>88</td>
<td>S.U.</td>
<td>1500 ft.</td>
<td>8&quot;</td>
<td>poor</td>
<td>none</td>
<td>was used with pump jack in 1977 - not used in 1978</td>
</tr>
<tr>
<td>88</td>
<td>$</td>
<td>on site</td>
<td>6&quot;</td>
<td>pump type unknown</td>
<td>probably submersible</td>
<td>serves pipeline</td>
</tr>
<tr>
<td>89</td>
<td>D.S.</td>
<td>on site</td>
<td>6&quot;</td>
<td>good</td>
<td>submersible</td>
<td>serves pipeline</td>
</tr>
<tr>
<td>90</td>
<td>S.U.</td>
<td>on site</td>
<td>6&quot;</td>
<td>good</td>
<td>none</td>
<td>oil test</td>
</tr>
<tr>
<td>91</td>
<td>$</td>
<td>1 mile</td>
<td>5&quot;</td>
<td>good</td>
<td>windmill</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>D.S.I.</td>
<td>on site</td>
<td>4½&quot;</td>
<td>good</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>D.S.I.</td>
<td>on site</td>
<td>2&quot;</td>
<td>good</td>
<td>submersible</td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>S.U.</td>
<td>on site</td>
<td>6&quot;</td>
<td>good</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>$</td>
<td>on site</td>
<td>5&quot;</td>
<td>good</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>D.S.I.</td>
<td>on site</td>
<td>10&quot;</td>
<td>good</td>
<td>submersible</td>
<td>serves pipeline</td>
</tr>
<tr>
<td>96</td>
<td>D.S.I.</td>
<td>on site</td>
<td>5&quot;</td>
<td>good</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>$</td>
<td>1 mile</td>
<td>4&quot;</td>
<td>poor</td>
<td>none</td>
<td>cased to 200&quot;</td>
</tr>
<tr>
<td>98</td>
<td>$</td>
<td>2 miles</td>
<td>10'</td>
<td>poor</td>
<td>none</td>
<td>oil test</td>
</tr>
<tr>
<td>99</td>
<td>D.S.I.</td>
<td>on site</td>
<td>4&quot;</td>
<td>good</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>Well Number</td>
<td>Age</td>
<td>Condition</td>
<td>Pump Information</td>
<td>Use of Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----</td>
<td>-----------</td>
<td>------------------</td>
<td>--------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.7-B-38</td>
<td></td>
<td></td>
<td>none</td>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
- none
- Jensen jack
- submersible - set @ 90°
- on site

**Appendix 3.7-B**

**June 2012**

Dewey-Burdock GDP
<table>
<thead>
<tr>
<th>S.</th>
<th>Distance to Electricity</th>
<th>Well Dia.</th>
<th>Age and Condition</th>
<th>Pump Information-Type, Setting, Capacity, Age, etc.</th>
<th>Season of Use</th>
<th>Water Requirement</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>on site</td>
<td>3½&quot;</td>
<td></td>
<td>jet pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>on site</td>
<td>1½&quot;</td>
<td></td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>on site</td>
<td>6&quot;</td>
<td></td>
<td>submersible pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1500 ft.</td>
<td>9½&quot;</td>
<td>poor</td>
<td>none</td>
<td>oil test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>on site</td>
<td>5&quot;</td>
<td></td>
<td>submersible pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>on site</td>
<td>2&quot;</td>
<td></td>
<td>pump jack</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1½ mile</td>
<td>5&quot;</td>
<td></td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5 miles</td>
<td>7&quot;</td>
<td></td>
<td>windmill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4½ mile</td>
<td>6&quot;</td>
<td></td>
<td>cylinder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>5 miles</td>
<td>4½&quot;</td>
<td></td>
<td>windmill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1½ miles</td>
<td>6&quot;</td>
<td>poor</td>
<td>none</td>
<td>casing rusted off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>DST</td>
<td>6½&quot;</td>
<td></td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2 miles</td>
<td>6½&quot;</td>
<td>poor</td>
<td>none</td>
<td>oil test - casing rusted off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>2½ miles</td>
<td>2½&quot;</td>
<td>poor</td>
<td>none</td>
<td>oil test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well D.</td>
<td>Distance to Electricity</td>
<td>Well Dia.</td>
<td>Age and Condition</td>
<td>Pump Information-Type Setting, Capacity, Age, etc.</td>
<td>Season of Use</td>
<td>Water Requirement</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------</td>
<td>-----------</td>
<td>------------------</td>
<td>------------------------------------------------------</td>
<td>---------------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>130 U</td>
<td>on site</td>
<td>UNK</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td>covered up by owner HoS is not used</td>
</tr>
<tr>
<td>131 S</td>
<td>200 ft.</td>
<td>3&quot;</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>132 S.I. on site</td>
<td>approx.5&quot;</td>
<td></td>
<td>pump type unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>133 U</td>
<td>1500 ft.</td>
<td>6&quot;</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>134 S.U.</td>
<td>on site</td>
<td>1&quot;</td>
<td>UNK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SOURCE B

DRAFT ENVIRONMENTAL STATEMENT FOR EDGEMONT URANIUM MINE TABLE 2.5.2-1

(Tennessee Valley Authority, 1979)
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Summary of Results within a Four-Year (6.3 km) Border of the

Table 2.4-1

The Burdocks, No. 1, June 1964

<table>
<thead>
<tr>
<th>Date</th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (‰)</th>
<th>Conductivity (µS/cm)</th>
<th>Dissolved Oxygen (mg/l)</th>
<th>pH</th>
<th>Total Dissolved Solids (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964-01-01</td>
<td>1</td>
<td>8.2</td>
<td>34.0</td>
<td>1000</td>
<td>10</td>
<td>7.5</td>
<td>50</td>
</tr>
<tr>
<td>1964-02-01</td>
<td>2</td>
<td>8.5</td>
<td>34.5</td>
<td>1050</td>
<td>12</td>
<td>7.6</td>
<td>60</td>
</tr>
<tr>
<td>1964-03-01</td>
<td>3</td>
<td>8.8</td>
<td>35.0</td>
<td>1100</td>
<td>14</td>
<td>7.7</td>
<td>70</td>
</tr>
</tbody>
</table>

Note: Data collected during the water and ice sample collection period.
### Table 2.5.2-1 (continued)

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Depth</th>
<th>Date &amp; Time</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>600</td>
<td>100</td>
<td>1105</td>
</tr>
<tr>
<td>1</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>625</td>
<td>100</td>
<td>1135</td>
</tr>
<tr>
<td>2</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>350</td>
<td>100</td>
<td>1145</td>
</tr>
<tr>
<td>3</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>200</td>
<td>100</td>
<td>1145</td>
</tr>
<tr>
<td>4</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>265</td>
<td>100</td>
<td>1145</td>
</tr>
<tr>
<td>5</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>265</td>
<td>100</td>
<td>1145</td>
</tr>
<tr>
<td>6</td>
<td>43°32'38&quot;</td>
<td>103°08'44&quot;</td>
<td>7-1-1990</td>
<td>360</td>
<td>100</td>
<td>1145</td>
</tr>
</tbody>
</table>

**Remarks**

- Water contains from.
- A.E.C. water analysis.
- Water contains from.
- A.E.C. water analysis.
- Water contains from.
- A.E.C. water analysis.
- A.E.C. water analysis.

**Flow rate:** 1000 L/min (1.6 L/s).
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NOTICE OF WELL CONSTRUCTION

1) WELL CONSTRUCTION

Location of well: SE 1/4 SE 1/4 Section 16 Township 7S Range 1E

Well owner: Peterson & Son, Inc.
Primary address: Edgerton, SD

Date well drilling completed: 11/7/81
Purpose of well: Domestic

(Water use: domestic, irrigation, industrial, etc.)

<table>
<thead>
<tr>
<th>Layer</th>
<th>Top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-380</td>
<td>Blk Sh</td>
<td></td>
<td>555</td>
</tr>
<tr>
<td>380-470</td>
<td>1B gy clst &amp; ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470-565</td>
<td>Gy ss &amp; clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>565-655</td>
<td>Gy, rd-brn &amp; gn clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>580-650</td>
<td>Gy clst</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name of producing aquifer: Lakota

Total depth of drill hole: 650 ft

Depth to bottom of casing: 650 ft

Casing information: In the space below show kind, size, weight, thread, length, diameter, etc., for production casing and surface casing.

Screen information: In the space below show length of screen, kind, kind and size of screen or screen material, kind of screen or screen material.

If a flowing well, show length of completed well: 650 ft

Water level: 38 ft

4" blk iron: 10$/ft

Silver King Mines, Inc.

2) PUMP INSTALLATION

Company name and size of pump: [Blank]

Type of pump: [Blank]  Capacity of installed pump: [Blank]

Depth of pump placement: [Blank] ft. Date of pump installation: [Blank]

3) WATER SURFACE MEASURING TUBE

On some wells an airtight water surface measuring tube is required. See Section C, 608 of WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: [Blank]

Name of pump installation contractor: [Blank]
NOTICE OF WELL CONSTRUCTION

(1) WELL CONSTRUCTION

Location of well: NW 1/4 SW 1/4 Section 3 Township 75 Range 1E

Well owner: Kathryn Spencer Dewey Route Edgemont, SD 57735

Date well drilling completed: 10-22-80 Purpose of well: Domestic (Domestic, Irrigation, Municipal, Industrial, Other)

(WELL LOG)

<table>
<thead>
<tr>
<th>Litho</th>
<th>LOG FOOTAGE</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ksc</td>
<td>0-320</td>
<td>Dark gray shale</td>
<td>580 ft.</td>
<td></td>
<td>Lakota</td>
<td>625 ft.</td>
<td>580 ft.</td>
</tr>
<tr>
<td>Kfu</td>
<td>320-395</td>
<td>Gray mudstone with 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>395-445</td>
<td>Gray mudstone with 50-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klf</td>
<td>445-690</td>
<td>Gray mudstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>590-520</td>
<td>Gray fess</td>
<td>5 1/2'' 16 lbs/ft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>520-585</td>
<td>Well cemented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>545-560</td>
<td>Gray mudstone with 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>560-575</td>
<td>Gray mudstone with 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>575-590</td>
<td>Gray mudstone</td>
<td>45 ft. open hole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>590-615</td>
<td>Gray fine grained sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>615-620</td>
<td>Gray mudstone with 50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>620-625</td>
<td>Gray mudstone with 50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Space below shall be used for screen information, size, length, etc., for production casing and surface casing, if used.)

(Space below shall be used for screen information, size, length, etc., for production casing and surface casing, if used.)

Attch sheet if more space is needed

Silver King Mines, Inc.

Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: HR

Type of pump: Capacity of installed pump: G.P.M.

Depth of pump placement: ft., Date of pump installation:

(3) WATER SURFACE MEASURING TUBE

On some wells, an air-tight water surface measuring tube is required. See Section 48.408 of Chapter 48.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ft., tube diameter inches, tube material:

Name of Pump Installation Contractor

Dewey-Burdock GDP
June 2012

3.7-B-50

Appendix 3.7-B
Hydro ID 38

Form W-3

OFFICE OF STATE ENGINEER
Pierre, South Dakota

CUSTER COUNTY

Location: SW NW Sec 33 Twp 69 Range 1E

Owner: George Putnam
Address: Burdock, S. Dak.

Depth: 494

Type Rig: Cable tool

Flow (gpm): __
Pressure: __
Date Measured: __

Grd. Elev.: __
Water Level Below Ground Surface: __

Temperature: __
Character Water (soft, medium, hard): __

Date commenced: __
Date Completed: 1/12/69

CASING DETAIL

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Length</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4&quot;</td>
<td>497</td>
<td>494</td>
</tr>
</tbody>
</table>

PERFORATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Length</th>
<th>Depth</th>
</tr>
</thead>
</table>

SCREEN

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Length</th>
<th>Depth</th>
</tr>
</thead>
</table>

Is there a seal between different size pipes? __
What kind? __

WATER BEARING SANDS

From: __
To: __

SOURCE OF INFORMATION

PMA office, Fall River Co.

Signed Driller: Roy Boner
Address: Hot Springs, S. Dak.
WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources
6/60

Well Owner:
Name Frank & Paul Jozwlick
Address Casper, Wyoming

Well Location:
Mark location with an "X"

County Custer
NW ¾ SW ¾ Sec. 30 Twp. 65 Rg. 1E

Proposed Use:
☑ Domestic ☑ Municipal ☑ Test Holes
☑ Irrigation ☑ Industrial ☑ Stock

Method of Drilling:
☑ Forward Rotary ☑ Bored ☑ Jetted
☐ Reverse Rotary ☑ Cable ☑ Other

Well Construction:
Diameter of Hole 7 7/8
Depth 680
Casing ☑ Steel ☑ Concrete
☑ Plastic ☑ Other

Was casing end left open Yes
Was a well screen installed No
Describe Well Screen

Well Log:
Date Completed: March 4, 1982

Formation From Depth To
Mad. & dk grv sh 15 400
Bk grv sh 400 535
Intvd grv slst & Cist 555 587
Gry-yrgr slst & Cist 587 602
Cist 602 610
Vf,fgas tr cist 610 673
Gry cist 673 680

Static water level below land sur
If flowing: closed in pressure 28 PSI
rate of flow 2 GPI
Controlled by:
☑ Valve ☑ Reducers ☑ Other
If other; specify:

Well Test Data:
☑ Pumped
☑ Railed Describe:
☑ Other

Pumping Level Below Land Surface
ft. After Hrs. pumped

Was casing end left open Yes

Date Completed: March 4, 1982
Driller: Contract Rig by
Silver King Mines, Inc. 406
Driller's or Firm's Name License
Edgemont, SD 57735
Address
Signed By Date

Remarks: Cased w/14-5/8 5 1/2" steel casing
Perforation completion.
SOUTH DAKOTA WELL REHABILITATION REPORT

Location: SE 1/4 NW 1/4 Sec. 5 Twp. 2S Rg. 1E

County:

FALL RIVER

Please mark well location with an "X"

North

W

E

1 mile

Rehabilitation Completion Date: 11-15-09

PD

E

W

N

S

Well owner:

Name: Putnam & Putnam, L.P.

Address: 728 Cedar St.

City, State, Zip: Dewey, S.D., 57735-5011

Decribe original construction if possible:

Well Drilled 1999

Cased 2" To 220'

Open Hapad to Bottom

PROPOSED USE:

☒ Domestic ☐ Industrial

☐ Municipal ☒ Stock

Description of condition of well before rehabilitation:

Casing deteriorating above and below ground

Description of rehabilitation work completed:

Swabbed well for 210’. Put 4” PVC casing solid for 280’ 20’ of screen

Put Shale Packer at 220’ and Trimmy line Pressure Grouted Back To Surface

Reduced casing To 14” and Put on Ball Valve to control well

Rercasing Information:

Material: PVC

Diameter: 4 inches

Depth: 700 feet

Describe screen or perforations: 25 Factory Screen Location From 280 To 300

Grout: ☒ YES

Describe grouting procedure and grout

☐ NO

Well Test Data:

Specific capacity: 75 GPM

Static water level: Flowing

If a flowing well: Shut in: 10 PSI

This well rehabilitation was completed under license # 224 and this report is true and accurate.

Drilling firm: J&M DRILLING

Signature of Licensed Representative: Bob McManus

Signature of Well Owner: Lloyd Putnam

Date: 1-4-2010

Dewey-Burdock GDP

June 2012

3.7-B-53

Appendix 3.7-B
**State of South Dakota Well Driller's Report**

**Location:**

- County: 
- Township: 
- Range: 
- Section: 

**Well Completion Date:**

- Date: 
- Month: 
- Year: 

**Proposed Use:**

- Domestic
- Municipal
- Test Holes
- Irrigation
- Industrial
- Stock

**Method of Drilling:**

- rotary

**Well Construction:**

- Diameter of hole: 
- Depth: 
- Casing: 
  - steel
  - plastic
  - other
- specify 
- pipe weight diameter from to 
- slv 40 lb/ft 
- 6 inches 
- 0 feet 
- 80 feet 
- slv 40 lb/ft 
- 80 inches 
- 160 feet 
- 360 feet

**Was a well screen used?**

- yes
- no

**Screen Type, Avg. Slot Size, Yd.**

- length
- diameter

**Was Casing left open ended?**

- yes
- no

**Was a Packer or seal used?**

- yes
- no

**If so what material?**

- rubber

**Was well gravel packed?**

- yes
- no

**Was well grouted?**

- yes
- no

**Describe grouting procedure:**

- pumped
- bailed describe:
- other

**Pumping level below land surface:**

- ft. after hrs. pumped

**WELL TEST DATA:**

- pumped
- bailed describe:
- other

**Remarks:**

- this is a water test to 600 psi
- this report is true and accurate

**Well Owner:**

- Name: 
- Address:

**Formation:**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>280</td>
</tr>
<tr>
<td>220</td>
<td>240</td>
</tr>
<tr>
<td>240</td>
<td>360</td>
</tr>
</tbody>
</table>

**Static Water Level:**

- 0 
- feet

- if flowing: closed in pressure 
- 60 psi
- gpm flow 65 through 6" inch pipe
- controlled by valve
- reducers
- other
- if other; specify
- can well be completely shut off? 
- yes
- no

**Well Test Data:**

- pumped
- bailed describe:
- other

**Remarks:**

- this is a water test to 600 psi
- this report is true and accurate

**Drilling Firm:**

- Dewey-Burdock GDP

**Date:**

- 12-6-84
**WELL DRILLERS REPORT**

**Division of Water Rights**

**Department of Water & Natural Resources**

**WELL OWNERS:**
- **Name:** Tennessee Valley Authority
- **Address:**

**WELL LOCATION:**
- **Mark location with an "X"**

**County:** Custer

**SW # N & SW # Sec., 17 Twp., 65 Rg., 16**

**PROPOSED USE:**
- ☑ Domestic
- ☑ Municipal
- ☑ Irrigation
- ☑ Test
- ☑ Industrial
- ☑ Stock

**METHOD OF DRILLING:**
- ☑ Forward Rotary
- ☑ Bored
- ☑ Jetted
- ☑ Reverse Rotary
- ☑ Cable
- ☑ Other

**WELL CONSTRUCTION:**
- **Diameter of Hole:** 6 1/8
- **Depth:** 750
- **Casing:** ☑ Steel
- **Concrete**
- ☑ Plastic
- ☑ Other
- **If other, specify:**

**WATER LEVEL INFORMATION:**
- Static water level: 34 ft below land surface
- If flowing: closed in pressure: 0 PSI
- Rate of flow: GPM
- Controlled by:
  - ☑ Valve
  - ☑ Reducers
  - ☑ Other
- **If other, specify:**

**WELL TEST DATA:**
- ☑ Pumped
- ☑ Bailed
- **Describe:**
- ☑ Other

**PUMPING LEVEL BELOW LAND SURFACE:**
- **After Hrs. pumped:**
- **GPM:**

**WELL LOG:**

<table>
<thead>
<tr>
<th>Formation</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alluvium</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Gry shale</td>
<td>33</td>
<td>403</td>
</tr>
<tr>
<td>Intd gry slat &amp; sh</td>
<td>403</td>
<td>416</td>
</tr>
<tr>
<td>Intd gry vgr ss &amp; clst</td>
<td>416</td>
<td>485</td>
</tr>
<tr>
<td>Br vs. ss</td>
<td>485</td>
<td>507</td>
</tr>
<tr>
<td>Gr r &amp; rvs &amp; gry clst</td>
<td>507</td>
<td>550</td>
</tr>
<tr>
<td>Rd vs. marss</td>
<td>550</td>
<td>576</td>
</tr>
<tr>
<td>Br brn clst</td>
<td>576</td>
<td>585</td>
</tr>
<tr>
<td>Rd marss</td>
<td>585</td>
<td>596</td>
</tr>
<tr>
<td>Intd gry, brn clst &amp; gry clst</td>
<td>596</td>
<td>651</td>
</tr>
<tr>
<td>It or m, vgr ss</td>
<td>651</td>
<td>689</td>
</tr>
<tr>
<td>brn clst</td>
<td>689</td>
<td>695</td>
</tr>
<tr>
<td>0° f, m, cgr ss</td>
<td>695</td>
<td>742</td>
</tr>
<tr>
<td>gry clst</td>
<td>742</td>
<td>750</td>
</tr>
</tbody>
</table>

**Remarks:**
- Cased w/.219 wall 4 1/2" steel casing.
- Open hole completion.

**Driller:**
- **Name:** Silver King Mines, Inc.
- **Address:** Edgemont, SD 57735

**Date Completed:** February 9, 1982

**Signed By:**

**License NO:** 405

**Address:**

**Driller's or Firm's Name:**

**Date:**
.'";-, -(
Hydro 10 220

STATE OF SOUTH DAKOTA WELL DRILLERS REPORT

LocatJor6I1'.~* Sec~Twp G-LRg

/,s

Well Owner:
Name

North

County

C'UW'P'fIV

Adaress

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Please mark well
location with
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Well Log:

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1 of 1

Depth

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Well Completion Date

PROPOSED USE:

Ck

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I 'Municipal

I /Test Holes

/llrrlgatlon

/

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'Industrial

of DrIlling:

WELL CONSTRUCT I 011 :

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(I'

If fJowfng: closed in pressure
/l;.
through
<p tf"/

DIameter of hole-'.:_Jnches Dept~feet
Casing: ,--rSteel ~J.stlc /lOther

'ti" Vf.~""~
Specify 'f" :.s:tr 2't lCa'r..J
Pipe Weight Of_tel"
~
To
___'b/ft ~Inches ~feet ~ feet
-

_ _'b/ft ....$._'_Inches ~feet ~feet
Was a _II screen used? l8/1Yes I tNo
I f Not Speclfy..~_ _ _ _ _ _ _ _ _ _.,...-_
~
Screen Type,4?c;
Slot Size
Length 4th I
DI.ater_....
WoIS CasIng l...,.ft open end? t:i/.Yes I /No
Was a Packer or ,eal used? fiSttes //No
If so what materlal'l :27~

y_q_ ___

Can well btl COIIpletely lIhut off?

~~At~~~~~~~~(t~~

171k1lled Describe:
__
'-----iJi:--!..illl!id'l!
!.-f0ther
Pl.Rping level Below land Surface
ft. After_ _ _Hrs. j)umped,_ _ _-,;:
~;t. After_ _ _Hrs. pumped,_ _ _--:

___ft.

After

Was well groutedf

//No

Remarks:

A/fIl'£

Describe grouting procedure&.cs:. ."""" tOAJ/IfJT
'
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" It",
"
~ ..no

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yIP:

WELL TEST OATA:

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p)j,ttV

Mrs. Pl.IlIloed

T#ld

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GPM

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~
What wes grouting _terlal?
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'£mEPr I" .!:. ~~
If c_nt, how Mny seeks?
LIId'
location of pecker(s) and screen or p..,,,,ated
pipe
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and this report is true and accurate.

To what .pthf

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Wtflt-I" 4/82

Dewey-Burdock GDP
June 2012

PSI
inch pIpe

Controlled by/!!!lvalve IIRaduc:ers I 'Other
If other. 'peclfy,_ _ _ _ _ _ _ _ _ __

Was well gravel pecked"', //Yes
,/8!2'Yes

~

GPM flow

3.7-B-56

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S9Md
by

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I:J.-/,

-If

Appendix 3.7-B


NOTICE OF WELL CONSTRUCTION

Custer

WELL CONSTRUCTION
Location of well: NE 1/4 NE 1/4 Section 26 Township 65 Range 1

Well owner: Tennessee Valley Authority

Date well drilling completed: 8-18-81
Purpose of well: Observation

WELL LOG
Layer, top to top in feet | Description of layer | Depth to top of water producing aquifer | Depth to static water level | Name of producing aquifer (if known) | Total depth of drill hole | Depth to bottom of casing |
--- | --- | --- | --- | --- | --- | ---
0-430 | Blk sh | 505 ft | 21.0 ft | Fall River | 590 ft | 505 ft |
430-495 | 18 ga clst & ss | | | | | |
495-520 | ln & brn ss | | | | | |
520-530 | Gy & brn-gy clst | | | | | |
530-545 | Rd-brn & tn ss | | | | | |
545-565 | Rd-ppl clst | | | | | |
565-590 | Pk, tn & brn ss | | | | | |

Casing information: the space below shows kind, size, weight, length per foot, diameter, etc., for production casing and surface casing, if used.

4" blk iron 108/ft

Screen information: in the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.

open hole 505-590

If a flowing well, flow of completed well: NA

Silver King Mines, Inc.
Name of Drilling Contractor

PUMP INSTALLATION
Company name and size of pump: 
Type of pump: 
Capacity of installed pump: HP
Depth of pump placement: ft., Date of pump installation: 

WATER SURFACE MEASURING TUBE
On some wells an air-tight water surface measuring tube is required: See Section 48.406 of Chapter 48, A MINNESOTA WELL CONSTRUCTION STANDARDS.
Show exact vertical length of water surface measuring tube, when installed ft, tube diameter:
tube material:

Home of Pump Installation Contractor

[Stamp: ULC 1991]
Division of Water Rights
State of Colorado
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

### Wall Owner
- **Name:** CECiE CURTIS

### Address
- **Dakota Rd., Sioux Falls, SD 57135**

### Well Log
- **Log:** Depth
- **Formation:**
  - **Formation:**
  - **Depth:**
    - **Falle River:** 0 to 180 ft
    - **Lakota:** 180 to 530 ft
    - **Moundview:** 530 to 940 ft

### Proposed Use:
- Domestic or Municipal or Industrial or Irrigation or Other

### Method of Drilling:
- Rotary Air + Mud

### CASING DATA:
- **Type:** Steel
- **Other:** Plastic

### PIGEON SIZE, DIAMETER, FROM TO WELL DIAMETER:

<table>
<thead>
<tr>
<th>Schedule</th>
<th>LB/FT</th>
<th>IN</th>
<th>FT</th>
<th>FT</th>
<th>IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>5</td>
<td>5</td>
<td>560</td>
<td>760</td>
<td>760</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>560</td>
<td>760</td>
<td>760</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>560</td>
<td>760</td>
<td>760</td>
</tr>
</tbody>
</table>

### GROUT:
- **Was the well grouted?** Yes
- **To what depth?** 380 ft
- **What is grouting material?** Cement
- **If cement, number of sacks?** 74 sacks
- **Describe grouting procedure?** TEMPLE CREEK

### What was weight? 1 Bag 7 Gallons

### SCREEN:
- **Type:** Perforated pipe
- **Material:** Plastic
- **Diameter:** 5 ft
- **Length:** 80 feet

### SIV SIZE:
- **Slot Size:** 0.04
  - **Set from:** 900 feet to 340 feet
- **Slot Size:** 0.04
  - **Set from:** 380 feet to 580 feet

### Other Information:
- **Was a packer or seal used?** Yes
- **If so, what material?** NEOPRENE
- **Describe packer(s) and location:***
  - **5/8 Packers at 5 ft intervals:**
  - **380 ft to 470 ft:**
  - **480 ft above:***

### Well Disinfected upon completion? No

### Well Water Analysis:
- **Bacteriological analysis:** Yes
- **Laboratory sent to laboratory:**

---

**Dewey-Burdock GDP**

June 2012

3.7-B-58

Appendix 3.7-B
Hydro ID 609

WELL CONSTRUCTION

Location of well Section Township Range TE

Tennessee Valley Authority, P.O. Box 49, Eudora, South Dakota

Date well drilling completed Purpose of well Observation

WELL LOG

Layer/leg to top of hole Description of layer Depth to top of water-producing aquifer

0-20

Brown Soil

20-530

Gray Shale

530-545

Gray Sandstone

545-620

Lt. Gray & Brown Mudstone & Siltstone

620-698

Lt. Gray Sandstone

690-720

Dark Gray Shale w/Light Gray Siltstone

720-740

Gray Sandstone

740-770

1B Dark Gray Shale, Gray-Green Mudstone

770-820

Gray Sandstone

820-840

Gray Shale

840-955

1B AA & Yellow-Brown Siltstone-Sandstone

955-975

Red & Yellow Sandstone

975-1000

Green w/Variegated Mudstone

Depth to bottom of casing

966 ft.

Casing information in the space below show kind, size, weight, length, per diameter, etc., for production casing and surface casing, if used.

Torch Slotted 903-966

is flowing well, flow of completed well G.P.M.

Silver King Mines, Inc.

(2) PUMP INSTALLATION

Company name and size of pump HP

Capacity of installed pump G.P.M.

Depth of pump placement ft., Date of pump installation

(3) WATER SURFACE MEASURING TUBE

On some wells an airtight water surface measuring tube is required. See Section 46.408 of Chapter 46A, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ft., tube diameter tube material

Name of Pump Installation Contractor
### WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of layer</th>
<th>Depth to top of water producing screen (ft)</th>
<th>Depth to static water level (ft)</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole (ft)</th>
<th>Depth to bottom of casing (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-20</td>
<td>Brown Sandy Soil</td>
<td>605</td>
<td></td>
<td>Fall River</td>
<td>680</td>
<td>672</td>
</tr>
<tr>
<td>20-14C</td>
<td>Gray Shale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>640-680</td>
<td>Gray Siltstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>680-780</td>
<td>IB Gray Sandstone &amp; Gray Shale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 1") Schedule 40 Black Iron
- Torch Slotted 630-672

Airlock sheet if more space is needed

---

### PUMP INSTALLATION

- Company name and size of pump: 
- Type of pump:  
- Capacity of installed pump:  G.P.M.
- Depth of pump placement:  ft, Date of pump installation:

### WATER SURFACE MEASURING TUBE

- On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46, MINIMUM WELL CONSTRUCTION STANDARDS.
- Show exact vertical length of water surface measuring tube when installed:  ft, tube diameter:  
- Name of pump installation contractor:

---

Dewey-Burdock GDP  
June 2012  
3.7-B-60  
Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION

(1) WELL CONSTRUCTION

Location of well: SW 1/4 NW 1/4 NE Section 29 Township 65 Range 1E

Well owner: Tennessee Valley Authority, P.O. Box 49, Edgemont, South Dakota

Date well drilling completed: 6-27-78 Purpose of well: Observation

WELL LOG

<table>
<thead>
<tr>
<th>Layer, top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>Brown Sandy Soil</td>
<td>605 ft.</td>
<td>672 ft.</td>
</tr>
<tr>
<td>20-540</td>
<td>Gray Shale</td>
<td>680 ft.</td>
<td></td>
</tr>
<tr>
<td>540-605</td>
<td>Gray Silstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>605-680</td>
<td>1B Gray Sandstone &amp; Gray Shale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: Use the space below show kind, size, weight, lengths per diameter, etc., for production casing and surface casing, if used.

1" Schedual 40 Black Iron

Screen information: Use the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.

Torch Slotted 630-672

If a flowing well, show flow of completed well: __________ G.P.M.

Silver King Mines, Inc.

Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: __________ HP

Type of pump: __________ Capacity of installed pump: __________ G.P.M.

Depth of pump placement: __________ Date of pump installation: __________

(3) WATER SURFACE MEASURING TUBE

On some wells an air tight water surface measuring tube is required: See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: __________ ft., tube diameter: __________ ft., tube material: __________

Name of Pump Installation Contractor

3.7-B-61 Appendix 3.7-B

Dewey-Burdock GDP
June 2012
NOTICE OF WELL CONSTRUCTION

Custer

Location of well: 5L 1/4 N1 1/4 Section 20 Township 65 Range 1E

Well owner: Tennessee Valley Authority

Date well drilling completed: 10-17-81
Purpose of well: Test (domestic, irrigation, municipal, industrial, other)

WELL LOG

<table>
<thead>
<tr>
<th>Layer/hop to top in foot</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-440</td>
<td>Dk brn-gy shale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-500</td>
<td>Gy &amp; brn mudstone</td>
<td></td>
<td></td>
<td>Lakota</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-520</td>
<td>Lt red sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>520-565</td>
<td>Dk brn &amp; gy-gn mdst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>565-600</td>
<td>Red sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-625</td>
<td>Dk brn mdst-sltst</td>
<td></td>
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</tr>
<tr>
<td>625-645</td>
<td>Dk brn mdst</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>645-690</td>
<td>Gy &amp; brn mdst w/int'd rd sltst</td>
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<tr>
<td>690-725</td>
<td>Red ss w/orng cht</td>
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<tr>
<td>725-755</td>
<td>Red sltst</td>
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<tr>
<td>755-800</td>
<td>Red ss w/wht, orng &amp; gy chert pbl cgl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: In the space below show kind, size, weight, length per diameter, etc., for production casing and surface casing, if used.

0-25' 20" steel
0-695 10 3/4" steel
730-755 8 5/8" steel

If a flowing well, list flow of completed well & %.

Forward Drilling Company

(2) PUMP INSTALLATION

Company name and size of pump: Pioneer 6"
Type of pump: Submersible
Capacity of installed pump: 325 g.p.d.
Depth of pump placement: 525 ft. Date of pump installation: 12-2-81

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required; See Section 48-408 of Chapter 48, Kansas WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: 525 ft. Tube material: Poly
NOTICE OF WELL CONSTRUCTION

(1) WELL CONSTRUCTION

Custer

Location of well: SE 1/4 NE 1/4 Section 20 Township 65 Range 1E

Well owner: Tennessee Valley Authority

Date well drilling completed: 8-14-81 Purpose of well: Observation

WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of layer</th>
<th>Depth to top of water producing unit</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-425</td>
<td>Blk sh</td>
<td>692</td>
<td>76.6</td>
<td>Lakota</td>
<td></td>
<td>692</td>
</tr>
<tr>
<td>425-495</td>
<td>18 gy clst &amp; ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>495-505</td>
<td>Rd &amp; brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-525</td>
<td>Gy clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>525-530</td>
<td>Rd &amp; orng-brn clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>530-545</td>
<td>Brn &amp; rd-brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>545-555</td>
<td>Gy &amp; wht slst w/fy-gn clst</td>
<td>4&quot; blk iron 100/ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>555-585</td>
<td>Orng, rd &amp; brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>585-610</td>
<td>Gy-wht slst w/gn clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>610-640</td>
<td>Tn-gy ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>640-650</td>
<td>Gy clst &amp; gy wht slst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>650-700</td>
<td>Gy &amp; gn clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>700-730</td>
<td>Tn, orng &amp; rd-brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>730-745</td>
<td>IB Gy ss &amp; slst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>745-800</td>
<td>Tn-brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screen information in the space below show length of screen below bottom of casing, diameter and kind of screen or screen perforations.

Name of Drilling Contractor: Silver King Mines, Inc.

(2) PUMP INSTALLATION

Company name and size of pump

Type of pump

Capacity of installed pump

Depth of pump placement:

Date of pump installation:

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.406 of Chapter 46A, Arizona WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed:

Tube material:

Name of Pump Installation Contractor:

Dewey-Burdock GDP
June 2012
3.7-B-63
Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION
Custer

(1) WELL CONSTRUCTION

Location of well: SE 1/4 NE 1/4 Section 21 Township 65 Range 1F
Well owner: Tennessee Valley Authority
Date well drilling completed: 8-14-81
Purpose of well: Observation (domestic, irrigation, municipal, industrial, other)

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-430</td>
<td>Blk sh</td>
<td>504</td>
<td>26.2</td>
<td>Fall River</td>
<td>580</td>
<td>504</td>
</tr>
<tr>
<td>430-510</td>
<td>18 gy clst &amp; ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>510-600</td>
<td>7n-gy &amp; rd-brn ss w/ GY, GN &amp; rd clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: in the space below show kind, size, weight, length and diameter, etc., for production casing and surface casing, if used.

4" blk iron 10#/ft

Screen information: in the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.

Open hole 504-580.

If a flowing well, flow of completed well: NA

Silver King Mines, Inc
Home of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: NA
Type of pump: Capacity of installed pump: NA
Depth of pump placement: ft.

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 48.604 of Code 91 WELL CONSTRUCTION STANDARDS.

Show space vertical length of water surface measuring tube, when installed.

Tube material: ____________________________

Home of Pump Reproduction: ____________________________
NOTICE OF WELL CONSTRUCTION

1) WELL CONSTRUCTION

Location of well: SF 1/4 NE 1/4 Section 20 Township 65 Range R1

Well owner: Tennessee Valley Authority

Date well drilling completed: 9-14-81 Purpose of well: Observation (domestic, irrigation, municipal, industrial, other)

<table>
<thead>
<tr>
<th>Layer, top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water-producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-440</td>
<td>Blk sh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-505</td>
<td>18-ga cist &amp; ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-565</td>
<td>Rd &amp; yr-brn ss w/rd-br</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>565-575</td>
<td>Rd-brn cist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>575-600</td>
<td>Rd 7 yr-brn ss-silt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-620</td>
<td>18-ga cist &amp; ss</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screen information: in the space below show kind, size, weight, length per 100 ft, etc. for production casing and surface casing, if used.

4" blk iron 100/ft

(2) PUMP INSTALLATION

Company name and size of pump: ____________________________ HP

Type of pump: ____________________________ Capacity of installed pump: ____________ HP

Depth of pump placement: ____________________________ ft. Date of pump installation: ____________

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 48.408 of Chapter 48A, Division 3, WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: ______ ft. Tube material: ____________________________

Silver King Mines, Inc.

Name of Pump Insertion Contractor: ____________________________
NOTICE OF WELL CONSTRUCTION

Custer

Location of well: SE 1/4 NE 1/4 Section 20 Township 6S Range 1E

Well owner: Tennessee Valley Authority

Date well drilling completed: 8-13-81

Purpose of well: Observation

(Water, irrigation, municipal, industrial, and others)

WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-435</td>
<td>Blk sh</td>
<td></td>
<td>712</td>
<td>39.7</td>
<td>Lakota</td>
<td>800</td>
<td>712</td>
</tr>
<tr>
<td>435-505</td>
<td>Intbd gy clst, ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505-525</td>
<td>Lt tn &amp; brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>525-550</td>
<td>18 gy clst-ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>550-590</td>
<td>18 rd brn &amp; gy slst &amp; clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>590-600</td>
<td>Rd &amp; brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-620</td>
<td>18 gy-gn &amp; rd-brn slst &amp; clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>620-645</td>
<td>Gv-wht slst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>645-685</td>
<td>18 &amp;wht slst &amp; pk slst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>685-695</td>
<td>Pk &amp; brn ss w/gy clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>695-800</td>
<td>Brn, orng, tn., pk, rd &amp; yw ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WELL LOG (continued)

<table>
<thead>
<tr>
<th>Layer</th>
<th>Top to top in feet</th>
<th>Description of layer</th>
<th>Screen information: In the space below enter length of screen below bottom of casing, diameter and end of screen or screen perforations.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Open hole 712-800

If a flowing well, flow of completed well: WA

Silver King Mines, Inc.

Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: NA

Type of pump: NA

Capacity of installed pump: NA

Depth of pump placement: 0.2 ft.

Date of pump installation: NA

(3) WATER SURFACE MEASURING TUBE

On some wells an air-filled water surface measuring tube is required. See Section 42.408 of Chapter 42-3, MINNESOTA WELL CONSTRUCTION STANDARDS.

Show upper vertical length of water surface measuring tube, when installed.

Tube material: NA

Name of Pump Installer: NA

Dewey-Burdock GDP

June 2012

3.7-B-66

Appendix 3.7-B
**NOTICE OF WELL CONSTRUCTION**

**CUSTER**

1) **WELL CONSTRUCTION**

Location of well: SE 1/4 NE 1/4 Section 20 Township 65 Range R1

Well owner: Tennessee Valley Authority

Date well drilling completed: 9-15-81 Purpose of well: Observation

**WELL LOG**

<table>
<thead>
<tr>
<th>Layer No.</th>
<th>Description of Layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-465</td>
<td>Blk sh</td>
<td>735</td>
<td>45.8</td>
<td>Lakota</td>
<td>835</td>
<td>735</td>
</tr>
<tr>
<td>465-530</td>
<td>1B gy clst &amp; ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>530-550</td>
<td>Ad 6 yw-brn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>550-605</td>
<td>1B go slst &amp; go-gy clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>605-645</td>
<td>Gr clst w/gy-wht slst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>645-680</td>
<td>Gy ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>680-720</td>
<td>Gy w/ga clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>720-760</td>
<td>1B rd &amp; yw-brn ss, gy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>760-835</td>
<td>Tn ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: the space below shows kind, size, weight, length per joint, diameter, etc., for production casing and surface casing, if used.

- 4” blk iron 100/ft
- 5 1/2” slst & rd-brn & brngy clst

Screen information: the space below shows length of screen below bottom of casing, diameter of screen or screen perforations.

- open hole 735-835

If a flowing well, flow of completed well: NA

Silver King Mines, Inc.

Name of Drilling Contractor

2) **PUMP INSTALLATION**

Company name and size of pump: Dewey-Burdock GDP June 2012

Type of pump: MR

Capacity of installed pump: 6.0 HP

Depth of pump placement: 60 ft Date of pump installation: 6/24/81

3) **WATER SURFACE MEASURING TUBE**

- On some wells an airtight water surface measuring tube is required. See Section 48.408 of Chapter 48, WATERS WELL CONSTRUCTION STANDARDS.

- Show exact vertical length of water surface measuring tube, when installed: 8 ft, tube diameter: 1”

Tube material: Dewey-Burdock GDP

Name of Pump Installation Contractor: DEC 1981

D. Y. C. of State of Wash. & MTs, State of Wash. & MTs.

---

Dewey-Burdock GDP
June 2012

3.7-B-67 Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION

Custer

(1) WELL CONSTRUCTION

Location of well: SW 1/4 NE 1/4 Section 26 Township 65 Range 1E

Well owner: Tennessee Valley Authority

Date well drilling completed: 9-15-81

Purposes of well: Observation

WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Depth to Top of Water Producing Aquifer</th>
<th>Depth to Static Water Level</th>
<th>Name of Producing Aquifer (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-450</td>
<td>715</td>
<td>21.4</td>
<td>Lakota</td>
</tr>
<tr>
<td>450-520</td>
<td>IB gy clst &amp; ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>520-555</td>
<td>Rd-bn &amp; gy clst w/gy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>555-570</td>
<td>Rd &amp; brn ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>570-625</td>
<td>IB gy silt &amp; gy, gi, &amp; rd clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625-655</td>
<td>Gy ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>655-760</td>
<td>IB gy silt w/gy &amp; an &amp; brn clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>740-810</td>
<td>Tn, yw &amp; rd-bn ss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing Information: In the space below show kind, size, weight, length, etc. for production casing and surface casing, if used.

- 4" blk iron 10#/ft

Scren Information: In the space below show length of screen, length and kind of screen or casing perforations.

- Open hole 715-810

If a flowing well, flow of completed well NA

Silver King Mines, Inc.
Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: NA

Type of pump: NA

Capacity of installed pump: NA

Depth of pump placement: NA ft, Date of pump installation: NA

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.108 of Chapter 46 A USSR

WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed.

Name of Pump Installation Contractor:

DEC 1981
# NOTICE OF WELL CONSTRUCTION

## (1) WELL CONSTRUCTION

| Location of well: NE 1/4 NE 1/4 Section 20 Township 6S Range 1E |
| Well owner: Tennessee Valley Authority |
| Date well drilling completed: 8-17-81 |

### WELL LOG

<table>
<thead>
<tr>
<th>Layer, stra top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer: 714 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-420</td>
<td>Blk sh</td>
<td>Depth to static water level: 49.7 ft.</td>
</tr>
<tr>
<td>420-490</td>
<td>1B gy clst &amp; ss</td>
<td>Name of producing aquifer (if known): Lakea</td>
</tr>
<tr>
<td>490-585</td>
<td>1B gy, pk &amp; orng slst &amp; rd-brn &amp; gn clst</td>
<td>Total depth of drill hole: 780 ft.</td>
</tr>
<tr>
<td>585-615</td>
<td>Gy-gn &amp; rd-brn clst</td>
<td>Depth to bottom of casing: 714 ft.</td>
</tr>
<tr>
<td>615-650</td>
<td>Gy-wht slst</td>
<td>Casing information: in the space below show kind, size, weight, lengths per diameter, etc. for production casing and surface casing, if used.</td>
</tr>
<tr>
<td>650-690</td>
<td>Gy &amp; gn clst</td>
<td>4&quot; blk iron 10c/ft</td>
</tr>
<tr>
<td>690-735</td>
<td>Gy w/rd &amp; yw-brn ss w/brn-gv clst</td>
<td>Screen information: in the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.</td>
</tr>
<tr>
<td>735-778</td>
<td>In &amp; yw-brn ss</td>
<td>Open hole 714-780</td>
</tr>
</tbody>
</table>

If a flowing well, flow of completed well: NA G.P.M.

Silver King Mines, Inc.

Name of Drilling Contractor

## (2) PUMP INSTALLATION

<table>
<thead>
<tr>
<th>Company name and size of pump</th>
<th>HP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of pump</td>
<td>Capacity of installed pump</td>
</tr>
<tr>
<td>Depth of pump placement</td>
<td>G.P.M.</td>
</tr>
</tbody>
</table>

## (3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required: See Section 46.40B of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube when installed: ft., tube diameter: , tube material: 

Name of Pump Installation Contractor
NOTICE OF WELL CONSTRUCTION

(1) WELL CONSTRUCTION

Location of well: NE 1/4 NE 1/4 Section 20 Township 6S Range R1

Well owner: Tennessee Valley Authority (Address)

Date well drilling completed: 8-17-81 Purpose of well: Observation

Well Log

<table>
<thead>
<tr>
<th>Layers top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-420</td>
<td>Blk sh</td>
<td></td>
<td>503 ft</td>
<td>Fall River</td>
<td>580 ft</td>
<td>503 ft</td>
</tr>
<tr>
<td>420-500</td>
<td>lb gy clst &amp; ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-580</td>
<td>Gy, rd &amp; tn ss w/gy c brn clst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: In the space below show kind, use, weight, lengths per diameter, etc., for production casing and surface casing, if used.

4" blk iron 10½/ft

Screen information: In the space below show length of screen below bottom of casing, diameter and kind of screen or perforations.

open hole 503-580

If flowing well, flow of completed well: NA 8 P.M.

Silver King Mines, Inc.
Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: ___________________________ HP: ___________________________

Type of pump: ___________________________ Capacity of installed pump: ___________________________ G.P.M.: ___________________________

Depth of pump placement: ___________________________ ft Date of pump installation: ___________________________

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ___________ ft, tube diameter ___________, tube material ___________________________.

Name of Pump Installation Contractor: ___________________________
NOTICE OF WELL CONSTRUCTION

Custer

Location of well: NE 1/4 NE 1/4 Section: 2 Township: 65 Range: R1

Well owner: Tennessee Valley Authority

Date well drilling completed: 8-17-81 Purpose of well: Observ.

(Domestic, irrigation, municipal, industrial, others)

(Home)

WELL LOG

Layers, top to top incl. ft:

Description of layer

Depth to top of water producing aquifer: 503 ft.

Depth to static water level: 34.7 ft.

Name of producing aquifer (if known): Fall River

Total depth of drill hole: 580 ft.

Depth to bottom of casing: 503 ft.

Casing information: In the space below show kind, size, weight, lengths, etc., of production casing and surface casing, if used.

4" blk iron 108/ft

Screen information: In the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.

open hole 503-580

If a flowing well, flow of completed well: NA

S.P.M.

Silver King Mines, Inc.

Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump:

Type of pump: Capacity of installed pump: S.P.M.

Depth of pump placement: ft., Date of pump installation:

(3) WATER SURFACE MEASURING TUBE

- On some wells an air-tight water surface measuring tube is required. See Section 46.406 of Chapter 46.4, Minimum WELL CONSTRUCTION STANDARDS.

- Show exact vertical length of water surface measuring tube, when installed ft., tube diameter

Tubing material

Name of Pump Installation Contractor

3.7-B-71 Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION

Custer

Location of well: SE 1/4 NE 1/4 Section 15 Township 65 Range 1E

Well owner: Earl Darrow

Date well drilling completed: 7-30-81

Purpose of well: Domestic

WELL LOG

<table>
<thead>
<tr>
<th>Layers to Top</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>Mth brn &amp; gy clst and slst</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>20-25</td>
<td>Gy clst &amp; ywtn bent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-35</td>
<td>Gy clst &amp; ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-55</td>
<td>Gy clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-60</td>
<td>Gy ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-65</td>
<td>Brn &amp; gy clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-70</td>
<td>Gy ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-95</td>
<td>Gy, blk, rd &amp; orgn-brn clst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95-115</td>
<td>Rd, orgn-brn &amp; ppl ss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115-120</td>
<td>Gy clst w/ss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Casing information: In the space below show kind, size, weight, length per diameter, etc., for production casing and surface casing, if used.

160# 4" PVC

Slotted casing 90-115

WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 45A, INDIANA WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed __________ ft. Tube material ________________

Silver King Mines, Inc.

Dewey-Burdock GDP
June 2012

Appendix 3.7-B

3.7-B-72
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

- **Location:** SW SW 23 6S 1E
- **County:** Clay
- **Well Completion Date:** Feb 98
- **Location:** Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) 3 ft. from

**PROPOSED USE:**
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

**METHOD OF DRILLING:**
- Air

**Casing Data:**
- Steel
- Plastic
- Other

**Piping Data:**
- Pipe weight: 15.5 lb/ft
- Diameter: 5 in
- From: 0 ft
- To: 70 ft
- Hole Diameter: 7 1/2 in

**GROUTING DATA**
- Grout Type: Lime
- No. of Sacks: 4
- Grout Weight: 1 lb/gal
- From: 0 ft
- R: 30 ft
- Other information

**Screen:**
- Perforated pipe
- Manufactured
- Diameter: 2 1/2 in
- Length: 40 feet
- Material: Steel
- Slot size: 5/16
- Set from 30 feet to 70 feet

**WAS A PACKER OR SEAL USED?**
- Yes
- No

**DISINFECTION:**
- Was well disinfected upon completion? Yes, How?
- Laboratory sent to for water quality analysis

**WELL LOG:**
- **Formation:** Sand Gravel
- **From:** 0 ft
- **To:** 75 ft

**STATIC WATER LEVEL:**
- 20 ft

**Well Test Data:**
- **Pumped:**
- **Bailed:**
- **Other:**

**Other Information**
- Pumping Level Below Land Surface
- ft. After
- Hrs. pumped
- GPM
- ft. After
- Hrs. pumped
- GPM
- If pump installed, pump rate

**REMARKS**

- This well was drilled under license #
- And this report is true and accurate
- Drilling firm
- Signature of Licensee Representative
- Signature of Well Owner or Equivalent Property Holder
- Date: 21-22-99

---

**Appendix 3.7-B**
NOTICE OF WELL CONSTRUCTION

CUSTER

Location of well: NW 1/4 NE 1/4 Section 26 Township 65 Range 1E

Well owner: Tennessee Valley Authority

Date well drilling completed: 8-18-81 Purpose of well: Domestic, irrigation, municipal, industrial, other

WELL LOG

<table>
<thead>
<tr>
<th>Layers, Top to Top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-430</td>
<td>Blk sh</td>
<td>715</td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>430-500</td>
<td>IB gy clst &amp; ss</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>500-550</td>
<td>GY &amp; rd-brn ss</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>550-580</td>
<td>Gy wht slst w/gy-gn clst</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>580-595</td>
<td>Rb, ywh &amp; yw-brn &amp; gav ss</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>595-605</td>
<td>Gy wht slst &amp; gav-gn clst</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>605-660</td>
<td>Gy ss w/gy slst &amp; gav clst</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>660-690</td>
<td>Gy wht slst &amp; gav clst</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>690-700</td>
<td>Gv w/arg ss</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>700-745</td>
<td>IB brn &amp; gy, tr yw ss brn &amp; gav clst</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
<tr>
<td>745-800</td>
<td>Brn-gy &amp; rd ss</td>
<td></td>
<td>42.4</td>
<td>Lakota</td>
<td>800</td>
<td>715</td>
</tr>
</tbody>
</table>

Casing information in the spaces below show length of screen below points of casing, diameter and kind of screen or casing perforations.

open hole 715-800

If a flowing well, flow of completed well: NA

Silver King Mines, Inc.
Name of Drilling Contractor

(2) PUMP INSTALLATION
Company name and size of pump: NA
Type of pump: NA Capacity of installed pump: NA
Depth of pump placement: NA Date of pump installation: NA

(3) WATER SURFACE MEASURING TUBE
On some wells an air-tight water surface measuring tube is required; See Section 46.408 of Chapter 46, Arizona WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: NA tube diameter: NA

Name of Pump Installation Contractor:

Appendix 3.7-B
Hydro ID 662

WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Top to bottom</th>
<th>Depth to top of water producing aquifer</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>Brown &amp; Gray Soil</td>
<td>665 ft</td>
<td>Sundance</td>
<td>740 ft</td>
<td>280 ft</td>
</tr>
<tr>
<td>30-95</td>
<td>Brown-Gray Mudstone, Siltstone</td>
<td>880 ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95-135</td>
<td>1B Lt. Gray Sandstone, and Gray Mudstone</td>
<td>Variegated Mudstone &amp; Siltstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>135-205</td>
<td>Tan &amp; Gray Sandstone</td>
<td>Gray &amp; Green Mudstone</td>
<td>1/11</td>
<td>14 ft</td>
<td>Steel Casing</td>
</tr>
<tr>
<td>205-280</td>
<td>Gray Sands</td>
<td>305-335</td>
<td>1B Brown-Gray Mudstone, Gray Sandstone</td>
<td>400-665</td>
<td>Gray, Brown &amp; Green Mudstones</td>
</tr>
<tr>
<td>400-665</td>
<td>Gray, Brown &amp; Green Mudstones</td>
<td>665-780</td>
<td>1B Red-Brown Sandstone and Gray &amp; Green Claystone</td>
<td>780-840</td>
<td>Black Shale &amp; Gray-Green Claystone</td>
</tr>
<tr>
<td>780-840</td>
<td>Black Shale &amp; Gray-Green Claystone</td>
<td>Red Siltstone-Mudstone</td>
<td>Torch Studded 666-780</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If a flowing well, flow of completed well ___________ G.P.M.

Silver King Mines, Inc.
Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump ___________________________ HP.
Type of pump ___________________________ Capacity of installed pump ___________________________ G.P.M.
Depth of pump placement ___________________________ ft. Date of pump installation ___________________________

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.4.08 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ___________ ft., tube diameter ___________, tube material ___________.

Name of Pump Installation Contractor

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
(1) WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of Layer</th>
<th>Depth to Top of Water Producing Layer</th>
<th>Depth to Water Level</th>
<th>Name of Producing Layer (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-29</td>
<td>Weathered Brown Clay and Silt</td>
<td>504 ft</td>
<td>504 ft</td>
<td></td>
</tr>
<tr>
<td>20-250</td>
<td>Dark Gray Shale</td>
<td>504 ft</td>
<td>504 ft</td>
<td></td>
</tr>
<tr>
<td>250-375</td>
<td>Interbedded Gray Claystone and Gray Sandstone</td>
<td>Depth of Well 550 ft</td>
<td>504 ft</td>
<td></td>
</tr>
<tr>
<td>375-410</td>
<td>Dark Gray Claystone</td>
<td>Depth of Bottom of Casing 504 ft</td>
<td>504 ft</td>
<td></td>
</tr>
<tr>
<td>410-505</td>
<td>Lt. Gray-White Silts and Green Clays</td>
<td>Depth of Bottom of Casing 504 ft</td>
<td>504 ft</td>
<td></td>
</tr>
<tr>
<td>505-550</td>
<td>Red-Brown Sandstone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(2) PUMP INSTALLATION

- Company Name and Size of Pump: __________ MP __________
- Type of Pump: __________
- Capacity of Installed Pump: __________ G.P.M.
- Depth of Pump Placement: __________ ft.
- Date of Pump Installation: __________

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required; See Section 48.408 of Chapter 48, MINIMUM WELL CONSTRUCTION STANDARDS.

- Show exact vertical length of water surface measuring tube, when installed: __________ ft., tube diameter: __________

Name of Pump Installation Contractor: __________
Layer Depth to top of water producing unit

<table>
<thead>
<tr>
<th>Layer</th>
<th>Depth to top of water producing unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>315 ft.</td>
</tr>
<tr>
<td>20-260</td>
<td>315 ft.</td>
</tr>
<tr>
<td>250-360</td>
<td>315 ft.</td>
</tr>
</tbody>
</table>

*4-in. Schedule 40 Black Iron*

*Screen information in the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.*

**Open Hole 315-360**

*If a flowing well, flow of completed well est. 2 G.P.M.*

**Silver King Mines, Inc.**

*Home of Drilling Contractor*

### (2) PUMP INSTALLATION

**Company name and size of pump**

Type of pump: __________________________ Capacity of installed pump: __________________________

Depth of pump placement: __________________________ ft. Date of pump installation: __________________________

### (3) WATER SURFACE MEASURING TUBE

*On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46, MINIMUM WELL CONSTRUCTION STANDARDS.*

Show exact vertical length of water surface measuring tube, when installed: __________________________ ft., tube diameter: __________________________

**Tube material:** __________________________

*Name of Pump Installation Contractor:__

**C 1978**

**Dewey-Burdock GDP**

**June 2012**

**3.7-B-77**

**Appendix 3.7-B**
NOTICE OF WELL CONSTRUCTION

1) WELL CONSTRUCTION

Location of well

Well owner

Tennessee Valley Authority - Box 49 - Edgerton, South Dakota

Date well drilling completed

1-31-77

WELL LOG

Layer 10 ft. in log (in feet)  Description of layer  Depth to top of water producing aquifer  Depth to static water level  Name of producing aquifer (if known)  Total depth of drill hole  Depth to bottom of casing

0 - 15  Alluvium & brn sh  280 - 480  Flowing

15 - 240  Dk gy fissile sh

240 - 340  Dk gy sh, md gy clst

340 - 365  Md gy-gn clst

365 - 420  Whlt gy slst-vfgrss

420 - 445  Lt gn & gy clst

445 - 475  AA w/tr it gy & brn vf-vfgrss

475 - 485  Gy vrgrss

485 - 500  AA w/brn mdst

0 - 560  Pk & org calc cem vfgrss

560 - 574  Lt-dk gy mdst

Casing information: In the space below show brand, size, weight, lengths per diameter, etc., for production casing and surface casing, if used.

Schedule 40 blk iron 10" diameter

0 - 280  335 - 480

Johnson Well Screen Stainless Steel .030 slot size

10" diam 280 - 335

8" diam 480 - 555

If a reading well, flow of completed well


2) PUMP INSTALLATION

Company name and size of pump

Pioneer # P 300 34 T 6"

Type of pump

Submersible

Capacity of installed pump

300 G.P.M.

Depth of pump placement

455 ft.

Date of pump installation

Feb. 10, 1977

3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Shoe exact vertical length of water surface measuring tube, when installed

tube material

Forward Drilling Co.

Date of testing and certification

Forward Drilling Co.

June 2012

Dewey-Burdock GDP

3.7-B-78

Appendix 3.7-B

Figure 2: Burdock Well Profile
NOTICE OF WELL CONSTRUCTION

Owner: Tennessee Valle Authority, 1490 Box 49, Edgemont, South Dakota

Date well drilling completed: 10-25-78
Purpose of well: Observation
Domestic, Irrigation, Municipal, Industrial, Others:

WELL LOG

<table>
<thead>
<tr>
<th>Layers, top to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>Brown Weathered Shale</td>
<td>510 ft</td>
<td></td>
<td>Lakota</td>
</tr>
<tr>
<td>25-235</td>
<td>Gray Shale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>235-265</td>
<td>Gray Shale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>265-335</td>
<td>Sandstone &amp; Gray with Gray Shale</td>
<td>550 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>335-355</td>
<td>Sandstone &amp; Gray with Gray Shale</td>
<td>510 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>355-370</td>
<td>Tan-Gray Siltstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>370-390</td>
<td>Gray &amp; Green Shale</td>
<td>4 1/2&quot; Black Iron Sched. 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>390-409</td>
<td>Dark Brown Mudstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>405-440</td>
<td>Lt. Green Claystone-Siltstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440-475</td>
<td>White Siltstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>475-480</td>
<td>Green Shale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>480-490</td>
<td>Sandstone &amp; Gray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>495-510</td>
<td>Mudstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>510-550</td>
<td>Red-Brown SS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If flowing well, name of completed well: est. 35 G.P.M.

Silver King Mines, Inc.
Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: HP
Type of pump: Capacity of installed pump: G.P.M.
Depth of pump placement: ft., Date of pump installation:

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 or Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.
Show exact vertical length of water surface measuring tube, when installed: ft., tube diameter:

Silver King Mines, Inc.
Name of Pump Installation Contractor

June 2012
Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION

TENNESSEE VALLEY AUTHORITY, P. O. Box 49, Edge mont, South Dakota

Date well drilling commenced 10-12-78 Purpose of well: Observation

DOMESTIC, DRINKING, MUNICIPAL, INDUSTRIAL, OTHER

WELL LOG

Layers, top to bottom

<table>
<thead>
<tr>
<th>Description of Layer</th>
<th>Depth to Top of Water Producing Aquifer</th>
<th>Depth to Static Water Level</th>
<th>Depth to Bottom of Casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20 Weathered Brown Clay &amp;</td>
<td>277 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>20-250 Dark Gray Shale</td>
<td>395 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>250-260 Interbedded Gray Clay &amp; Lt. Gray Sandstone</td>
<td>395 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>260-355 Gray Clay Stone</td>
<td>395 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>355-375 Lt. Gray-White Siltstone</td>
<td>395 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>375-390 Gray Claystone</td>
<td>395 ft</td>
<td>377 ft</td>
<td>377 ft</td>
</tr>
<tr>
<td>390-395 Gray &amp; Green Shale</td>
<td>4½ Schedule 40 Black Iron</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screen information in the space below show length of screen below bottom of casing. Name of Pump Installation Contractor

Open Hole 377-395

If a flowing well, flow of completed well ______ ft. per minute

PUMP INSTALLATION

Company name and size of pump ______________ HP

Type of pump ______________ Capacity of installed pump ______________ HP

Depth of pump placement ______ ft. Date of pump installation ______

WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 48.408 of Chapter 48.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ______ ft. Tube material ______

Name of Pump Installation Contractor

1978

Dewey-Burdock GDP
June 2012 3.7-B-81 Appendix 3.7-B
WELL CONSTRUCTION

Tennessee Valley Authority, P.O. Box 183, Edgemont, South Dakota

Date well drilling completed: 10-18-73

Purpose of well: Observation

Well Log

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>Weathered Brown Clay</td>
<td>300 ft</td>
<td>306 ft</td>
</tr>
<tr>
<td>10-250</td>
<td>Dark Gray Shale</td>
<td>350 ft</td>
<td></td>
</tr>
<tr>
<td>250-260</td>
<td>Interbedded Gray Clays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>260-295</td>
<td>Med. &amp; Lt. Gray Claystone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>295-300</td>
<td>Brown Claystone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300-335</td>
<td>Lt. Gray Sandstone, Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>335-350</td>
<td>Gray-Green Mudstone, Gray</td>
<td></td>
<td>4 1/2&quot; Schedual 40 Black Iron</td>
</tr>
</tbody>
</table>

Screen information in the space below show length of screen below bottom of casing, diameter and kind of screen or casing perforations.

Open Hole: 300-350

If a flowing well, flow of completed well: EST. 2 gpm

Silver King Mines, Inc.

(2) PUMP INSTALLATION

Company name and size of pump: 

Type of pump: 

Capacity of installed pump: 

Depth of pump placement: 

Date of pump installation: 

(3) WATER SURFACE MEASURING TUBE

On some wells an oiltight water surface measuring tube is required. See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: 

Tube material: 

Name of Pump Installation Contractor: 

Dewey-Burdock GDP

June 2012

Appendix 3.7-B
NOTICE OF WELL CONSTRUCTION

Tennessee Valley Authority, F.G. Box 49, Edgerton, South Dakota

Date well drilling completed: 11-6-78
Purpose of well: Observation

WELL LOG

<table>
<thead>
<tr>
<th>Layers, log to top in feet</th>
<th>Description of layer</th>
<th>Depth to top of water producing aquifer</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-260</td>
<td>Dark Gray Shale</td>
<td>400</td>
<td></td>
<td>Lakota-Fusion</td>
<td>420</td>
<td>400</td>
</tr>
<tr>
<td>260-280</td>
<td>Gray Shale &amp; Sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>280-350</td>
<td>Gray Sandstone-Siltstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>350-355</td>
<td>Dark Brown Shale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>355-395</td>
<td>Gray Shale &amp; Sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>395-420</td>
<td>Gray-Green Mudstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4½" Schedule 40 Black Iron

Screen information in the space below shows length of screen below bottom of casing, diameter and kind of screen or casing perforations.

Open Hole 400-420

if a flowing well, file of completed well: __________________ G.P.M.

Silver King Mines, Inc. Name of Drilling Contractor

(2) PUMP INSTALLATION

Company name and size of pump: __________________ HP

Type of pump: __________________ Capacity of installed pump: __________________ G.P.M.

Depth of pump placement: __________________ ft. Date of pump installation: __________________

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed: __________________ ft., tube diameter: __________________.

Name of Pump Installation Contractor: __________________
NOTICE OF WELL CONSTRUCTION

Tennessee Valley Authority, P. O. Box 49, Edgemont, South Dakota

Date well drilling completed: 11-6-78
Purpose of well: Observation
(domestic, irrigation, municipal, industrial, other)

WELL LOG

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description at Layer</th>
<th>Depth to Top of Water Producing Aquifer</th>
<th>Depth to Static Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>Orange-Brown Weathered Shale</td>
<td>525 ft.</td>
<td></td>
</tr>
<tr>
<td>10-270</td>
<td>Dark Gray-Black Shale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>270-280</td>
<td>AA w/Lt. Gray Siltstone</td>
<td>570 ft.</td>
<td></td>
</tr>
<tr>
<td>280-390</td>
<td>Interbedded Dark Gray Csh, mudstone, Gray &amp; Tan Sandstone</td>
<td>525 ft.</td>
<td></td>
</tr>
<tr>
<td>390-430</td>
<td>Dark Brown Mudstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>430-455</td>
<td>Green w/Brown &amp; Gray Claystone</td>
<td>4½&quot; Schedual 40 Black Iron</td>
<td></td>
</tr>
<tr>
<td>455-470</td>
<td>Dark Brown-Grey Mudstone, trace Green Claystone; Tan Sandstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470-500</td>
<td>Lt. Tan Siltstone-Sandstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-525</td>
<td>Gray-Brown Mudstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>525-570</td>
<td>Brown Mudstone</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Open Hole: 525-570

Company name and size of pump: Silver King Mines, Inc.
Type of pump: HP
Capacity of installed pump: GPM
Depth of pump placement: ft.
Date of pump installation:

(2) PUMP INSTALLATION

(3) WATER SURFACE MEASURING TUBE

On some wells an air-tight water surface measuring tube is required. See Section 46.408 of Chapter 46.4, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed, ft., tube diameter, tube material:

Name of Pump Installation Contractor

Silver King Mines, Inc.
# SOUTH DAKOTA WATER WELL COMPLETION REPORT

**Location:** NE ¼ SW ¼ Sec 34 Twp 65 Rg 1E, Custer County, South Dakota

**Well Completion Date:** 9/26/2007

**Well Owner:** Powertech

**Business Name:** Sure-E

**Address:** 145 N. Chicago Avenue, Suite C, Hot Springs, SD 57747

## WELL LOG

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>See attached boring log</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## RECIPIENT

**RECEIVED:** JAN 15, 2008

**WATER RIGHTS PROGRAM**

## STATIC WATER LEVEL

- 17.65 Feet
- If flowing: closed in pressure
- Not flowing
- PSI

## WATER TEST DATA

<table>
<thead>
<tr>
<th>Pumped</th>
<th>Describe: Developed using a bailer</th>
<th>Well did not bail down.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Bailed</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SCREEN

- Diameter: 2 IN
- Material: PVC
- Length: 10 FEET

## GRouting DATA

- Smout Type: Terrie pipe
- No. of Sacks: 10
- Grout Weight: T_B/gal
- From: Top
- To: depth

## SCREEN

- Diameter: 2 IN
- Length: 10 FEET

## SCREEN

- Diameter: 2 IN
- Length: 10 FEET

## SCREEN

- Diameter: 2 IN
- Length: 10 FEET

**Other Information:**

**Well Designation:** DB-GW676

**Remarks:**

This well was drilled under license # 676

And this report is true and accurate.


Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date: 11/2/07
# Boring/Well Construction Log

**Project Number:** 19-02617  
**Boring/Well Number:** B-4/D8-GW676  
**Date Drilled:** 9/25/07

**Location:** Burdock, South Dakota

**Drilling Method:** 4.25" HSA  
**Sampling Method:** Continuous

**Casing Type/Diameter:** 2" ID Schedule 40 PVC  
**Screen Type:** 2" ID Schedule 40 PVC Slotted 0.010"

**Packing Type:** #10-20 Silica Sand  
**Grout Type:** Cement

**Depth to Water:** 17.50

**Ground Water Elevation:**

**Remarks:** Well was completed with a 4" Pro Top

---

## Material Description

<table>
<thead>
<tr>
<th>Interval (m, BGL)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TOPSOIL with organics, dark brown, dry</td>
</tr>
<tr>
<td></td>
<td>SANDY SILT, red, dry</td>
</tr>
<tr>
<td>4</td>
<td>SILTY SANDY GRAVEL, with cobbles, red to brown, dry to moist</td>
</tr>
<tr>
<td></td>
<td>Same wet at 17.5 feet</td>
</tr>
<tr>
<td></td>
<td>Same saturated</td>
</tr>
<tr>
<td></td>
<td>End of Boring</td>
</tr>
<tr>
<td></td>
<td>- Concrete</td>
</tr>
<tr>
<td></td>
<td>- Cement Grout</td>
</tr>
<tr>
<td></td>
<td>- Bentonite Seal</td>
</tr>
<tr>
<td></td>
<td>- #10-20 Silica Sand</td>
</tr>
<tr>
<td></td>
<td>- Threaded 2&quot; PVC Screen 0.010&quot; Slot</td>
</tr>
<tr>
<td></td>
<td>- Bottom of Well</td>
</tr>
</tbody>
</table>
January 11, 2008

Mr. Ken Buhler  
Department of Environment and Natural Resources (DENR)  
Water Rights Division  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota  57501-3181

Subject: South Dakota Water Well Completion Reports  
Wells Installed for Powertech  
Burdock, South Dakota  
AET No. 18-02617

Dear Mr. Buhler:

Enclosed please find the well completion reports for five groundwater monitoring wells, DB-GW675, DB-GW676, DB-GW677, DB-GW678 & DB-GW679. The wells were completed to obtain information on the potential shallow groundwater impacts from previous uranium mining within the project area prior to initiating new uranium production activities within the Dewey-Burdock, South Dakota area. If you have any questions or need any additional information please contact me at (605) 388-0029.

Sincerely,

Clarke L. Knigge, CPRR  
Environmental Scientist  
Project Manager

CLK

pc: Mr. Cory Foreman, RESPEC
Appendix 3.7-B

B-4  DB - GW 676

6" TBN Silt - Dry

To 5' = Sandy Silt - Red, Dry

To 10' = Silty Sand, Red, Dry

Same to 13'

Silty

@ 13' = Sandy Gravel w/ Cobble, Go to Brown, Dry to WET

Same to 20'; WET @ 17.5'

Same to 22.5' Std.
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: SW 1/4 SW 1/4 Sec 3, Twp 7S, Rg 1E
County: Fall River

Location: Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) from (identify source).

Proposed Use: [] Domestic/Stock  [] Municipal  [] Business  [] Test Holes
[] Irrigation  [] Industrial  [] Institutional  [] Monitoring well

Method of Drilling: 4 1/4 HSA

Casing Data: [] Steel  [] Plastic  [] Other
Tubing Diameter: 2 1/2" 10 ft. 1 1/2"

Drilling Data: 

GROUTING DATA
Grout Type: 
No. of Sacks: 
Grout Weight: 
From: 
To Te: 

Describe grouting procedure: Top 1' filled w/concrete

Screen: [] Perforated pipe  [] Manufactured

Diameter: 2" 10 ft.
Material: PVC
Slot Size: 0.010
Set From: 4 Feet to: 14 Feet

Was a packer or seal used? [ ] YES  [ ] NO
If so, what material? 2" Bendonite Plus
Describe packers and location: Above Sand Pack

Disinfection: Was well disinfected upon completion?  [ ] YES  [ ] NO
Laboratory sent to for water quality analysis

Well Owner: Powertech
Business Name: Same
Address: 145 N. Chicago Avenue, Suite C
Hot Springs, SD 57747

WELL LOG:

FORMATION FROM TO
Sec Attached Benning Log
RECEIVED JAN 15 2008

WATER RIGHTS

STATIC WATER LEVEL = 9 Feet

Well flowing: Yes [] No []
Not flowing: Yes [] No []
GPM Flow: through inch pipe

Controlled by: [] Valve  [] Reducers  [] Other
Reduced Flowrate: GPM

Can well be completely shut in? []

WELL TEST DATA:
[] Pumped  Describe: Developed utilizing a booster well did not
[] Bailed  [] Other

Pumping Level Below Land Surface

ft. After ris. pumped: GPM

ft. After ris. pumped: GPM

If pump installed, pump rate: GPM

Remarks: DB-6W6-77

This well was drilled under license 

And this report is true and accurate.

Drilling firm: American Engineering Testing
Signature of License Representative:

Signature of Well Owner or Embodied Property Holder:

Date: 11/2/17
**BORING/WELL CONSTRUCTION LOG**

- **Project Name:** Dewey Burdock Monitor Well Installation
- **Location:** Burdock, South Dakota
- **Drilling Method:** 4.25" ID HSA
- **Sampling Method:** Continuous
- **Ground Elevation:**
- **Top of Casing:**
- **Logged By:** CH

<table>
<thead>
<tr>
<th>Interval (ft)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SANDY SILT, medium grain, tan</td>
</tr>
<tr>
<td>2</td>
<td>CL</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SANDY SILT</td>
</tr>
<tr>
<td>5</td>
<td>SILTY SAND, poorly sorted</td>
</tr>
<tr>
<td>6</td>
<td>SILTY SAND, tan</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SAND, very fine grained, tan, wet</td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>SHALE (Belle Fourche), dark gray, fissile</td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:** Well was completed with a 4" Pro Top

- **Date Drilled:** 9/29/07
- **Casing Type/Diameter:** 2" ID Schedule 40 PVC
- **Screen Type:** 2" ID Schedule 40 PVC Spotted 0.010"
- **Packing Type:** #10-20 Silica Sand
- **Grout Type:** Cement
- **Depth to Water:** 9.00
- **Ground Water Elevation:**

---

**Dewey-Burdock GDP**  
**June 2012**  
**3.7-B-90**  
**Appendix 3.7-B**
January 11, 2008

Mr. Ken Buhler  
Department of Environment and Natural Resources (DENR)  
Water Rights Division  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota  57501-3181

Subject: South Dakota Water Well Completion Reports  
Wells Installed for Powertech  
Burdock, South Dakota  
AET No. 18-02617

Dear Mr. Buhler:

Enclosed please find the well completion reports for five groundwater monitoring wells, DB-GW675, DB-GW676, DB-GW677, DB-GW678 & DB-GW679. The wells were completed to obtain information on the potential shallow groundwater impacts from previous uranium mining within the project area prior to initiating new uranium production activities within the Dewey-Burdock, South Dakota area. If you have any questions or need any additional information please contact me at (605) 388-0029.

Sincerely,

Clarke L. Knigge, CPRR  
Environmental Scientist  
Project Manager

CLK

attachments

pc: Mr. Cory Foreman, RESPEC

Y:\wp\Environmental\Correspondence\18-02617 MW Completion Report.wpd

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1745 Sannes Road • Rapid City, SD 57702 • 605-388-0029 • Fax 605-388-0064 • www.amengineer.com  
Chanhassen • Duluth • Mankato • Marshall • Rochester • St. Paul, MN/Pierre • Rapid City • Sioux Falls, SD • La Crosse • Wausau, WI  
AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER.
DB-GW677

Location     south of Putnam house

Construction Details

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Depth</td>
<td>14.5'</td>
</tr>
<tr>
<td>Screen Interval</td>
<td>4.5 – 14.5'</td>
</tr>
<tr>
<td>Sand pack</td>
<td>3 – 14.5'</td>
</tr>
<tr>
<td>Bentonite</td>
<td>1 – 3'</td>
</tr>
<tr>
<td>Cement</td>
<td>0 – 1'</td>
</tr>
</tbody>
</table>

Water Level    ~9' below surface

Lithology

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 4 ft</td>
<td>med tan, sandy silt</td>
</tr>
<tr>
<td>4 – 6 ft</td>
<td>sandy silt</td>
</tr>
<tr>
<td>6 – 7.5 ft</td>
<td>cobbles in silty sand, poorly sorted</td>
</tr>
<tr>
<td>7.5 – 9 ft</td>
<td>tan, silty sand</td>
</tr>
<tr>
<td>9 – 12.5 ft</td>
<td>wet, tan, very fine grained sand</td>
</tr>
<tr>
<td>12.5 -14.5 ft</td>
<td>dark gray, fissile shale (Belle Fourche Fm)</td>
</tr>
</tbody>
</table>
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

### Location:
- Location: §W § NE ¼ Sec 9 Twp 7S Rg 1E
- County: Fall River
- Well Completion Date: 9/25/2003

### Location:
- Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): [ ] ft. from (identify source).

### Proposed Use:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

### Method of Drilling:
- 4 1/4 TD HSA

### Casing Data:
- If other describe [ ] PVC

### Piping Data:
- LB/FT: [ ]
- Diameter: [ ] IN
- From: [ ] FT
- TO: [ ] FT
- Hole Diameter: [ ] IN

### Grouting Data:
- Grout Type: [ ]
- No. of Sacks: [ ]
- Grout Weight: [ ] lb./gal.
- From: [ ]
- To: [ ]

### Screen:
- Perforated pipe [ ]
- Manufactured [ ]

### Static Water Level:
- Height: [ ] ft.
- Depth: [ ] ft.

### Static Water Level:
- Height: [ ] ft.
- Depth: [ ] ft.

### Well Test Data:
- If flowing: [ ]
- If flowing: [ ]
- Not flowing [ ]
- Pumped [ ]
- Bailed out [ ]
- Other [ ]

### Remarks:
- This well was drilled under license 
- This report is true and accurate.

### Signature of Company Representative:
- [Signature]

### Signature of Well Owner or Equitable Property Holder:
- [Signature]

### Date:
- 11/2/07
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER: 18-02617
PROJECT NAME: Dewey Burdock Monitor Well Installation
LOCATION: Burdock, South Dakota
DRILLING METHOD: 4.25" ID HSA
SAMPLING METHOD: Continuous
GROUND ELEVATION: __________________
TOP OF CASING: __________________
LOGGED BY: __________________

REMARKS: Well was completed with a 4" Pro Top

MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>HUN (gpm)</th>
<th>Blow Count</th>
<th>Recovery Type</th>
<th>Sampler Type</th>
<th>INTERVAL (ft. BGL)</th>
<th>U.S.C.S.</th>
<th>GRAPHIC LOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSTS 1</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td></td>
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<td></td>
<td>3</td>
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<td>CSTS 2</td>
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</tbody>
</table>

SILTY SAND, very fine grained, red
SILTY SAND, very fine grained, red
SILTY SAND, very fine grained with 1-inch beds of medium to coarse sand

Reinforced Concrete
Bentonite Seal
#10-20 Silica Sand
Flush Threaded 2" PVC Screen 0.010" Slot
January 11, 2008

Mr. Kea Buhler  
Department of Environment and Natural Resources (DENR)  
Water Rights Division  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota 57501-3181

Subject: South Dakota Water Well Completion Reports  
Wells Installed for Powertech  
Burdock, South Dakota  
AET No. 18-02617

Dear Mr. Buhler:

Enclosed please find the well completion reports for five groundwater monitoring wells, DB-GW675, DB-GW676, DB-GW677, DB-GW678 & DB-GW679. The wells were completed to obtain information on the potential shallow groundwater impacts from previous uranium mining within the project area prior to initiating new uranium production activities within the Dewey-Burdock, South Dakota area. If you have any questions or need any additional information please contact me at (605) 388-0029.

Sincerely,

[Signature]

Clarke L. Knigge, CPRR  
Environmental Scientist  
Project Manager

CLK

attachments

pc: Mr. Cory Foreman, RESPEC
DB-GW678

Location: along Pass Creek west of Burdock

Construction Details

- Total Depth: 14.5’
- Screen Interval: 4.5 – 14.5’
- Sand pack: 3 – 14.5’
- Bentonite: 1 – 3’
- Cement: 0 – 1’

Water Level: ~8’ below surface

Lithology

- 0 – 9 ft: very fine grained, red, silty sand
- 9 – 14 ft: dominantly vfg silty sand with 1” beds of med to coarse sand (did not penetrate shale)
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NW ¾ SE ¼ Sec 27 Twp 65 Rg 1E
County: Custer

Please mark well location with an "X"

Long: -90.9680 N
Lat: 43.499534
Well Completion Date: 9/6/2007

Location: North 1 Mile

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)_ ft from ___________

PROPOSED USE:
- Domestic/Septic
- Industrial
- Institutional
- Monitoring Well

METHOD OF DRILLING:
- 4 1/4 OA HSA

CASING DATA:
- Steel
- Plastic
- Other
- Other: PVC

PIPEWEIGHT DIA METER FROM TO HOLE DIAMETER
- LB/FT 2 IN 19 FT 39 IN 11/4 IN
- LB/FT 2 IN 21 FT 19 IN 1 IN
- LB/FT 1 IN 1 FT 19 IN

GROUTING DATA:
- Slurry Type:
- No. of Sacks: 
- Slurry Weight: lb/gal
- From: h
- To: h

Describe grouting procedure: Trapezoidal pipe placement

SCREEN: 
- Perforated pipe
- Manufactured

Diameter: 2 IN Length: 20 FEET

Material: PVC

Slot Size: 4
Set From: 19 Feet to 39 Feet

Other information:

WAS A PACKER OR SEAL USED? YES NO

IF YES, WHAT MATERIAL? 2' Bondrite

Describe packer(s) and location: Above Sand Pack

DISINFECTION: Was well disinfected upon completion?
- YES
- NO

Laboratory sent to for water quality analysis: K

Was well used for human or domestic animals?
- YES
- NO

Well Owner: Power Tech
Business Name: Source
Address: 145 N. Chicago Avenue, Suite C
Hot Springs, SD 57747

WELL LOG:

FORMATION FROM TO

DEPHT:

STATIC WATER LEVEL: 31.28 Feet

WELL TEST DATA:
- Pumped
- Bailed
- Other

Describe: Well developed using bailer, well didn't bail down

Pumping Level Below Land Surface
- ft. After ________ Hrs. pumped ________ GPM
- ft. After ________ Hrs. pumped ________ GPM

If pump irritated, pump rate ________ GPM

REMARKS

Well Description: DB-6W679

This well was drilled under license # 678

And this report is true and accurate.

Drilling firm: American Engineering Testing Inc

Signature of Owner/Representative: [Signature]

Signature of Well Owner or Equitable Property Holder: [Signature]

Date: 11/3/07

RECEIVED
JAN 15, 2008
WATERSHED PROGRAM
January 11, 2008

Mr. Ken Buhler  
Department of Environment and Natural Resources (DENR)  
Water Rights Division  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota 57501-3181

Subject: South Dakota Water Well Completion Reports  
Wells Installed for Powertech  
Burdock, South Dakota  
AET No. 18-02617

Dear Mr. Buhler:

Enclosed please find the well completion reports for five groundwater monitoring wells, DB-GW675, DB-GW676, DB-GW677, DB-GW678, & DB-GW679. The wells were completed to obtain information on the potential shallow groundwater impacts from previous uranium mining within the project area prior to initiating new uranium production activities within the Dewey-Burdock, South Dakota area. If you have any questions or need any additional information please contact me at (605) 388-0029.

Sincerely,

Clarke L. Knigge, CPRR  
Environmental Scientist  
Project Manager

CLK

attachments

pc: Mr. Cory Foreman, RESPEC

This document shall not be reproduced, except in full, without written approval of American Engineering Testing, Inc.  
1745 Sannon Road • Rapid City, SD 57702 • 605-388-0029 • Fax 605-388-0064 • www.amerengtest.com  
Chanhassen • Duluth • Mankato • Marshall • Rochester • St. Paul • Aberdeen • Rapid City • Sioux Falls, SD • La Crosse • Wausau, WI  
AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER.
Appendix 3.7-B

To 7' 
5" Topsoil - 0"h from Dial

To 10' 
5" Sand, Silt, Red, Dry, to reach, Dry, to moist

B-5 
6.0 B-5.0

7' - 1" 1/2 Sand, gravel, Red, moist

17'-1/2

To 25' 
Sandy soil, Clay, Red, moist

3.7 - 3.7

To 30' 
Sandy soil, Clay, Red, moist

To 35' 
Sand, gravel, Red, moist

To 39' 
Gravel, Black, moist

Reviewed By:

Complted By:
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NE 1/4 SW 1/4
County: Fall River

Location:
Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): ft. from N/A Present (identify source)

PROPOSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING:
- Mud Rotary

CASING DATA:
- Steel
- Plastic
- Other

If other describe

PIPEGAGE
DIAMETER
FROM TO HOLE DIAMETER
Lb/FT IN FT IN FT IN FT IN FT IN
- 15/16 8 42 6 8 4
- 15/16 8 4 2 6 8 4
- 15/16 8 4 2 6 8 4

GROUTING DATA
- Cement: 95.3
- Great Weight: 15.1 lb./gal.
- From To
- 426 r. o.

Describe grouting procedure: Pump

SCREEN:
- Perforated pipe
- Manufactured

Diameter:
Material:
PVC

Slot Size: 0.25
Set From 4136 Feet to 426 Feet

Other information:
Set with K packer

WAS A PACKER OR SEAL USED? YES □ NO □
If so, what material?

Describe packer(s) and location:

DISINFECTION:
Was well disinfected upon completion?
- YES: How?
- NO, why not?

Laboratory sent to for water quality analysis:
Respec

WELL LOG:

FORMATION FROM TO
S NiII Creek Sh 0' 172'
Fall River SS 122' 250'
Fusion Sh 250' 317'
Luhoma SS 317' 436'

STATIC WATER LEVEL:
- 29' Feet

Well Flowing: closed in pressure
- NA

GPM Flow:
- 4 inch pipes

Controlled by:
- Valves
- Reducers
- Other

Reduced Flowrate:
- GPM

Can well be completely shut in?
- YES

WELL TEST DATA:
- Description:
  - Air: 1:1 at 3.85
- Other

Pumping Level Below Land Surface:
- ft. After
- Hrs. pumped
- 240 cubic ft.
- ft. After
- Hrs. pumped
- 240 cubic ft.
- If pump installed, pumping rate
- GPM

REMARKS: WELL D8-07-11-L
- Lithology attched.

RECEIVED

JAN 2 4 2008

WATER RATES PROGRAM
- This well was drilled under license # 745
- And this report is true and accurate.
- Drilling firm
- Signature of Licenee Representative:
- Signature of Well Owner or Equitable Proprietor Holder:

Date: 12-31-07

Dewey-Burdock GDP
June 2012
3.7-B-101
Appendix 3.7-B
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE DESCRIPTION</th>
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<tbody>
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<td>0-5</td>
<td>Silty claystone, soft and loose.</td>
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<tr>
<td>9-100</td>
<td>Blank</td>
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</table>

**NOTE:** Draft - draft - draft work.
Dewey-Burdock GDP
June 2012
3.7-B-103
Appendix 3.7-B
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
<th>Alteration</th>
<th>Alteration</th>
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</table>

**Sample Description**

- 210-290'
  - Clay, gravel, sandstone, argillaceous, and gravel, thinly laminated
  - Partly well sorted with some interbedded silt layers, reduced

**Core Interval 250-255.3'**

- 250-255.3'
  - Sandstone, interbedded sandstone (conglomerate), mostly chelled, grayish brown

**Sample Log**

- Drilled with: Air [ ] Water [ ]
- Hole No. [ ]
- T.D. [ ]
- Location [ ]
- Bit Size [ ]
- Sample Log By [ ]
- Lease/Project [ ]
- Date [ ]
- County [ ]
- State [ ]
### SAMPLE DESCRIPTION

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<th>LITHOLOGY</th>
<th>Alteration</th>
<th>Clay</th>
<th>Silica</th>
<th>Organic Mat</th>
<th>Odor</th>
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**Notes:**

**Page 4 of 5**
## PowerTech (USA) Inc.

### Sample Log

- **Drilled With:** Air [ ] Water [ ]
- **Hole No.:** 0467-11 NC
- **T.D.:**
- **Location:**
- **Bit Size:**
- **Sample Log By:**
- **Lease/Project:**
- **Date:**
- **County:**
- **State:**

### Sample Description

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Lithology</th>
<th>Alteration</th>
<th>Amounts in Percent (%)</th>
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</table>

**T = Trace**
1 = Minor
2 = Moderate
3 = Abundant

**Odet:** Primary Oxid.
**Ox2:** Secondary Oxid.
**Rpt:** Pyrite (FeS)
**Pm:** Pyrite Matrix
**Mf:** Manganiferous

**Sequences:**
- 0.1: Carbon
- 0.2: Bleached
- 0.3: Karst
- 0.4: Clay Chert

**TD 450** End of Hole
**PowerTech (USA) Inc.**

**DRILLED WITH:** Air

**T.D.:** 450'

**LOCATION:** Sec 11, T 7 S, R 1E, 10.5'E of 11-4C

**HOLE NO.:** DB07-11-11C

**BIT SIZE:** 6 5/8" to 2" collar 4 5/8" bit

**SAMPLE LOG BY:**

**DATE:** 10/01/07

**LEASE [PROJECT]:** Dewey Burdock

**COUNTY:** Fall River

**STATE:** SD

---

**SAMPLE DESCRIPTION**

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
<th>ALTERATION</th>
<th>ALTERATION 2</th>
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**SAMPLE LOG**

- At 250.8" contact black and gray fissile shale and sandstone.
- 254.6" Increase in plastic clay content and decrease in fissility.
- 255.2" grades quickly back to white shale and mudstone.
- 257.9" TD of core run.

---

**CONFIDENTIAL**

**PAGE 1 OF CORE**
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
<th>ALTERATION</th>
<th>SAMPLE DESCRIPTION</th>
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<td>4200</td>
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</table>

**CONFIDENTIAL**

TOTAL SAW LENGTH 16.4" ARMS 9.4"
**PowerTech (USA) Inc.**

**Hydro ID 680**

**DRILLED WITH:** Water

**HOLE NO.:** DWT-11-11C

**T.D.:** 

**LOCATION:** 

**BIT SIZE:** 

**SAMPLE LOG BY:** 

**LEASE/PART:** 

**DATE:** 

**COUNTY:** 

**STATE:** 

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**SAMPLE DESCRIPTION**

- Trace
- Minor
- Moderate
- Abundant

- **Lithology:** Clay
- **Alteration:** Clay
- **Oxidation:** Clay

**Notes:**

- Sample log by lease
- Sample log by project
- Dewey-Burdock GDP
- June 2012
- Appendix 3.7-B

**Confidential**

- Total run length: 1000'

**Page 3 of 4**
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</table>

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PAGE 2 OF 2
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Well Owner: Power-Tech
Business Name: Power-Tech USA Inc.
Address: PO Box 2723
         Huron SD 57350-2747

WELL LOG:

FORMATION FROM TO
Slovak Shale 0 470'
Fall River Sandstone 470' 585'

LOCATION:

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) ft. from NUNE Present [identify source].

PROPOSED USE:

□ Domestic/Stock □ Municipal □ Business □ Test Holes
□ irrigation □ Industrial □ Institutional □ Monitoring well

METHOD OF DRILLING:

Mud Bulb

CASING DATA:

□ Steel □ Plastic □ Other

If other describe:

PIEWIGHT DIAMETER FROM TO HOLE DIAMETER

SDR 21 LB/FT 6 IN 0 FT 585 FT 83/4 IN

LB/FT IN FT FT IN

LB/FT IN FT a FT IN

GROUTING DATA

Grout Type CMT No. of Sacks 96 Grout Weight K.2 lb/gal From To 585 ft G ft

Describe grouting procedure:

SCREEN:

□ Perforated pipe □ Manufactured

Diameter 3 IN Length 15 FEET

Material PVC

Slot Size .020 Set From 400 Feet to 585 Feet

Other information:

Was a packer or seal used? □ YES □ NO

If so, what material? 6" K Packer

Describe packer(s) and location:

DISINFECTION:

Was well disinfected upon completion? □ YES □ NO, Why Not?

Laboratory sent to for water quality analysis:

Replied:

REMARKS

This well was drilled under license # 745

And this report is true and accurate.

Dewey-Burdock GDP
June 2012

Dewey-Burdock GDP
June 2012
3.7-B-112

Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Hydro ID 682

Well Completion Date
2-21-08

Well Log:

FORMATION
Sylh Creek Shale 0 145
Fall River Shale 145 310
Fusion Shale 310 335
Lakota 335 460

WELL TEST DATA:

Stop Method: Air lift at 435

REMARKS

Dewey-Burdock

RECEIVED
7-11-2
MAR 24 2008

WATER RIGHTS

This well was drilled under license # 745

And this report is true and accurate

Drilling firm: Davis Drilling Inc

Signature of License Representative: Stan Davis

Signature of Well Owner/Equitable Property Holder:

Date: 3/9/08

Dewey-Burdock GDP
June 2012

3.7-B-113

Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Well: 3.8-08

Location: NE 1/4 SW 1/4

Location: [Map Diagram]

Date of Completion: 2-8-08

Location: Distance from nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.) from VINE Present (Identify Source):

Proposed Use:
- [ ] Domestic/Stock
- [ ] Municipal
- [ ] Business
- [ ] Test Holes
- [ ] Irrigation
- [ ] Industrial
- [ ] Institutional
- [ ] Monitoring well

Method of Drilling:

Casing Data:
- [ ] Steel
- [ ] Plastic
- [ ] Other
If other describe:

Pipe Weight:

Diameter:

From:

To:

Hole Diameter:

DFR 12 LB/FT

DFR 12 LB/FT

LB/FT

GF/FT

Gruouting Data:

Grout Type

No. of Stacks

Grout Weight From To

GF/ft

GF/ft

Describe grouting procedure:

Screen:
- [ ] Perforated pipe
- [ ] Manufactured

Diameter:

In Length:

Material:

Slot Size:

Set From:

To:

Other Information:

Was a packer or seal used?:
- [ ] Yes
- [ ] No

If yes, what material?

Describe packer(s) and location:

Disinfection:

Laboratory sent to for water quality analysis:

Yes, How:

No, Why Not:

Static Water Level:

81.9 Feet

If flowing: Cased in Pressure

PSI

GPM flow through inch pipe

Controlled by:
- [ ] Valve
- [ ] Reducers
- [ ] Other

Reduced Flow Rate

GPM

Can well be completely shut in?

Yes

WELL TEST DATA:

If pumped:
- [ ] Pumped
- [ ] Sailed
- [ ] Other

Describe:

Pumping Level Below Land Surface:

FT After:

Hrs. Pumped:

GPM

FT After:

Hrs. Pumped:

GPM

If pump installed, pump rate:

GPM

Remarks:

Dewey Burdock 7-29-7

This well was drilled under license #

745

And this report is true and accurate.

Drilling firm:

Davis Drilling Inc

Signature of Licensor Representative:

Signature of Well Owner or Equitable Property Holder:

Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NE 1/4 SW 1/4 Sec. 11 Twp 75 Rg 1E

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.: ) ft. from NONE

PROPOSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING:
- Mud

Casing Data:
- Steel
- Plastic
- Other

If other, describe:

Pipe Weight Diameter From To Hole Diameter
- 17'11/2 lb/ft 4 in. 0 ft 413 ft 634 in.

Grouting Data:
- Great Type: Cement
- No. of Sacks: 60
- Great Weight: 62 c. wt./gal
- From: 413 ft
- To: 413 ft

Screen:
- Perforated pipe
- Manufactured

Diameter: 2 in.
Length: 10 FEET
Material: PVC
Slot Size: 0.2 in.
Set From: 413 ft to 413 ft
Other Information: 61 K Packer.

Was a packer or seal used? Yes

If so, what material? 4 in. K Packer

Describe packer(s) and location? Packer 403

Disinfection:
- Was well disinfected upon completion? Yes
- How? LAB ANALYSIS

Laboratory sent to for water quality analysis:

Location: 2.13-08

Well Completion Date

WELL LOG:

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<td>238</td>
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<td>Fossil Sand</td>
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<td>390</td>
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<td>Lakota Sand</td>
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<td>423</td>
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RECEIVED:

MAR 11 2006

WATER RIGHTS PROGRAM

Static Water Level: 28.8 Feet

If flowing: closed in pressure

GPM flow

controlled by:
- Valve
- Reducers
- Other

Reduced Flowrate

Can well be completely shut in? Yes

WELL TEST DATA:

- Pumped
- Bailed
- Other

Pumping Level Below Land Surface

ft. After Hrs. pumped GPM
ft. After Hrs. pumped GPM

If pump installed; pump rate

REMARKS Dewey Burdock 11-14 C

This well was drilled under license # 745

And this report is true and accurate.

Drilling firm: Davis Drilling Inc

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date: 11-14-06
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

**Location**: Castle

**County**: Pennington

**Well Completion Date**: 7-1-08

**Distance from nearest potential pollution source (septic tank, abandoned well, lead line, etc.)**: [Blank]

**None**

**Proposed Use**: [Blank]

- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

**Method of Drilling**: Mud Rot

**Casing Data**: [Blank]

- Steel
- Plastic
- Other

**Pipe Weight Diameter From To Hole Diameter**

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<tr>
<th>SDR</th>
<th>LB/FT</th>
<th>FT</th>
<th>FT</th>
<th>IN</th>
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<td>17</td>
<td>4</td>
<td>30</td>
<td>580</td>
<td>63</td>
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**Grouting Data**: [Blank]

- No. of Sacks
- Slurry Weight
- From
- To

**Screen**: [Blank]

- perforated pipe
- Manuamembrane

**Diameter**: [Blank]

- PVC

**Material**: [Blank]

- Slot Size
- Size of Filter Screen
- other information

**Was a packer or seal used?**: [Blank]

- Yes
- No

**If so, what material?**: [Blank]

- Pack

**Disinfection**: [Blank]

- Yes
- No

**Laboratory sent for water quality analysis**: [Blank]

- Yes
- No

**Well Owner**: PowerTech

**Business Name**: PowerTech USA, Inc.

**Address**: P.O. Box 723

**Re: Springs, SD 57747

**Well ID**: HYDRO ID 685

**Location**: [Blank]

- North

**WELL LOG**:

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<td>595'</td>
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**LOCATION**: [Blank]

- North

**WELL TEST DATA**: [Blank]

- Pumped
- Bailed
- Other

**Pumping level below land surface**: [Blank]

- ft. After
- Hr. pumped
- GPM

**If pump installed, pump rates**: [Blank]

- GPM

**REMARKS**: Dewey Burdock 32-4 C

**This well was drilled under license #**: [Blank]

**Signature of Licensor Representative**: [Blank]

**Signature of Well Owner or Equitable Property Holder**: [Blank]

**Date**: 3/27/08
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

**Well Owner:** Power Tech. USA Inc.

**Business Name:** Power Tech. USA Inc.

**Address:** P.O. Box 723

**Location:** Fall River County, Sec. 11, Twp. 65, Ry. 1E

**Well Completion Date:** 2-24-09

### METHOD OF DRILLING:

**Casing Data:**
- Steel
- Plastic
- Other

**Pipe Weight and Diameter:**

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<th>DIA.</th>
<th>FT</th>
<th>FROM TO</th>
<th>HOLE DIAMETER</th>
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<td>60 lb/ft</td>
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<td>0</td>
<td>68/4</td>
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</table>

**Grouting Data:**

- Great Type: C-SMP
- No. of Sacks: 10
- Great Weight: 152 lbs
- From: 0 ft
- To: 418 ft

**Screen:**
- Perforated pipe
- Manufactured

**Other Information:**
- PVC
- Slot Size: 0.20
- Set From: 418 ft
- Feet to: 428 ft
- Perm K: 5 ft

**WAS A PÄCKER OR SEAL USED?**
- Yes
- No

**Other Information:**
- Päcker: 408

**DISINFECTION:**
- Was well disinfected upon completion?
- Yes

**Laboratory sent for water quality analysis?**
- Yes

**REMARKS:**

- Dewey Burdock 7-11-15

**STATIC WATER LEVEL:**

- 32.6 Feet

**WELL TEST DATA:**
- Pumped
- Description: Air; 12 M 40 ft/GPM

**WELL LOG:**

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<td>Fusion Shale</td>
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<td>Dakota Sand Shale</td>
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**RECEIVED:**

- MAR 1 2008

**WATER RIGHTS PROGRAM:**

**Description of Well:** The well was drilled under license #745.

**Dewey-Burdock GDP:**

**June 2012**

**3.7-B-117**

**Appendix 3.7-B**
## SOUTH DAKOTA WATER WELL COMPLETION REPORT

**Location**: NE 4 NN 4 Sec 32 Twp 65 Rg 1E

**County**: Lincoln

**Well Completion Date**: 2-6-08

**LOCATION:**
- Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): [ ] ft. from None

**PROPOSED USE:**
- [ ] Domestic/Stock
- [ ] Municipal
- [ ] Business
- [ ] Test Hole
- [ ] Irrigation
- [ ] Industrial
- [ ] Institutional
- [ ] Monitoring well

**METHOD OF DRILLING:**
- Mud Rotary

**Casing Data:**
- [ ] Steel
- [ ] Plastic
- [ ] Other

- If other describe:

**Pipe Weight:**
- Diameter:
  - [ ] From 0 to 590
  - [ ] From 590 to 67

- If other describe:

**Grouting Data:**
- [ ] Cement
- [ ] Other

- No. of Sach: 50
- Grout Weight: 590
- From: [ ] lb/gal
- To: [ ] lb/gal

- Describe grouting procedure: [pump]

**Screen:**
- [ ] Perforated pipe
- [ ] Manufactured

- Diameter: 2
- Length: 15 FEET

- Material: PVC
- Slot Size: 0.20
- Set From: 605 Feet to 590 Feet
- Other information: [ ]

**WAS A PACKER OR SEAL USED?**: [ ] Yes

- If so, what material?: [ ]
- Describe packer(s) and location: [ ]

**Disinfection:**
- [ ] Yes
- How?: [ ]

- Laboratory test for water quality analysis:
  - [ ] YES
  - [ ] NO
  - Why Not?: [ ]

**Well Log:**

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<tr>
<td>Fall River Sandstone</td>
<td>480'</td>
<td>605'</td>
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**RECEIVED**: [ ]
- [ ] Mar 8 2008

**Static Water Level**: 0 Feet
- If flowing: closed in pressure
  - [ ] 3 PSI
- GPM flow: 5
  - [ ] through
  - [ ] inch pipe

- Controlled by: [ ] Valve
- [ ] Reducers
- [ ] Other

- Reduced Flowrate: [ ]

- Can well be completely shut in?: [ ] Yes

**Well Test Data:**

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<th>Describe:</th>
<th>[ ] 1 ft. or 580'</th>
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<td>Bailed</td>
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<tr>
<td>Other</td>
<td>[ ]</td>
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</table>

- Pumping Level Below Land Surface:
  - [ ] ft. After [ ] Hrs. pumped [ ] GPM
  - [ ] ft. After [ ] Hrs. pumped [ ] GPM

- If pump installed, pump rate: [ ] GPM

**Remarks**: Dewey Burdick 7-32-5

- This well was drilled under license # [ ]
- 745

- And this report is true and accurate.

- Drilling firm: [ ]
- [ ] Davi Drilling Inc.

- Signature of License Representative: [ ]
- [ ]

- Signature of Well Owner/Equitable Property Holder: [ ]
- Powertech

- Date: [ ] 2/3/98

---

**Hydro ID 687**

**Well Owner**: Powertech

**Business Name**: Powertech USA Inc.

**Address**: PO Box 723

**Hal SPRINGS SPA 58274-7**
## South Dakota Water Well Completion Report

### Location
- **County:** Fall River
- **Well Completion Date:** 4-1-08

### Well Owner
- **Name:** Power-Tell
- **Address:** P.O. Box 723, Hot Springs, S.D. 57747

### Well Log
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<td>Fall River</td>
<td>128</td>
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</tbody>
</table>

### Location
- **Distance from nearest potential pollution source:** 1 Mile
- **Nearest Present Identity Source:** [Marked with an 'X']

### Proposed Use
- Domestic/Stock
- Municipal
- Business
- Test Wells
- Irrigation
- Industrial
- Institutional
- Monitoring well

### Method of Drilling
- **MUD + Rotary**

### Casing Data
- **Material:** Plastic
- **Diameter:** 6" IN
- **Length:** 250 FT
- **Sinking Rate:** 1.7 LB/FT
- **Grouting Data:**
  - **Grout Type:** Cement
  - **No. of Sacks:** 45
  - **Grout Weight:** 15.3 lb/gal
  - **From:** 0 ft
  - **To:** 245 ft

### Screen
- **Material:** PVC
- **Diameter:** 3" IN
- **Length:** 10 FEET
- **Slot Size:** 0.120
- **Set From:** 245 FT to 255 FT

### Disinfection
- **Laboratory sent to for water quality analysis:** Rejroc
- **Was well disinfected upon completion?** Yes
- **Date:** 6/11/17

### Well Test Data
- **Static Water Level:** 39 Feet
- **If flowing:** closed in pressure
- **GPM flow:** 100 GPM through 1 inch pipe
- **Controlled by:** Valve, Reducers, Other
- **Reduced Flowrate:** 50 GPM
- **Can well be completely shut in?** Yes

### Well Test Data
- **Describe:** Abandoned at 230'
- **Pumping Level Below Land Surface:**
  - **ft. After:** 10 ft
  - **Gallons per minute:** 100 GPM

### Remarks
- **Dewey Burdock**
- **Date:** 6/11/17

---

This well was drilled under license # 745.

And this report is true and accurate.

Drilling Firm: Davis Drilling

Signature of License Representative: [Signature]

Signature of Well-Driller or Equivalently Property Holder: [Signature]

Date: 6/11/17
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location:  NE 4 NW 4 Sec: 32 Twp: 65 Rg: 15 North

Well Completion Date: 3-11-09

LOCATION:
Distance from nearest potential pollution source (septic tank, abandoned well, feedlot, etc.) ft. from:

PROPOSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING:
- Mud Rotary

Casing Data:
- Steel
- Plastic
- Other

Other describe:

Pipe Weight:
- 3/8 LFT
- 6 IN

Diameter:
- FROM
- TO

Hole Diameter:
- FROM
- TO

Grouting Data:
- Grout Type
- No. of Sacks
- Great Weight
- From
- To
- lb/gal
- R x R x R

Describe grouting procedure:
- Pump

Screen:
- Perforated pipe
- Manufactured

Diameter:
- PVC
- IN

Length:
- 15 FEET

Material:
- 4 IN

Shot Size:
- 0.10
- Set From
- Feet to
- Feet

Other information:
- 6.
- k

Was a packer or seal used?
- YES
- NO

If so, what material?
- PVC

Describe packer(s) and location:

Disinfection:
- Water well disinfected upon completion?
- YES
- NO

Laboratory sent to for water quality analysis:
- Resp.

Well Owner: Power Tech

Business Name: Power Tech USA Inc.

Address: 1101 Spy Rd., S.D. 57777

WELL LOG:

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shale Silt</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>Full Zone 5.1</td>
<td>475</td>
<td>620</td>
</tr>
<tr>
<td>Lower Shale</td>
<td>620</td>
<td>665</td>
</tr>
<tr>
<td>Lower Silt</td>
<td>665</td>
<td>715</td>
</tr>
</tbody>
</table>

Static Water Level:
- 23.5
- Foot

If flowing: closed in pressure
- 4.5
- PSI

GPM flow:
- 2
- inch pipe

Controlled by:
- Valve
- Reducers
- Other

Reduced Flowrate:
- GPM

Can well be completely shut in?
- YES

WELL TEST DATA:

Pumping Level Below Land Surface
- APR 1,2000
- GPM

WATER TREATMENT PROGRAM

Remarks:

Dewey Burdock 3-32-10

This well was drilled under license # 7-415

And this report is true and accurate.

Drilling Firm:

Signature of License Representative:

Signature of Well-Owner or Equitable Property Holder:
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NE ¼ SW ¼ Sec. 11 Twp 65 N Rg 1E
County: Fall River

Please mark well location with an "X".

Well Completion Date: 4-15-08

LOCATION:
Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): ______ ft. from ______ (identity source).

PROPOSED USE:
☐ Domestic/Stock  ☐ Municipal  ☐ Business  ☐ Test Holes
☐ Irrigation  ☐ Industrial  ☐ Institutional  ☑ Monitoring well

METHOD OF DRILLING:

CASING DATA:
☐ Steel  ☐ Plastic  ☐ Other
If other describe: ________________________________

PIPEGWEIGHT DIAMETER FROM TO HOLE DIAMETER
18 LB/FT 6 IN 0 FT 621 FT 8 ¾ IN
LB/FT IN FT FT IN
LB/FT IN FT FT IN

GRAUATING DATA
Grout Type: Cement
En. No. of Sacks: 10
Grout Weight: 9 7 lb/gal
From: 0 ft 621 ft
To: 621 ft

Describe grouting procedure: PUMP

SCREEN: ☐ Perforated pipe  ☐ Manufactured
Diameter: 3 IN Length: 10 FEET
Material: PVC
Slot Size: 0.20 Set From: 621 ft to 631 ft
Other Information: Packer, Set at 611 ft

WAS A PACKER OR SEAL USED? ☑ YES  ☐ NO
If so, what material? 6 x 3 x 1 Packer
Describe packer(s) and location: Packer, Set at 611 ft

DISINFECTION: Was well disinfected upon completion? ☑ YES  ☐ NO
Why Not? NA
Laboratory sent to for water quality analysis: Respin

Well Owner: Power Tech
Business Name: Power-Tech USA Inc.
Address: P.O. Box 723
Hu, Sprig, SD 57747

WELL LOG:
FORMATION FROM TO
Skull Creek 0 115
Fall River 115 245
Fuson 245 310
Lunker 310 455
Morrison 455 580
UNKPAPA 580 621

STATIC WATER LEVEL
Height: __ Feet
If flowing: closed in pressure __ PSI
GPM flow: __ ft through __ inch pipe
Controlled by ☑ Valve ☐ Reducers ☐ Other
Reduced Flowrate __ GPM
Can well be completely shut in? ☑ YES

WELL TEST DATA:
☐ Pumped  Describe: 1 lift in 605
☐ Bailed  ☐ Other

RECEIVED
MAY 2-8-2000

Pumping Level Below Land Surface
ft. After: 1 Hrs. pumped: __ GPM
ft. After: 1 Hrs. pumped: __ GPM

WATER RIGHTS PROGRAM
GPM

REMARKS
DEWEY BURDOCK
8-11-18

This well was drilled under license #3.7-B-121
And this report is true and accurate.
Drilling firm: Dewey-Burdock
Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Dewey-Burdock GDP
June 2012
3.7-B-121
Appendix 3.7-B
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

**Location:**

- **Location:** Fall River
- **County:**
- **Twp:** 65
- **Sec:** 11
- **Rg:** 1E
- **W**

**Well Completion Date:** 4-16-08

**Location:** Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): [ ] ft. from NOISE. (Identify source).

**PROPOSED USE:**

- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional

**METHOD OF DRILLING:**

- mud
- rotary

**CASING DATA:**

- Steel
- Plastic
- Other

**PIPEWEIGHT DIAMETER FROM TO HOLE DIAMETER**

<table>
<thead>
<tr>
<th>SP 17</th>
<th>LB/FT</th>
<th>IN</th>
<th>0 FT</th>
<th>325 FT</th>
<th>8 3/4 IN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IN</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GROUTING DATA**

- Great Type: CEM
- No. of Sacks: 58
- Great Weight: 15.7 lb/gal
- From: 6
- To: 325

**SCREEN:**

- Perforated pipe
- Manufactured
- Diameter: 3 IN
- Length: 10 FEET
- PVC

**Slot Size:** .020

**Other Information:**

- Set K Packets

**WAS A PACKER OR SEAL USED:**

- Yes [ ]
- No [ ]

**If so, what material:** 6" X 3" K Packet

**Describe packer(s) and location:**

**DISINFECTION:**

- Was well disinfected upon completion?
  - Yes, How:
  - No, Why Not:

**Laboratory sent to for water quality analysis:** [ ]

**STATIC WATER LEVEL:** 39.6 Feet

**If flowing, closed in pressure:** [ ]

**GPM Flow:** through [ ] inch pipe

**Controlled by:**

- Valve
- Reducers
- Other

**Reduced Flowrate:** [ ] GPM

**Can well be completely shot in:** [ ]

**WELL TEST DATA:**

- Describe: Airlift at 310
- Pumped
- Bailed
- Other

**Pumping Level Below Land Surface:**

- ft. After: [ ] Hrs. pumped: [ ] GPM
- ft. After: [ ] Hrs. pumped: [ ] GPM

**If pump installed, pump rate:** [ ] GPM

**REMARKS:**

- DEWEY Burdock
- 8-11-19

- This well was drilled under license 
- And this report is true and accurate.
- Drilling Firm: Davis Drilling
- Signature of License Representative: [ ]
- Received: [ ]
- Signature of Well Owner or Equitable Property Holder: [ ]
- Date: [ ]

**WATER RIGHTS PROGRAM**

- MAY 20 2008

**APPENDIX 3.7-B**

**HYDRO ID:** 692

**Dewey-Burdock GDP**

**June 2012**

**3.7-B-123**
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

- **Well Owner:** Power-Tech
- **Business Name:** Power-Tech USA Inc
- **Address:** P.O. Box 723, Hot Springs, S.D. 57747

**WELL LOG:**

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell Creek Shale</td>
<td>0</td>
<td>475</td>
</tr>
<tr>
<td>Fall River Shale</td>
<td>475</td>
<td>670</td>
</tr>
<tr>
<td>Fossom Shale</td>
<td>620</td>
<td>670</td>
</tr>
<tr>
<td>Laskota Shale</td>
<td>670</td>
<td>765</td>
</tr>
<tr>
<td>Morrison Shale</td>
<td>765</td>
<td>865</td>
</tr>
<tr>
<td>UNKAPAPA 5.5</td>
<td>965</td>
<td>910</td>
</tr>
</tbody>
</table>

**LOCATION:**

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) is 0 ft from the well location.

**PROPOSED USE:**

- Domestic/Stock
- Municipal
- Business
- Test Wells
- Irrigation
- Industrial
- Institutional
- Monitoring well

**METHOD OF DRILLING:**

- MUD Rotary

**CASING DATA:**

- Steel
- Plastic
- Other

**PIPEWEIGHT:**

<table>
<thead>
<tr>
<th>DIA</th>
<th>FROM</th>
<th>TO</th>
<th>HOLE DIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>0 ft</td>
<td>910 ft</td>
<td>8 3/4 in</td>
</tr>
<tr>
<td>140</td>
<td>0 ft</td>
<td>910 ft</td>
<td>8 in</td>
</tr>
<tr>
<td>140</td>
<td>0 ft</td>
<td>910 ft</td>
<td>8 in</td>
</tr>
</tbody>
</table>

**GROUTING DATA:**

- Grout Type: Cement
- No. of Sacks: 219
- Grout Weight: 15.7 lb/gal
- From: 0 ft
- To: 910 ft

**SCREEN:**

- Perforated pipe
- Manufactured

**Material:** PVC

**Slot Size:** 0.20

**OTHER INFORMATION:**

- Perforated pipe
- 910 ft in 3 1/2 h. intervals
- Other information

**WAS A PACKER OR SEAL USED?** Yes

**DISINFECTION:** Was well disinfected upon completion? Yes, Here:

- **Laboratory sent to for water quality analysis:** Resin

**REMARKS:**

- Dewey Burdock: 8-32-11
- This well was drilled under license # 745
- And this report is true and accurate.
- Drilling firm: Davis Drilling Inc
- Signature of License Representative:
- Signature of Well Owner or Equitable Property Holder: Power-Tech
- Date: 3/18/13

---

Dewey-Burdoc GDP
June 2012

3.7-B-124
Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NW 1/4 NW 1/4 Sec 15 Twp 75 Rg 16

County: Fall River

Please mark well location with an "X"

Well-Completion Date: 3-22-08

1 Mile

LOCATION:
Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): ft. from None Present

PROPOSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING:
Mud + Rotary

CASING DATA:
- Steel
- Plastic
- Other

If other describe:

PIPEWEIGHT DIAETER FROM TO HOLE DIAETER
SDR 11 LB/FT 6 IN 0 FT 327 FT 8 3/4 IN
LS/FT IN FT IN FT IN
LB/FT IN FT IN FT IN

GROUTING DATA
Grout Type: LMT
No. of Sacks: 59
Grout Weight: 15.3 lb/gal
From To H 377 ft

Describe grouting procedure: Pump

SCREEN: Perforated pipe
- Manufactured

Diameter: PVC
Length: 15 FT

Material: PVC
Slot Size: 0.20
Set From 377 Feet to 392 Feet

Other information:

WAS A PACKER OR SEAL USED? YES NO
If so, what material? 8" x 4" Pelach 4" x 3" Bell

Describe packer(s) and location:

DISINFECTION: Was well disinfected upon completion?
Yes How:

Laboratory sent to for water quality analysis:

WELL LOG:
FORMATION FROM TO
Shell Leach Shale 0 295
Fall River S.S. 295 392

STATIC WATER LEVEL:

If flowing: closed in pressure
2 PSI

GPM Flow 2 through inch pipe

Controlled by: Valve
Reducers
Other

Reduced Flowrate
GPM

Can well be completely shut in? Yes

WELL TEST DATA:
- Pumped
- Described: Air @ 360
- Boiled
- Other

Pumping Level Below Land Surface

If pump installed, pump rate

REMARKS

Davis Drilling

This well was drilled under license number 745
And this report is true and accurate.

Drilling Firm:

Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Data: 4-1-08

Dewey-Burdock GDP
June 2012

3.7-B-125 Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: S 44 W 1/4 SE 1/4 Sec: 32 Twp: 65 Rng: 1E

Well Completion Date:
3.20.08

LOCATION:
Distance from nearest potential pollution source (septic tank, abandoned well, lead lot, etc.): _______ ft. from _____ present _____ (identify source).

PROPOSED USE:
☐ Domestic/Stock ☐ Municipal ☐ Business ☐ Test Hole
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

METHOD OF DRILLING:
MUD PUMP

Casing Data:
☐ Steel ☐ Plastic ☐ Other

If other describe:

PIRWEIGHT DIAMETER FROM TO HOLE DIAMETER
Sor 1.7 Lb/FT 15 IN 0 FT 493 IN

GROUNING DATA
Grout Type:
Cem. 105.4

If other describe:

Screen:
☐ Perforated pipe ☐ Manufactured

Diameter: _______ in Length: 15 FEET

Material: PVC

Slot Size: 0.020 Set From 493 Feet to 608 Feet

Other information:
Set K. Packer

WAS A PACKER OR SEAL USED? ☑ YES ☐ NO
If so, what material? 6 1/4" A. Papke 41/2" X 3" ball

Describe packer(s) location?
Packer 51 at 1815

Disinfection: Was well disinfected upon completion?
☐ YES, How?

Laboratory sent to for water quality analysis?
Respic

Well Owner:
Power Tech

Business Name:
Power Tech, USA Inc

Address:
Hot Springs, 50 577-47

WELL LOG:
FORMATION FROM TO
Shull Creek Shale 0 415
Fall River 5.5 415 508

DEPTH

LOCATION:

WELL TEST DATA:

Static Water Level 17

If flowing: closed in pressure ___ PSI

GPM flow 3 through 2 inch pipe

Controlled by ☑ Valve ☐ Reducers ☐ Other

Reduced Flowrate

Can well be completely shut in? ☑ YES

WELL TEST DATA:

Pumping Level Below Land Surface

If Pump installed, pump rate:

REMARKS

This well was drilled under license # 745

And this report is true and accurate.

Drilling firm: David's Drilling

Signature of License Representative:
[Signature]

Signature of Well Owner or Equitable Property Holder:
[Signature]

Date: 4-1-08

Dewey-Burdock GDP

June 2012 3.7-B-126 Appendix 3.7-B
<table>
<thead>
<tr>
<th>Location: Fall River</th>
<th>NW 1/4, NW 1/4 Sec 15, Twp 75, Rg 1E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Completion Date:</td>
<td>3-21-08</td>
</tr>
</tbody>
</table>

**WELL LOG:**

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall River Shale</td>
<td>0</td>
<td>295</td>
</tr>
<tr>
<td>Fall River Shale</td>
<td>295</td>
<td>425</td>
</tr>
<tr>
<td>Fusion Shale</td>
<td>425</td>
<td>475</td>
</tr>
<tr>
<td>Lohelo</td>
<td>475</td>
<td>587</td>
</tr>
</tbody>
</table>

**PROPOSED USE:**

- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

**METHOD OF DRILLING:**

- Mud and Rotary

**Casing Data:**

- Steel
- Plastic
- Other

**Pipe Weight:**

<table>
<thead>
<tr>
<th>DIA. (IN)</th>
<th>8</th>
<th>9 1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB/FT</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>FT from</td>
<td>0</td>
<td>572</td>
</tr>
<tr>
<td>FT to</td>
<td>8 1/4</td>
<td>8 1/4</td>
</tr>
</tbody>
</table>

**GROUTING DATA:**

- Cement
- No. of packs: 6
- Grout weight: 8 lb/gal
- From: 0
- To: 572 ft

**Screen:**

- Perforated pipe
- Manufactured

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>PVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIA.</td>
<td>3</td>
</tr>
<tr>
<td>IN</td>
<td>15</td>
</tr>
<tr>
<td>FEET</td>
<td></td>
</tr>
<tr>
<td>SLOT SIZE</td>
<td>.020</td>
</tr>
<tr>
<td>Set from</td>
<td>572 ft to 587 ft</td>
</tr>
<tr>
<td>Packer</td>
<td>4&quot; x 4&quot;</td>
</tr>
</tbody>
</table>

**Disinfection:**

- Yes, How? No
- Laboratory sent for water quality analysis: Yes

**Static Water Level:**

- 0 Feet

- If flowing: closed in pressure
- GPM flow: 60 through 2 inch pipe
- Controlled by: Valve

**WELL TEST DATA:**

- Pumped
- Describe: Air lift at 560 GPM
- Suction: Ejector

**RECEIVED:**

- APR 7-2000

**REMARKS:**

- Dewey Burdock
- 8-15-2

- This well was drilled under license #745
- And this report is true and accurate.

**Signature of License Representative:**

- Davis Drilling

- Signature of Well Owner or Equitable Property Holder:

- 4-1-08

---

**Hydro ID:** 696

**Well Completion Report:** 1 of 1

**Plant:** 07-92

**Business Name:** Power Tech USA Inc

**Address:** Hot Springs, S.D. 57747
**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

- **Location:** Lat 44° 50' 0" N, Long 103° 18' 0" W Sec. 32 Twp. 65, Rg. 1E
- **County:** Custer
- **Well Completion Date:** 3-19-08
- **Well Log:**
  - **Formation:** Shale, Dakota
  - **Depth:** 415 feet
- **Location:**
  - Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.): 780 feet from nearest pump (identity source).
- **Proposed Use:** Other
- **Method of Drilling:** Mud and B heli
- **Casing Data:**
  - **Pipe Weight:** 6 in
  - **Diameter:** 6 in
  - **Depth:** 667 ft
- **Method of Drilling:**
  - **Grouting Data:**
    - **Grout Type:** LCM
    - **No. of Sachets:** 112
    - **Grout Weight:** 13.0 lb/kg
    - **From:** 0
    - **To:** 667 ft
- **Screen:**
  - **Material:** PVC
  - **Slot Size:** 0.020
  - **Set From:** 667 ft to 682 ft
  - **Other Information:** Pack

- **Static Water Level:** 40 feet
- **Flowing:** Closed in pressure, GPM flow 30 through 2 inch pipe
- **Controlled by:** Valve, Reducer, Other
- **Reduced Flowrate:** 3 GPM
- **Can be completely shut in:** Yes

- **Well Test Data:**
  - **Pumping Level:** 6.6 ft
  - **Hrs. Pumped:** 4 hours
  - **GPM:** 3.7
  - **Date:** Apr. 7, 2008

- **Remarks:**
  - **Drilling Firm:** Davis Drilling Inc
  - **Signature of License Representative:**
  - **Signature of Well Owner or Equitable Property Holder:**

---

**Hydro ID 697**

**SOUTH DAKOTA WATER WELL COMPLETION REPORT**

**Location:** Lat 44° 50' 0" N, Long 103° 18' 0" W Sec. 32 Twp. 65, Rg. 1E

**County:** Custer

**Well Completion Date:** 3-19-08

**Well Log:**

<table>
<thead>
<tr>
<th>Formation</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shale</td>
<td>0</td>
<td>415</td>
</tr>
<tr>
<td>Dakota</td>
<td>415</td>
<td>635</td>
</tr>
</tbody>
</table>

**Static Water Level:** 40 feet

**Flowing:** Closed in pressure, GPM flow 30 through 2 inch pipe

**Controlled by:** Valve, Reducer, Other

**Reduced Flowrate:** 3 GPM

**Can be completely shut in:** Yes

**Well Test Data:**

<table>
<thead>
<tr>
<th>Pumping Level Below Land Surface</th>
<th>Feet</th>
<th>Hrs. Pumped</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.6</td>
<td>4</td>
<td>3.7</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- **Drilling Firm:** Davis Drilling Inc
- **Signature of License Representative:**
- **Signature of Well Owner or Equitable Property Holder:**

---

**Dewey Burdock**

**Date:** 6-32-12

This well was drilled under license #745

And this report is true and accurate.

**Drilling Firm:** Davis Drilling Inc

**Signature of License Representative:**

**Signature of Well Owner or Equitable Property Holder:**

**Date:** 6-1-08
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: SW 1/4 NE 1/4 Sec. 2, Twp 75, Rng. 1E
County: Fall River

Please mark well location with an "X"

Well Completion Date: 3-25-08

Location:
Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) 7 ft. from NONE: Prescribed (identify source).

Proposed Use:
- Domestic/Stock
- Municipal
- Business
- Landfill
- Irrigation
- Industrial
- Institutional
- Monitoring well

Method of Drilling:
Mud Rotary

Casing Data:
- Steel
- Plastic
- Other

If other, describe:

Pipe Weight:
- 6" IN
- 180 FT
- 8 7/8 IN

Hole Diameter:
- 6" IN
- 9 7/8 IN

Grouting Data:
- Grout Type: Cement
- No. of Sacks: 35
- Grout Weight: 156 lb/gal
- From: 0 FT
- To: 180 FT

Describe grouting procedure: Pump

Screen:
- Perforated pipe
- Manufactured

Diameter: 3 IN
Length: 25 FEET
Material: PVC
Slot Size: 0.25
Set from 190 FT to 205 FT
Other information: Set K path

Was a packer or seal used? YES: 6" X 3" K Inche
NO: Packer. Set at 170'

Disinfection:
Was well disinfected upon completion? YES, How:
NO, Why Not?

Laboratory sent to for water quality analysis:
Respect

Location: 1 Mile

Location:
- Shell Creek Shale: 0 FT
- Fall River: 5.5 FT

WELL LOG:

Formation | Depth
-----------|-----
Shell Creek Shale | 0 FT
Fall River | 75 FT

Well Test Data:
- Pumped
- Describe: Newell AT 165
- Bailed
- Other
- Pumping Level Below Land Surface
- FT After: 1 FT
- Hrs. Pumped: 3 Hrs.

Water Rights Program

REMARKS
Dewey Burdock
8-2-1

This well was drilled under license # 245
And this report is true and accurate.
Drilling Firm: Davis Drilling
Signature of License Representative:

Signature of Well Owner: Signature of Property Holder:

Date: 4/23/08
# SOUTH DAKOTA WATER WELL COMPLETION REPORT

**Location:** SW 1/4, SW 1/4 Sec. 1, Twp. 75, Rg. 1E, Fall River County  

**Well Completion Date:** 4-18-08

**Location:** Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) 200 ft. from Sep. Tn. 1 (identify source).

**PROPOSED USE:** Domestic/Stock, Municipal, Business, Test Holes, Irrigation, Industrial, Institutional, Monitoring well

**METHOD OF DRILLING:** Mud and Rotary

**Casing Data:**  
- Steel
- Plastic
- Other

**Grouting Data:**  
- Great Type: CD
- No. of Sacks: 92
- Grout Weight: 15.3 lb./gal.
- From: 0 ft.
- To: 475 ft.

**Screen:**  
- Perforated pipe
- Manufactured

**Screen Information:**  
- Diameter: 3
- Length: 50 feet
- Material: PVC
- Slot Size: 0.20
- Set From: 475 feet to 525 feet

**Other Information:**  
- Printed by: DEWEY BURDOCK GDP
- Printed Date: JUne 2012

**Form:**  
- FROM: 0 ft.
- TO: 100 ft.

**Formation:**  
- Fall River
- Fuson
- Lahun
- Murren
- UNK PAPA

**Depth:**  
- TO: 410 ft.
- 525 ft.

**Static Water Level:** 110 Feet

**Well Test Data:**  
- Pumped
- Described: A: 1:17 as of 4/10

**Pumping Level Below Land Surface:**  
- 410 ft. After
- 525 ft. After

**WATER RIGHTS PROGRAM:**  
- WATER: 3.7-B-130

---

## Remarks

**Dewey Burdock**  
8-17

The well was drilled under license # 245.  
And this report is true and accurate.  
Drilling firm: DAVID DRILLING INC  
Signature of License Representative:

**Signature of Well Owner or Equitable Property Holder:**

**Date:** 5/15/08

---

**Appendix 3.7-B**
### SOUTH DAKOTA WATER WELL COMPLETION REPORT

**Location:** Fall River  
**County:**  
**Property:**  
**Well Completion Date:** 4-29-08

**PROPOSED USE:**  
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

**METHOD OF DRILLING:** Mud 

**Casing Data:**  
- Steel
- Plastic
- Other

<table>
<thead>
<tr>
<th>Pipe Weight</th>
<th>Diameter</th>
<th>FROM</th>
<th>TO</th>
<th>Hole Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>6</td>
<td>0</td>
<td>915</td>
<td>6/4</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>IN</td>
<td>FT</td>
<td>IN</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>IN</td>
<td>FT</td>
<td>IN</td>
</tr>
</tbody>
</table>

**Grouting Data:**  
- Grout Type:  
- No. of Bags: 2005  
- Great Weight: 150 lb/gal  
- From 0 ft to 915 ft

**Screen:**  
- Perforated pipe
- Manufactured  
- Diameter: 3"  
- Length: 40 FEET  
- Material: PVC

**Shot Size:** 0.20  
Set From 915 Feet to 955 Feet

**WAS A PACKER OR SEAL USED?**  
- Yes
- No

**Describe packer(s) and location?**  
- K Packer

**Water Quality Analysis:**  
Laboratory sent to for water quality analysis

**Disinfection:**  
- Yes
- No, Why Not?

**Static Water Level:**  
- 0 Feet
- If flowing, closed in pressure:  
  - 42 PSI
- GPM flow: 2 inch pipe
  - Controlled by:  
    - Valve
    - Reducers
    - Other
  - Reduced Flowrate: 
    - GPM
- Can well be completely shut in?  
  - Yes

**Well Test Data:**  
- Pumped
- Bailed
- Other

<table>
<thead>
<tr>
<th>Pumping Level Below Land Surface</th>
<th>May 2 0 2008, pumped</th>
<th>May 28 0 2008, pumped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Rate:</td>
<td>0.1 GPM</td>
<td>0.1 GPM</td>
</tr>
<tr>
<td>Water Stage:</td>
<td>15 FT</td>
<td>15 FT</td>
</tr>
<tr>
<td>If pump installed, pump rate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:** Dewey-Burdock

**This well was drilled under license #:** 745  
And this report is true and accurate.

**Drilling Firm:**  
- ***DAVIS Drilling, Inc.***

**Signature of License Representative:**  
- ***Sue Davis***

**Signature of Well-Owner or Equitable Property Holder:**  
-  

<table>
<thead>
<tr>
<th>Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6-5-1</td>
<td></td>
</tr>
</tbody>
</table>

---

**Location:** Dewey-Burdock  
**Address:**  
**Business Name:**  
**Well Owner:**  
**Address:** P.O. Box 723  
**City:** Hot Springs  
**State:** SD  
**ZIP:** 57747

---

**Appendix 3.7-B**

---

**June 2012**

---

**Dewey-Burdock GDP**

**3.7-B-131**
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NE ¼, NE ¼ Sec 21, Twp 65, Rg 1 E
County: Custer

Please mark well location with an "X"

Well Completion Date: 12-5-09

LOCATION:
Distance from nearest potential pollution source: (septic tank, abandoned well, livestock, etc.) ft. from NONE

PROPOSED USE:
Domestic/Stock [ ] Municipal [ ] Business [ ] Test Holes [ ] Irrigation [ ] Industrial [ ] Institutional [ ] Monitoring well [ ]

METHOD OF DRILLING: MUD ROTARY

Casing Data:
Steel [ ] Plastic [ ] Other [ ]

Pipe Weight:
Diameter: 6" - 6-4/8" - 6-11/64"
From: 0 - 150'
To: 150' - 328'
Hole Diameter: 30'-10"
L/B: 0 - 150'/6" - 6-4/8" - 6-11/64"

Static Water Level: 115'

If flowing: closed-in pressure ___________ PSI
GPM flow through ___________ inch pipe
Controlled by: [ ] Valve [ ] Reducer [ ] Other [ ]
Reduced Flowrate: ___________ GPM

Our well to completely shut in?

WELL LOG:
FORMATION From To
Fall Creek 0 - 150'
Lahota (Fus. + chil.) 150' - 328'
Morrison 328' - 480'
Dakota shale 480' - 550'

WELL TEST DATA:

WELL WAS OVERDRILLED

Pumping Level Below Land Surface: ___________ ft. After ___________ hrs. pumped ___________ GPM
If pump installed, pump rate: ___________ GPM

REMARKS: Dewey-Burdock 9.21.1

This well was drilled under license # 745

And this report is true and accurate.

Drilling firm: Dewey-Burdock GDP

Date: 1/1/15/09

WATER RIGHTS PROGRAM

Appendix 3.7-B
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NE ¼ NE ¼ Sec 21 Twp 65 Rg 1 E

Well Completion Date: 12-5-09

Location:
Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.) 7 ft. from NONE PRESENT

POSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING: Mud Rotary

Casing DATA:
- Steel
- Plastic
- Other

POREWEIGHT DIAMETER FROM TO HOLE DIAMETER
18/16 FT 16/14 FT 14/12 FT

GRouting DATA:
- Grout Type: CEM
- No. of Sacks: 56
- Grout Weight: 13.1 lbs/gal
- From To: 0 ft to 28.4 ft
- Description: PUMP

Screen:
- Perforated pipe
- Manufactured

Diameter: 3 IN
Length: 30 FEET
Material: PVC
Set Size: 202
Set From: 28.4 ft to 314 ft
Other information: 10' Black 274.284

WAS A PACKER OR SEAL USED? YES NO
If yes, what material? K - Packer
Describe Packer(s) and location: SET AT 274'

Disinfection: Was well disinfected upon completion? YES, How? BLEACH
NO, Why Not? 1 gallon

Laboratory sent to for water quality analysis:

Well Owner: Power Tech
Business Name: Power Tech, USA Inc
Address: Hot Springs, SD 57747

WELL LOG:

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull Creek</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Fall River</td>
<td>150</td>
<td>316</td>
</tr>
<tr>
<td>Lakeo (Figueroa)</td>
<td>316</td>
<td>328</td>
</tr>
</tbody>
</table>

STATIC WATER LEVEL: 110 Feet

If flowing: closed in pressure
GPM New through pipe

Controlled by: Valve
Reduced Flowrate: 5.10 GPM

Well will be completely shut in?

WELL TEST DATA:
- Pumped
- Bailed
- Other

Description: Actull 2.274 ft

Pumping Level Below Land Surface
- ft. After: 7 Hrs. pumped: 5.10 GPM
- ft. After: 7 Hrs. pumped: 5.10 GPM

If pump installed, pump rate:

REMARKS:

Dewey-Burrock 9-21-2

This well was drilled under license # 745
And this report is true and accurate.
Drilling firm: Dare Drilling Inc
Signature of Licence Representative:
Signature of Well Owner of Irreplaceable Property Holder:

Date: 12/15/09

WATER RIGHTS PROGRAM
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: 34° 6S 1E

Well Completion Date: May 5, 2011

Well Owner: Powertech, Inc.
Address: 145 N Chicago Street
City, State, Zip: Hot Springs, SD 57747

WELL LOG:

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topsoil - Silty Lean Clay with sand, brown, moist (CL)</td>
<td>0</td>
<td>0.5'</td>
</tr>
<tr>
<td>Silty Sand, red-bm, dry (SM)</td>
<td>0.5'</td>
<td>12'</td>
</tr>
<tr>
<td>Silty Lean Clay, red-bm, moist (CL)</td>
<td>12'</td>
<td>21'</td>
</tr>
<tr>
<td>Silty Gravel with sand, It bm, moist to wet at 35' (GM)</td>
<td>21'</td>
<td>40'</td>
</tr>
</tbody>
</table>

STATIC WATER LEVEL

If flowing: closed in pressure

GPM flow through Inch pipe

Can well be completely shut in?

RECEIVED

WELL TEST DATA:

Pumped: NA

WATER RIGHTS PROGRAM

Pumping Level Below Land Surface

Fl. After Hrs. Pumped: GPM

Fl. After Hrs. Pumped: GPM

If pump installed, pump rate: GPM

REMARKS

Monitoring well 11-34-4

This well was drilled under license #678 and this report is true and accurate.


Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:
## SOIL BORING AND MONITORING WELL LOG

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring Started</td>
<td>5-5-11</td>
<td>10:55</td>
</tr>
<tr>
<td>Boring Completed</td>
<td>1-1</td>
<td>15:00</td>
</tr>
<tr>
<td>Pulling Casing</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Boring Filled</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Depth to Frost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Method of Advancing Boring

Continuous Sampling From _______ To _______

- In. Flite-Auger To _______
- 3/4 In. Hollow Stem Auger To 40
- In. Casing To _______
- In. Casing To _______
- P. D. or C. O. Tube From _______ To _______
- Jet With Water From _______ To _______
- w/ Drilling Mud From _______ To _______

### Remarks

- State Plane NAD27
- 441813 1032064

### WATER LEVEL MEASUREMENTS

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>SAMPLED DEPTH</th>
<th>CASING DEPTH</th>
<th>WATER LEVEL</th>
<th>METHOD</th>
</tr>
</thead>
</table>

| START | 40:53 | COMPLETE | 75:35 |

Crew Cheif Log: [Handwritten Signature]

---

Dewey-Burdock GDP
June 2012
3.7-B-135
Appendix 3.7-B
**GEOTECHNICAL FIELD DATA SHEET**

**Project Number:** 17-121  
**Data:** 5-5-11  
**Boring Number:** 11-34-4

**Project Location:** Dewey  
**Crew Chief:** RTH

**Boring Start Time:** 10:55  
**Boring Completion Time:** 15:00

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>Topsoil - silty and clay moist (and)</td>
</tr>
<tr>
<td>5'</td>
<td>Sandy (dry)</td>
</tr>
<tr>
<td>12'0'</td>
<td>Silty clay rich in organic matter</td>
</tr>
<tr>
<td>21.0'</td>
<td>Silty silt clay, wet 35% (dry) Eo 40'</td>
</tr>
<tr>
<td></td>
<td>silt clay</td>
</tr>
<tr>
<td>1-10'</td>
<td>3'L</td>
</tr>
<tr>
<td>3-10'</td>
<td>1' R</td>
</tr>
<tr>
<td>1-5'</td>
<td>3'L</td>
</tr>
<tr>
<td>7-10'</td>
<td>2-20</td>
</tr>
<tr>
<td>18-30'</td>
<td>1' 80%</td>
</tr>
</tbody>
</table>

**Method of Advancing Boring**

<table>
<thead>
<tr>
<th>Continuous Sampling</th>
<th>From:</th>
<th>To:</th>
</tr>
</thead>
<tbody>
<tr>
<td>In. Fill Auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4'1/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In. Hollow Stem Auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Water Level Check After Completion of Boring**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>W.L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-5-11</td>
<td>0-55</td>
<td>32</td>
</tr>
<tr>
<td>1st Recheck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Recheck</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Well Owner: Powertech, Inc.
Business Name: Powertech, Inc.
Address: 145 N Chicago Street
City, State, Zip: Hot Springs SD 57747

Location: Sec 34 Twp 66 Rg 1E

Fall River
County: Custer County

Please mark well location with an "X"

Well Completion Date: May 4, 2011
May 5, 2011

Distance to nearest potential pollution source (septic tank, abandoned well, lead line, etc)? ft from Unknown

PROPOSED USE:
Domestic/Stock
Municipal
Irrigation
Industrial
Business
Monitoring well

METHOD OF DRILLING:
4.25" HSA TO 30°

CASING DATA:
Steel
Plastic
20" Other

PIPEWEIGHT DMETER FROM TO HOLE DIAMETER
LBFT. IN. FT. FT. IN.

2.00 0.0 22.9 4.25

GROUTING DATA:
Grout Type No. of Grouts Grout Weight From To
Cement 1
Bentonite 1

Describe grouting procedure:

0 to 15 ft 15 to 20 ft

SCREEN:
Perforated pipe
Manufactured

Diameter: 2.00 inches
Material: Sch 40 PVC

Set Size 0.010" Set From 12.0 Feet to 23.0 Feet

Other information:
12-20 Silica Sand from 40° to 89°

WAS A PACKER OR SEAL USED? Yes No

DISINFECTION: Was well disinfected upon completion?

Lab to which water quality sample sent for analysis:
Yes, How?

No, Why Not?
Monitoring well only

WELL LOG:
FORMATION
Topsoil - Silty Lean Clay with sand, brown, moist (CL)
Silty Lean Clay with sand, brn (CL)
Silty Gravel with sand, brn, wet (GM)

DEPH
0 0.5° 0 0.5° 0 0.5°

6.5° 6.5° 6.5°

20° 20° 20°

Silty, sandy, clayey, GRAVEL, wet 22-26" Competent SHALE 28-30"

STATIC WATER LEVEL

If flowing: closed in pressure

UPM flow through inch pipe

Reduced flow rate

Can well be completely shut in?

WELL TEST DATA:

RECEIVED
NOV 09 2011

WATER RIGHTS PROGRAM

Pumping Level Below Land Surface
Fl. After Hrs. pumped GPM
Fl. After Hrs. pumped GPM

If pump installed, pump rate:

GPM

REMARKS
Monitoring well 11-3-3

This well was drilled under license 678 and this report is true and accurate.

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
## SOIL BORING AND MONITORING WELL LOG

**Hydro ID 708**

<table>
<thead>
<tr>
<th>Well No.</th>
<th>MW-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job No.</td>
<td>1-2-ll</td>
</tr>
<tr>
<td>Project</td>
<td>Powertech</td>
</tr>
<tr>
<td>Boring No.</td>
<td>11-3-3</td>
</tr>
<tr>
<td>Scale</td>
<td>1&quot; = 5'</td>
</tr>
<tr>
<td>Date</td>
<td>11-2-11</td>
</tr>
<tr>
<td>Time</td>
<td>10:35</td>
</tr>
</tbody>
</table>

### Water Level Measurements

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Sampled Depth</th>
<th>casing depth</th>
<th>Water Level</th>
<th>Method</th>
<th>Crew Chipp Log</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 ft</td>
</tr>
</tbody>
</table>

### Well Construction

- **Method of Advancing Boring**
  - Continuous Sampling From To
  - In Flite-Auger To
  - 3/4 in. Hollow Stem Auger to 30
  - In. Casing To
  - In. Casing To
  - P. D. or C. O. Tube From To
  - Jet With Water From To
  - w/ Drilling Mud From To

### Remarks

- State Plane NAD 27
- N 43.0498 E 103.0383

---

**Dewey-Burdock GDP**

June 2012

3.7-B-138

Appendix 3.7-B
**PowerTech (USA) Inc.**

**HOLE NO.: 0811-3, CANY-3**

**LOCATION:** 43°10'15.0"N, 103°32'50.6"W (State Plane NAD27)

**T.D.: 30**

**BIT SIZE:** 4" FA

**SAMPLE LOG BY:** LE

**LEASE:** Dewey Burdock

**DATE:** 9/14/11

**COUNTY:** Fall River

**STATE:** SD

### Lithology

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
<th>ALTERATION</th>
<th>SAMPLE DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-22'</td>
<td>Silty clay, marl, brown, dry, soft rocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22-23'</td>
<td>Silty, sandy, clayey, GRANITE, pink-white, gray, medium sized angular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38-50</td>
<td>Granular GRANITE, gray</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TD @ 28':** Drilled out to 8 1/2" w/ 4 1/4" HSA, converted to SWL.
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: NW ¼ Sec 34 - Twp 66 - Rg 1E

Fall River
Custer County

Well Completion Date: May 9, 2011

WELL LOG:

FORMATION FROM TO
Topsoil - Silty Lean Clay with sand, brown, moist (CL) 0 0.5'
Silty Lean Clay with sand, bm (CL) 0.5' 35'
Silty Gravel with sand, bm, wet (GM) 35' 38'

Casing Data:
Steel
Plastic
Other

28 FT

Screen:
Perforated pipe
Manufactured

2.00
28.0 to 38.0

Other Information:
12-20 Silica Sand from 28 to 38'

Water Test Data:
Pumped
Describe: N/A

WATER RIGHTS PROGRAM

Date: NOV 09 2011

This well was drilled under license #678 and the report is true and accurate.


Signature of License Representative:

Signature of Well Owner or Equitable Property Holder:

Date:
# PowerTech (USA) Inc.

**Drilled With:** AIR

**T.D.:** 40'  
**Location:** 42°46'40.639', 102°44'41.61"S 82°56'26.31"W  
**Hole No.:** DEW-15-ALLUV-4  
**Bit Size:** 4" FA  
**Sample Log By:** [LE]  
**Lease:** [Project] Dewey Burdock

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Lithology</th>
<th>Alteration %</th>
<th>SAMPLE DESCRIPTION</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35'</td>
<td>Silty, sandy, clay, H-and brown, dry,-set mud, (NAU)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.22' damp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.49'</td>
<td>Silty, sandy, gray gravel, red brown, quartzite, clay, fleshy, wet (Aitch)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40'</td>
<td>Nonhard gray gravel to TD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Drilled out to 284' w/ 4.94' HCA, 3 converted to NAU.
No. 380-2

Office of State Engineer
DOCUMENT FILE

Dewey-Burdock GDP
June 2012 3.7-B-143 Appendix 3.7-B

380-2

No. 409-2

Hydro ID 710 1 of 12
APPLICATION FOR PERMIT

To Appropriate Water within the State of South Dakota

APPLICATION FOR APPROPRIATION OF WATER

Name of Applicant: [Name]

Postoffice Address: [Address]

If a corporation: [Name]

(a) Name of corporation

(b) Date and place of incorporation

(c) Amount of capital stock

(d) Amount paid in

(e) Names and address of directors

Method of accomplishing the work and financial resources of the applicant:

(a) Method of accomplishing work (Whether by contract, employment of others, or by direct labor)

(b) Cash on hand, $...

(c) Treasury stock, $...

(d) Bonds to be issued, $...

(e) Other resources, $...

Name of well: [Name]

Location of well (subdivision): [Location]

Quantity of water claimed: [Quantity]

Source of water supply (estimated depth): [Source]

Location of well: [Location]

Annual periods during which water is to be used: [Periods]

To be used for:

I. Irrigation or domestic use: Gravity, overhead sprinkling or combination system

(a) Number of acres to be irrigated: [ Acres]

(b) Legal subdivisions to be irrigated: [Legal Subdivisions]

(c) Statement as to domestic use (giving location, etc.): [Location]

II. Stockwatering, mining, milling, power, fish culture, fire protection and public recreation:

(a) Nature of use: [Nature]

(b) Amount of power to be generated: [Amount]

(c) Location of plant: [Location]

(d) Method of developing power: [Method]

(e) Point where return water will be diverted to stream: [Point]

[Signature]

[Date]

[Name]

[Title]

[Return Address]

[Map No.]

[Received Date]

[Map No.]

[Received Date]
Hydro ID 710

K. Estimated cost of works:
(a) Head gates, $........................ (b) Pumping plant, $ 2000.00
(c) Fencing, $........................ (d) Canal-earth, $.............. Rock, $..............
(e) Other structures, $ 500.00 Total, $ 2000.00

Description of works:
(a) Head gate: Width .................. feet; height .................. feet; Material ..................
(b) Log of well:
(To be completed when well is drilled)


(c) Measuring device: Pressure range and Bore size

(d) Canal: Total length ... Miles


(e) Was water tested for irrigation purposes?

Result: Excellent

10. Time required for completion of work ...... years.
11. Time required for complete application of water to the proposed beneficial use ...... years.
12. Choice of newspaper for publication of notice of intention to appropriate water: ...Daily...

STATE OF SOUTH DAKOTA
County of ...Custer...

I, ....., being first duly sworn on my oath and say: That I am duly authorized to make the above described undertaking in that my owner, that I have read the above and foregoing statement, and examined the map accompanying the same, and that I know of any other personal knowledge that the matters herein stated and sworn are true.

Signed: ...Daniel Wasser...

Subscribed and sworn to before me this ...22 day of ....... 1051

Notary Public (or other qualified officer)


STATE OF SOUTH DAKOTA

County of ...Hughes

Pierre, South Dakota, _______Sept. 12, 1953 _______ 10...

This is to certify that the foregoing application was received at this office at _____1:00_____ o'clock
... m. upon the _____29th____ day of _____June_____, 1953 and that after examination it was found to comply with the South Dakota water laws, was published in accordance with the provisions thereof and consideration given to any and all information presented.

The following water laws were published in accordance with the provisions thereof and consideration given to any and all information presented.

10. PROVEN'T.: E. L. W. 11:4:1:4:

DEAL' N. BUCKS State Engineer.

Number of permit ...380-2.

Date of first receipt of application ...June 12.

Date of return to applicant for correction ...June 19.

Date of receipt of corrected application ...June 29.

Date from which applicant may claim right ...June 29, 1953.

Approved ...Sept. 12, 1953. Recorded in book ...Page .......

This is to certify that I have examined the foregoing application for a permit to appropriate water of the State of South Dakota, and I hereby grant the same as stated herein, subject, however, to the following limitations and conditions:

1st. The equivalent of at least one-fifth of the work above specified is to be completed on or before ____Sept. 12_____, 1953.

2nd. The whole of said work is to be completed on or before ____Sept. 12_____, 1953.

3rd. The limit of time for proof of beneficial use of water appropriated in accordance herewith is ____Sept. 12_____, 1953.

4th. The water appropriated shall be used for the purpose of Providing irrigation.

5th. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be injuriously affected by this appropriation.

6th. The amount of the appropriation herein granted shall not exceed __500__ feet of water per second.

July; the capacity of the above described system of diversion works, or the least amount of water that experience may hereafter indicate as necessary for the protection of crops in the exercise of the best husbandry, and further, said appropriation must be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually and beneficially applied for irrigation on or before ____Sept. 12_____, 1953; said water to be used during the following described annual period:

April 1 to October 1, Inclusive.

Witness my hand this _____12th____ day of ____Sept____., 1953.

DEAL' N. BUCKS State Engineer.

Certificate of Construction issued ____SEPTEMBER 8____, 1953.

Water License issued ____SEPTEMBER 9____, 1953.
Location of Lands to be Irrigated by the Golden Cliff Irrigation Well No. 2.

<table>
<thead>
<tr>
<th>Location</th>
<th>Sec.</th>
<th>Twp.</th>
<th>Rge.</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>6 S.</td>
<td>1 E.</td>
<td>34.40</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6 S.</td>
<td>1 E.</td>
<td>5.07</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6 S.</td>
<td>1 E.</td>
<td>5.25</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>5 S.</td>
<td>1 E.</td>
<td>86.30</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>6 S.</td>
<td>1 E.</td>
<td>10.45</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>126.48</td>
</tr>
</tbody>
</table>

Discharge of One Sprinkler Head - Two Nozzles - 7/32 & 1/4 "

<table>
<thead>
<tr>
<th>Pressure in Pounds</th>
<th>Discharge in GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>14.9</td>
</tr>
<tr>
<td>30</td>
<td>16.2</td>
</tr>
<tr>
<td>35</td>
<td>17.6</td>
</tr>
<tr>
<td>40</td>
<td>18.9</td>
</tr>
<tr>
<td>45</td>
<td>20.1</td>
</tr>
<tr>
<td>50</td>
<td>21.2</td>
</tr>
<tr>
<td>55</td>
<td>21.4</td>
</tr>
<tr>
<td>60</td>
<td>22.4</td>
</tr>
</tbody>
</table>
Hydro ID 710
Form 16

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 530-2

(1) WHEREAS, On the ___ 29th ___ day of June ___ A. D. 19_51 ___ Darrol Hawthorne

made Water Right Application No. 530-2 for a permit to use ___ 1.70 ___ cubic feet per second of the waters of artesian ground water

County of ___________, State of South Dakota, for ___________,

purposes; and

(2) WHEREAS, On the ___ 12th ___ day of ___ September ___ A. D. 19_51 ___ Permit No. 530-2, with a date of priority of ___ June 20, 1951 ___ was issued to said applicant for the diversion of said water, and provided for the completion of construction of the water supply system therein described on or before the ___ 12th ___ day of ___ September ___ A. D. 19_52 ___ and for the application to beneficial use of said water on or before the ___ 12th ___ day of ___ September ___ A. D. 19_51 ___

and, whereas, on the ___ 25th ___ day of November, 1975, the Permit was transferred to Henry C. Hollenbeck

and:

(3) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota relating to completion of the construction of the water supply system and is entitled to divert ___ .85 ___ cubic feet per second of water for beneficial use and,

(4) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota relating to the application of water to beneficial use of the following extent.

For irrigating 60 acres in the Section 17, T66, R1E

Dewey-Burdock GDP
June 2012
3.7-B-148
Appendix 3.7-B
NOW, THEREFORE, by the virtue of the authority vested in us by the laws of the State of South Dakota, we hereby grant and confirm to Henry C. Hellenbeck

of Edgemont

the holder and owner of said permit No. 380-2, a water right, dating from June 29, 1951, to use of 85 cubic feet per second of the waters of

artesian ground water

in the County of Custer and State of South Dakota, or so much thereof as may be necessary for the purposes hereinafter mentioned, to be diverted at a point in the center of NW 1/4, Section 17, T6S, R1E

and conduct to and upon 60 acres in the E1/4 NW1/4, Section 17, T6S, R1E

for the purpose of Irrigation

Subject to any limitations listed in Water Right Permit No. 380-2, and subject to the laws of the State of South Dakota.

WITNESS, My hand and seal of our office at Pierre, South Dakota this 9th day of September, Nineteen Hundred and Seventy-seven

WATER RIGHTS COMMISSION

By: John Hatch, Chief Engineer, Executive Officer
CERTIFICATE OF CONSTRUCTION

This is to certify, that Nancy C. Holtenhank

____________________________

the holder of Permit No. 380-2, issued upon Application No. 380-2, bearing date of priority of June 29, 1931, authorizing the diversion of 1.78 cu. ft. per second of the waters of the

extension ground water body of Custer, State of South Dakota at

a point in the center of the NW¼, Section 17, T66S, R11E

for irrigation purposes, in compliance with the provisions of the laws of the State of South Dakota relating to proof of completion of the works of diversion set out and described in said Permit; that said works are found in satisfactory condition for diverting and conveying to the place of intended use, 1.78 cu. ft. per second of water.

Date September 8, 1977

By: John Hatch,

John Hatch, Chief Engineer

Dewey-Burdock GDP
June 2012
3.7-B-150
Appendix 3.7-B
y.--Notice of Intent to appropriate Water
(First Publication _______ 19____)

PROPRIETARY OF WATER

Office of State Engineer,
Pierre, S. Dak., July 10, 1951

Notice is hereby given that Darrel Hawthorne, whose postoffice address is Dewey,
South Dakota, has made applications in accordance with the provisions of the water laws
of South Dakota for permits to appropriate for beneficial use as follows:

1000 gallons of water per minute of time from ground water supply through the Golden
Cliff Irrigation Project, Well No. 1, the point of diversion of which is to be located
in the NE § of the SW § of Section 6, Twp. 65 , Range 11. 600 gallons of water per minute
of time from ground water supply through the Golden Cliff Irrigation Project, Well No. 2,
the point of diversion of which is to be located in the NW § of the NW § of Section 17,
Twp. 65, Range 11. Said water to be used for the purpose of providing irrigation on
the following described lands: NE § Sec. 17, NW § NE § Sec. 18, NE § Sec. 2, NW § NE § Sec. 6,
NE § SW § Sec. 6, SE § SE § Sec. 6, NW § SE § Sec. 6, NE § NW § Sec. 1, and NW § NE § Sec. 7, T. 65, R. 11.

This application will be taken up by the State Engineer at his office at Pierre for
consideration upon the 21st day of August 1951, at 10:00 A.M. All persons who believe that
their prior rights would be injuriously affected, or that the allowance of the permit would
be detrimental to the public welfare shall file such protest with the State Engineer in
writing prior to the above date and may appear on the day above mentioned in person for
the purpose of discussing further the information presented.

Appropriate action will be taken by the State Engineer after suitable time has
elapsed for the consideration of any or all information presented.

NGS Inc.
Richardson

Dean T. Lucas
State Engineer
REPORT OF EXAMINATION OF WORKS
AND/OR APPLICATION OF WATER TO BENEFICIAL USE

TO: Water Resource Commission, State Office Building No. 2, Pierre, South Dakota 57501

I have this day made a thorough examination of the water use system constructed by Darrel
Hawthorne of Custer, SD

of Permit No. 380-2, bearing date of priority of June 29, 1981

authorizing the diversion of 1.78 cu. ft. per second of the waters of ground water

for irrigation purposes, in Custer County.

I have to report on the condition of the same as follows:

The Water Use System consists of,

A. Works used to divert the water:

376 foot flowing artesian well, steel cased; fill's storage dam, 15 foot high, 30 foot wide at the base and 50 foot in length on the west side and 60 foot in length on the south side.

B. Works used to transport water to place of use.

Approx. 800 feet of natural ditch

C. Works used to apply water to beneficial use.

Flood irrigates by spreading

The system is in the following condition:

The point of diversion is located Center of NW\(\frac{1}{4}\) of Sec. 17, T6\(\frac{1}{4}\), R1E., B.H.M.

The works are capable of diverting and conveying to the place of use 25 1.78

cu. ft. per second of water which is to be used for irrigation

Water has been put to beneficial use to the maximum extent as follows:

\(\frac{1}{2}\) of NW\(\frac{1}{4}\) of Sec. 17, T6\(\frac{1}{4}\), R1E., B.H.M.

comprising a total of 60 acres of land.

Henry C. Hollenbeck
Star Rt.
Edgemont, SD 57735

Date 6-25-75

THOMAS A GARDNER
Water Resources Engineer
Form 20.

No. J00-2

NOTICE OF TRANSFER OF WATER PERMIT

TO: WATER RIGHTS COMMISSION

State Office Building No. 2
Pierre, South Dakota 57501

This is to notify you that title to the lands described as follows:

Pt NWQ of Sec. 17, T6S., R1E., D.H.M.

was formerly owned by Darrel Hawthorne

has been transferred to Henry C. Hollenbeck

together with any rights to the beneficial use of water thereon as evidenced by Water Right Permit No. 380-2, as provided for in Section 61.0127 of the 1950 Supplement to the South Dakota Code of 1939.

You are therefore hereby requested to file this “Notice of Transfer of Water Permit” in its appropriate file at the Office of Water Rights Commission as evidence of the change of ownership.

A fee of one dollar is hereon attached to cover filing fees as required under Section 61.0159 of the 1950 Supplement to the South Dakota Code of 1939.

STATE OF SOUTH DAKOTA  

County of _______________

Henry C. Hollenbeck, being first duly sworn on my oath depose and say: That my relation to the above described undertaking is that of Owner, that I have read the above foregoing statement, and I know of my own personal knowledge that the information herein stated is true.

(Signed)

Subscribed and sworn to before me this 24th day of July, 1975.

(Notary Public)
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Location: Fall River County: Pennington

Well Completion Date: 3-26-08

LOCATION:
Distance from nearest potential pollution source (septic tank, abandoned well). Feedlot, etc.? __________ ft. from _______ Present (identify source)

PROPOSED USE:
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

METHOD OF DRILLING:
- Mud
- Air

Casing Data:
- Steel
- Plastic
- Other

If other describe: ____________________________

PipeWeight Diam per From To Hole Diameter
SDR 21 LB/FT 6 IN 0 FT 166 FT 89/4 IN

Grouting Data:
- Grout Type
- No. of Sacks
- Grout Weight
- From
- To

Describe grouting procedure: ____________________________

Screen:
- Perforated pipe
- Manufactured

Diameter
- 3 IN

Material
- PVC

Set Size 30720 Set from 166 Feet to 196 Feet

Grouting Data:
- Grout Type
- No. of Sacks
- Grout Weight
- From
- To

Describe grouting procedure: ____________________________

Screen:
- Perforated pipe
- Manufactured

Diameter
- 3 IN

Material
- PVC

Set Size 30720 Set from 166 Feet to 196 Feet

Other Information:

WAS A PACKER OR SEAL USED? __ YES __ NO
If yes, what material? 6 1/3 IN K Packer
Describing packer(s) and location? Packer set at 156

Disinfection:
Was well disinfected upon completion? __ YES __ NO, Why? NA

Laboratory sent to for water quality analysis: Respil

Remarks:
This well was drilled under license # 745 __
And this report is true and accurate.
Drilling firm: Dewey-Burdocx
Signature of License Representative: ____________

Signature of Well Owner and Suitable Property Holder: ____________

Date: 8-1-6

Dewey-Burdocx GDP
June 2012

3.7-B-155

Appendix 3.7-B
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER
HERSCHLER BLDG., 4-E
CHEYENNE, WYOMING 82002
(307) 777-8183

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

APPLICATION FOR WELLS AND SPRINGS

Name: Putnam & Putnam, LLP
Contact: Phone (605) 662-7448

Address: 778 Cedar St, Dewey SD 57735
(MAILING ADDRESS) (CITY) (STATE) (ZIP)

Name & address of agent to receive correspondence and notices:
John Putnam
(MAILING ADDRESS) (CITY) (STATE) (ZIP)

Use to which the water will be applied:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>Use of water in 3 single family dwellings or less, noncommercial watering of trees and gardens totaling one acre or less. Number of horses served.</td>
</tr>
<tr>
<td>Stock Watering</td>
<td>Normal livestock use at four tanks or less within one mile of well or spring. Stockwatering pipelines and commercial feedlots are a miscellaneous use. Number of stock tanks.</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Watering of commercially grown crops (large-scale lawn, meadow grass, commercial, recreational areas, etc.) is miscellaneous use.</td>
</tr>
<tr>
<td>Municipal</td>
<td>Use of water in incorporated Towns and Cities. Note: use of water in unincorporated towns, subdivisions, improvement districts, mobile home parks, etc. is classified as miscellaneous use. Note: a permit may be required by the Wyoming Department of Environmental Quality (WDEQ) if the well will be classified as a public water supply under the WDEQ's rules and regulations.</td>
</tr>
<tr>
<td>Industrial</td>
<td>Long term use of water for the manufacture of a product or production of cattle or other minerals (oil field water, food operations, power plant water supply, etc.). Describe in REMARKS.</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Any use of water not defined under previous definitions such as stock water pipelines, subdivisions, mine dewatering, mineral oil exploration drilling, potable supplies in office, etc. Describe in Remarks. Note: a permit may be required by the WDEQ if the well will be classified as a public water supply under the WDEQ's rules and regulations.</td>
</tr>
<tr>
<td>Coalbed Methane</td>
<td>Water produced in the production of coal bed methane gas. Note: wells used in the production of coal bed methane will require a permit from the Wyoming Oil and Gas Conservation Commission.</td>
</tr>
<tr>
<td>Monitor, Observation</td>
<td>Note: a WDEQ permit may be required. Test Well: (Describe in REMARKS)</td>
</tr>
</tbody>
</table>

Location of the well or spring: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: SE 1/4 NE 1/4 of Sec. 12, Township 14 N, Range 88 W.)

Estimated depth of the well or spring is 600 feet. Estimated production interval is (Unknown) feet. 

(a) Maximum instantaneous flow of water to be developed and beneficially used is 10 gallons per minute. 

(b) Maximum volumetric quantity of water to be developed and beneficially used per calendar year: 5 x 1,000

Circles appropriate units: (Gallons) (Acre Feet) A four person family utilizes approximately one (1) acre-foot of water per year or 355,000 gallons.

See reverse side
10. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc.

11. The well or spring is to be constructed on lands owned by _________________________________
   (The granting of a permit does not constitute the granting of right-of-way. If any easement or right-of-way is necessary in connection with this application, it should be understood that the responsibility is the applicant’s. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not the co-applicant.)

12. The water is to be used on lands owned by _________________________________
   (If the landowner is not the applicant, a copy of the agreement relating to the usage of appropriated water on the land should be submitted to this office. If the landowner is included as co-applicant on the application, this procedure need not be followed.) NOTE: Water rights attach to the area(s) and/or point(s) of use.

REMARKS: Existing well is located at ____________________________

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

Signature of Applicant or Authorized Agent ____________________________ Date ____________

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES $25.00

(Domestic use is defined as use of water in 3 single family dwellings or less, non-commercial watering of lawns and gardens totaling one acre or less.)

IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS, COAL BED METHANE $50.00

MONITOR (For water level measurements or chemical quality sampling) or TEST WELL No Fee

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING

STATE ENGINEER’S OFFICE

This instrument was received and filed for record on the 12th day of June, A.D. 2007, at 9:16 A.M.

Permit No. U.W. 133391

This is to certify that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to right-of-way and determination with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 186, Session Laws of Wyoming, 1957, and any subsequent amendments thereto. Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply. If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut-off when not in use without loss of water into sub-surface formations or at the land surface.

Coal Bed Methane wells have additional conditions and limitations on attachment sheet.

This permit and accompanying notices serve to register an existing well and establish a valid water right for the same. Time limit for completion of Construction and Completion of Beneficial Use is waived.

Approval of this application may be considered an authorization to proceed with construction of the proposed well or spring. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of the beneficial use of water for the purposes specified as item 4 of this application will be made by December 31, 2007.

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water is beneficial use.

Witness my hand this 29th day of October, A.D. 2007.

PATRICK TYRELL, State Engineer

October 16, 2007 - Statement of Completion on 1936 received. Beneficial Use assumed as of date of completion.
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER
HERSCHEL BLVD., PO
CHEYENNE, WYOMING 82002
(307) 772-6160

STATEMENT OF COMPLETION AND DESCRIPTION OF WELL OR SPRING

NOTE: Do not fill this form. Use typewriter or print neatly with black pen.

PERMIT NO. U.W. 183361
NAME OF WELL/SPRING: Palam - 21

1. NAME OF OWNER: Palam & Palam, LLP

2. ADDRESS: 778 CEDAR ST
   City: Dewey, State: SD, Zip Code: 57735, Phone No.: 605-662-7448

3. USE OF WATER: Domestic, Irrigation, Municipal, Industrial, Miscellaneous

4. LOCATION OF WELL/SPRING: SW 1/4 SW 1/4 or Section 28 T, 41 N, R 64 W, of the 6th P.M. (or W.R.M.)
   Subdivision Name: Lot: __, Block: __
   Surveyor Location Tract: or Lot: __, Datum: NAD83
   Geographic Coordinates: Latitude: __, Longitude: __
   UTM: Zone: __, Northing: __, Easting: __
   State Plane Coordinates: Zone: __, Northing: __, Easting: __
   Land surface elevation (ft. above mean sea level): __, Datum: NAVD29
   Source: GPS, Map, Survey, Hinton, Other

5. TYPE OF CONSTRUCTION: Drilled
   Describe: __________

6. CONSTRUCTION
   Total depth of wellspring: 639 ft.
   Depth of static water level: __ ft. (below land surface)
   Casing height: __ ft. above ground
   a. Diameter of borehole (bit size): 5 inches
   b. Casing schedule: New & Used
      Joint type: Threaded & Glued & Watertight
      Diameter from __ ft to __ ft, Material: __ Gage
      Diameter from __ ft to __ ft, Material: __ Gage
   c. Cemented/grounded interval, from __ ft to __ ft
   Amount of cement/grout used: __ type
   (example: 10 sacks)
   d. Type of completion: Customized perforations
      Open hole: __ Factory screen
      Type of perforator used: __
      Size of perforations: __ inches by __ inches
      Number of perforations and depths where perforated:
      __ perforations from __ ft. to __ ft.
      __ perforations from __ ft. to __ ft.
   e. Well development method: __
      How long was well developed?
   f. Was a filtergravel pack installed? __ Yes __ No
   Size of filtergravel: __
   Filtergravel pack installed from __ ft. to __ ft.
   g. Was surface casing used? __ Yes __ No
      Was it cemented in place? __ Yes __ No
      Surface casing installed from __ ft. to __ ft.

7. NAME AND ADDRESS OF DRILLING COMPANY: __

8. DATE OF COMPLETION OF WELL (including pump installation) OR SPRING (first used): 1936

9. PUMP INFORMATION
   Manufacturer: __
   Model: __
   Source of power: __
   Horsepower: __
   Depth of pump setting or intake: __ ft.
   Amount of water being pumped: __ gal./min. (For springs or flowing wells, see item 10)
   Total measured quantity used per calendar year: __ gal.
   * If these amounts exceed permitted amount an enlargement is required.

10. FLOWING WELL OR SPRING (Owner is responsible for control of flowing well)
    If intake flow or spring yield is __ gal./min. * Surface pressure is __ lb./sq. in., or __ feet of water
    The flow is controlled by __ Valve __ Cap __ Plug
    Does well leak around casing? __ Yes __ No

Permit No. U.W.: 183361
Book No.: 1329
Page No.: 61

SEE REVERSE SIDE
11. IF SPRING, HOW WAS IT CONSTRUCTED? (Some method of artificial diversion, i.e., spring box, cribbing, etc., is necessary to qualify for a water right)

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

12. PUMP TEST Was a pump test conducted? Yes  No

Yes  No

<table>
<thead>
<tr>
<th>if so, by whom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yield gal/min. with ft. drawdown after hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yield gal/min. with ft. drawdown after hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

13. LOG OF WELL Total depth drilled ft.

<table>
<thead>
<tr>
<th>Depth of completed well ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter of well inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth to first water bearing formation ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth to principal water bearing formation Top ft. to Bottom ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**DRILL CUTTINGS DESCRIPTION**

<table>
<thead>
<tr>
<th>From Feet</th>
<th>To Feet</th>
<th>Rock Type or Description</th>
<th>Formation</th>
<th>Water Bearing? (Yes or no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Surface</td>
<td>Not Available</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. DOES A GEOPHYSICAL LOG ACCOMPANY THIS FORM? Yes  No

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. QUALITY OF WATER INFORMATION

Does a chemical and/or bacteriological water quality analysis accompany this form? Yes  No

Yes  No

<table>
<thead>
<tr>
<th>If not, do you consider the water as</th>
<th>Good</th>
<th>Acceptable</th>
<th>Poor</th>
<th>Unusable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS**

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct, and complete

Signature of Owner or Authorized Agent

Date

FOR STATE ENGINEER'S USE ONLY

Permit No. U.W. 180361

Date of Receipt 06/10/2012 Date of Approval 10/29/2007

Date of Priority 06/13/2007

Cheryl Unglaub, for State Engineer

Dewey-Burdock GDP
June 2012
3.7-B-159 Appendix 3.7-B
### SOUTH DAKOTA WATER WELL COMPLETION REPORT

**Location:** SW NW 1/4 Sec 65 T5 S E

**Well Completion Date:** Jan 98

**Location:**
Distance from nearest potential pollution source (septic tank, abandoned well, fuel lot, etc.) ft. from **NONE** (identity source).

**PROPOSED USE:**
- Domestic/Stock
- Municipal
- Business
- Test Holes
- Irrigation
- Industrial
- Institutional
- Monitoring well

**METHOD OF DRILLING:** Air Rotary

**CASING DATA:**
- Steel
- Plastic
- Other

- Pipe Weight: 200 LB/FT
- Diameter: 5 IN
- From: 0 FT
- To: 140 FT
- Hole Diameter: 7 1/8 IN

**GROUTING DATA:**
- Cement Type: Lime
- Weight: 750 lb/gal
- From: 0 FT
- To: 140 FT
- Grouting Procedure: PUMPED

**SCREEN:**
- Perforated pipe
- Manufactured
- Diameter: 3 1/2 IN
- Length: 160 Feet
- Material: PVC
- Slotted Size: 3/5
- Set From: 00 Feet to: 140 Feet

**STATIC WATER LEVEL:** 0 Feet

**WELL TEST DATA:**
- Pumped
- Describe: Air lift 15:20

**Pumping Level Below Land Surface:**
- ft. After 1 Hrs. pumped: 00 GPM
- ft. After 7 Hrs. pumped: 00 GPM

**REMARKS:**
- This well was drilled under license 1603
- And this report is true and accurate.

**Signature of License Representative:**

**Signature of Well Owner or Enterprise Property Holder:**

**Date:** January 20, 1999

---

**Well Owner:** Don Spencer

**Address:** 125 59 Box 74

**Formation:**
- Muddy Shale: 0 to 80 FT
- Newcastle Sand: 80 to 140 FT

---

**Additional Notes:**
- Laboratory sent to for water quality analysis
- NO, Why Not?
WATER PERMIT NO. 1984-2

MAP No. Same

<table>
<thead>
<tr>
<th>Name of Applicant</th>
<th>Burlington Northern RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Office Address</td>
<td>Box 597, Alliance, Neb.</td>
</tr>
<tr>
<td>Amount of Water Claimed</td>
<td>0.17 yr</td>
</tr>
<tr>
<td>Source of Water Supply</td>
<td>Ground water (one well = 250 gal)</td>
</tr>
<tr>
<td>Water to be used for</td>
<td>Sanitary purposes in maintenance building, Valley County, Chase</td>
</tr>
<tr>
<td>About</td>
<td>23 miles SW of Alliance</td>
</tr>
<tr>
<td>PROOF OF PUBLICATION:</td>
<td>Received April 14, 1986, Not Received</td>
</tr>
<tr>
<td>APPLICATION:</td>
<td>Approved May 14, 1986, Subject to</td>
</tr>
<tr>
<td>F.F. &amp; C.L. Adopted</td>
<td>Not Approved, Deferred</td>
</tr>
<tr>
<td>PRIORITY</td>
<td>Date Received 1-27-86, Fee $150.00, Remarks</td>
</tr>
<tr>
<td>Corrected Application Received</td>
<td>Period of Annual Use Jan 1 to Dec 31</td>
</tr>
<tr>
<td>WATER QUALITY APPROVAL RECEIVED</td>
<td>N.A., APPROVED/CONDITIONAL (Circle one)</td>
</tr>
<tr>
<td>WI-1 Description same as Application</td>
<td>YES NO</td>
</tr>
<tr>
<td>REMARKS</td>
<td></td>
</tr>
<tr>
<td>Diversion Point</td>
<td>NE corner section 18 T6S R1E</td>
</tr>
<tr>
<td>Land to be irrigated</td>
<td>N.A.</td>
</tr>
<tr>
<td>Well Log: Driller</td>
<td>Ruby Dalk, Licensed YES X NO</td>
</tr>
<tr>
<td>Depth of Well</td>
<td>250 ft.</td>
</tr>
<tr>
<td>Type of Map</td>
<td>Plat.</td>
</tr>
<tr>
<td>PREPARED BY</td>
<td>Burlington Northern</td>
</tr>
<tr>
<td>Review and the Number assigned on</td>
<td>Feb. 5, 1986</td>
</tr>
<tr>
<td>By</td>
<td>L.C. Simon</td>
</tr>
</tbody>
</table>
Application For Permit To Appropriate Water Within The State Of South Dakota

Check use of water: Industrial [ ] Commercial [ ] Municipal [ ] Other Common Distribution System [ ] Rural Water System [ ] Suburban Housing [ ] Geothermal Heat [ ] Institutional [ ] Recreational [ ] Domestic [ ] (above 18gpm) Other [ ]

Type of Application: Check one or more of the following

- New [ ] Vested Right [ ] Future Use [ ] Change Use [ ]
- [ ] Amend Permit No. [ ] with old priority date retained
- Change diversion point(s) [ ] Add diversion point(s) [ ] Other [ ]
- Application to: Change diversion point(s) [ ] Add diversion point(s) [ ] on Permit No. [ ]
- Construction to use water reserved by Future Use Permit No. [ ]

1. Name of Applicant: Burlington Northern R.R. Co.
   Phone No. Ext: 2238
   Post Office Address: Box 597, Alliance, NE 69310
   Zip Code: (Street, RR or Box)

2. Amount of water claimed (c.f.s) 75 gpm (0.17 cfs)

3. Source of water supply: Ground water

4. Location of point of diversion: SWNE NE 1/4 section 18 T6S-R1E

   County: Custer

5. Counties where water will be used: Custer

6. Annual period during which water is to be used: January 1 until December 31

7. Give a brief description of proposed project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

   Installing 12' X 48' modular Bldg. at Dewey, S.D. as headquarters for track gangs and signal maintainer. Will include 1-lavatory, 1-water closet with tank and 1-Electric water cooler. Water use will be very minimal

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

STATE OF SOUTH DAKOTA
County of ________________

I, Burlington Northern Railroad Co. __________________________________________, the applicant, certify that I have read the foregoing application, have examined the attached map and that the matters herein stated are true and that I intend, and am able to complete the necessary construction.

Signed __________________________________________

Subscribed and sworn to before me this 30th day of December, 1975

Kathy J. Huber
Notary Public (or other qualified officer)
The Water Management Board hereby approves Water Permit Application No. 1954-2

Burlington Northern R.R. Co. Box 597, Alliance

NE 69301

With the following qualifications.

The well casing shall be pressure grouted with cement (bottom to top) above the water producing formation (Fall River) and construction shall be in compliance with Water Management Board Well Construction Rules, Chapter 74:02:04.

The well approved under this Permit shall be valved and the flow reduced to the amount needed or to a minimum when not being used. The well shall also be equipped with a pressure gauge and a record kept of any pressure fluctuations. Such records shall be available to the Chief Engineer upon request. If this well is abandoned or the Permit cancelled, the well must be plugged in accordance with rules of the Water Management Board.

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

Date of first receipt of application

January 27, 1986

Date of return to applicant for correction, amendments or changes required

January 28, 1986

Date of receipt of corrected application

Feb 3, 1986

Approved

May 14, 1986

The Water Management Board hereby approves this Water Permit No. 1954-2 authorizing the construction of the water use system and the placing of water to beneficial use as stated in the Application and as qualified in the Water Permit approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is

January 27, 1986

2. The equivalent of at least one-fifth of the specified work is to be completed on or before

October 14, 1986

3. The whole of said work is to be completed on or before

May 14, 1987

4. The limit of time from proof of beneficial use of water appropriated in accordance herewith is

May 14, 1985

5. The water appropriated shall be used for the purpose of

Sanitary use in a

Maintenance building

6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be unlawfully impaired by this appropriation.

7. The amount of the appropriation herein granted shall not exceed 17 cubic feet per second; neither shall it exceed the capacity of the above described water supply system nor shall it exceed the amount of water needed for beneficial uses served and to which water is actually and beneficially applied for commercial use on or before May 14, 1995; said water to be used during the following described annual period:

Jan 1 - Dec 31

WATER MANAGEMENT BOARD

By: (Signature)

Chief Engineer

Division of Water Rights

Dept. of Water and Natural Resources

JUN 20 1986
1. Well Information - Proposed construction  

   a) Drill Hole Diameter: 8 3/4 in.  
      Depth: 200 ft.  

   b) Casing Type: PVC  
      Diameter: 6 in.  
      Thickness: SCH 200  

   c) Screen Type: PVC  
      Diameter: 4 in.  
      Thickness: SCH 200  

   d) Gravel Pack Thickness: NO  
      Length of Gravel Pack: NO  

   e) Depth to Top of Water Bearing Material: TOP OF FAU RIVER  
      Top of LAKOTA 200 ft.  

   f) Depth of Water (ground surface to water level): WELL WILL BE ARTESIAN  
      GAME 40 GPM  

   g) Distance to nearest existing domestic well: 300 ft.  

   On applicant's property:  

2. Dugout Information Estimates  

   a) Surface Dimensions:  
      Depth:  

   b) Depth to water (ground surface to water level):  

3. Water Storage Dams  

   If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.  

   a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address:  

   b) Freeboard:  

   c) Crest Width:  
      Crest Length:  

   d) Height:  

   e) Outlet Dimensions:  
      Pipe diameter:  
      Spillway width:  

   f) X & Y Slope:  
      Upstream:  
      Downstream:  

   Surface Area of Impoundment:  

   Storage: acre feet  

   Drainage area above dam:  

[Diagram of water dam with dimensions labeled]  

---

Signature of Applicant: P. L. Werson for B. Jr. R.R.
**Diagram:**

- **Skull Creek**
- **Fall River**
- **L'akota**

- 6" x 3" Scour Flume to Control Flow
- 6" PVC Well Casing (PVC) Surface to Top of L'Akota
- 32' x 8' Drain Hole
- 80-100 ft. of 6" well casing
- 4" Scoured Well Screen
- Top of Aquifer
- 6" Drill Hole Through Aquifer

---

**Notes:**

- Drain Hole 1/2" Diameter
- 8' x 32' Drain Hole
- 6" Well Casing (PVC) Surface to Top of L'Akota
- 32' x 8' Well Casing

---

**References:**

- Dewey-Burdock GDP
- June 2012
- Appendix 3.7-B
RECEIPT
Division of Water Rights
South Dakota Department of Water and Natural Resources

Pierre, 19

RECEIVED OF

the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. 1954-6 to Appropriate Water, to construct works and to put water to beneficial use

Fee for Application for Permit No. 1954-6 to Appropriate Water for Future Use

Fee to retain Future Use Permit No. 1954-6 after period of seven years.

Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No.

Fee for Filing Transfer Form

Fee for Filing Extension Request

Fee for Certified Copy of

Fee for Print Copy of Map

Fee for Certifying

Fee for (Any Other Work Provided by Law)

Total

By

Chief Engineer
Burlington Northern RR Co.
ATTN: R.L. Wolzen
Box 597
Alliance NE 69301

Mr. Wolzen:

I am in receipt of your water permit application in Custer County. Before we can complete processing of your application we will need:

1. The amount of water you plan on utilizing from the well.

2. A filing fee based on water use. 0-45 gpm $50.00
   45-75 gpm 150.00
   75-150 gpm 225.00

When we receive the above information we can continue to process your application. If you have any questions, please contact this office.

Thank you,

KEVIN C LARSON
Natural Resources Engineer

KCL:ks
RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT

APPLICATION No. 1954-2, Burlington Northern Railroad

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Water Permit Application No. 1954-2, Burlington Northern Railroad, Box 597, Alliance NE.

The Chief Engineer is recommending APPROVAL of Application No. 1954-2 because 1) there is reasonable probability that there is unappropriated water available for the applicant’s proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualifications:

1. The well casing shall be pressure grouted with cement (bottom to top) above the water producing formation (Fall River) and construction shall be in compliance with Water Management Board Well Construction Rules, Chapter 74:02:04.

2. The well approved under this Permit shall be valved and the flow reduced to the amount needed or to a minimum when not being used. The well shall also be equipped with a pressure gauge and a record kept of any pressure fluctuations. Such records shall be available to the Chief Engineer upon request. If this well is abandoned or the Permit cancelled, the well must be plugged in accordance with rules of the Water Management Board.

3. The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner, under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

See the attached report for additional information.

JOHN HATCH, Chief Engineer
March 10, 1986
Application No. 1954-2 proposes to appropriate 0.17 cfs from one well approximately 250 feet deep, located in the SW1/4 NE1/4 Section 18, T6S, R1E. Water will be used for sanitary purposes in a maintenance building.

Aquifer: Fall River Sandstone – Inyan Kara Group

The Fall River Sandstone is the youngest member of the lower Cretaceous aged Inyan Kara Group. The Fall River overlies the Fuson Shale member of the Lakota Formation. The Fuson acts as a leaky aquitard between the Fall River and Lakota aquifers. However, an aquifer test conducted approximately 5 miles south of the applicant’s proposed well site suggests a direct hydrologic connection between the Lakota Formation and the Fall River Sandstone. The Lakota is composed of a crossbedded channel-filled sandstone, shale, some localized limestone, and thin conglomerate lenses. The Fall River consists of well-bedded, fine-grained sandstone and less abundant interbedded siltstone and claystone. Conformally overlying the Fall River is the Skull Creek Shale, which acts as a confining bed.

The Inyan Kara underlies approximately 360,960 acres of Custer County and contains an estimated 8,121,600 acre-feet of recoverable water in storage (Allen, 1984). The average annual recharge to the Inyan Kara has not been quantified and the source has not been identified. Possible sources of recharge include: Meteoric water and downward leakage through the overlying shale; water taken in at the outcrop; and upward migration of water from the underlying Paleozoic Limestones, along solution collapses and breccia pipes associated with fractures. The Inyan Kara aquifers are under artesian conditions, and wells completed in the Fall River and Lakota flow in this area.

The Division of Water Rights does not monitor any observation wells in this area, and there are few domestic wells from which information can be obtained.

Review of Existing Permits

<table>
<thead>
<tr>
<th>Permit</th>
<th>Owner</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>0181-2</td>
<td>Grand Island &amp; Wyo Cent RR Co.</td>
<td>Sec 18, T6S, R1E</td>
</tr>
<tr>
<td>0182-2</td>
<td>Grand Island &amp; Wyo Cent RR Co.</td>
<td>Sec 15, T6S, R1E</td>
</tr>
<tr>
<td>0183-2</td>
<td>Grand Island &amp; Wyo Cent RR Co.</td>
<td>Sec 18, T6S, R1E</td>
</tr>
<tr>
<td>379-2</td>
<td>Henery C Hollenbeck</td>
<td>Sec 6, T6S, R1E</td>
</tr>
<tr>
<td>380-2</td>
<td>Darrel Hawthorne</td>
<td>Sec 17, T6S, R1E</td>
</tr>
</tbody>
</table>

Conclusions

1. Water is available for appropriation from the Inyan Kara in the area of the proposed well.

2. Because the amount of water requested is minimal, there will be no significant impacts on the water levels in the aquifer.
Application No. 1954-2

Page 2

3. The well should be constructed according to the Well Construction Standards of South Dakota, Chapter 74:02:04.

4. The three permits held by Grand Island and Wyoming Central Rail Road divert water from three springs located near the applicant's proposed well site. Review of the geologic map of the area indicates the source of the springs may be the Inyan Kara (Brobst, 1961). If the specific capacity of the well is low and the springs are located high on the potentiometric surface, interference could be a problem.

KENT BUHLER
Natural Resources Engineer

References


Instruction to Newspaper - Publish first publication of the following Notice on or before March 26, 1986

NOTICE OF HEARING on Application No. 1954-2 to Appropriate Water

No.

March 26, 1986

with 2nd publication 1 week later. The applicant is responsible for payment.

NOTICE OF HEARING on Application No. 1954-2 to Appropriate Water and/or to Amend Water Permit or Water Right No.

Notice is hereby given that Burlington Northern R.R., whose mailing address is Box 597, Alliance, Nebraska, South Dakota has made an application for a permit to appropriate 0.17 cubic feet per second from one well approximately 250 feet deep (Fall River Sandstone - Inyan Kara Group) located in the SW\NE Section 19-T6S-R1E. Water will be used for sanitary purposes in a maintenance building.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends APPROVAL of Application No. 1954-2 because 1) unappropriated water is available, 2) will be no unlawful impairment of existing rights, 3) is beneficial use of water and 4) is in the public interest.

This application will be considered by the Water Management Board at Joe Foss 

Building, 523 E. Capitol, Pierre, South Dakota, May 14, 1986 at 10:00 am.

The recommendation of the Chief Engineer is not final or binding upon the Board and the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application after it reaches a conclusion based upon facts presented at the public hearing. Any interested person who may be affected by a Board decision and who intends to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 46-1-29, must file a written petition with BOTH the applicant and the Chief Engineer by May 2, 1986. The petition may be informal, but it must include a statement describing the petitioner's interest in the application, the reasons for the petitioner's opposition to or support of the application, and the signature and mailing address of the petitioner or his legal counsel if legal counsel is obtained. The applicant need not file a petition.


This hearing is an adversary proceeding. The applicant or any person, after filing a petition, has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised. Decisions of the Board may be appealed to the Circuit Court and the State Supreme Court as provided by law.

Any person wishing a copy of the Chief Engineer's recommendation, further information on this application or to assure access to the hearing by the handicapped can contact the Water Rights Division, DWR, Joe Foss Bldg, Pierre SD (605 773-3352) for assistance prior to the hearing date. The time of the hearing will be automatically extended for at least twenty days upon written request of the applicant or any person who has filed a petition to oppose or support the application. The request for extension must be filed with the Chief Engineer by May 2, 1986.
Burlington Northern Railroad Company  
Box 597  
Alliance, Nebraska 59301

Dear Sir:

Enclosed herewith is your Water Permit No. 1954-2 as approved by the Water Management Board authorizing you to construct your water diversion system and the water to beneficial use, not exceeding the limits as specified in said Water Permit No. 1954-2.

Also enclosed is Form 10, Notice of Completion of Works and Application of Water to Beneficial Use, which you are to complete and submit to the Chief Engineer when you have completed the system and/or have put the water to beneficial use. An inspection can then be scheduled so that your Water License may be issued to you, thus completing your acquisition of a Water Right.

Very truly yours,

[Signature]

JOHN HATCH, Chief Engineer  
Water Rights Division

JH:135

closure

PLEASE NOTE: Certain changes can be made in your permit within the five year construction period, usually without affecting the priority date provided an application to amend your permit is made within the five year period—i.e. changes in location or number of diversion points (wells) or location of land to be irrigated. Well locations for wells into the same aquifer can be moved up to 660 feet without application.

Applications to amend a permit after the five year construction period will be assigned a new priority date. Applications to change water sources, to add lands or increase original diversion rates, if approved will usually receive the date of the new application as a priority date regardless of the five year construction period.
NOTICE OF COMPLETION OF WORKS AND/OR APPLICATION OF WATER TO BENEFICIAL USE

Post Office Alliance, NE.

Date July 2, 1984

TO: Water Rights
Joe Foss Building
Pierre, South Dakota 57501

Dear Sirs:

This is to inform you that I have completed the construction of the water diversion system and/or that I have put the water to beneficial use to maximum extent it is going to be used, not exceeding the amounts as specified in Water Right No. 1954-2.

Water Right Permit No. 1954-2 states that the diversion system is to be constructed by 1-30-86, and that the water is put to beneficial use by 2-30-86.

The diversion system was completed on 1-22-86. Applying the water to beneficial use was completed on 3-15-86.

You may schedule an inspection so that the Certificate of Construction and/or the Water License may be issued, thus completing my acquisition of a water right.

Pat Wagen
Burroughs Wayson RR.

(Signature)
SOUTH DAKOTA WATER WELL COMPLETION REPORT

Well Completion Date 10-10-15

Well Owner: BN Rail Road (BTR) R WOLSEN
Address: Box 97 Alliance N.D. 57301

Well Log:

<table>
<thead>
<tr>
<th>Formation</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sioux Creek Sand</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>Faux River</td>
<td>90</td>
<td>180</td>
</tr>
<tr>
<td>Purdon</td>
<td>180</td>
<td>230</td>
</tr>
<tr>
<td>Lakota Sand Form-Cay</td>
<td>230</td>
<td>240</td>
</tr>
<tr>
<td>Lakota Sand Form</td>
<td>240</td>
<td>330</td>
</tr>
</tbody>
</table>

Location: SW 1/4 Sec 18 Twp 65 N. Rd. 2

Method of Drilling:
ROTARY MUD.

Casing Data:

- Screen: Plastic
- If other describe:

Pipe Weight Diameter From To Inside Diameter
6
4.2 00 L/ft 6" 196 ft 84 kg
6
4.2 00 L/ft 4" 165 ft 76 kg
6
L/ft 4" 165 ft 76 kg
6
L/ft 4" 165 ft 76 kg
6
L/ft 4" 165 ft 76 kg

GROUT:
Type of Grout mix: YES

Static Water Level: 46' January 1829 Feet
If flowing, flow in pressure 8168 PSI
GPM Flow: 18 through 6" inch pipe

Well Test Data:

- Pumped
- Tested
- Other

Pumping Level Below Land Surface

- ft. After
- Hrs. Pumped
- GPM

Remarks:

- This well was drilled under license # N180
- This report is true and accurate

Dewey-Burdock GDP
June 2012

3.7-B-176

Appendix 3.7-B
SOUTH DAKOTA WELL AND TEST HOLE PLUGGING REPORT 10-85

Well Owner:
Name: Burlington Northern Santa Fe Railway
Address: 80-44th Ave NE, Minneapolis, MN 55421

Plugging completion Date: 7-31-98

CHECK APPROPRIATE BOX

EXISTING WELL [ ]  TEST HOLE [ ]

Well depth 340 ft
Casing material steel
Casing size(s) 8 5/8" O.D.
Casing condition good

Describe plugging procedure: Pressure grouted through raffia line.
Filled with cement grout bottom to top w/120 sacks.
Well is in a pit, top of casing at -4/16 pit filled in with native material

Describe grout or plugging material: Cement grout type I/II
gel. water/bag

Type of non-slip plug: None

This well or test hole was plugged under license # 331 And this report is true and accurate.

Drilling firm: Taylor Drilling

Signature of Licensed Representative: [Signature]

Signature of Well Owner: [Signature]

Date: [Date]
TRANSMITTAL LETTER

TO: Mr. Don Group  
Water Rights Section  
SD DEN R  

DATE: June 1, 2001

PROJECT NO

FROM: John W. Humes
Cordilleran Environmental Consultants, Inc.  
7230 W. Ellsworth Ave.  
Lakewood, CO 80226  
(303) 274-5583  
FAX (303) 274-9542

PROJECT NAME: Well Abandonment - Dewey, SD

RESPONSE REQUIRED: YES

WE ARE SENDING YOU VIA:

- EXPRESS COURIER
- MESSENGER SERV.
- U.S. EXPRESS MAIL
- HAND DELIVERY
- REGULAR MAIL
- OTHER

THE FOLLOWING:

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>NO. OF COPIES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>SD well and test hole plugging report</td>
</tr>
</tbody>
</table>

FOR YOUR APPROVAL THE FOLLOWING:  
AS REQUESTED FOR REVIEW AND COMMENT

FOR YOUR INFORMATION

OTHER

REMARKS

Cordilleran Environmental Consultants, Inc.
MEMO

To:       File
From:     Donald E. Stroup, DENR Natural Resources Project Engineer
Subject:  Permit # 1954-2

I spoke with Burlington Northern Santa Fe Railway personnel at Alliance, NE and Edgemont, SD concerning the use of the well at their Dewey, SD depot. I was advised by the Train Master, Kenny White, at Edgemont that the depot was closed and the well was plugged. I requested and received the attached SD Well and Test Hole Plugging Report from Cordilleran Environmental Consultants. This permit can be cancelled.
NOTICE OF CANCELLATION

TO:       R L Wolzen, Burlington Northern Railroad Company  
           PO Box 597, Alliance, NE 69301

FROM:     Ron Duvall, Natural Resources Engineer  
           for Garland Erbele, Chief Engineer  
           Water Rights Program

SUBJECT: Cancellation of Water Permit No. 1954-2

Water Permit No. 1954-2 authorizes diversion of ground water for sanitary purposes in the maintenance building at the Dewey, South Dakota railroad depot. On June 11, 2001, Don Stroup, a staff engineer with our program, met with railroad personnel from Alliance, NE and Edgemont, SD concerning the use of the well at the depot. Don was advised by Kenny White at Edgemont that the depot was closed and the well had been plugged. The Chief Engineer of the Water Rights Program is recommending cancellation of Water Permit No. 1954-2, due to abandonment and/or forfeiture.

The Water Management Board will consider cancellation of Water Permit No. 1954-2 at 10:00 am, December 5, 2001, in the Floyd Matthew Training Center, Joe Foss Building, 523 E Capitol, Pierre, SD.

The recommendation of the Chief Engineer is not final or binding upon the Board. The Board is authorized to 1) cancel, 2) cancel portions of, 3) delay action on, or 4) take no action on Water Permit No. 1954-2 based upon facts presented at the public hearing. Our records show you to be the owner of property covered by this water permit. If you wish to oppose the cancellation and if you intend to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 1-26, you must file a written petition with the Chief Engineer by November 26, 2001. The petition may be informal, but it must include a statement describing the reasons for your opposition to the cancellation, and your signature and mailing address or your legal counsel if legal counsel is obtained. The Board may consider any abandoned or forfeited water to be available for appropriation subject to the provisions of SDCL 46-1, 46-2, 46-2A and 46-5.

The hearing(s) will be conducted pursuant to the provisions of SDCL 46-1-1 thru 46-1-10, 46-1-14 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-17; 46-5-36, 46-5-37, 46-5-37.1; 46-2A-1 thru 46-2A-7; and Board Rules ARSD 74:02:01:36 thru 74:02:01:41. These are contested cases pursuant to procedures contained in SDCL 1-26.
October 22, 2001
Burlington Northern Railroad Co
Page 2

These hearings are adversary proceedings. Any party has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law.

The time of the hearing will be automatically extended for at least twenty days upon your written request to the Chief Engineer after a petition has been filed to oppose the cancellation. If an extension is requested, the hearing on the cancellation will be continued until the next regular Board Meeting. Any request for extension must be filed with the Chief Engineer by November 26, 2001.

Prior to November 26, 2001, contact the Water Rights Program, Joe Foss Building, 523 E Capitol, Pierre, SD (605-773-3352) if assistance is needed with the following: 1) further information on the proposed cancellation; 2) to assure access to the meeting room for the handicapped; or 3) to obtain an interpreter for the hearing impaired.
RECOMMENDATION OF CHIEF ENGINEER

FOR WATER PERMIT NO. 1954-2, BURLINGTON NORTHERN RAILROAD COMPANY

Pursuant to SDCL 46-2A-2 and 46-5-37.1, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit No. 1954-2.

The Chief Engineer is recommending cancellation of the above Water Permit due to abandonment and/or forfeiture. An investigation by Donald Stroup, June 11, 2001, found the well at the Dewey, SD depot had been plugged and the depot was closed.

RON DUVALL, Natural Resources Engineer
for Garland Erbele, Chief Engineer
October 22, 2001
December 7, 2001

NOTICE

R L Wolzen
Burlington Northern Railroad Company
PO Box 597
Alliance, NE 69301

Dear Mr. Wolzen:

This will notify you that the Water Management Board cancelled Water Permit No. 1954-2 on December 5, 2001. The water permit had authorized use of ground water for sanitary purposes in the maintenance building at the Dewey, South Dakota railroad depot.

This action was taken under the conditions outlined in our notice to you dated October 22, 2001. If you have any questions concerning the Board action, please contact Genny McMath, with our program, at (605) 773-3352.

Sincerely,

Garland Erbele
Chief Engineer
Water Rights Program
WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

Well Owner:
Name: Silver King Mines
Address: St. Ignatius, SD

Well Location:
Mark location with an "X":

Horizontal Distance:

Vertical Distance:

County: 
Quarter Section:
Township:
Range:

Proposed Use:

- Domestic
- Municipal (Test Holes)
- Irrigation
- Industrial
- Stock Water

Method of Drilling:

- Forward Rotary
- Bored
- Jetted
- Reverse Rotary
- Cable
- Other

Well Construction:

- Diameter of Hole: 15"
- Depth:
- Casing: Steel
- Concrete
- Plastic
- Other

- Was casing end left open: No
- Was a well screen installed: Yes

Describe Well Screen:

- Diameter: 2/3" Material:

- Slot size:

- Was well gravel packed: Yes
- Was well grouted: Yes
- Was water sample taken: Yes

Remarks:

Water Level Information:

- Static water level 34 ft below land surface
- If flowing: closed in pressure
- Rate of flow
- Controlled by:
  - Valve
  - Reducers
  - Other

- If other; specify:

Well Test Data:

- Pumped:
  - Bailed: Describe: bailed 7 hrs.
  - Other: air lifted 3 hrs.

- Pumping Level Below Land Surface:

- ft: After Hours Pumped GPM
  - 0

Well Log:

<table>
<thead>
<tr>
<th>Formation</th>
<th>From</th>
<th>To</th>
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<tr>
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<td>Skull Creek</td>
<td>200</td>
<td>447</td>
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<td>Tall River</td>
<td>447</td>
<td>529</td>
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<td>Fusion</td>
<td>529</td>
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<td>546</td>
<td>890</td>
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<tr>
<td>Morricon</td>
<td>890</td>
<td>1000</td>
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</tbody>
</table>

(Use Back if Necessary)

Date Completed: 10-27-81

Driller: Forward Drilling
Driller's or Firm's Name: Line 2
License NO.: Line 3

Address: 2003 Lincoln, Hot Springs, SD

Signed By: Title: T. K. Tefertiller
Date: 1-2-81
of

2.76 Red, silty shale streaks of Cyp.

76 - 95 Red, silty shale streaks of Cyp.

259 - 394 Red, silty shale

441 - 442 Red, light lavender limestone

442 - 482 Red, lavender, limy shale

458 - 495 Red, silty shale

496 - 498 White Cyp., streaks of red, gray

502 - 546 Red, silty shale

547 - 574 White, streaks of pink limestone

576 - 580 Red, silty shale, blot chert, etc.

580 - 584 Red, muddy shale

584 - 601 Pink, limy shale

671 - 672 White, M. Pink sand

570 - 594 Anti, hydrite, white

592 - 641 Pink, limy shale, laminated limestone

641 - 679 Pink sand, shale

679 - 647 White limestone, light sandy

647 - 723 Gray, shaly sand

723 - 727 Gray, shaly sand

727 - 747 Gray, shaly sand

747 - 749 Gray, shaly sand

Cased with 60 ft. 3 in. black pipe

Connected 40 gal. Sketch: cement 21,000 lbs.
NOTICE OF WELL CONSTRUCTION

Custer

Location of well  
No. 1/4 NE 1/4  
Section  25  
Township  65  
Range  1

Well owner  
Silver King Mines  
Box 49  
Edgerton, South Dakota  57735

Date well drilling completed  7-14-80  
Purpose of well observation

Well Log

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description of layer</th>
<th>Depth to top of water producing sand</th>
<th>Depth to static water level</th>
<th>Name of producing aquifer (if known)</th>
<th>Total depth of drill hole</th>
<th>Depth to bottom of casing</th>
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</thead>
<tbody>
<tr>
<td>5-550</td>
<td>silt &amp; mud</td>
<td>800</td>
<td></td>
<td>Lakota</td>
<td>860</td>
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<td>550-599</td>
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<td>4½&quot; OD. Sch 40</td>
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<tr>
<td>700-707</td>
<td>mud &amp; clay</td>
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<td>60 ft. open hole</td>
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<td>820-864</td>
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<td>shut in pressure 3160 psi</td>
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<td>846-860</td>
<td>packed</td>
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</table>

(2) PUMP INSTALLATION

Company name and type of pump ____________________________  HP. ________
Type of pump ____________________________  Capacity of installed pump ________ G.P.M.
Depth of pump placement ____________________________ ft. Date of pump installation __________

(3) WATER SURFACE MEASURING TUBE

On some wells, an air-tight water surface measuring tube is required. See Section 48.408 of Chapter 48A, MINIMUM WELL CONSTRUCTION STANDARDS.

Show exact vertical length of water surface measuring tube, when installed ________ ft., tube diameter ________

Name of pipe installation contractor ____________________________
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<td>Elevation</td>
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<td>Information</td>
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<td>Details</td>
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<table>
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<th>1st water</th>
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<td>drilling water</td>
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<td>well flow sign of demand</td>
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<td>table deceased rate of well form a bottom. Possibly</td>
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<td>expected in many do arg that it does not</td>
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<td>show</td>
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---

Dewey-Burdock GDP
June 2012

3.7-B-187
Appendix 3.7-B
River Tubbs  
Feb. 4, 1977

Faul River County Sec. 29 Twp. 75 Range 18

Total Depth 40'  Static 26'
"la. 30"

-3" to soil
3-5" sand
24-28" gravel
34-40" blue chalco
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</tbody>
</table>
SOURCE D

SOUTH DAKOTA OIL AND GAS RECORDS
### Well Information

- **API No:** 40 047 20045  
- **County:** FALL RIVER
- **Well Name:** PETRO LEWIS 5-22 PETERSON  
- **Location:** SWNW 22-7S-1E
- **Permit No:** 606  
- **Total Depth:** 2545
- **Operator Name:** PETRO-LEWIS CORPORATION  
- **Bottom Hole:** Minnelusa
- **Permit Date:** 10-21-1970  
- **KB Elevation:** 3542
- **Spud Date:** 11-17-1970  
- **Ground Elevation:** 3534
- **Plug Date:** 11-27-1970  
- **Latitude:** 43.429484  
- **Longitude:** -103.992869
- **Well Field:** WILDCAT  
- **Status:** P&A
- **Class:** DRY HOLE  
- **Type:** DRY HOLE

### Formation Tops

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft)</th>
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<tbody>
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<tr>
<td>Lakota</td>
<td>452</td>
</tr>
<tr>
<td>Morrison</td>
<td>760</td>
</tr>
<tr>
<td>Sundance</td>
<td>848</td>
</tr>
<tr>
<td>Goose Egg</td>
<td>1441</td>
</tr>
<tr>
<td>Spearfish</td>
<td>1704</td>
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<td>Minnetaha</td>
<td>1704</td>
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<tr>
<td>Opeche</td>
<td>1738</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1815</td>
</tr>
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<td>1838</td>
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<tr>
<td>Red Marker</td>
<td>2237</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>2353</td>
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</table>
Hydro 10 3
2
of 69

COUNTY: FALL RIVER
LEGAL LOCATION: SWNW 22-7N-1E
API NO: 40 047 20045
PERMIT NO: 606
WELL NAME: PETRO-LEWIS #5-22
OPERATOR: PETRO-LEWIS CORPORATION
PERMIT ISSUED: 10/21/1970
PERMIT CLOSED: 12/29/1971
FILE LOCATION: 7N-1E-12 SWNW

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY /
CHECKLIST
Well History

Well Name: Petro-Lewis #5-22 Peterson
Permit No.: 606

Location: SSW 22-7S-1E Fall River
Date of Permit: 10-21-70

Elev.: 3534' Gr.
API No.: 40 047 20945

Logs Received: Dual Induction-Laterlog, Sonic-Gamma Ray
Cuttings Received: Cores Received:

Drill Stem Records:

Cap Plug and Marker Set:
Surface Restored:
Plugging Affidavit Signed: Date:

Bond Released: YES Date: 12-29-71

Summary of Scout Reports
11-27-70 FVS Logging. Drilled to T.D.
6-21-71 W.L Site Approved.
WELL HISTORY

Well Name: Peter Lewis #5-22 Petersen

Location: 22-7-1E

Elevation: 3542 ft

Confidential: Yes

Logs Received: Dual Ind, Sonic Gamma - Ray Sample

Cuttings Received: 24,000

Drill Stem Records: Rcv'd Date: 12-8-70

Cap Plug and Marker Set: Approved June 23, 1971

Surface Restored: Approved June 23, 1971

Plugging Affidavit Signed: Date:

Bond Released: Date:

Summary of Scout Reports:

No Cutting 29 Apr 1971
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

<table>
<thead>
<tr>
<th>DRILL</th>
<th>DEEPEN</th>
<th>PLUG BACK</th>
<th>SINGLE ZONE</th>
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<tbody>
<tr>
<td>OIL WELL</td>
<td>GAS WELL</td>
<td>MULTIPLE ZONE</td>
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</tr>
</tbody>
</table>

PETRO-LEWIS CORPORATION

12th Denver Club Building, Denver, Colorado 80202

1980' FNL, 660' FNL, SW-NW Section 22, T7S, RIE
Fall River County, South Dakota

NAME AND ADDRESS OF SURFACE OWNER

Mrs. M. Lenore Peterson

NAME AND ADDRESS OF CONTRACTOR

Will follow

IF ESTATE PURCHASED WITH ANY WELLS DRILLED, FROM WHOM PURCHASED (Name and address)

PROPOSED CASING AND CEMENTING PROGRAM

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECONDHAND</th>
<th>DEPTH</th>
<th>BAMS OF CEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-1/4&quot;</td>
<td>8-5/8&quot;</td>
<td>24&quot;</td>
<td>New</td>
<td>165'</td>
<td>Minimum To Surface</td>
</tr>
</tbody>
</table>

We propose to drill this well with rotary tools to a approximate depth of 2490' to test the Leo Sand. If commercial production is encountered a 5-1/2" 00

Certified Surveyors plat attached (3 copies)
Blanket drilling bond #1672873

INSTRUCTIONS

General: This form is designed for submitting proposals to perform certain well operations, as indicated, on all types of lands and leases for appropriate action by either a Federal or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Consult applicable Federal or State regulations, or appropriate officials, concerning approval of the proposal before operations are started.

If the proposal is to drill to the same reservoir as a different subsurface location or to a new reservoir, use this form with appropriate modifications.

If the well is to be or has been, directionally drilled, on state and show by attached sheets, if necessary, the coordinate location of the hole in any present or objective productive zones.

File 2 copies of this form with Secretary, Oil & Gas Board, Pierre.
I hereby certify that this plot is an accurate representation of a correct survey showing the location of No. 121 Driftwood Area.  

Date:  July 20  

Licensed Land Surveyor No. 1212 PE  
State of South Dakota
ORGANIZATION REPORT

Full Name of the Company, Organization, or Individual: Petro-Lewis Corporation

Post Office Address (Box or Street Address): 1200 Denver Club Building, Denver, Colorado, 80202

Plan of Organization (State whether organization is a corporation, joint stock association, firm, or partnership, or individual): Corporation

If a corporation, give name and address of previous organization:

If foreign corporation, give State where incorporated:

May 28, 1970

Executed this 7th day of October, 1970

State of Colorado

County of Denver

R. J. Doubek, Signature of Affiant, R. J. Doubek

Before me, the undersigned authority, on this day personally appeared R. J. Doubek, known to me to be the person whose name is subscribed to the above instrument, who being by me duly sworn on oath states, that he is duly authorized to make the above report and that he has knowledge of the facts stated herein, and that said report is true and correct.

Subscribed and sworn to before me this 7th day of October, 1970.

Notary Public, in and for

County, Colorado

DO NOT WRITE BELOW THIS LINE
**Current Officers of the Corporation:**

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Street Address</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Jerome A. Lewis</td>
<td>3680 South Downing</td>
<td>Englewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Don E. Mettler</td>
<td>5741 East Nassau Place</td>
<td>Englewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Dwight C. Moorhead</td>
<td>1437 South Fairfax</td>
<td>Denver</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>David A. Frawley</td>
<td>7343 E. Jefferson Drive</td>
<td>Denver</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Hal H. Wolfe</td>
<td>800 Lotus Way</td>
<td>Broomfield</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Herbert G. Allen</td>
<td>2195 Urban Drive</td>
<td>Lakewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Jim H. Hanlon</td>
<td>3162 South Gaylord</td>
<td>Englewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Secretary-Treasurer</td>
<td>Robert B. Huffman</td>
<td></td>
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**Current Directors of the Corporation:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Street Address</th>
<th>City</th>
<th>State</th>
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</thead>
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<tr>
<td>Jerome A. Lewis</td>
<td>3680 South Downing</td>
<td>Englewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Don E. Mettler</td>
<td>5741 East Nassau Place</td>
<td>Englewood</td>
<td>Colorado</td>
</tr>
<tr>
<td>Ted P. Stockmar</td>
<td>15 Cherry Street</td>
<td>Denver</td>
<td>Colorado</td>
</tr>
<tr>
<td>W. Dale Schoenweiler</td>
<td>5212 Indiana</td>
<td>Fort Wayne</td>
<td>Indiana</td>
</tr>
<tr>
<td>Cortlandt S. Dietler</td>
<td>888 Logan Street</td>
<td>Denver</td>
<td>Colorado</td>
</tr>
<tr>
<td>Carl R. Erpf</td>
<td>960 Park</td>
<td>New York</td>
<td>New York</td>
</tr>
<tr>
<td>James W. Vickers</td>
<td>346 North</td>
<td>Wichita</td>
<td>Kansas</td>
</tr>
</tbody>
</table>
WELL INSPECTION / SCOUT REPORTS
SCOUT REPORT
South Dakota Geological Survey

Number: 2

Date Scouted: 6-21-71

Operator: Petro-Lewis

Permit Number: 506

Farm/Lease Name: #5-22 Peterson

API Number: 40 047 00045

Sec., T., R.: Fall River, County


County

Contractor: Al. Schlaikjer

Geologist: Al. Nelson

WORK IN PROGRESS:

DEVELOPMENTS SINCE LAST VISIT:

FORMATION TOPS:

PLUGGING RECORD: Date Plugged: 11-27-70

CASING RECORD:

4 1/2 From 0 To 367 Feet

From To Feet

From To Feet

From To Feet

REMARKS:

Site approved, converted to water well, good running well. Area restored and policed.

SCOUTED BY: Ross Lamphere, Ass't. Geologist

Fred V. Steese, Principal Geologist

Dewey-Burdock GDP
June 2012

3.7-B-204

Appendix 3.7-B
**SCOUT REPORT**
South Dakota Geological Survey

Operator: Petro-Lewis
Farm/Lease Name: # 5-22 Peterson

**Number** 1
Date Scouted: 11-27-70
Permit Number: 506
API Number: 40 047 20045

**SWM** Sec. 22, T. 7S, R. 1E
County: Fall River

Elev. 3534 Geo.

Date Scouted: 11-27-70
Spudded: 11-18-70

**Operator:** Lewis

**Contractor:** A. L. Schlaikjer

**Geologist:** Al Nelson

**WORK IN PROGRESS:**
Logging

**DEVELOPMENTS SINCE LAST VISIT:**
Drilled to T.D.

**FORMATION TOPS:** (Al Nelson)

- Fall River: 324
- Fusion: 452
- Lakota: 489
- Morrison: 700
- Sundance: 848
- Lak: 866
- Basal Sund Sd: 1061
- Spearfish: 1174

**PLUGGING RECORD:**
Date Plugged: 11-27-70

- 40 sax—2410-2300 Leo
- 30 sax—1850-1750 Converse
- 30 sax—1130-1030 Basal Sand

**CASING RECORD:**

REMARKS:
Plugged back to Morrison, 1/2 casing ran to 367 and well completed as water well for Peterson farm; flow approx. 25.35 gal per min.

**SCOUTED BY:**
Fred V. Steece, Principal Geologist
PERMIT: 606 (10-21-70)  
API: 40 047 20045  
ELEV: 353 ft Ge 3542 KB  
CONTR: A.L. Schleisinger  
GEO: Al Nelson Edgemont  
ENG: M.J. Mepeters  
SPUD: 11-18-70 (115 BM)  
EST T.D: 2490  
CASING: 878-117  
CORES: None  
DST'S: 2381-2395  
LOGS: DIL & Sonic  
T.D: 3545 Dale 3544 Log  
PLUG: 11-27-70  

I called from Al Nelson saying well was started and that he would let us know when ready to plug. Said Petroleum plans 3 tests in Edgemont area.

Nelson called saying would be logging late tonight ready to plug in AM.
<table>
<thead>
<tr>
<th>Site</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>3rd Conv</td>
<td>26.76 -2094</td>
</tr>
<tr>
<td>4th Conv</td>
<td>21.59 -2165</td>
</tr>
<tr>
<td>Basal Con</td>
<td>222.6</td>
</tr>
<tr>
<td>Red Mark</td>
<td>223.7 -2247</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>23.52</td>
</tr>
<tr>
<td>Des Moines</td>
<td>24.16</td>
</tr>
<tr>
<td>TD</td>
<td>254.5 -Dell</td>
</tr>
<tr>
<td></td>
<td>254.4 - Log</td>
</tr>
<tr>
<td>Site Imp</td>
<td>Converted to 1420 well</td>
</tr>
<tr>
<td></td>
<td>Good running well</td>
</tr>
<tr>
<td></td>
<td>Horse in water</td>
</tr>
<tr>
<td></td>
<td>Not well drained</td>
</tr>
<tr>
<td></td>
<td>Horse immature</td>
</tr>
<tr>
<td>Speche</td>
<td>1738</td>
</tr>
<tr>
<td>Mimerom</td>
<td>1815</td>
</tr>
<tr>
<td>Corners</td>
<td>1838</td>
</tr>
<tr>
<td>Massie Hillside</td>
<td>1911</td>
</tr>
<tr>
<td>Beere</td>
<td>1902</td>
</tr>
<tr>
<td>2nd Conver</td>
<td>1961 - 1981</td>
</tr>
</tbody>
</table>
OPERATOR’S TECHNICAL REPORTS / MAPS
Contractor: A. L. Schlaikjer, Inc.
Rig No.: T
Spot: SM-NW
Sec.: 22
Twp.: 7 S
Rng.: 1 E
Field: Wildcat
County: Fall River
State: South Dakota
Elevation: 3531.1 (ground)
Length of D.C.: 520 ft
Formation: "2nd Lep" Sand
Type of Test: Straight

Flow #1: 45 Min. SI#1: 15 Min. Flow #2: 15 Min. SI#2: 15 Min.
Flow #3: 45 Min. SI#3: 45 Min. Flow #4: 45 Min. SI#4: 45 Min.
B. H. T.: 96°
Gravity: 9.0
Mod Wt.: 9.0
Viscosity: 60

RECOVERY IN PIPE

DID WELL FLOW - Gas: No
Oil: No
Water: No

110' Total fluid
60' Gas-cut mud with a sulphur smell = .29 Bbl.
80' Water with a sour of oil & sulphur smelling gas = .39 Bbl.

1st Flow - Very weak blow throughout period.
2nd Flow - Tool opened with a very weak blow (4" under water), remained for 10 minutes, then decreased to intermittent blow for remainder of test.
By-passed tool after 50 minutes (point "X") to see if it was plugged.

Well had 3" to 4" water flow from annulus throughout test. 3" fillup on bottom.

Breakdown of Shut-in curves not practical because of very bad stair-stepping on Shut-in curves, caused by tight formation.

TIGHT HOLE
**Fluid Sample Report**

<table>
<thead>
<tr>
<th>Date</th>
<th>11-25-70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Petro-Lewis Corp.</td>
</tr>
<tr>
<td>Well Name &amp; No.</td>
<td>Peternon #5-22</td>
</tr>
<tr>
<td>County</td>
<td>Fall River</td>
</tr>
<tr>
<td>DST No.</td>
<td>1</td>
</tr>
<tr>
<td>State</td>
<td>South Dakota</td>
</tr>
<tr>
<td>Sampler No.</td>
<td>02</td>
</tr>
<tr>
<td>Test Interval</td>
<td>2381-2395</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure in Sampler</th>
<th>11</th>
<th>PSIG</th>
<th>SHT</th>
<th>96</th>
<th>OF</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total Volume of Sampler</th>
<th>2150 cc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>2150 cc.</td>
</tr>
<tr>
<td>Oil</td>
<td>10 cc.</td>
</tr>
<tr>
<td>Water</td>
<td>2140 cc.</td>
</tr>
<tr>
<td>Mud</td>
<td>None cc.</td>
</tr>
<tr>
<td>Gas</td>
<td>None cu. ft.</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

**Resistivity**

<table>
<thead>
<tr>
<th>Water:</th>
<th>¼ @ 60° of Chloride Content</th>
<th>17,200 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Pit Sample:</td>
<td>2 ½ @ 60° of Chloride Content</td>
<td>2,550 ppm</td>
</tr>
</tbody>
</table>

**Gas/Oil Ratio**

**Gravity**

**Remarks:**

Where was sample drained: Big Floor
DISTRIBUTION OF FINAL DST REPORTS

Company Operating Well: Petro-Lewis Corp. Tkt. No. 0786

Lease: Peterson Well No. 5-22 Field: Wildcat

County: Fall River State: South Dakota Sec. 22 Twp. 7 S Rng. 1 E Spot SW-NW

DST. No. 1 Date of Test: 11-25-70 Interval Tested: 2381-2395

BE SURE AND SHOW CORRECT ADDRESS AND NUMBER OF COPIES. STATE ADDRESS TO WHICH ORIGINAL CHART WILL BE MAILED.

Original & 5 copies: Petro-Lewis Corp., 1224 Denver Club Bldg., Denver, Colo. 80202

2 copies: Amarillo Oil Co., Box 151, Amarillo, Texas 79105

1 copy: George Wulf, 611 Nat’l Bank Bldg., Casper, Wyo. 82601

1 copy: John Trotter, 311 Consolidated Royalty Bldg., Casper, Wyo. 82601

1 copy: Al Nelson, 408 Majestic Bldg., Denver, Colo. 80202

Our Tester _________________________ Approved by _________________________
GEOLOGICAL WELL REPORT

PETRO-LEWIS
#5-22 PETERSON

G SW NW SEC. 22, T. 7 S., R. 1 E.
FALL RIVER COUNTY, SOUTH DAKOTA

(Wildcat)
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<th>Page</th>
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<td>Log Formation Tops</td>
<td>6</td>
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<tr>
<td>Sample Lithologic Description</td>
<td>9</td>
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<td>Drill Stem Test</td>
<td>27</td>
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<tr>
<td>Log Calculations</td>
<td>29</td>
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<td>Hole Deviation Surveys</td>
<td>30</td>
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<tr>
<td>Bit Record</td>
<td>31</td>
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<tr>
<td>Drilling Progress Summary</td>
<td>32</td>
</tr>
</tbody>
</table>

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Dewey-Burdock GDP  
June 2012  
3.7-B-214  
Appendix 3.7-B
WELL DATA

LOCATION: 4620' from the East line and 1980' from the North line, C SW NW of Section 22, Township 7 South, Range 1 East, Fall River County, South Dakota.

ELEVATION: 3534 ground (before and after grading). 3542 kelly bushing (7.6' from ground to K.B.). (Surveyed by Powers, 7-24-70).

TYPE WELL: Wildcat (Driftwood Canyon Prospect).


COMPLETION DATE: Approximately 5:00 P.M., November 27, 1970 (Finished plugging).

CASING RECORD: Ran 4 joints of new 8 5/8" surface casing, totalling 167', 8 round, 20 pound. Cemented with 100 sax regular cement with 3% Calcium chloride (Plug down at 10:15 A.M., November 18, 1970. Cement circulated). Pipe set at 177 K. B.

TOTAL DEPTH: 2545 Driller.
               2544 Schlumberger.

DEEPEST FORMATION PENETRATED: Pre-Second Leo Sand (Des Moines or older).

DEPTH DATUM: 3542 K. B.

WELL STATUS: Plugged and abandoned (Landowner ran pipe into Dakota Sand to complete as flowing water well from Dakota-Lakota).

MUD PROGRAM: Mixed mud while drilling surface hole to combat lost circulation in river bed sands and gravels; mixed gel. Came out from under surface with native mud and gel and water and a 32-33 vis. Make-up water from nearby Beaver Creek.
WELL DATA (Continued)

Jetted pits at 953 in Sundance in order to convert to red bed type mud. Added 4 sacks of Caustic, 2 sacks of Soda Ash, and 6 sacks of Stabil-Vis. Requirements: 32-35 vis., wt. low as possible. On first trip below surface at 1086 in Sundance hole was flowing a 2" stream of water.

HOLE SIZE: 12 1/4" from surface to 178.
7 7/8" from 178 to 2545 T. D.

CORES: (None).

DRILL-STEM TEST: D.S.T. #1 2379-93 P. D. (Second Leo Sand).

LOGS: Ran Schlumberger Dual Induction-Laterolog first, running a logarithmic 5" and a logarithmic 2" from 2544 T. D. up above the Minnelusa. Then dropped back to bottom and came up to 1736 just above base of Opeche with another logarithmic 5" (repeat) and a linear 2". From above the Minnelusa ran a linear 2" and a linear 5" to base of surface casing at 177 K. B.

Second logs run consisted of the Borehole Compensated Sonic Log with Gamma Ray-Caliper Logs. Ran 5" Sonic, etc., from 2544 T. D. up above Minnelusa to 1732. Then ran a 5" repeat over same interval to see if variance was above 2%. Sonic was repeating good in Minnelusa so continued all the way out to base of surface casing at 177 K. B., running a 5" and 2".

At approximately 1700 added 2 sacks of C.M.C. (Driscose) to lower water loss to 10 cc. or less going into Minnelusa Converse section. At 2206 in lower Converse added 1320 gallons of #2 Diesel to speed drilling and prevent drill column getting stuck in hole. At approximately 2150 added 2 sacks of C.M.C. to lower water loss to 5 cc. or less for drilling Leo Section of Minnelusa. In this part
WELL DATA (Continued)

of section vis. was 38-40, wt. 9.9, Ph. 9.5 or more. Raised vis. to 72 for D.S.T. of Second Leo Sand.

Raised vis. with Gel and detergent for logging at 2545 T. D. Could not get vis. above 44 due to Dakota-Lakota water flow in upper hole; had no problems logging.

Mud furnished by American Mud Company, Gillette, Wyoming. Mud checks on location made every 1-2 days by engineer, Dick Myers, Gillette.

Est. mud bill at 2540, 5' above T. D.: $3,344.35.

Logging truck and personnel from Gillette, Wyoming. Engineer: Mr. Golas. (Calculations in rear of report).

PLUGGING RECORD:

40 sacks from 2420 to 2300 across Red Marker.
30 sacks from 1850 to 1750 across top of Converse.
30 sacks from 1130 to 1030 across Basal Sand of Sundance.
Cementing by Halco.
Finished plugging at approximately 5:00 P.M., November 27, 1970. (Left Dakota-Lakota open for flowing water well for landowner; contractor ran pipe into Dakota).

CONTRACTOR AND RIG EQUIPMENT:

Pusher: C. W. McPeters, part owner.
Rig. No. 4.
Spencer-Harris 6000 - Made in 1969 (trailer-mounted rig).
Spencer-Harris 97' derrick (pulls doubles) and trailer.
Bethlehem 5-45E with 15" double T. W. in Hydromatic.

-4-
WELL DATA (Continued)

1 335 H.P. Cummins Diesel engine powering drawworks.
2 D-300 Emsco mud pump, 7 1/4" x 14", with 5 1/2" liners.
2 6-71 (twins) G.M.C. engines with H.D. gear box, 300 H.P., powering mud pump. Space-Saver Cameron S.S. 8" blow-out preventer with 2 valve Cameron hydraulic closing unit.
19 5 1/2" O.D. drill collars with 2 1/4" bore.
6,000' 3 1/2" I.F. Reed drill pipe with square shoulder tool joints.
Caterpillar D-315 generator with 25 K.W. gas engine standby.
32' trailer house.
1 auxiliary 4 x 6 Gardner-Denver mud-mixing pump.
New General Electric 2-way radio system on rig, in pusher's car, and in Newcastle office.

SAMPLE STORAGE: Samples were shipped to American Stratigraphic in Casper where library cut will be made. Operator's complimentary cut will be sent to South Dakota Geological Survey as required.

DRILLING TIME RECORDS: Original copy of Geolograph 1' drilling time charts is on file in Denver office of G. A. Nelson.
## LOG FORMATION TOPS

All depths are measured from 3542 K. B.

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>DEPTH</th>
<th>DATUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOWER CRETACEOUS</strong></td>
<td></td>
<td></td>
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<tr>
<td>MOWRY SHALE</td>
<td></td>
<td>Surface</td>
</tr>
<tr>
<td>MUDDY SAND (NEWCASTLE)</td>
<td></td>
<td>(Behind pipe in surface hole)</td>
</tr>
<tr>
<td>SKULL CREEK SHALE</td>
<td></td>
<td>(Behind pipe in surface hole)</td>
</tr>
<tr>
<td>DAKOTA FORMATION (FALL RIVER FORMATION)</td>
<td>324</td>
<td>+3218</td>
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<tr>
<td>FUSON SHALE (FUSON MEMBER OF LAKOTA FORMATION)</td>
<td>452</td>
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<tr>
<td>LAKOTA SANDS</td>
<td>469</td>
<td>+3073</td>
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<tr>
<td><strong>UPPER JURASSIC</strong></td>
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<tr>
<td>MORRISON FORMATION</td>
<td>700</td>
<td>+2842</td>
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<tr>
<td>SUNDANCE FORMATION</td>
<td>832</td>
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<tr>
<td>REDWATER SHALE MEMBER</td>
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<tr>
<td>LAK MEMBER</td>
<td>966</td>
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<td>TENTATIVE HULETT SAND</td>
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<tr>
<td>BASE OF SAND</td>
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<td>TENTATIVE STOCKADE BEAVER SHALE</td>
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<td>TENTATIVE TOP OF BASAL SAND</td>
<td>1144</td>
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<td><strong>TRIASSIC</strong></td>
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<tr>
<td>SPEARFISH FORMATION</td>
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<td><strong>PERMIAN</strong></td>
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- 6-
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<tr>
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<tr>
<td>FORELLE LIME MEMBER</td>
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<td>GLENDO SHALE MEMBER</td>
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</tr>
<tr>
<td>MINNEKATHA LIME MEMBER</td>
<td>1704</td>
<td>+1838</td>
</tr>
<tr>
<td>OPECHE SHALE MEMBER</td>
<td>1738</td>
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</tr>
<tr>
<td>MINNELUSA FORMATION (REWORKED MINNELUSA)</td>
<td>1815</td>
<td>+1727</td>
</tr>
<tr>
<td>UPPER MINNELUSA (PERMIAN)</td>
<td>1815</td>
<td>+1727</td>
</tr>
<tr>
<td>FIRST CONVERSE SAND</td>
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<tr>
<td>MASSIVE ANHYDRITE</td>
<td>1911</td>
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<td>BASE ANHYDRITE</td>
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<td>SECOND CONVERSE SAND</td>
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<td>BASE OF SAND</td>
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<td>TENTATIVE TOP OF THIRD CONVERSE SAND</td>
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<td>BASAL CONVERSE SAND</td>
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<tr>
<td>RED MARKER</td>
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<tr>
<td>BASE RED MARKER</td>
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<td></td>
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<tr>
<td>PENNSYLVANIAN</td>
<td>2247</td>
<td>+1295</td>
</tr>
<tr>
<td>MIDDLE MINNELUSA (LEO SECTION)</td>
<td>2247</td>
<td>+1295</td>
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<tr>
<td>VIRGIL</td>
<td>2247</td>
<td>+1295</td>
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<tr>
<td>MISSOURI</td>
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<td>+1189</td>
</tr>
<tr>
<td>SECOND LEO SAND</td>
<td>2354</td>
<td>+1188</td>
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**LOG FORMATION TOPS (Continued)**

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<tr>
<th>FORMATION</th>
<th>DEPTH</th>
<th>DATUM</th>
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<tbody>
<tr>
<td>BASE OF SANDS</td>
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<td>DES MOINES (?)</td>
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<td>TOTAL DEPTH DRILLER</td>
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<tr>
<td>TOTAL DEPTH SCHLUMBERGER</td>
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SAMPLE LITHOLOGIC DESCRIPTION

All depths are from 3542 K. B.

All sample depths following have been corrected for lag, and then matched to drilling time breaks wherever possible. *Sample lithology is then matched to log lithology so all lithology following matches log.

All shows are underlined with a solid line. Possible shows are shown with a dashed line.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
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<tr>
<td>Surface</td>
<td>LOWER CRETACEOUS</td>
</tr>
<tr>
<td>Surface</td>
<td>MOWRY SHALE</td>
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</tbody>
</table>

(Surface pipe to 177 K. B.; Muddy Sand or New­castle Sand probably behind surface pipe).

(Samples below are caught and described every 30').

180-200 Silty shale, steel gray, very soft Skull Creek; muddy cave: sandstone, gray, dark gray, shaly, dirty, limy, glauconitic, biotitic, very hard and tight; trace light gray inoceramus prism veinlet on same gray shale; trace sandstone, light gray, very fine, soft, porous; no fluore­cence.

200-32 Same shale.
232-64 Same dark steel gray, very soft shale.
264-324 Same shale; trace light brown inoceramus prisms; trace loose pyrite.
324 (+3218) DAKOTA FORMATION (FALL RIVER FORMATION)

324-28 Abundant sandstone, light gray, lot of sandstone laminated with black silty shale, no show, slightly dirty, very fine to fine, well-cemented, poor vis­ible porosity, hard to soft, also gray; sandstone, fine, soft, porous, no show, white, friable; loose pyrite, crystalline to sandy with embedded sand grains; all with no fluorescence.
Shaly siltstone, light gray with thin blackish shaly laminations; sandstone, fine, slightly sugary, visible porosity, some glauconite, no show, soft, also very fine, light gray, few carbonaceous spots; also dark gray, very shaly siltstone; sandstone has spotty white cementation; no fluorescence; in stoppered shell vial Dakota cuttings above 354 are cut in C. Tet. solution with no fluorescence in resulting solution; this indicates no oil in samples.

354-78
Abundant shaly siltstone, dark gray; some friable, porous sand as above, no show; first traces of waxy clay, tannish light gray, grayish brown and gray (possibly Fuson); lot of small black carbonaceous spots and streaks in siltstone, no visible porosity, no show, no fluorescence.

378-452
Same dark gray shaly siltstone and fine light gray sandstone as above with good porosity, soft, white clay spots, no show; limited same waxy clay, tannish gray mottled with black (Fuson?); very shaly siltstone, gray mottled blackish, hard, tight; gray waxy clay.

452
FUSON SHALE

452-55
Abundant very soft clay, waxy, light gray, tannish light gray, whitish; grayish light green, very waxy, very soft; part sandy where light gray.

455-469
Same whitish, light gray clay; also mostly grayish purple and red.

469 (+3073)
LAKOTA SANDS

469-98
Abundant snow white sandstone, highly kaolinitic with abundant white waxy clay cementation, no show, non-calcareous, very fine to fine, no visible porosity, mushy soft, abundant pyrite, few fine grains (Lakota top marked by extremely fast drilling).

498-522
Same as above, mostly loose sand grains, clear, very fine to fine to fine-plus, unconsolidated, few medium grains; very abundant pyrite; limited light gray sandstone, no show, fine, cleaner, friable, porous; all with no fluorescence; shale breaks of very waxy clay, bluish white, very pale green; trace chert, smoky gray with tiny white spots, very coarse, subangular.
522-45 Traces sandstone, slightly tannish light gray possibly stained, very fine to mostly fine, excellent visible porosity, friable, no fluorescence; abundant very sandy lime, grayish tan, very hard, dense, earthy; abundant loose pyrite, limited medium crystalline, mostly very sandy with embedded sand grains, very fine to fine, part all fine-plus; abundant chert, light gray translucent, tan; loose clear quartz sand grains, fine to medium to medium-plus.

545-77 All very dark gray shale (sand on log), slightly waxy, almost black, part slightly sandy; traces conglomeratic sandstone, clean, very sugary, fine to medium, no show; trace loose clear chert, coarse, angular, also frosted, milky white; ironstone (?) stringer, tannish brown, part very sandy, dense, very hard (Morrison-type shale).

577-620 Same greenish black shale, slightly waxy, very soft; trace chert, clear, angular, very coarse; traces brown sand, very fine, very well-cemented, no show, no visible porosity, very hard, tight, limy.

620-48 Abundant pebbles, mostly very coarse-plus, subangular, brown, milky white, clear angular; loose pyrite (pebbles surface cave?); same shale.

648-62 (Poor sample, mostly cave).

662-700 Loose chert, clear, pink opaque, yellow, subangular, very coarse to pebble size; loose sand grains, very poorly sorted very fine, fine, medium, coarse, very coarse, mostly clear; abundant loose pyrite.

700 (+2842) JURASSIC

700 (+2842) MORRISON FORMATION

700-42 Abundant pale green waxy clay, very soft, with embedded tan lime spots.

742-74 Same green clay; increasing tan dense lime.

774-803 Same green clay, becoming dark gray; limited limestone stringers, tan with green spots; traces sandstone, gray, light gray, very fine to fine, no show, no visible porosity, hard, tight, limy cementation.

803-32 Limestone, very light tan, cream, very dense, very hard; traces dark brown limestone, highly microfossiliferous, hard; trace sandstone, cream, very limy, very fine, very well-cemented, scat-
tered orange grains, no visible porosity, hard, tight.

832 (+2710)  SUNDANCE FORMATION
832  REDWATER SHALE MEMBER
832-33  Trace dark gray shaly siltstone, highly glauconitic with dark green grains, very soft; trace shaly siltstone, greenish gray, highly glauconitic, very fine and finer grains.
833-86  (Missing samples).
886-920  Silty shale, dark gray, very soft; very shaly sand to siltstone, dark gray, very, very fine where sand, very silty, highly biotitic and glauconitic, very soft, no porosity.
920-40  Waxy shale, pale green, very soft; dense limestone stringer, light gray, very hard; sandstone, light gray, very fine and finer, limy, scattered dark green glauconite grains, slightly soft.
940-66  Same waxy green shale; same very, very fine sandstone, cream, limited glauconite, no show, soft to slightly soft, no porosity.
966  LAK MEMBER OF SUNDANCE
966-70  Very shaly sand, dark orange, very fine and finer, excellent sorting, no visible porosity, no show, slightly soft; very silty shale, orange red, soft.
970-98  Same sand, orange brown, very fine, no show, soft.
998-1002  Waxy shale, dark gray to blackish.
1002-52  Black waxy shale, very soft.
1052-61  TENTATIVE HULETT SAND
1061-76  (Circulated 20" sample at 1076 before trip for bit in prospective zone). Traces light gray sandstone, very, very fine, excellent sorting, no show, friable, porous; also slightly greenish light gray sandstone, very fine to very, very fine, excellent sorting, no show, glauconitic, porous, soft to slightly soft where more cemented, no fluorescence.
1076-92  Same as above, becoming slightly shallier grayish; trace very pale green waxy shale laminations on sand; all with no show; trace light gray sandstone, very fine, excellent sorting, no show, well-cemented but porous, soft; all with no fluorescence.
TENTATIVE STOCKADE BEAVER SHALE

(Shale on log).

TENTATIVE TOP OF BASAL SAND OF SUNDANCE

Sandstone, clean, friable, excellent visible porosity; traces tannish light gray sandstone, very fine, excellent sorting, spotty clay cementation in part.

TRIASSIC

SPEARFISH FORMATION

Smooth shale, red, part silty, all soft.
Abundant silty shale, brownish red, finely biotitic, few small light gray spots.
Same silty shale, orange red, brownish red, finely biotitic, soft to slightly soft.
Same shale, traces sandy.
Same shale, trace greenish gray large spot.
Same shale and silty shale.
Same shale; trace fibrous white anhydrite veinlet in shale.
Same silty shale, brownish red, orange red; traces loose white fibrous anhydrite; traces white anhydrite inclusions in shale.

PERMIAN

GOOSE EGG FORMATION

(7' of slower drilling). (Probably anhydrite -- none visible in samples).
Silty shale, brick red; small round light green spots in smooth red shale.
Silty shale, brick red.
Anhydrite, white, orange white, dense, hard.
Silty shale, orange red, white anhydrite inclusions; anhydrite, white, grayish white, dense, hard; white fibrous anhydrite trace, veinlet.
Same shale, orange red, few small round light green spots; anhydrite interbeds, white, gray, dense, as above.

FORELLE LIME MEMBER OF GOOSE EGG
1594-98  Abundant anhydrite, white mottled violet dense, hard; trace dolomite, bright orange adjacent to cream, dense, hard.

1598-1604  Anhydrite, white mottled with purple, dense, hard, becoming very shaly dark purple.

1604-14  Trace tan lime, dense, flaky; traces pink dolomitic lime to limy dolomite.

1614-18  Traces limestone, dolomitic limestone, cream, dense, very hard; trace dark tan dense lime.

1618  GLENDO SHALE MEMBER OF GOOSE EGG

1618-25  Shale, silty, finely sandy, dark orange, soft to hard.

1625-41  Same shale, very silty, few anhydrite inclusions and streaks.

1641-48  Same shale.

1648-59  Same shale; trace whitish anhydrite inclusion.

1659-67  Same as above; few white anhydrite inclusions, few small light green round spots.

1667-77  Same orange red silty shale with few white anhydrite inclusions.

1677-90  Same as above, trace anhydrite as veinlet on shale.

1690-1708  (Missing due to no circulation for sample just before trip at 1708 in nonprospective zone).

1704 (+1838)  MINNEKAHTA LIME MEMBER OF GOOSE EGG

1708-13  Limestone, cream to white chalky soft grading into tannish brown dense hard; trace light red slightly chalky limestone; trace dark orange anhydrite, very hard.

1713-22  Pink dense limestone, hard; tannish pink limestone, dense hard; also lime, chalky white to dense tan.

1722-38  (Missing).

1738  OPECHE SHALE MEMBER OF GOOSE EGG

1738-40  Silty shale, brownish red, reddish brown.

1740-49  (Poor sample, mostly cave).

1749-59  Silty shale, orange, orange red, soft to slightly soft.

1759-69  Silty shale, brick red, soft.

1769-79  Silty shale, brick red, soft to slightly soft, few greenish gray spots.

-14-
Top 4' white anhydrite, microcrystalline, soft, to dense gray; bottom 6' same silty shale as above, few white anhydrite inclusions, small round green spots also; trace very sandy anhydrite to anhydritic sand trace, light gray, fine to fine-plus grains which powder under pressure. 

Same brick red silty shale with few green small round spots; abundant white anhydrite, microcrystalline, part dense gray, hard.

**MINNELUSA FORMATION (REWORKED MINNELUSA)**

**UPPER MINNELUSA (PERMIAN)**

Trace very shaly sand, fine, orange, soft, no show, no visible porosity; trace dark brown possibly stained sand, very quartzitic, very fine, excellent sorting, no visible porosity, very hard and tight, tiny pyrite specks, very well-cemented, to quartzite, no fluorescence. 

(No consolidated sand). Loose sand grains, light orange clear, poorly sorted very fine to fine to medium to medium-plus, also all clear, subround to round.

Trace grayish tan possibly stained sand, very fine, well sorted, very well-cemented, no visible porosity, dolomite cementation in part, trace pyrite speck; traces very anhydritic sandstone, conglomeratic, very poorly sorted very fine to fine to medium grains, light orange grains, *like those disintegrated just above, in white anhydrite matrix, no show, very well-cemented, no visible porosity, hard to slightly soft; all with no fluorescence.

Trace same shaly sand as above, very fine to fine grains in orange red shaly matrix, no visible porosity, very well-cemented, no show, slightly soft, light orange clear grains when disintegrated, no fluorescence.

**FIRST CONVERSE SAND**

(Fast drilling of 1+”/ft. suggests soft, porous sand). (Poor sample, mostly Sundance cave due to water-flow from Dakota-Lakota thinning mud or mudcake). Traces white anhydritic sandstone, very fine, clear grains, soft, no show, to fine, sugary, clean, excellent visible porosity, non-
Hydro 103

1843-52
Same as above, mostly clean, white, light gray sugary sandstone, very anhydritic cementation, non-calcareous, fine to fine-plus, clear round to subround grains, excellent visible porosity, traces red shaly sandstone, very fine; all with no show, no fluorescence.

1852-56
(Slower drilling, tighter sand). (Poor sample due to abundant Sundance cave from water flow uphole). Traces same white sandstone, no show, fine, friable, no show, excellent visible porosity, no fluorescence.

1856-70
(Mostly very rapid drilling like very soft, porous sand). (Very poor sample, all cave, no visible sand or sand grains).

1870-94
(Same rapid drilling like very soft, porous sand). (Very poor sample, all cave, no visible sand nor sand grains).

1894-1911
(Top slower drilling like tight sand or anhydrite-dolomite; bottom fast drilling like soft, porous sand).

1911
MASSIVE ANHYDRITE

1911-21
Anhydrite, all hard, white finely crystalline to denser tannish cream, grading into very anhydritic dolomite, pinkish tan, and chalky white limestone; also white anhydrite mottled with orange to reddish denser anhydrite.

1921-29
Anhydrite, snow white, microcrystalline, slightly soft, to denser gray, hard, with tiny round white spots embedded; trace red silty shale on white anhydrite; trace white anhydrite with red shaly anhydritic dolomite.

1929-42
(Circulated 20" sample at 1945 just before trip for bit). Very dense hard anhydrite, white to denser orange red to purplish red; also chalky dolomite, dark pink, silty, liny where whiter, all purplish pink, slightly soft.

1942
BASE OF ANHYDRITE

1942-45
(Missing due to intentionally not circulating longer).

-16-
(Poor sample, mostly cave following trip at 1945). Dolomite, anhydritic dolomite, tan, cryptocrystalline, distinctive tiny red silty shale spots scattered in part.

1956-60
Tan anhydritic dolomite; mostly pink slightly silty anhydritic dolomite with light red shaly streaks, few small clear finely crystalline anhydrite spots.

1960-61
Second Converse Sand

1961
Trace sandstone, light orange, very fine to fine, well-cemented but soft, no show, anhydritic cementation, light orange clear grains, no fluorescence, trace dolomitic cementation, porous, few small white spots.

1965-85
(1965 top of best porosity, breakdown to less than 1"/ft. from 1965 to 1968, same from 1970 to 1977, and from 1980 to 1985). (Very poor sample, mostly Sundance cave). Trace sandstone, white, very fine, friable, excellent visible porosity, no show; trace reddish orange sandstone, very fine, excellent sorting, shaly, no visible porosity, no show, silty; all with no fluorescence; trace same light orange sandstone; loose grains very fine to fine, light orange clear, subround.
Increasing sandstone, tannish light gray, possibly stained, as above, very fine, well-sorted, porous, friable, becoming less sorted very fine to fine, slightly dolomitic cementation, slightly yellowish, clear grains slightly yellowish, subround to round; trace pink silty well-cemented, soft; all with no fluorescence; sandstone, light orange white, very fine to fine, friable, soft, excellent visible porosity, no show, no fluorescence.
(Representative cuttings from Second Converse Sand were cut in C. Tet. in stoppered shell vial; resulting solution had no fluorescence, indicating no oil in cuttings).

1985-88
(Drills like sand but slower than above, suggesting less porous sand). (Poor sample, abundant cave). Trace sandstone, pinkish light gray, very fine, good sorting, porous, friable, no show, few tiny white spots like clay; traces sandstone, snow white with abundant clay cementation, no
porosity, no show, non-calcareous, very fine to fine-plus, clear grains, round, friable.

1988-91
Trace fairly clean light gray sandstone, sugary very fine to fine-plus, excellent visible porosity, friable, no show.

1991

BASE OF SECOND CONVERSE SAND

1991-2006
Trace very anhydritic dolomite to dolomitic lime, grayish brown, slightly cherty, with tiny black spots of possible microfossils; trace light brown limestone, hard, brittle, dense; trace chalky limestone, light brown, mottled with light green shale, highly microfossiliferous with tiny round "bugs."

2006-18
Limestone, silty, chalky, grayish tan to tannish gray with small blackish spots, also tannish light gray to whitish chalkier with same black spots, slightly soft to hard and brittle where grayer (* good pre-Second Converse Sand marker bed).

2018-26
(Slower drilling, harder). (Poor sample, unusable, all cave).

2026-41
(Poor sample, cave). Traces very anhydritic dolomite, light to dark greenish brown, cryptocrystalline, intermingled with white anhydrite, microcrystalline; trace dark brown limestone, cherty, dense, with trace round microfossil fragment.

2041-46
Silty dolomite to limestone, tan, light tan, grayish tan denser, part lighter tan anhydritic denser; trace very dense limestone, cherty, tan-nish brown, highly microfossiliferous with cream "bugs" in brown limestone matrix, with encrusting waxy; trace chalky limestone, green shaly.

2046-59
Silty limestone, dolomitic, chalky, dark tan, light tan, cream, slightly soft where chalky to hard where dark tan.

2059-69
Anhydrite, white to tannish white, finely crystal-line, denser dark gray.

2069-75
Abundant orange red dolomite (?) with anhydrite inclusions; top anhydrite, white to brown; trace brown limestone, slightly silty, hard, brittle; bottom faster drilling possibly sandstone with some porosity: loose sand grains, very fine to fine, clear.

2075-86
Anhydritic dolomite, greenish dark tan, dense, cryptocrystalline, slightly limy on fresh surface,
hard, brittle, part siltier, greenish gray, slightly soft to soft.

Snow white anhydrite.

TENTATIVE THIRD CONVERSE SAND

Abundant greenish white quartzite, also gray, grading into greenish white sandstone and white sandstone, very fine, excellent sorting, all very well-cemented, no visible porosity, very hard and tight where quartzitic to soft where greenish white silty to white silty; trace white sandstone, very fine to fine, anhydritic; all with no show; non-calcareous, anhydritic; less of shaly light red sandstone mottled with same white sandstone, few fine grains; all with no fluorescence.

BASE OF THIRD CONVERSE SAND

Abundant anhydrite, snow white finely crystalline to denser tan to limited brown dolomitic; shale break, brick red; trace very shaly sand, light red with pale green spot, very silty, very soft, no show, no visible porosity, very fine sand grains in a silty shale matrix.

Same brown and white anhydrite; shaly sandstone streaks as above, red and white mottled, very fine, hard, tight, no show, no visible porosity.

Same white anhydrite with brown to gray denser parts.

FOURTH CONVERSE SAND

Abundant well-cemented sand, 50% white, pinkish white, anhydritic-looking, very fine, excellent sorting, no visible porosity, no show, slightly soft to some hard; 50% same sand but light red to dark pink, no show; white more anhydritic spot in red sand; all possibly slightly dolomitic, no fluorescence; trace white sandstone, cleaner, very fine, soft, porous, no show.

BASE OF FOURTH CONVERSE SAND

Anhydrite, white, gray denser; silty limestone, pinkish tan, soft to hard, white anhydrite spot, few dark purple silty shale streaks; dense brown
dolomite grading into chalky limestone, tannish cream.

2166-76
Traces limestone to dolomite, creamy white, slightly soft to hard; silty dolomite to limy dolomite, pinkish cream, purplish shaly streaks, soft to slightly soft, becoming anhydritic dolomite, reddish purple, dense, hard.

2176-89
Very anhydritic dolomite, few small limy spots, pink to light red with few small red silty shale spots, very cherty and hard, brittle, semi-crystalline, trace clear crystalline anhydrite veinlet on dolomite.

2192-2201
Abundant brick red shale, silty shale, smooth, with small round green spots; anhydrite, white, denser pink, light red; cream dolomite to limy dolomite, becoming very anhydritic dolomite as above, pink, light red, few yellow spots.

2201-12
Abundant anhydrite, snow white, finely crystalline.

2212-24
Anhydritic dolomite, tannish pink, small reddish spots, cherty, hard, brittle.

2224-26
Anhydrite, white to denser gray; abundant brick red shale with small green round spots, soft; anhydritic dolomite, pink, cherty, to limestone, hard, brittle.

2226
BASAL SAND OF CONVERSE

2226-37
Traces sandstone, white, pinkish white, very fine, few fine grains, no show, well-cemented, soft, anhydritic to traces of dolomitic cementation, no fluorescence, poor or less visible porosity, purplish part.

2237 (+1305)
RED MARKER

2237-47
(All faster drilling 3"-4"/ft.). Shale, smooth, brick red, also silty; trace white anhydrite veinlet in shale; small round green spots in red shale.

Typical shiny, splintery Red Marker, platy, very soft.

2247
BASE OF RED MARKER

2247 (+1295) PENNSYLVANIAN

-20-
MIDDLE MINNELUSA (LEO SECTION)

VIRGIL

2247 (+1295)

(Faster drilling from 2250 to 2256 like well-cemented sand). Trace light red sand (cave?), very fine to fine, no show, slightly soft, poor porosity, pinkish clear grains; remainder of interval anhydritic dolomite, cream chalky to hard tan dense, dolomite is slightly limy. Trace sand, brown possible staining, very fine, excellent sorting, friable, porous, very limy, no rainbows on acid, no fluorescence. (Dries like anhydrite and dolomite--poor sample).

2256-66

(Poor sample, mostly Red Marker cave; drills slow like anhydrite and dolomite). Traces very well-cemented sand, purplish white, very fine, few fine grains, no show; trace snow white sandstone (cave?), very well-cemented, very fine, white clay cementation, slightly soft, no show; trace tannish gray possibly stained sandstone, very fine to fine to fine-plus, friable, porous, clear grains, clay cementation; all with no fluorescence. (All sand may be cave).

2277-79

Traces anhydritic dolomite, tan, cherty, hard, dark tan; traces sandstone, white, cream-white, very fine, silty, soft, no show, possibly porous, no fluorescence, few fine grains, anhydritic cementation.

2279-81

(Missing due to no circulation for sample at 2281 just before trip for bit in slow drilling).

2281-85

Silty dolomite, gray, very silty, limy, some black spots; sandstone streaks, white, light gray, very fine, well-cemented, few black shale spots, no show, no visible porosity, soft. (Slightly faster drilling like sand). Traces white sandstone, very fine, good sorting, well-cemented, poor to no visible porosity, no show, slightly salt and pepper with few blackish grains scattered, soft; trace cleaner white sandstone, less cemented, no show, porous, friable, very fine, excellent sorting; all with no fluorescence (shale break on log).

2290-93

Dolomite, pert slightly limy, tan to brown, flaky, no show, no porosity.

2293-2302

(Slightly faster drilling). Trace chalky cream dolomite, slightly soft to soft, limy.
2302-05

2305-10

Same dark tan dolomite as 2290 to 2293, limy. (Slightly faster drilling, like sand). Traces sandstone, white, very anhydritic-looking, abundant white cementation, silty, very fine, few fine grains, angular to subround, few purplish shaly spots, no show, soft; traces white sand, very fine, few fine grains, no show, silty, white, possibly some porosity.

2310-16

Same dark tan dolomite as 2290 to 2293.

2316-26

(Very poor unusable sample, almost all cave, not screened). (All drills very slow like hard dolomite, possibly anhydrite also).

2326-36

Dolomite, anhydritic dolomite, brown where more anhydrite, also dark gray dense to dark gray siltier.

2336-47

(Very poor sample, almost all cave). (All drills slow like dolomite above). Traces white sandstone, probably in streaks, light gray, no show, well-cemented, very fine; part less cemented very fine to fine friable with porosity (cave?).

2347-51

(Circulated 20" sample at 2351 before trip for bit). Anhydrite, white to tan, finely crystalline, grading into dark tan dolomite and limy dolomite.

2351-53

Same as above.

2353 (+1189)

MISSOURI

2353-54

(Highly radioactive shale on log).

2354 (+1188)

SECOND LEO SAND

2354-57

Loose sand grains, very fine, clear, also fine; trace clean sandstone, light gray, very fine, good visible porosity, friable, no show.

2357-60

(Drills 4" to 5"/ft.). Traces well-cemented sand, very fine, no show, poor visible porosity, soft, light gray, white, slightly silty, no fluorescence; loose sand grains, very fine, fine, clear grains, round to subround.

2360-64

(Circulated 20" sample at 2365). Limited sandstone, white, light gray, well-cemented, shaly, very fine, no show; part less cemented with some porosity, friable, no show; % light brown possibly stained, cleaner less cemented, very fine, soft, porous; all with no fluorescence (5"/ft.).

2364-65

(Circulated 30" sample at 2365). Same well-cemented sand, very fine, no show, few fine grains, anhy-
dritic-looking cementation; trace same cleaner sand, very fine, very light brownish possibly stained, porous, friable.
* All above sand from 2354 to 2365 has no hydrocarbon cut nor fluorescence after cutting representative cuttings in C. Tet. in stoppered shell vial.

2365-66
Traces clean sandstone (probably above 2365), friable, excellent visible porosity, no show, light gray, so soft disintegrates when picked up with tweezers; trace friable white sandstone, abundant white cementation like clay, very fine to abundant fine, porous, clear grains, no show, loosely consolidated, non-calcareous; trace same well-cemented sand, very fine sand as above; all with no fluorescence; trace white sandstone, very fine, excellent sorting, well-cemented, no show, soft; trace light tan possibly stained sandstone, fine to very fine, limy, porous, friable.

2366-73
Dolomite stringer, grayish dark tan; greenish gray anhydritic dolomite to dolomitic lime; trace sandstone, light tan possibly stained, no live oil on freshly broken surface, friable, excellent visible porosity, salt and pepper with scattered dark gray shale grains, clear to slightly frosted grains, non-calcareous.

2373-75
(Circulated 20" sample at 2378). 75% jet black shale, coaly, strong hydrocarbon odor.

2375-78
25% gray chalky dolomite.
* Representative sand cuttings from 2354 to 2373 were cut in C. Tet. with no fluorescence in resulting solution, indicating no live oil in cuttings.

2378-82
(Top 2' are 2"/ft., bottom 2' are 1"/ft.). Abundant sandstone, light to medium tan oil staining when wet, dries to fair or better tan stain, definite abundant tiny brown live oil spots scattered, 80% fair yellowish fluorescence to 20% with good bright yellow fluorescence, anhydritic to dolomitic cementation, silty, very fine, good visible porosity, friable.

2382-93
(Circulated 20" sample at 2393). Abundant sandstone, light gray with tannish cast plus tiny dark brown live oil spots scattered, limy cementation, very fine to fine more sugary, friable, excellent visible porosity, acid cuts immediate rainbows, clear subround quartz grains; sandstone soaked with tan oil stain in very fine, cemented sand-
stone, some spotty white cementation like clay, tiny dark brown live oil stains scattered, acid brings out tiny dark brown oil bubbles, fair or better visible porosity, soft to slightly soft. * Representative cuttings of show zone were cut in C. Tet. in cork stoppered shell vial: there was no fluorescence in solution until several hours later when it was a faint grayish to yellowish.

2393-96 (Sand on log).

2396 BASE OF SECOND LEO SANDS

2396-2404 Chalky limy dolomite to dolomitic lime, cream-tan, denser tan also, few grayish streaks; limited associated anhydrite, finely crystalline white.

2404-15 Slightly silty dolomite, very finely sandy, grayish dark tan, minute pyrite specks.

2415-17 Coaly black shale, hard, brittle (probably a radioactive shale marker on log).

2416 DES MOINES (?)

2417-26 Abundant red shale in fast drilling breaks, orange red, silty to finely sandy, abundant small round light green spots in shale, with few anhydrite inclusions; remainder anhydritic dolomite, gray, few small limy streaks, part dark gray very shaly with few dark green spots; limited very sandy dolomite, limy, gray, flaky; limited sand streaks, gray, very well-cemented, no show, no porosity, hard, tight, very fine to fine; trace white sandstone, lot cleaner, very fine to fine, well-cemented, no show, possibly porous, soft (cave?).

2426-29 (Fast drilling shale break at 2429 to 2430).
Same anhydritic dolomite, light grayish tan with dark gray shaly spots, minute pyrite specks, also dark tan with blackish spots, trace gray very sandy.

2429-30 Possibly jet black coaly shale (highly radioactive shale on log).

2430-35 Same as from 2426 to 2429.

2435-46 Shale break from 2440 to 2441, orange red smooth plain to silty; same anhydritic dolomite, gray to tan, less of silty limy dolomite, light gray, chalky; few sandstone streaks, grayish brown, slightly quartzitic-looking, very fine, very well-cemented, no show, poor to no visible poros-
ity, part slightly soft; trace gray sandstone, very shaly and well-cemented, no show, no visible porosity, very fine to fine.

2446-53
Dolomite, limy dolomite, grayish tan to tan, cryptocrystalline, some associated white anhydrite, hard, brittle, few pyrite specks.

2453-55
Faster drilling plus shale on log.

2455-56
Sandstone stringer, white, fine, no show, very well-cemented, no visible porosity, same but shaler tannish gray, soft where white.

2456-59
Abundant sandstone, (possibly Third Leo Sand), snow white, very fine, fine, good sorting, no show, porous, anhydritic-looking, dolomitic to anhydritic cementation, part hard and tight, grayish yellow to yellow fluorescence, probably from dolomitic cementation, soft, part all fine grained.

2459-73
No odor in fresh sackful, same sandstone as above; part softer, cleaner, more porous, trace more porous with slight tannish possible staining, same fair or better fluorescence; trace fine sandstone, sugary, friable, excellent visible porosity; becoming gray slightly quartzitic, poorly sorted fine to few medium grains, hard, tight.

2473-85
Abundant anhydrite, snow white, grayish where denser; abundant red shale, orange red, plain, silty, soft to slightly soft, few small light gray round spots.

2485-91
(Missing due to no circulation for sample before trip at 2491).

2491-2501
Mostly shaly dolomite, gray, dark gray, tannish dark gray, part limy, with abundant associated snow white anhydrite, finely crystalline; thin sand beds, white, light gray, fine, fairly clean, good visible porosity, no show, slightly soft, some black carbonaceous streaks; also dark gray shaly sand, soft, fine, porous to nonporous, black carbonaceous streaks; all with no fluorescence.

2501-10
Faster drilling sand, traces sand, white, very well-cemented, no show, very fine, no visible porosity to limited porosity, soft to slightly soft, possible faint grayish fluorescence.

2510-14
Limy dolomite to dolomitic lime, tannish brown, silty, blackish spots in part, also light gray; tan dense dolomitic lime to limy dolomite, hard, brittle.
2514-18 (Missing due to no circulation for sample just before trip at 2518).

2518-26 * First chert, trace, smoky gray translucent, very coarse and angular, also light brown translucent; sandstone, white, light gray, very well-cemented, poor visible porosity, very fine, well-sorted, slightly soft, part light gray less cemented; part white hard and tight; all limy, all with no show; limy dolomite, very light tan, cherty, hard, brittle, also dark tan limy dolomite, cryptocrystalline; white anhydrite; sand in top 7'.

2526-31 Brick red shale break with few small round light green spots; dolomite, sandy dolomite, gray, dark gray, mottled blackish in part, part limy dolomite; same chert; sandstone streaks, shaly, quartzitic, light gray to gray, very well-cemented, no show, no visible porosity, slightly soft.

2531-38 Chert, tan, milky white, angular, coarse; same quartzitic sandstone streaks, brownish gray; finely sandy limy dolomite to dolomitic lime, tannish brown.

2538-43 (circulated 30" sample at 2543 T. D.). Chert, angular, very coarse, tan to light gray milky; limy dolomite to limestone, tannish brown, dense plain to cryptocrystalline; sandstone, white, very fine, very well-cemented, no show, no visible porosity, light gray, tannish light gray tighter, slightly limy, becoming brown quartzitic, good yellow fluorescence from limy mineralization.

2545 TOTAL DEPTH DRILLER

2544 TOTAL DEPTH SCHLUMBERGER

Samples examined and described on location by G. Allan Nelson.
DRILL-STEM TEST

D.S.T. #1  2379-2393 P. D. * (Corrected uphole 2' by matching lithology and drilling time to log).
(2381-2395 drillers depths at time test was run).
Zone tested: Lower of 2 Second Leo Sand benches.
Top packer at 2371 corrected.
Bottom packer at 2379 corrected.
Top choke 1". Bottom choke 9/16".
Hole size 7 7/8". 3 1/2" drill pipe.
2 1/4" I.D. of drill collars; 542' of drill collars.
Mud wt. 9.5. Vis. 60.
Packers held and did not leak. No cushion.

Tool opened with a very weak blow and remained open 5"; very weak blow throughout period. Tool reopened
with a very weak blow (1/4" under water); remained
for 10", then intermittent blow throughout rest of
test. (By-passed tool after 50" to see if it was plugged--before opening. Well had 3" to 4" water
flow from annulus throughout test--from Dakota-Lakota.
3' fillup on bottom).

Recovered:  60' gas-cut mud with a sulfur smell=.29 bbl.
           80' water with scum of oil and sulfur
           smelling gas=.39 bbl.
           140' Total Fluid

Pressures following are office-corrected:
   Initial hydrostatic - 1102
   Final hydrostatic - 1100
   5" Initial flow - 4 to 21
   45" Final flow - 31 to 76
   15" Initial shut-in - 969
   15" Final shut-in - 914

Fluid Sample Report:
   Pressure in sampler - 11 psig
   BHT - 90° F.
   Total volume of sampler - 2150 cc.
      Sample - 2150 cc.
      Oil - 10 cc.
      Water - 2140 cc.
      (No mud or gas)

  -27-
DRILL-STEM TEST (Continued)

Resistivity -
Water - .4 @ 62° = 17,200 ppm chlorides
Mud pit sample - 2.6 @ 60° = 2,550 ppm chlorides

Testing done by Virg's Testers, Gillette, Wyoming.
Tester: Lloyd Welty.

Checked periodically during test for combustability; would not burn. No gas to surface.
SCHLUMBERGER LOG CALCULATIONS

Calculations were performed by Mike Golas, Schlumberger engineer on location.

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<th>POROSITY (from Sonic)</th>
<th>Rw</th>
<th>Sw</th>
<th>FORMATION</th>
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<td>22%</td>
<td>1.6 @ 80°</td>
<td>100%</td>
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<td>&quot;</td>
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HOLE DEVIATION SURVEYS

Surveys were made using a TOTCO instrument with a 7° maximum.

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<td>1691</td>
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<td>1 (?)</td>
<td>Upper Leo</td>
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<td>2352</td>
<td>1</td>
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# BIT RECORD

12 1/4" bit from surface to 178. All bits below 178 are 7 7/8".

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<th>MAKE</th>
<th>TYPE</th>
<th>FROM</th>
<th>TO</th>
<th>FEET</th>
<th>HOURS</th>
<th>FORMATION AT BASE OF RUN</th>
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<td>HTC</td>
<td>OSC3 (RR)</td>
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<td>178</td>
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<td>OSC1GJ</td>
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<td>1707</td>
<td>621</td>
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<td>OSC1G</td>
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<td>1939</td>
<td>232</td>
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<td>4</td>
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<td>YSIG</td>
<td>1939</td>
<td>2091</td>
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<td>-</td>
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<td>-</td>
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<td>2520</td>
<td>2545</td>
<td>T.D.</td>
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-31-
## DRILLING PROGRESS SUMMARY

Drilling depths as of 7 A.M. each date.

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<th>DATE</th>
<th>NO. OF DAYS</th>
<th>P.D. DEPTH</th>
<th>FORMATION</th>
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<td>-</td>
<td>-</td>
<td>Rigging up rotary tools.</td>
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<td>18</td>
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<td>105</td>
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<td>Drilling surface hole.</td>
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<td>2040</td>
<td>Upper Minnelusa</td>
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<td>22</td>
<td>4 1/2</td>
<td>2189</td>
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<td>Trip for bit.</td>
</tr>
<tr>
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<td>Drilling.</td>
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<td>26</td>
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<td>9 1/2</td>
<td>2545 T.D.</td>
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<td>Logging.</td>
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(Finished plugging at 5:00 P.M., November 27).

Respectfully submitted,

G. Allan Nelson, Consultant  
Denver, Colorado  
January 26, 1971
### Dewey-Burdock GDP June 2012

<table>
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<th>Appendix 3.7-B</th>
<th>3.7-B-246</th>
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### Petro-Lewis

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<th>Position</th>
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<th>Notes</th>
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<td>Leaves</td>
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<tr>
<td>Smith</td>
<td>Operator</td>
<td>May 23, 1970</td>
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### South Dakota (Petro-Lewis)

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<th>Depth</th>
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### Final Report 8/1980

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<th>Analysis</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Physical</td>
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### Dewey-Burdock Water Test

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<tr>
<td>Pressure</td>
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### Appendix 3.7-B

- Detailed analysis of well performance over the past 5 years.
- Water chemistry report with updated standards.
- Recommendations for future adjustments to water treatment processes.
ADMINISTRATIVE / SUNDRY REPORTS
PLUGGING RECORD

Operator

Petro-lee Corporation

Address

1224 Denver Club Building. Denver. Colorado. 80202

Wells

Name of Lease

Set-Top-age or Block & Survey

Patonson

5-22

Wildcat

Location of Well

'801' FMA and 660' FVI. SW-NE Section 22. T. 77S. R. 18E

Fall River

Application to drill this well was filed in name of

Petro-lee Corporation

Date plugged

11/27/70

254 1 Logger

Is this well ever previously completed or gas

No

Total depth

254 ft

Amount well producing when plugged:

Oil (bbl/day)

Gas (MCF/day)

Water (bbl/day)

Casing Record

Size pipe

Put in well (ft.)

167'

Pulled out (ft.)

None

Left in well (ft.)

167'

Pipe depth and remarks

Remarks

The well will be filled with mud sludge fluid, according to regulations.

UNEXPECTED SIDES FOR ADDITIONAL DETAIL

Expounded this the 15th day of February, 1971

R. J. Donahue

State of Colorado

County of Denver

Subscribed and sworn to before me the 15th day of February, 1971

[Signature]

Elsie J. Stone

Deputy Public In and the

[Signature]

County

Colorado

[Signature]

DO NOT WRITE BELOW THIS LINE

Oil and Gas Board of the State of South Dakota

[Signature]

Note: File 3 copies of this form with Secretary, Oil & Gas Board, Pierre.
# WELL COMPLETION OR RECOMPLETION REPORT AND LOG

## TYPE OF COMPLETION
- [ ] Oil Well
- [X] Gas Well
- [ ] Dry Hole
- [ ] New Well
- [ ] Work-Over
- [ ] Deepen
- [ ] Plug Back
- [ ] Same Zone
- [ ] Diff Zone

## OPERATOR
Petro-Lewis Corporation

## LOCATION
1224 Denver Club Building, Denver, Colorado, 80202

### Surface
- 1980' FML and 660' FML, SW-NW, Section 22, T75, R1E
- Section 22, T75, R1E, Fall River County, South Dakota

### Total Depth
- Fall River County, South Dakota

## PERMIT NO.

<table>
<thead>
<tr>
<th>PERMIT NO.</th>
<th>DATE ISSUED</th>
<th>DATE SPOOLED</th>
<th>DATE T.D. REACHED</th>
<th>DATE COMPL.</th>
<th>PREVIOUS PERMIT NO.</th>
<th>DATE DIRECTIONAL SURVEY SUBMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>606</td>
<td>10/21/70</td>
<td>11/17/70</td>
<td>P6A 11/27/70</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

### TOTAL DEPTH (MD & TVD)
- 1980' / 660' (MD & TVD)
- 3244' / 3088' (MD & TVD)

### PRODUCING INTERVAL(S)
- None

### DUAL INDUCTION LATERLOG
- Compensated Sonic - Gamma Ray
- No

### Casing Size
- 8-5/8"
- Depth: 167' KB
- Hole: 12-1/4"
- Weight: 20#
- Purpose: Surface casing
- Amount Pulled: None

## Liner Record
- None

## Tubing Record
- None

## Production Record
- None

## Date First Production
- None

## Well Status
- None

---

Dewey-Burdock GDP
June 2012
Appendix 3.7-B
SUNDAY NOTICES AND REPORT ON WELLS

PETR O-Lewis Corporation

LOCATION: 1225 Denver Club Building, Denver, Colorado, 80202

1980' FNL and 660' FNL, SW-NW Section 22, T75, RIE

COUNTY Fall River

T. D. 2544' Logger

Date of Work 11/27/70

We propose to plug and abandon this well as follows:

40 sx. cement from 2300'-2420'
30 sx. cement from 1750'-1850'
30 sx. cement from 1030'-1130'

(Contractor will run pipe to complete as water well for landowner. Pipe will be set at 350', (Dakota).

I hereby certify that the foregoing is to any work or operation performed in a true and accurate report of each work or operation.

Signed: B. J. Dobek
Title: Manager of Operations
Date: 2/13/71

DO NOT WRITE BELOW THIS LINE

Oil and Gas Board of the State of South Dakota

Conditions of any:

See instructions on reverse side
CORRESPONDENCE
November 18, 1971

South Dakota Geological Survey  
Attn: Dr. Duncan McGregor  
Science Center, University  
Vermillion, South Dakota 57069

Gentlemen:

Sample cuts on the following wells are being sent to you today:

Petro-Lewis Corp. #14-14 Childers  
14-88-2E, Fall River Co., S. D.

Petro-Lewis Corp. #5-22 Peterson  
22-78-12, Fall River Co., S. D.

Petro-Lewis Corp. #3-7 Trotter-Federal  
7-93-2E, Fall River Co., S. D.

Very truly yours,

[Signature]

Fred McCotter  
Manager
June 23, 1971

Dr. Duncan J. McGregor  
State Geologist  
South Dakota Geological Survey  
Science Center, USD  
Vermillion, South Dakota 57069

Dear Duncan,

On June 21, 1971 we inspected the sites of the following oil tests and find that they have been satisfactorily restored. The wells are as follows:

Permit
806 Petro-Lewis #5-22 Peterson, SW 1/4 SE 1/2 22-17N-12W, Fall River County  
61 Petro-Lewis #14-14 Childers, 32SW 1/4 SE 1/2, Fall River County  
631 Webb Resources #11-16 Zuehlke, SFSE 11-11-4L, Fall River County

As soon as all other requirements have been met I recommend the release of bond.

Sincerely,

[Vacant]

Vex. V. Steen  
Principal Geologist

FVS/dme  
cc: Petro-Lewis Corporation  
Webb Resources, Inc.
January 13, 1971

Mr. Fred V. Steece
Western Field Office
615 Birch Ave.
Rapid City, South Dakota

Dear Fred:

I am enclosing the following logs:

- 1 Sonic log - Gamma ray and 1 Dual Induction-Laterolog for Petro-Lewis 5-22 Peterson well, Fall River County
- 1 Induction-Electrical log and 1 Sonic log - Gamma ray for Lee Banks #1-23 Federal-Richards in Butte County
- 1 Nicrotaterolog and 1 Sonic log - Gamma ray for Consolidated #1 Tribal well in Corson County
- 1 Induction-electrical log for Consolidated #1 Tribal well in Corson County.

Sincerely,

('rs.) Ruth Lynch
Accounting Clerk
For the State Geologist

Encl.

Small logs
December 15, 1970

Mrs. M. Lauro Peterson
Star Route
Digswell, South Dakota

Dear Mrs. Peterson,

Thank you for your letter of December 11, 1970 regarding the Webb Resources #5-22 Peterson oil well, located on your land in SW 1/4 NE 1/4 Sec. 22, T. 75 S., R. 13 E., Fall River County, South Dakota. The letter is fine as far as it goes, however it is incomplete.

I have enclosed the original and three carbon copies of a suggested substitution to your letter. If you approve of this please date and sign the original and two carbon copies and send them to:

South Dakota Oil and Gas Board, Capitol Office Building, Pierre, South Dakota 57501

Mr. J. W. Grimms, Chief Engineer, South Dakota Water Resources Comm., Capitol Office Building, Pierre, South Dakota 57501

Fred V. Steens, Principal Geologist, Geological Survey, Western Field Office, 615 Birch Avenue, Rapid City, South Dakota 57701

The other copy is for your files.

Sincerely,

Fred V. Steens
Principal Geologist

FVS/dms
cc: Dr. Duncan J. McIlgar
State Geologist
December 14, 1970

Mr. J. W. Grimes
Chief Engineer
South Dakota Water Resource Comm.
Capitol Office Building
Pierre, South Dakota 57501

Dear Joe,

Friday, December 11, 1970, I spoke with Don Driskill on the telephone with regard to an oil test in Fall River county that has recently been converted to a water well. The well is the Petro-Leda No. 22 Patterson located in Section 22-75-11 Fall River (permit 608). The well was drilled from November 18 to November 27, 1970 and completed as a water well in the Fall River Formation on November 28, 1970. The well has 167 feet of 8 5/8 surface casing converted from top to bottom and was completed with 389 feet of 4 1/2 inch casing suspended inside the larger casing. The original depth of the well was 2945 feet and was plugged back to 1030, which plugs through the Basal Sundance sand and allows the well to take advantage of the marl sand development of the Fall River and Lakota. The plugging record is as follows:

40 acre—2810-2200 across the Leo sand
30 acre—1860-1750 across the Converse sand
30 acre—1180-1030 across the Basal Sundance sand

If there is further information you need on this well, please let me know.

Sincerely,

Fred V. Steese
Principal Geologist

cc: Dorean J. McGregor
State Geologist

Miss Ada Larson
Secretary, Oil and Gas Board
SURETY
BOND

KNOW ALL HEY OF THESE PRESENTS:

That we, PETRO-LEWIS CORPORATION, 1224 Denver Club Building, Denver, Colorado 80202

of the City of Denver, State of Colorado

be and are Principal,

and

THE TRAVELERS INDEMNITY COMPANY

be and are Surety

as surety, authorized to do business in the State of South Dakota as surety, are held and firmly bound unto the State of South Dakota in the sum of $20,000.00, lawful money of the United States, for which payment, well and truly to be made, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, jointly by these presents.

The condition of this obligation is that whereas the above named principal agrees to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit:

ANY AND ALL LOCATIONS WITHIN THE STATE OF SOUTH DAKOTA

... (site or well as necessary hereafter or for single well)

NOW, THEREFORE, if the above named principal shall comply with all of the provisions of the laws of this State and the rules, regulations and orders of the oil and gas board of this State, especially with reference to the proper plugging at spot well or wells, and quit and abandon the same to the oil and gas board of this State all notices and removal required by said board, and the reclamation of the surface; in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation shall be terminated by the said, the same shall be and remain in full force and effect.

Plea said of

TWENTY THOUSAND AND NO/100 ($20,000.00) DOLLARS-

Witness our hands and seals, this day of

PETRO-LEWIS CORPORATION

By: /s/ A. C. Traylor

Pleasant

Witness our hands and seals, this 17th day of

July, 1970

THE TRAVELERS INDEMNITY COMPANY

By: /s/ J. A. Talbert

Attorney-in-Fact

If the principal or any other person authorized to execute this instrument, shall fail to observe the provisions of the laws of this State, or if any well or wells described herein are not properly plugged, then the surety will be and is liable for the payment of all sums which may be assessed and collected by the State, in the manner provided by law.

DO NOT WRITE BELOW THIS LINE

OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA

Date

Secretary

A. C. Traylor

Oil and Gas Board of the State of South Dakota

Note: The 3 copies of this form must be submitted to Secretary, Oil & Gas Board, Pierre.
MISCELLANEOUS
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
Oil and Gas Search for: api_no_ like '40 047 05093'

Record 1 of 1

Well Information

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<tr>
<td>County:</td>
<td>FALL RIVER</td>
</tr>
<tr>
<td>Well Name:</td>
<td>SUPERIOR OIL 1 PETERSON 44-15</td>
</tr>
<tr>
<td>Location:</td>
<td>SESE 15-7S-1E</td>
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<tr>
<td>Permit No:</td>
<td>382</td>
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<tr>
<td>Total Depth:</td>
<td>2264</td>
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<tr>
<td>Operator Name:</td>
<td>SUPERIOR OIL COMPANY</td>
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<tr>
<td>Bottom Hole:</td>
<td>Minnelusa</td>
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<td>02-18-1965</td>
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<td>KB Elevation:</td>
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<td>02-20-1965</td>
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Formation Tops

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<tr>
<td>Morrison</td>
<td>471</td>
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<tr>
<td>Sundance</td>
<td>670</td>
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<tr>
<td>Minnehahta</td>
<td>1518</td>
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<tr>
<td>Opeche</td>
<td>1557</td>
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<tr>
<td>Minnelusa</td>
<td>1645</td>
</tr>
<tr>
<td>Red River</td>
<td>2108</td>
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http://sddnr.net/oil_gas/search_results_oil_gas.cfm

2/15/2012
COUNTY: FALL RIVER
LEGAL LOCATION: SESE 15-7N-1E
API NO: 40 047 05093
PERMIT NO: 382
WELL NAME: SUPERIOR OIL #1
PETE RSON (44-15)
OPERATOR: THE SUPERIOR OIL COMPANY
PERMIT ISSUED: 02/18/1965
PERMIT CLOSED: 10/21/1966
FILE LOCATION: 7N-1E-15 SESE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
WELL HISTORY

Well Name Superior Oil #1 Peterson 44-15  Permit No. 382
Location SESE 15° 75.15 - Fall River  Date of Permit 2-18-65
Elev. 3576 Gr. API No.
Confidential From To Log's Received
Cuttings Received Cores Received
Drill Stem Records
Cap Plug and Marker Set
Surface Restored
Plugging Affidavit Signed Date
Bond Released Date 10-21-66

Summary of Scout Reports
2-19-65 First report
2-24-65 Spudded 2-20-65
3-4-65 Plugged
3-5-65 Planned to convert test to water well
4-9-65 Pits not filled - Rig still on location
5-25-65 Mud pits not filled - Rig moved from location
7-30-65 Pits not filled
8-1-66 Pits not filled
PERMIT TO DRILL / INTENT TO DRILL
APPENDIX FOR PERMIT TO:  

[ ] DRILL  [ ] DEEPEN  [ ] PLUG BACK  [ ] SINGLE ZONE  

[ ] OIL WELL  [ ] GAS WELL  [ ] MULTIPLE ZONE  

OPERATOR  

The Superior Oil Company  

ADDRESS  

P. O. Box 200, Casper, Wyoming  

LOCATION -10 feet from an established course of the legal description:  

660' FSL & 660' FEL Sec. 15-75-1E  

NAME AND ADDRESS OF SURFACE OWNER  

F. A. Peterson  

Edgemont, South Dakota  

NAME AND ADDRESS OF CONTRACTOR  

Unknown  

IF LEASE PURCHASED WITH ANY WELLS DRILLED, FROM WHOM PURCHASED (NAME and address)  

PROPOSED CASING AND CEMENTING PROGRAM  

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>RANKS OF CEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-1/4&quot;</td>
<td>8-5/8&quot;</td>
<td>24#</td>
<td>New</td>
<td>500'</td>
<td>300</td>
</tr>
</tbody>
</table>

REQUIRE PROPOSED OPERATIONS IF PROPOSAL IS TO DEEPEN OF PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE GIVE BLOW OUT PREVENTER PROGRAM IF ANY  

(1) The Superior Oil Company proposes to drill a 3500' 1st Leo Sand test at the above location.  
(2) Will set 8-5/8" casing at 500' & cement to surface.  
(3) Will drill 7-7/8" hole to total depth.  
(4) Will catch 10' samples from base of surface to TD.  
(5) Expect to core & test the 1st Leo Sand plus any other zones that have significant shows.  
(6) Will run Dual Induction-Laterallog & GRS logs from TD to base of surf. casing.  
(7) Should commercial production be encountered, 5-1/2" casing will be cemented through the productive zone.  

SIGNED  

D. P. Dicks  

TITLE District Engineer  

DATE 2-11-65  

APPROVAL OF PROPOSED OPERATIONS  

(1) IF SAMPLES AND CORES OF TAKEN, MUST BE SUBMITTED.  
(2) SAMPLES AND CORES OF TAKEN BELOW DEPTH, MUST BE SUBMITTED.  

INSTRUCTIONS  

General: This form is designed for submitting proposals to perform certain well operations, as indicated, on all types of lands and leases for appropriate action by either a Federal or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. (Those applicable Federal or State regulations or appropriate officials, concerning approval of the proposal before operations are started).  

If the proposal is to rework to the same reservoir at a different subarea location or to a new reservoir, use this form with appropriate  

If the well to be, or has been, driller-drilled, or state and shown by attached sheets, if necessary, the coordinate location of the hole in any present or prospective productive zones.  

Files 3 copies of this form with Secretary, Oil & Gas Board, Pierre.  

(*Sample location: 660 South and 660 East of the Northwest Corner of Section 16.)  

Dewey-Burdock GDP  

June 2012  

3.7-B-268  

Appendix 3.7-B
LAWRENCE T. PRICE, of Newcastle, Wyoming, certify that in accordance with a request from J. P. BURS to
of Casper, Wyoming for The Superior Oil Company.
P. O. Box 200, Casper, Wyoming
I made a survey (date) February 9, 1953, for the location and elevation of the Patterson No. 1 (44-15) oil
wellsite.
As shown on above map, the well site is in Section 15, Township 7 South, WIND Ranges 1 East, WIND
Township 7 South, State of Wyoming, elevation is 3576.5 feet above mean sea level before casing.

Licensed Surveyor No. 1311
WELL INSPECTION / SCOUT REPORTS
STATE GEOLOGICAL SURVEY

Scout Report

Date Scouted: 7/1/68

Owner: Superior Oil Company

Designation of well: #1 Peterson (44-15)

Location: Sec. 15 T. 7 N. S. R. 1 E. W.

Fall River County, S. D. Total depth: 2264 feet

Casing Record:

8 5/8 in. 971 Ft. 151 Ft.

Work in progress at time of visit:

None

Developments since last visit:

None

Remarks and recommendations:

Pits not filled

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregors, State Geologist
STATE GEOLOGICAL SURVEY
Scout Report
Date Scouted July 30, 1965

Owner Superior Oil Company

Designation of well #1 Peterson (44-15)

Location: Sec. 15 T. 7 M. S. R. 1 E.W.
Fall River County, S. D. Total depth 2264 feet

Casing Record:
8 5/8 971 Ft. _______ Ft.

Work in progress at time of visit:
None

Developments since last visit:
None

Remarks and recommendations:
Pits not filled

Scouted by Earl Cox, Geologist
Approved by Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date Scouted: May 25, 1965

Owner: Superior Oil Company

Designation of well: #1 Peterson (44-15)

Location: Sec. 15 T. 7 N. S. R. 1 E. W.

Fall River County, S. D. Total depth: 2,264 feet

Casing Record:

<table>
<thead>
<tr>
<th>Dia.</th>
<th>Ft.</th>
<th>Dia.</th>
<th>Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 5/8</td>
<td>971</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Work in progress at time of visit:

None

Developments since last visit:

Rig moved from location

Remarks and recommendations:

Mud pits not filled

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY
Scout Report
Date Scouted April 9, 1965

Owner Superior Oil Company

Designation of well #1 Peterson (44-15)

Location: Sec. 15 T. 7 W. S. R. 1 E. W.
Fall River County, S. D. Total depth 2264 feet

Casing Record:
8 5/8 971 Ft. _____ Ft.
_____ Ft. _____ Ft.

Work in progress at time of visit:
None, well is flowing at about 10 gpm

Developments since last visit:
A three-inch central valve is in place on the well head.

Remarks and recommendations:
Pits have not been filled.
Rig is still over location.

Scouted by Earl Cox, Geologist
Approved by Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date Scouted March 3, 1965

Owner Superior Oil Company

Designation of well #1 Peterson (44 - 15)

Location: Sec. 15 T. 7 N. S. R. 1 E. W.

Fall River County, S. D. Total depth 2264 feet

Casing Record:

8 5/8 971 Ft. _______ Ft.

______ Ft. _______ Ft.

Work in progress at time of visit:

An artesian flow at the base of the surface casing flushed out the top of the cement plug resulting in a 20-30 gpm flow of fresh water.

Developments since last visit:

Remarks and recommendations:

The flow is contained by a valve at the surface and it is planned to convert the test to a water well.

Scouted by Earl Cox, Geologist

Approved by Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date Scouted: March 4, 1966

Owner: Superior Oil Company

Designation of well: #1 Peterson (44 - 15)

Location: Sec. 15 T. 7 N. S. R. 1 E. M.

Fall River County, S. D. Total depth 2264 feet

Casing Record:

8 5/8

971 Ft. 1548 Ft.

---- Ft. ---- Ft.

Work in progress at time of visit:

Plugged as follows:

25 sacks 1970-1920 3rd Converse sand
35 sacks 1715-1645 Top Minnelusa
30 sacks Base surface casing 1020-950

Developments since last visit:

Core #1 2175-2221 anhydrite, Core #2 2221-22644, anhydrite essentially. Leo Sand very tight. No permeability or porosity. Run sonic-gamma ray leg and dual induction laterolog (971-T.D.). Run E-log and micro-leg prior to setting surface casing. Water flow of about 40 gpm at 890-905 and also a flow after drilling out from under surface casing.

Remarks and recommendations:

Tentative leg tops:

Minnekahta = 1518 3rd converse = 1942
Opeche = 1557 Red marker = 2108
Minnelusa = 1645 Base of 1st Leo = 2254
2nd Converse = 1777 T. D. = 2264

Scouted by: Earl Caw, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Owner: Superior Oil Co.

Designation of well: #1 Peterson

Location: Sec. 15, T. 7 S., R. 1 E., Me. Fall River County, S. D.

Total depth 2179 feet

Casing Record:

8 5/8” 971 Ft. 700 Ft.

Work in progress at time of visit:

Coring at 2179 (1st Leo Sand)

Developments since last visit:

Set 971' of 8 5/8” surface casing with 575 sacks.

Drilled from 974-2175.

Cored from 2175-2179.

Artesian flows were encountered in the Lakota and Sundance.

Remarks and recommendations:

E Log Tops:

<table>
<thead>
<tr>
<th>Dakota</th>
<th>Sundance</th>
<th>Top Sundance Sand</th>
<th>Minnekahta</th>
<th>Minnelusa</th>
</tr>
</thead>
<tbody>
<tr>
<td>185</td>
<td>670</td>
<td>771</td>
<td>1527</td>
<td>1552</td>
</tr>
</tbody>
</table>

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist

Elevations: 3570 gd.; 3585 K.B.
Hydro ID 4

STATE GEOLOGICAL SURVEY
Scout Report

Date Scouted: Feb. 24, 1965

Owner: Superior Oil Co.

Designation of well: #1 Peterson (44-15)

Location: Sec. 15 T. 7 N. 1 S. R. 1 B. NW.

Count River County, S. D. Total depth: 974 feet

Casing Record:

Ft. Ft.
Ft. Ft.

Work in progress at time of visit:
Drilling at 974'.

Developments since last visit:
Spud 2-20-65.
Drilled from 0 - 974.
Run electric log to locate water sands.

Remarks and recommendations:
Over 900 feet of surface casing will be set to case off artesian flows.

Scouted by: Earl Cow, Geologist
Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

FIRST REPORT

Scout Report

Date Scouted: Feb. 19, 1965

Owner: Superior

Designation of well: #1 (44-15) Peterson

Location: Sec. 15 T. 7 N. S. R. 1 E. W.

Fall River County, S. D. Total depth 0 feet

Casing Record:

_______ Ft. _______ Ft.

_______ Ft. _______ Ft.

Work in progress at time of visit:

Petroleum information informed me by phone that Barnhart Drilling Company was the contractor and they were on location.

Developments since last visit:

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
Don Brown called Paul
Rounded up 2364 for
the smell about new
phones. Get to lay +
then play

Jim called 662-6222

Semi lay. Gamma by Paul
103 = 135 by closed as subject.
Paul instructed early.

#3

June 7, 1970

2:45 A.M. to Chuk
play.

62 - 7244
Run 7

June 7, 1970
March 6, 1966
called approx 8:30 am
he said he was quits
came over and came
from 10 1/2 surface,
most wanted to see me

I said cant

I done but would

can we play about

Dewey Burdock GDP
June 2012
3.7-B-281
Appendix 3.7-B
4.3

Dewey-Burdock GDP
June 2012
3.7-B-283
Appendix 3.7-B
Hydro ID 4.

1. Received request of letter for June 2012 from Peterson and the B2B sets.
2. Clearing of all of the B2B set was completed yesterday.
3. The cover of the analyses.

4. 4-4-05

Well flow at about 100 ppm, controllable. Pump set not failed, no indication of contamination.

5. 5-10-05

Lifter pump is not engaged, and well is not failing. Although production has resumed, responsibility for well.

6. 5-25-05

Rig moved from location. Lift not failed.

7. 7-30-05

Pumps not failed.

10-1-05

Letter from Dr. E.Requests pumping not started, and not failed.
Hydro ID 4

Letter from end it was after
Letter from Peterson provided
Peterson falls 7-1-66

Received please respond by
Peterson for pile 9-28-66

Letter from deal copy ok to
include here
Hydro ID 4

WELL: Emperor III 1-5-7

LOCATION:

LOGS RECEIVED:

TOOL:

GEOLOGIC:

ELECTRIC:
FIELD: 23
FINAL: 23
REMARK:

RADIO:
FIELD: 2
FINAL: 2
REMARK:

OTHERS: 3 copies and index

CUTTINGS RECEIVED: 6/10/83

CORES RECEIVED: 2 copies of core index 5-13-63

DRILL STEEL DATA RECEIVED:

CAP PLUG CHECKED: correct and watertight

SUSPENDING POLES FILLED:

FLUSSING AFFIDAVIT SIGNED:
1 photograph and affidavit received (2-2-63)

BOND RELEASED: $10,000 for owner signature 10-7-66

10-21-66
OPERATOR’S
TECHNICAL
REPORTS / MAPS
**CORE ANALYSIS RESULTS**

**Company:** SUPERIOR OIL COMPANY  
**Well:** NO.1 PETERSON  
**Field:** WILDCAT  
**County:** FALL RIVER  
**State:** S. DAKOTA  
**Location:** SE SE 15-7S-1E  
**Formation:** MINNEUSA  
**Core Type:** DIAMOND'Connor  
**Drilling Fluid:** WATER BASE  
**Sample Description:** 3576 Gravel

<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>DEPTH FEET</th>
<th>PERMEABILITY MILLIDAYS</th>
<th>POROSITY PERCENT</th>
<th>RESIDUAL SATURATION</th>
<th>TOTAL WATER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2217-13</td>
<td>0.16</td>
<td>2.7</td>
<td>7.4</td>
<td>63.1</td>
<td>SD, GRY, V/FN-PN, CALC.</td>
</tr>
<tr>
<td>2</td>
<td>19-19</td>
<td>0.24</td>
<td>2.6</td>
<td>0.0</td>
<td>66.5</td>
<td>SD, GRY, V/FN-PN, CALC.</td>
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<tr>
<td>3</td>
<td>2133</td>
<td>0.10</td>
<td>2.2</td>
<td>0.0</td>
<td>77.2</td>
<td>SD, GRY, V/FN-PN, SL/DOL.</td>
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<tr>
<td>4</td>
<td>2222</td>
<td>0.10</td>
<td>1.3</td>
<td>0.0</td>
<td>84.5</td>
<td>SD, GRY, V/FN-PN, SL/DOL.</td>
</tr>
<tr>
<td>5</td>
<td>2221</td>
<td>&lt;0.1</td>
<td>0.5</td>
<td>0.0</td>
<td>40.0</td>
<td>SD, GRY, V/FN-PN, SL/CALC.</td>
</tr>
<tr>
<td>6</td>
<td>2239</td>
<td>0.10</td>
<td>2.8</td>
<td>0.0</td>
<td>68.0</td>
<td>SD, GRY, FN-MED, SL/CALC.</td>
</tr>
<tr>
<td>7</td>
<td>2249</td>
<td>0.10</td>
<td>1.9</td>
<td>0.0</td>
<td>47.3</td>
<td>SD, GRY, FN-MED, SL/CALC.</td>
</tr>
</tbody>
</table>

**Lithological Abbreviations**

- SD: Sandstone
- GRY: Gray
- V/FN: Very Fine-Neat
- SL: Siltstone
- DOL: Dolomite
- CALC: Calcite

---

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Superior Oil Company, 44-15 Petersen  
C SE SE Section 15, T 7 S, R 1 E  
Fall River County, South Dakota

Elevation: 3576G, 3585KB

970- 980 Shaly siltstone, dark reddish brown, calc, NS.
980- 990 Siltstone, aa, NS.
990-1000 Siltstone, aa, NS.
1000-1010 Siltstone, dark reddish brown, calc, NS.
1010-1020 Siltstone, dark reddish brown, calc, NS.
1020-1030 Siltstone, dark reddish brown, calc, NS.
1030-1040 Shaly siltstone, dark reddish brown, calc, NS.
1040-1050 Shaly siltstone, dark reddish brown, calc, NS.
1050-1060 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1060-1070 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1070-1080 Shaly siltstone, dark reddish brown, calc, NS.
1080-1090 Shaly siltstone, dark reddish brown, calc, NS.
1090-1100 Shaly siltstone, dark reddish brown, calc, NS.
1100-1110 Shaly siltstone, dark reddish brown, calc, NS.
1110-1120 Shaly siltstone, dark reddish brown, calc, NS.
1120-1130 Shaly siltstone, dark reddish brown, calc, NS.
1130-1140 Shaly siltstone, dark reddish brown, calc, NS.
1140-1150 Shaly siltstone, dark reddish brown, calc, NS.
1150-1160 Shaly siltstone, dark reddish brown, calc, NS.
1160-1170 Shaly siltstone, dark reddish brown, calc, NS.
1170-1180 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1180-1190 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1190-1200 Shaly siltstone, dark reddish brown, calc, NS.
1200-1210 Shaly siltstone, dark reddish brown, calc, NS.
1210-1220 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1220-1230 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1230-1240 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
1240-1250 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.
Superior Oil Company, 44-15 Petersen
C SE NE Section 15, T 7 S, R 1 E
Fall River County, South Dakota
Page 2

1250-1260 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1260-1270 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1270-1280 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1280-1290 Shaly siltstone, dark reddish brown, calc, with 10% anhydrite, NS.

1290-1300 Shaly siltstone, dark reddish brown, calc, with 10% anhydrite, NS.

1300-1310 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1310-1320 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1320-1330 Shaly siltstone, dark reddish brown, calc, with 25% anhydrite, NS.

1330-1340 Shaly siltstone, dark reddish brown, slightly calc, with 30% anhydrite, NS.

1340-1350 Anhydrite, white, crystalline with shaly siltstone as, NS.

1350-1360 Anhydrite, white, crystalline with shaly siltstone as, NS.

1360-1370 Anhydrite, white, crystalline, decreasing with siltstone as above, NS.

1370-1380 Shaly siltstone, dark reddish brown, calc, with 25% anhydrite, NS.

1380-1390 Shaly siltstone, dark reddish brown, calc, with 25% anhydrite, NS.

1390-1400 Shaly siltstone, dark reddish brown, calc, with 10% anhydrite, NS.

1400-1410 Anhydrite, white, crystalline with shaly siltstone as, NS.

1410-1420 Anhydrite and shaly siltstone, as, 50-50, NS.

1420-1430 Anhydrite and shaly siltstone, as, 50-50, NS.

1430-1440 Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.

1440-1450 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1450-1460 Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.

1460-1470 Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.
<table>
<thead>
<tr>
<th>Interval (ft)</th>
<th>Lithology Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1470-1480</td>
<td>Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1480-1490</td>
<td>Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1490-1500</td>
<td>Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1500-1510</td>
<td>Shaly siltstone, dark reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1510-1520</td>
<td>Shaly siltstone, dark reddish brown, calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1520-1530</td>
<td>40% Shaly siltstone, as, with 10% white anhydrite and 20% dolomites, pink, very fine granular to dense, slow effervescence, NS.</td>
</tr>
<tr>
<td>1530-1540</td>
<td>Shaly siltstone, anhydrite and dolomite, as, in equal parts. The dolomite is varicolored - white, pink, tan, NS.</td>
</tr>
<tr>
<td>1540-1550</td>
<td>Sample as, with minor calcareous purple shale, NS.</td>
</tr>
<tr>
<td>1550-1560</td>
<td>Sample as, with minor calcareous purple shale, NS.</td>
</tr>
<tr>
<td>1560-1570</td>
<td>Sample as, with no purple shale, NS.</td>
</tr>
<tr>
<td>1570-1580</td>
<td>Sample as, NS.</td>
</tr>
<tr>
<td>1580-1590</td>
<td>Sample as, NS.</td>
</tr>
<tr>
<td>1590-1600</td>
<td>Sample as, NS.</td>
</tr>
<tr>
<td>1600-1610</td>
<td>Silty shale to siltstone, reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1610-1620</td>
<td>Silty shale to siltstone, reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1620-1630</td>
<td>Silty shale to siltstone, reddish brown, slightly calc, with minor anhydrite, NS.</td>
</tr>
</tbody>
</table>

**Note:** The Apache lithology is similar to the pre-Mississippian with the exception that the silt grains seem generally smaller.

<table>
<thead>
<tr>
<th>Interval (ft)</th>
<th>Lithology Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1630-1640</td>
<td>Shaly siltstone, reddish brown, calc, with minor anhydrite, NS.</td>
</tr>
<tr>
<td>1640-1650</td>
<td>Sample as, with sandy siltstone, reddish brown, slightly calc, soft and sandstone, gray to pink, fine grained, non-calc poor porosity, NS.</td>
</tr>
<tr>
<td>1650-1660</td>
<td>Sample as, with sandstone, pink to white, fine to medium grained, fair sorting, slightly calc, poor porosity, grains appear to have secondary overgrowths, NS.</td>
</tr>
<tr>
<td>1660-1670</td>
<td>Sandy siltstone, reddish brown, and sandstone as, NS.</td>
</tr>
<tr>
<td>1670-1680</td>
<td>Sample as, with sandy siltstone predominant, NS.</td>
</tr>
<tr>
<td>1680-1690</td>
<td>Sample as, with sandstone increasing to 30%, NS.</td>
</tr>
</tbody>
</table>
Hydro

Superior Oil Company, 44-15 Petersen
C SE SE Section 15, T 7 S, R 1 E
Fall River County, South Dakota
Page 4

1690-1700 Sample aa, with sandstone increasing to 30%, with minor anhydrite, NS.

1700-1710 Sample aa, with sandstone increasing to 30%, with minor anhydrite, NS.

1710-1720 Sample aa, with sandstone increasing to 30%, with minor anhydrite, NS.

1720-1730 60% Anhydrite, white, crystalline with silty shale, reddish brown and minor sandstone, NS.

1730-1740 Sample aa, NS.

1740-1750 Dolomite, white to pink, dense, with anhydrite aa, NS.

1750-1760 Dolomite, white to pink to gray, dense, with anhydrite aa, NS.

1760-1770 Sandy siltstone, reddish brown, calc, with minor anhydrite, NS.

1770-1780 Sandy siltstone, reddish brown, calc, with minor anhydrite, NS.

1780-1790 Sandy siltstone, reddish brown, calc, with minor sandstone, white to pink, fine grained, angular, well sorted, poor porosity anhydrite cement, NS.

1790-1800 Sandy siltstone and sandstone aa, with anhydrite, NS.

1800-1810 Shale, reddish brown with siltstone and anhydrite aa, NS.

1810-1820 Limestone, mottled gray, dense, with lithology aa, NS.

1820-1830 Limestone, mottled gray, dense, with lithology aa, NS.

1830-1840 Shaly siltstone, reddish brown, slightly calc, with limestone and anhydrite aa, NS.

1840-1850 Sample aa, NS.

1850-1860 Sample aa, with minor white sandstone, fine grained, poor porosity, NS.

1860-1870 Limestone aa, with shaly siltstone and anhydrite aa, NS.

1870-1880 Limestone aa, with shaly siltstone and anhydrite aa, NS.

1880-1890 Limestone aa, with shaly siltstone and anhydrite aa, NS.

1890-1900 Shaly siltstone increasing in proportion to limestone and anhydrite with minor sandstone, white very fine grained, angular, no porosity, grains are anhydrite encased, NS.

1900-1910 Sample aa, NS.

1910-1920 Shaly siltstone to silty shale, reddish brown, soft calc, and anhydrite, white, granular with minor limestone, pink, dense, NS.

1920-1930 60% Shaly siltstone aa, 30% anhydrite aa, 10% limestone aa, NS.
Superior Oil Company, 44-15 Petersen
C SE SE Section 15, T 7 S, R 1 E
Pall River County, South Dakota

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1930-1940 Sample aa, MS.
1940-1950 Silty shale, reddish brown, slightly calc, soft
with minor anhydrite, MS.
1950-1960 Silty shale, reddish brown, slightly calc, soft
with minor anhydrite and sandstone, white, very
fine grained, non-calc, tight, MS.
1960-1970 Silty shale and minor anhydrite aa, no sandstone, MS.
1980-1990 75% cave, 25% sample aa, MS.
1990-2000 75% cave, 25% sample aa, MS.
2000-2010 75% cave, 25% sample aa, MS.
2010-2020 30% cave and silty shale, reddish brown, non-calc,
soft with minor anhydrite and limestone, MS.
2020-2030 Sample aa, with sandstone, pink, fine to very fine
grained, sub-angular, fair sorting dolomite cement,
poor porosity, MS.
2030-2040 Sandstone aa, MS.
2040-2050 Sandstone aa, except very fine to medium grained
sub-rounded poor sorting, poor porosity, MS.
2050-2060 Sandstone aa.
2060-2070 Anhydrite, white, with minor dolomite, pink and gray,
dense and sandstone aa, with one chip shaly siltstone,
red, slightly calc, hard, MS.
2070-2080 Sample aa, with 10% siltstone aa, MS.
2080-2090 Sample aa, with 10% siltstone aa, MS.
2090-2100 Anhydrite and limestone aa, MS.
2100-2110 Anhydrite and limestone aa, with sandstone white to
lavender, very fine to fine grained, poor sorting,
slightly calc to non-calc, MS.
2110-2120 Dolomite, tan to grey, dense; anhydrite, white,
crystalline, shale, red, soft, sandstone white to
lavender, very fine to fine grained, poor sorting,
slightly calc to non-calc, tight, MS.
2120-2130 Sample aa, with sandstone white, very fine to fine
grained, fair sorting, rounded, slight effervescence,
poor porosity, MS.
2130-2140 Dolomite and shale aa, with white sandstone aa, MS.
2140-2150 Increasing white sandstone with shale aa, MS.
2150-2160 Shale aa, with dolomite aa and decreasing sandstone
aa, with minor black shale, soft, slightly calc, MS.
2160-2170 Sample aa, with increasing black shale and limestone, MS.
2170-2175 Sample aa, MS.
2175-2221 Core #1, see detailed description.
2221-2264 Core #2, see detailed description.
Total Depth 2264'.
The Superior Oil Company, #44-15 Peterson
C SE 36 Section 15, T 7 S, R 1 E
Fall River County, South Dakota

CORE #1 2175-2221 Cored 45 feet, Recovered 44 feet.

2175-76 Dolomite, black, finely crystalline, tight, NS.

2176-77 Anhydrite and dolomite, mottled light and dark gray, coarsely crystalline, tight, NS.

2177-78 Anhydrite, light to dark gray, tight, NS.

2178-79 Anhydrite, aa, with reddish-brown dolomite mottling, tight, NS.

2179-80 Dolomite, light gray, finely crystalline with minor clear anhydrite crystals and black shale mottling, NS.

2180-81 Dolomite, light gray, dense, mottled with clear anhydrite and red spots, NS. Some of the anhydrite has the curved shape of shell fragments.

2181-82 Sample aa, NS.

2182-83 Sandstone, gray, very fine-grained, subrounded, dolomitic and anhydritic cement, hard and tight, NS.

2183-84 Sample aa, NS.

2184-85 Anhydrite, mottled white and gray, tight, NS.

2185-86 Shale, dark gray, anhydritic, NS.

2186-87 Anhydrite, gray, very finely crystalline, dolomitic and very silty, NS.

2187-88 Anhydrite, light gray, sandy, very fine grained, NS.

2188-89 Sandstone, light gray, very fine to medium-grained, poorly sorted, dolomitic and anhydritic, tight, NS.

2189-90 Sandstone, light gray, very fine to medium-grained, poorly sorted, dolomitic and anhydritic, tight, NS.

2190-91 Sandstone, light gray, very fine to medium-grained, poorly sorted, dolomitic and anhydritic, tight, NS.

2191-92 Sandstone, light gray, very fine to medium-grained, poorly sorted, dolomitic and anhydritic, tight, NS.

2192-93 Sandstone, light gray, very fine to fine-grained, anhydritic cement, tight, NS.

2193-94 Anhydritic, gray with white dolomite mottling, tight, NS.

2194-95 Anhydrite, gray and white mottled, NS.

2195-96 Anhydrite, gray and white mottled, NS.

2196-97 Anhydrite, gray and white mottled, NS.
Superior, #44-15 Peterson
Core #1
Page 2

2197-98  Anhydrite, gray and white mottled, NS.
2198-99  Anhydrite, gray and white mottled, NS.
2199-2200 Anhydrite, gray and white mottled, NS.
2200-01  Anhydrite, gray and white mottled, NS.
2201-02  Anhydrite, gray and white mottled, NS.
2202-03  Anhydrite, aa, mottled with reddish-brown dolomite, tight, NS.
2203-04  Sample aa, NS.
2204-05  Sample aa, NS.
2205-06  Anhydrite, mottled light and dark gray, NS.
2206-07  Anhydrite, mottled light and dark gray, NS.
2207-08  Anhydrite, mottled light and dark gray, with minor dolomite, NS.
2208-09  Anhydrite, mottled light and dark gray and black, with minor dolomite, NS.
2209-10  Anhydrite, aa, with 1-inch tan dolomite layers, no dip, tight, NS.
2210-11  Dolomite, gray, finely crystalline, with veinlets of black anhydrite, tight, NS.
2211-12  Thin laminae of black anhydrite and light gray sandy dolomite, tight, NS.
2212-13  Sandstone, black, very fine-grained, with anhydrite cement, tight, NS.
2213-14  Anhydrite, mottled light and dark gray with tan dolomite mottling, NS.
2214-15  Dolomite, tan to light gray, mottled with dark gray anhydrite, tight, NS.
2215-16  Black shale, anhydritic with gray anhydrite laminae, NS.
2216-17  Black shale, anhydritic, NS.
2217-18  Dolomite, light gray, very finely crystalline, very sandy, very fine to fine-grained, NS.
2218-19  Sandstone, light gray, very fine to medium-grained, subrounded, fair sorting, dolomite cement, tight, NS.
The Superior Oil Company, #44-15 Peterson
C SE SE Section 15, T 7 S, R 1 E
Fall River County, South Dakota

CORE #2 2221-2264 Cored 43 feet, Recovered 43 feet.

2221-22 Sandstone, gray, very fine to medium-grained, sub-rounded, fair sorting, dolomitic and anhydritic cement, tight, NS.

2222-23 Sandstone, dark gray, very fine to fine-grained, good sorting, anhydritic cement, tight, NS.

2223-24 Anhydrite, mottled gray, NS.
2224-25 Anhydrite, mottled gray, NS.
2225-26 Anhydrite, mottled gray, NS.
2226-27 Anhydrite, mottled gray, NS.
2227-28 Anhydrite, mottled gray, NS.
2228-29 Anhydrite, mottled gray, NS.
2229-30 Anhydrite, mottled gray, NS.
2230-31 Anhydrite, mottled gray, NS.
2231-32 Anhydrite, mottled gray, NS.
2232-33 Anhydrite, mottled gray, NS.
2233-34 Dolomite, gray, dense with spots of anhydrite; yellow fluorescence in hairline fractures; very slight and very slow cut with acetone. Strong sulfur odor.
2234-35 Dolomite, aa, tight, NS. Sulfur odor.
2235-36 Dolomite, aa, tight with increasing amount of anhydrite, NS.
2236-37 Anhydrite, gray, dense, NS.
2237-38 Dolomite and anhydrite, gray, very finely crystalline, very sandy, fine to very fine grains, slight porosity, NS.
2238-39 Sandstone, fine to medium-grained, rounded to sub-rounded, fair sorting, dolomitic and anhydritic cement. Trace of porosity. NS.
2239-40 Anhydrite, gray, very sandy, tight, NS.
2240-41 Anhydrite, gray, very sandy, tight, NS.
2241-42 Anhydrite, gray, very sandy, tight, NS.
2242-43 Anhydrite, gray, very sandy, tight, NS.
2243-44 Sandstone, gray, very fine to fine-grained, sub-rounded, fair sorting, dolomitic and anhydritic cement, tight, NS.
Superior, #44-15 Peterson
Core 02
Page 2

2244-45 Sandstone, aa, tight, NS.
2245-46 Sandstone, gray, fine to medium-grained, anhydritic cement, tight, NS.
2246-47 Anhydrite, black, silty, tight, NS.
2247-48 Anhydrite, black, silty, tight, NS.
2248-49 Anhydrite, gray, dolomitic, tight, NS.
2249-50 Sandstone, gray, very fine to fine-grained, sub-rounded, anhydritic cement, tight, NS.
2250-51 Sandstone, gray, very fine to fine-grained, sub-rounded, anhydritic cement, tight, NS.
2251-52 Sandstone, gray, very fine to fine-grained, sub-rounded, anhydritic cement, tight, NS.
2252-53 Sandstone, gray, very fine to fine-grained, sub-rounded, anhydritic cement, tight, NS.
2253-54 Sandstone, gray, very fine to fine-grained, sub-rounded, anhydritic cement, slight porosity, NS.
2254-55 Anhydrite, mottled gray, dense with streaks of tan dolomite and very fine-grained pyrite, tight, NS.
2255-56 Anhydrite, mottled gray, dense with streaks of tan dolomite, tight, NS.
2256-57 Sample aa, NS.
2257-58 Sample aa, NS.
2258-59 Sample aa, NS.
2259-60 Dolomite, light gray, dense, tight, NS.
2260-61 Dolomite, light gray, dense, tight with small spots of anhydrite, NS.
2261-62 Sample aa, NS.
2262-63 Sample aa, with minor spots of very finely crystalline pyrite, NS.
2263-64 Sample aa, NS.
ADMINISTRATIVE /
SUNDRY REPORTS
**PLUGGING RECORD**

**Operator**
The Superior Oil Company

**Address**
P. O. Box 200, Casper, Wyoming

**Name of Leasor**
Peterson

**Field & Reservoir**
1 (44-1-A) Wildcat

**Location of Well**
660° FSL & 660° FEL, SE SE 15-75-1E, Fall River

**Application to drill this well was filed in name of**
The Superior Oil Co.

**No. of Plug**
March 5, 1965

**Formation containing oil or gas**

<table>
<thead>
<tr>
<th>Name of formation containing oil or gas</th>
<th>Fluid content of each formation</th>
<th>Depth interval of each formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>No depth</td>
</tr>
</tbody>
</table>

**Character of well at completion (initial production)**

<table>
<thead>
<tr>
<th>Oil (bbls/day)</th>
<th>Gas (MMCF/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Well Producing When Plugged**

<table>
<thead>
<tr>
<th>Oil (bbls/day)</th>
<th>Gas (MMCF/day)</th>
<th>Water (bbls/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2264</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Plug 1 - Equalized through open end DP 25 sx reg. cmt. from 1970' to 1920'**

**Plug 2 - Equalized through open end DP 35 sx reg. cmt. from 1715' to 1645'**

**Plug 3 - Equalized through open end DP 30 sx reg. cmt. 2/3 CaCl2 from 1020' to 950'**

**Removed csg, head & capped well as requested by land owner in attached letter.**

Mr. Earl J. Cox of the State Geological Survey supervised the plugging operations. This well was plugged & abandoned in the following manner:

**Pits have been fenced and the location will be cleaned & leveled when the pits dry up.**

---

**DO NOT WRITE BELOW THIS LINE**

**Secretary of State of Wyoming**

J. F. Delk

---

**Note:** File 2 copies of this form with Secretary, Oil & Gas Board, Pierre.
# WELL COMPLETION OR RECOMPLETION REPORT AND LOG

## TYPE OF COMPLETION
- [ ] Oil Well
- [ ] Gas Well
- [ ] Dry Hole
- [ ] New Well
- [ ] Work-Over
- [ ] Deepen
- [ ] Plug Back
- [ ] Same Zone
- [ ] Diff Zone

### COMPANY
- The Superior Oil Company

### LOCATION
- P.O. Box 260, Casper, Wyoming
- Location is feet from survey line or section of legal subdivision where possible:
  - 660' FSL & 660' FEL Sec. 15.

### Well No.
- NO.
- 1 (44-15)

### Field and Pool or Wildcat
- Wildcat

### No. Acres in Lease
- 2846.93

### County
- Crook

### Municipal
- Fall River

### Town
- None

### Horsepower
- None

### DATE ISSUED
- 2-13-65

### DATE COMPLETED
- 3-3-65

### ELEVATION
- 3545' KB

### INTERVALS
- none

### ROTARY TOOLS
- none

### DATE SURVEY SUBMITTED
- 2-13-65

### DATE OF LATERAL SURVEY SUBMITTED
- none

### DATE OF LATERAL DRILLING SUBMITTED
- none

## TYPE: ELECTRIC AND OTHER LOG RUN (Circle those filed):  
- [ ] Oil Well
- [ ] Core Log: Dual Induction - LL & GRG (All filed)

### CASING SIZE
- 6-5/8"

### DEPTH MTD END
- 971

### HOLE SIZE
- 12-1/4"

### 24# Surface
- 625

### CANADIAN FORCES
- None

### LINER DIAMETER
- None

### PORE SPACE
- None

### PRODUCING RECORD
- None

### DEPT INTERVAL - MID
- None

### DEPTH END PT.
- None

### BGA BEC
- None

### BGA BICE
- None

### BGA BICE
- None

### PRODUCTION
- None

### PRODUCING METHOD
- None

### WELL STATUS
- None

### DATE OF TEST
- None

### OIL TEST
- None

### GAS TEST
- None

### WATER TEST
- None

### OIL GRAVITY
- None

### OIL GRAVITY
- None

### GAS GRAVITY
- None

### GAS GRAVITY
- None

### WATER GRAVITY
- None

### BARREL DATE
- None

### DEPT OF GAS, G, used for fuel, heating, etc.
- None

### TEST WITNESSED BY
- None

### DESCRIPTION OF GAS, G, used for fuel, heating, etc.
- None

### COPY ATTACHMENTS
- None

### TITLE
- District Engineer

### DATE
- 3-15-65

### OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA

---

**W.R. Smith (3) w/ copy all attachments,**  
**State Geologist (1) w/1 copies all attachments.**
### Instructions

**General:** This form is designed for submitting a complete and current well completion report and has been approved by the Department of the Interior, Bureau of Land Management, for use by all Federal and State agencies in their inspections of all types of lands and is designed for use by all Federal and State agencies in their inspections of all types of lands.

**Table of Water Wells and Wells by Owners:**

*Table 3.7-B-302*

**Summary of Water Wells and Non-Commercial Oil or Gas Wells**

<table>
<thead>
<tr>
<th>KIND OF FORMATION</th>
<th>MEAS. DEPTH</th>
<th>TRUE VERT. DEPTH</th>
<th>PRODUCTIVE RATE, IF KNOWN</th>
<th>NAME</th>
<th>DEPT. TO TOP</th>
<th>MEAS. DEPTH</th>
<th>TRUE VERT. DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lekota Sd.</td>
<td>371</td>
<td>425</td>
<td>30 bbls. wtr./hr.</td>
<td>Dakota</td>
<td>185</td>
<td>371</td>
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<tr>
<td>Sundance Sd.</td>
<td>771</td>
<td>950</td>
<td>25 bbls. wtr./hr.</td>
<td>Bowlist</td>
<td>571</td>
<td>771</td>
<td></td>
</tr>
<tr>
<td>Bel. Sundance Sd.</td>
<td>966</td>
<td>2087</td>
<td>15 bbls. wtr./hr.</td>
<td>Sundance</td>
<td>670</td>
<td>771</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mimaskeeta</td>
<td>1518</td>
<td>771</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Opeche</td>
<td>1557</td>
<td>771</td>
<td></td>
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<td></td>
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<td>Mimasalea</td>
<td>1845</td>
<td>1557</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>Red Marker</td>
<td>2108</td>
<td>1845</td>
<td></td>
</tr>
</tbody>
</table>

**Geologic Markers:**

A separate record is kept for each interval (zone) to be separately produced.

*Table 3.7-B-302*

**Summary of Water Wells and Non-Commercial Oil or Gas Wells**

*Table 3.7-B-302*
CORRESPONDENCE
Western Field Office  
October 12, 1966  

Mr. Merlin J. Tipton  
Assistant State Geologist  
State Geological Survey  
Vermillion, South Dakota  

Dear Mr. Tipton:

In going through my files, I find that my records show the following oil tests have met all requirements and can now be released from bond coverage:

- Superior #1 Peterson (44-15)  
  Fall River County, South Dakota  
- Gulf #1 Dahlke  
  Jones County, South Dakota  
- Gulf #1 Sandy  
  Jones County, South Dakota  
- Gulf #1 Wold-State  
  Lyman County, South Dakota.

Sincerely,

Earl Cox  
Senior Geologist

EC:rk

Dewey-Burdock GDP  
June 2012  
3.7-B-304  
Appendix 3.7-B
Western Field Office  
September 29, 1966

Dr. Duncan McGregor  
State Geologist  
State Geological Survey  
Vermillion, South Dakota

Re: Superior #1 Peterson (44-15)  
SESE-15-75-1E  
Fall River County, South Dakota  
 Permit No. 382

Dear Duncan:

I have received a copy of the RELEASE, signed by Francis Peterson, and the letter showing two copies of the RELEASE has been sent you by Superior Oil Company.

My records show all required samples, logs and records have been received by your office. The RELEASE, completes all requirements and it is recommended the bond covering this location be terminated.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC:rk
State Geological Survey  
Science Center  
University of South Dakota Campus  
Vermillion, South Dakota

Re: Peterson No. 1 (44-15)  
C SE SE Sec. 15-7S-1E  
Fall River Co., South Dakota  
Permit No. 382

Gentlemen:

Attached are two (2) copies of a letter agreement executed by Mr. Francis A. Peterson releasing us from all surface damages in connection with the drilling of the above referenced well.

We shall appreciate your approval of our abandonment of this location and the attendant release from bond requirement.

Very truly yours,

THE SUPERIOR OIL COMPANY

J. P. Dwyer

JPD:sm

Attached

cc w/attach.: Mr. Earl Cox  
South Dakota Geological Survey  
Western Field Office  
Belle Fourche, South Dakota
Mr. Francis A. Peterson  
Edgemont, South Dakota  

Re: Peterson #1 (44-15)  
C SE SE 15-75-1E  
Fall River County, South Dakota  
Permit #382

Dear Mr. Peterson:

Reference is made to Assignment and Agreement dated March 16, 1965 whereby we assigned to you the well in the SE SE 15-75-1E and you assumed the responsibility for the well.

Regarding the reserve mud pit used in connection with said well, you have informed us that you wish to use it for a reservoir and will take it over, relieving us of any further clean up work or concern about surface damages of any kind arising out of the drilling of the well mentioned above.

If you agree with the foregoing, please sign in the space provided below and return one copy of this letter to us in the enclosed self-addressed envelope.

Very truly yours,

THE SUPERIOR OIL COMPANY

RST

R. S. Troost  
District Landman

ACCEPTED AND AGREED TO
THIS 29 DAY OF Sept., 1966.

FRANCIS A. PETEERSON
Western Field Office
September 12, 1966

Mr. Robert Schoon
Geologist
State Geological Survey
Vermillion, South Dakota

Dear Bob:

Would you check the file on the Superior #1 Peterson, in Fall River County, and see if Superior has sent us a copy of the RELEASE, signed by the land owner.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:rk
Western Field Office  
October 29, 1968

Mr. J. P. Dujka  
Superior Oil Company  
P. O. Box 200  
Casper, Wyoming

Re: Superior #1 Peterson (44-15)  
328E-15-75-1E  
Fall River County, So. Dakota  
Permit No. 382

Dear Mr. Dujka:

Thank you for your October 27 letter. A release from Mr. Peterson will meet all requirements covering cleaning up of the above location. If a copy of the release is sent to me, it will expedite bond termination.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC:sm
Western Field Office  
October 7, 1965

Mr. J. P. Dujka  
Superior Oil Company  
P. O. Box 200  
Casper, Wyoming  

Re: Superior #1 Jeterson (44-15)  
SES-E-16-75-1E  
Fall River County, Sd. Dakota  
Permit No. 382  

Dear Mr. Dujka:

I visited the above location September 2 and found that the wellhead valve was open and water was running into the mud pit.

As you plan to fill the pit after it dries up, you may wish to contact the landowner and have him either close the valve or divert the water so it will not enter the pit.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist  

EC:an
July 13, 1965

Mr. Earl Cox
State Geological Survey
P. O. Box 187
Belle Fourche, South Dakota 57717

Dear Earl:

I am enclosing the electric log and dual induction laterolog on the Superior Peterson #1 (44-15) well in Fall River County, and carbon copies of the scout reports that Bob Schoon turned in last week.

Sincerely yours,

Janet J. McDonough
Senior Stenographer

Enclosures
Mr. Francis A. Peterson
Pierre, South Dakota 57501

Re: Superior #1 Peterson (4-15)
SP #1 15-73-18 W1
Fall River County, S.D.
Permit No. 347

Dear Mr. Peterson:

In as much as the requirements for converting your oil test well to a water well have been done, as specified by the State Geological Survey, the Water Resources Commission hereby assumes jurisdiction of the well as a water well.

Sincerely yours,

[Signature]

C/O BM/BW
cc: Ex. Duncan McGeehan, State Geologist, Vermillion, S.D.
Mr. Earl Cox, Helle Foundation, Pierre, S.D.
Oil and Gas Board, Pierre, S.D.
Western Field Office
Belle Fourche, South Dakota
May 10, 1965

Mr. Joe Grimes
Water Resources Commission
State Office Building
Pierre, South Dakota

Re: Superior #1 Peterson (44-15)
SE 35-15-75-1E
Fall River County, South Dakota
Permit No. 382

Dear Mr. Grimes:

The above oil test is on land owned by Francis A. Peterson. We made arrangements to convert the test to a water well. The well has 971 feet of 6 5/8 inch surface casing, cemented with 575 sacks of cement. The base of the casing is just above the lowest Sundance sand. Immediately below the sand is a cement plug. Additional plugs were placed so as to isolate the Minnelusa sands in the hole. A three inch control valve is in place on the wellhead and when last visited, the well was flowing about 10 gpm of fresh water.

Enclosed is a letter from Mr. Peterson asking that conversion of the oil test to a water well be approved. Peterson agrees to assume full liability for any subsequent plugging that might be required.

If the Water Resources Commission will accept jurisdiction of this test as a water well, please so inform the Oil and Gas Board with a copy of your letter to the State Geologist.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

cc: Secretary, Oil and Gas Board w/gas.
State Geologist w/gas.
F.S. to Duncan: Even though the Water Resources Commission accepts jurisdiction the pits have not been filled at this location and it is suggested that we not approve the bond release until they have been filled. Earl
State Geological Survey  
Science Center  
University of South Dakota Campus  
Vermillion, South Dakota

Re: Peterson #1 (44-15)  
C SE SE 15-7S-1E  
Fall River County  
South Dakota  
Permit #382

Gentlemen:

Attached are two copies each of the core and sample description on the above test.

Today we received a copy of the transmittal letter from American Stratigraphic Company showing they have sent you the samples for this well. As stated on the plugging record, the mud pits have been fenced and will be filled and leveled when they dry up.

If you need any further information or reports, please let us know.

Yours very truly,

J. P. Dujka

cc: Mr. Earl Cox  
South Dakota State Geological Survey  
Western Field Office  
Belle Fourche, South Dakota
State of South Dakota Geological Survey  
Science Center  
Vermillion, South Dakota  

Attention: Dr. Duncan McGregor  
State Geologist  

Gentlemen:  

We are shipping you today via motor freight samples on the following well:  

✓ Superior, #1 Peterson  
15-79-1E  
Fall River County, South Dakota.  

Very truly yours,  

AMERICAN STRATIGRAPHIC COMPANY  

Fred McCotter  
Manager  

PMc/be  
cc: Mr. Jerry Davis, Superior Oil Company, Box 200, Casper, Wyoming.
Mr. J. P. Dujka
Superior Oil Company
P.O. Box 200
Casper, Wyoming

Re: Superior #1 Peterson (44-15)
SE 1/4 SE 1/4, 15-75-16
Fall River County, So. Dakota
Permit No. 382

Dear Mr. Dujka:

In checking our files, at Vermillion, I find we still need two copies each of the core and sample description on the above test. These records should be sent in within thirty days of completion of the test.

Before the bond can be released, the rig must be removed from the location, the samples sent in and the mud pits either filled or a release obtained from Mr. Peterson.

This letter is merely to inform you of the status of our files and to outline our requirements. It is hoped Superior will see fit to do additional work in South Dakota and be assured of our future cooperation.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:sh
Edgemont, South Dakota
March 10, 1965

Mr. Joe Grimes
Water Resource Commission
Pierre, South Dakota

Re: Superior #1 Peterson (44-15)
SE 4-15-7S-1E
Fall River County, So. Dakota
Permit No. 302

Dear Mr. Grimes:

I wish to convert the above oil test, on my land, to a water well. The water to be used will come from the sand zone immediately below the surface casing. A cement plug is in place, immediately below the water zone. The lower portion of the hole has been plugged according to specifications of the State Geological Survey.

Should conversion of the oil test to a water well be approved, I agree to assume full liability for any subsequent plugging that might be required.

Sincerely,

Francis A. Peterson

[Signature]
Mr. Francis A. Peterson
Edgemont, South Dakota

Re: Superior #1 Peterson (44-15)
SE\SE\SE\SE-15-7S-1E
Fall River County, So. Dakota
Permit No. 382

Dear Mr. Peterson:

Enclosed is a letter and three copies made out to Mr. Grimes, of the Water Resource Commission, stating you wish to convert the above oil test to a water well. Please sign the original and all copies, and return to me in the stamped, addressed envelope.

As soon as you get the valve in place, at the wellhead, please let me know so it can be inspected. An envelope is enclosed for your use.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:sn
Edgemont, South Dakota
March 4, 1965

Dr. Duncan McGregor
State Geologist
State Geological Survey
Vermillion, South Dakota

Re: Superior #1 Peterson (44-15)
SE1/4 SE4-15-7S-1E
Fall River County, So. Dak.
Permit No. 382

Dear Sir:

The above oil test on my land is to be plugged and abandoned. It is requested that the test be plugged in a manner so that I can easily go back into it at a future date and perforate the casing and tap the artesian water flow that is behind the casing.

To be specific, it is requested that approval be granted to weld or screw a cap on the top of the surface casing in place of the abandonment marker. It is also requested that the ten sack surface plug not be placed.

Should the test be plugged in the above manner, I agree to assume full liability for any subsequent plugging that might be required.

Sincerely,

F. A. Peterson
SOUTH DAKOTA
State Water Resources Commission
STATE OFFICE BUILDING
PIERRE, SOUTH DAKOTA

February 23, 1965

Mr. F. A. Peterson
Ridgmont, South Dakota

Dear Mr. Peterson:

I have been advised that the Superior Oil Company has obtained a Permit to Drill for Oil and Gas on your land in Section 13, T __ R __.

Occasionally, owners of land consider converting abandoned oil wells into water wells. Please advise me whether or not you intend to convert the oil well drill hole on your land into a water well if water is encountered and the drill hole is abandoned as an oil well.

If you are considering making a water well out of the abandoned oil well drill hole, special considerations are necessary to comply with the State's oil and water laws. The abandoned oil hole must be properly plugged and the water well properly constructed. All conversion work will be at your expense. The cost will vary, depending upon the characteristics of the drill hole, but such cost will be in the neighborhood of $5,000 or more. Usually another driller and drill rig will have to be arranged for. This other drill rig and casing and other materials will have to be on hand to take over immediately after the special oil well plugging is completed, because the drill hole cannot be left open for any appreciable length of time without spoiling it. Approval of plans for construction of the water well will be required, and a bond covering proper construction may be required. Also, a water right may be required. All of these arrangements take considerable time to accomplish.

Please advise me immediately if you plan to convert the oil well drill hole into a water well. We both hope that a producing oil well results from the drill hole on your land; however, if not and you are planning on a water well, we must start making arrangements now.

Sincerely,

J.W. CRIMES
Chief Engineer

Mr. Duncan McRae, State Geologist, University of S.D.
Vermillion, South Dakota
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
## Record 1 of 1

### Well Information

<table>
<thead>
<tr>
<th>API No:</th>
<th>40 047 20065</th>
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<tbody>
<tr>
<td>County:</td>
<td>FALL RIVER</td>
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<tr>
<td>Well Name:</td>
<td>PRC 21-14 PETERSON</td>
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<tr>
<td>Location:</td>
<td>NENW 14-7S-1E</td>
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<td>Permit No:</td>
<td>741</td>
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<td>Total Depth:</td>
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<tr>
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<td>890</td>
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<tr>
<td>Goose Egg</td>
<td>1178</td>
</tr>
<tr>
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<td>1425</td>
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<tr>
<td>Opeche</td>
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<tr>
<td>Red Marker</td>
<td>1984</td>
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<tr>
<td>2nd Leo</td>
<td>2100</td>
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</table>

## Formation Tops

<table>
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<tr>
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<th>Depth (ft.)</th>
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<tr>
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<td>1984</td>
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<tr>
<td>2nd Leo</td>
<td>2100</td>
</tr>
</tbody>
</table>

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http://sddnr.net/oil_gas/search_results_oil_gas.cfm

2/2/2012
COUNTY: FALL RIVER
LEGAL LOCATION: NENW 14-7N-1E
API NO: 40 047 20065
PERMIT NO: 741
WELL NAME: PRC #21-14 PETERSON
OPERATOR: POWER RESOURCES CORPORATION
PERMIT ISSUED: 12/03/1975
PERMIT CLOSED: 01/23/1976
FILE LOCATION: 7N-1E-14 NENW

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
**BOND RELEASE CHECKLIST**

<table>
<thead>
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<th>Well Name &amp; Location</th>
<th>Permit #</th>
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<td>PRC #21-14 Peterson</td>
<td>741</td>
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<tr>
<td>NENW 14-7S-1E, Fall River County</td>
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<tr>
<td>Bond # 4288541</td>
<td>Date Issued Dec. 3, 1975</td>
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<td>Date released Aug. 25, 1976</td>
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**Surface Restoration**
- [X] Pits filled
- [X] Site level
- [ ] Site policed
- [ ] Dry-hole marker solid, sealed, correctly inscribed
- [ ] No dry-hole marker desired, letter in WFO files from surface owner

**Paperwork Filed**
- [ ] Form 4 (Completion or Recompletion Report)
- [ ] Form 6 (Sundry Notices and Report on Wells)
- [ ] Form 7 (plugging Report)

**Geological Information Filed**
- [ ] Wall Logs: IDS, SNP, DIL, GR, NEUT, CALIP, Cement Bond, Temp, Micro, LaterLog, SW Dens
- [ ] DST charts and reports
- [ ] Geologist's Report
- [ ] Results of coring and core analyses
- [ ] Set of 10-foot sample cuttings (check with Bob Schoon)

**DATE** 8.25.76 **CHECKED BY**

---

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
**PERMIT CHECKLIST**

<table>
<thead>
<tr>
<th>Well Name and Location:</th>
<th>Permit # 741</th>
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<td>PRC #21-14 Peterson</td>
<td>API #10 047 20065</td>
</tr>
<tr>
<td>NENW 14-79-1E, Fall River</td>
<td>Bond # 4288541</td>
</tr>
</tbody>
</table>

**Paperwork Filed with WFO**
- ✔️ Organization Report
- ✔️ Application
- ✔️ Bond
- ✔️ Permit fee

**The Following Papers sent to Operator:**
- ✔️ Permit (Form 2a)
- ✔️ Receipt for $100 permit fee
- ✔️ Cover letter explaining material sent

**Permit Fee Filed:**
- ✔️ Permit fee w/Cash Receipts Transmittal Form sent to State Treasurer

**Notification of New Permit sent to:**
- ✔️ Dr. Duncan J. McGregor
- ✔️ Mr. Vern W. Butler
- ✔️ Dr. Allyn Lockner
- ✔️ Mr. George Kane

**DATE** Dec. 3, 1975  **CHECKED BY**[Signature]

---

Dewey-Burdock GDP
June 2012  3.7-B-329  Appendix 3.7-B
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

Drill

☐ DEEPEN
☐ PLUG BACK

Oil Well

☐ GAS WELL
☐ SINGLE ZONE

☐ MULTIPLE ZONE

Operator

Power Resources Corporation

Address

1660 S. Robin St Suite 827 Denver, Colorado 80222

Location

600 ft. North
1985 ft. West
Section 14-75-10

State

Colorado

County

Fremont

NAME AND ADDRESS OF SURFACE OWNER

M. Lawrence Peterson

State Route, Edgerton, So Dakota 57726

NAME AND ADDRESS OF CONTRACTOR

Montana & Kansas

Po Box 940

Newcastle, Wyoming

NAME AND ADDRESS OF WELLS TO BE DEEPENED, PLUGGED BACK OR CONSIDERED FOR DEEPENED, PLUGGED BACK OR CONSIDERED FOR

Wildcat

No

No. of Wells To Be Drilled From Which Purchased (Name and Address)

December 5, 1975

PROPOSED CASING AND CEMENTING PROGRAM

Type of Hole

17.25

Size of Casing

8 7/8

Weight Per Foot

28

New or Second Hand

Second Hand

Approximate Depth

150

No. of Totals

No

DEEPENING AND PLUGGING PROGRAM:

In this proposed area, if the proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. Give blowout prevention program if any.

Drill a 17 1/2" hole from bottom of surface casing to estimated total depth of 2500. Will test Leo zones of Minnolusa formation. Will stem test any zones with shows of oil & gas. If commercial production indicated will set 56" casing 100 ft. below prospective pay zone, penetrates, and complete.

Richard Swanson

Title

Vice President- Land

Date

November 28, 1975

INSTRUCTIONS

General

This form is designed for submitting proposals to perform certain well operations as indicated. It is intended to be used in the United States in the State of Colorado, and is applicable to Federal and State regulations. It may be used for any operations, including, but not limited to, those indicated. Any applicable Federal or State regulations, or appropriate officials, reviewing approval of the proposal before final approval is issued, may require additional requirements.

For the Colorado Oil and Gas Conservation Commission, the form must be submitted to the same licensee at a different surface location or to a new location, unless the same location is included.

If the well is to be, or has been, directionally drilled, on state and show by attached sheets, if necessary, the coordinates location of the hole in any present or objective productive zones.

Sample Location: 600 North and 600 East of the Northwest Corner of Section 10
Thomas E. Nelson, of Casper, Wyoming, has in accordance with a request from Mr. Beasham for the Power Resources Corporation determined the location of #12-14 9. Lenore Peterson to be 4 NE NW Section 14, Township 7 South Range 1 East of the Black Hills Meridian, Fall River County, South Dakota.

I hereby certify that this plat is an accurate representation of a correct survey showing the location of #12-14 9. Lenore Peterson.

Date: 11-23-85

Licensed Land Surveyor No. 1700
State of South Dakota
## ORGANIZATION REPORT

<table>
<thead>
<tr>
<th>Full Name of the Company, Organization, or Individual</th>
<th>Aurora Resources Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Office Address (Box or Street Address)</td>
<td>1660 S. Akinon St. Suite 822, Denver, CO 80223</td>
</tr>
<tr>
<td>Plan of Organization (State whether organization is a corporation, joint stock association, firm or partnership, or individual)</td>
<td>Corporation</td>
</tr>
<tr>
<td>If a reorganization, give name and address of present organization</td>
<td>None</td>
</tr>
<tr>
<td>(1) If foreign corporation, give State where incorporated</td>
<td>WYOMING</td>
</tr>
<tr>
<td>(2) Name and postoffice address of State agent incorporated</td>
<td>CT Corporation System 179 S. Colorado St. Aurora, CO 80014</td>
</tr>
<tr>
<td>(3) Date of permit to do business in state</td>
<td>December 1995</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>POSTOFFICE ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert V. Bailey</td>
<td>President</td>
<td>1660 S. Akinon St. Suite 822, Denver, CO 80223</td>
</tr>
<tr>
<td>Milton O. Childers</td>
<td>Executive Vice President</td>
<td>“”</td>
</tr>
<tr>
<td>Richard A. Bossman</td>
<td>Vice President</td>
<td>“”</td>
</tr>
<tr>
<td>John F. Platt</td>
<td>Secretary-Treasurer</td>
<td>307 Center Ave. Cody, WY 82411</td>
</tr>
</tbody>
</table>

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<td>“”</td>
</tr>
<tr>
<td>Richard A. Bossman</td>
<td>“”</td>
</tr>
<tr>
<td>John F. Platt</td>
<td>307 Center Ave. Cody, WY 82411</td>
</tr>
<tr>
<td>Clavis F. Rodalander</td>
<td>132 N. Dakota</td>
</tr>
</tbody>
</table>

Exercised this the 28th day of November, 1975
State of South Dakota

[Signature of Affiant]

Below is the undersigned authority, on this day personally appeared Richard A. Bossman, known to me to be the person whose name is subscribed to the within instrument, who being at the time above the true owner, and the is duly authorized to make the foregoing report and the contents of the same are correct, and this said report is true and correct.

Richard A. Bossman

My Consideration Expiration Date 6-30-1999
County of Natrona
State of Wyoming

[Signature of Affiant]

Approved 12-3-75

[Signature of Affiant]

DEC 1975
RECEIVED
WESTERN FIELD OFFICE

Dewey-Burdock GDP
June 2012
3.7-B-333
Appendix 3.7-B
WELL INSPECTION / SCOUT REPORTS
Hydro 10 5 11 of 44

SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Operator: Power Resources Corporation
Date Scouted: 7-27-76

Farm/Lease Name: #21-14 Peterson
Permit Number: 741

API Number: 40 047 20065

W.N. Sec. 14 T. 78 R. 1E
County: Fall River

Elev. 3638 Est. T.D. ______ Actual T.D. 2284 Spudded 12-11-75

Contractor: Farnsworth & Kaiser
Geologist: Al Nelson

SCOUT'S OBSERVATION:
Open pipe at surface with mud all around it remains at site. Bags of cement and other refuse strewn about. No indication of completion as water well.
FORMATION TOPS:

PLUGGING RECORD:

CASING RECORD:

SITE INSPECTION:
Approved X
Not Approved

REMARKS: No open mud pits. Water well piping is probably subsurface. Mess probably belongs to the rancher.

SCOUTED BY: James E. Ellithorpe, Field Assistant
Fred V. Steace, Supervisor
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRC</td>
<td>#21-14 Peterson</td>
</tr>
<tr>
<td>NEXW</td>
<td>75-1E Fall Run</td>
</tr>
<tr>
<td>660 FNL &amp; 1983 EWL</td>
<td>12-26-75</td>
</tr>
<tr>
<td>PERMIT</td>
<td>7.41 (12-3-75)</td>
</tr>
<tr>
<td>API</td>
<td>40 047 20065</td>
</tr>
<tr>
<td>ELEV</td>
<td>3639 Cr.</td>
</tr>
<tr>
<td>CONTR</td>
<td>Farmwood</td>
</tr>
<tr>
<td>GEOL</td>
<td>91. Nelson</td>
</tr>
<tr>
<td>ENGR</td>
<td>12-11-75</td>
</tr>
<tr>
<td>SPUD</td>
<td>2500 (Leo)</td>
</tr>
<tr>
<td>EST T.D.</td>
<td>85/4 1/60 (152)</td>
</tr>
<tr>
<td>CASING</td>
<td>None</td>
</tr>
<tr>
<td>CORES</td>
<td>None</td>
</tr>
<tr>
<td>DST'S</td>
<td>None</td>
</tr>
<tr>
<td>LOGS</td>
<td>BCCL, D/L</td>
</tr>
<tr>
<td>T.D.</td>
<td>2269 (Del) 2267 (Leo)</td>
</tr>
<tr>
<td>PLUG</td>
<td>12-26-75</td>
</tr>
</tbody>
</table>

*Formations Top (Nelson)*

- Ficuson — 178
- Morrison — 579
- Sandance — 651
- Bird Ed — 862

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Power Resources Corp., Denver
John Troutt & George Wolf, Principals

3.7-B-336
Appendix 3.7-B
OPERATOR’S TECHNICAL REPORTS / MAPS
GEOLOGICAL WELL REPORT

POWER RESOURCES CORPORATION

#21-14 LENORE PETERSON

NE NW SEC. 14, T.7S., R.1E.,

FALL RIVER COUNTY, SOUTH DAKOTA

Wildcat
WELL DATA

Location: 1983' from the West line and 660' from the North line, 0 NE NW Sec. 14, Township 7 South, Range 1 East, Fall River County, South Dakota.

Elevation: 3647 R.B. 3639 ground.

Type Well: Wildcat.

Spud Date: 10:00 P.M., December 11, 1975.

Completion Date: 9:00 P.M., December 26, 1975.

Casing Record: Ran 8 5/8" surface casing. Set at 152 ground. Cemented with 125 sacks of regular cement with 3% Calcium chloride. Pipe set at 152 ground. 24# casing.

Total Depth: 2269 Driller.
2267 Schlumberger.

Deepest Formation Penetrated: Lower Leo Section.

Depth Datum: 3647 R.B.

Well Status: Plugged and abandoned (left as water well for landowner).

Mud Program: Drilled out from under surface with water. Continued drilling with native mud down to 1070 in Spearfish red beds. Converted to a red bed between 1070 and 1283 in the Goose Egg formation after setting stuck at 1283. Added 1 sack of soda ash, 1 Hayvan, 4 caustic soda, 1 can sulfur, and 25 sacks of gel. Above 1283 a water-flow was continually thinning mud, particularly when mud pump was shut down on trips for bit. Between 1625 in the Converse Massive Anhydrite and 1729 in middle Converse tourly treatment was gel, 1 sack caustic soda, 1 soda ash, 1 Hayvan, and mud weight was 9.4-9.6 Mud vis. was 36 to 37. At 2045 to 2075 in upper Leo wt. was 9.7 and vis. was 46, with tourly treatments of 1 sack of soda ash, 1 Hayvan, 1 caustic soda, and 4 GNC to get water loss down to 5 cu. or less before Second Leo was reached at approximately 2100. At 2105 in Second Leo Sand main objective wt. was 10.0, vis. 36, and water loss 6.0. Water flow from up the hole continued to create problems in maintain-good quality mud. Logs were run without any hole trouble. Wt. was 10.3, vis. 85, and water loss 7.2. Mud furnished by Pro-Mud, Casper; Phil Hogan, engineer.
WELL DATA (Con.)

Hole Size: 12½" from surface to 168,
7 7/8" from 168 to 2269 T.D. Driller.

Cores: (None).

Drill-Stem Tests: (None).

Logs: Schlumberger Borehole Compensated Sonic Log was run from T.D. up to base of surface casing on a 5" scale 40-70-100, and on a 5" scale 40-90-140 from T.D. up to 1400 above Minnekahta. Gamma Ray Log and Caliper Log were also run with Sonic Log. Two repeats were run from T.D. up to 1980 first and then from T.D. up to 1400 on a 40-90-140 scale.

Dual Induction Laterolog was run second and did not work. 8 hours were spent waiting for a second tool to arrive. A 2" scale was run from T.D. to base of surface pipe, and a 5" scale over same interval was also run, with a repeat from T.D. up to 1900.

Engineer: Don Marques, Gillette.

Plugging Record: 40 sacks from 2020 to 1900 across the Red Marker.
30 sacks from 1600 to 1500 across top of the First Converse Sand.
30 sacks from 950 to 850 across Basal Sand of the Sundance.

Cementing by Haloc, Gillette
(No plug-in surface pipe since left as water well).

Contractor and Rig Equipment: Farnsworth & Kaiser, Newcastle, Wyoming.

U-34 rig,
3½" IF drill pipe,
5½" drill collar totaling 341',
Mud pump 6D 9X2 with 6" liners and 16" stroke,
Radios on rig and at Newcastle base plus in pusher’s pickup,
Mud pump trailer-mounted,
Big trailer-mounted,
Russ Farnsworth, pusher-owner.

Sample Storage: One out of samples were sent to American Stratigraphic in Casper, sent
One out of samples were to the South Dakota Geologic Survey in Vermillion.

Drilling Time Records: Original copy of Star Recording 1' drilling time
charts is on file in Denver office of C.A. Nelson.
### Log Formation Tops

All depths are measured from 3647 K.B.

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
<th>Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Cretaceous</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tentative Fusion Shale (Lakota Top Indeterminate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Jurassic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morrison Formation</td>
<td>339</td>
<td></td>
</tr>
<tr>
<td>Sundance Formation</td>
<td>571</td>
<td></td>
</tr>
<tr>
<td>Redwater Shale Member</td>
<td>571</td>
<td></td>
</tr>
<tr>
<td>Lake Member</td>
<td>690</td>
<td></td>
</tr>
<tr>
<td>Tentative Hulett Sand</td>
<td>795</td>
<td></td>
</tr>
<tr>
<td>Stockade Beaver Shale</td>
<td>817</td>
<td></td>
</tr>
<tr>
<td>Basal Sand of Sundance</td>
<td>862</td>
<td></td>
</tr>
<tr>
<td><strong>Triassic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spearfish Formation</td>
<td>877</td>
<td></td>
</tr>
<tr>
<td><strong>Permian</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goose Egg Formation</td>
<td>1180</td>
<td></td>
</tr>
<tr>
<td>Porelle Limestone Member</td>
<td>1320</td>
<td></td>
</tr>
<tr>
<td>Glendo Shale Member</td>
<td>1338</td>
<td></td>
</tr>
<tr>
<td>Minnekahta Limestone Member</td>
<td>1428</td>
<td></td>
</tr>
<tr>
<td>Oppeg Shale Member</td>
<td>1471</td>
<td></td>
</tr>
<tr>
<td>Minnelusa Formation</td>
<td>1571</td>
<td>-2076</td>
</tr>
<tr>
<td>Upper Minnelusa (Permian)</td>
<td>1571</td>
<td>-2076</td>
</tr>
<tr>
<td>First Converse Sand Base of Sand</td>
<td>1571</td>
<td>-2076</td>
</tr>
<tr>
<td>Massive Anhydrite Base of Anhydrite</td>
<td>1648</td>
<td>1696</td>
</tr>
<tr>
<td>Second Converse Sand Base of Second Converse Sand</td>
<td>1696</td>
<td>1722</td>
</tr>
<tr>
<td>Red Marker Base of Red Marker</td>
<td>1988</td>
<td>-1659</td>
</tr>
<tr>
<td></td>
<td>1992</td>
<td></td>
</tr>
</tbody>
</table>
## LOG FORMATION TOPS

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>DEPTH</th>
<th>DATUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENNSYLVANIAN</td>
<td>1992</td>
<td>-1663</td>
</tr>
<tr>
<td>MIDDLE MINNELUSA (LEO SECTION)</td>
<td>1992</td>
<td>-1663</td>
</tr>
<tr>
<td>SECOND LEO SAND</td>
<td>2099</td>
<td>-1548</td>
</tr>
<tr>
<td>BASE OF SAND</td>
<td>2130</td>
<td></td>
</tr>
<tr>
<td>TOTAL DEPTH DRILLER (STRAP)</td>
<td>2269</td>
<td></td>
</tr>
<tr>
<td>TOTAL DEPTH SCHLUMBERGER</td>
<td>2267</td>
<td></td>
</tr>
</tbody>
</table>
### SAMPLE LITHOLOGIC DESCRIPTION

All depths are from 3647 ft. B.E.

All sample depths following have been corrected for lag, and then matched to drilling time breaks wherever possible. **Sample lithology is then matched to log lithology so that all lithology following matches log.**

All shows are underlined with a solid line. Possible shows are underlined with a dashed line.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOWER CREDOUS</td>
<td>(In first samples caught below surface pipe at 184 ft. B.E.)</td>
</tr>
<tr>
<td>TENTATIVE FUSION</td>
<td>176 (LAKOTA TOP INDETERMINATE)</td>
</tr>
<tr>
<td>(Samples following are caught at 10 ft. intervals)</td>
<td></td>
</tr>
<tr>
<td>184-86</td>
<td>Abundant variegated clay, red, maroon, dark gray, purple, light green; limited sand, white, no show, no porosity, very well-cemented, very fine to fine, limy, poorly sorted, slightly soft, abundant white clay-fill.</td>
</tr>
<tr>
<td>186-97</td>
<td>Same variegated clay; very shaly sand, very silty, very fine, abundant clay cementation, part very fine to fine with poor sorting, no porosity, very soft.</td>
</tr>
<tr>
<td>197-204</td>
<td>Same red, maroon, purple waxy clay, also light green, noticeable brownish gray; purple very sandy clay; limited very shaly sand as above.</td>
</tr>
<tr>
<td>204-10</td>
<td>(Very fast drilling) Traces pale green sand with abundant waxy clay cementation, very fine, silty, very soft, no show, also white.</td>
</tr>
<tr>
<td>210-24</td>
<td>Same as above (fast drilling).</td>
</tr>
<tr>
<td>230-34</td>
<td>(Very slow drilling like hard formation) Trace tannish brown very shaly sand, hard, tight, very fine, excellent sorting, no porosity, noncalcareous.</td>
</tr>
<tr>
<td>234-41</td>
<td>(Fast drilling) Waxy clay, red, maroon, violet, tan, pale green.</td>
</tr>
<tr>
<td>241-52</td>
<td>Same clay, also distinctive very dark chocolate brown; loose sand grains, poorly sorted very fine to fine to medium, subround.</td>
</tr>
<tr>
<td>252-59</td>
<td>Same red, violet waxy clay, some dark gray; same loose sand grains, clear, poorly sorted.</td>
</tr>
<tr>
<td>259-70</td>
<td>Same clay; traces green shaly sand, very fine to fine, very soft, silty, trace angular red grained orange quartz grain.</td>
</tr>
<tr>
<td></td>
<td>Same clay; abundant light red very shaly sand, waxy clay cementation, very fine, very soft, first trace short, whitish, light gray, very coarse and coarser, subangular. (top 12 ft. very, very fast drilling like high porosity)</td>
</tr>
<tr>
<td>270-88</td>
<td>Purple maroon waxy white, clay, light to dark gray; abundant very shaly sand, light red, very silty, clay cementation, very fine, soft.</td>
</tr>
</tbody>
</table>
SAMPLE LITHOLOGIC DESCRIPTION (Cont.)

288-99 (Top 6' very fast drilling) Same as above.
299-311 (Basal 4' hard drilling) Shaly sand, dark green, very hard
and tight, very well-cemented, no porosity, var fine, well-
sorted.
311-18 Abundant clay-filled sand, light red, very fine, silty,
mushy soft; shale breaks, waxy clay, light green, red.
318-39 Same; green sand, shaly, very fine to fine, tight, no
porosity.
339 MORRISON
339-50 Abundant dark gray silty shale, shale, slightly waxy in
part.
350-61 Same blackish shale, clay; loose calcite like from veinlet,
white, gray, dark gray, in abundance.
361-66 Same shale.
366-78 Same shale, also dark green waxy, few streaks quartzitic
sand, shaly, dark green, hard, very well-cemented, very fine,
soft in part.
378-52 Increasing greenish dark gray shale, clay, also very dark
gray.
Clay, slightly waxy, very dark gray to greenish dark gray,
soft.
392-7 Same waxy clay, grayish green to greenish dark gray, traces
red.
394-414 Same, also very dark gray clay; intermingled with sandy
lime stringers, white to gray (Very slow drilling in basal
part like lime).
414-19 Same clay, very dark gray to greenish dark gray.
419-28 (Fast drilling) Waxy clay, dark gray, greenish gray, soft,
grayish green.
428-34 Waxy clay, mostly grayish green, very soft.
434-44 (Very fast drilling) Same.
444-57 Same, also dark gray.
452-69 Waxy clay, dark gray to greenish dark gray.
469-79 Same, with trace white kaolinite sand, very soft, very fine,
no show, excellent sorting.

571 SUNDANCE FORMATION

572 REDWATER SHALE MEMBER

699 LAM MEMBER

699 699-710 Waxy clay, grayish green to greenish gray, dark gray, platy,
very soft; sand streaks, greenish light gray, very silty,
very, very fine, very soft, poor porosity, scattered fine
glauconite.
710-16 Same clay and sand; also light tan sand, very fine, silty,
soft, no show, porous, excellent sorting.
716-30 Same gray to green waxy clay, very soft; limited sand,
light tan, very fine and finer, soft, porous, excellent
sorting; no show.
730-37 Very waxy clay, dark gray, greenish gray, grayish green,
very soft; same soft tan sand, very fine, silty, no show;
limited orange sand, very fine, well-sorted, shaly, soft,
no show.

Page 6
SAMPLE LITHOLOGIC DESCRIPTION (Con.)

795 TENTATIVE HULETT SAND
823-31 Sandstone, grayish white, very fine, excellent sorting, no show, some porosity, fine glauconite scattered, abundant tiny white spots of clay scattered, soft to very soft, also black specks scattered, limy (Hulett cave).

831-46 Shale, silty shale, gray, greenish gray, platy, very soft, also darker gray; sand streaks, same sand as above, no show, part yellow limonite stained (Hulett cave).

846-57 Same soft waxy shale, grayish green to greenish gray; sand streaks, greenish gray, light gray, no show, poor porosity, very well-cemented, silty, very soft, very fine, excellent sorting, fine glauconite, limy.

857-62 Same alternating shale and sand as above; no show; (Very rapid drilling of 7" in 4") Basal sand of Hulett.

862-72 Sandstone, light greenish gray to yellowish greenish gray, no show, very fine, excellent sorting, porous; very soft, fine glauconite and black specks scattered, no fluorescence.

872-77 Dark gray very waxy shale, very soft; trace also black with pyrite spot; trace tannish gray mottled purplish maroon.

877 TRIASSIC

877 SPEARFISH FORMATION

877-99 (Samples up at 900 in less than 22"; red bed top marked by faster drilling from 24"/ft. above red bed top to 2"/ft. below red bed top) Abundant brick red silty shale, very silty, very soft, fine black biotite specks scattered; limited smooth red shale; trace white medium crystalline to coarsely crystalline anhydrite.
SAMPLE LITHOLOGIC DESCRIPTION (Cont.)

1528-34 Plain shale to silty shale, brick red, soft in lower part; top 4' anhydrite, white, tan, microcrystalline.

1533-44 (Missing).

1544-49 Same red silty shale, soft.

1549-56 Silty shale, light red, brick red, soft.

1556-71 Same shale.

1571 (2076) MINNEOLA FORMATION
1571 (2076) UPPER MINNEOLA (PERMIAN)

1571-90 (Sample surfacing off bottom at 1590 in more than 15" and less than 45") (Top 10' very fast drilling like high porosity and bottom 5' fast drilling like good porosity) Abundant sandstone, light yellow, pinkish yellow, soft, no show, good visible porosity, poorly sorted very fine to fine to fine-plus, anhydrite-looking, clear grains, subrounded.

1590-93 Anhydrite stringer, white to tan to gray denser, crys-tallo-crystalline.

1593-1602 (Fast drilling like very porous sand) Same sand as above, light yellow, pinkish possible from red mud contamination, poorly sorted very fine to fine to fine-plus, porous, no show, no fluorescence, friable.

1602-07 (Slower drilling like tight or hard streak) Possible an hydrite stringer, tan denser to white.

1607-18 (Very fast drilling of 1'/ft. like high porosity) Sandstone, light yellow, fair sorting, very fine to fine, clear grains, soft, good visible porosity, no show, anhydrite-looking, trace limy; trace light red shale sandstone, very fine to mostly fine, abundant tiny red shale specks.

1615-35 Abundant loose sand grains, very poorly sorted, very fine to fine to few medium grains, clear grains, mostly light yellowish to less of light orange coloration (Slower drilling like more cemented, less porosity); sand is cave; white anhydrite, finely crystalline. Same as above; anhydrite is in top 17' and sand is in bottom 3' of fast drilling.

1635-45 (Continued fast drilling) Same loose sand grains as above.

1645-48 (Slightly slower drilling like sand is transitional to anhydrite below)

1648 BASE OF FIRST CONVERSE SAND

1648 MASSIVE ANHYDRITE

1648-60 (Slower drilling 11'/ft.) Anhydrite, tannish light gray, finely crystalline.

1696 BASE OF MASSIVE ANHYDRITE

1696 SECOND CONVERSE SAND

1696-98 Abundant sandstone, light orange, orange, very fine, good sorting, porous, soft, no show, traces whitish clay-fill scattered, clear grains but light orange, subrounded.

1698-1702 Increasingly abundant light orange sand, no show, soft, porous, very fine, well-sorted, anhydritic cementation.
SAMPLE LITHOLOGIC DESCRIPTION (Con.)

1702-1722 (Below top 3' very fast drilling begins: 1"/ft.)
Same light orange sandstone, very fine to fine, soft, porous, no show, anhydritic cmentation, clear light orange grains, fair sorting, noncalcareous.

1722 BASE OF SECOND CONVERSE SAND

1806-13 Snow white sand, no show, well-cemented, poor porosity, very fine to fine, fair sorting, anhydritic-looking cmentation, clear grains, soft to slightly soft, no fluorescence.

1813-24 Same white sand as above, no show, poor porosity due to being very well-cemented, abundant white clay-fill, soft.
SAMPLE LITHOLOGIC DESCRIPTION (Con.)

1988-165 RED MARKER

1988-92 (At 1990 samples coming off bottom in less than 35")
(Red Marker marked by typical faster drilling from
10"/ft. above Marker to 2,4,3"/ft. in it) Abundant shale,
shiny, splintery, platy, red, maroon, purplish red, very
soft.

1992 BASE OF RED MARKER

1992-166 PENNSYLVANIAN

1992-166 MIDDLE MINNELUSA (LEO SECTION)

1992-2002 Abundant dolomite, tan to dark tan, anhydritic dolomite,
less of red, lighter tan slightly chalky softer, darker
tan and reddenser, harder; associated white anhydrite
in 20%.

2002-12 (4' below top is 4' of faster drilling like possible
shale break) Abundant silty shale, brick red, orange red,
very soft; some dolomite and anhydritic dolomite and white
anhydrite; with dolomite becoming violet to tan with pur-
ple shale spots in part; sand streaks, white, very well-
semented, no show, limited, no visible porosity, very
fine to fine, clear grains, anhydritic cementation, non-
calcareous, soft, possibly a granular anhydrite; fast drilling is
Dolomite, tan, pink, violet, dense, hard, becoming an-
hydritic dolomite, tan, finely crystalline; sand streak(s),
white, very fine, well-sorted, no show, no porosity, tight,
unfilled grains, trace mostly fine grained.

2012-22 Very distinctive blackish brown to greenish brown dolo-
mite with tiny blackish spots which in part are embedded
in clear sand grains, slightly chalky-looking, noncalcareous, hard;
20% finely crystalline snow white anhydrite with dark
greenish brown dolomite and tan dense anhydrite.

2022-41 Same dolomite as above, becoming mostly snow white an-
hydrite with part tan denser and few brown sandy streaks
with no porosity, tight.

2041-52 Same as above.

2052-62 Hard snow white to denser gray anhydrite; hard, dense
tan to tanish brown to brown mottled red dolomite and
anhydritic dolomite, part slightly crystalline; tanish
gray very very finely sandy dolomite, silty, with dark
maroon to purplish maroon shale spots.

2662-72 Anhydritic dolomite, dark tan, dense, very hard, crypto-
crystalline, with anhydrite, snow white, very finely
crystalline.

2071-84 Dolomite, anhydritic dolomite, tan with purplish tan in
part, few purplish red tiny shale spots in part; associ-
ated white anhydrite as above; limited violet chalky
dolomite.

2084-92 Tan to dark tan anhydritic dolomite, dense, hard, cryp-
tocrystalline, also purplish to maroon shale spots in
part 5% sandstone, light gray to tanish gray, poorly
sorted very fine to fine, very well-semented, no porosity,
tight, mostly dolomitic, trace limy, soft to hard, scat-
tered purplish tiny shale spots.
SAMPLE LITHOLOGIC DESCRIPTION (Con.)

2092-99 Amhydritic dolomite, tannish brown, very finely sandy, hard, with associated snow white anhydrite, microcrystalline, limited gray denser.

2099(-1548) SECOND LEO BAND
2099-2113 (Very slow drilling like hard formation) (Drills at 19" to 28"/ft. in sand versus 16"/ft. above and below sand)
Abundant sandstone, light gray, very silty, very well-cemented, no show, no visible porosity, tight, poorly sorted, part mostly very fine, part mostly fine with few medium grains, limy to dolomitic; two out of 25 cuttings with traces of yellow fluorescence on each end only, two other cuttings with golden yellow fair fluorescence throughout opposite tan staining in all of one cutting and tan staining in 50% of other cutting. Surround grains, tiny possible oil droplets not detectable after crushing, good yellow fluorescence in 2 stained pieces after crushing.

2113-21 Trace first chert in LEO, light gray, translucent, angular, very fine, and clearer; same light gray sand, no show, very silty, very well-cemented, also gray more cemented, mostly very fine, few fine grained streaks, limited same sand grayer slightly quartzitic, no fluorescence.

2121-30 Sandstone, very silty, light gray, very fine, excellent sorting, very well-cemented, no show, no porosity, soft, in 40-50%; sandstone, 30-40%; grayish tan staining, very fine to mostly fine, well-cemented, poor or less porosity, soft, noncalcareous; limited gray denser sand, slightly quartzitic, very fine, hard, tight; limited fine to fine-plug sand, white, soft, porous, no show; all with no fluorescence.

2130 BASE OF SECOND LEO BAND
2130-42 First jet black ocellate shale, oolit, mostly brownish black. Firm to hard, blocks from 2121 to 2124.

2142-52 Same as above but darker brown, greenish brown, dense, cryptoocrystalline, with 10% snow white anhydrite; trace round white anhydrite spots in tan dolomite matrix. Same dolomite and minor amounts of anhydrite as above; also silty dolomite to limy, greenish tan, soft.

2163-69 Silty shale, orange redbrick red, soft; abundant very shaly siltstone, medium gray, no show, no porosity, dolomitic to limy, soft to limited hard; white anhydrite veinlet intersecting siltstone, medium crystalline. Second jet black ocellate shale, oolit, brownish black, firm, slightly soft; silty red shale break(s) as above, soft; mostly dolomite to anhydritic dolomite, tan, gray, dark grey, some brown, mostly dense to crypto-crystalline; anhydrite is from 2171 to 2182.

2182-65 Dolomite, anhydritic dolomite, tan, grayish tan, very cherty, dense, cryptoocrystalline in part; grading into very sandy dolomite to very dolomitic sand, tan to grayish tan, very poorly sorted very fine to fine to few medium grains, very well-cemented, no porosity.
SAMPLE LITHOLOGIC DESCRIPTION (Cont.)

2195-2202 Same dolomite and anhydritic dolomite, becoming darker brown cryptocrystalline; also chalky dolomite to lime, cream, light tan grayish, light gray; abundant shale, orange red, silty; soft; minor amount of anhydrite, white to brownish denser; shale probably in faster dril-

2202-12 Same dolomite and abundant red shale as above; increasing snow white anhydrite, very finely cryptocrystalline; traces quartzitic sand, white to gray where tighter, very fine, excellent sorting, very well-cemented, no porosity, hard, tight.

2212-21 Abundant snow white anhydrite, part gray denser; abun-
dant orange red silty shale as above, very soft; minority

2221-32 Dolomite to limestone, grayish tan, cryptocrystalline, hard, brittle, trace dark gray irregular streaks, trace fine pyrite specks.

2232-40 Very finely sucrace silty lime dolomite to limestone, tan, grayish tan, tannish gray, hard; minority snow white anhydrite, microscopic to gray denser.

2140-54 Sucrose limestone, dolomitic lime, ver, very finely sandy lime, tan, greenish tan; traces anhydritic sand, white, light gray, no show, no porosity, very well-
cemented, very fine, well-sorted; 15% white anhydrite.

2154-63 Same as above, with limestone, becoming same white sand, very fine, well-sorted, very well-cemented, no show, no porosity, anhydritic-looking.

2163-68 (Missing because when 45’ circulated samples were caught at Z.D. no more cuttings were coming since hole was all cleaned out.)

APPENDIX 3.7-B

TOTAL DEPTH DRILLER (5THAlF)

TOTAL DEPTH SCHLUMBERGER
HOLE DEVIATION SURVEYS

Surveys were made using a Sure Shot Model B with a 7° maximum reading.

<table>
<thead>
<tr>
<th>Depth</th>
<th>Deviation</th>
<th>Formation</th>
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</thead>
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<tr>
<td>160</td>
<td>3/4°</td>
<td>Lakota</td>
</tr>
<tr>
<td>268</td>
<td></td>
<td>Morrison</td>
</tr>
<tr>
<td>547</td>
<td>1</td>
<td>Sundance LAK member</td>
</tr>
<tr>
<td>779</td>
<td>3/4°</td>
<td>Goose Egg</td>
</tr>
<tr>
<td>1283</td>
<td></td>
<td>Opeche</td>
</tr>
<tr>
<td>1526</td>
<td>3/4°</td>
<td>Lower Leo</td>
</tr>
<tr>
<td>2162</td>
<td></td>
<td></td>
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BIT RECORD

12½" bit from surface to 168. All bits below 168 are 7 7/8".

<table>
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<tr>
<th>Run</th>
<th>Make</th>
<th>Type</th>
<th>From</th>
<th>To</th>
<th>Feet</th>
<th>Hours</th>
<th>Base of Run</th>
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<tr>
<td>1</td>
<td>Smith</td>
<td>DAY</td>
<td>168</td>
<td>1037</td>
<td>869</td>
<td>26</td>
<td>Spearfish</td>
<td></td>
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<tr>
<td>2</td>
<td>&quot;</td>
<td>DG7</td>
<td>1037</td>
<td>1526</td>
<td>489</td>
<td>24</td>
<td>3/4° Opeche</td>
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<tr>
<td>3</td>
<td>HTC</td>
<td>OEST</td>
<td>1526</td>
<td>1655</td>
<td>129</td>
<td>9½</td>
<td>Massive Anhydrite</td>
<td>Pre-Second Converse</td>
</tr>
<tr>
<td>4</td>
<td>Smith</td>
<td>VJ2</td>
<td>1655</td>
<td>1750</td>
<td>95</td>
<td>12½</td>
<td>Pre-Second Converse</td>
<td>Basalmost Converse</td>
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<tr>
<td>5</td>
<td>HTC</td>
<td>J22</td>
<td>1750</td>
<td>1974</td>
<td>224</td>
<td>37½</td>
<td>Pre-Second Leo Sand</td>
<td>Lower Leo Section</td>
</tr>
<tr>
<td>6</td>
<td>&quot;</td>
<td>J33</td>
<td>1974</td>
<td>2162</td>
<td>188</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>J05</td>
<td>RR</td>
<td>2162</td>
<td>2269</td>
<td>T.D. 17'</td>
<td>---</td>
<td></td>
<td></td>
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DRILLING PROGRESS SUMMARY

Drilling depths as of 8 A.M. each day.

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<th>Date</th>
<th>No. of Days</th>
<th>F.P. Depth</th>
<th>F.P.</th>
<th>Footage Drilled Last 24 hours</th>
<th>Status</th>
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<td>Dec. 6, 1975</td>
<td>--</td>
<td>168</td>
<td>---</td>
<td>168</td>
<td>Moving, Move a rig up.</td>
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<tr>
<td>7</td>
<td>--</td>
<td>391</td>
<td>Morrison</td>
<td>223</td>
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<tr>
<td>9</td>
<td>--</td>
<td>1038</td>
<td>Spearfish</td>
<td>647</td>
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<tr>
<td>10</td>
<td>--</td>
<td>1437</td>
<td>Himelkante</td>
<td>392</td>
<td>Check B.O.P.</td>
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<tr>
<td>11</td>
<td>--</td>
<td>1665</td>
<td>Massive Anhydrite</td>
<td>238</td>
<td>Drilling.</td>
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<tr>
<td>17</td>
<td>3</td>
<td>1764</td>
<td>Pre-Second Converse</td>
<td>99</td>
<td>Drilling.</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>1882</td>
<td>Lower Converse</td>
<td>118</td>
<td>Drilling.</td>
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<tr>
<td>19</td>
<td>5</td>
<td>1974</td>
<td>Basal Converse</td>
<td>92</td>
<td>Trip for bit.</td>
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<tr>
<td>20</td>
<td>6</td>
<td>1862</td>
<td>basal Converse</td>
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<td>7</td>
<td>2077</td>
<td>Upper Leo</td>
<td>103</td>
<td>Drilling.</td>
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<tr>
<td>22</td>
<td>8</td>
<td>2162</td>
<td>Pre-Second Leo</td>
<td>85</td>
<td>Drilling.</td>
</tr>
<tr>
<td>23</td>
<td>9</td>
<td>2210</td>
<td>Lower Leo</td>
<td>46</td>
<td>Drilling.</td>
</tr>
<tr>
<td>24</td>
<td>10</td>
<td>2210</td>
<td>Lower Leo</td>
<td>46</td>
<td>Drilling.</td>
</tr>
<tr>
<td>25</td>
<td>11</td>
<td>2210</td>
<td>Lower Leo</td>
<td>46</td>
<td>Drilling.</td>
</tr>
<tr>
<td>26</td>
<td>12</td>
<td>2210</td>
<td>Lower Leo</td>
<td>46</td>
<td>Drilling.</td>
</tr>
</tbody>
</table>

Page 13 Respectfully Submitted, B. Ackles Nelson
DAILY DRILLING REPORT

11/29/75  Surveyed and staked location
12/02/75  Graded location and dug pits
12/08/75  Moving in rotary tools
12/09/75  Moving in and rigging up
12/10/75  Finished rigging up
12/11/75  Prep to spud
12/12/75  Spudded at 10:00 P.M., 12/11/75
          Ran 8-5/8" 28\" surface casing. Cemented with 125 sacks regular
          cement with 3% calcium chloride. Plug down at midnight - good
          returns. Pipe set at 152 Gr.
          Shut down - waiting on crews.
12/16/75  Drilling @ 397', 3/4\" @ 268'.
          8 drill collars. Weight on bit - 15,000#. Rotary speed - 100 rpm.
12/17/75  1037' - Drilling. 3/4\" @ 541', 1\" @ 779'.
12/18/75  1437' - Drilling. 1\" @ 1002'.
          Sample tops: Morrison - 122'
          Spearfish - 890'
          Goose Egg - 1178'
          No shows.
12/19/75  1660' - Drilling. 1\" @ 1526'. Sample Top: Minnekahta - 1425'
          Drilling in 1st Converse sand.
          Mud Wt. - 9.4; Visc. - 36.
12/20/75  1765' - Drilling
12/21/75  1890' - Drilling
12/22/75  1974' - Drilling
12/23/75  2078' - Drilling

1660 So. Albion, Suite 827, Denver, Colorado 80222  303  759-5660
DAILY DRILLING REPORT cont'd.

12/24/75  2162' - drilling.  Sample Top: 2nd Leo - 2100' (+1547)  
           Sh, tite, some oil stn, poor P&P  
Drilling to est. total depth of 2285' and log.
ADMINISTRATIVE /
SUNDRY REPORTS
Hydro ID 5

PLUGGING RECORD

Operator
POWER RESOURCES CORPORATION
Address
1880 So. Alton, Suite 827, Denver, CO 80222

Name of Lease
Lenore Peterson
Well No.
21-14
File & Reserve
Wildcat

Location of Well
HERN Sec. 14 - T. 7 S. - R. 1 W.
County
Fall River

Applicantin to drill this well was file in name of
Power Resources Corporation

Date plugged
December 2, 1975

Total depth
2266

Mobsion

Depth Interval of each Formation

Field test of each Formation

Depth of each plug used and type of cement

Name of each Formation containing oil or gas, including zones,
information given to wellowner at time of plugging

Morrison
339

Basal Sundance Sand
862
950-850 30 Sacks

First Converse Sand
1571
1650-1600 30 Sacks

Basal 2nd Converse Sand
1722
1900-2020 40 Sacks

2nd Leo Sand
2099-2113
Traces Yellow Fluorescence

Casing Record

Blg pipe
B-15/8
Left in well (ft)
152

Pulled out (ft)
0

Parbore and River


The well drilled with mudwell fluid, according to regulations.
Indicate deeper formation remaining fresh water.

The well plugged back to 850. Land owner, Lenore Peterson, Star Route, Edgemont, So. Dakota, has furnished letter to So. Dakota Geological Survey at Rapid City requesting use of well as a fresh water well. Mr. D. Allen Nelson has presented a detailed Geologic Well Report by letter dated 2 January 1976.
CORRESPONDENCE
Mr. Fred Steece
South Dakota Geological Survey
308 West Boulevard
Rapid City, South Dakota 57701

Dear Sirs:

I am writing in regard to your letter of February 26, 1976, concerning the well converted to our use. We are using the well as a flowing well to water livestock. The well was completed by adding a 8 5/8 inch pipe to the existing casing and reducing this pipe to 4 inches with a one inch outlet. Approximately 100 feet of plastic pipe carries the water to the tank. We have not had the water analyzed.

If you have any further questions, feel free to contact us.

Sincerely,

Deborah Peterson
Secretary
January 7, 1976

Fred Steece
South Dakota Geological Survey
308 West Blvd.
Rapid City, South Dakota 57701

Dear Sirs,

I, M. Lenore Peterson, accept full responsibility for the oil test well known as 121-14 Peterson located on my land in NE1/4 Section 14 Township 73, Range 1E, Fall River County, South Dakota as it is being left for a water well. Relieving Power Resources of their responsibilities with their bond.

The top of the highest plug is 850 feet and it has an 8 5/8" casing to 152 feet below ground level.

Sincerely,

M. Lenore Peterson
Star Route
Edgemont, S.D. 57735

Cc: John Trotter
December 3, 1975

Mr. P. A. Bassham, Vice President
Power Resources Corporation
1660 S. Albion, Suite #27
Denver, Colorado 80222

Dear Mr. Bassham:

Enclosed is your copy of Permit #741 (form 2a) and approved application to drill (form 2) covering the Power Resources Corporation #21-14 Peterson well test in Fall River County, South Dakota. A copy of the permit should be posted at the well site. Also enclosed is a receipt for your $100 permit fee. Please make drilling progress reports to the Western Field Office at least weekly.

May I wish you success in your drilling venture and if there is anything I can do to be of help, please let me know.

Sincerely,

Fred V. Steese
Supervisor, Western Field Office

FVS/jlm
cc: Dr. Duncan J. McGregor
Enc. 3
December 7, 1975

Mr. David Volk
State Treasurer
Capitol Office Building
Pierre, S. D. 57501

Dear Mr. Volk:

Enclosed is a check in the amount of $100 from Power Resources Corporation to cover the drilling fee for permit #741 for an oil test in Fall River County. This check is for deposit in the general fund and a Cash Receipts Transmittal form is enclosed for the same amount.

Sincerely,

[Signature]

Fred V. Steece
Supervisor, Western Field Office

FVS/jlm
Dec. 2
cc: Dr. Duncan J. McGregor
SURETY
Powers Tech (USA) Inc.

HY*o

10 5

8, Doll. 01

436x694

G...

Co.,

I'ORJI ,

BOND NO. 804878

BOND

KNOW ALL MEN BY THESE PRESENTS,

That

Energy Reserves Group, Inc.

of the

County of

Sedgwick

in the

State of

Kansas

and

Seaboard Surety Company

New York, N.Y.

is heretofore, authorized to do business in the State of South Dakota as such, and is held and firmly bound into the State of South Dakota in the sum of ($20,000.00), lawful money of the United States, for which payment, well and truly to be made, we bind ourselves, and each of us, and each of our heirs, executors, administrators or assigns, and assigns jointly and severally, jointly by these presents.

The condition of this obligation is that whereas the above bond named principal proposes to drill a well or wells for oil, gas, or geophysical purposes in and upon the following described land situated within the State, to wit:

Any land situated within State of South Dakota

(Use as used for blanket bond or for single well)

------------------- Blanket Bond -------------------

NOW, THEREFORE, if the above bond named principal shall comply with all of the provisions of the laws of this State and the rules, regulations and orders of the Oil and Gas Board of this State, especially with reference to the proper plugging of said well or wells, and being with the Oil and Gas Board of this State all notices and records required by said Board, and the restoration of the surface, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation shall be terminated by the Board, the same shall be and remain in full force and effect.

Pretax sum of

Twenty Thousand and 00/100 Dollars ($20,000.00)

Witness our hands and seals, this 21st day of April, 1976

Energy Reserves Group, Inc.

By

Vice President K. B. Orr

Principal

Witness our hands and seals, this 21st day of April, 1976

Seaboard Surety Company

By

James W. Duley

Attorney-in-fact

If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agents, power of attorney or other evidence of authority must accompany the bond.

DO NOT WRITE BELOW THIS LINE

Approved May 11, 1976

Dewey-Burdock GDP

June 2012

3.7-B-362

Appendix 3.7-B
POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: The SEABOARD SURETY COMPANY, a corporation of the state of New York, has made, constituted and appointed and by these presents doth make, constitute and appoint John C. Whitley or John C. Whitley or either of them to be its Attorney-in-Fact, to make, execute and deliver in its behalf insurer policies, surety bonds, insurance certificates and other instruments of like nature as follows: Without limitation,

This power of attorney is made pursuant to the following By-Laws which were duly adopted by the Board of Directors of the said Company on December 8th, 1957, and are still in full force and effect:

ARTICLE XIII, SECTION 2: Power of Attorney in Writing:

WITNESS WHEREOF, the said Company has caused these presents to be signed by its Vice-President and its corporate seal to be hereunto affixed and hereby delivered to the said attorney-in-fact, together with a certificate under the seal of the Company, certifying the execution of these presents, for the use of the said attorney-in-fact, to the end that he may act as agent and attorney in fact for the said Company in the discharge of all its duties, powers and authority as the said Company may deem expedient under the laws of the United States and of the state of New York.

SEABOARD SURETY COMPANY,

By: John C. Whitley
Vice-President

STATE OF NEW YORK
COUNTY OF NEW YORK

On the 13th day of August, 1975, before me, James Lynch, Assistant Secretary, personally appeared John C. Whitley, Vice-President of SEABOARD SURETY COMPANY, who being by me duly sworn, deposes and says that he is a Vice-President of SEABOARD SURETY COMPANY, the corporation described in and which executed the foregoing instrument, that he knows the corporate seal of the said Company, that the seal affixed to said instrument is such corporate seal, that he is the authorized officer of the Board of Directors of the said Company, and that he signed his name to the said instrument as a Vice-President of said Company in due form.

State of New York
Dr. 24-4608755 Qualified in Richmond County
Certificate filed in New York County
Certificate expires March 19, 1997
Karen Gurrity 
Notary P. T.

CERIFICATE

IN WITNESS WHEREOF, I have hereunto set my hand and caused the corporate seal of the Company to be hereunto affixed.

21st day of April, 1976

Joan Lynch
Assistant Secretary

Dewey-Burdock GDP
June 2012
3.7-B-363
Appendix 3.7-B
BOND

KNOW ALL MEN BY THESE PRESENTS,

That

POWER RESOURCES CORP. in the

DENVER, in the

STATE OF COLORADO,

be

HARTFORD ACCIDENT AND INDEMNITY COMPANY

in the

HARTFORD, CONN.

is hereby authorized to issue bonds in the State of South Dakota in payment of the

amount of $100,000,000, lawful money of the United States, for which payment, well and truly to be made, we bind ourselves, and each of us, and each of our heirs, executors, administrators or assigns, jointly and severally, to the

principal of the corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or agent executes this bond by seal, power of attorney or other evidence of authority must accompany the bond.

DO NOT WRITE BELOW THIS LINE

POWER RESOURCES CORP.

Richard L. Bassett, President

December 1975

Hartford Accident and Indemnity Co.

Will Fordham, attorney-in-fact

The South Dakota, August 8260

Printed in South Dakota

Note: A copy of the bond will be retained until the bond expires.

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
POWER OF ATTORNEY

Know all men by these Presents, That the HARTFORD ACCIDENT AND INDEMNITY COMPANY, a company, duly incorporated, under the laws of the State of Connecticut, having its principal office in the City of Hartford, County of Hartford, State of Connecticut, hereby names and appoints

WALT FORBES, W. W. BUTLER, SHERLY L. MCPHERSON, and THOMAS L. MYERS, of CASPER, WYOMING,

and hereby gives and bestows upon each of them, and to each of them, as the true and lawful attorneys in fact, with full power and authority, to receive, agree to, accept, and acknowledge, and do and perform, all and every one of the acts, things, and matters aforesaid, as if themselves present, and in their own names, and in the name of said company, for and in its behalf, we still, and forever, authorize and empower. and hereby do authorize and empower, and in witness whereof, the HARTFORD ACCIDENT AND INDEMNITY COMPANY has caused these presents to be executed, and that they, as such, shall be the true and lawful attorneys for and in behalf of said company, and that they may and shall execute all and every one of the acts, things, and matters aforesaid, and that every power contained herein be and is conferred.

(Signed)

HARTFORD ACCIDENT AND INDEMNITY COMPANY

STATE OF CONNECTICUT

COUNTY OF HARTFORD.

On the 26th day of January, A.D. 1988, before me personally came John F. Boudreau, to me known, who being by me duly sworn, deposed and said, that he resides in the City of Hartford, State of Connecticut, that he is the Vice-President of the HARTFORD ACCIDENT AND INDEMNITY COMPANY, the corporation described in and which executed the above instrument, that he knows the seal of the said corporation, that the seal is affixed to the said instrument, and that he was authorized by order of the Board of Directors of the corporation and that he signed his name thereto as an officer of the corporation.

COUNTY OF CONNECTICUT

CERTIFICATE

I, undersigned Assistant Secretary of the HARTFORD ACCIDENT AND INDEMNITY COMPANY, a Connecticut corporation, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore, that Articles I, Sections 8 and 11, at the 16th Law of the Connecticut General Assembly of the Board of Directors of the corporation, set forth in the Power of Attorney, as now amended.

(Seal)


STATE OF CONNECTICUT

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(Seal)

MISCELLANEOUS
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
**ORIGINAL WELL CONSTRUCTION DURING OPERATION**

API No. 4004720085
14-75-1E

**PLUGGING AND ABANDONMENT CONSTRUCTION**

- **Surface**
  - 125sx cement to surface
  - Surface Casing 8 5/8", 24#, set @ 152'
  - No Plug in Surface Pipe since left as a water well
  - 30 sx 850'-960' (Sundance)
  - 30 sx 1500'-1600' (1st Conversa Sand)
  - 40 sx 1900'-2020' (2nd Leo)

**Hole Size**
Unknown

**Perforations**
None (DH)

**Total Depth**
2281'

Feet of cement from Plugging Report
Mod wt. 10.3 #/gal

Dewey-Burdock GDP
June 2012
Appendix 3.7-B
Record 1 of 1

Well Information

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<th>40 033 05219</th>
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<tr>
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<tr>
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<td>CARTER OIL COMPANY</td>
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Formation Tops

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Submittal Requirements for Building Permit Application

Communication Tower:

Evidence of Ownership:  * A copy of a recorded deed from the Clerk & Recorder's Office.

Proof/Issuance of Address:  * Required prior to beginning construction. To apply for an address, the cost of the permit is $75.00 & permits can be obtained at the Building Department. Questions may be directed to the Planning & Zoning Department @ 276-7360.

County Driveway Access Permit & Inspection Report Approved by District Supervisor:  * Required prior to beginning construction. The cost of the permit is $55.00 & permits can be obtained at the Building Department. If there's an existing driveway, it's required that a driveway inspection be performed by a Road & Bridge designee. Questions may be directed to the Road & Bridge Department @ 276-7320.

State Highway Access Permit:  * Required prior to beginning construction. If access is taken from a state highway, questions may be directed to the Colorado Department of Transportation, Region 2 Access Management Unit @ (719)-546-5407.

Plot Plan:  ** May be prepared by applicant & must be legible. Plot plan must contain the following: Any questions regarding the property set-backs, please call Planning & Zoning @ 719-276-7360.
   • Configuration of lot & all property dimensions.
   • Location on lot & the dimensions of all structures. Identify each structure as "existing" or "proposed."
   • Setback distances from proposed structures to all property lines & to any existing buildings.
   • Location & name of any public or private roads which adjoin or trespass property.
   • Location that driveway enters property from public or private road. Driveway will determine “front” of property.
   • North arrow clearly visible.

Foundation Design:  ** Any & all foundation designs must be prepared, signed, & sealed by an engineer or architect licensed by the State of Colorado.

Construction Details:  ** Details must identify structural components & must verify compliance with the 2006 International Residential Code &/or 2006 International Building Code & 2006 International Energy Conservation Code. May be prepared by applicant & may be drawn or in written form. Details must identify structural components such as floor support beam sizes, floor joist size & spacing, wall stud size & spacing, header sizes for all openings, roof assembly components or engineering from truss manufacturer, etc. Roof snow load depends on the construction elevation. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared, signed & sealed by an engineer licensed in the State of Colorado. For identification purposes, every page must contain the client's name & construction address.

Fire Department Permit:  * Required only if in the Cañon City, Colorado Area Fire Protection District.

Drainage Study:  ** Must be prepared, signed, & sealed by a Colorado licensed professional engineer.

   • http://www.dora.state.co.us/electrical/onlinepermitsystem.htm
   • State Electrical Inspector: Robert Brant - (719)-275-2816
   • http://www.dora.state.co.us/plumbing/forms.htm#info
   • State Plumbing Inspector: Gary Hartsuiker - (719)-269-1255
   • Colorado Division of Water Resources: http://water.state.co.us/default.htm

   *(1) / *(2) - Indicates number of copies to be submitted.
   INCOMPLETE OR FAXED SUBMITTALS WILL NOT BE ACCEPTED.

Revised 02/20/2009 6/15  By Direction of the Building Official
Submittal Requirements for Building Permit Application

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* (1) / ** (2) - Indicates number of copies to be submitted.
INCOMPLETE OR FAXED SUBMITTALS WILL NOT BE ACCEPTED.

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
### Sample Analysis Report

**CLIENT:** Extranexn  
F. O. Box 6795  
Sheridan, WY 82801  

**Date Reported:** 2/1/2012  
**Report ID:** S1201249001

**Project:** Lance Oil & Gas-Kinney Draw  
**Lab ID:** S1201249-002  
**Client Sample ID:** Treated Water Pond  
**Station ID:** DP_WYG0055681_019_TWP  

**Collection Date:** 1/18/2012 11:15 AM  
**Date Received:** 1/18/2012 4:30 PM  
**Matrix:** Water  
**CQC:** 4479

### Analyses

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These results apply only to the samples tested.

**Qualifiers:**  
* Value exceeds Maximum Contaminant Level  
C Calculated Value  
H Holding times for preparation or analysis exceeded  
L Analysed by a contract laboratory  
ND Not Detected at the Reporting Limit  
S Spike Recovery outside accepted recovery limits

**RL - Reporting Limit**  
E Analyte detected in the associated Method Blank  
F Value above quantitation range  
J Analyte detected below quantitation limits  
M Value exceeds Monthly Ave or MCL  
O Outside the Range of Dilutions

Reviewed by: Adrien Aletti, Project Manager

---

**Page 3 of 4**

Dewey-Burdock GDP  
June 2012  
3.7-B-372  
Appendix 3.7-B
**Sample Analysis Report**

**CLIENT:** Exterran  
P. O. Box 6795  
Sheridan, WY 82801

**Project:** Lance Oil & Gas-Kinney Draw  
**Lab ID:** S1201249-002  
**Client Sample ID:** Treated Water Pond  
**Station ID:** DP_WY0056081_019_TWP

**Date Reported:** 2/1/2012  
**Report ID:** S1201249001  
**Work Order:** S1201249  
**Collection Date:** 1/18/2012 11:15 AM  
**Date Received:** 1/18/2012 4:30 PM  
**Matrix:** Water  
**COC:** 4479

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<th>Units</th>
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<td>B Analyte detected in the associated Method Blank</td>
</tr>
<tr>
<td>C Calculated Value</td>
<td>E Value above quantitation range</td>
</tr>
<tr>
<td>H Holding times for preparation or analysis exceeded</td>
<td>J Analyte detected below quantitation limits</td>
</tr>
<tr>
<td>L Analyzed by a contract laboratory</td>
<td>M Value exceeds Monthly Ave or MCL</td>
</tr>
<tr>
<td>ND Not Detected at the Reporting Limit</td>
<td>O Outside the Range of Dilutions</td>
</tr>
<tr>
<td>S Spike Recovery outside accepted recovery limits</td>
<td></td>
</tr>
</tbody>
</table>

Reviewed by:  
Adrien Alelli, Project Manager

These results apply only to the samples tested.
Oil and Gas Search for: api_no_like '40 033 05221'

**Record 1 of 1**

**Well Information**

<table>
<thead>
<tr>
<th>API No:</th>
<th>40 033 05221</th>
<th>County:</th>
<th>CUSTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name:</td>
<td>CARTER 2</td>
<td>Location:</td>
<td>SWSE 19-6S-1E</td>
</tr>
<tr>
<td>Permit No:</td>
<td>H32-2</td>
<td>Total Depth:</td>
<td>420</td>
</tr>
<tr>
<td>Operator Name:</td>
<td>CARTER OIL COMPANY</td>
<td>Bottom Hole:</td>
<td>Fall River</td>
</tr>
<tr>
<td>Permit Date:</td>
<td>01-01-1932</td>
<td>KB Elevation:</td>
<td></td>
</tr>
<tr>
<td>Spud Date:</td>
<td>01-01-1932</td>
<td>Ground Elevation:</td>
<td>3690</td>
</tr>
<tr>
<td>Plug Date:</td>
<td>01-01-1932</td>
<td>Latitude:</td>
<td>43.508820</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Longitude:</td>
<td>-104.042397</td>
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<td>Well Field:</td>
<td>WILDCAT</td>
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<tr>
<td>Class:</td>
<td>DRY HOLE</td>
<td>Type:</td>
<td>DRY HOLE</td>
</tr>
</tbody>
</table>

**Formation Tops**

- **Formation**: Red River
- **Depth (ft)**: 300

---

[http://sddnr.net/oil_gas/search_results_oil_gas.cfm](http://sddnr.net/oil_gas/search_results_oil_gas.cfm) 2/15/2012
COUNTY: CUSTER

LEGAL LOCATION: SWSE 19-6S-1E

API NO: 40 033 05221

PERMIT NO: H32-2

WELL NAME: CARTER #2

OPERATOR: CARTER OIL COMPANY

PERMIT ISSUED: 6S-1E-19 SWSE

TARGET CODES:

- WELL HISTORY / CHECKLIST
- PERMIT TO DRILL / INTENT TO DRILL
- WELL INSPECTION / SCOUT REPORTS
- OPERATOR’S TECHNICAL REPORTS / MAPS
- ADMINISTRATIVE / SUNDRY REPORTS
- CORRESPONDENCE
- SURETY
- MISCELLANEOUS
WELL HISTORY / CHECKLIST
NO WELL HISTORY OR CHECKLIST FOR THIS WELL AS OF 9/21/2011
PERMIT TO DRILL /
INTENT TO DRILL
NO PERMIT TO DRILL OR INTENT TO DRILL FOR THIS WELL AS OF 9/21/2011
WELL INSPECTION / SCOUT REPORTS
NO WELL INSPECTION OR SCOUT REPORTS FOR THIS WELL AS OF 9/21/2011
OPERATOR’S TECHNICAL REPORTS / MAPS
NO OPERATOR’S TECHNICAL REPORTS OR MAPS FOR THIS WELL AS OF 9/21/2011
ADMINISTRATIVE / SUNDRY REPORTS
NO ADMINISTRATIVE OR SUNDRY REPORTS FOR THIS WELL AS OF 9/21/2011
CORRESPONDENCE
NO CORRESPONDENCE FOR THIS WELL AS OF 9/21/2011
NO SURETY INFORMATION FOR THIS WELL AS OF 9/21/2011
MISCELLANEOUS
Carter #2
Drill Date 1931
T. D. 405 Water Well
Surface - Graneros
395-405 Oak. Water

From USGS files, Newcastle
<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Name</th>
<th>Location</th>
<th>Elev. Depth</th>
<th>Green- Dakota Fall River</th>
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<tr>
<td>7</td>
<td>1931</td>
<td>Carter #1</td>
<td>SW SE, 19-6S-1E</td>
<td>3690± 405</td>
<td>395?</td>
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<td>8</td>
<td>1932</td>
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<td>SW SE, 19-6S-1E</td>
<td>3690± 420</td>
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<td>9</td>
<td>1956</td>
<td>Continental #1</td>
<td>SW SE, 24-35-8E</td>
<td>3208± 1544</td>
<td>662 1100 1507</td>
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<td>10</td>
<td>1956</td>
<td>Continental #1</td>
<td>SW SE, 33-25-8E</td>
<td>3252± 953</td>
<td>548 940</td>
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<td>11</td>
<td>1963</td>
<td>Bodgill #1 Coffing</td>
<td>SE NE NW, 34-6S-2E</td>
<td>421± 1367</td>
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<td>12</td>
<td>1963</td>
<td>Bodgill #1</td>
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<td>4116± 763</td>
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<td>13</td>
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<td>Over #1 Government- Christian</td>
<td>NE SA, 53-6S-2E</td>
<td>433± 52</td>
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<td>14</td>
<td>1955</td>
<td>Fairburn #1</td>
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<td>566± 740±</td>
<td>630±</td>
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<tr>
<td>15</td>
<td>1957</td>
<td>Gary #1 Bohling</td>
<td>NE SE, 21-35-1E</td>
<td>28±4 2500</td>
<td>1559 2600 2430</td>
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<td>16</td>
<td>1957</td>
<td>Gary #1 O’Neill</td>
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<td>16± 24± 260</td>
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<td>17</td>
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<td>Gary #1 Kelsey</td>
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<td>30±1± 28±</td>
<td>16± 26± 24±</td>
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<td>18</td>
<td>1957</td>
<td>Gary #1 Young</td>
<td>NE NA, 21-45-8E</td>
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<td>10± 11± 15±</td>
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<td>19</td>
<td>1955</td>
<td>Gokel #1 Govern- ment-Hallerman</td>
<td>SW NA, 1-5-1E</td>
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<td>Great Western Eyes #1 Coffing</td>
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<td>21</td>
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<td>Harris #1 Rothwein</td>
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<tr>
<td>Minne-</td>
<td>Minne-</td>
<td>Madi-</td>
<td>Devo-</td>
<td>Red</td>
<td>Cam-</td>
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<tr>
<td>--------</td>
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<td>Custer County--continued</td>
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<tr>
<td>s</td>
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<td>s</td>
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<tr>
<td>E,ML</td>
<td>Cored 1100-1225,1240-93</td>
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<td>350</td>
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<td>Production from 1379-1385</td>
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<td>Water at 740f with oil</td>
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<td>500</td>
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<td>Cured 735</td>
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</table>
Record 1 of 1

Well Information

API No: 40 047 05089  County: FALL RIVER
Well Name: SUN 1 LANCE NELSON  Location: NESE 21-7S-1E
Permit No: 356  Total Depth: 3057
Operator Name: SUN OIL COMPANY  Bottom Hole: Madison
Permit Date: 01-27-1964  KB Elevation: 3535
Spud Date: 02-04-1964  Ground Elevation: 3526
Plug Date: 02-22-1964  Latitude: 43.425795
Well Field: WILDCAT  Longitude: -103.997224
Class: DRY HOLE  Status: P&A
Type: DRY HOLE

Formation Tops

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft.)</th>
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</thead>
<tbody>
<tr>
<td>Fall River</td>
<td>366</td>
</tr>
<tr>
<td>Lakota</td>
<td>562</td>
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<tr>
<td>Morrison</td>
<td>653</td>
</tr>
<tr>
<td>Sundance</td>
<td>850</td>
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<tr>
<td>Spearfish</td>
<td>1152</td>
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<tr>
<td>Minnekahta</td>
<td>1726</td>
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<tr>
<td>Opeche</td>
<td>1764</td>
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<tr>
<td>Minnelusa</td>
<td>1838</td>
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<tr>
<td>Red Marker</td>
<td>2272</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>2384</td>
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<tr>
<td>3rd Leo</td>
<td>2618</td>
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<tr>
<td>Madison</td>
<td>2989</td>
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</table>

Dewey-Burdock GDP
June 2012
3.7-B-395
Appendix 3.7-B
COUNTY: FALL RIVER
LEGAL LOCATION: NESE 21-7N-1E
API NO: 40 047 05089
PERMIT NO: 356
WELL NAME: SUN #1 LANCE-NELSON
OPERATOR: SUN OIL COMPANY
PERMIT ISSUED: 01/27/1964
PERMIT CLOSED: 09/02/1964
FILE LOCATION: 7N-1E-21 NESE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
WELL HISTORY

Well Name  Sun #1 Lane-Nelson  Permit No.  356
Location  NESE 21-7S-IE - Fall River  Date of Permit  1-27-64
Elev.  3526.0'  API No.  
Confidential  X  From  To  8-21-64
Logs Received  
Cuttings Received  Cores Received  
Drill Stem Records  

Cap Plug and Marker Set  2-28-64
Surface Restored  5-12-64
Plugging Affidavit Signed  
Bond Released  9-2-64  Date  

Summary of Scout Reports

2-1-64  No equipment at location - First report
2-7-64  Spudded 2-4-64
2-22-64  Plugged
2-28-64  Rig moved out - Marker placed - Mud pits not filled
5-12-64  Mud pits filled & surface restored
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

☐ DRILL  ☐ DEEPEN  ☐ PLUG BACK  ☐ SINGLE ZONE
☐ OIL WELL  ☐ GAS WELL  ☐ MULTIPLE ZONE

OPERATOR
Sun Oil Company

ADDRESS
P.O. Box 1798 (mailing Address) 800 Security Life Bldg. Denver, Colorado
Phone: 266-2181

LOCATION (in feet from nearest line of section or legal subdivision, where possible)
1980' North of South Line & 660' West of East Line of Section 21, Township 7S, Range 1E, Fall River, South Dakota

NAME AND ADDRESS OF SURFACE OWNER
First National Bank of Black Hills, Trustee of the Nelson Estate

NAME AND ADDRESS OF CONTRACTOR
Unknown

IF LEASE PURCHASED WITH ANY Wells DRILLED FROM WHOM PURCHASED (name and address)

PROPOSED CASING AND CEMENTING PROGRAM

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>博客 ONLY</th>
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</thead>
<tbody>
<tr>
<td>12-1/8&quot;</td>
<td>8-5/8&quot;</td>
<td>24#</td>
<td>New</td>
<td>200'</td>
<td>130</td>
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<tr>
<td>7-7/8&quot;</td>
<td>4-7/8&quot;</td>
<td>9.5#</td>
<td>New</td>
<td>3200'</td>
<td>200</td>
</tr>
</tbody>
</table>

DESCRIBE PROPOSED OPERATIONS, IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOW OUT PREVENTER PROGRAM IF ANY.

Principal Objective is Minnelusa Ss
Certified Location Plat Attached
Check in the amount of $100.00 covering the drilling permit fee attached.

A $5000 bond from our South Dakota agent will be submitted in the very near future.

Please wire your approval to drill this well to the undersigned when everything is in order.

SIGNED

DIV. SEP. OPER. DEPT.  DATE: January 7, 1964

PERMIT NO. 356

APPROVAL DATE: January 27, 1964

CONDITIONS:
☐ COMPLETE SET OF SAMPLES, AND CORES IF TAKEN, MUST BE SUBMITTED.
☐ SAMPLES, AND CORES IF TAKEN, BELOW DEPTH, MUST BE SUBMITTED.

*See Instructions On Reverse Side
SECTION 21
T.7S., R.1E, EAST OF THE BLACK HILLS MERIDIAN
FALL RIVER COUNTY, SOUTH DAKOTA

SCALE
1" = 20 Chains.
DISTANCES ARE EXPRESSED IN CHAINS EXCEPT AS INDICATED.

LEGEND
U.S. Government Brass Cap Corner.......................... 0
Original stone corner, properly marked, firmly set................
Iron pipe set at proportionate distance...........................
Corner established by others as indicated......................
Dependent Resurvey............................................
Protraction.........................................................
Well location.................................................... 0

ELEVATIONS:
LOCATION 3526.0
R.P. 100'N. 3526.6
100'S 3526.5
100'E 3526.4
100'W 3526.3

SURVEY AND PLAT BY
WORTHINGTON LENHART & ASSOCIATES, INC.
200 South Lowell St., Casper, Wyoming
Direct solar lines and chained distances. Ref. Book No. 247, P. 68

PLATTED FIELD NOTES OF SURVEY
MARKING WELL LOCATION NE 1/4 SE 1/4, SECTION 21
FOR
SUN OIL COMPANY .................. CASPER, WYOMING

Dated: 1-6-64
Work Order No. 12-A4

Certified true and correct, Surveyor.
SOUTH DAKOTA REG. NO. 1255

Dewey-Burdock GDP
June 2012
3.7-B-401
Appendix 3.7-B
WELL INSPECTION / SCOUT REPORTS
CONFIDENTIAL

STATE GEOLOGICAL SURVEY

Scout Report

Permit Number 356

Date scouted: May 12, 1964

Owner: Sun Oil Company

Designation of well: #1 Lance-Nelson

Location: Sec. 21 T. 7 N. R. 1 E. M.

Fall River County, S. D. Total Depth: 3,037 feet

Casing Record:

8 5/8 269 Ft. _____Ft.

_____Ft. _____Ft.

Work in progress at time of visit:

None

Developments since last visit:

Mud pits have been filled and the surface satisfactorily restored.

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist

Dewey-Burdock GDP
June 2012
3.7-B-403
Appendix 3.7-B
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: February 28, 1964

Owner: Sun Oil Company

Designation of well: #1 Lance-Nelson

Location: Sec. 21 T. 7 S. R. 1 E. W.
Fall River, County, S. D. Total Depth: 3057 feet

Casing Record:

$5/8" 269' 12' 15' 15' 15' 15'$

Work in progress at time of visit:

None

Developments since last visit:

Rig moved from location.
Abandonment marker placed.

Remarks and recommendations:

Mud pits not filled.

Earl Cox, Geologist

Scouted by

Duncan J. McGregor, State Geologist

Approved by
STATE GEOLOGICAL SURVEY

Permit No. 356

Scout Report

Date scouted: February 22, 1964

Owner: Sun Oil Company

Designation of well: #1 Lance-Nelson

Location: Sec. 21 T __7_7_ T. 7 W. S. R. 1 E. M.

County, S. D. Total Depth 3057 feet (T.D.)

Casing Record:

8 5/8" 269 Ft. 2977 Ft. 3057

Phone: Work in progress at time of visit:

Plugged as follows:

25 5x 2977-3057 Madison
25 5x 2360-2440 2nd Leo Sand
25 5x 1800-1880 Minnelusa
25 5x 820-900 Top Sundance
40 5x 330-460 Top Dakota
25 5x 220-290 Bottom Surface Casing
10 5x Surface Plug

Developments since last visit:

Drilled from 2916'-3057'.
Run laterolog and gamma ray sonic logs.

Remarks and recommendations:

Log Tops:

Dakota 368 Gypsum Springs - 1151 2nd Leo - 2384
Lakota - 562 Spearfish - 1186 3rd Leo - 2618 (?)
Morrison - 653 Minnelusa - 1842 Madison - 2990
Sundance - 850 Red Marker - 2271 T.D. - 3057

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Hold this information confidential until well is plugged.

Owner: Sun Oil Company

Designation of well: #1 Lance-Nelson

Location: Sec. 21 T. 7 N. S. R. 1 E. W.

Fall River, County, S. D. Total Depth 2916 feet

Casing Record:

8 5/8" 269 Ft. 579 Ft.

Work in progress at time of visit:

Drilling at 2916.

Developments since last visit:

DST #1 2315-33. Shut in 30 min., open 60 min., shut in 40 min.
Recovered 15 feet drilling mud.
Shut in pressures - 15-27
Flow pressures - 15-27
Hydro Static pressures - 1211-1143
Temp. - 67° (oil show in samples 2318-25)

DST #2 2390-2400. (Second Loc) Shut in 30 min; open 60 min; shut in 30 min.

Remarks and recommendations:

Recovered 2036' black sulphur water, slightly gas cut.
Shut in pressures 1026-1026
Flow pressures 144-684
Hydrostatic pressures 1341-1241
Temp. - 84°

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: February 14, 1964

Owner: Sun Oil Company

Designation of well: #1 Lance-Nelson

Location: Sec. 21 T. 7 W. S. R. 1 E. W.

Fall River County, S. D. Total Depth: 2333 feet

Casing Record:
8 5/8" 269 Ft. ______ Ft.
_________ Ft. ________ Ft.

Work in progress at time of visit:
Preparing to drill stem test at 2333' after obtaining oil show.

Developments since last visit:
Drilled from 300-2333'.

Elevation: Gd - 3526
KB - +8.5

Remarks and recommendations:
Sample Tops: Dakots - 370
Morrlson - 710
Sundance - 870
Spearfish - 1106

Minnakahta - 1727
Opche - 1755
Minnelusa - 1840
Red Marker - 2272

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: February 7, 1964

Owner: Sun Oil Company

Designation of well: #1 Lance - Nelson

Location: Sec. 21 T. 7 R. S. M. E.

Fall River County, S. D. Total Depth: 300 feet

Casing Record:

8 5/8 _269_ Ft. _______ Ft.

Work in progress at time of visit:

Preparing to drill out from under surface casing

Developments since last visit:

Spudded: February 4, 1964

Set 269' of 8 5/8" surface casing with 175 sacks.

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: February 1, 1964

Owner: Sun Oil Company

Designation of well: #1 Lane - Nelson

Location: Sec. 21 T. 7 N. S. R. 1 E. W.

Fall River County, S. D. Total Depth: 0 feet

Casing Record:

_______ Ft. _______ Ft.

_______ Ft. _______ Ft.

Work in progress at time of visit:

None

Developments since last visit:

Remarks and recommendations:

Pits not dug.

No equipment at location

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
FEB 14, 1964

Drilling out from NE.

2333' from DST. 26 1/2".

Sample tops:

- Rock 370
- Marmor 710
- Sandstone 870
- Sp. 118
- Pk. 1787' (?)
- Pk. 1795' (?)
- Pk. 1846
- R. Maker 2272

Est T.D. 3200 or 50' inclination

Will re-enter 4'

January 15th.

7 3/8" hole.

2nd line

Top and

End Sample

50 ccacket as per call.

2-21-64

Jordan called at which said

were about ready to plug.

T.D. 3057

Top from lateral 2 j.

Dry 3 P/L.

Rock 5-62

Marmor - 653

Sandstone 830

Gypsum Springs 1151

Spring H 86 of 1770

Mode 1760 (?) Mill 1842

In (?)
John closed it mostly on and 300-350 med. should have, this or 32% favor on. Said yes of this. These plays were placed Saturday, 2-22-64.

25% at 500-550/medium 25-100 end of 2360-2440 35-70 ml 1880-1880 25-24 Send over 820-800 40 at 400. Val. 330-400 25-44 230-290 Rod 600

1:24 umpire play.

2-28-64

Rig in the pit not filled.

Made up. Does not have.

W.E. not but given it OK.
<table>
<thead>
<tr>
<th>Well:</th>
<th>1orse Melon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>NE Sec. 21, T7S, R1E</td>
</tr>
<tr>
<td>Logs Recd:</td>
<td></td>
</tr>
<tr>
<td>Tops:</td>
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<tr>
<td>Geologic:</td>
<td>completion report (2) (3-9-64)</td>
</tr>
<tr>
<td>Electric, field:</td>
<td>final: 2400 V, 3-6-69</td>
</tr>
<tr>
<td>Radio, field:</td>
<td>final: 1200 V, CR (2 cycles) 8-7-69</td>
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<tr>
<td>Others:</td>
<td></td>
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<tr>
<td>Cuttings Recd:</td>
<td>3-27-64</td>
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<tr>
<td>Cores Recd:</td>
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<tr>
<td>Drill stem data Recd:</td>
<td>completion report</td>
</tr>
<tr>
<td>Cap plug checked:</td>
<td>OK 2-28-64</td>
</tr>
<tr>
<td>Plugging affidavit signed:</td>
<td></td>
</tr>
</tbody>
</table>

Dewey-Burdock GDP  
June 2012  
3.7-B-412  
Appendix 3.7-B
Released - 2-22-64
Sun #1 Lance - Nelson
NE, SE, sec 21, T. 75 S., R. 1E
Fall River Co.
seln 3 526.0
2-1-64
Site not dug; no equip
ment at location.
2-7-64
Spudled 2-4-64 &
set 269' of 8 7/8" surface cty.
2-14-64
Preparing to drill other test
at 2333' after obtaining adeq
sln temp:
Kd - 370  Meanholte - 1727
Monica - 710  Ogack - 1795
Dundee - 870  Moberlina - 1840
Sparrow - 1176  Red Rock - 2272
Drilling at 7,916
DST #1  2315-33  Dec 15' Dilly mud
SIP 15'-17', FP 15'-27', HP 1211-1848
Cost above in sample 2318-25' Temp 67°

DST #2  2390-2400 (second sec)
Res. 2036', black mud 2700, alt. open
SIP 1026-1026', FP 144.984', HP 144-1241
Temp 84°

Plugged
Drilled from 2916-3057', ran 17'
+ GR twin log

Ko 368
KL 567
Res 653
Res 850
RM 1271
TD 3057
Temp 12-28-64

Reb moved from loc
Mother replaced
Pipe not felled

Mount pipe fell 5-12-64
WELL COMPLETION REPORT

SUN OIL CO.

#1 LAUCHE-NELSON ESTATE

NE SE, SEC. 21, T. 7S., R. 1E.

FALL RIVER COUNTY, SOUTH DAKOTA
## INDEX

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<th>Page</th>
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<td>BIT RECORD, DEVIATION SURVEYS</td>
<td>4</td>
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<tr>
<td>DRILL STEM TEST DATA, SCHLUMBERGER POROSITY AND WATER SATURATION DETERMINATIONS</td>
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<td>SAMPLE DESCRIPTION</td>
<td>6</td>
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<td>ELECTRIC LOG TOPS</td>
<td>17</td>
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<tr>
<td>PLUGGING RECORD</td>
<td>18</td>
</tr>
</tbody>
</table>
SYNOPSIS

OPERATOR: Sun Oil Co.
WELL: #1 Lance-Nelson Estate
LOCATION: NE SE; 1980 NSL, 660 WEL (not center location)
Sect. 21, T. 78., R. 1E.
Fall River County, South Dakota
ELEVATION: 3526 Gr., 3535 FE
SPUNNED: February 4, 1964 (9:00 P.M.)
CEASED DRILLING: February 21, 1964 (12:30 P.M.)
COMPLETED: February 22, 1964 (7:00 A.M.)
STATUS: P & A
TOTAL DEPTH: 3057 Driller; 3057 Log
CASING: 8-5/8" surface casing set @ 269 w/175 sacks
HOLE SIZE: 9" from below surface casing to 620'.
8-2/4" from 620' to 302'. 7-7/8" from 302' to T.D.
CONTRACTOR: Barnhart Drilling Co. - Rig #1
Tool Pusher - Lyle Robinson
Drillers - H. H. Wilson, Floyd P. Reed, Sam Rinard
DRILLING MUD: Magnet-Cove Parim Corp.; Low PH Gel-Chemical
Mud Engineers - Morris Carroll, George Crow, J. Martin

LOST CIRCULATION:
Lost circulation for 5½ hours @ 2125'. Lost
approximately 500 bbl. mud.
Lost circulation while making trip @ 2523, Lost
approximately 200 bbl. mud.

CORING:
No cores cut

DRILL STEM TESTS:
DST #1 2315-13 (1st Leo (a) Zone)
Rec. 15' drilling mud
DST #2 2390-2600 (2nd Leo)
Rec. 2036' SGC black sulphur water
Johnston Testers Inc.
Test Engineer - Jimmie Hulse; Gillette, Wyo.

LOGS:
Schlumberger Well Surveying Corp.
Laterolog from 3057 to 269; Sonic Log-Gamma
Ray Caliper from 3057 to 269
Log Engineer: Ted Caylen
SAMPLES: All samples were delivered to American Stratigraphic Co., Casper, Wyoming.

GEOLOGIST RELEASED: February 22, 1964

CHRONOLOGICAL HISTORY

<table>
<thead>
<tr>
<th>Date</th>
<th>8:00 A.M. Depth</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4-64</td>
<td>Spudded 9:00 P.M. this date</td>
<td></td>
</tr>
<tr>
<td>2-5-64</td>
<td>Drilling surface hole @ 187</td>
<td>Made 187'</td>
</tr>
<tr>
<td>2-6-64</td>
<td>Drilling surface hole @ 772</td>
<td>Made 585'</td>
</tr>
<tr>
<td>2-7-64</td>
<td>Trip for bit #4 @ 1102'</td>
<td>Made 220'</td>
</tr>
<tr>
<td>2-8-64</td>
<td>Drilling @ 1436'</td>
<td>Made 384'</td>
</tr>
<tr>
<td>2-9-64</td>
<td>Drilling @ 1745'</td>
<td>Made 259'</td>
</tr>
<tr>
<td>2-10-64</td>
<td>Drilling @ 1942'</td>
<td>Made 197'</td>
</tr>
<tr>
<td>2-11-64</td>
<td>Drilling @ 2079'</td>
<td>Made 137'</td>
</tr>
<tr>
<td>2-12-64</td>
<td>Drilling @ 2230'</td>
<td>Made 131'</td>
</tr>
<tr>
<td>2-13-64</td>
<td>Trip for Pit #13 @ 2310'</td>
<td>Made 100'</td>
</tr>
<tr>
<td>2-14-64</td>
<td>Pulling DST #1</td>
<td>DST #1 2315-2333. Rec. 15' @ mud, no show.</td>
</tr>
<tr>
<td>2-15-64</td>
<td>Trip for DST #2 @ 2400'</td>
<td>Made 90'</td>
</tr>
<tr>
<td>2-16-64</td>
<td>Drilling @ 2438'</td>
<td>Made 88'</td>
</tr>
</tbody>
</table>

Drilled out cement and cleaned out to 802'. Began drilling new hole & 5:10 PM this date, Encountered water flow of 10-12 Bbl./hr. White @ 900' lost circulation for 5½ hrs. @ 2125', lost approximately 500 bbl. mud before regaining circulation.
2-18-64  Drilling @ 2607'
Made 119'
2-19-64  Drilling @ 2752'
Made 145'
2-20-64  Drilling @ 2891'
Made 139'
2-21-64  Drilling @ 3005'
Made 114'
Drilled to TD of 3057 @ 12:30 PM this date. Made 52'. Ran Schlumberger Lateral-log and Gamma Ray-Sonic-Caliper log from 3057 to 269'.

TD 3057 driller
3057 Log

2-22-64  P & A
Set 25 sack plug from 2977-3057 across top of Hadisc. Set 25 sack plug from 2360-2440 across 2nd Leo.
Set 25 sack plug from 1800-1880 across top of Minnelusa.
Set 25 sack plug from 820-900 across top of Sunishoe.
Set 40 sack plug from 330-460 across top of Dakota.
Set 25 sack plug from 220-290 in base of surface pipe.
Set 10 sack plug with regulation marker in top of surface pipe.
Rig released @ 7:00 AM. P & A.
**HIT RECORD**

<table>
<thead>
<tr>
<th>No.</th>
<th>Size</th>
<th>Make</th>
<th>Type</th>
<th>Serial #</th>
<th>Depth Out</th>
<th>Footage</th>
<th>Hours Run</th>
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<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>Smith</td>
<td>SGH</td>
<td>Re-Run</td>
<td>620</td>
<td>371/2</td>
<td>10-1/4</td>
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<tr>
<td>2</td>
<td>8-3/4</td>
<td>ITTC</td>
<td>OSC1G</td>
<td>Re-Run</td>
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<td>132</td>
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**DEVIATION SURVEYS**

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<td>72'</td>
<td>1/4°</td>
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<tr>
<td>139'</td>
<td>1/4°</td>
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<tr>
<td>138'</td>
<td>1/4°</td>
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<tr>
<td>174'</td>
<td>3/4°</td>
</tr>
<tr>
<td>528'</td>
<td>1/2°+</td>
</tr>
<tr>
<td>620'</td>
<td>1/4°</td>
</tr>
<tr>
<td>741'</td>
<td>3/4°</td>
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<tr>
<td>802'</td>
<td>1/2°</td>
</tr>
<tr>
<td>994'</td>
<td>10</td>
</tr>
<tr>
<td>1102'</td>
<td>3/4°</td>
</tr>
<tr>
<td>1123'</td>
<td>3/4°</td>
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<table>
<thead>
<tr>
<th>Depth</th>
<th>Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1618'</td>
<td>1-1/4°</td>
</tr>
<tr>
<td>1815'</td>
<td>10</td>
</tr>
<tr>
<td>1916'</td>
<td>1-1/2°</td>
</tr>
<tr>
<td>2000'</td>
<td>1-1/4°</td>
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<tr>
<td>2162'</td>
<td>1-3/4°</td>
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<tr>
<td>2310'</td>
<td>1-3/4°</td>
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<tr>
<td>2371'</td>
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<tr>
<td>2593'</td>
<td>2-1/4°</td>
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<tr>
<td>2767'</td>
<td>3-1/2°</td>
</tr>
<tr>
<td>3057'</td>
<td>3</td>
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</table>
DRILL STEM TEST DATA

DST #1, 2315-2333 (1st Leo (?) Zone)
ISIP 30 minutes. Open 1 hour. FSI 40 minutes.
Tool opened with a very slight blow and died
Recovered 15' drilling mud.
ISIP 15# IFP 15# LIP 1211#
F.I.T. 670F.

DST #2, 2390-2400 (2nd Leo)
ISIP 30 minutes. Open 1 hour. FSI 30 minutes
Tool opened with a good blow for 30 minutes, decreased to fair blow
at end of test.
Recovered 2036' slightly gas cut black sulphur water.
ISIP 1026# IFP 144# LIP 1341#
F.I.T. 84F.

Drill stem tests by Johnston Testers, Inc.
Engineer: Jimmie Hulse, Gillette, Wyoming

SCHLUMBERGER POROSITY AND WATER SATURATION DETERMINATIONS

Dakota 450-460
SP = +10 R11 = 35
θ+ = 115 Rw = 2.4
θ = 27% Sw = 75-80%

Sundance 1080-1090
SP = +10 R11 = 43
θ+ = 100 Rw = 2.4
θ = 21% Sw = 100%

Converse 1970-1980
SP = +10 R11 = 200
θ+ = 75 Rw = 3.0
θ = 14% Sw = 90%

1st Leo (?) Zone 2316-2325
SP = -10 R11 = 75
θ+ = 65 Rw = .80
θ = 11% Sw = 87%

3rd (?) Leo 2685-2690
SP = +35 R11 = 30
θ+ = 83 Rw = 5.0
θ = 20% Sw = 100%

Lakota 590-600
SP = +10 R11 = 50
θ+ = 115 Rw = 2.5
θ = 27% Sw = 70%

Converse 1850-1900
SR = +10 R11 = 48
θ+ = 100 Rw = 2.4
θ = 21% Sw = 100%

Converse 2106-2138
R11 = 30
θ+ = 84 Rw = .41
θ = 17% Sw = 61-78%

2nd Leo 2400-2420
R11 = 13 Rw = .60 @ 60'
θ+ = 110 Rw = .38 @ 100'
θ = 29% Sw = 70%

Pahasapa 3020-3040
SP = -45 R11 = 200
θ+ = 35 Rw = 1.0
θ = 22% Sw = 85%
**SAMPLE DESCRIPTION**

Samples were examined under the binocular microscope with 9X eyepiece and 1X, 2X, and 3X objective lenses during the drilling of the well, February, 1963. 30' samples were caught from surface to 600'. 10' samples were caught from 600' to T.D. The sample description is condensed from the well-site description and adjusted to the E-Log depths.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feat</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>45</td>
<td>45</td>
<td>Stream gravel; red, pink, orange chert and quartz granules and pebbles, unconsolidated.</td>
</tr>
<tr>
<td>45</td>
<td>260</td>
<td>215</td>
<td>Shale, very dark gray to black, firm to hard, slightly micaceous, bentonitic to siliceous, silty. Trace of dark brown, hard, slightly calcareous siltstone in interval 150-160. Scattered traces of calcite and selenite fragments.</td>
</tr>
<tr>
<td>260</td>
<td>270</td>
<td>10</td>
<td>Sandstone, medium gray, very fine grained, subangular, poor sorting, clay filled, very heavily glauconitic, poor P &amp; P, no show.</td>
</tr>
<tr>
<td>270</td>
<td>366</td>
<td>96</td>
<td>Shale, very dark gray to black, firm to hard, some soft, silty, slightly micaceous, bentonitic in part.</td>
</tr>
<tr>
<td><strong>Dakota sandstone</strong></td>
<td>366</td>
<td>400</td>
<td>34</td>
</tr>
<tr>
<td>366</td>
<td>400</td>
<td>34</td>
<td>Sandstone, white-light gray, very fine grained, subangular, clay filled, fairly friable, poor P &amp; P, no show, interbedded with shale, very dark gray to black, firm to hard, some soft, silty, micaceous.</td>
</tr>
<tr>
<td>400</td>
<td>425</td>
<td>25</td>
<td>Shale, as above, very dark gray to black, with some interbedded streaks of sandstone, as above, white, hard and calcareous in part.</td>
</tr>
<tr>
<td>425</td>
<td>450</td>
<td>25</td>
<td>Sandstone, white, fine to very fine grained, subangular, hard, calcareous in part, poor P &amp; P, interbedded with shale, as above, very dark gray to black, silty, also some medium gray, smooth, somewhat waxy, in part variegated with brown to tar shale.</td>
</tr>
<tr>
<td>450</td>
<td>500</td>
<td>50</td>
<td>Sandstone, white, fine to very fine grained, subangular, glauconitic in part, fair P &amp; P to very hard and tight. Spotty bright yellow fluorescence with fair to good cut in sample 450-480. Some interbedded medium gray to green claystone, waxy, smooth, with floating sand grains, and some scattered gray to black silty shale, as above. Abundant brown siderite pellets in sample 450-480. Scattered pyrite and very abundant loose very coarse quartz grains at base of interval.</td>
</tr>
</tbody>
</table>
Sandstone, white to gray, medium to very coarse grained, conglomeritic, sub-rounded to sub-angular, extremely friable, being mostly loose grains in samples, no show. Some traces of interbedded shale, variegated medium gray, lavender, olive green, trace pink, smooth, somewhat waxy, some light green shale with floating sand grains.

Lakota sandstone

562 (+2973) log

Sandstone, white to gray, fine to coarse grained, conglomeritic, sub-rounded to sub-angular, poor sorting, extremely friable, excellent P & P, some scattered fairly bright yellow fluorescence, poor to fair cut. Some interbedded shale, as above, variegated, purple, gray, green, rust-brown, waxy.

Sandstone, white to fine to coarse grained, conglomeritic, poor sorting, sub-rounded, extremely friable, excellent P & P, slight trace of stain, spotty bright yellow fluorescence, poor cut at base of interval. Some interbedded shale, variegated as above, but mostly gray and lavender.

Morrison formation

653 (+2882) log

Shale, medium gray, firm, smooth and waxy, some silty, with some variegated shale, as above, and sandstone white, fine to very coarse grained, conglomeritic, sub-rounded, poor sorting, very friable, good to excellent P & P, some scattered fairly bright yellow fluorescence with poor to fair cut at base of interval. At top of interval is some yellow to yellow-brown sandstone, very fine grained, sub-rounded to sub-angular, micaeous, hard to friable, calcareous, Scattered pyrite fragments throughout interval.

Shale, as above, medium to dark gray, some variegated, with some sandstone, white, fine to very coarse grained, conglomeritic, sub-rounded, very friable, good to excellent P & P, some scattered bright yellow fluorescence with fair to good cut at top of interval. Trace white, fine grained, fairly hard, clay filled sandstone. Slight trace hard, brown, silty, crystalline limestone. Some very coarse red and yellow chert grains.
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>720</td>
<td>750</td>
<td>30</td>
<td>Shale, medium to dark gray, some variegated, firm, smooth, very fine grained, sub-rounded, clay filled, friable to hard and tight, slightly calcareous, slightly glauconitic in part, no show. Fairly abundant pyrite at top of interval.</td>
</tr>
<tr>
<td>750</td>
<td>780</td>
<td>30</td>
<td>Shale, medium to dark gray and greenish gray, firm, blocky, fairly smooth, somewhat waxy, becoming silty in part. Some medium to dark gray and dark grayish brown, hard, silty, very argillaceous limestone, increasing toward base of interval. Scattered traces of calcite fragments. Slight trace of pyrite.</td>
</tr>
<tr>
<td>820</td>
<td>850</td>
<td>30</td>
<td>Limestone, light to medium gray, some gray-green, hard, very argillaceous, grading to and interbedded with shale, medium to dark gray, calcareous to very calcareous, silty in part, mostly smooth and waxy. Some bright green shale, smooth waxy, some with floating sand grains at top of interval. Some very argillaceous limestone shows fairly bright yellow fluorescence but no cut. Also at base of interval is some sandstone, white to bright green, very fine grained, sub-angular to sub-rounded, friable, calcareous, clay matrix, fair to good P &amp; P, some dull to fairly bright yellow fluorescence, no cut.</td>
</tr>
</tbody>
</table>

Sundance formation

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>850</td>
<td>880</td>
<td>30</td>
<td>Shale, medium gray to grayish-brown, soft, silty, some carbonaceous inclusions, also bright green waxy shale, interbedded with sandstone, white to medium gray and green, very fine grained, sub-rounded, clay matrix, silty fairly friable, becoming glauconitic, fair to good P &amp; P, no show. Some hard, very argillaceous limestone at top of interval.</td>
</tr>
<tr>
<td>880</td>
<td>920</td>
<td>40</td>
<td>Shale, medium to dark gray and grayish-brown, soft, silty, calcareous in part, also light to dark, soft lavender shale, slightly silty, slightly calcareous in part. Some interbedded sandstone, light gray to green, very fine grained, sub-rounded, glauconitic, clay matrix, calcareous, hard to soft and friable, no show.</td>
</tr>
</tbody>
</table>
**Shale, variegated, medium gray, green, maroon, lavender, red, some olive green, firm to soft, silty to waxy, calcareous, interbedded with sandstone, as above, gray to green, very fine grained, sub-rounded, glauconitic, calcareous, no show.**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>920</td>
<td>970</td>
<td>50</td>
</tr>
</tbody>
</table>

**Siltstone, rust-red, sandy, soft, shaly and sandstone, rust-red, very fine grained, sub-angular to sub-rounded, very silty, friable, no show. Some variegated shale, as above.**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>970</td>
<td>990</td>
<td>20</td>
</tr>
</tbody>
</table>

**Sandstone and siltstone, rust-red, as above, and sandstone, light to medium gray and gray green, very fine grained, sub-angular to sub-rounded, glauconitic slightly calcareous, friable, no show. Some interbedded shale, variegated as above, becoming predominately gray, soft to firm, smooth and waxy to silty. Some bright green waxy shale with floating sand grains.**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>990</td>
<td>1050</td>
<td>60</td>
</tr>
</tbody>
</table>

**Sandstone, light gray to green, some very light tan, very fine grained, sub-angular to sub-rounded, clay filled in part, becoming glauconitic at base of interval, calcareous, friable, fair to good P & P, no show. Some interbedded shale, gray as above, some variegated.**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1050</td>
<td>1100</td>
<td>50</td>
</tr>
</tbody>
</table>

**Shale, medium to dark gray, firm to soft, slightly silty, calcareous, with some light green and lavender variegated shale, as above.**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>1152</td>
<td>52</td>
</tr>
</tbody>
</table>

**Gypsum Spring formation**

**Shale, medium to dark gray and grayish-brown, some green and lavender, soft, slightly silty, calcareous. Some scattered sandstone, white, fine to very fine grained, friable, calcareous, no show.**

(The above description of the Gypsum Spring is what was observed in the samples. From the drilling time, however, it would appear that the interval is made up predominantly of gypsum or anhydrite. This interval drilled at the rate of .25 minutes per foot as compared to 1.45 minutes per foot both immediately above and below the Gypsum Spring. The log also looks like gypsum, especially since the caliper shows a washed out zone at this interval.)

---

**Description**

**From** | **To**  | **Feet** |
---------|---------|----------|
| 920     | 970     | 50       |

Shale, variegated, medium gray, green, maroon, lavender, red, some olive green, firm to soft, silty to waxy, calcareous, interbedded with sandstone, as above, gray to green, very fine grained, sub-rounded, glauconitic, calcareous, no show.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>970</td>
<td>990</td>
<td>20</td>
</tr>
</tbody>
</table>

Siltstone, rust-red, sandy, soft, shaly and sandstone, rust-red, very fine grained, sub-angular to sub-rounded, very silty, friable, no show. Some variegated shale, as above.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>990</td>
<td>1050</td>
<td>60</td>
</tr>
</tbody>
</table>

Sandstone and siltstone, rust-red, as above, and sandstone, light to medium gray and gray green, very fine grained, sub-angular to sub-rounded, glauconitic slightly calcareous, friable, no show. Some interbedded shale, variegated as above, becoming predominately gray, soft to firm, smooth and waxy to silty. Some bright green waxy shale with floating sand grains.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1050</td>
<td>1100</td>
<td>50</td>
</tr>
</tbody>
</table>

Sandstone, light gray to green, some very light tan, very fine grained, sub-angular to sub-rounded, clay filled in part, becoming glauconitic at base of interval, calcareous, friable, fair to good P & P, no show. Some interbedded shale, gray as above, some variegated.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>1152</td>
<td>52</td>
</tr>
</tbody>
</table>

Shale, medium to dark gray, firm to soft, slightly silty, calcareous, with some light green and lavender variegated shale, as above.

**Gypsum Spring formation**

**From** | **To**  | **Feet** |
---------|---------|----------|
| 1152    | 1186    | 34       |

Shale, medium to dark gray and grayish-brown, some green and lavender, soft, slightly silty, calcareous. Some scattered sandstone, white, fine to very fine grained, friable, calcareous, no show.

(The above description of the Gypsum Spring is what was observed in the samples. From the drilling time, however, it would appear that the interval is made up predominantly of gypsum or anhydrite. This interval drilled at the rate of .25 minutes per foot as compared to 1.45 minutes per foot both immediately above and below the Gypsum Spring. The log also looks like gypsum, especially since the caliper shows a washed out zone at this interval.)
Spearfish formation

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1186</td>
<td>1290</td>
<td>104</td>
</tr>
<tr>
<td>1290</td>
<td>1350</td>
<td>60</td>
</tr>
<tr>
<td>1350</td>
<td>1450</td>
<td>100</td>
</tr>
<tr>
<td>1450</td>
<td>1500</td>
<td>50</td>
</tr>
<tr>
<td>1500</td>
<td>1600</td>
<td>100</td>
</tr>
<tr>
<td>1600</td>
<td>1620</td>
<td>20</td>
</tr>
<tr>
<td>1620</td>
<td>1640</td>
<td>20</td>
</tr>
<tr>
<td>1640</td>
<td>1680</td>
<td>40</td>
</tr>
<tr>
<td>1680</td>
<td>1726</td>
<td>46</td>
</tr>
</tbody>
</table>

**Description**

1186 (±2349) log

Siltstone, brick red, becoming bright brick red in lower 2/3 of interval, sandy, shaly in part, slightly calcareous with interbedded dark brick red shale, silty, slightly calcareous. Trace of white crystalline to earthy anhydrite near base of interval.

1290 1350 60

Siltstone, bright brick red, firm to hard, sandy, calcareous, becoming anhydritic, and some shale, brick red to reddish-brown, hard, silty, slightly calcareous. Some traces of anhydrite, white, soft, succrose to earthy, some clear and crystalline.

1350 1450 100

Siltstone, and shale, as above, becoming only slightly calcareous, interbedded with thin stringers of anhydrite, white, soft, succrose to earthy, some crystalline to fibrous.

1450 1500 50

Siltstone, bright red-orange, becoming darker in lower 1/2 of interval, sandy, hard, slightly calcareous to non-calcereous, anhydritic, and some brick-red, silty shale, as above, and some interbedded anhydrite, as above.

1500 1600 100

Anhydrite, white, firm to hard, brittle, succrose to crystalline, also soft and earthy, interbedded with siltstone and shale, as above, non-calcareous.

1600 1620 20

Anhydrite, white, firm to hard, succrose to crystalline, brittle.

1620 1640 20

Dolomite, white, light grey, pink, light purple, very fine to microcrystalline, hard, brittle, dull to light yellow fluorescence, no cut. Some interbedded siltstone bright, red-orange, sandy, anhydritic.

1640 1680 40

Interbedded siltstone, bright red-orange as above, and dolomite, white, pink, purple, fine to microcrystalline, silty in part, light to dull yellow fluorescence, no cut.

1680 1726 46

Siltstone, as above, red-orange, sandy anhydritic. Scattered traces of dolomite and anhydrite, as above.
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnekahta Limestone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1726</td>
<td>1764</td>
<td>38</td>
</tr>
</tbody>
</table>

1726 (+1809) log
Limestone, white to gray, pink, hard, brittle, very fine to microcrystalline, dull to light yellow fluorescence, no cut, grading to dolomite pink to light purple, hard, brittle, microcrystalline, dull to light yellow fluorescence, no cut.

Opecho Shale | | |
| 1764 | 1800 | 36 |

1764 (+1771) log
Dolomite, white-light gray, pink, hard, brittle, microcrystalline, with some traces of limestone as above, dolomitic, dull yellow fluorescence, no cut, interbedded with shist, red-orange to brick-red, sandy, anhydritic and some brick-red silty shale.

Minnelusa Formation | | |
| 1800 | 1838 | 38 |

1838 (+1697) log
Shist, red-orange to brick-red, firm, sandy, dolomitic, shaly in part, with some scattered dolomite, as above, and anhydrite, white, sucrose.

1838 1895 57
Sandstone, pink to white, fine to medium grained, sub-rounded to sub-angular, well sorted, friable, good to excellent P & P, no show. Toward base of interval sandstone becomes dark pink to red, slightly harder, clay filled, dolomitic, poor to fair P & P. Trace of interbedded dolomite, as above, at top of interval.

1895 1960 65
Dolomite, white, pink, light gray, trace of purple, hard, brittle, fine to microcrystalline, sandy in part, very slight trace of brown stain, dull yellow fluorescence, no cut. Some interbedded shale, dark gray to black, and grayish-green, firm to soft, silty to smooth and somewhat waxy, sandy in part.

1960 1990 30
Sandstone, pink to red-orange, some white, fine grained, sub-angular to sub-rounded, well sorted, anhydrite filled, friable, poor to fair P & P, some good P & P, no show. Abundant anhydrite, white, soft to very soft, granular to earthy.

1990 2030 40
Limestone, mojlted medium to dark gray, hard, fine to microcrystalline, some medium crystalline, silty to sandy, becoming dolomitic and grading to dolomite, dull yellow fluorescence, no cut. Some scattered shales, medium gray to black, also lavender and green, smooth, fairly soft, somewhat waxy, with some floating sand grains. Some scattered soft, white, earthy to succrose anhydrite.
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>2060</td>
<td>30</td>
<td>Dolomite, mottled medium to dark gray, some light gray, hard, limy, brittle,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>very fine to fine crystalline, scattered dull fluorescence, no cut. Some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>interbedded limestone at base of interval, very fine to microcrystalline,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>hard, brittle, silty to sandy, dull fluorescence, no cut.</td>
</tr>
<tr>
<td>2060</td>
<td>2070</td>
<td>10</td>
<td>Sandstone, pink to purple, fine to very fine grained, sub-angular to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sub-rounded, clay filled, dolomite, hard and brittle to friable, poor to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fair P &amp; P, no show, with dolomite, white to pink, some purple, very fine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to microcrystalline, hard, light yellow fluorescence, no cut. Scattered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>coarse yellow chert grains.</td>
</tr>
<tr>
<td>2070</td>
<td>2080</td>
<td>10</td>
<td>Siltstone, bright red-orange, hard, sandy, dolomitic, with some bright</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>red-orange silty shale, and abundant very soft, white, earthy anhydrite.</td>
</tr>
<tr>
<td>2080</td>
<td>2100</td>
<td>20</td>
<td>Shale, medium to dark gray, some green, firm, smooth to silty, with some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>anhydrite, soft to firm, sucrose to earthy. Some sandstone, as above.</td>
</tr>
<tr>
<td>2100</td>
<td>2160</td>
<td>60</td>
<td>Sandstone, white, fine to medium grained, some very fine grained, sub-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>rounded, well sorted, anhydritic in part, friable to extremely friable,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>good to excellent P &amp; P, no show, with some interbedded shale, medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>gray to grayish-green, some light green, firm, smooth and waxy to silty.</td>
</tr>
<tr>
<td>2160</td>
<td>2210</td>
<td>50</td>
<td>Dolomite, white to gray, pink, purple, very fine to microcrystalline, hard,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>brittle, scattered dull to light yellow fluorescence, no cut. Some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>interbedded white, dolomitic anhydrite at top of interval, very fine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>crystalline, firm to hard. Scattered white chert grains.</td>
</tr>
<tr>
<td>2210</td>
<td>2230</td>
<td>20</td>
<td>Sandstone white, fine to medium grained, sub-angular to sub-rounded, well</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sorted, very friable, anhydritic, fair to good P &amp; P, no show, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dolomite, as above, hard, microcrystalline, fair light yellow fluorescence,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>no cut. Some soft white earthy anhydrite.</td>
</tr>
<tr>
<td>2230</td>
<td>2272</td>
<td>42</td>
<td>Dolomite, white to light gray, some pink and purple, very fine to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>microcrystalline, hard, limy, light to dull yellow fluorescence, no cut,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>with interbedded shale, gray to greenish gray, soft, silty to waxy. Some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>scattered streaks of sandstone, white to pink and light purple, fine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>grained, dolomitic, anhydritic, firm to somewhat friable, no show. Some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>very soft white, earthy anhydrite, and scattered yellow chert grains.</td>
</tr>
</tbody>
</table>
**Prop** | **To** | **Feet** | **Description**
--- | --- | --- | ---
"Red Marker" | 2272 | 5 | 2272 (+1263) log
Shale, red, soft, flaky, smooth with silky metallic luster.

| 2280 | 38 |

| 2318 | 15 |

Dolomite, white to gray, pink, very fine to microcrystalline, hard, trace of medium brown stain, trace faint fluorescence, no cut, with some interbedded sandstone, white to pink and purple, fine to medium grained, sub-angular to sub-rounded, dolomitic, anhydritic, hard to fairly friable, poor P & P, no show. Some sandstone at base of interval, white to pink, fine to medium grained, sub-rounded to sub-angular, well sorted, friable, dolomitic in part, some faint yellow fluorescence, trace very faint cut.

| 2333 | 15 |

Dolomite, dark gray, fine crystalline, hard to somewhat porous, shaly in part, scattered dark brown stain, fairly bright yellow gold fluorescence, good bright yellow gold cut, with some sandstone, white fine grained, sub-rounded, dolomitic in part, hard to friable with fairly abundant loose grains, fairly even light brown stain, pale yellow fluorescence, faint light yellow cut.

Circulated samples @ 2333:
Dolomite, as above, more light brown stain, and sandstone, as above, light stain, pale fluorescence, more abundant loose grains in sample. Entire sample gives fair to bright light yellow cut.

**D.S.T. #1, 1st Leo (?) Zone 2315-2333** (See page 5 for data on DST #1)

| 2333 | 2384 | 51 |

Shale, dark to very dark gray, some grayish-green, firm, waxy, silty in part, with some interbedded dolomite, white to gray, tan, very fine to microcrystalline, hard. Some stringers of sandstone, white fine to very fine grained, hard, dolomitic, poor P & P, no show.

**2nd Leo Sandstone**

| 2384 | 6 |

Sandstone, medium gray, very fine grained, sub-angular, hard, dolomitic, poor P & P, no show, becoming softer, somewhat friable, with slight fluorescence, no cut.
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2390</td>
<td>2400</td>
<td>10</td>
</tr>
</tbody>
</table>

(Circulated 30 minutes for samples)
Sandstone, white, fine grained, sub-rounded, well sorted, friable, good P & P, fair light brown stain, even fairly bright light yellow fluorescence, fair to good cut. Sulphur odor in sample.

**DST #2, 2nd Aug, 2390-2400** (See page 5 for data on DST #2)

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2400</td>
<td>2430</td>
<td>30</td>
</tr>
</tbody>
</table>

Sandstone, white, fine to medium grained, sub-rounded, well sorted, friable to extremely friable, good to excellent P & P, even light brown stain at top of interval becoming spotty, fairly bright to dull yellow fluorescence, good to poor cut.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2430</td>
<td>2460</td>
<td>30</td>
</tr>
</tbody>
</table>

Shale, dark to very dark gray, some greenish gray, firm, waxy to silty, with dolomite, gray to pink, tan, fine to microcrystalline, hard, limy, silty in part. Some interbedded sandstone, white, fine to medium grained, sub-rounded, friable, to very friable, good to excellent P & P, slight trace light brown stain, faint to fair light yellow fluorescence, trace fair to good cut. Scattered traces hard, black, brittle, silty shale.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2460</td>
<td>2500</td>
<td>40</td>
</tr>
</tbody>
</table>

Dolomite, tan to dark gray, fine crystalline, hard, limy, silty to sandy in part, with interbedded medium to dark gray, firm waxy to silty shale and, very hard black, brittle, silty shale. Some traces of interbedded sandstone, white to light gray, fine to very fine grained, sub-angular to sub-rounded, hard, dolomite matrix, poor P & P, very slight trace of fluorescence, no cut.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500</td>
<td>2515</td>
<td>15</td>
</tr>
</tbody>
</table>

Sandstone, white, fine to very fine grained, sub-rounded to sub-angular, hard and dolomitic in part, becoming friable, with good P & P, some very light brown stain, faint yellow fluorescence, very slight trace of cut, sulphur odor.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2515</td>
<td>2580</td>
<td>65</td>
</tr>
</tbody>
</table>

Dolomite, gray to dark gray, fine to very fine crystalline, hard, silty to sandy, limy and anhydritic in part, with interbedded shale, medium to dark gray, firm to hard, with some scattered shale, black, very hard, brittle, silty. Some scattered sandstone, white to light gray, fine to very fine grained, sub-rounded to sub-angular, hard and dolomitic to friable, no P & P to good P & P, trace fair light yellow fluorescence, no cut.
**Description**

Dolomite, dark gray to tan, hard, silty to sandy, and sandstone, white to gray, fine grained, sub-rounded to sub-angular, hard, dolomitic, some friable, poor to fair P & P, some scattered even brown stain, very poor to fair yellow fluorescence, no cut.

### 3rd Leo (7) sandstone

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Feet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2580</td>
<td>2618</td>
<td>32</td>
<td>Sandstone, white to gray, very fine grained, sub-angular to sub-rounded, dolomitic, friable, poor to fair P &amp; P, dull to fair yellow fluorescence, no cut, with dolomite, tan, gray, white, fine to microcrystalline, hard, limey, sandy, dull to fair yellow fluorescence, no cut.</td>
</tr>
<tr>
<td>2618</td>
<td>2650</td>
<td>32</td>
<td>Sandstone, white to light gray, very fine to fine grained, sub-rounded, very calcareous, hard to friable, poor to fair P &amp; P, poor light yellow fluorescence, no cut, with some interbedded limestone, white, hard, microcrystalline, very sandy, and dolomite, tan, gray, hard, microcrystalline, very limey, fair light yellow fluorescence, no cut. Abundant very soft, white, earthy anhydrite near top of interval.</td>
</tr>
<tr>
<td>2650</td>
<td>2690</td>
<td>30</td>
<td>Sandstone, white, fine to very fine grained, sub-rounded to sub-angular, calcareous to very calcareous, hard to friable, poor to fairly good P &amp; P, no fluorescence on porous sand, to fairly bright light yellow fluorescence on hard and tight sand, no cut. Some dolomite, dark gray to brown, hard, very fine crystalline, silty in part, somewhat limey. Scattered red, yellow, orange and white chert fragments.</td>
</tr>
<tr>
<td>2680</td>
<td>2700</td>
<td>20</td>
<td>Shale, dark maroon to red, soft to firm, silty, some green shale inclusions, interbedded with sandstone, white to light gray, very fine grained, sub-rounded to sub-angular, hard and dolomitic to friable and very calcareous, anhydritic, no P &amp; P to fairly good P &amp; P, very faint fluorescence, no cut. Abundant anhydrite at top of interval, white, soft and earthy to firm and sucrosic.</td>
</tr>
<tr>
<td>2700</td>
<td>2730</td>
<td>30</td>
<td>Sandstone, white to gray and greenish gray, with maroon speckling, very fine grained, sub-angular to sub-rounded, calcareous to very calcareous, firm to friable, scattered faint fluorescence, no cut, with interbedded dolomite, tan to gray, microcrystalline, hard, fairly bright fluorescence, no cut, and some limestone, white, very fine to microcrystalline, hard.</td>
</tr>
<tr>
<td>From</td>
<td>To</td>
<td>Feet</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>2760</td>
<td>2795</td>
<td>35</td>
<td>Shale, variegated red, green, maroon, lavender, soft to firm, silty, sandy in part and calcareous in part, interbedded with limestone, white to light gray and tan, very fine to microcrystalline, hard, shaly in part. Some scattered yellow and orange chert fragments.</td>
</tr>
<tr>
<td>2795</td>
<td>2848</td>
<td>53</td>
<td>Limestone, white, light gray, very light pink, light lavender, very fine to microcrystalline, hard to very hard, with abundant orange, tan, and lavender chert, some interbedded shale, variegated gray to dark gray, green, red and green mottled, firm and waxy to soft and silty. Some soft, white, earthy anhydrite in upper half of interval.</td>
</tr>
<tr>
<td>2848</td>
<td>2870</td>
<td>22</td>
<td>Sandstone, white to tan, fine to medium grained, sub-angular, calcareous, very conspicuous bright green glauconite grains, hard to friable, poor P &amp; P, no show, interbedded with variegated shale and tan, hard limestone, as above.</td>
</tr>
<tr>
<td>2870</td>
<td>2905</td>
<td>35</td>
<td>Limestone, light tan to light gray, some lavender, and very light green, very fine to microcrystalline, trace of floating sand grains, hard, shaly in part, dolomitic in upper half of interval, some pale yellow fluorescence, no cut. Fairly abundant scattered yellow, orange, red, and some white chert.</td>
</tr>
<tr>
<td>2905</td>
<td>2917</td>
<td>12</td>
<td>Anhydrite, white, very soft, earthy and abundant chert, mottled scarlet and light gray.</td>
</tr>
<tr>
<td>2917</td>
<td>2965</td>
<td>48</td>
<td>Limestone, light tan to light gray, fine to very fine crystalline, hard, some lithographic, very hard and siliceous, with some interbedded shale, variegated, gray, red, purple, firm smooth, somewhat waxy. Scattered, chert, red, gray, orange, yellow. Bryozoan (?) fragment in sample 2930-40.</td>
</tr>
<tr>
<td>2965</td>
<td>2989</td>
<td>24</td>
<td>Shale, variegated red, gray, green, purple, red-orange, soft, silty to sandy, anhydritic in part. Some limestone, as above, light tan to light gray, hard. Trace purple dolomitic limestone with floating sand grains.</td>
</tr>
</tbody>
</table>
From | To | Feet | Description
---|---|---|---
Pahasapa limestone | 2989 | 3057 | 68 | 2989 (+546) log

Limestone, white to light gray, some light tan, becoming pink at base of interval, fine to very fine crystalline, some traces medium to coarse crystalline, firm brittle, some soft and earthy. Some limestone has very fine purple speckling.

Circulated for logs @ 3057

30 min. circulation

Limestone, white to light gray and light pink, fine to very fine crystalline, some medium to coarse crystalline and darker pink, firm to hard, brittle. Trace coarse white calcite rhombs.

1 hour circulation

Limestone, as above, white to light gray and pink, trace tan, fine to very fine crystalline, some medium to coarse crystalline, fairly hard, brittle. Fairly abundant variegated shale cavings.

1½ hour circulation

Limestone, as above. Sample mostly cavings.

T.D. 3057 Driller (+478) 3057 Log (+478) Drilling time was kept on an Eastman Star drilling time recorder and the original chart was delivered to the Sun Oil Co., district office in Casper, Wyoming.

ELECTRIC LOG TOPS

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
<th>Datum (K.B.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dakota sandstone</td>
<td>366</td>
<td>+3169</td>
</tr>
<tr>
<td>Lakota sandstone</td>
<td>562</td>
<td>+2973</td>
</tr>
<tr>
<td>Morrison formation</td>
<td>653</td>
<td>+2882</td>
</tr>
<tr>
<td>Sundance formation</td>
<td>850</td>
<td>+2685</td>
</tr>
<tr>
<td>Gypsum Spring formation</td>
<td>1152</td>
<td>+2383</td>
</tr>
<tr>
<td>Spearfish formation</td>
<td>1186</td>
<td>+2349</td>
</tr>
<tr>
<td>Minnekahta limestone</td>
<td>1726</td>
<td>+1909</td>
</tr>
<tr>
<td>Oseboh shale</td>
<td>1764</td>
<td>+1771</td>
</tr>
<tr>
<td>Minnelusa formation</td>
<td>1838</td>
<td>+1697</td>
</tr>
<tr>
<td>&quot;Red Marker&quot;</td>
<td>2272</td>
<td>+1263</td>
</tr>
<tr>
<td>2nd Leo sandstone</td>
<td>2334</td>
<td>+1151</td>
</tr>
<tr>
<td>3rd Leo (?) sandstone</td>
<td>2618</td>
<td>+917</td>
</tr>
<tr>
<td>Pahasapa limestone</td>
<td>2989</td>
<td>+546</td>
</tr>
<tr>
<td>T.D.</td>
<td>3057</td>
<td>+478</td>
</tr>
</tbody>
</table>
PLUGGING RECORD

Set 25 sack plug across top of Pahasapa from 2977-3057.
Set 25 sack plug across 2nd Lee from 2360-2440.
Set 25 sack plug across top of Minnelusa from 1800-1860.
Set 25 sack plug across top of Sundance from 820-900.
Set 40 sack plug across top of Dakota from 330-460.
Set 25 sack plug in base of surface pipe from 220-290.
Set 10 sack plug with regulation marker in top of surface pipe.
## PLUGGING RECORD

**Operator:** Sun Oil Company  
**Address:** P.O. Box 1798, Denver, Colorado

### Location of Well
- **Name of Lease:** Lance-Nelson Estate  
- **Well No.:** 1  
- **Field & Reserve:** Wildcat  
- **Location:** NE SE Sec. 21-7 S-1E  
- **County:** Fall River

### Application to Drill This Well Was Filed
- **Operator:** Sun Oil Company  
- **Date of Application:** 2-22-64  
- **Well:** 269

<table>
<thead>
<tr>
<th>Name of each formation containing oil or gas</th>
<th>Field element of each formation</th>
<th>Depth interval of each formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Date Plugged
- **Date:** 2-22-64  
- **Depth:** 3057'

### Has This Well Ever Produced Oil or Gas
- **Character of Well:** No  
- **Character of Well at Completion:** Initial production: Oil (bbls/day) Gas (MCF/day) Water (bbls./day)  
- **Dry?** X

### Amount Well Producing When Plugged
- **Oil (bbls/day):**  
- **Gas (MCF/day):**  
- **Water (bbls./day):**

### Name of each formation containing oil or gas, indicating which formation, open or closed at time of plugging
- **Indicate zones squeezed with cement:** None

### CASING RECORD

<table>
<thead>
<tr>
<th>Size pipe</th>
<th>Punt in well (ft.)</th>
<th>Bailed out (ft.)</th>
<th>Left in well (ft.)</th>
<th>Give depth and method of parting casing (shallow, ripped off)</th>
<th>Packers and sleeves</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-5/8&quot;</td>
<td>269</td>
<td>None</td>
<td>269</td>
<td>-</td>
<td>Surface casing remains in hole</td>
</tr>
</tbody>
</table>

### Was Well Filled with Mud-Bolus Held, According to Regulations?
- **Yes**

### Subsequent Plug-Up
- **6-1/2:**
- **7-3/8:**
- **8-5/8:**

### Type of Material
- **9-5/8:**
- **10-5/8:**

### Casing Material
- **8:1:**
- **8:2:**
- **9:1:**

### Additional Details

**Executed this 24th day of February, 1964

State of Colorado

County of Denver

Before me, the undersigned authority, on this day personally appeared the person whose name is subscribed to the above instrument, who being by me duly sworn on oath that he has knowledge of the facts stated therein and that said record is true and correct.

My Commission expires July 9, 1964

DO NOT WRITE BELOW THIS LINE

Oil and Gas Board of the State of South Dakota

Secretary
Our CasPer Office will submit copies of all logs run, complete well history along with other pertinent information in the near future.

**Log Tops:**

<table>
<thead>
<tr>
<th>Well</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dakota</td>
<td>366</td>
</tr>
<tr>
<td>Lakota</td>
<td>562</td>
</tr>
<tr>
<td>Morrison</td>
<td>653</td>
</tr>
<tr>
<td>Sundance</td>
<td>850</td>
</tr>
<tr>
<td>Gypsum Springs</td>
<td>1152</td>
</tr>
<tr>
<td>Spearfish</td>
<td>1186</td>
</tr>
<tr>
<td>Minekahta</td>
<td>1726</td>
</tr>
<tr>
<td>Peccone</td>
<td>1754</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1838</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2272</td>
</tr>
<tr>
<td>Anaden</td>
<td>2848</td>
</tr>
<tr>
<td>Pahasapa</td>
<td>3057' TD</td>
</tr>
</tbody>
</table>
**SUNDARY NOTICES AND REPORT ON WELLS**

- **Operator**: Sun Oil Company

**LOCATION** (in feet from nearest lines or legal subdivision, where possible):

- 1980 NSL and 660 WEL NE SE Sec. 21 - 78 - 1E
- NE SE Sec. 21-78-1E

**ELEVATIONS** (G.P., R.K., O.H., etc., as determined):

- 3526.0 Grd.

**COUNTY**: Fall River

** diaper BELOW BY CHECK MARK NATURE OF REPORT, NOTICE OR OTHER DATA**

- TEST WATER SHUT-OFF: SHOW OR ACIDIZE
- FRACTURE TREAT: REPAIR WEL.
- MULTIPLE COMPLETE: PULL, OR ALTER CASING
- ABANDON

**INDICATE PROPOSED OR COMPLETED OPERATIONS** (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work):

**Subsequent report of cleared location:**

This well was P & A 2-22-64 and the pits have been filled and leveled and location has been cleaned up and the well site is now ready for final abandonment, inspection and approval.

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

**SIGNED**

**TITLE** Div. Supt. - Oper. Dept.

**DATE** 7-1-64

**APPROVED** July 7, 1964

**CONDITIONS, IF ANY:**

See Instructions On Reverse Side

OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA

Secretary

[Stamp]
August 21, 1964

Dr. Duncan McGregor
State Geologist
Vermillion
South Dakota

RE Sun #1 Lance-Nelson
NE4, SE4-21-7S-1E
Fall River County, South Dakota
Permit No. 356

Dear Duncan:

The six months confidential period on information from the above test has now terminated and all information may be released.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:cr
August 10, 1964

Mr. Earl J. Cox  
State Geological Survey  
Box 208  
Belle Fourche, South Dakota  

Dear Earl:

Please find enclosed the Sonic Log and Laterolog for  
Sun Lance #1 Nelson, Fall River County, Sec. 21-7S-1E.  

Sincerely yours,

(Mrs.) Donna Jean Hedges  
Administrative Assistant  
For the State Geologist

Enclosures
Dr. Duncan McGregor  
State Geologist  
Science Center  
Vermillion, South Dakota

May 15, 1964

Dear Duncan:

Re: Sun #1 Lance-Nelson  
NE½ SE¼ –21-7S-1E  
Fall River County, South Dakota  
Permit #356

As shown by the attached Scout report, the above location meets our requirements.

If your office has received the samples, and two copies each of the sample descriptions, two drill stem tests and the logs (latero, gamma ray senic), the bond can be released.

As information on this test is Confidential, both sets of records should be kept at Vermillion until August 22, 1964, when the Confidential period ends.

You may wish to wait until August 22, before recommending the bond released.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC:cr

Enc
March 27, 1964

Mr. Fred Mc Cotter
American Stratigraphic Company
17 North 31st Street
Billings, Montana

Dear Mr. Mc Cotter:

We received the samples in good shape yesterday from the following wells:

Cities Service #1 Carl Wagner
NW NW 13-5N-29E
Stanley County, South Dakota

Cities Service #1-A Phipps
NW SW 4-28-23E
Jackson County, South Dakota

Sun Oil Company #1 Lance-Nelson
21-7S-1E
Fall River County, South Dakota

Thank you very much.

Sincerely yours,

Merlin J. Tipton
Assistant State Geologist

MJT:jmd
Dear Duncan,

I have your March 10 letter with the mention that Frank Neighbor wants the logs on the Sun #1 Lance-Nelson kept confidential.

The Rules, page 3-42, state that all records shall be kept confidential for six months if requested in writing by the owner.

I am always careful to check with the geologist, engineer, or operator, to see if information I obtain when scouting is confidential. Even if no letter has been written, if I am verbally asked to keep the information confidential, I treat it as such, and so mark the scout sheets.

The geologist on the Sun #1 Lance-Nelson test told me several times it was not a tite hole. Sun themselves gave out the sample tops and DST results to Rinchart's. However, now that Sun has changed their mind on this, we are obligated to hold the information until August 21, 1964, unless Sun approves the release before that. Neighbor seems to want only the mechanical logs kept confidential, but to be on the safe side I suppose the whole file should be considered confidential. Under the circumstances, any information we might have released prior to Neighbors letter cannot be considered a violation.

The method followed in the past seems to have worked satisfactorily and we have not had any hard feelings or misunderstandings about this to my knowledge. I believe we would get adverse reactions from the oil industry if we made it a policy not to release any information for six months on "non Confidential" tests.

Sincerely,

Earl Cox
March 10, 1964

Mr. Earl Cox
State Geological Survey
P. O. Box 208
Belle Fourche, South Dakota

Dear Earl:

I just received your two memos telling us (1) that you are about to make your move, and (2) the fact that you are getting together with Mr. Hanson about pictorial coverage on your big article on petroleum in South Dakota. Both of these are very good, and I feel that this will materially improve not only the physical space of the Geological Survey in our Western Field Office, but certainly will get the meaning and worth of our organization before the public.

I just got a letter from Frank Neighbor relative to the Sun Oil Company Lance Nelson Estate #1, in which he sent me copies of the logs. He wrote a P. S., saying that he wanted these logs kept confidential as they have not released them to date. I note on some of the scout reports that information you submitted on the Sun Wells carried no confidential word at the top. I was wondering if this were an oversight, or if they have actually waited until now before they declared it confidential. I am wondering if we should adopt a policy that all records we get from these oil companies are held confidential for the six-month period from close of operation. On the other hand, I realize this may hold up getting information out, particularly if the company doesn't mind if it is released. This presents a bit of a problem, because since they have not seen fit to mark the information you got for scout confidential, we may have given out some information that we shouldn't have.

You might ponder this and give me your ideas on what to do about it.

Sincerely yours,

Duncan J. McGregor
State Geologist

DJM: jmd
March 10, 1964

Mr. Frank Neighbor
District Exploration Manager
411 Petroleum Building
P. O. Box 1732
Casper, Wyoming

Dear Frank:

Reference is made to your letter of March 5, 1964, in which you attached a P. S., requesting that we keep the logs confidential until released by you.

This letter is to inform you that because of your request, we have so placed your logs in confidential file, and they will remain there for six months from the date of completion of the Lance-Nelson Estate #1 well.

Seeing your signature at the bottom of the letter made me feel homesick for Salt Lake City. You may or may not remember me, but back in the early '50's I was working with Darwin Quigley for the Sinclair Oil and Gas Company. At that time you and Lou Wells held the fort down on the third floor in the Newhouse Building.

If and when I am in Casper, and I hope it won't be too long before I am, I will certainly make an effort to look you up and at least say "hi".

Sincerely yours,

Duncan J. McGregor
State Geologist

DJM;jmd
March 5, 1964

Dr. Duncan McGregor  
State Geologist  
Science Center  
Vermillion, South Dakota  

Re: Sun Oil Co. Lance Nelson Estate #1  
Section 21, T. 7 S., R. 1 E.  
Fall River County, South Dakota  

Dear Sir:

Enclosed you will please find the following information on the subject well:

1: Two Copies - Well History by Eldred Johnson  
   Consulting Geologist  

2: Two Copies - Final Print - Sonic Gamma Ray Log  
   By Schlumberger  

3: Two Copies - Final Print - Laterolog  
   By Schlumberger  

If additional copies are needed please do not hesitate to call on us. American Stratigraphic Company as per your requirements has been instructed to furnish you with a cut of the samples.

Very truly yours,

SUN OIL COMPANY  

[Signature]  
Frank Neighbor  
District Exploration Manager  

FN/mk  
Enc.  

P.S. We would appreciate your keeping the logs confidential, since we have not released these logs to-date.
I have been advised that the Sun Oil Company has obtained a Permit to Drill for Oil and Gas on your land in Section 21, T 7 S, R 1 E.

Occasionally, owners of land consider converting abandoned oil wells into water wells. Please advise me whether or not you intend to convert the oil well drill hole on your land into a water well if water is encountered and the drill hole is abandoned as an oil well.

If you are considering making a water well out of the abandoned oil well drill hole, special considerations are necessary to comply with the State's oil and water laws. The abandoned oil hole must be properly plugged and the water well properly constructed. All conversion work will be at your expense. The cost will vary, depending upon the characteristics of the drill hole, but such cost will be in the neighborhood of $5,000 or more. Usually another driller and drill rig will have to be arranged for. This other drill rig and casing and other materials will have to be on hand to take over immediately after the special oil well plugging is completed, because the drill hole cannot be left open for any appreciable length of time without spoiling it. Approval of plans for construction of the water well will be required, and a bond covering proper construction may be required. Also, a water right may be required. All of these arrangements take considerable time to accomplish.

Please advise me immediately if you plan to convert the oil well drill hole into a water well. We both hope that a producing oil well results from the drill hole on your land; however, if not and you are planning on a water well, we must start making arrangements now.

Sincerely,

J.W. GRIMES
Chief Engineer
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
State of South Dakota Geological Survey  
Attn: Dr. Duncan McGregor, State Geologist  
Science Center  
Vermillion, South Dakota

SOUTH DAKOTA SAMPLES N/C

Cities Service #1 Carl Wagner  
NW NW 13-5N-29E  
Stanley Co., South Dakota

Cities Service #1-A Phipps  
NW SW 4-2S-23E  
Jackson Co., South Dakota

Sun Oil Company #1 Lance-Nelson  
21-7S-1E  
Fall River Co., South Dakota

PLEASE NOTE:
We are shipping these samples via United Buckingham. Please let us know when you receive them.
Sun abandons second oil test

The Sun Oil Company plugged and abandoned their No. 1 Lance-Nelson oil test in Fall River County last Friday, Feb. 22, according to a report released this week by Earl Cox, Belle Fourche, Engineering-Petroleum Geologist of the State Geological Survey. This was the second oil test in the Edgemont area which Sun has made unsuccessfully within the past few months.

Cox said oil and gas shows were found in the Minnelusa sands by Sun in this latest test, but were not present in commercial quantities. The company has not indicated if additional tests are planned for South Dakota, he said.

Drilling continues at the Carpenter No. 1 Cox test near the Darkey Dome Field. A depth of 1530 feet had been reached by February 20, Cox reported. Information on this test is confidential and the only part being released to the public is the drilling depth.
BELLFOURCHE — Sun Oil Company plugged and abandoned its Number One Lance-Nelson oil test in Fall River County Friday, according to Earl Cox, engineering-petroleum geologist for the State Geological Survey in Belle Fourche.

Cox said the test reached a depth of 3,057 feet. Oil and gas shows were found in the Minnelusa sands but were not present in commercial quantities.

Cox said Sun Oil Co. has not indicated if additional tests are planned in South Dakota.

Drilling continues at the Carpenter Number One Cox test near the Barker Dome field in Fall River County. A depth of 1,530 feet had been reached Feb. 20, but Cox said information on the test is confidential and the only information being released concerns drilling depth.
Earl Cox, Engineering-Petroleum Geologist of the State Geological Survey, Belle Fourche last week announced that the State Oil and Gas Board granted a permit January 27 to the Sun Oil Company to drill their No. 1 Lance-Nelson Oil and gas test in Fall River County. The location is twelve miles northwest of Edgemont and will reach an estimated depth of 3200 feet. The test is seven miles east of the West Mule Creek Oil Field in Wyoming and eight miles southwest of the Barker Dome Oil Field in Custer County, South Dakota.

This test will be the second recent wildcat to be drilled by Sun Oil Company in Fall River County. Sun plugged and abandoned their No. 1 Government test a month ago after reaching a dept of 3250 feet. The No. 1 Government test was located six miles west of Edgemont.
Sun Oil Co. was granted a permit Monday to drill an oil and gas test well in Fall River County 12 miles northwest of Edgemont, according to Earl Cox, geologist with the State Geological Survey.

The State Oil and Gas Board issued the permit for the well, the No. 1 Lance-Nelson, with drilling estimated to reach a depth of 3,200 feet.

The test is seven miles east of the West Mule Creek Oil Field in Wyoming and eight miles southwest of the Barker Dome Oil Field in Custer County.

The test will be the second recent wildcat to be drilled by Sun Oil Co. in Fall River County. The company plugged and abandoned their No. 1 government test a month ago after reaching a depth of 3,220 feet. This test was located six miles west of Edgemont.
EDGEMONT — Sun Oil Company has set surface casing and was drilling below the 915-foot level last week at its No. 1 NCRA-Government oil well 5½ miles west of Edgemont.

The projected 3,200-foot Minnelusa wildcat is 14 miles southwest of the Barker Dome field in Fall River County, according to C. W. Sanders, owner of C. W. Sanders and Associates of Rapid City, a petroleum exploration and consulting firm.

Sanders said the information came from Rinehart's Oil Report, a daily publication issued from Denver.

The wildcat was started Dec. 13 and surface casing was set at 199 feet.

In Stanley County, Cities Service Oil Co., was making hole below 2,230 feet at its No. 1 Carl Wagner well. The projected 2,500-foot wildcat is 12 miles northwest of Pierre.
Record 1 of 1

Well Information

<table>
<thead>
<tr>
<th>API No.</th>
<th>40 047 05095</th>
<th>County</th>
<th>FALL RIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>DOLEZAL 1 DARROW</td>
<td>Location</td>
<td>SESE 2-7S-1E</td>
</tr>
<tr>
<td>Permit No.</td>
<td>361</td>
<td>Total Depth</td>
<td>2447</td>
</tr>
<tr>
<td>Operator Name</td>
<td>GEORGE DOLEZAL JR</td>
<td>Bottom Hole</td>
<td>Minnelusa</td>
</tr>
<tr>
<td>Permit Date</td>
<td>07-03-1964</td>
<td>KB Elevation</td>
<td>3797</td>
</tr>
<tr>
<td>Spud Date</td>
<td>07-24-1964</td>
<td>Ground Elevation</td>
<td>43.466062</td>
</tr>
<tr>
<td>Plug Date</td>
<td>08-19-1964</td>
<td>Latitude</td>
<td>3792</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Longitude</td>
<td>-103.958032</td>
</tr>
<tr>
<td>Well Field</td>
<td>WILDCAT</td>
<td>Status</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>Class</td>
<td>DRY HOLE</td>
<td>Type</td>
<td>DRY HOLE</td>
</tr>
</tbody>
</table>

Formation Tops

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dakota Mud</td>
<td>120</td>
</tr>
<tr>
<td>Lakota</td>
<td>300</td>
</tr>
<tr>
<td>Morrison</td>
<td>425</td>
</tr>
<tr>
<td>Sundance</td>
<td>640</td>
</tr>
<tr>
<td>Spearfish</td>
<td>918</td>
</tr>
<tr>
<td>Goose Egg</td>
<td>1240</td>
</tr>
<tr>
<td>Minnekahta</td>
<td>1479</td>
</tr>
<tr>
<td>Opecche</td>
<td>1520</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1616</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2032</td>
</tr>
</tbody>
</table>

http://sddnr.net/oil_gas/search_results_oil_gas.cfm  2/16/2012
## PLUGGING RECORD

**Operator:** George Dobson, Jr.  
**Address:** 1151 South Building, Denver, Colorado

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Field &amp; Reserve</th>
<th>WI.</th>
<th>Location of Well</th>
<th>Sec-Town or Block &amp; Survey</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>114</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Application to drill this well was filed:**

<table>
<thead>
<tr>
<th>Name of Applicant</th>
<th>Date filed</th>
<th>Name of Applicant</th>
<th>Date filed</th>
<th>Name of Applicant</th>
<th>Date filed</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Dobson, Jr.</td>
<td>8-21-63</td>
<td>George Dobson, Jr.</td>
<td>8-21-63</td>
<td>George Dobson, Jr.</td>
<td>8-21-63</td>
</tr>
</tbody>
</table>

**Date plugged:** 8-21-63  
**Total depth:** N/A  
**Actual well producing when plugged:**

<table>
<thead>
<tr>
<th>Character of Well at completion (initial production):</th>
<th>Oil (bbl/day)</th>
<th>Gas (MCF/day)</th>
<th>Water (bbl/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Name of each formation capable of producing oil or gas:**

<table>
<thead>
<tr>
<th>Fluid content of each formation</th>
<th>Depth interval of each formation</th>
<th>Shale, kind &amp; depth of plug used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Casing Record

<table>
<thead>
<tr>
<th>Size pipe</th>
<th>Put in well (ft.)</th>
<th>Pulled out (ft.)</th>
<th>Lost in well (ft.)</th>
<th>Casing depth and point of (ft.)</th>
<th>Packers and shoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Was well drilled with mud-laden fluid, according to regulations?** Yes

In addition to other information required on this form, if this well was plugged back for use as a fresh water well, give all pertinent details on drilling operations to keep fresh water will perforated interval in fresh water sand, means and evidence of sufficient water, and account of any associated wet wells. The above will substantiate completion of this well as a water well and agreeing to assume full liability for any subsequent plugging which might be required.

## Approved

**Dewey-Burdock GDP**  
**June 2012**

Appendix 3.7-B
Cement Plugs Set as Follows:

25 Sacks = 2'03' to 2'09'
25 Sacks = 1'50' to 1'57'
25 Sacks = 1'00' to 1'25'
25 Sacks = 4'00' to 4'25'
25 Sacks = 1'65' to 1'90'

Dry hole marker and 10 sacks at surface, balance of hole filled with gel-base drilling mud.
SUMMARY OF WELL DATA

Operator: George Dolezal Jr., Sun Oil Co., etal.
Lease: No. 1 Earl Darrow
Location: SE SE Section 2, T. 78, R. 1E.
Fall River County, South Dakota.
Elevation: Ground 3792', X. B. 3797'
Contractor: Baker Drilling Company
Rig No. 3 - Sullivan draw works
Tool Pusher: Jim Baker
Drillers: Don Garhart, Ed Buchanan
Spud Date: July 24, 1964
Completion Date: August 19, 1964
Casing: 140'-5/8" used 24# @ 142' ground
with 60 sacks of regular cement.
Hole Size: 11" cable tool hole to 145'
7-7/8" from 145' to total depth.
Mud: No-War Mud Company
Casper, Wyoming
J. M. Bunce Engineer
Gel base
Logging: Drilling time: From surface casing
to total depth (Geolograph)
Schlumberger: Dual Induction-Laterlog
147' to 2442'
Schlumberger: Sonic Log-Gamma Ray
147' to 2441'
Samples: 10-foot samples 140 - 2100 feet
5-foot samples 2100 - 2250 feet
10-foot samples 2250 - 2450 feet
Samples on file at AmStrat in Denver.
Geology: Well site geology by J. D. Ayres
Lost Circulation: Lost minor amount of mud from 1630'
to total depth.

Dewey-Burdock GDP
June 2012
3.7-B-463
Appendix 3.7-B
SUMMARY OF WELL DATA (continued)

Total Depth: 2450' - Driller
2446' - Schlumberger

Status: Plugged and Abandoned

Plugs: 2435' to 2360' - 25 sacks
1650' to 1575' - 25 sacks
600' to 525' - 25 sacks
400' to 325' - 25 sacks
165' to 90' - 25 sacks
Dry-hole marker and 10 sacks at surface.

Drill Stem Tests: Schlumberger Formation Tester
1688' to 1690.5' Converse sand.
Tool open 30 minutes
Tool shut in 23 minutes
Recovered 600 cc mud
Pressures 0

Gores: Core #1-2155' to 2206'.
First Leo zone (see sample desc.)

ELECTRIC LOG FORMATION TOFS

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
<th>Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusan</td>
<td>300</td>
<td>+3407</td>
</tr>
<tr>
<td>Lakota</td>
<td>350</td>
<td>+3447</td>
</tr>
<tr>
<td>Morrisan</td>
<td>425</td>
<td>+3372</td>
</tr>
<tr>
<td>Sundance</td>
<td>640</td>
<td>+3157</td>
</tr>
<tr>
<td>Spearfish</td>
<td>910</td>
<td>+2879</td>
</tr>
<tr>
<td>Goose Egg</td>
<td>1240</td>
<td>+2577</td>
</tr>
<tr>
<td>Minnekahta</td>
<td>1479</td>
<td>+2318</td>
</tr>
<tr>
<td>Osneke</td>
<td>1520</td>
<td>+2277</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1616</td>
<td>+2181</td>
</tr>
<tr>
<td>Red Shale Marker</td>
<td>2032</td>
<td>+1765</td>
</tr>
</tbody>
</table>

GEOREAL SUMMARY

The subject well was drilled to a total depth of 2450
feet within a sand that would possibly correlate with
the Third Leo sandstone of the Pennsylvanian stratigraphic
section in the Lance Creek field.

The Dakota sandstone between the base of the surface
sanding and 300 feet gave no indications of oil staining.
COUNTY: FALL RIVER
LEGAL LOCATION: SESE 2-7S-1E
API NO: 40 047 05095
PERMIT NO: 361
WELL NAME: DOLEZAL #1 DARROW
OPERATOR: GEORGE DOLEZAL, JR.
PERMIT ISSUED: 07/03/1964
PERMIT CLOSED: 03/12/1965
FILE LOCATION: 7S-1E-2 SESE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS

Dewey-Burdock GDP
June 2012
3.7-B-465 Appendix 3.7-B
WELL HISTORY / CHECKLIST
### WELL HISTORY

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Permit No.</th>
<th>Location</th>
<th>Date of Permit</th>
<th>Elev.</th>
<th>Confidential</th>
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</thead>
<tbody>
<tr>
<td>Dolezal #1 Darrow</td>
<td>361</td>
<td>SESE 2-75-16 - Fall River</td>
<td>7-3-64</td>
<td>3792</td>
<td>X</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Logs Received From</th>
<th>To</th>
<th>Core Received</th>
<th>Drill Stem Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-20-64</td>
<td>2-18-65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cuttings Received</th>
<th>Cores Received</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cap Plug and Marker Set</th>
<th>Surface Restored</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-2-64</td>
<td>10-21-64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plugging Affidavit Signed</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bond Released</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3-12-65</td>
</tr>
</tbody>
</table>

**Summary of Scout Reports**

- **7-8-64** First visit - rig was not at location
- **8-3-64** Spudded 7-24-64
- **9-19-64** plugged
- **10-2-64** Marker has been placed - mud pits not filled.
- **10-21-64** Mud pits filled & surface smoothed.

PERMIT TO DRILL /
INTENT TO DRILL
APPLICATION FOR PERMIT TO

[] DRILL  [ ] DEEPEN  [ ] PLUG BACK

[] OIL WELL  [ ] GAS WELL  [ ] SINGLE ZONE

[ ] MULTIPLE ZONE

FARM OR LEASE NAME

Carl Larry

WELL NO.

00

FIELD AND POOL, OR WILDCAT

NO. ADDRESS OR LEASE

362

NAME OF OCCUPANT

Dewey-Burdock, John Dakota

NAME AND ADDRESS OF SURFACE OWNER

Dewey-Burdock Company, Osage, Wyoming

NAME AND ADDRESS OF CONTRACTOR

OPERATOR

State Park Building, Denver, Colorado

ADDRESS

1324 10th Street NE

LOCATION: In last from nearest lines of section or legal subdivision, where possible:

150.4 feet east - 450 feet from the southeast corner of Section 7 Township 7 South Range 2 East

ELEVATION

2265.

PROPOSED DEPTH

900 ft.

NO. OF WELLS ETC

2

ROTARY OR CABLE TOOLS

Rotary

ANNIVERSARY DATE:

Rotary

WORK WILL START

July 7, 1964

IF LEASE PURCHASED WITH ANY WELLS DRILLED FROM WHOM PURCHASED (NAME and address)

PROPOSED CLOTHING AND CEMENTING PROGRAM

<table>
<thead>
<tr>
<th>SIZE OF HOE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>BAGS OF CEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 inch</td>
<td>5-3/4 inch</td>
<td>29 lbs</td>
<td>new</td>
<td>150 ft</td>
<td>100</td>
</tr>
</tbody>
</table>

DESCRIBE PROPOSED OPERATIONS. IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCIVE ZONE AND PROPOSED NEW PRODUCIVE ZONE. GIVE BLOW OUT PREVIEWS PROGRAM IF ANY.

Principal objective is the lower sands of the Inniskin formation. Proposed to drill to 250 feet, or to a point 400 feet below the top of the sand unit and test any zones having significant show of oil or gas.

George Dolan

Title: Operator

Date: July 7, 1964

PERMIT NO

361

APPROVAL DATE

July 4, 1964

CONDITIONS

> COMPLETE SET OF SAMPLES AND CORES IF TAKEN, MUST BE SUBMITTED.

> SAMPLES, AND CORES IF TAKEN, BELOW DEPTH, MUST BE SUBMITTED.

> See Instructions on Reverse Side
Joseph Dodd, Surveyor: 

I made a survey for the location and elevation of the N.W. Corner of Section 27, T. 113 N., R. 7 E., Madison County, Iowa. I found the N.W. Corner to be located at the following coordinates:

Latitude: 41° 45' 30.5" N. 
Longitude: 93° 58' 45.2" W.

I have marked this corner with a wooden stake and a metal plate. I certify that this description is true and correct to the best of my knowledge and belief.

[Signature]

Joseph Dodd, Surveyor
WELL INSPECTION / SCOUT REPORTS
Well Name: Dolezal #1 Darow
Location: 7S-1E-2 SESE, Fall River
Directions: 933.5 FNL and 450 west of SE corner
Spud Date: 7-24-64
Elevation: 3792

Permit Date: 7-3-64
Permit #: 361
API: 4004705095
Plug Date: 8-19-64
Total Depth: 2446

7-8-64: Mud pits has not been dug. Rig was not at location
8-3-64: Casing 8 5/8 142 feet. By phone from Dolezal - drilling at 977 in Spearfish. Spudded July 24, 1964, set 142' 8 5/8 surface casing with 60 sacks, drilled 0-977'. Geologist Sam Ayres.
8-6-64: Drilling at 1700 in Minnelusa, drilled from 977-1700. Sample tops:
          Lakota 320, Morrison 407, Sundance 600, Spearfish 932, Minnekahta 1472, Opeche 1508
8-13-64: Coring at 2163, drilled from 17-0-02155, Cored from 2155-2163
8-18-64: Drilling at 2429 and preparing to log, drilled from 2162-2429
8-19-64: Plugged 2435-2360 25 sacks Leo Sand
          1650-1575 25 sacks Top Minnelusa
          600- 525 25 sacks top Sundance
          400- 325 25 sacks top Lakota
          165- 90 25 sacks base surface casing
          10 sacks surface plug

Remarks:

Dewey-Burdock GDP
June 2012
3.7-B-472
cored 2155-2206 no shows, DST #1 1688-90 12(?) recovered only a little drilling mud-formation tight, drilled 2206-2446, run induction-laterolog and gamma ray sonic. Tentative log tops:
Fuson-300, Lakota-350, Morrison-460, Sundance-640, Basal Sundance sand-866, Triassic-918, Minnekahta-1479, Opechee-1520, Minnelusa-1578, Red Marker-2032, 3rd Leo-2400
9-21-64: Abandonment marker had been placed, mud pits filled and surface smoothed satisfactorily.

signed by Earl Cox
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: September 21, 1964

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2, T 7 N., R 1 E., Fall River County, S. Dak.
Total Depth: 2446 feet

Casing Record:

8 5/8 142 Ft. 8 3/8 Ft.
8 3/8 Ft. 8 5/8 Ft.

Work in progress at time of visit:
None

Developments since last visit:

Mud pits had been filled and surface smoothed satisfactorily

Remarks and recommendations:

Scouted by: Earl Cox, Geologist
Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: Sept. 2, 1964

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2, T. 7 N., S. R. 1 E. W.

Fall River: County, S. Dak. Total Depth: 2446 feet

Casing Record:

8 5/8 142 Ft. _____ Ft.

_____ Ft. _____ Ft.

work in progress at time of visit:

None

Developments since last visit:

Abandonment marker had been placed.

Remarks and recommendations:

Mud pits not filled.

Scouted by: EarI Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: August 19, 1964

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2 T. 7 E. S. R. 1 E. N.

...Fall River, ...County, S. D. Total Depth: 2446 feet

Casing Record:

8 5/8 ______142 Ft. ______142 Ft.

Plugged as follows:

Work in progress at time of visit:

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sacks</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2435-2560</td>
<td>25</td>
<td>Leo Sand</td>
</tr>
<tr>
<td>1650-1575</td>
<td>25</td>
<td>Top Minnelusa</td>
</tr>
<tr>
<td>600-525</td>
<td>25</td>
<td>Top Sundance</td>
</tr>
<tr>
<td>400-325</td>
<td>25</td>
<td>Top Lakota</td>
</tr>
<tr>
<td>165-90</td>
<td>25</td>
<td>Base surface casing</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Surface plug</td>
</tr>
</tbody>
</table>

Developments since last visit:

Cored 2155-2206 No shows

Data $\#1$ 1688-90? (?) Recovered only a little drilling mud - formation tight

Drilled 2206-2446

Run induction-laterolog and gamma ray sonic

Remarks and recommendations:

Tentative log tops:

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnekahta</td>
<td>1479</td>
</tr>
<tr>
<td>Opeche</td>
<td>1520</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1578</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2032</td>
</tr>
<tr>
<td>Basal Sundance Sand</td>
<td>866</td>
</tr>
<tr>
<td>Triassic</td>
<td>918</td>
</tr>
</tbody>
</table>

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: August 18, 1964

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2 T. 7 N. S. R. 1 E. W.

Location: Fall River, County, S. Dak.

Total Depth: 2429 feet

Casing Record:

8 5/8

142 Ft. ___________ Ft.

__________ Ft. ___________ Ft.

Work in progress at time of visit:

Drilling at 2429 and preparing to log

Developments since last visit:

Drilled from 2163-2429 (details later)

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY
Scout Report

Date scouted: August 13, 1964

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2 T. 7 N S. R. 1 E. M.

Fall River County, S. Dak.

Total Depth: 2163 feet

Casing Record:

8 5/8

142 Ft. 142 Ft.

---Ft. ---Ft.

Work in progress at time of visit:

Coring at 2163

Developments since last visit:

Drilled from 1700-2155
Cored from 2155-2163

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY
Scout Report

Date scouted August 6, 1964.

Owner ........ Polegal .........................
Designation of well ...... #1 Darrow ..............
Location: Sec. 2, T. 7, M. S. R., 1 E. W.

... Fall River ................ County, S. Dak.  Total Depth 1,700 feet

Casing Record:
8 5/8  142  Ft.  _______ Ft.
      _______ Ft.  _______ Ft.

Work in progress at time of visit:
Drilling at 1700 in Minnelusa

Developments since last visit:
Drilled from 977-1700

Remarks and recommendations:
Sample tops: Lakota 320  Minnekahta 1472
Morrison 407  Opechee 1508
Sundance 600
Spearfish 932

Scouted by ........ Earl Cox, Geologist ............
Approved by  ........ Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted August 3, 1964.

Owner: Dolezal
Designation of well: #1 Darrow
Location: Sec. 2, T. 7, R. 1, E. 3

Fall River County, S. Dak. Total Depth: 977 ft

Casing Record:
8 5/8
142 ft. _____ ft.
_____ ft. _____ ft.

Work in progress at time of visit:
By phone from Dolezal
Drilling at 977 in Spearfish

Developments since last visit:
Spudded July 24, 1964
Set 142' 8 5/8" surface casing with 60 sacks.
Drilled 0-977'

Remarks and recommendations:
Geologist: Sam Ayres, Rainbow Motel, Edgemont, South Dakota

Scouted by: Earl Cox, Geologist
Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date scouted: July 8, 1964.

Owner: Dolezal

Designation of well: #1 Darrow

Location: Sec. 2 T. 7 N. S. R. 1 E. W.

County, S. Dak. Total Depth: 0 feet

Casing Record:

Ft. Ft.
Ft. Ft.

Work in progress at time of visit:

Mud pits had not been dug
Rig was not at location

Developments since last visit:

Remarks and recommendations:

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
3554 1435 - 2360 2450.1
214 1575.1 1450.1 T. M. L
250 515 - 600 1 R. M.
250 325 - 400 1 F. M.
25 165 - up Surge.

Tony
135 44

Sagor:協力者: Sullivan

778 Helen

Coned: 2/85 - 22 66
no show

From: 11 - Santa Cruz

Chuck Reiber: Superior
XU79 Neum. 662-73/2

157 41
16 88 - 90 1

To: No recovery at all:
Any time.

Aug 19, 1964

951 1
No. 21 played.

Confidental

Dewey-Burdock GDP
June 2012

Appendix 3.7-B
July 8, 1964
No pit on by Carroll 25 ft.

July 13, 1964
Carroll found nothing. Mechanic job on Aug.

July 19, 1964
Called Baker. He said Baker had his BJ on hand. A T.T. picture had spilled July 24 and was going to get surface for Baker.

Aug. 3, 1964
Phone call from Deolegal. Spudded July 24. T.D. 2120. C.1. 600 ft. morning Aug. 3 at 9:30. agreed to 3.7-B at Agreed. Pensam

Aug 13, 1964

@ 2429 and well could build about 10 more feet and let gamma Ray. Draw in Cavalier today, induction tomorrow.

Aug 13

Com. at 2152. C.R.

No D.P. from Com. Cat. 24. Full pressure 150. Cold oil line from Carroll at 9:30 min.
Appendix 3.7-B

Dewey-Burdock GDP
June 2012

Appendix 3.7-B-484

Dewey-Burdock GDP
June 2012

Appendix 3.7-B-484
Appendix 3.7-B

Abandoned or made plasma; made pit or fill; 9-21-64

Weld pit filled & surf

un.
WELL 1 - ... ft

LOCATION 1 -

LOGS READ -

TOPS -

GEOLGIC -

ELECTRIC FIELD -

FINAL - 2

RADIO FIELD -

FINAL - 2

OTHERS - 2 in test

CUTTINGS RECD - 2 - 9 - 65

CORES RECD - 2 - 9 - 65

DRILL STEM DATA RECD -

CAP PLUG CHECKED - OK

Plugging Affidavit Signed - 3-10-66

Copy 1 for 46 + 1 copy for 7
OPERATOR'S
TECHNICAL
REPORTS / MAPS
George Dolezal Jr., Sun Oil Co., et al

No. 1 Earl Darrow
Fall River County
South Dakota

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SUMMARY OF WELL DATA

Operator: George Doleza Jr., Sun Oil Co., etal.

Lease: No. 1 Earl Darro

Location: SE SE Section 2, T. 73, R. 1E, 660' PSL 650' PEL
Fall River County, South Dakota.

Elevation: Ground 3792'

Contractor: Baker Drilling Company
Rig No. 3 - Sullivan draw works
Tool Pusher: Jim Baker
Drillers: Don Garhart
          Ed Buchanan

Spud Date: July 24, 1964

Completion Date: August 19, 1964

Casing: 140' 8-5/8" used 24# @ 142' ground
        with 60 sacks of regular cement.

Hole Sizes: 11" cable tool hole to 145'

7-7/8" from 145' to total depth.

Mud: Mo-Mar Mud Company
     Casper, Wyoming
     J. M. Bunce Engineer
     Gulf base

Logging: Drilling time: From surface casing
to total depth (Geolograph)

Schlumberger: Dual Induction-Laterlog

147' to 2442'

Schlumberger: Sonic Log-Gamma Ray

147' to 2441'

Samples: 10-foot samples 140 - 2100 feet
         5-foot samples 2100 - 2250 feet
         10-foot samples 2250 - 2450 feet

Samples on file at AmStrat in Denver.

Geology: Well site geology by S. D. Ayres

Lost Circulation: Lost minor amounts of mud from 1630'
to total depth.
SUMMARY OF WELL DATA (continued)

Total Depth: 2450' - Driller
2446' - Schlumberger

Status: Plugged and Abandoned

Plugs: 2435' to 2360' - 25 sacks
1650' to 1575' - 25 sacks
600' to 525' - 25 sacks
400' to 325' - 25 sacks
165' to 90' - 25 sacks
Dry-hole marker and 10 sacks at surface.

Drill Stem Tests: Schlumberger Formation Tester
1688' to 1690.5' Converse sand.
Tool open 30 minutes
Tool shut in 23 minutes
Recovered 600 cu. mud
Pressures 0

Cores: Core #1-2155' to 2206',
First Leo zone (see sample descr.)

ELECTRIC LOG FORMATION TOPS

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GEOLOGICAL SUMMARY

The subject well was drilled to a total depth of 2450 feet within a sand that would possibly correlate with the Third Leo sandstone of the Pennsylvanian stratigraphic section in the Lance Creek field.

The Dakota sandstone between the base of the surface casing and 300 feet gave no indications of oil staining.
GEOLOGICAL SUMMARY (continued)

or fluorescence.

No indications of oil and/or gas were noted in the Lakota horizon.

The Canyon Spring sandstone of the Sundance was missing.

A circulated sample of the First Converse sandstone at 1638 feet showed no oil staining. A circulated sample of a Converse sand at an electric log depth of 1690’ showed no indication of oil or gas staining.

Minor amounts of lost circulation occurred from 1650’ to total depth but this did not noticeably effect the drilling or the samples.

The First Leo sandstone was cored, no effective or reservoir sands were found and no staining was noted.

No effective sands or staining was found in the Second Leo zone.

The Third Leo zone did contain some possible reservoir sands but no staining or fluorescence was noted.

Because of electric log interpretation a Schlumberger formation test was made on the Converse sand from 1688 feet to 1690.5 feet.

No shows of oil and/or gas and the lack of reservoir beds in the Leo zones led to the decision to abandon this well without further testing.

S. D. Ayres

3.
SAMPLE DESCRIPTION

Surface - Skull Creek
10-foot samples between 140 and 2100 feet.
Samples have been corrected for lag.

140 - 180 Sand, fine grained, sub-rounded, vitreous, friable, white, well sorted, good permeability and porosity. Some gray friable siltstone. No show.

180 - 200 Siltstone, medium gray, friable.

200 - 230 Shale, light to pale gray, silky, waxy, bentonitic.

230 - 250 Sand, fine to coarse grained, conglomeratic, poorly sorted in part, with white to pale green matrix, rounded to angular. No shows.

250 - 260 Shale, medium to dark gray.

260 - 300 Sand, fine grained, friable, clay-filled, white to pale green, slightly glauconitic. No shows. Traces of dark gray to red to yellow silty shale.

300 TOP FUSION SHALE

300 - 330 Shale, silty, slightly conglomeratic, yellow.

330 - 350 Shale, as above, traces of sand, fine to medium grained, calcareous. Traces of good porosity. No show.

350 TOP LAKOTA

350 - 380 Sand, fine to medium grained, vitreous to frosted, slightly calcareous, pink to red. No show. Some traces of shale.

380 - 425 Sand, fine to very coarse grained, vitreous to coated, friable, clay-filled, mostly red, poorly sorted, sub-rounded, numerous free floating sand grains, conglomeritic. No shows.

425 TOP MORRISON

425 - 450 Shale, gray to green to yellow. Quit waxy, traces of gray bentonite.

450 - 460 Sand, fine grained, angular, frosted, hard, poorly sorted, tight. No show.

460 - 490 Shale, dark gray to dark green, waxy, soft.

490 - 520 Shale, green, waxy, bentonitic. Trace of pyrite. Traces of calcite crystals and white crystalline limestone.

520 - 550 Shale, green, as above. Red to maroon silty shale.
SAMPLE DESCRIPTION (continued)

550 - 620 Shale, light gray to green, traces of buff to gray dense limestone. Traces of white sandy limestone.
620 - 640 Shale, medium to dark gray.
640

TOP SUNDANCE

640 - 700 Shale, light gray to green, silty. Traces of green glauconite, fine grained, friable sandstone. No show.
700 - 750 Sand and shale, as above. Trace + of sand, fine grained, white, friable, slightly calcareous. No show.
750 - 870 Sand, fine to medium grained, vitreous to coated, friable, white to gray to pink to red, slightly calcareous, traces of good porosity. No show. Shale, gray to green to red to purple. Silty in part.
870 - 920 Shale, silty, red, gray to green. Traces of sand, as above.
918

TOP SPEARFISH

920 - 1000 Red silty shale.
1000 - 1110 Red silty shales, traces of red silty sand. No show.
1110 - 1240 As above. Traces of white anhydrite, buff to white limestone and calcite.
1240

TOP GOOSE EGG

1240 - 1250 Anhydrite, white.
1250 - 1280 Shale, red, very silty to sandy, very hard and brittle.
1280 - 1480 Anhydrite, white, sucrosic, interbedded with red silty shale. Traces of dolomite.
1480

TOP MINNEKAHTA

1480 - 1520 Dolomites - limestone, gray to buff to white to pink to purple. Micro-crystalline to dense, some sucrosic. No show. Good mineral fluorescence, no cut.
1520

TOP OFEGHE

1520 - 1560 Shale, red to purple, silty to a sandy shale to a silty sand, fine grained, friable, coated. No show.
SAMPLE DESCRIPTION (continued)

1560 - 1590 Red silty shale, as above and white sucrosic anhydrite, slightly dolomitic.
1590 - 1620 Red silty to sandy shale to a red, hard, brittle, very fine grained silty sand.

1616

TOP MINNELUSA

1620 - 1660 Sand, medium grained, rounded to sub-rounded, vitreous to frosted, friable, white to pink to red, good porosity in part, clay-filled in part, fairly well sorted. Red sand is dolomitic. Sand becomes more red at the base. No show.

1660 - 1680 Anhydrite, gray, hard, dense.

1680 - 1690 Sand, medium grained, rounded to sub-rounded, vitreous to frosted, friable, slightly dolomitic. Red. Traces of good porosity. No show.

1690 - 1750 Anhydrite, gray, hard, dense. Traces of red and gray silty shale. Traces of dolomite and sand.

1750 - 1775 Shale, red to gray, silty. Traces of sand. Traces of medium grained, well sorted, friable, clay-filled red to pink sand. No show.

1775 - 1830 Dolomite, buff to gray, fairly hard, sucrosic.

1830 - 1855 Dolomite-anhydrite, buff to gray, micro-crystalline, very hard.

1855 - 1865 Sand, medium to coarse grained, rounded to sub-rounded, vitreous to frosted, friable, poorly sorted, white, clay-filled, dolomitic, poor porosity. No show.

1865 - 1880 Dolomite, buff to gray, traces of pink.

1880 - 1905 Dolomite, buff to white, dense. Traces of sand and anhydrite.

1905 - 1915 Sand, medium grained, dolomitic and anhydritic. No show.

1915 - 1940 Anhydrite, white to buff to pink. Some gray.

1940 - 1960 Dolomite, buff to pink to red, mostly pink, hard, dense. 20% buff to red very dolomitic sand, very hard.

1960 - 2000 Dolomite, as above with increase in fairly friable sand as above. No show.

2000 - 2020 Anhydrite, white to buff to gray.

2020 - 2030 Dolomite, buff to gray to pink.
SAMPLE DESCRIPTION (continued)

2030  

TOP RED SHALE MARKER

2030 - 2042  
Shale, red to pink to yellow, felty,  
metallic luster.

2042 - 2070  
Dolomite, white to buff to gray to pink,  
hard and dense.

2070 - 2085  
Dolomite, gray, very hard, micro-  
crystalline. Shale, very black, hard,  
brittle.

2085 - 2125  
Dolomite, dark gray to black, some brown  
and tan, micro-crystalline. Chert, vitreous,  
angular, some smoky. Dark gray to black  
dolomitic shale with oily taste. No cut or  
fluorescence.

Five foot samples from 2100 to 2250 feet.

2125 - 2145  
Dolomite, as above, with no chert. Traces  
of a poorly sorted dolomitic sand. No  
show.

2145 - 2151  
Dolomite, medium to dark gray, micro-  
crystalline, hard, slightly anhydritic.

Core #1 2155 to 2206 feet is adjusted up four feet in  
depth to fit the electric log.

2151 - 2152.5  
Sand, gray, fine grained, well sorted,  
anhydrite filled, hard, tight, no  
porosity. No show.

2152.5 - 2153  
Sand, gray, fine grained, well sorted,  
trace of porosity, slightly dolomitic,  
No show.

2153 - 2158  
Dolomite, gray, hard, dense, micro-  
crystalline. Slightly shaly.

2158 - 2160.5  
Shale, black, carbonaceous, micaceous,  
hard.

2160.5 - 2167  
Sand, gray to greenish gray, fine grained,  
anhydrite and dolomite filled, well  
sorted, hard, tight, no porosity. No show.  
Anhydrite, gray, hard.

2167 - 2171  
Shale, black, micaceous, carbonaceous,  
with occasional anhydrite streaks.

2171 - 2176  
Shale, black, carbonaceous, micaceous,  
with sulfur odor.

2180 - 2188.5  
Sand, gray to greenish gray, fine grained,  
anhydrite and dolomite filled, well sorted,  
hard, tight, no porosity. No show.

2188.5 - 2189.5  
Shale, gray, hard.
SAMPLE DESCRIPTION (continued)

2189.5 - 2194 Sand, gray to greenish gray, fine grained, anhydrite and dolomite filled, well sorted, hard, tight, no show.

2194 - 2202 Dolomite, gray to brown, anhydritic, trace of vuggy porosity.

End of core #1

2202 - 2206 Shale, black, carbonaceous, micaceous.
2206 - 2218 Dolomite, gray, dense.
2218 - 2220 Shale, black, micaceous, carbonaceous.
2220 - 2228 Dolomite, gray, dense.
2228 - 2230 Shale, black, carbonaceous, micaceous.
2230 - 2238 Dolomite, gray, dense.
2238 - 2242 Shale, black, carbonaceous, micaceous.
2242 - 2250 Sand, fine to medium grained, rounded, vitreous to frosted, hard to friable, anhydrite filled and dolomite filled, tight. No show.

Ten foot samples from 2250 to 2450 feet. Total depth.

2250 - 2268 Dolomite, gray, hard.
2268 - 2272 Black silty shale with oily taste.
2272 - 2298 Dolomite, gray, hard, traces of sand and anhydrite as above.
2298 - 2300 Black silty shale.
2300 - 2325 Dolomite, gray to dark gray, hard, dense, traces of sand as above.
2325 - 2395 Sand, fine grained, rounded, frosted, very calcareous, lime or dolomite matrix. Very dense, tight, buff to tan. No show. Traces of medium grained, rounded, frosted, friable, slightly clay-filled sandstone. Trace of porosity, white. No show.
2395 - 2400 Dolomite, gray, dense.
2400 - 2450 Sand, fine to medium grained, mostly fine, rounded, frosted, calcareous, friable. Trace to fair porosity, white to buff to gray. No show.
2450 Total Depth.
Chronological History

7-24-64 C Spudded 11" cable tool surface hole.
7-27-64 Set 140 feet of 8-5/8" used 24# pipe with 60 sacks of regular cement at 142 feet ground. Plug down 10:00 P.M.
7-28-64 Waiting on rotary
7-29-64 Waiting on rotary
7-30-64 Waiting on rotary
7-31-64 Moving in rotary and rigging up.
8- 1-64 Finished rigging up. Drilled out from under surface @ 6130 P.M. Drilled to 415 feet.
     Drilled to 530 feet, made trip for bit #2.
     Drilled to 772 feet, made trip for bit #3.
     Drilled to 925 feet
8- 3-64 Drilled to 977 feet, made trip for bit #4.
     Strapped out of hole and found a 33 foot error. 977 feet equals 1010 feet. Drilled to 1217 feet, started trip for bit #5.
     Finished trip for bit #5. Drilled to 1341 feet. Made trip for bit #6. Drilled to 1410 feet.
8- 5-64 Drilled to 1525 feet. Made trip for bit #7.
     Drilled to 1590 feet.
8- 6-64 Drilled to 1622 feet. Made trip for bit #8.
     Drilled to 1752 feet.
8- 7-64 Drilled to 1756 feet. Made trip for bit #9.
     Began mudding up. Drilled to 1834. Made trip for bit #10. Drilled to 1845 feet.
8- 8-64 Drilled to 1875 feet. Made trip for bit #11.
     Drilled to 1933 feet.
8- 9-64 Drilled to 1942 feet. Made trip for bit #12.
     Drilled to 1987 feet. Started trip for bit #13.
8-10-64 Finished trip for bit #13. Drilled to 2036 feet. Made trip for bit #14. Drilled to 2075 feet.
8-11-64 Drilled to 2091 feet. Made trip for bit #15. Drilled to 2116 feet.
8-12-64 Drilled to 2125 feet. Made trip for bit #16. Drilled to 2155 feet. Came out of hole to go in with core barrel for core #1.
8-13-64 Cored from 2155 feet to 2200 feet.
8-14-64 Cored from 2200 feet to 2206 feet. Reamed core hole. Drilled to 2250 feet. Twisted off.
8-15-64 Recovered fish. Drilled to 2275 feet with bit #19.
8-16-64 Drilled to 2285 feet. Made trip for bit #20.
     Drilled to 2309 feet. Made trip for bit #21.
     Drilled to 2318 feet.
CHRONOLOGICAL HISTORY (continued)

8-17-64  Drilled to 2341 feet. Made trip for bit #22.  
Drilled to 2400 feet.
8-18-64  Drilled to 2429 feet. Made trip for bit #23.  
Drilled to 2450 feet. Ran logs.
8-19-64  Ran Schlumberger Formation Test #1. F. & A.

BIT RECORD

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DEVIATION SURVEYS

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<td>3/4</td>
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</tbody>
</table>

Dewey-Burlock GDP
June 2012
3.7-B-498
Appendix 3.7-B
## Coring Time

<table>
<thead>
<tr>
<th>Time Range</th>
<th>Minutes per Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>2155 - 2160</td>
<td>116 33 36 39 38</td>
</tr>
<tr>
<td>2160 - 2170</td>
<td>30 33 17 28 39 30 11 15 27 29</td>
</tr>
<tr>
<td>2170 - 2180</td>
<td>29 26 42 43 38 23 27 30 28 27</td>
</tr>
<tr>
<td>2180 - 2190</td>
<td>31 30 29 30 28 14 12 20 16 15</td>
</tr>
<tr>
<td>2190 - 2200</td>
<td>19 15 24 31 20 25 20 34 35 33</td>
</tr>
<tr>
<td>2200 - 2206</td>
<td>41 35 20 37 29 41</td>
</tr>
</tbody>
</table>
ADMINISTRATIVE / SUNDRY REPORTS
## WELL COMPLETION OR RECOMPLETION REPORT AND LOG

**TYPE OF COMPLETION**
- Oil Well
- Gas Well
- New Well
- Work-Over
- Deepen
- Plug Back
- Same Zone
- Diff Zone

**OPERATOR**
S. Dlhn, Jr.

**ADDRESS**
1112 lower building, Denver, Colorado 80206

**LOCATION**
In feet from nearest lines of section or legal subdivision where geology 
Surface 
Top depth 

**PERMIT NO.**

<table>
<thead>
<tr>
<th>Date Issued</th>
<th>PERMIT NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DATE COMPLETED**
August 15, 2012

**TOTAL DEPTH**
- 3,600 ft BGL (Below Ground Level)
- 3,600 ft GL (Ground Level)
- 3,600 ft TVL (True Vertical Depth)

**PRODUCING INTERVAL**
- This completion
- Top: 111-2/4
- Bottom: 21 1/16

**Casing Size**
- 8-5/8 in.

**Record**

<table>
<thead>
<tr>
<th>Date</th>
<th>Depth (ft)</th>
<th>Purpose</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,200</td>
<td>cement</td>
<td>6.75</td>
</tr>
</tbody>
</table>

**Tubing Record**

<table>
<thead>
<tr>
<th>Date</th>
<th>Depth (ft)</th>
<th>Purpose</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3,600</td>
<td>cement</td>
<td>2.75</td>
</tr>
</tbody>
</table>

**Production**

- Date of First Production
- Date of Test
- Date of Production

**List of Attachments**
- Two copies final well completion report by ... & ... including sample descriptions, etc.

**Secretary**
Dewey-Burdock GDP
June 2012

---

**Notes**
- Field and Pool or Wildcat
- No Action in Lease

---

**Appendix 3.7-B**
## SUMMARY OF WATER HOMES AND NON-COMMERCIAL OIL OR GAS HOMES

(Note: If well was directionally drilled, show both measured and true vertical depths for zones and markers noted)

<table>
<thead>
<tr>
<th>KIND OF FORMATION</th>
<th>DEPTH TO TOP</th>
<th>DEPTH TO BOTTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAS. DEPTH</td>
<td>TRUE VERT. DEPTH</td>
</tr>
<tr>
<td>Dakota</td>
<td>120'</td>
<td></td>
</tr>
<tr>
<td>Fusion</td>
<td>300'</td>
<td></td>
</tr>
<tr>
<td>L.A.</td>
<td>350'</td>
<td></td>
</tr>
<tr>
<td>Morrison</td>
<td>425'</td>
<td></td>
</tr>
<tr>
<td>Sundancee</td>
<td>640'</td>
<td></td>
</tr>
<tr>
<td>Spearfish</td>
<td>918'</td>
<td></td>
</tr>
<tr>
<td>Goose Egg</td>
<td>1260'</td>
<td></td>
</tr>
<tr>
<td>Minneashta</td>
<td>1479'</td>
<td></td>
</tr>
<tr>
<td>Opeche</td>
<td>1520'</td>
<td></td>
</tr>
<tr>
<td>Mancelius</td>
<td>1616'</td>
<td></td>
</tr>
<tr>
<td>&quot;Red Marker&quot;</td>
<td>2032'</td>
<td></td>
</tr>
</tbody>
</table>

## GEOLOGIC MARKERS

<table>
<thead>
<tr>
<th>NAME</th>
<th>DEPTH TO TOP</th>
<th>MEAS. DEPTH</th>
<th>TRUE VERT. DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Instructions: Which direction is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any agencies. If this well is completed for any productive zones (other than water zones), include any productive zone(s), and if any, for each zone reported in the form under "PRODUCTIVE," submit a separate completion report on this form for each interval (zones) to be separately positioned.*

*Note: Census*: Attached supplemental records for this well should show the depth of any maintenance cementing and the location of the cementing tool.

File 2 copies of this form with Quarterly, Oil and Gas Board, Pierre.
# PLUGGING RECORD

<table>
<thead>
<tr>
<th>Operator</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Bolegal, Jr.</td>
<td>1121 Tower Building, Spear, Colorado</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Lease</th>
<th>Well No.</th>
<th>Field &amp; Reserve</th>
<th>Location of Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spear, North</td>
<td>20</td>
<td>Wildcat</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application to drill this well and finished in name of</th>
<th>Has this well ever produced oil or gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Bolegal, Jr.</td>
<td>Yes, 308 days</td>
</tr>
</tbody>
</table>

## FORI (Oil) 

<table>
<thead>
<tr>
<th>Character of well at completion (initial production)</th>
<th>Oil (MBbl/day)</th>
<th>Gas (MMcf/day)</th>
<th>Water (Mbd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total depth</td>
<td>2,477 ft</td>
<td>2,477 ft</td>
<td>355 ft</td>
</tr>
<tr>
<td>Amended well producing when plugged</td>
<td>2,477 ft</td>
<td>2,477 ft</td>
<td>355 ft</td>
</tr>
</tbody>
</table>

## CASING EXTRAV

<table>
<thead>
<tr>
<th>Size pipe</th>
<th>In well (ft)</th>
<th>In well (ft)</th>
<th>Left in well (ft)</th>
<th>Casing and Lip to lip (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5/8</td>
<td>14</td>
<td>12</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

Water wells filled with something that, according to regulations, is indicative of open formation containing fresh water.

In addition to other information required on this form, if this well is a abandoned well as a dry well, or as a fresh water well, give all pertinent details of plugged formation to best of a person's knowledge, including location, water source, and other related items. Sign and date abandonment completion of this well as a water well and certify in accordance with §3-5 of the code.

## LIST REFERENCE SIDE FOR ADDITIONAL DETAIL

Excerpted on the 27th day of AUGUST, 1968, of the state of COLORADO, county of DAKOTA.

Before me, the undersigned authority, on this day personally appeared George Bolegal, Jr., known to me to be the person whose signature is subscribed to the above instrument, who being for the purpose required, did declare that the same is a true and correct copy of the original instrument, and that he is duly authorized to make this true copy thereof and that he has knowledge of the facts stated therein, and that said report is true and correct.

Subscribed and sworn to before me this 27th day of AUGUST, 1968.

My commission expires May 26, 1968.

Randy Public and for

(Seal)

State of Colorado

DO NOT WRITE BELOW THIS LINE

Approved

(Seal)

See instructions on reverse side.
SUNDAY NOTICES AND REPORT ON WELLS

<table>
<thead>
<tr>
<th>OIL WELL</th>
<th>GAS WELL</th>
<th>DRY</th>
</tr>
</thead>
</table>

**Date:**

- **Location:**
  - Nezzell, etc.
  - 1100 over side, lower side, etc.

**Drilled:**
- 500' well
- 600' well

**Fracture Treatment:**
- 2-1/2' around 2-7/8' add.

**Well Type:**
- Field and pool, or vicinity
- 300' N, 300' E, etc.

**Operations:**
- Indicate below by check mark nature of report, notice or other date:
  - Test water shut-off
  - Water shut-off
  - Fracture treatment
  - Repairing well
  - Altering casing

**Remarks:**
- ** ideals to 2,400' total depth in the Amoco formation. 100' of oil or gas were encountered.**

<table>
<thead>
<tr>
<th>Sack</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.75</td>
<td>3350'</td>
</tr>
<tr>
<td>1.75</td>
<td>3500'</td>
</tr>
<tr>
<td>1.25</td>
<td>4000'</td>
</tr>
<tr>
<td>1.25</td>
<td>4500'</td>
</tr>
</tbody>
</table>

**Note:**
- All operations were performed as recommended by Mr. Carl For of the State Geological Survey.

**Certificate:**
- Signed:

**Approval:**
- Approved by:
- Date:

**OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA**
CORRESPONDENCE
Dr. Duncan McGregor  
State Geologist  
Vermillion  
South Dakota

Re: Dolezal #1 Darrow  
SE 1/4 SE 1/4 2-7S-1E  
Fall River County, South Dakota  
Permit No. 361

Dear Duncan:

The six month confidential period on the above test terminates today, and all information may now be released to anyone wanting it.

The marker pipe has been placed and the mud pits satisfactorily filled and smooth. My file indicated that all required logs and records have been sent in by Mr. Dolezal.

If you have received the samples of this test, I believe the bond can be released.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC:sn

cc: Secretary, Oil and Gas Board
February 18, 1965

Mr. Earl Cox
State Geological Survey
P. O. Box 208
Belle Fourche, South Dakota

Dear Earl:

On February 9, 1965, we received from Amstrat the following samples:

- Phillips Petroleum #1-"A" Njos, Sec. 34, T. 23 N., R. 3 E., Harding County; core and intervals 50-3270, 3270-6330, 6330-9820.

- Sun Oil et al #1 Earl Darrow, Sec. 2, T. 7 S., R. 1 E., Fall River County; core and interval 150-2450.

- Consolidated Royalty #1 Wulf-Ideen-USA, Sec. 15, T. 6 S., R. 2 E., Fall River County; interval 0-2472.

- Mule Creek #1-4410 Clark, Sec. 10, T. 8 S., R. 9 E., Fall River County; interval 105-2871 and 1 box cores.

- Colonial Oil Co. #1 Howard Bailey, Sec. 18, T. 9 S., R. 8 E., Fall River County; interval 230-2692.

Today in the mail we received notice of shipment on February 16, 1965, of the following samples: 1 box, Consolidated Royalty Oil et al #1 Ideen-Federal, SW SW 15-98-2E, Fall River County. We have not yet received this shipment.

Sincerely yours,

Merlin J. Tipton
Assistant State Geologist

MJTjmd
November 13, 1984

Mr. Earl J. Cox
State Geological Survey
Box 208
Aberdeen, South Dakota

Dear Earl,

I am enclosing a copy of the Dual Induction-Laterolog and Sonic Log-Gamma Ray for Deoleal #1 Darrow, Fall River County, Sec. 2, T. 7S, R. 1E.

Sincerely yours,

(Ids) Donna Jean Hodges
Administrative Assistant

For the State Geologist

Enclosures
Dr. Duncan McGregor  
State Geologist  
Vermillion  
South Dakota

Re: Dolezal #1 Darrow  
SE ¼ SEC 2-7S-1E  
Fall River County, South Dakota  
Permit No. 361

Dear Duncan:

Enclosed for your files is one copy each of the following logs: sonic-gamma ray, dual induction-log, formation tester.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC: cr
Dr. Duncan McGregor  
State Geologist  
Science Center  
Vermillion, South Dakota  

Re: Dolenzel #1 Darrow  
SE2, SEC-2, 75-12  
Fall River County  
South Dakota  
Permit No. 361  

Dear Duncan:  

The pits have been filled and the marker pipe placed at the above location.  

After the samples have been received, it would seem that the bond can be released on this test.  

Sincerely,  

Earl Cox  
Engineering-Petroleum Geologist  

EC:cr
Western Field Office  
Belle Fourche, South Dakota  
September 1, 1974

Mr. George Dolezal, Jr.  
Tower Building  
1700 Broadway  
Denver 2, Colorado

PE: Dolezal / Harrow  
SE: 40-27-12-26E  
Fall River County  
South Dakota  
Permit No. 361

Dear Mr. Dolezal:

I see details of the above test have been released to Rinchart's.

If information from this test is no longer confidential,  
I would appreciate you writing me to this affect.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

Dewey-Burdock GDP  
June 2012  
3.7-B-512  
Appendix 3.7-B
Mr. George Dolezal, Jr.
1121 Tower Building
Denver, Colorado

FE: Dolezal & Harrow
2 1/4 SE1/4 2-75-1E
Fall River County
South Dakota
Permit No. 361

Dear Mr. Dolezal:

I have received from Schlumberger one copy of logs run on the above test.

We require two copies of all logs and records on all oil or gas tests. Logs and records are required within 30 days of completion of the test. This letter is only to inform you of the status of our records at this time.

I appreciate the cooperation given by Mr. Ayres and hope you plan additional work in South Dakota.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC: cr

cc: Duncan McGregor
Dr. Duncan McGregor  
State Geologist  
Vermillion  
South Dakota

RE: Dolezal #1 Darrow  
SE¼ SE½-2-7S-1E  
Fall River County  
South Dakota  
Permit No. 361

Dear Duncan:

We have been asked to keep information on this test confidential for the six months period, unless released sooner by the operator.

Sincerely,

Earl Cox  
Engineering-Petroleum Geologist

EC:cr
Mr. Earl Darrow
Dewey, South Dakota

Dear Sir:

I have been advised that Mr. George Palesal, Jr., 121 Tower Bldg. Denver, has obtained a Permit to Drill for Oil and gas on your land in Section 2, T 7 S, R 1 E.

Occasionally, owners of land consider converting abandoned oil wells into water wells. Please advise me whether or not you intend to convert the oil well drill hole on your land into a water well if water is encountered and the drill hole is abandoned as an oil well.

If you are considering making a water well out of the abandoned oil well drill hole, special considerations are necessary to comply with the State's oil and water laws. The abandoned oil hole must be properly plugged and the water well properly constructed. All conversion work will be at your expense. The cost will vary, depending upon the characteristics of the drill hole, but such cost will be in the neighborhood of $5,000 or more. Usually another driller and drill rig will have to be arranged for. This other drill rig and casing and other materials will have to be on hand to take over immediately after the special oil well plugging is completed, because the drill hole cannot be left open for any appreciable length of time without spoiling it. Approval of plans for construction of the water well will be required, and a bond covering proper construction may be required. Also, a water right may be required. All of these arrangements take considerable time to accomplish.

Please advise me immediately if you plan to convert the oil well drill hole into a water well. We both hope that a producing oil well results from the drill hole on your land; however, if not and you are planning on a water well, we must start making arrangements now.

Sincerely,

J.W. Grimes
Chief Engineer

cc State Geologist
Oil & Gas Board
Mr. George Dolezal, Jr.
1121 Tower Building
Denver 2, Colorado

FE: Dolezal & Harrow
SE 1/4 SE 1/4-7S-1E
Fall River County, South Dakota
Permit No. 361

Dear Mr. Dolezal:

The Secretary of the Oil and Gas Board has forwarded me a copy of your approved permit to drill a test. This will be an interesting test and we will watch it with interest.

During the drilling of oil tests in the State, I scout them periodically. Our Rules require the use of a blow-out preventer, on wildcat tests as spelled out in Paragraph 2, Section A, Page 10, of the Rules and Regulations which states:

"In all unproven areas, (wildcat wells) all drilling wells shall be equipped with a mastergate, or its equivalent, an adequate blow-out preventer, together with a flow line valve of the proper size and working pressure. The entire control equipment shall be in good working condition at all times."

It is a pleasure to welcome you to South Dakota and wish you success in your test.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC: cr

Ec: Secretary Oil and Gas Board
State Geologist
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
STATE OIL DRILLING ACTIVITY ON INCREASE

Oil well drilling activity in South Dakota is expected to increase with the granting last week of four permits. Dr. Duncan McGregor, State Geologist, reports that the Oil and Gas Board has granted permits to the Consolidated Royalty Company, Casper, Wyoming, for two tests in Fall River county. One test, the No. 1 Ideen-Federal, is three miles southwest of Edgmont on the H. C. Porter ranch. The test will reach an estimated depth of 3300 feet and test the Leo sands of the Minnelusa Formation. The other permit to Consolidated is located eight miles southeast of Edgmont on the Kenneth Helsel ranch, and will also test the Leo sands.

Drilling continues on the Dolezal No. 1 Darrow test, and had reached a depth of 1700 feet on August 6. The test is located fourteen miles northwest of Edgmont.

Gulf Oil has been granted two permits. One location is nine miles southeast of Murdo, on the Don Hight ranch. The other is twelve miles south of Murdo on the Russell Olson ranch. On August 10 the Olson test was in the process of being drilled, but no further information was being released at that time.
South Dakota State Geological Survey
Attn: Dr. Duncan McGregor
Science Center
University of South Dakota
Vermillion, South Dakota

SOUTH DAKOTA WELLS N/C

| 3 Boxes | Phillips #1-A Njos, 34-23N-3E, Harding Co. |
| 1 Box   | Sun Oil et al, #1 Earl Darrow, 2-7S-1E, Fall River Co. |
| 1 Box   | Consolidated Royalty #1 Wolf-Ideen-USA, 15-8S-2E, Fall River Co. |
| 1 Box   | Mule Creek #1-4410 Clark, 10-8S-9E, Fall River Co. |
| 1 Box   | Colonial Oil Co., #1 Howard Bailey, 18-9S-6E, Fall River Co. |

Shipped Ewig

United Buckingham

2-9-65

February 1, 1965
NC 1786
**Record 1 of 1**

**Well Information**

<table>
<thead>
<tr>
<th>API No:</th>
<th>40 047 05147</th>
<th>County:</th>
<th>FALL RIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name:</td>
<td>CONROY 1 PETERSON</td>
<td>Location:</td>
<td>NWSE 22-7S-1E</td>
</tr>
<tr>
<td>Permit No:</td>
<td>408</td>
<td>Total Depth:</td>
<td>2400</td>
</tr>
<tr>
<td>Operator Name:</td>
<td>CONSOLIDATED ROYALTY OIL CO</td>
<td>Bottom Hole:</td>
<td>Minnelusa</td>
</tr>
<tr>
<td>Permit Date:</td>
<td>11-22-1965</td>
<td>KB Elevation:</td>
<td>3533</td>
</tr>
<tr>
<td>Spud Date:</td>
<td>12-11-1965</td>
<td>Ground Elevation:</td>
<td>3522</td>
</tr>
<tr>
<td>Plug Date:</td>
<td>12-24-1965</td>
<td>Latitude:</td>
<td>43.429674</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Longitude:</td>
<td>-103.983142</td>
</tr>
<tr>
<td>Well Field</td>
<td>WILDCAT</td>
<td>Status:</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>Class:</td>
<td>DRY HOLE</td>
<td>Type:</td>
<td>DRY HOLE</td>
</tr>
</tbody>
</table>

**Formation Tops**

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnekahta</td>
<td>1610</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1690</td>
</tr>
<tr>
<td>Converse</td>
<td>1741</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2158</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>2290</td>
</tr>
</tbody>
</table>

http://sddnr.net/oil_gas/search_results_oil_gas.cfm 2/15/2012
COUNTY: FALL RIVER
LEGAL LOCATION: NWSE 22-7N-1E
API NO: 40 047 05147
PERMIT NO: 408
WELL NAME: CONROY #1 PETERSON
OPERATOR: THE CONSOLIDATED ROYALTY OIL COMPANY
PERMIT ISSUED: 11/22/1965
PERMIT CLOSED: 06/14/1966
FILE LOCATION: 7N-1E-22 NWSE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR'S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
WELL HISTORY

Well Name: Conroy #1 Peterson  

Location: NWSE 22-7S-1E Fall River  

Elev.: 3522 ft.  

API No.: 408  

Well Name: Conroy #1 Peterson  

Location: NWSE 22-7S-1E Fall River  

Elev.: 3522 ft.  

API No.: 408  

Date of Permit: 11-22-65  

Confidential:  

From:  

To:  

Logs Received:  

Cuttings Received:  

Cores Received:  

Drill Stem Records:  

Cap Plug and Marker Set: 12-28-65  

Surface Restored: 12-28-65  

Plugging Affidavit Signed:  

Date:  

Bond Released:  

Date: 6-14-66  

Summary of Scout Reports  

12-16-65 First visit, Spudded 12-11-65  

12-24-65 Plugged  

12-28-65 Marker in place - pits filled and location smoothed
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

[ ] DRILL  [ ] DEEPEN  [ ] PLUG BACK  [ ] SINGLE ZONE  [ ] OIL WELL  [ ] GAS WELL  [ ] MULTIPLE ZONE

PARK OR LEASE NAME:  F. A. Peterson
WELL NO.: No. 1

OPERATOR

THE CONSOLIDATED ROYALTY OIL COMPANY

ADDRESS

P. O. Box 605
Casper, Wyoming  82602

LOCATION: The legal description of the land is:

Southwest corner of Section 22, Township 7 South, Range 1 East, S.W.

NAME AND ADDRESS OF SURFACE OWNER

Francis A. Peterson
P. O. Box 5, Burdock, South Dakota

NAME AND ADDRESS OF CONTRACTOR

Bullock and Barnhart
P. O. Box 2426
Casper, Wyoming  82602

P. O. Box purchased with any wells drilled. From whom purchased (name and address)

None

PROPOSED CASING AND CEMENTING PROGRAM

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>SACKS OF CEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-1/8&quot;</td>
<td>8-5/8&quot;</td>
<td>24 lb.</td>
<td>New</td>
<td>1050'</td>
<td>750</td>
</tr>
</tbody>
</table>

We plan to set surface casing in Spearfish formation to shut off anticipated water flows from the Dakota and Sundance formations.

PROPOSING PROPOSED OPERATIONS. IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOW OUT PREVENTION PROGRAM IF ANY


A 7-7/8" hole will be drilled from the base of the surface casing to total depth. In the event oil or gas production is indicated, either 4-1/2" or 5-1/2" casing will be set through the productive zone or zones and cemented with an appropriate amount of cement. In the event this test is abandoned then the hole will be plugged in accordance with the Regulations of the State Oil and Gas Board.

Anticipated Formation Tops:
- Dakota 205'; Labota 398'; Sundance 687'; Basal Sundance 996';
- Goose Egg 1295'; Minnekaha 1537'; Opache 1581';
- Minnelusa 1615'; Converse Anhydrite 1742'; Red Marcer 2130';
- 2nd Leo 2255'.

SIGNATURE

TITLES

President

DATE: November 17, 1965

CHECKED BY

AnnHackworth, Assistant Secretary

INSTRUCTIONS

General: This form is designed for submitting proposals to perform certain well operations, as indicated, on all types of lands and leases. If appropriate action by either a Federal or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations, is required, any applicable Federal or State regulations, or appropriate officials, concerning approval of the proposal before operations are started. If the proposal is to be returned to the same reservoir or to a new reservoir, use this form with appropriate instructions.

If the well is to be, or has been, directionally drilled, on state and show by attached sheet, if necessary, the coordinate location of the hole in the present or objective productive zones. File 3 copies of this form with Secretary, Oil & Gas Board, Pierre.

Sample location: 600' South and 600' East of the Northwest Corner of Section 161.
SECTION 22
T.7 S.-R.1 E., BLACK HILLS MER.
FALL RIVER COUNTY, SOUTH DAKOTA

LEGEND
U.S. Government Brass Gip Corner
Original stone corner, properly marked, firmly set
Iron pipe set at proportionate distance
Corner established by others as indicated
Dependent Resurvey
Protraction
Well location

ELEVATIONS:
Before grading
LOCATION 3522
R.P. 100' N. 3521
R.P. 100' S. 3522
R.P. 100' E. 3522
R.P. 100' W. 3522

ELEV'S. REFERRED TO:
U.S.G.S. BM TT1 WBR 1949
Elev. 3522

SURVEY AND PLAT BY
WORTHINGTON, LENHART & ASSOCIATES, INC.
200 South Lowell St., Casper, Wyoming
Direct solar lines and chained distances. Ref.Book No.226, R 68

PLATTED FIELD NOTES OF SURVEY
MARKING WELL LOCATION
NW¼, SE¼, SECTION 22
FOR
CON ROY-SUN-FROST, CASPER, WYOMING

*Revised 11-4-85
Willing
Certified true and correct
SOUTH DAKOTA WKB 493 1980 L.R.
WELL INSPECTION / SCOUT REPORTS
STATE GEOLOGICAL SURVEY

Scout Report

Permit No. 408

Date Scouted 12-28-65

Owner:_ConRoy________________________

Designation of well ___#1 Peterson____

Location: Sec. ___22___ T. ___7____ N. S. R. ___1___ W.W.

Fall River ____________________________County, S. D.  Total depth 2400 _____ feet

Casing Record:

14 ___________ 30 _______ Ft. ___________ Ft.

8 5/8 ___________ 11 25 _______ Ft. ___________ Ft.

Work in progress at time of visit: None:

Developments since last visit:

Abandonment marker in place. Pits filled and location smoothed.

Remarks and recommendations:

Rig stacked at location.

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Date Scouted 12-24-65

Owner

Designation of well

Location: Sec. 22 T. 7 N. S. R. 1 E. W.

Casing Record:

14 30 Ft. 1125 Ft.

8 5/8 1125 Ft.

Work in progress at time of visit:
Plugged as follows:
1925 - 1850 25 sacks 3rd Converse
1195 - 1120 25 sacks Base Surface casing.

Developments since last visit:

Run Dual Induction and Sonic Gamma Log
AmStrat will process samples
No cores taken, no shows observed, no tests run.

Remarks and recommendations:

Sample tops:
Minnakhta - 1610
Minnelusa - 1690
2nd Converse - 1741
3rd Converse - 1871
4th Converse - 2020
Red Marker - 2158
2nd Leo - 2290 (title - no shows)

Scouted by

Approved by

Duncan J. McGregor, State Geologist
STATE GEOLOGICAL SURVEY

Scout Report

Permit No. 408

Date Scouted 12-16-65

Owner: ConRoy

Designation of well: #1 Peterson

Location: Sec. 22 T. 7 N. R. 1 E., W.

Fall River County, S. D. Total depth 1140 feet

Casing Record:

14”   30 Ft.
8 5/8 1125 Ft.

Work in progress at time of visit:
Had just finished cementing surface casing.

Developments since last visit:
Spudded: 12-11-65
Set 30 feet of 14" conductor pipe with 11 sacks.
Set 1125 feet of 8 5/8 surface casing at 1136 with 850 sacks.
Slight flow from basal Sundance that was controlled with heavy mud.

Remarks and recommendations: Sample tops:
Dakota   260
Lakota   460
Morrison 560
Sundance 750
Spearfish 1122

Elevation: 3522 gds.
3533 K. B.

Scouted by: Earl Cox, Geologist

Approved by: Duncan J. McGreer, State Geologist
12-16-65

Spend: 12-11-65

Set 14" Centurian at 30'

Cammed until 11:40

Pulled 13 1/2 fath to 11:40

Sought tops:

Rah 260

Fek 460

Mow 560

Finn 750

Top SP 1128

Run 1125.36° 832

Set 13 46.36° W 830.24

Good return

NWOC 13:30 12-16-65

12-23-65

Capen called 6:00 a.m. from body

11:00. Then plug. Centurion

wants surfaced left off for

pass. Use as a water

well. Et Endle said

would make a nice

bore. Came.

12-24-65

Plugged:

19.25-11.50 25-44 34 Raw

1195-1150 25-44 Base

Sought tops:

mt 1610

Hel 1690

Duo crew 1741

2nd crew 1871

4th crew 2020

Red man - 2158

And 1552 t.t.w. Down

T.O. 2400 11:10a

Appendix 3.7-B

Dewey-Burdock GDP
June 2012

3.7-B-533
API ID 4004705147

Con. Rep. #1 Petron

C NW § 7/8 sec. 22 T 15 S, R 1 E

Well Cokin Co.

Spudked 12-11-65

Elec. 3-22-66

Net

Contract

12-14-65

Leb 40 ft of 14” CIP 40 112.5’ of 8”

Drill hole through floor and beam of 8 ft CIP 11” centered with mud.

K1 200, K2 300, K3 500, K4 750, Dsp. 11’ 19 x 35’ 3’ 12-24-65

Cobbled to 240 ft plug.

Ckt. and check 240 ft.

Net well proven complete to

Cline 1610, 2nd 1711, 3rd 1711

2nd 2800, RM 2100, 2nd 2400

Appendix 3.7-B
API ID 40 047 05147

letter for seal to Aiken copy
need support writing to each surface
make paper

make moves. Pot filled &
smoothed. Dry stuck.
LOCATION:

LOGS END:

TOPS:

GEOLOGIC: [illegible]

ELECTRIC, FIELD:
FINAL: [illegible]

RADIO: FIELD:
FINAL: [illegible]

OTHERS:

CUTTINGS: 3 - 4 - 2

CORES: [illegible]

DRILL SCREEN CHECK: OK 12 - 28 - 45

LUB THREE: [illegible]

BUDDING EFFICIENT CHECK: [illegible]

BOND RELEASED: 6 - 19 - 44.
OPERATOR’S
TECHNICAL
REPORTS / MAPS
## CONTENTS

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</tbody>
</table>
## SUMMARY

**Operator:** The Consolidated Royalty Oil Company  
**Name:** ConRoy #1 F. A. Peterson  
**Location:** C NE SE Sec 22, Twp 7 South, Rge 1 East, Fall River County, South Dakota  
**Elevation:** 3522 GR., 3533 K.B.  
**Spud:** December 10, 1965  
**Complete:** December 24, 1965  
**Status:** Plugged and abandoned

### Geologic Record:

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<th>Schl. Top</th>
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<tr>
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<td>380</td>
<td>383</td>
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<td>520</td>
<td>524</td>
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<tr>
<td>Sundance</td>
<td>740 ?</td>
<td>753</td>
<td>+2780</td>
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<tr>
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<td>1110</td>
<td>1106</td>
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<td>1120</td>
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<td>1371</td>
<td>+2.62</td>
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<td>1600</td>
<td>1613</td>
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<td>Opeeche</td>
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<td>1741</td>
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<td>2024</td>
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<tr>
<td>Red Marker</td>
<td>2160</td>
<td>2166</td>
<td>+1367</td>
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<tr>
<td>2nd Leo SS</td>
<td>2250</td>
<td>2255</td>
<td>+1238</td>
</tr>
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</table>

**Total Depth:** 2400

**Formation Tests:** None  
**Cores:** None  

**Logs:** By Schlumberger, Newcastle, Wyoming  
- Sonic & Cal 5' (1') 1136-2393  
- Gamma Ray 5' 300-2393  
- Dual Ind - LL 2' 1136-2394  
- 5' 1136-2394
SUMMARY (Cont'd.)

Drilling Mud: Mo-Mar Mud Company, Casper, Wyoming
Drilling Contractor: Barnhart & Bullock Drilling Company, Casper, Wyoming
Geologic Supervision: James D. Copen, Consulting Geologist, Casper, Wyoming
The test was proposed primarily to investigate a permeability pinch-out of the Second Leo Sandstone member of the Minnelusa. The test was located approximately midway between a down-dip dry hole having 40 feet of permeable sandstone which was wet with a show of oil and two up-dip dry holes, both of which had no permeable sand. One of the up-dip tests had good oil staining in the Second Leo. Secondary objectives were the Canyon Springs member of the Sundance and the several Converse sands of the upper Minnelusa. The test was proposed to drill to a total depth of 2500 feet; or 300 feet below the Red Marker.

In drilling, a normal sequence of formations was encountered. The Second Leo was found to be thin, dolomitic, tight and had no shows. The various Converse sandstones were found to be nicely developed but had no shows. There were no cores or formation tests.

The test was plugged and abandoned at a depth of 2400 feet; approximately 240 feet below the Red Marker.

Sample Description

Samples from the surface hole (0-1140') are generally poor to useless, being predominantly material which was recirculated by the very heavy drilling mud used to control water flows. Samples were caught both from the pilot hole and while reaming. The descriptions below are partly of each, depending on which seemed the most representative. Samples from 1140 to total depth were of uniformly good quality. Sample intervals are 10 feet with the exceptions noted below. The samples are in possession of the American Stratigraphic Company, Billings, Montana.

20' Samples

100-260 Sh - drk gry to blk, fis; occas silt strk; Pyr

DAKOTA 260

260-300 SS - gry partly mottled blk, wh, fms, v/firm w/poor to no porosity, occas blk sh prts, NS; Pyr

Begin 10' Samples

300-310 Sh - gry to brn-blk, partly mottled w/blk carb material; SS - as abv grdg to Siltst; Pyr
GEOLOGIC RECORD (Cont’d.)

310-340  SS - wh to lt gry mottled and banded w/blk, fg, vht, NS; little Sh - a/a; Pyr
340-360  SS - a/a grdg to v/argill Siltst; little Sh - v/lt gry, wxy to silty; few Siderite pellets; Pyr
360-370  Same a/a w/free Sd - fmg, NS
370-380  Same a/a w/abun free Sd; little SS - clr, fmg, v/ffi, ex porosity, NS; Pyr

Fusion 380

380-420  Sh - lt gry, wh, pale lvnr, wxy; decr SS - a/a
420-430  Sh - v/drk gry v/brn cast, wxy
430-440  Sh - a/a; Sh - wh, pale grn, wxy
440-460  Sh - pale grn to wh, v/ady, wxy; little Sd - free; Sh a/a

Lakota 460

460-480  Sd - free, fcs, poor sorting; NS; Sh - a/a; Pyr
480-500  Same a/a; little Sh - pale grn, sdy grading to SS-pale grn, v/argill, NS; Pyr

Begin 20’ Samples

500-520  SS - fmg, frr, porous, NS; SS - wh, pale grn, v/argill; abun free Sd; Sh - brte grn, wh, gry, blk, sdy; entire spl bailed-up w/gry Bent

Morrison 520

520-560  Sh - blu-grn to brn-gry, wxy; little SS - clr, mcg, v/ffi & porous, NS; abun free ad
560-580  Siltst - dead wh v/thin even bands of blk carb Sh; Sh - blk, silty; Ls - drk gry, dns; abun Pyr
580-600  Same a/a; Sd - free, mcvg, ang to rd, NS; Pyr
600-660  SS - gry, v/fcc, v/Pyrte, frr, argill, poor porosity, NS; Sh - a/a; abun free Sd
660-910  Samples this interval were composed 100% of recirculated material, one fragment of grn, glass siltstone observed in 740-760 sample is thought to be near the top of the Sundance

Resume 10’ Samples

910-920  Mostly recirc material; Siltst - red-brn, v/argill & soft
920-980  SS & Siltst - red-brn to wh, fcs, partly w/ex porosity, NS
980-1040  SS - lt gry-grn, fmg, partly w/ex porosity, NS; Sh - blu-gry, wxy
GEOLOGIC RECORD (Cont'd.)

1040-1090  Sh - blu-gry, wxy, blocky; little SS a/a
1090-1110  Poor samples, apparently same a/a

CANYON SPRINGS 1110

1110-1120  Poor spl; abun free sd - fvcg, clr qtz, lrg frms are well rdd, NS

SPEARFISH 1120

1120-1140  Same a/a; increasing SS & Siltst - red-brn, vfg, argill, tite
1140-1150  No sample
1150-1160  Same a/a w/occas Anhy
Begin 20' Samples

1160-1180  Same a/a
1180-1190  Siltst - red-brn a/a grading to Sh of same clr; occas Anhy

GOOSE EGG 1190

1190-1200  Anhy - vh, buff, dns to xln; Siltst & Sh - red-brn
1200-1210  Siltst & Sh - red-brn w/little Anhy

MINNEHAATA 1210

1210-1240  Ls - vh, pnk, viol, dns; abun Anhy & Sh a/a
Resume 10' Samples

1240-1250  Same a/a

OPECHE 1250

1250-1260  Sh - brite red-brn, earthy; little Ls & Anhy a/a

MINNEAPOLIS 1260

1260-1290  Sh - brite red-brn a/a, partly sdy; Dolo - red-brn, dns; Anhy - vh, xln
1290-1300  Sh - red-brn a/a, bcmg silty; abun Anhy - vh
1300-1320  Silt & Sh a/a becoming sdy, no porosity, NS; abun Anhy

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GEOLOGIC RECORD (Cont'd.)

SECOND CONVERSE SANDSTONE 1740

1740-1746  SS - wh, tan, orng, fmg, argill, tite w/rare porosity, NS; Sh & Anhy a/a

Circ 1746  Same a/a, NS
1746-1760  Same a/a, NS
1760-1790  SS - wh, pnk, orng, mch, ex porosity in part, NS; little Sh & Anhy a/a
1790-1810  SS - a/a to viol, mg, argill & tite, NS; Sh & Anhy a/a

CONVERSE ANHYDRITE 1810

1810-1840  Anhy - wh, buff, dns, xin; Dolo - pnk, viol; Sh - brite red w/occas grn mottling; diminishing SS a/a
1840-1870  Dolo - gry, viol, dns, gran; Anhy & Sh a/a

THIRD CONVERSE SANDSTONE 1870

1870-1876  SS - wh to orng, mg, partly argill, v/fri, fair porosity, by, NS; Sh, Anhy & Dolo a/a

Circ 1876  Same a/a, NS
1876-1890  SS - same a/a to red, fmg, v/argill & tite; NS; Sh, Anhy & Dolo a/a
1890-1900  Same a/a w/decr SS
1900-1940  Dolo - tan, wh, gry mottled blk, dns to gran; little SS, Sh & Anhy a/a
1940-1970  Dolo - a/a w/abun smoky cht; little Anhy & Sh a/a
1970-1980  Dolo - a/a to tan, brn; abun Anhy
1980-2000  SS - wh, mg, dolomite, hd & tite, NS; Dolo - a/a to wh, pnk; abun Anhy
2000-2020  Dolo & Anhy a/a

FOURTH CONVERSE SANDSTONE 2020

2020-2030  SS - clr, mg, fri, porous, NS; Dolo & Anhy a/a

Circ 2035  SS - wh, mg, fri, porous, abun free Sd, NS; Sh, Dolo & Anhy a/a
2035-2040  Same a/a
2040-2060  Anhy - wh to brn, dns to xin; little Dolo - tan, pnk; diminishing SS a/a
2060-2070  Same a/a w/abun free Sd - mch, NS
2070-2100  Dolo - tan, pnk, viol, dns, gran; little Anhy, Sh & SS a/a
2100-2110  Anhy - wh, dns, xin; Dolo - tan, pnk; abun Sh - red
2110-2120  Dolo - wh mottled viol, dns; little Anhy & Sh a/a
2120-2130  Same a/a w/free Sd
2130-2160  Same as 2110-20 w/little SS - wh to lvndr, fg, poor porosity, NS

- 6 -
GEOLOGIC RECORD (Cont’d.)

RED MARKER 2160

2160-2170  Same a/a w/little "Red Marker" Sh - red, ivndr, splnry, sub-metallic, specular sheen
2170-2180  Abun "Red Marker" Sh w/Dolo, Anhy & SS a/a
2180-2190  Dolo - wh, tan, gran to dus; abun Anhy; little "Red Marker" Shale
2190-2200  Little SS - wh mottled viol, mg, tite, NS; Dolo, Anhy & abun "Red Marker" Sh
2200-2210  Sh - dead blk, v/hd & brl, fisil; Same a/a
2210-2220  Same a/a w/Dolo - lt to drk gry, gran to earthy
2220-2260  Dolo - tan, brn, wh, pink; little Anhy; little SS - wh, fm, tite, NS; Sh a/a
2260-2270  SS - gry, fcg, doloc, tite, NS; Dolo, Anhy & Sh a/a

Begin 5' Samples

2270-2275  Dolo - gry to drk brn, microxln; SS - a/a, NS
2275-2285  Dolo - a/a; little Anhy - wh
2285-2290  Sh - blk, brittle, flakey; tr SS - gry, fm, doloc, tite, NS

SECOND LEO SANDSTONE 2290

2290-2300  SS - gry, fm, v/doloc grading to sdy dolo, tite, NS; little Anhy - wh, xln
2300-2311  Dolo - med gry, fn xln
Circ 2314  Sh - blk, silty, brittle
2314-2320  Dolo - med gry, microxln, prtly w/setrd sd grns
2320-2325  SS - gry to wh, fm, v/doloc, tite, NS

Resume 10' Samples

2325-2335  Dolo - gry to wh, microxln, tite; Anhy - gry, sdy
2335-2345  Sh - blk, silty, hd
2345-2355  Dolo - gry, microxln, hd
2355-2363  Dolo - a/a w/abun Anhy - wh, xln
Circ 2363  SS - gry, mg, v/doloc, tite, NS
2363-2375  Dolo - med gry, microxln; little Anhy - wh, xln
2375-2385  Sh - blk & drk brn, silty, carb
2385-2390  Dolo - med gry, microxln; little SS - wh to buff, fm, doloc, tite, NS
2390-2400  SS - a/a, NS
2400  TOTAL DEPTH
API 1040047

ConRoy #1 F. A. Peterson
C NE SE 22 T35 R1
Fall River Co., South Dakota

DRILLING RECORD

Remarks

The original proposal was to drill a 12-1/4-inch surface hole to a depth of approximately 1050 feet and set surface casing at that point to shut off water flows which were anticipated from the Dakota, Lakota and Sundance Sandstones. From under surface a 7-7/8-inch hole was to be drilled to the total depth of approximately 2600 feet.

In practice, 30 feet of 14-inch conductor pipe was set in 30 feet of 17-1/4-inch hole. 8-3/4-inch pilot hole was drilled 30-645 feet, followed by 7-7/8-inch pilot hole 645-906 feet; reamed 12-1/4 inch from 30-847 feet; 7-7/8-inch pilot hole 906-1140 feet and reamed 12-1/4-inch from 947-1140 feet. 8-5/8-inch surface pipe was set at 1136 feet resulting in a successful water shut-off. The balance of the hole was drilled 7-7/8-inch to the total depth of 2400 feet.

Lost circulation was encountered momentarily at 2025 feet, but was cured by the addition of lost circulation material. Because of deviation problems, 5-1/2 days were required to drill and ream the surface hole. Casing was set and the balance of the test was drilled in 8 days.

The test was drilled with a Unit U-34 rig utilizing two 671 GM Diesel draw works motors (300 HP) and a 214P Oil Well 7-1/4" x 14" mud pump with two 6-110 GM Diesel motors (600 HP).

Well History

12-10-65 Rig up; drill 30' of 17-1/4" conductor hole and set 30' of 14" conductor pipe
12-11-65 Drill 8-3/4" surface hole 30-663'
12-12-65 Drill 8-3/4" surface hole 633-645'; drill 7-7/8" surface hole 645-852'
12-13-65 Drill 7-7/8" surface hole 852-906'; ream surface hole 30-565' to 12-1/4"'
12-14-65 Ream surface hole 565-947' to 12-1/4"
12-15-65 Drill 7-7/8" surface hole 906-1140'; ream 947-947' to 12-1/4"
12-16-65 Ream surface hole 947-1140 to 12-1/4"; set surface casing; W.O.C.
12-17-65 W.O.C.; drill cement 1093-1140; drill 7-7/8" hole 1140-1340'
12-18-65 Drill 7-7/8" hole 1340-1656'
12-19-65 Drill 7-7/8" hole 1656-1919'
12-20-65 Drill 7-7/8" hole 1919-2046'
12-21-65 Drill 7-7/8" hole 2046-2196'
12-22-65 Drill 7-7/8" hole 2196-2301'
12-23-65 Drill 7-7/8" hole 2301-2400' total depth; prepare to log
12-24-65 Run logs; plug and abandon
## DRILLING RECORD (Cont’d.)

### Bit Record

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<th>Type</th>
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<tbody>
<tr>
<td>1</td>
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<td>HTCo</td>
<td>OSC3</td>
<td>30</td>
<td>646</td>
<td>Dr 61.5'/12 hrs.</td>
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<td>2</td>
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<td>646</td>
<td>845</td>
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<tr>
<td>3</td>
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<td>906</td>
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<td>4</td>
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<td>L4W3</td>
<td>906</td>
<td>1120</td>
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<td>5</td>
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<td>1140</td>
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<td>6</td>
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<td>DT</td>
<td>29</td>
<td>667</td>
<td>Rm 628'/16 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>12-1/4</td>
<td>Smith</td>
<td>DT</td>
<td>667</td>
<td>847</td>
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<td>8</td>
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<td>OSC3</td>
<td>847</td>
<td>1140</td>
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<td>K2P2</td>
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<td>1462</td>
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<td>10</td>
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<td>YS1R</td>
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<td>13</td>
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<td>T2U</td>
<td>1948</td>
<td>2046</td>
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<td>OWC</td>
<td>2321</td>
<td>2400</td>
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</table>

### Casing Record

30' of 1¼" spiral weld conductor pipe at 30' w/10 ax
1425.36' of 8-5/8" surface casing at 1136.36 KB w/850 ax

### Mud Program

The surface hole (30-140') was drilled with weighted mud in anticipation of water flows from the Dakota, Lakota and Sundance Sandstones. The mud was maintained at an average weight of 11 lb/gal and an average viscosity of 50 sec/qt.

After surface casing, the balance of the hole was drilled with mud having the following average characteristics:

- **Weight**: 10.4 lb/gal
- **Viscosity**: 38 sec/qt
- **Water Loss**: 13 cc. API

A momentary loss of circulation occurred at 2025' in the 4th Converse Sandstone. The condition was remedied with very little loss of mud by the addition of lost circulation material. No further trouble was encountered.
Plugging Record

Used 50 sacks of cement to plug as follows:

1925-1850 w/25 sacks
1195-1120 w/25 sacks

In lieu of a surface plug, a cap was screwed and tack-welded to the surface casing to permit later re-entry for conversion to a water well.
ADMINISTRATIVE / SUNDARY REPORTS
PLUGGING RECORD

Operator
THE CONSOLIDATED ROYALTY OIL COMPANY

Address
P. O. Box 605, Casper, Wyoming 82601

Name of Lessee
P. A. Peterson

Well No.
1

Field & Reserve
Wildecat

Location of Well
1980' FEL and 1980' PSL of Section 22-75-1E

See Township or Block & Survey
Fall River

Countv
Casper, Wyoming

Application to drill this well was filed in name of
THE CONSOLIDATED ROYALTY OIL COMPANY

Has this well ever produced oil or gas
No

Character of well at completion (initial production)

Oil (bbls/day)
-

Gas (MCF/day)
-

Date plugged:

12-24-65

Total depth
2400'

Amount well producing when plugged:

Oil (bbls/day)
-

Gas (MCF/day)
-

Water (bbls/day)
-

Name of each formation containing oil or gas, indicate which formation open to wellbore at time of plugging

No oil or gas.

Refer to well summary and sample description for details

CASING IDENTIFICATION

8-5/8" 1125.36' All Guide shoe, float collar and six centralizers.

Basal Sandstone from 1102'-1120'

We will be satisfied with mud-laden fluid, according to regulations.

Yes

With the verbal approval of Mr. Earl Cox, State Engineer, the cement plugs normally set in the bottom and top of the surface casing were omitted to allow the surface owner, Mr. Francis A. Peterson, P.O. Box 5, Burdoc, South Dakota to convert the surface hole into a water well pending approval of Oil and Gas Board and Water Resources Commission. The water producing sands of the Dakota-Lakota series, Sandstone and Basal Sandstone formations were successfully cased off with 8-5/8" 24 lb. casing set in the Spearfish 8 1128' ground level. The surface casing string was cemented to surface with 850 sacks of cement with good returns of cement slurry (estimate 50 bbl.) flowing to reserve pit during displacement. No additional water zones were encountered while drilling below the surface casing to total depth. A casing protector with the abandonment marker welded on top has been screwed into the top casing collar at ground level and tack welded to permit later re-entry for conversion to a water well.

Signed this 13th day of January 1966

Signature of Attest

Edward P. Benke

I, Edward P. Benke, know to be the person whose signature appears on the face of this form, to be the holder of the facts stated therein, and that said report is true and correct.

Signed and sworn to before me this 13th day of January 1966

Notary Public in and for

Wyoming

Approved:

June 13, 1966

Oil and Gas Board of the State of South Dakota

Secretary

Note: Two copies of this form with Secretary, Oil & Gas Board, Pierre.
# Well Completion or Recompletion Report and Log

## Type of Completion
- [ ] Oil Well
- [ ] Gas Well
- [X] New Well
- [ ] Work-Over
- [ ] Deepen
- [ ] Plug Back
- [ ] Same Zone
- [ ] Diff Zone

## Operator
**The Consolidated Royalty Oil Company**

**Address**
P. O. Box 645, Casper, Wyoming 82601

**Completion** (Indicate from nearest list of section or block subdivision where possible).

- [ ] 1900' TBL and 1900' TBL of Section 22-79-18, Bott.

**Top of Interval**

**At Total Depth**

<table>
<thead>
<tr>
<th>Permit No.</th>
<th>Date Issued</th>
<th>Field and Pool or Wildcat</th>
<th>Wildcat</th>
<th>No. Acres</th>
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<tbody>
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<td>408</td>
<td>11-12-43</td>
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## Production Intervals

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<th>Date Completed</th>
<th>Description</th>
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<tbody>
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<td>2400'</td>
<td></td>
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## Electric Logs Run

- [ ] Sonic Log-Gamma Ray with Caliper, Dual Induction-Laterolog

### Casing Log

<table>
<thead>
<tr>
<th>Casing Size</th>
<th>Depth Below</th>
<th>Hole Size</th>
<th>Weight Lbs.</th>
<th>Purpose</th>
<th>Slick Line</th>
<th>Cement</th>
<th>Cemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3/4&quot;</td>
<td>13-1/2&quot;</td>
<td>12-1/4&quot;</td>
<td>24 lbs.</td>
<td>Surface</td>
<td>830</td>
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<td></td>
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</table>

### Liner Record

<table>
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<tr>
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<th>Top Odd</th>
<th>Bottom Odd</th>
<th>Screen Odd</th>
<th>Size</th>
<th>Depth Set Odd</th>
<th>Packer Set Odd</th>
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</table>

### Perforation Record

<table>
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<tr>
<th>Depth Interval</th>
<th>Size and Type</th>
<th>Purpose</th>
<th>Material Used</th>
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</thead>
</table>

### Production

- **Date: 1-13-46**
- **Method:** Please fill out the production method and type of pump for well, stating condition of well.

### Flow Test

- **Flow Test Pressure:** Please fill out the calculated flow test pressure.

### Disposition of Gas

- Use for fuel, vent, etc.

### List of Attachments

- **2 copies Wall History**
- **2 prints Sonic Log-Gamma Ray with Caliper**

**Signed:**

- **Dewey-Burdock GDP**
- **June 2012**

**Title:**

- **Production Superintendent**

**Approved:**

- **Date:** 1-13-46

**DO NOT WRITE BELOW THIS LINE**

- **See instructions on reverse side.**
CORRESPONDENCE
March 9, 1966

Mr. Earl J. Cox
South Dakota Geological Survey
Box 187
Belle Fourche, South Dakota

Dear Earl:

Reference is made to your letter of March 7, 1966, addressed to Mr. Bill Lewis, Bueno Drilling Company, concerning the Bueno #1 Holloway-State Well.

In the fifth paragraph, you stated that you assumed the various required reports had been sent to our office. We have received everything except two copies of the dual-induction laterolog, and two copies of the sonic gamma-ray log.

Sincerely,

Merlin J. Tipton
Assistant State Geologist

P.S. We received the samples from the following wells today.

Consolidated Royalty #1 Peterson
NW SE 22-7E-1
Falls River County

Consolidated Royalty #1 Childers
9-8S-2E
Falls River County

Consolidated Royalty #1 Superior-USA
10-9S-2E
Falls River,
January 31, 1966

Mr. Earl J. Cox
State Geological Survey
P.O. Box 187
Belle Fourche, S.Dak.

Dear Earl:

I am enclosing a dual induction-interior and sonic log— accompanied by a key for each of the following wells:

Conboy #1 U.S.A., Superior
Fall River County

Conboy #1 Childers
Fall River County

Conboy #1 Peterson
Fall River County

Tennessee #1 USA-Idaho
Fall River County

Sincerely,

(Mrs.) Ruth Lynch
Bookkeeper
For the State Geologist

Inclosures: 6
January 10, 1966

Re: ConRoy #1 Peterson
Fall River County

Mr. Earl J. Cox
State Geological Survey
Box 167
Belle Fourche, South Dakota

Dear Earl:

I think you are quite right that we do not need to involve Joe Grimes in taking over this particular well at this time. I think that it is advisable for us to keep close check with Mr. Peterson to see that he does fulfill the requirements of getting a permit to convert the well to water and to make sure that Joe is involved when such a conversion does take place.

As long as the marker has been placed and the mud pits filled and with Mr. Peterson's release I think we can say that all things have been fulfilled in qualifying this well for release as soon as we have received the information as stated in your letter.

I am being flooded with letters giving viewpoints about our changes in Rules and Regulations. At this time it appears that Gulf is definitely in the minority in their thinking and certainly the more letters that I can get to validate a particular position, that will be the direction in which I have to advise the board. When the time does come that a decision needs to be made, I want to sit down with you and go over all the correspondence to arrive at an adequate recommendation to give to the board for any rule changes. Possibly this could be done in Pierre sometime.

Earl, I want to express my sincere and deepest appreciation, as I have done to the personnel here, on your kindness in giving me the bowling ball this past Christmas. It does my heart a lot of good to know that the employees are behind the activities of the Survey 100% and you can be sure that I am going to do my utmost to see that the people in the Survey are given every benefit possible from the standpoint of improving the situation both in work and time.
I have to go to Pierre this Wednesday to appear before the appropriations committee. The Governor does want to give us money for another ground water geologist. Although I did not ask for this money, the pressure outside has caused the administration to see fit to bend to this request and therefore asked me to give them a modest sum for inclusion in our budget to enhance our ground-water program. The sum that I asked for was $16,650.00 to be divided between salary O & M and direct match moneys for the USGS.

I feel somewhat remiss in the fact that E. Y. Berry responded to your letter about those plates to this office. I mislaid the correspondence and have just now found it. When you hear from Hillings, I think it would be nice to write E. Y. Berry and inform him as to whether or not you achieved this material. His letter is enclosed.

Sincerely,

Duncan J. McGregor
State Geologist

DJM:hs
Enc.
Western Field Office
January 6, 1966

Dr. Duncan McGregor
State Geologist
State Geological Survey
Vermillion, South Dakota

Re: Conroy #1 Peterson
NWSE-22-75-1E
Fall River County, So. Dakota
Permit No. 408

Dear Duncan:

Enclosed is an original and copy of a letter from the landowner of the above test that is self-explanatory. Peterson's letter is addressed to you, rather than Joe Grimes, as the test may not be converted for a long time and it would seem pointless to have the Water Resources Commission assume jurisdiction of the well at this time. However, we can go through the procedure of turning it over to the Water Resources Commission if you feel this is the proper action to take.

The marker has been placed and the pits filled and smoothed. The location can be released from bond coverage after we have received the following:

One set of samples
Two copies of the dual induction log
Two copies of the sonic-gamma ray log
Two copies of the sample description
Final plugging forms.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:se
Duncan J. McGregor
Director and State Geologist
Vermillion
Merlin J. Tipton
Assistant State Geologist
Vermillion
Earl J. Cox
Senior Geologist
Belle Fourche

Dewey-Burdock GDP
June 2012
3.7-B-558
Appendix 3.7-B
Burdock, South Dakota
December 28, 1965

Dr. Duncan McGregor
State Geologist
State Geological Survey
Vermillion, South Dakota

Re: Conroy #1 Peterson
NWSE-22-7S-1E
Fall River County, So. Dakota
Permit No. 408

Dear Dr. McGregor:

At my request, the ten sack surface plug was eliminated in plugging the above test. It is planned that some time in the future, the surface casing in the hole will be perforated and the test made into an artesian water well.

Should the test be converted to a water well, in the future, I agree to assume full liability for any subsequent plugging that might be required.

Sincerely,

Francis A. Peterson
Burdock, South Dakota  
December 28, 1965

Mr. Duncan McGregor  
State Geologist  
State Geological Survey  
Vermillion, South Dakota

Re: Conroy #1 Peterson  
NMSE-22-76-1E  
Fall River County, So. Dakota  
Permit No. 406

Dear Mr. McGregor:

At my request, the ten sack surface plug was eliminated in plugging the above test. It is planned that some time in the future, the surface casing in the hole will be perforated and the test made into an artesian water well.

Should the test be converted to a water well, in the future, I agree to assume full liability for any subsequent plugging that might be required.

Sincerely,

Francis A. Peterson

Francis A. Peterson
Western Field Office
December 27, 1965

Mr. Francis A. Peterson
P. O. Box 5
Burdock, South Dakota

Re: Corroy 41 Peterson
W-5E-22-75-1E
Fell River County, So. Dakota
Permit No. 406

Dear Mr. Peterson:

Following your request, the ten sack surface plug was not placed when the above well was plugged. To leave out this plug, it is necessary that you request it in writing.

Enclosed is an original and two copies of a letter to the State Geologist requesting that the surface plug not be required. Please sign the original and two copies and return them to me in the enclosed addressed envelope.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist
I have been advised that the Consolidated Royalty Oil Co. has obtained a Permit to Drill for Oil and Gas on your land in Section 22, T 7 S, R 24 W.

Occasionally, owners of land consider converting abandoned oil wells into water wells. Please advise me whether or not you intend to convert the oil well drill hole on your land into a water well if water is encountered and the drill hole is abandoned as an oil well.

If you are considering making a water well out of the abandoned oil well drill hole, special considerations are necessary to comply with the State's oil and water laws. The abandoned oil hole must be properly plugged and the water well properly constructed. All conversion work will be at your expense. The cost will vary, depending upon the characteristics of the drill hole, but such cost will be in the neighborhood of $5,000 or more. Usually another driller and drill rig will have to be arranged for. This other drill rig and casing and other materials will have to be on hand to take over immediately after the special oil well plugging is completed, because the drill hole cannot be left open for any appreciable length of time without spoiling it. Approval of plans for construction of the water well will be required, and a bond covering proper construction may be required. Also, a water right may be required. All of these arrangements take considerable time to accomplish.

Please advise me immediately if you plan to convert the oil well drill hole into a water well. We both hope that a producing oil well results from the drill hole on your land; however, if not and you are planning on a water well, we must start making arrangements now.

Sincerely,

J.W. GRIMES
Chief Engineer

cc Oil & Gas Board, Pierre, South Dakota
Dr. Duncan McGregor, State Geologist, Vermillion, S.D.
Western Field Office
November 6, 1965

Dr. Duncan McGregor
State Geologist
State Geological Survey
Vermillion, South Dakota

Dear Duncan:

Just a note to let you know that Consolidated Royalty Oil Company will make application for permits on the following locations:

- Conroy #1 Childers
  NESE-9-05-2E
  Fall River County

- Conroy #1 Petersen
  NWSE-22-75-1E
  Fall River County

- Conroy #1 Superior-USA
  SESE-10-95-2E
  Fall River County

The first well will test the basal Sundance formation. The other two will test the second Lee Sand.

Consolidated Royalty is in the process of obtaining a $20,000 blanket bond. This would indicate that further tests are planned.

Sincerely,

Earl Cox
Engineering-Petroleum Geologist

EC:sn

Duncan A. McGregor  
Director and State Geologist
Vermillion

Berlien A. Tipton  
Assistant State Geologist
Vermillion

Earl A. Cox  
Senior Geologist
Belle Fourche
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
South Dakota Geological Survey
Attn: Dr. Duncan McGregor
Science Center
Vermillion, South Dakota

March 2, 1966

NC 1825

Consolidated Royalty #1 Peterson
NW SE 22-7S-1E
Fall River County, South Dakota

Consolidated Royalty #1 Childers
9-8S-2E
Fall River County, South Dakota

Consolidated Royalty #1 Superior - USA
10-8S-2E
Fall River County, South Dakota

N/C
Oil and Gas Search for: api_no_ like '40 047 20071'

Record 1 of 1

Well Information

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<tr>
<td>Permit No:</td>
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<td>FALL RIVER</td>
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<tr>
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<td>SWSE 11-7S-1E</td>
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<td>Total Depth:</td>
<td>2250</td>
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<td>Operator Name:</td>
<td>AQUARIUS RESOURCES CORPORATION</td>
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<td>Bottom Hole:</td>
<td>Minnelusa</td>
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<td>11-10-1976</td>
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Formation Tops

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<th>Depth (ft.)</th>
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<td>1964</td>
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<td>3rd Leo</td>
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http://sddnr.net/oil_gas/search_results_oil_gas.cfm

Dewey-Burdock GDP
June 2012
3.7-B-568
Appendix 3.7-B
### SUNDAY REPORT ON WELLS

**OPERATOR**

**AQUARIUS RESOURCES CORPORATION**

**ADDRESS**

307 Conroy Building, Casper, Wyoming 82601

**LOCATION**

660' ENE, 2217' FEL Section 11-7S-1E

**ELEVATIONS** (O.P.S. M.E.B., N.Y., G.D., all new standards)

- 3679' Gr.
- 3689' K.B.
- Fall River

**WELL NO.**

34-11

**WELL NAME**

Peterson

**COUNTY**

Fall River

**FINDS AND WELL ON WELLCAT**

Wildcat

**AREA IN LEASE**

1080.00

**WATER ENCOUNTERED**

Water was encountered in all porous zones drilled. The Leo sand had excellent porosity but yielded sulphur water when tested. Proposed plugging as approved by telephone is as follows:

- 35 sx 1900-2000 Minnelusa-Leo
- 50 sx 750-900 Sundance
- 30 sx 105-190 base of surface casing
- 10 sx Surface plug & erect dry hole marker

---

**SIGNED**

[Signature]

**DATE**

December 23, 1976

**DO NOT WRITE BELOW THIS LINE**

**SUPERVISOR**

JAN 1977

**REC.**

WESTON FIELD OFFICE
### Synopse

**Operator:** Aquarius - Double U - Powerton  
**Well:** #94-11 Peterson  
**Location:** C/SW SE; 660' FSL, 2217' FKL  
Section 11, T. 78., R. 1E.  
Fall River County, South Dakota  
**Area:** Wildcat (Driftwood Canyon Prospect)  
**Elevation:** 3679' Ground, 3689' K.B.  
**Spudded:** December 9, 1976 (7:30 A.M.)  
**Ceased Drilling:** December 22, 1976 (3:30 A.M.)  
**Completed:** December 23, 1976 (12:30 A.M.)  
**Status:** P & A  
**Total Depth:** 2250' driller, 2248' log  
**Casing:** 8-5/8' surface casing set @ 163'  
**Hole Size:** 7-7/8' below surface to TD  
**Contractor:** A. O. Bullock Drilling Co. - Rig #1  
Tool Pusher - Ray Cottrell  
Drillers - Larry Halligan, D. F. Ellisworth, Chuck Sides  
**Drilling Mud:** Wyoming Mud Co., Casper, Wyo.  
Gal-Chemical from 394' to TD  
Engineer - Bruce Johnson  
**Lost Circulation:** Lost Circulation for 5/4 hours @ 394'.  
**Core:** No cores cut.  
**Drill Stem Tests:** Halliburton Services  
IBT #1; 2nd Leo, 2660'-2682' (adjusted to log from 2668'-2690')  
Res. 125' muddy water, 1836' black sulfur water.  
Engineer - D. E. Nook, Gillette, Wyoming  
**Logs:** Schlumberger Well Surveying Corp.  
Run Dual Induction-Laterolog from 2248' to base of surface casing.  
Run Botheold Compensated Sonic Log w/caliper from 2248' to base of  
surface casing. Run Gamma Ray log from base of surface casing to  
surface.  
Engineer - Craig Rang, Gillette, Wyo.  
**Samples:** All samples were delivered to American Stratigraphic Co., Casper,  
Wyo., for shipment to their Billings, Montana office where a cut  
will be made for the South Dakota State Geologist.
COUNTY: FALL RIVER
LEGAL LOCATION: SWSE 11-7S-1E
API NO: 40 047 20071
PERMIT NO: 776
WELL NAME: ARC #34-11 PETERSON
OPERATOR: AQUARIUS RESOURCES CORPORATION
PERMIT ISSUED: 11/10/1976
PERMIT CLOSED: 01/05/1977
FILE LOCATION: 7S-1E-11 SWSE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY /
CHECKLIST
## BOND RELEASE CHECKLIST

<table>
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<tr>
<th>Well Name &amp; Location</th>
<th>Permit #</th>
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<tr>
<td>Aquarius #34-11 Peterson</td>
<td>776</td>
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<tr>
<td>19-130-1584-76</td>
<td>Sept. 20, 1976</td>
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### Surface Restoration
- [ ] Pits filled
- [ ] Site level
- [ ] Site policed
- [ ] Dry-hole marker solid, sealed, correctly inscribed
- [ ] No dry-hole marker desired, letter in TFO files from surface owner

### Paperwork filed
- [ ] Form 4 (Completion or Recompletion Report)
- [ ] Form 6 (Sundry Notices and Report on Wells)
- [ ] Form 7 (Plugging Report) *(included on Form #6)*

### Geological Information Filed
- [ ] DST Charts and Reports
- [ ] Geologist's Report
- [ ] Results of coring and core analyses **(None Cut)**
- [ ] Set of 10-foot sample cuttings **(samples received)** **(samples verified)**

**DATE**: 7-5-79  **CHECKED BY**: John Fricke
**PERMIT CHECKLIST**

<table>
<thead>
<tr>
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<td>SWE 11-7S-1E - Fall River</td>
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<td>19-0130-1584-76</td>
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**Paperwork filed with WFO**

- [ ] Organization Report
- [ ] Application
- [ ] Bond
- [ ] Permit Fee

**The Following Papers sent to Operator:**

- [ ] Permit (Form 2a)
- [ ] Receipt for $100 permit fee
- [ ] Cover letter explaining material sent

**Permit Fee Filed:**

- [ ] Permit fee w/Cash Receipts Transmittal Form sent to State Treasurer

**Notification of New Permit sent to:**

- [ ] Dr. Duncan J. McGregor
- [ ] Mr. Vern W. Butler
- [ ] Dr. Allyn Lockner
- [ ] Mr. George Kane

**DATE November 11, 1976**

**CHECKED BY**

Jean Miller, Secretary, WFO
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

DRILL [ ] DEEPEN [ ] PLUG BACK [ ] SINGLE ZONE

OIL WELL [ ] GAS WELL [ ] MULTIPLE ZONE

API 10 40 047:10071

STslt 0.1

API 11

APPLICATION FOR PERMIT TO:

API 10 40 047

FORM 2

FARM OR LEASE NAME

Peterson

WELL NO

44-11

FIELD AND POOL, OR WILDCAT

Wildcat

NO ACRES IN LEASE

1080.80

SW SEC 11-7S-1E

CORN

Fall River

660' from South line

2217' from East line

Section 11-7S-1E

MARK AND ADDRESS OF SURFACE OWNER

Peterson and Son, Inc.

Edgemont, South Dakota 57735

MARK AND ADDRESS OF CONTRACTOR

A. O. Bullock Drilling Company

P. O. Box 821

Casper, Wyoming 82602

IF LEASE PURCHASED WITH ANY WELLS BUILT FROM WHOM PURCHASED (Name and address)

Proposed casing and cementing program

Proposed casing and cementing program

-77/8" 8-5/8" 24# New 150' 125

7-7/8" 5-1/2" 15.5# New 2300' 75

Drill a 7-7/8" hole from bottom of surface casing to estimated total depth of 2300 feet.

After drilling, will test the Leo zones of Minniwaka formation. Drillstem test any zone with shows of oil and gas. If commercial production indicated will set 5" casing to total depth, perforate and complete.

A double ram, hydraulically operated preventer (Shafer 10" API Series 300) will be installed and will be tested at a minimum of 500 psi for 15 minutes prior to drilling out from under the surface casing. Deficiencies, if any, will be corrected before drilling ahead. The blowout equipment will be checked daily by opening and closing the pipe rams and blind rams.

Exception to statewide spacing pattern allowed for topographic reasons (see Burdock 7; quadrat) - 902

Instructions

TYPICAL USE OF THIS FORM

This form is designed for submitting proposals to perform certain well operations. It should be used for applications of the drilling of wells as regulated by the Board of Public Lands for the extraction of oil and gas from lands held in trust for the State of Wyoming. This form is applicable to all public lands whether Federal or State. It is designed to be used for the purpose of obtaining approval for the drilling of wells as regulated by the Board of Public Lands. It is not designed to be used for the purpose of obtaining approval for the drilling of wells on private lands.

The form contains space for the essential information required by the Board of Public Lands to make an informed decision regarding the approval of the well. It is the responsibility of the applicant to ensure that all necessary information is provided on the form.

If the well is to be drilled, the applicant must submit a detailed proposal for the well, including the location of the well, the expected production, and any other pertinent information.

The form must be completed and submitted to the Board of Public Lands for approval. Approval is not automatic and is based on a review of the submitted proposal and any other relevant information.

Attachment: Application for Permit to Drill, Burdock 7, quadrat - 902

Dewey-Burdock GDP

June 2012

3.7-B-577

Appendix 3.7-B
Powers Elevation Company, Inc. of Denver, Colorado has in accordance with a request from Mr. Trotter for Aquarius Resources Corporation determined the location of #34-11 Peterson to be 560'FS & 2217'FW Section 11 Township 7 S. Range 1 E. of the Black Hills Meridian Fall River County, South Dakota

I hereby certify that this plot is an accurate representation of a correct survey showing the location of #34-11 Peterson

Date: 9/22/76 T. Tolan
Licensed Land Surveyor No.
State of South Dakota
WELL INSPECTION / 
SCOUT REPORTS
SCOUT REPORT

Operator: Aquarius Resources Corporation

Farm/Lease Name: #34-11 Peterson

API Number: 40 047 20071

County: Fall River

Elev.: 3689 ft

Sec.: 11

T.: 7S

R.: 1E

Contractor:

Geologist: Eldred Johnson

SCOUT'S OBSERVATION:

Pits filled, landscape recontoured, wild grass and shrubs taking over, no seeds planted. Dry hole marker sound, sealed, and properly labeled.

Site Approved.

FORMATION TOPS:

PLUGGING RECORD:

DATE PLUGGED/COMPLETED: 12-22-76

CASING RECORD:

8 5/8

From: ]

To: 163

8 5/8

From: ]

To: ]

SITE INSPECTION:

Approved: X

Not Approved:

REMARKS:

SCOUTED BY:

John Frick, Geologist

Fred V. Steece, Supervisor

Field Assistant

Western Field Office
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Operator: Aquarius Resources Corporation
Permit Number: 776
API Number: 4004720071

Farm/Lease Name: #34-11 Peterson
Sec. 11 T. 7S R. LE County: Fall River


case

Contractor: A. O. Bullock

SCOUT'S OBSERVATION:
The site has not been restored. Mounds of dirt surround a pit that is practically dry. There is no fence and plenty of garbage is laying on the ground. A dry hole marker is in place and is solid, sealed and correctly marked. Near the marker pole is a small open hole and trench that should be filled in. The area has not been leveled or policed and therefore at this time cannot be approved.

FORMATION TOPS:

PLUGGING RECORD:

DATE PLUGGED/COMPLETED: 12-22-76

CASING RECORD:

SITE INSPECTION:

REMARKS: The site is difficult to locate since the road leading up to the drilling area is for the most part covered with grass and also because the uranium companies have made so many roads in their exploration efforts, which inevitably lead in the wrong direction. (3 pictures).

SCOUTED BY: Fred V. Steece, Supervisor
David F. Johnston, Geologic Assistant
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Operator 1/ Aquarius Resources Corporation

Farm/Lease Name #34-11 Peterson

SMSE Sec. 11 T. 7S R. 1E

Elev. 3689 ft Est. T.D. __

Actual T.D. 2250 Spudded 11-09-76

Contractor A. O. Bullock

Geologist Eldred Johnson

SCOUT’S OBSERVATION:

Preparing to plug.

FORMATION TOPS:

Morrison—— 406 Opchee—— 1452 1st Leo—— 1964
Sundance—— 570 1st Converse—— 1552 2nd Leo—— 2062
Basal sand—— 819 Conv. Anhyd—— 1630 3rd Leo—— 2168
Spearfish—— 866 2nd Converse—— 1677
Gooseegg—— 1158 3rd Converse—— 1764
Minnekahta—— 1412 Red Marker—— 1952

PLUGGING RECORD:

35 sax: 2000-1900 Red Marker
50 sax: 900-750 Basal Sundance
25 sax: 190-120 Base Surface
10 sax: Surface plug w/marker

DATE PLUGGED/COMPLETED 12-22-76

CASING RECORD:

8 5/8 From 0 To 163

SITE INSPECTION:

Approved ________________

Not Approved ________________

REMARKS:

(W/135 sax)

SCOUTED BY Fred V. Steece, Supervisor

1/ Casper, Wyoming.
<p>| | | |</p>
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<td><strong>Dewey-Burdock GDP</strong></td>
<td><strong>June 2012</strong></td>
<td><strong>3.7-B-585</strong></td>
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<tr>
<td><strong>Appendix 3.7-B</strong></td>
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</table>
Minnicka 140.7 Morrison 406
Apache 145.4 Sandine 570
1st Converse 130.0 (Broad RD) 819
Converse Anhyd 16.36 Spearfish 866
Spear 1158
12-22-76 Minnicka 1412

Cold from Eldred Apache 145.2
Johnston Winding 1st Converse 1552
Piercing into 2nd Converse 1630
Butlered the faller 2nd Converse 1477
3rd Converse 1264
Red Mesa 1952

350 ft. 2000-1900 Les 1964
500 ft. 1900-750 Les 2062
2500 ft. 190-120 base surf 2nd Les 2168
10 Max: 350 ft. Play by marker T.D. 2250

Rec 1965 written, (2) 1968 88k mutual
Wells 1966 88k mutual filer.

Wells lead is practically dry. The known oil line is dead.
Nothing of bit. notoriously
limited around lead to be found.
D ESP
OPERATOR’S TECHNICAL REPORTS / MAPS
AQUARIUS RESOURCES CORPORATION

John F. Trotter, President

Aquarius Resources Corporation
34-11 Peterson
C SW SE Sec. 11, T. 7S., R. 1E.
Fall River County, South Dakota
Elev. - Gr. 3679', KB 3689'
Well Permit #776

DAILY DRILLING REPORT

12/06/76 Moving equipment to 34-11 Peterson

12/07/76 Moving equipment to drill site

12/08/76 Rigging up

12/09/76 Finished rigging up and started drilling rat hole @ 2:00 A.M.
Spudded surface hole @ 7:30 A.M. Drilled 12 ft. hole to 164 ft. K.B.
Set 153 ft. of 24' 8-5/8" casing @ 164 ft. K.B. with 135 mx cement,
2% CaCl2

12/10/76 Finished setting surface casing, plug down @ 1:00 A.M. Good returns
to surface. W.O.C. Expect to drill out early this afternoon.

Drilled out at midnight.

12/11/76 8:00 A.M. - PTD - 319'. Lost circulation @ 386'

12/12/76 8:00 A.M. - PTD - 486'. Drilling. Made trip for bit @ 447'

12/13/76 8:00 A.M. - PTD - 608' - drilling.

12/14/76 8:00 A.M. - PTD - 967' - drilling in the red beds.
Drilled 279' in last 24 hours.

12/15/76 8:00 A.M. - PTD - 1243' - drilling. Drilled 276 ft. in last 24 hours.
Repairing mud pump - 8 hours. M.W. - 9.6; Visc. - 31
Made trip for bit #4 @ 978 ft.

12/16/76 8:00 A.M. - PTD - 1515' - drilling. Drilled 272 ft. in last 24 hours.

12/17/76 8:00 A.M. - PTD - 1663' - drilling. M.W. - 9.1, Visc. - 32
Drilled 148' in last 24 hours. Tripped for bit @ 1535'.
Dropped one drill collar - lost approximately 6 hours fishing.
Sample tops: Minnakahta - 1407' (+2282)
Opechee - 1454' (+2235)
1st Converse - 1540' ?
Converse Anhydrite - 1636' (+2053)

12-06-76 Moving equipment to #34-11 Peterson

307 Conroy building - Casper, Wyoming 82601 - (307) 265-9025
<table>
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<tr>
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<th>O.D.</th>
<th>I.D.</th>
<th>LENGTH</th>
<th>DEPTH</th>
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<td>Drill Pipe or Tubing</td>
<td>6&quot;</td>
<td>2.75&quot;</td>
<td>1'</td>
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<td>Reversing Sub</td>
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<td>Water Cushion Valve</td>
<td>4.5&quot;</td>
<td>3.826&quot;</td>
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<td>Drill Pipe</td>
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<td>Drill Collars</td>
<td>6 1/4&quot;</td>
<td>2.25&quot;</td>
<td>242'</td>
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<td>Handling Sub &amp; Choke Assembly</td>
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<td>Dual CIP Valve</td>
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<td>2044'</td>
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<td>Extension Joint</td>
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<tr>
<td>AP Running Case</td>
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<td>3&quot;</td>
<td>4'</td>
<td>2045'</td>
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<td>4'</td>
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**Total Depth**: 2090'
GEOLOGICAL REPORT AND WELL HISTORY

Aquarius - Double U - Powerco

#3-11 Peterson

Section 11, T. 75., R. 11.

Fall River County, South Dakota

eldred D. Johnson
830 Trigood Dr.
Casper, Wyoming 82601
Phone: 30 4-8568
### INDEX

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<tr>
<th>Section</th>
<th>Page</th>
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<td>Bit Record</td>
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<td>Deviation Surveys</td>
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<td>Drill Stem Test Data</td>
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<td>Schlumberger Log Analysis</td>
<td>4</td>
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<tr>
<td>Electric Log Tops</td>
<td>5</td>
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<tr>
<td>Sample Descriptions</td>
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Synopsis

Operator: Aquarius - Double U - Poweroo
Well: #34-11 Peterson
Location: C/SW SE: 660' FSL, 2217' FEL
Section 11, T. 7S., R. 1E.
Fall River County, S. D.
Area: Wildcat (Driftwood Canyon Prospect)
Elevations: 3679' Ground, 3689' X.B.
Spudded: December 9, 1976 (7:30 A.M.)
Ceased Drilling: December 22, 1976 (3:30 A.M.)
Completed: December 23, 1976 (12:30 A.M.)
Status: P & A
Total Depth: 2250' driller, 2248' log
Casing: 8-5/8" surface casing set @ 163'
Nole Size: 7-7/8" below surface to TD
Contractor: A. O. Bullock Drilling Co. - Rig #1
            Tool Pusher - Ray Gottrell
            Drillers - Larry Halligan, D. F. Ellsworth, Chuck Sides
Drilling Mud: Wyoming Mud Co., Casper, Wyo.
              Gel-Chemical from 994' to TD
              Engineer - Bruce Johnson
Lost Circulation: Lost Circulation for 5½ hours @ 384'.
Coring: No cores cut.
Drill Stem Tests: Halliburton Services
            DST #1: 2nd Le©, 2060'-2062' (adjusted to log from 2068'-2090')
            Rec. 125' sandy water, 1838' black sulfur water.
            Engineer - D. R. Rock, Gillette, Wyoming
Logs: Schlumberger Well Surveying Corp.
            Ran Dual Induction-Lateolog from 2248' to base of surface casing.
            Ran Borehole Compensated Sonic Log w/calliper from 2248' to base of
            surface casing. Ran Gamma Ray log from base of surface casing to
            surface.
            Engineer - Craig Raag, Gillette, Wyo.
Samples: All samples were delivered to American Stratigraphic Co., Casper,
            Wyo., for shipment to their Billings, Montana office where a cut
            will be made for the South Dakota State Geologist.
### Chronological History

<table>
<thead>
<tr>
<th>Date</th>
<th>8:00 A.M. Depth</th>
<th>Data</th>
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<tbody>
<tr>
<td>12/8/76</td>
<td>Rigging up</td>
<td>12/9/76 Drilling surface hole</td>
</tr>
<tr>
<td>12/9/76</td>
<td>Drilling surface hole</td>
<td>Spudded 7:30 A.M. Drilled 124&quot; surface hole to 163' @ 8:30 P.M.</td>
</tr>
<tr>
<td>12/10/76</td>
<td>PTD 163&quot;, W.O.C.</td>
<td>12/11/76 Drilling @ 319'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 163'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set 8-5/8&quot; surface casing @163' K.B. w/135 sacks regular cement, 3% CaCl₂, 1/4# Flo Cale per sack. Plug down @ 1:00 A.M. W.O.C. Began drilling cement @ 6:00 P.M.</td>
</tr>
<tr>
<td>12/12/76</td>
<td>Drilling @ 486'</td>
<td>12/12/76 Drilling @ 486'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 167'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shut down @ 5:45 P.M. to repair pump. Resumed drilling @ 10:30 P.M.</td>
</tr>
<tr>
<td>12/13/76</td>
<td>Drilling @ 688'</td>
<td>12/14/76 Drilling @ 968'</td>
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<tr>
<td></td>
<td></td>
<td>Made 280'</td>
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<td></td>
<td></td>
<td>Started trip @ 978' @ 10:00 A.M. Resumed drilling @ 6:30 P.M. after trip &amp; working on pump for 4-3/4 hrs.</td>
</tr>
<tr>
<td>12/15/76</td>
<td>Drilling @ 1234'</td>
<td>12/15/76 Drilling @ 1234'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 266'</td>
</tr>
<tr>
<td>12/16/76</td>
<td>Drilling @ 1517'</td>
<td>12/16/76 Drilling @ 1517'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 283'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Started trip @ 1553' @ 1:00 P.M. Dropped bottom hole drill collar to bottom @ 3:00 P.M. Pished out drill collar w/rig overshot and resumed drilling @ 11:45 P.M.</td>
</tr>
<tr>
<td>12/17/76</td>
<td>Drilling @ 1663'</td>
<td>12/17/76 Drilling @ 1663'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 146'</td>
</tr>
<tr>
<td>12/18/76</td>
<td>Drilling @ 1823'</td>
<td>12/18/76 Drilling @ 1823'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 160'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Started trip @ 1832' @ 1:45 P.M. Spent 4-3/4 hrs replacing carrier bearing in torque converter. Resumed drilling @ 8:45 P.M.</td>
</tr>
<tr>
<td>12/19/76</td>
<td>Drilling @ 1939'</td>
<td>12/19/76 Drilling @ 1939'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 116'</td>
</tr>
<tr>
<td>12/20/76</td>
<td>PTD 2086'. W.O.O.</td>
<td>12/20/76 PTD 2086'. W.O.O.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made 147'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reached 2086' @ 5:30 A.M. Circulated samples &amp; W.O.O. for DST till 8:30. Drilled to 2092' @ 9:00. Started out of hole for DST #1 @10:00 A.M. SIM 2092 - 9090</td>
</tr>
</tbody>
</table>
Began picking up test tools @ 1:00 P.M. On bottom testing @ 4:20 P.M. Finished testing @ 7:00 P.M. Out of hole w/test tools @ 11:00 P.M. DST #1; 2nd loc. 2068-2090. Rev. 125' muddy water, 1838' blokk sulfur water.

Made 59'.

12/21/76 Drilling @ 2133'.

12/22/76 TD 2250' going in hole w/logging tool.

Made 117'.

12/23/76 TD 2250' driller 2248' log

Set 35 sack plug from 1900'-2000' across "Red Shale Marker".
Set 50 sack plug from 750'-900' across Basal Sundance sandstone.
Drill Stem Test Data

DST #1; 2nd Leo sandstone, 2060'-2088' (adjusted to log from drillers depth of 2068'-2090')

Open 11 min. SI 30 min. Open 60 min. SI 60 min.

Tool opened on pre-flow w/very strong blow, off bottom of 5 gal. bucket in 30 sec., remained steady for 11 min. Tool re-opened on final flow off bottom of 5 gal. bucket, began gradually decreasing after 12 min., decreased to surface bubbles after 44 min., decreasing to intermittent surface bubbles @ end of test.

No gas - to - surface.

Recovered 1963' fluid; 125' muddy water, 1838' black sulfur water. Rw = 2.16 @ 48° F.

1200 ppm chlorides.

Sample chamber contained 2175 cc black sulfur water, 0# pressure

pre-flow

<table>
<thead>
<tr>
<th>Depth</th>
<th>Rw</th>
<th>Rt</th>
<th>%</th>
<th>Sw</th>
</tr>
</thead>
<tbody>
<tr>
<td>708</td>
<td>2.5</td>
<td>20</td>
<td>30%</td>
<td>80%</td>
</tr>
<tr>
<td>718</td>
<td>2.5</td>
<td>18</td>
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<td>70%</td>
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final flow

<table>
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<tr>
<th>Depth</th>
<th>Rw</th>
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<th>%</th>
<th>Sw</th>
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</thead>
<tbody>
<tr>
<td>870-885</td>
<td>5.0</td>
<td>20</td>
<td>30%</td>
<td>100%</td>
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BHT 78° F.

Tested by Halliburton Services

Engineer - D. H. Rock, Gillette, Wyo.

Schlumberger Log Analysis

<table>
<thead>
<tr>
<th>Hulett sandstone</th>
<th>Basal Sundance sandstone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>Rw</td>
</tr>
<tr>
<td>708</td>
<td>2.5</td>
</tr>
<tr>
<td>718</td>
<td>2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1st Converse sandstone</th>
<th>2nd Converse sandstone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>Rw</td>
</tr>
<tr>
<td>1592</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>2nd Leo sandstone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>2078</td>
</tr>
<tr>
<td>2088</td>
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Engineer - Craig Bang, Gillette, Wyo.
**Electric Log Type**

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<tr>
<th>Formation</th>
<th>Depth</th>
<th>Datum (K.B.)</th>
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<tbody>
<tr>
<td>Morrison formation</td>
<td>406</td>
<td>+3283</td>
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<tr>
<td>Sundance formation</td>
<td>570</td>
<td>+3119</td>
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<tr>
<td>Basal Sundance sandstone</td>
<td>866</td>
<td>+2823</td>
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<tr>
<td>Spearfish formation</td>
<td>888</td>
<td>+2601</td>
</tr>
<tr>
<td>Goose Egg formation</td>
<td>1158</td>
<td>+2531</td>
</tr>
<tr>
<td>Minnekahta limestone</td>
<td>1412</td>
<td>+2277</td>
</tr>
<tr>
<td>Opeche shale</td>
<td>1452</td>
<td>+2237</td>
</tr>
<tr>
<td>1st Converse sandstone</td>
<td>1552</td>
<td>+2137</td>
</tr>
<tr>
<td>Converse anhydrite</td>
<td>1630</td>
<td>+2059</td>
</tr>
<tr>
<td>2nd Converse sandstone</td>
<td>1677</td>
<td>+2012</td>
</tr>
<tr>
<td>3rd Converse sandstone</td>
<td>1764</td>
<td>+1925</td>
</tr>
<tr>
<td>&quot;Red Shale Marker&quot;</td>
<td>1952</td>
<td>+1737</td>
</tr>
<tr>
<td>1st Leo sandstone some</td>
<td>1964</td>
<td>+1725</td>
</tr>
<tr>
<td>2nd Leo sandstone some</td>
<td>2062</td>
<td>+1627</td>
</tr>
<tr>
<td>3rd Leo sandstone some</td>
<td>2168</td>
<td>+1521</td>
</tr>
<tr>
<td>TD</td>
<td>2248</td>
<td>+1441</td>
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**Sample Descriptions**

Samples were examined under the bimocular microscope during the drilling of the well in December, 1976, using 10X eyepiece and 1X and 2X objective lenses. 10' samples were caught from under surface to TD. Sample quality was generally fair to good. The following sample descriptions were condensed from the well-site description with the depths adjusted to the E-log to compensate for lag.

**Minnekahta limestone**

1412 (+2277) log

Dol. cream - lt tan, some lavender gray, v fn - microxln, anhy, limy in part, firm - hrd, brittle, w/anhy, wht - pink, v fn xln, massive, some sucrosic, firm.

**Opeche shale**

1452 (+2237) log

Sh, drk rust red, soft, silty, anhy.

1490 1515 25

Sh aa, w/interbedded anhy, wht, v fn xln, sucrosic, some massive, soft - firm.

1515 1535 20

Sh, rust red, soft, silty, anhy, grng to silt, rust red - red orange, firm, edy, shly, anhy.

1535 1552 17

Sh, rust red, soft, silty, anhy & some rust red - red orange, shly, edy, silt aq, interbedded w/ls, wht - cream & tan, v fn -
microxln, fma - hrd, brittle, anhy, w/some anhy, wht, v fn xln, sucrosic, soft.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Converse sandstone</td>
<td>1552 (+2137) log</td>
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<tr>
<td>1552</td>
<td>1580</td>
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<td>1580</td>
<td>1600</td>
<td>20</td>
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<tr>
<td>1600</td>
<td>1630</td>
<td>30</td>
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<tr>
<td>Conv. anhydrite</td>
<td>1630 (+2059) log</td>
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<tr>
<td>1630</td>
<td>1660</td>
<td>30</td>
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<tr>
<td>1660</td>
<td>1677</td>
<td>17</td>
<td></td>
<td></td>
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<tr>
<td>2nd Converse sandstone</td>
<td>1677 (+2012) log</td>
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<td>1677</td>
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<td>1690</td>
<td>1720</td>
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<td>1750</td>
<td>1764</td>
<td>14</td>
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<td></td>
</tr>
<tr>
<td>3rd Converse sandstone</td>
<td>1764 (+1925) log</td>
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<tr>
<td>1764</td>
<td>1774</td>
<td>10</td>
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<tr>
<td>Year</td>
<td>Year</td>
<td>Num</td>
<td>Description</td>
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<tr>
<td>1774</td>
<td>1796</td>
<td>24</td>
<td>Dol, tan - gry, some brn, v fn granular, some v fn - microxln, firm - hrd, brittle, limest w/some anhy, whit - brn, some gry, fn - v fn xln, massive, some sucrosic, firm - hrd, some soft. Scatt stringers of ss, whit - pink, fn grn, s rmd - s ang, anhy filled, dolo, firm - fri, no - poor P &amp; P, some poor - fr it yell fluor, no cut.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1796</td>
<td>1810</td>
<td>14</td>
<td>Dol, it pink - cream &amp; v lt gry, v fn - microxln, firm - hrd, brittle, anhy w/scatt ss, whit, fn grn, s rmd - s ang, anhy filled, firm - fri, no - poor P &amp; P, fnt, tr fr it yell fluor, no cut.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1810</td>
<td>1860</td>
<td>50</td>
<td>Anhy, whit - gry, fn - v fn xln, massive - sucrosic, firm - hrd, some soft w/some interbedded dol, pink - cream &amp; it tan - gry, v fn - microxln, some granular, firm - hrd, brittle, anhy in part, w/scatt stringers of ss, whit - it gry, some buff, s rmd - s ang, anhy filled, dolo, firm - fri, no - poor P &amp; P, all tr fr it yell fluor, no cut, 99% NS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1860</td>
<td>1884</td>
<td>24</td>
<td>Sh, rust red, soft, silty, anhy, all dolo, interbedded w/dol, tan - gry, some lavender, v fn - microxln &amp; granular, firm - hrd, brittle, anhy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1884</td>
<td>1926</td>
<td>42</td>
<td>Dol lt tan - lavender pink &amp; it gry, v fn - microxln, firm - hrd, brittle, anhy, w/anhy whit, v fn - fn xln, massive - sucrosic, firm - soft. Scatt interbedded sh, drk rust red, soft, silty, all dolo, anhy &amp; some scatt ss, whit - v lt pink, fn grn, s rmd - s ang, anhy filled, dolo, firm - fri, poor - fr P &amp; P, MS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>1938</td>
<td>12</td>
<td>Dol, cream - it tan, &amp; pink - it gry, v fn - microxln, hrd - firm, brittle, anhy, limest.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1938</td>
<td>1952</td>
<td>14</td>
<td>Dol, it gry - tan &amp; pink, v fn - microxln, firm - hrd, brittle, anhy, limest in part, ady in part, w/ss, whit - it pink, fn grn, some med, s rmd - s ang, anhy filled, dolo, firm - fri, poor P &amp; P, tr fnt - poor fluor, no cut.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Red Shale Marker&quot;</td>
<td>1952 (+1737) log</td>
<td>1952</td>
<td>Sh, rust red w/metallic luster from finely disseminated mica, v soft, fissile w/some interbedded ls @ base of interval, tan - cream, some pink, v fn - microxln, firm - hrd, brittle, dolo &amp; anhy, whit, v fn - fn xln, massive - sucrosic, firm - soft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1752</td>
<td>1964</td>
<td>12</td>
<td>Dol, it tan, v fn - microxln, hrd - firm, brittle, anhy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l.t. lpeg sandstone some</td>
<td>1964 (+1725) log</td>
<td>1964</td>
<td>Dol, it tan, v fn - microxln, hrd - firm, brittle, anhy.</td>
<td></td>
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</tr>
<tr>
<td>1964</td>
<td>1976</td>
<td>12</td>
<td>Dol, it tan, v fn - microxln, hrd - firm, brittle, anhy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Year</td>
<td>Sample</td>
<td></td>
<td></td>
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<td>------</td>
<td>------</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>2000</td>
<td>2020</td>
<td>20</td>
<td>Dol, med gry - gry brn, w/blk mottling, v fn granular - v fn xln, firm - hrd, brittle, anhy, limy &amp; anhy w/brn mottling, v fn xln, massive, some sucrosc, firm, w/some sa, med gry - tan, fn gmn, s rnd - s ang, anhy filled, dolo, firm - fri, no P &amp; P, some tr blk dead oil stn, poor - fr it yell flour, no cut.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>2046</td>
<td>26</td>
<td>Dol tan - brn &amp; gry, v fn - microxln, some granular, hrd - firm, brittle, anhy, somewhat limy w/interbedded anhy, wht w/some brn mottling, fn - v fn xln, massive, some sucrosc, firm - soft.</td>
<td></td>
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<tr>
<td>2046</td>
<td>2062</td>
<td>16</td>
<td>Dol, tan - gry brn, v fn xln - granular, firm - hrd, anhy, somewhat limy, brittle w/ss, wht - tan, fn gmn, some med, s rnd - s ang, anhy filled in part, dolo, firm - fri, no - fr P &amp; P, some tr blk dead oil stn, ali tr brn oil (?) stn, fn t it yell flour, no cut. Some tr hrd blk carb, silty sh @ base of interval.</td>
<td></td>
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</tbody>
</table>

**2nd Leo sandstone zone** 2062 (+1627) log

<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
<th>Sample</th>
</tr>
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<tbody>
<tr>
<td>2062</td>
<td>2072</td>
<td>10</td>
</tr>
<tr>
<td>2072</td>
<td>2102</td>
<td>30</td>
</tr>
</tbody>
</table>

Samples were circulated @ 2076' and 2082' for 1 hr @ each point before DST #1
DST #1: 2060'-2062' (adjusted to log from 2068'-2090' driller's depth)
(See page 9 for DST data)

<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2102</td>
<td>2110</td>
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<tr>
<td>2110</td>
<td>2146</td>
<td>36</td>
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<tr>
<td>2146</td>
<td>2168</td>
<td>22</td>
</tr>
</tbody>
</table>

**3rd Leo sandstone zone** 2168 (+1521) log

<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2168</td>
<td>2178</td>
<td>10</td>
</tr>
<tr>
<td>2178</td>
<td>2204</td>
<td>26</td>
</tr>
</tbody>
</table>
Dewey-Burdock GDP
June 2012

2204 2250 46
Dol. tan - gry crn. v fn - microxin & v fn granular, firm - hrd, brittle w/some interbedded - 0 , wht. fn - v fn xln, massive - sucroesic, firm - soft. Some scatt stringers of as, wht - lt gry & tan, fn grn. s rnd - s avg. any filled, iso, firm - hrd, no P & F, tr slx dead oil strn, fat - Fr. some gd lt yell flour, no cut.

Samples circulated for 1 hr @ TD before logging

TD 2250' drilled
2248' log

Drilling time was kept on a Geolograph drilling time recorder. A drilling time log was constructed for each 2' interval on a scale of 5" = 100' from 1300' to TD. Both the original drilling time chart and the drilling time log were delivered to the offices of Aquarius Resources Corp., Gillette, Wyo.

Aldred D. Johnson
<table>
<thead>
<tr>
<th>Item Description</th>
<th>O.D.</th>
<th>I.D.</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drill Pipe or Tubing</td>
<td>6&quot;</td>
<td>2.75&quot;</td>
<td>1'</td>
</tr>
<tr>
<td>Reversing Sub</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Cushion Valve</td>
<td>4⅝&quot;</td>
<td>3.826&quot;</td>
<td>1795'</td>
</tr>
<tr>
<td>Drill Pipe</td>
<td>6⅛&quot;</td>
<td>2.25&quot;</td>
<td>242'</td>
</tr>
<tr>
<td>Drill Collars</td>
<td></td>
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</tr>
<tr>
<td>Handling Sub &amp; Choke Assembly</td>
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</tr>
<tr>
<td>Dual CIP Valve</td>
<td>5&quot;</td>
<td>.87&quot;</td>
<td>6.65'</td>
</tr>
<tr>
<td>Dual CIP Sampler</td>
<td>3&quot;</td>
<td>.75&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>Hydro-Spring Tester</td>
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<tr>
<td>Multiple CIP Sampler</td>
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<tr>
<td>Extension Joint</td>
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<tr>
<td>AP Running Case</td>
<td>5&quot;</td>
<td>3&quot;</td>
<td>4'</td>
</tr>
<tr>
<td>Hydractic Jar</td>
<td>5&quot;</td>
<td>1.5&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>VR Safety Joint</td>
<td>5&quot;</td>
<td>1&quot;</td>
<td>2.5'</td>
</tr>
<tr>
<td>Pressure Equalizing Crossover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packer Assembly</td>
<td>7&quot;</td>
<td>1.53&quot;</td>
<td>6'</td>
</tr>
<tr>
<td>Distributor</td>
<td>5&quot;</td>
<td>1.68&quot;</td>
<td>2'</td>
</tr>
<tr>
<td>Packer Assembly</td>
<td>7&quot;</td>
<td>1.53&quot;</td>
<td>6'</td>
</tr>
<tr>
<td>Flush Joint Anchor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Equalizing Tube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanked-Off B.T. Running Case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drill Collars</td>
<td>5&quot;</td>
<td>1.5&quot;</td>
<td>4'</td>
</tr>
<tr>
<td>Anchor Pipe Safety Joint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packer Assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packer Assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchor Pipe Safety Joint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Wall Anchor</td>
<td></td>
<td></td>
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<tr>
<td>Drill Collars</td>
<td>5&quot;</td>
<td>3&quot;</td>
<td>4'</td>
</tr>
<tr>
<td>Flush Joint Anchor</td>
<td>5&quot;</td>
<td>2.37&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>Blanked-Off B.T. Running Case</td>
<td>5&quot;</td>
<td>3&quot;</td>
<td>4'</td>
</tr>
<tr>
<td>Total Depth</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>
### SPECIAL PRESSURE DATA

<table>
<thead>
<tr>
<th>Gauge No.</th>
<th>Depth</th>
<th>Clock No.</th>
<th>12 hour</th>
<th>Ticket No.</th>
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<tbody>
<tr>
<td></td>
<td>2045'</td>
<td>9984</td>
<td></td>
<td>771061</td>
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</table>

<table>
<thead>
<tr>
<th>First Flow Period</th>
<th>First Closed In Pressure</th>
<th>Second Flow Period</th>
<th>Second Closed In Pressure</th>
<th>Third Flow Period</th>
<th>Third Closed In Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Def.</td>
<td>PAG</td>
<td>Time Def.</td>
<td>PAG</td>
<td>Time Def.</td>
<td>PAG</td>
</tr>
<tr>
<td>0.0000</td>
<td>288</td>
<td>0.0090</td>
<td>624</td>
<td>0.0000</td>
<td>651</td>
</tr>
<tr>
<td>0.0199</td>
<td>369</td>
<td>0.0088**</td>
<td>636</td>
<td>0.0736***</td>
<td>790</td>
</tr>
<tr>
<td>0.0332</td>
<td>462</td>
<td>0.0203</td>
<td>857</td>
<td>1.498</td>
<td>847</td>
</tr>
<tr>
<td>0.0485</td>
<td>573</td>
<td>0.0338</td>
<td>863</td>
<td>2.079</td>
<td>868</td>
</tr>
<tr>
<td>0.0577</td>
<td>576</td>
<td>0.0473</td>
<td>868</td>
<td>2.749</td>
<td>876</td>
</tr>
<tr>
<td>0.0730</td>
<td>624</td>
<td>0.0608</td>
<td>870</td>
<td>3.479</td>
<td>878</td>
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<tr>
<td>0.0744</td>
<td>872</td>
<td>0.0879</td>
<td>874</td>
<td>4.090</td>
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<tr>
<td>0.1074</td>
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<td>1.149</td>
<td>876</td>
<td>4.428</td>
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<tr>
<td>0.1284</td>
<td>878</td>
<td>1.294</td>
<td>878</td>
<td>4.961</td>
<td>880</td>
</tr>
<tr>
<td>0.1420</td>
<td>878</td>
<td>1.355</td>
<td>880</td>
<td>5.510</td>
<td>880</td>
</tr>
<tr>
<td>0.1555</td>
<td>880</td>
<td>1.690</td>
<td>880</td>
<td>6.068</td>
<td>880</td>
</tr>
<tr>
<td>0.1823</td>
<td>880</td>
<td>1.960</td>
<td>880</td>
<td>6.626</td>
<td>880</td>
</tr>
</tbody>
</table>

### Remarks:

- First interval is equal to 3 minutes.
- ** = 1 minute
- *** = 11 minutes.
**FLUID SAMPLE DATA**

<table>
<thead>
<tr>
<th>Date</th>
<th>12-20-76</th>
<th>Ticket Number</th>
<th>77106</th>
</tr>
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</table>

**Sampler Pressure**

<table>
<thead>
<tr>
<th>Pressure</th>
<th>P.S.I.G. at Surface</th>
</tr>
</thead>
</table>

**Recovery**

- Cu. Ft. Gas
- cc. Oil
- cc. Water
- cc. Mud
- Tst. Liquid cc.

**Gravity**

- * API @ °F.
- Cu. Ft./Bbl.

**Gas/Oil Ratio**

- RESISTIVITY Cu. Ft./Bbl.
- CHLORIDE CONTENT ppm

**Recovery Water**

- 2.1% 48 °F. - 1200 ppm

**Recovery Mud**

- 0 °F.
- ppm

**Recovery Mud Filtrates**

- 1.42% 41 °F. - 700 ppm

**Mud Pit Sample**

- 1.40% 41 °F. - 700 ppm

**Mud Weight**

- 9.3 lbs via 50 sec

**Cushion**

- TYPE
- AMOUNT
- Depth Back
- Ft. Pres. Valve
- Surface Choke
- 3/8" Bottom Choke
- 3/4"

**Recovered**

- 125 Feet of brownish colored water
- 1838 Feet of black colored sulphur water

**Remarks**

- SEE PRODUCTION TEST DATA SHEET. No gas to the surface.

---

**FORMATION TEST DATA**

**TEMPERATURE**

<table>
<thead>
<tr>
<th>Gauge No. 48</th>
<th>Gauge No. 47</th>
<th>Gauge No. 48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death: 2045 ft</td>
<td>Death: 2006 ft</td>
<td>Death: 2045 ft</td>
</tr>
<tr>
<td>12 Hour Check</td>
<td>12 Hour Check</td>
<td>Hour Check</td>
</tr>
<tr>
<td>Test A.M.</td>
<td>1615 P.M.</td>
<td>Opened A.M.</td>
</tr>
<tr>
<td>Opened A.M.</td>
<td>1855 P.M.</td>
<td>Bypass</td>
</tr>
</tbody>
</table>

**Actual 70 °F**

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Office</td>
</tr>
<tr>
<td>Field</td>
<td>Office</td>
</tr>
<tr>
<td>Field</td>
<td>Office</td>
</tr>
<tr>
<td>Field</td>
<td>Office</td>
</tr>
</tbody>
</table>

**Initial Hydrostatic**

- 979
- 1019
- 998
- 1034

**Flow Initial**

- 294
- 298
- 346
- 337

**Flow Final**

- 588
- 624
- 605
- 625

**Flow Closed In**

- 882
- 880
- 907
- 894

**Flow Closed Out**

- 593
- 651
- 652
- 675

**Flow Initial**

- 882
- 880
- 807
- 894

**Flow Closed In**

- 882
- 882
- 907
- 896

**Flow Closed Out**

- 983
- 1000
- 998
- 1017

---

Dewey-Burdock GDP
June 2012
3.7-B-603
Appendix 3.7-B
PRODUCTION TEST DATA

<table>
<thead>
<tr>
<th>Time</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300</td>
<td>On location</td>
</tr>
<tr>
<td>1315</td>
<td>Made up tools</td>
</tr>
<tr>
<td>1355</td>
<td>Started in hole</td>
</tr>
<tr>
<td>1615</td>
<td>Opened tool with a strong blow at bottom of bucket, remained same until closed in.</td>
</tr>
<tr>
<td>1625</td>
<td>Closed tool, blow died in 9 minutes.</td>
</tr>
<tr>
<td>1655</td>
<td>Opened tool with blow at bottom of bucket, after 12 minutes appeared to start decreasing. In 28 minutes had 1&quot; off bottom of bucket. In 35 minutes had 9½&quot; into bucket In 37 minutes had 2½&quot; in bucket In 38 minutes had 1¾&quot; in bucket In 40 minutes had 1&quot; in bucket In 42 minutes - 1/2&quot; in bucket In 44 minutes had surface bubbles. Remained same until closed in.</td>
</tr>
<tr>
<td>1755</td>
<td>Closed tool - dead.</td>
</tr>
<tr>
<td>1855</td>
<td>Pulled loose with no trouble.</td>
</tr>
</tbody>
</table>

PRODUCTION TEST DATA

Dewey-Burdock GDP
June 2012
3.7-B-604 Appendix 3.7-B
ADMINISTRATIVE / SUNDRY REPORTS
## PLUGGING RECORD

**Operator:** Aquarius Resources Corporation  
**Address:** 107 Conroy Building, Casper, Wyoming 82601

<table>
<thead>
<tr>
<th>Field &amp; Reservoir</th>
<th>Name of Lease</th>
<th>Well No.</th>
<th>Location of Well</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>14-11</td>
<td>C 160 SE Section 11-75-1E</td>
</tr>
</tbody>
</table>

**Application to drill this well was filed in name of:** Aquarius Resources Corp.

- **Has this well ever produced oil or gas?** No
- **Character of well at completion (initial production):** Oil 150 Bbl/day
- **Field & Reservoir:** Conroy But
- **Gypsum Water:** 819 ft
- **Borehole:** 162 ft
- **Dry hole marker:** 162 ft

### CASING HISTORY

<table>
<thead>
<tr>
<th>Date</th>
<th>Depth (ft)</th>
<th>Type of Casing</th>
</tr>
</thead>
</table>
| October 25, 1976 | 162 ft. | Minnelusa<br>406 ft.
|             | 162 ft. | Converse<br>570 ft.
|             |         | Sandstone<br>619 ft.
|             |         | Spearfish<br>866 ft.
|             |         | Goose Egg<br>1158 ft.
|             |         | Minnelusa<br>1412 ft.
|             |         | Spike<br>1452 ft.

**Fall River-Lakota**

- **Well 16-B-14:** 162 ft.
- **Dry hole marker:** 162 ft.

### END REVERSE SIDE FOR ADDITIONAL DETAIL

**Date:** 30th day of December 1976  
**State:** Wyoming  
**County:** Natrona

**Signatures:**
- **John P. Truttner:** Secretary of State of Wyoming
- **Mark L. Weisser:** Wyoming Board of Oil and Gas Supervisors
- **James L. Davidson:** Oil & Gas Board of the State of South Dakota

**Notations:**
- **Dewey-Burdock GDP June 2012**
- **Appendix 3.7-B**
## Sundri Notices and Report on Wells

<table>
<thead>
<tr>
<th>OIL WELL</th>
<th>GAS WELL</th>
<th>___________</th>
<th>DRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATOR</td>
<td>AQUARIUS RESOURCES CORPORATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADDRESS</td>
<td>367 Conroy Building, Casper, Wyoming 82601</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCATION</td>
<td>660' FSL, 2217' PHL Section 11-75-18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATION</td>
<td>1660.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUNTY</td>
<td>Platte, Wyoming</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WELL NO.** 3-7-B-607

**FIELD IN WHICH WELLS WERE DRILLED**

**Well no. 3-7-B-607**

**COUNTY** Platte

**PARK OR LEASE NAME** Petramax

**DATE OF PERMIT** 14-11

**NOTICE OF INTENT TO PERFORM SUBSEQUENT REPORT OF**

<table>
<thead>
<tr>
<th>Test Water Shut-Off</th>
<th>Shoot or Acidize</th>
<th>Water Shut-Off</th>
<th>Shoot or Acidizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture Treat</td>
<td>Repair Well</td>
<td>Fracture Treatment</td>
<td>Repairing Well</td>
</tr>
<tr>
<td>Multiple Complete</td>
<td>Pull or Alter Casing</td>
<td>Altering Casing</td>
<td></td>
</tr>
<tr>
<td>Abandon</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notice of Perforation**

Water was encountered in all porous zones drilled. The Leo sand had excellent porosity but yielded sulfur water when tested. Proposed plugging as approved by telephone is as follows:

- 35 sx 1900-2000 Minneluna-Leo
- 50 sx 750-900 Sundance
- 30 sx 105-190 base of surface casing
- 10 sx Surface plug & erect dry hole marker

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

**SIGNED** J. H. Wells

**TITLE** President

**DATE** December 23, 1976

**APPROVED** Jan. 5, 1977

**CONNECTIONS, IF ANY**

**SUPERVISOR**

---

Dewey-Burdock GDP
June 2012

3.7-B-607

Appendix 3.7-B
CORRESPONDENCE
November 10, 1976

Aquarius Resources Corporation
307 Conroy Building
Casper, WY 82601

Attention John F. Trotter

Gentlemen:

Enclosed is your copy of Permit #776 (Form 2a) and approved Application
to Drill (Form 2) covering the Aquarius #34-11 Peterson oil test in
Fall River County, South Dakota. A copy of the permit should be posted
at the well site. Also enclosed is a receipt for your $100 permit fee.

Please make weekly drilling progress reports to the Western Field Office.

May I wish you success in your drilling venture and if there is anything
I can do to be of help, please let me know.

Sincerely,

[Signature]

Fred V. Staece
Supervisor, Western Field Office

FVS/jm
Eno. 3
cc: Dr. Duncan J. McGregor
    Mr. Vann W. Butler
    Dr. Allyn Lockner
    Mr. George Kane
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
Record 1 of 1

Well Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>API No:</td>
<td>40 047 20074</td>
</tr>
<tr>
<td>Well Name:</td>
<td>WULF 1 PETERSON</td>
</tr>
<tr>
<td>Permit No:</td>
<td>903</td>
</tr>
<tr>
<td>Operator Name:</td>
<td>CRYSTAL OIL COMPANY</td>
</tr>
<tr>
<td>Permit Date:</td>
<td>12-13-1978</td>
</tr>
<tr>
<td>Spud Date:</td>
<td>03-10-1979</td>
</tr>
<tr>
<td>Plug Date:</td>
<td></td>
</tr>
<tr>
<td>County:</td>
<td>FALL RIVER</td>
</tr>
<tr>
<td>Location:</td>
<td>NENE 21-7S-1E</td>
</tr>
<tr>
<td>Total Depth:</td>
<td>2500</td>
</tr>
<tr>
<td>Bottom Hole:</td>
<td>Minnelusa</td>
</tr>
<tr>
<td>KB Elevation:</td>
<td>3639</td>
</tr>
<tr>
<td>Ground Elevation:</td>
<td>3333</td>
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<tr>
<td>Latitude:</td>
<td>43.433117</td>
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<tr>
<td>Longitude:</td>
<td>-103.991735</td>
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<tr>
<td>Status:</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>Type:</td>
<td>DRY HOLE</td>
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</table>

Formation Tops

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dakota Mud</td>
<td>235</td>
</tr>
<tr>
<td>Lakota</td>
<td>545</td>
</tr>
<tr>
<td>Sundance</td>
<td>840</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1840</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2287</td>
</tr>
<tr>
<td>1st Leo</td>
<td>2290</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>2382</td>
</tr>
</tbody>
</table>

Dewey-Burdock GDP
June 2012

3.7-B-614 Appendix 3.7-B
COUNTY: FALL RIVER
LEGAL LOCATION: NENE 21-7N-1E
API NO: 40 047 20074
PERMIT NO: 903
WELL NAME: WULF #1 PETERSON
OPERATOR: CRYSTAL OIL COMPANY
PERMIT ISSUED: 12/13/1978
PERMIT CLOSED: 05/08/1979
FILE LOCATION: 7N-1E-21 NENE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
BOND RELEASE CHECKLIST

Well Name & Location
Wulf #1 Peterson
NENE 21-7S-1E, Fall River

Permit # 903
API # 40 047 20074

Bond # 708E675-4 Date Issued 10-25-78 Date Released OCT 03 1986

Surface Restoration

✓ Pits filled
✓ Site Level
✓ Site policed
NA Dry-hole marker solid, sealed, correctly inscribed

X No dry-hole marker desired, letter in WPD files from surface owner
✓ Letter of approval from surface owner.

Paperwork filed

✓ Form 4 (Completion or Recompletion Report)
✓ Form 6 (Gundry Notices and Report on Wells)
✓ Form 7 (Plugging Report)

Geological Information Filed

✓ Well Logs: ITT, SNP, DIL, CR, PETP, CALIB, Current Bond, 2 Turn, Micro, LaterJing, SM Dens.

NA DST Charts and Reports
✓ Geologist's Report
✓ Results of coring and core analyses

✓ Set of 10-foot sample cuttings (check with Bob Schoon)

Crystal #1 Peterson - Core from 2,378' - 2,472' at depth

Date OCT 3 1986
Checked By

Dewey-Burdock GDP
June 2012
Appendix 3.7-B
## PERMIT CHECKLIST

<table>
<thead>
<tr>
<th>Well Name and Location:</th>
<th>Permit # 903</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well #1 Peterson</td>
<td></td>
</tr>
<tr>
<td>NENE 21-7S-1E, Fall River</td>
<td></td>
</tr>
<tr>
<td>API # 40 047 2007h</td>
<td></td>
</tr>
<tr>
<td>Bond # 708675-4</td>
<td></td>
</tr>
</tbody>
</table>

**Paperwork filed with WFO**

- [x] Organization Report
- [x] Application
- [x] Bond
- [x] Permit Fee

**The Following Papers sent to Operator:**

- [x] Permit (Form 2a)
- [x] Receipt for $100 permit fee
- [x] Cover letter explaining material sent

**Permit Fee Filed:**

- [x] Permit fee w/Cash Receipts Transmittal Form sent to State Treasurer

**Notification of New Permit sent to:**

- [x] Dr. Duncan J. McGregor
- [x] Mr. Vern W. Butler
- [x] Dr. Allyn Lockner
- [x] Mr. George Kane

**DATE 12-13-78**

**CHECKED BY Cheryl Pederson**
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

[ ] DRILL  [ ] DEEPEN  [ ] PLUG BACK  [ ] SINGLE ZONE

[ ] OIL WELL  [ ] GAS WELL  [ ] MULTIPLE ZONE

Wulf Oil Corporation

P. O. Box 1320 - Chadron, Nebraska 69337

NAME AND ADDRESS OF SURFACE OWNER:

Peterson & Son, Inc.

ELEVATION:

2,531 CR

PROPOSED DEPTH:

2,400'

NAME AND ADDRESS OF CONTRACTOR:

Northern Wyoming Drilling Co., Inc.

Box 746

Chadron, Nebraska 69337

PROPOSED CASING AND CEMENTING PROGRAM:

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>SACKS OF CEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 1/2&quot;</td>
<td>8 5/8&quot;</td>
<td>24#</td>
<td>New</td>
<td>250'</td>
<td>200 S.X.</td>
</tr>
<tr>
<td>7 7/8&quot;</td>
<td>5 1/2&quot;</td>
<td>15.30#</td>
<td>New</td>
<td>2,400'</td>
<td>150 S.X.</td>
</tr>
</tbody>
</table>

We plan to drill a 2,400' well into the Leo Formation. We plan to start the well Dec. 28, 1978 with operations lasting approximately 14 days.

Northern Wyoming Drilling Rig #2 is equipped with a 10" Ragan Blowout Preventer, which will be used while drilling the well.
Elevation at the following reference points:

130' North (on bank of Beaver Creek) - 3532'
150' West (on bank of Beaver Creek) - 3573'
200' South - 3532'
200' East (possible alternate site) - 3537.4'

I, Lawrence T. Price, in the County of Weston, Wyoming, certify

that in accordance with a request from

Sherry Samuels
Gillette, Wyoming
Wulf Oil Corp.

P. O. Box 1320, Chadron, Nebraska 69337

That I

made a survey (date)

November 29, 1978

for the location and elevation of the #1 Peterson Well site

As shown on the above map, the wellsite is in

NEq NEq

Section 21
Township 7 South
Range 1 East

Fall River
South Dakota
Elevation is 3533 feet

above mean sea level before casing.

709663.54
Notes in Blk 312 Pg 46
WELL INSPECTION / SCOUT REPORTS
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Operator Wulf Oil & Crystal

Farm/Lease Name #1 Peterson

API Number 40 047 20074

NE NE Sec. 21 T. 78 R. 1E

County Fall River

Elev. 3533 Gr. Est. T.D. 2400 Actual T.D. 2500 Spudded 3-10-79

Contractor N. Wyoming Drilling Geologist Jim Cox

SCOUT'S OBSERVATION: DST RECORD:

Site clean, level, no dry hole marker (as requested by landowner), site approved.

FORMATION TOPS:

PLUGGING RECORD: DATE PLUGGED/COMPLETED 4-7-79

CASING RECORD: SITE INSPECTION:

R 5/8 From 0 To 250 Approved X

Not Approved

REMARKS:

SCOUTED BY Tim Kenyon Fred V. Steece

Geologic Assistant Supervisor

Western Field Office
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Operator Wulf Oil & Crystal

Farm/Lease Name El Peterson

Elev. 3533 Est. T.D. 2400 Actual T.D. 2500 Spudded 3-10-79

Contractor Northern Wyoming Drilling Geologist Jim Cox

SCOUT'S OBSERVATION:
4-9-79: Pits filled but surface is not leveled. Surface plug not in yet, and no dry hole marker erected. Dozer still at site.
5-15-79: Pits filled and surface leveled to original topography. No seed planted.

FORMATION TOPS:

PLUGGING RECORD:

DATE PLUGGED/COMPLETED 4-7-79

CASING RECORD:
8 5/8 From 0 To 250
Not Approved

SITE INSPECTION:
Approved

REMARKS:
Mr. Peterson requested that no dry hole marker be erected. Peterson also wanted us to hold the bond since he and Joe Banks haven't come to an agreement yet.

SCOUTED BY
John Fricke Geologic Inspector
Fred V. Stedde, Supervisor Western Field Office

Dewey-Burdock GDP
June 2012
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Number 1

Date Scouted ____________

Permit Number 903

Operator Wulf Oil & Crystal

Farm/Lease Name #1 Peterson

_ MINE __ Section 21 __ T. 7S __ R. 1E __

County Fall River

Elev. 3533 Gr Est. T.D. 2400 Actual T.D. 2140 Spudded 3-10-79

Contractor Northern Wyoming Drilling

Joe Banks, owner, Gillette, WY

SCOUT'S OBSERVATION:

3-6-79: Still M.I. S., performing minor repairs.

3-22-79: Drilling at 2434. DST #1, 2nd Leo (misrun). Presently down hole with core barrel (core #4). Plan to drill down to 2500'. Good oil shows reported in cores #1 & #3.

FORMATION TOPS:

PLUGGING RECORD:

DATE PLUGGED/COMPLETED __________

Core #1, 17', 2378-2395
#2, 2', 2395-2397
#3, 25', 2397-2422
#4, 12', 2422-2434

CASING RECORD:

SITE INSPECTION:

From 0 To 280

Approved _____________

Not Approved X

REMARKS:

Mylo Wisman, toolpusher. Will probably spud tomorrow, and test should last approximately 2 weeks. Location extremely muddy.

SCOUTED BY

John Fricke
Geologic Assistant

Fred V. Steece, Supervisor
Western Field Office

 predator
5/22/95: MM received a call from Wayne Peterson, the landowner. He discovered water surfacing in his alfalfa field several months ago, near the well location. He dug down almost to the wellhead, and the flow increased substantially. Mr. Peterson dug a trench away from the wellhead to keep his alfalfa from damage.

5/30/95: MM inspected the site, accompanied by Wayne Peterson. The flow was estimated at 10 gpm, and since the Inyan Kara and Sundance both exhibit artesian conditions in that area, it was possible the flow was emanating from either (or both) of those formations, travelling up the 5 1/2, 8 5/8 casing annulus.

6/1/95: FVS contacted Sam Clinton w/ Crystal Oil Co. Mr. Clinton assured FVS Crystal was a responsible co. and would fix the problem.

6/1/95: Pat Eddings (Crystal) called FVS and requested info from well files, which were faxed that day.

6/6/95: Received fax from Pat Eddings, Updike Brothers Well Service (Newcastle, WY), had been contracted to plug well.

8/22/95: Received fax from Ed Gibbs (Updike Bros) with Sundry of proposed P&A procedure.

8/24/95: MM called Ed Gibbs, approved P&A procedure. Ed said planning to move rig on-site the following week.

8/31/95: MM witnessed P&A (see procedure above).

9/11/95: Received Sundry from Ed Gibbs (Updike Bros) w/ P&A procedure. Approved by FVS.
OPERATOR’S
TECHNICAL
REPORTS / MAPS
CORE ANALYSIS RESULTS FOR
CRYSTAL OIL COMPANY
#1 PETERSON
WILDCAT
FALL RIVER COUNTY, SOUTH DAKOTA
### Conventional Core Analysis

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<th>Perm. To Air (md)</th>
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<th>Perm. To Air (md)</th>
<th>Por. Fl.</th>
<th>Fluid Sat. Gr.</th>
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**VF = Vertical Fracture**

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CRystal Oil Company

Formation: Minnelusa
Drlg.: Fluid: Water Base Mud
Location: NE NE Sec 21 T76-R16
State: South Dakota

Conventional Core Analysis

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<th>Per.</th>
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Vf = Vertical Fracture

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Page 2 of 2
CORE-GAMMA CORRELATION

INTERPRETATION OF DATA

2206.0-2208.0 feet - Non productive due to low permeability and porosity.
2208.0-2404.0 feet - Oil productive characteristics-thin zone. Results oil saturation indicates high water cut could be expected.
2404.0-2432.0 feet - Water productive where permeable.

These reports estimate representative theoretical maximum values for suction gas and water drive. They assume that production is started at original reservoir pressure, i.e., no account is taken of production in place or of prior drainage by other means. The effects of factors tending to reduce actual ultimate recovery, such as geologic, liquid or oil production rates, gas-oil ratios, or analogs, have not been taken into account. Further, however, factors have been considered which may result in actual recovery being greater than that expected from theoretical analysis. Such factors include: (a) the presence of any (b) the presence of any

Appendix 3.7-B
DAILY DRILLING REPORT

DATE: March 12, 1979
OPERATOR: Gulf Oil Corporation

WELL NAME AND LOCATION: EL Peterson, T75, R18, Sec 21; NEWME, Fall River Co., SD

DEPTH: 75'

BIT NUMBER: 11, Y127, 7 7/8" Reed, drilled 750' with water, 5 hrs drilling cement & p

DRILLING MUD PROPERTIES: WT. __________ VIS. __________ PH __________ H2O LOSS __________

SAMPLE TOPS:

REMARKS:

3-12

9 hrs - drilling new hole
8 hrs - nipple up
4 hrs - rig service
4 hrs - jetting pits
1 hrs - packing mud

drilling 100 RPM's, 30,000 lbs weight, 54 strokes, 700 lbs pump pressure

35 total rotating hours
6 3/4 hrs - drilling
1 3/4 hrs - circulating
4 hrs - rig service
4 hrs - rig up casing tools
4 hrs - running casing
3/4 hrs - cementing

13 hrs - waiting on cement and nipple up

survey at 255' with 10° deviation
ran 245' of 8 5/8" 24 lbs STNC
set at 253' Kb

cemented with 250 cem cement, 3% Calcium Chloride and 1% chip seal

Good returns
4 hrs - work on derrick
5 hrs - drilling mouse and rat hole
15 hrs - drilling 12 1/4 hole

survey at 100' - 10° deviation

drill 100 RPM's, 54" liners, 14 x 54 strokes, 450 lbs pump pressure
Estimated spud date, March 1.

2-22-79

Grading location.

Expect to move in rotary tools by February 28.

Rig is currently under day work contract for the Federal Government at Phillip, South Dakota on a geothermal test.

March 2, 1979, 1:35 p.m.

Moved last load onto location this a.m.

Rig is on location and set in.

Shut down and recruiting crews.

When crews are hired, needed welding on derrick will begin.

Anticipate spudding Monday, March 5, 1979.

March 3, 1979

Hiring crews.

Crane or truck unavailable.

Anticipated spud date, Thursday, March 8, 1979

March 4, 1979

Hiring crews.

Crane or truck unavailable.

Anticipated spud date, Thursday, March 8, 1979

Working on derrick. Waiting on crane or truck to move derrick off of the floor.

Anticipated spud date March 8, 1979.

March 6, 1979

Working on derrick.

Anticipated spud date March 8, 1979.

March 7, 1979

Working on derrick.

Anticipated spud date March 8, 1979.

March 8, 1979

Derrick repaired and set up on drilling rig floor.

RIG T

March 9, 1979

Should spud late this afternoon.

Mixed mud and prepared to spud yesterday but derrick would not scope up due to damage incurred in transit to location. Will continue to repair derrick today. If you have further questions, please feel free to contact Joe Banks. Telephone (307) 682-9354.
DRILLING REPORT

Crystal Oil Company
AFE #09889
Total Est Cost $100,065

LOCATION: NE/4, NE/4, Sec. 21, T7S, R1E

PROPOSED TD: 2400'

CONTRACTOR: Crystal Oil

ELEVATION:

3-10-79 TD 155', made 155', 1 day - - - This AM drilling - - - 4 hrs work on derrick, 5 hrs drill mouse & rathole, 15 hrs spud 12 1/4' hole. Survey 100', 10'.

3-11-79 TD 255', made 100', 2 days - - - This AM WOC & NU BOP's - - - 6 3/4 hrs drilling, 1 3/4 hrs circ, 1/4 hr rig service, 1/4 hr RU csg tools, 1 1/2 hrs run 8 5/8' 24# ST & C surface csg set at 253', cement w/250 ax + 3% CaCl + 1% chip seal, good returns, 3/4 hr cement, 13 hrs WOC & NU BOP's. Survey 250', 10'.

3-12-79 TD 750', made 495', 3 days - - - This AM drilling - - - drilling w/water - - - 5 hrs drill cement plug, 9 hrs drilling w/30,000#, 100 RPM, 700 pp, 8 hrs NU, 1 1/2 hrs rig service, 1 1/2 hrs jet pts, 1 hr pack swival - - - Bt #1, 7 7/8", Y12J, in 255', made 495'.

Crystal Oil assume operation 3-13-79.

3-13-79 TD 1478', made 734', 4 days - - - This AM drilling - - - drilling w/water - - - 1 1/4 hrs rig service, 1 1/2 hr survey, 1/2 hr rig repair, 4 1/8 hrs trip, 17 1/4 hrs drilling w/30,000#, 100 RPM, 650 pp - - - Bt #1, 7 7/8", Y12J, in 255', out 818', made 561' in 11 hrs. Bt #2, 7 7/8", Y12J, in 818', made 880' in 14 1/2 hrs. Survey 818', 10'.

3-14-79 TD 1721', made 245', sh, 5 days - - - This AM mudding up - - - Mud 9.2, Vls 46, WL 6.3 - - - 14 3/4 hrs drilling w/30,000#, 80 RPM, 650 pp, 1 1/4 hrs rig repair, 4 3/4 hrs work stock pipe, ream 120' to btm, 1/4 hr service rig, 3 hrs mudding up & circ - - - Bt #2, 7 7/8", Y12J, in 818', made 905' in 29 1/4 hrs.

3-15-79 TD 1944', made 223', sd & sh, Minnelusa, 8 days - - - This AM work on mud pump - - - Mud 8.4, Vls 38, WL 12.8 - - - 4 1/2 hrs trip (1 hr pull 1st 3 sides, tight spot, 1/2 hr washing down), 1/2 hr survey, 1 1/2 hrs circ & cond, 1/2 hr service rig, 13 3/4 hrs drilling w/30,000#, 50 RPM, 550 pp, 3 1/4 hrs rig repair, work on mud pump - - - Bt #2, 7 7/8", Y12J, in 818', out 1721', made 905' in 29 1/4 hrs. Bt #3, 7 7/8", FP-52, in 1721', made 458' in 32 1/4 hrs. Cum cost $90,004.

3-16-79 TD 2218', made 233', sd & sh, 7 days - - - This AM drilling - - - Mud 6.7, Vls 53, WL 6.0 - - - 3 1/4 hrs rig repair, 3/4 hrs service rig, 1 1/2 hrs circ & cond mud, 18 1/2 hrs drilling w/30,000#, 50 RPM, 500 pp - - - Bt #3, 7 7/8", FP-52, in 1721', made 566' in 55 hrs. 'Top of Red Marker 2270', Btm at 2278'. Cum cost $98,684.

3-17-79
3-18-79  TD 2378', made 92', ad & sh, 9 days -- This AM trip to run core barrel
- - - Mud 10, Vis 45, WL 4 -- -- 21 3/4 hrs drilling w/35,000#., 50 RPM,
600 pp, 1/2 hr service rig, 1/4 hr rig repair, 1 1/2 hrs trip -- -- Bit #3,
7 7/8", FP-52., in 1721', out 2378', made 657' in 75 3/4 hrs. Cum cost
$107,426.

3-19-79  TD 2383', made 17', sh & Leo ad, 10 days -- -- This AM WOO, lay down core barrel
- - - Mud 9.9, Vis 43, WL 9 -- -- 4 hrs reaming, 13 hrs coring
2378-557', 5 hrs trip, out 17', 1/4 hr survey, 1/4 hr RU to TOOH w/core,
1 1/2 hr break out & lay down core, show of sd on btm 8 1/2', Leo ad
2386.5-557', light to med gray, very, very fine grain, hard anhy, poor porosity
& permeability. Survey 2378', 1 1/2'.

3-20-79  TD 2395', made 0', Leo Sd, 11 days -- -- This AM wash core barrel to btm
- - - Mud 9.7, Vis 51, WL 7.6 -- -- 1 3/4 hrs trip, 3/4 hr ream,
4 1/2 hrs PU DST tool, run DST test #1, 15 mins, surface bubbles only, close
tool 30 mins, reopen tool 80 mins, surface bubbles only, blow died in
52 mins, CI for 60 mins, POOH, CI pressures were higher than hydrostatic,
tool slid 5' to btm, CI press appears to be of no value, mud may have been
by passed or pks compressed rathole mud during CI, Interval tested 2386-95',
surface ck 1/4", btm ek 15/16", rec 150' drilling mud, Cal 300 PPM

1st Period:  2nd Period:

IF 1165#       IF ----
IF 17-23#     FF 23-0#
ICI ----      FCI ----

Test not valid, 2 hrs circ & cond mud, 1/2 hr service rig, 4 1/2 hrs WOO,
PU 60' core barrel, RH at 7 AM, wash core barrel to btm. Cum cost
$124,415.

3-21-79  TD 2422', made 27', 2nd Leo Sd, 12 days -- -- This AM lay down core -- --
Mud 9.8, Vis 49, WL 5.8 -- -- 3 1/2 hrs wash & ream 50' to btm, 1/2 hr
circ & clean hole, 1 1/2 hr coring 2365-95', 1 hr go through pump, change
fuel filters, 1/2 hr coring 2365-95', TOOH w/core #2 2395-97', 2 1/2 hrs
TOOH & check core barrel, 1 1/2 hrs TH w/core barrel, 1 1/2 hrs wash 4 jbs
to btm, 1 hr circ & cond mud, 3 hrs coring 2397-2422', 1/4 hr service rig,
2 1/2 hrs cond & circ mud, lay down kelly, 2 1/4 hrs TOOH w/core #3.
Cum cost $133,060.

3-22-79  TD 2434', made 12', 2nd Leo Sd & sh, 13 days -- -- This AM POOH w/core #4
-- -- Mud 10.5, Vis 48, WL 14 -- -- 1 hr lay down core #8, cut 28', rec 18',
1 1/4 hrs WOO, 1/2 hr TH to ream & cond core hole, 1 hr reaming core hole,
1 1/2 hrs circ & cond hole for core #9, 2 1/4 hrs TOOH, 1/2 hr service rig,
1/2 hr PU core barrel, 2 hrs TH w/core barrel, 2 hrs reaming & circ, 8 1/2
hrs coring, 2422-34', 12', 1/4 hr service rig, 2 3/4 hrs circ & cond mud.
Cum cost $140,080.

3-23-79  TD 2500', made 68', ad, sh & dolomite, 14 days -- -- This AM circ & cond
to log -- -- Mud 9.8, Vis 48, WL 8 -- -- 2 1/2 hrs TOOH w/core #4, 2422-34',
cut 12', 2 hrs lay down core & core barrel, rec 12', 1/2 hr service rig,
2 hrs TH w/bit, 1/2 hr ream, 3/4 hr service rig, 14 1/2 hrs drilling, 1 1/4
hr circ & cond mud to log -- -- Bit #3, 7 7/8", FP-52, RR, made 66' in
14 1/2 hrs. Cum cost $150,853.
CEPCO Pelllirson • AFE 80383

Total Est Cost $100,650

Crystal's Share $100,650

3-24-79  TD 2500', made 0', 15 days - - - This AM circ, prep to run csg - - - Mud 9.8, Vis 49 - - - 1/2 hr circ to log, 1/4 hr survey, 1 3/4 hrs TOOH to log, 10 hrs logging, Schlumberger ran DILL-SFL, bore hole compensated, sonic & dip meter, Schlumberger's TD 2499', driller's TD 2500', 1 1/2 hr TIH to circ, 11 hrs circ, WO csg. Survey 2500', 2º. Cum cost $182,326.

3-25-79  TD 2500', made 0', 16 days - - - 1 'hia AM woe - - - 1 1/2 hr eire, WO csg, 3 1/2 hrs down kelly, DP, collars, RU csg crew, 3 hrs run 71 jts 5 1/2" 14# K-55 R-2 STC csg, best to 4300º, total 2503.94', land csg at 2499', FB 4266'. 3/4 hr RU Howco to cement, cement w/10 BW, 500 gals mud flush, 300 ax Class "H" cement, 3% KCL, .75% CFR-2, .4% Halad 22-A, .25 D-Air, displace w/61.13% KCL water, pump plug w/2000º, held 5 mins OK, plug down at 3:45 PM, broke out Howco, break down Hydrit to set slips, 7 1/4 hrs well had strong water flow out csg, CI csg head, RD Howco, release rig at 11 PM, 3-24-79, 8 hrs WOC. Cum cost $174,208.

 TD 2500', PBD 4266'.

3-26-79  24 hrs, waiting to move rig off location. Cum cost $174,208.

3-27-79  RD & MO Rig, WO completion Rig. Cum cost $174,208.

3-28-79  WO completion Rig. Cum cost $174,208.

3-29-79  11 hrs MI & RU Estmon Rig #12 from Kimball, NB. Plan to run CBL & perforate today. Cum Cost $195,208.

3-30-79  11 hrs, Schlumberger ran CBL-VDL-GR from 2490-1400º, good bond to top of cement at 1530º, found PBD at 2460º, Howco press tested csg to 2500º, held OK, TIH w/4" csg gun, 2490-1400º, 4/SPF, FL at surface after perf, RH w/bbl as follows:

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</tr>
<tr>
<td>1.12'</td>
<td>1 - SN</td>
</tr>
<tr>
<td>2349.63'</td>
<td>75 jts</td>
</tr>
</tbody>
</table>

RH w/swab, FL at surface, swab 3 hrs, rec 53 BLW, pulling from SN, fluid 100% load water, no gas, last run FL 100' above SN, 13 hrs CIFN. This AM CITP 5#, FL 1900', rec 300' dirty, brackish water, prep to acidize. Cum cost $195,240.

 TD 2500', PBD 4266', 5 1/2" csg perfs 2399-2400º.

3-31-79  11 hrs, CITP 5#, CICP 5#, FL 1900º, Halliburton acidized perfs 2399-2400º as follows: load hole w/36 bbls 2% KCL water, circ 12 bbls 15% HCL + 1%, displace w/3 bbls 3% KCL, CI csg w/1 bbl of acid across perfs, start pump on acid, break down formation at 600º at 1 BPM, 400º pp w/6 bbls of acid pump, SD, let acid soak 10 mins, press dropped to 0º, pump final 8 bbls acid at 2 BPM, 700º pp, overdisplace 1 bbl, ISIP 600º, 15 min 100º, RH w/swab, FL at surface, swab 8 hrs, rec 157 bbls 100% water, swabbing from SN w/FL maintaining 400º, average 19 BW per hr fixed in after load rec, 15 hrs CIFN. This AM CITP 5#, CICP 5#, FL 200' from surface, bled off air (no gas) (no hydrocarbons). Cum cost $901,219.
DRILLING REPORT

(4)

CEPCO
AFE #80883
Total Est Cost $100,650
Crystatt's Share $100,650

Peterson #1
Driftwood Prospect
Fall River County, S. Dakota

TD 2500', PBD 2450'.

4-1-79 10 hrs, CITP 50#, CICP 50#, bled off air (no gas), FL 200' from surface, fluid sample indicated 100% water, TOOH w/tbg, MU & TIH w/pkr & tbg, set pkr at 2290.53', WO Halliburton 4 hrs, mix & pump 25 ft Class "O" w/haid 22-A, 75 ft Class "G" regular, 20 bbls slurry, sq perf 2399-2400' at 2 BPM 1500# pp W/4 bbls in perf, press increased to 1500#, reduce rate slowly from 2 BPM to 0 w/5 bbls in perf, cement locked up, held 1500# on well for 30 mins w/min bleed off, rev out cement, press up to 1500#, held 5 min, OK, POOH w/tbg, 14 hrs CIFN. This AM WOC. Cum cost $209,452.

4-2-79 24 hrs WOC. This AM drill out cement sq. Cum cost $208,452.

4-3-79 11 hrs, MU & TIH w/4 3/4" bit & scraper, 2 7/8" tbg, tag cement at 2346', RU power swab, rev circ equip, drill 50' cement, circ hole clear, bset sq to 1500#, held OK, MU & TIH w/pkr, set at 2350', swab dry in 2 runs, no fluid entry, 13 hrs CIFN. This AM TOOH w/pkr, prep to perf 2400-02'. Cum cost $210,442.

4-4-79 10 hrs, TP 0#, CP 0#, FL 2350', no fluid feed in, POOH w/tbg & pkr, RU Goodwill & perf 2400-02', 4/SPF, made 7 holes w/4" egg gun, 1 shot did not fire, found PBD 2424', RD Goodwill, TIH w/tbg & pkr as follows:

<table>
<thead>
<tr>
<th>Tbg breakdown:</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB</td>
</tr>
<tr>
<td>2342.51'</td>
</tr>
<tr>
<td>75 bpl</td>
</tr>
<tr>
<td>1.12'</td>
</tr>
<tr>
<td>1 - SN</td>
</tr>
<tr>
<td>3.50'</td>
</tr>
<tr>
<td>1 - Baker Model &quot;R&quot; pkr</td>
</tr>
<tr>
<td>2353.13'</td>
</tr>
<tr>
<td>75 bpl</td>
</tr>
</tbody>
</table>

RU swab, swab well dry in 2 runs, made 1 run every 30 mins to 1 hr, rec 100' fluid per run, 100% water, no gas, cont to swab while RU Goodwill to reperf made 2 BW in 3 hrs swabbing, RU Goodwill, TIH w/1 11/16" through tbg gun, FL 200' above SN, perf 2400-02' w/9 holes, RD Goodwill, GIH w/swab, found FL 200' above SN, swab dry, made 1 run every 30 mins, rec 50-100' fluid per run, 100% water, 14 hrs CIFN, rec 3 BW in 5 hrs swabbing. This AM opened tbg w/slight blow, no gas, CP 0#, FL 1000' from surface, 100% water, swab down in 1 run, FL maintaining 100' above SN, making 1 run every 30 mins. Cum cost $213,332.
DRILLING REPORT

CEPCO
AFE #60883
Total Est Cost $100,650
Crystal's Share $100,650

Peterson #1
Driftwood Prospect
Fall River County, S. Dakota

TD 2500', PBD 2400', 5 1/2'' cag perfs 2400-02'.

4-7-79 12 hrs, work, 3 hrs WO Halliburton, RU, pump plug from 2424-2274' w/18 ax 50-50 Poz mix, lay down tbg, pump plug from 230-210' w/8 ax 50-50 Poz mix, filled top of 5 1/2'' cag w/15' cement, pumped 10 ax cement into surface cag, RD Halliburton, RD Eatmon rig, load out pipe & clean up location.

P & A

FINAL REPORT
ADMINISTRATIVE / SUNDRY REPORTS
Found fresh water leak to be in 5 3/4" csg.
Tagged T.D. at 1800' with sand line.
Welded a seal between 5 3/4" and 8 5/8" with an outlet in 8 5/8"
Pump 50 sx class G. cement down 8 5/8" and shut in.
Pump 50 sx cement in 8 5/8" from 370' to surface.
Cement settled inside 8 5/8"
Filled 5 3/4" back up with 20 sx
Cement settled
Wait 1 hour and filled 5 3/4" back up with 24 sx.
Cement settled slowly.
Wait 3 hours and filled 5 3/4" back up with 32 sx.
5 3/4 and 8 5/8 stayed full.
Welded a cap over the 8 5/8"
Filled in holes and ditches and leveled location up.

OIL & GAS PROGRAM

SEP 11 1995

8-31-95
SUNDAY NOTICES AND REPORT ON WELLS

SUBMIT IN TRIPlicate

1. Type of Well
   - [ ] Oil
   - [ ] Gas
   - [ ] Water
   - [ ] Other

2. Name of Operator
   - Crystal Oil Company

3. Address of Well (Permit, Sec., T., R., M., or Survey Description)
   - P.O. Box 21101, Shreveport, LA 71120 800-231-4814

4. Location of Well (Permit, Sec., T., R., M., or Survey Description)
   - NENE Sect. 27, T7S R1E 660'- FNL & 658'- FEL

5. Well Name and No.
   - Peterson #1

6. Field and Coat, or Exploatory Area
   - Wildcat

7. County or Parish, State
   - Fall River, SD

8. Check Appropriate Box(s) to Indicate Nature of Notice, Report, or Other Data

<table>
<thead>
<tr>
<th>TYPE OF SUBMISSION</th>
<th>TYPE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Notice of Leak</td>
<td>[ ] Abandonment</td>
</tr>
<tr>
<td>[ ] Subsequent Report</td>
<td>[ ] Recompletion</td>
</tr>
<tr>
<td>[ ] Total Abandonment Notice</td>
<td>[ ] Plugging Well</td>
</tr>
<tr>
<td>[ ] Change of Plane</td>
<td></td>
</tr>
<tr>
<td>[ ] New Construction</td>
<td></td>
</tr>
<tr>
<td>[ ] Post-Ball Perforating</td>
<td></td>
</tr>
<tr>
<td>[ ] Well Shut-Off</td>
<td></td>
</tr>
<tr>
<td>[ ] Conversion to Injection</td>
<td></td>
</tr>
<tr>
<td>[ ] Other</td>
<td></td>
</tr>
</tbody>
</table>

(Notes: Report results of multiple completions by Well Completion or Recompletion Report and Log Form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and if the proposed work modifies an existing well, state any proposed work. If well is directionally drilled, give sub-bottom locations and measured and true vertical depths for all markers that come permisible to this work.)

Repair a fresh water leak at the surface of the well which had been plugged on 4-6-79.

RIH with tubing and Taq cement plug at 210'-290'. If the plug is still there and is not leaking then perforate at 275' and set a cement retainer at 210' and squeeze the 8 5/8 with 100 sx of Class G cement.

Put a 15 sx plug at surface of 5 4.

If the cement plug is not found at 210'-290' then replace it with 35 sx cement and 15 sx at surface of 5 4 plus pump 50 sx cement down the surface pipe.

Signed: Edward Miller

Foreman URI

Date 8-22-95

Dewey-Burdock GDP

June 2012 3.7-B-641 Appendix 3.7-B
**PLUGGING RECORD**

<table>
<thead>
<tr>
<th>Operator</th>
<th>CRYSTAL OIL COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Owner</td>
<td>Peterson</td>
</tr>
<tr>
<td>Location of Well</td>
<td>Wildcat - Dry</td>
</tr>
<tr>
<td>Address</td>
<td>P. O. Box 21101, Shreveport, LA 71120</td>
</tr>
<tr>
<td>Well No.</td>
<td>1</td>
</tr>
<tr>
<td>Fields &amp; Reservoir</td>
<td></td>
</tr>
<tr>
<td>County</td>
<td>Fall River</td>
</tr>
<tr>
<td>Section</td>
<td>21</td>
</tr>
<tr>
<td>Township</td>
<td>75</td>
</tr>
<tr>
<td>NEq of Section</td>
<td>RIE</td>
</tr>
<tr>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>660’ FNL &amp; 658’ FEL NEq</td>
<td>26</td>
</tr>
</tbody>
</table>

**Wulf Oil Corporation**

<table>
<thead>
<tr>
<th>Date Plugged</th>
<th>April 6, 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Depth</td>
<td>2500'</td>
</tr>
<tr>
<td>Oil (bbls/day)</td>
<td>0</td>
</tr>
<tr>
<td>Gas (MCF/day)</td>
<td>0</td>
</tr>
<tr>
<td>Water (bbls/day)</td>
<td>0</td>
</tr>
<tr>
<td>Amounts Produced When Plugged</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Name of Gas Formation Contained Oil or Gas:**

<table>
<thead>
<tr>
<th>Depth of Each Formation</th>
<th>2500'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth Interval of Each Formation</td>
<td>---</td>
</tr>
</tbody>
</table>

**Dry**

**CASING RECORD**

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Plt in Well (ft)</th>
<th>Pulled Out (ft)</th>
<th>Left in Well (ft)</th>
<th>Packers and Valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-5/8&quot;</td>
<td>253'</td>
<td>0</td>
<td>253'</td>
<td>None</td>
</tr>
<tr>
<td>5-1/2&quot;</td>
<td>2499'</td>
<td>0</td>
<td>2499'</td>
<td>None</td>
</tr>
</tbody>
</table>

**Wells were filled with mud and bentonite according to regulations:**

| Yes | Second Lea |

**Condition**

- Pump plug from 2424-2274’ w/16 sx 50-50 Posmix
- Pump plug from 290-210’ w/8 sx 50-50 Posmix
- Pump plug from 15'-0' w/5 sx cement
- Pump 10 sx cement into surface casing annulus.

**Plugged and Abandoned 4-6-79**

**Signature:**

James O. Glass

**Notary Public in and for:**

Caddo Parish, Louisiana

**Approved:**

May 8, 1979
SUNDRY NOTICES AND REPORT ON WELLS

OIL WELL [ ] GAS WELL [ ] DRY [X]

OPERATOR
Crystal Oil Company

ADDRESS
P.O. Box 21101 -Shreveport, Louisiana 71120

LOCATION (in feet from nearest line of section or legal subdivision, where possible)
660' FNL and 658' FEL of Sec. 21, T7S, R1E

ELEVATIONS (top, B.F.B., alt. grid, etc.; how determined)
3533' GR.

FARM OR LEASE NAME
Peterson

WELL NO.
1

FIELD AND POOL OR WILDCAT
Wildcat

ACRES IN LEASE
1200

SEC. 1/4, NE 1/4, Sec. 21, T7S, R1E

COUNTY
Fall River

INDICATE BELOW BY CHECK MARK NATURE OF REPORT, NOTICE OR OTHER DATA

TEST WATER SHUT-OFF [ ] SHOOT OR ACIDIZE [ ] WATER SHUT-OFF [ ] SHOOTING OR ACIDIZING [ ]
FRAC TREAT [ ] REPAIR WELL [ ] FRACTURE TREATMENT [ ] REPAIRING WELL [ ]
MULTIPLE COMPLETE [ ] FULL OR ALTER Casing [ ] ALTERING CASING [ ]
ABANDON [X]

NOTICE OF INTENTION TO:

SUBSEQUENT REPORT OF:

I hereby certify that the foregoing notice of operation performed is a true and complete report of such work or operation.

SIGNED

DATE: 4/9/79

DO NOT WRITE BELOW THIS LINE

APR 1917

WESTERN FIELD OFFICE

See Instructions On Reverse Side

Dewey-Burdock GDP
June 2012
3.7-B-644
Appendix 3.7-B
CORRESPONDENCE
I witnessed the plugging of this well last Thursday (9/31). When I arrived on location a backhoe had finished digging down to the casing. Water was shooting out of the weld around the cap on the surface (8 5/8") casing. The welder welded a 2" collar on the side of the surface pipe and cut a hole through the pipe. I estimated the flow at about 20 gpm. When the welder cut off the old casing cap, it was apparent the flow was coming up the inside of the production (5 1/2") casing, not the production/surface casing annulus as we had expected. This led us to speculate that the 5 1/2" had holes in it somewhere. Since the rig only had 400' of tubing, I had the rig run their sand line with a large sisal bar into the hole to determine where the top cement plug was. They didn't hit anything until 1800', there was supposed to be cement plug at the surface and at 210-220'.

A ring was welded in the annulus to isolate the two strings of casing, and a vacuum truck pumped up the water flowing out of the casing. A line from the cement pump was hooked up to the 8 5/8" casing, and we pumped 50 sacks of cement down the casing at 2 bpm - 400 psi, leaving a plug from 295'-0'. There was still 300 psi when we stopped pumping, so we shut the valve, and left the pressure on the pipe. The flow from the 5 1/2" never changed.

The rig ran 12 lbs of 2 3/4" tubing into the 5 1/2" casing to 369', and we pumped a 50 slt. plug from 419'-0' (base of surface ceg - 367'). When the tubing was pulled out, the cement level dropped about 100' in the pipe, but the water flow had stopped completely. I had them shut down for 1 hour, then we pumped 20 more slt. cement. The cement level dropped again, to the 100' level. I told them I wanted to see the cement level stay at surface, so we released the rig and waited 3 hours for the cement to set up. After 3 hours, we pumped another 35 slts. cement to fill the pipe. This time, the cement level stayed static. A total of 105 lbs cement were pumped down the 5 1/2" ceg, which calculates to a plug from 768' to surface.

A steel cap was welded on top of the pipe, and the backhoe filled the hole and backfilled the location. Wayne Peterson (the landowner) stopped by and said he was pleased with the response, cooperation, and results from Crystal Oil Co. and DENR.

As a side note, I witnessed another plugging of a former producing well the day before south of Provo. The company rep spent most of the time informing me how plugging rigs were too strict and expensive, and we were killing future exploration in the state. He asked why we required so much cement in shallow wells. I invited him to ride with me the next day to this well, and I would show him why.
I discussed this with Fred this morning. The leakage rate was estimated by Meck at about 10 gpm. The leakage is probably related to a problem with cementing in the annulus between the surface casing and long string. Fred has been in contact with the company that did the test several times and has faxed well information to them in that they no longer have records on this well. Fred indicates that they plan to fix the well although they don’t have a time line for the fix yet because they are still evaluating the information Fred sent. If the company does not respond with a plan in the next week or two, Fred will write them a letter requesting a plan for fixing the well.

Bob, this note is for your information.

Mr. Wayne Peterson, a rancher in Fall River County informed us that an oil test drilled on his land in 1979 has started to leak water for the past several months. Meck and Mr. Peterson inspected the site on Tuesday and found the well to be flowing maybe 10 gpm. The water is being diverted from his hay field onto the Cheyenne River flood plain where it is being disseminated into the alluvium. I talked to Roxanne who told me that even though the operator’s drilling bond has long since been released, they would still have some responsibility to fix the problem. I phoned the operator, located in Louisiana, and was told they would repair the well at an early date.
TO:         WFO Files
FROM:       Fred V. Steece
DATE:       June 2, 1995
SUBJECT:    Leaking oil test, Fall River County

This office was contacted by Mr. Mark Tubbs for Mr. Wayne Peterson on or about May 28, 1995 informing Mack that an old oil test drilled on Peterson's land had begun to flow water several months ago. The Wulf #1 Peterson located in NENE 21-7S-1E, Fall River County, was started by Wulf, taken over and plugged by Crystal Oil Company in 1979.

The following day Mack McGillivray met Mr. Peterson and inspected the well location and took photos and kept notes on his findings. He found that the water was flowing at an estimated rate of 10 gpm and had been channelled away from a hayfield toward the Cheyenne River. The water was not entering the river but was disappearing into the alluvium some distance from the river.

I spoke to Roxanne Giedd, Assistant Attorney General, to find out what responsibility the company would have after all this time, particularly since their drilling and plugging bond had long since been released. Roxanne told me as long as the well was not completed as a water well and turned over to the landowner for his use that, the company would still be responsible for plugging the hole.

I next visited with Jim Goodman at Water Rights to inform him of the flowing well and to inquire whether his division had a fund for plugging uncontrolled wells. He informed me they did not.

On June 1, 1995, I telephoned the company in Shreveport, LA and spoke with Mr. Sam Clinton who assured me that Crystal is a responsible company and would fix the problem. He arranged for Mr. Pat Eddings to contact me and we spoke about details of information in our well files. I faxed the information that he requested, including a list of drilling contractors who have drilled in South Dakota in recent times. Mr. Eddings said he would study the information and get back to me when they had made a decision on the well.

I conveyed some of this information to Bob Townsend via E-Mail dated June 2, 1995.
September 2, 1986

Mr. Fred Steece, Supervisor
Department of Water & Natural Resources
Western Field Office
36 E. Chicago
Rapid City, South Dakota 57701

Re: Letter of 06/09/86
Wulf Oil Corporation

Dear Mr. Steece:

As per requested in your letter of June 9, 1986, in regard to
the Wulf #1 Peterson well and the Wulf #4 Federal well in Fall
River County, South Dakota, I have sent you the material I found
in the company files. The Wulf #1 Peterson was operated by Crystal
Oil, who took over in the middle of the drilling of it. Any further
information you need on this, I would suggest you contact them.

The information I am sending includes this:

(1) Geological Report Wulf Oil #4 Federal
(2) Plugging Record Wulf Peterson #1
(3) Drilling Report Wulf #1 Peterson

I received copies of the above from Banks Enterprises, Inc., one
of the partners on the projects. Most of our records were lost in

Yours very truly,

Larry C. Wulf, President
WOLF OIL CORPORATION

LCW/lw
Enc: 1
Mr. Fred V. Steece, Supervisor  
Western Field Office  
36 East Chicago  
Rapid City, SD 57701

Dear Mr. Steece:

This letter informs you that the surface restoration at the site of the following oil or gas test well has been completed to my satisfaction.

<table>
<thead>
<tr>
<th>Permit</th>
<th>Well Name and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>903</td>
<td>Wulf #1 Peterson, NENE 21-7S-1E, Fall River</td>
</tr>
</tbody>
</table>

I am the surface owner of record.

SIGNED  

DATE 9/12/85
April 10, 1979

Department of Natural Resources
South Dakota Geological Survey
Western Field Office
308 West Boulevard
Rapid City, South Dakota 57701

Attention: Fred V. Steece

Re: Crystal No. 1 Peterson
NE/4NE/4 Section 21
Township 1 East, Range 7 South
Fall River County, South Dakota

Gentlemen:

This is to advise I do not want a dry hole marker locating the Crystal No. 1 Peterson erected in my cultivated field because of a hindrance to my future farming of same. Thank you.

Very truly yours,

PETERSON AND SONS, INC.

By: Wayne J. Peterson
March 13, 1979

South Dakota
State Geological Survey
308 West Boulevard
Rapid City, South Dakota 57701

Re: Transfer of Drilling Permit
Wulf Oil Corp.-Peterson #1
Permit no. 903

Gentlemen:

We acquired the above well March 13, 1979 and assume the full responsibility for its operation and abandonment in conformity with the law, rules, regulations, and orders issued by the board.

A Blanket Bond in our name is attached.

If there is any other information we should furnish you, please let us know.

Yours very truly,

CRYSTAL OIL COMPANY

[Signature]
Asst. Manager of Production Admin.

JOG/sm

Attachments
SURETY
BOND

KNOW ALL MEN BY THESE PRESENTS,

That

Wulf Oil Corporation

was

in the

County of Dawes

in the State of Nebraska

as Principal,

Travelers Indemnity Company

and

Hartford, Connecticut

are duly authorized to do business in the State of South Dakota as surety, are held and firmly bound unto the State of South Dakota in the sum of ($20,000.00), lawful money of the United States, for which payment, well and truly to be made, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit:

Blanket

(May be used as blanket bond or for single well)

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of this State and with the conditions and orders of the Oil and Gas Board of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Board of this State all notices and records required by said Board, and the restoration of the surface, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation shall be terminated by the Board, the same shall be and remain in full force and effect.

Final sum of

Twenty Thousand Dollars and no/100---------($20,000.00)

Witness our hands and seals, this 25th day of October 1978

Wulf Oil Corporation

Norman Sterling, Jr., Attorney-in-fact

Dewey Burdock GDP
June 2012

3.7-B-654

Appendix 3.7-B
STATE OF SOUTH DAKOTA

Department of Natural Resource Development  Division of Geological Survey

BONDING COMPANY INFORMATION SHEET

Information about your bonding company:

Name of bonding company:  Travelers Indemnity Company

Street Address:  101 University Blvd.

City, State:  Denver, CO  80206

Phone:  (303) 321-2333  Remarks:

Information about your South Dakota bonding company agent:

Name of South Dakota Agent:  Kluthe & Land Agency

Street Address:  619 Mount Rushmore Rd., P.O. Box 3031

City, State:  Rapid City, South Dakota 57701

Phone:  Remarks:

Information about releasing your bond:

When the Principal for whom you are providing Surety has fulfilled all obligations, whom should we contact with our Bond Release?

Name of Contact:  Bayly, Martin & Fay, Inc.

Street Address:  817 17th Street, Suite 500

City, State:  Denver, Colorado 80202

Phone:  (303) 292-500  Remarks:

Please file this form together with Oil & Gas Form No. 3 with:  Mr. Fred V. Steece, Supervisor, South Dakota Geological Survey, Western Field Office, 308 West Boulevard, Rapid City, South Dakota 57701  PH:  (605) 394-2229
The Travelers Indemnity Company
Hartford, Connecticut

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That the TRAVELERS Indemnity Company, a corporation of the State of Connecticut, does hereby make, constitute and appoint

Norman Sterling, Jr., Paul M. Barbour, Norman C. Henderick, David H. Snead, Thomas J. Stahl, Jr., all of Denver, Colorado, EACH

its true and lawful Attorney(s)-in-Fact, with full power and authority, for and on behalf of the Company, as attorney, to execute and deliver and affix the seal of the Company thereto, or, if a seal is required, bonds, undertakings, recognizances, consents of surety or other written obligations in the nature thereof, as follows:

Any and all bonds, undertakings, recognizances, consents of surety or other written obligations in the nature thereof not exceeding in amount Two Hundred Thousand Dollars ($200,000) in any single instance and to bind the TRAVELERS Indemnity Company thereby, and all of the acts of said Attorney(s)-in-Fact, pursuant to these presents, are hereby ratified and confirmed.

This appointment is made under and by authority of the following by-laws of the Company which by-laws are now in full force and effect:

ARTICLE IV, SECTION 14. The Chairman of the Board, the President, the Chairman of the Finance Committee, the Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Chief Financial Officer and Secretary may appoint attorneys-in-fact or agents, with power and authority, as defined or limited to their respective powers of attorney, for and on behalf of the Company to execute and deliver, and affix the seal of the Company thereto, bonds, undertakings, recognizances, consents of surety or other written obligations in the nature thereof and any of said officers may remove any such attorney-in-fact or agent and revoke the power and authority given to him.

ARTICLE IV, SECTION 16. Any bond, undertaking, recognizance, consent of surety or written obligations in the nature thereof shall be valid and binding upon the Company when signed by the Chairman of the Board, the President, the Chairman of the Finance Committee, the Executive Vice President, any Senior Vice President, any Vice President or any Second Vice President and duly attested and sealed if a seal is required, by the Corporate Secretary or any Assistant Corporate Secretary or any Assistant Secretary, or shall be valid and binding upon the Company when duly executed and sealed, if a seal is required, by any duly authorized attorney-in-fact or agent, possessory to and within the limits of the authority granted by his or her power of attorney.

This power of attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Directors of THE TRAVELERS Indemnity Company at a meeting duly called and held on the 30th day of December, 1959:

Voted: That the signatures of any officer authorized by the By-Laws and the Company may be affixed by facsimile to any power of attorney or special power of attorney or certificate of stock given for the execution of any bond, undertaking, recognizance or other written obligations in the nature thereof, such signature and seal when affixed shall be hereby adopted by the Company as the original signatures of such officers and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed.

This power of attorney revokes that dated October 20, 1976 on behalf of Norman Sterling, Jr., Schuyler F. Cross, Paul M. Barbour

IN WITNESS WHEREOF, THE TRAVELERS Indemnity Company has caused these presents to be signed by its proper officer and its corporate seal to be hereunto affixed this 30th day of May 1978.

THE TRAVELERS Indemnity Company

By

[Signature]

Secretary, Treasurer

State of Connecticut, County of Hartford—on:

On this 30th day of May in the year 1978 before me personally came D. J. Nash to me known, who, being by me duly sworn, did depose and say: that he resides in the State of Connecticut; that he is Secretary (Treasurer) of THE TRAVELERS Indemnity Company, the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that said seal is affixed to said instrument in such corporate seal; that it was so affixed by authority of his office under the by-laws of said corporation, and that he signed his name thereto by like authority.

Notary Public

My commission expires April 1, 1983

(After)
MISCELLANEOUS
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
### Record 1 of 1

**Well Information**

- **API No:** 40 047 20077  
- **Well Name:** WULF 2 PETERSON  
- **County:** FALL RIVER  
- **Location:** SWSW 15-7S-1E  
- **Operator Name:** WULF OIL CORPORATION  
- **Permit No:** 919  
- **Total Depth:** 2462  
- **Bottom Hole:** Minnelusa  
- **Permit Date:** 06-08-1979  
- **KB Elevation:** 3572  
- **Spud Date:** 06-03-1979  
- **Ground Elevation:** 3564  
- **Plug Date:** 08-13-1979  
- **Latitude:** 43.435870  
- **Longitude:** -103.991563  
- **Well Field:** WILDCAT  
- **Status:** P&A  
- **Type:** DRY HOLE

**Formation Tops**

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sundance</td>
<td>822</td>
</tr>
<tr>
<td>Spearfish</td>
<td>1164</td>
</tr>
<tr>
<td>Goose Egg</td>
<td>1515</td>
</tr>
<tr>
<td>Minnekahta</td>
<td>1689</td>
</tr>
<tr>
<td>Opeche</td>
<td>1728</td>
</tr>
<tr>
<td>Minnelusa</td>
<td>1817</td>
</tr>
<tr>
<td>Red Marker</td>
<td>2232</td>
</tr>
<tr>
<td>1st Leo</td>
<td>2242</td>
</tr>
<tr>
<td>2nd Leo</td>
<td>2349</td>
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</tbody>
</table>
COUNTY: FALL RIVER
LEGAL LOCATION: SWSW 15-7N-1E
API NO: 40 047 20077
PERMIT NO: 919
WELL NAME: WULF #1 PETERSON
OPERATOR: WULF OIL CORPORATION
PERMIT ISSUED: 06/08/1979
PERMIT CLOSED: 09/21/1979
FILE LOCATION: 7N-1E-15 SWSW

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR'S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
BOND RELEASE CHECKLIST

Well Name and Location
Wulf #2 Peterson
SM SW 15-78-1E, Fall River
Bond # 7086675-4

Permit # 919
API # 40 063 20077

Date Issued

Date Released Nov 6, 1985

Surface Restoration

√ Pits filled
√ Site Level
√ Site policed
√ Dry-hole marker solid, sealed, correctly inscribed
NA No dry-hole marker desired; letter in WFO files from surface owner
√ Letter from surface owner

Paperwork filed

√ Form 4 (Completion or Recompletion Report)
√ Form 6 (Sundry Notice and Report on Wells)
√ Form 7 (Plugging Report)

Geological Information Filed

√ Well Logs: IPS, SNP, DIL, GR, NEUT, CALIP, Cement Bond, Temp, Micro, Leterlog, SM Dens. (Accurately)

√ DST Charts and Reports
√ Geologist's Report

- Results of coring and core analyses (None cut)
√ Set of 10-foot sample cuttings (Check with Bob Schoon)

Date Nov 1, 1985

Checked By
PERMIT CHECKLIST

Well Name and Location: Wulf #2 Peterson  
SWSW 15-7S-1E, Fall River

Permit # 919
API # 40 047 20077  
BOND # 708E675-4

Paperwork filed with WFD

x Organization Report  
x Application  
x Bond  
x Permit Fee

The Following Papers sent to Operator:

x Permit (Form 2a)  
x Receipt for $100 permit fee  
x Cover letter explaining material sent

Permit Fee Filed:

x Permit fee w/Cash Receipts Transmittal Form sent to State Treasurer

Notification of New Permit sent to:

x Dr. Duncan J. McGregor  
x Mr. Warren R. Neufeld  
x Mr. Jack Gerken

Date June 22, 1979  
Check By cp
PERMIT TO DRILL / INTENT TO DRILL
APPLICATION FOR PERMIT TO:

☐ DRILL  ☐ DEEPEN  ☐ PLUG BACK  ☑ SINGLE ZONE

☐ OIL, WELL  ☐ GAS WELL  ☐ MULTIPLE ZONE

OPERATOR:

Wulf Oil Corporation

ADDRESS:

P.O. Box 1320, Chadron, NE 69337

LOCATION:

In foot from nearest lines of section or legal subdivision, where practicable:

1/330' FSL - 987' FWL Section 15

NAME AND ADDRESS OF SURFACE OWNER:

Peterson & Son, Inc.
Edgemont, South Dakota
HCR 59, Box 16

NAME AND ADDRESS OF CONTRACTOR:

Northern Wyoming Drilling Co., Inc.
P.O. Box 487
Gillette, Wyoming 82716

IF LEASE PURCHASED WITH ANY WELLS DRILLED, FROM WHOM PURCHASED (Name and address):

No Purchase

ELEVATION:

3564.9' gr

PROPOSED DEPTH:

2400'

ROTARY OR CABLE TOOLS:

Rotary

APPROXIMATE DATE WORK WILL START:

July 1, 1979

PROPOSED CASING AND CEMENTING PROGRAM:

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>SACKS OF CEMENT</th>
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</thead>
<tbody>
<tr>
<td>12 1/4&quot;</td>
<td>8 5/8&quot;</td>
<td>24#</td>
<td>New</td>
<td>250'</td>
<td>200 bx.</td>
</tr>
<tr>
<td>7 7/8&quot;</td>
<td>5 5/8&quot;</td>
<td>15.50#</td>
<td>New</td>
<td>2400'</td>
<td>150 bx.</td>
</tr>
</tbody>
</table>

DESCRIBE PROPOSED OPERATIONS. IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOW OUT PREVENTER PROGRAM IF ANY:

We plan to drill a 2,400' well into the Leo Formation. We plan to start the well July 1, 1979 with operations lasting approximately 14 days.

Northern Wyoming Drilling Rig #2 is equipped with a 10" Ragan Blowout Preventor which will be used while drilling the well.

Dewey-Burdock GDP
June 2012 3.7-B-665 Appendix 3.7-B
Dry Hole Site - NE1/4 NE1/4 Section 21 - Elev. = 3536.5'
Water Well - SW1/4 NW1/4 Section 22 - Elev. = 3532.5'

Darrel L. Schlipf of Newcastle, Wyoming, certify
that in accordance with a request from Jim Cox
of Chadron, Nebraska for Wulf Oil Corp.

P. O. Box 1320, Chadron, Nebraska 69337

That I
made a survey (date) May 8, 1979
for the location and elevation Wellsite

As shown on above map, the wellsite is in Center NE1 SW1 SW1
Section 15 Township 7 South, Range 1 East, WBL
Fall River County, South Dakota
Elevation is 3564.9 feet
above mean sea level before dosing.

Notes Attached
RW 799003.29

Dewey-Burdock GDP
June 2012
3.7-B-666
Appendix 3.7-B
WELL INSPECTION / SCOUT REPORTS
SCOUT REPORT

Operator ___________________________ Permit Number ___________________________

Farm/Lease Name ___________________________ API Number ___________________________

Sec. ______ T. ____ R. ______ County ______

Elev. _______ Est. T.D. _______ Actual T.D. _______ Spudded _______

Contractor ___________________________ Geologist ___________________________

SCOUT'S OBSERVATION:

DSI RECORD:

Drilling at 1539, expect TD in 3 days - move out on Sunday, 8-10-79.
8-12-79: Logger was broken down but is now fixed. Couldn't get all the way down the hole. Contractor plans to trip in and condition and then try logging again, will plug sometime tomorrow. Had fresh water flow from Lakota.

FORMATION TOPS:

8-12-13/79: Plugged, no problems.
8-21-79: Dry hole marker solid, sealed, properly labeled. Two sections of pipe are still at the site. The pits are open and not fenced and there is assorted junk lying around. Mouse, rat holes still open. Site not approved.
10-6-79: Pits are filled, site is clean, level. Not seeded. Site approved.

PLUGGING RECORD:

DATE PLUGGED: COMPLETED 8/12-13/79

10 sax - 0' - surface
60 sax - 682' - Top Morrison - BS
25 sax - 1922' - Minnelusa
25 sax - 2232' - Red Marker

CASING RECORD:

SITE INSPECTION:

From _______ To _______ Approved _______

From _______ To _______ Not Approved _______

REMARKS:

SCOUTED BY ___________________________

Tim Kenyon, Geologic Assistant

Fred V. Steece, Supervisor

Western Field Office
OPERATOR’S TECHNICAL REPORTS / MAPS
PROPERTIES: WT. __________ VIS. __________ PH __________ H2O LOSS __________

SAMPLE TOPS:

REMARKS:

Finished DIRT & Spudded at 7:00 P.M.  
August 4, 1979
Drilling rat and mouse hole

August 5, 1979
7:00 A.M. — Tripping
Drilled 600' of 12¼" hole
2 hrs — rat hole
3 hrs — trip
18½ hrs — drill
½ hrs — rig service
Surveys at — 250' with 1° deviation
600' with 3/4° deviation

August 6, 1979
7:00 A.M. nippling up
½ hr — circulating
1 hr — trip out
2 hr — rig up & run casing
2 hr — cementing
12 hr — waiting on cement
6½ hr — nippling up

ran 13 joints of 8 5/8", 24 lbs. ST & C
588' set at 596' KB
plugged down at 11:00 A.M. with good returns
water flow in Lakota at 500', strong 3 inch, improving
225 max lite cement with 3% calcium chloride and 1% chip plug followed by
175 max regular cement with 3% calcium chloride and 1% chip load.

August 7, 1979
3 days since spud
7 days since move
Drilling with water
Surface bit — 12¼ Y-12-J — drilled 600' in 20 hrs.
Bit #1 — 7 7/8" Y-12-J, in at 600', drilled 820' in 17 3/4 hrs.
½ hrs — rig service
17 3/4 hrs — drilling
2 hrs drilling cement
1 hr redrill mouse hole
3 hrs finish nippling up
8 - 8

4 days since spud

- drilled 495' in 24 hrs
- present operation — drilling
- drilling in shale
- total rotating hrs. = 56 3/4 hrs
- drilling with water
- Bit #2 — 7 7/8" Y-12, in at 600', out at 1432', drilled 832' in 18 hrs.
- Bit #3 — 7 7/8" Y-13, in at 1432', present operation is drilling,
  drilled 483' in 19 hrs.

19 hrs. — drilling
3 hrs. — trip
1/2 hrs. — rig repair
1 hr. — washing
1/2 hrs. — rig service

NOTE: The surface bit is Bit #1.

8 - 9

five days since spud

- present operation is drilling
- Bit #3 — 7 7/8" Y-13, in at 1432', out at 1924', drilled 492' in 20 hrs.
  teeth are 7, bearings are 8
- Bit #4 — FP-53, in at 1924', drilled 281' in 20 hrs., weight 25-30,000 lbs.,
  55-60 RPM's, pump 14 x 5½, 54 strokes per minute, 900 lbs. pressure

20 hrs. — drilling
2 hrs. — trip
2 hrs. — wash to bottom
1/4" estimated water flow
SAMPLEx TOPS:

2nd Leo — 2344'

REMARKS:

8-10

6 days since spud

Formation is Minnelusa

drilled 149' in 24 hrs.

present operation is drilling.

total rotating hrs. — 97 3/4

21 hrs. -- drilling

2½ hrs. — circulating

4 hrs. — rig service

Sample Description

Drilling break at 2344'

2nd Leo Sandstone 2344'-2360'

sandstone, hard, calcareous and anhydritic, stained, bleeding

oil, drilled slow but that may be because of button bit.

will drill to 2365' and test 2nd Leo

8:00 P.M. — DST #1 2348-2378 (corrected 11 feet downhole based on pipe strap)

Bottom hole temperature — 86°F

Open 5 minutes, SI 30 minutes, Open 30 minutes, SI 60 minutes

opened with very strong blow off bottom of bucket in 2 minutes; decreased
to top of water at end of second flow period.

Recovered 2250 feet of fluid—600 feet gas cut muddy water, 1650 feet of
gas cut sulphur water

Top sample Rw 1.08 @ 64° (3800 ppm)

Middle " 0.9 @ 70° (6800 ppm)

Bottom " 0.89 @ 70° (6950 ppm)

HP 1163-1134

FP 1 379-437

FP 2 452-988

SIP 1003-1006

Geologic Notes: Fair to good staining in samples but very poor porosity;

sand very dolomitic and anhydritic. No significant
drilling break. Considerable chattering of bit indicating

fractures throughout 2nd Leo section; fractures in cuttings
also. Generally poor samples.

p83
7 days since spx

Drilled 51' in 24 hrs.

104 3/4 total rotating hrs.

7 hrs — drilling
10 3/4 hrs — trip
1 hr — wait on tester
2½ hrs — testing
2½ hrs — pick up & make & break down & load out test tool.

8:00 P.M. Drilled to 2462', ran Laterolog-SP from 2458'—2150'. Tool malfunctioned.

Tentative log tops (KB=3572)

- Red Marker: 2230 (+1342)
- 1st Leo (Mo²): 2250
- 2nd Leo "Zone" 2351 (+1221)
8-12
8 days since spud
drilled 57' in 24 hrs.
116 3/4 total rotating hrs.
4 hrs — rig service
12 hrs — drilling
4 3/4 hrs — trip
1 hr — circulate
6 hrs — logging

Attemted to run logs, but hole bad; will recondition hole and finish logging on August 13.

8-13
9 days since spud
8:30 a.m. on bottom logging, one log down

7 1/2 hrs — trip
3 hrs — circulate to log
3 1/4 hrs — logging
10 hrs — wash to bottom

8-14-19
4:00 P.M.
Log Taps and Calculations:

Red Marker 2229 (+1343)
1st Leo 2248
2248-53 100% water, 25% por
2255-58 100% water, 22% por

2nd Leo 2350
2350-2406 100% water, 5% por

Ran GR Sonic Log from 596-2458
Ran Dual Induction Focused Log from 605-2460
DAILY DRILLING REPORT

DATE: August 14, 1979
OPERATOR: Gulf Oil Corporation

WELL NAME AND LOCATION: #2 Peterson, T7S, R1E, Sec. 15: SPCA, Fall River Co., SD

DEPTH: __________
BIT NUMBER: __________

DRILLING MUD PROPERTIES: WT. ________ VIS. ________ PH ________ H2O LOSS ______

REMARKS:

4¾ hrs — waiting on orders
5½ hrs — logging
8 hrs — lay down collars, picking up pipe, going in hole, plugging
and lay down pipe
6 hrs — rigging down BOP

2132-2232  25 aos
1822-1922  25 aos
582-682    600 aos
5-25       10 aos

Plugged at 1:30 A.M.
JOHN PAUL GRIES
Consulting Geologist
208 St. Charles Street
Rapid City, South Dakota

Wulf No. 2 Wayne Paterson
SE1/4 SW1/4 SW1/4 sec. 15, T. 7 S., R. 1 E.  
Elevation: 3572 ft.
Custer County, South Dakota

Tool pusher: Milo Wiseman, Gillette, Wyoming 307-682-9154
Spud: August 4, 1979 Plugged August 13, 1979
Well site geologist: J. P. Gries, Rapid City, S. D. 605-342-5841
Testing: B & S Testers, P. O. Box 1436, Gillette, Wyoming
Dean Boese, tester, 307-682-9626
Ran BHC Acoustic w/ caliper and GR.
Dual Induction focused log w/ GR
Casing: 596' of 8 5/8-inch 24 pound in 12¼-inch hole with 300 sacks cement

Bit record:
12 1½-in. Reed Y-12 145628 out of hole at 600 feet
7 7/8-in. Reed Y-12 40794 out of hole at 1432. 18 hr.
7 7/8-in. Reed Y-13 212925 out of hole at 1924. 20 hr.
7 7/8-in. Reed FP-53 141792 out of hole at 2462.

Cores: none

DST No. 1. Drillers depth 2336-2366. After strapping out, corr. to 2348-2378.

Test started 4:00 PM, Aug. 10th. Open 5 minutes, shut in 5 minutes, open 30 minutes, shut in 60 minutes. Recovered 600 feet gas cut muddy water and 1650 feet of gas cut sulfur water.

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<th>Pressures</th>
<th>inside</th>
<th>outside</th>
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<td>1163</td>
<td>1201</td>
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<td>FH</td>
<td>1134</td>
<td>1172</td>
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<tr>
<td>IF-1</td>
<td>379</td>
<td>447</td>
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E-log tops:
Sundance 822
Spearfish 1164
Goose Egg 1515
Minnekahta 1689
Opales 1728
Minnelusa 1817
Red marker 2232 - 2240
Wulf No. 2 Wayne Peterson
Sample description by J. P. Gries

Note: There are intervals where samples were not taken or where depth labeling is obviously in error. Due to constant inflow of water from basal Lakota sand, drilling mud was not maintained until a critical depth was reached with the result that the bit ground the cuttings very fine. Errors of depth were found when strapping out of hole. Cuttings above these points were not corrected to the new depth, and none of the samples was lagged to correct for return time.

Lakota formation

617 - 643 sandstone, f to m, poorly sorted, gray to white, with calcareous and pyritic cement

Morrison formation

648 - 679 shale or clay, gray to greenish gray; some new light green, very waxy
711 clay, conchoidal fracture, gray to greenish gray
741 clay, same; and very light gray lithographic limestone
805 clay, same; sample almost all limestone
836 shale and clay, brownish gray to greenish gray

Sundance formation

836 - 868 clay, same, and sandstone and siltstone, greenish gray, glauc. 896 shale, greenish gray; very poor sample
920 shale, greenish gray; trace glauconitic siltstone
1020 no samples
1170 samples mislabeled
1200 shale, silty, greenish gray

Spearfish formation (E-log top at 1164)

1200 - 1230 redbeds and anhydrite, ox, white
1260 anhydrite and redbeds
1290 redbeds
1310 redbeds; trace of anhydrite
1340 redbeds
1466 no samples
1498 redbeds; mostly cavings of Jurassic shale
1529 redbeds, poor sample
1560 redbeds, good

Goose Egg formation (E-log top at 1515)

1560 - 1592 redbeds and fresh white anhydrite
1686 no samples
Wulf No. 2 Wayne Peterson (cont'd)

**Minnekahta formation** (E-log top at 1689)

1686 - 1717 redbeds and anhydrite; trace limestone very fx, pink, brown
1817 no samples

**Opechee formation** (E-log top at 1729)

no samples

**Minnelusa formation** (E-log top at 1817)

1817 - 1993 no samples
2013 traces of Minnelusa sand in very poor samples
2010 dolomite, orange and white sand, traces of anhydrite. Sample caught by geologist using 80-mesh sieve
2022 same fine dry ground mixture of dolomite and sand
2027 dolomite, light brown, dense, 2/3; anhydrite, white, 1/3; trace sandstone
2029 sandstone, fine, white, 1/2; dolomite, as above, 1/4; anh., 1/4
2033 poor sample, mostly redbeds
2043 log as anhydrite, 2/3; dolomite, 1/3
2053 dolomite, fx, light gray-brown, 1/2; anhydrite, fx to mx, white, 1/2
2063 anhydrite, s.ame; 3/4; dolomite, same, 1/4
2073 dolomite, vy fx, dns, gray, 2/3; anhydrite, white, 1/3
2083 dolomite as above, 1/2; anhydrite, 1/2
2093 poor sample, log as anhydrite
2103 anhydrite, wx, white, 2/3; dolomite, very fx, dense, light gray-brown, 1/3
2123 anhydrite, same but some very sandy, 2/3; dolomite, same, 1/3.
2133 dolomite, finely crystalline, dense, gray-brown
2143 dolomite, same, 1/2; anhydrite, same, 1/2
2153 poor sample, about same; some anhydrite is very sandy
2163 anhydrite, same, 3/4; dolomite, same, 1/4
2173 dolomite, 2/3; anhydrite, 1/3
2183 dolomite, same, 1/2; anhydrite, same, 1/2
2193 poor sample; log as anhydrite
2200 no sample
2210 poor sample, trace splintery red shale
2220 no sample
2230 sample all gray shale, cvd
2240 same
2250 no sample
2260 circulated sample, all shale from above
2270 no sample
2283 poor sample; redbeds with some Minnelusa dolomite & anhydrite
2303 poor samples, probably fine white anhydritic sandstone and anh.
2310 starting to build up drilling mud; dolomite and anhydrite
2320 dolomite, fx, dense, light brown; trace sandstone, fn, white, por.
2333 probably dolomite, vy fx, light gray; trace sandy
2339 dolomite, fx, light gray, anhydritic, to medium gray, dense, 3/4;
anhydrite, 1/4. First good sample after mudding up
2343 dolomite, medium gray dense, fractured w/ anhydrite in the frac-
tures; dolomite, light gray, anhydritic
Wulf No. 2 Peterson (cont'd)

2343 - 2345 sandstone, f to m, rounded to angular, cemented w/ dolomite and anhydrite, light gray; some porous pieces have fair oil staining.

2346 sandstone, same but hotter staining; some bleeding oil when first examined.

2348 poor sample; some stained sandstone as above; some new tight white siltstone or fine sandstone.

2352 sandstone, f to m, dolomitic, gray; little staining.

2358 sandstone, poorly sorted, larger grains well rounded, tight, gray, little staining.

2360 sandstone, f, round to angular, tight, with dolomite and anhydrite cement.

2365 probably dolomite, argillaceous, dark gray.

2366 dolomite, fx, medium gray, some sandy, grading to sandstone, fine, tight, gray; much black fissile shale. Circulated sample.

SIM 2367 = 2383

2383 - 2388 Trip, poor sample. Dolomite and some sand as above.

2393 poor sample. Dolomite, vy fx, dense, gray to brown.

2398 dolomite, vy fx, dense but slightly vuggy, medium gray; good sample.

2403 dolomite, same, fractured with anhydrite healing the fractures; 2/3, sandstone, f, dolomitic, tight, gray, 1/3.

2408 dolomite and sand, same; also more black fissile shale.

2413 dolomite, vy fx, dense, medium gray.

2420 dolomite, same, 2/3; sandstone, f, dolomitic, light gray.

2425 dolomite, same, with some thin streaks black fissile shale.

2430 dolomite, same, 1/3; shale, black, fissile, 2/3.

2435 dolomite, same; still some black shale coming in.

2440 dolomite, same, some sandy; traces mx white anhydrite.

2445 dolomite, same, 2/3; sandstone, f, dolomitic, tight, gray, 2/3.

2450 dolomite, same, 1/4; shale, black, fissile, 1/4.

2455 dolomite, same, 1/2; sandstone, same, 1/4; shale, black, fissile, almost coaly, 1/4.

2460 dolomite, vy fx, dense, very light gray.

2462 dolomite, same, with some fractures healed with anhydrite.

2462 circ. dolomite, same, 1/2; sandstone, vy f, dense, tight, no staining, 1/2. TOTAL DEPTH.
ADMINISTRATIVE / SUNDRY REPORTS
PLUGGING RECORD

Operator: WULF OIL CORPORATION
Address: P. O. BOX 1320 - CHADRON, NEBRASKA 69337

Name of Lease: Peterson
Well No. & Field & Reserve: #2 - Wildcat - Leo

Location of Well: 330 FSL, 987 FDL (SE 1/4 SW 1/4)
Application to drill this well was filed in name of
Wulf Oil Corporation
Date plugged: August 13, 1979

No

Character of well at completion (initial production): Oil (bbls/day) - N/A
Gas (MCF/day) - N/A
Water flow (bbls/day) - Yes

Amount well producing when plugged:
Oil (bbls/day) - N/A
Gas (MCF/day) - N/A
Water flow (bbls/day) - ??

Depths of formation:
See Geologists Report, Attached
See Attached

2132-2232 25 sx.
1822-1922 25 sx
582 - 682 40 sx
5 - 25 10 sx
Surf. w/marker - 10 sx

CASING RECORD

Size pipe: 5/8"
Cement well:
Cement out:
Cement in:
N/A

N/A
N/A
None

Was well filled with mixed-bond fluid, according to regulations

Lakota (not sure of type of water)

Note: In addition to other information required on this form, if this well was plugged back for use as a fresh water well, give all pertinent details of plugging procedure, in case of fresh water well, perforated interval in fresh water used, name and address of surface water; and attach letter from water commissioner authorizing completion of this well as a water well and swearing to assume full liability for any subsequent plugging which might be required.

on August 15, 1979 we went back in and squeezed the well with 50 sx. of cement to kill the water flow. (Cement had 3% CaCl)

USE BACKSIDE FOR ADDITIONAL DETAIL

State of Nebraska
Before me, the undersigned authority, on this day personally appeared
State of Dawes
the person whose name is subscribed to the above instrument, who being by me duly sworn on oath states, that he is duly authorized to make the above report and that he has knowledge of the facts stated therein, and that said report is true and correct.

Dennis R. Sharr
Signature of Affiant

Subscribed and sworn to before me the 10th day of September, 1979

Anne M. Rueck
Notary Public in and for Dawes, County, Nebraska

Approved SEp 21 1979

OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA

Dewey-Burdock GDP
June 2012
3.7-B-683
Appendix 3.7-B
**WELL COMPLETION OR RECOMPLETION REPORT AND LOG**

- **Operator:** Wulf Oil Corporation
- **Address:** P.O. Box 1320, Chadron, Nebraska 69337
- **Location:** From nearest line of section or legal subdivision where possible
- **Surface:** 330 FSL, 987 FWL (Sec 15 T7S R1E)
- **Date Issued:** 6-8-79
- **Wildcat:** Yes - Field and Pool, or Wildcat
- **Acres in Lease:** 1200
- **County:** Fall River
- **Well Name:** Peterson
- **Well No.:** #2

| Type of Completion | Oil Well | Gas Well | Dry Hole | New Well | Work-Over | Deepen | Plug Back | Same Zone | Different Zone | Wildcat 
|--------------------|---------|----------|----------|----------|-----------|--------|-----------|-----------|----------------|---------
| **PERMIT NO.** | 919 | DATE ISSUED: | 6-8-79 | PREVIOUS PERMIT NO.: | None | DATE ISSUED: | None |
| **DATE SPUN/SPUN:** | 8-3-79 | **DATE D.B. REACHED:** | 8-12-79 | **DATE COMPL.:** | Dry Hole | **ELEVATIONS:** | 3564 GR, 3572 KB |
| **TOTAL DEPTH:** | N/A | **PEAK CASING HEAD FLG.:** | N/A | **FLEX CASING HEAD FLG.:** | Ground | **IF MULTIPLE COMPLE.:** | N/A |
| **PRODUCING INTERVAL:** | N/A | **TOOK DIRECTIONS:** | N/A | **DIRECTIONS SUBMITTED:** | None |
| **TYPE ELECTRIC AND OTHER LOG RUN:** | None - Dry Hole | **FACILITY:** | None |
| **BNC ACoustic, W/Caliper & GR - Dual Induction Focused Log, W/GR:** | None |
| **Casing Size:** | 8 5/8" | **Depth Set (MD):** | 596' KB | **Hole Size:** | 12 1/4" | **Weight Per Ft.:** | 24# |
| **Casing Record:** | Surface 300 sq. | **Purp.:** | None |
| **Top (MD):** | None | **Weight Per Ft.:** | None |
| **Bottom: Screen:** | None | **Purpose:** | None |
| **Liner Record:** | None | **Cement:** | None |
| **Perforation Record:** | None | **Acid, Shot, Frac, Cement:** | None |
| **Depth Interval:** | None | **Size and Type:** | None |

**Production:**
- **Date First Production:**
- **Producing Method:** Flowing gas lift, pumping
- **Flowing Pressure:** Calculated 24 hour rate
- **Disposal of Gas:** Used for fuel

**List of Attachments:**
- **Signed:**

**Approved:** Sep 21, 1979

---

**Dewey-Burdock GDP**
**June 2012**
**3.7-B-684**
**Appendix 3.7-B**
SUNDRY NOTICES AND REPORT ON WELLS

OIL WELL ☑ GAS WELL ☐ DRY ☐

OPERATOR WULF OIL CORPORATION

ADDRESS P. O. BOX 1220 - Chadron, Nebraska 69337

LOCATION 330 FSL, 987 FWL (SE<SW<SW<)

ELEVATIONS 3564' OR (Survey) 3572 KB

NOTICE OF INTENTION TO

WATER SHUT-OFF ☐ SHORT OR ACIDIZE ☐ W/TREATMENT ☐ REPAIRING WELLS ☐ ABANDONMENT ☑

DESCRIPTION OF PROPOSED OR COMPLETED OPERATIONS

Well was plugged on August 13, 1979 with plugs as follows:

2132 - 2232 25 sx
1822 - 1922 25 sx
582 - 682 40 sx
5 - 25 10 sx.

Surface w/ marker 10 sx

On August 15, 1979 it was necessary to go back in and squeeze the well with 50 sx. cement w/3% CaCl to kill the water flow.

Dry hole marker has been set, and location will be cleaned up and re-seeded as soon as possible. We would like to know if your office has any requirements as to the seed mixture it would like used when we do re-seed the location, etc.
Verbal permission to plug was obtained August 13, 1979.

Well to be plugged as follows:

- 2132 - 2232  25 ax
- 1822 - 1922  25 ax
- 342 - 682  40 ax
- 5 - 25  10 ax
- Surface w/ marker  10 ax
Mr. Fred V. Steece, Supervisor
Western Field Office
36 East Chicago
Rapid City, SD 57701

Dear Mr. Steece:

This letter informs you that the surface restoration at the site of the following oil or gas test well has been completed to my satisfaction.

<table>
<thead>
<tr>
<th>Permit</th>
<th>Well Name and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>919</td>
<td>Wulf #2 Peterson, SWSW 15-7S-1E, Fall River</td>
</tr>
</tbody>
</table>

I am the surface owner of record.

SIGNED [Signature] [DATE 07/31/12]
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
MISCELLANEOUS
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
### Record 1 of 1

**Well Information**

- **API No:** 40 047 20085  
- **Well Name:** WULF 1A PETERSON  
- **Permit No:** 957  
- **Operator Name:** WULF OIL CORPORATION  
- **Permit Date:** 12-18-1979  
- **Spud Date:** 01-13-1980  
- **Plug Date:** 01-24-1980  
- **County:** FALL RIVER  
- **Location:** NENE 21-7S-1E  
- **Total Depth:** 2460  
- **Bottom Hole:** Minnelusa  
- **KB Elevation:** 3545  
- **Ground Elevation:** 3537  
- **Latitude:** 43.433064  
- **Longitude:** -103.996978  
- **Status:** P&A  
- **Type:** DRY HOLE

**Formation Tops**

- **Dakota Mud** 335 ft  
- **Lakota** 545 ft  
- **Sundance** 840 ft  
- **Minneskaht** 1705 ft  
- **Minnelusa** 1840 ft  
- **Converse** 1910 ft  
- **Red Marker** 2247 ft  
- **1st Leo** 2290 ft  
- **2nd Leo** 2382 ft

---

http://sddnr.net/oil_gas/search_results_oil_gas.cfm  
2/15/2012
COUNTY: FALL RIVER
LEGAL LOCATION: NENE 21-7N-1E
API NO: 40 047 20085
PERMIT NO: 957
WELL NAME: WULF #1-A PETERSON
OPERATOR: WULF OIL CORPORATION
PERMIT ISSUED: 12/13/1979
PERMIT CLOSED: 04/21/1982
FILE LOCATION: 7N-1E-21 NENE

TARGET CODES:
WELL HISTORY / CHECKLIST
PERMIT TO DRILL / INTENT TO DRILL
WELL INSPECTION / SCOUT REPORTS
OPERATOR’S TECHNICAL REPORTS / MAPS
ADMINISTRATIVE / SUNDRY REPORTS
CORRESPONDENCE
SURETY
MISCELLANEOUS
WELL HISTORY / CHECKLIST
BOND RELEASE CHECKLIST

Well Name & Location
Wulf #1-A Peterson
NENE 21-7S-1E, Fall River
Permit # 957
API # 40-047 20085
Bond #_708RSE75-A_ Date Issued _______ Date Released NOV 6, 1995

Surface Restoration

✓ Pits filled
✓ Site Level
✓ Site policed
NA Dry-hole marker solid, sealed, correctly inscribed
✓ No dry-hole marker desired, letter in WFO files from surface owner
✓ Letter of Approval from Surface owner
Paperwork filed

Form 4 (Completion or Recompletion Report)
✓ Form 6 (Casing Notice and Report on Wells)
✓ Form 7 (Plugging Report)

Geological Information File:

✓ Well Logs: JIP, SWP, PIR, SRT, CALIP, Cement Bond, Traps, Micro, Laterolog, MWD
✓ NDT Charts and Records
✓ Geologist’s Report
✓ Results of coring and core analyses (None Cut)
✓ Set of 10-foot sample cuttings (check with Bob Schoon)
(Manuscript Form 3.7-B)

Date NOV 1, 1995 Checked By

[Signature]

Dewey-Burdock GDP
June 2012
3.7-B-696
Appendix 3.7-B
**PERMIT CHECKLIST**

<table>
<thead>
<tr>
<th>Well Name and Location:</th>
<th>Permit # 957</th>
<th>API # 40 047 20085</th>
<th>BOND # 708E675-4</th>
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<tr>
<td>Wulf #1-A Peterson</td>
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<tr>
<td>NENE 21-78-1E, Fall River</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Paperwork filed with WFO**

- [X] Organization Report
- [X] Application
- [X] Bond
- [X] Permit Fee

The Following Papers sent to Operator:

- [X] Permit (Form 2a)
- [X] Receipt for $100 permit fee
- [X] Cover letter explaining material sent

**Permit Fee Filed:**

- [X] Permit fee w/Cash Receipts Transmittal Form sent to State Treasurer

**Notification of New Permit sent to:**

- [X] Dr. Duncan J. McGregor
- [X] Mr. Warren R. Neufeld
- [X] Mr. Jack Gerken
- [X] Fall River County Auditor

**Date** 12-18-79 **Check By** Cheryl Pederson
PERMIT TO DRILL / 
INTENT TO DRILL
APPLICATION FOR PERMIT TO:

- DRILL
- DEEPEN
- PLUG BACK
- SINGLE ZONE
- OIL WELL
- GAS WELL
- MULTIPLE ZONE

FARM OR LEASE NAME: Peterson

Wulf Oil Corporation

P.O. Box 1320 - Chadron, Nebraska 69337

LOCATION (in feet from an established corner of the legal subdivision):
660' FNL - 458' PEL Section 21

NAME AND ADDRESS OF SURFACE OWNER:
Peterson & Son, Inc.
Edgemont, S.D.

NAME AND ADDRESS OF CONTRACTOR:
Northern Wyoming Drilling Company
P. O. Box 487
Gillette, Wyoming 82716

IF LEASE PURCHASED WITH ANY WELLS DRILLED, FROM WHOM PURCHASED (Name and address):
N/A

PROPOSED CASING AND CEMENTING PROGRAM:

<table>
<thead>
<tr>
<th>SIZE OF HOLE</th>
<th>SIZE OF CASING</th>
<th>WEIGHT PER FOOT</th>
<th>NEW OR SECOND HAND</th>
<th>DEPTH</th>
<th>SACKS OF CEMENT</th>
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<tr>
<td>12 1/4&quot;</td>
<td>8 5/8&quot;</td>
<td>24#</td>
<td>NEW</td>
<td>250'</td>
<td>200 SACKS</td>
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<tr>
<td>7 7/8&quot;</td>
<td>5 5/8&quot;</td>
<td>15.50#</td>
<td>NEW</td>
<td>2,400'</td>
<td>150 SACKS</td>
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</tbody>
</table>

DESCRIPTION OF PROPOSED OPERATIONS. IF PROPOSAL IS TO DEEPEN OR PLUG BACK, GIVE DATA ON PRESENT PRODUCTIVE ZONE AND PROPOSED NEW PRODUCTIVE ZONE. GIVE BLOW OUT PREVENTER PROGRAM IF ANY:

We plan to drill a 2,400' well into the Leo Formation. We plan to start the well December 28, 1979 with operations lasting approximately 14 days.

Northern Wyoming Drilling Rig #2 is equipped with a 10" Hagan Blowout Preventor which will be used while drilling the well.
Elevation at the following reference points:

100' North (on bank of Beaver Creek) - 3532'
150' West (on bank of Beaver Creek) - 3533'
200' South - 3532'
200' East (possible alternate site) - 3532.41'

Lawrence T. Price of Newcastle, Wyoming, certify that in accordance with a request from Sherry Samuels of Gillette, Wyoming, for Wulf Oil Corp. of P. O. Box 1320, Chadron, Nebraska 69337

That I made a survey (date) November 29, 1978 for the location and elevation of the #1 Peterson Wellsite

As shown on above map the wellsite is in

Section 21 Township 7 South Range 1 East

Fall River County, South Dakota Elevation is 3533 feet above mean sea level before doing.

789663.54 Notes in Fl 312 Pg 46

Signature
WELL DRILLING PROCEDURE RECOMMENDATION

LOCATION AND WELL NAME: Wulf Oil #1-A Peterson
NEBRASKA, Section 21, T7S, R1E, Fall River County,
South Dakota

METHOD OF DRILLING: Rotary

HOLES SIZE: 12½" surface - 7 7/8" drilling hole

CASING: set 150' to 300' of 8 5/8" surface pipe.

MUD PROGRAM: Gel chemical mud—weight 88293#'s per gallon—
viscosity of 35-45 seconds per quart—viscosity of 75-100 for testing or logging—water loss of 8 cc's and Ph of 8295

SURVEYS: Dual Induction Laterolog and Sonic-Gamma Ray
log from base of surface casing to TD

DRILL STEM TESTS: 1-2nd Leo Sandstone

CORES: None

SAMPLES: Every 10' from base of surface casing to TD

POOL NAME: None

ELEVATION: 3537'

DEPTH AND OBJECTIVE: 2400' or 250' below Red Marker, whichever is the lesser.

FORMATION DATA:
- Dakota - 295' (+3238)
- Red Marker - 2208' (+1325)
- 2nd Leo - 2328' (+1205)

CONTRACTOR: Northern Wyoming Drilling Company

GEOLOGIST: Forest Twiford
WELL INSPECTION / SCOUT REPORTS
**SOUTH DAKOTA GEOLOGICAL SURVEY**  
Western Field Office  
**SCOUT REPORT**

**Well Name**: Wulf #1-A Peterson  
**API Number**: 40 047 20085  
**Contractor**: N. Wyoming #2  
**Geologist**: Dennis Stahl, Engr.

**Elev.**: 3537  
**Gr**: 2400  
**Est. T.D.**: 2400  
**Actual T.D.**: 2460  
**Spudded**: 1/13/80  
**Formation Tops:**

**PLUGGING RECORD:**  
**DATE PLUGGED/COMPLETED**: 1/24/80

---

**Casing Record**

<table>
<thead>
<tr>
<th>Date</th>
<th>Marked</th>
<th>Marker Cupped</th>
<th>Mud Pits Filled</th>
<th>Site Created</th>
<th>Site Cleaned</th>
<th>Rigs Replaced</th>
<th>Letter to Owner</th>
<th>Letter to Operator</th>
<th>Scouted By</th>
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<td>X</td>
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<td>X</td>
<td>O</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<td>O</td>
<td>X</td>
<td>X</td>
<td>JRC, JDO</td>
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<tr>
<td>7/11/83</td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
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<td></td>
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</table>

- **X**: Satisfactory  
- **O**: Not satisfactory  
- **NA**: Not applicable

**Remarks**: 5/27/81: Includes Wulf #1-A Peterson; landowner unhappy w/results. No letter regarding dry hole marker. 6/8/82: Mr. Peterson not satisfied with restoration. Says he seeded site himself, but only weeds grew. Company didn't seed site. Lots of garbage in creek; looks like owner dumped it.
No red marker in red ltr from land owner in file dated 4/10/79.

7/11/83: Mr. Peterson contacted company in 1982. They said they would look at the site, but never have. Mr. Peterson says site is still very rough and he's not satisfied. Didn't visit site. Owner said site has not changed. MNS.
SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

SCOUT REPORT

Number 1

Date Scouted 1-9-80

Operator Wulf Oil Company

Permit Number 957

Farm/Lease Name #1-A Peterson

API Number 40 047 20085

NENE Sec. 21 T. 2S R. 1E

County Fall River

Elev. 1537 Gr. Est. T.D. 2400

Actual T.D. 2460 Spudded 1-13-80

Contractor W. Wyoming Drilling #2

Geologist Dennis Staal, Engr.

SOUTH DAKOTA GEOLOGICAL SURVEY
Western Field Office

PLUGGING RECORD:

2300-2200----40 sax
1922-1800----25 sax
1149-1050----30 sax
0868-0750----50 sax
Surface ----10 sax

DATE PLUGGED/CURRENTLY 1-24-80

9-09-80: Site is clean, level, seeded. Pits are filled, there is no marker and no letter from landowner in files.

CASING RECORD:

8 5/8 From 0 To 800 Approved

Not Approved X

REMARKS:

SCOUTED BY

Tim Kenyon
Geologic Assistant

Fred V. Steece, Supervisor
Western Field Office
DAILY DRILLING REPORT

DATE: January 25, 1980
OPERATOR: Wulf Oil Corporation

WELL NAME AND LOCATION: A. Peterson, NE 36X, Sec 26, T1S, R1E, Fall River Co., S.D.

DEPTH: T.D.

BIT NUMBER:

DRILLING MUD
PROPERTIES: WT, VIS, PH, H2O LOSS

DRILLERS REPORT:

- Present operation - rigging down
- 8 hours plugging & laying down pipe
- 8 hours waiting on orders
- 8 hours rigging down

Cost to date - $182,158.15

PROPERTIES: WT, VIS, PH, H2O LOSS

WATER CALIBRATED - 1/20nds

DRILLERS REPORT:

- Drilled 0' in last 24 hours. 125 total rotating hours
- Present operation - tripping w/DR 12; testing Leo Sand
- Recovered 1366' of gas cut water

- 24 hours testing
- 5 hours tripping
- 12 hours waiting on orders
- 1 3/4 hours pick up test tool

GEOLOGISTS REPORT:

- LDT #2 - Interval tested was 2395-2404'. TD Driller-2463'; TD Logger-2459'

- Opened tool with weak blow 1/8" in water bucket; decreased to surface bubbles after 5 min.
- Remained for rest of 15 min. flow.
- Closed tool for 60 min.; opened tool with 1/8" blow on surface and remained steady for 20 min.; decreased to surface bubbles for remainder of test.
- Closed tool for 120 min.; no gas to surface.
- Recovered 1366' of slightly gas cut sulphur water.

- Rw top sample 1.10 @ 46°F
- Rw mid sample 1.10 @ 46°F
- Rw bottom sample 1.20 @ 46°F
- Rw sample - 1.10 @ 46°F
- Rw of make-up water - 4.1 @ 50°F
- Rw of mud pit sample - 1.38 @ 50°F
- Total volume-sampler-2400 cc's
- Total volume-sample-2220 cc's

- Oil - none
- Water - 2250 cc's
- Mud - none
- Gas - 1.18 cubic feet
- Other - none
Il-A Peterson  
January 24, 1980  
Page 2

**Pressures**

<table>
<thead>
<tr>
<th>Layer</th>
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<th>1388</th>
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<td>SIP2</td>
<td>1113</td>
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</tr>
</tbody>
</table>

BOP Temperature - 86° F

Wulf Oil Corporation recommends plugging; please indicate your confirmation as soon as possible today.

---

**GEOLOGISTS REPORT:**

- Ran Dual Laterolog and GR-Neutron Density Logs. TD Driller-2460'; TD Logger-2459'.

**Log Types**

- Dakota 336
- Lakota 545
- Morrison 686
- Sundance 840
- Minnekahta 1707
- Red Marker 2267 (+1273)
- 2nd Leo Zone-2385 (+1160)
- 2nd Leo SS-2399 (+1146)

**Notes:**

1. 2nd Leo SS is 6' high to 81 Peterson.
2. Based on core analysis in 81 Peterson, the zone 2399-2405 should be productive in the 81-A.
3. Preparing to run DST #2 2397-2404. Test should be out tomorrow a.m.

**DRILLERS REPORT:**

- Drilled 0' in last 24 hours
- Present operation - waiting on orders

- 6 hours waiting on loggers
- 9 hours waiting on orders
- 9 hours logging

Cost to date - $155,362.15

**GEOLOGISTS REPORT:**

- Calculating & analyzing logs.
DRILLERS REPORT:
10 days from spud. Drilled 50' in last 24 hours.
Present operation - out of hole to log.
Bit #3 7 7/8" F3—in at 2410', out @ 2460'; drilled 50' in 6 3/4 hours
30,000# wt., 55 rpm, 5 1/2 x 14 pump, 52 SPM, 950# pump pressure
6 3/4 hours drilling
9 1/2 hours tripping
3 hours rig repair
1 hour testing
3/4 hour rig service
2 3/4 hours circulating
Cost to date - $147,794.15
GEOLeGISTS REPORT:
Drilled last 50' at 5-10 mpf with a few 2-3 mpf.
Present operation is waiting on loggers
Samples are poor and soapy—Shale shaker is freezing up because mud is sticking.
Will have sample preparations later.

DRILLING MUD PROPERTIES: WT. 10.6 VIS. 63 PH 10 H2O LOSS 6

DRILLERS REPORT:
Drilled 0' in last 24 hours. 129 total rotating hours.
Present formation - Leo Sand
Present operation - testing Leo
Bit #2 7 7/8" F953—in at 1810', out at 2400'; drilled 600' in 54 hours.
30,000# wt., 55 rpm, 54 SPM, 900# pump pressure
5 1/2 hours tripping
3 hours waiting on test tool
1 1/2 hours waiting on orders
1 1/2 hour rig service
3 3/4 hours testing
Pipe strap was 2432' and tally board was 2422'
Cost to date - $129,411.08
GEOLeGISTS REPORT:
DST #1 from 2390-2410' (depth correction of 10'). Corrected Drilling top of Red Marker -2270'
corrected top of 2nd Leo - 2400'
FP period of 15 minutes
Tool opened with weak blow 5 min. in bucket. 5 min. blow increased to 1 min. 15 minute blow increased to 2 min.

ISI period--60 minutes
FP period of 90 minutes, opened tool with weak blow 5 min in bucket, 5 min blow increased to 1 min, 15 minute blow increased to 2 min, 15 - 90 minutes blow remained steady in bucket.
Closed tool, blow died in 1 minute.

Recovered 1400' of fluid. 200' of slightly gas cut/mud cut water
1200' of gas cut sulphur smelling water. Gas would burn at tool joints.

Rw top sample - .129 @ 50° F
Rw mid sample - .8 @ 50° F
Rw bottom sample - .69 @ 50° F
Rw of make-up water - 4.1 @ 50° F
Mud pit sample Rw - 1.36 @ 50° F
Rw-sampler - .88 @ 50° F
Pressure in sampler - 30 psi
Total volume - 2700 cc's Total volume of sample - 2600 cc's

Oil - none
Water - 2600 cc's
Mud - none
gas - .16 cubic feet
January 21, 1980

**Pressures**

<p>| | | |</p>
<table>
<thead>
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<th></th>
<th></th>
<th></th>
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<tr>
<td>SIP₂</td>
<td>991</td>
<td>1016</td>
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</table>

BOP temperature -- 86° F

Will drill to 2460' and run Dual Laterolog and GR-Density-Neutron to determine if additional DST's are needed.
Wulf Oil Corporation

DAILY DRILLING REPORT

DATE: January 20, 1980
OPERATOR: Wulf Oil Corporation

WELL NAME AND LOCATION: #1-A Peterson, NEDEN, Sec 26, T7S, R7E, Fall River Co., SD

DEPTH: 2400'

BIT NUMBER: 2

DRILLING MUD
PROPERTIES: WT. 10 VIS. 45 PH 10 H2O LOSS 6

DRILLERS REPORT:
7 days from spud. Drilled 110' in last 24 hours.
Present formation - sand
Present operation - circulating samples
Bit #2 7 7/8" FR53-in at 1810; drilled 590' in 54 hours.
30,000# wt., 55 rps, 52 SPM, 950# pump pressure
Survey at 2290' - 3/40 dev.
21 hours drilling
1 1/2 hours circulating
1 hour survey
1 hour repairs

GEOLOGISTS REPORT:
Drilling in Upper Pennsylvanian.

2:00 p.m. report — top of 2nd Leo Zone at 2390'. Good drilling break from 20 mph to 2 mph. Circulated samples were SS, excellent P & P, good visible stain, excellent flour and excellent stringing cut. TD 2400'. Will test from 2385-2400'. Test should be out by noon 1-21-80.
Wulf Oil Corporation

DAILY DRILLING REPORT

DATE: January 19, 1980

OPERATOR: Wulf Oil Corporation

WELL NAME AND LOCATION: #1-A Peterson, Newton, Sec 32, T 7 S, R 1 E, Fall River Co., SD

DEPTH: 2290'

BIT NUMBER: 2

DRILLING MUD

PROPERTIES: WT. 9.0 VIS. 40 PH 9 H2O LOSS 10

DRILLERS REPORT:

6 days from spud. Drilled 360' in last 24 hours. Present formation-sand: Present operation-drilling Bit #2 7 7/8" FP 53 in at 1810'; drilled 480' in 33 hours. 30,000# wt., 55 rpm, 52 BPM, 900# pump pressure

24 hours drilling

GEOLOGISTS REPORT:

Drilling in lower Permian.
API 10 40
04120085
210138
DAILY DRILLING REPORT

DATE: January 16, 1980

WELL NAME AND LOCATION: #1-Peterson, NEVADA, Sec 32, T7S, R1E, Fall River Co., SD

DEPTH: 1035'

BIT NUMBER: 1

DRILLING MUD

PROPERTIES: WT. drilling with VIS. PH H2O LOSS

water

DRILLERS REPORT:

3 days from spud.
Drilled 233' in last 24 hours. 43 total rotating hours.
Present formation - Shale
Present operation - working on motor
Bit #1 Y-12 — in at 802'; drilled 233' in 7 hours.
25,000# wt., 100 rps.
7 hours drilling
15½ hours waiting on cement
3½ hour cement
1 hour circulating casing

Set 18 joints of 8 5/8" JE24# - set 792' at 802'

Cement - 380# regular, 3% CaCl, 1% chip plug.

$85,061.49 — Cumulative Costs.
BIT NUMBER: 2

DRILLING MUD PROPERTIES: WT, drill w/water VIS. PH H2O LOSS

DRILLERS REPORT:
5 days from spud. Drilled 180' in last 24 hours.
Present operation - drilling
Bit #1 7 7/8" Y12-in at 802'; out at 1810'; drilled 1008' in 31 hours,
Bit #2 7 7/8" FP-53-in at 1810'; drilled 120' so far.
25,000# wt., 55 rmps, 54 SPM, 800# pump pressure
9 hours drilling
12 1/2 hours tripping (had to borrow drill collars from another rig)
1 1/2 hours reaming
1 hour cleaning mud tank
Cost to date - $97,224.84

GEOLOGISTS REPORT:

DRILLERS REPORT:
4 days from spud. Drilled 115' in last 24 hours. 75 total rotating hours.
Present operation - Drilling
Bit #1 7 7/8" Y12--in at 802'; drilled 948' in 29 hours.
pump 5 1/2 x 14, 54 SPM, 950# pump pressure
22 hours drilling
2 hours mixing mud
Cost to date - $93,593.54

GEOLOGISTS REPORT:
DAILY DRILLING REPORT

DATE: January 15, 1980  OPERATOR: Wulf Oil Corporation

WELL NAME AND LOCATION: #1-A Peterson, NE, Sec 32, T7S, R1E, Fall River Co., SD

DEPTH: 802'

BIT NUMBER: __________

DRILLING MUD PROPERTIES: WT. ___________ VIS. ___________ PH ___________ H2O LOSS ___________

DRILLERS REPORT:
37½ total rotating hours
Present formation - shale
Present operation - circulating casing

Bit #1-A 12½" - in at 0', out at 802', drilled 802' in 37½ hours.
Survey at 802' - 2½ deviation
19¾ hours drilling
2 hours tripping
2½ hours run casing
½ hour survey

Cumulative Costs - $74,381.91

GEOLOGISTS REPORT:

DATE: January 14, 1980  OPERATOR: Wulf Oil Corporation

WELL NAME AND LOCATION: #1-A Peterson, NE, Sec 32, T7S, R1E, Fall River Co., SD

DEPTH: 300'

BIT NUMBER: 1-A

DRILLING MUD PROPERTIES: WT. ___________ VIS. ___________ PH ___________ H2O LOSS ___________

DRILLERS REPORT:
1 day from spud
Drilled 300' in last 24 hours
18 total rotating hours
Present formation - shale
Present operation - drilling

Bit #1-A 12 3/4" Y-12-- in at 0', out at 300', drilled 300' in 18 hours
110 rpm, 54 BPM, 600# pump pressure
Survey at 300' - 2° deviation
18 hours drilling
6 hours waiting on water

Cumulative Costs - $66,894.07
## Field Ticket

**Operator:** UX Oil Corporation  
**Address:** P.O. Box 120  
**Chadron, Nebraska 69337**

### Well Name & Number
- **Paterson #1-A**

### Completion Details
- **Top Card:** 3/8"  
- **Bottom Card:** 3/4"

### Testing Details
- **Test Name:** Dewey-Burdock GDP  
- **Date:** January 21, 2012

### Testing Procedure
- **00:15:** Start tool in hole.
- **03:37:** Open tool w/weak blow 1/2" deep in the water. 5 min. blow increased to 1" deep in the water. 15 min. blow increased to 2" deep in the water.
- **03:52:** Close tool-blow died in 1 min.
- **04:22:** Open tool w/weak blow -1/2" deep in the water. 5 min. blow increased to 1" deep in the water. 15 min. blow increased to 2" deep in the water. 30 min. blow steady @ 2" deep in the water. 60 min. blow steady @ 2" deep in the water. 90 min. blow steady @ 2" deep in the water. 06:22:** Close tool-blow died in 1 min.
- **08:22:** Equivale tools & work looses.
- **Time:** 03:37 AM - 1/21/80

### Pressure Details
- **Surface:** 0.80 @ 500°
- **Stress/Strain:**
  - **Type AK-1**
    - **No. 2015**
    - **Check No:**
      - **Depth:** 5,200 ft.
        - **Level:** 3,236 ft.
        - **Net:** 2,074 ft.
      - **Oil:**
        - **Depth:** 3,236 ft.
        - **Net:** 2,074 ft.
      - **Gas:**
        - **Depth:** 3,236 ft.
        - **Net:** 2,074 ft.
      - **Water:**
        - **Depth:** 3,236 ft.
        - **Net:** 2,074 ft.
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<tr>
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<th>Factor</th>
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<td>Initial Hydrostatic 1388</td>
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<tr>
<td></td>
<td>152</td>
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<td>Final Hydrostatic 1354</td>
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<table>
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Remarks:
Quantitative log interpretation

This interpretation represents the best judgment. However, because all log analysis is based on best assumptions and empirical relationships, we cannot guarantee the accuracy of these figures. For this reason, we must disclaim any responsibility for any loss or expense which results from the use of this interpretation.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>ΔT</th>
<th>ØAL</th>
<th>ØD</th>
<th>Rm</th>
<th>Rl</th>
<th>Rwm</th>
<th>Sw</th>
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<td>80</td>
<td>If use Rm=.65 @ 1½h Then Sw 95</td>
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<td>100</td>
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<td>100</td>
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<td>.4</td>
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</table>

References

ΔTmo Dmo
ΔTf Df
ΔTsh

G. VAUGHIN
DRESSER ATLAS ENGINEER

DATE 1/31/80
Ticket No. 1182  D.S.T.No.1 Gauge No. 3851

Ticket No. 1182  D.S.T.No.1 Gauge No. 2015

Each Horizontal Line Equal to 100 p.s.i.
ADMINISTRATIVE / SUNDARY REPORTS
**PLUGGING RECORD**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wulf Oil Corporation</td>
<td>P.O. Box 1320, Chadron, NE 69337</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Well No</th>
<th>Field &amp; Reservoir</th>
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<tbody>
<tr>
<td>1-A</td>
<td>Wildcat - Dry</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>NP PANEL</th>
<th>Sec. 21, T7S, R1E</th>
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</thead>
<tbody>
<tr>
<td>Wulf Oil Corporation</td>
<td>Fall River</td>
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</table>

<table>
<thead>
<tr>
<th>Date plugged</th>
<th>Total depth</th>
<th>Amount well producing when plugged</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 25, 1980</td>
<td>2460'</td>
<td>0 Oil (MCF/day) 0 Gas (MCF/day) 0 Water (MM)</td>
</tr>
</tbody>
</table>

**Oil & gas indicator**

<table>
<thead>
<tr>
<th>Name of each formation containing oil or gas</th>
<th>Fluid content of each formation</th>
<th>Depth interval of each formation</th>
<th>Spec. kind &amp; depth of plugs used</th>
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</thead>
<tbody>
<tr>
<td>Dry</td>
<td></td>
<td></td>
<td>Indicate number, type, length, cement used.</td>
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**Casing Record**

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<th>Size pipe</th>
<th>Put in well (ft)</th>
<th>Pulled out (ft)</th>
<th>Left in well (ft)</th>
<th>Give depth and method of parting casing below</th>
<th>Pickers and shores</th>
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<tr>
<td>8-5/8&quot;</td>
<td>802'</td>
<td>0</td>
<td>802'</td>
<td>---</td>
<td>None</td>
</tr>
</tbody>
</table>

**Was well filled with mud-laden fluid**

- Yes
- No

**Indicate deepest formation containing fresh water**

- Yes
- No

In addition to other information required on this form, if this well was plugged back for use as a fresh-water well, give all pertinent details of plugged operations in base of fresh water sand, perforated interval to fresh water sand, name and address of owner, and attach to this form a record of completion of this well as a fresh-water well and agreeing to assume full liability for any subsequent plugging which might be required.

**January 25, 1980**

Plugs were placed as follows:

- 2200 to 2300 40 sx.
- 1800 to 1900 25 sx.
- 1050 to 1150 30 sx.
- 750 to 850 40 sx.
- surface no/marker 10 sx.

Plugged and abandoned 1-25-80

**Reverse side for additional detail**

**Notary Public**

- Seal
- Signature

**General Notarial Seal**

- Seal
- Signature

**Approved**

- Date

**Notary Public in and for**

- County

**APR 21 1982**

**OIL AND GAS BOARD OF THE STATE OF SOUTH DAKOTA**

---

Dewey-Burdock GDP
June 2012
3.7-B-721
Appendix 3.7-B
Verbal permission was obtained to plug the well January 25, 1980.

Plugs to be placed as follows:

- 2200 to 2300 40 sx.
- 1800 to 1900 25 sx.
- 1050 to 1150 30 sx.
- 750 to 850 40 sx.
- Surface w/marker 10 sx.
CORRESPONDENCE
Mr. Fred V. Steece, Supervisor  
Western Field Office  
36 East Chicago  
Rapid City, SD  57701  

Dear Mr. Steece:  

This letter informs you that the surface restoration at the site of the following oil or gas test well has been completed to my satisfaction.  

<table>
<thead>
<tr>
<th>Permit</th>
<th>Well Name and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>957</td>
<td>Wulf #1-A Peterson, NENE 21-7S-1E, Fall River</td>
</tr>
</tbody>
</table>

I am the surface owner of record.  

SIGNED  

DATE  9/9/13
Wulf Oil Corporation
P.O. Box 1320
Chadron, NE 69337
Attention: Tim Schuckman

Re: Wulf #1-A Peterson
NE1/4NE1/4, 21-75-1E
Fall River County, South Dakota

Dear Mr. Schuckman:

This is to advise Wulf Oil Corporation that as surface owner I hereby request that no dry hole marker be erected for the above referenced well.

Very truly yours,

Wayne Peterson
March 11, 1980

Ms. Deb Richards
Wulf Oil Corporation
P.O. Box 1320
Suite 25, Chaney Center Bldg.
Chadron, NE 69337

Dear Ms. Richards:

Please find enclosed the approved copy of Sundry Notices and Report on Wells, (Form 6) for the following Well:

<table>
<thead>
<tr>
<th>Permit</th>
<th>Well Name and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>957</td>
<td>Wulf 11A Peterson, NENE 21-7S-1E, Fall River</td>
</tr>
</tbody>
</table>

This is for your information.

If there is any other way that I can be of help, please let me know.

Sincerely,

Fred V. Steece, Supervisor
Western Field Office

FVS/op
Enc.
cc: Dr. Duncan J. McGregor
SURETY
NO SURETY INFORMATION FOR THIS WELL AS OF 5/18/2011
NO MISCELLANEOUS INFORMATION FOR THIS WELL AS OF 5/18/2011
SOURCE E

DEWEY BURDOCK GROUNDWATER WELL REPORT

2010 & 2011 FIELD WORK COMPLETED

(Mike Beshore, Powertech (USA) Inc., October 4, 2011)

During the field seasons of 2010 and 2011, Powertech personnel conducted groundwater well work at the Dewey Burdock project area. This work consisted of locating groundwater wells within the Area of Review (AOR), monitoring water levels of selected wells, measuring flow rates of artesian wells, and determining groundwater well construction information by running the down-hole camera and geophysical logging tools. Groundwater wells within the AOR are shown in Map 1. The conducted field work is detailed below.

Groundwater Level Measurements:

Groundwater levels were monitored by Powertech personnel on selected groundwater wells, in order to construct groundwater potentiometric surfaces for various aquifers. Standard operating procedures (SOP) for water level measurements under artesian and sub-surface conditions are shown in Attachment 1. Groundwater elevation data from the monitoring program are contained within Table 1. It should be noted that a significant amount of work had to be completed on many groundwater well surface casings in order to obtain accurate measurements. This was particularly the case for artesian groundwater wells that needed to be fully sealed up and shut in, in order to obtain accurate pressure measurements. Below is a photograph showing an example of well head work completed in order to accurately obtain artesian pressure measurements.

Artesian/Windmill Groundwater Well Flow Rates:

Groundwater wells that free-flow at the ground surface under artesian pressure and by the use of a windmill and their associated flow rates are shown in Table 2. This information was provided to Petrotek to incorporate into the project area groundwater flow model. Flow rates of free flowing groundwater wells was obtained by using a 5-gallon bucket, and noting the amount of time it took to fill the bucket, which yielded an estimate of the flow rate. Below are photographs of a typical artesian groundwater well and a flowing windmill within the project area, that are allowed to free-flow to the ground surface.
Groundwater Well Work Completed:

Below is a well by well summary of work completed on groundwater wells during the field season of 2011. Several tasks were completed in order to determine the construction details of many groundwater wells. A tabulated summary of groundwater well status as of September 30, 2011 is included in Table 3.

**Groundwater Well Hydro ID 5:**

Groundwater well number 5 is located about 0.5 miles south of the Powertech Burdock pump test location. The well is artesian and consists of a 4-inch casing. Originally the well was expected to produce water from the Chilson aquifer, however further investigations utilizing the down-hole camera and geophysical tool actually revealed that the well is screened within the lower Fall River aquifer. The geophysical log and the screened interval were sent to Powertech geologists for sub-surface geologic interpretations. The well consists of 4-inch casing to a depth of 155 feet below the ground surface, and is open hole from 155 to 175 feet.

**Groundwater Well Hydro ID 6:**
Groundwater well number 6 is located within the project AOR and about 1-mile south of the Powertech Burdock pump test location. This well is non-flowing and consists of a 12-inch steel casing. The static water level in the well is at about 20 feet below ground surface.

The 2-inch down-hole camera was run down the well casing in order to determine the well construction details. As with many groundwater wells in the area, it was very difficult to see the screened interval of the well due to mineralization on the inner casing walls. It appeared from the video that the steel well casing ended at a depth of 135 feet below the ground surface, below which was open bore hole to a total depth of 200 feet below ground surface. These depths correspond to other Fall River wells in the area. The geophysical logging tool was also run down the well casing to its total depth. The logs suggest that sandy facies with good porosity exists from the ground surface to 200 feet below the ground surface.

**Groundwater Well Hydro ID 9:**

Groundwater well number 9 is located within the AOR and south of the Powertech Burdock pump test area. The status of this well was unknown, and was identified at the ground surface by the presence of upwelling water flow from what was hypothesized to be a broken-off casing (see photo below). Historical documents from TVA identify this well as being screened within the Fall River Aquifer. Conversations with the landowner also help validate that well number 9 is screened within the Fall River Aquifer.
Powertech personnel excavated a small portion of the area near the upwelling water in an attempt to locate the groundwater well. After much effort, the broken off 2-inch groundwater well casing was located about 6 feet below the ground surface. A pipe was then attached to the casing to ensure that artesian pressure would lift the groundwater to the ground surface before repairing the well-head, but water did not flow to the ground surface.

Powertech personnel then constructed a 6-foot long 1-inch drill bit. This tool was used to ream out sulfide mineralization that had accumulated on the inner walls of the well casing. This process increased artesian flow from the well to about 1.0 gallon/minute at the ground surface.

After verifying flow from the well at the ground surface, a 2-inch pipe was placed inside the existing well casing and penetrated into the well about 2-feet. A protective riser was then placed around the 2-inch pipe, and cement was added to the space between the 2-inch well head and the protective riser. Artesian flow of 1 gallon/minute was observed at the ground surface. Below is a photograph of the final well-head configuration.

The excavated area around the well was then replaced and smoothed out to match the existing topography. The landowner can now utilize the groundwater well for stock watering purposes.
Powertech personnel were unable to run a down-hole camera on the well due to mineralization on the inner casing walls. A one inch camera, once obtained, may penetrate into the water well and allow construction details to be ascertained. This effort resulted in verifying the presence of a groundwater well and is now set up so water level measurements can be obtained.

**Groundwater Well Hydro ID 37:**

Groundwater well number 37 is located outside of the project boundary but within the AOR, about 0.75 miles south-east of the south-east corner of the project boundary. This groundwater well is not artesian and produces stock water by a windmill. The windmill was disassembled by Powertech personnel so access to the well could be obtained.

This groundwater well originally produce water from an unknown aquifer, but further investigations reveal that it produces from the upper Fall River aquifer according to Powertech geologists who interpreted the geophysical log and screened interval obtained from the down-hole camera. The down-hole camera revealed that the well is cased at the surface, but is open-hole from a depth of 93-145 feet below the ground surface.

**Groundwater Well Hydro ID 49:**

Groundwater well number 49 is located within the Powertech Dewey aquifer pump test area. This well has a construction report associated with it, is screened from a depth of 475-540 feet, and is known to be screened within the upper Fall River aquifer. The total depth of the well was verified to be 540 feet by Powertech personnel.

This groundwater well is artesian, and when first visited had a leaky surface casing. In order to be able to measure artesian pressure and groundwater levels with a high degree of accuracy, the leak in the surface casing had to be fixed, and fitted with valves to isolate the pressure gauge. Below is a photograph of surface casing work completed. There are no leaks at the ground surface, and measured water levels now correlate very well with other surrounding upper Fall River wells.
Groundwater Well Hydro ID 106:

Groundwater well number 106 is located within the AOR just north of the town of Dewey, and north of the Dewey Fault zone. The status of this 7-inch was unknown, and expected to produce from Inyan Kara aquifers. The well is artesian and flows about 0.1 gallons/minute.

The 2-inch down-hole camera was run down the well casing to determine well construction details. The casing walls were very difficult to see due to mineralization and algae growth. It appeared from the video that the steel casing ended at 160 feet below the ground surface, below which was open borehole to a depth of 196 feet below ground surface. The geophysical logging tool was then run down the well casing to its total depth. The logs show a zone of good porosity below about 175 feet to 196 feet below the ground surface.

Groundwater Well Hydro ID 220:

Groundwater well number 220 is an existing stock well located about 1.5 miles north-north-west of the Powertech Dewey pump test location, consisting of a 6-inch surface casing. Flow from the groundwater well is artesian and produces about 0.2 gallons of water per minute to a nearby stock tank. Below is a photograph of well number 220.
The down-hole camera and geophysical logging tool was used by Powertech personnel to investigate the groundwater well. The well was initially screened within an unknown aquifer. Through the use of the down-hole camera, it was determined that the well is screened from at least 463-523 feet below the ground surface. This corresponds to the upper Fall River aquifer according to Powertech geologists. However as can be seen from the down-hole video, the screened interval extends below 523 feet to an unknown depth. At 523 feet the camera could not go any deeper as the casing was broken and caved in.

**Groundwater Well Hydro ID 270:**

Groundwater well number 270 has been found and is located about 1.5 miles north and west of the Powertech Dewey pump test location. This groundwater well is artesian and produces about 12 gallons/minute from a 2-inch steel casing. Currently the construction details of the groundwater well are unknown, but is expected to produce from the Inyan Kara aquifers.

Powertech personnel excavated the area around the groundwater well to fix the leaky well-head and prepare it for down-hole tools. A new well-head riser pipe was installed and fitted with a valve for artesian water level measurements. The well-head is no longer leaky.

An attempt was made to run a down-hole camera in the well in order to obtain construction details. Due to mineralization on the inner casing walls, the down-hole camera would not enter the well casing. A 1-inch camera must be obtained to penetrate the well casing and obtain construction details.

**Groundwater Well Hydro ID 605:**

The original groundwater well database provided to Powertech from their consultants identified a ground water well hydro ID 605, which was supposed to be located about 1500 feet east of the TVA Burdock aquifer pump test well 668. There is in fact no groundwater well at this location. There is a vertical 1-inch pipe that comes up from the ground and provides water to a livestock tank. However this pipe comes from groundwater well Hydro ID 668, which provide water to this location via artesian flow from 668. There is no evidence that groundwater well 605 exists.

**Groundwater Wells Hydro ID's 622 and 623:**
The status of groundwater wells 622 and 623 are known as TVA construction reports exist, and were utilized in the TVA Dewey pump test as observation wells. Powertech personnel verified in the field each of these wells using a tag line to determine well depth, and most maps that show the screened interval are incorrect. Groundwater well 622 is the southern well and is the lower Chilson, as defined by the well depth being 780 feet below the ground surface. Groundwater well 623 is the northern well and is the lower Fall River, as defined by the tag line going to a depth of 580 feet below the ground surface. Furthermore, groundwater levels obtained from surrounding wells correlate perfectly with the above conclusions. Most maps that have been generated to date are labeled incorrectly, and the well symbols need to be revised to show the verified aquifer. Groundwater well 622 is Chilson and well 623 is Fall River.

**Groundwater Well Hydro ID 635:**

It was originally thought that Hydro ID 635 was an Sundance groundwater well located near the stock reservoir about 750 feet east of groundwater well Hydro ID 5. However, it has been confirmed that this is actually a discharge point from groundwater well Hydro ID 5. Any groundwater quality samples obtained that are labeled as Hydro ID 635 are actually from Hydro ID 5.

According to well construction reports, there was once a Sundance groundwater well in this area. The construction report shows that an oil test well was plugged back and perforated in the Sundance aquifer. Powertech personnel found a solid steel pipe sticking out of the ground about 2000 feet north of the reservoir where the Hydro ID 5 discharge point is located. It is thought that this is the location of the oil test well. The steel pipe needs to be excavated to check if the well has been plugged back to the ground surface.

**Groundwater Well Hydro ID 642:**

Groundwater well number 642 is located in the extreme south-east corner of the project boundary, and was originally hooked up to a windmill for livestock watering purposes. The well is currently not being used for any purpose except for groundwater monitoring. The photograph below shows the windmill structure below which groundwater well 642 is located.
Well number 642 consists of a 5-inch steel surface casing that is in good condition. Groundwater level measurements completed by Powertech personnel yield a water level of about 5-feet below the ground surface. Below is a close up photograph of groundwater well 642.

The construction details of groundwater well 642 were initially unknown. Powertech personnel ran down-hole tools on the well to determine construction information. The down-hole camera shown that the 5-inch surface casing extends to a depth of 12 feet below the ground surface, below which is an open hole to a total well depth of 33 feet. Location and geophysical log information was provided to Powertech geologists, and they interpreted the well to be producing water from surface alluvial sediments. However while running the camera down the hole, it was noted that the walls of the borehole consisted of solid-rock. The geophysical log from the hole should be re-examined to make sure the well is not completed in a sandstone formation such as the Fall River or Chilson.

Groundwater Well Hydro ID 651:

The original groundwater well database provided to Powertech from its consultants identified a groundwater well Hydro ID 651. Powertech personnel inspected this area, and confirmed that there is no groundwater well at this location. There is a stock tank at the location, but it originally received water from groundwater well Hydro ID 6 via a trenched pipeline. Inspection of an aerial photograph of this location clearly shows that a pipeline exists from well number 6 to the location of the stock tank, which was originally thought to be a stand-alone well. From conversations with the current landowner, the groundwater well 6 at one time would provide water to the stock tank, but following TVA pumping of aquifers, the well failed to deliver water to the stock tank location.

Groundwater Well Hydro ID 668:

Groundwater well number 668 is located within the project area and within the proposed groundwater aquifer exemption boundary at the location of the TVA Burdock groundwater pumping test.
As can be seen from the above photograph, this groundwater well is in excellent condition and consists of a 10-inch casing. The groundwater well is artesian and provides livestock water for the landowner. This groundwater well was used as the pumping well during the TVA Burdock aquifer test, and so there is a lot of construction information available. The TVA well construction report shows that the well produces groundwater from both the Fall River and Chi'son aquifers, but Powertech personnel thought it was important to verify that information by running the down-hole camera and geophysical logging tool.

Powertech personnel ran the down-hole camera on the water well and confirmed that the well is screened at multiple intervals. The upper screen of the well extends from 300 feet to 350 feet below the ground surface. A solid, unscreened interval exists from 350 feet to 495 feet below the ground surface. From 495 feet to 550 feet below the ground surface is the lower screened interval of the well. The total depth of the well is 550 feet.

The geophysical logs ran by Powertech personnel were provided to Powertech geologists for geologic interpretation. It was confirmed that the upper screened interval of the well (300-350 feet) is in fact within the lower Fall River Formation aquifer. The lower screen of the well from 495 to 550 feet intersects the Lower Chi'son Member of the Lakota aquifer. The solid casing that runs between the two screened intervals intersects the Fuson Member confining layer.

During the summer of 2011 Powertech personnel installed an inflatable packer within the groundwater well 668, in an attempt to isolate the two screened intervals of the groundwater well and conduct monitoring of the artesian pressures of each screened aquifer. That task and monitoring details are contained within a stand-alone report provided to Powertech engineering.
### Dewey-Burdock Groundwater Potentiometric Surface Measurement - Collected by Beshore and Van Lalton

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**By Mike Beshore, Powertech (USA) Inc.**

**October 4, 2011**

---

**Dewey-Burdock GDP**

**June 2012**

**Appendix 3.7-B**
Powertech (USA) Inc.

Standard Operating Procedure (SOP)

Groundwater Well Water Level Monitoring

This SOP outlines procedures for measuring and documenting artesian and sub-surface water levels within groundwater monitoring wells.

Materials:

- Powertech Groundwater Well Monitoring Data Sheet.
- Electric Logging Water Level Measuring Tape.
- High-Resolution Digital Pressure Gauge.
- Tape Measure with 1/100th foot accuracy.

Personal Protective Equipment (PPE):

- Several potential hazards exist during groundwater well water level monitoring. These include but are limited to pinch-points, pressure, slip/trip/fall, and environmental hazards. Appropriate PPE must always be utilized when conducting groundwater well water level monitoring.

Documentation:

- The person conducting the groundwater well monitoring must completely and accurately fill out the Groundwater Well Monitoring Data Sheet.
- The person conducting the groundwater well monitoring must read and sign the SOP for Groundwater Well Water Level Monitoring. A copy of the signed SOP should be filed at the nearest Powertech Field Office. A copy of the SOP must accompany the person conducting the monitoring in the field.

Procedures:

2. Procedure for pressurized artesian groundwater wells.
   a. Fully shut-in the artesian groundwater well so that there are no leaks that result in the loss of artesian pressure. This may require some tightening or replacement of plumbing fixtures. A closable valve should be fitted to the well head that allows the attachment of the high-resolution digital pressure gauge. This valve and other plumbing fittings should not be removed, so that future measurements can be conducted at the same elevation.
   b. Make sure that all air has been evacuated from the artesian groundwater well. The high-resolution digital pressure gauge can now be installed and turned on. Make sure that the gauge has been reset, or zeroed out.
c. Take an initial pressure measurement in pounds/square-inch (PSI) and document the measurement and time on the Powertech Groundwater Well Monitoring Data Sheet. Pressure measurements should be taken with an accuracy of 0.01 PSI.
d. Continue to take and document pressure measurements until the artesian water well pressure has stabilized. A stabilized artesian pressure measurement is defined as one of the following:
   a. A pressure measurement that reaches a maximum value, and then slightly decreases, but does not exceed the maximum documented value within a period of 15 minutes.
   b. If the pressure measurements DO NOT fluctuate more than 0.04 PSI (or 0.1 feet of water head) over 3 measurements within a 15 minute time period.
e. Make sure to measure the vertical distance between the surveyed control point (Top of Casing or Survey Pin) and the pressure sensor diaphragm on the pressure gauge. This measurement must be taken with an accuracy of 1/100th of a foot.

3. Procedure for sub-surface water level groundwater wells.
   a. Lower the probe of an Electric Logging Water Level Measuring Tape into the groundwater well, and lower at a slow rate. Be careful not to let the probe and tape unwind too quickly as they may come free of the spool and be lost into the well.
   b. Also make sure that the probe sensitivity is adequately adjusted. The deeper the water is in the well, the less sensitivity the probe will require. This is important as condensation in the well could give false readings of the water level in the well.
   c. Measure and document the depth to the water in the well from the top of the well casing. This measurement must be logged with an accuracy of 1/100th of a foot. Make sure to take several measurements to ensure an accurate final water level.

I certify that I have read and understand the content of this Standard Operating Procedure.

Employee Signature: _____________________________ Date: ____________
SOURCE F

RESPEC RESPONSES TO NUCLEAR REGULATORY COMMISSION COMMENTS (REVISION 1)

(Letter from Crystal Hocking, RESPEC, to Mark Hollenbeck, Powertech (USA) Inc., July 22, 2010)
External Memorandum

To: Mr. Mark Hollenbeck  
Powertech (USA) Inc.  
310 2nd Avenue  
P.O. Box 612  
Edgemont, SD 57735

cc: Mr. John Mays, Powertech  
Mr. Cory Foreman, RESPEC  
Project Central File 1853 — Category A

From: Ms. Crystal Hocking  
Staff Geologist  
RESPEC  
P.O. Box 725  
Rapid City, SD 57709

Date: July 22, 2010

Subject: Responses to Nuclear Regulatory Commission Comments (Revision 1)

The purpose of this memorandum is to respond to the five tasks designated by Powertech to help respond to Nuclear Regulatory Commission (NRC) comments regarding the technical report. These tasks were outlined by Mr. John Mays and you at a meeting with RESPEC on June 24, 2010.

Task 1. Check Well 650 and Compare Water Level to Depth to Lakota to Determine Saturated/Unsaturated Conditions at That Location

In an effort to help identify areas where the Lakota Formation is fully saturated, water level measurements of Lakota wells were compared to the elevation of the top of the aquifer. Tables 1 and 2 include well completion and water level measurements for Wells 650, 3026, and 619. Well locations are shown on Figure 1.

The elevation of the top of the Lakota at Well 650, 3,775 feet, was approximated by interpolating the known depth to Lakota at Well 3026 with the location of the outcrop (where the depth equals 0). The average water level measurement is at 3,682 feet elevation, or 92 feet below the approximate top of the Lakota. At the location of Well 3026 (DB08-01-06), the water level is approximately 60 feet below the top of the Lakota Formation. At both of these wells, the Lakota is only partially saturated. At Well 619, the water level in the Lakota is approximately 300 feet above the top of the Lakota Aquifer based on estimates of the Lakota elevation from the sitewide structural contour maps; here the Lakota is fully saturated.
Table 1. Well Completion for Wells 650, 3026, and 619

<table>
<thead>
<tr>
<th>Hydro I.D. or Hydro Code</th>
<th>650</th>
<th>3026</th>
<th>619</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<tr>
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<td>Lakota</td>
<td>Lakota</td>
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<td>Screened Interval (ft)</td>
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<td>166–196</td>
<td>Unknown</td>
</tr>
<tr>
<td>Measuring Point</td>
<td>Top of 8-inch steel casing</td>
<td>Top of 6-inch casing pipe</td>
<td>Top of 5-inch steel coupling on casing</td>
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<td>Stick Up (Well Casing Mark) (ft)</td>
<td>-0.20</td>
<td>0.00</td>
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<tr>
<td>Surveyed Control Point Elevation (ft)</td>
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<td>Calculated Measuring Point Elevation (ft)</td>
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<td>3,700.12</td>
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</table>

In an effort to better delineate where the Lakota Aquifer becomes fully saturated, RESPEC recommends Powertech acquire water levels from two or three additional Lakota wells in close proximity to the outcrop. Recommended wells include Wells 16, 61, and/or 620 (Figure 1). None of these wells have well completion reports, although they are listed in Tennessee Valley Authority (TVA) reports as being completed within the Lakota. Well 16 is listed in the TVA draft Environmental Impact Statement (EIS) as having a water elevation of 3,747 feet, and based on approximations from structure contour maps, the elevation of the Lakota is 3,730 feet or just below the water level of the Lakota. Based on this information alone, it appears that Well 16 is at or very near the area where the Lakota Aquifer becomes fully saturated. From this, it is reasonable to assume that the transition from saturated to unsaturated conditions in the Lakota is located geographically in the central to western portion of the Fall River Formation outcrop. However, because of fluctuations in the water table with time and precipitation patterns, it is highly recommended to take a new water level measurement at Well 16, the only Lakota well located on the Fall River outcrop.

Task 2. Check Field Notes to Verify Data on Existing Potentiometric Surfaces Is Correct

Water level data for wells with questionable data were spot checked to compare field notes with the tabular data. An explanation of the results is provided in the following sections.

--- DRAFT ---
Table 2. Water Level Measurements for Wells 650, 3026, and 619

<table>
<thead>
<tr>
<th>Hydro I.D. or Hydro Code</th>
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Mean Water Level Elevation 3,682 3,682 3,879
Elevation of Top Lakota 3,775 3,741 3,875
Difference (a) -92 -59 304

(a) Based on interpolation.
(b) Negative value indicates Lakota Aquifer is unsaturated at well location. Positive value indicates Lakota Aquifer is saturated at well location.
Figure 1. Lakota Wells Near the Saturated/Unsaturated Interface.
Fall River Aquifer

Well 613 and Well 622. These two wells are both completed to similar depth in the Fall River Formation (well completion reports available) and are located about 700 feet apart. Both wells have a total depth of 580 feet and similar surface elevation with well 613 screened between 504 and 580 feet and well 622 screened between 503 and 580 feet. The average water levels reported on Figure 2.7-14 of the NRC technical report (TR) are correct as compared to original field notes. These two wells have a difference in head of about 8 feet based on recent averages (3,701 and 3,709 feet elevation, respectively); at the time these wells were drilled, they also exhibited a difference of 8 feet (3,711 and 3,719 feet elevation). The difference in head between these two closely spaced wells is likely the result of minor differences in lithology and permeability of the aquifer.

Well 695. The mean water elevation for this well is 3,632 feet and is correct as presented on Figure 2.7-14 of the NRC TR. The pressure has a mean average of 12 pounds per square inch (psi) with individual measurements that range from 12.7 to 13.8 psi. As in all free-flowing wells, psi is converted to feet by the formula:

\[
\text{Feet H}_2\text{O above measuring point} = \text{psi} \times (144 \text{ in}^2/\text{ft}^2) \times (\text{ft}^2/62.43 \text{lb}). \tag{1}
\]

Lakota Aquifer

Well 8002. This Lakota stock well has an average elevation of 3,578 feet as presented on Figure 2.7-15 of the TR. This value was not used while generating the water level contours for several reasons. First, this well is a free-flowing artesian that was shut in during measurements; although no leaks were visible, it is possible that this well could not completely be shut in, as it is an older well with multiple fittings at the surface. Over the measurement time interval (September 2007 through February 2009), only 3 pressure measurements were made: 13, 15, and 14.65. Based on field notes, the value of 14.65 psi should be discarded as one of the lines froze during the stabilization period and the sampler was required by the landowner to open the valve to prevent well damage. It is also believed that the other two readings were potentially taken before the well had completely stabilized.

In generating the water level contours, Well 608 to the west was considered to have more reliable readings as this well is nonartesian and was measured with a water level tape. Water levels at Well 608 indeed exceeded estimates at Well 8002; that is unexpected and unlikely given the water gradient decreases toward the southwest. Water level data for Well 696, although not used in the generation of the original potentiometric surface, have an average value of 3,639 feet elevation; this value is extremely close to the potentiometric surface generated by ignoring the data from Well 8002. Therefore, it is our position that this decision to not use data from Well 8002 was sound. It is advisable to verify completion of this well and obtain additional water level measurements.

Well 615. Based on six measurements, the mean potentiometric surface at Well 615 is correctly reported at 3,690 feet elevation. A well completion report for this well is available to verify this well is completed into the Lakota.
**Well 609.** There are a total of 11 measurements for this well, all within ± 2 feet of each other. The value of 3,690 feet elevation on the existing potentiometric surface map is correct. A well completion report for this well is available to verify this well is completed into the Lakota. In addition, Well 610 (completed in the Fall River) is immediately adjacent to this well and has a comparable water level of 3,693 feet.

**Well 689.** This well was recently installed by Powertech as a monitoring well for the Dewey pump test. It is screened for 15 feet in the upper Lakota Formation. A total of 11 pressure measurements were collected from this well, ranging from 23 to 25 psi. The mean water level of 3,684 feet presented on the potentiometric surface is correct according to our database and field records.

**Well 38.** Based on the TVA EIS, this stock well is located in Sec. 33, T6S, R1E with a depth of 550 feet and completed in the Lakota. However, data from a well completion report (Figure 2) indicate this well has a depth of 494 feet. The surface elevation at this well is roughly 3,630 feet, making the depth of this well have an elevation of 3,136 feet (assuming the well completion report is correct). Based on structure contour maps, the bottom of the Fall River (top of Fuson) is around 3,130 feet. Based on the depth reported on the well completion form and the structural contour information based on exploration boreholes, this well is now believed to be completed in the Fall River Formation and not the Lakota Formation. The mean water elevation of 3,644 feet measured at this well could be used in the future to slightly modify the potentiometric surface for the Fall River Formation; the measured value is not unreasonable for the Fall River. Since this is a free-flowing well, it is also possible the water level could be higher than measured if shut in for a longer period of time. If potentiometric surfaces are redrawn in the near future, it is recommended to not include Well 38 on the Lakota surface. It is also recommended to log this well to verify completion.

**Task 3. Generate Map of Potentiometric Surfaces That has Wells Labeled by Well I.D.**

Existing potentiometric surfaces for the Fall River, Lakota, and Unkpapa Aquifers are presented in Figures 3 through 6. Contours have not been modified from previous versions. Figure 5 is a revised potentiometric map of the Lakota that has wells not used in generating contours removed to reduce confusion.

**Task 4. Compile Water Level Data and Completion Information Into a Table**

Tables 3 through 8 contain the field water level measurements and calculated water table elevations. Tables 3 and 4 contain data for the Inyan Kara Aquifers, Tables 5 and 6 contain alluvial aquifer information, and Tables 7 and 8 contain water level information on the Unkpapa Aquifer.
Mr. Mark Hollenbeck  

Page 7  

July 22, 2010  

RSL-1853-10-034  

---  

DRAILER'S FINAL REPORT  

OFFICE OF STATE ENGINEER  
Pierre, South Dakota  

Well No. (Do not fill in)  

CUSTER COUNTY  

Location: SW NW Section 33 Top 68 Range 1E  

Owner: George Putnam  
Address: Burdock, S. Dak.  

Depth  

Flow (gpm)  
Pressure  
Date Measured  

Ord. Elev.  
Water Level Below Ground Surface  

Temperature  
Character Water (soft, medium, hard)  

Date Completed  

---  

CASING DETAIL  

Type  
Size  
Length  
Depth  

---  

DRILLER'S LOG  

From  
To  

---  

PREPARATIONS  

Type  
Size  
Length  
Depth  

---  

SCREEN  

Type  
Size  
Length  
Depth  

---  

Is there a seal between different size pipes?  
What kind?  

WATER BORING BANDS  

From  
To  

---  

SOURCE OF INFORMATION  

RSL office, Wall River Co.  

Address: Hot Springs, S. Dak.  

---  

Figure 2. Well Completion Report for Well 38.
Figure 3. Fall River Aquifer Potentiometric Map With Wells Labeled by Hydro I.D.
Figure 4. Lakota Aquifer Potentiometric Map With Wells Labeled by Hydro I.D.
Figure 5. Revised Lakota Aquifer Potentiometric Surface. This map has removed Wells 38 and 8002 and added Well 696 to reflect data that were actually used to generate the contour map.
Figure 6. Unkpapa Aquifer Potentiometric Map With Wells Labeled by Hydro I.D.
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<th>Year</th>
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<tr>
<td>2022</td>
<td>South</td>
<td>15</td>
<td>Appendix 3.7-B</td>
</tr>
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</table>

Table 3.7-B: Inuyama Water Level Measurements in Feet or Pounds per Square Inch
Table 4. Inyan Kara Water Level Measurements in Elevation Above Sea Level

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<th>Date</th>
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<td>3650.17</td>
</tr>
<tr>
<td>2007-07-09</td>
<td>18:00</td>
<td>3641.74</td>
<td>2007-07-16</td>
<td>12:00</td>
<td>3650.17</td>
</tr>
<tr>
<td>2007-07-10</td>
<td>00:00</td>
<td>3641.74</td>
<td>2007-07-17</td>
<td>00:00</td>
<td>3650.17</td>
</tr>
<tr>
<td>2007-07-10</td>
<td>06:00</td>
<td>3641.74</td>
<td>2007-07-17</td>
<td>00:00</td>
<td>3650.17</td>
</tr>
<tr>
<td>2007-07-10</td>
<td>12:00</td>
<td>3641.74</td>
<td>2007-07-17</td>
<td>06:00</td>
<td>3650.17</td>
</tr>
<tr>
<td>2007-07-10</td>
<td>18:00</td>
<td>3641.74</td>
<td>2007-07-17</td>
<td>12:00</td>
<td>3650.17</td>
</tr>
</tbody>
</table>

- DRAFT -
Table 6. Alluvial Water Level Measurements in Feet Below Measuring Point

<table>
<thead>
<tr>
<th>Hydro I.D. or Hydro Code</th>
<th>675</th>
<th>676</th>
<th>677</th>
<th>678</th>
<th>679</th>
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</thead>
<tbody>
<tr>
<td>Targeted Measurement</td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring Point</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
</tr>
<tr>
<td>Distance from Measuring</td>
<td>2.3</td>
<td>2.4</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Point to Ground (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximate Land Elevation From Topographic Map (ft)</td>
<td>3,491</td>
<td>3,862</td>
<td>3,570</td>
<td>3,591</td>
<td>3,717</td>
</tr>
<tr>
<td>Calculated Measuring Point Elevation (ft)</td>
<td>3,493.3</td>
<td>3,664.4</td>
<td>3,572.3</td>
<td>3,593.3</td>
<td>3,719.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>ft below measuring point</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/26/2007</td>
<td>-11.04 -20.3 -11.95 -11.73 -33.83</td>
</tr>
<tr>
<td>11/14/2007</td>
<td>-33.85</td>
</tr>
<tr>
<td>12/11/2007</td>
<td>-10.82 -20.4 -11.15 -33.88</td>
</tr>
<tr>
<td>1/1/2008</td>
<td>-10.6 -20.44</td>
</tr>
<tr>
<td>1/30/2008</td>
<td>-10.17 -10.82</td>
</tr>
<tr>
<td>2/3/2008</td>
<td>-33.88</td>
</tr>
<tr>
<td>2/5/2008</td>
<td>-10.37 -20.5 -10.1 -10.81</td>
</tr>
<tr>
<td>3/6/2008</td>
<td>-10.045 -20.53 -9.9 -10.75 -33.93</td>
</tr>
<tr>
<td>5/18/2008</td>
<td>-34.02</td>
</tr>
<tr>
<td>6/30/2008</td>
<td>-20.66 -9.45 -10.95 -34.03</td>
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</table>
Table 8. Alluvial Water Level Measurements in Elevation Above Mean Sea Level

<table>
<thead>
<tr>
<th>Hydro ID or Hydro Code</th>
<th>Hydro ID or Hydro Code</th>
<th>675</th>
<th>676</th>
<th>677</th>
<th>678</th>
<th>679</th>
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<tbody>
<tr>
<td>Formation</td>
<td>Formation</td>
<td>Alluvial</td>
<td>Alluvial</td>
<td>Alluvial</td>
<td>Alluvial</td>
<td>Alluvial</td>
</tr>
<tr>
<td>Subsurface (SS) or Free-Flowing (FF)</td>
<td>Subsurface (SS) or Free-Flowing (FF)</td>
<td>SS</td>
<td>SS</td>
<td>SS</td>
<td>SS</td>
<td>SS</td>
</tr>
<tr>
<td>Depth (ft)</td>
<td>Depth (ft)</td>
<td>14–4</td>
<td>22.5</td>
<td>14.5</td>
<td>14.5</td>
<td>39</td>
</tr>
<tr>
<td>Screened Interval (ft)</td>
<td>Screened Interval (ft)</td>
<td>4–14</td>
<td>12–22</td>
<td>4–14</td>
<td>4–14</td>
<td>29–39</td>
</tr>
<tr>
<td>Measuring Point</td>
<td>Measuring Point</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
</tr>
<tr>
<td>Distance from Measuring Point to Ground (ft)</td>
<td>Distance from Measuring Point to Ground (ft)</td>
<td>2.3</td>
<td>2.4</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Approximate Land Elevation From Topographic Map (ft)</td>
<td>Approximate Land Elevation From Topographic Map (ft)</td>
<td>3,491</td>
<td>3,662</td>
<td>3,570</td>
<td>3,591</td>
<td>3,717</td>
</tr>
<tr>
<td>Calculated Measuring Point Elevation (ft)</td>
<td>Calculated Measuring Point Elevation (ft)</td>
<td>3,483.3</td>
<td>3,664.4</td>
<td>3,572.3</td>
<td>3,593.3</td>
<td>3,719.3</td>
</tr>
<tr>
<td>Date</td>
<td>Date</td>
<td>9/28/2007</td>
<td>3,482.1</td>
<td>3,644.3</td>
<td>3,560.8</td>
<td>3,581.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/26/2007</td>
<td>3,482.3</td>
<td>3,644.1</td>
<td>3,561.0</td>
<td>3,581.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11/9/2007</td>
<td>3,482.3</td>
<td>3,644.1</td>
<td>3,561.1</td>
<td>3,581.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11/14/2007</td>
<td>3,482.3</td>
<td>3,644.0</td>
<td>3,561.2</td>
<td>3,582.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11/27/2007</td>
<td>3,482.3</td>
<td>3,644.0</td>
<td>3,561.2</td>
<td>3,582.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12/11/2007</td>
<td>3,482.5</td>
<td>3,644.0</td>
<td>3,582.2</td>
<td>3,685.4</td>
</tr>
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<td></td>
<td></td>
<td>1/1/2008</td>
<td>3,482.7</td>
<td>3,644.0</td>
<td>3,582.4</td>
<td>3,685.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/30/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2/2/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2/5/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/6/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4/29/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5/18/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6/30/2008</td>
<td>3,483.3</td>
<td>3,643.9</td>
<td>3,582.9</td>
<td>3,686.3</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>3,483</td>
<td>3,644</td>
<td>3,582</td>
<td>3,582</td>
<td>3,685</td>
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</table>
Table 7. Unkpapa Water Level Measurements in Feet

<table>
<thead>
<tr>
<th>Hydro L.D. or Hydro Code</th>
<th>609</th>
<th>693</th>
<th>703</th>
<th>704</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Measurement Frequency</td>
<td>Once</td>
<td>Once</td>
<td>Once</td>
<td>Once</td>
</tr>
<tr>
<td>Measuring Point</td>
<td>top of casing</td>
<td>top of casing</td>
<td>top of casing</td>
<td>top of casing</td>
</tr>
<tr>
<td>Distance from Measuring Point to Ground</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Surveyed Well Casing Elevation (ft)</td>
<td>3,700.04</td>
<td>3,627.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stick Up (Well Casing Mark) (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveyed Control Point Elevation (ft)</td>
<td>3,699.59</td>
<td>3,626.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stick Up (Control Point) (ft)</td>
<td>0.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculated Measuring Point Elevation (ft)</td>
<td>3,699.18</td>
<td>3,627.27</td>
<td>3,877″</td>
<td>3,599″</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>ft above (+) or below (−) measuring point</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/14/08</td>
<td>29.15</td>
</tr>
<tr>
<td>5/21/08</td>
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<tr>
<td>5/28/08</td>
<td>30.65</td>
</tr>
<tr>
<td>5/30/08</td>
<td></td>
</tr>
<tr>
<td>6/24/08</td>
<td></td>
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</tbody>
</table>

(a) Wells were not surveyed. Elevation estimated from topographic map.

Task 5. Generate an Explanation of Water Level Measurement Feasibility for the Wells Listed in the NRC Comments

The wells listed in the NRC review of the TR and an explanation of the feasibility of obtaining a water level measurement from those specific wells is included in Table 9. Figures 7 and 8 display these wells for possible inclusion alongside those wells that are in the current water level monitoring plan. For many of these wells, water level measurements were not easily obtained, but could be obtained with additional work such as pulling a pump and shutting in a well for a period of time. At this time, it is assumed that Powertech will be conducting further field investigations into this matter based on RESPEC’s cursory review.
Table 8. Unkpapa Water Level Measurements in Elevation Above Sea Level

<table>
<thead>
<tr>
<th>Hydro LD. or Hydro Code</th>
<th>690</th>
<th>693</th>
<th>703</th>
<th>704</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formation</td>
<td>Unkpapa</td>
<td>Unkpapa</td>
<td>Unkpapa</td>
<td>Unkpapa</td>
</tr>
<tr>
<td>Subsurface (SS) or Free-Flowing (FF)</td>
<td>FF</td>
<td>FF</td>
<td>SS</td>
<td>FF</td>
</tr>
<tr>
<td>Depth (ft)</td>
<td>623</td>
<td>930</td>
<td>525</td>
<td>955</td>
</tr>
<tr>
<td>Screened Interval (ft)</td>
<td>621-631</td>
<td>910-930</td>
<td>475-525</td>
<td>915-955</td>
</tr>
<tr>
<td>Targeted Measurement Frequency</td>
<td>Once</td>
<td>Once</td>
<td>Once</td>
<td>Once</td>
</tr>
<tr>
<td>Measuring Point</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
<td>top of well casing</td>
</tr>
<tr>
<td>Distance from Measuring Point to Ground</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Approximate Land Elevation from topographic map (ft)</td>
<td></td>
<td></td>
<td>3,877</td>
<td>3,699</td>
</tr>
<tr>
<td>Calculated Measuring Point Elevation (ft)</td>
<td>3,729.2</td>
<td>3,627.3</td>
<td>3,877</td>
<td>3,599</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>ft above mean sea level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/14/08</td>
<td>3,729.3</td>
</tr>
<tr>
<td>5/21/08</td>
<td>3,729.8</td>
</tr>
<tr>
<td>5/28/08</td>
<td>3,729.8</td>
</tr>
<tr>
<td>6/30/08</td>
<td>3,729.8</td>
</tr>
<tr>
<td>6/24/08</td>
<td>3,729.8</td>
</tr>
<tr>
<td>Mean</td>
<td>3,729</td>
</tr>
</tbody>
</table>

Task 6. Review the Water Rights, Well Completion, and Water Quality for the Well North of Kennoble’s Ranch to Determine Aquifer

Well 4, a stock well located in SESE Sec. 15, T7S, R1E, was brought into question as to which aquifer the well is completed in. A well log indicates this well was originally drilled as an oil exploration well (API # 5093) into the Minnelusa Formation to a depth of 2,264 feet. This log (Figure 9) also indicates the well was plugged and abandoned. RESPEC was not able to find any water rights or well completion information describing how this well was completed as a water well. However, information in Table 2.5.2-1 of the TVA EIS report describes this well (D-19) as being 2,264 feet deep, coinciding with the original drilling depth into the Minnelusa, and with a water level of 3,580 feet elevation.
### Table 9. Wells for Possible Inclusion in Water Level Measurement Plan (Page 1 of 3)

<table>
<thead>
<tr>
<th>Aquifer</th>
<th>Well</th>
<th>Free Flowing or Subsurface</th>
<th>Reason for not Measuring Originally</th>
<th>Could be Measured With Minimal Additional Effort</th>
<th>Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall River</td>
<td>7</td>
<td>Unknown</td>
<td>Domestic can not measure without pulling pump</td>
<td>Yes</td>
<td>There is a JAS file for this well, so it must be possible to measure</td>
</tr>
<tr>
<td>Fall River</td>
<td>8</td>
<td>FF</td>
<td>Domestic can not measure without pulling pump and shutting in for period of time</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Fall River</td>
<td>17</td>
<td>SS</td>
<td>Stock well would need pump pulled and to stop being use to stabilized</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Fall River</td>
<td>18</td>
<td>FF</td>
<td>Domestic can not measure without pulling pump and shutting in for period of time</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Fall River</td>
<td>20</td>
<td>Unknown</td>
<td>Domestic can not measure without pulling pump and shutting in for period of time</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Lakota</td>
<td>1</td>
<td>FF</td>
<td>Could not be sealed for psi measurement because of leaks caused by corrosion and age</td>
<td>No</td>
<td>Could only be measured if well casing is repaired</td>
</tr>
<tr>
<td>Lakota</td>
<td>2</td>
<td>FF</td>
<td>Could not be sealed for psi measurement because of leaks caused by corrosion and age</td>
<td>No</td>
<td>Could only be measured if well casing is repaired</td>
</tr>
<tr>
<td>Lakota</td>
<td>13</td>
<td>Unknown</td>
<td>Domestic can not measure without pulling pump; well is no longer used as resident moved</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
</tbody>
</table>
Table 9. Wells for Possible Inclusion in Water Level Measurement Plan (Page 2 of 3)

<table>
<thead>
<tr>
<th>Aquifer</th>
<th>Well</th>
<th>Free Flowing or Subsurface</th>
<th>Reason for not Measuring Originally</th>
<th>Could be Measured With Minimal Additional Effort</th>
<th>Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakota</td>
<td>14</td>
<td>SS</td>
<td>Difficult surface access</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Lakota</td>
<td>16</td>
<td>SS</td>
<td>Difficult surface access because of fittings, domestic well would have to be shut in for period</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Lakota</td>
<td>42</td>
<td>Unknown</td>
<td>Domestic could not measure without pulling pump. Well has been revamped and completed in the Fall River Formation (?)</td>
<td>Yes</td>
<td>We are not sure when or to what formation this well is now completed in.</td>
</tr>
<tr>
<td>Lakota</td>
<td>51</td>
<td>FF</td>
<td>Surface casing in poor condition, leaking</td>
<td>No</td>
<td>This well is not measurable under the present condition</td>
</tr>
<tr>
<td>Lakota</td>
<td>96</td>
<td>FF</td>
<td>Domestic can not measure without pulling pump and shutting in for period of time</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Lakota</td>
<td>115</td>
<td>FF</td>
<td>Domestic can not measure without pulling pump and shutting in for period of time; also not measured because of location north of Dewey Fault</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
<tr>
<td>Lakota</td>
<td>147</td>
<td>SS</td>
<td>Not measured because of location north of Dewey Fault</td>
<td>Yes</td>
<td>This is a 1-inch piezometer that could easily be measured</td>
</tr>
<tr>
<td>Lakota</td>
<td>510</td>
<td>FF</td>
<td>Difficult access, would require shut</td>
<td>Maybe</td>
<td>Requires further investigation to determine feasibility</td>
</tr>
</tbody>
</table>

- ORAFT -

Dewey-Burdock GDP
June 2012
3.7-B-773
Appendix 3.7-B
Table 9. Wells for Possible Inclusion in Water Level Measurement Plan (Page 3 of 3)

<table>
<thead>
<tr>
<th>Aquifer</th>
<th>Well</th>
<th>Free Flowing or Subsurface</th>
<th>Reason for not Measuring Originally</th>
<th>Could be Measured With Minimal Additional Effort</th>
<th>Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakota</td>
<td>620</td>
<td>SS</td>
<td>Stock well would need pump pulled and to stop being use to stabilized</td>
<td>Maybe</td>
<td>This well has a good potential for measurement</td>
</tr>
<tr>
<td>Lakota</td>
<td>696</td>
<td>FF</td>
<td>Could not be measured at time of potentiometric map generation because of poor or cracked valve fittings. Valves were replaced and RESPEC has record of six measurements from 9/22/08 to 2/22/09</td>
<td>Yes, and it has been</td>
<td></td>
</tr>
<tr>
<td>Lakota</td>
<td>697</td>
<td>FF</td>
<td>This well was inadvertently left off potentiometric maps. It has been measured 12 times between 3/30/08 and 2/24/09.</td>
<td>Yes, and it has been</td>
<td></td>
</tr>
<tr>
<td>Lakota</td>
<td>7002</td>
<td>FF</td>
<td>Because of the age of this well, it is believed that pressurizing may cause a line to rupture</td>
<td>No</td>
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This well was sampled three times in 1979 by TVA and once by RESPEC in 2008. Data results are presented in Table 10. In comparison to nearby Well 7 and Well 7002, this well has nearly twice the value of chemical conductivity and sulfates. Conductivity and sulfate values observed at this well are dissimilar from other Inyan Kara wells in the area as well, but values are more compatible with expected water quality for the Minnelusa Aquifer. A detailed statistical comparison of water quality was not conducted at this time.

Based on the available information, it is now reasonable to believe Well 4 may be completed in the Minnelusa Aquifer. It is recommended to try to log this well with a borehole teviewer to confirm the completion of this well.

If you have any further questions or need further explanation of these items, please do not hesitate to contact me.

CMH:lef

--- DRAFT ---
Figure 7. Fall River Aquifer Wells for Possible Inclusion in the Water Level Measurement Plan. Black dots are wells in the current monitoring plan while blue dots are wells not currently included.
Figure 8. Lakota Aquifer Wells for Possible Inclusion in the Water Level Measurement Plan. Black dots are wells in the current monitoring plan while blue dots are wells not currently included.
Figure 9. Well Completion Report for Well L.D. #4 (Page 1 of 3).
Figure 9. Well Completion Report for Well I.D. #4 (Page 2 of 3).
Figure 3. Well Completion Report for Well I.D. #4 (Page 3 of 3).
### Table 10. Water Quality Data for Well 4 (Page 1 of 4)

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DOMESTIC AND LIVESTOCK WELLS MONITORED DURING FEBRUARY 1982 DEWEY PUMP TEST

(Letter from Gary Cummings, Silver King Mines, Inc., to Peter Martin, Tennessee Valley Authority, April 12, 1982)
April 12, 1982

Peter W. Martin
Technical Engineer
Edgemont Project
Tennessee Valley Authority
P. O. Box 2957
Casper, Wyoming 82602

RE: GWC; 223, 82

Dear Pete:

Enclosed you will find the information relating to domestic and livestock wells that were monitored during the Dewey Pump Test.

If you have any questions, please call.

Very truly yours,

GWC: dlg
Enclosure
cc: R. M. Caywood
    D. H. Marks
    R. H. Davidson
    Mark Boggs

Gary W. Cummings
Resident Manager
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Dewey-Burdock GDP
June 2012
Appendix 3.7-B
SOURCE H

WYOMING WATER RIGHT 183561
STATE OF WYOMING

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

APPLICATION FOR WELLS AND SPRINGS

Note: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic and/or stock watering, will be considered as ground water appropriations.

FOR OFFICE USE ONLY

PERMIT NO. U.W. [ ]
WATER DIVISION NO. [ ]
U.W. DISTRICT [ ]

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE

NAME AND NUMBER OF WELL OR SPRING

Putnam & Putnam, LLP
1. Name of applicant(s)
778 Cedar St. Dewey, SD 57735
2. Address of applicant(s)

MAILING ADDRESS (CITY) (STATE) (ZIP)

John A. Putnam
3. Name & address of agent to receive correspondence and notices
778 Cedar St. Dewey, SD 57735

MAILING ADDRESS (CITY) (STATE) (ZIP)

4. Use to which the water will be applied:

Domestic: Use of water in up to 3 single-family dwellings or less, noncommercial watering of lawns and gardens totaling one acre or less. Number of houses served:

Stock Watering: Use of water at four tanks or less within one mile of well or spring. Stock water use includes livestock and commercial feedlots as a miscellaneous use. Number of stock tanks:

Irrigation: Use of water in incorporated Towns and Cities. Note 1: use of water in unincorporated towns, subdivisions, improvement districts, mobile home parks, etc. is classified as miscellaneous use. Note 2: a permit may be required by the Wyoming Department of Environmental Quality (WDEQ) if the well will be classified as a public water supply under the WDEQ's rules and regulations.

Municipal: Long term use of water for the manufacture of a product or production of oil or gas or other minerals (oil field water flood operations, power plant water supply, etc.). (Describe in REMARKS)

Industrial: Any use of water not defined under previous definitions such as stock water pipelines, subdivisions, mine dewatering, mineral oil exploration drilling, potable supplies to office, etc. (Describe in REMARKS)

Monitor, Observation: Note: a WDEQ permit may be required. Test Well. (Describe in REMARKS)

5. Location of the well or spring: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: NE 1/4 NW 1/4 of Sec. 12, Township 14 North, Range 32 West.)

Putnam & Putnam
6. Estimated depth of the well or spring is ______ ft. Estimated production interval is ______ ft.

7. (a) Maximum instantaneous flow of water to be developed and beneficially used: ______ gallons per minute.

(b) Maximum daily quantity of water to be developed and beneficially used: ______ gallons per calendar year.

Circles appropriate units: (Gallons) (Acre-Feet) A four person family utilizes approximately one (1) acre-feet of water per year or 355,000 gallons.

8. Mark the point(s) or area(s) of use in the tabulation box below.

TABULATION BOX

<table>
<thead>
<tr>
<th>TW</th>
<th>WE</th>
<th>SE</th>
<th>NW</th>
<th>SW</th>
<th>EN</th>
<th>WN</th>
<th>EL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Stock Tank</td>
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</table>

SEE REVERSE SIDE

Dewey-Burdock GDP
June 2012

3.7-B-793

Appendix 3.7-B
Appendix 3.7-B

3.7-B-794

Dewey-Burdock GDP

June 2012

Statement of Completion on 1936 received.

Beneficial Use assumed as of date of completion.
NAME OF WELL/SPRING: Putnam 21

PERMIT NO. U.W. 183561

STATE OF WYOMING

STATEMENT OF COMPLETION AND DESCRIPTION OF WELL OR SPRING

NOTE: Do not fold this form. Use typewriter or print neatly with black pen.

NAME OF OWNER: Putnam & Putnam, LLC

ADDRESS: 778 Cedar St

STATE: WY

CITY: Cheyenne

ZIP: 82002

PERMIT NO. U.W. 183561

STATE ENGINEER

OFFICE OF THE STATE ENGINEER

Herschler Bldg., 4-2

Cheyenne, Wyoming 82002

(307) 777-1631

FORM U.W. 8
Rev. 1/07

June 2012

3.7-B-795

Appendix 3.7-B

Hydro ID 5002

10. FLOWING WELL OR SPRING

DATE OF COMPLETION OF WELL (including pump installation) OR SPRING (first used): 1931

PUMP INFORMATION

Manufacturer: None

Source of power: None

Horsepower: None

Depth of pump setting or intake: None

Amount of water being pumped: None

Total volumetric quantity used per calendar year: None

If these amounts exceed permitted amount, an enlargement is required.

FLOWING WELL OR SPRING: None

Owner is responsible for control of flowing well.

If artesian flow or spring, yield is None

Surface pressure is None

feet of water.

The flow is controlled by None

Valve

Cap

Plug

Does well leak around casing? None

Yes

No

1 NAME OF OWNER

Putnam & Putnam, LLC

2 ADDRESS

778 Cedar St

3 USE OF WATER

Domestic

Stock Watering

Irrigation

Municipal

Industrial

Miscellaneous

Monitor or Test

Coal Bed Methane

Explain proposed use (Example: One single family dwelling)

I stock tank

4 LOCATION OF WELL/SPRING

Sw. 1/4 Sw. 1/4 of Section 28 T. 41 N. R. C. W. of the 6th P.M. (or W.R.M.)

Subdivision Name

Resurvey Location Tract or Lot

Datum

UTM Zone

State Plane Coordinates

Land surface elevation (ft. above mean sea level)

Source

1 GPS

Map

Survey

Other

Altimeter (for elevation only)

5 TYPE OF CONSTRUCTION

Drilled

Dug

Dwnt

Other

Describe

CONSTRUCTION

Total depth of well/spring: 639 ft.

Depth of static water level: None

Casing height: None ft. above ground

a Diameter of borehole (bit size): None inches

b Casing schedule: New

Used

Joint type: Threaded

Glued

Welded

diameter from ft. to ft.

diameter from ft. to ft.

cemented/grount interval, from ft. to ft.

Amount of cement/grout used, from ft. to ft.


d Type of completion: Customized perforations

Open hole

Factory screen

Size of perforations: None inches by None inches

Number of perforations and depths where perforated

perforations from ft. to ft.

perforations from ft. to ft.

Open hole from ft. to ft.

Well screen details

 Diameter slot size set from ft. to ft.

 Diameter slot size set from ft. to ft.

 Size of perforations: None inches by None inches

Number of perforations and depths where perforated

perforations from ft. to ft.

perforations from ft. to ft.

Open hole from ft. to ft.

Well screen details

 Diameter slot size set from ft. to ft.

 Diameter slot size set from ft. to ft.

e Well development method: None

How long was well developed?

f Was a filter/gravelpack installed? None

Yes

No

Size of sand/gravel: None

Filter/gravelpack installed from ft. to ft.

g Was surface casing used? None

Yes

No

Surface casing installed from ft. to ft.

7 NAME AND ADDRESS OF DRILLING COMPANY

D urged

8 DATE OF COMPLETION OF WELL (including pump installation) OR SPRING (first used)

9 PUMP INFORMATION

Manufacturer: None

Source of power: None

Horsepower: None

Depth of pump setting or intake: None

Amount of water being pumped: None

Total volumetric quantity used per calendar year: None

If these amounts exceed permitted amount, an enlargement is required.

If artesian flow or spring, yield is None

Surface pressure is None

feet of water.

The flow is controlled by None

Valve

Cap

Plug

Does well leak around casing? None

Yes

No

Permit No. U.W. 183561

Book No. 1329

Page No. 61

SEE REVERSE SIDE
11. IF SPRING, HOW WAS IT CONSTRUCTED? (Some method of artificial diversion, i.e., spring box, cribbing, etc., is necessary to qualify for a water right)

12. PUMP TEST Was a pump test conducted? Yes No

If so, by whom
Yield gal. min. with h. drawdown after hours
Yield gal. min. with ft. drawdown after hours

13. LOG OF WELL Total depth drilled ft. 

Depth of completed well ft. Diameter of well inches
Depth to first water bearing formation ft.
Depth to principal water bearing formation Top ft. to Bottom ft.

DRILL CUTTINGS DESCRIPTION

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<tr>
<th>From</th>
<th>To</th>
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<td></td>
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</table>

Not Available

14. DOES A GEOPHYSICAL LOG ACCOMPANY THIS FORM? Yes No

15. QUALITY OF WATER INFORMATION

Does a chemical and/or bacteriological water quality analysis accompany this form? Yes No

It is recommended that chemical and bacteriological water quality analyses be performed and that the report(s) be filed with the records of this well (contact Department of Agriculture, Analytical Lab Services, Laramie, 742-2984).

If not, do you consider the water as Good Acceptable Poor Unusable

REMARKS

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct, and complete.

[Signature of Owner or Authorized Agent]

Date 10.15.07

For State Engineer's Use Only

Permit No. UW 133361

Date of Receipt 06-15-07

Date of Approval 10-29-07

Date of Priorry 06-12-07

Cheryl Vepliance

for State Engineer

Dewey-Burdock GDP
June 2012

3.7-B-796 Appendix 3.7-B
SOURCE I

ADDITIONAL WATER WELLS IN EDGEMONT PROJECT AREA

(Silver King Mines, Inc., Interoffice Correspondence, Keith Andersen to R.M. Caywood, August 3, 1979)
To: R. M. Caywood

From: Keith E. Andersen

Subject: Quarterly Burdock Area Water Levels

Attached are quarterly measurements of Burdock Area water well flow rates and water levels. Wells numbered 135 - 143 are new wells or wells added to our monitoring program by request. Wells numbered 200 - 216 are probable Sundance wells located east of the Burdock Area.

In an effort to obtain all possible information, several measurements of questionable accuracy were made as noted below.

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<td>2</td>
<td>Leaking around casing</td>
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<tr>
<td>4</td>
<td>Leaking around casing</td>
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<tr>
<td>75</td>
<td>Measuring point changes</td>
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<td>13</td>
<td>Pipeline use affects flow</td>
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<tr>
<td>33</td>
<td>Measuring point changes</td>
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<td>35</td>
<td>Measured inside cylinder drop pipe</td>
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<td>36</td>
<td>Leaking around pipeline fittings</td>
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<tr>
<td>37</td>
<td>Measured inside cylinder drop pipe</td>
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<tr>
<td>40</td>
<td>Two wells at different elevations piped together</td>
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<tr>
<td>41</td>
<td>Pump had been operating</td>
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<td>42</td>
<td>Leaking around pipeline fittings</td>
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<td>Measuring point changed</td>
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<td>114</td>
<td>Measured inside cylinder drop pipe</td>
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Water quality data on these wells is not yet complete.

Keith E. Andersen, Chief Engineer
### Additional Water Wells in Edgemont Project Area

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<td>T 7 S, R 3 E, Sec. 18 db</td>
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<tr>
<td>215</td>
<td>T 6 S, R 2 E, Sec. 27 dd</td>
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<tr>
<td>216</td>
<td>T 6 S, R 2 E, Sec. 27 dd</td>
</tr>
<tr>
<td>144</td>
<td>T 9 S, R 3 E, Sec. 21</td>
</tr>
<tr>
<td>145</td>
<td>T 8 S, R 2 E, Sec. 21</td>
</tr>
<tr>
<td>146</td>
<td>T 9 S, R 2 E, Sec. 21</td>
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### Additional Water Wells in Edgemont Project Area

<table>
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<tr>
<th>No.</th>
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<tr>
<td>135</td>
<td>Mike Ringer</td>
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<td>360</td>
<td>Lakota</td>
<td>Drilled 1977 - Submersible Pump</td>
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<tr>
<td>136</td>
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<td></td>
<td>Spring</td>
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<td>Windmill</td>
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<td>138</td>
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<td>D</td>
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<td>Drilled 1977, flows, Jet Pump</td>
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<tr>
<td>139</td>
<td>Gerald Darrow</td>
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<td>620</td>
<td>Lakota</td>
<td>Drilled 1978, flows 20 gpm</td>
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<td>140</td>
<td>Ken Barker</td>
<td>D,S</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>141</td>
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<td>S</td>
<td></td>
<td>Spring</td>
<td>Source Uncertain</td>
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<td>142</td>
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<td>Fall River</td>
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<td>143</td>
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<td>Drilled 1962, Submersible Pump @ 440</td>
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<tr>
<td>200</td>
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<tr>
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<td>S</td>
<td>110</td>
<td>Sundance</td>
<td>Pump Jack</td>
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<td>202</td>
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<td>S</td>
<td>200</td>
<td>Sundance</td>
<td>Water Level 16.7'</td>
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<td>203</td>
<td>Donald Spencer</td>
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<td>Sundance</td>
<td>Submersible Pump at 160</td>
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<tr>
<td>204</td>
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<td>U</td>
<td>170</td>
<td>Sundance</td>
<td></td>
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<tr>
<td>205</td>
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<td>206</td>
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</tr>
<tr>
<td>207</td>
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<td>D,S</td>
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<td>Submersible Pump, Pipeline</td>
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<tr>
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<td>S</td>
<td>161</td>
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<td>Pump Jack - Water Level 8.14</td>
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<td>212</td>
<td>Carl Reutter</td>
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<td>2,204</td>
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<td>Flows 1.5 gpm, old oil test</td>
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<td>Submersible Pump, Water Level 34.1</td>
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<td>270</td>
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<td>215</td>
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<td>Water Level 60.7, Submersible Pump, Pipeline</td>
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<td>216</td>
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<td>144</td>
<td>S.O</td>
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<td>Water Level 368.4'</td>
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</tbody>
</table>
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SOURCE J

FOREST SERVICE WELLS AND SPRINGS

(Letter from Keith Andersen, Silver King Mines, Inc., to John Hatch, South Dakota Water Rights Commission, January 12, 1979)
FOREST SERVICE WELLS AND SPRINGS

This list of wells and springs located on U. S. Forest Service land was obtained from the Forest Service office in Newcastle, Wyo. These wells and springs will be visited and an attempt made to determine the aquifer from which they produce. The water on Forest Service land is used by ranches for stock water during the summer months and to supply water for wild life.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
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<tbody>
<tr>
<td>Bennett Canyon Well</td>
<td>T7S, R2E, SW¼, Sec. 7</td>
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<tr>
<td>Driftwood Canyon Well</td>
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<td>Heck Well</td>
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<td>Spencer Well</td>
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<td>Bennett #2 Well</td>
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<td>Hey Well</td>
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<td>Roderick Spring</td>
<td>T7S, R2E, SE¼, Sec. 18</td>
</tr>
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<td>North Roderick Spring</td>
<td>NE¼, Sec. 17</td>
</tr>
<tr>
<td>North Long Mountain Spring</td>
<td>T7S, R3E, NW¼, Sec. 32</td>
</tr>
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<td>South Long Mountain Spring</td>
<td>T6S, R1E, SW¼, Sec. 5</td>
</tr>
<tr>
<td>Dewey Well</td>
<td>NW¼, Sec. 9</td>
</tr>
<tr>
<td>Cook Well</td>
<td>NE¼, Sec. 22</td>
</tr>
<tr>
<td>Pass Creek Well</td>
<td>T5S, R1E, SW¼, Sec. 32</td>
</tr>
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<td>Lower Turkey Spring</td>
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<td>Turkey Spring</td>
<td>T5S, R1E, NE¼, Sec. 29</td>
</tr>
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<td>Tailend Reservoir Spring</td>
<td>SE¼, Sec. 17</td>
</tr>
<tr>
<td>Bowl Spring</td>
<td>NW¼, Sec. 7</td>
</tr>
<tr>
<td>Bosley Spring</td>
<td>T4S, R1E, SW¼, Sec. 32</td>
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<td>Barrel Spring</td>
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<td>Sheepwagon Spring</td>
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<td>Lower Dugout Spring</td>
<td>T42N, R60W, SE¼, Sec. 4</td>
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<td>Dugout Spring</td>
<td>T43N, R60W, NW¼, Sec. 28</td>
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<td>North Spring</td>
<td>NE¼, Sec. 9</td>
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<td>South Spring</td>
<td>Sec. 6</td>
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<tr>
<td>Carr Spring</td>
<td>Sec. 6</td>
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<tr>
<td>Mix Spring</td>
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<td>Pipeline Spring</td>
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<td>Pollard Spring</td>
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SOURCE K

HYDROGEOLOGIC INVESTIGATIONS AT PROPOSED URANIUM MINE NEAR DEWEY, SOUTH DAKOTA

(Report No. WR28-2-520-128, J. Mark Boggs, Tennessee Valley Authority, October 1983)
HYDROGEOLOGIC INVESTIGATIONS
AT PROPOSED URANIUM MINE
NEAR DEWEY, SOUTH DAKOTA
HYDROGEOLOGIC INVESTIGATIONS AT
PROPOSED URANIUM MINE NEAR
DEWEY, SOUTH DAKOTA

Report No. WR28-2-520-128

Prepared by
J. Mark Boggs
Norris, Tennessee
October 1983
ABSTRACT

The Lakota and Fall River Formations represent aquifers of major importance in the Southern Black Hills Region as well as host rock for uranium ore. An 11-day constant discharge test involving 13 observation wells and numerous private wells was conducted in the Lakota aquifer at TVA's proposed uranium mine near Dewey, South Dakota. The pumping phase of the test was followed by several months of water-level recovery measurements. Results indicate that the test site is located in an area where the Lakota is exceptionally permeable having a transmissivity of 4,400 gpd/ft and a storativity of about $1 \times 10^{-4}$. Outside of this locality the Lakota transmissivity decreases substantially due to aquifer thinning and a change to finer-grained sedimentary facies. The drawdown response in the Fall River aquifer was substantially less than that observed during a similar test conducted at TVA's proposed Burdock mine, indicating that the Fuson shale unit lying between the two aquifers is a more effective aquitard in the Dewey area. It is further concluded that the nearby Dewey fault acts as a barrier to horizontal ground-water movement in the Lakota and Fall River aquifers.
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INTRODUCTION

The following report describes a hydrogeologic test conducted February 1982 at TVA's proposed uranium mine shaft site near Dewey, South Dakota (Figure 1). The Dewey test is one of a series of tests TVA has conducted in aquifer units of the Inyan Kara Group in the southwestern Black Hills area. The purpose of these tests is to obtain sufficient quantitative information about local hydrogeologic conditions to enable prediction of mine depressurization requirements and impacts to local ground-water users.

HYDROGEOLOGIC ENVIRONMENT

The principal aquifers in the region are the alluvial deposits associated with the Cheyenne River and its major tributaries, the Fall River formation, the Lakota formation, the Sundance formation, and the Pahasapa (or Madison) formation. Except for the alluvium, these aquifers crop out peripherally to the Black Hills where they receive recharge from precipitation. Ground-water movement is in the direction of dip, radially from the central Black Hills. In most instances, ground water in these aquifers is under artesian conditions away from the outcrop area, and water flows at ground surface from numerous wells in the area.

The Fall River and Lakota formations which form the Inyan Kara Group are the most widely used aquifers in the region. The alluvium is used locally as a source of domestic and stock water. The Sundance formation is used near its outcrop area in central and northwestern Fall River County. The Pahasapa (Madison) formation is locally accessible only by very deep wells and is the source for five wells in the city of Edgemont.
Figure 1: Site Location and Potentiometric Surface Map
The Fall River and Lakota aquifers are of primary concern because of the potential impact of mine dewatering on the numerous wells developed in these aquifers in the vicinity of the mine. At the proposed mine site, the Fall River consists of approximately 180 feet of interbedded fine-grained sandstone, siltstone and carbonaceous shale. The Fall River aquifer is overlain by approximately 400 feet of the Mowry and Skull Creek shales unit, which act as confining beds. Five domestic and stock-watering wells are known to be developed in the Fall River formation within a four-mile radius of the mine site.

The Fall River formation is underlain by Fuson member of the Lakota formation consisting primarily of siltstone and shale with occasional fine-grained sandstone lenses. Thickness of the Fuson is on the order of 100 feet in the site vicinity. The Fuson acts as a leaky aquitard between the Fall River and Lakota aquifers.

The Chilson member of the Lakota formation is the source for some 30 wells within a four-mile radius of the mine site. It also represents the primary uranium-bearing unit targeted for mining. The Chilson (also referred to as the "Lakota aquifer" in this report) consists of about 120 feet of consolidated to semi-consolidated, fine-to-coarse grained sandstone with interbedded siltstone and shale. It is underlain by the Morrison formation consisting of interbedded shale and fine-grained sandstone. Regionally, the Morrison is not considered an aquifer. Under conditions of ground-water withdrawal from the Chilson, the Morrison is expected to act as an aquitard.

Recharge to the Fall River and Lakota aquifers is believed to occur at their outcrop areas. Gott, et al. (1974), suggest on the basis of geochemical data that recharge to these aquifers may also be derived from the upward movement of ground water along solution collapses and breccia.
pipes from the deeper Minnelusa and Pahasapa aquifers. The solution collapse and breccia pipe features lie within the Dewey and Long Mountain structural zones (Figure 1).

Inasmuch as the proposed mine site lies only about one mile south of the Dewey fault trace, one of the primary objectives of the test was to determine the hydrologic significance of the fault and its affect on the propagation of drawdown in the vicinity of the mine during depressurization. Vertical displacement on the major fault generally increases toward the southwest, and is on the order of 200 feet at the point where the fault trace crosses the South Dakota-Wyoming border. Thus, it appears that the Fall River and Lakota aquifers are completely offset by the fault in the site vicinity.

**LAKOTA AQUIFER TEST**

**Design**

The shaft site for the Dewey mining area had not been selected at the time the aquifer testing designs were made. The test site was, therefore, located in the general vicinity of the proposed mine site within close proximity to the Dewey fault. The test well was completed to a depth of 804 feet and was screened within the Chilson member of the Lakota Formation. A network of eleven observation wells were constructed along two perpendicular lines intersecting at the pumped well for the purpose investigating hydrologic boundary conditions. One line of wells was oriented normal to the Dewey fault trace, and the other was approximately normal to the aquifer outcrop belt to the east (see Figure 2). Seven of these wells were developed in the Chilson member, three in the Fall River formation,
Figure 2: Well Location Map
and one in the Fuson. Preexisting observation wells BPZ-20LAK and BPZ-20FR (hereafter referred to as D-20LK and D-20FR, respectively) located about one mile south of the test well were also monitored during the test. Construction details for these wells are given in Table 1. In addition, periodic measurements of water level (or well flowrate) were made during the test at all private wells within the test site vicinity.

Based upon preliminary drilling results in the Dewey test site area and experience from the Burdock aquifer tests, it was expected that the Fall River and Lakota aquifers in the Dewey area would respond essentially as a single aquifer system. As a result less emphasis was placed on measurement of the Fuson aquitard properties.

Procedures

A constant-discharge aquifer test was initiated at 1000 hours on February 16, 1982. Discharge from the well was pumped into an arroyo which ultimately drained into a stock pond located about one mile west of the test site. There was no possibility of recirculation of well discharge water during the test due to the 400+ feet thickness of shale between ground surface and the top of the Fall River aquifer. The well pumping rate was monitored with an in-line flow meter and with an orifice plate and manometer device at the end of the discharge line. The pumping rate varied little during the test ranging from 493 to 503 gpm and averaging 495 gpm. The pumping phase of the test lasted 11 days and was followed by approximately 10 months of recovery measurements. Water level measurements in all wells were made with electric probes. Flow rates associated with offsite private wells were checked with a bucket and stopwatch.
### TABLE 1. Well Construction Data

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Depth (feet)</th>
<th>Casing Diameter (inches)</th>
<th>Depth Interval of Open Borehole or Well Screen (feet)</th>
<th>Distance From Pumped Well (feet)</th>
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<tr>
<td>D-PW</td>
<td>804</td>
<td>10</td>
<td>695-725, 755-800</td>
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<td>D-1LK</td>
<td>800</td>
<td>4</td>
<td>712-800</td>
<td>189</td>
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<tr>
<td>D-1FU</td>
<td>620</td>
<td>4</td>
<td>609-620</td>
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<tr>
<td>D-1FR</td>
<td>580</td>
<td>4</td>
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<td>D-2LK</td>
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<td>D-3LK</td>
<td>800</td>
<td>4</td>
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<td>D-3FR</td>
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<td>D-4LK</td>
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<td>D-4FR</td>
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<td>4</td>
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<td>1</td>
<td>671-672</td>
<td>5700</td>
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</table>
Analysis

Semilogarithmic graphs of drawdown (s) versus time (t) for the pumped well and observation wells are given in Appendix A. The drawdown trends in wells D-PW, D-1LK and D-2LK are essentially the same, i.e., there is a period of roughly linear drawdown during the first 1000 minutes of the test, followed by a gradual increase in the rate of drawdown during the remainder of the test. The remaining Lakota wells exhibit s-t curves which have a continuous increase in slope throughout the test without stabilizing to a linear drawdown trend. A slight increase in hydrostatic water level was observed during the early period of the test in the Fall River and Fuson wells. This seemingly paradoxical behavior, known as the Noordbergum effect, is due to a transfer of stress from the pumped aquifer to the adjacent aquitards and aquifers (Gambolati, 1974). Drawdowns observed in the Fall River and Fuson wells were much less than those recorded during a similar test conducted near Burdock (Boggs and Jenkins, 1980). The Jacob straight-line method (Walton, 1970) was applied to the semilog graphs for the Lakota wells to obtain the values of transmissivity (T) and storativity (S) presented in Table 2. In the case of the closer observation wells, two straight-line data fits were possible: one using the early data and another using the late data. Only the late data for the more distant observation wells were analyzed by this method.

Logarithmic s-t graphs for all test wells are given in Appendix B. Theis curve-matching techniques (Walton, 1970) were applied to the Lakota aquifer curves to obtain the T and S estimates presented in Table 2. Due to the somewhat unusual shape of the s-t response curves, the only curve-match solutions possible were those using the early data.
TABLE 2. Computed Lakota Aquifer Properties

<table>
<thead>
<tr>
<th>Well</th>
<th>( r ) (ft)</th>
<th>( T_e )</th>
<th>( S_e )</th>
<th>( T_1 )</th>
<th>( T_e )</th>
<th>( T_1 )</th>
<th>( T_e )</th>
<th>( S_e )</th>
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<td>4890</td>
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<td>D-1LK</td>
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<td>5280</td>
<td>3.E-05</td>
<td>4890</td>
<td>650</td>
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<td>191</td>
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<td>3.E-04</td>
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<td>4090</td>
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<td>670</td>
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<td>900</td>
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<td>670</td>
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</tr>
<tr>
<td>D-6LK</td>
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<td>900</td>
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<td>D-20LK</td>
<td>5700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>680</td>
<td>1400</td>
<td>3.E-05</td>
</tr>
</tbody>
</table>

Note: Transmissivity \( (T_e, T_1) \) in units of gpd/ft.
A semilog plot of the final drawdown in each Lakota well versus its radial distance from the pumped well is shown in Figure 3. The Jacob straight-line method was applied to this plot to obtain T and S values of 4400 gpd/ft and $10^{-6}$, respectively, for the Lakota aquifer. The storativity value computed by this method is considered highly unreliable since it is two orders of magnitude lower than expected.

Water level recovery data for all wells are presented in Appendix C. Data are plotted as semilog graphs of residual drawdown versus $t/t'$ (ratio of time since pumping started to time since pumping stopped). The Lakota graphs were analyzed using the Jacob method. Again, two straight-line fits are possible for the closer Lakota wells. Both are given in Table 2.

Fuson aquitard properties were estimated from the D-1 well group data using the ratio method (Neuman and Witherspoon, 1973). The vertical hydraulic conductivity of the aquitard ($K'_v$) is computed to be approximately $2 \times 10^{-4}$ ft/d based on the average of several computed $K'_v$ during the interval between 1800 and 5000 minutes. For purposes of the analysis, the specific storativity ($S'_s$) of the aquitard was assumed to be approximately equal to that computed for the Lakota aquifer (about $7 \times 10^{-7}$ ft$^{-1}$).

**Interpretation**

The T estimates obtained from all methods using the early drawdown and recovery data are in reasonably good agreement. Values range from 3180 to 6900 gpd/ft and average approximately 4800 gpd/ft. The T of 4400 gpd/ft derived from the distance drawdown analysis is also consistent with the early T estimates. These values are believed to represent the transmissivity of the Lakota aquifer within the immediate vicinity of the test.
FIGURE 3. DISTANCE-DRAWDOWN GRAPH
site, and are consistent with the physical characteristics of the aquifer materials within this area. The T values computed from the late drawdown data, although consistent from well to well, are not reliable since the rate of drawdown during the later stage of the test never stabilized to the linear or ideal Theis-curve trend. The late recovery data provide the best estimates of the regional or long-term transmissivity of the Lakota aquifer in the Dewey region because of the long duration of this phase of the test.

In general, drawdown response in the pumped well and closer observation wells is characterized by a period of approximately linear drawdown during the first 1000 minutes of the test, followed by a steadily increasing rate of drawdown until the end of the test. The recovery data reflects the same sort of trend. The late response may be interpreted as either the effect of barrier boundary conditions or a decrease in transmissivity with distance from the test site or both.

Most of the available hydrogeologic information indicates that the Dewey fault acts as a barrier to horizontal ground-water movement in the Inyan Kara aquifers. Vertical displacement along the Dewey fault is on the order of 200 feet in the test site vicinity causing the complete separation of the Lakota aquifer on either side of the fault. Despite the geochemical evidence of Gott, et al. (1974), that the fault may act as conduit for upward circulation of ground water from deeper aquifers to the Inyan Kara Group, a recharge condition is not reflected in the potentiometric surface configuration in the fault zone (Figure 1) or in the test results. A reduction in the rate of drawdown would be expected in the s-t graphs for observation wells closest to the fault if significant recharge occurred in the fault zone. Instead the opposite response is observed in the test data.

The s-t curve for well D-8LK (the closest observation well to the fault)
exhibits the steepest slope during the late stage of the test, supporting the idea that the fault is a hydrogeologic barrier. Upward recharge may occur in the fault zone but at relatively low rates. Consequently, the fault does not behave as a recharge boundary.

**Computer Simulations**

A computer ground-water model of the Dewey region was developed to aid in interpreting the test results and refining aquifer parameters. A three-dimensional ground-water flow code developed by Trescott (1975) was used for the simulations. The Inyan Kara is conceptualized as a three-layer aquifer system consisting of the Lakota (Chilson) aquifer, the Fuson aquitard and the Fall River aquifer, with model layers having uniform thicknesses of 120, 100, and 180 feet, respectively. Impervious boundaries are set above the Fall River layer and below the Lakota layer to represent the relatively impermeable shales which bound the Inyan Kara Group. The model area and finite-difference grid are shown in Figure 4. The outcrop area of the Inyan Kara represents the eastern limit of the modeled region. The remaining three sides of the model are set at sufficient distances from the test pumping well to eliminate the possibility of artificial boundary effects in model simulations. The Dewey fault zone was treated as a barrier boundary.

Simulations were made using two basic conceptual models of the Inyan Kara aquifer system to determine which model best represented observed responses during the Dewey test. For case I, uniform T and S values of 4,400 gpd/ft and 1x10^{-4}, respectively were assigned to the Lakota aquifer. A uniform T was used for this case despite evidence of a much lower transmissivity outside of the immediate test site in order to determine
Figure 4: Ground-Water Model Grid
whether the fault alone could account for late drawdown trends. The Fuson aquitard was assigned a uniform $K'_v$ of $10^{-4}$ ft/d. The Fall River aquifer was represented by uniform $T$ and $S$ values of 400 gpd/ft and $10^{-4}$ respectively, based on the results of the Burdock tests (Boggs and Jenkins, 1980). A simulation was then made of the 11-day Dewey aquifer test using the average pumping rate of 495 gpm in an attempt to reproduce the test results. A comparison of computed and observed s-t graphs for the Lakota observation wells is shown in Figure 5. Clearly, the barrier boundary condition created by the fault does not fully account for the observed increase in drawdown rate during the latter part of the test.

In Case II, the model was modified to account for the suspected spatial variability of transmissivity in the Lakota aquifer. Geologic evidence indicates that the test site is located in an area where the Lakota is composed of an exceptionally thick course-grained sandstone. Outside of this locality the aquifer becomes thinner and its composition changes to finer-grained sedimentary facies. These changes are particularly evident in the area east of the site. The test results indicate a local $T$ in the immediate site area of about 4,400 gpd/ft and a regional average of about 670 gpd/ft. These $T$ estimates were used along with areal variations in the sandstone-shale composition of the Lakota aquifer in the site vicinity to arrive at the $T$ distribution shown in Figure 6. Exploration borehole geophysical logs were used to estimate the relative amounts of sandstone and shale in the Lakota across the site area. The horizontal hydraulic conductivity of the sandstone is estimated at approximately $5.7 \times 10^{-5}$ ft/sec based upon the near-field $T$ estimate of 4,400 gpd/ft, an aquifer thickness of 120 feet, and the assumption that the aquifer in the immediate vicinity of the test well and closest observation wells is essentially all sandstone. The
Figure 5. Comparison of Observed and Computed Drawdown, Case I
Figure 6: Transmissivity Distribution, Case II
horizontal conductivity of the shale is estimated to be about $10^{-8}$ ft/sec assuming (1) the measured vertical conductivity of the Fuson shale is also representative of shale in the Lakota aquifer and (2) the ratio of horizontal to vertical conductivity is about 10:1. Given the estimated horizontal conductivities for the sandstone and shale, a representative average conductivity was computed for areas having similar aquifer sandstone-shale ratios. The representative average conductivity was computed from the geometric mean of the conductivity samples as suggested by Bouwer (1969). The transmissivity of 1,400 gpd/ft assigned to the southern portion of the model is based on results of the Burdock aquifer test. Note that although an attempt was made to assign realistic transmissivity values to the entire model region, model simulation results are mainly affected by the transmissivity distribution within the observed limits of influence of the 11-day aquifer test as indicated in Figure 6. Outside of this region the model is relatively insensitive to the assigned T values.

The Case II simulation results are shown in Figure 7. The agreement between the computed and observed drawdown trends in the Lakota wells is quite good overall. At least part of the discrepancy between observed and computed responses in these units is due to the fact that computed hydraulic heads are average values over the thickness of the aquifer or aquitard layer.

The observed drawdown trends could, perhaps, be reproduced using some alternative T distribution without the barrier boundary condition assumed for the Dewey fault. However, if the fault did not represent a barrier, substantial pressure changes should have been observed during the test in the private Lakota wells located north of the fault. These wells are located at approximately the same radial distance as observation well...
Figure 7. Comparison of Observed and Computed Drawdown, Case II
D-20LK which exhibited 66 feet of drawdown at the end of the test. As no drawdown occurred in these wells, it is concluded that the Dewey fault represents a hydrogeologic barrier.

The Case II simulation results support the concept of the Lakota as a patchy aquifer of relatively low-transmissivity overall but having within it localized zones of substantially higher transmissivity. The proposed mine site lies within one of these high transmissivity localities. Although the T distribution used in the Case II model is based upon reasonable assumptions, it is considered only an approximation of actual conditions in the test site area. Nevertheless, this approximation is adequate for assessing long-term mine depressurization impacts. The significance of the Case II model result is that it provides an interpretation of the test results which is consistent with what is known or suspected about the hydrogeologic conditions in the site region.

CONCLUSIONS

Hydrogeologic investigations in the Dewey area indicate that the proposed mine site lies within an area where the Lakota Formation is composed of relatively thick permeable sandstone. The transmissivity of the Lakota aquifer in this locality is estimated to be approximately 4,400 gpd/ft. Storativity of the aquifer is about $10^{-4}$. Outside of this area the Lakota transmissivity decreases substantially. The variation in transmissivity over the region is consistent with geologic evidence of thinning of the Lakota sandstone away from the test site and a change to finer-grained sand and shale facies. The significance of this condition is that long-term mine depressurization rates and drawdown response in the Dewey vicinity will be
governed by the lower transmissivity material. As a result, dewatering rates will be lower and the areal extent of drawdown impacts smaller than if the higher transmissivity prevailed.

There is evidence that hydraulic communication between the Fall River and Lakota aquifers occurred during the Dewey test. However, the degree of interconnection between these units is substantially less than that observed at the Burdock test site. The vertical hydraulic conductivity of the intervening Fuson aquitard estimated from the Dewey test data is approximately $10^{-4}$ ft/d. This value is about an order of magnitude lower than the estimate obtained at Burdock. The difference is somewhat surprising in that the Fuson aquitard is thinner in the Dewey area than at Burdock. A possible explanation may be that the direct avenues of hydraulic communication (e.g., numerous open pre-TVA exploration boreholes) believed to exist at Burdock, are not present in the Dewey area.

Evaluation of the drawdown responses recorded in test wells and private wells during the aquifer test and review of existing subsurface geologic data indicates that the Dewey fault zone acts as a hydrogeologic barrier to horizontal ground-water movement between the Inyan Kara aquifers located on opposite sides of the fault zone. Some upward vertical recharge to the Inyan Kara may occur in the fault zone as suggested by Gott, et al. (1968). However, rate of recharge from this source must be relatively small, otherwise recharge effects would be apparent in the aquifer test results and in the configuration of the steady-state potentiometric surface. It is expected that the fault will significantly reduce mining drawdown impacts on ground-water supplies located north of the fault zone.
3. The model should be calibrated by adjustment of hydraulic parameters to reproduce the existing steady-state potentiometric surface shown in Figure 1. The hydraulic properties for the Inyan Kara units measured at the Dewey and Burdock test sites should be held constant in the calibration process, while parameter adjustments are made in other areas to obtain a reasonable match between the computed and observed potentiometric levels. An estimate of net ground-water recharge can be obtained from the calibrated model by assigning observed potentiometric head values to the model nodes which lie within the aquifer recharge (outcrop) area. The aquifer recharge fluxes may be incorporated directly into the model to more accurately represent drawdown conditions in the outcrop areas during mine depressurization simulations.

4. Significant pumping stresses on the Inyan Kara aquifers other than the TVA mining operations should be identified and incorporated into the model.
REFERENCES


FIGURE A-1: DRAWDOWN GRAPH FOR WELL D-PW
FIGURE A-2: DRAWDOWN GRAPH FOR D-1 WELL GROUP
FIGURE A-3: DRAWDOWN GRAPH FOR WELL D-2LK
FIGURE A-4: DRAWDOWN GRAPH FOR D-3 WELL GROUP
FIGURE A-5: DRAWDOWN GRAPH FOR D-4 WELL GROUP
FIGURE A-6: DRAWDOWN GRAPH FOR WELL D-SLK

DREYER-BURDICK GDP
June 2012

Appendix A-6

DREYER-BURDICK GDP
June 2012

Appendix A-6

FIGURE A-6: DRAWDOWN GRAPH FOR WELL D-SLK
FIGURE A-7: DRAWDOWN GRAPH FOR WELL D-6LK
FIGURE A-8: DRAWDOWN GRAPH FOR WELL D-8LK
FIGURE A-9: DRAWDOWN GRAPH FOR WELL D-20LK
APPENDIX B

LOGARITHMIC TIME-DRAWDOWN GRAPHS
FIGURE B-1: DRAWDOWN GRAPH FOR WELL D-PW
FIGURE B-2: DRAWDOWN GRAPH FOR D-1 WELL GROUP

- D-1LK
- D-1FR
- D-1FU
FIGURE B-3: DRAWDOWN GRAPH FOR WELL D-2LK
FIGURE B-4: DRAWDOWN GRAPH FOR D-3 WELL GROUP

- D-3LK
- D-3FR
FIGURE B-5: DRAWDOWN GRAPH FOR D-4 WELL GROUP

- D-4LK
- D-4FR
FIGURE B-6: DRAWDOWN GRAPH FOR WELL D-5LK
Figure B-7: Drawdown Graph for Well D-6LK
**Figure B-8:** Drawdown Graph for Well D-8LK
APPENDIX C

SEMILOGARITHMIC TIME-RESIDUAL DRAWDOWN GRAPHS
FIGURE C-1: RECOVERY GRAPH FOR WELL D-PW
FIGURE C-2: RECOVERY GRAPH FOR D-1 WELL GROUP
FIGURE C-3: RECOVERY GRAPH FOR WELL D-2LK
FIGURE C-4: RECOVERY GRAPH FOR D-3 WELL GROUP
FIGURE C-5: RECOVERY GRAPH FOR D-4 WELL GROUP

RESIDUAL DRAWDOWN (FT)

T/T'
FIGURE C-6: RECOVERY GRAPH FOR WELL D-5LK
FIGURE C-7: RECOVERY GRAPH FOR WELL D-6LK
FIGURE C-9: RECOVERY GRAPH FOR WELL D-20LK
SOURCE L

COORDINATES, ELEVATIONS AND WATER LEVELS FOR BURDOCK PIEZOMETERS

(Letter from Keith Andersen, Silver King Mines, Inc., to John Hatch, South Dakota Water Rights Commission, January 12, 1979)
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## Coordinates (SKM Grid) and Elevations for Burdock Area Observation Wells

### Original Nine Wells: Installed Fall 1976 (Abandoned five Fall 1978)

<table>
<thead>
<tr>
<th>Well</th>
<th>Aquifer</th>
<th>Coordinates</th>
<th>Measuring Point Elevation</th>
<th>Height of Measuring Point Above Ground Level</th>
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<tbody>
<tr>
<td>B-1</td>
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<td>B-2</td>
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<td>B-3</td>
<td>FR 82</td>
<td>93,532 E 190,992 N</td>
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<td>2.0 ft.</td>
</tr>
<tr>
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<td>Aban Kf</td>
<td>93,583 E 191,005 N</td>
<td>3701.63</td>
<td>1.6 ft.</td>
</tr>
<tr>
<td>B-4</td>
<td>Aban Kf</td>
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<td>3679.45</td>
<td>2.58 ft.</td>
</tr>
<tr>
<td>B-5</td>
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<td>97,944 E 191,090 N</td>
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</tr>
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<td>B-6</td>
<td>FR 659</td>
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<td>3642.64</td>
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</tr>
<tr>
<td>B-6</td>
<td>660 Aban</td>
<td>91,874 E 192,472 N</td>
<td>3644.12</td>
<td>0</td>
</tr>
<tr>
<td>B-8</td>
<td>661</td>
<td>100,952 E 193,839 N</td>
<td>3788.58</td>
<td>2.0 ft.</td>
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**Burdock Well Kf,Kf 668**

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<th>Coordinates</th>
<th>3624.16 = GL Elevation</th>
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### Four Additional Wells: Installed August 1977

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<th>Coordinates</th>
<th>Measuring Point Elevation</th>
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</tr>
</thead>
<tbody>
<tr>
<td>B-7</td>
<td>FR 665</td>
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<tr>
<td>B-7</td>
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<tr>
<td>B-9</td>
<td>658</td>
<td>91,309 E 187,658 N</td>
<td>3605.42</td>
<td>2.6 ft.</td>
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### Seven Replacement Wells: Installed Fall 1978

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<tr>
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<td>91,221 E 189,275 N</td>
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<td>FU 670</td>
<td>91,265 E 189,344 N</td>
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<td>B-11</td>
<td>FR 664</td>
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<td>90,843 E 189,739 N</td>
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<td>1.0 ft.</td>
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</table>

**Source:** Letters from Keith Andersen, Silver King Mines, Inc., to John Hatch, South Dakota Water Rights Commission, January 12, 1979

Dewey-Burdock GDP June 2012 3.7-B-867 Appendix 3.7-B
Revised Coordinates and Elevations for Burdock Piezometers

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<th>Height of Measuring Point to Ground Level</th>
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</tr>
<tr>
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<td>1.3 ft.</td>
</tr>
<tr>
<td>1-2 Fusion</td>
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<td>0'</td>
</tr>
<tr>
<td>1-3 FR</td>
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</tr>
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<td>2.58 ft.</td>
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<td>1-6</td>
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<td>0'</td>
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<td>1.75 ft.</td>
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<td>3631.19</td>
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Water Level Measurements for Burdock Piezometers

All pressure measurements on 9-21 are 2-2.75 psi lower than previous measurement – gauge may not have been accurate.

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<th>Pressure</th>
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<tr>
<td></td>
<td>9-21-78</td>
<td>12.25 psi</td>
</tr>
<tr>
<td></td>
<td>10-13-78</td>
<td>8.80 psi</td>
</tr>
<tr>
<td>B-2</td>
<td>7-20-78</td>
<td>16.0 psi</td>
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<tr>
<td></td>
<td>9-21-78</td>
<td>13.25 psi</td>
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<tr>
<td>B-3</td>
<td>7-20-78</td>
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<td>8-4-78</td>
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<td>Water Level in Annulus 11.8'</td>
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<td>Burdock well flowing</td>
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<td>Abandoned 12-5-78</td>
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**Outlying Piezometer Wells**

Locations:

- **BPZ 14 #602**
- **BPZ 15 FR #601**
- **BPZ 16 #643**
- **BPZ 17 FR #644**
- **BPZ 18 #608**
- **BPZ 19 FR #607**
- **BPZ 20 #609**
- **BPZ 21 FR #610**
- **BPZ 22 #626**
- **BPZ 23 FR #625**


June 2012

3.7-B-869

Appendix 3.7-B
### Water Levels:

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Source: Letter from Keith Andersen, Silver King Mines, Inc. to John Hatch, South Dakota Water Rights Commission, January 12, 1979
All wells constructed of 1" blk iron pipe with torch slot screen. Grout pumped down annulus to desired depth with 1" plastic pipe.

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All wells constructed of 1" blk iron pipe with torch slot screen. Grout pumped down annulus to desired depth with 1" plastic pipe.
SOURCE M

CONSTRUCTION AND LOCATION DATA FOR DEWEY PUMP TEST WELLS

(in letter from Keith Andersen, Silver King Mines, Inc., to Steve Stampfli, Office of Surface Mining, South Dakota Department of Water and Natural Resources, March 3, 1982)
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Source: Letter from Keith Andersen, Silver King Mines, Inc., to Steve Stampfl, Office of Surface Mining, South Dakota Department of Water and Natural Resources, March 3, 1982
SOURCE N

BURDOCK MINE AREA HYDROLOGY STATUS REPORT

(Silver King Mines, Inc. Interoffice Correspondence from Keith Andersen to R.M. Caywood, December 18, 1978, provided in a letter from Keith Andersen to John Hatch, South Dakota Water Rights Commission, January 12, 1979)
INTEROFFICE CORRESPONDENCE

Company: Silver King Mines, Inc.  Date: December 18, 1978

To: R. M. Caywood

From: Keith E. Andersen  Subject: Burdock Mine Area Hydrology Status Report

Uranium ore in economically recoverable quantities has been discovered northwest of Edgemont, South Dakota, near Burdock on lands leased by the Tennessee Valley Authority. The ore is located in the Lakota Formation. Tentative plans call for conventional underground mining techniques which will require dewatering the ore zone during the mining operation. The Lakota Formation and the overlying Fall River Formation are the two principal aquifers supplying domestic water for area ranches. In view of this information, it was apparent that extensive hydrologic investigations would be required in planning the proposed mine.

An attempt has been made to identify all wells and springs having their source in the Fall River or Lakota Formation within approximately a 25 mile radius of the proposed mine. Appended are lists of these wells. The list entitled "Water Wells in the Edgemont Project Area" includes those wells felt most likely to be affected by proposed mine dewatering because of their proximity to the mine and their topographic location along the Cheyenne River Basin. Information on these wells was obtained from personal visits to the wells and with the well owners, Silver King Mines, Inc. files, South Dakota Geological Survey Report #109 "Ground Water Resources of the Western Half of Fall River County, SD" by Jack Keene, and from USGS Hydrologic Atlas "Water Resources of the Powder River Basin and Adjacent Areas, Northeastern Wyoming" by Hodson, Pearl, and Druse. Since completion of this listing in May, 1977, selected wells from this list have been monitored on a quarterly basis. Information on other wells within 25 miles of the proposed mine is as shown on the listings.

In addition to monitoring selected existing wells several observation wells have been installed to monitor water levels in the Fall River and Lakota aquifers. Initially nine observation wells were constructed in the Burdock area during the fall of 1976 to monitor water level drawdown during the February, 1977, pump test. Four more wells were installed during August, 1977, to provide additional information for the November, 1977, pump test. To provide additional information on area water levels ten wells were installed during the summer of 1978 at selected locations throughout the project area. Finally, when it appeared that some of the original nine wells were not providing reliable data, five of these wells were cemented off and abandoned and seven replacement wells drilled during the fall of 1978. Information on all of the observation wells is appended.
A test well was constructed during January, 1977, for the purpose of conducting pump tests and potentially for dewatering use. This well was pumped during the February, 1977, and November, 1977, pump tests.

The well was allowed to free flow after completion until February 11, 1977, the starting date for the first pump test. This flow resulted in pre-pump test drawdown as shown in the attached data. The well was pumped from both aquifers for 337 hours at an average discharge of 261 gpm. The water level in the well stabilized at 433 feet of drawdown after 280 hours. Data from observation well B-2 indicated the static head on the well before it was allowed to flow was about +30 feet. Using a total drawdown of 463 feet the specific capacity of the well was estimated at 0.56 gpm/ft.

Coefficients of transmissibility and storage were estimated from the observation well drawdown data using the time-drawdown graphical solution to the Thoens non-equilibrium well formula. It was necessary to estimate the pumping rate from the Fall River and Lakota for this analysis. The Fall River pumping rate was estimated at 100 gpm and the Lakota at 161 gpm. Using these figures, the transmissivity and storage coefficient of the Lakota were estimated at 1600 gpd/ft. and 5.5 x 10^-5, respectively, and at 860 gpd/ft. and 4 x 10^-5 for the Fall River.

Since approximately one-half of the domestic wells in the area produce from the Fall River aquifer and since it would be possible to sink a shaft through the Fall River with minimal disturbance to water levels, another pump test was planned to determine if the Fall River and Lakota were hydraulically connected. Four additional observation wells were installed in preparation for this test.

Following the February, 1977, pump test the well was shut in and not allowed to flow at the surface. Water was able to communicate between the aquifers since the well screen was open to both aquifers. During the week of October 25, 1977, the Fall River aquifer was isolated and shut in with a pneumatic packer. The Lakota was allowed to free flow until the pump test, November 14, again resulted in pre-pump test drawdown.

The pump test began at 10:00 a.m. on November 14, and continued until November 17. By the morning of November 17, it appeared that sufficient data had been obtained to determine whether or not leaky aquifer conditions existed in the Burdock area and the initial phase of the test was terminated at 11:30 a.m.. The average pumping rate for this period was 193 gpm. Assuming that the water levels in piezometers B-1 FR and B-2 were the same as the Fall River and Lakota water levels in the well before the pump was installed, the total Lakota drawdown at the end of the initial phase was 267 feet and the total Fall River drawdown was 49 feet. At 11:30 a.m. the pumping rate was increased to 225 gpm in an attempt to provide additional data on the apparent specific capacity of the well and on the rate of drawdown in the Fall River with respect to the head differential between the Fall River and Lakota water levels.
After two hours additional pumping at 225 gpm the Lakota drawdown was 298 feet and the Fall River drawdown was 50 feet. At 1:30 p.m. the pumping rate was increased to 250 gpm. For the next hour the pumping rate fluctuated considerably because the pipeline from the well head to the holding reservoir was not capable of handling the increased flow. The pipeline broke and was repaired several times causing a varying pumping head and varying pumping rate. The pumping rate was cut back to 230 gpm at 3:00 p.m.. The pneumatic packer, which had been set at 200 psi, was pressured to 250 psi at 3:15 p.m. to see what effect this might have on the rate of drawdown in the Fall River. The pump was shut off at 4:15 p.m. and water level recovery rates monitored.

Time-drawdown data from this pump test indicated a complex hydrologic system in this area, with the effects of both leakage and boundary conditions influencing groundwater flow. Early time data indicated a transmissivity of about 1600 gpd/ft. and storage coefficient of about $7.5 \times 10^{-5}$ for the Lakota, which agreed reasonably well with the values calculated for the first test. Attempts at more detailed analysis of the data were not successful.

Because of the difficulty in analyzing the drawdown data it began to appear that some of the data might be unreliable. To investigate this possibility, cement logs were run on wells B-2, B-3, B-4, and B-5. These logs showed the cement grout was not properly placed to isolate the Fall River and Lakota in these wells. These four wells and well B-6 have been abandoned and replaced with seven new wells. Sonic bond logs were run on the new wells, which showed the wells to be properly grouted.

At this time two additional pump tests are planned in the Burdock Area to obtain more reliable hydrologic data on the Lakota and Fall River aquifers. A three-five day test pumping from the Lakota is tentatively scheduled for early January, 1979, followed by a three-five day test pumping from the Fall River.

Keith E. Andersen, Chief Engineer
SOURCE O

ANALYSIS OF AQUIFER TESTS CONDUCTED AT THE PROPOSED BURDOCK URANIUM MINE SITE, BURDOCK, SOUTH DAKOTA

ANALYSIS OF AQUIFER TESTS CONDUCTED
AT THE PROPOSED BURDOCK URANIUM MINE SITE
BURDOCK, SOUTH DAKOTA

TENNESSEE VALLEY AUTHORITY
OFFICE OF NATURAL RESOURCES
DIVISION OF WATER RESOURCES
WATER SYSTEMS DEVELOPMENT BRANCH
NORRIS, TENNESSEE
Tennessee Valley Authority
Office of Natural Resources
Division of Water Resources
Water Systems Development Branch

ANALYSIS OF AQUIFER TESTS CONDUCTED
AT THE PROPOSED BURDOCK URANIUM MINE SITE
BURDOCK, SOUTH DAKOTA

Report No. WR28-1-520-109

Prepared by
J. M. Boggs
and
A. M. Jenkins

Norris, Tennessee
May 1980
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ABSTRACT

Separate aquifer tests were conducted in two aquifers which may be affected by TVA's proposed uranium mining operation near Burdock, South Dakota. In April 1979, a constant-discharge test was conducted in the Chilson member of the Lakota formation which comprises the principal ore body and an aquifer of regional importance. The hydraulic properties of both the Lakota (Chilson) aquifer and the overlying Fuson shale aquitard were determined. A second test was conducted in July 1979 in the Fall River aquifer which overlies the Fuson. The hydraulic characteristics of the Fall River aquifer and a second estimate of the Fuson aquitard properties were obtained from the test. The test results indicate that the two aquifers are hydrologically connected via (1) general leakage through the Fuson shale, and (2) direct pathways, probably in the form of numerous old (pre-TVA) unplugged exploration boreholes.

The hydraulic properties of the Fall River, Fuson and Lakota units obtained from the aquifer test analyses were incorporated into a computer model of the site geohydrologic system. These parameters were refined in a calibration process until the model could reproduce the drawdown responses observed during the Lakota aquifer test. Results indicate the transmissivity and storativity of the Lakota (Chilson) aquifer are approximately 1400 gallons per day per foot (gpd/ft) and $1.0 \times 10^{-4}$, respectively. The Fall River aquifer has an estimated transmissivity of 400 gpd/ft and a storativity of about $1.4 \times 10^{-5}$. The hydraulic conductivity of the Fuson aquitard is estimated at approximately $10^{-3}$ foot per day. The specific storativity of the Fuson was not measured but is assumed to be about $10^{-6}$ feet$^{-1}$. 

Dewey-Burdock GDP
June 2012
3.7-B-892
Appendix 3.7-B
INTRODUCTION

This report describes the aquifer testing program conducted at the proposed uranium mine site in Burdock, South Dakota. The purpose of the program was to determine the hydrogeologic conditions in the mining area in order to predict mine dewatering requirements and impacts.

The Fall River formation and the Chilson member of the Lakota formation comprise the principal aquifers in the vicinity of the proposed mine. These aquifers are separated by the Fuson shale member of the Lakota formation which acts as an aquitard. The uranium deposits to be mined lie within the Chilson unit.

Two unsuccessful aquifer tests were conducted at the site prior to those described in this report. The first test was conducted at the Burdock test well in February 1977. Pumping took place from both the Fall River and Lakota aquifers during the 14-day test. The test results were invalidated by questionable well discharge measurements and by mechanical difficulties with a deep-well current meter used to measure the quantity of water pumped from each aquifer. A second test lasting three days was performed in November 1977. Pumping was restricted to the Lakota aquifer during the test in order to determine the potential for leakage through the Fuson shale from the overlying Fall River aquifer. The results of the test were inconclusive because (1) five observation wells used in the test were subsequently found to be improperly constructed and (2) pressure gauges used to monitor pumping response at several wells malfunctioned during the test.
The problems associated with the two earlier tests were corrected for the tests described in this report. The defective observation wells were pressure sealed with cement grout and replaced with properly constructed wells. More reliable instrumentation for monitoring potentiometric heads in observation wells was used in subsequent tests.
HYDROGEOLOGY

Regional Setting

The proposed mine site is located in the northwestern corner of Fall River County, South Dakota, less than one mile southeast of the community of Burdock. Geologically, the site is situated on the southwest flank of the Black Hills Uplift (see Appendix, Figure 1). The stratigraphy of the region consists of a sequence of rocks ranging in age from Precambrian to Recent which crop out peripherally to the Black Hills. The Precambrian rocks crop out near the center of the Black Hills, and progressively younger rocks crop out to the southwest. Surficial rocks in the site area range in age from lower Cretaceous to Recent. A generalized stratigraphic column for the site is shown in Table 1.

The major structural features of the region are the southwesterly-trending Dewey and Long Mountain structural zones. Faults, fractures and breccia pipes in these zones are believed to affect the ground-water water regime.

Aquifers

The principal aquifers in the region are the alluvial deposits associated with the Cheyenne River and its major tributaries, the Fall River formation, the Lakota formation, the Sundance formation, and the Pahasapa (or Madison) formation. Except for the alluvium, these aquifers crop out peripherally to the Black Hills where they receive recharge from precipitation. Ground-water movement is in the direction of dip, radially from the central Black Hills. In most instances, ground water in these aquifers is under artesian conditions away from the
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<th>SYMBOL</th>
<th>COLUMN</th>
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<tr>
<td>Quaternary</td>
<td>Alluvium</td>
<td>Gq</td>
<td></td>
<td>Gravel, sand, and silt floodplain deposits Alluvial terraces and windblown material</td>
<td>1-30</td>
<td>Good to excellent aquifer along floodplains, terraces generally non-productive except for scattered springs</td>
</tr>
<tr>
<td></td>
<td>Pierre Fm.</td>
<td>Kp</td>
<td></td>
<td>Dark grey shale, weathering brown or buff and containing many fossiliferous concretions</td>
<td>1000+</td>
<td>Relatively no value as an aquifer; locally large diameter wells in stream valleys may yield small amounts of highly mineralized water during wet seasons</td>
</tr>
<tr>
<td></td>
<td>Niobrara Fm.</td>
<td>Kn</td>
<td></td>
<td>Scattered concretions which form &quot;tessas buttes&quot;</td>
<td>100-225</td>
<td>No known wells</td>
</tr>
<tr>
<td></td>
<td>Turner sand</td>
<td>Krr</td>
<td></td>
<td>Light grey shale with large concretions</td>
<td>520-540</td>
<td>Relatively impermeable; possible small yields from Turner and Wall Creek sands.</td>
</tr>
<tr>
<td></td>
<td>Carlin Fm.</td>
<td>Kcr</td>
<td></td>
<td>Grey concretion shale, weathering yellow and impure shale with Ostrac Cones</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wall Creek sand</td>
<td>Kg</td>
<td></td>
<td>Light grey shale, with thin sandstone layers</td>
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<td>Cretaceous</td>
<td>Greenhorn Lms.</td>
<td>Kg</td>
<td></td>
<td>Bed of impure chalk with Oolite and pebbles</td>
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<td></td>
<td>Belle Fourche Fm.</td>
<td>Kgs</td>
<td></td>
<td>Dark gray shale, weathering brown or buff, contains impure Limestone</td>
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<tr>
<td></td>
<td>Mowry Shale</td>
<td>Kgs</td>
<td></td>
<td>Impure grey shale with Oolite and pebbles</td>
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<td></td>
<td>Graneros Group</td>
<td>Kgs</td>
<td></td>
<td>Light grey shale, weathering sandy and impure shale</td>
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<tr>
<td></td>
<td>Newcastle sand</td>
<td>Kgs</td>
<td></td>
<td>Light grey silicious shale</td>
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<tr>
<td></td>
<td>Skull Creek Shale</td>
<td>Kgs</td>
<td></td>
<td>Thin brown-to-yellow sandstone</td>
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<td></td>
<td>Fall River Fm.</td>
<td>Kfr</td>
<td></td>
<td>Interbedded red-brown massive sandstone and Carbonaceous shales</td>
<td>30-165</td>
<td>Largest producer in the area. Yields up to 60 gpm of highly mineralized water (fowl). Water quality generally poor, sometimes yields hydrogen sulfide</td>
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<td></td>
<td>Fusion Shale</td>
<td>Kfr</td>
<td></td>
<td>Gray-to-purple shale, thin shales</td>
<td>0-180</td>
<td>Relatively good aquifer from the lower Chirion member, up to 30 gpm artesian flow</td>
</tr>
<tr>
<td></td>
<td>Minnewasst Lms.</td>
<td>Klf</td>
<td></td>
<td>Light grey massive limesteone</td>
<td>0-220</td>
<td></td>
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<td></td>
<td>Lakota Fm.</td>
<td>Klf</td>
<td></td>
<td>Coarse, hard, cross-bedded sandstone, buff-to-grey, coal beds locally near base.</td>
<td>130-230</td>
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<td></td>
<td>Morrison Fm.</td>
<td>Km</td>
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<td>Green-to-maron shale, thin sandstone</td>
<td>0-125</td>
<td>No known wells.</td>
</tr>
<tr>
<td></td>
<td>Unkapa Fm.</td>
<td>Ju</td>
<td></td>
<td>Fine grained, massive, verti-colored sandstone</td>
<td>0-240</td>
<td>No known wells, possible aquifer</td>
</tr>
<tr>
<td>Jurassic</td>
<td></td>
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<tr>
<td></td>
<td>Sundance Fm.</td>
<td>Jsd</td>
<td></td>
<td>Alternating beds of red sandstone and red-to-green marine shales</td>
<td>250-450</td>
<td>Produces small amounts of water from the sands suitable for domestic use</td>
</tr>
<tr>
<td>Triassic</td>
<td>Spearfish Fm.</td>
<td>Rs</td>
<td></td>
<td>Red silt layer, limestone, and anhydrite near the top. Red beds</td>
<td>400</td>
<td>Poor producer, small yields of sulfate water</td>
</tr>
<tr>
<td>Permian</td>
<td>Minnewasst Lms.</td>
<td>Cmny</td>
<td></td>
<td>Pale brown, to grey dense, crystalline limestones</td>
<td>50</td>
<td>Locally secondary fracture porosity</td>
</tr>
<tr>
<td></td>
<td>Opecche Fm.</td>
<td>Co</td>
<td></td>
<td>Red clayey sandy and shales and red-to-yellow cross bedded sand</td>
<td>00</td>
<td>No known wells</td>
</tr>
<tr>
<td>Pennsylvanian</td>
<td>Minnewasst Fm.</td>
<td>Cml</td>
<td></td>
<td>Converse sand, red-to-yellow cross bedded sand. Red marker, thin red shale near middle.</td>
<td>750-1040</td>
<td>Permeability variable; tremendous flows of worm mineralized water recorded near the periphery of the Block Hills Excellent potential</td>
</tr>
<tr>
<td>Mississippian</td>
<td>Raphasna Fm.</td>
<td>Cpt</td>
<td></td>
<td>Massive, light colored dolomites and limestone, covering in upper 100 feet.</td>
<td>450-465</td>
<td>Most promising aquifer in the area. Two 2 wells in this aquifer produce large amounts of water suitable for domestic use</td>
</tr>
<tr>
<td>Precambrian</td>
<td>Metamorphic and igneous rocks</td>
<td>PC</td>
<td></td>
<td>Granites, schists, quartzites, and slates</td>
<td>---</td>
<td>No potential!</td>
</tr>
</tbody>
</table>
outcrop area, and water flows from numerous wells in the area at ground surface.

The Fall River and Lakota formations which form the Inyan Kara Group are the principal aquifers in the region. The alluvium is used locally as a source of domestic and stock water. The Sundance formation is used near its outcrop area in central and northwestern Fall River County. The Pahasapa (Madison) formation is locally accessible only by very deep wells and is the source for five wells in the city of Edgemont.

The Fall River and Lakota aquifers are of primary concern because of the potential impact of mine dewatering on the numerous wells developed in these aquifers in the vicinity of the mine. At the proposed mine site, the Fall River consists of approximately 120 feet of interbedded fine-grained sandstone, siltstone and carbonaceous shale. The Fall River aquifer is overlain by approximately 250 feet of the Mowry and Skull Creek shales unit, which act as confining beds. Twenty-six domestic and stock-watering wells are known to be developed in the Fall River formation within a four-mile radius of the mine site. Many of these are flowing at the surface.

The Fall River formation is underlain by Fuson shale member of the Lakota formation. Thickness of the Fuson is on the order of 60 feet in the site vicinity. The Fuson acts as a leaky aquitard between the Fall River and Lakota aquifers. A physical examination of undisturbed core samples of Fuson indicates that the shale itself has a very low permeability. However, aquifer tests suggest a direct connection through the Fuson which may be the result of some as-yet-unidentified structural features or old unplugged exploration holes.
The Chilson member of the Lakota formation is the second most widely used aquifer in western Fall River County, as the source for some 23 wells within a four-mile radius of the mine site. It is also the uranium-bearing unit to be mined. The Chilson consists of about 120 feet of consolidated to semi-consolidated, fine-grained sandstone and siltstone. It is underlain by the Morrison formation consisting of interbedded shale and fine-grained sandstone. Regionally, the Morrison is not considered an aquifer. Under conditions of groundwater withdrawal from the Chilson, the Morrison is expected to act as an aquitard.

Recharge to the Fall River and Lakota aquifers is believed to occur at their outcrop areas. Bowles (1968) has theorized that recharge to these aquifers may also be derived from the upward movement of ground water along solution collapses and breccia pipes from the deeper Minnelusa and Pahasapa aquifers. The solution collapse and breccia pipe features lie within the Dewey and Long Mountain structural belts.
AQUIFER TEST DESIGN

The objective of the aquifer testing program was to obtain sufficient quantitative information about local hydrogeologic conditions to enable prediction of mine dewatering requirements and impacts to both the Fall River and Lakota aquifers. Since the two aquifers involved are separated by the Fuson aquitard, two distinct pumping tests were required to obtain the necessary information about each formation: one test in which the Lakota aquifer was pumped, and another in which pumping was limited to the Fall River aquifer. During both tests ground-water levels were monitored in observation wells developed in each of the three formations. Data obtained from these tests were then analyzed to obtain estimates of the hydraulic properties of the aquifers and aquitard.

The Burdock test well was constructed approximately 600 feet north of the proposed mine shaft. Total depth of the well is 559 feet. The well is screened in both the Fall River and Lakota aquifers as shown in Figure 2.

Fifteen observation wells were constructed within an approximate one-mile radius of the pumping well as indicated in Figure 3. Seven of these wells are developed in the Fall River formation, five in the Lakota, and three in the Fuson. In addition, there is a single well developed in the Sundance formation located approximately one mile from the test well. This well was not constructed specifically for the aquifer tests, but was monitored periodically during the Lakota aquifer test. Construction details for these wells are given in Table 2.
### TABLE 2. Observation Well Construction Details

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Total Depth (feet)</th>
<th>Casing Diameter (inches)</th>
<th>Depth Interval of Open Borehole or Well Screen (feet)</th>
<th>Distance From Pumped Well (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-10LAK</td>
<td>550</td>
<td>4</td>
<td>510-550</td>
<td>195</td>
</tr>
<tr>
<td>B-10FU</td>
<td>395</td>
<td>4</td>
<td>377-395</td>
<td>255</td>
</tr>
<tr>
<td>B-10FR</td>
<td>350</td>
<td>4</td>
<td>300-350</td>
<td>177</td>
</tr>
<tr>
<td>B-1LAK</td>
<td>570</td>
<td>4</td>
<td>525-570</td>
<td>405</td>
</tr>
<tr>
<td>B-1FU</td>
<td>440</td>
<td>4</td>
<td>420-440</td>
<td>350</td>
</tr>
<tr>
<td>B-1FR</td>
<td>376</td>
<td>4</td>
<td>334-376</td>
<td>373</td>
</tr>
<tr>
<td>B-11LAK</td>
<td>550</td>
<td>4</td>
<td>504-550</td>
<td>618</td>
</tr>
<tr>
<td>B-11FR</td>
<td>360</td>
<td>4</td>
<td>315-360</td>
<td>620</td>
</tr>
<tr>
<td>B-9LAK</td>
<td>545</td>
<td>1</td>
<td>503-545</td>
<td>1540</td>
</tr>
<tr>
<td>B-9FR</td>
<td>293</td>
<td>1</td>
<td>251-293</td>
<td>1540</td>
</tr>
<tr>
<td>B-7LAK</td>
<td>441</td>
<td>1</td>
<td>399-441</td>
<td>2507</td>
</tr>
<tr>
<td>B-7FR</td>
<td>252</td>
<td>1</td>
<td>210-252</td>
<td>2540</td>
</tr>
<tr>
<td>Sundance Well</td>
<td>880</td>
<td>7 7/8</td>
<td>666-780</td>
<td>4763</td>
</tr>
</tbody>
</table>
Inasmuch as water levels in each hydrogeologic unit will respond differently during pumping tests, it is important that each observation well reflect the potentiometric head in the intended uncased borehole interval. Several observation wells used in previous tests were suspected of leaking along the grout seal placed in the annular space between well casing and borehole wall. As a result, special precautions were taken to ensure proper construction of the observation wells used in the present tests. A geophysical device known as a cemeton logging probe was used to check the continuity of the cement grout seal in each well after construction. All were found to be properly sealed.

The so-called ratio-method of multiple-aquifer test analysis (Neuman and Witherspoon, 1973) requires that the response of water levels in both the pumped and unpumped aquifers and in the intervening aquitard be monitored during the test. Water level responses in these units must be measured in wells located at approximately the same radial distance from the pumped well. To obtain the necessary data, two groups of observation wells were constructed, each group having one well developed in the Fall River, one in the Fuson, and one in the Lakota (Chilson member). The B-10 group was located approximately 200 feet northeast of the pumping well, while the B-1 group was located approximately 375 feet to the southwest. These well groups were located close to the pumped well to ensure response in the aquitard and in the unpumped aquifer, if such responses were to occur at all. The remaining well groups (B-7, B-9 and B-11 series) contain only Fall River and Lakota wells.
Under natural conditions, the test well and all monitor wells except for those of the B-7 group flow at ground surface if not capped. The two previous tests conducted at the site indicated that observation wells in the pumped aquifer located close to the pumping well would become non-flowing at some point during the test. Thus, pressure sensing devices would be required during the early part of the test and depth measuring techniques during later periods. To ensure adequate data records, each flowing well was equipped with two pressure measuring devices. Malfunctions of several pressure gauges on previous tests pointed out the need for a back-up pressure measuring device.

Three types of pressure sensors were used: mercury manometers, electronic pressure transducers, and mechanical pressure gauges. The B-1 and B-10 observation well groups were equipped with mercury manometers and pressure transducers. As the closest wells to the pumping center, the data from these wells are most important in the multiple aquifer analysis and warrant the best instrumentation. Pressure transducers from all wells were wired to a central terminal and could be monitored frequently during the tests. Each well in groups B-9 and B-11 was equipped with a mercury manometer and a mechanical pressure gauge. Electric probes were used to measure water levels in the non-flowing wells of the B-7 group. These devices were also used to measure water levels in other wells which became non-flowing during pumping tests. Potentiometric head in the pumped well was measured with a mercury manometer, an air line and an electric probe.
LAKOTA AQUIFER TEST

Several months prior to the Lakota test, a pneumatic packer was set within the Fuson section of the test well to prevent communication between the Fall River and Lakota aquifers through the well. A submersible pump was set below packer to restrict pumping to the Lakota aquifer. Well-head valves on the test well and other artesian observation wells were closed to prevent flow in order to bring the ground-water system into equilibrium before testing.

Hydrographs for the test well and observation wells prior to test are shown in Figures 4 and 5. These hydrographs typify the basic relationship between the potentiometric heads in the Fall River, Fuson and Lakota, i.e., heads are highest in the Lakota, lowest in the Fall River, and at an intermediate position within the Fuson. The irregular readings recorded during January and February 1979 were due to depressurization of the aquifers during the installation of instrumentation and new wells. The pre-test ground-water level configuration in the Lakota aquifer on April 18 is shown in Figure 6.

Test Procedures and Results

A constant-discharge aquifer test was initiated at 1300 hours on April 18, 1979. Discharge from the well was pumped via pipeline to a stock-watering pond located approximately 0.75 miles from the test well. Pumpage was measured with an in-line flow meter and with an orifice plate and manometer device at the end of the discharge line. The pumping rate varied little during the test ranging from 201 to 205 gpm and averaging 203 gpm. The pumping phase of the test lasted for
73 hours (3.04 days) and was followed by a 30 day period of recovery measurements.

Figure 7 shows a semilogarithmic graph of drawdown ($s$) versus time ($t$) for the pumping well (Lakota aquifer). Erratic readings during the first 200 minutes of the test are the result of problems with the airline equipment, and are not due to discharge variations. These difficulties were subsequently corrected, but in general airline measurements are believed to be accurate only to within about ±2 feet.

Semilog graphs for the observation well groups are shown in Figures 8 through 12. Note that a slight initial increase in hydrostatic pressure is indicated in the Fall River and Fuson wells of the B-10 and B-1 well groups. This anomalous trend is more pronounced in the Fuson wells than in the Fall River wells and persists for approximately 90 minutes in B-10FU. The response is believed to be due to an increase in pore pressure resulting from deformation of the matrix of these formations.\(^1\) In any case, the anomalous trend was recorded by both the pressure transducers and mercury manometers, and is not the result of measurement error.

The Jacob straight-line method (see Walton, 1970, pp. 130-133) was applied to the semilog graphs for the Lakota wells to obtain the values of transmissivity ($T$) and storativity ($S$) presented in Table 3. In the case of the closer observation wells, two straight-line

\(^1\)During the early stages of pumping, water removed from the Lakota in the immediate vicinity of the well causes compaction of the aquifer. This, in turn, may cause the overlying strata to flex slightly in the area where the underlying support of the Lakota has been reduced. The resulting deformation in the overlying formations causes compressive forces which temporarily increase pore pressures in these materials. Subsequently, the effect of pumping-induced depressurization is transmitted through the overlying materials, gradually lowering the hydrostatic pressure.
<table>
<thead>
<tr>
<th>Well No.</th>
<th>$r$ (ft)</th>
<th>$T_e$ (gpd/ft)</th>
<th>$S_e$ (gpd/ft)</th>
<th>$T_g$ (gpd/ft)</th>
<th>$S_g$ (gpd/ft)</th>
<th>$T_e$ (gpd/ft)</th>
<th>$S_e$ (gpd/ft)</th>
<th>$T_g$ (gpd/ft)</th>
<th>$S_g$ (gpd/ft)</th>
<th>$T_e$ (gpd/ft)</th>
<th>$T_g$ (gpd/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW-LAK</td>
<td>0.67</td>
<td>1980</td>
<td>--</td>
<td>1260</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B-10LAK</td>
<td>195</td>
<td>2680</td>
<td>7.6x10^{-5}</td>
<td>1370</td>
<td>3.5x10^{-4}</td>
<td>2530</td>
<td>8.4x10^{-5}</td>
<td>1660</td>
<td>1.6x10^{-4}</td>
<td>2060</td>
<td>1300</td>
</tr>
<tr>
<td>B-1LAK</td>
<td>405</td>
<td>2140</td>
<td>4.4x10^{-5}</td>
<td>1340</td>
<td>1.2x10^{-4}</td>
<td>2120</td>
<td>4.8x10^{-5}</td>
<td>1550</td>
<td>8.4x10^{-5}</td>
<td>1970</td>
<td>1240</td>
</tr>
<tr>
<td>B-11LAK</td>
<td>620</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2530</td>
<td>1.1x10^{-4}</td>
<td>1530</td>
<td>1.5x10^{-4}</td>
<td>--</td>
<td>1250</td>
</tr>
<tr>
<td>B-9LAK</td>
<td>1540</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1370</td>
<td>1.3x10^{-4}</td>
<td>--</td>
<td>1290</td>
</tr>
<tr>
<td>B-7LAK</td>
<td>2507</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1760</td>
<td>6.5x10^{-5}</td>
<td>--</td>
<td>1500</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>2270</td>
<td>6.0x10^{-5}</td>
<td>1320</td>
<td>2.4x10^{-4}</td>
<td>2390</td>
<td>8.1x10^{-5}</td>
<td>1570</td>
<td>1.2x10^{-4}</td>
<td>2015</td>
<td>1270</td>
</tr>
</tbody>
</table>

NOTE: Subscript "e" denotes an aquifer parameter determined using early drawdown (or recovery) data. Similarly, subscript "g" denotes a parameter computed from late data.
solutions were possible: one using the early data and another using the late data. Note that data for wells B-7L, B-9L and B-11L cannot be analyzed by the Jacob method because data do not satisfy the criterion that $r^2S/4Tt \leq 0.01$ (consistent units), where $r$ is the distance between the pumped well and the observation well.

Logarithmic graphs of drawdown data for all observation wells are given in Figures 13 through 17. Theis curve-matching techniques (Walton, 1970, pp. 209-211) were applied to the Lakota curves to obtain $T$ and $S$ estimates for the Lakota aquifer. As with the Jacob analyses, two curve-match solutions were possible: one using the early, steeply-rising portions of the $s-t$ curves, and another using the later data. Both solutions are given in Table 3.

A semilogarithmic graph of distance versus drawdown (Figure 18) was constructed by plotting the final drawdown in each Lakota well versus its radial distance from the pumped well. The Jacob straight-line techniques were applied to these data to obtain $T$ and $S$ values for the Lakota of 1780 gpd/ft and $7.7\times10^{-5}$, respectively. However, this type of analysis is applicable only to nonleaky aquifer systems. Since leakage obviously occurred during the test, the results are considered unreliable.

Contour maps of the final drawdown in the Lakota and Fall River aquifers at the end of the test are shown in Figures 19 and 20, respectively. The drawdown cone in both aquifers is slightly elongated in a northwesterly direction. This is probably an indication of anisotropic transmissivity, with the transmissivity in the direction parallel to the axis of elongation being somewhat greater than that in the direction normal to the axis of elongation. The principal direction of trans-
missivity parallels the strike of a regional fracture-joint set, suggesting a possible explanation for the observed drawdown configuration.

Following the pumping phase of the test, water level recovery measurements were made at all observation wells for a period of 30 days. Attempts were also made to monitor recovery in the pumped well using an airline. However, data collected were highly erratic suggesting a malfunction of the airline equipment. Semilogarithmic graphs of residual drawdown versus t/t' (ratio of time since pumping started to time since pumping stopped) for the observation wells are shown in Figures 21 through 25. Lakota graphs were analyzed using Jacob straight-line techniques to obtain the estimates of transmissivity presented in Table 3. Again, two straight-line fits are possible for the closer Lakota wells. Both are given in Table 3.

**Interpretation of Test Results**

The drawdown trends recorded in the observation wells indicate some important qualitative information about hydrogeologic conditions at the proposed mine site, in addition to providing a basis for determining hydraulic properties of materials. The relative response of the Fall River, Fuson and Lakota formations as reflected in the B-10 and B-1 groups (Figures 13 and 14), is not typical of the response that would be expected in an ideal leaky multiple aquifer system. Ideally, the s-t curve for the intervening aquitard lies between the curves for the pumped and unpumped aquifers. That is, in a logarithmic plot of s-t data the aquitard (Fuson) curve would lie below the curve for the pumped aquifer (Lakota), and above the curve for the unpumped aquifer (Fall River). However, "ideal" trends are not evident in the
observed data until after 300 minutes of pumping in the case of the B-10 group, and not until after 2000 minutes in the case of the B-1 group. The fact that a greater pumping response is observed in Fall River formation than in the Fuson during the early part of the test indicates that direct (though restricted) avenues through the Fuson must exist. This condition was suspected before the test, and is believed to be the result of numerous old, unplugged uranium exploration boreholes in the test site vicinity. The shift to a more ideal relationship among the s-t curves exhibited during the latter part of test possibly indicates that general leakage through the Fuson itself has caught up with leakage through the open boreholes.

The leakage condition which is apparent in the response of the Fuson and Fall River wells is not evident in the Lakota well data. Under ideal conditions, the rate of drawdown in the Lakota observation wells would be expected to gradually decrease and perhaps even level off completely for some period of time. However, the opposite effect is noted in Lakota s-t plots, particularly the semilog graphs for B-10 LAK and B-1 LAK (Figures 8 and 9). The rate of drawdown increases in the latter stages of pumping which might indicate decreasing transmissivity of the Lakota aquifer in the site vicinity. The decrease in transmissivity may be due to aquifer thinning or possibly a facies change to less permeable materials. In any case, it is suspected that the leakage effects in the Lakota drawdown data are masked by the conflicting effect of a decreasing transmissivity in the site vicinity.

In general, the agreement between the Theis and Jacob analyses of s-t data is good. T values computed using early drawdown data average 2390 gpd/ft using the Theis method, and about 2270
gpd/ft using the Jacob method. Early data storativities are also in
good agreement averaging 6.0x10^{-5} for the Jacob method and 8.1x10^{-5}
for the Theis method. The T values computed from the late data (T_e) are
significantly lower than those determined from the early data, whereas late
storativities are larger. The Jacob method yields T_e values which average 1320 gpd/ft and storativities averaging 2.4x10^{-4}. The Theis method produced an average T_e of 1570 gpd/ft and an
average S_e of 1.2x10^{-4}. The late Theis T values are somewhat higher
than the Jacob T's because the Theis method gives some consideration
to the earlier data which the Jacob method does not. Transmissivities
estimated by the recovery data average 1270 gpd/ft, and are in close
agreement with the late Jacob results, although slightly lower.

Ordinarily, in selecting representative T and S for the
pumped aquifer in a leaky multiple aquifer system, more emphasis would
be placed on the early data collected in the pumped aquifer at the
pumped well and closest observation wells. These data are considered
least affected by leakage. However, because of the apparent decrease
in transmissivity of the Lakota aquifer during the latter stages of the
test, it is believed that Lakota parameters computed from the late data
are more representative of aquifer properties under a long-term pump-
ing situation such as mine dewatering. On this basis the average
transmissivity of the Lakota is estimated to be 1400 gpd/ft and the
average storativity 1.8x10^{-4}. 
FALL RIVER AQUIFER TEST

Following completion of recovery measurements associated with the Lakota aquifer test, pumping equipment in the Burdock well was rearranged for the Fall River test. A submersible pump was set within the Fall River section of the well and the pneumatic packer reset below the pump in the Fuson section of the well in order to restrict pumping to the Fall River. A preliminary test of the pump and other equipment lasting less than one hour was conducted on May 29. Unexpectedly, the Fall River aquifer was capable of yielding only about 10 gpm on a sustained basis. Since other Fall River wells in the region yield up to 40 gpm, it was assumed that either the well screen was encrusted or the well was not fully developed, or both. An unsuccessful effort was made to develop the well by pumping. A television camera was subsequently lowered into the well to examine the well screen. Little or no encrustation was observed on the screen. Ultrasonics were used in the well to remove any existing encrustation but the yield of the well was not improved. The low productivity of the well is, therefore, attributed to locally poor water-bearing characteristics of the Fall River formation.

Test Procedures and Results

A constant discharge test commenced at 1100 hours on July 24. Water levels in all geologic units were stable prior to the test, as there was no pumping activity in the site vicinity since the completion of well development on July 3. Discharge was measured with an in-line flowmeter, and checked with a 55-gallon container and stopwatch.
During the test the pumping rate varied from 7.6 to 10.4 gpm, and averaged 8.5 gpm. Ground-water levels were monitored in all observation wells shown in Figure 3. The constant discharge test was terminated at 1200 hours on July 26 after 49 hours of pumping. Subsequently, ground-water level recovery measurements were made for a period of six days.

Semilog graphs of drawdown data recorded at the pumped well and observation well groups B-1, B-10 and B-11 are shown in Figures 26 through 29, respectively. No graphs are presented for B-11LAK or the B-7 and B-9 groups as there was no measureable drawdown in these wells. Except for B-11FR, these graphs exhibit a typical straight-line drawdown trend during the first part of the test, followed by a gradual decrease in slope towards the end of the test. This slope change is the result of leakage from adjacent formations, and/or an increase in aquifer transmissivity at some distance from the pumped well. The Jacob method was applied to the semilog graphs to obtain the transmissivity and storativity values shown in Table 4. The $T_e$ and $S_e$ values were obtained using early drawdown data recorded during approximately the first 500 minutes of the test. $T_1$ and $S_1$ values were computed from data recorded after about 1000 minutes. The only reliable estimates are considered to be those computed for B-11FR and B-10FR. Drawdown data for the pumped well is affected by wellbore storage which is significant in this test because of the relatively low pumping rate. The pumped well drawdown data may also be affected by low well efficiency. The semilog plot for B-11FR cannot be analyzed by the Jacob method because the criterion that $r^2S/4Tt \leq 0.01$ is not satisfied for any of the data.
### TABLE 4. Fall River Aquifer Properties

<table>
<thead>
<tr>
<th>Well No.</th>
<th>r (ft)</th>
<th>$T_e$ (gpd/ft)</th>
<th>$S_e$</th>
<th>$T_z$ (gpd/ft)</th>
<th>$S_z$</th>
<th>$T_e$ (gpd/ft)</th>
<th>$S_e$</th>
<th>$T_z$ (gpd/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW-FR</td>
<td>0.67</td>
<td>16. (?)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>150.</td>
<td>1.7x10^-5</td>
<td>--</td>
</tr>
<tr>
<td>B-10FR</td>
<td>177</td>
<td>140.</td>
<td>1.8x10^-5</td>
<td>410.</td>
<td>--</td>
<td>80.</td>
<td>340.</td>
<td></td>
</tr>
<tr>
<td>B-1FR</td>
<td>373</td>
<td>150.</td>
<td>0.8x10^-5</td>
<td>420.</td>
<td>--</td>
<td>90.</td>
<td>350.</td>
<td></td>
</tr>
<tr>
<td>B-11FR</td>
<td>618</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Average:</td>
<td>145</td>
<td>1.3x10^-5</td>
<td>415.</td>
<td>--</td>
<td>150</td>
<td>1.4x10^-5</td>
<td>85</td>
<td>345.</td>
</tr>
</tbody>
</table>
Logarithmic graphs of drawdown data for the pumped well and observations well groups B-10, B-1 and B-11 are presented in Figures 30 through 33, respectively. Theis curve-matching techniques were applied to the Fall River curves to obtain the aquifer properties given in Table 4.

Semilog recovery curves for the pumped well and well groups B-10, B-1 and B-11 are shown in Figures 34 through 37, respectively. Again, properties computed from the pumped well recovery data are invalidated by well-bore storage effects. Separate estimates of transmissivity obtained from early and late phases of the recovery data are given in Table 4.

**Interpretation of Fall River Aquifer Test Results**

There is good agreement between the early Jacob and Theis results for B-1FR and B-10FR. These analyses indicate an average $T_e$ of about 150 gpd/ft and an average $S_e$ of approximately $1.4\times10^{-5}$. Application of the Jacob method to the late drawdown data yields an average $T_1$ of 415 gpd/ft. No meaningful storativity values could be computed from the late data. The $T_e$ values computed by the recovery method are considerably lower than those computed by the other two methods and are believed to be unrealistic. The $T_1$ values derived from the recovery analyses compare reasonably well with the Jacob late drawdown results.

The computed transmissivity and storativity values are representative of the aquifer only within the relatively small area influenced by the pumping test. The yield of the test well is substantially less than that of several other wells in the region. The difference in well
yields suggests that the Fall River aquifer is less permeable in the mine site vicinity than in certain surrounding areas. The aquifer parameters computed from the early drawdown and recovery data are believed to be representative of the aquifer in the immediate vicinity of the test wells. Parameters obtained from analysis of the late data are probably more representative of regional aquifer characteristics.
FUSON AQUITARD PROPERTIES

The hydraulic properties of the Fuson aquitard were estimated using an analytical technique known as the "ratio method" developed by Neuman and Witherspoon (1973). The method requires (1) a knowledge of the transmissivity and storativity of the pumped aquifer; (2) drawdown data for the pumped and unpumped aquifers and the aquitard measured in wells located at approximately the same radial distance from the pumped well; and (3) the vertical distance between the aquifer-aquitard boundary and the perforated section of each aquitard well (Z).

The method yields a value of aquitard hydraulic diffusivity, \( \alpha' \), equal to \( K'_v/S'_s \), where \( K'_v \) is the vertical hydraulic conductivity of the aquitard and \( S'_s \) is the specific storativity of the aquitard. To determine \( K'_v \) or \( S'_s \) from \( \alpha' \), either \( K'_v \) or \( S'_s \) must first be known. In the following analyses a value of \( S'_s = 10^{-6} \text{ ft}^{-1} \) is assumed for the Fuson aquitard. Experience indicates that specific storativities of geologic materials do not vary over as wide a range as do hydraulic conductivities. For this reason, and considering the difficulty and expense of obtaining an accurate measure of \( S'_s \) over the site vicinity, it appears justifiable to assume a value of \( S'_s \) typical of similar geologic materials.

The first step in the analysis is to compute a value of \( s'/s \) at a given radial distance from the pumped well, \( r \), and at a given time, \( t \). Next a value of \( t_D \) (dimensionless time for the aquifer equal to \( tT/r^2S \)) is determined. The values of \( s'/s \) and \( t_D \) are used to compute a value for \( t'_D \) (dimensionless time for the aquitard equal to \( K't/S'_sZ^2 \)) using a family of type curves given in Figure 3 of Neuman and Witherspoon (1973). The vertical hydraulic conductivity of the aquitard \( K'_v \) is then obtained from the following equation:
FUSON AQUITARD PROPERTIES

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$K'_v = t'_D Z^2 S'_s/t$ (1)

Since separate pumping tests were conducted in the Lakota and Fall River aquifers, it is possible to calculate two independent values of $K'_v$ for each well group. Fuson aquitard properties computed by the ratio method along with certain pertinent parameters used in the calculations are presented in Table 5.

Note that since the Fall River, Fuson and Lakota observation wells in each well group do not lie at exactly the same radial distance from the pumped well, an average radial distance $r_{avg}$ is used in the calculations. The $r_{avg}$ values shown in Table 5 were obtained by averaging the radial distance for the pumped aquifer observation well and the radial distance for the aquitard observation well. Also note that the column labeled "Time Interval" represents the time interval during which $K'_v$ values were computed. Generally, three or four values of $K'_v$ were computed at specific times within this interval. These values were then averaged to obtain the $K'_v$ values shown in Table 5.

The vertical hydraulic conductivity of the Fuson ranges from about $10^{-4}$ ft/d at the B-1 well group to about $10^{-3}$ ft/d at the B-10 well group. The agreement between the conductivities computed at each well group site for both tests is good. The reason for the order of magnitude difference between the conductivities at the different well sites is unknown, but may be related to errors caused by differences in the radial distances of observation wells--these differences being somewhat greater for the wells of the B-10 group.
TABLE 5. Fuson Aquitard Properties

<table>
<thead>
<tr>
<th>Test</th>
<th>Well Group</th>
<th>$r_{avg.}$ (ft)</th>
<th>$Z$ (ft)</th>
<th>Time Interval (min.)</th>
<th>$K'$ (gpd/ft²)</th>
<th>$v$ (ft/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakota</td>
<td>B-10</td>
<td>225</td>
<td>28</td>
<td>100-393</td>
<td>$2.0 \times 10^{-2}$</td>
<td>$2.7 \times 10^{-3}$</td>
</tr>
<tr>
<td></td>
<td>B-1</td>
<td>378</td>
<td>11</td>
<td>100-393</td>
<td>$1.0 \times 10^{-3}$</td>
<td>$1.3 \times 10^{-4}$</td>
</tr>
<tr>
<td>Fall R.</td>
<td>B-10</td>
<td>216</td>
<td>25</td>
<td>100-300</td>
<td>$4.8 \times 10^{-3}$</td>
<td>$6.6 \times 10^{-4}$</td>
</tr>
<tr>
<td></td>
<td>B-1</td>
<td>362</td>
<td>40</td>
<td>1200-2350</td>
<td>$1.3 \times 10^{-3}$</td>
<td>$1.8 \times 10^{-4}$</td>
</tr>
</tbody>
</table>
The magnitudes of computed conductivities are slightly higher than expected on the basis of the physical characteristics of the Fuson, although they are still within reason. The presence of open boreholes may have caused a more rapid drawdown response in the Fuson monitor wells than would have occurred otherwise. As a result, the calculated $K'_{v}$ values are probably larger than the actual conductivity of the Fuson shale. The calculated $K'_{v}$ values are, however, probably smaller than the effective $K'_{v}$ of the aquitard in the areas where it is breached by open boreholes.
COMPUTER MODEL SIMULATIONS

The hydraulic properties estimated for the Fall River, Fuson and Lakota formations were incorporated into a computer model of the site geohydrologic system. Simulations of the Lakota aquifer test were performed to see if the model could reproduce the drawdown responses observed during the test. An acceptable match between the measured and computed responses would indicate the validity of the estimated formation properties, and thus enhance the credibility of the model for predicting mine dewatering requirements and impacts.

A finite element numerical model developed by Narasimhan et al. (1978) was used for the aquifer test simulations. The aquifer/well-field system was modeled in three dimensions using axial symmetry. The hydraulic properties of the Fall River, Fuson and Lakota formations obtained from the aquifer test analyses were used as initial input data (see Table 6). Uniform properties were assumed for each hydrogeologic unit. The shale units which lie above the Fall River formation and those which lie below the Lakota were assumed to be impermeable in the model. All simulation comparisons were made for the Lakota aquifer test. The Lakota test stressed a larger portion of the multiple aquifer system than did the Fall River test, and more closely approximates the flow regime expected during mine dewatering.

A comparison of the measured and computed results for the initial simulation run are shown in Figure 38. In general, the agreement between the computed and observed drawdown graphs for the Lakota aquifer are good. However, there are large discrepancies in the Fall River and Fuson responses.
TABLE 6. Parameters Used In Computer Simulations

<table>
<thead>
<tr>
<th>Formation</th>
<th>(gpd/ft)</th>
<th>T</th>
<th>S</th>
<th>K_v</th>
<th>K_v/K_h</th>
<th>Ss</th>
<th>(ft^-1)</th>
<th>(gpd/ft)</th>
<th>T</th>
<th>S</th>
<th>K_v</th>
<th>K_v/K_h</th>
<th>Ss</th>
<th>(ft^-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall River</td>
<td>150.</td>
<td>1.4x10^-5</td>
<td>5.6x10^-2</td>
<td>1/3</td>
<td>1.2x10^-7</td>
<td></td>
<td></td>
<td>400</td>
<td>1.4x10^-5</td>
<td>4.6x10^-2</td>
<td>1/10</td>
<td>1.2x10^-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuson</td>
<td>0.13</td>
<td>6.0x10^-5</td>
<td>1.7x10^-4</td>
<td>1/3</td>
<td>1.0x10^-6</td>
<td></td>
<td></td>
<td>0.45</td>
<td>6.0x10^-5</td>
<td>1.0x10^-3</td>
<td>1/1</td>
<td>1.0x10^-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakota (Chilson)</td>
<td>1400.</td>
<td>1.8x10^-4</td>
<td>5.0x10^-1</td>
<td>1/3</td>
<td>1.5x10^-6</td>
<td></td>
<td></td>
<td>1400.</td>
<td>1.0x10^-4</td>
<td>1.5x10^-1</td>
<td>1/10</td>
<td>8.3x10^-7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Several attempts were made to improve the match between the computed and observed drawdown responses by trial-and-error adjustment or calibration of model parameters. The most reliable parameters, such as the computed Lakota and Fall aquifer coefficients, were only slightly altered in the calibration process, whereas the least reliable parameters, including the ratio of vertical to horizontal permeability and the Fuson properties, were allowed to vary over a wider (though reasonable) range. The hydraulic properties within each hydrogeologic unit were assumed to be uniform throughout the calibration process.

The set of hydraulic parameters yielding the best agreement between measured and observed drawdown data is given in Table 6. The final parameter set differs only slightly from the original. The largest changes were made in the $K_v/K_h$ terms which were unknown to begin with; and in the Fuson hydraulic conductivity which was increased by a factor of five. Both the early and late Fall River $T$ values computed from the aquifer test analyses (150 and 415 gpd/ft, respectively) were tested during model calibration. The drawdown response of the model was found to be relatively insensitive to the value of $T$ used. A transmissivity of 400 gpd/ft is included in the final parameter set as it is believed to be more characteristic of the aquifer regionally.

The match between the measured and computed drawdown responses, shown in Figure 39, is considered acceptable in light of the fact that uniform aquifer-aquitard properties were used in the model. The apparent discrepancies are believed to be due to the heterogeneity and anisotropy of the actual system. The departures which occur during the early phase of the simulation appear large, but are not significant.
The ability of the model to predict the long-term response of system is more important. Thus, more significance is attached to the agreement between the simulated and observed results for the latter part of the test which, in most cases, is quite good. The final set of aquifer-aquitard properties are considered to represent a valid basis for future predictive modeling.
SUMMARY AND CONCLUSIONS

The aquifer test results indicate that the Fuson member of the Lakota formation is a leaky aquitard separating the Fall River and Lakota aquifers. The hydraulic communication between the two aquifers observed during the tests is believed to be the result of (1) general leakage through the primary pore space and naturally occurring joints and fractures of the Fuson shale, and (2) direct connection of aquifers via numerous old unplugged exploratory boreholes. Whereas, the former leakage mechanism is a regional characteristic of the Fuson, leakage caused by borehole short-circuiting is probably limited to the relatively small area of intensive uranium exploration in the Burdock vicinity.

The Lakota (Chilson) aquifer has an estimated transmissivity of approximately 1400 gpd/ft and a storativity of about $1.0 \times 10^{-4}$. These properties are representative of the Lakota in the area affected by the pumping test, and are consistent with what is known or suspected about the aquifer regionally. The transmissivity and storativity of the Fall River aquifer are estimated at approximately 400 gpd/ft and $1.4 \times 10^{-5}$, respectively. Test results indicate that the transmissivity of the Fall River may be considerably less than 400 gpd/ft in the immediate vicinity of the test site. However, the selected transmissivity value is more consistent with regional aquifer characteristics.

The hydraulic conductivity of the Fuson aquitard is estimated at approximately $10^{-3}$ ft/d. The specific storativity of the Fuson was not measured but is assumed to be about $10^{-6}$ ft$^{-1}$. If open boreholes
are present at the test site as suspected, the computed hydraulic conductivity is probably higher than the true conductivity of the shale, yet lower than the effective conductivity of the aquitard where short-circuited by open boreholes. For this reason, the selected aquitard conductivity of $10^{-3}$ ft/d should provide a conservative estimate of mine dewatering impacts. Outside of the relatively small area where the aquitard is breached by boreholes, leakage between the two aquifers will be governed by the true conductivity of the shale which is probably on the order of $10^{-4}$ ft/d or less.

The hydraulic properties of the Fall River, Fuson and Lakota (Chilson) formations computed from aquifer test data were incorporated into a computer model of the site geohydrologic system. These parameters were refined through repeated simulations of the Lakota aquifer test until the model could reproduce the drawdown responses observed during the test. The agreement between the observed and computed responses indicates the validity of the aquifer-aquitard properties, and should enhance the credibility of future predictive models using these parameters.
REFERENCES


Figure 1: Generalized Geologic Map of Site Region

LEGEND

- Uranium deposit—existing mine or prospect
- General area of planned mining

SCALE 1:250,000

(MODIFIED FROM PLATE 4 - USGS PROFESSIONAL PAPER 763)
Figure 2: Burdock Well Profile
Figure 3: Well Location Map
Figure 4: Hydrographs for Burdock Test Well, January 1 through April 17, 1979
Figure 5: Hydrographs for B-10 Observation Well Group, January 1 through April 17, 1979
Figure 6: Pre-Test Ground-Water Level Contour Map for Lakota Aquifer
Figure 7: Semilogarithmic Graph of Drawdown for Pumped Well, Lakota Aquifer Test
Figure 8: Semilogarithmic Graphs of Drawdown for B-10 Observation Well Group, Lakota Aquifer Test
Figure 9: Semilogarithmic Graphs of Drawdown for B-1 Observation Well Group, Lakota Aquifer Test
Figure 10: Semilogarithmic Graph of Drawdown for B-II Observation Well Group, Lakota Aquifer Test

\[ Q_{LAK} = 203 \text{ GPM} \]

\[ B-II LAK (r = 620 \text{ ft}) \]
Figure 11: Semilogarithmic Graph of Drawdown for B-9 Observation Well Group, Lakota Aquifer Test

QLAK = 203 GPM
B-9LAK (r = 1540 ft)
Figure 12: Semilogarithmic Graph of Drawdown for B-7 Observation Well Group, Lakota Aquifer Test
Figure 13: Logarithmic Graphs of Drawdown for B-10 Observation Well Group, Lakota Aquifer Test
Figure 14: Logarithmic Graphs of Drawdown for B-1 Observation Well Group, Lakota Aquifer Test
Figure 15: Logarithmic Graphs of Drawdown for B-11 Observation Well Group, Lakota Aquifer Test
Figure 16: Logarithmic Graphs of Drawdown for B-9 Observation Well Group, Lakota Aquifer Test

Q_{LAK} = 203 GPM

B-9LAK (r = 1540 FT)

B-9FR (r = 1540 FT)
Figure 17: Logarithmic Graphs of Drawdown for B-7 Observation Well Group, Lakota Aquifer Test
Figure 18: Semilogarithmic Graph of Distance vs. Drawdown at End of Pumping Test, Lakota Aquifer Test
Figure 19: Drawdown in Lakota Aquifer at End of Lakota Test
EXPLANATION

MEASURED DRAWDOWN IN FEET

CONTOUR TO EQUAL DRAWDOWN IN FEET;
DASHED WHERE UNCERTAIN;
CONTOUR INTERVAL IS 5 FEET

TIME = 3.04 DAYS

Figure 20: Drawdown in Fall River Aquifer at End of Lakota Test
Figure 21: Recovery Graphs for B-10 Observation Well Group, Lakota Aquifer Test
Figure 22: Recovery Graphs for B-1 Observation Well Group, Lakota Aquifer Test
Figure 23: Recovery Graphs for B-II Observation Well Group, Lakota Aquifer Test
Figure 24 Recovery Graphs for B-9 Observation Well Group, Lakota Aquifer Test
Figure 25. Recovery Graphs for B-7 Observation Well Group, Lakota Aquifer Test
Figure 26: Semilogarithmic Graph of Drawdown for the Pumped Well, Fall River Aquifer Test
Figure 27: Semilogarithmic Graphs of Drawdown for B-10 Observation Well Group,
Fall River Aquifer Test
Figure 28: Semilogarithmic Graphs of Drawdown for B-1 Observation Well Group, Fall River Aquifer Test
NOTE: THERE WAS NO DETECTABLE DRAWDOWN IN B-11 LAK DURING TEST.

Figure 29: Semilogarithmic Graph of Drawdown for B-11 Observation Well Group,
Fall River Aquifer Test
Figure 30: Logarithmic Graph of Drawdown for Pumped Well, Fall River Aquifer Test
Figure 31: Logarithmic Graphs of Drawdown for B-10 Observation Well Group, Fall River Aquifer Test
Figure 32: Logarithmic Graphs of Drawdown for B-1 Observation Well Group, Fall River Aquifer Test
Figure 33: Logarithmic Graphs of Drawdown for B-II Observation Well Group, Fall River Aquifer Test

NOTE: THERE WAS NO DETECTABLE DRAWDOWN IN B-II LAK DURING TEST

\[ Q_{FR} = 8.5 \text{ GPM} \]

\[ B-II FR (r = 618 \text{ FT}) \]
Figure 34: Recovery Graph for Pumped Well, Fall River Aquifer Test
Figure 35: Recovery Graphs for B-10 Observation Well Group, Fall River Aquifer Test
Figure 36: Recovery Graphs for B-1 Observation Well Group, Fall River Aquifer Test
Figure 37 Recovery Graph for B-11 Observation Well Group, Fall River Aquifer Test
Figure 38: Results of Initial Lakota Aquifer Test Simulation
Figure 39: Results of Final Lakota Aquifer Test Simulation
SOURCE P

HYDRO ID 704 RECOMPLETION

(Email from Len Eakin, Powertech (USA) Inc., to Mike Beshore, Powertech (USA) Inc., May 9, 2011)
Elizabeth Scheinost

For DB08-5-1 the Unkpapa completion date was 4/29/2008. The Unkpapa was cemented off on 1/28/2009 and the Lakota was perf'd by Goodwell on 2/4/2009.

---

Gents, Could Lisa and myself be provided the following information on well 704. This was the Putnam well that was originally drilled to the Unkpapa, and then cemented up to the Lakota.

Please Provide:
Date Drilled to Unkpapa and the Date Cemented up to the Lakota.

This may have occurred on the same day, but need to make certain so we know what water quality samples are from what.

Thanks, Mike

---

POWERTECH (USA) INC.

Michael D. Beshore, P.G.
Senior Environmental Coordinator

Powertech (USA) Inc.
P.O. Box 1066
8305 6th Street
Wellington, CO 80549
(970) 282-7777 office
(970) 556-5988 cell
Email: mbeshore@powertechuranium.com
Website: www.powertechuranium.com

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SOURCE Q

SOUTH DAKOTA WATER RIGHT 380-2
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PERMIT

Office of State Engineer

No. 380-2

Ground Water Supply

Name of applicant
Darrell Southard

Name of division works...Pond

Div. 3, Feed & Irrigation Project... No. 2

Date of first receipt at office of State Engineer... June 29, 1951

Returned to applicant for Correction

Corrected application received

Date of water right...June 21, 1951

Recorded in Book 3...Pt. 3, p. 1

One-fifth of work to be completed

Sept. 12...1952

Whole work to be completed

Sept. 12...1952

Final proof of use of water...

Sept. 12...1953

Approved Sept. 12,...1953

Dale...LOWES State Engineer.
**APPLICATION FOR PERMIT**

To Appropriate Water within the State of South Dakota, S. Dak.

1. **Name of applicant**
   - 
   - Postoffice address
   - County
   - State

2. **Method of accomplishing the work and financial resources of the applicant:**
   - (a) Method of accomplishing work (Whether by contract, employment of others, or by direct labor)
   - (b) Cash on hand, $________________
   - (c) Treasury stock, $________________
   - (d) Bonds to be issued, $________________
   - (e) Other resources, $________________

3. **Name of well**
   - Golden Cliff Irrigation Project well No. 2

4. **Quantity of water claimed**
   - 800 gals. per min.

5. **Source of water supply (estimated depth)**
   - 376 ft.

6. **Location of well (subdivision)**
   - 3 3/4 S., 17 1/4 W., Sec. 15, T. 6 S., R. 6 W.

7. **Annual periods during which water is to be used**
   - 1st Jan to Oct. 1

8. **To be used for:**
   - **I. Irrigation or domestic use:** Gravity, overhead sprinkling, or combination system
   - (a) Number of acres to be irrigated
   - (b) Legal subdivisions to be irrigated
   - (c) Statement as to domestic use (giving location, etc.)

   **II. Stockwatering, mining, milling, power, fish culture, fire protection and public recreation:**
   - (a) Nature of use
   - (b) Amount of power to be generated
   - (c) Location of plant
   - (d) Method of developing power
   - (e) Point where return water will be diverted to stream
Hydro ID 710

8. Estimated cost of work:
   (a) Head gate, $..........................
   (b) Pumping plant, $2000.00
   (c) Flushing, $......................
   (d) Canal earth, $..................
   (e) Back, $.........................
   (f) Other structures $6000.00
   Total, $6400.00

9. Description of works:
   (a) Head gate: Width ..................... feet; Height ..................... feet;
       Material .................................. 
   (b) Log of well:
       (To be completed when well is drilled)
       
   (c) Measuring device: Pressure Force and Noodle Stake
   (d) Canal: Total length: 1 mile

10. Time required for completion of work: 2 years.
11. Time required for complete application of water to the proposed beneficial use: 1 year.
12. Choice of newspaper for publication of notice of intention to appropriate:Custer

STATE OF SOUTH DAKOTA

County of Custer

I, Daniel Joynt, being first duly sworn on my oath deposed and sworn. That my relation to the above described, undertaking is that of owner, that I have read the above and foregoing statement and examined the map accompanying the same, and that I know of my own personal knowledge the matters herein stated and shown are true.

Signed

Dewey-Burdock GDP
June 2012
3.7-B-975
STATE OF SOUTH DAKOTA

County of......Pierre, South Dakota,......Sept. 12, 1951......10......

This is to certify that the foregoing application was received at this office at .....4:00......o'clock

P.......m. upon the.......22nd......day of......June......, 19.51......and that after examination it was found to comply with the South Dakota water laws, was published in accordance with the provisions thereof and consideration given to any and all information presented. To comply with the South Dakota water laws, was published in accordance with the provisions, thereof and consideration given to any and all information presented.

NO PROTESTS HAVE BEEN RECEIVED.

[Signature]

State Engineer.

Number of permit......380-2......

Date of first receipt of application......June 29......

Date of return to applicant for correction......19.51......

Date of receipt of corrected application......June 29......

Date from which applicant may claim right......June 29......

Approved.......Sept. 12......19.51......Recorded in Book......St.......Page......10......

This is to certify that I have examined the foregoing application for a permit to appropriate water of the State of South Dakota, and thereby grant the same as stated herein, subject, however, to the following limitations and conditions:

1st. The equivalent of at least one-fifth, of the work above specified is to be completed on or before.......Sept. 12......19.52......

2nd. The whole of said work is to be completed on or before.......Sept. 12......19.53......

3rd. The limit of time for proof of beneficial use of water appropriated in accordance herewith is.......Sept. 12......19.53......

4th. The water appropriated shall be used for the purpose of......Providing irrigation.....

5th. The water right of all persons, with or contrary to the laws of the State of South Dakota, have acquired a right to the use of water must not be injuriously affected by this appropriation.

6th. The amount of the appropriation herein granted shall not exceed.......800......gallons per minute; neither shall it exceed the capacity of the above described system of diversion works, nor the last amount of water that experience may hereafter indicate as necessary for the production of crops in the exercise of the best husbandry; and further, said appropriation must be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually and beneficially applied for irrigation on or before.......Sept. 12......1953......said water to be used during the following described annual period:

April 1 to October 31, Inclusive.

Witness my hand this.......12th......day of......Sept......, 19.51......

[Signature]

State Engineer.

Certificate of Construction issued.......September.......9......19.77......

Water License issued.......:

September.......9......19.77.
### Location of Lands to be Irrigated by the Golden Cliff Irrigation Well No. 2

<table>
<thead>
<tr>
<th>Location</th>
<th>Sec.</th>
<th>Twp.</th>
<th>Rng.</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>6</td>
<td>1</td>
<td>5.07</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6</td>
<td>2</td>
<td>36.75</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>6</td>
<td>1</td>
<td>38.30</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>6</td>
<td>2</td>
<td>10.46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>125.48</strong></td>
</tr>
</tbody>
</table>

### Discharge of One Sprinkler Head - Two Nozzles - 7/32 & 1 1/2"

<table>
<thead>
<tr>
<th>Pressure in Pounds</th>
<th>Discharge in GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>14.8</td>
</tr>
<tr>
<td>30</td>
<td>15.2</td>
</tr>
<tr>
<td>35</td>
<td>16.6</td>
</tr>
<tr>
<td>40</td>
<td>18.0</td>
</tr>
<tr>
<td>45</td>
<td>19.0</td>
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<tr>
<td>50</td>
<td>20.0</td>
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<tr>
<td>55</td>
<td>21.0</td>
</tr>
<tr>
<td>60</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STATE OF SOUTH DAKOTA

WATER LICENSE NO. 230-2

(1) WHEREAS, on the 28th day of June, A.D. 1951, Darrel Hawthorne

made Water Right Application No. 380-2 for a permit to use 1.78 cubic feet per second of the water

of Artesian ground water

County of Custer, State of South Dakota, for irrigation

purposes; and

(2) WHEREAS, on the 12th day of September, A.D. 1951

Permit No. 380-2, with a date of priority of June 27, 1951

was issued to said applicant for the diversion of said water, and provided for the completion of construction
of the water supply system therein described or before the 27th day of September, A.D. 1952 and for the

application to beneficial use of said water on or before the 12th day of September, A.D. 1953

and, whereas, on the 26th day of November, 1975, the Permit was

transferred to Henry C. Hollebeck

and:

(3) WHEREAS, it is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
relating to completion of the construction of the water supply system and is entitled to divert .05 cubic feet per second of water for beneficial use and.

(4) WHEREAS, it is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
relating to the application of water for beneficial use of the following extent:

For irrigating 60 acres in the E1 NW1/4, Section 17, T06S, R1E
(5) NOW, THEREFORE, by the virtue of the authority vested in us by the laws of the State of South Dakota, we hereby grant and
confer upon Henry C. Hollenbeck

the holder hereby permit No. 380-2

of Edgemont

to use of 385 cubic feet per second of the waters

of artesian ground water in the County of Custer and State of South Dakota, or so much thereof as may be necessary for the

purposes hereinbelow mentioned, to be diverted at a point in the center of NW\(_4\), Section 17, T6S, R1E

and conduct to and upon 60 acres in the E\(_2\) NW\(_4\), Section 17, T6S, R1E

for the purpose of irrigation

Subject to any limitations listed in Water Right Permit No. 380-2 and subject to the laws of the State of South Dakota.

WITNESS, My hand and seal of our office at Pierre, South Dakota this 9th day of September, A.D. Nineteen Hundred and Seventy-seven

WATER RIGHTS COMMISSION

by: John Hatch

Chief Engineer, Executive Officer
Form 15.

Permit No. 300-2

Water Diversion No. 2 Fall River Water District

CERTIFICATE OF CONSTRUCTION

This is to certify that Henry C. Hollenbank, the holder of Permit No. 300-2, issued upon Application No. 300-2, bearing date of priority of June 29, 1931, authorizing the diversion of 1.78 cu. ft. per second of the waters of the Arduino ground water county of Custer, State of South Dakota at a point in the center of the High, Section 17, T9S, R1E, for irrigation purposes, has complied with the provisions of the laws of the State of South Dakota relating to proof of completion of the works of diversion set out and described in said Permit; that said works are found in satisfactory condition for diverting and conveying to the place of intended use 1.78 cu. ft. per second of water.

Date September 9, 1977

By: John Hatch
JOHN HATCH, Chief Engineer
Notice of Intent to Appropriate Water

(First Publication _______ 19____)

PROPRIATION OF WATER

Office of State Engineer,
Pierre, S. Dak., July 16, 1951

Notice is hereby given that Darrel Samtome whose postoffice address is Dewey, South Dakota, has made applications in accordance with the provisions of the water laws of South Dakota for permits to appropriate for beneficial use as follows:

1100 gallons of water per minute of time from ground water supply through the Golden Cliff Irrigation Project, Well No. 1, the point of diversion of which is to be located in the NW<sub>1</sub> of the S<sub>3</sub> of Section 6, Twp. 65<sub>S</sub>, Range 11<sub>W</sub>. 840 gallons of water per minute of time from ground water supply through the Golden Cliff Irrigation Project, Well No. 2, the point of diversion of which is to be located in the NE<sub>1</sub> of the SW<sub>1</sub> of Section 17, Twp. 65<sub>S</sub>, Range 11<sub>W</sub>. Said water to be used for the purpose of providing irrigation on the following described lands: NE<sub>1</sub> Sec. 17, NE<sub>2</sub> SW<sub>2</sub> Sec. 18, NW<sub>2</sub> Sec. 6, NW<sub>1</sub> SW<sub>1</sub> Sec. 6, NE<sub>2</sub> SW<sub>2</sub> Sec. 6, NE<sub>1</sub> SW<sub>1</sub> Sec. 6, NE<sub>1</sub> NE<sub>2</sub> Sec. 7, and NE<sub>2</sub> NE<sub>1</sub> Sec. 7, T. 65<sub>S</sub>, R. 11<sub>W</sub>.

This application will be taken up by the State Engineer at his office at Pierre for consideration upon the 21st day of August 1951, at 10:00 a.m. All persons who believe that their prior rights would be injuriously affected, or that the allowance of the permit would be detrimental to the public welfare shall file a protest with the State Engineer in writing prior to the above date and may appear on the day above mentioned in person for the purpose of discussing further, the information presented.

Appropriate action will be taken by the State Engineer after suitable time has elapsed for the consideration of any or all information presented.

Walter J. LOCKEY
State Engineer

Dewey-BurdocK GDP
June 2012
3.7-B-981
Appendix 3.7-B
REPORT OF EXAMINATION OF WORKS
AND/OR APPLICATION OF WATER TO BENEFICIAL USE

TO: Water Resources Commission, State Office Building No. 2, Pierre, South Dakota 57501

I have this day made a thorough examination of the water use system constructed by Darrel

Hawthorne of Custer, SD

of Permit No. 360-2, bearing date of priority of June 29, 1951

authorizing the diversion of 1.78 cu. ft. per second of the waters of ground water

for irrigation purposes, in Custer County.

I have to report on the condition of the same as follows:

The Water Use System consists of,

A. Works used to divert the water:

376 foot flowing artesian well, steel cased; fill's storage dam, 15 foot high, 30 foot wide at the base and 50 foot in length, on the west side and 60 foot in length on the south side.

B. Works used to transport water to place of use:

Approx. 800 feet of natural ditch

C. Works used to apply water to beneficial use:

Flood irrigates by spreading

The system is in the following condition: Fair

The point of diversion is located Center of NW¼, Sec. 17, T6S., R1E., B.H.M.

The works are capable of diverting and conveying to the place of use as 1.78

cu. ft. per second of water which is to be used for irrigation

Water has been put to beneficial use to the maximum extent as follows:

W½ of NW¼ of Sec. 17, T6S., R1E., B.H.M.

comprising a total of 60 acres of land.

Henry C. Hollenbeck
Star Rt. 1
Edgemont, SD 57735

Date: 8-25-75

THOMAS A GARDNER
Water Resources Engineer

Dewey-Burdock GDP
June 2012

3.7-B-982

Appendix 3.7-B
NOTICE OF TRANSFER OF WATER PERMIT

TO: WATER RIGHTS COMMISSION
State Office Building No. 2
Pierre, South Dakota 57501

Date __________________

This is to notify you that title to the lands described as follows:

Easement over Sec. 17, T6S., R1E., D.H.M.

is hereby transferred from

Formerly owned by

Darrel Hawthorne

has been transferred to

Henry C. Hollenbeck

and all rights to the beneficial use of water thereon as evidenced by Water Right Permit No. 360-2 as provided for in Section 61.0127 of the 1960 Supplement to the South Dakota Code of 1939.

You are therefore hereby requested to file this "Notice of Transfer of Water Permit" in its appropriate file at the Office of Water Resources, Department of the State of South Dakota, in evidence of the change of ownership.

A fee of one dollar is hereby attached to cover filing fees as required under Section 61.0159 of the 1960 Supplement to the South Dakota Code of 1939.

STATE OF SOUTH DAKOTA

County of

Henry C. Hollenbeck, being first duly sworn on my oath deposes and says: That my relation to the above described undertaking is that of Owner, that I have read the above foregoing statement, and I know of my own personal knowledge that the information hereon stated is true.

(Signed)

[Signature]

Notary Public

[Signature]

[Signature]

Dewey-Burdock GDP
June 2012
3.7-B-983
Appendix 3.7-B
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SOURCE R

AN EARLIER NAME FOR HYDRO ID 710

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May 12, 1980

Clinton C. Smythe
Project Manager
Edgemont Project
Tennessee Valley Authority
P. O. Box 2957
Casper, Wyoming 82602

RE: CAY; 143,80

Dear Clint:

Attached are water levels and flow rates for Burdock Area water wells measured during the April, 1980 quarterly well check. Please note the addition of Wells #149 and 150.

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Location</th>
<th>Well Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>149</td>
<td>T 6 S, R 1 E, Sec. 17 bb</td>
<td>H. C. Hollenbeck</td>
</tr>
<tr>
<td>150</td>
<td>T 6 S, R 1 E, Sec. 6 aa</td>
<td>H. C. Hollenbeck</td>
</tr>
</tbody>
</table>

Very truly yours,

SILVER KING MInES, INC.

R. M. Caywood
Resident Manager

cc: David C. Arnold
    C. Richard Dodson
    R. J. Mullin
    J. M. Boggs
    R. L. Doty
    J. T. Watson
# QUARTERLY WELL CHECK

**April, 1980**

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Date Read</th>
<th>Water Level/gpm</th>
<th>Change Since Last Report</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>136</td>
<td>4-17-80</td>
<td>3.60'</td>
<td>down .10'</td>
<td></td>
</tr>
<tr>
<td>139</td>
<td>4-25-80</td>
<td>23.00 gpm</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>141</td>
<td>5-1-80</td>
<td>.60 gpm</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>147</td>
<td>5-1-80</td>
<td>10.90'</td>
<td>down .75'</td>
<td></td>
</tr>
<tr>
<td>148</td>
<td>5-1-80</td>
<td>flows</td>
<td>Well still flows, but MP elevation has been dropped about 8&quot;.</td>
<td></td>
</tr>
<tr>
<td>149</td>
<td>4-29-80</td>
<td>19.20'</td>
<td>first measurement</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>4-29-80</td>
<td>70.70'</td>
<td>first measurement</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>4-30-80</td>
<td>52.02'</td>
<td>up 1.00'</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>4-30-80</td>
<td>16.34'</td>
<td>up .12'</td>
<td></td>
</tr>
<tr>
<td>204</td>
<td>4-28-80</td>
<td>37.12'</td>
<td>down .29'</td>
<td></td>
</tr>
<tr>
<td>205</td>
<td>4-30-80</td>
<td>24.48'</td>
<td>down .37'</td>
<td></td>
</tr>
<tr>
<td>206</td>
<td>4-30-80</td>
<td>18.49'</td>
<td>down .33'</td>
<td></td>
</tr>
<tr>
<td>209</td>
<td>4-30-80</td>
<td>145.75</td>
<td>down 1.11'</td>
<td></td>
</tr>
<tr>
<td>212</td>
<td>4-28-80</td>
<td>2.75 gpm</td>
<td>None</td>
<td></td>
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<tr>
<td>213</td>
<td>4-28-80</td>
<td>32.97'</td>
<td>down .42'</td>
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</tr>
<tr>
<td>214</td>
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<td>80.40'</td>
<td>down .40'</td>
<td></td>
</tr>
<tr>
<td>216</td>
<td>4-30-80</td>
<td>220.37</td>
<td>down 1.37'</td>
<td></td>
</tr>
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