DAUB & ASSOCIATES, INC.

1985 ½ SOUTH BROADWAY
GRAND JUNCTION, CO 81507-9649
(970) 254-1224
FAX (970) 242-8438
email: gjdaub@daubandassociates.com
www.daubandassociates.com

October 28, 2013

Mr. Paul Daggett
Bureau of Land Management
220 East Market Street
Meeker, CO 81641

Re: **Natural Soda, Inc. (NSI) Subsequent Notice of Abandonment.**

Dear Mr. Daggett:

NSI plugged and abandoned three antiquated monitoring wells in late September and early October of 2013. The wells are the 1-3A Dissolution Surface Aquifer (DS) monitoring well, the 88-1 subsurface subsidence monitoring well, and the 90-2 DS monitoring well. The subsequent reports and other pertinent data will be hand delivered on October 28, 2013.

Attached:

- *BLM forms 3160-5 for wells: 1-3A, 88-1, and 90-2.*
- *Well Plug and Abandonment Reports*
- *Well Abandonment Diagrams*

Should you have any questions or comments, please contact me at (970) 254-1224 or (970) 216-1010 (c), or Bob Warneke at (970) 878-3674 ext. 14.

Regards,

Jerry Daub

Gerald J. Daub, P.G., C.P.G.
President
Daub & Associates, Inc.

Cc: Bob Warneke w/o encl.
Executive Director of Manufacturing
Natural Soda, Inc.

Travis Marshall w/o encl.
CO DRMS

Wendy Cheung w/o encl
US EPA UIC Region VIII

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: July 31, 2010

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE – Other instructions on page 2.

5. Lease Serial No.
C-0118327

6. If Indian, Allottee or Tribe Name

7. If Unit of CA/Agreement, Name and/or No.

1. Type of Well
☐ Oil Well ☐ Gas Well ☑ Other Subsidence Monitoring Well

8. Well Name and No.
88-1V

2. Name of Operator
Natural Soda, Inc

9. API Well No.

3a. Address
3200 Rio Blanco County Road 31
Rifle, CO 81650

3b. Phone No. *(include area code)*
(970) 878-3674

10. Field and Pool or Exploratory Area

4. Location of Well *(Footage, Sec., T.,R.,M., or Survey Description)*
Latitude 39.93351 W, Longitude 108.36081 N (NAD 27), S26, T1S, R98W

11. Country or Parish, State
Rio Blanco County, Colorado

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☑ Subsequent Report	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☑ Plug and Abandon	☐ Temporarily Abandon	
☐ Final Abandonment Notice	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.)

Ran in hole with casing scraper, cleaned out well and circulated, could not establish circulation. Ran gauge ring, gamma ray log, and set bridge plu at 1892'. Pumped 6.5 cu yards of Portland Type II cement (19 sacks/yard, 15% fly ash). Tagged top of cement at 1579' (BGL). Pumped 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top of cement at 1234' (BGL). Pumped another 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top of cement at 870' (BGL). Pumped another 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top of cement at 471' (BGL). Pumped another 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Top of cement at 13.6'. Topped off with ~0.3 yards to 2' BGL.

14. I hereby certify that the foregoing is true and correct.
Name *(Printed/Typed)*
Gerald J. Daub

Title President, Daub & Associates, Inc.

Signature G. J. Daub

Date 10-28-13

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

NATURAL SODA

Natural Soda, Inc.
Plug and Abandonment Report
Subsidence Monitoring Well 88-1

Prepared for
Natural Soda, Inc.
By
Daub & Associates, Inc.
2013

Introduction

The Natural Soda, Inc. (NSI) 88-1 was a vertical, rotary drilled well. Originally drilled as a vertical sodium bicarbonate production well, it was recompleted as a subsurface subsidence monitoring well. The well was drilled in the Parachute Creek Member of the Green River Formation in the Piceance Creek Basin located in Northwestern Colorado. The well is located on U.S. Department of the Interior, Bureau of Land Management (BLM) property in the NE quarter of the SW quarter of Section 26, Township 1 South, Range 98 West, in Rio Blanco County, CO. The as-built location is 39.99351000° North latitude, 108.36081000° West longitude, referenced to NAD 27. The as-built ground elevation is 6,647.5 feet above mean sea level. Depths mentioned in the text are measured depths reported relative to ground level (GL). The primary objective of the 88-1 was to monitor for subsurface subsidence in the mined interval of Panel 1. The well was scheduled for plugging and abandonment (P&A) due to cessation of mining operations in Mine Panel 1 and its advanced age.

The P&A contractor was Red Rock Well Service (RRWS) based out of Blanding, Utah. RRWS used workover rig number RR-3 to P&A the well. RRWS worked in day shifts and traveled to and from location from Rifle, Colorado daily.

Northwest Ready Mix, based out of Meeker, Colorado, provided cement for the plugging operations.

Daub & Associates, Inc. (D&A), based in Grand Junction, Colorado, engineered the P&A and secured the contract. A geologist from D&A was on-site during all phases of the abandonment operation, provided field coordination-supervision, and quality control and confirmation of the P&A activity. The D&A geologist performed the following duties:

- provided QA/QC of all operations
- maintained a chronological log of daily activities
- coordinated contractor operations
- provided cost tracking and reporting

Plugging and Abandonment

On September 26, 2013 RRWS arrived on location. The location was prepped for the abandonment operations, and the well head was readied to accept the diverter and cementing equipment. Other equipment was gathered in preparation for cementing operations. The equipment was rigged up and Red Rocks ran in the hole with the 9 7/8 inch scraper to a depth of 1,903 feet below GL. While pulling back a joint driller felt some resistance as if the scraper had possibly gone out of the casing. The job was shutdown for the day.

On September 27, 2013 RRWS set up and attempted to circulate. Circulation could not be established, so RRWS pulled out of the hole. Jet West rigged up to run geophysical logs and a bridge plug. Jet West first ran a 9.625 inch gauge ring to 1,899 feet, then ran a gamma ray log to 1,899 feet. Jet West then ran in and set a 9.625 inch bridge plug at 1,892 feet, with the bottom set at 1894 feet. Jet West rigged down and left location. RRWS tripped in to 1,876 feet and circulated the hole clean.

On September 28, 2013 RRWS set up and pumped approximately 6.5 cubic yards of cement mixed at 19 sacks per cubic yard with 15% fly ash) and with 1 % CaCl added at site prior to pumping down hole. The cement was poured into a graduated plastic tote through a metal screen to remove any clumps. Top of cement was expected to have been at approximately 1,488 feet. Sixteen joints of pipe were pulled (1,396 feet) while displacing and flushing out the pump. After allowing sufficient time for the cement to cure, RRWS ran in and tagged the top of cement at a depth of 1,579 feet. RRWS then pumped seven cubic yards of cement, using the previous recipe. The pipe was pulled up to a total depth of 1,084 feet and flushed with water. Operations were shut down for the day.

On September 29, 2013 RRWS ran in and tagged cement at 1,234 feet. A third batch consisting of 7 cubic yards of Portland Type II/V cement (19 sacks per yard, 15% fly ash) with 1% CaCl accelerant added on location, was pumped down hole. Sixteen joints of pipe were pulled and then flushed with fresh water. After allowing the third cement batch time to cure, RRWS ran in and tagged top of cement at a depth of 870 feet. The fourth cement batch, consisted of seven cubic yards using the previous recipe, was pumped down hole. The pipe was pulled up to a depth of approximately 480 feet and flushed with water.

On September 29, 2013 RRWS ran in hole and tagged the top of batch number 4 at 471 feet. Pipe was set to a depth of 469 feet and cement batch number 5 (7 cubic yards cement) was pumped down hole. Approximately 1 to 2 barrels of gray water returned to surface and were dumped to the pit. Top of cement was measured at a depth of 13.6 feet.

On October 19, 2013, 15 pound per gallon (ppg) neat cement was poured from surface to top off the 88-1. Top of cement was 2 feet below ground level.

Conclusion

The Natural Soda, Inc. directionally controlled, rotary drilled vertical monitor well 88-1 was successfully plugged and abandoned on October 19, 2013. Approximately 41.8 cubic yards (790 sacks) of Portland Type II/V cement were pumped down hole to plug well from a depth of 1,892 feet (top of CIBP) to the surface. The intermediate casing was cut off below surface, and a dry hole marker was welded onto the well head prior to reclamation of the pad.

Natural Soda, Inc.
Well Abandonment Diagram

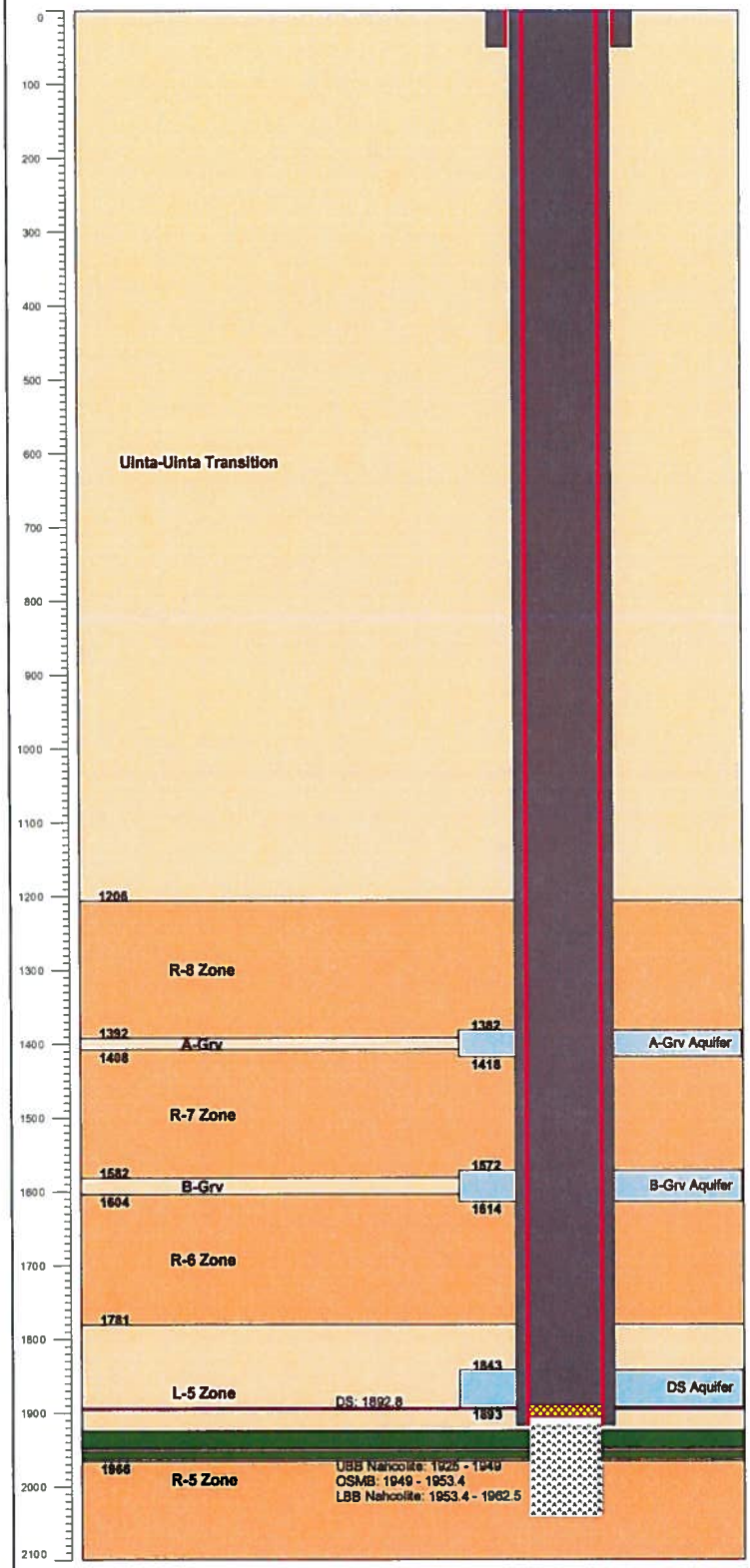
NATURAL SODA

Daub & Associates, Inc.

Well: 88-1V
Section: 26
Township: 1S
Range: 98W
Latitude: 39.933508417
Longitude: 108.360815616
Total Depth, ft: 2040.5

Well Type: Subsidence Monitoring Well
Hole Type: Core Hole
Ground Elevation, ft: 6647.5
WL Measurement Elevation, ft: 6649.8
Diagram Date: 10/25/2013

- Cement
- Hole Plug and/or Cement
- Bentonite Plug / Seal
- Sand Plug / Sand Pack
- Bridge Plug
- Pump
- Transducer



DRILLING and COMPLETION SUMMARY

0-49.5: conductor drill hole, 18.000" dia.
0-49.5: conductor casing, 13.375" OD
49.5-1777.5 pre-core drill hole, 12.250" dia.
1777.5-1960.5: cored interval, 8.5" dia.
1777.5-1960.5: reamed interval, 8.750" dia.
1960.5-2040.5: intermediate hole, 8.750" dia.
1694.5-1917.5: reamed interval, 12.250" dia.
0-1917.9: intermediate casing, 9.625" OD
1917.9-1939.5: drill hole, 8.750" dia.
1917.9-2040.5: native fill

ABANDONMENT

1892.0: set bridge plug
0-1892.0: cement to surface

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: July 31, 2010

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SUBMIT IN TRIPLICATE – *Other instructions on page 2.*

5. Lease Serial No.
C-0118327

6. If Indian, Allottee or Tribe Name

7. If Unit of CA/Agreement, Name and/or No.

1. Type of Well
☐ Oil Well ☐ Gas Well ☑ Other Hydrology Monitoring Well

8. Well Name and No.
1-3A

2. Name of Operator
Natural Soda, Inc.

9. API Well No.

3a. Address
3200 Rio Blanco County Road 31
Rifle, CO 81650

3b. Phone No. *(include area code)*
(970) 878-3674

10. Field and Pool or Exploratory Area

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Latitude 39 92991 W, Longitude 108 36379 N (NAD 27), S26, T1S, R98W

11. Country or Parish, State
Rio Blanco County, Colorado

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
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	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☑ Subsequent Report	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☑ Plug and Abandon	☐ Temporarily Abandon	
☐ Final Abandonment Notice	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

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Ran in hole, cleaned out well and circulated. Pumped 4 cu yards of Portland Type II cement (21 sacks/yard). Tagged top of cement at 1700' (BGL). Pumped 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top of cement at 1182' (BGL). Pumped another 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top of cement at 535' (BGL). Pumped another 7 cu yards Portland Type II (19 sacks/yard, 15% fly ash, 1% CaCl). Tagged top at ~30'. Topped off with 0.5 yards to 3.4' BGL.

14. I hereby certify that the foregoing is true and correct.
Name *(Printed/Typed)*
Gerald J. Daub

Title President, Daub & Associates, Inc.

Signature G. J. Daub

Date 10/28/13

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

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Office

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(Instructions on page 2)

NATURAL SODA

Natural Soda, Inc.
Plug and Abandonment Report
Subsidence Monitoring Well 1-3A

Prepared for
Natural Soda, Inc.
By
Daub & Associates, Inc.
2013

Introduction

The Natural Soda, Inc. (NSI) 1-3A was a vertical rotary-drilled well. Originally drilled in 2001 as a vertical sodium bicarbonate production well in the Parachute Creek Member of the Green River Formation, it was recompleted in 2002 as a Dissolution Surface (DS) aquifer monitoring well. The well was drilled in the Piceance Creek Basin located in Northwestern Colorado, on U.S. Department of the Interior, Bureau of Land Management (BLM) property. The surface location is in the SE quarter of the SW quarter of Section 26, Township 1 South, Range 98 West, in Rio Blanco County, Colorado. The as-built location is 39.929910000° North latitude, 108.363790000° West longitude, referenced to NAD 27. The as-built ground elevation is 6,687.8 feet above Mean Sea Level. Depths mentioned in the text are measured depths (MD) reported relative to ground level (GL). The primary objective of the 1-3A was to monitor the DS aquifer in the inactive solution mining of Mine Panel 1. The well was scheduled for plug and abandonment (P&A) due to cessation of mining operations in Mine Panel 1, its location up-dip from the 90-1 water supply well, and it's advanced age.

The P&A contractor was Red Rock Well Service (RRWS) based out of Blanding, Utah. RRWS used Workover Rig No. RR-3 to P&A the well. RRWS worked in day shifts and commuted to the location daily from Rifle, Colorado. Northwest Ready Mix (NW), based out of Meeker, Colorado, provided all of the cement for the plugging operations.

Daub & Associates, Inc. (Daub), based in Grand Junction, Colorado, engineered the P&A and secured the contract. A geologist from Daub was on-site during all phases of the abandonment operation, provided field coordination-supervision, and quality control and confirmation of the P&A activities. The Daub geologist performed the following duties:

- Provided QA/QC of all operations.
- Maintained a chronological log of daily activities.
- Coordinated contractor operations.
- Provided cost tracking and reporting.

Plug and Abandonment Operations

On September 23, 2013, RRWS arrived on location. The location was prepared for the abandonment operations, and the well head was readied to accept the diverter and cementing equipment. Other equipment was gathered in preparation for cementing operations.

Cement Plug No. 1: On September 24, 2013, the RRWS crew was onsite at 07:30 hours. The hoses and valves for cementing were hooked up while waiting for a winch truck to move the water tank to location. The winch truck arrived at 09:00 and promptly moved the water tank. The tank was partially filled with 143 barrels (bbls) of water (two truckloads). The well was circulated clean with returns to surface for about five minutes, after which returns were lost. Pumping was halted to avoid pumping too much water into the wellbore. The water tank and truck were re-filled for cement clean up. NW Ready Mix delivered 4 cubic yards of cement to the site at 14:00 hours (21 sacks of Portland cement per yard). The cement was poured into 2 plastic tubs and pumped downhole with the bottom of the pipe at 1,860 feet MD GL. Fifteen joints of drill pipe were pulled out of the hole and laid down. The pump and pipe were circulated clean; the equipment was laid down and the pipe was cleaned. The tank and truck were re-filled for operations on the following day.

Cement Plug No. 2: On September 25, 2013, RRWS was onsite at 07:30 hours and warmed up the equipment. RRWS ran drill pipe into the hole and tagged the top of Cement Plug No. 1 at 1,700 feet MD GL. The pipe was pulled back to 1,688 feet MD GL in preparation for the second plug. NW Ready Mix was notified and delivered the cement (7 cubic yards mixed at 19 sacks per yard with 15% fly ash additive) at 09:10 hours. An accelerant (1% CaCl) was added to the cement onsite (in the truck) prior to placement. The cement was poured from the truck continuously into a plastic tote through a screen of expanded steel to maintain smooth consistency of the cement. The cement was pumped continuously downhole until the truck was empty. RRWS started pumping cement at 09:25 hours and finished pumping the cement 20 minutes later. A cement sample was taken at the beginning of the pour. The pump was hooked up to the water tank and was pumped clean, with waste water going into the pit. While the pump was being cleaned, the crew pulled out 25 joints of drill pipe to clear the calculated top of cement. When the pump was clean, the water was hooked to the drill pipe annulus and reverse circulated through the drill pipe remaining in the hole to clean it of cement. The pipe used in cementing operations, hoses and plastic tub were cleaned for the next cement plug. While waiting on cement to set, the driller looked at the next two P&A well locations (90-2 and 88-1).

Cement Plug No. 3: The top of Cement Plug No. 2 was tagged at 1,182 feet MD GL. Cement Plug No. 2 provided 518 feet of cement in the hole. Approximately 700 feet of cement plug-back was anticipated with the second plug. Another cement plug was planned. NW Ready Mix arrived onsite at 15:10 hours on September 25th and another 7 yard batch of cement for the third plug (identical to plug number 2) was pumped downhole. The cleanup was completed as above and operations were completed at 16:30 hours.

Cement Plug No. 4: On September 26, 2013, RRWS was onsite at 07:30 hours, warmed up the equipment, ran in the hole and tagged the top of Cement Plug No. 3 at 535 feet MD GL. The third cement plug resulted in 647 feet of cement in the hole. The drill pipe was pulled back to 530 feet MD GL prior to pumping Cement Plug No. 4. NW Ready Mix delivered the cement for the fourth plug number (7 cubic yards mixed at 19 sacks per yard with 15% fly ash additive) at 08:35 hours on September 26, 2013. An accelerant (1% CaCl) was added to the cement onsite (in the truck) prior to dumping. RRWS started pumping cement at 08:45 hours and finished pumping 20 minutes later. Good cement was circulated to surface 15 minutes into pumping and 1.75 yards was pumped away. It took 23.25 cubic yards of cement to plug back to approximately 30 feet MD GL below ground level. The pump was hooked up to the water tank and was pumped clean, with waste water going into the pit. While the pump was being cleaned, the crew pulled out the remaining 17 joints of pipe and laid them down. The drill pipe, hoses and plastic tub were cleaned.

On September 28, 2013, RRWS was onsite at 07:30 hours and warmed up the equipment. NSI filled up the water tank for cleaning cement from the equipment. NW Ready Mix arrived on-site at 08:20 hours. Approximately 0.5 cubic yards of cement was poured down the casing, bringing the wet cement top off to surface. The top of the P&A cement plug in the 1-3A well was measured at 3.4 feet below GL after curing.

Conclusion

The Natural Soda, Inc. rotary-drilled vertical monitor well 1-3A was successfully plugged and abandoned on September 28, 2013. A total of 23.75 cubic yards (460 sacks) of Portland Type II/V cement were pumped down hole to plug the well from a depth of 1,860 feet MD GL, above where the cast iron bridge plug (CIBP) was set during previous recompletion, to near surface (see attached P&A Diagram). The intermediate casing was cut off below surface, and a dry hole marker was welded onto the well head prior to reclamation of the pad.

Natural Soda, Inc.
Well Abandonment Diagram

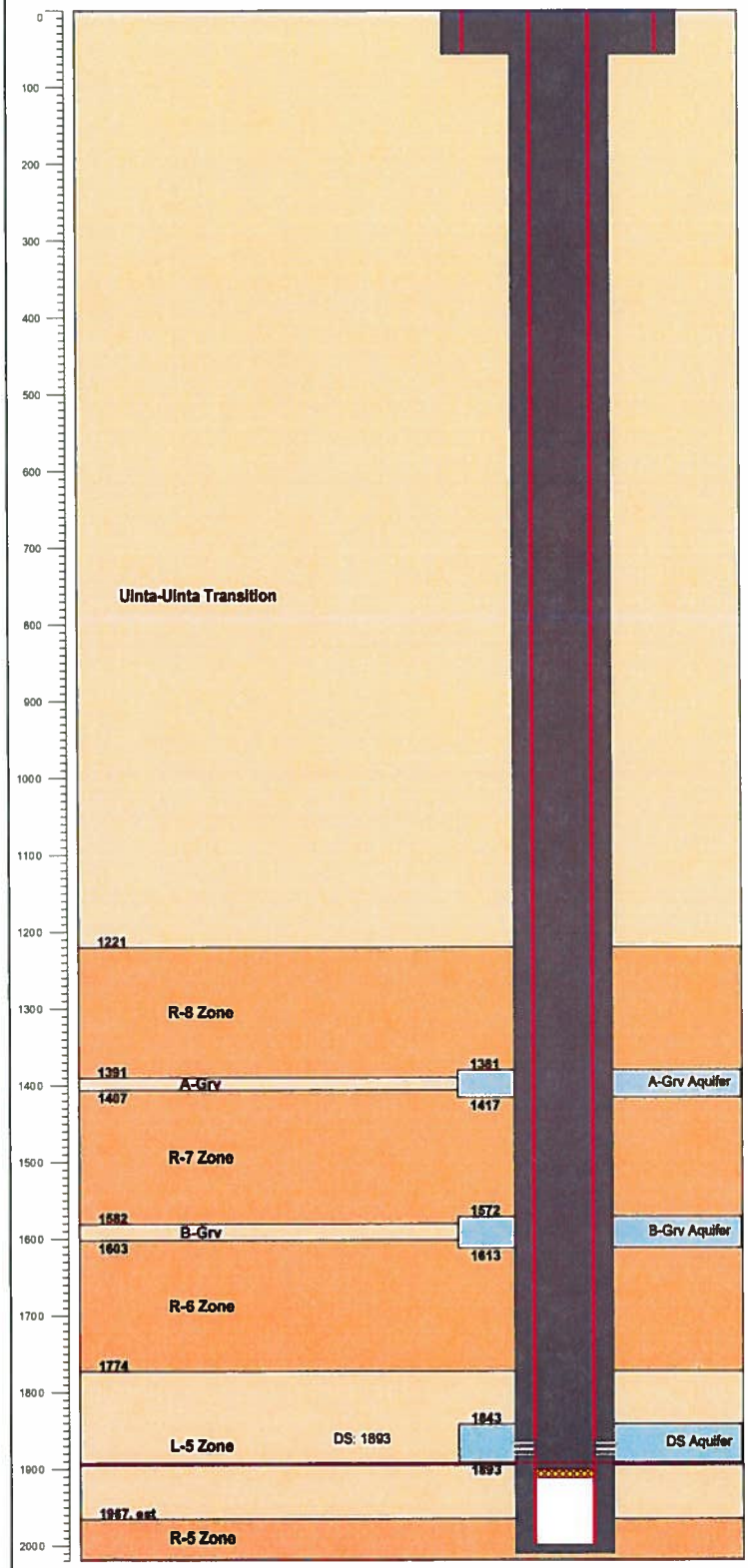
NATURAL SODA

Daub & Associates, Inc.

Well: 1-3A
Section: 26
Township: 1S
Range: 98W
Latitude: 39.929910880
Longitude: 108.363784672
Total Depth, ft: 2012.0

Well Type: DS Aquifer Monitoring Well
Hole Type: Rotary Hole
Ground Elevation, ft: 6687.8
WL Measurement Elevation, ft: 6687.8
Diagram Date: 7/8/2013

- Cement
- Hole Plug and/or Cement
- Bentonite Plug / Seal
- Sand Plug / Sand Pack
- Bridge Plug
- Pump
- Transducer



DRILLING and COMPLETION SUMMARY
0-57.0: conductor drill hole, 29.000" dia.
0-57.0: conductor casing, 24.000" OD
57.0-2012.0: intermediate hole, 12.250" dia.
0-1999.4: intermediate casing, 7.625" OD
0-2012.0: intermediate casing cement
1891.0-1893.0: cement plug
1893.0-1895.0: cast iron bridge plug
1867.0-1891.0: perforations

ABANDONMENT
0-1891.0: cement to surface

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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OMB No. 1004-0137
Expires: July 31, 2010

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5. Lease Serial No.
C-0118327

6. If Indian, Allottee or Tribe Name

7. If Unit of CA/Agreement, Name and/or No.

1. Type of Well
☐ Oil Well ☐ Gas Well ☑ Other DS Monitoring Well

8. Well Name and No.
90-2

2. Name of Operator
Natural Soda, Inc

9. API Well No.

3a. Address
3200 Rio Blanco County Road 31
Rifle, CO 81650

3b. Phone No. *(include area code)*
(970) 878-3674

10. Field and Pool or Exploratory Area

4. Location of Well *(Footage, Sec., T.,R.,M., or Survey Description)*
Latitude 39 992766 W, Longitude 108 36312 N (NAD 27), S26, T1S, R98W

11. Country or Parish, State
Rio Blanco County, Colorado

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	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☑ Subsequent Report	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
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☐ Final Abandonment Notice	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

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Fished out ~ 10' of stainless steel sample tubing stingers. Could not fish out all junk. Casing parted at ~1815'. Set bridge plug at 1800'. Perforated at 550' and 275'(four holes per interval). Cemented with ~6.5 cubic yards of 15 ppg neat cement to 4' below ground level.

14. I hereby certify that the foregoing is true and correct.
Name *(Printed/Typed)*
Gerald J. Daub

Title President, Daub & Associates, Inc.

Signature G. J. Daub

Date 10-28-13

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Approved by

Title

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(Instructions on page 2)

NATURAL SODA

Natural Soda, Inc.
Plug and Abandonment Report
Subsidence Monitoring Well 90-2

Prepared for
Natural Soda, Inc.
By
Daub & Associates, Inc.
2013

Introduction

The Natural Soda, Inc. (NSI) 90-2 was a vertical rotary drilled well. Originally drilled as a vertical sodium bicarbonate production well, it was recompleted as a subsurface subsidence monitoring well. The well was drilled in the Parachute Creek Member of the Green River Formation in the Piceance Creek Basin located in Northwestern Colorado. The well is located on U.S. Department of the Interior, Bureau of Land Management (BLM) property in the SE quarter of the SW quarter of Section 26, Township 1 South, Range 98 West, in Rio Blanco County, CO. The as-built location is 39.992766° North latitude, 108.36312° West longitude, referenced to NAD 27. The as-built ground elevation is 6,691.5 feet above mean sea level. Depths mentioned in the text are measured depths reported relative to ground level (GL). The primary objective of the 90-2 was to monitor for subsurface subsidence in the mined interval of Panel 1. The well was scheduled for plugging and abandonment (P&A) due to cessation of mining operations in Mine Panel 1 and its advanced age.

The P&A contractor was Red Rock Well Service (RRWS) based out of Blanding, Utah. RRWS used workover rig number RR-3 to P&A the well. RRWS worked in day shifts and traveled to and from location from Rifle, Colorado daily.

Meeker Sand & Gravel, based out of Meeker, Colorado, provided cement for the plugging operations.

Daub & Associates, Inc. (D&A), based in Grand Junction, Colorado, engineered the P&A and secured the contract. A geologist from D&A was on-site during all phases of the abandonment operation, provided field coordination-supervision, and quality control and confirmation of the P&A activity. The D&A geologist performed the following duties:

- provided QA/QC of all operations
- maintained a chronological log of daily activities
- coordinated contractor operations
- provided cost tracking and reporting

Plugging and Abandonment

On October 2, 2013 RRWS arrived on location. The location was prepped for the abandonment operations, and the well head was readied to accept the diverter and cementing equipment. Other equipment was gathered in preparation for cementing operations. RRWS was then directed by NSI personnel to move the rig to another well location.

On October 16, 2013 RRWS moved back onto location and rigged up over the 90-2 to conduct fishing operations. A video log run in June of 2012 showed a possible sampling pump in the hole at 1,801 feet below ground level. The fabricated fishing tool was a 3.5 inch outside diameter (OD) steel pipe with a mule shoe cut onto the end and wire rope welded inside to grab and hold junk. RRWS ran in with the fishing tool and initially tagged something at a depth of 1,807 feet below ground level (BGL). The Driller continued and tagged something hard at 1,811 feet BGL. The string was rotated slightly using power tongs, and the string dropped approximately 6 inches. The string was worked up and down, and the driller pulled approximately 5,000 pounds over string weight. The fishing tool was then pulled out of the hole. The junk retrieved consisted of approximately ten feet of ¾ inch stainless steel tubing with two fittings. RRWS shutdown for the day.

On October 17, 2013 RRWS ran in the 2 3/8 inch tubing open ended to determine if any additional junk remained in the hole. The tubing stacked out at a depth of 1,813 feet BGL, and was tripped out of the hole. RRWS tripped back into the hole with the fishing tool, worked the fish at 1,813 feet BGL when the string dropped slightly and was on the fish. RRWS pulled out of the hole and discovered that the tool was empty. RRWS shut down for the day.

On October 18, 2013 RRWS set up to fish and cement. The driller ran in the hole with a new fishing tool with a cut-lip junk basket. The tool tagged at a depth of 1,813 feet BGL, and the driller worked the string to get over the fish. RRWS then reverse circulated fresh water while sitting on the fish. The fluid level was approximately 550 feet, therefore we should have seen returns after 5 bbls of freshwater pumped. The driller pumped 50 bbls of fresh water with no returns. After breaking the connection at the pump, a strong vacuum was noted, indicating the hole was draining rapidly. The 2 3/8 inch pipe string and fishing tool were pulled out of the hole, and the fishing tool was empty. The decision was made to pull out of the hole, set a bridge plug above 1,811 feet BGL, perforate, then cement to surface

On October 19, 2013 RRWS and Jet West rigged up to run a video log, set a bridge plug, perforate the casing and then cement to surface. The video log showed the fluid level at a depth of 537 feet BGL, casing in good condition was noted, with an unknown bridge at 1,810.5 feet BGL. The nature of the fish in the hole and the casing damage could not be visually assessed. Jet West pulled the camera out of the hole and ran in the bridge plug. The cast-iron bridge plug (CIBP) was set at 1,800 feet BGL due to the severe dogleg below 1,800 feet, and the location of a casing collar at 1,806 feet BGL. A two stage slick perforation gun was run into the well, and the 4.5 inch casing was perforated at 550 feet BGL and 275 feet BGL. Each interval was perforated with 4 – ½ inch holes at 90° phasing. Jet West was then rigged down. RRWS

tripped in with open ended with 2 3/8 inch drill pipe to a depth of 1,776 feet and flushed the 4.5 inch casing with fresh water to prepare it for cementing. Meeker Sand and Gravel arrived with 7 cubic yards of 15 ppg Portland II/V neat cement. RRWS pumped 3.5 yards of cement, and then pulled 34 joints of pipe. This brought the calculated top of cement to 1,086 feet BGL. The tremie pipe and pump were flushed with freshwater. A second batch of approximately 3 cubic yards was pumped downhole. Cement returns were noted at surface, and discharged to the pit. RRWS pulled all but two joints of tremie pipe and flushed with fresh water. A second truck from Meeker Sand and Gravel arrived with 3 cubic yards of 15 ppg neat cement. Approximately 1.5 cubic yards was pumped down hole and circulated to surface. Good cement returns were discharged to the pit, and circulation was maintained until all fresh water was displaced and the returns consisted of just cement. The hole took approximately 6.5 yards to cement, including displacement through the perforations. The two remaining tremie pipe joints were pulled, and top of cement was noted at four feet BGL. RRWS rigged down.

Conclusion

The Natural Soda, Inc. Dissolution Surface monitoring well 90-2 was successfully plugged and abandoned on October 19, 2013. A total of approximately 6.5 cubic yards (approximately 163 sacks) of Portland Type II/V neat cement were pumped down hole to plug well from a depth of 1,800 feet (CIBP) to 4 feet below ground level. Approximately 1 cubic yard exited the perforations into the casing annulus. The intermediate casing was cut off below surface, and a dry hole marker was welded onto the well head prior to reclamation of the pad.

Natural Soda, Inc.
Well Abandonment Diagram

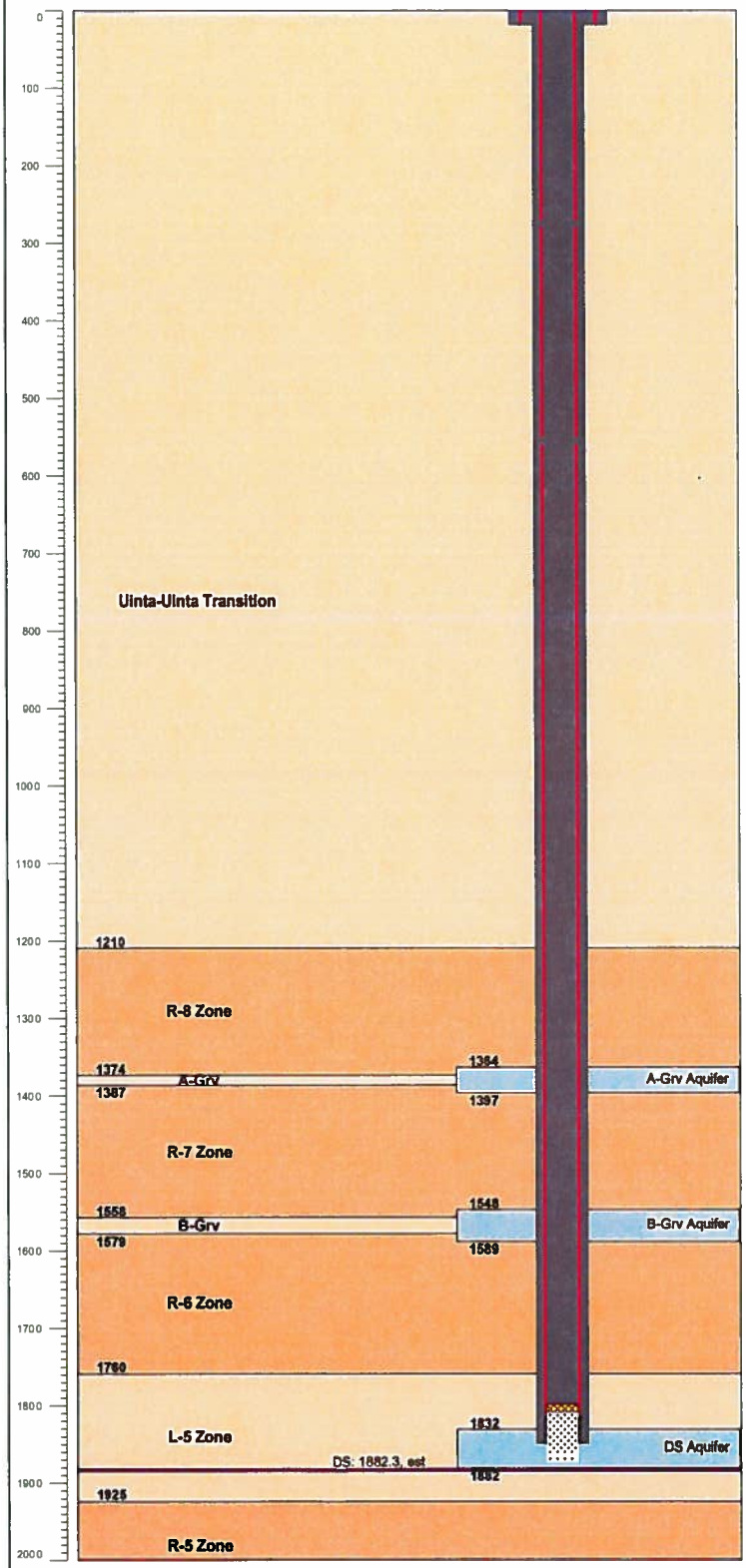
NATURAL SODA

Daub & Associates, Inc.

Well: 90-2
Section: 26
Township: 1S
Range: 98W
Latitude: 39.927657952
Longitude: 108.363117979
Total Depth, ft: 1874.0

Well Type: DS Aquifer Monitoring Well
Hole Type: Rotary Hole
Ground Elevation, ft: 6691.5
WL Measurement Elevation, ft: 6693.6
Diagram Date: 10/25/2013

- Cement
- Hole Plug and/or Cement
- Bentonite Plug / Seal
- Sand Plug / Sand Pack
- Bridge Plug
- Pump
- Transducer



DRILLING and COMPLETION SUMMARY

0-19.0: conductor drill hole, 12.250" dia. (est.)
0-19.0: conductor casing, 9.625" OD
19.0-1850: intermediate drill hole, 6.250" dia.
0-1850.0: intermediate casing, 4.500" OD
300.0-1850.0: intermediate casing cement
1850.0-1874.0: drillout, 3.875" dia.
1849.0-1865.0: sand plug back
1865.0-1866.0: bentonite plug back
1866.0-1874.0: sand plug back

ABANDONMENT

1800.0: remove fish (sampling pump and tubing)
1800.0-1830.0: video inspection of casing revels casing damage 1815-1817
1800.0: set bridge plug
550: perforate (four 1/2" holes, 90 degree phasing)
275: perforate (four 1/2" holes, 90 degree phasing)
0-1800.0: cement to surface