15322

CASE (~~Number~~): ***Application of Key Energy Resources, LLC for approval of a salt water disposal well, Eddy County, New Mexico.*** Applicant seeks an order approving disposal of produced water into the Brushy Canyon formation of the Delaware Mountain group at depths of 4082-5200 feet subsurface in the **Grace Carlsbad No. 1**, located 1980 feet from the south line and 660 feet from the east line of Section 36, Township 22 South, Range 26 East, NMPM. The well is located approximately 4 miles south of Carlsbad, New Mexico.

Florene -

Please prepare for hearing. RBD

05/12/2015

RECEIVED OCD

2015 MAY 12 P 2:49

DATE IN 3/31/2015	SUSPENSE	ENGINEER PRG	LOGGED IN 4/1/2015	TYPE SWD	APP NO. pMAM1509157269

ABOVE THIS LINE FOR DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION
- Engineering Bureau -
1220 South St. Francis Drive, Santa Fe, NM 87505

Case 15322

ADMINISTRATIVE APPLICATION CHECKLIST

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

Application Acronyms:

[NSL-Non-Standard Location] [NSP-Non-Standard Proration Unit] [SD-Simultaneous Dedication]
[DHC-Downhole Commingling] [CTB-Lease Commingling] [PLC-Pool/Lease Commingling]
[PC-Pool Commingling] [OLS - Off-Lease Storage] [OLM-Off-Lease Measurement]
[WFX-Waterflood Expansion] [PMX-Pressure Maintenance Expansion]
[SWD-Salt Water Disposal] [IPI-Injection Pressure Increase]
[EOR-Qualified Enhanced Oil Recovery Certification] [PPR-Positive Production Response]

[1] **TYPE OF APPLICATION** - Check Those Which Apply for [A]

[A] Location - Spacing Unit - Simultaneous Dedication
☐ NSL ☐ NSP ☐ SD

Check One Only for [B] or [C]

[B] Commingling - Storage - Measurement
☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[C] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery
☐ WFX ☐ PMX **X SWD** ☐ IPI ☐ EOR ☐ PPR

[D] Other: Specify _____

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[2] **NOTIFICATION REQUIRED TO:** - Check Those Which Apply, or Does Not Apply

[A] ☐ Working, Royalty or Overriding Royalty Interest Owners

[B] **X** Offset Operators, Leaseholders or Surface Owner

[C] **X** Application is One Which Requires Published Legal Notice

[D] **X** Notification and/or Concurrent Approval by BLM or SLO
U.S. Bureau of Land Management - Commissioner of Public Lands, State Land Office

[E] **X** For all of the above, Proof of Notification or Publication is Attached, and/or,

[F] ☐ Waivers are Attached

[3] **SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED ABOVE.**

[4] **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

Wayne Price-Price LLC		Key Agent/Consultant	March 24,2015
Print or Type Name	Signature	Title	Date

WAYNEPRICE77@EARTHLINK.NET

March 24, 2015

Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Attention: Mr. David Catanach
Division Director

Re: Form C-108 SWD-1344
Key Energy Services, LLC
Grace Carlsbad No.1
API No. 30-015-20573
1980' FSL & 660' FEL, Unit I
Section 36, T-22S, R-26E, NMPM
Eddy County, New Mexico

Dear Mr. Catanach,

Enclosed please find a Division Form C-108 (Application for Authorization to Inject) for the Key Energy Services, LLC ("Key") Grace Carlsbad Well No.1 SWD-1344. Key proposes to re-permit this well as a SWD for the Brushy Canyon member of the Delaware formation through selectively perforated intervals from 4,082 feet to 5,200 feet. Produced water from various oil and gas producing formations in Southeast, New Mexico will be injected into this well.

We believe that all the information necessary to approve the application is enclosed. If additional information is needed, please contact me at 505-715-2809 or E-mail wayneprice77@earthlink.net.

Sincerely,

Wayne Price

Wayne Price-Price LLC
Key Agent/Consultant
312 Encantado RD CT NE
Rio Rancho, NM 87124

Xc: OCD-Artesia

STATE OF NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT	**Oil Conservation Division** **1220 South St. Francis Dr.** **Santa Fe, New Mexico 87505**	FORM C-108 Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____Secondary Recovery _____Pressure Maintenance XXX Disposal _____Storage
Application qualifies for administrative approval? _____Yes _____No

II. OPERATOR: Key Energy Services, LLC

ADDRESS: 1301 McKinney Street, Suite 1800, Houston, Texas 77010

CONTACT PARTY: Daniel Miers- VP Fluid Management Services PHONE: 713-651-4342

III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? _____Yes XXX No
If yes, give the Division order number authorizing the project: _____

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).

*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: Wayne Price-Price LLC TITLE: Key Energy Consultant

SIGNATURE: Wayne Price DATE: March 25, 2015

E-MAIL ADDRESS: wayneprice77@earthlink.net

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: _____

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

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

(2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;

(3) The formation name and depth with expected maximum injection rates and pressures; and,

(4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

C-108 Application
Key Energy Services, LLC
Grace Carlsbad Well No. 1
API No. 30-015-20573 1980' FSL & 660' FEL (Unit I)
Section 36, T-22S, R-26E, NMPM
Eddy County, New Mexico

I. The purpose of the application is to request approval to convert the Grace Carlsbad Well No. 1 to a commercial produced water disposal well in the Brushy Canyon member of the Delaware formation.

II. Key Energy Services, LLC ("Key")
1301 McKinney Street, Suite 1800
Houston, Texas 77010
Contact Parties: Daniel Miers-VP Fluid Management Services 713-651-4342
Wayne Price-Price LLC Consultant 505-715-2809

III. Injection well data sheet is attached. In addition, attached are three (3) wellbore schematic diagrams. Schematic No. 1 shows the current wellbore configuration. Since the current condition of the 7" casing in the well is unknown, Key would like the opportunity to run a casing inspection log prior to determining whether or not to leave the 7" casing in the well, or cutting and pulling this casing string. Consequently, Schematic No. 2 illustrates the proposed wellbore configuration if the 7" casing is left in place in the well. Cement would likely be circulated to surface from the current TOC @ 8,606', and the well would be plugged back from the current Canyon producing interval to the Brushy Canyon member of the Delaware formation. (**Note: The plug-back depths and methods were determined in consultation with the OCD District Office in Hobbs**.) If log testing of the 7" casing shows unacceptable mechanical integrity, Key would like the opportunity to cut and pull the 7" casing at a depth of approximately 8,600'. Schematic No. 3 illustrates the proposed wellbore configuration if the 7" casing is cut and pulled at this depth. In this scenario, the well would be plugged back from the current Canyon producing interval in accordance with a procedure approved by the Division. Key believes that either method of completing the well for disposal will protect fresh water zones and other producing formations in this area.

IV. This is not an expansion of an existing project.

V. A map showing all wells/leases within a 2-mile radius of the Grace Carlsbad Well No. 1 is attached. Also attached is a more detailed map showing the ½-mile Area of Review ("AOR") for the Grace Carlsbad No. 1.

VI. Area of review well data is attached. As shown in the table, there are only two wells in the AOR of the Grace Carlsbad No. 1, and both are plugged and abandoned. Plugging diagrams for each of these wells are attached. Plugging data shows that these two wells are plugged so as to preclude the migration of fluid from the proposed injection interval.

VII. 1. The average injection rate is anticipated to be approximately 1,500 BWPD. The maximum rate will be approximately 5,000 BWPD. If the average or maximum rates increase in the future, the Division will be notified.

2. This will be an open system.

3. The injection pressure will initially be in conformance with the Division assigned gradient of 0.2 psi/ft. or 816 psi. If a higher injection pressure is necessary, Key will conduct a step rate injection test to determine the fracture pressure of the injection interval.

4. Produced water from various producing formations in Southeast New Mexico will be injected into the Grace Carlsbad No. 1. Attached is a water analysis from the Bone Spring formation in this area. Also attached is a water analysis from a storage tank located at Key's BKE Well No. 1, which is a commercial disposal well located in Unit H of Section 13, Township 23 South, Range 27 East, NMPM. This water analysis is a mixture of various produced waters in Southeast New Mexico and Key believes this water is representative of the water that will be injected into the Grace Carlsbad No. 1.

5. Injection is to occur into the Brushy Canyon member of the Delaware formation, There are currently no wells producing from the Delaware formation in Section 36. The closest well producing from the Delaware interval is located approximately 0.9 mile northeast of the Grace Carlsbad No. 1. This well, which is currently not capable of producing, was perforated in the interval from 2,600'-2,700', 2,822'-2,842' and 5,202'-5,213'. The Grace Carlsbad No. 1 appears to be located in an area that is non-productive in the Delaware formation, however, there appears to be Delaware production approximately 2.5 miles to the southeast, 3.25 miles to the west, 2 miles to the north and 6 miles to the northeast of the Grace Carlsbad No. 1.

VIII. Attached is a report entitled "Potential Horizons for Salt Water Disposal in the Delaware Mountain Group T22S, R26E, Section 36, Eddy County, New Mexico". The report was prepared for Key Energy Services, LLC by Dennis W. Powers, Ph.D., Consulting Geologist. This report explains in great detail, the geologic characteristics of the Delaware formation in this area. Also attached is a hydrologic report that examines the underground sources of fresh water in this area, including the Pecos River Valley Alluvial Aquifer and the Permian Capitan Reef.

IX. No stimulation is planned.

X. Logs were filed at the time of drilling.

XI. Within the hydrologic report is a water analysis from the Brantley fresh water well located in Section 30, T-22 South, R-26 East.

XII. Affirmative statement is attached.

XIII. Proof on notice is attached.

INJECTION WELL DATA SHEET

OPERATOR: Key Energy Services, LLC

WELL NAME & NUMBER: Grace Carlsbad No. 1

WELL LOCATION:	1980' FSL & 660' FEL	I	36	22 South	26 East
	FOOTAGE LOCATION	UNIT LETTER	SECTION	TOWNSHIP	RANGE

WELLBORE SCHEMATIC

See Attached Wellbore Schematics

WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17" Casing Size: 13 3/8" @ 382'
Cemented with: 400 Sx. or _____ ft^3
Top of Cement: Surface Method Determined: Circulated

Intermediate Casing

Hole Size: 12 1/4" Casing Size: 9 5/8" @ 5,200'
Cemented with: 1200 Sx. or _____ ft^3
Top of Cement: 1,451' Method Determined: T. S.

Production Casing

Hole Size: 8 3/4" Casing Size: 7" @ 10,727'
Cemented with: 335 Sx. or _____ ft^3
Top of Cement: 8,606' Method Determined: T.S.

Production Liner

Hole Size: 6 1/4" Casing Size: 4 ½" @ 10,630'-11,875'
Cemented with: 200 Sx. or _____ ft^3
Top of Cement: 10,634' Method Determined: Well File

Total Depth: 11,875'

Injection Interval

Delaware Formation: 4,082'-5,200'

INJECTION WELL DATA SHEET

Tubing Size: 3 1/2" Lining Material: Internally Plastic Coated

Type of Packer: Arrowset 1-X Packer

Packer Setting Depth: 3,982' or within 100' of the uppermost injection perforations

Other Type of Tubing/Casing Seal (if applicable): None

Additional Data

1. Is this a new well drilled for injection: ____ Yes ____X____ No

   If no, for what purpose was the well originally drilled: Well was initially drilled in 1972 as a producing well in the Morrow formation. The well was also subsequently produced from the Strawn and Canyon formations.

2. Name of the Injection Formation: Delaware Formation

3. Name of Field or Pool (if applicable): N/A

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

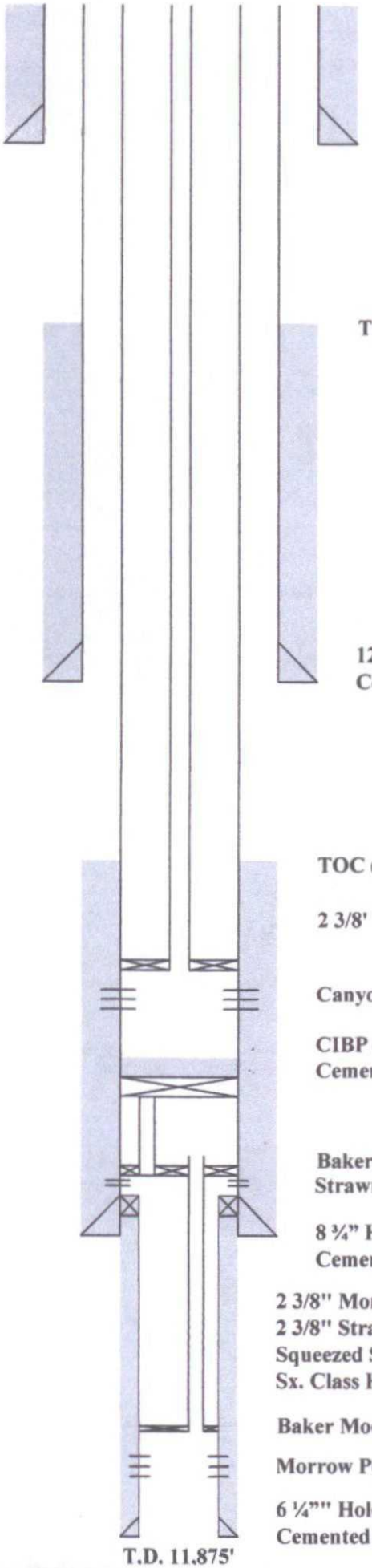
   Morrow-11,486'-11,526'; Strawn-10,270'-10,492' (Both intervals squeezed w/310 Sx.)
   Canyon-9,946'-9,962' Currently Open

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

   Within Section 36, T-22S, R-26E are the following pools: South Carlsbad-Strawn Gas Pool (74120) & South Carlsbad-Morrow Gas Pool (73960). There are no Delaware pools in Section 36.

Schematic No. 1: Current Wellbore Configuration

Key Energy Services, LLC
Grace Carlsbad No. 1
API No. 30-015-20573
1980' FSL & 660' FEL (Unit I)
Section 36, T-22 South, R-26 East, NMPM



17" Hole; Set 13 3/8"48# J-55 Csg @ 382'. Cemented w/400 Sx. Cement circulated to Surface

Drilled: 2/1972

TOC @ 1,451' by T.S.

12 ¼" Hole; Set 9 5/8" 36 & 40# J-55 Csg @ 5,200' Cemented w/1200 Sx. TOC @ 1,451' by T.S.

TOC @ 8,606' by T.S.

2 3/8' Tbg. @ 9,911'

Canyon Perforations: 9,946'-9,962'

CIBP @ 10,052' w/35' of cement on top & Cement Retainer @ 10,052'

Baker Dual Packer @ 10,169'
Strawn Perforations: 10,270'-10,492'

8 ¾" Hole; Set 7" 23 & 26# Csg. @ 10,727' Cemented w/335 Sx. TOC @ 8,606' by T.S.

2 3/8" Morrow Tbg. Cut @ 10,150'
2 3/8" Strawn Tbg. Cut @ 10,054'
Squeezed Strawn & Morrow intervals w/310 Sx. Class H.

Baker Model A-1 Packer @ 11,380'

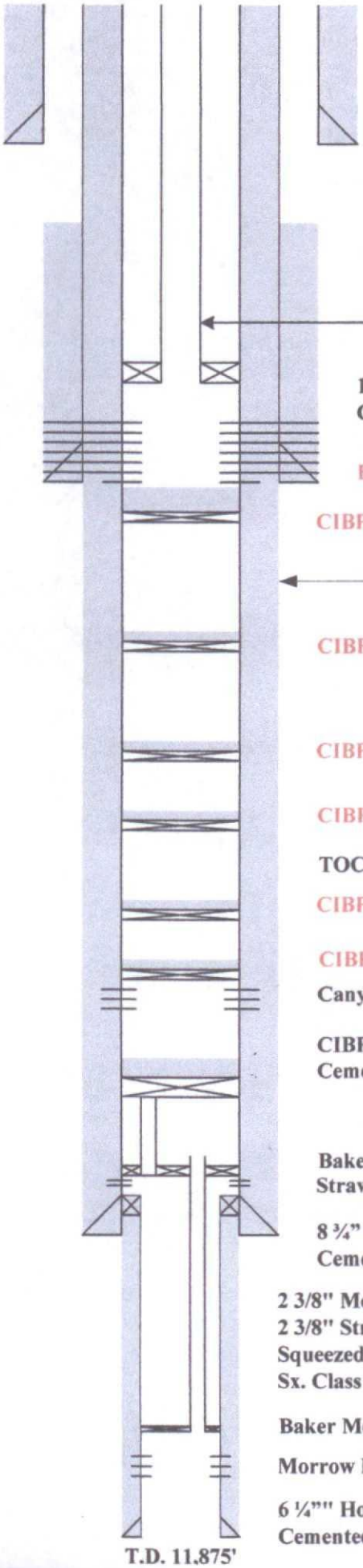
Morrow Perforations: 11,486'-11,526'

6 ¼"" Hole; Set 4 ½" Liner 10,630'-11,875' Cemented w/200 Sx. TOC @ Liner Top

T.D. 11,875'

Schematic No. 2: Leave 7" Casing in Wellbore

Key Energy Services, LLC
Grace Carlsbad No. 1
API No. 30-015-20573
1980' FSL & 660' FEL (Unit I)
Section 36, T-22 South, R-26 East, NMPM



17" Hole; Set 13 3/8"48# J-55 Csg @ 382'. Cemented w/400 Sx. Cement circulated to Surface

Drilled: 2/1972

TOC @ 1,451' by T.S.

3 ½" IPC Tubing set in a Arrowset 1-X Packer @ 3,982'

12 ¼" Hole; Set 9 5/8" 36 & 40# J-55 Csg @ 5,200' Cemented w/1200 Sx. TOC @ 1,451' by T.S.

Brushy Canyon Injection Perforations: 4,082'-5,200'

CIBP @ 5,250' w/50' cmt.

TOC behind the 7" casing is currently at 8,606'. If 7" casing is left in the well, cement will be circulated from 8,606' to surface, or to a depth approved by NMOCD

CIBP @ 6,280' w/35' cmt. Top Bone Spring/1st Bone Spring Sand

CIBP @ 7,790' w/35' cmt. Top 2nd Bone Spring Sand

CIBP @ 8,120' w/35' cmt. Top 3rd Bone Spring Sand

TOC @ 8,606' by T.S.

CIBP @ 9,030' w/ 35' cmt. Top Wolfcamp

CIBP @ 9,900' w/35' cmt. Isolate Canyon Perfs.

Canyon Perforations: 9,946'-9,962'

CIBP @ 10,052' w/35' of cement on top & Cement Retainer @ 10,052'

Baker Dual Packer @ 10,169'
Strawn Perforations: 10,270'-10,492'

8 ¾" Hole; Set 7" 23 & 26# Csg. @ 10,727' Cemented w/335 Sx. TOC @ 8,606' by T.S.

2 3/8" Morrow Tbg. Cut @ 10,150'
2 3/8" Strawn Tbg. Cut @ 10,054'
Squeezed Strawn & Morrow intervals w/310 Sx. Class H.

Baker Model A-1 Packer @ 11,380'

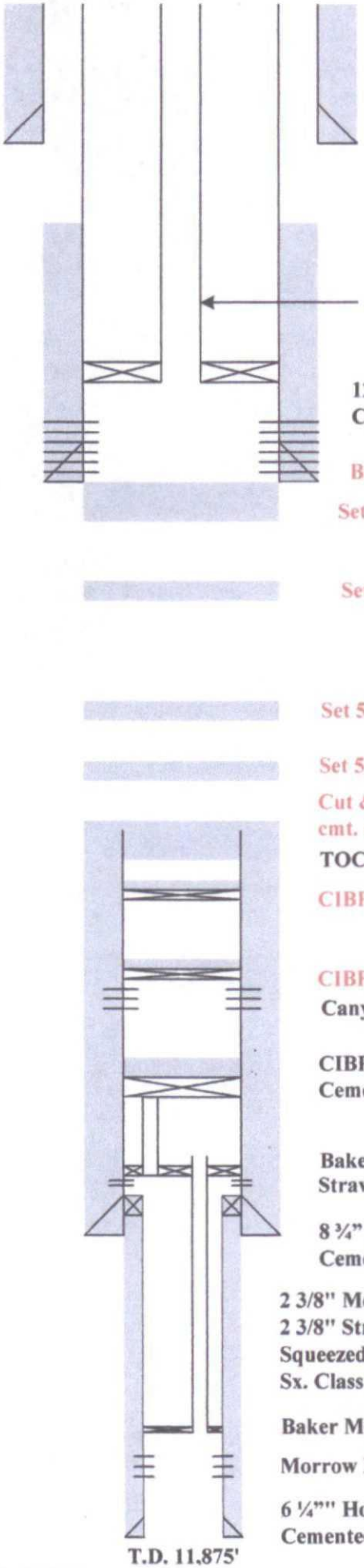
Morrow Perforations: 11,486'-11,526'

6 ¼"" Hole; Set 4 ½" Liner 10,630'-11,875' Cemented w/200 Sx. TOC @ Liner Top

T.D. 11,875'

Schematic No. 3:
Cut & Pull 7" Casing

Key Energy Services, LLC
Grace Carlsbad No. 1
API No. 30-015-20573
1980' FSL & 660' FEL (Unit I)
Section 36, T-22 South, R-26 East, NMPM



17" Hole; Set 13 3/8"48# J-55 Csg @ 382'. Cemented w/400 Sx. Cement circulated to Surface

Drilled: 2/1972

TOC @ 1,451' by T.S.

3 ½" IPC Tubing set in a Arrowset 1-X Packer @ 3,982'

12 ¼" Hole; Set 9 5/8" 36 & 40# J-55 Csg @ 5,200' Cemented w/1200 Sx. TOC @ 1,451' by T.S.

Brushy Canyon Injection Perforations: 4,082'-5,200'

Set 50 sx. cmt. plug @ 5,200'

Set 50 sx. cmt. plug @ 6,280'. Top Bone Spring/1st Bone Spring Sand

Set 50 sx. cmt. plug @ 7,790'. Top 2nd Bone Spring Sand

Set 50 sx. cmt. plug @ 8,120'. Top 3rd Bone Spring Sand

Cut & pull 7" casing @ 8,600'. Set 50 Sx. cmt. stub plug 8,550'-8,650'

TOC @ 8,606' by T.S.

CIBP @ 9,030' w/35' cmt. Isolate Wolfcamp

CIBP @ 9,900' w/35' cmt. Isolate Canyon Perfs.

Canyon Perforations: 9,946'-9,962'

CIBP @ 10,052' w/35' of cement on top & Cement Retainer @ 10,052'

Baker Dual Packer @ 10,169'

Strawn Perforations: 10,270'-10,492'

8 ¾" Hole; Set 7" 23 & 26# Csg. @ 10,727' Cemented w/335 Sx. TOC @ 8,606' by T.S.

2 3/8" Morrow Tbg. Cut @ 10,150'

2 3/8" Strawn Tbg. Cut @ 10,054'

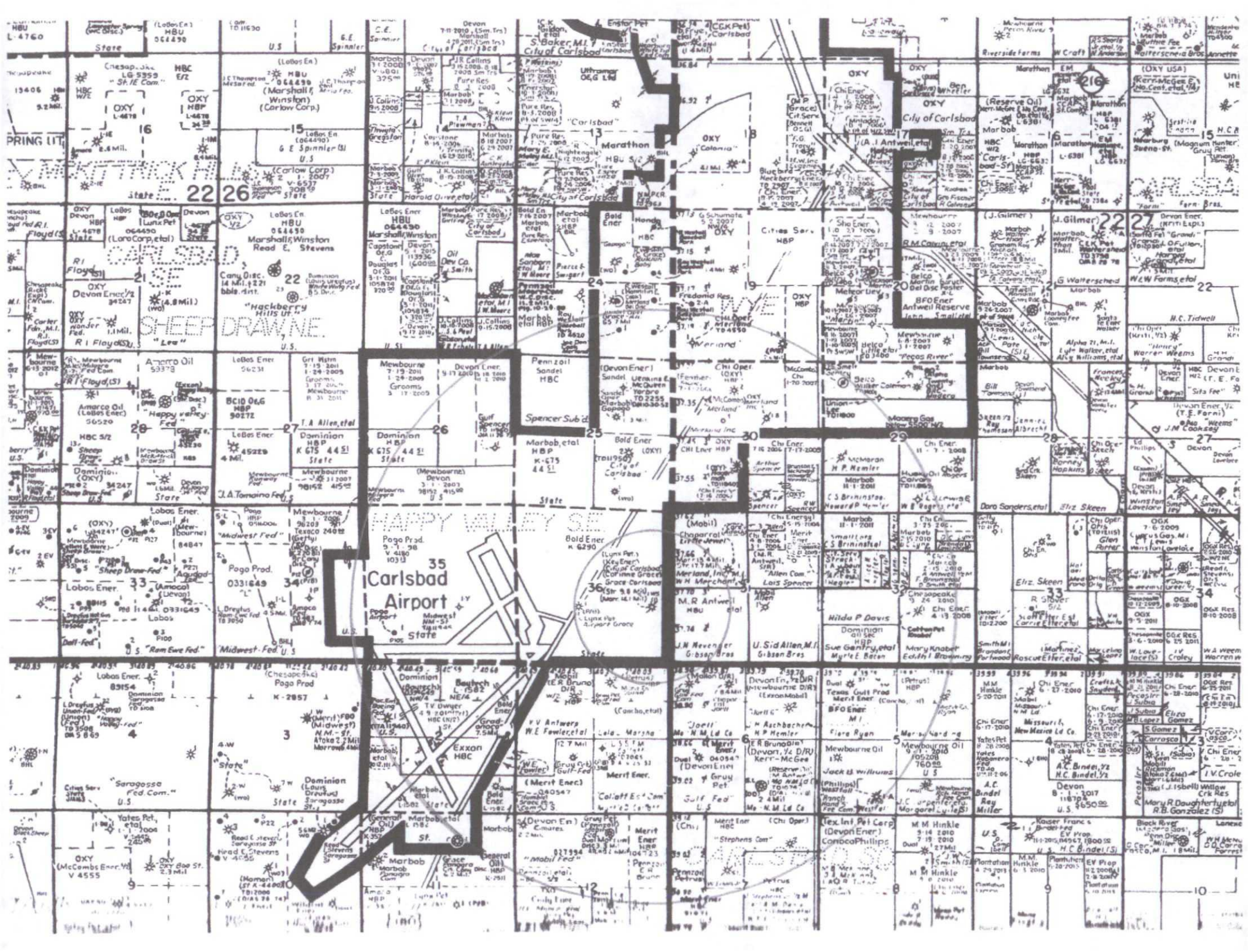
Squeezed Strawn & Morrow intervals w/310 Sx. Class H.

Baker Model A-1 Packer @ 11,380'

Morrow Perforations: 11,486'-11,526'

6 ¼"" Hole; Set 4 ½" Liner 10,630'-11,875' Cemented w/200 Sx. TOC @ Liner Top

T.D. 11,875'


Carlsbad Airport
HAPPY VALLEY SE
SHEEP DRAW NE
CARLSBAD
Marathon
OXY
Marshall & Winston
Read E. Stevens
Mewbourne
Devon Ener.
Chi Oper.
Chi Ener.
Bold Ener.
Pogo Prod.
Lobos Ener.
Amarco Oil
Dominion
Exxon
HBC
Pennzoil
Sandel
Spencer Sub'd
Cities Serv.
Texaco
Midwest
Saragossa Fed. Com.
Ram Ewe Fed.
Sheep Draw Fed
Happy Valley Fed
Midwest Fed
Hackberry Hills Unit
Lea
Stephens Com
Merland
Pecos River
Allen Com
Lois Spencer
Gibson Bros
Sue Gantry, et al
Myrtle E. Beton
Hilda P. Davis
Cotton Pet Knabert
Mary Knabert
Edith I. Browning
Roscoe Etter, et al
Elizabeth Skeen
Daro Sanders, et al
Glen Porter
Carrie E. Etter, et al
Alpha 21, M.L.
Lyle Walker, et al
Alice Williams, et al
Frances Wesley
Jennie Albrecht
Barney Hopkins
Bill Townsend
Ed Phillips
Winston Lovelace
Lovelace
Croley
Mary R. Daughtery, et al
R.B. Gonzalez
Elvira Gomez
I.V. Crole
Willow Crk Res
Black River
Lanexco
Kaiser Francis
Bindel Ray Miller
Yates Pet. et al
Read & Stevens
Tex Int Pet Corp
(Devon Ener)
ConocoPhillips
Jack B. Williams
Mewbourne Oil
Flora Ryan
Joell
Merit Ener.
Gruy Pet.
Gulf Fed
Exxon HBC
Marbob
Yates Petroleum
Amoco
Lynx Pet
Key Ener
Grace Carlsbad
Collatt Est. Com
Penzoil et al
Mobil
Texaco Gulf Prod
Chaparral
Little Jewel
Nerland, Inc.
W. H. Merchant
M. R. Antwell
HBU
J. N. Nevenger
Gibson Bros
Hondo
Bold Ener
Fredonia Res.
Meteor Ley
Belco
Del Osc Foster
Antwell Reserve
Jane Small et al
Marbob
Bill Townsend
Jennie Albrecht
Barney Hopkins
Daro Sanders, et al
Elizabeth Skeen
Glen Porter
Carrie E. Etter, et al
Roscoe Etter, et al
Alpha 21, M.L.
Lyle Walker, et al
Alice Williams, et al
Frances Wesley
Ed Phillips
Winston Lovelace
Lovelace
Croley
Mary R. Daughtery, et al
R.B. Gonzalez
Elvira Gomez
I.V. Crole
Willow Crk Res
Black River
Lanexco
Kaiser Francis
Bindel Ray Miller
Yates Pet. et al
Read & Stevens
Tex Int Pet Corp
(Devon Ener)
ConocoPhillips
Jack B. Williams
Mewbourne Oil
Flora Ryan
Joell
Merit Ener.
Gruy Pet.
Gulf Fed
Exxon HBC
Marbob
Yates Petroleum
Amoco
Lynx Pet
Key Ener
Grace Carlsbad
Collatt Est. Com
Penzoil et al
Mobil
Texaco Gulf Prod
Chaparral
Little Jewel
Nerland, Inc.
W. H. Merchant
M. R. Antwell
HBU
J. N. Nevenger
Gibson Bros
Hondo
Bold Ener
Fredonia Res.
Meteor Ley
Belco
Del Osc Foster
Antwell Reserve
Jane Small et al
Marbob
Bill Townsend
Jennie Albrecht
Barney Hopkins
Daro Sanders, et al
Elizabeth Skeen
Glen Porter
Carrie E. Etter, et al
Roscoe Etter, et al
Alpha 21, M.L.
Lyle Walker, et al
Alice Williams, et al
Frances Wesley
Ed Phillips
Winston Lovelace
Lovelace
Croley
Mary R. Daughtery, et al
R.B. Gonzalez
Elvira Gomez
I.V. Crole
Willow Crk Res
Black River
Lanexco
Kaiser Francis
Bindel Ray Miller
Yates Pet. et al
Read & Stevens
Tex Int Pet Corp
(Devon Ener)
ConocoPhillips
Jack B. Williams
Mewbourne Oil
Flora Ryan
Joell
Merit Ener.
Gruy Pet.
Gulf Fed
Exxon HBC
Marbob
Yates Petroleum
Amoco
Lynx Pet
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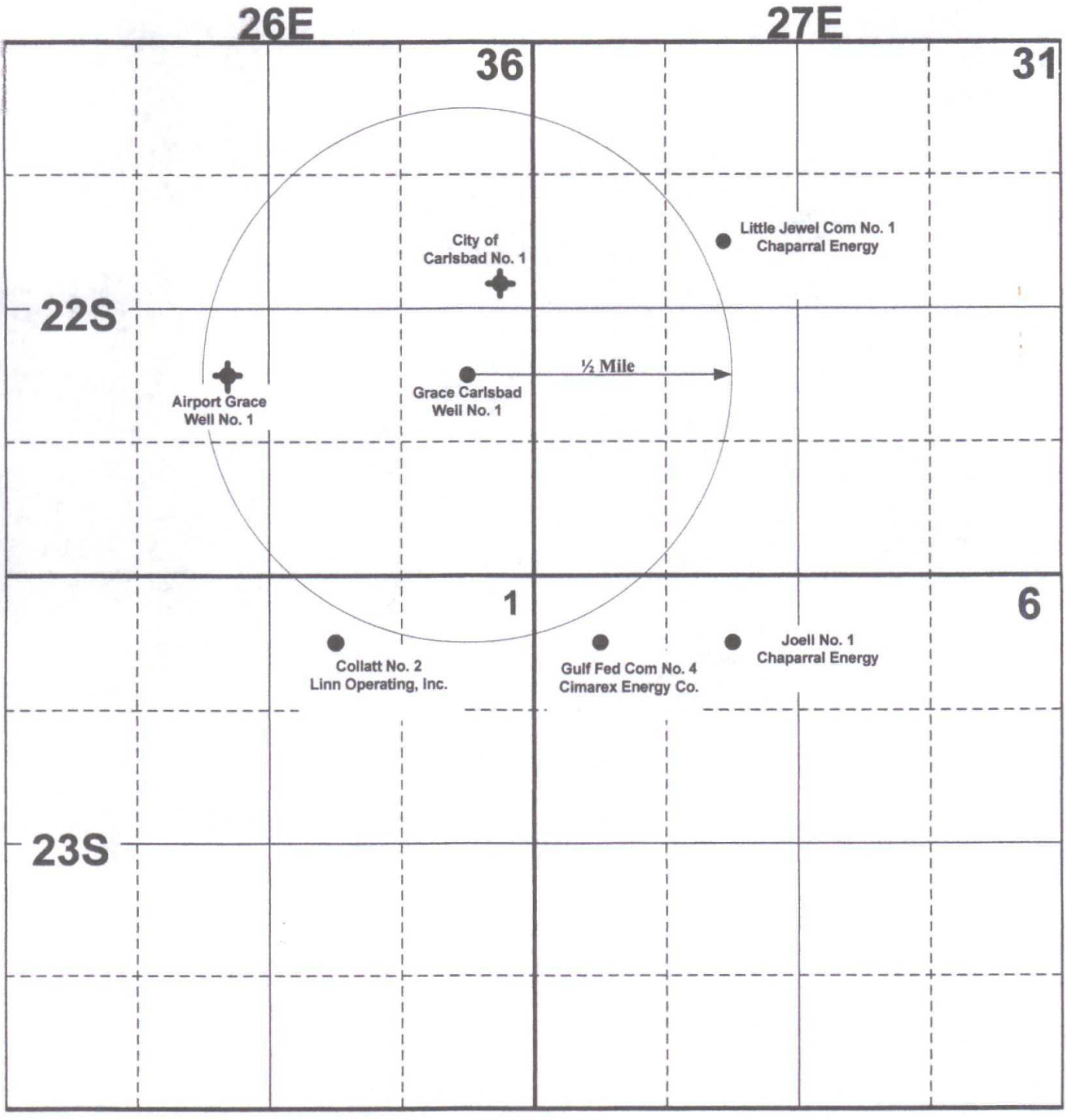
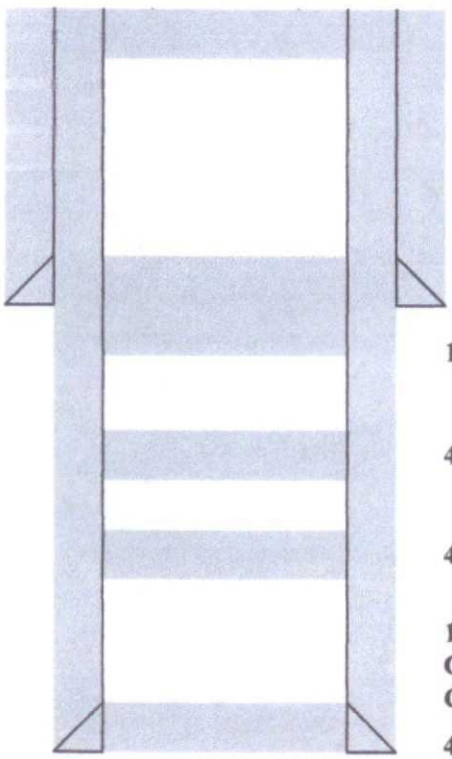


Key Energy Services, LLC
½ Mile Area of Review Map
Grace Carlsbad Well No. 1

KEY ENERGY SERVICES, LLC
AREA OF REVIEW WELL DATA
GRACE CARLSBAD No. 1

API NUMBER	OPERATOR	LEASE NAME	WELL NO.	WELL TYPE	STATUS	FTG. N/S	N/S	FTG. E/W	E/W	UNIT	SEC.	TSHP.	RNG.	DATE DRILLED	TOTAL DEPTH	HOLE SIZE	CSG. SIZE	SET AT	SX. CMT.	CMT. TOP	MTD.	HOLE SIZE	CSG. SIZE	SET AT	SX. CMT.	CMT. TOP	MTD.	COMPLETION	REMARKS
30-015-20829	Bold Energy, LP	Airport Grace	1	P	PA	1980'	S	2164'	W	K	36	22S	26E	Mar-73	11,956'	17"	13 3/8"	358'	375	Surface	Circ.	12 1/4"	9 5/8"	5,395'	1650	Surface	Circ.	9,862'-9,866' Perf.	PA'd 2/2007. Schematic Attached
																8 3/4"	7"	11,956'	680	6,900'	File								
30-015-21842	Key Energy Services, LLC	City of Carlsbad	1	Brine	PA	2420'	N	330'	E	H	36	22S	26E	Jul-76	930'	13"	8 5/8"	350'	225	Surface	Circ.	7 7/8"	5 1/2"	710'	150	Surface	Circ.	710'-930' O.H.	PA'd 10/2008. Schematic Attached

Bold Energy, LP
Airport Grace No. 1
API No. 30-015-20829
1980' FSL & 2164' FWL (Unit K)
Section 36, T-22 South, R-26 East, NMPM



35 Sx. 100'-
Surface

17" Hole; Set 13 3/8" Csg @ 358'
Cemented w/375 Sx.
Cement circulated to Surface

Drilled: 3/1973
Plugged: 2/2007

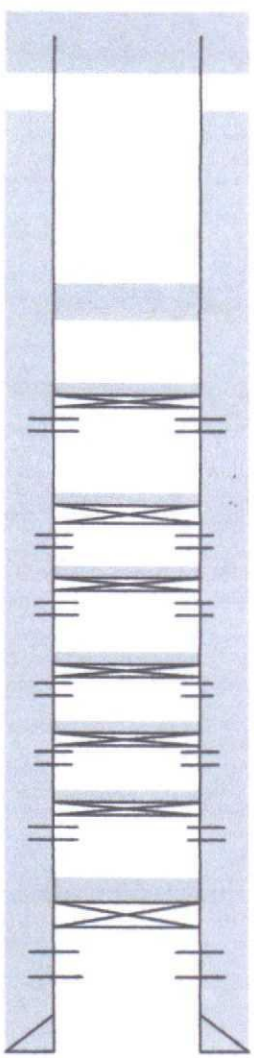
100 Sx. cement plug 212'-500'

45 Sx. cement plug 1,423'-1,500'

40 Sx. cement plug 1,876'-1,984'

12 ¼" Hole; Set 9 5/8" Csg @ 5,395'
Cemented w/1650 Sx.
Calculated TOC @ surface.

45 Sx. cement plug 5,276'-5,400'



7" Csg. Cut & pulled @ 6,500'
Set 60 sx. cement plug 6,389'-6,600'

TOC @ 6,900'

25 Sx. cement plug 8,763'-8,900'

CIBP @ 9,800' w/25 Sx. of cement on top
Canyon Perforations: 9,862'-9,866'

CIBP @ 10,160' w/35' of cement on top
Canyon Perforations: 10,200'-10,205'

CIBP @ 10,395' w/35' of cement on top
Strawn Perforations: 10,435'-10,560'

CIBP @ 10,865' w/35' of cement on to
Atoka Perforations: 10,900'-10,904'

CIBP @ 11,400' w/35' of cement on top
Morrow Perforations: 11,429'-11,439'

CIBP @ 11,500' w/10' of cement on top
Morrow Perforations: 11,518'-11,528'

CIBP @ 11,606' w/10' of cmt. on top

Morow Perforations: 11,610'-11,712'

8 ¾" Hole; Set 7" Csg. @ 11,956'
Cemented w/680 Sx.
TOC @ 6,900' by Well File

T.D. 11,956'

Well: AIRPORT GRACE **No.:** 001
Operator: Nabors Well Service LTD
API: 3001520829
1980 FSL X 2164 FWL
Township: 22.0S **Range:** 26E
Section: 36 **Unit:** K
Land Type: S **County:** Eddy **True Vertical Depth:** 11956

Well was spudded 3/28/1973 by Michael P. Grace as a Morrow test
Cement volumes and tops were taken and calculated from NMOCD records
Well is currently a non-producing Carlsbad, Canyon, South Gas Well
Please see attached wellbore schematic for available well data
Well is located on Fee surface and state minerals with in the City limits of Carlsbad,NM

Spud 3/28/1973
13 3/8" 48# &72# casing was set at 358ft in a 17" hole
Cemented with 375 sacks of Class "C" cement with 2% CaCl
Cement circulated to the surface

9 5/8" 36# & 40#casing was set at 5391ft in a 12 ¼" hole
Cemented with 1250 sacks of Halliburton lite and 400 sacks Class "C"
No record in well file of cement circulating
Cement volumes sufficient to circulate at 70% fill

7" 23# & 32# casing was set at 11956ft in a 8 ¾" hole
Cemented with 320 sacks of Class "C" 50-50 poz mix Followed by 360 sacks Class "H" cement.
Calculated TOC at 7960ft using 70% fill

Morrow Perforations 11610 -11712ft
Cast iron bridge plug set at 11400ft, capped with 35ft of cement
Atoka Perforations 10900 -10904ft
Cast iron bridge plug set at 10865ft, capped with 35ft of cement
Strawn Perforations 10435 – 10564ft
Cast iron bridge plug set at 10395ft, capped with 35ft of cement
Wolfcamp Perforations 10200 – 10205ft
Cast iron bridge plug set at 10160ft, capped with 35ft of cement
Canyon Perforations 9862 – 9866ft

Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO. 30-015-20829
5. Indicate Type of Lease STATE ☒ FEE ☐
6. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name: **Airport Grace**

1. Type of Well: Oil Well ☐ Gas Well ☒ Other

Month - Year FEB 22 2007 OCD - ARTESIA, NM

8. Well No. **1**

2. Name of Operator **Bold Energy, L P**

9. OGRID Number

3. Address of Operator **415 W. Wall, Ste 500, Midland, TX 79701**

10. Pool name or Wildcat

4. Well Location
Unit Letter **K** : **1980** feet from the **South** line and **2164** feet from the **West** line
Section **36** Township **22S** Range **26E** NMPM County **Eddy**

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)* **3221**

Pit or Below-grade Tank Application ☐ or Closure ☐
Pit type _____ Depth to Groundwater _____ Distance from nearest fresh water well _____ Distance from nearest surface water _____
Pit Liner Thickness: _____ mil Below-Grade Tank: Volume _____ bbls; Construction Material _____

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☒
PULL OR ALTER CASING	☐	MULTIPLE COMPLETION	☐	CASING/CEMENT JOB	☐		
OTHER:	☐			OTHER:	☐		

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

1/10/07 MIRU
1/11/07 Through 1/18/07 Blow tbg. and casing pressure down. Load hole with brine. POH w/ tbg.
1/22/07 WIH w/ 7" CIBP. Set @ 9800. COH / wireline. WIH w/ 62 jts tbg. SDFN
1/24/07 WIH w/243 jts. tbg. Circ. hole w/ 290 bbls 10 lb. brine. Spot 25 sx cement on top CICB @ 9800' POH w/192 jts. tbg. SDFN. 1/25/07 POH w/ 75 jts tbg. ND well head. SDFN. 1/26/07 RIH w/ 7" jet cutter to 8897'. COH w/ wireline. Could not pull casing. SDFN. 1/27/07 WIH w/ 20 jts tbg & 7" packer. Pressure up to 1500 psi. Held. WIH w/ tbg to 8900'. Spot 25 sx cement. POH w/ 160 jts. SDFN.. 1/29/07 Tag plug @ 8763. POH w/ tbg. RIH w/ jet cutter cut pipe @ +/- 6500. POH wireline. Rig up Jacks Pull casing free. Rig down Jacks. SDFN. 1/30/07 Lay down 175 jts. 7" XLine casing. SDFN. 1/31/07 Lay down 18jts. casing. RIH w/ tbg to 6600'. Spot 60 sx. cement plug SDFN. 2/01/07 Tag plug @ 6389'. Spot 45 sx cement @ 5400'. POH SDFN. 2/02/07. Tag plug @ 5276. Spot 40 sx cement @ 1984. WOC 4 hrs. Tag plug @ 1867'. Spot 45 sx. plug @ 1500'. POH SDFN. 2/05/07 Tagged plug @ 1423'. Spot 100 sx. cement plug @ 500'. WOC 4 hrs. Tagged plug @ 212'. Circ. 35 sx cement from 100' to surface. ND BOP. & wellhead. SDFN. 2/06/07 Dug out cellar. Cut off well head. Weld on Dry Hole Marker. Rig down move off.

**Plugging of the well bore.
Liability under bond is retained
until surface restoration,
environmental remediation and
final inspection is completed.**

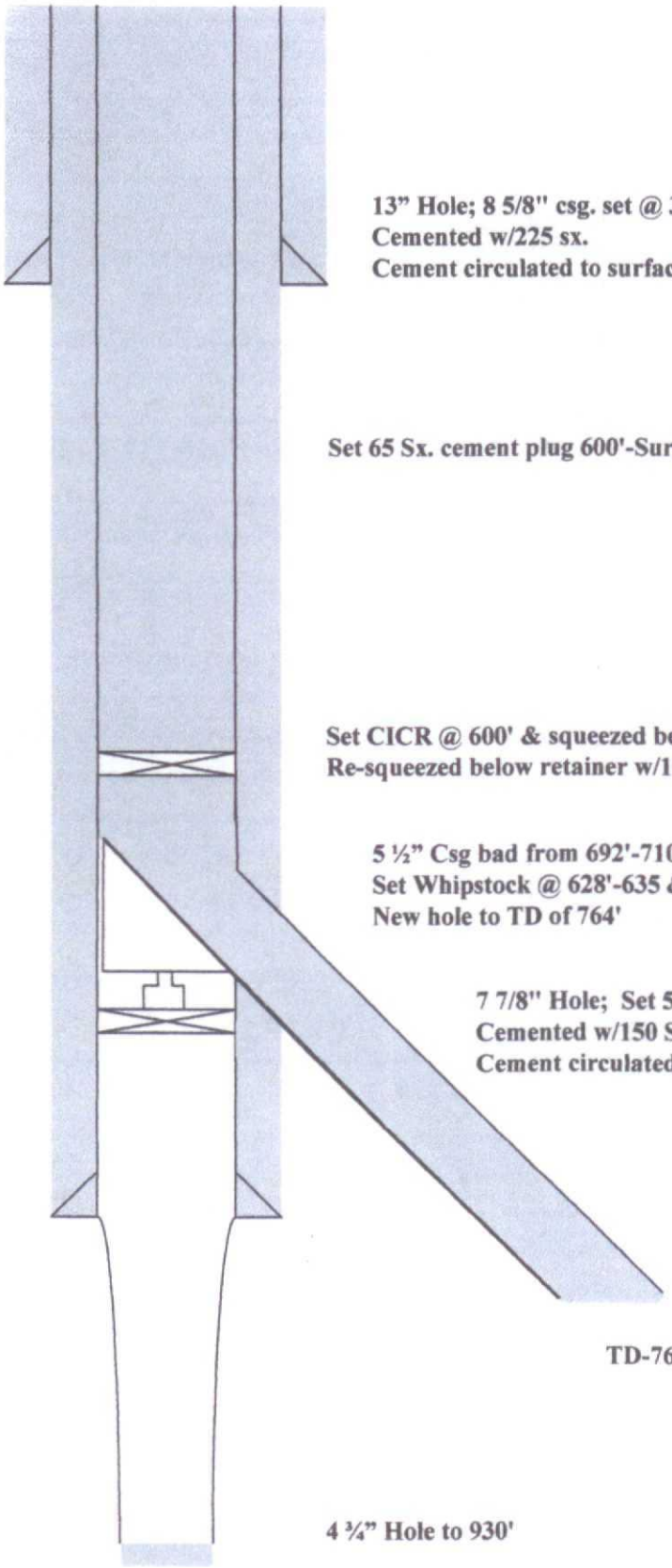
I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.

SIGNATURE _____ TITLE Operations Mgr. DATE 2/19/07
Shannon Klier
Type or print name E-mail address: shannon.klier@boldenergy.com Telephone No. 432-686-1100

For State Use Only

APPROVED BY _____ TITLE Gary Guye Deputy Field Inspector DATE FEB 23 2007
Conditions of Approval (if any):

Key Energy Services, LLC
City of Carlsbad No. 1
API No. 30-015-21842
2420' FNL & 330' FEL, Unit H
Section 36, T-22S, R-26E
Type Well: Brine Well



13" Hole; 8 5/8" csg. set @ 350'
Cemented w/225 sx.
Cement circulated to surface

Date Drilled: 7/76
Date PA'd: 10/08

Set 65 Sx. cement plug 600'-Surface

Set CICR @ 600' & squeezed below retainer w/100 sx.
Re-squeezed below retainer w/100 sx.

5 ½" Csg bad from 692'-710' Set BP @ 642'
Set Whipstock @ 628'-635 & drilled
New hole to TD of 764'

7 7/8" Hole; Set 5 ½" Csg. @ 710'
Cemented w/150 Sx.
Cement circulated to surface

TD-764'

4 ¾" Hole to 930'

PBTD.-908'
TD-930'

Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO.
30-015-21842

5. Indicate Type of Lease
STATE ☒ FEE ☐

6. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
City of Carlsbad

1. Type of Well: Oil Well ☐ Gas Well ☒ Other Brine

8. Well Number 1

2. Name of Operator
Key Energy Services LLC

NOV – 1 2008

9. OGRID Number

3. Address of Operator
6 Desta Drive, Ste 4400, Midland, Texas 79705

OCD-ARTESIA

10. Pool name or Wildcat
Brine Mining Well

4. Well Location
Unit Letter H : 2420 feet from the North line and 330 feet from the East line
Section 36 Township 22S Range 26E NMPM Lea County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

Pit or Below-grade Tank Application ☐ or Closure ☐

Pit type Steel Depth to Groundwater Distance from nearest fresh water well Distance from nearest surface water

Pit Liner Thickness: mil Below-Grade Tank: Volume bbls; Construction Material

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☒
PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
OTHER:	☐			OTHER:	☐		

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

10-20-08 Set CICR @ 600'. Sqz'd 100 sks of C cmt displacing 10' below retainer. WOC.

10-21-08 Sting into retainer & established injection rate @ 2 bpm 500 psi. Called Tim Gum w/ NMOCD & received his OK to re-sqz. Sqz'd 100 sks of cmt displacing 10' below retainer. WOC

10-22-08 Sting into retainer & pressure up on cmt. Pressure test to 680 psi recording test on 30 minute chart. Sting out of retainer. Spot 65 sks of cmt from 600'- surface.

Cut off wellhead and anchors 3' BGL. Installed dry hole marker.

I hereby certify that the information above is true and complete to the best of my knowledge and belief. **I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.**

SIGNATURE _____ TITLE PA Manager Key Energy Services DATE 10-31-08

Type or print name Jack Shelton E-mail address: jshelton@keyenergy.com Telephone No.432-523-5155

For State Use Only Accepted for record NMOCD

APPROVED BY: _____ TITLE _____ DATE 11/3/08

Conditions of Approval (if any):

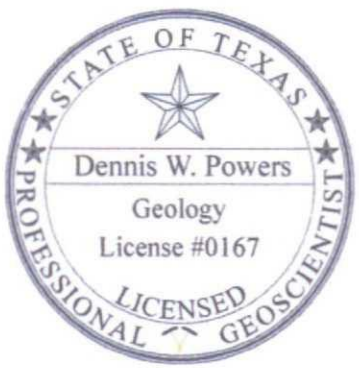
Approved for plugging of well bore only. Liability under bond is retained pending receipt of C-103 (Subsequent Report of Well Plugging) which may be found at OCD Web Page under Forms, www.emnrd.state.nm.us/ocd.

Potential Horizons for Salt Water Disposal in the Delaware Mountain Group T22S, R26E, Section 36, Eddy County, New Mexico

prepared for Key Energy Services

Dennis W. Powers, Ph.D.
Consulting Geologist
170 Hemley Road
Anthony, TX 79821

March 21, 2012



Potential Horizons for Salt Water Disposal in the Delaware Mountain Group T22S, R26E, Section 36, Eddy County, New Mexico

Dennis W. Powers, Ph.D.
Consulting Geologist
170 Hemley Road
Anthony, TX 79821

March 21, 2012

EXECUTIVE SUMMARY

Key Energy Services proposes to drill and operate a salt water disposal (SWD) well in section 36, T22S, R26E, in Eddy County, New Mexico. The interval of primary interest is the lower formation (Brushy Canyon) of the Upper Permian Delaware Mountain Group (DMG). The formations were evaluated from readily available geophysical logs.

The DMG consists of three formations of mainly sandstone, siltstone, and some limestone intervals. From the top of the Bone Spring Limestone, the formations in order are Brushy Canyon, Cherry Canyon, and Bell Canyon. They are equivalent stratigraphically to Guadalupian rocks of the Guadalupe Mountains, with the uppermost (Bell Canyon) stratigraphically equivalent to the Capitan Limestone (reef and related rocks).

The formations were evaluated for best continuous intervals of ~20 ft thick (or more) for the following characteristics: lower gamma (more sand), middle range acoustic travel time (generally sand), lower neutron (higher H content), and lower resistivity (fluid content).

The Brushy Canyon includes the most intervals with favorable characteristics, and several are recommended for penetration and testing for hydraulic properties. The Cherry Canyon is more uniformly high in gamma, indicating less sand and poorer prospects for porosity and permeability suitable for injection. The Bell Canyon has limited potential intervals.

Some zones at the top of Cherry Canyon and basal Brushy Canyon are producing in the general area around the prospective site. These zones are to be minimized as possible.

The Brushy Canyon has no stratigraphic connection to the Capitan reef or older Goat Seep reef rocks. The elevation of the upper contact of the Bone Spring Limestone across the Capitan reef front does not show displacement due to faulting that could potentially connect deep zones to Capitan.

INTRODUCTION

Task

Key Energy Services proposes to drill and operate a salt water disposal (SWD) well in section 36, T22S, R26E, in Eddy County, New Mexico (Figure 1). The interval of primary interest is the lower formation (Brushy Canyon) of the Upper Permian Delaware Mountain Group (DMG).

This report provides the background information used to evaluate the DMG formations for intervals suitable for testing as injection sites. These formations were evaluated from geophysical logs readily available from the New Mexico Oil Conservation Department (OCD), supplemented in a few instances by purchasing logs from TGS-NOPEC.

Methods

Geophysical logs provide basic properties that are useful as a guide to the suitability of intervals for fluid injection. The main desired properties are adequate porosity and thickness for storage and permeability for efficiency of inection. The following suite of logs, where available, was used to indicate suitable properties (see Figure 5):

natural gamma – in clastic rocks, lower gamma is typically associated with sand and higher gamma with more clay content. The standard 100 API units is typical of a North American Pennsylvanian black shale. Quartz sand will have low natural gamma, possibly less than 10 API units. The DMG rocks are fairly fine-grained, with high natural gamma. Intervals with lower natural gamma were preferred, and an artificial filter of 70 API units was used to identify preferred intervals.

acoustic travel time – acoustic travel time is related to the density and lithification of the rock. High density, well lithified rocks such as anhydrite and dolomite, have high velocity and short travel times. Well compacted sandstone has slightly lower velocities and longer travel times. Shale or siltstones, common components of these formations, have quite variable travel times (see Figure 5). The acoustic or sonic log is very useful as a lithologic indicator and for stratigraphic correlation; in combination with other logs, it can be used for porosity estimates.

neutron – the neutron log responds to hydrogen (H) in the rock; lower neutron returns to the sensor indicate more H, although the form (e.g., water, oil, gas, mineral form such as hydrated minerals or clays) is not indicated by this log. High neutron intervals are avoided here because they are likely cemented, with little available porosity.

density – density is particularly useful in diagnosing lithology, especially in evaporites where halite is present. Here, high density rocks such as limestones are generally not selected as they tend to exhibit other characteristics not expected to be suitable.

resistivity – several kinds of "electric" logs measure resistivity. Here the laterolog is the most common. Resistivity is an important characteristic as it is related strongly to the permeability and porosity of the rock. Fluid type (e.g., brine vs fresh water) affect resistivity, but this analysis focuses more simply on lower resistivity in general, with the general assumption that water at these depths is unlikely to be fresh.

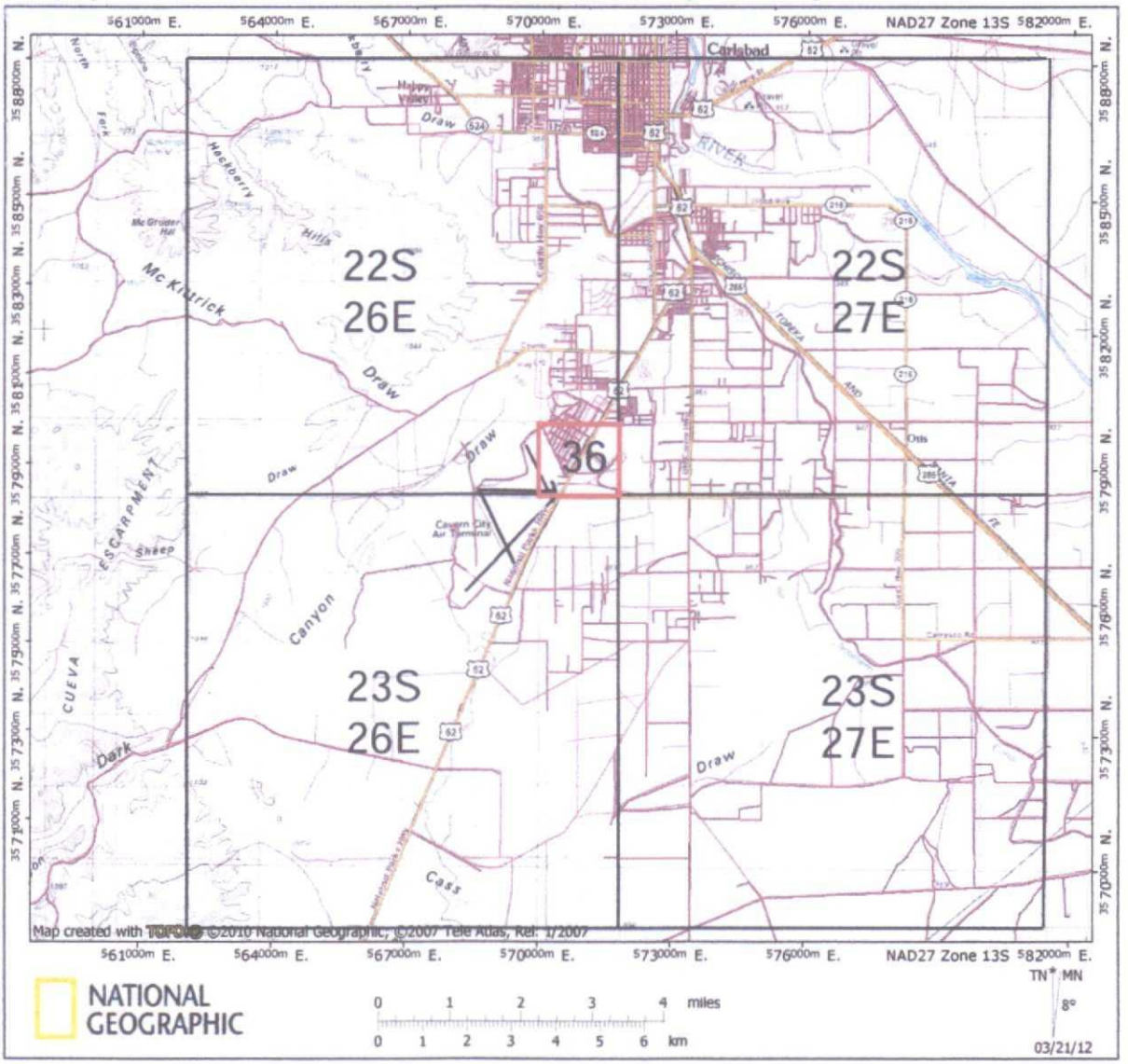
other – the log files include many other types of logs, and these were generally not examined because of the presence of more suitable log types.

Data Sources

Geophysical logs are publically available through the OCD website (http://ocdimage.emnrd.state.nm.us/imaging/). Because some logs were not available from this source or the log images were poor, a few logs were purchased by me from TGS-NOPEC. These are available to anyone who has a membership. All logs used in illustrations in this report are from public sources.

The literature on the DMG and related rocks is voluminous. A few references are cited here. The New Mexico Bureau of Geology & Mineral Resources (formerly New Mexico Bureau of Mines and Mineral Resources) produces publications and staff reports that are relevant to this and other aspects of New Mexico geology (http://geoinfo.nmt.edu/).

Figure 1. General location map with topography. Stratigraphic data were obtained mainly from these townships and immediately west to determine continuity and properties of DMG rocks. The proposed SWD well location is in section 36, marked by the red square.



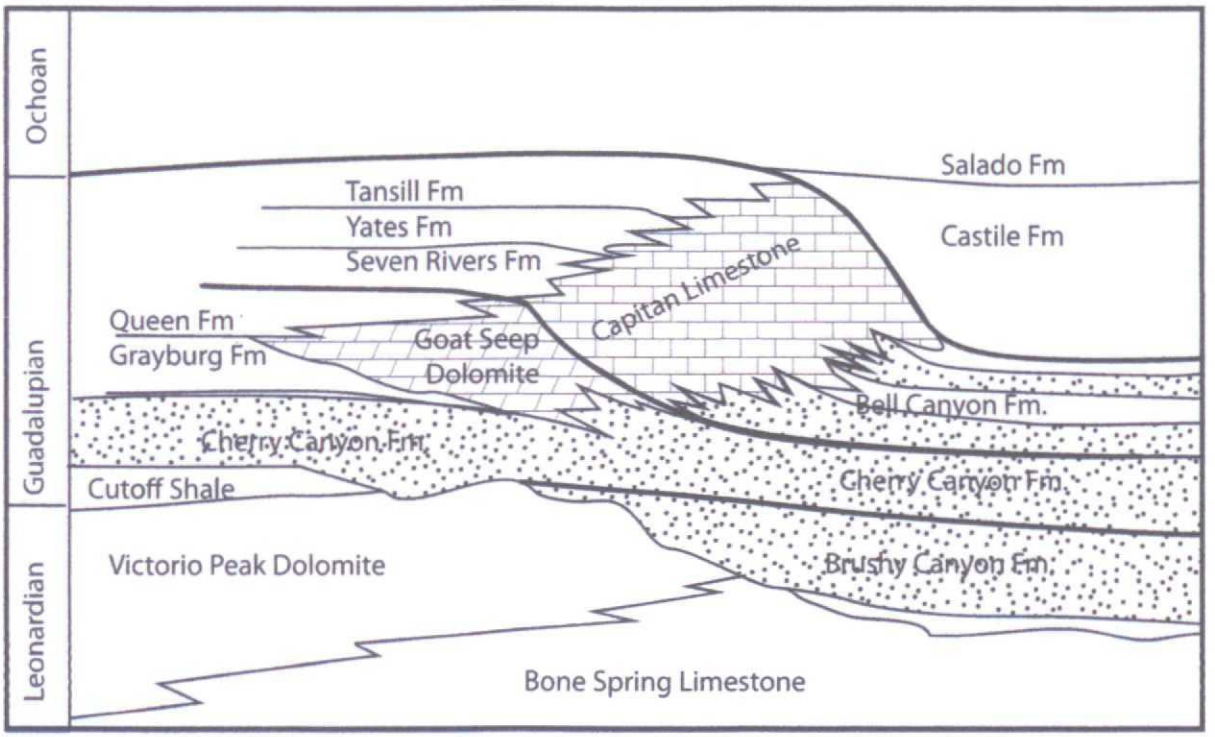
BACKGROUND GEOLOGY

Stratigraphic Units

The three formations of the DMG (Figure 2) are basin facies of shelf, reef, and backreef rocks of the Guadalupe Mountains. Their physical and stratigraphic relationships are complex and have been studied in great detail in outcrops and subsurface (e.g., King, 1948; Newell et al., 1972; Dunham, 1972). They were deposited mainly as slide and debris flow sediments driven by density currents along the sediment-water interface. They exhibit some erosive channeling with coarser deposits as well as lateral and distal fining as the density currents wane with distance into the deeper Delaware Basin. As a consequence, these deposits tend to be more elongate as sands and have finer "overbank" deposits. Delaware Basin drilling patterns since the mid to late 1980s for DMG exploration and development tend to show these channels very well.

The underlying unit to the DMG is the Bone Spring Limestone. It is persistent well beyond northwestern limits of the Delaware Basin. Broadhead and Gillard (2005) developed structure contours (elevation) on the top of the formation across southeastern New Mexico, with some data in the vicinity of the proposed SWD well location. For the geophysical log interpretation, the top was picked as closely as practical to the same signatures as Broadhead and Gillard used. They report (op cit., p. 7) that "in most places within the Delaware Basin, the top of the Bone Spring is marked by the boundary between the dark micritic limestones of the uppe Bone Spring and the sandstone, siltstone, and shales of the overlying Brushy

Figure 2. Stratigraphic units in the area around the proposed SWD location. Delaware Mountain Group units (Brushy Canyon, Cherry Canyon, and Bell Canyon are mainly Delaware Basin equivalents to reef and earlier rocks in the Guadalupe Mountains.



Canyon Formation of the Delaware Mountain Group." In many logs, there is a short section of high natural gamma at or near the top of the high density limestones that may be called the Cutoff Shale or Formation. It is not distinguished here from Brushy Canyon. The natural gamma and acoustic travel time log from Airport Grace No. 1 (API 30-015-20829) located 1980' fsl, 2164' fwl, section 36, T22S, R26E is taken as a reference log (Figure 3) in section 36 in view of the variable information from other wells. It displays the sharp increase in acoustic velocity of the dense limestones below the contact compared to the lower velocities in the overlying Brushy Canyon (and Cutoff).

The Brushy Canyon is about 1148 ft thick at the reference well (5230 ft - 4082 ft). The natural gamma shows generally shorter segments of lower values (less than ~70 API units) indicating sands. Some of these segments are overlain by intervals of increasing natural gamma upward that indicate upward fining (e.g. 4900-4700 ft). Higher acoustic travel times (lower velocity) coincident with some of the lower natural gamma may be indicating somewhat limited cements and greater porosity/permeability (e.g., 4540-4500 ft). These alternating signatures are consistent with the origin of of the formation by deep-water density currents (Harms, 1974).

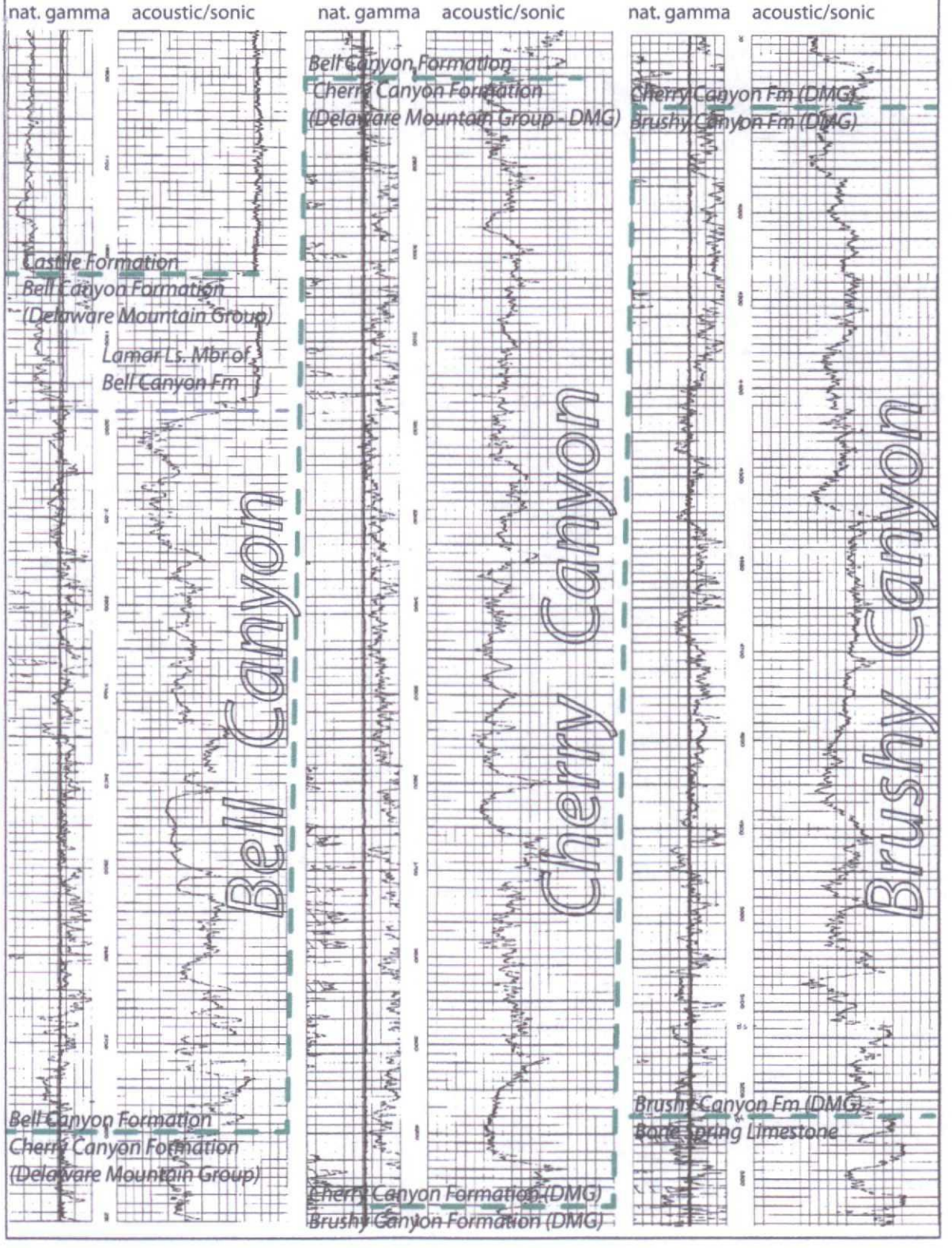
The Cherry Canyon is ~1276 ft thick (4082-2806 ft) as interpreted here. The basal contact with the Brushy Canyon is commonly marked by a large increase in natural gamma above the main body of the Brushy Canyon. At the reference well, there is an increase in the acoustic velocity (lower travel time), followed upward by a decrease in gamma and decrease in velocity. This contact was not clearly defined in several wells interpreted within the area around the proposed site. The upper contact of Cherry Canyon with Bell Canyon is placed at the base of a small sandstone (lower natural gamma) that is associated with a marked increase in acoustic velocity as well as changes in neutron, density, and resistivity. The Cherry Canyon displays much increased natural gamma in the lower half (compared to the underlying Brushy Canyon), a zone of relatively uniform natural gamma ~400 ft thick, and another zone of increased and variable natural gamma toward the top of the formation. It formed similarly to Brushy Canyon, but in general appears to be finer-grained.

The Bell Canyon is 981 ft thick (2806-1825 ft) as interpreted at the reference well. The upper contact with the base of Castile Formation is marked by a sharp upward decrease in natural gamma to a very low baseline level and a high acoustic velocity or density above the contact. The Bell Canyon displays characteristics between that of Brushy Canyon and Cherry Canyon. The natural gamma tends to be lower than Cherry Canyon and somewhat more uniform. The acoustic log displays considerable variation between low and moderate velocities. From 1980-1870 ft, a low natural gamma and high acoustic velocity zone is here called the Lamar Limestone, a member of the Brushy Canyon. This unit is persistent in the area. Well files from OCD for the Salty Bill SWD well in section 36 indicate the equivalent zone is anhydrite. The velocity signature is consistent with either lithology, but the natural gamma is slightly high for most anhydrites in the basin.

Basin Structure and Alleged Faulting

The margin of the Delaware Basin is complex stratigraphically, with facies changes for the DMG that also reflect considerable difference in elevation for equivalent beds over short distances. To evaluate the local structure and

Figure 3 Delaware Mountain Group Stratigraphy
in Section 35, T22S, R26E, Airport Grace #1 (API 30-015-20829)



potential for faults, the contacts at top of Bone Spring, top of Brushy Canyon, top of Cherry Canyon, and base of Lamar Limestone were mapped as elevations and contoured (Figure 4; at end of report due to dimensions). The Bone Spring map was extended to the west to evaluate the alleged Carlsbad fault along the edge of the escarpment west of the proposed SWD location.

The Bone Spring contour map shows two important features: general eastward dip and no apparent displacements along the trend of the alleged Carlsbad fault (Kelley, 1971). This is consistent also with the findings of Hayes and Bachman (1979), in which they concluded (p. 9) "a careful field examination of the area of the Carlsbad Fault as described by Kelley failed to reveal any fault planes or fault scarps." The Carlsbad fault was located in section 6, T23S, R26E by Kelley and trended northeast across T22S, R26E.

The top of Brushy Canyon indicates an east to east-northeast dip and some possible channeling on the top of the formation by the overlying Cherry Canyon. There is uncertainty associated with interpreting this contact, as noted earlier, that make the channeling somewhat less certain, but it is not a feature that requires resolving for this project. There is some possible increase in dip to the west.

The top of Cherry Canyon is similar to top of Brushy Canyon. Data are sparse along the trend of the alleged Carlsbad fault.

The base of Lamar Limestone Member also displays general eastward dip. There are variations in the south central part of T22S, R26E, along the trend of the alleged fault, but these are much more likely due to facies changes along the reef front, part of which is equivalent to the Lamar.

PROPOSED INJECTION INTERVALS

Criteria

The main inferences that can be drawn from geophysical logs relate to basic lithology and the potential for favorable properties (porosity and permeability). In the vicinity of the proposed SWD well location, each of the formations of the DMG was examined for several logs (Figure 5), and favorable zones were noted for each log. Intervals exceeding ~20 ft thickness and with favorable characteristics for several log properties were chosen and prioritized by quality, thickness, and depth.

The main criteria, as described previously, were for low (or lower) gamma (sandier), low neutron (presence of H), low resistivity (fluid and connectivity) and general range of acoustic travel times.

An overlay layer layer in Figure 5 includes the following:
labelled red dashed line on the left log to mark 70 API units, and
colored zones on the acoustic log indicating common ranges for some important lithologies.

The natural gamma log for each formation shows reddish rectangles opposite zones of gamma < 70 API units. The neutron log for each formation shows some orange rectangles for low neutron zones. The resistivity log for each formation shows pink rectangles for low resistivity. For each formation, the criteria were the same.

The results are simple to summarize. The Brushy Canyon shows thicker and more numerous zones with common more favorable properties for each log type. The Cherry Canyon shows little that is favorable, compared to the Brushy Canyon. The Bell

Figure 5 Delaware Mountain Group Log for Formations in Section 35, T22S, R26E, Airport Grace #1 (API 30-015-20829)

Note: figure has layers for each formation that can be accessed with Acrobat

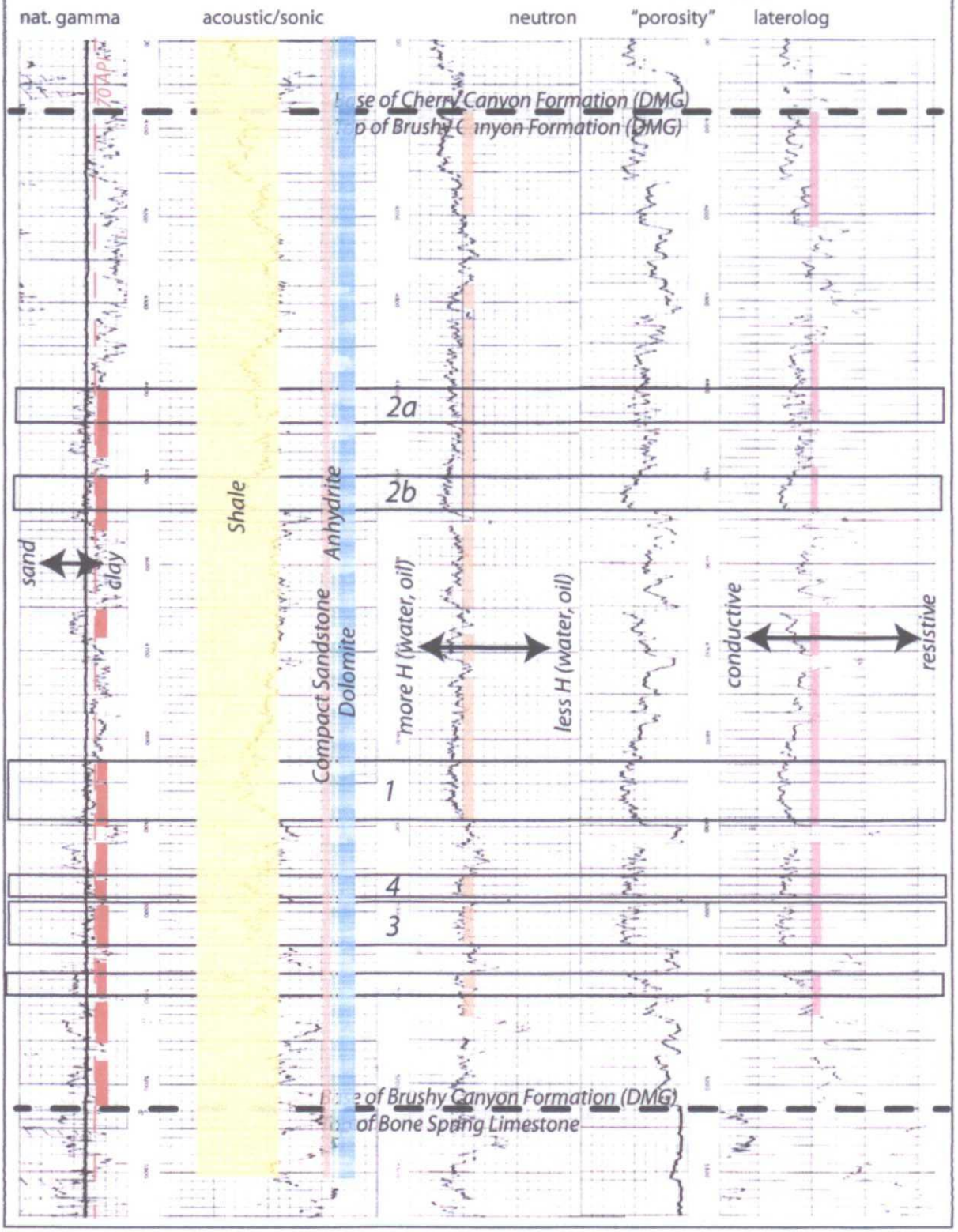


Figure 5 Delaware Mountain Group Log for Formations in Section 35, T22S, R26E, Airport Grace #1 (API 30-015-20829)

Note: figure has layers for each formation that can be accessed with Acrobat

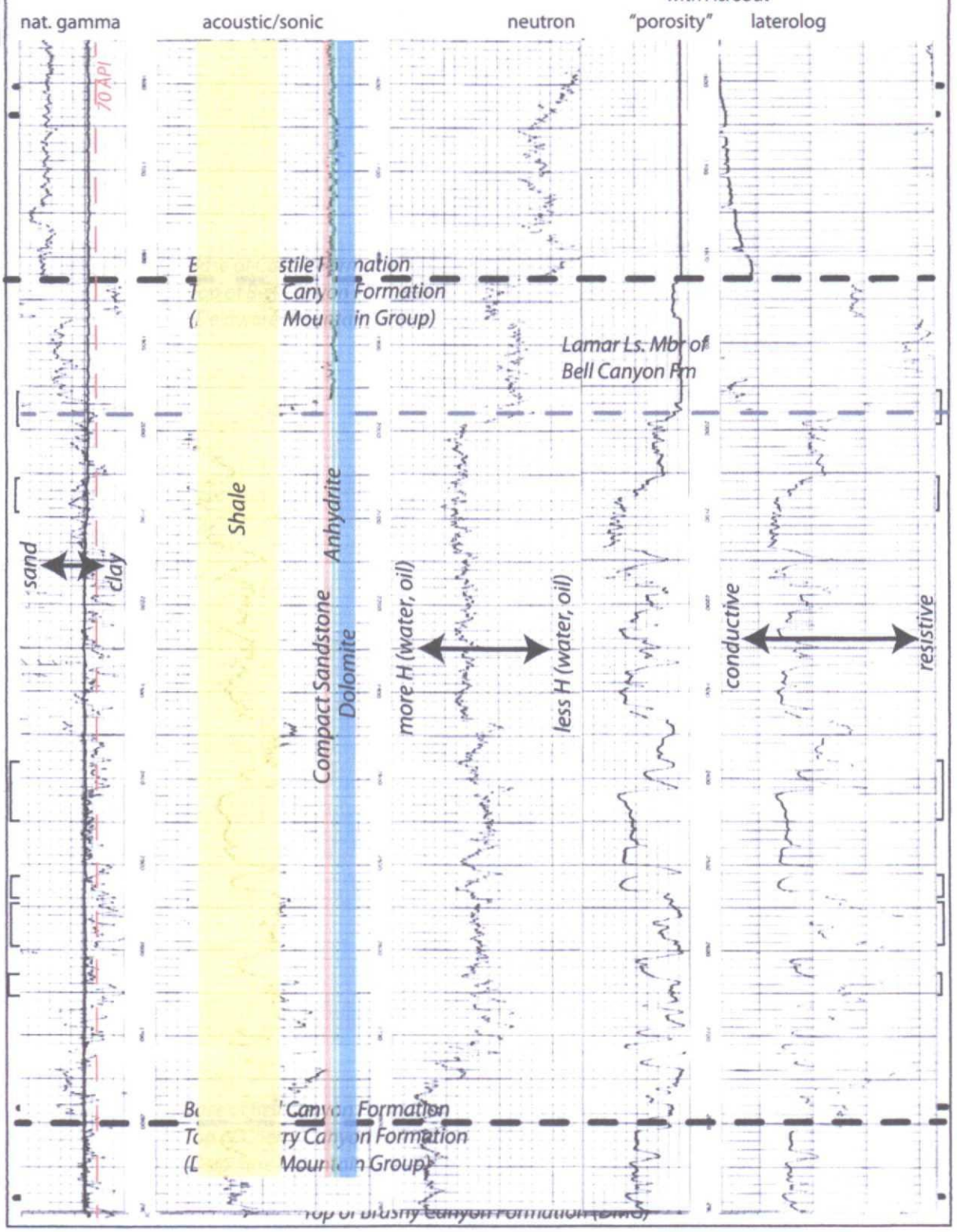
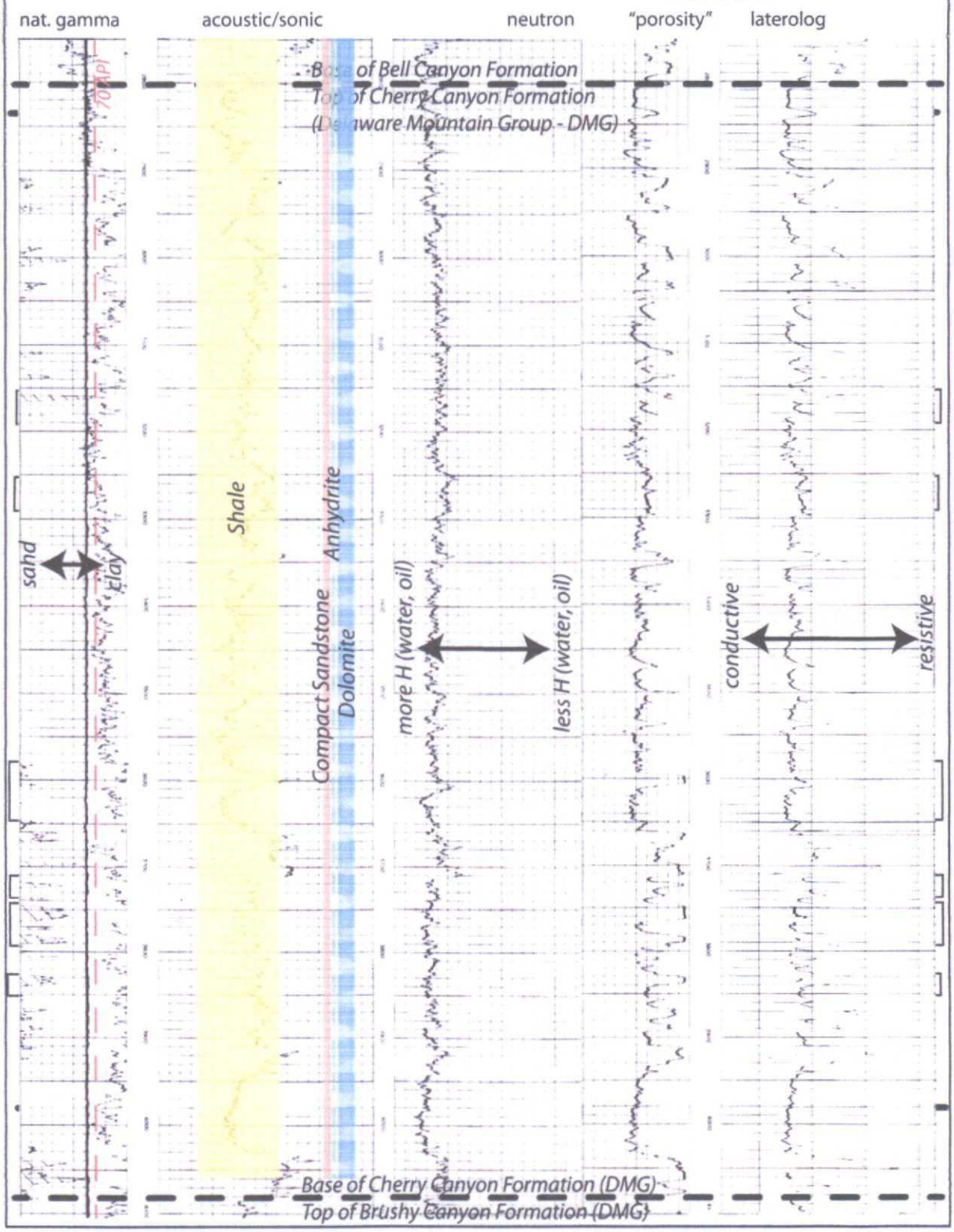


Figure 5 Delaware Mountain Group Log for Formations in Section 35, T22S, R26E, Airport Grace #1 (API 30-015-20829)

Note: figure has layers for each formation that can be accessed with Acrobat



Canyon is somewhat more promising than Cherry Canyon but mainly lacks thicker intervals.

The Brushy Canyon is also a preferred interval because it lacks direct stratigraphic connection to the Capitan reef, a significant local source of water. Other formations that are higher and closer to the Capitan have been used as injection wells without apparent issue, but first priority is for a different unit without direct connection.

Short log cross-sections (Figure 6; E-W, N-S) across the proposed location indicate both continuity and lateral heterogeneity of the rocks of the Brushy Canyon. Some of the sand units are correlated, while others appear to truncate or pinch out laterally. Some correlations suggest potential channeling. More detailed cross-sections with shorter spaces can better discriminate such channeling. There is apparent significant continuity with some of the intervals to indicate larger areas for the injection unit, while the heterogeneity indicate lateral limits to migration of the injected fluid.

Lateral heterogeneity of the formation also indicates that specific intervals at the proposed location may differ somewhat from the reference well, requiring some adjustment based on geophysical logging of the well.

Priorities

Only intervals within the Brushy Canyon are given priority for testing.

Interval 1 is ~65 ft thick (4890-4825 ft). It is the thickest interval without combining short intervals of less favorable characteristics.

Interval 2a and 2b may offer ~80 ft combined if perforated separately. These two intervals are ~300 ft higher than interval 1.

Intervals 3 and 4, if combined, offer ~70-75 ft with preferred characteristics. These two intervals might be combined with interval 1 for ~150 ft.

Recommendations

As many of the suitable intervals 1-4 as are practical should be tested. Interval 1 is top priority as a single interval, but combining 1, 3, and 4 would be better. Intervals 2a and 2b, even if combined, would be lower priority although 2b has possibly the best characteristics overall.

A good range of open hole logs are recommended, to include natural gamma (spectral if possible), borehole compensated (BHC) neutron and BHC density, and multi-depth electrical logs (e.g., dual laterolog or better). I also recommend monitoring cuttings closely for hydrocarbon shows.

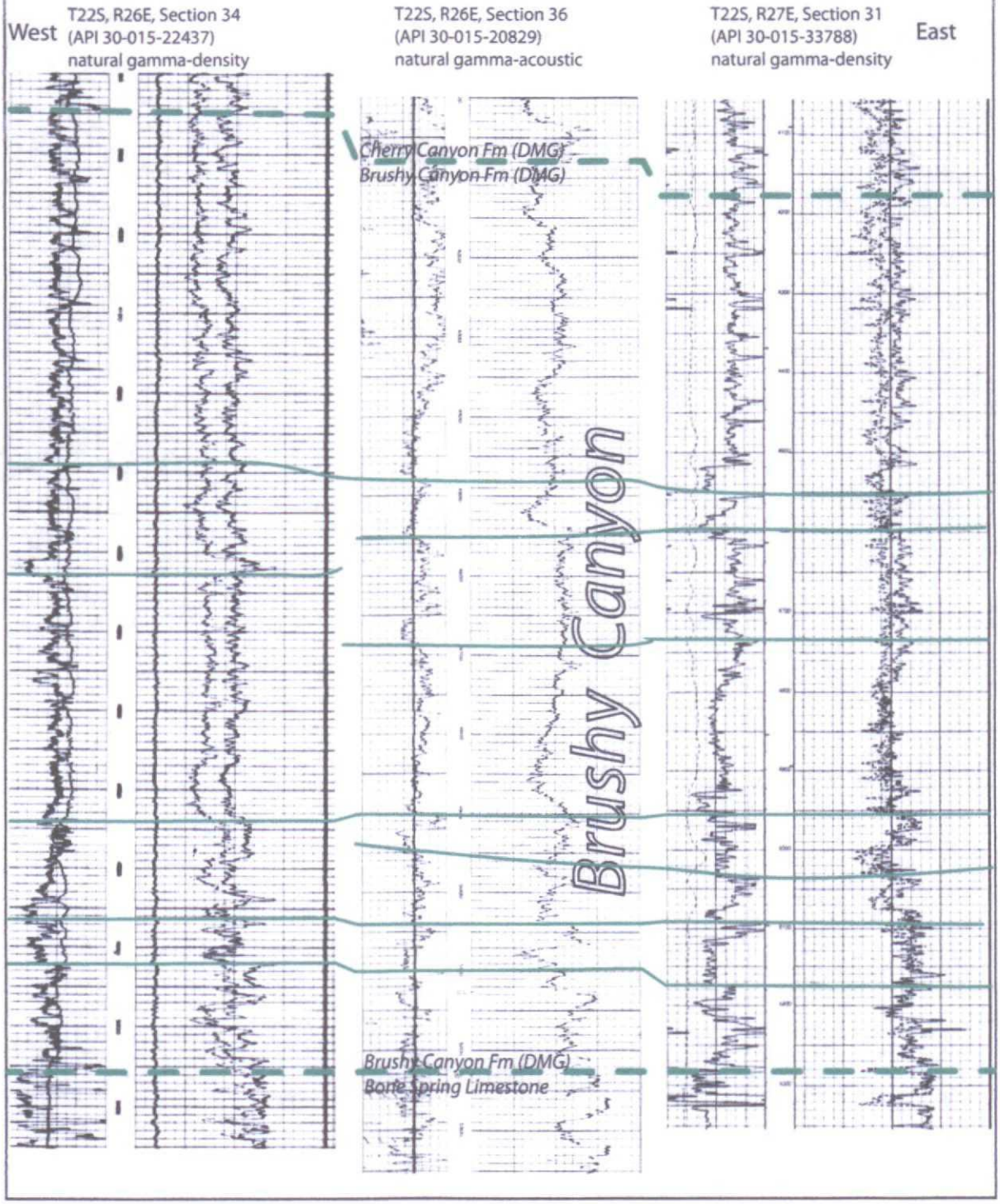
Resource Conflicts

There is some potential for conflict with resources in these formation, but they appear to be avoidable. Broadhead and Justman (undated) describe production from the lower Brushy Canyon sandstones south of the proposed location. This production may require additional examination to determine if there is conflict with some of the preferred lower intervals. There is also some production in the area from upper Cherry Canyon, but not immediately adjacent to the site.

These formations all produce in different parts of the basin.

Figure 6 North-South and East-West Log Cross-sections of Brushy Canyon Formation Through T22S, R26E, Section 36

Note: figure has layers for each formation that can be accessed with Acrobat



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Kelley, V.C., 1971, Geology of the Pecos country, southeastern New Mexico: New Mexico Bureau of Mines and Mineral Resources, Memoir 24, 75 p.

King, P.B., 1948, Geology of the southern Guadalup Mountains, Texas: U.S. Geological Survey Professional Paper 251, 183 p.

Newell, N.D., Rigby, J.K., Fischer, A.G., Whiteman, A.J., Hickox, J.E., and Bradley, J.S., 1972, The Permian reef complex of the Guadalup Mountains region, Texas and New Mexico: A study in Paleoecology: Hafner Publishing Company, New York, 236 p.

Figure 4
Elevation (ft amsl) of the Bone Spring, Brushy Canyon, Cherry Canyon, and Lamar Limestone Member of the Bell Canyon Formation.

Note: each map can be observed separately in the pdf.

Contour interval 100 ft

Red contours are lows

C-108 Section VIII (underground sources of drinking water) and Section X1 (chemical analysis of water wells).

AREA Hydrology:

Introduction:

The proposed saltwater disposal (SWD) injection well API # 30-015-20573, UL I- Section 36-Township 22 South-Range 26 East, is sited in the Pecos River Valley which is part of the Carlsbad Underground Water Basin in southeastern New Mexico.

There are two important aquifers in the Carlsbad area: The *Pecos River Valley alluvial aquifer* associated with the Pecos River and its tributaries, and a karstic carbonate aquifer associated with the *Permian Capitan Reef*. Both aquifers provide significant amounts of water for irrigation, municipal, and industrial purposes. Other formations provide small amounts of water to wells. Water in these formations, for the most part, are disconnected from the alluvial and reef aquifers (Bjorklund and Motts, 1959).

The proposed SWD injection well is located within the alluvial aquifer and is approximately four miles east of the eastern edge of the Capitan Reef. Figure 2-1 in the Appendix shows the location of the proposed SWD injection well in reference to the configuration of the Capitan Reef and Alluvial Aquifers in the Carlsbad area.

Currently, the closest public water supply that could be impacted is located over five miles from the site. Figure 2-1 modified shows the locations of the Carlsbad, Loving, and Otis-Malaga water well fields in retrospect to the proposed SWD. Ground water in this area is somewhat limited, with some dry holes being encountered, while in other wells, groundwater may be present both in shallow lenses 30-60 feet deep and in deeper horizons i.e. 100-250 feet. The shallow groundwater in this area is typically not used for drinking water and when found is in very limited quantity. The deeper zone is considered usable as an irrigation water source, when sufficient quantities are found, with an average quality concentration of 500-2000 mg/l of total dissolved solids.

The closest major surface water feature is Dark Canyon located west of the proposed SWD approximately one mile. The rim of the canyon has an elevation higher than the proposed site thus no run-off from the site would impact this feature. The site drains very well with most of the water sheet flowing generally in an easterly direction. The proposed location is not within a designated floodplain pursuant to the city of Carlsbad and Eddy County FEMA maps.

The *Pecos River Valley Alluvium aquifer* consists of surficial deposits associated with the Pecos River and its tributaries. This aquifer connects directly to stream courses in the region and is recharged by a variety of natural and artificial sources.

The *Capitan Reef* is primarily a subterranean structure that underlies the northern part of the alluvial aquifer. Where the *reef aquifer is not present, as in the proposed SWD area*, the alluvial aquifer is directly underlain by the Permian Castile formation comprising up to 2,500 feet of evaporite beds and forms the basal boundary of most of the alluvial aquifer. These units form the southern and northern boundaries of the Pecos Valley Alluvium.

The alluvial aquifer consists of a variety of materials, ranging from very transmissive sands and gravels to low-permeability clays. Layers of hard, mineralized alluvial material are sometimes found at depth in the alluvium; such material can produce considerable amounts of water where it is either fractured or rendered more permeable by dissolution of carbonate rock.

Some alluvial aquifer wells near Dark Canyon obtain water from solution passages in dense limestone conglomerate (Hale, 1945). One such non-potable well is the old US Army airport well (now Carlsbad Airport Well #1) located in the NE/4 of Section 35-Ts 22S-R26E on the one mile fringe of the SWD area of review. Key Energy has sampled this well and the results are included in the Appendix for review

Generally groundwater levels in the alluvial aquifer slope from north to south and from west to east, indicating southward and southeastward groundwater flow toward the Pecos River. These general flow patterns are probably similar to the natural directions of flow that occurred in the basin before the effects of human activities were observed. However, due to excessive pumping and influence from the river canal system in the area, the groundwater flow at the site is now in a south-southwest direction.

Within the one-mile area of review, in the NW/4 of Section of 31-Ts-22s-R27e, Mr. Will Brantley, a local landowner, drilled an exploratory well 180 feet deep and encountered no water, either shallow or deep. However, In Section 30, Mr. Brantley has a water-well that is approximately 80-100 feet deep. Key Energy has sampled this well and the results are included in the Appendix for review.

A comprehensive review of water wells in the area was conducted by downloading records from the office of the State Engineers' (OSE) website and observations from on-site field visits. The review area included all sections surrounding the proposed location of the SWD well. It included sections 31,32,29,30,25,36,1,2,and 6 of Townships 22 & 23 South and Ranges 26 & 27 East.

The number of water wells were counted from each section and noted as follows: Section 31 has 08 wells, Section 32 has 21 wells, Section 29 has 16 wells, Section 30 has 11 wells, and Section 32 has 21 wells, Section 25 has 77 wells, Section 36 has 03 wells, Section 01 has 09 wells, and Section 02 has 07 wells, and Section 06 with 07 wells. A "one-mile" area of review (AOR) revealed that only 19 water wells are located within one-mile of the proposed SWD well site, and no wells were found within a (1/2) mile. Included in the Appendix is Figure AOR-1, showing the one-mile Area of Review (AOR) around the proposed SWD well injection site.

Reference Notes: The above referenced material *"in part"* was taken directly from the most recent study conducted by the New Mexico Office of the State Engineer (OSE), "THE CARLSBAD AREA GROUNDWATER FLOW MODEL" Prepared by: Dr. Peggy Barroll, New Mexico Office of the State Engineer-2004. The compilation of water wells and the area of review, including water samples were collected and generated by Wayne Price-Price LLC, a full time consultant for Key Energy Services LLC.

Area Hydrology Appendix:

Figure 2-1:	Configuration of the Capitan Reef and Alluvial Aquifers Near Carlsbad, NM.
Figure 2-1 Modified:	Local Groundwater Information.
Water Analysis:	Old Army Airport #1 (NE/4 of Section 35-Ts 22S-R26E).
	Brantley Well (Section 30-Ts 22S-R27E).
Figure AOR-1:	One Mile Area of Review map showing all water wells.

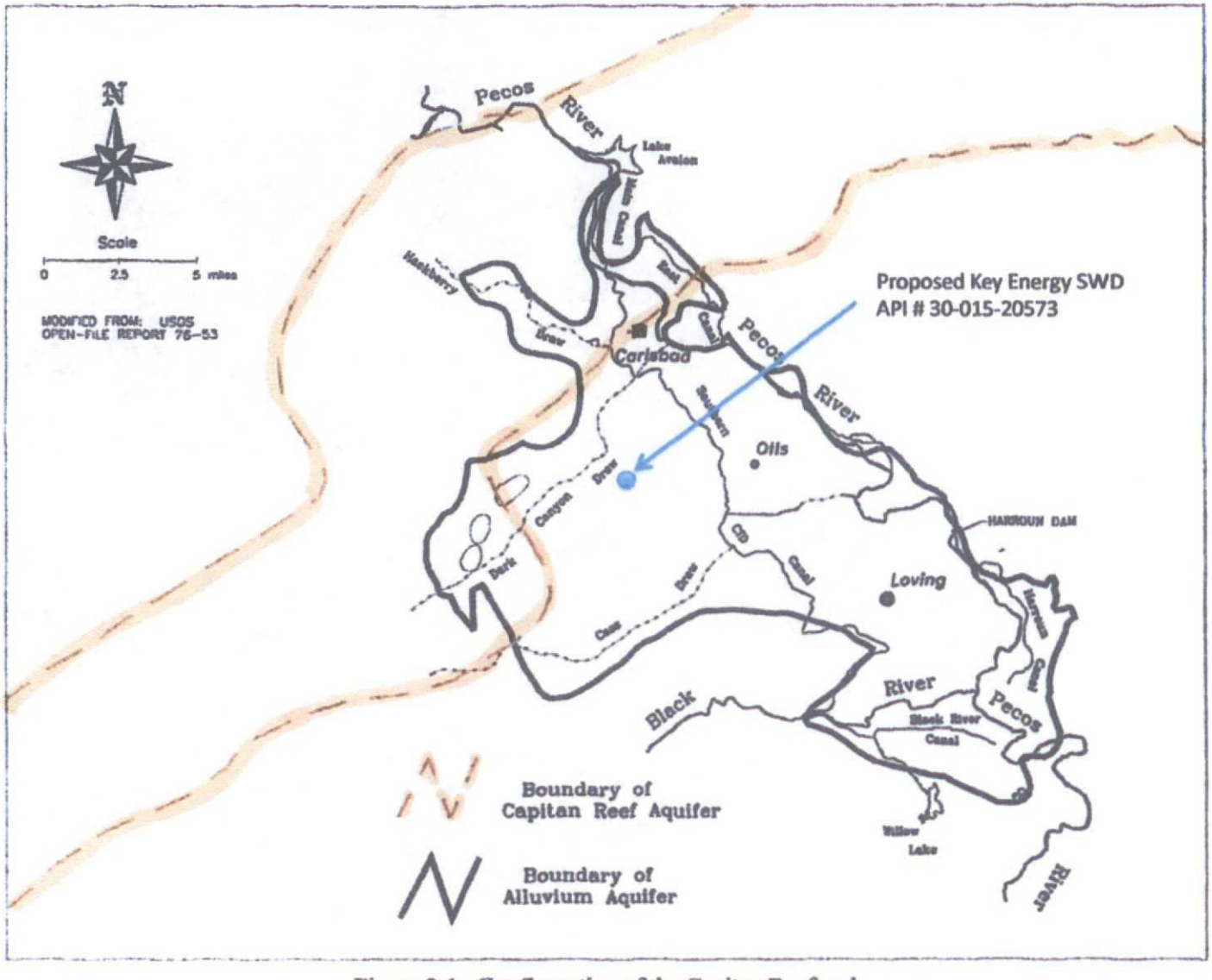

Figure 2-1. Configuration of the Capitan Reef and Alluvial Aquifers Near Carlsbad.

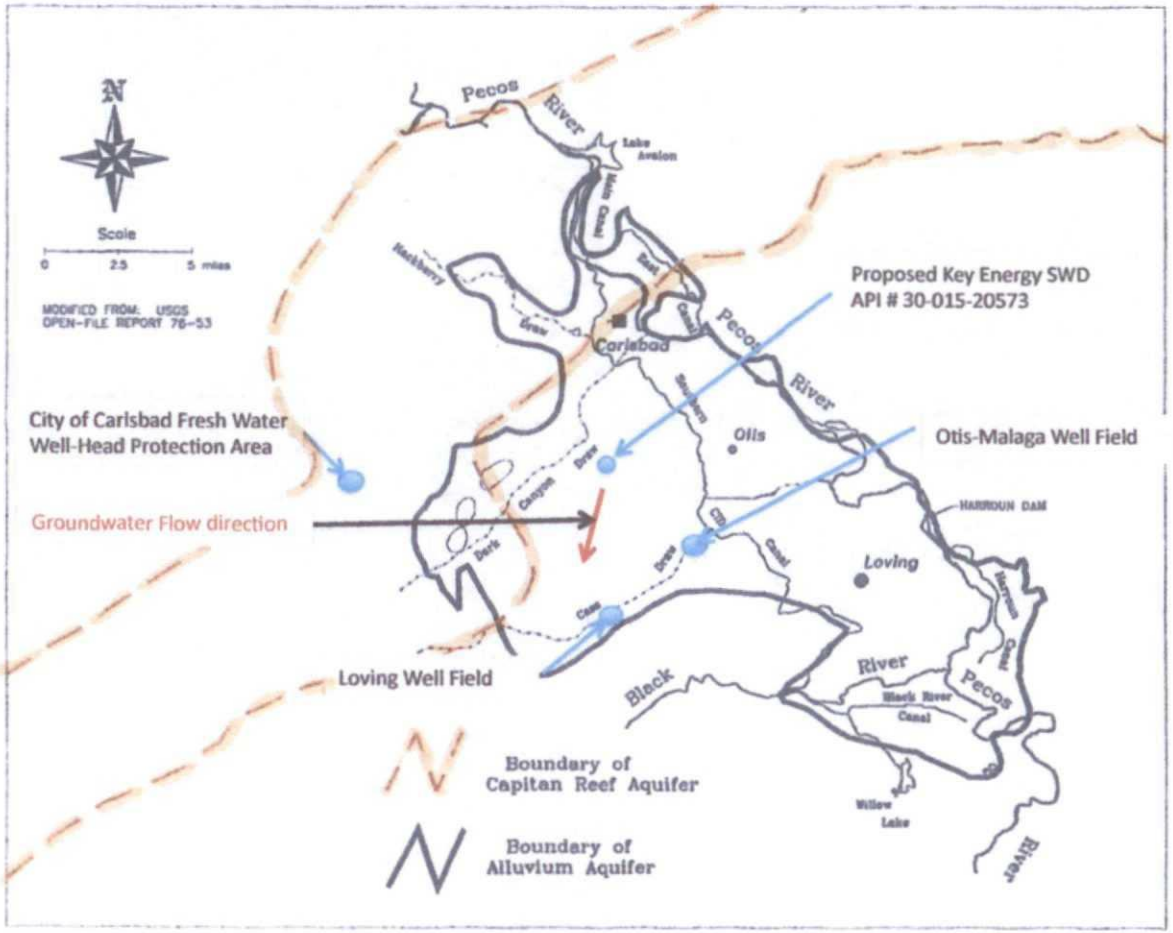

Figure 2-1. Configuration of the Capitan Reef and Alluvial Aquifers Near Carlsbad.

Figure 2-1 Modified: Local Groundwater Information- by Price LLC Feb 11, 2012

Summary Report

Wayne Price
Key Energy-Carlsbad
1609 E Green
Carlsbad, NM 88220

Report Date: July 6, 2011

Work Order: 11062823

Project Location: Carlsbad, NM
Project Name: Airport #1 WN
Project Number: Key-062711

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
270590	WW #1	water	2011-06-27	11:10	2011-06-28

Sample: 270590 - WW #1

Param	Flag	Result	Units	RL
Dissolved Silver		<0.00500	mg/L	0.005
Dissolved Aluminum		<0.0500	mg/L	0.05
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1
Bicarbonate Alkalinity		**240**	mg/L as CaCo3	4
Total Alkalinity		**240**	mg/L as CaCo3	4
Dissolved Arsenic		<0.0100	mg/L	0.01
Dissolved Boron		**0.0790**	mg/L	0.01
Dissolved Barium		**0.0800**	mg/L	0.01
Biochemical Oxygen Demand		<7.50	mg/L	2
Bromide	Q*	<5.00	mg/L	0.5
Dissolved Calcium		**81.5**	mg/L	1
Dissolved Potassium		**2.15**	mg/L	1
Dissolved Magnesium		**28.3**	mg/L	1
Dissolved Sodium		**17.5**	mg/L	1
Dissolved Cadmium		<0.00500	mg/L	0.005
Dissolved Cobalt		<0.00500	mg/L	0.005
Chemical Oxygen Demand		<50.0	mg/L	50
Specific Conductance		**683**	uMHOS/cm	
Dissolved Chromium		<0.0100	mg/L	0.01
Dissolved Copper		**0.0190**	mg/L	0.005

continued ...

sample 270590 continued ...

Param	Flag	Result	Units	RL
Density		**0.970**	g/ml	
Dissolved Iron		<0.0100	mg/L	0.01
Dissolved Mercury		<0.000200	mg/L	0.0002
Chloride	Qs	<25.0	mg/L	2.5
Fluoride	Qs	<5.00	mg/L	0.5
Sulfate	Qs	**54.7**	mg/L	2.5
Dissolved Manganese		<0.00500	mg/L	0.005
Dissolved Molybdenum		<0.0500	mg/L	0.05
Dissolved Nickel		<0.0100	mg/L	0.01
Nitrite-N	Qs	<5.00	mg/L	0.5
Nitrate-N	Qs	**5.81**	mg/L	0.5
Oil and Grease		<5.00	mg/L	5
Naphthalene		<0.000201	mg/L	0.0002
2-Methylnaphthalene		<0.000201	mg/L	0.0002
1-Methylnaphthalene		<0.000201	mg/L	0.0002
Acenaphthylene		<0.000201	mg/L	0.0002
Acenaphthene		<0.000201	mg/L	0.0002
Dibenzofuran		<0.000201	mg/L	0.0002
Fluorene		<0.000201	mg/L	0.0002
Anthracene		<0.000201	mg/L	0.0002
Phenanthrene		<0.000201	mg/L	0.0002
Fluoranthene		<0.000201	mg/L	0.0002
Pyrene		<0.000201	mg/L	0.0002
Benzo(a)anthracene		<0.000201	mg/L	0.0002
Chrysene		<0.000201	mg/L	0.0002
Benzo(b)fluoranthene		<0.000201	mg/L	0.0002
Benzo(k)fluoranthene		<0.000201	mg/L	0.0002
Benzo(a)pyrene		<0.000201	mg/L	0.0002
Indeno(1,2,3-cd)pyrene		<0.000201	mg/L	0.0002
Dibenzo(a,h)anthracene		<0.000201	mg/L	0.0002
Benzo(g,h,i)perylene		<0.000201	mg/L	0.0002
Dissolved Lead		<0.00500	mg/L	0.005
pH		**7.14**	s.u.	2
Dissolved Selenium		<0.0200	mg/L	0.02
Pyridine		<0.00500	mg/L	0.005
N-Nitrosodimethylamine		<0.00500	mg/L	0.005
2-Picoline		<0.00500	mg/L	0.005
Methyl methanesulfonate		<0.00500	mg/L	0.005
Ethyl methanesulfonate		<0.00500	mg/L	0.005
Phenol		<0.00500	mg/L	0.005
Aniline		<0.00500	mg/L	0.005
bis(2-chloroethyl)ether		<0.00500	mg/L	0.005
2-Chlorophenol		<0.00500	mg/L	0.005
1,3-Dichlorobenzene (meta)		<0.00500	mg/L	0.005
1,4-Dichlorobenzene (para)		<0.00500	mg/L	0.005
Benzyl alcohol		<0.00500	mg/L	0.005
1,2-Dichlorobenzene (ortho)		<0.00500	mg/L	0.005

continued ...

sample 270590 continued ...

Param	Flag	Result	Units	RL
2-Methylphenol		<0.00500	mg/L	0.005
bis(2-chloroisopropyl)ether		<0.00500	mg/L	0.005
4-Methylphenol / 3-Methylphenol		<0.00500	mg/L	0.005
N-Nitrosodi-n-propylamine		<0.00500	mg/L	0.005
Hexachloroethane		<0.00500	mg/L	0.005
Acetophenone		<0.00500	mg/L	0.005
Nitrobenzene		<0.00500	mg/L	0.005
N-Nitrosopiperidine		<0.00500	mg/L	0.005
Isophorone		<0.00500	mg/L	0.005
2-Nitrophenol		<0.00500	mg/L	0.005
2,4-Dimethylphenol		<0.00500	mg/L	0.005
bis(2-chloroethoxy)methane		<0.00500	mg/L	0.005
2,4-Dichlorophenol		<0.00500	mg/L	0.005
1,2,4-Trichlorobenzene		<0.00500	mg/L	0.005
Benzoic acid		<0.00500	mg/L	0.005
Naphthalene		<0.000200	mg/L	0.0002
a,a-Dimethylphenethylamine		<0.00550	mg/L	0.0055
4-Chloroaniline		<0.00500	mg/L	0.005
2,6-Dichlorophenol		<0.0100	mg/L	0.01
Hexachlorobutadiene	Qc	<0.00500	mg/L	0.005
N-Nitroso-di-n-butylamine		<0.00500	mg/L	0.005
4-Chloro-3-methylphenol		<0.00500	mg/L	0.005
2-Methylnaphthalene		<0.000200	mg/L	0.0002
1-Methylnaphthalene		<0.000200	mg/L	0.0002
1,2,4,5-Tetrachlorobenzene		<0.00500	mg/L	0.005
Hexachlorocyclopentadiene		<0.00500	mg/L	0.005
2,4,6-Trichlorophenol		<0.0100	mg/L	0.01
2,4,5-Trichlorophenol		<0.00500	mg/L	0.005
2-Chloronaphthalene		<0.00500	mg/L	0.005
1-Chloronaphthalene		<0.00500	mg/L	0.005
2-Nitroaniline		<0.00500	mg/L	0.005
Dimethylphthalate		<0.00500	mg/L	0.005
Acenaphthylene		<0.000200	mg/L	0.0002
2,6-Dinitrotoluene		<0.00500	mg/L	0.005
3-Nitroaniline		<0.00500	mg/L	0.005
Acenaphthene		<0.000200	mg/L	0.0002
2,4-Dinitrophenol		<0.00500	mg/L	0.005
Dibenzofuran		<0.000200	mg/L	0.0002
Pentachlorobenzene		<0.00500	mg/L	0.005
4-Nitrophenol		<0.0250	mg/L	0.025
2,4-Dinitrotoluene		<0.00500	mg/L	0.005
1-Naphthylamine		<0.00500	mg/L	0.005
2,3,4,6-Tetrachlorophenol		<0.0100	mg/L	0.01
2-Naphthylamine		<0.00500	mg/L	0.005
Fluorene		<0.000200	mg/L	0.0002
4-Chlorophenyl-phenylether		<0.00500	mg/L	0.005
Diethylphthalate		<0.00500	mg/L	0.005

continued ...

sample 270590 continued ...

Param	Flag	Result	Units	RL
4-Nitroaniline		<0.00500	mg/L	0.005
Diphenylhydrazine		<0.00500	mg/L	0.005
4,6-Dinitro-2-methylphenol		<0.00500	mg/L	0.005
Diphenylamine		<0.00500	mg/L	0.005
4-Bromophenyl-phenylether		<0.00500	mg/L	0.005
Phenacetin		<0.00500	mg/L	0.005
Hexachlorobenzene		<0.00500	mg/L	0.005
4-Aminobiphenyl		<0.00500	mg/L	0.005
Pentachlorophenol		<0.100	mg/L	0.1
Anthracene		<0.000200	mg/L	0.0002
Pentachloronitrobenzene		<0.00500	mg/L	0.005
Pronamide		<0.00500	mg/L	0.005
Phenanthrene		<0.000200	mg/L	0.0002
Di-n-butylphthalate		<0.00500	mg/L	0.005
Fluoranthene		<0.000200	mg/L	0.0002
Benzidine		<0.0250	mg/L	0.025
Pyrene		<0.000200	mg/L	0.0002
p-Dimethylaminoazobenzene		<0.00500	mg/L	0.005
Butylbenzylphthalate		<0.00500	mg/L	0.005
Benzo(a)anthracene		<0.000200	mg/L	0.0002
3,3-Dichlorobenzidine		<0.00500	mg/L	0.005
Chrysene		<0.000200	mg/L	0.0002
bis(2-ethylhexyl)phthalate		<0.00500	mg/L	0.005
Di-n-octylphthalate	Qc	<0.00500	mg/L	0.005
Benzo(b)fluoranthene		<0.000200	mg/L	0.0002
Benzo(k)fluoranthene		<0.000200	mg/L	0.0002
7,12-Dimethylbenz(a)anthracene		<0.00500	mg/L	0.005
Benzo(a)pyrene		<0.000200	mg/L	0.0002
3-Methylcholanthrene		<0.00500	mg/L	0.005
Dibenzo(a,j)acridine		<0.00500	mg/L	0.005
Indeno(1,2,3-cd)pyrene		<0.000200	mg/L	0.0002
Dibenzo(a,h)anthracene	Qs	<0.000200	mg/L	0.0002
Benzo(g,h,i)perylene		<0.000200	mg/L	0.0002
Dissolved Strontium		**0.374**	mg/L	0.005
Total Dissolved Solids		**401.0**	mg/L	10
Total Organic Carbon		<1.00	mg/L	1
Total Cyanide		<0.0150	mg/L	0.015
Total Suspended Solids		**3.00**	mg/L	1
Total Uranium		<0.0300	mg/L	0.03
Bromochloromethane		<1.00	µg/L	1
Dichlorodifluoromethane	Qc	<1.00	µg/L	1
Chloromethane (methyl chloride)		<1.00	µg/L	1
Vinyl Chloride		<1.00	µg/L	1
Bromomethane (methyl bromide)		<5.00	µg/L	5
Chloroethane		<1.00	µg/L	1
Trichlorofluoromethane		<1.00	µg/L	1
Acetone	Qc	<10.0	µg/L	10

continued ...

sample 270590 continued ...

Param	Flag	Result	Units	RL
Iodomethane (methyl iodide)		<5.00	µg/L	5
Carbon Disulfide		<1.00	µg/L	1
Acrylonitrile		<1.00	µg/L	1
2-Butanone (MEK)	Qc	<5.00	µg/L	5
4-Methyl-2-pentanone (MIBK)		<5.00	µg/L	5
2-Hexanone	Qc	<5.00	µg/L	5
trans 1,4-Dichloro-2-butene		<10.0	µg/L	10
1,1-Dichloroethene		<1.00	µg/L	1
Methylene chloride		<5.00	µg/L	5
MTBE		<1.00	µg/L	1
trans-1,2-Dichloroethene		<1.00	µg/L	1
1,1-Dichloroethane		<1.00	µg/L	1
cis-1,2-Dichloroethene		<1.00	µg/L	1
2,2-Dichloropropane		<1.00	µg/L	1
1,2-Dichloroethane (EDC)		<1.00	µg/L	1
Chloroform		<1.00	µg/L	1
1,1,1-Trichloroethane		<1.00	µg/L	1
1,1-Dichloropropene		<1.00	µg/L	1
Benzene		<1.00	µg/L	1
Carbon Tetrachloride		<1.00	µg/L	1
1,2-Dichloropropane		<1.00	µg/L	1
Trichloroethene (TCE)		<1.00	µg/L	1
Dibromomethane (methylene bromide)		<1.00	µg/L	1
Bromodichloromethane		<1.00	µg/L	1
2-Chloroethyl vinyl ether		<5.00	µg/L	5
cis-1,3-Dichloropropene		<1.00	µg/L	1
trans-1,3-Dichloropropene		<1.00	µg/L	1
Toluene		<1.00	µg/L	1
1,1,2-Trichloroethane		<1.00	µg/L	1
1,3-Dichloropropane		<1.00	µg/L	1
Dibromochloromethane		<1.00	µg/L	1
1,2-Dibromoethane (EDB)	Qs	<1.00	µg/L	1
Tetrachloroethene (PCE)	Qc	<1.00	µg/L	1
Chlorobenzene	Qs	<1.00	µg/L	1
1,1,1,2-Tetrachloroethane		<1.00	µg/L	1
Ethylbenzene	Qs	<1.00	µg/L	1
m,p-Xylene	Qs	<1.00	µg/L	1
Bromoform		<1.00	µg/L	1
Styrene	Qs	<1.00	µg/L	1
o-Xylene	Qs	<1.00	µg/L	1
1,1,2,2-Tetrachloroethane	Qc	<1.00	µg/L	1
2-Chlorotoluene	Qs	<1.00	µg/L	1
1,2,3-Trichloropropane		<1.00	µg/L	1
Isopropylbenzene	Qs	<1.00	µg/L	1
Bromobenzene		<1.00	µg/L	1
n-Propylbenzene	Qs	<1.00	µg/L	1
1,3,5-Trimethylbenzene	Qs	<1.00	µg/L	1

continued ...

sample 270590 continued ...

Param	Flag	Result	Units	RL
tert-Butylbenzene		<1.00	µg/L	1
1,2,4-Trimethylbenzene	Qs	<1.00	µg/L	1
1,4-Dichlorobenzene (para)	Qs	<1.00	µg/L	1
sec-Butylbenzene		<1.00	µg/L	1
1,3-Dichlorobenzene (meta)	Qs	<1.00	µg/L	1
p-Isopropyltoluene		<1.00	µg/L	1
4-Chlorotoluene	Qs	<1.00	µg/L	1
1,2-Dichlorobenzene (ortho)	Qs	<1.00	µg/L	1
n-Butylbenzene		<1.00	µg/L	1
1,2-Dibromo-3-chloropropane		<5.00	µg/L	5
1,2,3-Trichlorobenzene	Qc	<5.00	µg/L	5
1,2,4-Trichlorobenzene	Qc	<5.00	µg/L	5
Naphthalene	Qc	<5.00	µg/L	5
Hexachlorobutadiene	Qc	<5.00	µg/L	5
Dissolved Zinc		**0.474**	mg/L	0.005

Summary Report

Wayne Price
Key Energy-Rio Rancho
312 Encanatado Ridge Ct. NE
Rio Rancho, NM 87124

Report Date: May 26, 2011

Work Order: 11051620

Project Location: Carlsbad, NM
Project Name: Brantley WW-Sec. 30
Project Number: BWW-30

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
266643	Brantley WW-30	water	2011-05-12	16:46	2011-05-16

Sample: 266643 - Brantley WW-30

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.005
Total Aluminum		**0.116**	mg/L	0.05
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1
Bicarbonate Alkalinity		**190**	mg/L as CaCo3	4
Total Alkalinity		**190**	mg/L as CaCo3	4
Total Arsenic		<0.0100	mg/L	0.01
Total Boron		**0.130**	mg/L	0.01
Total Barium		**0.0190**	mg/L	0.01
Bromide		<25.0	mg/L	0.5
Dissolved Calcium		**148**	mg/L	0.1
Dissolved Potassium		**6.27**	mg/L	0.1
Dissolved Magnesium		**67.2**	mg/L	0.1
Dissolved Sodium		**88.0**	mg/L	0.1
Total Cadmium		<0.00500	mg/L	0.005
Chloride		**164**	mg/L	2.5
Total Cobalt		<0.00500	mg/L	0.005
Specific Conductance		**1680**	uMHOS/cm	
Total Chromium		<0.0100	mg/L	0.01
Total Copper		<0.00500	mg/L	0.005
Total Iron		**0.122**	mg/L	0.01

continued ...

sample 266643 continued ...

Param	Flag	Result	Units	RL
Fluoride		<25.0	mg/L	0.5
Total Mercury		<0.000200	mg/L	0.0002
Total Manganese		<0.00500	mg/L	0.005
Total Molybdenum		<0.0500	mg/L	0.05
Total Nickel		<0.0100	mg/L	0.01
Nitrate-N		<25.0	mg/L	0.5
Total Lead		<0.00500	mg/L	0.005
pH		**7.36**	s.u.	2
Total Selenium		<0.0200	mg/L	0.02
Sulfate		**316**	mg/L	2.5
Total Dissolved Solids		**1068**	mg/L	10
Total Cyanide		<0.0150	mg/L	0.015
Total Suspended Solids		**7.00**	mg/L	1
Total Uranium		<0.0300	mg/L	0.03
Total Zinc		<0.00500	mg/L	0.005

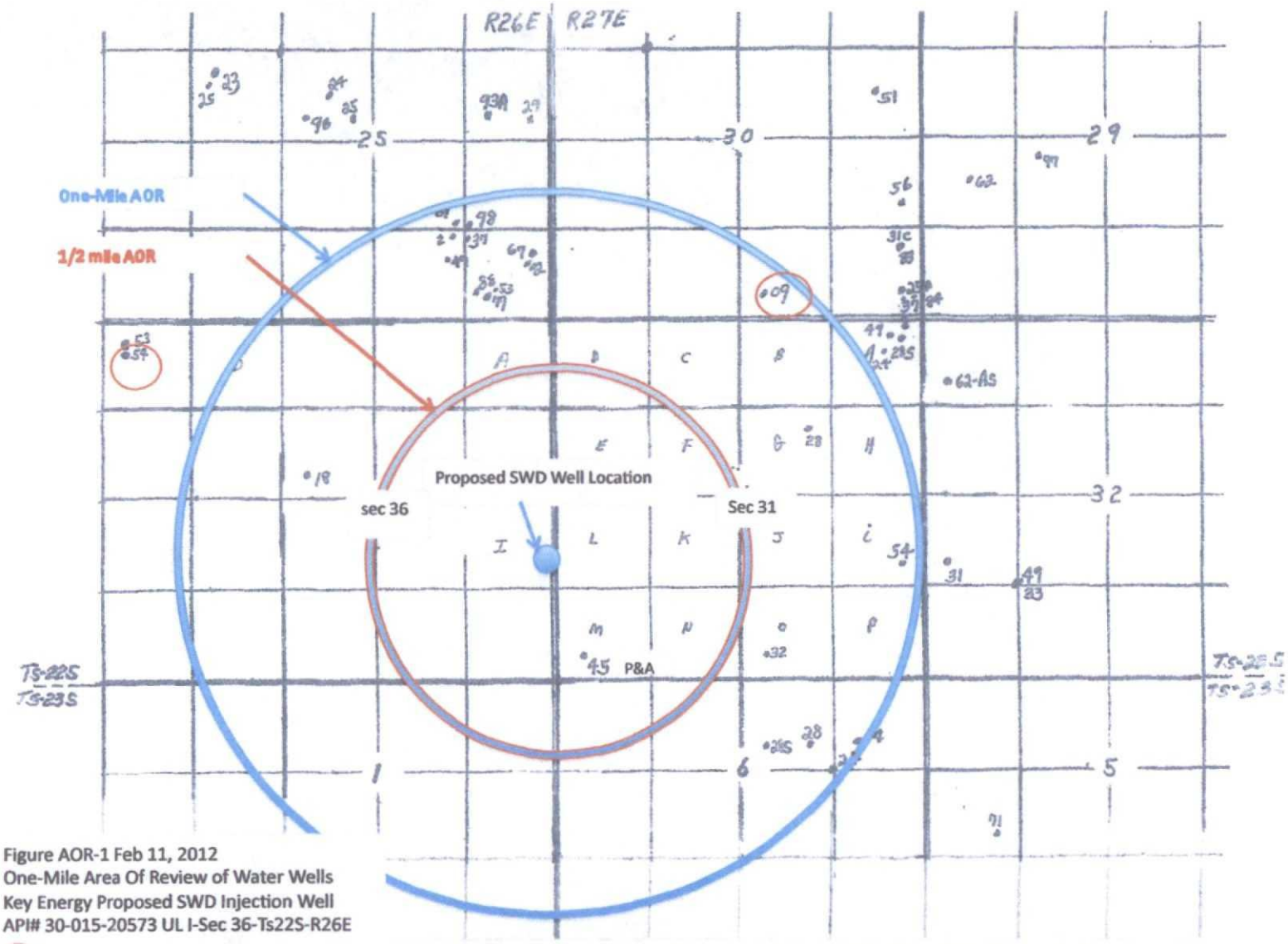

Figure AOR-1 Feb 11, 2012
One-Mile Area Of Review of Water Wells
Key Energy Proposed SWD Injection Well
API# 30-015-20573 UL I-Sec 36-Ts22S-R26E

Denotes wells that were sampled

Note: Well locations were taken from the NMOSE website. Wells are labeled using the last two digits of the POD#.
Example: Well #28 shown in UL G-Sec 31-Ts22S-R27E is well# C00228 as registered on the OSE website list.
Well 45 in UL M-31-Ts22S-R27E is P&A.

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

April 20, 2012

KEY ENERGY

KEY ENERGY - EUNICE

P. O. BOX 99

EUNICE, NM 88230

RE: BKE LOVING, NM

Enclosed are the results of analyses for samples received by the laboratory on 04/02/12 14:45.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list on accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
P WATER TANK	H200775-01	Water	02-Apr-12 11:30	02-Apr-12 14:45
P WATER THE BONE SPRIN	H200775-02	Water	02-Apr-12 11:30	02-Apr-12 14:45

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

P WATER TANK

H200775-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Inorganic Compounds									
Alkalinity, Bicarbonate	**181**	5.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	
Calcium	**7210**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	
Chloride	**118000**	4.00	mg/L	1	2040412	AP	09-Apr-12	4500-Cl-B	
Conductivity	**324000**	1.00	uS/cm	1	2041108	HM	03-Apr-12	120.1	
Magnesium	**1330**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
pH	**6.26**	0.100	pH Units	1	2041107	HM	03-Apr-12	150.1	
Potassium	**1160**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Sodium	**53000**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Sulfate	**849**	10.0	mg/L	1	2040403	HM	03-Apr-12	375.4	
TDS	**186000**	5.00	mg/L	1	2040402	HM	03-Apr-12	160.1	
Alkalinity, Total	**148**	4.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	

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*=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

P WATER THE BONE SPRINGS

H200775-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Inorganic Compounds									
Alkalinity, Bicarbonate	**259**	5.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	
Calcium	**3610**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	
Chloride	**134000**	4.00	mg/L	1	2040412	HM	09-Apr-12	4500-Cl-B	
Conductivity	**350000**	1.00	uS/cm	1	2041108	HM	03-Apr-12	120.1	
Magnesium	**751**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
pH	**6.26**	0.100	pH Units	1	2041107	HM	03-Apr-12	150.1	
Potassium	**1420**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Sodium	**58800**	50.0	mg/L	50	2041906	CK	17-Apr-12	200.7	GAL
Sulfate	**833**	10.0	mg/L	1	2040403	HM	03-Apr-12	375.4	
TDS	**175000**	5.00	mg/L	1	2040402	HM	03-Apr-12	160.1	
Alkalinity, Total	**212**	4.00	mg/L	1	2041909	HM	11-Apr-12	310.1M	

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Celey D. Keene

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CARDINAL Laboratories

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Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2040402 - Filtration										
Blank (2040402-BLK1)				Prepared: 03-Apr-12 Analyzed: 05-Apr-12						
TDS	ND	5.00	mg/L							
LCS (2040402-BS1)				Prepared & Analyzed: 03-Apr-12						
TDS	250		mg/L	240		104	80-120			
Duplicate (2040402-DUP1)		**Source: H200776-01**		Prepared: 03-Apr-12 Analyzed: 05-Apr-12						
TDS	3130	5.00	mg/L		3160			0.954	20	
Batch 2040403 - NO PREP										
Blank (2040403-BLK1)				Prepared & Analyzed: 03-Apr-12						
Sulfate	ND	10.0	mg/L							
LCS (2040403-BS1)				Prepared & Analyzed: 03-Apr-12						
Sulfate	22.6	10.0	mg/L	20.0		113	80-120			
LCS Dup (2040403-BSD1)				Prepared & Analyzed: 03-Apr-12						
Sulfate	22.3	10.0	mg/L	20.0		111	80-120	1.34	20	
Duplicate (2040403-DUP1)		**Source: H200737-01**		Prepared & Analyzed: 03-Apr-12						
Sulfate	333	10.0	mg/L		354			6.11	20	
Batch 2040412 - General Prep - Wet Chem										
Blank (2040412-BLK1)				Prepared & Analyzed: 04-Apr-12						
Chloride	ND	4.00	mg/L							

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2040412 - General Prep - Wet Chem										
LCS (2040412-BS1)				Prepared & Analyzed: 04-Apr-12						
Chloride	100	4.00	mg/L	100		100	80-120			
LCS Dup (2040412-BSD1)				Prepared & Analyzed: 04-Apr-12						
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
Duplicate (2040412-DUP1)		Source: H200777-01		Prepared & Analyzed: 04-Apr-12						
Chloride	2200	4.00	mg/L		2100			4.65	20	
Batch 2041107 - General Prep - Wet Chem										
LCS (2041107-BS1)				Prepared & Analyzed: 03-Apr-12						
pH	10.1		pH Units	10.0		101	90-110			
Duplicate (2041107-DUP1)		Source: H200747-01		Prepared & Analyzed: 03-Apr-12						
pH	8.91	0.100	pH Units		8.86			0.563	20	
Batch 2041108 - General Prep - Wet Chem										
LCS (2041108-BS1)				Prepared & Analyzed: 02-Apr-12						
Conductivity	515		uS/cm	500		103	80-120			
Duplicate (2041108-DUP1)		Source: H200747-01		Prepared & Analyzed: 02-Apr-12						
Conductivity	4710	1.00	uS/cm		4730			0.424	20	
Batch 2041906 - Dissolved/Potentially Dissolved Metals										
Blank (2041906-BLK1)				Prepared: 12-Apr-12 Analyzed: 17-Apr-12						
Calcium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							

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CARDINAL Laboratories

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Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

DISSOLVED METALS BY ICP - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2041906 - Dissolved/Potentially Dissolved Metals										
LCS (2041906-BS1)				Prepared: 12-Apr-12 Analyzed: 17-Apr-12						
Calcium	5.27		mg/L	5.00		105	85-115			
Potassium	10.6		mg/L	10.0		106	85-115			
Magnesium	27.1		mg/L	25.0		108	85-115			
Sodium	8.58		mg/L	8.10		106	85-115			
LCS Dup (2041906-BSD1)				Prepared: 12-Apr-12 Analyzed: 17-Apr-12						
Magnesium	27.2		mg/L	25.0		109	85-115	0.368	20	
Sodium	8.56		mg/L	8.10		106	85-115	0.233	20	
Calcium	5.27		mg/L	5.00		105	85-115	0.00	20	
Potassium	10.8		mg/L	10.0		108	85-115	1.87	20	
Batch 2041909 - General Prep - Wet Chem										
Blank (2041909-BLK1)				Prepared & Analyzed: 11-Apr-12						
Alkalinity, Carbonate	ND	0.00	mg/L							
Alkalinity, Bicarbonate	9.76	5.00	mg/L							
Alkalinity, Total	8.00	4.00	mg/L							
LCS (2041909-BS1)				Prepared & Analyzed: 11-Apr-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120			
Alkalinity, Bicarbonate	117	5.00	mg/L				80-120			
Alkalinity, Total	104	4.00	mg/L	100		104	80-120			
LCS Dup (2041909-BSD1)				Prepared & Analyzed: 11-Apr-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	122	5.00	mg/L				80-120	4.18	20	
Alkalinity, Total	100	4.00	mg/L	100		100	80-120	3.92	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene

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CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

KEY ENERGY - EUNICE P. O. BOX 99 EUNICE NM, 88230	Project: BKE LOVING, NM Project Number: NOT GIVEN Project Manager: KEY ENERGY Fax To: NOT GIVEN	Reported: 20-Apr-12 09:14

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2041909 - General Prep - Wet Chem										
Duplicate (2041909-DUP1)	**Source: H200775-01**			Prepared & Analyzed: 11-Apr-12						
Alkalinity, Carbonate	ND	0.00	mg/L		0.00				20	
Alkalinity, Bicarbonate	185	5.00	mg/L		181			2.19	20	
Alkalinity, Total	152	4.00	mg/L		148			2.67	20	
Matrix Spike (2041909-MS1)	**Source: H200775-01**			Prepared & Analyzed: 11-Apr-12						
Alkalinity, Carbonate	ND	0.00	mg/L		0.00		70-130			
Alkalinity, Bicarbonate	332	5.00	mg/L		181		70-130			
Alkalinity, Total	272	4.00	mg/L	100	148	124	70-130			

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

GAL	Analysis subcontracted to Green Analytical Laboratories, a subsidiary of Cardinal Laboratories.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name:	KEY	BILL TO	
Project Manager:	N/A	P.O. #:	N/A
Address:	N/A	Company:	KEY
City:	N/A State: N/A Zip: N/A	Attn:	N/A
Phone #:	N/A Fax #: N/A	Address:	N/A
Project #:	N/A Project Owner: N/A	City:	N/A
Project Name:	N/A	State: N/A Zip: N/A	
Project Location:	BKE Loving NM	Phone #:	N/A
Sampler Name:	Leston Wayne Price Jr.	Fax #:	N/A

ANALYSIS REQUEST: General Chemistry

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRESERV.: ACID/BASE:	ICE / COOL	OTHER :	SAMPLING: DATE	TIME	
H200175															
1	P Water Tank		2		X						X		4/2/12	11:30AM	X
2	P Water The Bone Springs		1		X						X		4/2/12	11:30AM	X

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: Leston Wayne Price Jr.	Date: 4/2/12 Time: 2:45PM	Received By: Jodi Henson	
Relinquished By:	Date: Time:	Received By:	
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No	CHECKED BY: (Initials)	
3° C		GH	

Phone Result: ☐ Yes ☒ No Add'l Phone #: N/A
Fax Result: ☐ Yes ☒ No Add'l Fax #: N/A
REMARKS: PLEASE EMAIL RESULTS TO: wayneprice77@eunet.link.net

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#26

Form C-108
Affirmative Statement
Key Energy Services, LLC
Grace Carlsbad Well No. 1
Section 36, T-22 South, R-26 East, NMPM,
Eddy County, New Mexico

Available geologic and engineering data has been examined and no evidence of open faults or hydrological connection between the injection zone and any underground sources of drinking water has been found.

Dennis W. Powers, Ph.D.
Consulting Geologist
Key Energy Services, LLC

May 2, 2012
Date

March 24, 2015

Certified Mail
Return Receipt Requested

To: OFFSET OPERATORS/LEASEHOLD OWNERS & SURFACE OWNERS

RE: Key Energy Services, LLC
Form C-108 (Application for Authorization to Inject)
Grace Carlsbad Well No. 1
API No. 30-015-20573
1980' FSL & 660' FEL, Unit I, Section 36, T-22S, R-26E, NMPM
Eddy, County, New Mexico

Ladies & Gentlemen:

Enclose please find a copy of the Oil Conservation Division Form C-108 (Application for Authorization to inject) for the Key Energy Services, LLC Grace Carlsbad Well No. 1. You are being provided a copy of the application as an off-set operator, offset leaseholder or surface owner. The enclosed flash-drive contains the complete application, and if for some reason you need a hard paper copy please notify us and we will forward you a copy and re-set the time allowance.

Key Energy Services, LLC had proposed to convert this existing well to a produced water disposal well, and was approved to do so on July 17, 2012, by the New Mexico Oil Conservation Division.

Key Energy proposes to re-permit this well and plans to inject in the same previously approved formation of the Brushy Canyon member of the Delaware formation through selectively perforated intervals from 4,082'-5,200' feet below surface.

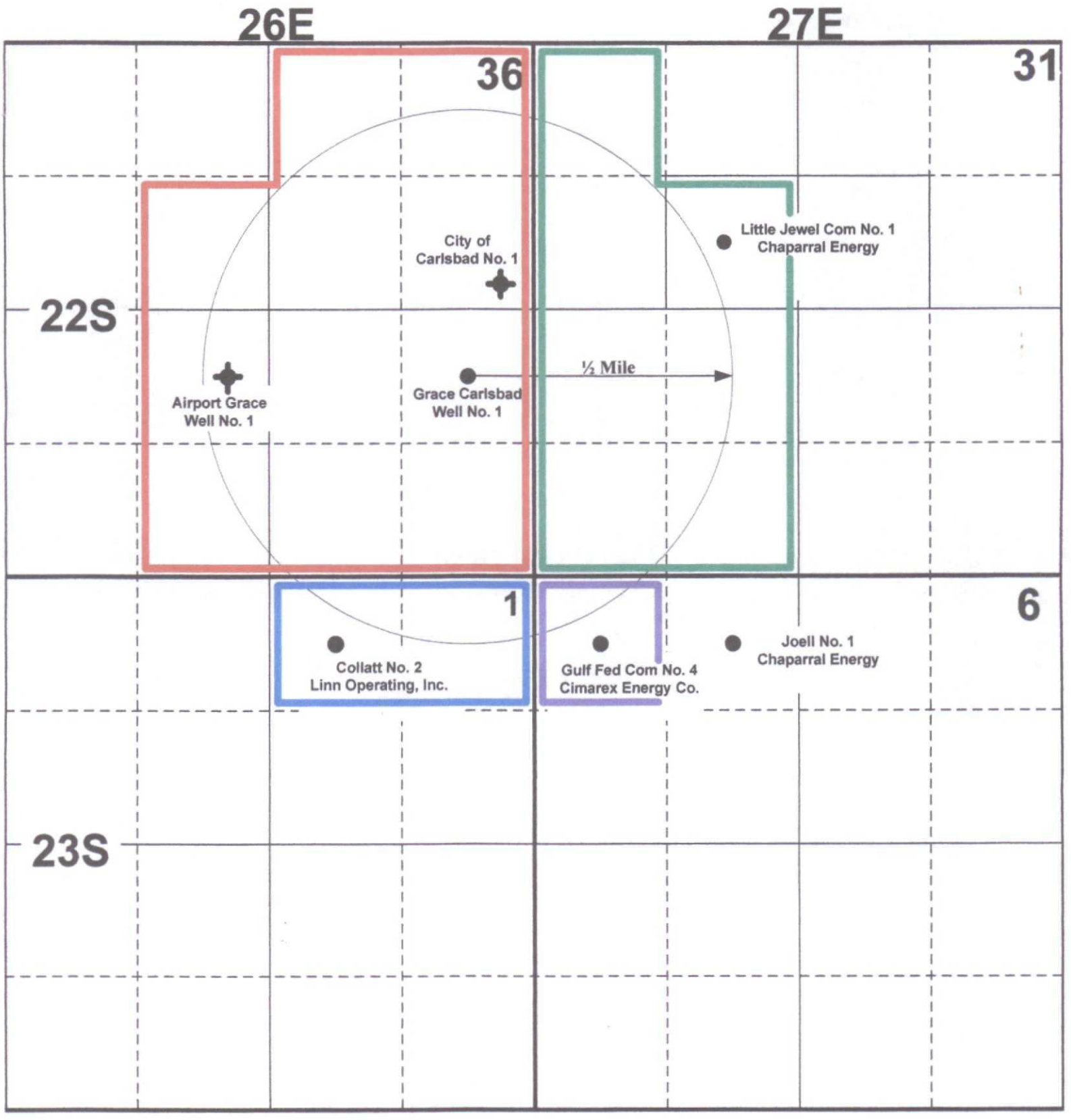
Objections must be filed with the Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, New Mexico 87505, with 15 days.

If you should have any questions please contact me at 505-715-2809 or E-mail wayneprice77@earthlink.net.

Sincerely,

Wayne Price

Wayne Price-Price LLC
312 Encantado Rd CT NE
Rio Rancho, NM 87124
Agent/Consultant for NM Key Services LLC



Tract 1 Notice Area
Tract 2 Notice Area
Tract 3 Notice Area
Tract 4 Notice Area

Key Energy Services, LLC
Grace Carlsbad Well No. 1
Notice Area Map

Key Energy Services, LLC

Form C-108
Grace Carlsbad No. 1
1980' FSL & 660' FEL (Unit I)
Section 36, T-22 South, R-26 East, NMPM,
Eddy County, New Mexico

Offset Operator/Leasehold Owner Notification List (Page 1)

Tract 1

Per NMSLO: - State Lease
E½ of Sec. 36
V0961400000
3/1/2014
Crown Oil Partners
(OGRID 306668)

Lease Owner:

State of New Mexico
Commissioner of Public Lands
P.O. Box 1148
Santa Fe, New Mexico 87504

Tract 2

Operator:

Chaparral Energy, LLC
701 Cedar Lake Blvd.
Oklahoma City, Oklahoma 73114

Lessees: All Depths

ExxonMobil Corp.
5959 Las Colinas Blvd.
Irving, Texas 75039-4202

Isabel Sanditen Revocable Trust u/t/a 6/1/96
2140 E. 30th
Tulsa, Oklahoma 74101

Murray M. Cash &
Goldie Cash Revocable Trust
3109 S. Atlanta
Tulsa, Oklahoma 74101

Citation 1987-II Investment Ltd. Partnership
South Atrium, Suite 300
16800 Greenspoint Park Drive
Houston, Texas 77060-2304

Reserve Oil, Inc.
P.O. Box 5568
Denver, Colorado 80217

BFO Energy, Inc.
1161 One Energy Square
4925 Greenville Ave.
Dallas, Texas 75206

Chaparral Energy, LLC
701 Cedar Lake Blvd.
Oklahoma City, OK 73114

Mar Oil & Gas Corp.
P.O. Box 5155
Santa Fe, New Mexico
87502-5155

Snowmass Energy Partners Ltd.
3300 S. 14th St., Suite 322
Abilene, Texas 79605

CEI Bristol Acquisition LP
701 Cedar Lake Blvd.
Oklahoma City, OK 73114

Key Energy Services, LLC

Form C-108
Grace Carlsbad No. 1

Offset Operator/Leasehold Owner Notification List (Page 2)

Tract 3

Operator:

Linn Operating, Inc.
600 Travis Street, Suite 5100
Houston, Texas 77002

Lessees: All Depths

ExxonMobil Corp.
5959 Las Colinas Blvd.
Irving, Texas 75039-4202

Magnum Hunter Resources, Inc.
(c/o Cimarex Energy Company)
600 N. Marienfeld St., Suite 600
Midland, Texas 79701

Petrus Oil Company, LP
12201 Merit Dr., Suite 900
Dallas, Texas 75251

Diverse GP III
16414 San Pedro, Suite 340
San Antonio, Texas 78232

S.E.S. Investments, Ltd.
P.O. Box 271
Midland, Texas 79702

Brazos Limited Partnership
300 N. Breckenridge Ave.
Breckenridge, Texas
76424-3506

Canaan Resources, LLC
211 N. Robinson Ave., #N1000
Oklahoma City, Oklahoma 73114

Merit Energy Company
6748 West Highway 80
Midland, Texas 79706

Linn Energy Holdings, LLC
600 Travis Street, Suite 5100
Houston, Texas 77002

Murchison Oil & Gas, Inc.
1100 Mira Vista Blvd.
Plano, Texas 75093

Chi Energy, Inc.
P.O. Box 1799
Midland, Texas 79702

TMBR/Sharp Drilling, LLC
P.O. Box 1416
Snyder, Texas 79550

McCombs Energy, Ltd.
5599 San Felipe, Suite 1200
Houston, Texas 77056

Concho Resources, Inc.
550 W. Texas Ave., Suite 1300
Midland, Texas 79701

States, Inc.
P.O. Box 911
Breckenridge, Texas 76424

Jeremiah, LLC
P.O. Box 924
Hobbs, New Mexico 88241

Bonefish, LLC
200 Sunset Road, Suite D
El Paso, Texas 79922

Chesapeake Energy Corp.
P.O. Box 18496
Oklahoma City, OK
73154-0496

Tract 4

Operators:

Chaparral Energy, LLC
701 Cedar Lake Blvd.
Oklahoma City, Oklahoma 73114

Cimarex Energy Company
600 N. Marienfeld St., Suite 600
Midland, Texas 79701

Key Energy Services, LLC

Form C-108
Grace Carlsbad No. 1

Offset Operator/Leasehold Owner Notification List (Page 3)

Tract 4

Lessees: All Depths

ExxonMobil Corp.
5959 Las Colinas Blvd.
Irving, Texas 75039-4202

Magnum Hunter Resources, Inc.
(c/o Cimarex Energy Company)
600 N. Marienfeld, Suite 600
Midland, Texas 79701

Atapaz Petroleum, Inc.
P.O. Box 1828
Midland, Texas 79702-1828

Isabel Sanditen Revocable Trust u/t/a 6/1/96
2140 E. 30th St.
Tulsa, Oklahoma 74101

Citation 1987-II Investment Ltd. Partnership
South Atrium, Suite 300
16800 Greenspoint Park Drive
Houston, Texas 77060-2304

Reserve Oil, Inc.
P.O. Box 5568
Denver, Colorado 80217

BFO Energy, Inc.
1161 One Energy Square
4925 Greenville Ave.
Dallas, Texas 75206

Kerr-McGee Corporation
Kerr-McGee Oil & Gas Corp.
Kerr-McGee North American Onshore Corp.
c/o Anadarko Petroleum Corp.
P.O. Box 1330
Houston, Texas 77251-1330

Faubon Oil & Gas Corp.
5599 San Felipe St., Suite 1104
Houston, Texas 77056-2721

Frank M. Agar
4 Hanover Drive
Midland, Texas 79705

Diverse GP III
16414 San Pedro, Suite 340
San Antonio, Texas 78232

Kona-Ltd.
816 Congress Ave., #1130
Austin, Texas 78701-2471

Canaan Resources, LLC
211 N. Robinson Ave., #N1000
Oklahoma City, Oklahoma 73114

Brighthawk/Burkhead Venture
601 Jefferson Street, Suite 3705
Houston, Texas 77002

EGL Resources, Inc.
P.O. Box 10886
Midland, Texas 79702

Devon Energy Production Co. LP
20 North Broadway, Suite 1500
Oklahoma City, Oklahoma 73102

Amarco Oil Corporation
P.O. Box 10886
Midland, Texas 79702

Finwing Corporation
P.O. Box 10886
Midland, Texas 79702

Manta Oil & Gas Corporation
P.O. Box 10886
Midland, Texas 79702

Olwick Corporation
P.O. Box 10886
Midland, Texas 79702

Petraitis Oil & Gas, Inc.
P.O. Box 10886
Midland, Texas 79702

Tiburon Oil & Gas, Inc.
P.O. Box 10886
Midland, Texas 79702

Lynx Petroleum Consultants
P.O. Box 1708
Hobbs, New Mexico 88241

Murray M. Cash &
Goldie Cash Revocable Trust
3109 S. Atlanta
Tulsa, Oklahoma 74101

Apache Corporation
300 Veterans Airpark Lane, Suite 3000
Midland, Texas 79705

M & W Petroleum
13435 Rogers Road
Edcouch, Texas 78538

Key Energy Services, LLC

Form C-108
Grace Carlsbad No. 1

Offset Operator/Leasehold Owner Notification List (Page 4)

Tract 4 (Cont.)

Lessees: All Depths

Chaparral Energy, LLC
701 Cedar Lake Blvd.
Oklahoma City, Oklahoma 73114

CEI Bristol Acquisition LP
701 Cedar Lake Blvd
Oklahoma City, Oklahoma 73114

Centurion Energy Corporation
214 W. Texas Ave., Suite 810
Midland, Texas 79701-4647

Surface Owner-Grace Carlsbad No. 1

Danny C. Stafford
5501 Old Cavern HWY
Carlsbad, New Mexico 88220

Form C-108

Key Energy Services, LLC
Grace Carlsbad No.1
API No. 30-015-20573
1980' FSL & 660' FEL, Unit I
Section 36, T-22S, R-26E, NMPM
Eddy County, New Mexico

LEGAL NOTICE WILL BE PUBLISHEDIN THE:

CARLSBAD CURREN-ARGUS
P.O. BOX 1629
CARLSBAD, NEW MEXICO 88221-1629

A COPY OF THE LEGAL ADVERTISEMENT WILL BE FORWARED TO THE DIVISION UPON PUBLICATION.

Key Energy Services, LLC, 1301 McKinney Street, Suite 1800, Houston, Texas 77010 has filed a Form C-108 (Application for Authorization to Inject) with the Oil Conservation Division seeking administrative re-approval for its Grace Carlsbad Well No. 1 API No. 30-015-20573, located 1980' FSL & 660' FEL, Unit I, Section 36, T-22S, R-26E, NMPM Eddy, County, New Mexico.

Key Energy Services, LLC had previously received approval to convert this existing well to a produced water disposal well, and was approved to do so on July 17, 2012, by the New Mexico Oil Conservation Division.

Key Energy proposes to re-permit this well and plans to inject in the same previously approved formation of the Brushy Canyon member of the Delaware formation through selectively perforated intervals from 4,082'-5,200' below the surface.

The average injection and maximum injections rates will be 1,500 and 5,000 barrels per day and the average and maximum surface injection pressure is anticipated to be 816 psi and 2000 psi, respectively.

Interested parties must file objections with the Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, New Mexico 87505, with 15 days of the date of this publication.

If you should have any questions please contact me at 505-715-2809 or E-mail wayneprice77@earthlink.net.

McMillan, Michael, EMNRD

From: McMillan, Michael, EMNRD
Sent: Wednesday, April 01, 2015 3:44 PM
To: 'WAYNEPRICE77@EARTHLINK.NET'
Cc: Goetze, Phillip, EMNRD
Subject: Key Energy Grace Carlsbad SWD Well No.1

Wayne:

- Please provide the registered mail/return receipt for all of the affected parties.
- The City of Carlsbad was not notified-we will require registered mail/return receipt.
- The 15-day clock will not begin until we receive these in our office

Thank You

Michael A. McMillan

Engineering and Geological Services Bureau, Oil Conservation Division
1220 South St. Francis Dr., Santa Fe NM 87505
O: 505.476.3448 F. 505.476.3462
Michael.mcmillan@state.nm.us

• AFFIDAVIT OF PUBLICATION

BC OPERATING, INC.

P.O. Box 50820
Midland, Texas 79710

4000 N. Big Spring Street, Suite 310
Midland, Texas 79705
(432) 684-9696
Fax (432) 686-0600

VIA EMAIL: PHILLIP.GOETZE@STATE.NM.US

April 15th, 2015

Oil Conservation Division
Attn: Phillip Goetze
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: Key Energy Services, LLC
Administrative SWD Approval

Grace Carlsbad No.1
API No. 30-015-20573
Unit I, Section 36, T-22-S, R-26-E, NMPM
Eddy County, New Mexico

Dear Mr. Goetze:

In a letter dated March 24th, 2015 (received April 8th, 2015), Wayne Price of Price LLC, on behalf of Key Energy Services, LLC ("Key"), notified Crown Oil Partners V, LP ("Crown") and BC Operating, Inc. ("BC") of its Application for Authorization to Inject in the Grace Carlsbad No. 1, Section 36, Township 22 South, Range 26 East, NMPM, Eddy County, New Mexico. A copy of the notice is attached.

The Grace Carlsbad No. 1 is an active well per NMOCD Online Records, and is located on the State of New Mexico Oil and Gas Lease V0-9614, covering the E2 of Section 36, T22S-R26E, Eddy County, New Mexico, of which Crown is the current Lessee of Record and BC is the current Operator. Crown and BC hereby object to Key's application and respectfully requests this application be set for hearing.

Sincerely,

BC Operating, Inc.

Caleb Hopson

Cc: Wayne Price, Price LLC
Wayneprice77@earthlink.net

Goetze, Phillip, EMNRD

From: wayne price <wayneprice77@earthlink.net>
Sent: Tuesday, April 21, 2015 11:20 AM
To: Caleb Hopson; Brad Stauffer; Bobby Sisson
Cc: Goetze, Phillip, EMNRD
Subject: Re: SWD Objection - Grace Well Key Energy Services, LLC

Dear Caleb,

We received your objection and OCD's response, currently it appears Key Energy is the registered owner of the well bore which is located on private land. We will be contacting you in the near future to resolve any issues and a possible path forward agreement.

Wayne Price-Price LLC

On Apr 15, 2015, at 1:37 PM, Caleb Hopson wrote:

Mr. Goetze-

Attached for your records, please find BC Operating, Inc. and Crown Oil Partners V, LP's objection letter to Key Energy Services, LLC's Application for Authorization to Inject. If you need any additional information, please let me know.

Sincerely,

Caleb Hopson
BC Operating, Inc.
4000 N. Big Spring, ste 310
Midland, Tx 79705
OFF: 432-684-9696 ext. 762
<image001.jpg>
Crown Oil Partners V, LP
Crump Energy Partners II, LLC

<SWD Objection - Key Energy Services, LLC.pdf>