

UIC - I - __ 8 - 1__

EPA FALL-OFF
TEST
(WDW-1)

2014

**2014 ANNUAL BOTTOM-HOLE PRESSURE SURVEY AND
PRESSURE FALLOFF TEST FOR MEWBOURNE WELL NO. 1**

**NAVAJO REFINING COMPANY
ARTESIA, NEW MEXICO
PROJECT NO. 185818-7039**

**REPORT SUBMITTED:
SEPTEMBER 2014**

PREPARED BY:

**SUBSURFACE CONSTRUCTION CORP.
6925 PORTWEST DRIVE, SUITE 110
HOUSTON, TEXAS 77024
pfh@subsurfacegroup.com**

TABLE OF CONTENTS

CERTIFICATION STATEMENT

EXECUTIVE SUMMARY	vii
1. FACILITY INFORMATION	1
2. WELL INFORMATION	1
3. CURRENT WELLBORE SCHEMATIC	1
a. Size and Type of Injection Tubing (Include Type of Internal Coating, if Applicable)	
b. Packer Depth	
c. Tubing Length Including Depth of any Seating or Profile Nipples, and the Last Date Tubing was Run	
d. Size, Type, and Depth of Casing	
e. Cement Tops with Method of Determining the Top of Cement	
f. Top and Bottom Perforations/Completion Depths Including the Size of Perforation Holes and Date Perforated	
g. Total Depth, Plug Back Depth, and the Most Recent Depth to Wellbore Fill and Date Measured	
h. Location of the Pressure Measuring Tool During the Test	
4. ELECTRIC LOG ENCOMPASSING THE COMPLETE INTERVAL.....	3
5. RELEVANT PORTIONS OF POROSITY LOG USED TO ESTIMATE FORMATION POROSITY	3
6. PVT DATA OF THE FORMATION AND INJECTION FLUID.....	3
a. Formation Fluid and Reservoir Rock Compressibility	
b. Formation Fluid Viscosity with Reference Temperature	

TABLE OF CONTENTS (CONTINUED)

c. Formation Fluid Specific Gravity/Density with Reference Temperature	
d. Injection Fluid Viscosity and Compressibility with Reference Temperature	
7. DAILY RATE HISTORY DATA (MINIMUM OF ONE MONTH PRECEDING THE FALL-OFF TEST)	5
8. CUMULATIVE INJECTION INTO THE FORMATION FROM TEST WELL AND OFFSET WELLS	5
9. PRESSURE GAUGES	5
10. ONE MILE AREA OF REVIEW (AOR)	7
a. Wells Located Within The One Mile AOR	
b. Status of Wells Within The One Mile AOR	
c. Offset Producers and Injectors Completed in the Same Injection Interval	
11. GEOLOGY	8
a. Description of the Geological Environment of the Injection Interval	
b. Discussion of Geological Features	
c. Structure Map	
12. OFFSET WELLS	11
a. The Distance Between the Offset Wells Completed in the Same Injection Interval	
b. Status of the Offset Wells During Both the Injection and Shut-in Portions of the Testing	
c. Impact the Offset Wells Had On the Testing	

TABLE OF CONTENTS (CONTINUED)

13. CHRONOLOGICAL LISTING OF DAILY TESTING ACTIVITIES (OPERATIONS LOG)	12
a. Date of the Testing	
b. Time of the Injection Period	
c. Type of Injection Fluid	
d. Final Injection Pressure and Temperature Prior To Shutting In the Well	
e. Total Shut-in Time	
f. Final Static Pressure and Temperature At the End of the Falloff Portion of the Test	
14. DESCRIPTION OF THE LOCATION OF THE SHUT-IN VALVE USED TO CEASE FLOW TO THE WELL FOR THE SHUT-IN PORTION OF THE TEST	13
15. PRESSURE FALLOFF ANALYSIS	13
16. NEW MEXICO OIL CONSERVATION DIVISION THREE YEAR RECORD KEEPING STATEMENT	22

TABLES

TABLE I:	Formation Water Analysis Summary
TABLE II:	Tabulation of Wells Within One Mile Area of Review of Mewbourne Well No. 1 (WDW-1), Chukka Well No. 2 (WDW-2), and Gaines Well No. 3 (WDW-3)
TABLE III:	Well Changes in the Combined Area of Review
TABLE IV:	Wells That Have Been Plugged and Abandoned Since the 2012 AOR Update
TABLE V:	Wells That Have Been Temporarily Abandoned Since the 2012 AOR Update

TABLE OF CONTENTS (CONTINUED)

TABLE VI:	Wells That Have Been Recompleted Since the 2012 AOR Update
TABLE VII:	Newly Drilled Wells Since the 2012 AOR Update
TABLE VIII:	Tabulation of the Figures Included in the Report
TABLE IX:	Comparison of Permeability, Transmissibility, Skin, False Extrapolated Pressure, and Fill Depth
TABLE X:	Static Pressure Gradient Data

FIGURES

FIGURE 1:	Mewbourne Well No. 1 Schematic
FIGURE 2:	Plot of Bottom-Hole Pressure and Temperature Data Chukka Well No. 2
FIGURE 3:	Gaines Well No. 3 Schematic
FIGURE 4:	Chukka Well No. 2 Schematic
FIGURE 5:	Plot of Bottom-hole Pressure and Temperature Data Gaines Well No. 3
FIGURE 6:	Midland Map of One Mile Area of Review
FIGURE 7:	Mewbourne Well No. 1 Wellhead Schematic
FIGURE 8:	Diagram of Valve Locations for Shut-in on Mewbourne Well No. 1
FIGURE 9:	Test Overview
FIGURE 10:	Cartesian Plot of Bottom-Hole Pressure and Temperature vs. Time
FIGURE 11:	Cartesian Plot of Injection Rate vs. Time
FIGURE 12:	Historical Surface Pressure and Injection Rates vs. Calendar Time
FIGURE 13:	Derivative Log-Log Plot
FIGURE 14:	Superposition Horner (Semi-Log) Plot

TABLE OF CONTENTS (CONTINUED)

FIGURE 15: Expanded Superposition Horner (Semi-Log) Plot

FIGURE 16: Hall Plot

FIGURE 17: Static Pressure Gradient Survey

APPENDICES

APPENDIX A: Dual Induction Log Sections from 7,924 feet to 8,476 feet

APPENDIX B: Neutron Density Log Sections from 7,924 feet to 8,476 feet

APPENDIX C: Compressibility of Fluid

APPENDIX D: Compressibility of Pore Volume

APPENDIX E: Mewbourne Well No. 1, July 23, 1998, Temperature Log

APPENDIX F: Water Viscosities at Various Salinities and Temperatures

APPENDIX G: Daily Rate History Data

APPENDIX H: Gauge Calibration Sheets

APPENDIX I: Strawn Structure Maps

APPENDIX J: Wolfcamp Structure Maps

APPENDIX K: Cisco Structure Maps

APPENDIX L: Chronology of Field Activities

APPENDIX M: PanSystem© Analysis Output

EXECUTIVE SUMMARY

Subsurface Technology (Subsurface) was contracted by Navajo Refining Company (Navajo) to perform a pressure falloff test and bottom-hole pressure survey on Navajo's Mewbourne Well No. 1. The test was performed according to New Mexico Oil Conservation Division (OCD) falloff test guidelines (*New Mexico Oil Conservation Division UIC Class I Well Fall-Off Test Guidance, December 3, 2007*).

The test provides the state regulatory agency with the necessary information to assess the validity of requested or existing injection well permit conditions and satisfy the permitting objective of protecting the underground sources of drinking water (USDW). Specifically, 40 CFR Part 146 states "the Director shall require monitoring of the pressure buildup in the injection zone annually, including at a minimum, a shutdown of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve" (40 CFR§146.13 for Non-hazardous Class I Wells).

The falloff testing was conducted according to the testing plan submitted to and approved by the NM OCD. The testing plan stated that, all offset wells that inject into the injection interval would be shut-in for the duration of the test period. The testing consisted of a 30-hour injection period and a 30-hour falloff period. Bottom-hole pressure gauges were also placed in the offset wells Gaines Well No. 3 and Chukka Federal Well No. 2. These wells are owned by Navajo and are used to inject plant waste into the same intervals as the Mewbourne Well No. 1.

As prescribed by the guidelines, the report discusses supporting and background information in Sections 1 through 9. The one mile area of review (updated since the 2012 falloff testing) is discussed in Section 10 and geology in Section 11. Information on the offset wells is discussed in Section 12, daily testing activities in Section 13, and point of shut-in, in Section 14. The pressure falloff testing and analysis results are discussed in Section 15. The OCD required record keeping statement is discussed in Section 16.

1. FACILITY INFORMATION

- a. Name: Navajo Refining Company (subsidiary of the Holly Corporation)
- b. Facility Location: Highway 82 East, Artesia, New Mexico 88211
- c. Operator's Oil and Gas Remittance Identifier (OGRID) Number: 223518

2. WELL INFORMATION

- a. OCD UIC Permit Number: UIC-CLI-008-1
- b. Well Classification: Class I Non-hazardous
- c. Well Name and Number: Mewbourne Well No. 1
- d. API Number: 30-015-27592
- e. Well Legal Location: 660 FSL, 2310 FEL

3. CURRENT WELLBORE SCHEMATIC

The Mewbourne Well No. 1 wellbore schematic is presented in Figure 1. The schematic has all data as requested by the guidelines and includes the following:

- a. Tubing: 4-1/2-inch, 11.6 pound per foot, steel construction, API grade N-80, with long thread connections (LT&C).
- b. Packer: Arrow X-1, 7-inch by 3-1/2-inch set in tension at 7,879 feet.
- c. Tubing Length: 7,879 feet. There are no profile nipples in the tubing or the packer as this was not a requirement of the permit.
- d. Size, Type, and Depth of Casing: There are three casing strings in the well. The information for these casing strings was obtained from OCD records on file with the state and geophysical logs. The casing strings are:
 - i. 13-3/8-inch, 48 pound per foot (lb/ft), steel construction, API grade J-55, with short thread connections (ST&C), set at a depth of 390 feet. The casing was

cemented to the surface with 525 sacks of cement. The casing was set in open hole with a diameter of 17.5 inches. This information was obtained from OCD records.

- ii. 9-5/8-inch, 36 lb/ft, steel construction, API grade J-55, ST&C, set at a depth of 2,555 feet. The casing was cemented to the surface with 1,000 sacks of cement. The casing was set in open hole with a diameter of 12.25 inches. This information was obtained from OCD records.
- iii. 7-inch, 26 lb/ft and 29 lb/ft, steel construction, API grade N-80 and P-110, LT&C, set at a depth of 9,094 feet. The casing was cemented to surface in two stages with 1,390 sacks of cement. The casing was set in open hole with a diameter of 8.75 inches. The top cement was verified with a CBL run on July 23, 1998. The remainder of the information was obtained from OCD records.
- iv. A cement plug at 9,004 feet isolates the lower section of the original borehole. This information was obtained from OCD records.
- e. The top of cement was determined from a CBL run in the 7-inch casing string on July 23, 1998. The top of cement in the 7-inch casing was found at the surface. The top of cement in the 9-5/8-inch and 13-3/8-inch casing strings was verified through OCD records and volume calculations.
- f. The 7-inch casing was perforated on July 24 and July 27, 1998. The casing was perforated with a 0.5-inch diameter hole at 2 shots per foot on a 60° phasing. The perforations are located between 7,924 feet and 8,188 feet and from 8,220 feet to 8,476 feet.
- g. The total depth of the well is 10,200 feet with the plug back depth at 9,004 feet. On May 18, 2014, fill was tagged at 8,990 feet.

The bottom-hole pressure gauges run in the Mewbourne Well No. 1 for the pressure falloff testing consisted of two memory (top of the perforations) (MRO) pressure gauges were placed at 7,922 feet and the other was placed two feet lower at 7,924 feet.

4. ELECTRIC LOG ENCOMPASSING THE COMPLETED INTERVAL

The dual induction log is presented in Appendix A and encompasses the completed interval between 7,924 feet and 8,476 feet. The dual induction log was submitted to the OCD with the original permit after the well was drilled by the Mewbourne Oil Company. The log was resubmitted to the OCD when the well was re-permitted as a Class I injection well.

5. RELEVANT PORTIONS OF THE POROSITY LOG USED TO ESTIMATE FORMATION POROSITY

The neutron density log is presented in Appendix B and encompasses the completed interval between 7,924 feet and 8,476 feet. The neutron density log was submitted to the OCD with the original permit after the well was drilled by Mewbourne Oil Company. The log was resubmitted to the OCD when the well was re-permitted as a Class I injection well. The porosity of the formation, 10%, and the reservoir thickness, 175 feet, were determined from this log. These values were used in the analysis of the pressure falloff data (Section 15). Additional information concerning the geology of the injection reservoir is discussed in Section 11.

6. PVT DATA OF THE FORMATION AND INJECTION FLUID

The Mewbourne Well No. 1 was recompleted in July 1998, prior to the issuance of the current well testing guidelines (December 3, 2007). At the time, no directives were in place to test formation fluids or derive formation characteristics from cores. However, reservoir fluid samples were obtained during the recompletion and the average density and average total dissolved solids (TDS) were measured at 1.03 g/l and 26,500 mg/l, respectively. The analytical results of the analysis of the formation fluid are summarized in Table I.

The viscosity of the formation fluid, formation water compressibility, and total system compressibility were estimated in reference to bottom-hole temperature using industry accepted correlations. These correlations are found in the Society of Petroleum Engineer's "Advances in Well Test Analysis, Monograph Volume 5" and "Pressure Buildup and Flow Tests in Wells, Monograph Volume 1".

a. Estimation of formation fluid and reservoir rock compressibility:

The fluid compressibility of the formation brine was estimated for a sodium chloride solution (26,500 mg/l) at the bottom-hole temperature of 127°F using Appendix C (Figure D.16 SPE Monograph 5). This value was $2.9 \times 10^{-6} \text{ psi}^{-1}$. The formation pore volume compressibility was estimated using Appendix D (Figure G.5 SPE Monograph 1). This value was $5.5 \times 10^{-6} \text{ psi}^{-1}$. The total system compressibility is the sum of the fluid compressibility and the pore volume compressibility, $8.4 \times 10^{-6} \text{ psi}^{-1}$. The temperature used with the correlations was recorded during the temperature survey conducted in the Mewbourne Well No. 1 on July 23, 1998, and included in this report as Appendix E.

b. Formation fluid viscosity with reference temperature:

The formation fluid had a TDS concentration of 26,500 mg/l. This equates to an approximate equivalent percentage of NaCl of 4.5%. The average viscosity of the formation fluid was estimated using Appendix F (Figure D.35 SPE Monograph 5). This value was 0.57 centipoise (cp) at 127°F.

c. Formation fluid specific gravity/density with reference temperature:

The average formation fluid density was measured at 1.03 g/l at 70°F (Table I).

d. Injection fluid specific gravity, viscosity and compressibility with reference temperature:

The specific gravity and pH of the refinery waste water were measured during the injection portion of the reservoir testing. The specific gravity was 1.01 (8.41 pounds per gallon). This equates to an approximate equivalent percentage of NaCl

of 4%. Using the same methodology described above, the viscosity of the injected fluid was 0.54 cp at 127°F. The compressibility of the injected plant waste was $2.9 \times 10^{-6} \text{ psi}^{-1}$ at 127°F.

7. DAILY RATE HISTORY DATA (MINIMUM OF ONE MONTH PRECEDING THE FALLOFF TEST)

The rate history used in the analysis of the pressure falloff data began on September 21, 2012, following the 2012 falloff testing, and ends on May 18, 2014. The daily rate history is summarized in Appendix G.

8. CUMULATIVE INJECTION INTO THE FORMATION FROM TEST WELL AND OFFSET WELLS

The total volume of fluid injected into all three wells as of May 18, 2014, was 3,101,137,702 gallons. The volume of fluid injected into the Mewbourne Well No. 1 was 1,583,253,441 gallons. The volume of fluid injected into the Chukka Well No. 2 was 1,019,974,703 gallons. The volume of fluid injected into the Gaines Well No. 3 was 497,909,558 gallons. The area of review (AOR) indicates that there are two wells injecting into the intervals in which the Navajo wells inject. The volumes injected were obtained from plant records.

9. PRESSURE GAUGES

Two (2) down hole pressure gauges were used for the Mewbourne Well No. 1 buildup and falloff testing. The down hole pressure gauges were set at 7,922 feet and 7,924 feet. Bottom-hole pressure gauges were also placed in each of the offset wells: Gaines Well No. 3 and Chukka Well No. 2. The pressure gauges were set at 7,660 feet in the Gaines Well No. 3 and at 7,570 feet in the Chukka Well No. 2.

- a. Describe the type of down hole surface pressure readout gauge used including manufacture and type:

In the Mewbourne Well No. 1, two MRO pressure gauges were used to record the pressure and temperature data during the injection/falloff testing. Both gauges were sapphire crystal gauges. The manufacturer of the MRO pressure gauges (Serial Nos. 76170 – top recorder, and 76169 – bottom recorder) is Spartek Systems.

In the Gaines Well No. 3, two MRO pressure gauges were used to monitor the bottom-hole pressure and temperature during the testing of the Mewbourne Well No. 1. Both gauges were sapphire crystal gauges with Serial Nos. 76404 and 76171. Both gauges are manufactured by Spartek Systems.

In the Chukka Well No. 2, two MRO pressure gauges were used to monitor the bottom-hole pressure and temperature during the testing of the Mewbourne Well No. 1. Both gauges were sapphire crystal gauges with Serial Nos. 76175 and 76298. Both gauges are manufactured by Spartek Systems.

b. List the full range, accuracy and resolution of the gauge:

In Mewbourne Well No. 1, the MRO pressure gauges, Serial Nos. 76170 and 76169 have a full range of 0 psi to 6,010 psi, an accuracy of 0.024% of full scale, and a resolution of 0.01% of full scale. A surface pressure gauge was not installed during testing.

In Gaines Well No. 3, the MRO pressure gauge, Serial No. 76404, has a full range of 0 psi to 10,005 psi, an accuracy of 0.024% of full scale, and a resolution of 0.01% of full scale. The MRO pressure gauge, Serial No. 76171, has a full range of 0 psi to 6,001 psi, and accuracy of 0.024% of full scale, and a resolution of 0.01% of full scale.

In Chukka Well No. 2, the MRO pressure gauge, Serial No. 76175, has a full range of 0 psi to 6,003 psi, an accuracy of 0.024% of full scale, and a resolution

of 0.01% of full scale. The MRO pressure gauge, Serial No. 76298, has a full range of 0 psi to 10,006 psi, an accuracy of 0.024% of full scale, and a resolution of 0.01% of full scale.

- c. Provide the manufacturer's recommended frequency of calibration and a calibration certificate showing date the gauge was last calibrated:

The certificate of calibration for each of the pressure gauges used during the testing are included as Appendix H. The manufacturer's recommended calibration frequency is one year.

10. ONE MILE AREA OF REVIEW (AOR)

Federal Abstract Company was contracted by Subsurface and instructed to undertake a review of well changes made within a one-mile area of review (AOR) of the Mewbourne Well No. 1, Chukka Well No. 2, and Gaines Well No. 3. In 2009, an update of the original AOR, submitted with the Discharge Application Permit 2003, was completed within the one-mile AOR for all three wells. The current update includes all existing wells within the one-mile AOR and any changes that have occurred to these wells since the 2012 update.

No new fresh water wells were reported within the search area since the submittal of the 2012 report. The discharge application lists the water wells located in the Area of Review.

- a. Identify wells located within the one mile AOR:

Table II also contains a listing of all wells within the one-mile AOR of Mewbourne Well No. 1, Chukka Well No. 2, and Gaines Well No. 3. Figure 6 is a Midland Map Company base map of the area containing the one mile AOR.

b. Ascertain the status of wells within the one mile AOR:

Table II contains a listing of all wells within the one-mile AOR, with their current status. Tables III through XII contain a list of all wells within the one-mile AOR that have had modifications to the current permit or have had new drilling and/or completion permits issued since the 2012 pressure falloff report.

Thirteen (13) wells were found in which the owner had changed. Fourteen (14) new plugged and abandoned oil and gas wells were found. Sixteen (16) wells were placed in temporarily abandoned status. No wells were found that were returned to production status. Eight (8) wells were found that had been recompleted.

There were sixty-eight (68) new drills and permits to drill, of which none penetrated the Wolfcamp interval. All plugged and abandoned wells were successfully plugged and isolated from the Mewbourne Well No. 1, Chukka Well No. 2, and Gaines Well No. 3 injection intervals according to current OCD records.

c. Provide details on any offset producers and injectors completed in the same interval:

Navajo has two injection wells in the same interval. Mewbourne Well No. 1 is listed as ID No. 59 in Table II and no changes have occurred to this well. Chukka Well No. 2 is listed as ID No. 120 in Table II and no changes have occurred to this well. The Gaines Well No. 3 is listed as ID No. 861 in Table XI. The wellbore schematics for the Gaines Well No. 3 and Chukka Well No. 2 are presented as Figure 3 and Figure 4, respectively.

11. GEOLOGY

The injection zones are porous carbonates of the lower portion of the Wolfcamp Formation, the Cisco Formation, and the Canyon Formation. These formations occur in the Mewbourne Well No. 1, the Chukka Well No. 2, and the Gaines Well No. 3 at the depths shown in the table below.

Injection Zone Formation	Mewbourne Well No. 1 (KB = 3,693 ft)		Chukka Well No. 2 (KB = 3,623 ft)		Gaines Well No. 3 (KB = 3,625 ft)	
	MD below KB (ft)	SS Depth (ft)	MD below KB (ft)	SS Depth (ft)	MD below KB (ft)	SS Depth (ft)
Lower Wolfcamp	7,450	-3,757	7,270	-3,647	7,303	-3,678
Cisco	7,816	-4,123	7,645	-4,022	7,650	-4,025
Canyon	8,475	-4,782	8,390	-4,767	8,390	-4,765
Base of Injection Zone (base of Canyon)	9,016	-5,323	8,894	-5,271	8,894	-5,269

a. Description of the geological environment of the injection interval:

The lower portion of the Wolfcamp Formation (Lower Wolfcamp) is the shallowest porous unit in the proposed injection interval. The Wolfcamp Formation (Permian-Wolf campaign age) consists of light brown to tan, fine to medium-grained, fossiliferous limestones with variegated shale interbeds (Meyer, 1966, page 69). The top of the Wolfcamp Formation was correlated for this study to be below the base of the massive, dense dolomites of the overlying Abo Formation. The base of the Wolfcamp coincides with the top of the Cisco Formation. The thickness of log porosity greater than 5% in the entire Wolfcamp Formation ranges from 0 feet to 295 feet in a band three miles wide that trends northeast-southwest across the study area.

The Cisco Formation (Pennsylvanian-Virgilian age) of the Northwest Shelf is described by Meyer (1966, page 59) as consisting of uniform, light colored, chalky, fossiliferous limestones interbedded with variegated shales. Meyer (1966, page 59) also describes the Cisco at the edge of the Permian basin as consisting of biothermal (mound) reefs composed of thick, porous, coarse-grained dolomites. Locally, the Cisco consists of porous dolomite that is 745 feet thick in Chukka Well No. 2, 659 feet thick in Mewbourne Well No. 1, and 720 feet in Gaines Well No. 3.

The total thickness of intervals with log porosity greater than 5% is approximately 310 feet in Mewbourne Well No. 1, 580 feet in Chukka Well No. 2, and 572 feet in Gaines Well No. 3. The total thickness with log porosity greater than 10% is approximately 100 feet in Mewbourne Well No. 1, 32 feet in Chukka Well No. 2, and 65 feet in Gaines Well No. 3. The thickness of the porous intervals in the Cisco ranges from 0 feet in the northwestern part of the study area to nearly 700 feet in a band three miles wide that trends northeast-southwest.

The Canyon Formation (Pennsylvanian-Missourian age) consists of white to tan to light brown fine grained, chalky, fossiliferous limestone with gray and red shale interbeds (Meyer, 1966, page 53). Locally, the Canyon occurs between the base of the Cisco dolomites and the top of the Strawn Formation (Pennsylvanian-Desmoinesian age). The total thickness of intervals with log porosity greater than 5% is 34 feet in Mewbourne Well No. 1, 30 feet in Chukka Well No. 2, and 10 feet in Gaines Well No. 3. No intervals appear to have log porosity greater than 10% in any of the three injection wells.

- b. Discuss the presence of geological features, i.e., pinchouts, channels, and faults, if applicable:

From the geological study completed and submitted in the Discharge Plan Application and Application for Authorization to Inject, the reservoir appears to be continuous, with the possibility of anisotropic conditions extending to the west-southwest. The injection intervals that were studied are well confined by the Abo and Yeso low porosity carbonate beds, Tubbs shale, and Salado salt. The Cisco and Wolfcamp formations follow the Vacuum arch and have a southeasterly dip. No faults existed in the study area although, the study also shows that faulting occurs via the K-M fault located 6 miles northwest of Artesia and trends northeast-southwest. The distance to this fault line occurs no closer than 16 miles. No faults are known to exist in the confining zone within the AOR.

- c. Provide a portion of relevant structure map, if necessary:

The structure map for Strawn is presented as Appendix I. The structure map for the Wolfcamp presented as Appendix J. The structure map for the Cisco is presented as Appendix K.

12. OFFSET WELLS

There are only four offset wells identified in the AOR that inject into the same interval: The Federal No. 1, the Chalk Bluff Federal Com No. 3, the Gaines Well No. 3 and the Chukka Well No. 2. The Gaines and Chukka were shut-in during the buildup and falloff portions of the testing.

- a. Identify the distance between the test well and any offset well completed in the same injection interval:

The Mewbourne Well No. 1 is approximately 7,900 feet from Gaines Well No. 3, the test well. The Chukka Well No. 2 is approximately 10,860 feet from the Mewbourne Well No. 1.

- b. Report the status of the offset wells during both the injection and shut-in portions of the test:

Both the Gaines Well No. 3 and Chukka Well No. 2 were shut-in during the buildup and falloff portions of the testing. Bottom-hole pressure gauges were lowered into each well approximately 48 hours before shutting in the Mewbourne Well No. 1. The bottom-hole pressure and temperature data are graphically depicted in Figure 5 for the Gaines Well No. 3 and Figure 2 for the Chukka Well No. 2.

- c. Describe the impact, if any, the offset wells had on the testing:

The offset wells were shut in prior to beginning the 30-hour injection period and remained shut-in during the falloff portion of the testing.

13. CHRONOLOGICAL LISTING OF THE DAILY TESTING ACTIVITIES (OPERATIONS LOG)

Appendix L contains the formal Chronology of Field Activities. This chronology was developed from the field activity reports.

a. Date of the testing:

The buildup portion of the testing started on May 15, 2014 at 2:11 p.m. and continued until May 16, 2014, at 8:12 p.m., when the Mewbourne Well No. 1 was shut-in. The falloff test ended on May 18, 2014, at 07:32 a.m. The total depth of the well was tagged at 8,990 feet and five-minute gradient stops were made while pulling the pressure gauges out of the wellbore. After the pressure gauges were pulled out of the well on May 18, 2014, the well was turned over to Navajo plant operations personnel.

b. Time of the injection period:

The buildup portion of the testing began on May 15, 2014 when the injection rate was set at an average injection rate of 130 gallons per minute (gpm). The injection rate was held constant for 29.98 hours.

c. Type of injection fluid:

The injected fluid was non-hazardous waste water from the plant. The density of the injection fluid was periodically measured and averaged 8.34 pounds per gallon during the 29.98-hour injection period.

d. Final injection pressure and temperature prior to shutting in the well:

The final flowing pressure (P_{wf}) and temperature (T_{wf}) were 4,624.97 psia and 95.06°F, respectively.

e. Total shut-in time:

The Mewbourne Well No. 1 was shut-in, while offset wells shut-in, for 35.32 hours.

f. Final static pressure and temperature at the end of the fall-off portion of the test:

The final static pressure at 7,924 feet was 4,416.61 psia. The final temperature was 98.63°F.

14. DESCRIBE THE LOCATION OF THE SHUT-IN VALVE USED TO CEASE FLOW TO THE WELL FOR THE SHUT-IN PORTION OF THE TEST

On the pipeline to the Mewbourne Well No. 1, there are two, 4-inch motor controlled valves installed on the incoming pipeline before the pod filters. Two 4-inch valves are installed between the pod filters and the wellhead. There is one 6-inch valve installed in the main line between the pod filters and the booster pump. A 4-1/16-inch wing valve is installed on the wellhead. All valves were closed during the falloff portion of the testing. A diagram of the wellhead is shown in Figure 7 and a diagram of the valve locations are shown in Figure 8.

15. PRESSURE FALLOFF ANALYSIS

The following discussion of the analysis of the pressure data recorded during the falloff testing of the Mewbourne Well No. 1 satisfies Sections 15 through 19 of Section IX, Report Components, of the OCD's falloff test guidelines. Where appropriate, the specific guideline addressed is annotated. Specific parameters used in the equations and discussed previously in this report are also annotated. The plots included with this report are summarized in Table VIII. The inclusion of these plots in this report satisfies OCD Guideline Section IX.18.

The pressure data obtained during the falloff test were analyzed using the commercially available pressure transient analysis software program PanSystem©.

Appendix M contains the output from this software program. Figure 9 shows the pressure data recorded by the bottom-hole pressure gauge from the time the tool was in place through the 35.32 hour total shut-in period. Figure 10 shows the pressure and temperature data recorded by the bottom-hole pressure gauge from the time the tool was in place through the 35.32 hour falloff shut-in period. Figure 11 is a Cartesian plot of the injection rates versus time for the injection period used in the pressure falloff analysis. The superposition time function was used to account for all rate changes during the injection period. Figure 12 is a plot of the historical injection rates and surface pressures versus calendar time.

Figure 13 is a log-log diagnostic plot of the falloff data, showing change in pressure and pressure derivative versus equivalent shut in time. The different flow regimes, wellbore storage, radial flow and change in reservoir characteristics, are indicated on the log-log plot and the superposition Horner plot (OCD Guideline Section IX.18.c and IX.18.d)

Wellbore storage begins at 0.0015 hours and continues to an elapsed shut in time of 0.0627 hours. Radial flow begins at an elapsed shut in time of 8.85 hours and continues until 15.89 hours (OCD Guideline Section IX.15.b).

The reservoir permeability was determined from the radial flow region of the superposition Horner plot, Figure 14. The radial flow regime begins at a Horner time of 1866.13 and continues until a Horner time of 1033.93, at which time the pressure data departs the semi-log straight-line. Figure 15 shows an expanded view of the radial flow regime. The slope of the radial flow period, as calculated by the analysis software, 4.40489 psi/cycle (OCD Guideline Section IX.15.c). The injection rate just prior to shut in was 132.5 gpm which is equivalent to 4543 barrels per day (bbl/day).

An estimate of mobility-thickness (transmissibility, OCD Guideline Section IX.15.d), kh/μ , for the reservoir was determined to be 167,698 md-ft/cp using the following equation:

$$\frac{k h}{\mu} = 162.6 \frac{q B}{m}$$

where,

- kh/μ = formation mobility-thickness, millidarcy-feet/centipoise
- q = rate prior to shut in, bpd
- B = formation volume factor, reservoir volume/surface volume
- m = slope of radial flow period, psi/cycle

$$\frac{k h}{\mu} = 162.6 \frac{(4.543)(1.0)}{4.40489}$$

$$= 167,698 \text{ md} - \text{ft} / \text{cp}$$

The permeability-thickness (flow capacity, OCD Guideline Section IX.15.i), kh , was determined to be 95,588 md-ft by multiplying the mobility-thickness, kh/μ , by the viscosity of the reservoir fluid (see Section 6), $\mu_{\text{reservoir}}$, of 0.57 centipoises:

$$\begin{aligned} kh &= \left(\frac{kh}{\mu} \right) \mu_{\text{reservoir}} \\ &= (167,698) * (0.57) \\ &= 95,588 \text{ md-ft} \end{aligned}$$

The reservoir permeability (OCD Guideline Section IX.15.e) using the total thickness (see Section 5 and Section 11) of 175 feet was 546 md:

$$k = \frac{kh}{h}$$

$$= \frac{95,588}{175}$$

$$= 546 \text{ md}$$

To determine whether the proper viscosity was used in arriving at this permeability, the travel time for a pressure transient to pass beyond the waste front needs to be calculated (OCD Guideline Section VIII.5). The distance to the waste front is determined from the following equation:

$$r_{\text{waste}} = \left(\frac{0.13368 V}{\pi h \phi} \right)^{1/2}$$

where,

- r_{waste} = radius to waste front, feet
- V = total volume injected into the injection interval, gallons
- h = formation thickness, feet
- ϕ = formation porosity, fraction
- 0.13368 = constant

A cumulative volume of approximately 1,583,253,441 gallons of waste has been injected into Mewbourne Well No. 1 (see Section 8). The formation has a porosity of 0.10 (see Section 5 and Section 11).

The distance to the waste front was determined to be 1,962 feet:

$$r_{\text{waste}} = \left(\frac{(0.13368)(1,583,253,441)}{(\pi)(175)(0.10)} \right)$$

$$= 1,962 \text{ feet}$$

The time necessary for a pressure transient to traverse this distance is calculated from the following equation:

$$t_{\text{waste}} = 948 \frac{\phi \mu_{\text{waste}} c_t r_{\text{waste}}^2}{k}$$

where,

- t_{waste} = time for pressure transient to reach waste front, hours
- ϕ = formation porosity, fraction
- μ_{waste} = viscosity of the waste at reservoir conditions, centipoise
- r_{waste} = radius to waste front, feet
- c_t = total compressibility of the formation and fluid, psi
- k = formation permeability, millidarcies
- 948 = constant

The pore volume compressibility is $8.4 \times 10^{-6} \text{ psi}^{-1}$ (see Section 6). The time necessary for a pressure transient to traverse the distance from the wellbore to the leading edge of the waste front would be 3.20 hours:

$$t_{\text{waste}} = 948 \frac{(0.10)(0.57)(8.4 \times 10^{-6})(1962)^2}{546}$$

$$= 3.20 \text{ hours}$$

Since the time required to pass through the waste is less than the 8.85 hours required to reach the beginning of the radial flow period, the assumption that the pressure transient was traveling through reservoir fluid during the period of the semi-log straight line was correct.

The near wellbore skin damage (OCD Guideline Section IX.15.f) was determined from the following equation:

$$s = 1.151 \left[\frac{p_{wf} - p_{1hr}}{m_1} - \log \left(\frac{k}{\phi \mu c_t r_w^2} \right) + 3.23 \right]$$

where,

- s = formation skin damage, dimensionless
- 1.151 = constant
- p_{wf} = flowing pressure immediately prior to shut in, psi
- p_{1hr} = pressure determined from extrapolating the first radial flow semi-log line to a Δt of one hour, psi
- m_1 = slope of the first radial flow semi-log line, psi/cycle
- k = permeability of the formation, md
- ϕ = porosity of the injection interval, fraction
- μ = viscosity of the fluid the pressure transient is traveling through, cp
- c_t = total compressibility of the formation plus fluid, psi^{-1}
- r_w = radius of the wellbore, feet
- 3.23 = constant

The final measured flowing pressure was 4,624.95 psia. The pressure determined by extrapolating the radial flow semi-log line to a Δt of one hour, p_{1hr} , was 4,423.28 psia (calculated from the analysis software). The wellbore radius, r_w , is 0.3646 feet (completion records). Using these values in addition to the previously discussed parameters results in a skin of 44.99:

$$s = 1.151 \left[\frac{4.624.97 - 4,423.28}{4.40489} - \log \left(\frac{546}{(0.10)(0.57)(8.4 \times 10^{-6})(0.3646)^2} \right) + 3.23 \right]$$

$$= 44.99$$

The change in pressure, Δp_{skin} , in the wellbore associated with the skin factor (OCD Guideline Section IX.15.g) was calculated using the following equation:

$$\Delta p_{\text{skin}} = 0.869(m)(s)$$

where,

0.869 = constant

m = slope from superposition plot of the well test, psi/cycle

s = skin factor calculated from the well test

The change in pressure, Δp_{skin} , using the previously calculated and defined values was determined to be 172.21 psi:

$$\begin{aligned} \Delta p_{\text{skin}} &= 0.869(m)(s) \\ &= 0.869(4.40489)(44.99) \\ &= 172.21 \text{ psi} \end{aligned}$$

The flow efficiency (E, OCD Guideline Section IX.15.h) was determined from the following equation:

$$E = \frac{p_{\text{wf}} - \Delta p_{\text{skin}} - p_{\text{static}}}{p_{\text{wf}} - p_{\text{static}}}$$

where,

- E = flow efficiency, fraction
- p_{wfi} = flowing pressure prior to shutting in the well for the fall-off test,
- p_{static} = final pressure from the pressure falloff test
- Δp_{skin} = pressure change due to skin damage

Using the previously determined parameters, the flow efficiency was calculated to be 0.17:

$$E = \frac{4,624.97 - 172.20 - 4,416.61}{4,624.97 - 4,416.61}$$
$$= 0.17$$

The radius of investigation (OCD Guideline Section IX.15.a) was calculated using the following equation:

$$R_{inv} = 0.029 \sqrt{\frac{k \Delta t_s}{\phi \mu C_t}}$$

where,

- k = formation permeability, millidarcies
- Δt_s = elapsed shut-in time, hours
- ϕ = formation porosity, fraction
- μ = viscosity of the fluid the pressure transient is traveling through, cp
- C_t = total compressibility of the formation plus fluid, psi^{-1}
- 0.029 = constant

The radius of investigation, r_{inv} , using the previously defined values was determined to be 5,820 feet:

$$R_{inv} = 0.029 \sqrt{\frac{(546)(35.32)}{(0.10)(0.57)(8.4 \times 10^6)}}$$

$$R_{inv} = 5,820 \text{ feet}$$

As indicated on Figure 13, the pressure data departs the radial flow region at an elapsed time from shut in of 15.89 hours. No pressure or temperature anomalies were noted that would cause this type of pressure response observed on the derivative log-log plot (OCD Guideline Section VIII.9). A review of the geology of the injection zones (see Section 11) indicates that all three of the formations in which the Mewbourne Well No. 1 injects into have varying thicknesses and porosities within the mapped area. Changes in formation thickness, porosity, and fluid viscosity can cause the slope changes seen on the derivative log-log plot. Because these changes occurred during the duration of the pressure falloff test, the reservoir analysis results are considered heterogeneous as opposed to homogeneous (OCD Guideline Section IX.17.b).

The Hall plot (OCD Guideline Section IX.18.h) is presented as Figure 16. No slope changes are seen in the plotted data.

A comparison of the current analysis results with previous analysis results as well as with the reservoir parameters submitted with the permit application is presented in Table IX (OCD Guideline Section IX.19).

On May 18, 2014, a static pressure gradient survey was conducted while pulling the pressure gauges out of the well. Static gradient stops were conducted at 7,924 feet, 7,000 feet, 6,000 feet, 5,000 feet, 4,000 feet, 3,000 feet, 2,000 feet, 1,000 feet, and at the surface. The bottom-hole pressure and temperature, after 35.32 hours of shut-in at 7,924 feet, were 4,416.43 psia and 98.33°F, respectively. The gradient survey is summarized in Table X. The data are graphically depicted in Figure 17.

**16. NEW MEXICO OIL CONSERVATION DIVISION THREE YEAR
RECORDING KEEPING STATEMENT**

Navajo will keep the raw test data, generated during the testing, on file for a minimum of three years. The raw test data will be made available to OCD upon request.

TABLE I
FORMATION WATER ANALYSIS SUMMARY

Chemical	Mewbourne Well No. 1	Chukka Well No. 2	Gaines Well No. 3	Average
Date	July 31, 1998	June 14, 1999	Nov 8, 2006	
Fluoride (mg/l)	2.6	9.7	Not Detected	6.15
Chloride (mg/L)	19,000	15,000	10,447	14,815.67
NO ₃ -N (mg/L)	<10	<10	--	<10
SO ₄ (mg/L)	2,200	2000	1,908	2,036
CaCO ₃ (mg/L)	1000	1210	--	1105
Specific Gravity (g/L)	1.034	1.0249	--	1.0295
TDS (mg/L)	33,000	20,000	--	26,500
Specific Conductance (uMHOs/cm)	52,000	43,000	--	47,500
Potassium (mg/L)	213	235	85.5	177.83
Magnesium (mg/L)	143	128	155	142
Calcium (mg/L)	390	609	393	464
Sodium (mg/L)	12,770	8,074	6,080	8,974.67
pH (s.u.)	8.1	7.2	--	7.65

The data in the above table was referenced from “Discharge Plan Application and Application for Authorization to Inject per Oil Conservation Division Form C-108, into Class I Wells WDW-1 and Proposed WDW-2 and WDW-3” and the “Discharge Permit Approval Conditions”, “Reentry and Completion Report Waste Disposal Well No. 2”, and “Reentry and Completion Report Waste Disposal Well No. 3”.

TABLE II
Tabulation of Wells Within One Mile Area of Review

NO	API	Unit		TOWNS				EW FTG	WELL NAME	OPERATOR	WELL			DATE - Comp or Plug
		No.	Sect	HIP	RNG	NS FTG	TYPE				PLUG DATE	STATUS		
1	30-015-00693	A		36 17S	27E	330N		330E	DELHI #001	GEORGE A CHASE & C SERVICE	O		T/A	8/30/1941
2	30-015-00694	A		36 17S	27E	990N		990E	STATE #013	DELHI OIL CORP.	O	6/24/1948	P&A	6/24/1948
3	30-015-00646	A		36 17S	27E	990N		330E	DELHI #007	GEORGE A CHASE & C SERVICE	O		T/A	4/21/1950
4	30-015-00668	G		36 17S	27E	1650N		2310E	SOUTH RED LAKE GRAYBURG UNIT #010	LEGACY RESERVES OPERATING, LP	O		SHUT IN	12/6/1947
5	30-015-00690	G		36 17S	27E	1830N		2205E	CONKLIN #002	GEORGE A CHASE & C SERVICE	O		ACTIVE	3/6/1949
6	30-015-00667	G		36 17S	27E	2310N		2310E	SOUTH RED LAKE GRAYBURG UNIT #011	FAIRWAY RESOURCES OPERATING INC	I		ACTIVE	3/23/1949
7	30-015-00666	G		36 17S	27E	2310N		2310E	CONKLIN #001	GEORGE A CHASE & C SERVICE	O	N/A	P&A	1/10/1942
8	30-015-00689	H		36 17S	27E	1650N		330E	GATES STATE #001	GEORGE A CHASE JR & C SERVICE	O		ACTIVE	8/4/1950
9	30-015-00647	H		36 17S	27E	1650N		990E	GATES STATE #002	ASPEN OIL INC	O	10/21/2003	ACTIVE	10/21/2003
10	30-015-00669	H		36 17S	27E	2310N		330E	HOMAN #001	GEORGE A CHASE JR & C SERVICE	O	5/6/2008	P&A	5/6/2008
11	30-015-00688	I		36 17S	27E	2310S		330E	RAMAPO #001	KERSEY & CO	O	10/28/1941	P&A	10/28/1941
12	30-015-00670	I		36 17S	27E	2970N		330E	RAMAPO #003	KERSEY & CO	O	1/3/1950	P&A	1/3/1950
13	30-015-00687	I		36 17S	27E	2310S		990E	RAMAPO #002	KERSEY & CO	G	5/7/1948	P&A	5/7/1948
14	30-015-00685	I		36 17S	27E	1650S		330E	EMPIRE ABO UNIT G #020	ARCO OIL & GAS	O	7/10/1989	P&A	7/10/1989
15	30-015-00671	J		36 17S	27E	2310S		2310E	RAMAPO #003	ROJO GRANDE COMPANY LLC	O	1/24/2000	ZONE ABAN	2/13/1942
16	30-015-01221	J		36 17S	27E	2300S		2300E	SOUTH RED LAKE GRAYBURG UNIT #023	LEGACY RESOURCES OPERATING LP	O	8/13/2002	ZONE ABAN	2/27/1948
17		J		36 17S	27E				DOOLEY STATE #3	MARTIN YATES III				4/22/1961
18	30-015-05934	J		36 17S	27E	1650S		1650E	EMPIRE ABO UNIT #019A	BP AMERICA PRODUCTION COMPANY	O		ACTIVE	2/26/1961
19	30-015-01220	K		36 17S	27E	2310S		2330W	SOUTH RED LAKE GRAYBURG UNIT #022	MCQUADRANGLE, LC	O	7/17/2002	ZONE ABAN	2/3/1949
20	30-015-00674	K		36 17S	27E	2310S		2310W	RAMAPO #002	ROJO GRANDE COMPANY LLC	O		ACTIVE	5/15/1947
21	30-015-01219	K		36 17S	27E	2310S		1650W	SOUTH RED LAKE GRAYBURG UNIT #021	MCQUADRANGLE, LC	I		ACTIVE	1/20/1948
22	30-015-23913	K		36 17S	27E	1650S		1650W	SOUTH RED LAKE GRAYBURG UNIT #043	MCQUADRANGLE, LC	O		ACTIVE	12/11/1981
23		K		36 17S	27E				DOOLEY STATE ABO #3	MARTIN YATES III	O		ACTIVE	4/19/1961
24	30-015-00673	K		36 17S	27E	1650S		2310W	RAMAPO #001	ROJO GRANDE COMPANY LLC	O	1/24/2000	ZONE ABAN	1/24/2000
25	30-015-00682	N		36 17S	27E	990S		1650W	RAMAPO #004	ROJO GRANDE COMPANY LLC	O	1/24/2000	ZONE ABAN	1/24/2000
26	30-015-00683	N		36 17S	27E	965S		1650W	SOUTH RED LAKE GRAYBURG UNIT #028	FAIRWAY RESOURCES OPERATING INC	I		ACTIVE	4/16/1948
27	30-015-01218	N		36 17S	27E	330S		2310W	EMPIRE ABO UNIT #018	BP AMERICA PRODUCTION COMPANY	O	3/11/2009	P&A	3/11/2009
28	30-015-00684	O		36 17S	27E	990S		2310E	STATE B-6961 NO. 1-A	BURNHAM OIL COMPANY	O	5/13/1947	P&A	5/13/1947
29	30-015-01251	O		36 17S	27E	660S		1980E	EMPIRE ABO UNIT #019	BP AMERICA PRODUCTION COMPANY	O	4/27/2009	P&A	9/8/1959
30		I		36 17S	27E								MISPLOT OF 14	
31	30-015-00677	P		36 17S	27E	330S		990E	EMPIRE ABO UNIT #020	BP AMERICA PRODUCTION COMPANY	O	4/10/2009	P&A	4/13/2009
32	30-015-01616	P		30 17S	28E	330S		990E	BLAKE STATE #001	APACHE CORPORATION	O		ACTIVE	3/7/1953
33	30-015-01638	A		31 17S	28E	330N		990E	STATE NO. 1	BEDINGFIELD, MALCO, RESLER	O	7/15/1952	P&A	7/15/1952
34	30-015-21594	B		31 17S	28E	330N		1650E	POWCO STATE #001	FINNEY OIL COMPANY	O		ACTIVE	11/15/1975
35	30-015-01636	C		31 17S	28E	330N		2310E	DELHI-STATE NO. 1	BEDINGFIELD, J E	O	12/23/1952	P&A	12/23/1952
36	30-015-25621	B		31 17S	28E	980N		1620E	POWCO STATE #002	FINNEY OIL COMPANY	O		ACTIVE	7/15/1986
37	30-015-01633	1		31 17S	28E	330N		330W	ASTON & FAIR A #001	GEORGE A CHASE JR DBA G AND C SERVICE	O		ACTIVE	6/23/1942
38	30-015-01634	D		31 17S	28E	350N		345W	STATE 31 NO. 1X	ASTON & FAIR	O		NO COMPL	1/5/1946
39	30-015-01645	F		31 17S	28E	990N		990W	BEDINGFIELD STATE 1 NO. 1	MCLAUGHLIN, C T	O	2/16/1950	P&A	2/16/1950
40	30-015-02666	2		31 17S	28E	2310N		330W	HUDSON SAIKIN STATE #001	APACHE CORPORATION	O		ACTIVE	5/29/1948
41	30-015-24887	2		31 17S	28E	2310N		990W	HUDSON SAIKIN STATE #002	APACHE CORPORATION	O		ACTIVE	7/7/1984
42	30-015-01643	F		31 17S	28E	2310N		2260W	EMPIRE ABO UNIT #022	BP AMERICA PRODUCTION COMPANY	O	7/10/2009	P&A	6/7/1960
43	30-015-01635	F		31 17S	28E	2310N		2310W	ASTON & FAIR #001Y	GEORGE A CHASE JR DBA G AND C SERVICE	O		ACTIVE	5/8/1948
44	30-015-01637	G		31 17S	28E	2310N		2310E	MALCO STATE #001	GEORGE A CHASE JR DBA G AND C SERVICE	O		ACTIVE	10/12/1953
45	30-015-01652	G		31 17S	28E	2288N		1625E	BOLING #001	KERSEY & CO	O		ACTIVE	8/10/1960
46	30-015-10537	H		31 17S	28E	2277N		330E	NORTHWEST ARTESIA UNIT #004	LIME ROCK RESOURCES A, L.P.	O		ACTIVE	9/23/1965
47	30-015-10833	I		31 17S	28E	1980S		660E	NORTHWEST ARTESIA UNIT #010	LIME ROCK RESOURCES A, LP	O		ACTIVE	6/17/1966
48	30-015-01644	I		31 17S	28E	1650S		330E	EMPIRE ABO UNIT #024A	BP AMERICA PRODUCTION COMPANY	O	6/12/2009	P&A	4/29/1960
49	30-015-01642	J		31 17S	28E	1650S		2310E	STATE FW #001	APACHE CORPORATION	O		ACTIVE	12/23/1962
50	30-015-01650	J		31 17S	28E	1650S		1958E	EMPIRE ABO UNIT #023A	BP AMERICA PRODUCTION COMPANY	O	9/17/2003	P&A	9/17/2003
51	30-015-01651	K		31 17S	28E	1650S		2387W	EMPIRE ABO UNIT #022B	BP AMERICA PRODUCTION COMPANY	O	10/22/2009	P&A	4/10/1960
52	30-015-01640	3		31 17S	28E	2310S		330W	RAMPO #002	APACHE CORPORATION	O		ACTIVE	7/16/1955
53	30-015-01648	3		31 17S	28E	1651S		1089E	EMPIRE ABO UNIT #021A	BP AMERICA PRODUCTION COMPANY	O	8/24/2002	ZONE ABAN	8/24/2002
54	30-015-01639	4		31 17S	28E	990S		330W	RAMPO #001	APACHE CORPORATION	O		ACTIVE	5/1/1948

TABLE II
Tabulation of Wells Within One Mile Area of Review

		Unit		TOWNS						WELL			DATE - Comp	
NO	API	No.	Sect	HIP	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	TYPE	PLUG DATE	STATUS	or Plug	
55	30-015-01647	4	31	17S	28E	660S	660W	EMPIRE ABO UNIT #021	BP AMERICA PRODUCTION COMPANY	O	7/23/2005	P&A	1/31/1960	
56	30-015-01646	N	31	17S	28E	660S	2082W	EMPIRE ABO UNIT #022A	BP AMERICA PRODUCTION COMPANY	O		P&A	1/22/1960	
57	30-015-10118	N	31	17S	28E	766S	2188W	STATE FV #001	APACHE CORPORATION	O		ACTIVE	3/1/1963	
58	30-015-01653	O	31	17S	28E	990S	1650E	PARKER-STATE NO. 1	OTIS A ROBERTS	O	1/18/1942	P&A	1/18/1942	
59	30-015-27592	O	31	17S	28E	660S	2310E	WDW #001	NAVAJO REFINING CO. PIPELINE DIVISION	I		ACTIVE	8/4/1998	
60	30-015-01649	O	31	17S	28E	660S	1939E	EMPIRE ABO UNIT #023	BP AMERICA PRODUCTION COMPANY	O	8/14/2009	P&A	2/24/1960	
61	30-015-20042	P	31	17S	28E	990S	660E	NORTHWEST ARTESIA UNIT #011	LIME ROCK RESOURCHES A, LP	O		ACTIVE	5/8/1967	
62	30-015-01641	P	31	17S	28E	660S	660E	EMPIRE ABO UNIT #024	APACHE CORPORATION	O		ACTIVE	3/12/1960	
63	30-015-01654	D	32	17S	28E	330N	330W	ASTON-STATE NO. 1	BEDINGFIELD, J E	O	5/12/1953	P&A	5/12/1953	
64	30-015-01671	E	32	17S	28E	2280N	978W	EMPIRE ABO UNIT #025B	BP AMERICA PRODUCTION COMPANY	O	8/14/2008	P&A	9/13/1960	
65	30-015-01657	F	32	17S	28E	2280N	1980W	AA STATE NO. 1	APACHE CORPORATION	O		ACTIVE	8/24/1960	
66	30-015-10818	K	32	17S	28E	2310S	2105W	NORTHWEST ARTESIA UNIT #008	SDX RESOURCES INC	O	11/6/2006	P&A	11/6/2006	
67	30-015-01661	K	32	17S	28E	1650S	2310W	EMPIRE ABO UNIT #026B	APACHE CORPORATION	O		T/A	3/27/1960	
68	30-015-10795	L	32	17S	28E	2310S	660W	NORTHWEST ARTESIA UNIT #009	LIME ROCK RESOURCES A, LP	O	5/28/2008	P&A	5/15/1966	
69	30-015-01662	L	32	17S	28E	1650S	990W	EMPIRE ABO UNIT #025A	APACHE CORPORATION	O		P/A	4/13/1960	
70	30-015-20043	M	32	17S	28E	990S	760W	NORTHWEST ARTESIA UNIT #012	APACHE CORPORATION	O		T/A	5/9/1967	
71	30-015-01660	M	32	17S	28E	660S	660W	EMPIRE ABO UNIT #025	BP AMERICA PRODUCTION COMPANY	O	1/14/2009	P&A	3/5/1960	
72	30-015-10834	N	32	17S	28E	990S	2030W	NORTHWEST ARTESIA UNIT #013	SDX RESOURCES INC	O	9/15/2006	P&A	9/15/2006	
73	30-015-01659	N	32	17S	28E	660S	1980W	EMPIRE ABO UNIT #026A	APACHE CORPORATION	O		T/A	2/14/1960	
74	30-015-21539	N	32	17S	28E	150S	1400W	EMPIRE ABO UNIT #261	APACHE CORPORATION	O		ACTIVE	7/25/1975	
75	30-015-22009	O	32	17S	28E	330S	2481E	EMPIRE ABO UNIT #272	APACHE CORPORATION	O		T/A	7/18/1977	
76	30-015-02606	3	5	18S	28E	330N	1941W	EMPIRE ABO UNIT #026E	APACHE CORPORATION	O		ACTIVE	7/18/1960	
77	30-015-22697	3	5	18S	28E	1080N	1914W	EMPIRE ABO UNIT #261A	BP AMERICA PRODUCTION COMPANY	O	6/16/2009	P&A	1/4/1979	
78	30-015-02607	4	5	18S	28E	660N	660W	EMPIRE ABO UNIT #025C	APACHE CORPORATION	O		P/A	3/27/1960	
79	30-015-22750	4	5	18S	28E	660N	150W	EMPIRE ABO UNIT #251	APACHE CORPORATION	O		P/A	1/12/1979	
80	30-015-02608	E	5	18S	28E	1660N	330W	STATE E AI #001	CONOCOPHILLIPS COMPANY	O	1/13/2006	P&A	1/13/2006	
81	30-015-24485	E	5	18S	28E	1980N	990W	ILLINOIS CAMP A COM #001	CONOCOPHILLIPS COMPANY	G		ACTIVE	8/10/1983	
82	30-015-02602	F	5	18S	28E	1650N	1650W	EMPIRE ABO UNIT #026D	APACHE CORPORATION	O		ACTIVE	12/30/1959	
83	30-015-25522	L	5	18S	28E	2240S	400W	WALTER SOLT STATE #001	APACHE CORPORATION	S		ACTIVE	8/12/1983	
84	30-015-10244	L	5	18S	28E	2310S	330W	STATE AG #001	MACK ENERGY CORP	O	3/27/2001	ZONE ABAN	3/27/2001	
87	30-015-20019	1	6	18S	28E	330N	330E	NORTHWEST ARTESIA UNIT #016	LIME ROCK RESOURCES A, LP	O		ACTIVE	3/14/1967	
88	30-015-02615	1	6	18S	28E	660N	660E	EMPIRE ABO UNIT #024B	APACHE CORPORATION	O		ACTIVE	2/29/1960	
89	30-015-02625	2	6	18S	28E	470N	2170E	EMPIRE ABO UNIT #023C	APACHE CORPORATION	I		ACTIVE	12/21/1959	
90	30-015-21542	2	6	18S	28E	1260N	1580E	EMPIRE ABO UNIT #231	APACHE CORPORATION	O		P/A	11/1/1975	
91	30-015-02621	3	6	18S	28E	660N	1980W	EMPIRE ABO UNIT #022E	APACHE CORPORATION	O		ACTIVE	12/29/1959	
92	30-015-21626	G	6	18S	28E	1361N	2531E	EMPIRE ABO UNIT #231A	APACHE CORPORATION	O		P/A	10/22/1975	
93	30-015-02613	4	6	18S	28E	990N	660W	EMPIRE ABO UNIT #021B	APACHE CORPORATION	O		ACTIVE	12/30/1959	
94	30-015-23116	5	6	18S	28E	2050N	100W	EMPIRE ABO UNIT #213	APACHE CORPORATION	O		ACTIVE	6/2/1980	
95	30-015-02619	5	6	18S	28E	1990N	660W	EMPIRE ABO UNIT #021C	APACHE CORPORATION	O		ACTIVE	10/30/1959	
96	30-015-22637	5	6	18S	28E	2450N	400W	EMPIRE ABO UNIT #212	APACHE CORPORATION	O		ACTIVE	12/28/1978	
97	30-015-21395	5	6	18S	28E	2630N	1300W	EMPIRE ABO UNIT #211	APACHE CORPORATION	O		ACTIVE	2/11/1975	
98	30-015-22012	F	6	18S	28E	1350N	1572W	EMPIRE ABO UNIT #222	APACHE CORPORATION	O		ACTIVE	3/13/1977	
99	30-015-02626	F	6	18S	28E	1650N	1650W	STATE NO. 1	SARKIN, DAVID C & OLIVER, HENRY F	O	2/21/1942	P&A	2/21/1942	
100	30-015-10107	F	6	18S	28E	1874N	1874W	STATE FX #001	DORAL ENERGY CORP	O		ACTIVE	8/8/1963	
101	30-015-02620	F	6	18S	28E	1990N	2082W	EMPIRE ABO UNIT #022D	APACHE CORPORATION	O		ACTIVE	11/26/1959	
102	30-015-22527	F	6	18S	28E	2630N	1930W	EMPIRE ABO UNIT #223	APACHE CORPORATION	O		ACTIVE	5/19/1978	
103	30-015-21746	F	6	18S	28E	2610N	2713W	EMPIRE ABO UNIT #221	APACHE CORPORATION	O		ACTIVE	4/23/1976	
104	30-015-22913	G	6	18S	28E	1750N	1600E	EMPIRE ABO UNIT #235	APACHE CORPORATION	O		T/A	7/8/1979	
105	30-015-22593	G	6	18S	28E	1900N	2441E	EMPIRE ABO UNIT #234	BP AMERICA PRODUCTION COMPANY	O	12/3/2008	P&A	8/27/1978	
106	30-015-02614	G	6	18S	28E	1980N	1980E	EMPIRE ABO UNIT #023B	APACHE CORPORATION	O		ACTIVE	1/26/1960	
107	30-015-21737	G	6	18S	28E	2253N	1576E	EMPIRE ABO UNIT #232	BP AMERICA PRODUCTION COMPANY	O	5/7/2009	P&A	4/13/1976	
108		H	6	18S	28E							MISPLOT OF 107		
109	30-015-22490	G	6	18S	28E	2550N	2050E	EMPIRE ABO UNIT #233	BP AMERICA PRODUCTION COMPANY	O	4/3/2009	P&A	6/5/1978	
110	30-015-02616	H	6	18S	28E	1650N	990E	EMPIRE ABO UNIT #024C	APACHE CORPORATION	O		P/A	3/24/1960	

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID		Unit		TOWNS					WELL		WELL		WELL		DATE - Comp	
NO	API	No.	Sect	HIP	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	TYPE	PLUG DATE	STATUS			or Plug	
111	30-015-23547	H		6 18S	28E	1950N	660E	EMPIRE ABO UNIT #241	BP AMERICA PRODUCTION COMPANY	O	9/19/2008	P&A			4/12/1981	
112	30-015-02617	I		6 18S	28E	2310S	990E	EMPIRE ABO UNIT #024K	BP AMERICA PRODUCTION COMPANY	O	12/12/2002	P&A			12/12/2002	
113	30-015-22528	J		6 18S	28E	2300S	1570E	EMPIRE ABO UNIT #232A	BP AMERICA PRODUCTION COMPANY	O	4/7/2009	P&A			2/5/1979	
114	30-015-02611	J		6 18S	28E	2310S	2310E	STATE NO. 1	BARNEY COCKBURN	O	8/15/1949	P&A			8/15/1949	
115	30-015-02628	J		6 18S	28E	2260S	2270E	EMPIRE ABO UNIT #023D	BP AMERICA PRODUCTION COMPANY	O		ACTIVE			5/23/1979	
116	30-015-22491	J		6 18S	28E	1700S	2350E	EMPIRE ABO UNIT #231B	BP AMERICA PRODUCTION COMPANY	O	9/2/2009	P&A			8/13/1978	
117	30-015-02618	J		6 18S	28E	1647S	2076E	CAPITOL STATE NO. 1	MILLER BROS OIL CO	G	3/21/1955	P&A			3/21/1955	
118	30-015-02623	K		6 18S	28E	2248S	2075W	EMPIRE ABO UNIT #022F	APACHE CORPORATION	O		ACTIVE			2/22/1960	
119		K		6 18S	28E							MISPLOT				
120		L		6 18S	28E			WDW-2 (ORIGINAL LOCATION)	NAVAJO REFINING COMPANY							
121	30-015-02622	6		6 18S	28E	2219S	660W	EMPIRE ABO UNIT #021D	APACHE CORPORATION	O		ACTIVE			1/23/1960	
122	30-015-23548	6		6 18S	28E	1950S	1000W	EMPIRE ABO UNIT #211A	APACHE CORPORATION	O		ACTIVE			7/17/1980	
123	30-015-02627	7		6 18S	28E	949S	990W	STATE M-AI #002	RUTH OIL CO, LLC	O		ACTIVE			10/21/1960	
124	30-015-26943	7		6 18S	28E	990S	730W	CHALK BLUFF 6 STATE #001	MEWBOURNE OIL CO	G		ACTIVE			4/16/1992	
125	30-015-02610	N		6 18S	28E	955S	1750W	EMPIRE ABO UNIT #022C	APACHE CORPORATION	O		ACTIVE			8/5/1960	
126	30-015-02624	O		6 18S	28E	968S	2270E	STATE CD NO. 1	PAN AMERICAN PETROLEUM CO	O	5/1/1961	P&A			5/1/1961	
127	30-015-25503	P		6 18S	28E	660S	330E	KIMBERLY STATE NO. 1	DICKSON PETROLEUM CO	O	12/30/1985	P&A			12/30/1985	
128	30-015-02612	P		6 18S	28E	330S	330E	STATE NO. 1	D & H OIL CO	O	5/13/1952	P&A			5/13/1952	
129	30-015-01215	1		1 18S	27E	667N	666E	EMPIRE ABO UNIT #020D	APACHE CORPORATION	O		ACTIVE			11/5/1959	
130	30-015-00708	2		1 18S	27E	660N	1980E	EMPIRE ABO UNIT #019B	APACHE CORPORATION	O		P/A			7/7/1959	
131		C		1 18S	27E			HILL #4	MALCO REFINERIES		5/10/1948	P&A			5/10/1948	
132		C		1 18S	27E							MISPLOT				
133	30-015-00710	3		1 18S	27E	660N	1980W	AAO FEDERAL No. 013	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			7/21/2004	
134	30-015-26741	F		1 18S	27E	1650N	1350W	CHALK BLUFF FEDERAL COM #002	MEWBOURNE OIL CO	G		ACTIVE			8/24/1991	
135	30-015-00706	F		1 18S	27E	2310N	1980W	EMPIRE ABO UNIT #018A	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			5/31/1959	
136	30-015-00709	G		1 18S	27E	1980N	1980E	EMPIRE ABO UNIT #019C	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			8/2/1959	
137		G		1 18S	27E							MISPLOT				
138	30-015-21552	G		1 18S	27E	2500N	2500E	EMPIRE ABO UNIT #191	CFM OIL, LLC	O		P/A			9/7/1975	
139	30-015-00711	H		1 18S	27E	1980N	660E	EMPIRE ABO UNIT #020C	BP AMERICA PRODUCTION COMPANY	O		P/A			10/13/1959	
140	30-015-21783	H		1 18S	27E	2490N	1299E	EMPIRE ABO UNIT #202	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			5/13/1976	
141	30-015-22656	H		1 18S	27E	2400N	700E	EMPIRE ABO UNIT #203	APACHE CORPORATION	O		ACTIVE			10/10/1978	
142		H		1 18S	27E			CRONIN #1	MANHATTAN OIL		7/1/2027	P&A			7/1/1927	
143	30-015-21553	H		1 18S	27E	2501N	20E	EMPIRE ABO UNIT #201	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			7/19/1975	
144	30-015-27163	I		1 18S	27E	1980S	990E	CHALK BLUFF FEDERAL COM #003	MEWBOURNE OIL CO	I		ACTIVE			1/16/1993	
145	30-015-00697	I		1 18S	27E	1980S	660E	EMPIRE ABO UNIT #020K	BP AMERICA PRODUCTION COMPANY	O	1/5/2003	P&A			1/5/2003	
146	30-015-22657	J		1 18S	27E	2490S	2200E	EMPIRE ABO UNIT #193	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			10/26/1978	
147	30-015-00696	J		1 18S	27E	1980S	1980E	EMPIRE ABO UNIT #019Q	APACHE CORPORATION	O		P&A			8/20/1959	
148	30-015-22560	J		1 18S	27E	220S	1390E	EMPIRE ABO UNIT #192	BP AMERICA PRODUCTION COMPANY	O		T/A			6/25/1978	
149	30-015-21873	J		1 18S	27E	1526S	1470E	EMPIRE ABO UNIT #191A	ALAMO PERMIAN RESOURCES, LLC	O		ACTIVE			9/23/1976	
150	30-015-22658	J		1 18S	27E	1500S	2130E	EMPIRE ABO UNIT #194	APACHE CORPORATION	O		T/A			11/14/1978	
151	30-015-22559	K		1 18S	27E	2290S	2445W	EMPIRE ABO UNIT #184	APACHE CORPORATION	O		P/A			7/25/1978	
152	30-015-22096	K		1 18S	27E	2370S	1510W	EMPIRE ABO UNIT #183	APACHE CORPORATION	O		ACTIVE			7/24/1977	
153	30-015-21554	K		1 18S	27E	1367S	1440W	EMPIRE ABO UNIT #181	BP AMERICA PRODUCTION COMPANY	O	4/17/2003	P&A			4/17/2003	
154	30-015-00707	K		1 18S	27E	1980S	1980W	EMPIRE ABO UNIT #018B	APACHE CORPORATION	O		ACTIVE			5/22/1959	
155	30-015-21792	K		1 18S	27E	1533S	2370W	EMPIRE ABO UNIT #182	LIME ROCK RESOURCES A, L.P.	O		ACTIVE			6/1/1976	
156	30-015-00713	N		1 18S	27E	995S	1644W	EMPIRE ABO UNIT #018D	BP AMERICA PRODUCTION COMPANY	O	9/27/2003	P&A			9/27/2003	
157	30-015-26575	N		1 18S	27E	790S	2250W	WDW-3	NAVAJO REFINING COMPANY	I		ACTIVE			3/7/1991	
158	30-015-20394	O		1 18S	27E	953S	2197E	EMPIRE ABO FEDERAL NO. 5	HUMBLE OIL & REFINING CO	O	4/9/1971	P&A			4/9/1971	
159	30-015-00698	O		1 18S	27E	660S	1980E	EMPIRE ABO UNIT #191	BP AMERICA PRODUCTION COMPANY	S		ACTIVE			11/8/1959	
160	30-015-00699	P		1 18S	27E	940S	330E	EMPIRE ABO UNIT #020B	APACHE CORPORATION	O		ACTIVE			12/2/1961	
161	30-015-26404	A	12	18S	27E	660N	990E	FEDERAL T #001	APACHE CORPORATION	I		ACTIVE			9/13/1990	
162	30-015-25099	H	12	18S	27E	1809N	990E	COMSTOCK FEDERAL #006	HARLOW ENTERPRISES LLC	O		ACTIVE			9/11/1985	
165	30-015-25997	C	7	18S	28E	940N	1757W	LAUREL STATE #001	EASTLAND OIL CO	O		ACTIVE			2/23/1987	
166	30-015-25675	2	7	18S	28E	940N	1757W	LAUREL STATE #002	EASTLAND OIL CO	O		ACTIVE			11/10/1988	

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID NO	API	Unit		TOWNS			EW FTG	WELL NAME	OPERATOR	WELL		STATUS	DATE - Comp or Plug
		No.	Sect	HIP	RNG	NS FTG				TYPE	PLUG DATE		
167	30-015-25236	F		7 18S	28E	1980N	1980W	STATE BY #001	MOREXCO INC	O		ACTIVE	6/10/1985
168	30-015-22636	J		7 18S	28E	1950N	1300W	PRE-ONGUARD WELL #213	DYAD PE	O		ABAN LOCATION	
169	30-015-22635	J		8 18S	28E	1900N	100W	PRE-ONGUARD WELL #212	DYAD PE	O		ABAN LOCATION	
170	30-015-24372	J		8 18S	28E	1980S	990E	PRE-ONGUARD WELL #001	DYAD PE	O		ABAN LOCATION	
171	30-015-27636	H		7 18S	28E	2310N	810E	CHALK BLUFF 6 STATE #002	PHILLIPS PETROLEUM	O		ABAN LOCATION	
353	30-015-27286	M		36 17S	27E	660S	990W	CHALK BLUFF 36 STATE #001	MEWBOURNE OIL CO	O		ACTIVE	3/30/1993
354	30-015-24612	M		36 17S	27E	790S	990W	STATE M #001	PRONGHORN MANAGEMENT CORP	O	4/21/2009	P&A	10/11/1983
355	30-015-00676	M		36 17S	27E	330N	990W	EMPIRE ABO UNIT #017	LIME ROCK RESOURCES A, L.P.	O		ACTIVE	
356	30-015-10184	M		36 17S	27E	330S	920W	STATE #006	ASPEN OIL INC	O		ACTIVE	
358	30-015-21623	M		36 17S	27E	360S	455W	STATE #007	GEORGE A CHASE JR & C SERVICE	O		ACTIVE	
359	30-015-00662	M		36 17S	27E	330S	330W	STATE NO. 2	ACREY, B L & F D	O	10/15/1942	P&A	10/15/1942
595	30-015-02605	B		5 18S	28E	930N	2271E	EMPIRE ABO UNIT NO. 27 E	BP AMERICA PRODUCTION UNIT	O	6/12/2009	P&A	3/30/1960
748	30-015-00701	D		1 18S	27E	330N	330W	SOUTH RED LAKE GRAYBURG UNIT 37 WIW	FAIRWAY RESOURCES OPERATING LLC	O		ACTIVE	
748	30-015-00715	4		1 18S	27E	330N	330W	SOUTH RED LAKE GRAYBURG UNIT #037	LEGACY RESERVES OPERATING LP	I		ACTIVE	
749	30-015-00712	D		1 18S	27E	647N	667W	EMPIRE ABO UNIT I NO. 17	ARCO OIL & GAS	O	1/24/1987	P&A	1/24/1987
750		E		1 18S	27E	1650N	330W	BRAINARD	JONES	O	5/10/1939	P&A	5/10/1939
751	30-015-00704	E		1 18S	27E	1980N	660W	EMPIRE ABO UNIT J NO. 17	ARCO OIL & GAS	O	3/26/1959	P&A	3/26/1959
752	30-015-00703	L		1 18S	27E	1980S	660W	EMPIRE ABO UNIT #017A	BP AMERICA PRODUCTION COMPANY	O	3/27/2009	P&A	5/22/1995
753	30-015-22815	M		1 18S	27E	670S	330W	EMPIRE ABO UNIT #171	LIME ROCK RESOURCES A, L.P.	O		ACTIVE	5/22/1979
754		M		1 18S	27E							MISPLOT OF 756	
755	30-015-00714	N		1 18S	27E			HILL #1	VALLEY REFINING CO		12/20/1943	P&A	12/20/1943
756	30-015-00705	M		1 18S	27E	990S	660W	EMPIRE ABO UNIT #017B	BP AMERICA PRODUCTION COMPANY	O	7/21/2004	P&A	6/25/1959
757		A		2 18S	27E	330N	610E	STATE 2	BRAINARD & GUY		1/31/1942	NO COMPL	1/31/1942
758	30-015-00721	1		2 18S	27E	330N	990E	SOUTH RED LAKE GRAYBURG UNIT #036	FAIRWAY RESOURCES OPERATING LLC	O		PROD	11/6/1947
765	30-015-00724	1		2 18S	27E	990N	330E	EMPIRE ABO UNIT #016B	LIME ROCK RESOURCES A, L.P.	O		ACTIVE	
766	30-015-00737	B		2 18S	27E	905N	1601E	SOUTH RED LAKE GRAYBURG UNIT #038	FAIRWAY RESOURCES OPERATING LLC	O		ACTIVE	5/23/1948
772	30-015-00745	H		2 18S	27E	1980N	660E	STATE H #001	MACK ENERGY CORPORATION	O	3/7/2008	P&A	3/7/2008
773	30-015-00742	H		2 18S	27E	1650N	990E	SOUTH RED LAKE GRAYBURG UNIT 39 WIW	S&J OPERATING COMPANY	O	2/8/1991	P&A	2/8/1991
774	30-015-00740	G		2 18S	27E	1650N	2197E	SOUTH RED LAKE GRAYBURG UNIT #040	MCQUADRANGLE, LC	I	7/10/2002	P&A	7/10/2002
778		G		2 18S	27E	2310N	1650E	HUDSON #2	RUTTER & WILBANKS	O			1/1/1957
779	30-015-00741	G		2 18S	27E	2310N	1980E	EMPIRE ABO UNIT #015B	APACHE CORPORATION	O		ACTIVE	6/6/1959
781		J		2 18S	27E	2310S	2310E	STATE B-2	MALCO REFINING CO	O	1/1/1947	P&A	1/1/1947
785	30-015-00717	I		2 18S	27E	1980S	660E	EMPIRE ABO UNIT #016	BP AMERICA PRODUCTION COMPANY	O		P/A	2/6/1995
786	30-015-00716	J		2 18S	27E	1980S	1830E	EMPIRE ABO UNIT #015	APACHE CORPORATION	O		ACTIVE	3/23/1959
789	30-015-22896	K		2 18S	27E	1820S	2550W	EMPIRE ABO UNIT #143A	WALTER SOLT, LLC	O		ACTIVE	5/13/1979
791	30-015-22914	I		2 18S	27E	1310S	590E	EMPIRE ABO UNIT #161	COG OPERATING, LLC	O		T/A	9/13/1979
792		O		2 18S	27E							MISPLOT OF 814	
793	30-015-22609	N		2 18S	27E	1200S	1900W	EMPIRE ABO UNIT #143	APACHE CORPORATION	O		ACTIVE	12/20/1978
795		P		2 18S	27E							MISPLOT OF 765	
796	30-015-21544	O		2 18S	27E	1110S	1322E	EMPIRE ABO UNIT #151	APACHE CORPORATION	O		P/A	11/4/1975
797	30-015-22885	O		2 18S	27E	1040S	2025E	EMPIRE ABO UNIT #155	APACHE CORPORATION	O		T/A	5/1/1979
799	30-015-00722	P		2 18S	27E	660S	660E	EMPIRE ABO UNIT #016A	APACHE CORPORATION	O	2/24/2009	P&A	1/20/1959
800	30-015-22808	O		2 18S	27E	600S	1330E	EMPIRE ABO UNIT #156	BP AMERICA PRODUCTION COMPANY	O	2/5/2009	P&A	4/12/1979
801	30-015-00731	O		2 18S	27E	660S	1980E	EMPIRE ABO UNIT #015A	BP AMERICA PRODUCTION COMPANY	O	2/11/2009	P&A	11/19/1958
802	30-015-22669	O		2 18S	27E	800S	2500E	EMPIRE ABO UNIT #154	BP AMERICA PRODUCTION COMPANY	O	1/27/2009	P&A	12/4/1978
805	30-015-22013	O		2 18S	27E	90S	1456E	EMPIRE ABO UNIT #153	BP AMERICA PRODUCTION COMPANY	O	10/30/2008	P&A	4/20/1977
806	30-015-21825	O		2 18S	27E	320S	2602E	EMPIRE ABO UNIT #152	APACHE CORPORATION	O		T/A	6/17/1976
												P&A	
807	30-015-22608	N		2 18S	27E	100S	1950W	EMPIRE ABO UNIT #142	BP AMERICA PRODUCTION COMPANY	O		(No info on dates)	
808	30-015-21807	M		2 18S	27E	275S	1243W	EMPIRE ABO UNIT #132	BP AMERICA PRODUCTION COMPANY	O		ACTIVE	7/1/1976
812	30-015-00730	N		2 18S	27E	660S	1980W	EMPIRE ABO UNIT #014	APACHE CORPORATION	O		ACTIVE	10/21/1958
813	30-015-00720	A		2 18S	27E	990N	1650E	RIVERWOLF UNIT #004	BP AMERICA PRODUCTION COMPANY	O	12/12/2008	P&A	10/21/1959
814	30-015-22051	K		2 18S	27E	1370S	2445W	EMPIRE ABO UNIT #141A	APACHE CORPORATION	O		ACTIVE	5/17/1977
836	30-015-00869	A		11 18S	27E	330N	653E	EMPIRE ABO UNIT #016C	BP AMERICA PRODUCTION COMPANY	O	10/25/2004	P&A	10/25/2004

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID		Unit		TOWNS			EW FTG	WELL NAME	OPERATOR	WELL		STATUS	DATE - Comp or Plug
NO	API	No.	Sect	HIP	RNG	NS FTG				TYPE	PLUG DATE		
837	30-015-22568	B		11 18S	27E	400N	1450E	EMPIRE ABO UNIT #151B	BP AMERICA PRODUCTION COMPANY	O	8/16/2006	P&A	8/16/2006
838	30-015-22838	B		11 18S	27E	200N	1925E	EMPIRE ABO UNIT #153B	BP AMERICA PRODUCTION COMPANY	O	1/4/2009	P&A	5/6/1979
839	30-015-00868	B		11 18S	27E	660N	1980E	EMPIRE ABO UNIT #015C	BP AMERICA PRODUCTION COMPANY	O	7/16/2004	P&A	7/16/2004
840	30-015-22569	B		11 18S	27E	560N	2588E	EMPIRE ABO UNIT #152B	BP AMERICA PRODUCTION COMPANY	O	9/24/2008	P&A	8/23/1978
841	30-015-22834	C		11 18S	27E	225N	2280W	EMPIRE ABO UNIT #141B	APACHE CORPORATION	O		ACTIVE	5/21/1979
842	30-015-00864	C		11 18S	27E	660N	1980W	EMPIRE ABO UNIT M NO. 14	ARCO OIL & GAS	O	9/5/1957	P&A	9/5/1957
843	30-015-22833	D		11 18S	27E	450N	1175W	EMPIRE ABO UNIT #133B	APACHE CORPORATION	O		ACTIVE	5/23/1979
844	30-015-00867	D		11 18S	27E	660N	660W	EMPIRE ABO UNIT M NO. 13	ARCO OIL & GAS	O	4/26/1958	P&A	4/26/1958
846	30-015-22556	D		11 18S	27E	1100N	1200W	EMPIRE ABO UNIT M NO. 131	ARCO OIL & GAS	O	7/10/1978	P&A	7/10/1978
848	30-015-20510	F		11 18S	27E	1650N	1653W	MALCO S NO. 1	AMOCO PRODUCTION CO	O	10/16/1971	P&A	10/16/1971
849	30-015-00865	F		11 18S	27E	1650N	1980W	EMPIRE ABO UNIT N NO. 14	ARCO OIL & GAS	O	2/3/1961	P&A	2/3/1961
850	30-015-00866	E		11 18S	27E	1980N	660W	EMPIRE ABO UNIT N NO. 131	ARCO OIL & GAS	O	3/27/1958	P&A	3/27/1958
851	30-015-00870	J		11 18S	27E	1980S	1980E	SMITH-MCPHERSON NO. 1	AMOCO PRODUCTION CO	O	9/1/1956	P&A	9/1/1956
852	30-015-01201	N		11 18S	27E			AN ETZ #3	OSCAR HOWARD		4/15/2027	P&A	
853	30-015-01202	O		11 18S	27E			AN ETZ #2	OSCAR HOWARD		2/4/2027	P&A	
854	30.015-00863	N		11 18S	27E			VICKERS #1	B.R. POLK, JR.		10/14/1949	P&A	10/14/1949
855	30-015-24857	M		11 18S	27E	700S	990W	FEDERAL DH GAS COM #001	CHEVERON USA INC.	G		ACTIVE	5/18/1984
856	30-015-20535	D		12 18S	27E	330N	455W	FEDERAL EA 2	ROBERT G COX	O	8/7/1973	P&A	8/7/1973
857	30-015-00871	D		12 18S	27E	330N	330W	FEDERAL EA #001	RHONDA OPERATING CO	O	4/12/1994	P&A	4/12/1994
858	30-015-23115	D		12 18S	27E	330N	380W	FEDERAL EA NO. 3	RHONDA OPERATING CO	O	3/16/1980	D&A	3/16/1980
859	30-015-25738	G		12 18S	27E	2310N	2310E	COMSTOCK FEDERAL #009	HARLOW ENTERPRISES LLC	O		ACTIVE	4/25/1987
860	30-015-25270	F		12 18S	27E	2310N	2310W	CHUKKA FEDERAL #001	PHOENIX ENERGY	O		ACTIVE	4/23/1985
861	30-015-20894	E		12 18S	27E	1980N	660W	WDW #002	NAVAJO REFINING COMPANY	I		ACTIVE	7/18/1973
862	30-015-00874	J		12 18S	27E	2310S	2355E	COMSTOCK FEDERAL #007	HARLOW ENTERPRISES LLC	O		ACTIVE	6/29/1948
863	30-015-00872	L		12 18S	27E	310S	990W	MAGRUDER NO. 1	MCKEE-JONES	O	2/18/1943	D&A	
864	30-015-25201	K		12 18S	27E	1650S	1770W	COMSTOCK FEDERAL #002	HARLOW ENTERPRISES LLC	O		ACTIVE	3/16/1985
865	30-015-25649	L		12 18S	27E	1650S	990W	COMSTOCK FEDERAL NO. 8	FRED POOL DRILLING CO	O	10/10/1986	D&A	
866	30-015-25545	M		12 18S	27E	990S	990W	COMSTOCK FEDERAL #003	HARLOW ENTERPRISES LLC	O		ACTIVE	5/19/1986
867	30.015-00873	M		12 18S	27E			MAGRUDER #2	R.E. MCKEE ET AL		2/27/1945	P&A	2/27/1945
868	30-015-26017	N		12 18S	27E	990S	1650W	COMSTOCK FEDERAL #010	EASTLAND OIL CO	O	1/23/2003	P&A	1/23/2003
869	30-015-25100	N		12 18S	27E	330S	1650W	COMSTOCK FEDERAL #001	HARLOW ENTERPRISES LLC	O		ACTIVE	12/10/1984
870	30-015-25202	O		12 18S	27E	330S	2310E	COMSTOCK FEDERAL #005	HARLOW ENTERPRISES LLC	O		ACTIVE	4/19/1985
871	30-015-06171	I		12 18S	27E	1069S	251E	MICHAEL CRONIN NO. 3	PILCHER OIL & GAS	O	5/20/2026	P&A	
872		P		12 18S	27E			MICHAEL CRONIN #1	PILCHER OIL & GAS		2/15/1932	P&A	2/15/1932
873	30-015-00875	P		12 18S	27E	330S	330E	MAGRUDER NO. B-4	CITIES SERVICE OIL CO	O	7/30/1952	P&A	7/30/1952
874	30-015-00876	P		12 18S	27E	100S	500E	MAGRUDER NO. 5	ROBERT E MCKEE	O	2/8/1954	P&A	2/8/1954
875	30-015-06170	P		12 18S	27E	200S	200E	MICHAEL CRONIN NO. 2	PILCHER OIL & GAS	O	2/22/2026	P&A	
876	30-015-01200	A		13 18S	27E	0	0	STATE NO. 1	HASSENFUSH-DONNELLY	O	1/1/2026	P&A	
877	30-015-06137	A		13 18S	27E	250N	990E	STATE NO. 2	EASTLAND OIL CO	O	1/1/2026	D&A	
878	30-015-25394	C		13 18S	27E	330N	2310W	ARTESIA STATE #002	BILL MILLER	O		ACTIVE	9/28/1985
879	30-015-25241	C		13 18S	27E	330N	1650W	ARTESIA STATE #001	BILL MILLER	O		ACTIVE	4/13/1985
880	30-015-00884	C		13 18S	27E	990N	1650W	STATE NO. 3	DALE RESLER	O	1/29/1945	P&A	1/29/1945
881	30-015-25370	D		13 18S	27E	480N	940W	ARTESIA STATE UNIT #002A	APACHE CORPORATION	O		ACTIVE	8/27/1985
882	30-015-00883	D		13 18S	27E	990N	990W	ARTESIA STATE UNIT #001	APACHE CORPORATION	O		ACTIVE	12/11/1944
883	30-015-00880	E		13 18S	27E	1650N	990W	STATE NO. 1	DALE RESLER - JONES	O	1/26/1945	P&A	1/26/1945
884	30-015-24881	F		13 18S	27E	1880N	1830W	ANADARKO 13 FEDERAL #001	DAVID G HAMMOND	O	7/17/2011	P&A	6/18/1984
885	30-015-00888	F		13 18S	27E	1980N	1650W	PAGE NO. 1	RALPH NIX & JERRY CURTIS	O	11/28/1954	P&A	11/28/1954
886	30-015-00879	F		13 18S	27E	2310N	1650W	JONES-GOVT NO. 1	DALE RESLER	O	3/14/1945	D&A	3/14/1945
888	30-015-25078	G		13 18S	27E	1724N	2279E	ANADARKO 13 FEDERAL NO. 1	DICKSON PETROLEUM, INC	O	12/30/1984	D&A	12/30/1984
895	30-015-00891	A		14 18S	27E	990N	330E	ARTESIA STATE UNIT TRACT 4 NO. 1	ANADARKO PETROLEUM CORP	O	6/30/1944	P&A	6/30/1944
896	30-015-00893	G		14 18S	27E	1650N	1650E	STATE NO. 1	RESLER	O	1/1/1900	D&A	1/1/1900
897	30-015-00895	H		14 18S	27E	1650N	330E	ARTESIA STATE UNIT #001B	APACHE CORPORATION	O		ACTIVE	2/8/1945
901	30-015-00695	L		1 18S	27E	1650S	330W	HILL NO. 1	WILLIAM & EDWARD HUDSON	O	6/18/1948	D&A	6/18/1948
910	30-015-00744	J		2 18S	27E	2310S	1640E	STATE 1	COMPTON-SMITH	O		P&A	

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID			Unit	TOWNS							WELL			
NO	API		No.	Sect	HIP	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
911	30-015-31123	H	36	17S	27E	1980N		760E	NO BLUFF 36 STATE COM #002	LIME ROCK RESOURCES A, LP	G		ACTIVE	
912	30-015-31036	H	36	17S	27E	2310N		990E	GATES STATE #003	GEORGE A CHASE JR & C SERVICE	O		ACTIVE	
916	30-015-31592	N	36	17S	27E	330S		2310E	RAMAPO #007	ROJO GRANDE COMPANY LLC	O	12/21/2001	P&A	12/21/2001
917	30-015-30784	A	31	17S	28E	330N		480E	NW STATE #012	LIME ROCK RESOURCES A, LP	O		ACTIVE	
918	30-015-30893	A	31	17S	28E	973N		959E	NW STATE #028	LIME ROCK RESOURCES A, LP	O		ACTIVE	
919	30-015-32162	1	31	17S	28E	460N		990W	ENRON STATE #004	LIME ROCK RESOURCES A, LP	O		ACTIVE	4/3/2003
920	30-015-30783	H	31	17S	28E	1650N		330E	NW STATE #011	LIME ROCK RESOURCES A, LP	O		ACTIVE	
921	30-015-30849	I	31	17S	28E	2310S		270E	NW STATE #009	LIME ROCK RESOURCES A, LP	O		ACTIVE	
922	30-015-30760	P	31	17S	28E	735S		330E	NW STATE #010	LIME ROCK RESOURCES A, LP	O		ACTIVE	
923	30-015-31920	D	32	17S	28E	990N		990W	ENRON STATE #002	APACHE CORPORATION	O		ACTIVE	
924	30-015-30781	K	32	17S	28E	1900S		2146W	NW STATE #005	LIME ROCK RESOURCES A, LP	I		ACTIVE	
925	30-015-30777	L	32	17S	28E	2310S		990W	NW STATE #006	APACHE CORPORATION	O		ACTIVE	
926	30-015-30685	M	32	17S	28E	990S		990W	NW STATE #007	APACHE CORPORATION	O		ACTIVE	
927	30-015-30815	N	32	17S	28E	1090S		2126W	NW STATE #008	LIME ROCK RESOURCES A, LP	I		ACTIVE	
928	30-015-32310	1	1	18S	27E	990N		990E	AAO FEDERAL #004	APACHE CORPORATION	O		ACTIVE	5/4/2004
929	30-015-32309	2	1	18S	27E	330N		1690E	AAO FEDERAL #003	APACHE CORPORATION	O		ACTIVE	4/10/2003
930	30-015-32308	3	1	18S	27E	430N		2310W	AAO FEDERAL #002	APACHE CORPORATION	O		ACTIVE	9/19/2002
931	30-015-32307	4	1	18S	27E	330N		990W	AAO FEDERAL #001	APACHE CORPORATION	O		ACTIVE	12/10/2002
932	30-015-22816	O	1	18S	27E	1120S		1440E	EMPIRE ABO UNIT L #192	ARCO OIL & GAS	O	6/23/1980	ABAN LOCATION	6/28/1980
933	30-015-20388	N	1	18S	27E	990S		2297E	EMPIRE ABO #5	ARCO OIL & GAS	O	12/31/9999	SAME AS 158	
934	30-015-27719	I	12	18S	27E	1650S		990E	CHALK BLUFF 12 FED #001	MEWBOURNE OIL CO	G		ABAN LOCATION	
935	30-015-27437	B	14	18S	27E	660N		1980E	BEAUREGARD ANP STATE COM #001	YATES PETROLEUM CORPORATION	G		ABAN LOCATION	
936	30-015-31086	E	5	18S	28E	1650N		990W	LP STATE #001	MARBOB ENERGY CORP	O	3/11/2008	P&A	3/11/2008
937	30-015-31109	E	5	18S	28E	2301N		230W	LP STATE #002	APACHE CORPORATION	O		PROPOSED	
938	30-015-30785	1	6	18S	28E	430N		330E	NW STATE #015	APACHE CORPORATION	O		ACTIVE	
939	30-015-00264	J	6	18S	28E	2310S		2310E	CAPITAL STATE NO. 1	BARNEY COCKBURN	O		SAME AS 114	5/23/1979
940	30-015-31087	7	6	18S	28E	990S		330W	LP STATE #003	MARBOB ENERGY CORP	O	3/17/2008	P&A	7/15/2000
941	30-015-31088	7	6	18S	28E	330S		990W	LP STATE #004	MARBOB ENERGY CORP	O		PROPOSED	
942	30-015-06250	O	6	18S	28E	470S		2170E		BP AMERICA PRODUCTION COMPANY	O		SAME AS 89	
943	30-015-31319	3	7	18S	28E	2310N		330W	LAUREL STATE #003	EASTLAND OIL CO	O		ACTIVE	1/31/2001
944	30-015-26575	D	6	18S	28E	778N		995W	WDW-3 (ORIGINAL LOC.)	NAVAJO REFINING COMPANY	I		ACTIVE	
945	30-015-32959	E	1	18S	27E	1650N		875W	AAO FEDERAL #005	APACHE CORPORATION	O		ACTIVE	10/12/2004
946	30-015-33473	G	1	18S	27E	1750N		1650S	AAO FEDERAL #007	MARBOB ENERGY CORP	O		ACTIVE	4/4/2005
947	30-015-33784	H	1	18S	27E	1650N		330W	AAO FEDERAL #008	MARBOB ENERGY CORP	O		ACTIVE	2/25/2005
948	30-015-34071	F	1	18S	27E	2169N		1963W	AAO FEDERAL #006	MARBOB ENERGY CORP	O		ACTIVE	8/5/2005
949	30-015-34387	L	1	18S	27E	1980S		630W	AAO FEDERAL #009	MARBOB ENERGY CORP	O		ACTIVE	1/17/2006
950	30-015-34555	M	1	18S	27E	890S		660W	AAO FEDERAL #011	MARBOB ENERGY CORP	O		ACTIVE	3/9/2006
951	30-015-34576	K	1	18S	27E	2060S		2160W	AAO FEDERAL #010	MARBOB ENERGY CORP	O		ACTIVE	10/26/2006
952	30-015-34998	N	1	18S	27E	890S		1650W	AAO FEDERAL #012	MARBOB ENERGY CORP	O		ACTIVE	9/21/2006
953	30-015-34028	G	6	18S	28E	2285N		1366E	SLIDER 6 STATE NO. 001	BP AMERICA PRODUCTION COMPANY	O	12/17/2006	P&A	12/17/2006
954	30-015-35050	D	32	17S	28E	330N		500W	ENRON STATE NO 012	LIME ROCK RESOURCES A, LP	O		ACTIVE	12/21/2006
955	30-015-40187	A	14	18S	27E	660N		990E	VIOLET BIV STATE COM #1	YATES PETROLEUM CORP	O		EXT PERMIT TO DRILL	2/20/2009
956	30-015-33994	A	36	17S	27E	915N		420E	RED LAKE 36 A STATE #2	EDGE PETROLEUM OPERATING COMPANY, INC	O		ACTIVE	4/20/2005
957	30-015-36116	G	36	17S	27E	2305N		1650E	SOUTH RED LAKE UNIT II #57	LEGACY RESERVES OPERATING LP	O		ACTIVE	6/6/2008
958	30-015-32946	J	2	18S	27E	2210S		1650E	SCBP STATE #1	APACHE CORPORATION	O		ACTIVE	4/26/2005
959	30-015-35814	H	2	18S	27E	2063N		441E	STATE H NO 2	MACK ENERGY CORPORATION	O		ACTIVE	1/11/2008
960	30-015-36343	G	31	17S	28E	1650N		2310E	MALCO STATE NO. 002	GEORGE A CHASE JR DBA G AND C SERVICE	O		ACTIVE	7/9/2008
961	30-015-36978	D	31	17S	28E	990N		330W	ENRON STATE NO. 015	LIME ROCK RESOURCES A, LP	O		ACTIVE	7/3/2009
962	30-015-36554	L	32	17S	28E	1770S		550W	NW STATE NO. 029	LIME ROCK RESOURCES A, LP	O		ACTIVE	1/30/2009
963	30-015-36989	K	32	17S	28E	1630S		1710W	NW STATE NO. 030	LIME ROCK RESOURCES A, LP	O		NO COMPL	7/14/2009
964	30-015-37057	N	32	17S	28E	330S		1750W	NW STATE NO. 031	LIME ROCK RESOURCES A, LP	O		NO COMPL	7/28/2009
965	30-015-37058	M	32	17S	28E	330S		330W	NW STATE NO. 032	LIME ROCK RESOURCES A, LP	O		NO COMPL	8/23/2009
966	30-015-37428	G	31	17S	28E	1980N		1980E	MALCO STATE NO. 3	G&C SERVICE	O		ACTIVE	2/10/2010
967	30-015-38240	G	36	17S	27E	1425N		1520E	KIOWA STATE NO. 3	COG OPERATING, LLC	O		ACTIVE	

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID		Unit		TOWNS			EW FTG	WELL NAME	OPERATOR	WELL		STATUS	DATE - Comp or Plug
NO	API	No.	Sect	HIP	RNG	NS FTG				TYPE	PLUG DATE		
968	30-015-39029	G		36 17S	27E	2210N	2310E	CONKLIN STATE NO. 1-Y	G AND C SERVICE	O		ACTIVE	
969	30-015-39321	M		36 17S	27E	990S	890W	BIG BOY STATE NO. 1	COG OPERATING, LLC	O		PERMIT TO DRILL	
970	30-015-39322	M		36 17S	27E	840S	425W	BIG BOY STATE NO. 3	COG OPERATING, LLC	O		ACTIVE	
971	30-015-39323	O		36 17S	27E	870S	1560E	BIG BOY STATE NO. 5	COG OPERATING, LLC	O		ACTIVE	
972	30-015-39324	O		36 17S	27E	480S	2210E	BIG BOY STATE NO. 6	COG OPERATING, LLC	O		PERMIT TO DRILL	
973	30-015-39325	O		36 17S	27E	990S	2210E	BIG BOY STATE NO. 7	COG OPERATING, LLC	O		PERMIT TO DRILL	
974	30-015-39326	O		36 17S	27E	275S	1560E	BIG BOY STATE NO. 8	COG OPERATING, LLC	O		ACTIVE	
975	30-015-39401	P		36 17S	27E	1110S	630E	EMPIRE ABO UNIT NO. 417	APACHE CORPORATION	O		ACTIVE	
976	30-015-39009	G		2 18S	27E	1650N	2430E	EMPIRE ABO UNIT NO. 415	APACHE CORPORATION	O		PERMIT TO DRILL	
977	30-015-39066	L		2 18S	27E	2551S	1170W	EMPIRE ABO UNIT NO. 416	APACHE CORPORATION	O		PERMIT TO DRILL	
978	30-015-38234	P		30 17S	28E	430S	800E	ANTHONY NO. 2	LIME ROCK RESOURCES	O		ACTIVE	
979	30-015-39299	M		30 17S	28E	990S	990W	MAPLE STATE NO. 5	COG OPERATING, LLC	O		PERMIT TO DRILL	
980	30-015-39300	M		30 17S	28E	330S	330W	MAPLE STATE NO. 6	COG OPERATING, LLC	O		PERMIT TO DRILL	
981	30-015-38512	D		30 17S	28E	990N	940W	ENRON STATE NO. 16	LIME ROCK RESOURCES	O		ACTIVE	
982	30-015-39004	P		31 17S	28E	150S	1300E	EMPIRE ABO UNIT NO. 401	APACHE CORPORATION	O		PERMIT TO DRILL	
983	30-015-39011	O		31 17S	28E	1190S	1320E	EMPIRE ABO UNIT NO. 419	APACHE CORPORATION	O		PERMIT TO DRILL	
984	30-015-39020	O		31 17S	28E	140S	2560E	EMPIRE ABO UNIT NO. 408	APACHE CORPORATION	O		PERMIT TO DRILL	
985	30-015-38513	J		32 17S	28E	2310S	2032E	JEFFER 32 STATE NO. 3	LIME ROCK RESOURCES	O		ACTIVE	
986	30-015-39006	J		32 17S	28E	2400S	2450E	EMPIRE ABO UNIT NO. 407	APACHE CORPORATION	O		T/A	
987	30-015-39007	M		32 17S	28E	70S	100W	EMPIRE ABO UNIT NO. 409	APACHE CORPORATION	O		PERMIT TO DRILL	
988	30-015-39064	O		32 17S	28E	1175S	1310E	EMPIRE ABO UNIT NO. 403	APACHE CORPORATION	O		T/A	
989	30-015-39008	D		6 18S	28E	160N	1300W	EMPIRE ABO UNIT NO. 410	APACHE CORPORATION	O		PERMIT TO DRILL	
990	30-015-39021	D		6 18S	28E	40N	145W	EMPIRE ABO UNIT NO. 411	APACHE CORPORATION	O		PERMIT TO DRILL	
992	30-015-00715	D		1 18S	27E	330N	330W	SOUTH RED LAKE II UNIT NO. 37	LEGACY RESERVES OPERATING LP	O			
993	30-015-32307	4		1 18S	27E	330N	990W	AAO FEDERAL NO. 1	APACHE CORPORATION	O		PERMIT TO DRILL	
994	30-015-32959	E		1 18S	27E	1650N	875W	AAO FEDERAL NO. 5	APACHE CORPORATION	O		PERMIT TO DRILL	
995	30-015-33473	G		1 18S	27E	1750N	1650E	AAO FEDERAL NO. 7	APACHE CORPORATION	O		PERMIT TO DRILL	
996	30-015-33784	H		1 18S	27E	1650N	330E	AAO FEDERAL NO. 8	APACHE CORPORATION	O		PERMIT TO DRILL	
997	30-015-34071	F		1 18S	27E	2169N	1963W	AAO FEDERAL NO. 6	APACHE CORPORATION	O		PERMIT TO DRILL	
998	30-015-34555	M		1 18S	27E	890S	660W	AAO FEDERAL NO. 11	APACHE CORPORATION	O		PERMIT TO DRILL	
999	30-015-34576	K		1 18S	27E	2060S	2160W	AAO FEDERAL NO. 10	APACHE CORPORATION	O		PERMIT TO DRILL	
1000	30-015-00735	K		2 18S	27E	1980S	1830W	EMPIRE ABO UNIT NO. 14B	APACHE CORPORATION	O		PERMIT TO DRILL	
1001	30-015-22777	M		2 18S	27E	10S	640W	EMPIRE ABO UNIT NO. 134	APACHE CORPORATION	O		PERMIT TO DRILL	
1002	30-015-22824	M		2 18S	27E	800S	950W	EMPIRE ABO UNIT NO. 133	APACHE CORPORATION	O		PERMIT TO DRILL	
1003	30-015-22952	K		2 18S	27E	1310S	1400W	EMPIRE ABO UNIT NO. 142A	APACHE CORPORATION	O		PERMIT TO DRILL	
1004	30-015-39956	G		36 17S	27E	2176N	1858E	KIOWA STATE NO. 8	COG OPERATING, LLC	O		ACTIVE	4/30/2012
1005	30-015-40428	M		36 17S	27E	200S	485W	BIG BOY STATE NO. 2	COG OPERATING, LLC	O		ACTIVE	
1006	30-015-40429	M		36 17S	27E	492S	806W	BIG BOY STATE NO. 4	COG OPERATING, LLC	O		PERMIT TO DRILL	
1007	30-015-39898	A		1 18S	27E	1258E	1005E	EMPIRE ABO UNIT NO. 412	APACHE CORPORATION	O		PERMIT TO DRILL	
1008	30-015-39899	3		1 18S	27E	1305N	2535W	EMPIRE ABO UNIT NO. 413	APACHE CORPORATION	O		PERMIT TO DRILL	
1009	30-015-39900	4		1 18S	27E	1120N	1205W	EMPIRE ABO UNIT NO. 414	APACHE CORPORATION	O		PERMIT TO DRILL	
1011	30-015-36564	O		30 17S	28E	330S	2210E	STALEY STATE NO. 9	LRE OPERATING, LLC	O		ACTIVE	5/5/2009
1012	30-015-37673	N		30 17S	28E	330S	1650W	STALEY STATE NO. 12	LRE OPERATING, LLC	O		ACTIVE	7/7/2010
1013	30-015-38203	P		30 17S	28E	330S	990W	MAPLE STATE NO. 8	COG OPERATING, LLC	O		PERMIT TO DRILL	
1014	30-015-40026	N		30 17S	28E	330S	2410W	STALEY STATE No. 17	LRE OPERATING, LLC	O		ACTIVE	4/4/2012
1015	30-015-39011	O		31 17S	28E	1190S	1320E	EMPIRE ABO UNIT NO. 419	APACHE CORPORATION	O		T/A	11/7/2011
1016	30-015-39020	O		31 17S	28E	140S	2560E	EMPIRE ABO UNIT NO. 408	APACHE CORPORATION	O		T/A	11/9/2011
1017	30-015-40257	D		31 17S	28E	184N	257W	BIG GIRL 31 STATE NO. 1	COG OPERATING, LLC	O		PERMIT TO DRILL	
1018	30-015-40258	D		31 17S	28E	195N	990W	BIG GIRL 31 STATE NO. 2	COG OPERATING, LLC	O		PERMIT TO DRILL	
1019	30-015-40259	G		31 17S	28E	2160N	2310E	BIG GIRL 31 STATE NO. 5	COG OPERATING, LLC	O		PERMIT TO DRILL	
1020	30-015-40260	D		31 17S	28E	1155N	990W	BIG GIRL 31 STATE NO. 7	COG OPERATING, LLC	O		PERMIT TO DRILL	
1021	30-015-40409	L		31 17S	28E	1920S	330W	BIG GIRL 31 STATE NO. 9H	COG OPERATING, LLC	O		PERMIT TO DRILL	
1022	30-015-40410	M		31 17S	28E	615S	10W	BIG GIRL 31 STATE NO. 11H	COG OPERATING, LLC	O		PERMIT TO DRILL	
1023	30-015-39927	K		32 17S	28E	1750S	1765W	AA STATE NO. 2	APACHE CORPORATION	O		ACTIVE	

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID	Unit		TOWNS			EW FTG	WELL NAME	OPERATOR	WELL		STATUS	DATE - Comp or Plug
			No.	Sect	HIP	RNG	NS FTG		TYPE	PLUG DATE		
1024	30-015-40339	D			32 17S	28E	990N	330W	ENRON STATE No. 18	LRE OPERATING, LLC	O	ACTIVE
1025	30-015-00643	O			35 17S	27E	990S	2310E	South Red Lake Grayburg Unit #026	Legacy Reserves Operating LP	O	ACTIVE
1026	30-015-37783	O			35 17S	27E	990S	2225E	Russell C 003	Tarco Energy, L.C.	I	ACTIVE
1027	30-015-00644	N			35 17S	27E	330S	2310W	South Red Lake Grayburg Unit #031	Legacy Reserves Operating LP	O	ACTIVE
1028	30-015-20104	P			35 17S	27E	990S	990E	South Red Lake Grayburg Unit #041	Legacy Reserves Operating LP	O	ACTIVE
1029	30-015-34626	M			36 17S	27E	935N	2260E	Jeffers 36 State #4t	LRE Operating LLC	O	ACTIVE
1030	30-015-41289	O			25 17S	27E	985S	2310E	Enron Federal #18	LRE Operating LLC	O	ACTIVE
1031	30-015-41890	N			29 17S	28E	330S	2200E	Williams A Federal No 12	LRE Operating LLC	O	ACTIVE
1032	30-015-40807	N			35 17S	27E	330N	2310W	Logan B "35" N Federal #18	Lime Rock Resources A, L.P.	O	ACTIVE
1033	30-015-40808	P			35 17S	27E	970S	990E	Logan 35 P Federal #19	LRE Operating LLC	O	ACTIVE
1034	30-015-41435	O			35 17S	27E	720S	1770E	Logan 35 O Federal 10	Lime Rock Resources A, L.P.	O	ACTIVE
1035	30-015-42003	E			2 18S	27E	2515N	800W	Sb State 004	Apache Corporation	O	ACTIVE
1036	30-015-42002	E			2 18S	27E	1900N	990W	Sb State 002	Apache Corporation	O	ACTIVE
1037	30-015-36979	C			32 17S	28E	990N	2035W	Enron State #14	LRE Operating LLC	O	ACTIVE
1038	30-015-41833	C			32 17S	28E	990 N	1700W	Enron State 19	LRE Operating LLC	O	ACTIVE
1039	30-015-39996	C			32 17S	28E	230 N	2420W	Enron State 17	LRE Operating LLC	O	ACTIVE
1040	30-015-41511	N			32 17S	28E	330 S	2365W	Ab State 647 016	Apache Corporation	O	ACTIVE
1041	30-015-41498	M			32 17S	28E	330S	1090W	Ab State 647 014	Apache Corporation	O	ACTIVE
1042	30-015-41493	N			32 17S	28E	1080S	2535W	Ab State 647 009	Apache Corporation	O	ACTIVE
1043	30-015-41491	L			32 17S	28E	1650S	950W	Ab State 647 007	Apache Corporation	O	ACTIVE
1044	30-015-41492	K			32 17S	28E	1375S	2320W	Ab State 647 008	Apache Corporation	O	ACTIVE
1045	30-015-40783	C			2 18S	27E	990N	1500W	Logan 2c State No. 4	Lime Rock Resources A, L.P.	O	ACTIVE
1046	30-015-38420	G			36 17S	27E	1460N	1539E	Kiowa State	COG Operating LLC	O	ACTIVE
1047	30-015-39626	G			36 17S	27E	2152N	2103E	Kiowa State # 04	COG Operating LLC	O	ACTIVE
1048	30-015-41500	K			32 17S	28E	2355S	2600W	Ab State 647 002	Apache Corporation	O	ACTIVE
1049	30-015-41501	K			32 17S	28E	2370S	1650W	Ab State 647 003	Apache Corporation	O	ACTIVE
1050	30-015-41505	L			32 17S	28E	2250S	1185W	Ab State 647 004	Apache Corporation	O	ACTIVE
1051	30-015-41502	L			32 17S	28E	2310S	330W	Ab State 647 005	Apache Corporation	O	ACTIVE
1052	30-015-41504	N			32 17S	28E	330S	1650W	Ab State 647 015	Apache Corporation	O	ACTIVE
1053	30-015-41497	M			32 17S	28E	220 S	350W	Ab State 647 013	Apache Corporation	O	ACTIVE
1054	30-015-41503	L			32 17S	28E	1730S	430W	Ab State 647 006	Apache Corporation	O	ACTIVE
1055	30-015-41495	M			32 17S	28E	920S	960W	Ab State 647 011	Apache Corporation	O	ACTIVE
1056	30-015-41494	N			32 17S	28E	1140S	1650W	Ab State 647 010	Apache Corporation	O	ACTIVE
1057	30-015-41496	M			32 17S	28E	910S	930W	Ab State 647 012	Apache Corporation	O	ACTIVE
1058	30-015-40679	B			2 18S	27E	968N	2300E	Blake State No. 4	Lime Rock Resources A, L.P.	O	ACTIVE
1059	30-015-40621	C			2 18S	27E	968N	1650W	Brad State No. 4	Tarco Energy, L.C.	O	ACTIVE
1060	30-015-31530	C			32 17S	28E	530N	1650W	Enron State #1	Lime Rock Resources A, L.P.	O	ACTIVE
1061	30-015-00681	M			36 17S	27E	990S	330W	South Red Lake Grayburg Unit #027	Legacy Reserves Operating LP	O	P/A
1062	30-015-33111	I			2 18S	27E	530N	2310W	Logan 2c State #3	Devon Energy	O	ACTIVE
1063	30-015-22526	B			5 18S	28E	1300N	2345E	Empire Abo Unit "I" 272a	Apache Corporation	O	T/A
1064	30-015-32070	I			2 18S	27E	660S	990W	Bb State Com #1	Apache Corporation	O	T/A
1065	30-015-32899	I			2 18S	27E	2310S	2310W	Bm State #1	Apache Corporation	O	T/A
1066	30-015-32900	I			2 18S	27E	1650N	2305W	Tdf State #2	Apache Corporation	O	T/A
1067	30-015-36978	D			31 17S	28E	990N	330W	Enron State #15	LRE Operating LLC	O	ACTIVE
1068	30-015-36513	N			29 17S	28E	1090S	1550W	Williams A Federal No. 8	LRE Operating LLC	O	ACTIVE
1069	30-015-33232	M			29 17S	28E	690S	530W	Williams A Federal 5	LRE Operating LLC	O	ACTIVE
1070	30-015-40480	M			29 17S	28E	600S	645W	Williams A Federal No. 10	Tarco Energy, L.C.	O	ACTIVE
1071	30-015-40677	B			2 18S	27E	380N	1650E	Blake State No. 1	Tarco Energy, L.C.	O	Permit to Drill
1072	30-015-40678	B			2 18S	27E	330N	2300E	Blake State No. 2	Tarco Energy, L.C.	O	Permit to Drill
1073	30-015-41766	F			5 18S	28E	1910N	1505W	Libby State 001	Apache Corporation	O	Permit to Drill
1074	30-015-41767	F			5 18S	28E	1570N	2245W	Libby State 002	Apache Corporation	O	Permit to Drill
1075	30-015-41768	F			5 18S	28E	1570N	2245W	Libby State 002	Apache Corporation	O	Permit to Drill
1076	30-015-41770	B			31 17S	28E	330N	2270E	T Rex State 001	Apache Corporation	O	Permit to Drill
1077	30-015-41771	B			31 17S	28E	575N	1650E	T Rex State 002	Apache Corporation	O	Permit to Drill

TABLE II
Tabulation of Wells Within One Mile Area of Review

ID	Unit		TOWNS			EW FTG	WELL NAME	OPERATOR	WELL		STATUS	DATE - Comp or Plug
									TYPE	PLUG DATE		
NO	API	No.	Sect	HIP	RNG	NS FTG						
1078	30-015-41772	B		31 17S	28E	875N	2430E	T Rex State 003	Apache Corporation	O	Permit to Drill	
1079	30-015-41774	B		31 17S	28E	890N	1750E	T Rex State 004	Apache Corporation	O	Permit to Drill	
1080	30-015-41892	M		29 17S	28E	330S	975W	Williams A Federal 15	LRE Operating LLC	O	Permit to Drill	
1081	30-015-41959	K		2 18S	27E	2310S	1750W	Bm State 002	Apache Corporation	O	Permit to Drill	
1082	30-015-42024	1		1 18S	27E	126N	141E	Aao Federal #14	Apache Corporation	O	Permit to Drill	
1083	30-015-42025	1		1 18S	27E	1130N	2408E	Aao Federal #15	Apache Corporation	O	Permit to Drill	
1084	30-015-42026	1		1 18S	27E	1305N	2455W	Aao Federal #16	Apache Corporation	O	Permit to Drill	
1085	30-015-42029	1		1 18S	27E	1650N	865E	Aao Federal #17	Apache Corporation	O	Permit to Drill	
1086	30-015-42035	1		1 18S	27E	2310N	1650E	Aao Federal #18	Apache Corporation	O	Permit to Drill	
1087	30-015-42036	1		1 18S	27E	2188N	909W	Aao Federal #20	Apache Corporation	O	Permit to Drill	
1088	30-015-42051	1		1 18S	27E	2310N	2310W	Aao Federal #19	Apache Corporation	O	Permit to Drill	
1089	30-015-42116	M		29 17S	28E	990S	2160W	Williams A Federal 16	LRE Operating LLC	O	Permit to Drill	
1090	30-015-42121	C		2 18S	27E	658N	1984W	Brade State No. 5	Tarco Energy, L.C.	O	Permit to Drill	
1091	30-015-42156	D		32 17S	28E	385N	900W	Enron State 21	LRE Operating LLC	O	Permit to Drill	
1092	30-015-42334	1		1 18S	27E	1005N	1630W	Aao Federal #21	Apache Corporation	O	Permit to Drill	
1093	30-015-42335	1		1 18S	27E	790N	330W	Aao Federal #22	Apache Corporation	O	Permit to Drill	
1094	30-015-42336	1		1 18S	27E	226N	330E	Aao Federal #23	Apache Corporation	O	Permit to Drill	
1095	30-015-42337	1		1 18S	27E	984S	243E	Aao Federal #24	Apache Corporation	O	Permit to Drill	
1096	30-015-42338	1		1 18S	27E	2270S	1650W	Aao Federal #26	Apache Corporation	O	Permit to Drill	
1097	30-015-42339	1		1 18S	27E	360S	990W	Aao Federal #29	Apache Corporation	O	Permit to Drill	
1098	30-015-42358	1		1 18S	27E	183S	2497W	Aao Federal #28	Apache Corporation	O	Permit to Drill	
1099	30-015-42359	1		1 18S	27E	1960S	2063W	Aao Federal #27	Apache Corporation	O	Permit to Drill	
1100	30-015-42360	1		1 18S	27E	1261S	281W	Aao Federal #30	Apache Corporation	O	Permit to Drill	
1101	30-015-42361	1		1 18S	27E	2000S	1022W	Aao Federal #25	Apache Corporation	O	Permit to Drill	
1102	30-015-42372	D		31 17S	28E	330N	430W	Enron State #20	LRE Operating LLC	O	Permit to Drill	
1103	30-015-36281	1		18S	27E	2193S	1520W	SUN DEVILS FEDERAL NO. 001	MACK ENERGY CORPORATION	O	PERMIT TO DRILL 4/11/12	

TABLE III

Well Changes in the Combined One Mile Area of Review Since the 2012 Annual Report for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sect	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
1025	30 015 00643	O	35	17S	27E	990 FSL & 2310 FEL	South Red Lake Grayburg Unit #026	Legacy Reserves Operating LP	Changed owner from Fairway Resources Operating, LLC to Legacy Reserves Operating LP	1						
1027	30 015 00644	N	35	17S	27E	330 FSL & 2310 FWL	South Red Lake Grayburg Unit #031	Legacy Reserves Operating LP	Changed owner from Fairway Resources Operating, LLC to Legacy Reserves Operating LP	1						
7	30 015 00666	G	36	17S	27E	2310 FNL & 2310 FEL	Conklin #001	Aspen Oil Inc	Plugged - Spotted cement 35' to Surface.			1				
1061	30 015 00681	M	36	17S	27E	990 FSL & 330 FWL	South Red Lake Grayburg Unit #027	Legacy Reserves Operating LP	Plugged - Spotted cement 1200' to 1165' and 60' to Surface. Plugged - Set CIBP at 5850'. Spotted 10 sacks of cement at 5850'. Spotted 25 sacks of cement at 4430'			1				
147	30 015 00696	J	1	18S	27E	1980 FSL & 1980 FEL	Empire Abo Unit #019q	Apache Corporation	Plugged - Set CIBP at 5650'. Spotted 25 sacks of cement at 5650'. Spotted 25 sacks at 3415'. Perforated at 1895'. Squeezed 50 sacks of cement at 1895'. Perforate at 1535' and squeezed 150 sacks of cement. Perforated at 250'. Squeezed 80 sacks of cement.			1				
130	30 015 00708	B	1	18S	27E	660 FNL & 1980 FEL	Empire Abo Unit #019b	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 50 sacks at 3420'. Perforated at 2000'. Squeezed 50 sacks of cement at 2000'. Perforate at 1550' and squeezed 60 sacks of cement.			1				
139	30 015 00711	H	1	18S	27E	1980 FNL & 660 FEL	Empire Abo Unit #020c	BP America Production Company	Perforated at 250'. Squeezed 100 sacks of cement.			1				
785	30 015 00717	I	2	18S	27E	1980 FSL & 660 FEL	Empire Abo Unit #016	BP America Production Company	Set CIBP above perfs and filled with packed fluid.				1			
862	30 015 00874	J	12	18S	27E	2310 FSL & 2355 FEL	Comstock Federal #007	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
18	30 015 01222	O	35	17S	27E	330 FSL & 2310 FEL	South Red Lake Grayburg Unit #030	Legacy Reserves Operating LP	Changed owner from Fairway Resources Operating, LLC to Legacy Reserves Operating LP	1						
73	30 015 01659	N	32	17S	28E	660 FSL & 1980 FWL	Empire Abo Unit #026a	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1				
67	30 015 01661	K	32	17S	28E	1650 FSL & 2310 FWL	Empire Abo Unit "G" 026b	Apache Corporation	Set CIBP above perfs and filled with packed fluid. Plugged - Set CIBP at 5800'. Spotted 25 sacks of cement at 4000'. Spotted 45 sacks at 2300'. Spotted 25 sacks at 1230'. Perforate at 778' and squeeze 90 sacks at 778'.			1				
69	30 015 01662	L	32	17S	28E	1650 FSL & 990 FWL	Empire Abo Unit #025a	Apache Corporation	Plugged - Set CIBP at 5775'. Spotted 25 sacks of cement at 5775'. Spotted 25 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 1250' and squeeze 50 sacks at 1250'. Perforate at 250' and squeeze 800 sacks at 250'.			1				
78	30 015 02607	D	5	18S	28E	660 FNL & 660 FWL	Empire Abo Unit #025c	Apache Corporation	Plugged - Set CIBP at 6220'. Spotted 55 sacks of cement at 6220'. Spotted 25 sacks at 3550'. Spotted 50 sacks at 2125'. Perforate at 1300' and squeeze 50 sacks at 1300'. Spotted 80 sacks at 800'.			1				
110	30 015 02616	H	6	18S	28E	1650 FNL & 990 FEL	Empire Abo Unit #024c	Apache Corporation	Changed from producing/flaring gas to gas injection well	1						
89	30 015 02625	B	6	18S	28E	470 FNL & 2170 FEL	Empire Abo Unit #023c	Apache Corporation	Changed owner from Fairway Resources Operating, LLC to Legacy Reserves Operating LP	1						
1028	30 015 20104	P	35	17S	27E	990 FSL & 990 FEL	South Red Lake Grayburg Unit #041	Legacy Reserves Operating LP	Plugged - Set CIBP at 5800'. Spotted 25 sacks of cement at 5800'. Spotted 25 sacks at 4292'. Spotted 25 sacks at 2050'. Perforate at 1210' and squeeze 130 sacks at 1210'.			1				
90	30 015 21542	B	6	18S	28E	1260 FNL & 1580 FEL	Empire Abo Unit #231	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 25 sacks at 4292'. Spotted 25 sacks at 2050'. Perforate at 1210' and squeeze 130 sacks at 1210'.			1				
796	30 015 21544	O	2	18S	27E	1110 FSL & 1322 FEL	Empire Abo Unit #151	Apache Corporation	Plugged - Set CIBP at 6000'. Spotted 25 sacks of cement at 6000'. Spotted 80 sacks at 4311'. Spotted 25 sacks of cement at 1700'. Spotted 50 sacks of cement at 1051. Spotted 25 sacks of cement at 200'			1				
138	30 015 21552	G	1	18S	27E	2500 FNL & 2500 FEL	Empire Abo Unit #191	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 25 sacks at 4454'. Spotted 25 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 1210' and squeeze 40 sacks at 1210'. Spotted 50 sacks at 160'.			1				
92	30 015 21626	G	6	18S	28E	1361 FNL & 2531 FEL	Empire Abo Unit #231a	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1				
75	30 015 22009	O	32	17S	28E	330 FSL & 2481 FEL	Empire Abo Unit #272	Apache Corporation	Set CIBP above perfs and filled with packed fluid.				1			
1063	30 015 22526	B	5	18S	28E	1300 FNL & 2345 FEL	Empire Abo Unit "I" 272a	Apache Corporation	Plugged - Set CIBP at 5725'. Spotted 25 sacks of cement at 5725'. Spotted 65 sacks at 4570'. Spotted 25 sacks of cement at 3470'. Spotted 100 sacks of cement at 1950. Spotted 25 sacks of cement at 250'			1				
151	30 015 22559	K	1	18S	27E	2290 FSL & 2445 FWL	Empire Abo Unit #184	Apache Corporation	Set CIBP above perfs and filled with packed fluid.				1			
148	30 015 22560	J	1	18S	27E	220 FSL & 1390 FEL	Empire Abo Unit #192	Apache Corporation	Set CIBP above perfs and filled with packed fluid.					1		
150	30 015 22658	J	1	18S	27E	1500 FSL & 2130 FEL	Empire Abo Unit #194	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 40 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 800' and squeeze 70 sacks at 800'. Spotted 25 sacks at 250'. Set CIBP above perfs and filled with packed fluid.			1				
79	30 015 22750	D	5	18S	28E	660 FNL & 150 FWL	Empire Abo Unit #251	Apache Corporation	Set CIBP above perfs and filled with packed fluid.				1			
104	30 015 22913	G	6	18S	28E	1750 FNL & 1600 FEL	Empire Abo Unit #235	Apache Corporation						1		
791	30 015 22914	I	2	18S	27E	1310 FSL & 590 FEL	Empire Abo Unit #161	Apache Corporation							1	
855	30 015 24857	M	11	18S	27E	700 FSL & 990 FWL	Federal Dh Gas Com #001	Chevron Usa Inc.	Changed owner from Chesapeake Operating, Inc. to Chevron USA Inc.	1						
162	30 015 25099	H	12	18S	27E	1809 FNL & 990 FEL	Comstock Federal #006	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
869	30 015 25100	N	12	18S	27E	330 FSL & 1650 FWL	Comstock Federal #001	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
864	30 015 25201	K	12	18S	27E	1650 FSL & 1770 FWL	Comstock Federal #002	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
870	30 015 25202	O	12	18S	27E	330 FSL & 2310 FEL	Comstock Federal #005	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
860	30 015 25270	F	12	18S	27E	2310 FNL & 2310 FWL	Chukka Federal #001	Phoenix Energy	Changed owner from Eastland Oil Co. to Phoenix Energy	1						
866	30 015 25545	M	12	18S	27E	990 FSL & 990 FWL	Comstock Federal #003	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						
859	30 015 25738	G	12	18S	27E	2310 FNL & 2310 FEL	Comstock Federal #009	Harlow Enterprises LLC	Changed owner to Harlow Enterprises LLC	1						

144	30	015	27163	I	1	18S	27E	1980 FSL & 990 FEL	Chalk Bluff Federal Com #003	Mewbourne Oil Co	Changed from producing to Salt Water Disposal Well	1	
1060	30	015	31530	C	32	17S	28E	530 FNL & 1650 FWL	Enron State #1	Lime Rock Resources A, L.P.	Perforations in Glorieta-Yeso: 3226' - 3795'; 3806' - 3864'		1
1064	30	015	32070	I	2	18S	27E	660 FSL & 990 FWL	Bb State Com #1	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
1065	30	015	32899	I	2	18S	27E	2310 FSL & 2310 FWL	Bm State #1	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
1066	30	015	32900	I	2	18S	27E	1650 FNL & 2305 FWL	Tdf State #2	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
1062	30	015	33111	I	2	18S	27E	530 FNL & 2310 FWL	Logan 2c State #3	Devon Energy	REMOVED BRIDGE PLUG AT 2600'		1
1069	30	015	33232	M	29	17S	28E	690 FSL & 530 FWL	Williams A Federal 5	LRE Operating LLC	Set CIBP at 3250'. Perforations in San Andres: 1786' - 2035'; 2100' - 2301'; 2326' - 2621'; 2650' - 2941'; 2970' - 3201'		1
1029	30	015	34626	M	36	17S	27E	935 FNL & 2260 FEL	Jeffers 36 State #4t	LRE Operating LLC	Drilled to 4000' TD, PBTD: 3488'. Perforations in the Glorieta/Upper Yeso: 3152' - 3481'		1
1068	30	015	36513	N	29	17S	28E	1090 FSL & 1550 FWL	Williams A Federal No. 8	LRE Operating LLC	Set CIBP at 3150'. Perforations in San Andres: 2000' - 2200'; 2300' - 2601'; 2700' - 3031'		1
961	30	015	36978	D	31	17S	28E	990 FNL & 330 FWL	Enron State #15	LRE Operating LLC	Set CIBP at 3100'. Perforations in San Andres: 2018' - 2339'; 2376' - 2651'; 2684' - 2951'		1
1037	30	015	36979	C	32	17S	28E	990 FNL & 2035 FWL	Enron State #14	LRE Operating LLC	NEW: Drilled to 4205' TD, PBTD: 3250'. Perforations in San Andres; 5578' - 2568'; 2635' - 2870'; 2920' - 3165'		1
1026	30	015	37783	O	35	17S	27E	990 FSL & 2225 FEL	Russell C 003	Tarco Energy, L.C.	Changed from producing to injection well	1	
											NEW: Drilled to 4873' TD, PBTD: 4805'. Perforations in Upper Blinebry: 3770' - 4020'; Middle Blinebry: 4080' - 4330'; Lower Blinebry: 4390' - 4640'		1
1046	30	015	38420	G	36	17S	27E	1460 FNL & 1539 FEL	Kiowa State	COG Operating LLC			1
981	30	015	38512	D	31	17S	28E	990 FNL & 940 FWL	Enron State #16	LRE Operating LLC	Perforations in San Andres: 2120' - 2370'; 2400' - 2710'; 2752' - 3034'		1
986	30	015	39006	J	32	17S	28E	2400 FSL & 2450 FEL	Empire Abo Unit 407	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
984	30	015	39020	O	31	17S	28E	140 FSL & 2560 FEL	Empire Abo Unit 408	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
988	30	015	39064	O	32	17S	28E	1175 FSL & 1310 FEL	Empire Abo Unit 403	Apache Corporation	Set CIBP above perfs and filled with packed fluid.	1	
											NEW: Drilled to 5015 TD, PBTD: 4958'. Perforations in Lower Yeso: 4360' - 4610'; Middle Yeso: 4050' - 4300'; Glorieta/Upper Yeso: 3740' - 3990'		1
970	30	015	39322	M	36	17S	27E	840 FSL & 425 FWL	Big Boy State #3	COG Operating LLC	NEW: Drilled to 5015 TD, PBTD: 4958'. Perforations in Lower Yeso: 4375' - 4600'; Middle Yeso: 4090' - 4315' and 3805' - 4030'; Glorieta/Upper Yeso: 3410' - 3660';		1
971	30	015	39323	O	36	17S	27E	870 FSL & 1560 FEL	Big Boy State #5	COG Operating LLC	NEW: Drilled to 5510' TD, PBTD: 4955'. Perforations in Lower Yeso: 4700' - 4450'; Middle Yeso: 4050' - 4275' and 3800' - 4000'; Glorieta/Upper Yeso: 3500' - 3750';		1
974	30	015	39326	O	36	17S	27E	275 FSL & 1560 FEL	Big Boy State #8	COG Operating LLC	Set CIBP above perfs and filled with packed fluid.	1	
975	30	015	39401	M	36	17S	27E	1110 FSL & 630 FEL	Empire Abo Unit #417	Apache Corporation	NEW: Drilled to 4934' TD, PBTD: 4863'. Perforations in Lower Yeso: 4350' - 4600'; Middle Yeso: 4040' - 4290' and 3755' - 3980'; Glorieta/Upper Yeso: 3250' - 3500';		1
974	30	015	39626	G	36	17S	27E	2152 FNL & 2103 FEL	Kiowa State # 04	COG Operating LLC	NEW: Drilled to 5016' TD, PBTD: 5000'. Perforations in Blinebry; 4069' - 4855'; Perforations in Glorieta/Paddock; 3448' - 3991'		1
1023	30	015	39927	K	32	17S	28E	1750 FSL & 1765 FWL	Ab State 647	LRE Operating LLC	NEW: Drilled to 4215' TD, PBTD: 4193'. Perforations in San Andres; 1896' - 2234'; 2268' - 2574'; 2650' - 2970'; 3000' - 3310'		1
1039	30	015	39996	C	32	17S	28E	230 FNL & 2420 FWL	Enron State 17	LRE Operating LLC	NEW: Drilled to 4250' TD, PBTD: 4196'. Perforations in Yeso; 3460' - 3752'; 3800' - 4140'		1
1024	30	015	40339	D	32	17S	28E	990 FNL & 330 FWL	Enron State 18	COG Operating LLC	NEW: Drilled to 4934' TD, PBTD: 4863'. Perforations in Lower Yeso: 4400' - 4650'; Middle Yeso: 4100' - 4350' and 3818' - 4043'; Glorieta/Upper Yeso: 3300' - 3550';		1
1005	30	015	40428	M	36	17S	28E	200 FSL & 485 FWL	Big Boy State #2	LRE Operating LLC	Sidetracked well. Perforations in San Andres: 1880' - 2193'; 2324' - 2692'; 2896' - 3251'; 3,403' - 3586'		1
1070	30	015	40480	M	29	17S	28E	600 FSL & 645 FWL	Williams A Federal No. 10	Tarco Energy, L.C.	NEW: Drilled to 550' TD, PBTD: 529'. Perforations in Seven Rivers: 415' - 419'; 424' - 426'; 433' - 439'; 446' - 458'		1
1059	30	015	40621	C	2	18S	27E	968 FNL & 1650 FWL	Brad State No. 4	Tarco Energy, L.C.	NEW: Permit to Drill		1
1071	30	015	40677	B	2	18S	27E	380 FNL & 1650 FEL	Blake State No. 1	Tarco Energy, L.C.	NEW: Permit to Drill		1
1072	30	015	40678	B	2	18S	27E	330 FNL & 2300 FEL	Blake State No. 2	Tarco Energy, L.C.	NEW: Drilled to 530' TD, PBTD: 523'. Perforations in Seven Rivers: 417' - 421'; 429' - 434'; 438' - 440'; 450' - 456'; 461' - 463'		1
1058	30	015	40679	B	2	18S	27E	968 FNL & 2300 FEL	Blake State No. 4	Lime Rock Resources A, L.P.			1
1045	30	015	40783	C	2	18S	27E	990 FNL & 1500 FWL	Logan 2c State No. 4	Lime Rock Resources A, L.P.	NEW: Drilled to 4776' TD, PBTD: 4729'. Perforations in Lower Yeso: 4293' - 4620'; Middle Yeso: 3900' - 4226'; Upper Yeso: 3498' - 3844';		1
1032	30	015	40807	N	35	17S	27E	330 FNL & 2310 FWL	Logan B "35" N Federal #18	Lime Rock Resources A, L.P.	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower Yeso: 3604' - 3916'; Middle Yeso: 3326' - 3546'; Glorieta/Upper Yeso: 3032' - 3265'		1
1033	30	015	40808	P	35	17S	27E	970 FSL & 990 FEL	Logan 35 P Federal #19	LRE Operating LLC	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower San Andreas: 2590' - 2826'; Upper San Andreas: 2015' - 2088'		1
1030	30	015	41289	O	25	17S	27E	985 FSL & 2310 FEL	Enron Federal #18	LRE Operating LLC	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower Yeso: 3609' - 3890'; Middle Yeso: 3362' - 3561'; Glorieta/Upper Yeso: 3128' - 3304'		1
1034	30	015	41435	O	35	17S	27E	720 FSL & 1770 FEL	Logan 35 O Federal 10	Lime Rock Resources A, L.P.	NEW: Drilled to 3157' TD, PBTD: 3157'. Perforations in Lower San Andreas: 2590' - 2826'; Upper San Andreas: 2015' - 2088'		1
1043	30	015	41491	L	32	17S	28E	1650 FSL & 950 FWL	Ab State 647 007	Apache Corporation	NEW: Drilled to 4300' TD, PBTD: 4257'. Perforations in Yeso; 3406' - 4100'		1
1044	30	015	41492	K	32	17S	28E	1375 FSL & 2320 FWL	Ab State 647 008	Apache Corporation	NEW: Drilled to 4326' TD, PBTD: 4288'. Perforations in Yeso; 3443' - 4098'		1
1042	30	015	41493	N	32	17S	28E	1080 FSL & 2535 FWL	Ab State 647 009	Apache Corporation	NEW: Drilled to 4300' TD, PBTD: 4257'. Perforations in Blinebry; 4161' - 4930'; Perforations in Glorieta/Paddock; 3414' - 4058'		1
1056	30	015	41494	N	32	17S	28E	1140 FSL & 1650 FWL	Ab State 647 010	Apache Corporation	NEW: Drilled to 5076' TD, PBTD: 5056'. Perforations in Glorieta/Paddock; 3415' - 3955'		1
1055	30	015	41495	M	32	17S	28E	920 FSL & 960 FWL	Ab State 647 011	Apache Corporation	NEW: Drilled to 5070' TD, PBTD: 5060'. Perforations in Blinebry; 4198' - 4905'; Perforations in Glorieta/Paddock; 3393' - 4118'		1

1057	30	015	41496	M	32	175	28E	910 FSL & 930 FWL	Ab State 647 012	Apache Corporation	NEW: Drilled to 5080' TD, PBTD: 5070'. Perforations in Blinebry; 4180' - 4890'; Perforations in Glorieta/Paddock; 3373' - 4091'	1
1053	30	015	41497	M	32	175	28E	220 FSL & 350 FWL	Ab State 647 013	Apache Corporation	NEW: Drilled to 5065' TD, PBTD: 4025'. Perforations in Blinebry; 4033' - 4886'; Perforations in Glorieta/Paddock; 3417' - 3930'	1
1041	30	015	41498	M	32	175	28E	330 FSL & 1090 FWL	Ab State 647 014	Apache Corporation	NEW: Drilled to 4300' TD, PBTD: 4251'. Perforations in Glorieta/Paddock; 3466' - 4010'	1
1048	30	015	41500	K	32	175	28E	2355 FSL & 2600 FWL	Ab State 647 002	Apache Corporation	NEW: Drilled to 5013' TD, PBTD: 5005'. Perforations in Blinebry; 4212' - 4858'; Perforations in Glorieta/Paddock; 3427' - 4104'	1
1049	30	015	41501	K	32	175	28E	2370 FSL & 1650 FWL	Ab State 647 003	Apache Corporation	NEW: Drilled to 5027' TD, PBTD: 4835'. Perforations in Glorieta/Paddock; 3504' - 3885'	1
1051	30	015	41502	L	32	175	28E	2310 FSL & 330 FWL	Ab State 647 005	Apache Corporation	NEW: Drilled to 5060' TD, PBTD: 5045'. Perforations in Blinebry; 4161' - 4938'; Perforations in Glorieta/Paddock; 3427' - 4104'	1
1054	30	015	41503	L	32	175	28E	1730 FSL & 430 FWL	Ab State 647 006	Apache Corporation	NEW: Drilled to 5065' TD, PBTD: 5050'. Perforations in Blinebry; 4208' - 4919'; Perforations in Glorieta/Paddock; 3380' - 4120'	1
1052	30	015	41504	N	32	175	28E	330 FSL & 1650 FWL	Ab State 647 015	Apache Corporation	NEW: Drilled to 5063' TD, PBTD: 5050'. Perforations in Blinebry; 4142' - 4900'; Perforations in Glorieta/Paddock; 3394' - 3943'	1
1050	30	015	41505	L	32	175	28E	2250 FSL & 1185 FWL	Ab State 647 004	Apache Corporation	NEW: Drilled to 5046' TD, PBTD: 4050'. Perforations in Blinebry; 4066' - 4850'; Perforations in Glorieta/Paddock; 3338' - 3990'	1
1040	30	015	41511	N	32	175	28E	330 FSL & 2365 FWL	Ab State 647 016	Apache Corporation	NEW: Drilled to 4297' TD, PBTD: 4250'. Perforations in Glorieta; 3445' - 4091'	1
1073	30	015	41766	F	5	185	28E	1910 FNL & 1505 FWL	Libby State 001	Apache Corporation	NEW: Permit to Drill	1
1074	30	015	41767	F	5	185	28E	1570 FNL & 2245 FWL	Libby State 002	Apache Corporation	NEW: Permit to Drill	1
1075	30	015	41768	F	5	185	28E	1570 FNL & 2245 FWL	Libby State 002	Apache Corporation	NEW: Permit to Drill	1
1076	30	015	41770	B	31	175	28E	330 FNL & 2270 FEL	T Rex State 001	Apache Corporation	NEW: Permit to Drill	1
1077	30	015	41771	B	31	175	28E	575 FNL & 1650 FEL	T Rex State 002	Apache Corporation	NEW: Permit to Drill	1
1078	30	015	41772	B	31	175	28E	875 FNL & 2430 FEL	T Rex State 003	Apache Corporation	NEW: Permit to Drill	1
1079	30	015	41774	B	31	175	28E	890 FNL & 1750 FEL	T Rex State 004	Apache Corporation	NEW: Permit to Drill	1
1038	30	015	41833	C	32	175	28E	990 FNL & 1700 FWL	Enron State 19	LRE Operating LLC	NEW: Drilled to 4206' TD, PBTD: 4167'. Perforations in Glorieta; 3495' - 3762'; 3810' - 4099'	1
1031	30	015	41890	N	29	175	28E	330 FSL & 2200 FNL	Williams A Federal No 12	LRE Operating LLC	NEW: Drilled to 3700' TD, PBTD: 3694'. Perforations in Yeso: 3536' - 3618'	1
1080	30	015	41892	M	29	175	28E	330 FSL & 975 FWL	Williams A Federal 15	LRE Operating LLC	NEW: Permit to Drill	1
1081	30	015	41959	K	2	185	27E	2310 FSL & 1750 FWL	Bm State 002	Apache Corporation	NEW: Permit to Drill	1
1036	30	015	42002	E	2	185	27E	1900 FNL & 990 FWL	Sb State 002	Apache Corporation	NEW: Drilled to 4115' TD, PBTD: 4077'. Perforations in Yeso: 3076' - 3906'	1
1035	30	015	42003	E	2	185	27E	2515 FNL & 800 FWL	Sb State 004	Apache Corporation	NEW: Drilled to 4114' TD, Perforations in Yeso: 3173' - 3929'	1
1082	30	015	42024	1	1	185	27E	126 FNL & 141 FEL	Aao Federal #14	Apache Corporation	NEW: Permit to Drill	1
1083	30	015	42025	1	1	185	27E	1130 FNL & 2408 FEL	Aao Federal #15	Apache Corporation	NEW: Permit to Drill	1
1084	30	015	42026	1	1	185	27E	1305 FNL & 2455 FWL	Aao Federal #16	Apache Corporation	NEW: Permit to Drill	1
1085	30	015	42029	1	1	185	27E	1650 FNL & 865 FEL	Aao Federal #17	Apache Corporation	NEW: Permit to Drill	1
1086	30	015	42035	1	1	185	27E	2310 FNL & 1650 FEL	Aao Federal #18	Apache Corporation	NEW: Permit to Drill	1
1087	30	015	42036	1	1	185	27E	2188 FNL & 909 FWL	Aao Federal #20	Apache Corporation	NEW: Permit to Drill	1
1088	30	015	42051	1	1	185	27E	2310 FNL & 2310 FWL	Aao Federal #19	Apache Corporation	NEW: Permit to Drill	1
1089	30	015	42116	M	29	175	28E	990 FSL & 2160 FWL	Williams A Federal 16	LRE Operating LLC	NEW: Permit to Drill	1
1090	30	015	42121	C	2	185	27E	658 FNL & 1984 FWL	Brade State No. 5	Tarco Energy, L.C.	NEW: Permit to Drill	1
1091	30	015	42156	D	32	175	28E	385 FNL & 900 FWL	Enron State 21	LRE Operating LLC	NEW: Permit to Drill	1
1092	30	015	42334	1	1	185	27E	1005 FNL & 1630 FWL	Aao Federal #21	Apache Corporation	NEW: Permit to Drill	1
1093	30	015	42335	1	1	185	27E	790 FNL & 330 FWL	Aao Federal #22	Apache Corporation	NEW: Permit to Drill	1
1094	30	015	42336	1	1	185	27E	2265 FNL & 330 FEL	Aao Federal #23	Apache Corporation	NEW: Permit to Drill	1
1095	30	015	42337	1	1	185	27E	984 FNL & 243 FEL	Aao Federal #24	Apache Corporation	NEW: Permit to Drill	1
1096	30	015	42338	1	1	185	27E	2270 FSL & 1650 FWL	Aao Federal #26	Apache Corporation	NEW: Permit to Drill	1
1097	30	015	42339	1	1	185	27E	360 FSL & 990 FWL	Aao Federal #29	Apache Corporation	NEW: Permit to Drill	1
1098	30	015	42358	1	1	185	27E	183 FSL & 2497 FWL	Aao Federal #28	Apache Corporation	NEW: Permit to Drill	1
1099	30	015	42359	1	1	185	27E	1960 FSL & 2063 FWL	Aao Federal #27	Apache Corporation	NEW: Permit to Drill	1
1100	30	015	42360	1	1	185	27E	1261 FSL & 281 FWL	Aao Federal #30	Apache Corporation	NEW: Permit to Drill	1
1101	30	015	42361	1	1	185	27E	2000 FSL & 1022 FWL	Aao Federal #25	Apache Corporation	NEW: Permit to Drill	1
1102	30	015	42372	D	31	175	28E	330 FNL & 430 FWL	Enron State #20	LRE Operating LLC	NEW: Permit to Drill	1

TABLE IV
Wells that have been Plugged and Abandoned since the 2012 Annual Report
Well Changes in the Combined One Mile Area of Review for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sect	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
7	30 015 00666	G	36	17S	27E	2310 FNL & 2310 FEL	Conklin #001	Aspen Oil Inc	Plugged - Spotted cement 35' to Surface.							1
1061	30 015 00681	M	36	17S	27E	990 FSL & 330 FWL	South Red Lake Grayburg Unit #02 Legacy Reserves Operating LP		Plugged - Spotted cement 1200' to 1165' and 60' to Surface.							1
147	30 015 00696	J		1 18S	27E	1980 FSL & 1980 FEL	Empire Abo Unit #019q	Apache Corporation	Plugged - Set CIBP at 5850'. Spotted 10 sacks of cement at 5850'. Spotted 25 sacks of cement at 4430'							1
130	30 015 00708	B		1 18S	27E	660 FNL & 1980 FEL	Empire Abo Unit #019b	Apache Corporation	Plugged - Set CIBP at 5650'. Spotted 25 sacks of cement at 5650'. Spotted 25 sacks at 3415'. Perforated at 1895'. Squeezed 50 sacks of cement at 1895'. Perforate at 1535' and squeezed 150 sacks of cement. Perforated at 250'. Squeezed 80 sacks of cement.							1
139	30 015 00711	H		1 18S	27E	1980 FNL & 660 FEL	Empire Abo Unit #020c	BP America Production Company	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 50 sacks at 3420'. Perforated at 2000'. Squeezed 50 sacks of cement at 2000'. Perforate at 1550' and squeezed 60 sacks of cement. Perforated at 250'. Squeezed 100 sacks of cement.							1
69	30 015 01662	L	32	17S	28E	1650 FSL & 990 FWL	Empire Abo Unit #025a	Apache Corporation	Plugged - Set CIBP at 5800'. Spotted 25 sacks of cement at 4000'. Spotted 45 sacks at 2300'. Spotted 25 sacks at 1230'. Perforate at 778' and squeeze 90 sacks at 778'.							1
78	30 015 02607	D	5	18S	28E	660 FNL & 660 FWL	Empire Abo Unit #025c	Apache Corporation	Plugged - Set CIBP at 5775'. Spotted 25 sacks of cement at 5775'. Spotted 25 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 1250' and squeeze 50 sacks at 1250'. Perforate at 250' and squeeze 800 sacks at 250'.							1
110	30 015 02616	H	6	18S	28E	1650 FNL & 990 FEL	Empire Abo Unit #024c	Apache Corporation	Plugged - Set CIBP at 6220'. Spotted 55 sacks of cement at 6220'. Spotted 25 sacks at 3550'. Spotted 50 sacks at 2125'. Perforate at 1300' and squeeze 50 sacks at 1300'. Spotted 80 sacks at 800'.							1
90	30 015 21542	B	6	18S	28E	1260 FNL & 1580 FEL	Empire Abo Unit #231	Apache Corporation	Plugged - Set CIBP at 5800'. Spotted 25 sacks of cement at 5800'. Spotted 25 sacks at 4292'. Spotted 25 sacks at 2050'. Perforate at 1210' and squeeze 130 sacks at 1210'.							1
796	30 015 21544	O	2	18S	27E	1110 FSL & 1322 FEL	Empire Abo Unit #151	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 25 sacks at 4292'. Spotted 25 sacks at 2050'. Perforate at 1210' and squeeze 130 sacks at 1210'.							1
138	30 015 21552	G	1	18S	27E	2500 FNL & 2500 FEL	Empire Abo Unit #191	Apache Corporation	Plugged - Set CIBP at 6000'. Spotted 25 sacks of cement at 6000'. Spotted 80 sacks at 4311'. Spotted 25 sacks of cement at 1700'. Spotted 50 sacks of cement at 1051. Spotted 25 sacks of cement at 200'							1
92	30 015 21626	G	6	18S	28E	1361 FNL & 2531 FEL	Empire Abo Unit #231a	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 25 sacks at 4454'. Spotted 25 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 1210' and squeeze 40 sacks at 1210'. Spotted 50 sacks at 160'.							1
151	30 015 22559	K	1	18S	27E	2290 FSL & 2445 FWL	Empire Abo Unit #184	Apache Corporation	Plugged - Set CIBP at 5725'. Spotted 25 sacks of cement at 5725'. Spotted 65 sacks at 4570'. Spotted 25 sacks of cement at 3470'. Spotted 100 sacks of cement at 1950. Spotted 25 sacks of cement at 250'							1
79	30 015 22750	D	5	18S	28E	660 FNL & 150 FWL	Empire Abo Unit #251	Apache Corporation	Plugged - Set CIBP at 5600'. Spotted 25 sacks of cement at 5600'. Spotted 40 sacks at 3310'. Spotted 25 sacks at 2045'. Perforate at 800' and squeeze 70 sacks at 800'. Spotted 25 sacks at 250'.							1

TABLE V
Wells that have been Temporally Abandoned since the 2012 Annual Report
Well Changes in the Combined One Mile Area of Review for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sect	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
785	30	015	00717	I	2 18S	27E	1980 FSL & 660 FEL	Empire Abo Unit #016	BP America Production Company	Set CIBP above perfs and filled with packed fluid.			1			
73	30	015	01659	N	32 17S	28E	660 FSL & 1980 FWL	Empire Abo Unit #026a	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
67	30	015	01661	K	32 17S	28E	1650 FSL & 2310 FWL	Empire Abo Unit "G" 026b	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
75	30	015	22009	O	32 17S	28E	330 FSL & 2481 FEL	Empire Abo Unit #272	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
1063	30	015	22526	B	5 18S	28E	1300 FNL & 2345 FEL	Empire Abo Unit "I" 272a	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
148	30	015	22560	J	1 18S	27E	220 FSL & 1390 FEL	Empire Abo Unit #192	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
150	30	015	22658	J	1 18S	27E	1500 FSL & 2130 FEL	Empire Abo Unit #194	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
104	30	015	22913	G	6 18S	28E	1750 FNL & 1600 FEL	Empire Abo Unit #235	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
791	30	015	22914	I	2 18S	27E	1310 FSL & 590 FEL	Empire Abo Unit #161	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
1064	30	015	32070	I	2 18S	27E	660 FSL & 990 FWL	Bb State Com #1	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
1065	30	015	32899	I	2 18S	27E	2310 FSL & 2310 FWL	Bm State #1	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
1066	30	015	32900	I	2 18S	27E	1650 FNL & 2305 FWL	Tdf State #2	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
986	30	015	39006	J	32 17S	28E	2400 FSL & 2450 FEL	Empire Abo Unit 407	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
984	30	015	39020	O	31 17S	28E	140 FSL & 2560 FEL	Empire Abo Unit 408	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
988	30	015	39064	O	32 17S	28E	1175 FSL & 1310 FEL	Empire Abo Unit 403	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			
975	30	015	39401	M	36 17S	27E	1110 FSL & 630 FEL	Empire Abo Unit #417	Apache Corporation	Set CIBP above perfs and filled with packed fluid.			1			

TABLE VI
Wells that have been Recompleted in Upper Zones since the 2012 Annual Report
Well Changes in the Combined One Mile Area of Review for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sect	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
1060	30 015 31530	C	32	17S	28E	530 FNL & 1650 FWL	Enron State #1	Lime Rock Resources A, L.P.	Perforations in Glorieta-Yeso: 3226' - 3795'; 3806' - 3864'							1
1062	30 015 33111	I	2	18S	27E	530 FNL & 2310 FWL	Logan 2c State #3	Devon Energy	REMOVED BRIDGE PLUG AT 2600'							1
1069	30 015 33232	M	29	17S	28E	690 FSL & 530 FWL	Williams A Federal 5	LRE Operating LLC	Set CIBP at 3250'. Perforations in San Andres: 1786' - 2035'; 2100' - 2301'; 2326' - 2621'; 2650' - 2941'; 2970' - 3201'							1
1029	30 015 34626	M	36	17S	27E	935 FNL & 2260 FEL	Jeffers 36 State #4t	LRE Operating LLC	Drilled to 4000' TD, PBTD: 3488'. Perforations in the Glorieta/Upper Yeso: 3152' - 3481'							1
1068	30 015 36513	N	29	17S	28E	1090 FSL & 1550 FWL	Williams A Federal No. 8	LRE Operating LLC	Set CIBP at 3150'. Perforations in San Andres: 2000' - 2200'; 2300' - 2601'; 2700' - 3031'							1
961	30 015 36978	D	31	17S	28E	990 FNL & 330 FWL	Enron State #15	LRE Operating LLC	Set CIBP at 3100'. Perforations in San Andres: 2018' - 2339'; 2376' - 2651'; 2684' - 2951'							1
981	30 015 38512	D	31	17S	28E	990 FNL & 940 FWL	Enron State #16	LRE Operating LLC	Perforations in San Andres: 2120' - 2370'; 2400' - 2710'; 2752' - 3034'							1
1070	30 015 40480	M	29	17S	28E	600 FSL & 645 FWL	Williams A Federal No. 10	Tarco Energy, L.C.	Sidetracked well. Perforations in San Andres: 1880' - 2193'; 2324' - 2692'; 2896' - 3251'; 3,403' - 3586'							1

TABLE VII
Newly Drilled Wells in the Area of Review since the 2012 Annual Report
Well Changes in the Combined One Mile Area of Review for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sect	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
1037	30 015 36979	C		32 17S	28E	990 FNL & 2035 FWL	Enron State #14	LRE Operating LLC	NEW: Drilled to 4205' TD, PBTD: 3250'. Perforations in San Andres; 5578' - 2568'; 2635' - 2870'; 2920' - 3165' NEW: Drilled to 4873' TD, PBTD: 4805'. Perforations in Upper Blinbry: 3770' - 4020'; Middle Blinbry: 4080' - 4330'; Lower Blinbry: 4390' - 4640'							1
1046	30 015 38420	G		36 17S	27E	1460 FNL & 1539 FEL	Kiowa State	COG Operating LLC								1
970	30 015 39322	M		36 17S	27E	840 FSL & 425 FWL	Big Boy State #3	COG Operating LLC	NEW: Drilled to 5015 TD, PBTD: 4958'. Perforations in Lower Yeso: 4360' - 4610'; Middle Yeso: 4050' - 4300'; Glorieta/Upper Yeso: 3740' - 3990' NEW: Drilled to 5015 TD, PBTD: 4958'. Perforations in Lower Yeso: 4375' - 4600'; Middle Yeso: 4090' - 4315' and 3805' - 4030'; Glorieta/Upper Yeso: 3410' - 3660';							1
971	30 015 39323	O		36 17S	27E	870 FSL & 1560 FEL	Big Boy State #5	COG Operating LLC	NEW: Drilled to 5510' TD, PBTD: 4955'. Perforations in Lower Yeso: 4700' - 4450'; Middle Yeso: 4050' - 4275' and 3800' - 4000'; Glorieta/Upper Yeso: 3500' - 3750';							1
974	30 015 39326	O		36 17S	27E	275 FSL & 1560 FEL	Big Boy State #8	COG Operating LLC	NEW: Drilled to 4934' TD, PBTD: 4863'. Perforations in Lower Yeso: 4350' - 4600'; Middle Yeso: 4040' - 4290' and 3755' - 3980'; Glorieta/Upper Yeso: 3250' - 3500';							1
974	30 015 39626	G		36 17S	27E	2152 FNL & 2103 FEL	Kiowa State # 04	COG Operating LLC	NEW: Drilled to 5016' TD, PBTD: 5000'. Perforations in Blinebry; 4069' - 4855'; Perforations in Glorieta/Paddock; 3448' - 3991' NEW: Drilled to 4215' TD, PBTD: 4193'. Perforations in San Andres; 1896' - 2234'; 2268' - 2574'; 2650' - 2970'; 3000' - 3310'							1
1023	30 015 39927	K		32 17S	28E	1750 FSL & 1765 FWL	Ab State 647	LRE Operating LLC	NEW: Drilled to 4250' TD, PBTD: 4196'. Perforations in Yeso; 3460' - 3752'; 3800' - 4140'							1
1039	30 015 39996	C		32 17S	28E	230 FNL & 2420 FWL	Enron State 17	LRE Operating LLC	NEW: Drilled to 4934' TD, PBTD: 4863'. Perforations in Lower Yeso: 4400' - 4650'; Middle Yeso: 4100' - 4350' and 3818' - 4043'; Glorieta/Upper Yeso: 3300' - 3550';							1
1024	30 015 40339	D		32 17S	28E	990 FNL & 330 FWL	Enron State 18	COG Operating LLC	NEW: Drilled to 550' TD, PBTD: 529'. Perforations in Seven Rivers: 415' - 419'; 424' - 426'; 433' - 439'; 446' - 458'							1
1005	30 015 40428	M		36 17S	28E	200 FSL & 485 FWL	Big Boy State #2	LRE Operating LLC	NEW: Permit to Drill							1
1059	30 015 40621	C	2 18S	27E		968 FNL & 1650 FWL	Brad State No. 4	Tarco Energy, L.C.	NEW: Drilled to 530' TD, PBTD: 523'. Perforations in Seven Rivers: 417' - 421'; 429' - 434'; 438' - 440'; 450' - 456'; 461' - 463'							1
1071	30 015 40677	B	2 18S	27E		380 FNL & 1650 FEL	Blake State No. 1	Tarco Energy, L.C.								1
1072	30 015 40678	B	2 18S	27E		330 FNL & 2300 FEL	Blake State No. 2	Tarco Energy, L.C.								1
1058	30 015 40679	B	2 18S	27E		968 FNL & 2300 FEL	Blake State No. 4	Lime Rock Resources A, L.P.								1
1045	30 015 40783	C	2 18S	27E		990 FNL & 1500 FWL	Logan 2c State No. 4	Lime Rock Resources A, L.P.	NEW: Drilled to 4776' TD, PBTD: 4729'. Perforations in Lower Yeso: 4293' - 4620'; Middle Yeso: 3900' - 4226'; Upper Yeso: 3498' - 3844';							1
1032	30 015 40807	N	35 17S	27E		330 FNL & 2310 FWL	Logan B "35" N Federal #18	Lime Rock Resources A, L.P.	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower Yeso: 3604' - 3916'; Middle Yeso: 3326' - 3546'; Glorieta/Upper Yeso: 3032' - 3265'							1
1033	30 015 40808	P	35 17S	27E		970 FSL & 990 FEL	Logan 35 P Federal #19	LRE Operating LLC	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower Yeso: 3609' - 3890'; Middle Yeso: 3362' - 3561'; Glorieta/Upper Yeso: 3128' - 3304' NEW: Drilled to 3157' TD, PBTD: 3157'. Perforations in Lower San Andreas: 2590' - 2826'; Upper San Andreas: 2015' - 2088'							1
1030	30 015 41289	O	25 17S	27E		985 FSL & 2310 FEL	Enron Federal #18	LRE Operating LLC	NEW: Drilled to 4000' TD, PBTD: 3960'. Perforations in Lower Yeso: 3609' - 3890'; Middle Yeso: 3362' - 3561'; Glorieta/Upper Yeso: 3128' - 3304' NEW: Drilled to 4300' TD, PBTD: 4257'. Perforations in Yeso; 3406' - 4100'							1
1034	30 015 41435	O	35 17S	27E		720 FSL & 1770 FEL	Logan 35 O Federal 10	Lime Rock Resources A, L.P.	NEW: Drilled to 4326' TD, PBTD: 4288'. Perforations in Yeso; 3443' - 4098'							1
1043	30 015 41491	L	32 17S	28E		1650 FSL & 950 FWL	Ab State 647 007	Apache Corporation	NEW: Drilled to 4300' TD, PBTD: 4257'. Perforations in Blinebry; 4161' - 4930'; Perforations in Glorieta/Paddock; 3414' - 4058'							1
1044	30 015 41492	K	32 17S	28E		1375 FSL & 2320 FWL	Ab State 647 008	Apache Corporation	NEW: Drilled to 5076' TD, PBTD: 5056'. Perforations in Glorieta/Paddock; 3415' - 3955'							1
1042	30 015 41493	N	32 17S	28E		1080 FSL & 2535 FWL	Ab State 647 009	Apache Corporation	NEW: Drilled to 5070' TD, PBTD: 5060'. Perforations in Blinebry; 4198' - 4905'; Perforations in Glorieta/Paddock; 3393' - 4118'							1
1056	30 015 41494	N	32 17S	28E		1140 FSL & 1650 FWL	Ab State 647 010	Apache Corporation	NEW: Drilled to 5080' TD, PBTD: 5070'. Perforations in Blinebry; 4180' - 4890'; Perforations in Glorieta/Paddock; 3373' - 4091'							1
1055	30 015 41495	M	32 17S	28E		920 FSL & 960 FWL	Ab State 647 011	Apache Corporation	NEW: Drilled to 5065' TD, PBTD: 4025'. Perforations in Blinebry; 4033' - 4886'; Perforations in Glorieta/Paddock; 3417' - 3930'							1
1057	30 015 41496	M	32 17S	28E		910 FSL & 930 FWL	Ab State 647 012	Apache Corporation	NEW: Drilled to 4300' TD, PBTD: 4251'. Perforations in Glorieta/Paddock; 3466' - 4010'							1
1053	30 015 41497	M	32 17S	28E		220 FSL & 350 FWL	Ab State 647 013	Apache Corporation	NEW: Drilled to 5013' TD, PBTD: 5005'. Perforations in Blinebry; 4212' - 4858'; Perforations in Glorieta/Paddock; 3427' - 4104'							1
1041	30 015 41498	M	32 17S	28E		330 FSL & 1090 FWL	Ab State 647 014	Apache Corporation	NEW: Drilled to 5027' TD, PBTD: 4835'. Perforations in Glorieta/Paddock; 3504' - 3885'							1
1048	30 015 41500	K	32 17S	28E		2355 FSL & 2600 FWL	Ab State 647 002	Apache Corporation	NEW: Drilled to 5060' TD, PBTD: 5045'. Perforations in Blinebry; 4161' - 4938'; Perforations in Glorieta/Paddock; 3427' - 4104'							1
1049	30 015 41501	K	32 17S	28E		2370 FSL & 1650 FWL	Ab State 647 003	Apache Corporation	NEW: Drilled to 5065' TD, PBTD: 5050'. Perforations in Blinebry; 4208' - 4919'; Perforations in Glorieta/Paddock; 3380' - 4120'							1
1051	30 015 41502	L	32 17S	28E		2310 FSL & 330 FWL	Ab State 647 005	Apache Corporation	NEW: Drilled to 5063' TD, PBTD: 5050'. Perforations in Blinebry; 4142' - 4900'; Perforations in Glorieta/Paddock; 3394' - 3943'							1
1054	30 015 41503	L	32 17S	28E		1730 FSL & 430 FWL	Ab State 647 006	Apache Corporation	NEW: Drilled to 5046' TD, PBTD: 4050'. Perforations in Blinebry; 4066' - 4850'; Perforations in Glorieta/Paddock; 3338' - 3990'							1
1052	30 015 41504	N	32 17S	28E		330 FSL & 1650 FWL	Ab State 647 015	Apache Corporation	NEW: Drilled to 4297' TD, PBTD: 4250'. Perforations in Glorieta; 3445' - 4091'							1
1050	30 015 41505	L	32 17S	28E		2250 FSL & 1185 FWL	Ab State 647 004	Apache Corporation								1
1040	30 015 41511	N	32 17S	28E		330 FSL & 2365 FWL	Ab State 647 016	Apache Corporation								1

1073	30	015	41766	F	5	185	28E	1910 FNL & 1505 FWL	Libby State 001	Apache Corporation	NEW: Permit to Drill	1
1074	30	015	41767	F	5	185	28E	1570 FNL & 2245 FWL	Libby State 002	Apache Corporation	NEW: Permit to Drill	1
1075	30	015	41768	F	5	185	28E	1570 FNL & 2245 FWL	Libby State 002	Apache Corporation	NEW: Permit to Drill	1
1076	30	015	41770	B	31	175	28E	330 FNL & 2270 FEL	T Rex State 001	Apache Corporation	NEW: Permit to Drill	1
1077	30	015	41771	B	31	175	28E	575 FNL & 1650 FEL	T Rex State 002	Apache Corporation	NEW: Permit to Drill	1
1078	30	015	41772	B	31	175	28E	875 FNL & 2430 FEL	T Rex State 003	Apache Corporation	NEW: Permit to Drill	1
1079	30	015	41774	B	31	175	28E	890 FNL & 1750 FEL	T Rex State 004	Apache Corporation	NEW: Permit to Drill	1
1038	30	015	41833	C	32	175	28E	990 FNL & 1700 FWL	Enron State 19	LRE Operating LLC	NEW: Drilled to 4206' TD, PBTD: 4167'. Perforations in Glorieta; 3495' - 3762'; 3810' - 4099'	1
1031	30	015	41890	N	29	175	28E	330 FSL & 2200 FNL	Williams A Federal No 12	LRE Operating LLC	NEW: Drilled to 3700' TD, PBTD: 3694'. Perforations in Yeso: 3536' - 3618'	1
1080	30	015	41892	M	29	175	28E	330 FSL & 975 FWL	Williams A Federal 15	LRE Operating LLC	NEW: Permit to Drill	1
1081	30	015	41959	K	2	185	27E	2310 FSL & 1750 FWL	Bm State 002	Apache Corporation	NEW: Permit to Drill	1
1036	30	015	42002	E	2	185	27E	1900 FNL & 990 FWL	Sb State 002	Apache Corporation	NEW: Drilled to 4115' TD, PBTD: 4077'. Perforations in Yeso: 3076' - 3906'	1
1035	30	015	42003	E	2	185	27E	2515 FNL & 800 FWL	Sb State 004	Apache Corporation	NEW: Drilled to 4114' TD, Perforations in Yeso: 3173' - 3929'	1
1082	30	015	42024	1	1	185	27E	126 FNL & 141 FEL	Aao Federal #14	Apache Corporation	NEW: Permit to Drill	1
1083	30	015	42025	1	1	185	27E	1130 FNL & 2408 FEL	Aao Federal #15	Apache Corporation	NEW: Permit to Drill	1
1084	30	015	42026	1	1	185	27E	1305 FNL & 2455 FWL	Aao Federal #16	Apache Corporation	NEW: Permit to Drill	1
1085	30	015	42029	1	1	185	27E	1650 FNL & 865 FEL	Aao Federal #17	Apache Corporation	NEW: Permit to Drill	1
1086	30	015	42035	1	1	185	27E	2310 FNL & 1650 FEL	Aao Federal #18	Apache Corporation	NEW: Permit to Drill	1
1087	30	015	42036	1	1	185	27E	2188 FNL & 909 FWL	Aao Federal #20	Apache Corporation	NEW: Permit to Drill	1
1088	30	015	42051	1	1	185	27E	2310 FNL & 2310 FWL	Aao Federal #19	Apache Corporation	NEW: Permit to Drill	1
1089	30	015	42116	M	29	175	28E	990 FSL & 2160 FWL	Williams A Federal 16	LRE Operating LLC	NEW: Permit to Drill	1
1090	30	015	42121	C	2	185	27E	658 FNL & 1984 FWL	Brade State No. 5	Tarco Energy, L.C.	NEW: Permit to Drill	1
1091	30	015	42156	D	32	175	28E	385 FNL & 900 FWL	Enron State 21	LRE Operating LLC	NEW: Permit to Drill	1
1092	30	015	42334	1	1	185	27E	1005 FNL & 1630 FWL	Aao Federal #21	Apache Corporation	NEW: Permit to Drill	1
1093	30	015	42335	1	1	185	27E	790 FNL & 330 FWL	Aao Federal #22	Apache Corporation	NEW: Permit to Drill	1
1094	30	015	42336	1	1	185	27E	2265 FNL & 330 FEL	Aao Federal #23	Apache Corporation	NEW: Permit to Drill	1
1095	30	015	42337	1	1	185	27E	984 FNL & 243 FEL	Aao Federal #24	Apache Corporation	NEW: Permit to Drill	1
1096	30	015	42338	1	1	185	27E	2270 FSL & 1650 FWL	Aao Federal #26	Apache Corporation	NEW: Permit to Drill	1
1097	30	015	42339	1	1	185	27E	360 FSL & 990 FWL	Aao Federal #29	Apache Corporation	NEW: Permit to Drill	1
1098	30	015	42358	1	1	185	27E	183 FSL & 2497 FWL	Aao Federal #28	Apache Corporation	NEW: Permit to Drill	1
1099	30	015	42359	1	1	185	27E	1960 FSL & 2063 FWL	Aao Federal #27	Apache Corporation	NEW: Permit to Drill	1
1100	30	015	42360	1	1	185	27E	1261 FSL & 281 FWL	Aao Federal #30	Apache Corporation	NEW: Permit to Drill	1
1101	30	015	42361	1	1	185	27E	2000 FSL & 1022 FWL	Aao Federal #25	Apache Corporation	NEW: Permit to Drill	1
1102	30	015	42372	D	31	175	28E	330 FNL & 430 FWL	Enron State #20	LRE Operating LLC	NEW: Permit to Drill	1

TABLE VIII**FIGURES INCLUDED IN THE REPORT**

Figure	Description	OCD Reference
1	Mewbourne Well #1 Schematic	Section VI.1 and IX.3
2	Plot of Bottom Hole Pressure and Temperature Data Chukka Well #2	n/a
3	Gaines Well #3 Schematic	n/a
4	Chukka Well #2 Schematic	n/a
5	Plot of Bottom Hole Pressure and Temperature Data Gaines Well #3	n/a
6	Midland Map of One Mile Area of Review	n/a
7	Mewbourne Well #1 Wellhead Schematic	Section IX.14
8	Diagram of Valve Locations for Shut-in on Mewbourne Well #1	Section IX.14
9	Mewbourne Well #1 Test Overview	Section IX.18.f
10	Mewbourne Well #1 Cartesian Plot of Bottom-Hole Pressure and Temperature vs. Time	Section IX.18.a
11	Mewbourne Well #1 Cartesian Plot of Injection Rate vs. Time	Section IX.18.b
12	Historical Surface Pressure and Injection Rates vs. Calendar Time	Section IX.18.g

TABLE VIII (cont.)

Figure	Description	OCD Reference
13	Mewbourne Well #1 Derivative Log-Log Plot	Section IX.18.c
14	Mewbourne Well #1 Superposition Horner (Semi-Log) Plot	Section IX.18.d
15	Mewbourne Well #1 Expanded Superposition Horner (Semi-Log) Plot	Section IX.18.d
16	Mewbourne Well #1 Hall Plot	Section IX.18.h
17	Mewbourne Well #1 Static Pressure Gradient Survey	n/a

TABLE IX**Comparison of Permeability, Transmissibility,
Skin, False Extrapolated Pressure, and Fill Depth**

Date of Test	Permeability (k)	Transmissibility (kh/u)	Skin (s)	False Extrapolated Pressure (p*)	Fill Depth
May 15–18, 2014	546 md	167,698 md-ft/cp	44.99	4404.70 psia	8,990 feet
September 21-23, 2012	661 md	202,929 md-ft/cp	36.1	4007.98 psia	9,018 feet
November 10-13, 2011	685 md	210,441 md-ft/cp	68.5	3846.18 psia	9,001 feet
December 16-21, 2010	521 md	159,979 md-ft/cp	92.7	3716.9 psia	9,001 feet
October 26-29, 2009	883 md	271,155 md-ft/cp	77	3,591.62 psia	9,001 feet
April 3-4, 2008	1,592 md	488,655 md-ft/cp	262	3,527.37 psia	N/A
Permit Parameters	250 md	40,094 md-ft-cp	0	N/A	N/A

TABLE X

**NAVAJO REFINING COMPANY
STATIC PRESSURE GRADIENT SURVEY – MEWBOURNE WELL #1
May 18, 2014**

Depth (ft)	Pressure (psia)	Pressure Gradient (psi/ft)	Temperature (°F)
7924	4416.61	0.437	98.63
7000	4013.29	0.436	104.00
6000	3576.93	0.436	100.46
5000	3141.18	0.436	96.21
4000	2704.96	0.436	92.18
3000	2268.84	0.436	88.79
2000	1832.84	0.436	85.37
1000	1397.07	0.444	81.89
0	953.06	0.00	79.43

BELOW GROUND DETAILS

All depths are referenced to the Kelly bushing elevation of 12.5' above ground level. Ground level elevation is 3,678' above mean sea level.

1. Surface Casing: 13 3/8", 48 lb/ft, J-55, ST&C set at 390' in a 17 1/2" hole. Cemented with 150 sx Class C with 3 % calcium chloride, 375 sx Class C Lite w/3 % calcium chloride and 1/2 lb/sx flocele. Circulated 86 sx to surface.
2. Intermediate Casing: 9 5/8", 36 lb/ft, J-55, ST&C set at 2,555' in a 12 1/4" hole. Cemented w/800 sx of Class C Lite w/ 1/2 lb/sx flocele and 2 lb/sx Gilsonite and 12 % salt. Followed by 200 sx of Class C w/2 % calcium chloride. Circulated 133 sx to surface.
3. Base of the USDW at 493'.
4. Injection Tubing: 4 1/2", 11.6 lb/ft, N-80, SMLS, R3, LT&C set at 7,879'.
5. DV Tool: at 5,498'.

6. Annulus Fluid: 8.7 lb/gal brine water mixed w/UniChem Techni-Hib 370 corrosion inhibitor.

7. Protection Casing: 7", 29 lb/ft, N-80, LT&C: 9094' to 7031'. 7", 29 lb/ft, P-110, LT&C: 7031' to 5845'. 7", 26 lb/ft, P-110, LT&C: 5845' to surface. Casing cemented in two stages as follows:

First Stage - 600 sx modified Class H w/0.4 % CFR-3, 5 lb/sx Gilsonite, 0.5 % Halad-344, and 1 lb/sx salt mixed at 13.0 ppg. Opened DV tool at 5498' and circulated 142 sx to surface.

Second Stage - Lead Slurry: 220 sx Interfill "C" (35:65:6) mixed at 11.7 ppg. Tail Slurry: 550 sx modified Class H w/0.4 % CFR-3, 5 lb/sx, Gilsonite, 0.5 % Halad-344, 0.1 % HR-7, and 1 lb/sx mixed at 13.0 ppg. Circulated 75 sx to surface. Top out w/20 sx permium plus 3 % calcium chloride.

8. Packer: 7" x 3.5" EVI Oil Tools (Arrow), Model X-1 retrievable packer set at 7879'. Minimum I.D. is 3.0". Wireline re-entry guide on bottom. To release: turn 1/4 turn to the right and pick up.

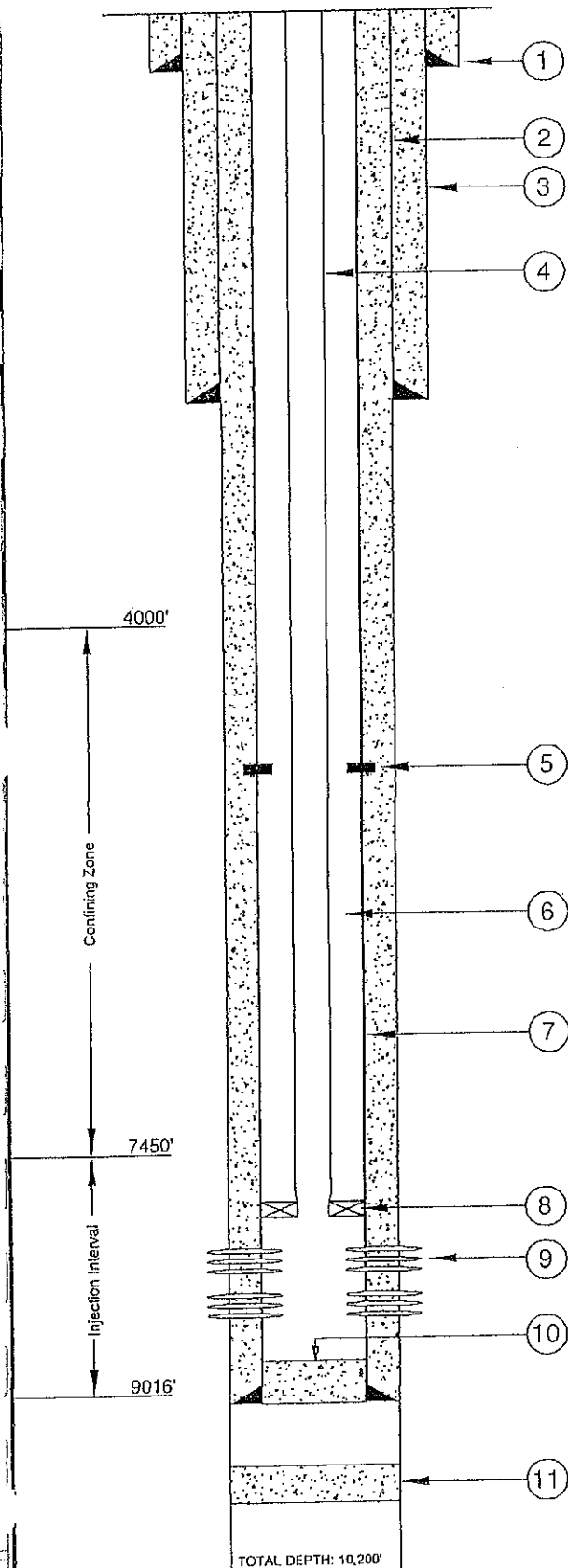
9. Perforations (2 SPF):

Upper Zone - 7924-7942', 7974-8030', 8050-8056', 8066-8080', 8118-8127', 8132-8140', 8160-8164', 8170-8188'.

Lower Zone - 8220-8254', 8260-8270', 8280-8302', 8360-8366', 8370-8378', 8400-8410', 8419-8423', 8430-8446', 8460-8464', 8470-8476'.

10. PBTD: 9004'.

11. Cement Plug: 45 sx Class H from 9624' to 9734'.



SUBSURFACE 		HOUSTON, TX. SOUTH BEND, IN. BATON ROUGE, LA.
NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO BELOW GROUND DETAILS WASTE DISPOSAL WELL NO. 1		
DATE: 07/13/01	CHECKED BY:	JOB NO: 70D5256
DRAWN BY: WDL	APPROVED BY:	DWG. NO:

FIGURE 1

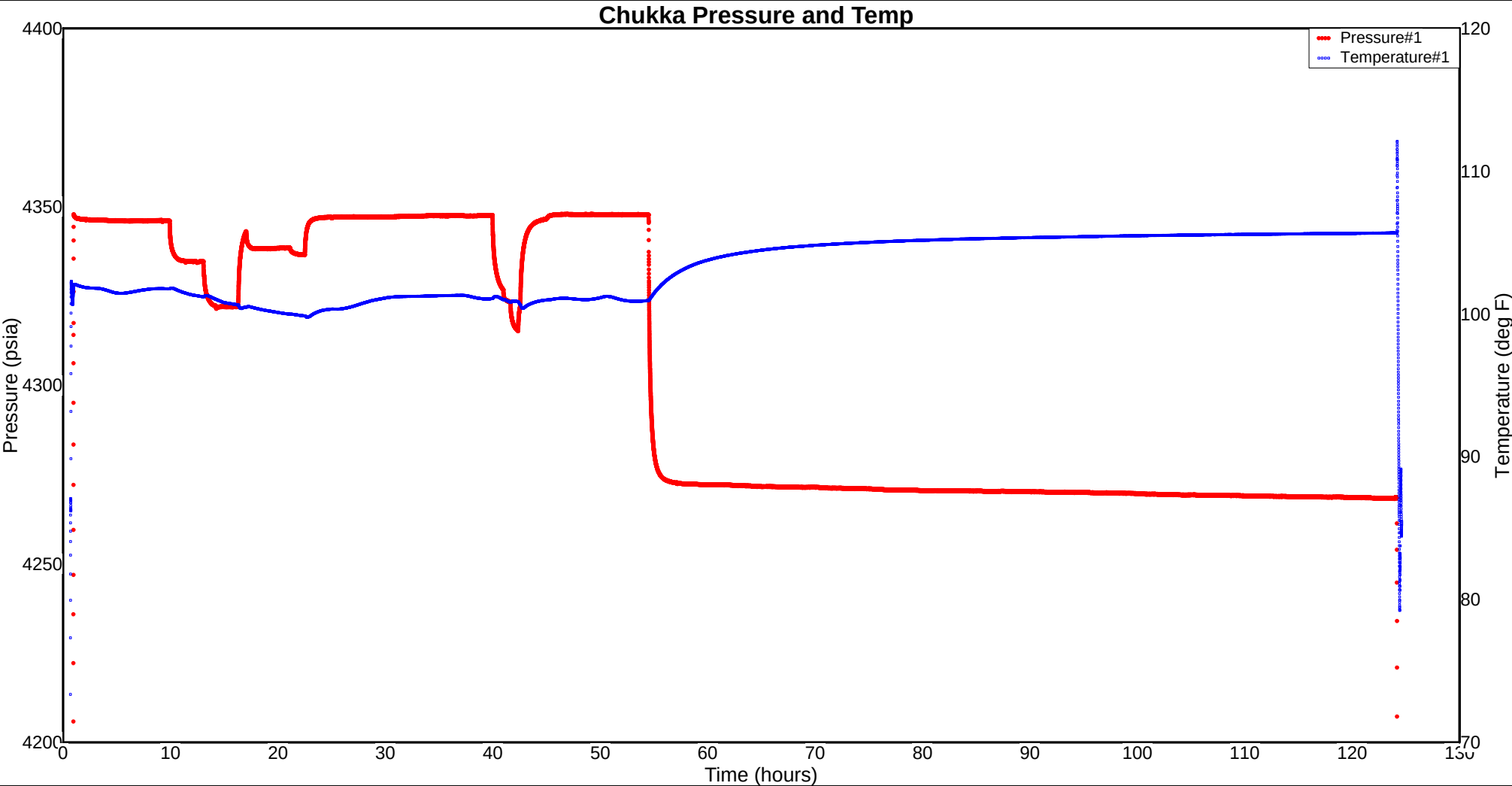


FIGURE 2

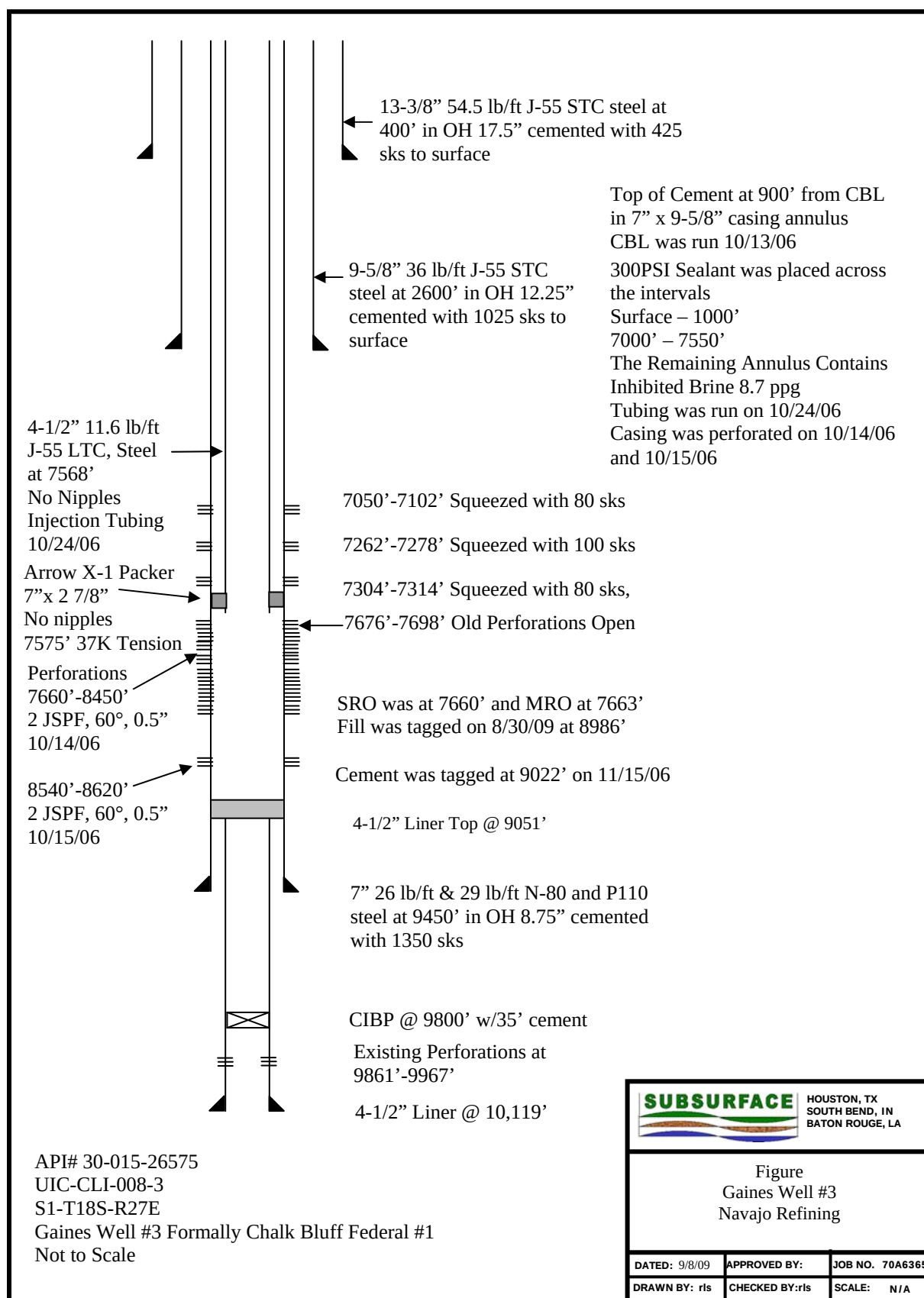


FIGURE 3

BELOW GROUND DETAILS

All depths are referenced to the Kelly bushing elevation of 13' above ground level. Ground level elevation is 3610' above mean sea level.

1. Base of the USDW at 473'.
2. Surface Casing: 8 $\frac{5}{8}$ ", 32 lb/ft, set at 1995' in an 11" hole. Cemented to surface with 800 sacks of cement.
3. Injection Tubing: 3 $\frac{1}{2}$ ", 9.2 lb/ft, J-55, smls, NUE 10 rd. set at 7528'.
4. DV Tool: at 5,785'.
5. Annulus Fluid: 8.7 lb/gal brine water mixed w/UniChem Techni-Hib 370 corrosion inhibitor.

6. Protection Casing: 5 $\frac{1}{2}$ ", 17 lb/ft, L-80, LT&C: 8869' to the surface and set in a 7 $\frac{7}{8}$ " hole. Casing cemented in two stages as follows:

First Stage - 575 sacks of modified Class "H" with 0.4 % CFR-3, 5 lb/sk Gilsonite, 0.5 % Halad-344, and 3 lb/sk salt. Mixed at 13.0 ppg. Opened DV tool at 5785 and circulated 20 sacks to surface.

Second Stage - Lead Slurry: 300 sacks of Interfill "C" (35:65:6) mixed at 11.7 ppg. Tail slurry: 695 sacks modified Class "H" with 0.4% CFR-3, 5 lb/sk Gilsonite, 0.5 % Halad-344 and 3 lb/sk salt mixed at 13.0 ppg. Circulated 150 sacks to surface. Topped out with 10 yards of Redi-mix.

7. Packer: 5 $\frac{1}{2}$ " x 2 $\frac{7}{8}$ " Weatherford Completion Tools (Arrow) Model X-T retrievable packer set at 7528'. Minimum ID is 2.4375". Wireline re-entry guide is on bottom. To release: turn $\frac{1}{4}$ turn to the right and pick up.

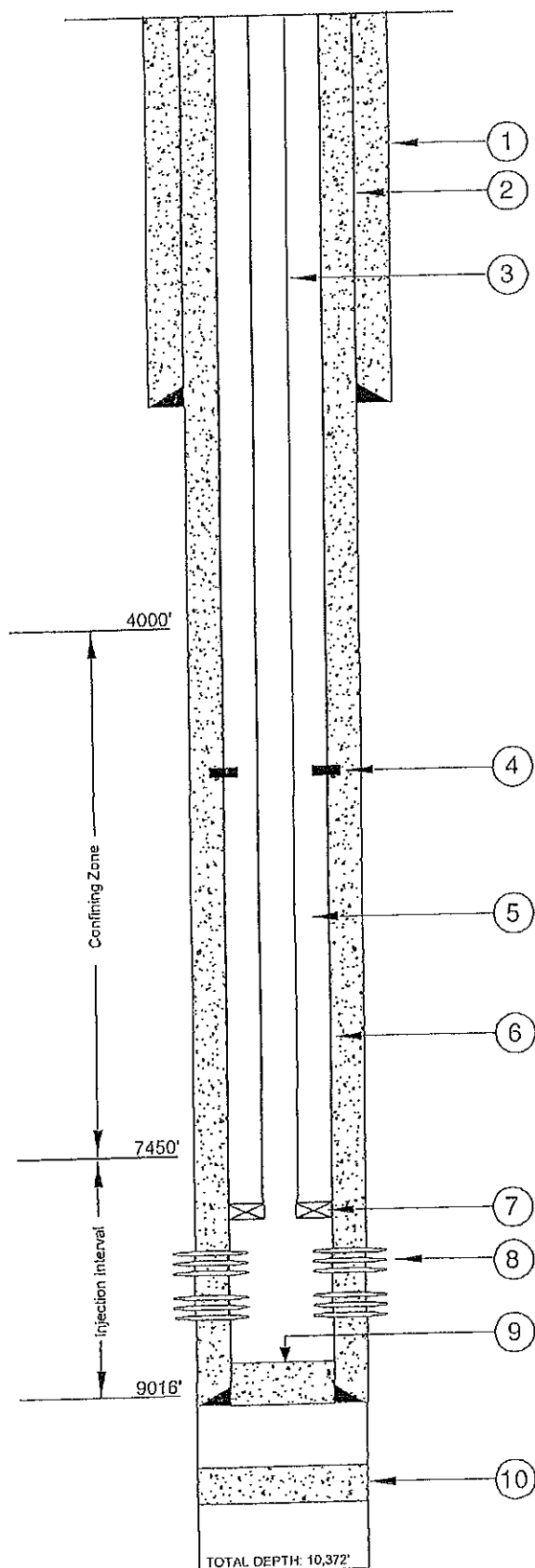
8. Perforations (2 SPF):

Zone 1: 7570-7620', 7676-7736'

Zone 2: 7826-7834', 7858-7880', 7886-7904', 7916-7936', 7944-7964', 7990-8042', 8096-8116', 8191-8201', 8304-8319', 8395-8399'.

9. PBTD: 8770'

10. Cement Plug: 45 sacks from 9675' to 9775'.



SUBSURFACE

HOUSTON, TX.
SOUTH BEND, IN.
BATON ROUGE, LA.

NAVAJO REFINING COMPANY
ARTESIA, NEW MEXICO

BELOW GROUND DETAILS WASTE DISPOSAL WELL NO. 2

DATE: 07/13/01	CHECKED BY:	JOB NO: 7005256
DRAWN BY: WDL	APPROVED BY:	DWG. NO:

FIGURE 4

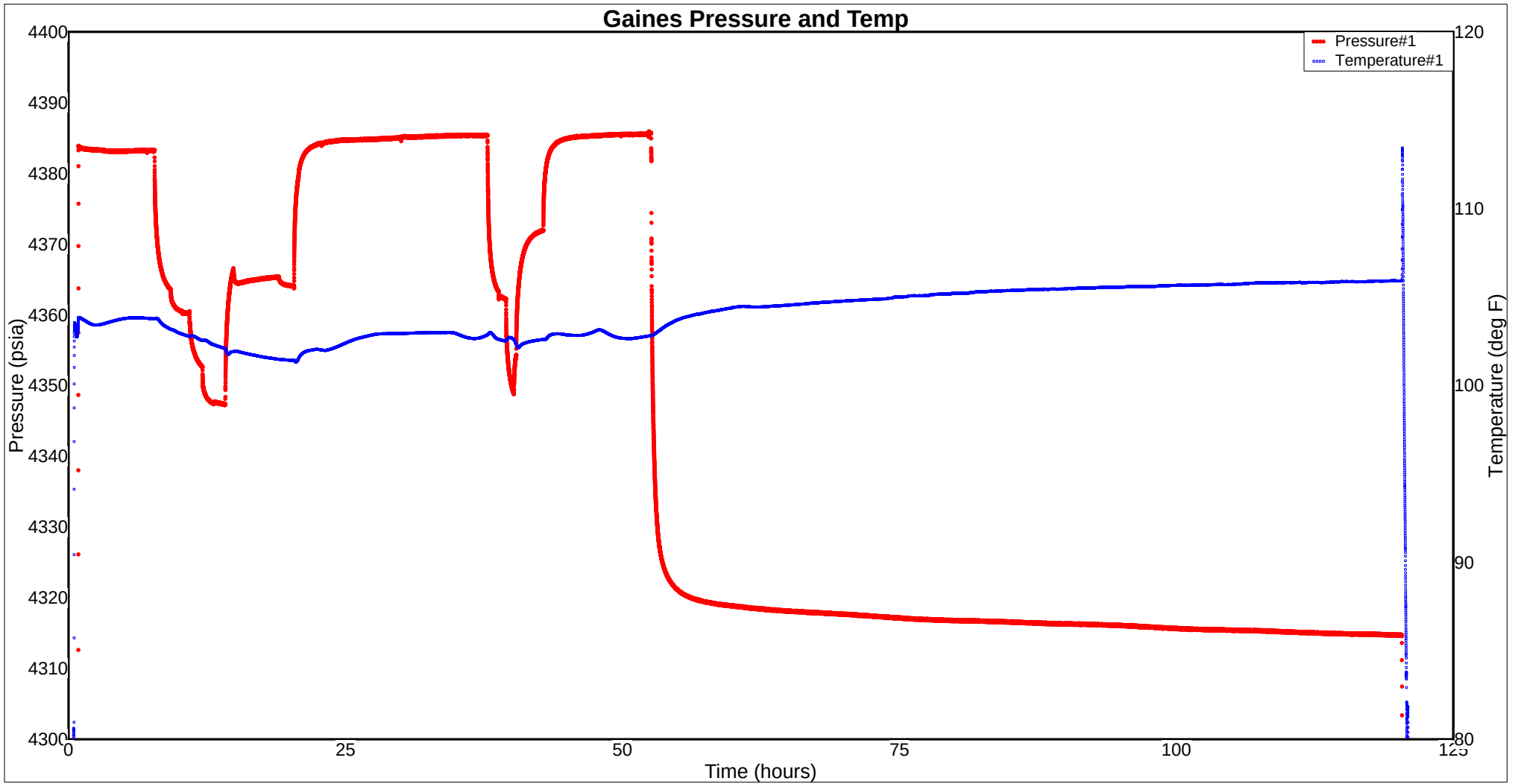
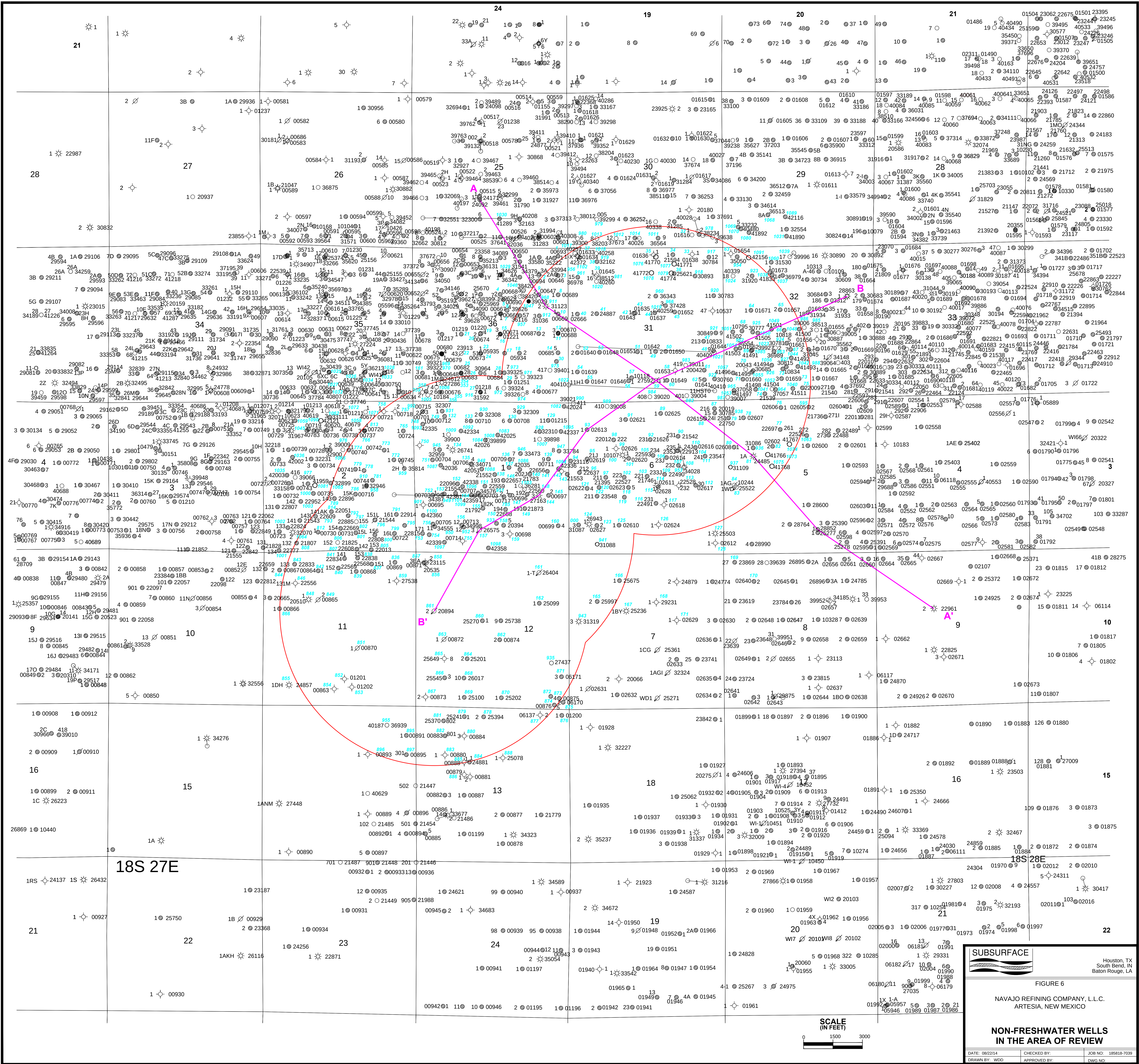


FIGURE 5



WELL: NAVAJO REFINING MEWBOURNE WELL NO. 1

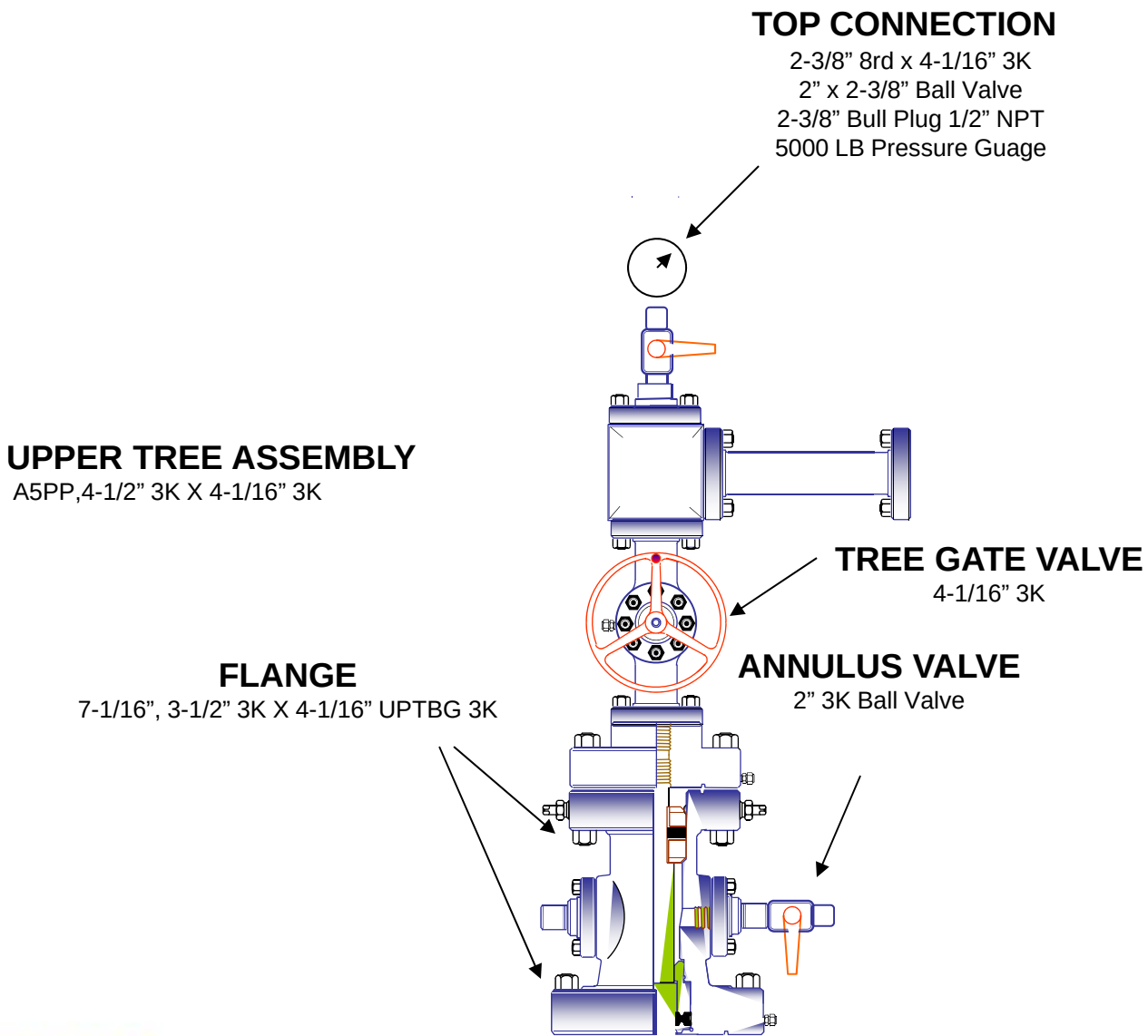
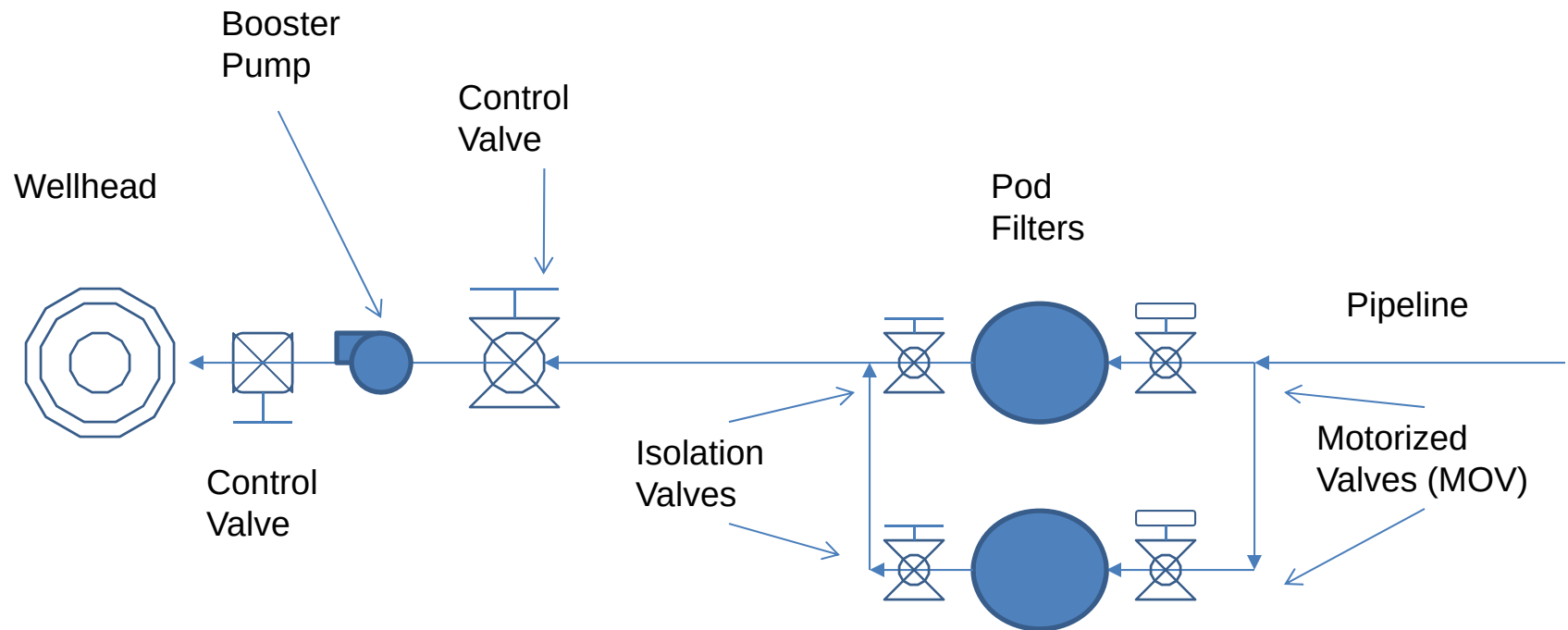


FIGURE 8
Mewbourne Well No. 1
Diagram of Shut-in Valve Control



At Shut-in

- Close MOV
- Close Control Valve
- Close Isolation Valves
- Close Control Valve
- Drain POD Filters

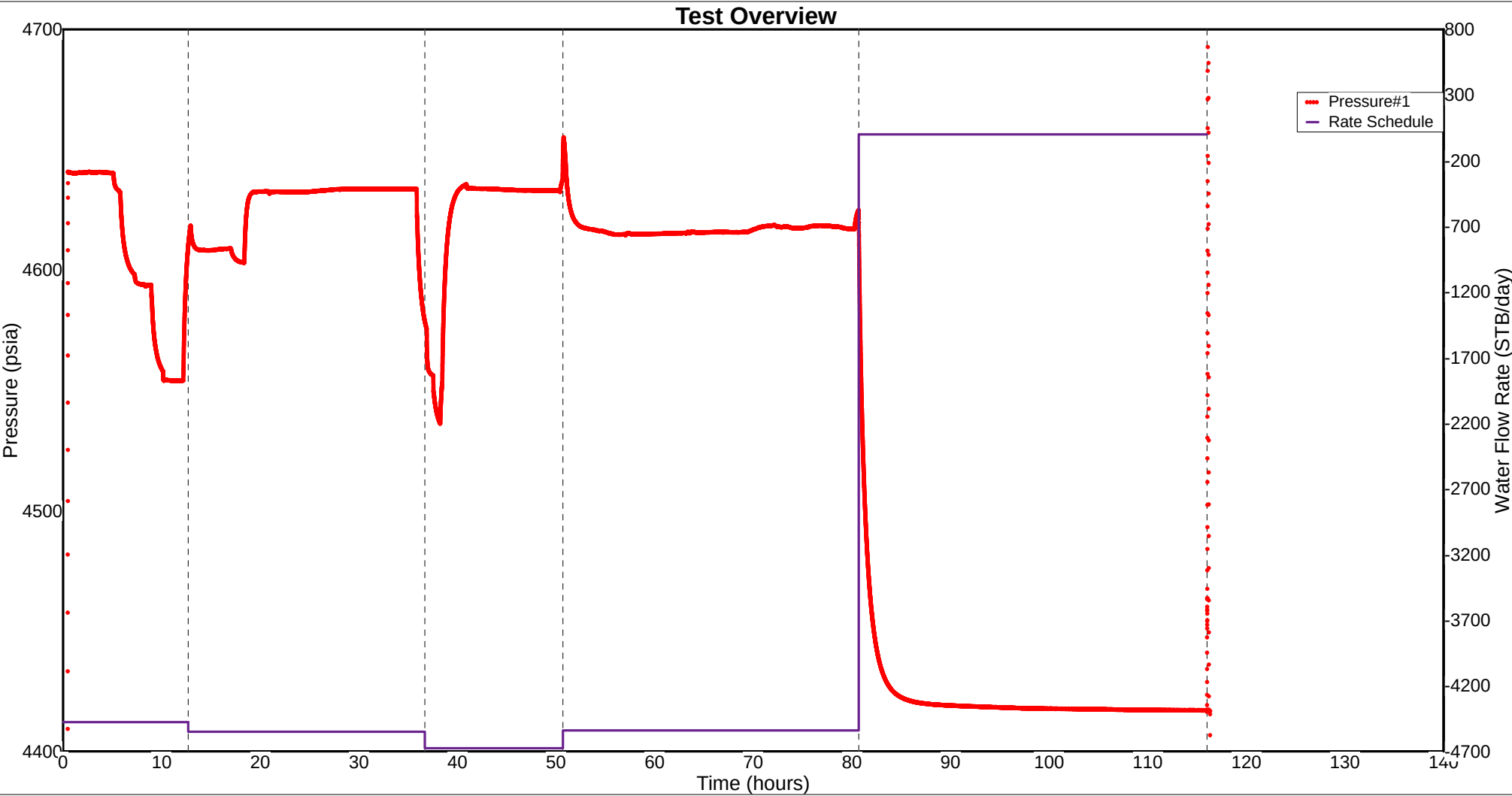


FIGURE 9

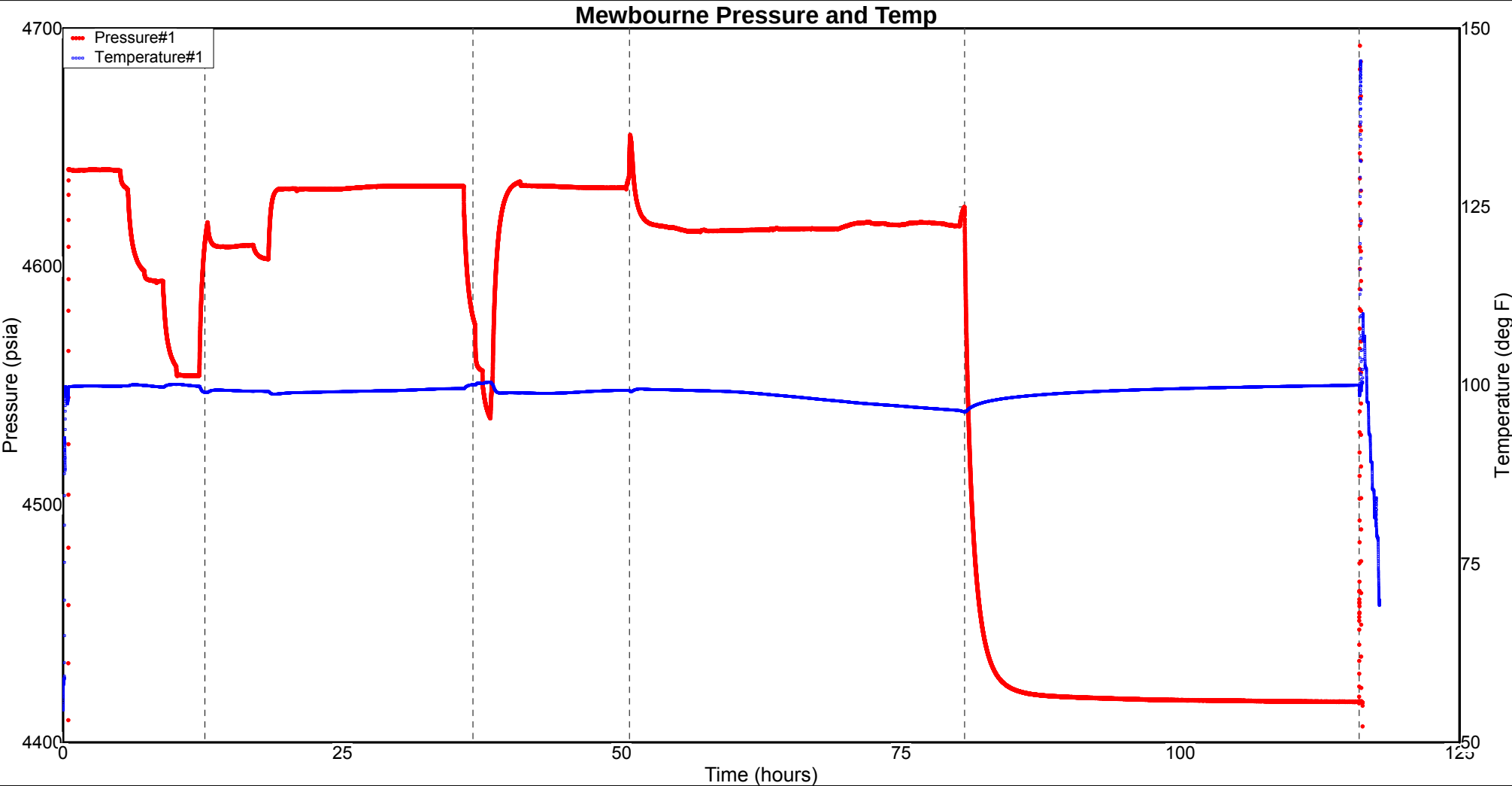


FIGURE 10

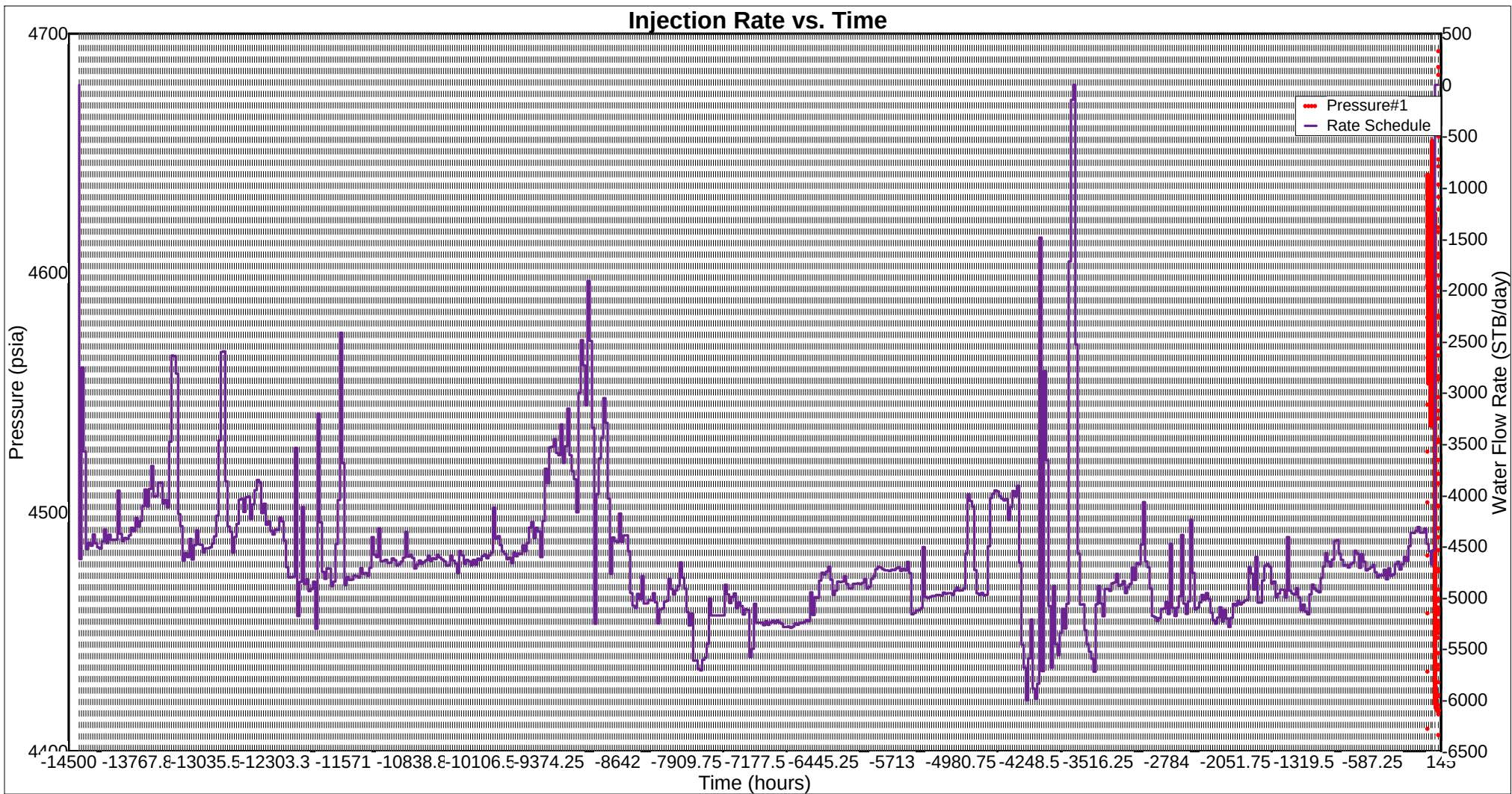


FIGURE 11

Mewbourne Well No. 1
Cartesian Plot of Surface Pressure and Injection Rates
December 24, 2000 to May 18, 2014

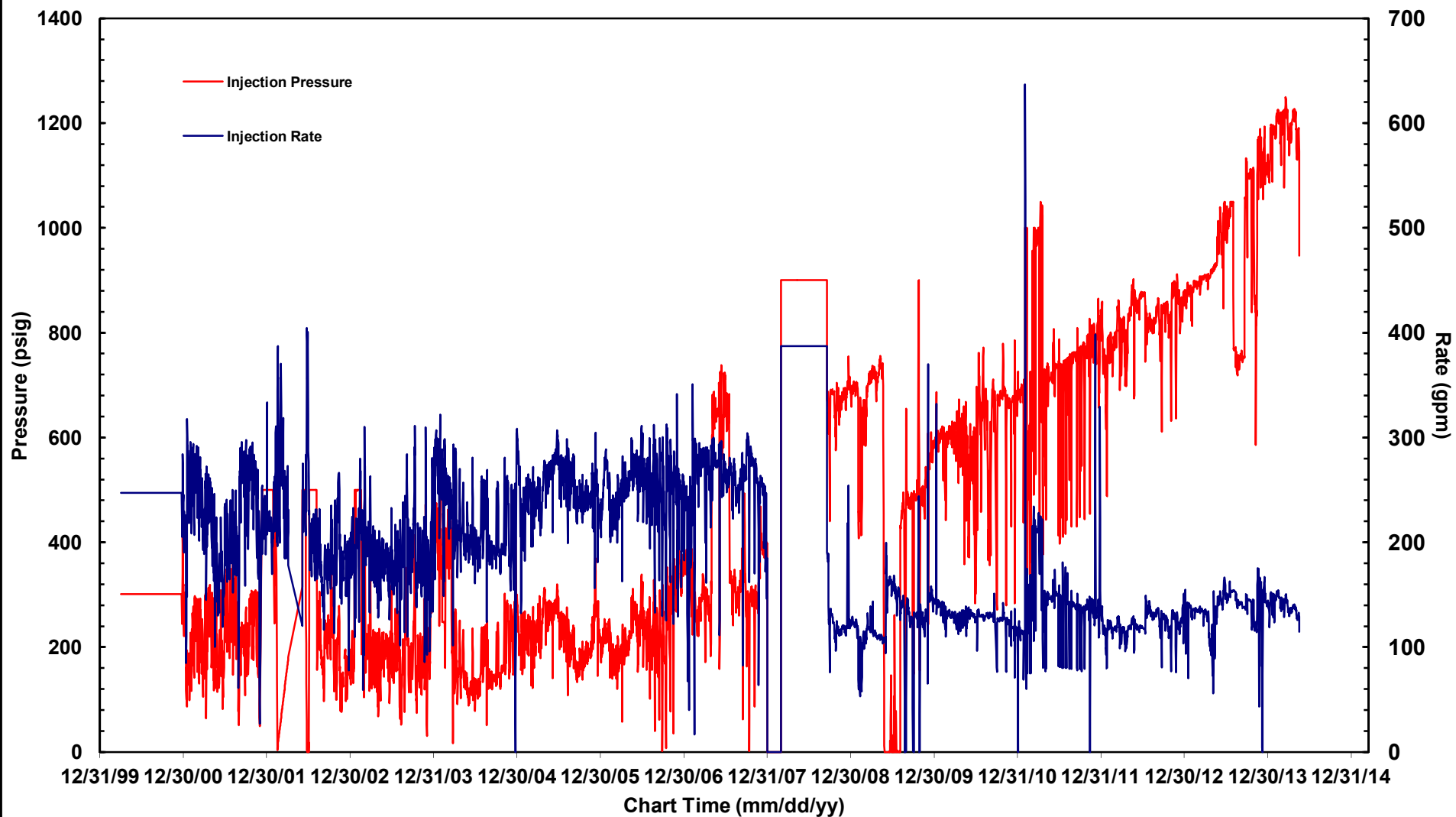


FIGURE 12

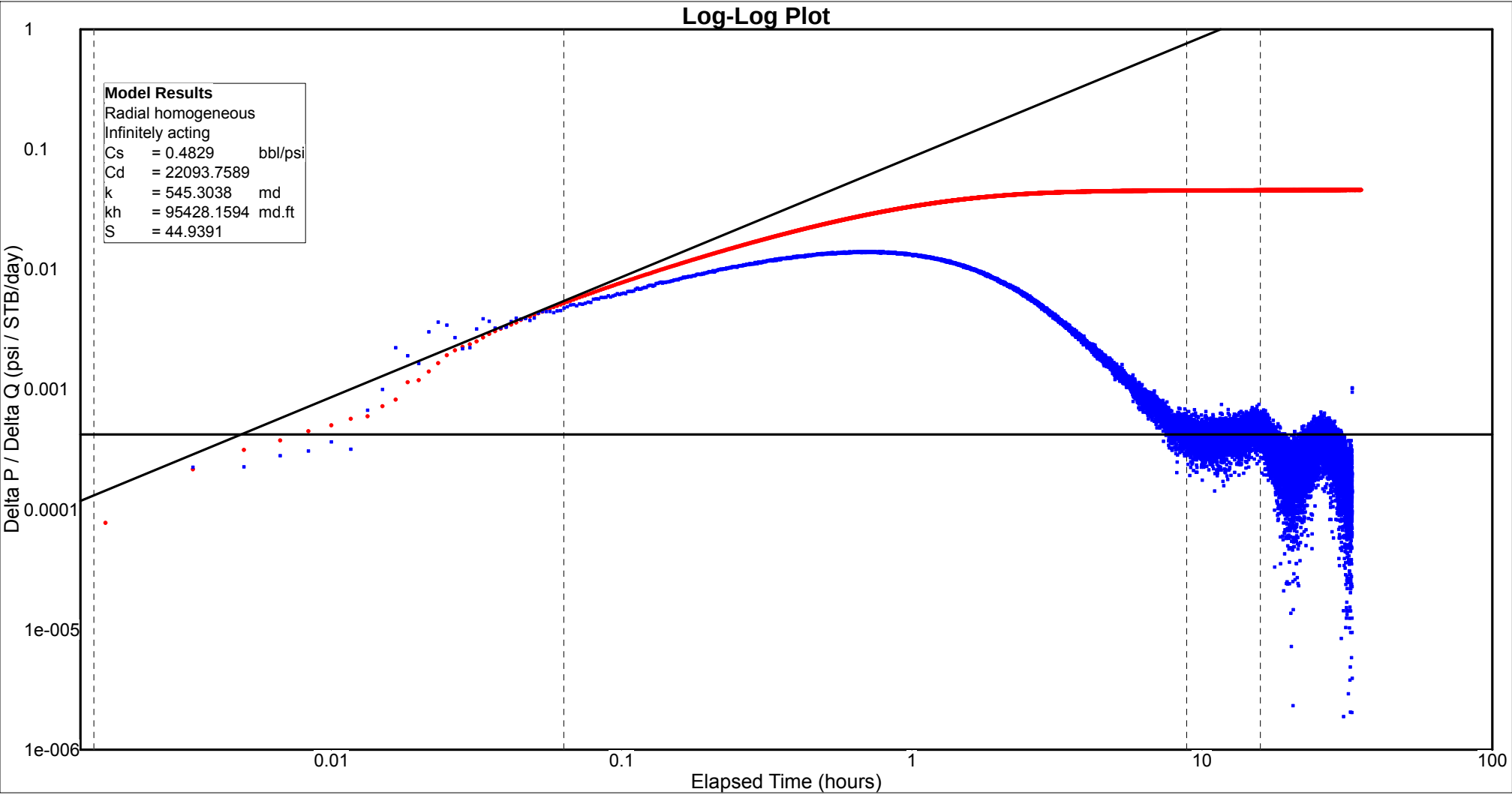


FIGURE 13

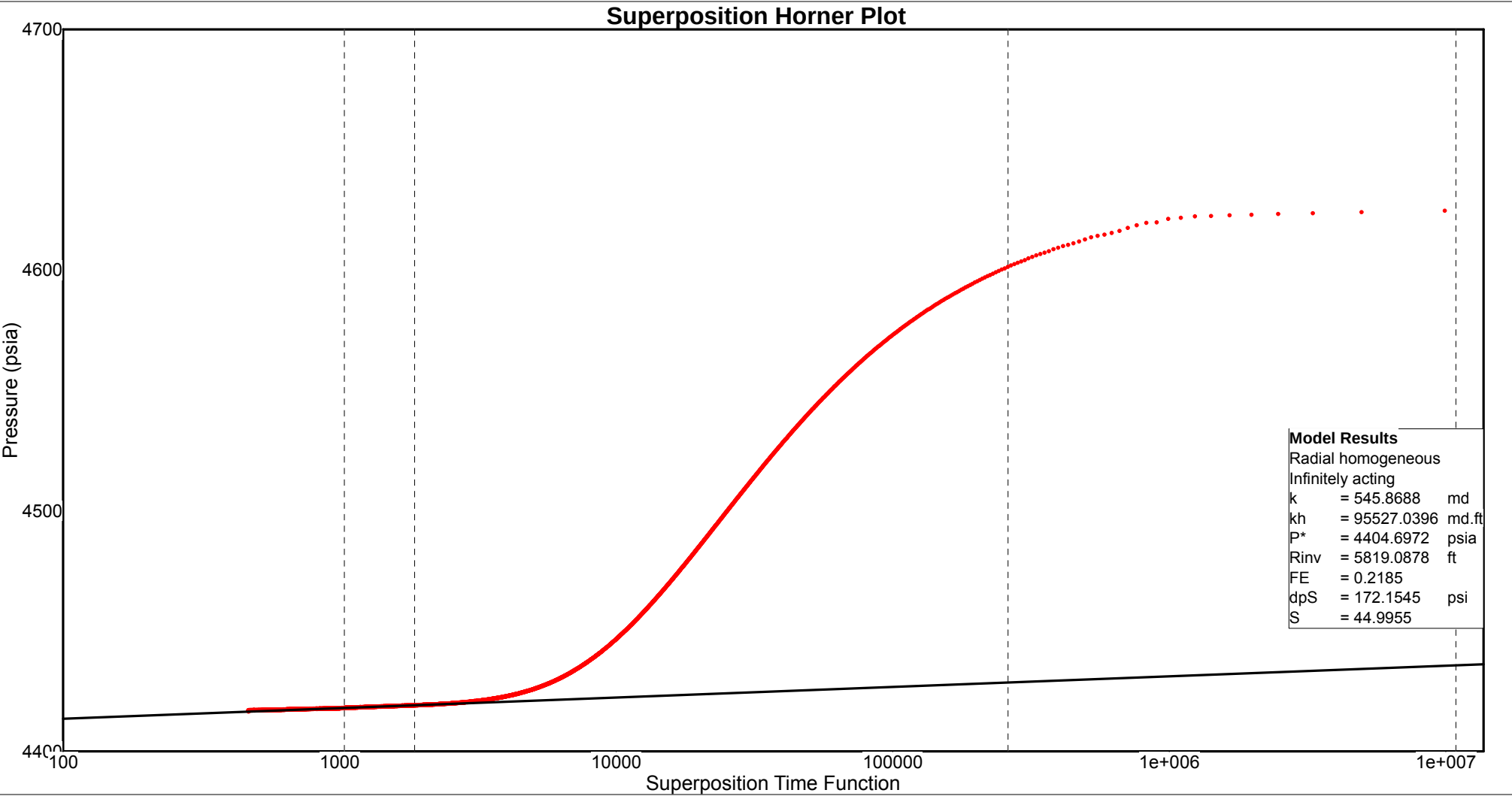


FIGURE 14

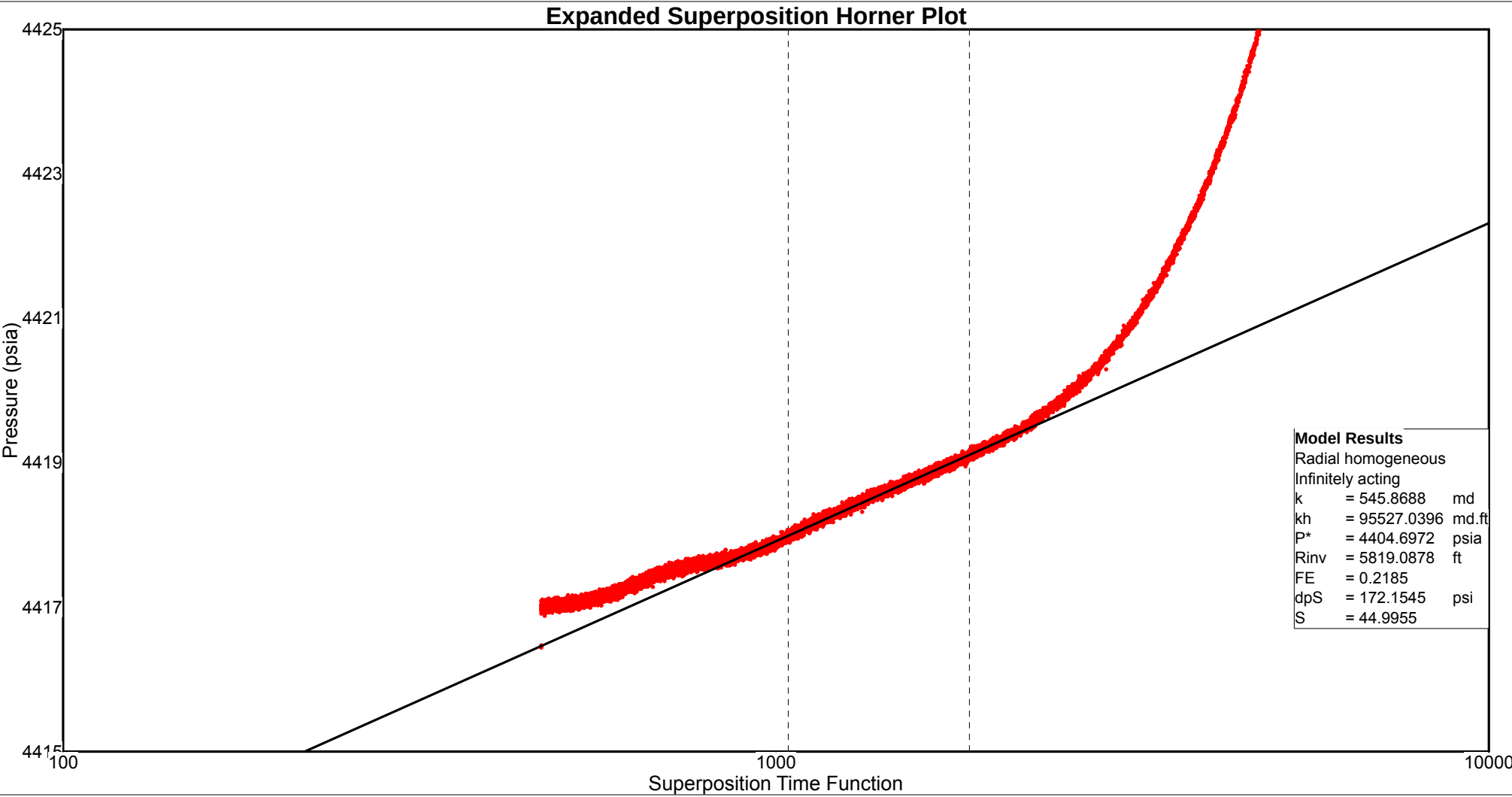


FIGURE 15

Navajo Refining Company
Mewbourne Well No. 1
March 26, 2014 to May 15, 2014
Hall Plot

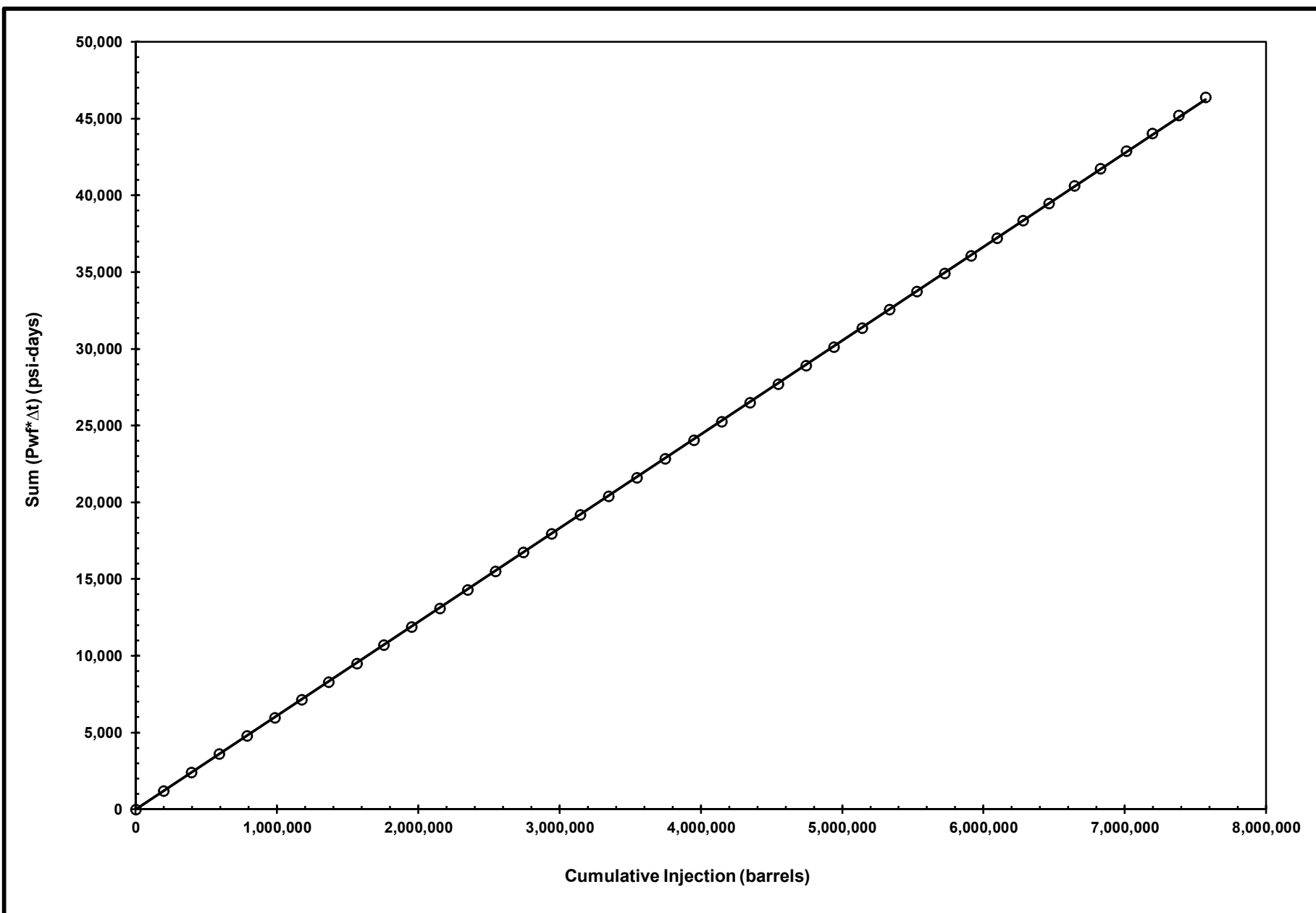
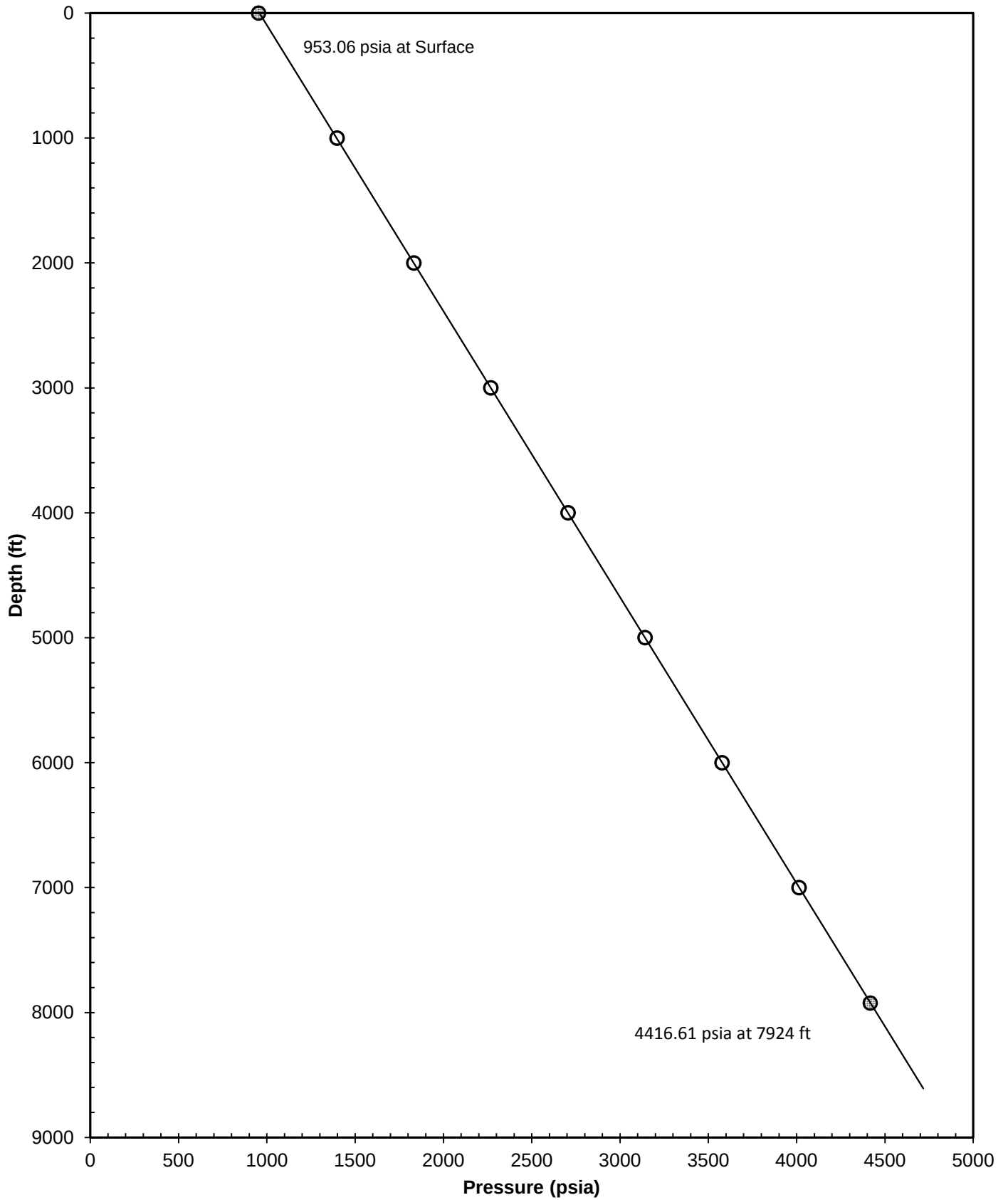


FIGURE 16

FIGURE 17

**Navajo Refining Company
Static Pressure Gradient Survey
Mewbourne Well No. 1
May 18, 2014**



APPENDIX C

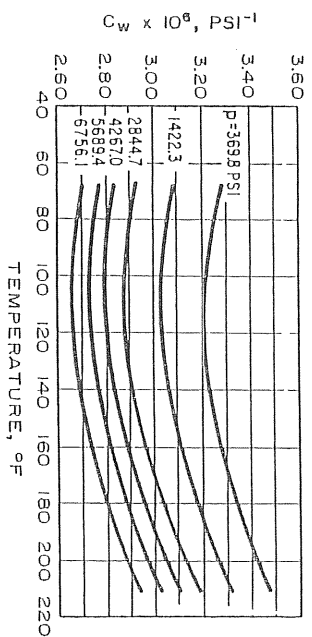


Fig. D.16 Average compressibility of distilled water. After Long and Chierici.¹³

Source: Earlougher, 1977, Advances in Well Test Analysis

COMPRESSIBILITY OF PORE VOLUME AND DISTILLED WATER

APPENDIX D

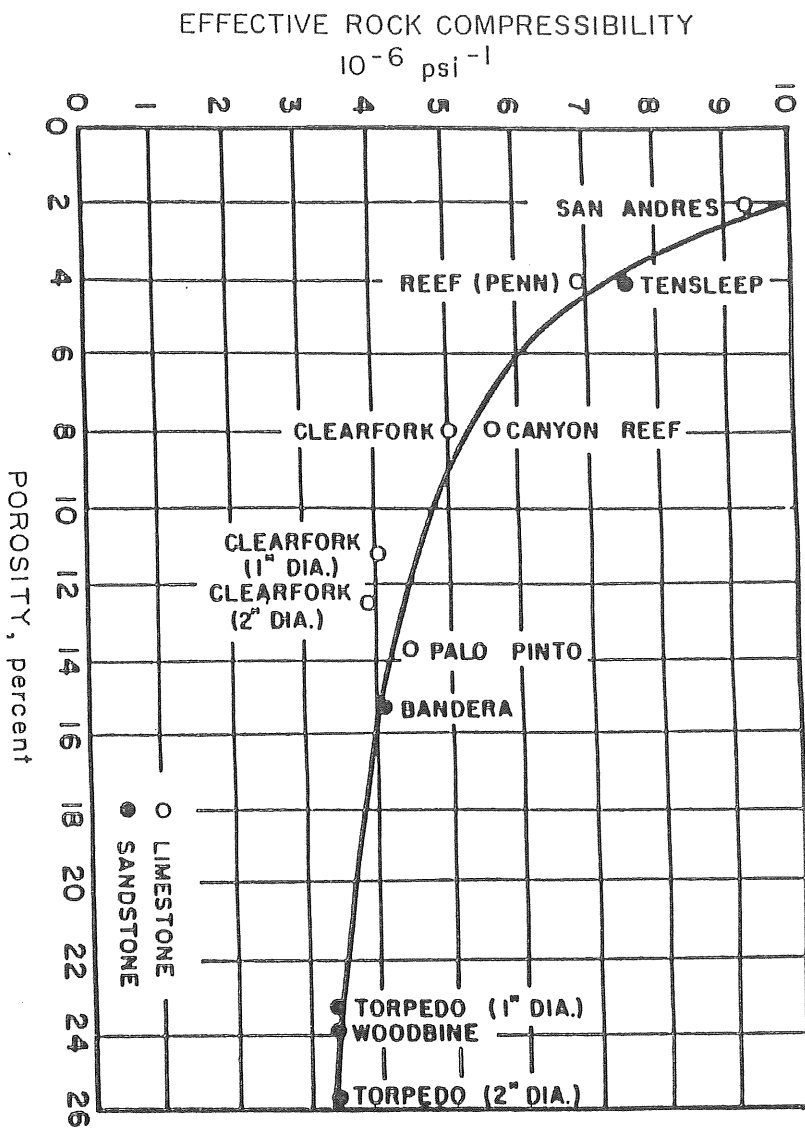


Fig. G.5 Effective formation (rock) compressibility. From Hall, *Trans., AIME* (1953) 196, 309.

Source: Matthews and Russell, 1967, Pressure Buildup and Flow Tests in Wells

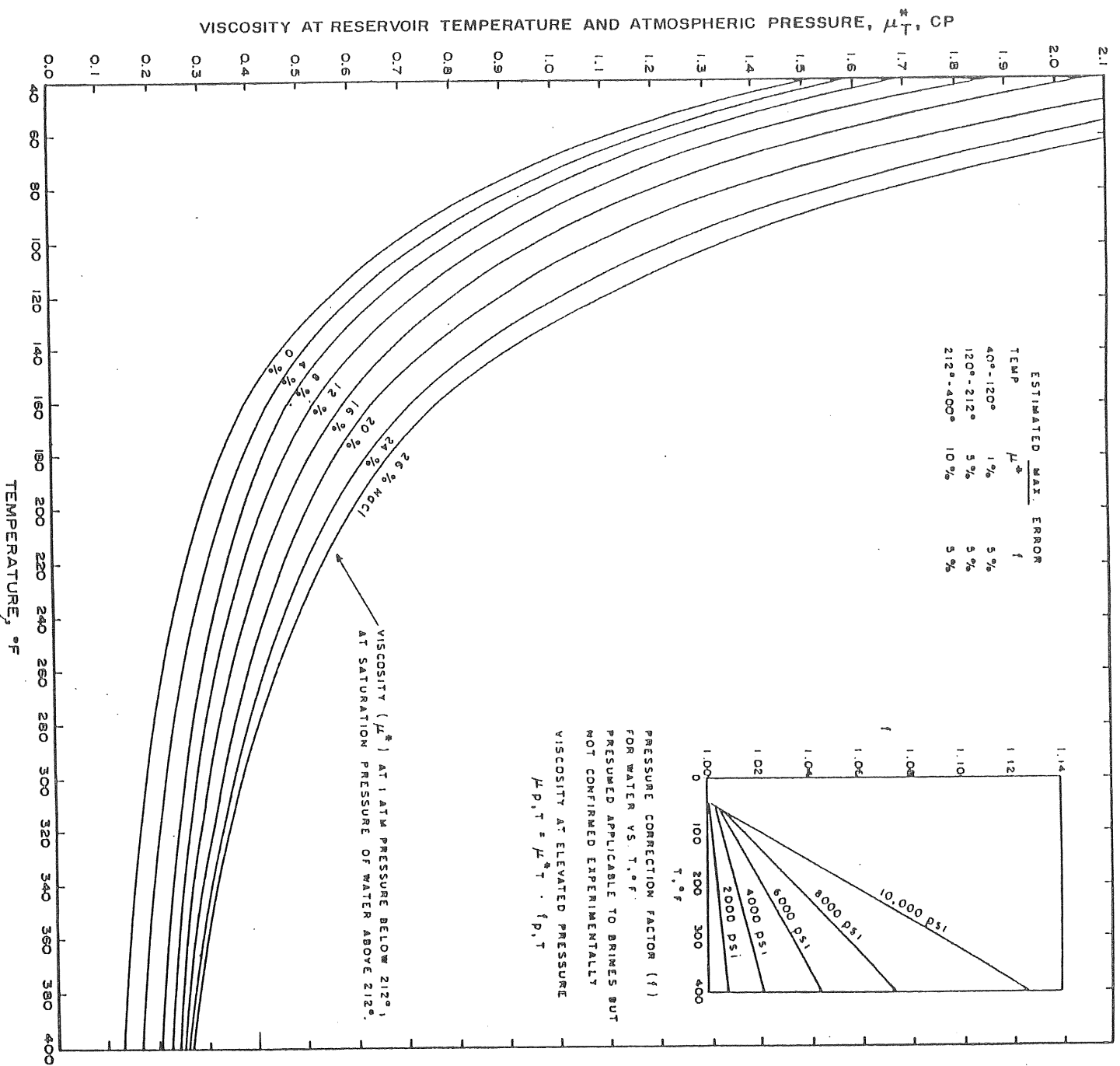


Fig. D.35 Water viscosity at various salinities and temperatures. After Matthews and Russell, data of Chesnut.¹⁸

FROM: Earlougher, R. C., 1977, "Advances in Well Test Analysis", SPE of AIME, Dallas, Texas

Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate	Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd	mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
09/21/2012	12:00:00 AM	126.863	-14387.305	0821.82	-4349.591	12/08/2012	12:00:00 AM	115.334	-12492.305	0855.18	-3954.300
09/22/2012	12:00:00 AM	134.946	-14363.305	0852.97	-4626.722	12/09/2012	12:00:00 AM	112.443	-12468.305	0847.40	-3855.203
09/23/2012	12:00:00 AM	080.471	-14339.305	0611.15	-2759.000	12/10/2012	12:00:00 AM	113.131	-12444.305	0816.28	-3878.778
09/24/2012	12:00:00 AM	104.318	-14315.305	0711.43	-3576.631	12/11/2012	12:00:00 AM	121.887	-12420.305	0798.85	-4178.990
09/25/2012	12:00:00 AM	132.152	-14291.305	0841.37	-4530.932	12/12/2012	12:00:00 AM	119.202	-12396.305	0814.47	-4086.922
09/26/2012	12:00:00 AM	130.326	-14267.305	0838.12	-4468.333	12/13/2012	12:00:00 AM	125.187	-12372.305	0846.80	-4292.111
09/27/2012	12:00:00 AM	131.164	-14243.305	0843.63	-4497.038	12/14/2012	12:00:00 AM	124.209	-12348.305	0846.55	-4258.609
09/28/2012	12:00:00 AM	127.923	-14219.305	0835.62	-4385.935	12/15/2012	12:00:00 AM	126.885	-12324.305	0863.47	-4350.357
09/29/2012	12:00:00 AM	130.442	-14195.305	0844.79	-4472.313	12/16/2012	12:00:00 AM	127.959	-12300.305	0867.71	-4387.167
09/30/2012	12:00:00 AM	131.625	-14171.305	0852.07	-4512.843	12/17/2012	12:00:00 AM	126.502	-12276.305	0857.41	-4337.224
10/01/2012	12:00:00 AM	131.986	-14147.305	0855.13	-4525.236	12/18/2012	12:00:00 AM	126.652	-12252.305	0861.31	-4342.357
10/02/2012	12:00:00 AM	129.914	-14123.305	0848.30	-4454.205	12/19/2012	12:00:00 AM	123.137	-12228.305	0846.98	-4221.827
10/03/2012	12:00:00 AM	126.560	-14099.305	0837.56	-4339.198	12/20/2012	12:00:00 AM	124.226	-12204.305	0851.53	-4259.177
10/04/2012	12:00:00 AM	130.382	-14075.305	0852.45	-4470.244	12/21/2012	12:00:00 AM	129.757	-12180.305	0820.80	-4488.796
10/05/2012	12:00:00 AM	127.991	-14051.305	0845.31	-4388.264	12/22/2012	12:00:00 AM	137.253	-12156.305	0826.64	-4705.815
10/06/2012	12:00:00 AM	129.468	-14027.305	0852.55	-4438.905	12/23/2012	12:00:00 AM	140.183	-12132.305	0852.22	-4806.262
10/07/2012	12:00:00 AM	129.511	-14003.305	0855.47	-4440.379	12/24/2012	12:00:00 AM	140.101	-12108.305	0859.78	-4803.462
10/08/2012	12:00:00 AM	129.426	-13979.305	0856.45	-4437.466	12/25/2012	12:00:00 AM	139.931	-12084.305	0876.97	-4797.629
10/09/2012	12:00:00 AM	115.440	-13955.305	0801.78	-3957.946	12/26/2012	12:00:00 AM	103.322	-12060.305	0875.85	-3542.458
10/10/2012	12:00:00 AM	127.781	-13931.305	0842.89	-4381.079	12/27/2012	12:00:00 AM	151.164	-12036.305	0879.39	-5182.762
10/11/2012	12:00:00 AM	129.849	-13907.305	0857.29	-4451.962	12/28/2012	12:00:00 AM	141.437	-12012.305	0853.25	-4849.280
10/12/2012	12:00:00 AM	128.919	-13883.305	0854.63	-4420.085	12/29/2012	12:00:00 AM	120.103	-11988.305	0852.46	-4117.823
10/13/2012	12:00:00 AM	129.221	-13859.305	0857.36	-4430.431	12/30/2012	12:00:00 AM	142.039	-11964.305	0864.74	-4869.925
10/14/2012	12:00:00 AM	128.205	-13835.305	0857.73	-4395.583	12/31/2012	12:00:00 AM	140.667	-11940.305	0851.55	-4822.855
10/15/2012	12:00:00 AM	126.038	-13811.305	0852.96	-4321.318	01/01/2013	12:00:00 AM	144.067	-11916.305	0879.02	-4939.448
10/16/2012	12:00:00 AM	126.977	-13787.305	0858.98	-4353.506	01/02/2013	12:00:00 AM	143.424	-11892.305	0881.84	-4917.405
10/17/2012	12:00:00 AM	123.198	-13763.305	0846.03	-4223.939	01/03/2013	12:00:00 AM	141.367	-11868.305	0877.39	-4846.861
10/18/2012	12:00:00 AM	125.729	-13739.305	0854.87	-4310.706	01/04/2013	12:00:00 AM	154.767	-11844.305	0873.80	-5306.308
10/19/2012	12:00:00 AM	124.097	-13715.305	0853.49	-4254.754	01/05/2013	12:00:00 AM	093.604	-11820.305	0880.11	-3209.280
10/20/2012	12:00:00 AM	119.883	-13691.305	0837.12	-4110.286	01/06/2013	12:00:00 AM	124.508	-11796.305	0880.82	-4268.833
10/21/2012	12:00:00 AM	115.143	-13667.305	0818.15	-3947.770	01/07/2013	12:00:00 AM	138.589	-11772.305	0845.83	-4751.609
10/22/2012	12:00:00 AM	119.972	-13643.305	0834.79	-4113.333	01/08/2013	12:00:00 AM	140.587	-11748.305	0875.38	-4820.121
10/23/2012	12:00:00 AM	114.995	-13619.305	0816.17	-3942.683	01/09/2013	12:00:00 AM	137.551	-11724.305	0858.13	-4716.032
10/24/2012	12:00:00 AM	108.463	-13595.305	0790.14	-3718.717	01/10/2013	12:00:00 AM	137.676	-11700.305	0859.27	-4720.333
10/25/2012	12:00:00 AM	117.172	-13571.305	0817.44	-4017.323	01/11/2013	12:00:00 AM	142.679	-11676.305	0889.73	-4891.857
10/26/2012	12:00:00 AM	117.026	-13547.305	0827.08	-4012.308	01/12/2013	12:00:00 AM	141.361	-11652.305	0892.26	-4846.667
10/27/2012	12:00:00 AM	113.228	-13523.305	0813.27	-3882.107	01/13/2013	12:00:00 AM	130.663	-11628.305	0895.39	-4479.869
10/28/2012	12:00:00 AM	113.184	-13499.305	0812.54	-3880.595	01/14/2013	12:00:00 AM	118.154	-11604.305	0869.80	-4050.994
10/29/2012	12:00:00 AM	119.152	-13475.305	0834.36	-4085.216	01/15/2013	12:00:00 AM	070.522	-11580.305	0883.47	-2417.905
10/30/2012	12:00:00 AM	118.105	-13451.305	0830.64	-4049.306	01/16/2013	12:00:00 AM	107.643	-11556.305	0889.55	-3690.613
10/31/2012	12:00:00 AM	120.242	-13427.305	0839.98	-4122.595	01/17/2013	12:00:00 AM	142.378	-11532.305	0890.55	-4881.542
11/01/2012	12:00:00 AM	101.544	-13403.305	0761.37	-3481.516	01/18/2013	12:00:00 AM	140.055	-11508.305	0880.82	-4801.901
11/02/2012	12:00:00 AM	077.022	-13379.305	0633.80	-2640.738	01/19/2013	12:00:00 AM	140.884	-11484.305	0874.05	-4830.309
11/03/2012	12:00:00 AM	077.167	-13355.305	0631.95	-2645.738	01/20/2013	12:00:00 AM	140.808	-11460.305	0876.35	-4827.695
11/04/2012	12:00:00 AM	082.165	-13331.305	0650.72	-2817.099	01/21/2013	12:00:00 AM	139.604	-11436.305	0879.24	-4786.438
11/04/2012	12:00:00 AM	122.132	-13308.305	0845.36	-4187.377	01/22/2013	12:00:00 AM	139.815	-11412.305	0880.57	-4793.667
11/05/2012	12:00:00 AM	125.565	-13284.305	0858.47	-4305.070	01/23/2013	12:00:00 AM	140.224	-11388.305	0882.87	-4807.687
11/06/2012	12:00:00 AM	135.414	-13260.305	0894.85	-4642.774	01/24/2013	12:00:00 AM	137.486	-11364.305	0868.57	-4713.813
11/07/2012	12:00:00 AM	133.252	-13236.305	0887.76	-4568.655	01/25/2013	12:00:00 AM	139.151	-11340.305	0884.71	-4770.895
11/08/2012	12:00:00 AM	134.389	-13212.305	0892.91	-4607.639	01/26/2013	12:00:00 AM	138.878	-11316.305	0885.63	-4761.534
11/09/2012	12:00:00 AM	129.190	-13188.305	0866.10	-4429.385	01/27/2013	12:00:00 AM	139.740	-11292.305	0889.90	-4791.095
11/10/2012	12:00:00 AM	135.066	-13164.305	0895.96	-4630.835	01/28/2013	12:00:00 AM	137.427	-11268.305	0878.19	-4711.786
11/11/2012	12:00:00 AM	131.000	-13140.305	0884.25	-4491.423	01/29/2013	12:00:00 AM	128.689	-11244.305	0823.32	-4412.185
11/12/2012	12:00:00 AM	126.742	-13116.305	0869.93	-4345.427	01/30/2013	12:00:00 AM	133.719	-11220.305	0875.16	-4584.643
11/13/2012	12:00:00 AM	130.761	-13092.305	0887.05	-4483.224	01/31/2013	12:00:00 AM	134.405	-11196.305	0873.02	-4608.171
11/14/2012	12:00:00 AM	130.912	-13068.305	0889.56	-4488.409	02/01/2013	12:00:00 AM	126.213	-11172.305	0812.52	-4327.319
11/15/2012	12:00:00 AM	133.062	-13044.305	0898.88	-4562.133	02/02/2013	12:00:00 AM	135.631	-11148.305	0881.76	-4650.204
11/16/2012	12:00:00 AM	131.875	-13020.305	0896.25	-4521.415	02/03/2013	12:00:00 AM	135.455	-11124.305	0883.85	-4644.163
11/17/2012	12:00:00 AM	131.883	-12996.305	0897.47	-4521.694	02/04/2013	12:00:00 AM	135.165	-11100.305	0879.38	-4634.228
11/18/2012	12:00:00 AM	131.622	-12972.305	0898.01	-4512.758	02/05/2013	12:00:00 AM	136.052	-11076.305	0885.64	-4664.657
11/19/2012	12:00:00 AM	130.531	-12948.305	0894.34	-4475.357	02/06/2013	12:00:00 AM	136.007	-11052.305	0887.78	-4663.091
11/20/2012	12:00:00 AM	128.473	-12924.305	0892.70	-4404.778	02/07/2013	12:00:00 AM	134.736	-11028.305	0877.23	-4619.514
11/21/2012	12:00:00 AM	122.585	-12900.305	0872.13	-4202.927	02/08/2013	12:00:00 AM	135.259	-11004.305	0889.81	-4637.462
11/22/2012	12:00:00 AM	101.148	-12876.305	0767.20	-3467.921	02/09/2013	12:00:00 AM	136.791	-10980.305	0897.56	-4689.976
11/23/2012	12:00:00 AM	075.996	-12852.305	0637.81	-2605.562	02/10/2013	12:00:00 AM	136.416	-10956.305	0899.70	-4677.109
11/24/2012	12:00:00 AM	075.838	-12828.305	0636.70	-2600.177	02/11/2013	12:00:00 AM	135.650	-10932.305	0893.36	-4650.871
11/25/2012	12:00:00 AM	112.792	-12804.305	0811.88	-3867.161	02/12/2013	12:00:00 AM	134.549	-10908.305	0889.41	-4613.119
11/26/2012	12:00:00 AM	125.678	-12780.305	0880.43	-4308.956	02/13/2013	12:00:00 AM	127.185	-10884.305	0887.15	-4360.633
11/27/2012	12:00:00 AM	127.173	-12756.305	0886.75	-4360.220	02/14/2013	12:00:00 AM	134.261	-10860.305	0890.19	-4603.248
11/28/2012	12:00:00 AM	133.130	-12732.305	0912.04	-4564.463	02/15/2013	12:00:00 AM	133.712	-10836.305	0892.63	-4584.409
11/29/2012	12:00:00 AM	128.653	-12708.305	0895.91	-4410.959	02/16/2013	12:00:00 AM	134.617	-10812.305	0895.90	-4615.444
11/30/2012	12:00:00 AM	124.929	-12684.305	0884.16	-4283.280	02/17/2013	12:00:00 AM	137.618	-10788.305	0898.15	-4718.329
12/01/2012	12:00:00 AM	118.054	-12660.305	0858.48	-4047.558	02/18/2013	12:00:00 AM	136.523	-10764.305	0890.75	-4680.780
12/02/2012	12:00:00 AM	117.754	-12636.305	0860.01	-4037.296	02/19/2013					

Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
02/25/2013	12:00:00 AM	134.669	-10596.305	0896.58	-4617.238
02/26/2013	12:00:00 AM	134.993	-10572.305	0895.83	-4628.317
02/27/2013	12:00:00 AM	133.722	-10548.305	0893.48	-4584.744
02/28/2013	12:00:00 AM	134.494	-10524.305	0896.63	-4611.212
03/01/2013	12:00:00 AM	135.050	-10500.305	0897.54	-4630.286
03/02/2013	12:00:00 AM	135.543	-10476.305	0897.67	-4647.177
03/03/2013	12:00:00 AM	136.826	-10452.305	0897.68	-4691.185
03/04/2013	12:00:00 AM	136.763	-10428.305	0888.69	-4689.004
03/05/2013	12:00:00 AM	133.967	-10404.305	0889.61	-4593.161
03/06/2013	12:00:00 AM	135.377	-10380.305	0898.91	-4641.482
03/07/2013	12:00:00 AM	136.237	-10356.305	0896.37	-4670.976
03/08/2013	12:00:00 AM	139.002	-10332.305	0908.16	-4765.784
03/09/2013	12:00:00 AM	132.636	-10308.305	0872.69	-4547.504
03/11/2013	12:00:00 AM	133.846	-10283.305	0890.21	-4589.014
03/12/2013	12:00:00 AM	136.328	-10259.305	0900.63	-4674.115
03/13/2013	12:00:00 AM	135.139	-10235.305	0890.73	-4633.323
03/14/2013	12:00:00 AM	135.565	-10211.305	0898.70	-4647.933
03/15/2013	12:00:00 AM	136.756	-10187.305	0902.94	-4688.772
03/16/2013	12:00:00 AM	135.177	-10163.305	0893.99	-4634.653
03/17/2013	12:00:00 AM	136.559	-10139.305	0906.57	-4682.014
03/18/2013	12:00:00 AM	134.816	-10115.305	0907.83	-4622.248
03/19/2013	12:00:00 AM	135.250	-10091.305	0906.08	-4637.147
03/20/2013	12:00:00 AM	134.085	-10067.305	0902.86	-4597.190
03/21/2013	12:00:00 AM	133.625	-10043.305	0907.28	-4581.415
03/22/2013	12:00:00 AM	134.706	-10019.305	0904.87	-4618.500
03/23/2013	12:00:00 AM	133.879	-9995.305	0903.52	-4590.143
03/24/2013	12:00:00 AM	133.123	-99971.305	0901.48	-4564.228
03/25/2013	12:00:00 AM	120.332	-99947.305	0906.48	-4125.667
03/26/2013	12:00:00 AM	129.171	-99923.305	0906.59	-4428.726
03/27/2013	12:00:00 AM	128.424	-99899.305	0902.38	-4403.115
03/28/2013	12:00:00 AM	131.012	-99875.305	0910.09	-4491.853
03/29/2013	12:00:00 AM	132.792	-99851.305	0909.29	-4552.861
03/30/2013	12:00:00 AM	133.492	-99827.305	0910.00	-4576.885
03/31/2013	12:00:00 AM	135.005	-99803.305	0910.46	-4628.742
04/01/2013	12:00:00 AM	134.498	-99779.305	0906.88	-4611.359
04/02/2013	12:00:00 AM	136.108	-99755.305	0909.14	-4666.552
04/03/2013	12:00:00 AM	133.046	-99731.305	0909.46	-4561.575
04/04/2013	12:00:00 AM	134.172	-99707.305	0910.16	-4600.183
04/05/2013	12:00:00 AM	133.333	-99683.305	0906.37	-4571.429
04/06/2013	12:00:00 AM	133.496	-99659.305	0908.38	-4577.014
04/07/2013	12:00:00 AM	131.021	-99635.305	0898.99	-4492.133
04/08/2013	12:00:00 AM	132.746	-99611.305	0910.61	-4551.292
04/09/2013	12:00:00 AM	130.356	-99587.305	0906.47	-4469.357
04/10/2013	12:00:00 AM	125.987	-99563.305	0908.61	-4319.567
04/11/2013	12:00:00 AM	124.412	-99539.305	0907.47	-4265.564
04/12/2013	12:00:00 AM	129.003	-99515.305	0896.22	-4422.950
04/13/2013	12:00:00 AM	126.048	-99491.305	0882.78	-4321.629
04/14/2013	12:00:00 AM	127.073	-99467.305	0907.49	-4356.788
04/15/2013	12:00:00 AM	134.400	-99443.305	0912.36	-4607.994
04/16/2013	12:00:00 AM	124.106	-99419.305	0905.66	-4255.047
04/17/2013	12:00:00 AM	109.225	-99395.305	0904.03	-3744.862
04/18/2013	12:00:00 AM	113.299	-99371.305	0903.30	-3884.541
04/19/2013	12:00:00 AM	103.149	-99347.305	0903.84	-3536.534
04/20/2013	12:00:00 AM	102.958	-99323.305	0905.81	-3529.992
04/21/2013	12:00:00 AM	100.803	-99299.305	0907.69	-3456.095
04/22/2013	12:00:00 AM	104.731	-99275.305	0904.81	-3590.768
04/23/2013	12:00:00 AM	105.395	-99251.305	0906.95	-3613.543
04/24/2013	12:00:00 AM	096.606	-99227.305	0907.00	-3312.198
04/25/2013	12:00:00 AM	107.567	-99203.305	0911.93	-3687.995
04/26/2013	12:00:00 AM	102.822	-99179.305	0917.66	-3525.321
04/27/2013	12:00:00 AM	092.113	-99155.305	0919.68	-3158.167
04/28/2013	12:00:00 AM	105.382	-99131.305	0920.62	-3613.096
04/29/2013	12:00:00 AM	109.979	-99107.305	0921.72	-3770.711
04/30/2013	12:00:00 AM	112.226	-99083.305	0919.15	-3847.751
05/01/2013	12:00:00 AM	121.640	-99059.305	0913.65	-4170.502
05/02/2013	12:00:00 AM	087.639	-99035.305	0913.61	-3004.760
05/03/2013	12:00:00 AM	072.629	-99011.305	0917.32	-2490.145
05/04/2013	12:00:00 AM	079.829	-98987.305	0921.30	-2736.992
05/05/2013	12:00:00 AM	091.175	-98963.305	0921.31	-3126.008
05/06/2013	12:00:00 AM	055.849	-98939.305	0923.09	-1914.810
05/07/2013	12:00:00 AM	072.892	-98915.305	0919.93	-2499.167
05/08/2013	12:00:00 AM	097.569	-98891.305	0926.92	-3345.225
05/09/2013	12:00:00 AM	153.340	-98867.305	0917.42	-5257.376
05/10/2013	12:00:00 AM	116.475	-98843.305	0927.65	-3993.435
05/11/2013	12:00:00 AM	106.340	-98819.305	0929.42	-3645.947
05/12/2013	12:00:00 AM	100.466	-98795.305	0921.22	-3444.535
05/13/2013	12:00:00 AM	089.146	-98771.305	0925.56	-3056.441
05/14/2013	12:00:00 AM	096.179	-98747.305	0931.20	-3297.558
05/15/2013	12:00:00 AM	117.720	-98723.305	0932.03	-4036.119

Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
05/16/2013	12:00:00 AM	139.162	-98699.305	0927.61	-4771.265
05/17/2013	12:00:00 AM	128.791	-98675.305	0925.86	-4415.677
05/18/2013	12:00:00 AM	129.830	-98651.305	0928.28	-4451.315
05/19/2013	12:00:00 AM	130.148	-98627.305	0931.52	-4462.200
05/20/2013	12:00:00 AM	121.985	-98603.305	0932.83	-4182.353
05/21/2013	12:00:00 AM	130.035	-98579.305	0928.52	-4458.348
05/22/2013	12:00:00 AM	128.211	-98555.305	0928.80	-4395.811
05/23/2013	12:00:00 AM	128.177	-98531.305	0935.79	-4394.656
05/24/2013	12:00:00 AM	132.744	-98507.305	0977.06	-4551.232
05/25/2013	12:00:00 AM	144.615	-98483.305	0983.06	-4958.221
05/26/2013	12:00:00 AM	148.194	-98459.305	0967.80	-5080.933
05/27/2013	12:00:00 AM	148.866	-98435.305	1013.37	-5103.984
05/28/2013	12:00:00 AM	144.829	-98411.305	0986.11	-4965.564
05/29/2013	12:00:00 AM	146.369	-98387.305	1000.35	-5018.379
05/30/2013	12:00:00 AM	139.785	-98363.305	0949.65	-4792.613
05/31/2013	12:00:00 AM	147.603	-98339.305	1011.18	-5060.679
06/01/2013	12:00:00 AM	147.576	-98315.305	1007.86	-5059.751
06/02/2013	12:00:00 AM	146.526	-98291.305	1005.93	-5023.752
06/03/2013	12:00:00 AM	146.678	-98267.305	1007.47	-5028.952
06/04/2013	12:00:00 AM	144.647	-98243.305	0993.05	-4959.335
06/05/2013	12:00:00 AM	147.260	-98219.305	0997.03	-5048.915
06/06/2013	12:00:00 AM	153.254	-98195.305	1039.00	-5254.437
06/07/2013	12:00:00 AM	149.282	-98171.305	1007.91	-5118.256
06/08/2013	12:00:00 AM	148.986	-98147.305	1022.09	-5108.087
06/09/2013	12:00:00 AM	147.077	-98123.305	1002.63	-5042.623
06/10/2013	12:00:00 AM	146.810	-98099.305	1000.38	-5033.500
06/11/2013	12:00:00 AM	140.556	-98075.305	0949.34	-4819.065
06/12/2013	12:00:00 AM	143.470	-98051.305	0973.01	-4918.984
06/13/2013	12:00:00 AM	145.053	-98027.305	0989.37	-4973.238
06/14/2013	12:00:00 AM	143.858	-98003.305	0979.90	-4932.277
06/15/2013	12:00:00 AM	142.636	-97979.305	0977.77	-4890.393
06/16/2013	12:00:00 AM	135.896	-97955.305	0923.32	-4659.298
06/17/2013	12:00:00 AM	140.229	-97931.305	0964.97	-4807.850
06/18/2013	12:00:00 AM	143.295	-97907.305	0979.39	-4912.976
06/19/2013	12:00:00 AM	149.987	-97883.305	0984.32	-5142.423
06/20/2013	12:00:00 AM	153.815	-97859.305	1028.22	-5273.669
06/21/2013	12:00:00 AM	150.420	-97835.305	0907.60	-5157.273
06/22/2013	12:00:00 AM	163.860	-97811.305	1046.75	-5618.053
06/23/2013	12:00:00 AM	163.757	-97787.305	1043.48	-5614.528
06/24/2013	12:00:00 AM	166.231	-97763.305	1047.33	-5699.350
06/25/2013	12:00:00 AM	166.613	-97739.305	1050.00	-5712.436
06/26/2013	12:00:00 AM	163.605	-97715.305	1050.00	-5609.310
06/27/2013	12:00:00 AM	162.965	-97691.305	1045.96	-5587.357
06/28/2013	12:00:00 AM	159.022	-97667.305	1034.47	-5142.194
06/29/2013	12:00:00 AM	146.158	-97643.305	0977.17	-5011.115
06/30/2013	12:00:00 AM	151.000	-97619.305	0994.95	-5177.143
07/01/2013	12:00:00 AM	151.000	-97595.305	1004.18	-5177.143
07/02/2013	12:00:00 AM	151.000	-97571.305	1013.41	-5177.143
07/03/2013	12:00:00 AM	151.000	-97547.305	1022.64	-5177.143
07/04/2013	12:00:00 AM	151.000	-97523.305	1031.87	-5177.143
07/05/2013	12:00:00 AM	151.000	-97499.305	1041.10	-5177.143
07/06/2013	12:00:00 AM	142.242	-97475.305	0971.58	-4876.863
07/07/2013	12:00:00 AM	145.026	-97451.305	1010.98	-4972.319
07/08/2013	12:00:00 AM	147.460	-97427.305	1025.19	-5055.760
07/09/2013	12:00:00 AM	145.689	-97403.305	1012.06	-4995.046
07/10/2013	12:00:00 AM	144.710	-97379.305	1003.94	-4961.502
07/11/2013	12:00:00 AM	148.926	-97355.305	0998.80	-5106.023
07/12/2013	12:00:00 AM	147.217	-97331.305	1022.49	-5047.452
07/13/2013	12:00:00 AM	148.319	-97307.305	1003.47	-5085.208
07/14/2013	12:00:00 AM	150.722	-97283.305	1033.15	-5167.621
07/15/2013	12:00:00 AM	149.219	-97259.305	1018.01	-5116.073
07/16/2013	12:00:00 AM	149.450	-97235.305	1036.82	-5123.990
07/17/2013	12:00:00 AM	162.862	-97211.305	1033.25	-5583.852
07/18/2013	12:00:00 AM	160.491	-97187.305	1026.17	-5502.545
07/19/2013	12:00:00 AM	147.681	-97163.305	1021.99	-5063.341
07/20/2013	12:00:00 AM	153.038	-97139.305	1050.00	-5247.022
07/21/2013	12:00:00 AM	153.034	-97115.305	1050.00	-5246.895
07/22/2013	12:00:00 AM	153.016	-97091.305	1050.00	-5246.272
07/23/2013	12:00:00 AM	153.752	-97067.305	1050.00	-5271.500
07/24/2013	12:00:00 AM	152.601	-97043.305	1042.15	-5232.036
07/25/2013	12:00:00 AM	153.690	-97019.305	1050.00	-5269.375
07/26/2013	12:00:00 AM	152.995	-96995.305	1050.00	-5245.534
07/27/2013	12:00:00 AM	152.500	-96971.305	1041.67	-5228.561
07/28/2013	12:00:00 AM	153.153	-96947.305	1050.00	-5250.962
07/29/2013	12:00:00 AM	152.419	-96923.305	1049.00	-5225.800
07/30/2013	12:00:00 AM	153.020	-96899.305	1050.00	-5246.405
07/31/2013	12:00:00 AM	153.343	-96875.305	1048.10	-5257.462
08/01/2013	12:00:00 AM	154.303	-96851.305	1050.00	-5290.381
08/02/2013	12:00:00 AM	154.251	-96827.305	10874.80	-5288.595

Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate	Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd	mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
08/03/2013	12:00:00 AM	154.118	-06803.305	0768.01	-5284.048	10/21/2013	12:00:00 AM	133.356	-04907.305	1010.74	-4572.208
08/04/2013	12:00:00 AM	154.497	-06779.305	0770.64	-5297.048	10/22/2013	12:00:00 AM	116.501	-04883.305	0838.40	-3994.310
08/05/2013	12:00:00 AM	154.154	-06755.305	0770.91	-5285.286	10/23/2013	12:00:00 AM	118.463	-04859.305	0856.83	-4061.601
08/06/2013	12:00:00 AM	153.240	-06731.305	0766.38	-5253.942	10/24/2013	12:00:00 AM	120.018	-04835.305	0925.32	-4114.903
08/07/2013	12:00:00 AM	153.654	-06707.305	0769.15	-5268.143	10/25/2013	12:00:00 AM	138.063	-04811.305	1065.67	-4733.605
08/08/2013	12:00:00 AM	153.058	-06683.305	0769.51	-5247.714	10/26/2013	12:00:00 AM	144.695	-04787.305	1110.81	-4960.954
08/09/2013	12:00:00 AM	153.142	-06659.305	0770.43	-5250.595	10/27/2013	12:00:00 AM	145.141	-04763.305	1112.24	-4976.272
08/10/2013	12:00:00 AM	152.856	-06635.305	0770.71	-5240.762	10/28/2013	12:00:00 AM	144.578	-04739.305	1113.50	-4956.976
08/11/2013	12:00:00 AM	152.320	-06611.305	0771.91	-5222.395	10/29/2013	12:00:00 AM	145.322	-04715.305	1114.90	-4982.452
08/12/2013	12:00:00 AM	152.668	-06587.305	0772.32	-5234.320	10/30/2013	12:00:00 AM	145.101	-04691.305	1109.71	-4974.881
08/13/2013	12:00:00 AM	144.412	-06563.305	0734.29	-4951.270	10/31/2013	12:00:00 AM	131.284	-04667.305	1007.31	-4501.175
08/14/2013	12:00:00 AM	150.863	-06539.305	0764.50	-5172.433	11/01/2013	12:00:00 AM	117.560	-04643.305	0906.69	-4030.637
08/15/2013	12:00:00 AM	145.821	-06515.305	0749.46	-4999.575	11/02/2013	12:00:00 AM	116.326	-04619.305	0869.62	-3988.310
08/16/2013	12:00:00 AM	146.000	-06491.305	0750.88	-5005.724	11/03/2013	12:00:00 AM	115.382	-04595.305	0854.04	-3955.962
08/17/2013	12:00:00 AM	141.053	-06467.305	0728.78	-4836.097	11/03/2013	12:00:00 AM	115.681	-04572.305	0854.85	-3966.190
08/18/2013	12:00:00 AM	138.827	-06443.305	0721.59	-4759.786	11/04/2013	12:00:00 AM	117.069	-04548.305	0871.12	-4013.810
08/19/2013	12:00:00 AM	139.376	-06419.305	0725.18	-4778.619	11/05/2013	12:00:00 AM	117.769	-04524.305	0853.45	-4037.805
08/20/2013	12:00:00 AM	138.512	-06395.305	0723.69	-4748.980	11/06/2013	12:00:00 AM	118.266	-04500.305	0838.57	-4054.851
08/21/2013	12:00:00 AM	137.133	-06371.305	0718.21	-4701.690	11/07/2013	12:00:00 AM	117.853	-04476.305	0838.02	-4040.690
08/22/2013	12:00:00 AM	144.817	-06347.305	0736.92	-4828.008	11/08/2013	12:00:00 AM	123.805	-04452.305	0585.65	-4244.738
08/23/2013	12:00:00 AM	145.135	-06323.305	0757.71	-4976.048	11/09/2013	12:00:00 AM	120.133	-04428.305	0830.31	-4118.837
08/24/2013	12:00:00 AM	143.913	-06299.305	0755.51	-4934.151	11/10/2013	12:00:00 AM	115.559	-04404.305	0814.29	-3962.010
08/25/2013	12:00:00 AM	141.333	-06275.305	0742.87	-4845.700	11/11/2013	12:00:00 AM	117.051	-04380.305	0842.68	-4013.181
08/26/2013	12:00:00 AM	141.506	-06251.305	0745.33	-4851.619	11/12/2013	12:00:00 AM	114.070	-04356.305	0831.64	-3910.966
08/27/2013	12:00:00 AM	141.384	-06227.305	0745.13	-4847.466	11/13/2013	12:00:00 AM	136.005	-04332.305	0970.61	-4663.016
08/28/2013	12:00:00 AM	139.810	-06203.305	0729.51	-4793.478	11/14/2013	12:00:00 AM	159.336	-04308.305	1101.08	-5462.960
08/29/2013	12:00:00 AM	142.065	-06179.305	0744.34	-4870.804	11/15/2013	12:00:00 AM	165.893	-04284.305	1123.35	-5687.752
08/30/2013	12:00:00 AM	143.279	-06155.305	0753.39	-4912.425	11/16/2013	12:00:00 AM	175.132	-04260.305	1168.60	-6004.520
08/31/2013	12:00:00 AM	143.297	-06131.305	0756.68	-4913.042	11/17/2013	12:00:00 AM	163.220	-04236.305	1115.32	-5596.109
09/01/2013	12:00:00 AM	141.987	-06107.305	0751.75	-4868.109	11/18/2013	12:00:00 AM	152.168	-04212.305	1054.02	-5217.181
09/02/2013	12:00:00 AM	141.936	-06083.305	0753.71	-4866.367	11/19/2013	12:00:00 AM	171.842	-04188.305	1160.74	-5891.724
09/03/2013	12:00:00 AM	141.848	-06059.305	0757.01	-4863.357	11/20/2013	12:00:00 AM	174.693	-04164.305	1173.72	-5989.478
09/04/2013	12:00:00 AM	142.089	-06035.305	0759.15	-4871.631	11/21/2013	12:00:00 AM	170.396	-04140.305	1153.50	-5842.145
09/05/2013	12:00:00 AM	141.712	-06011.305	0758.55	-4858.704	11/22/2013	12:00:00 AM	043.459	-04116.305	1142.64	-1490.036
09/06/2013	12:00:00 AM	140.621	-05987.305	0747.81	-4821.284	11/23/2013	12:00:00 AM	166.860	-04092.305	1137.64	-5720.905
09/07/2013	12:00:00 AM	143.324	-05963.305	0765.57	-4913.980	11/24/2013	12:00:00 AM	081.418	-04068.305	1147.46	-2791.488
09/08/2013	12:00:00 AM	142.852	-05939.305	0763.99	-4897.784	11/25/2013	12:00:00 AM	106.841	-04044.305	1158.10	-3663.105
09/09/2013	12:00:00 AM	140.607	-05915.305	0755.75	-4820.823	11/26/2013	12:00:00 AM	148.308	-04020.305	1109.08	-5084.834
09/10/2013	12:00:00 AM	139.808	-05891.305	0753.56	-4793.423	11/27/2013	12:00:00 AM	165.847	-03996.305	1188.37	-5686.187
09/11/2013	12:00:00 AM	137.850	-05867.305	0746.81	-4726.272	11/28/2013	12:00:00 AM	142.594	-03972.305	1076.36	-4888.932
09/12/2013	12:00:00 AM	137.127	-05843.305	0743.71	-4701.486	11/29/2013	12:00:00 AM	159.172	-03948.305	1156.10	-5457.310
09/13/2013	12:00:00 AM	137.367	-05819.305	0749.61	-4709.740	11/30/2013	12:00:00 AM	162.296	-03924.305	1172.93	-5564.446
09/14/2013	12:00:00 AM	137.820	-05795.305	0750.14	-4725.272	12/01/2013	12:00:00 AM	155.975	-03900.305	1143.80	-5347.703
09/15/2013	12:00:00 AM	138.136	-05771.305	0751.74	-4736.095	12/02/2013	12:00:00 AM	149.174	-03876.305	1112.08	-5114.530
09/16/2013	12:00:00 AM	138.187	-05747.305	0752.62	-4737.823	12/03/2013	12:00:00 AM	154.698	-03852.305	1136.37	-5303.923
09/17/2013	12:00:00 AM	138.354	-05723.305	0754.76	-4743.568	12/04/2013	12:00:00 AM	147.655	-03828.305	1099.99	-5062.442
09/18/2013	12:00:00 AM	137.972	-05699.305	0754.03	-4730.452	12/05/2013	12:00:00 AM	050.232	-03804.305	1123.26	-1722.242
09/19/2013	12:00:00 AM	138.084	-05675.305	0754.54	-4734.310	12/06/2013	12:00:00 AM	004.266	-03780.305	1116.44	-0146.262
09/20/2013	12:00:00 AM	137.613	-05651.305	0752.14	-4718.167	12/07/2013	12:00:00 AM	000.000	-03756.305	1086.89	0000.000
09/21/2013	12:00:00 AM	137.250	-05627.305	0929.59	-4705.724	12/08/2013	12:00:00 AM	073.895	-03732.305	1143.69	-2533.528
09/22/2013	12:00:00 AM	138.306	-05603.305	1058.15	-4741.919	12/09/2013	12:00:00 AM	133.366	-03708.305	1054.58	-4572.544
09/23/2013	12:00:00 AM	137.685	-05579.305	1055.89	-4720.619	12/10/2013	12:00:00 AM	147.926	-03684.305	1126.44	-5071.734
09/24/2013	12:00:00 AM	138.222	-05555.305	1056.95	-4739.048	12/11/2013	12:00:00 AM	147.802	-03660.305	1100.82	-5067.494
09/25/2013	12:00:00 AM	135.737	-05531.305	1038.43	-4653.851	12/12/2013	12:00:00 AM	155.212	-03636.305	1149.85	-5321.552
09/26/2013	12:00:00 AM	138.942	-05507.305	1061.49	-4763.730	12/13/2013	12:00:00 AM	159.219	-03612.305	1155.38	-5458.935
09/27/2013	12:00:00 AM	150.656	-05483.305	1133.04	-5165.357	12/14/2013	12:00:00 AM	161.303	-03588.305	1169.05	-5530.397
09/28/2013	12:00:00 AM	150.310	-05459.305	1130.19	-5153.476	12/15/2013	12:00:00 AM	163.310	-03564.305	1176.96	-5599.188
09/29/2013	12:00:00 AM	149.527	-05435.305	1126.12	-5126.633	12/16/2013	12:00:00 AM	166.983	-03540.305	1193.78	-5725.129
09/30/2013	12:00:00 AM	149.513	-05411.305	1126.22	-5126.167	12/17/2013	12:00:00 AM	147.805	-03516.305	1092.24	-5067.589
10/01/2013	12:00:00 AM	148.927	-05387.305	1119.49	-5106.085	12/18/2013	12:00:00 AM	142.584	-03492.305	1083.46	-4888.605
10/02/2013	12:00:00 AM	131.498	-05363.305	0943.43	-4508.486	12/19/2013	12:00:00 AM	147.551	-03468.305	1098.26	-5058.901
10/03/2013	12:00:00 AM	145.741	-05339.305	1091.26	-4996.841	12/20/2013	12:00:00 AM	151.229	-03444.305	1123.31	-5184.984
10/04/2013	12:00:00 AM	146.062	-05315.305	1097.83	-5007.857	12/21/2013	12:00:00 AM	143.432	-03420.305	1099.30	-4917.675
10/05/2013	12:00:00 AM	145.726	-05291.305	1096.46	-4996.310	12/22/2013	12:00:00 AM	143.416	-03396.305	1104.51	-4917.119
10/06/2013	12:00:00 AM	145.438	-05267.305	1102.91	-4986.442	12/23/2013	12:00:00 AM	143.981	-03372.305	1111.33	-4936.488
10/07/2013	12:00:00 AM	145.438	-05243.305	1104.18	-4986.439	12/24/2013	12:00:00 AM	141.847	-03348.305	1104.95	-4863.310
10/08/2013	12:00:00 AM	145.144	-05219.305	1104.29	-4976.372	12/25/2013	12:00:00 AM	141.607	-03324.305	1110.99	-4855.085
10/09/2013	12:00:00 AM	145.197	-05195.305	1098.11	-4978.177	12/26/2013	12:00:00 AM	139.174	-03300.305	1102.24	-4771.691
10/10/2013	12:00:00 AM	145.381	-05171.305	1102.68	-4984.490	12/27/2013	12:00:00 AM	142.584	-03276.305	1124.57	-4888.577
10/11/2013	12:00:00 AM	144.468	-05147.305	1093.17	-4953.200	12/28/2013	12:00:00 AM	142.227	-03252.305	1125.36	-4876.371
10/12/2013	12:00:00 AM	144.868	-05123.305	1103.46	-4966.919	12/29/2013	12:00:00 AM	141.186	-03228.305	1126.04	-4840.677
10/13/2013	12:00:00 AM	144.635	-05099.305	1104.31	-4958.905	12/30/2013	12:00:00 AM	144.623	-03204.305	1140.03	-4958.509
10/14/2013	12:00:00 AM	144.628	-05075.305	1105.22	-4958.677	12/31/2013	12:00:00 AM	142.946	-03180.305	1130.23	-4901.018
10/15/2013	12:00:00 AM	145.172	-05051.305	1110.25	-4977.310	01/01/2014					

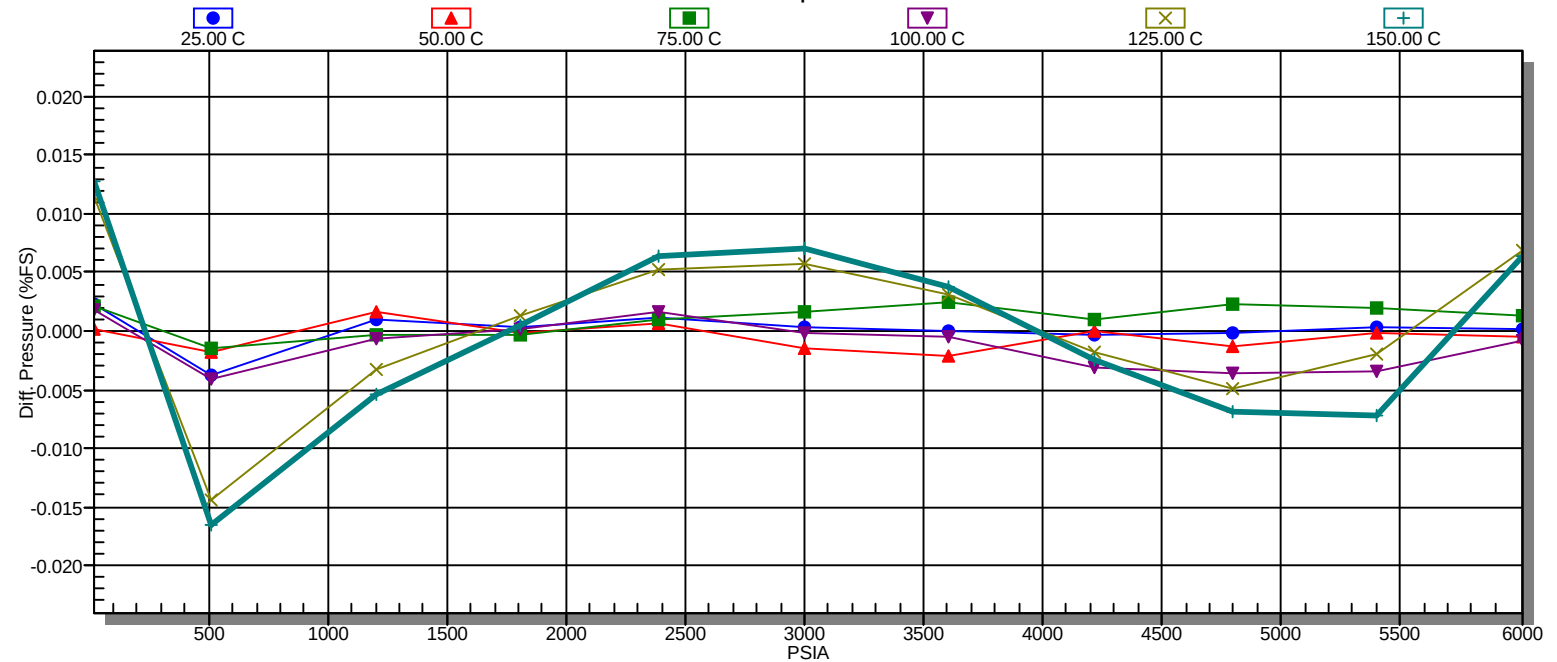
Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate	Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd	mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
01/07/2014	12:00:00 AM	118.735	-03012.305	1105.51	-4070.909	03/28/2014	12:00:00 AM	140.305	-01115.305	1201.08	-4810.442
01/08/2014	12:00:00 AM	135.619	-02988.305	1109.11	-4649.780	03/29/2014	12:00:00 AM	137.041	-01091.305	1181.90	-4698.564
01/09/2014	12:00:00 AM	137.257	-02964.305	1118.80	-4705.968	03/30/2014	12:00:00 AM	133.236	-01067.305	1168.31	-4568.089
01/10/2014	12:00:00 AM	143.320	-02940.305	1144.23	-4913.823	03/31/2014	12:00:00 AM	135.664	-01043.305	1177.08	-4651.345
01/11/2014	12:00:00 AM	151.154	-02916.305	1190.29	-5182.415	04/01/2014	12:00:00 AM	137.066	-01019.305	1179.39	-4699.421
01/12/2014	12:00:00 AM	151.488	-02892.305	1190.88	-5193.859	04/02/2014	12:00:00 AM	135.085	-00995.305	1171.16	-4631.486
01/13/2014	12:00:00 AM	152.606	-02868.305	1197.32	-5232.191	04/03/2014	12:00:00 AM	129.775	-00971.305	1138.25	-4449.427
01/14/2014	12:00:00 AM	151.711	-02844.305	1194.21	-5201.518	04/04/2014	12:00:00 AM	129.575	-00947.305	1141.54	-4442.587
01/15/2014	12:00:00 AM	149.244	-02820.305	1181.99	-5116.947	04/05/2014	12:00:00 AM	133.381	-00923.305	1173.87	-4573.071
01/16/2014	12:00:00 AM	148.992	-02796.305	1176.52	-5108.285	04/06/2014	12:00:00 AM	135.132	-00899.305	1183.22	-4633.103
01/17/2014	12:00:00 AM	147.105	-02772.305	1166.66	-5043.613	04/07/2014	12:00:00 AM	136.800	-00875.305	1197.71	-4690.276
01/18/2014	12:00:00 AM	150.607	-02748.305	1189.79	-5163.655	04/08/2014	12:00:00 AM	136.614	-00851.305	1198.96	-4683.894
01/19/2014	12:00:00 AM	130.602	-02724.305	1088.14	-4477.770	04/09/2014	12:00:00 AM	137.363	-00827.305	1200.08	-4709.593
01/20/2014	12:00:00 AM	148.810	-02700.305	1180.07	-5102.066	04/10/2014	12:00:00 AM	136.407	-00803.305	1189.46	-4676.809
01/21/2014	12:00:00 AM	151.173	-02676.305	1196.47	-5183.085	04/11/2014	12:00:00 AM	136.000	-00779.305	1183.31	-4662.865
01/22/2014	12:00:00 AM	148.752	-02652.305	1185.28	-5100.085	04/12/2014	12:00:00 AM	132.552	-00755.305	1162.69	-4544.623
01/23/2014	12:00:00 AM	145.565	-02628.305	1177.48	-4990.784	04/13/2014	12:00:00 AM	133.388	-00731.305	1170.42	-4573.310
01/24/2014	12:00:00 AM	128.091	-02604.305	1191.48	-4391.706	04/14/2014	12:00:00 AM	137.444	-00707.305	1198.53	-4712.349
01/25/2014	12:00:00 AM	147.626	-02580.305	1182.17	-5061.452	04/15/2014	12:00:00 AM	133.541	-00683.305	1196.07	-4578.559
01/26/2014	12:00:00 AM	150.552	-02556.305	1193.64	-5161.772	04/16/2014	12:00:00 AM	135.681	-00659.305	1201.17	-4651.903
01/27/2014	12:00:00 AM	146.985	-02532.305	1185.28	-5039.496	04/17/2014	12:00:00 AM	138.163	-00635.305	1206.83	-4737.034
01/28/2014	12:00:00 AM	123.747	-02508.305	1185.68	-4242.752	04/18/2014	12:00:00 AM	137.735	-00611.305	1207.55	-4722.345
01/29/2014	12:00:00 AM	138.876	-02484.305	1193.73	-4761.463	04/19/2014	12:00:00 AM	137.290	-00587.305	1208.26	-4707.081
01/30/2014	12:00:00 AM	149.293	-02460.305	1187.02	-5118.627	04/20/2014	12:00:00 AM	136.594	-00563.305	1211.04	-4683.218
01/31/2014	12:00:00 AM	148.796	-02436.305	1181.60	-5101.589	04/21/2014	12:00:00 AM	138.675	-00539.305	1222.07	-4754.577
02/01/2014	12:00:00 AM	147.254	-02412.305	1169.88	-5048.714	04/22/2014	12:00:00 AM	140.178	-00515.305	1225.07	-4806.118
02/02/2014	12:00:00 AM	145.162	-02388.305	1176.96	-4976.982	04/23/2014	12:00:00 AM	139.477	-00491.305	1220.34	-4782.055
02/03/2014	12:00:00 AM	146.497	-02364.305	1192.78	-5022.738	04/24/2014	12:00:00 AM	139.638	-00467.305	1221.95	-4787.605
02/04/2014	12:00:00 AM	144.591	-02340.305	1171.27	-4957.401	04/25/2014	12:00:00 AM	137.978	-00443.305	1211.66	-4730.667
02/05/2014	12:00:00 AM	146.275	-02316.305	1191.59	-5015.157	04/26/2014	12:00:00 AM	140.737	-00419.305	1226.97	-4825.266
02/06/2014	12:00:00 AM	150.184	-02292.305	1211.98	-5149.151	04/27/2014	12:00:00 AM	137.557	-00395.305	1203.17	-4716.234
02/07/2014	12:00:00 AM	152.440	-02268.305	1219.07	-5226.510	04/28/2014	12:00:00 AM	139.726	-00371.305	1225.02	-4790.599
02/08/2014	12:00:00 AM	153.302	-02244.305	1215.89	-5256.068	04/29/2014	12:00:00 AM	139.346	-00347.305	1222.90	-4777.571
02/09/2014	12:00:00 AM	151.625	-02220.305	1203.54	-5198.583	04/30/2014	12:00:00 AM	136.396	-00323.305	1210.13	-4676.440
02/10/2014	12:00:00 AM	148.671	-02196.305	1203.62	-5097.704	05/01/2014	12:00:00 AM	135.706	-00299.305	1205.38	-4652.776
02/11/2014	12:00:00 AM	152.746	-02172.305	1225.04	-5237.021	05/02/2014	12:00:00 AM	137.948	-00275.305	1221.70	-4729.658
02/12/2014	12:00:00 AM	149.406	-02148.305	1203.47	-5122.496	05/03/2014	12:00:00 AM	136.403	-00251.305	1205.43	-4676.669
02/13/2014	12:00:00 AM	151.844	-02124.305	1209.89	-5206.077	05/04/2014	12:00:00 AM	134.346	-00227.305	1187.01	-4606.133
02/14/2014	12:00:00 AM	154.261	-02100.305	1225.02	-5288.956	05/05/2014	12:00:00 AM	135.525	-00203.305	1190.04	-4646.573
02/15/2014	12:00:00 AM	151.669	-02076.305	1212.60	-5200.091	05/06/2014	12:00:00 AM	131.262	-00179.305	1151.90	-4500.415
02/16/2014	12:00:00 AM	147.653	-02052.305	1198.82	-5062.401	05/07/2014	12:00:00 AM	127.462	-00155.305	1130.79	-4370.123
02/17/2014	12:00:00 AM	148.229	-02028.305	1207.14	-5082.153	05/08/2014	12:00:00 AM	127.540	-00131.305	1136.94	-4372.816
02/18/2014	12:00:00 AM	146.815	-02004.305	1202.86	-5033.644	05/09/2014	12:00:00 AM	126.949	-00107.305	1137.38	-4352.528
02/19/2014	12:00:00 AM	147.880	-01980.305	1210.57	-5070.181	05/10/2014	12:00:00 AM	125.830	-00083.305	1130.24	-4314.173
02/20/2014	12:00:00 AM	147.333	-01956.305	1219.13	-5051.425	05/11/2014	12:00:00 AM	127.442	-00059.305	1136.77	-4369.442
02/21/2014	12:00:00 AM	146.737	-01932.305	1218.89	-5030.972	05/12/2014	12:00:00 AM	127.428	-00035.305	1140.04	-4368.970
02/22/2014	12:00:00 AM	146.586	-01908.305	1209.92	-5025.818	05/13/2014	12:00:00 AM	126.284	-00011.305	1139.50	-4329.728
02/23/2014	12:00:00 AM	137.191	-01884.305	1160.80	-4703.696	05/14/2014	12:00:00 AM	130.607	00012.695	1184.24	-4477.938
02/24/2014	12:00:00 AM	139.091	-01860.305	1168.01	-4768.833	05/15/2014	12:00:00 AM	132.742	00036.695	1190.55	-4551.145
02/25/2014	12:00:00 AM	143.604	-01836.305	1201.81	-4923.554	05/15/2014	02:00:00 PM	136.404	00050.695	1200.79	-4676.716
02/26/2014	12:00:00 AM	134.324	-01812.305	1119.52	-4605.377	05/16/2014	08:00:00 PM	132.450	00080.695	1178.53	-4541.152
02/27/2014	12:00:00 AM	147.368	-01788.305	1220.93	-5052.603	05/18/2014	08:00:00 AM	000.000	00116.012	0946.08	0000.000
02/28/2014	12:00:00 AM	147.371	-01764.305	1215.52	-5052.720						
03/01/2014	12:00:00 AM	141.036	-01740.305	1185.20	-4835.514						
03/02/2014	12:00:00 AM	136.802	-01716.305	1177.43	-4690.341						
03/03/2014	12:00:00 AM	136.351	-01692.305	1182.42	-4674.906						
03/04/2014	12:00:00 AM	137.116	-01668.305	1178.34	-4701.107						
03/05/2014	12:00:00 AM	141.954	-01644.305	1198.52	-4867.005						
03/06/2014	12:00:00 AM	141.340	-01620.305	1194.74	-4845.946						
03/07/2014	12:00:00 AM	145.900	-01596.305	1215.48	-5002.278						
03/08/2014	12:00:00 AM	144.789	-01572.305	1223.10	-4964.187						
03/10/2014	12:00:00 AM	143.635	-01547.305	1211.41	-4924.613						
03/11/2014	12:00:00 AM	143.695	-01523.305	1212.36	-4926.676						
03/12/2014	12:00:00 AM	145.946	-01499.305	1225.04	-5003.861						
03/13/2014	12:00:00 AM	128.697	-01475.305	1077.11	-4412.462						
03/14/2014	12:00:00 AM	143.994	-01451.305	1216.52	-4936.942						
03/15/2014	12:00:00 AM	144.755	-01427.305	1216.86	-4963.045						
03/16/2014	12:00:00 AM	145.064	-01403.305	1221.97	-4973.637						
03/17/2014	12:00:00 AM	143.251	-01379.305	1222.48	-4911.452						
03/18/2014	12:00:00 AM	145.937	-01355.305	1234.14	-5003.555						
03/19/2014	12:00:00 AM	149.500	-01331.305	1248.97	-5125.708						
03/20/2014	12:00:00 AM	147.876	-01307.305	1242.71	-5070.022						
03/21/2014	12:00:00 AM	149.894	-01283.305	1245.26	-5139.234						
03/22/2014	12:00:00 AM	150.674	-01259.305	1245.42	-5165.976						
03/23/2014	12:00:00 AM	144.972	-01235.305	1222.43	-4970.464						
03/24/2014	12:00:00 AM	142.215	-01211.305	1217.47	-4875.938						
03/25/2014	12:00:00 AM	143.388	-01187.305	1208.07	-4916.151						
03/26/2014	12:00:00 AM	144.004	-01163.305	1219.03	-4937.278						
03/27/2014	12:00:00 AM	144.402	-01139.305	1225.01	-4950.929						



Pressure Gauge Certificate of Calibration

Calibration Report - 76169.



GAUGE NUMBER: 76169

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $x_p = m * (f_p - f_{p0})$

m: 0.01

$f_{p0} = 710742$

Temp

4

$x_t = m * (f_t - f_{t0})$

0.01

$f_{t0} = 156337$

Pressure Equation:

$Pressure (PSI) = A + x_p(B + x_p(C + x_p(D)))$

Temperature Compensation:

$A = A_0 + x_t(A_1 + x_t(A_2 + x_t(A_3 + x_t(A_4))))$

$B = B_0 + x_t(B_1 + x_t(B_2 + x_t(B_3 + x_t(B_4))))$

$C = C_0 + x_t(C_1 + x_t(C_2 + x_t(C_3 + x_t(C_4))))$

$D = D_0 + x_t(D_1 + x_t(D_2 + x_t(D_3 + x_t(D_4))))$

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 14.82087007	0.09563385467	-0.0001527500782	-2.03884945E-06	-5.110729545E-09
B 2.102688988	-0.001609847369	-4.903523837E-07	-2.731437895E-09	2.067659037E-12
C 3.303855599E-06	2.974260276E-08	6.271752163E-10	2.931170789E-12	2.241002218E-15
D 2.867136838E-10	-1.048561933E-11	-1.744898539E-13	-8.578329112E-16	-8.714852132E-19
Temperature (C) STANDARD FIT COEFFICIENTS				
A 24.79185016				
B -0.341869118				
C -4.093453097E-05				
D -3.012040932E-07				

0 points eliminated.

Error File: Gauge # 76169

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
14.70	25.00	710742.69	156337.50	0.14
507.13	25.00	734131.69	156308.00	-0.23
1202.12	25.00	767155.69	156331.25	0.05
1810.42	25.00	796012.69	156332.50	0.02
2389.65	25.00	823460.31	156326.75	0.07
2997.84	25.00	852230.00	156311.00	0.02
3606.03	25.00	880949.00	156287.25	0.00
4214.21	25.00	909617.31	156261.50	-0.02
4793.42	25.00	936842.00	156217.25	-0.01
5401.59	25.00	965365.00	156168.75	0.02
6009.76	25.00	993792.31	156105.75	0.01
14.70	50.00	711061.69	148975.25	0.01
507.13	50.00	733233.00	148978.25	-0.11
1202.12	50.00	764517.69	148989.00	0.10
1810.42	50.00	791859.00	148994.50	-0.01
2389.65	50.00	817869.31	148991.75	0.04
2997.84	50.00	845130.31	148979.00	-0.09
3606.03	50.00	872349.31	148960.25	-0.13
4214.21	50.00	899528.69	148939.25	0.00
4793.42	50.00	925336.69	148903.25	-0.08
5401.59	50.00	952387.31	148865.00	-0.01
6009.76	50.00	979361.00	148818.50	-0.03
14.70	75.00	711308.00	141705.50	0.13
507.13	75.00	732355.69	141679.25	-0.09
1202.12	75.00	762052.00	141692.75	-0.02
1810.42	75.00	788013.69	141698.75	-0.02
2389.65	75.00	812706.69	141695.75	0.06
2997.84	75.00	838598.69	141689.25	0.10
3606.03	75.00	864452.00	141678.50	0.15
4214.21	75.00	890249.00	141658.00	0.06
4793.42	75.00	914776.69	141633.00	0.13
5401.59	75.00	940473.69	141601.75	0.12
6009.76	75.00	966111.00	141565.50	0.08
14.70	100.00	711489.31	134683.75	0.10
507.13	100.00	731485.00	134683.75	-0.25
1202.12	100.00	759723.69	134688.75	-0.04
1810.42	100.00	784421.00	134695.50	0.01
2389.65	100.00	807919.31	134696.00	0.10
2997.84	100.00	832558.69	134693.25	-0.01
3606.03	100.00	857159.31	134677.75	-0.03
4214.21	100.00	881714.31	134660.75	-0.19
4793.42	100.00	905062.00	134641.75	-0.21
5401.59	100.00	929525.31	134617.25	-0.21
6009.76	100.00	953930.31	134586.00	-0.05
14.70	125.00	711759.69	128066.00	0.69
507.13	125.00	730697.69	128082.75	-0.87
1202.12	125.00	757565.31	128098.75	-0.20
1810.42	125.00	781080.69	128100.00	0.08
2389.65	125.00	803469.00	128095.25	0.31
2997.84	125.00	826957.69	128089.00	0.35
3606.03	125.00	850415.31	128078.25	0.19
4214.21	125.00	873835.00	128065.50	-0.10
4793.42	125.00	896105.00	128052.75	-0.29
5401.59	125.00	919443.00	128031.25	-0.11
6009.76	125.00	942726.31	128005.25	0.41
14.70	150.00	712214.31	121891.75	0.77
507.13	150.00	730152.00	121920.00	-1.00
1202.12	150.00	755657.00	121924.25	-0.33
1810.42	150.00	778022.69	121925.00	0.03
2389.65	150.00	799338.69	121908.50	0.38
2997.84	150.00	821725.00	121898.00	0.42
3606.03	150.00	844104.31	121889.50	0.23
4214.21	150.00	866458.69	121878.50	-0.15
4793.42	150.00	887718.31	121864.00	-0.41
5401.59	150.00	910011.69	121852.75	-0.44
6009.76	150.00	932257.31	121829.50	0.39



SPARTEK SYSTEMS

GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

#1 Thevenaz Industrial Trail
Sylvan Lake, AB, Ca, T4S 2J6
Phone (403) 887-2443
Fax (403) 887-4050
www.sparteksystems.com

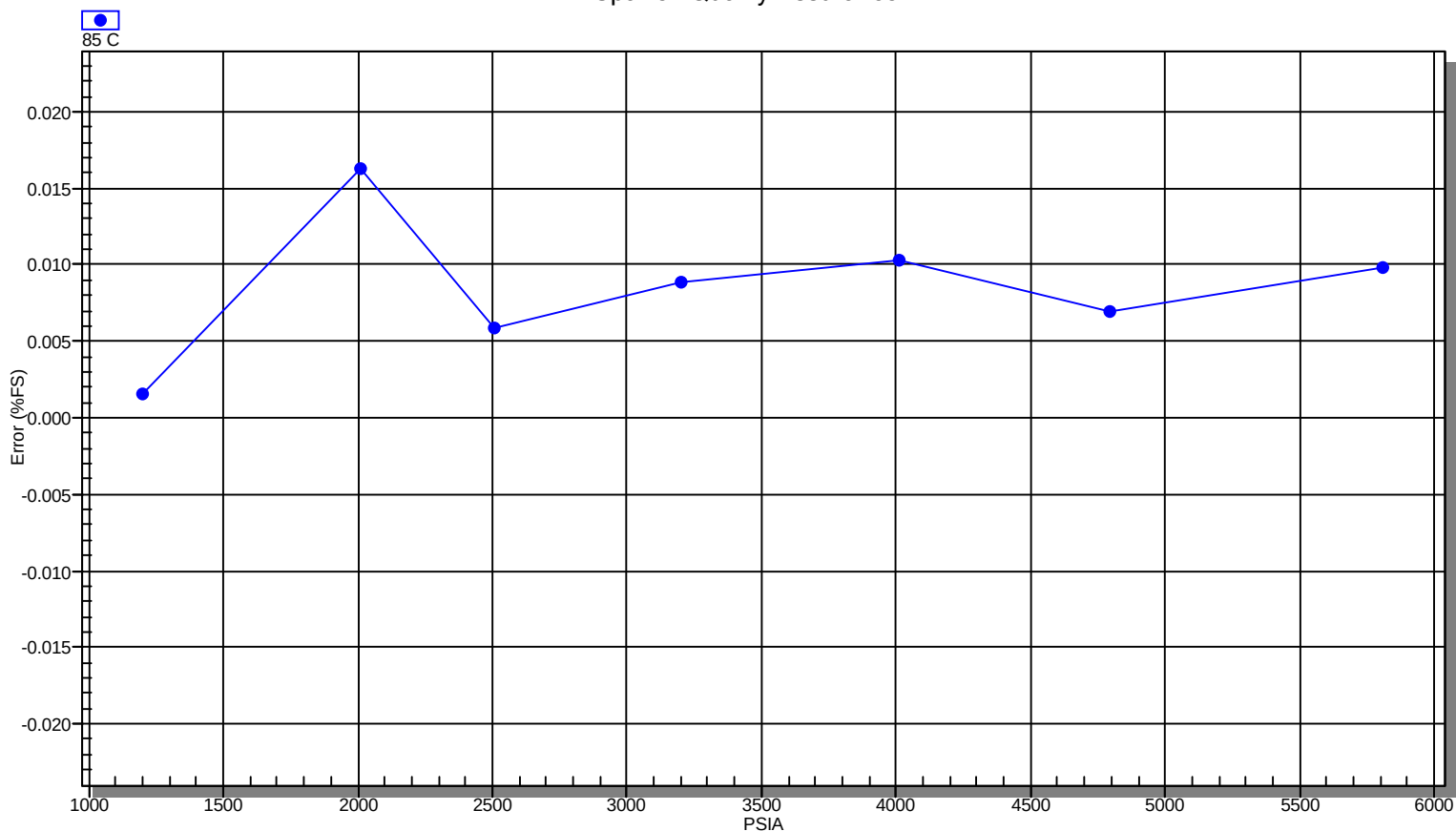
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76169	CALIBRATION DATE	APR 08/13
MODEL NUMBER	1139 FF8	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	14.70 - 6009.76 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.00 - 150.00 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.024\%$ F.S. of the pressure standard used in calibration, which is accurate to within $\pm 0.01\%$ of reading. This gives an overall accuracy of $\pm(0.024\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Jeff Banno

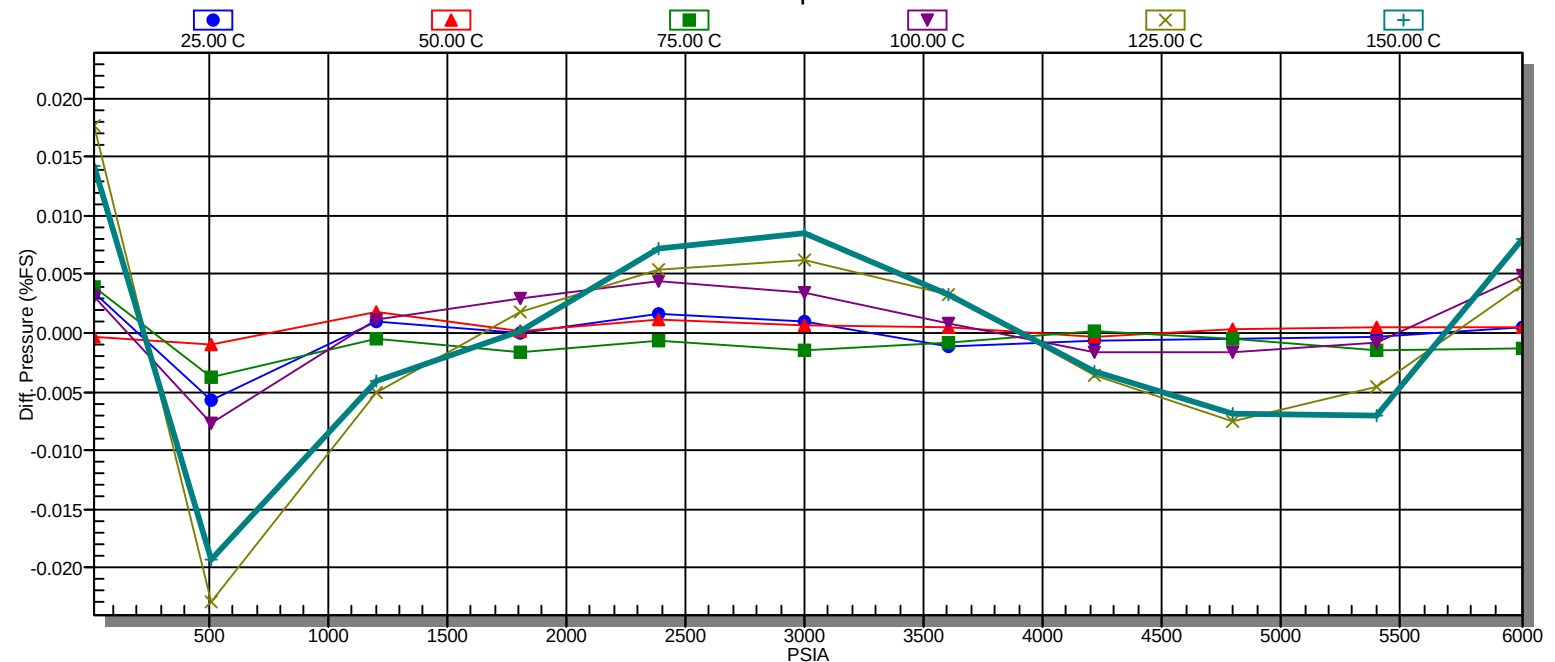
Accepted By: _____

Date: APR 08/13 _____



Pressure Gauge Certificate of Calibration

Calibration Report - 76170.



GAUGE NUMBER: 76170

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $x_p = m * (f_p - f_{p0})$

m: 0.01

$f_{p0} = 716096$

Temp

4

$x_t = m * (f_t - f_{t0})$

0.01

$f_{t0} = 154918$

Pressure Equation:

$Pressure (PSI) = A + x_p(B + x_p(C + x_p(D)))$

Temperature Compensation:

$A = A_0 + x_t(A_1 + x_t(A_2 + x_t(A_3 + x_t(A_4))))$

$B = B_0 + x_t(B_1 + x_t(B_2 + x_t(B_3 + x_t(B_4))))$

$C = C_0 + x_t(C_1 + x_t(C_2 + x_t(C_3 + x_t(C_4))))$

$D = D_0 + x_t(D_1 + x_t(D_2 + x_t(D_3 + x_t(D_4))))$

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 14.91038648	0.0486827886	-0.0001761399887	-2.730317111E-06	-6.885639337E-09
B 2.088698398	-0.00162360585	-7.981201829E-07	-4.025137254E-09	1.245945659E-12
C 3.375928333E-06	3.793677125E-08	7.641876438E-10	3.369766541E-12	2.072098157E-15
D 2.6589512E-10	-1.189842901E-11	-1.968058162E-13	-9.405348403E-16	-8.473954552E-19
Temperature (C) STANDARD FIT COEFFICIENTS				
A 24.83935439				
B -0.3377095891				
C -1.590241204E-06				
D -2.236230423E-07				

0 points eliminated.

Error File: Gauge # 76170

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
14.70	25.00	716096.00	154918.25	0.21
507.13	25.00	739635.00	154910.25	-0.34
1202.12	25.00	772886.00	154923.00	0.06
1810.42	25.00	801937.00	154925.75	0.00
2389.65	25.00	829568.69	154918.00	0.10
2997.84	25.00	858530.31	154902.50	0.06
3606.03	25.00	887433.69	154878.00	-0.07
4214.21	25.00	916285.69	154846.75	-0.04
4793.42	25.00	943696.31	154807.25	-0.03
5401.59	25.00	972400.00	154755.75	-0.02
6009.76	25.00	1001022.69	154696.50	0.03
14.70	50.00	716251.00	147563.00	-0.02
507.13	50.00	738566.69	147547.00	-0.06
1202.12	50.00	770048.00	147560.50	0.11
1810.42	50.00	797561.00	147563.50	0.01
2389.65	50.00	823734.00	147559.75	0.07
2997.84	50.00	851170.31	147548.25	0.04
3606.03	50.00	878558.31	147528.00	0.03
4214.21	50.00	905894.00	147504.75	-0.02
4793.42	50.00	931869.31	147471.25	0.02
5401.59	50.00	959080.31	147431.75	0.03
6009.76	50.00	986212.00	147382.25	0.03
14.70	75.00	716333.69	140289.50	0.23
507.13	75.00	737506.31	140269.75	-0.22
1202.12	75.00	767397.69	140283.50	-0.02
1810.42	75.00	793518.00	140287.50	-0.10
2389.65	75.00	818364.00	140286.00	-0.04
2997.84	75.00	844410.31	140279.50	-0.09
3606.03	75.00	870414.00	140264.25	-0.05
4214.21	75.00	896369.00	140243.25	0.01
4793.42	75.00	921039.69	140221.75	-0.03
5401.59	75.00	946876.69	140186.75	-0.09
6009.76	75.00	972664.31	140152.00	-0.08
14.70	100.00	716348.69	133314.75	0.18
507.13	100.00	736453.00	133297.75	-0.47
1202.12	100.00	764877.31	133307.50	0.07
1810.42	100.00	789726.31	133314.75	0.18
2389.65	100.00	813365.69	133315.25	0.27
2997.84	100.00	838152.00	133311.75	0.21
3606.03	100.00	862895.31	133301.75	0.05
4214.21	100.00	887591.31	133284.50	-0.10
4793.42	100.00	911070.69	133265.75	-0.10
5401.59	100.00	935670.00	133242.25	-0.05
6009.76	100.00	960211.31	133211.50	0.29
14.70	125.00	716517.31	126748.25	1.07
507.13	125.00	735516.00	126739.75	-1.38
1202.12	125.00	762539.69	126750.50	-0.30
1810.42	125.00	786193.31	126758.25	0.11
2389.65	125.00	808712.31	126758.50	0.33
2997.84	125.00	832342.00	126755.75	0.37
3606.03	125.00	855939.00	126747.25	0.20
4214.21	125.00	879489.69	126734.25	-0.21
4793.42	125.00	901881.31	126720.00	-0.45
5401.59	125.00	925345.31	126698.50	-0.28
6009.76	125.00	948747.00	126672.50	0.25
14.70	150.00	716958.00	120500.75	0.86
507.13	150.00	734925.31	120493.25	-1.16
1202.12	150.00	760516.00	120504.50	-0.24
1810.42	150.00	782968.00	120512.50	0.01
2389.65	150.00	804395.00	120513.00	0.44
2997.84	150.00	826904.00	120509.50	0.52
3606.03	150.00	849402.00	120501.75	0.20
4214.21	150.00	871881.31	120491.50	-0.20
4793.42	150.00	893263.00	120479.00	-0.41
5401.59	150.00	915666.69	120462.50	-0.42
6009.76	150.00	938026.69	120441.75	0.49



SPARTEK SYSTEMS

GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

#1 Thevenaz Industrial Trail
Sylvan Lake, AB, Ca, T4S 2J6
Phone (403) 887-2443
Fax (403) 887-4050
www.sparteksystems.com

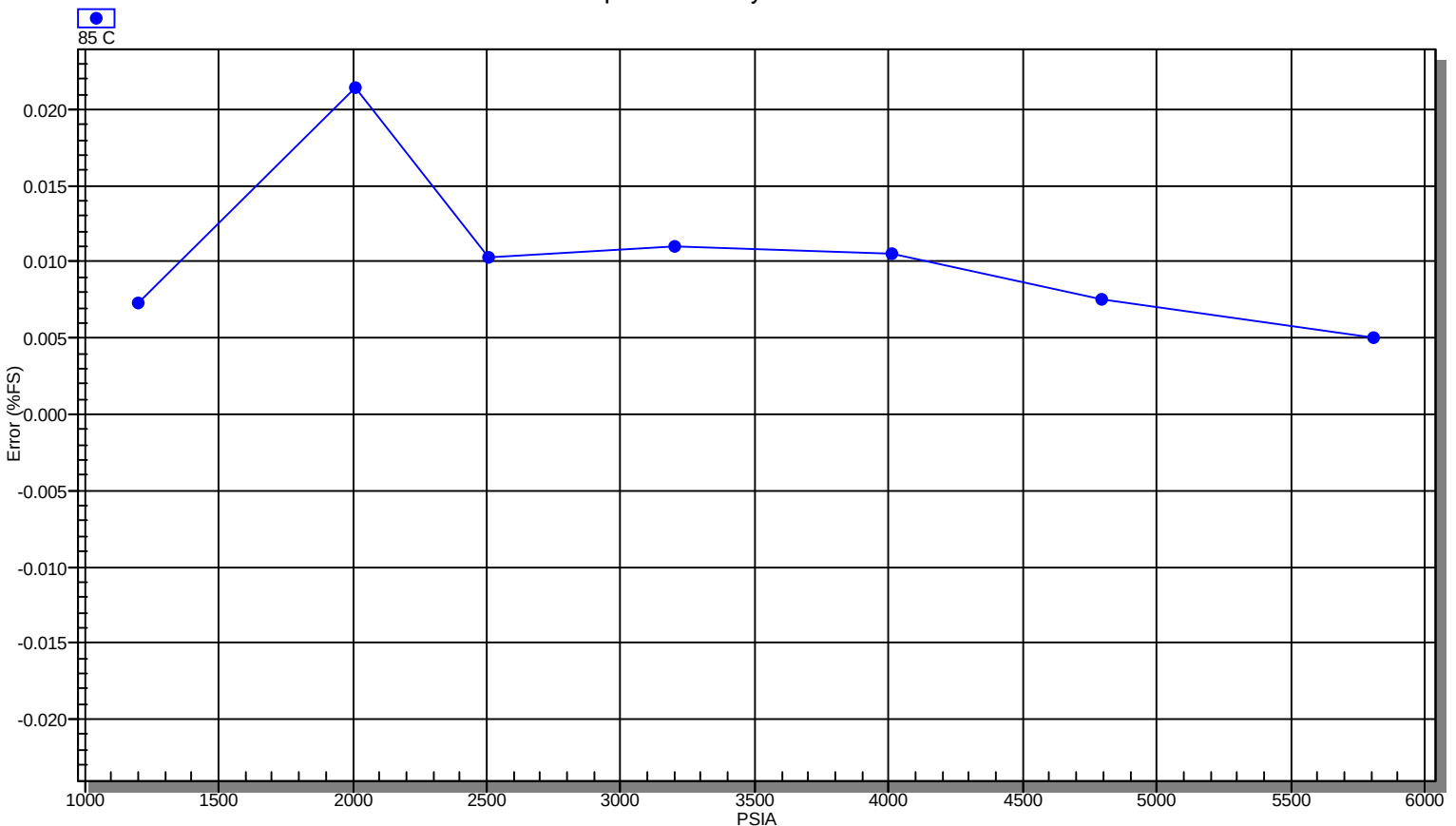
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76170	CALIBRATION DATE	APR 08/13
MODEL NUMBER	1139 FFO	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	14.70 - 6009.76 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.00 - 150.00 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.024\%$ F.S. of the pressure standard used in calibration, which is accurate to within $\pm 0.01\%$ of reading. This gives an overall accuracy of $\pm(0.024\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Jeff Banno

Accepted By: _____

Date: APR 08/13 _____



SPARTEK SYSTEMS

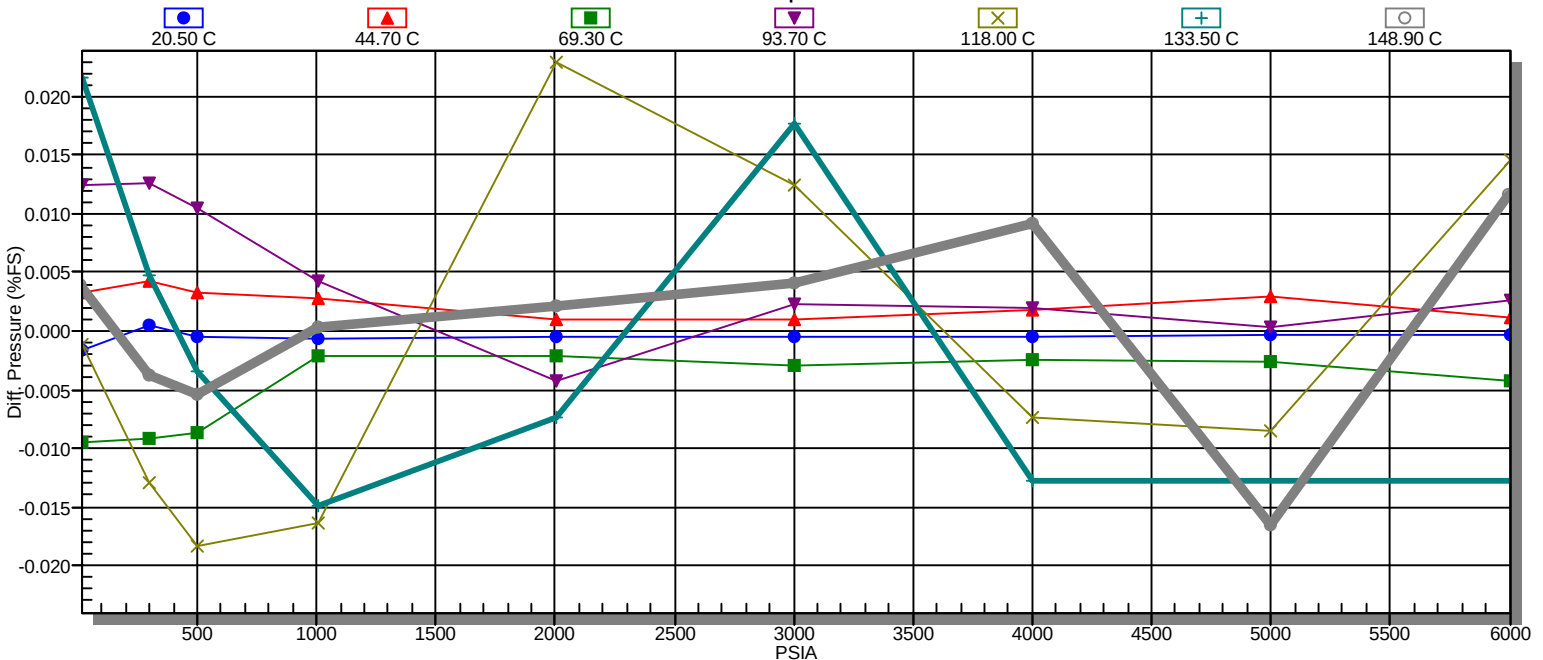
GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

Spartek Systems
 #1 Thevenaz Ind. Tr.
 Sylvan Lake, AB, Ca, T4S 1P5
 Phone (403) 887-2443
 Fax (403) 887-4050
 URL www.sparteksystems.com

Pressure Gauge Certificate of Calibration

Calibration Report - 76171.



GAUGE NUMBER: 76171

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $x_p = m * (f_p - f_{p0})$

m: 0.01

$f_{p0} = 680467$

Temp

4

$x_t = m * (f_t - f_{t0})$

0.01

$f_{t0} = 147715$

Pressure Equation:

Pressure (PSI) = $A + x_p(B + x_p(C + x_p(D)))$

Temperature Compensation:

$A = A_0 + x_t(A_1 + x_t(A_2 + x_t(A_3 + x_t(A_4))))$

$B = B_0 + x_t(B_1 + x_t(B_2 + x_t(B_3 + x_t(B_4))))$

$C = C_0 + x_t(C_1 + x_t(C_2 + x_t(C_3 + x_t(C_4))))$

$D = D_0 + x_t(D_1 + x_t(D_2 + x_t(D_3 + x_t(D_4))))$

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 12.95713534	0.07176652475	-0.0008403552752	-8.075479491E-06	-1.986285576E-08
B 2.154114143	-0.001777116361	-1.031398656E-07	2.568332342E-09	2.000963373E-11
C -6.280010174E-06	1.532672175E-08	2.116426596E-10	-1.074931629E-12	-9.914299177E-15
D 1.137635017E-10	-5.275689956E-12	-7.935964758E-14	-5.228817887E-18	1.711892186E-18
Temperature (C) STANDARD FIT COEFFICIENTS				
A 20.61027667				
B -0.3623574837				
C -8.529409921E-06				
D -2.511062843E-07				

1 points eliminated.

Error File: Gauge # 76171

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.06	20.50	680467.00	147715.50	-0.10
296.86	20.50	693654.00	147727.50	0.03
500.40	20.60	703112.33	147738.50	-0.03
1003.35	20.60	726518.33	147758.00	-0.04
2001.27	20.50	773055.67	147771.75	-0.03
3003.39	20.60	819897.67	147764.75	-0.03
4002.65	20.50	866697.00	147742.75	-0.03
4998.57	20.50	913386.67	147693.50	-0.02
6000.93	20.60	960410.33	147625.75	-0.02
13.10	44.70	680768.00	141068.25	0.20
296.90	44.70	693270.33	141080.50	0.26
500.44	44.70	702238.67	141087.00	0.20
1003.39	44.80	724427.33	141101.50	0.17
2001.31	44.80	768537.33	141122.50	0.06
3003.43	44.70	812931.33	141120.75	0.06
4002.70	44.80	857273.67	141100.50	0.11
4998.61	44.70	901516.00	141060.75	0.18
6000.97	44.80	946061.00	141001.25	0.07
13.13	69.30	680937.67	134383.25	-0.57
296.93	69.30	692819.67	134394.75	-0.55
500.47	69.30	701347.33	134402.00	-0.52
1003.42	69.20	722449.00	134418.00	-0.13
2001.35	69.20	764348.33	134434.00	-0.13
3003.46	69.20	806496.00	134435.25	-0.18
4002.73	69.20	848587.33	134421.00	-0.15
4998.64	69.30	890582.00	134391.25	-0.16
6001.00	69.30	932873.67	134344.25	-0.26
13.14	93.70	681100.33	127945.00	0.75
296.94	93.80	692402.67	127954.00	0.76
500.48	93.70	700509.00	127960.75	0.62
1003.43	93.70	720558.33	127975.50	0.26
2001.35	93.70	760419.00	127992.50	-0.25
3003.47	93.70	800560.33	127995.75	0.14
4002.73	93.80	840625.33	127986.00	0.12
4998.64	93.80	880583.33	127962.50	0.02
6001.00	93.70	920816.33	127925.50	0.15
13.11	118.00	681374.00	121840.00	-0.07
296.91	118.00	692059.00	121851.25	-0.77
500.45	118.00	699740.67	121856.00	-1.10
1003.40	118.00	718797.33	121866.75	-0.98
2001.32	118.00	756833.67	121885.00	1.38
3003.43	118.00	795057.00	121890.00	0.74
4002.70	118.10	833236.67	121886.75	-0.44
4998.61	118.00	871355.00	121872.00	-0.51
6000.96	118.20	909727.67	121839.25	0.87
13.09	133.50	681887.33	118155.00	1.30
296.89	133.50	692163.67	118162.00	0.28
500.43	133.50	699561.33	118167.00	-0.20
1003.38	133.50	717922.33	118176.25	-0.90
2001.29	133.50	754648.33	118191.75	-0.44
3003.41	133.50	791796.67	118199.25	1.06
4002.67	133.50	828849.00	118197.75	-0.77
6000.94	133.40	903068.67	118156.25	-0.77
13.04	148.90	682634.67	114532.25	0.23
296.84	148.90	692500.00	114542.25	-0.22
500.37	149.00	699611.67	114551.00	-0.32
1003.32	148.90	717301.33	114561.75	0.02
2001.24	148.80	752726.00	114581.00	0.13
3003.36	148.80	788649.33	114587.00	0.24
4002.61	148.90	824690.00	114587.75	0.55
4998.53	148.90	860606.00	114579.50	-0.99
6000.88	148.90	896784.00	114562.00	0.70



SPARTEK SYSTEMS

GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

Spartek Systems
#1 Thevenaz Ind. Tr.
Sylvan Lake, AB, Ca, T4S 1P5
Phone (403) 887-2443
Fax (403) 887-4050
URL www.sparteksystems.com

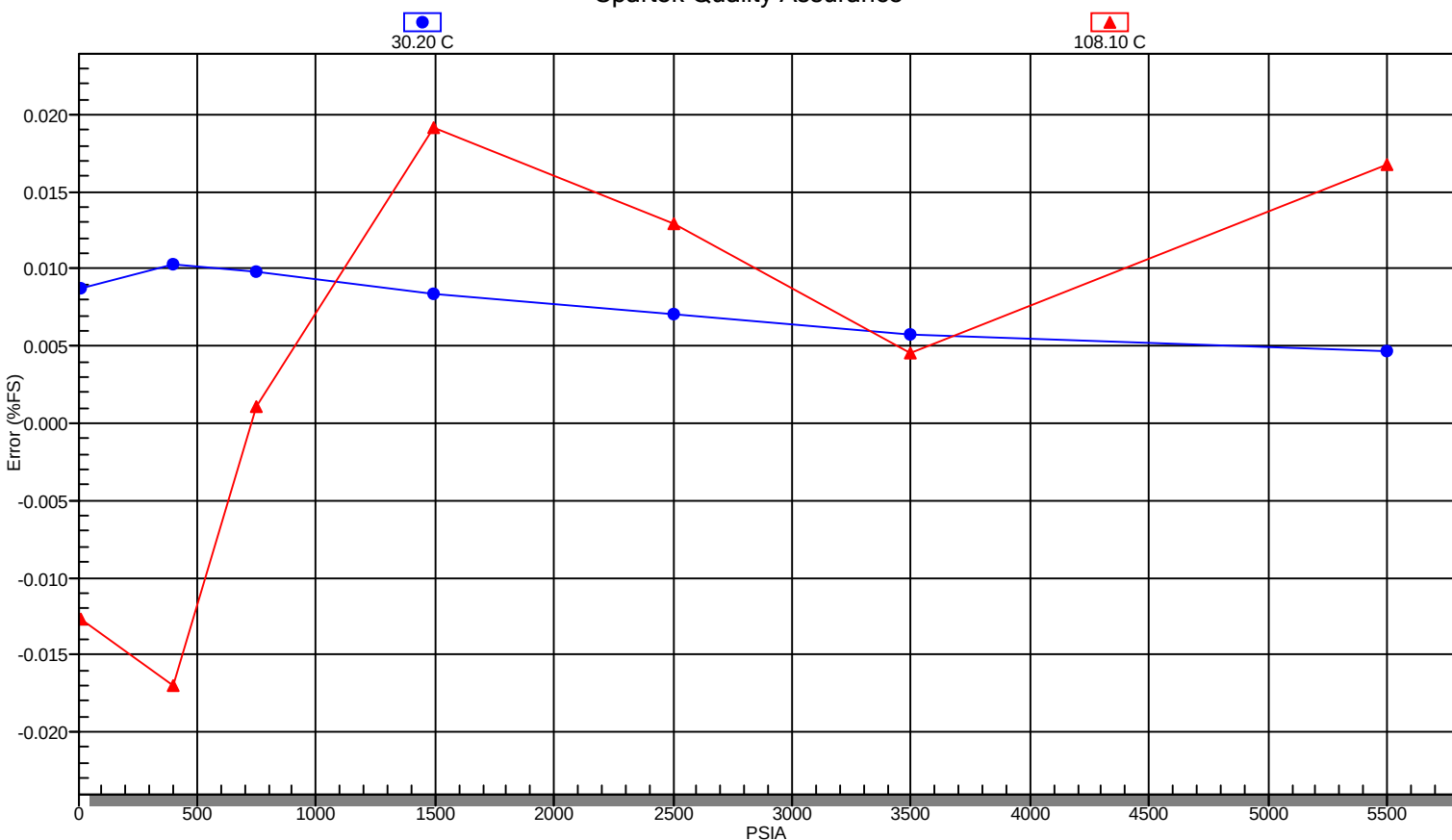
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76171	CALIBRATION DATE	AUG 23/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.06 - 6000.93 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	20.50 - 148.90 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.024\%$ F.S. of the pressure standard used in calibration, which is accurate to within $\pm 0.01\%$ of reading. This gives an overall accuracy of $\pm(0.024\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Accepted By: _____

Date: AUG 25/11

Ramp report: Serial # 76171

Gauge range = 6001.001 PSI. Max. DIFF. = 1.440

Ramp check result: PASS, Max Err = 0.019% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
5500.38	5500.66	5501.26	0.28	0.0046	30.20	30.24
3498.99	3499.33	3499.82	0.35	0.0058	30.10	30.03
2502.86	2503.28	2503.69	0.42	0.0070	30.30	30.01
1497.38	1497.89	1498.19	0.50	0.0084	30.20	30.06
747.03	747.62	747.70	0.59	0.0099	30.10	30.14
398.54	399.16	399.15	0.62	0.0103	30.40	30.18
13.09	13.62	13.51	0.53	0.0088	30.40	30.27
5500.41	5501.41	5501.33	1.00	0.0167	108.10	107.93
3499.02	3499.29	3499.87	0.27	0.0045	108.10	107.91
2502.89	2503.67	2503.71	0.78	0.0129	108.30	108.03
1497.41	1498.56	1498.15	1.15	0.0192	108.20	108.16
747.06	747.13	747.78	0.06	0.0011	108.20	108.25
398.59	397.56	399.23	-1.02	0.0171	108.30	108.34
13.14	12.37	13.52	-0.76	0.0127	108.30	108.41

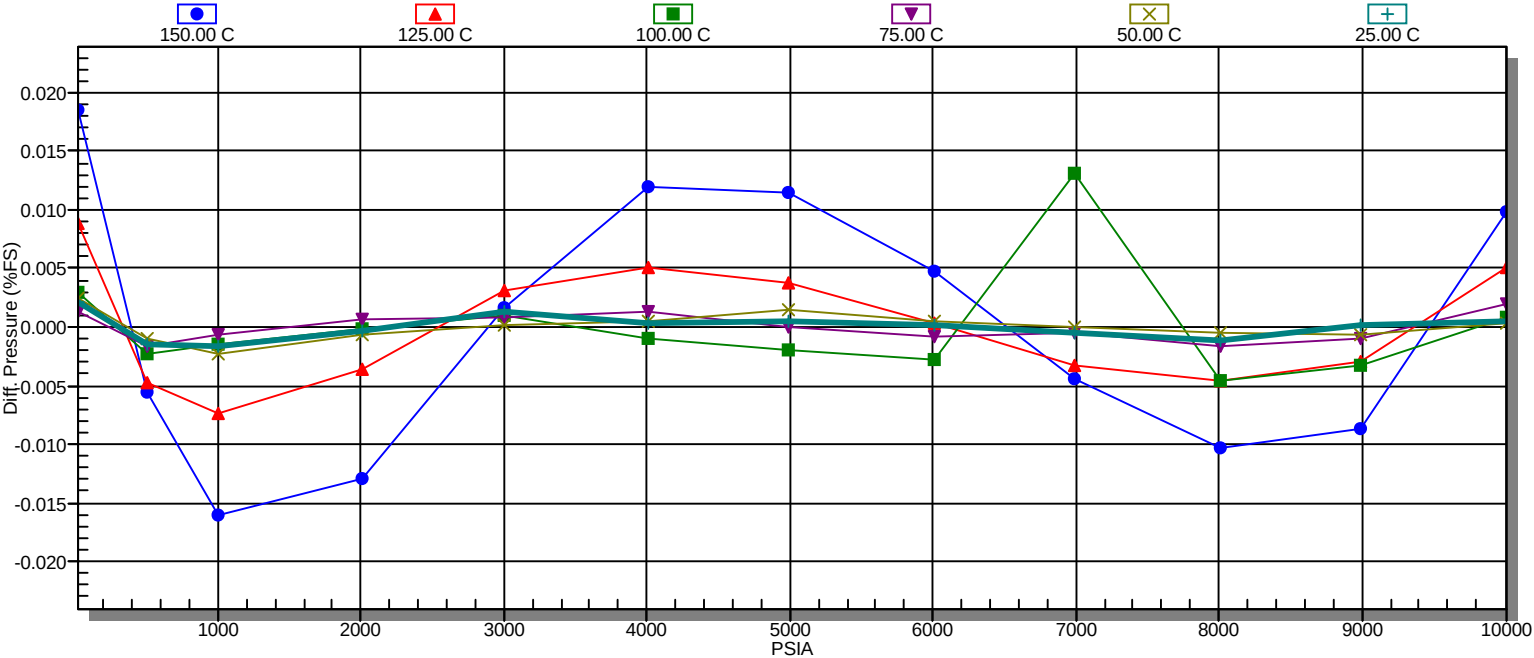


SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION
"Providing our customers with Best in Class Technology"

#1 Thevenaz Industrial Trail
Sylvan Lake, AB, Ca, T4S 2J6
Phone (403) 887-2443
Fax (403) 887-4050
www.sparteksystems.com

Pressure Gauge Certificate of Calibration

Calibration Report - 76298.



GAUGE NUMBER: 76298

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $x_p = m * (f_p - f_{p0})$

m: 0.01

$f_{p0} = 695895$

Temp

4

$x_t = m * (f_t - f_{t0})$

0.01

$f_{t0} = 131954$

Pressure Equation:

$Pressure (PSI) = A + x_p(B + x_p(C + x_p(D)))$

Temperature Compensation:

$A = A_0 + x_t(A_1 + x_t(A_2 + x_t(A_3 + x_t(A_4))))$

$B = B_0 + x_t(B_1 + x_t(B_2 + x_t(B_3 + x_t(B_4))))$

$C = C_0 + x_t(C_1 + x_t(C_2 + x_t(C_3 + x_t(C_4))))$

$D = D_0 + x_t(D_1 + x_t(D_2 + x_t(D_3 + x_t(D_4))))$

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 16.54553116	0.2533877362	-0.001829070363	5.664499957E-06	-6.109077412E-09
B 2.755790187	-0.00250023197	4.463535848E-06	-1.038222554E-08	9.136904647E-12
C -1.272409443E-05	2.301450855E-07	-1.528871474E-09	4.439050146E-12	-4.704340993E-15
D 2.491850634E-09	-3.390997021E-11	2.17159294E-13	-6.348164303E-16	6.769845423E-19
Temperature (C) STANDARD FIT COEFFICIENTS				
A 149.831235				
B -0.4060774968				
C 0.0002178930956				
D -2.648495164E-07				

0 points eliminated.

Error File: Gauge # 76298

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
14.70	150.00	695895.00	131954.75	1.85
507.07	150.00	713688.00	131940.25	-0.55
999.41	150.00	731555.69	131948.50	-1.60
2013.03	150.00	768507.00	131960.25	-1.30
2997.69	150.00	804516.69	131965.75	0.16
4011.29	150.00	841607.00	131962.75	1.20
4995.91	150.00	877601.69	131950.75	1.15
6009.48	150.00	914601.00	131928.75	0.48
6994.09	150.00	950472.31	131899.25	-0.44
8007.64	150.00	987314.00	131860.25	-1.04
8992.20	150.00	1022994.00	131810.50	-0.87
10005.73	150.00	1059618.63	131750.50	0.98
14.70	125.00	695472.31	138321.00	0.88
507.07	125.00	714273.31	138319.75	-0.47
999.41	125.00	733124.31	138330.25	-0.74
2013.03	125.00	771992.00	138345.25	-0.36
2997.69	125.00	809769.31	138350.00	0.31
4011.29	125.00	848620.00	138340.75	0.51
4995.91	125.00	886313.69	138324.00	0.38
6009.48	125.00	925047.31	138295.75	0.03
6994.09	125.00	962592.00	138257.00	-0.32
8007.64	125.00	1001141.31	138205.25	-0.46
8992.20	125.00	1038487.00	138149.25	-0.29
10005.73	125.00	1076794.38	138076.25	0.50
14.70	100.00	695319.69	145066.75	0.30
507.07	100.00	715116.31	145036.00	-0.23
999.41	100.00	734938.69	145047.50	-0.15
2013.03	100.00	775748.31	145063.50	-0.01
2997.69	100.00	815382.69	145075.00	0.10
4011.29	100.00	856126.69	145063.75	-0.09
4995.91	100.00	895654.69	145040.50	-0.20
6009.48	100.00	936269.31	145003.25	-0.29
6994.09	100.00	975696.69	144953.75	1.31
8007.64	100.00	1016032.69	144890.75	-0.46
8992.20	100.00	1055170.38	144821.25	-0.32
10005.73	100.00	1095309.38	144733.25	0.09
14.70	75.00	695269.69	152113.50	0.13
507.07	75.00	716089.00	152093.75	-0.16
999.41	75.00	736926.31	152108.50	-0.07
2013.03	75.00	779819.31	152123.75	0.06
2997.69	75.00	821463.00	152125.75	0.08
4011.29	75.00	864285.31	152108.50	0.13
4995.91	75.00	905813.00	152077.75	0.00
6009.48	75.00	948483.31	152034.00	-0.08
6994.09	75.00	989826.00	151971.50	-0.04
8007.64	75.00	1032256.31	151895.75	-0.16
8992.20	75.00	1073334.00	151806.50	-0.09
10005.73	75.00	1115463.38	151700.75	0.19
14.70	50.00	695191.00	159338.25	0.24
507.07	50.00	717115.31	159332.00	-0.10
999.41	50.00	739050.00	159346.25	-0.23
2013.03	50.00	784224.31	159363.50	-0.07
2997.69	50.00	828077.00	159359.00	0.01
4011.29	50.00	873169.00	159339.00	0.05
4995.91	50.00	916900.69	159300.50	0.14
6009.48	50.00	961808.31	159240.75	0.05
6994.09	50.00	1005311.31	159163.25	0.00
8007.64	50.00	1049950.38	159067.50	-0.06
8992.20	50.00	1093148.00	158956.50	-0.07
10005.73	50.00	1137439.63	158828.00	0.04
14.70	25.00	695076.00	166531.00	0.21
507.07	25.00	718214.69	166533.50	-0.14
999.41	25.00	741371.00	166550.25	-0.17
2013.03	25.00	789045.69	166560.50	-0.03
2997.69	25.00	835337.31	166557.50	0.13
4011.29	25.00	882914.31	166527.75	0.02
4995.91	25.00	929046.69	166474.75	0.04
6009.48	25.00	976424.31	166402.50	0.02
6994.09	25.00	1022293.69	166306.25	-0.05

8007.64	25.00	1069345.38	166188.75	-0.11
8992.20	25.00	1114854.38	166050.50	0.01
10005.73	25.00	1161484.38	165891.25	0.05



SPARTEK SYSTEMS

GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

#1 Thevenaz Industrial Trail
Sylvan Lake, AB, Ca, T4S 2J6
Phone (403) 887-2443
Fax (403) 887-4050
www.sparteksystems.com

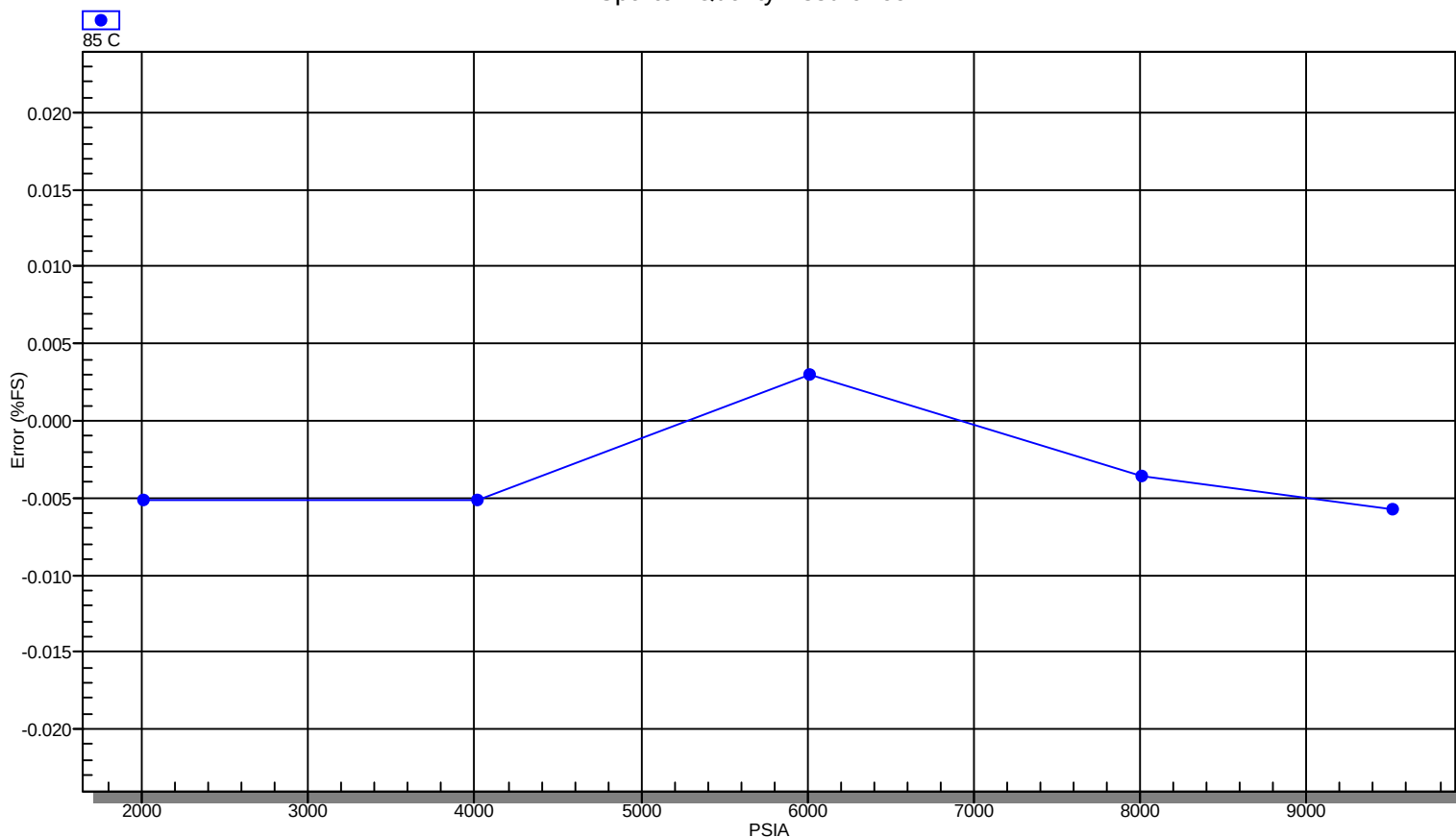
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76298	CALIBRATION DATE	MAR 01/11
MODEL NUMBER	1139 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	14.70 - 10005.73 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.00 - 150.00 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.024\%$ F.S. of the pressure standard used in calibration, which is accurate to within $\pm 0.01\%$ of reading. This gives an overall accuracy of $\pm(0.024\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Jeff Banas

Accepted By: _____

Date: MAR 03/11

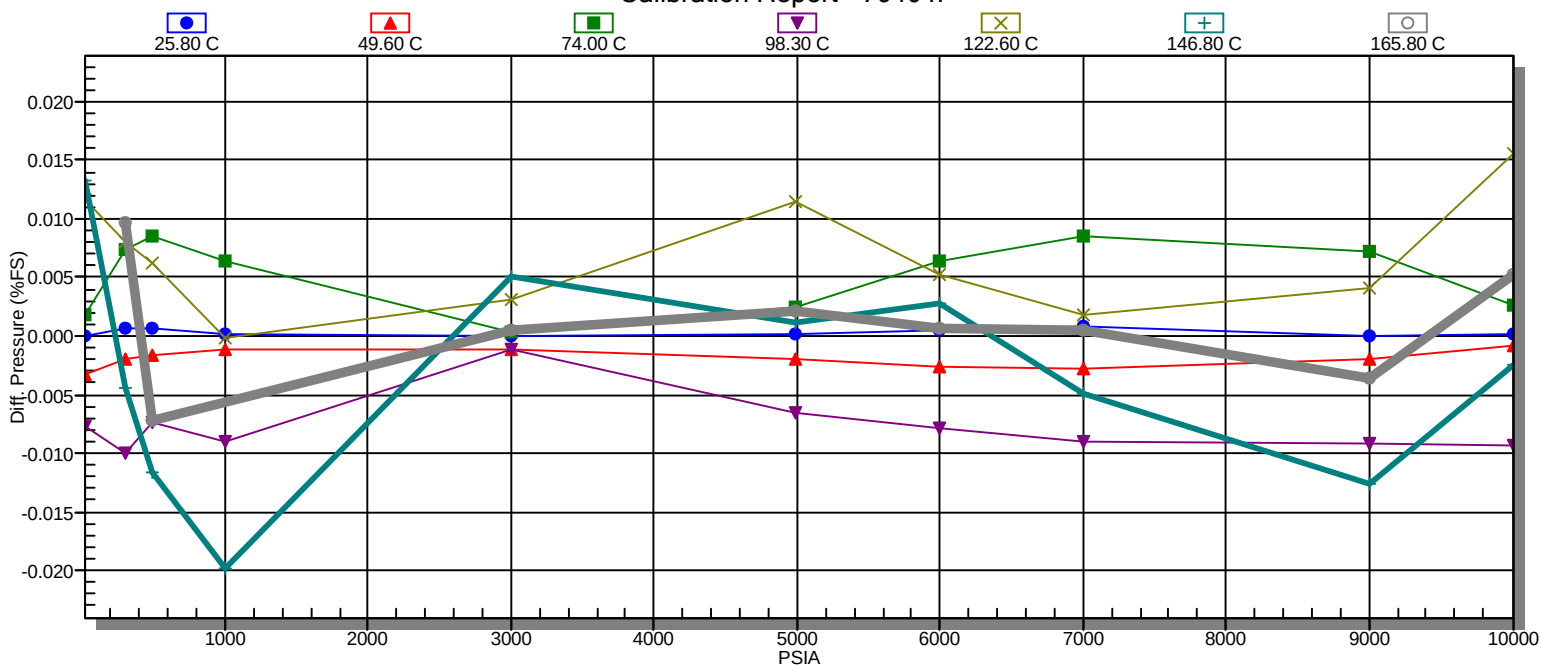


SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION
"Providing our customers with Best in Class Technology"

Spartek Systems
 #1 Thevenaz Ind. Tr.
 Sylvan Lake, AB, Ca, T4S 1P5
 Phone (403) 887-2443
 Fax (403) 887-4050
 URL www.sparteksystems.com

Pressure Gauge Certificate of Calibration

Calibration Report - 76404.



GAUGE NUMBER: 76404

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $x_p = m * (f_p - f_{p0})$

m: 0.01

$f_{p0} = 679762$

Temp

5

$x_t = m * (f_t - f_{t0})$

0.01

$f_{t0} = 147934$

Pressure Equation:

$\text{Pressure (PSI)} = A + x_p(B + x_p(C + x_p(D)))$

Temperature Compensation:

$A = A_0 + x_t(A_1 + x_t(A_2 + x_t(A_3 + x_t(A_4))))$

$B = B_0 + x_t(B_1 + x_t(B_2 + x_t(B_3 + x_t(B_4))))$

$C = C_0 + x_t(C_1 + x_t(C_2 + x_t(C_3 + x_t(C_4))))$

$D = D_0 + x_t(D_1 + x_t(D_2 + x_t(D_3 + x_t(D_4))))$

0

1

2

3

4

Pressure (psi) STANDARD FIT COEFFICIENTS:

A 12.99794347	0.2330350417	0.001448503543	8.059807097E-06	2.546076087E-08
B 3.425793327E-11	2.732094734	-0.002470381242	-2.808599563E-06	-1.357774352E-08
C -9.364561627E-12	7.798827128E-15	-5.296904725E-06	1.130329865E-07	2.416253335E-09
D 1.471188786E-11	3.328730054E-14	2.832889781E-17	1.145768863E-10	-2.228504448E-11

Temperature (C) STANDARD FIT COEFFICIENTS

A 25.84508201

B -0.3744317269

C 1.894632477E-05

D -1.71314099E-07

2 points eliminated.

Error File: Gauge # 76404

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.02	25.80	679762.67	147934.25	0.00
303.29	25.60	690391.67	147943.75	0.06
492.47	25.70	697321.33	147956.75	0.06
1001.53	25.90	715981.67	147982.75	0.02
3005.18	25.90	789576.33	148010.25	0.00
4994.65	25.80	862809.33	147991.25	0.02
5995.36	25.90	899684.00	147968.00	0.05
6996.43	25.80	936553.00	147921.25	0.08
9002.25	25.80	1010378.00	147797.25	0.00
10004.67	25.90	1047231.00	147721.25	0.02
13.02	49.60	680117.67	141661.00	-0.33
303.29	49.70	690206.67	141675.25	-0.20
492.47	49.60	696783.67	141683.50	-0.16
1001.53	49.60	714492.00	141701.50	-0.12
3005.19	49.50	784326.67	141739.00	-0.11
4994.66	49.60	853811.33	141729.00	-0.20
5995.37	49.50	888789.67	141709.00	-0.26
6996.44	49.60	923776.33	141674.25	-0.28
9002.26	49.60	993832.67	141572.75	-0.20
10004.68	49.60	1028780.33	141499.50	-0.08
13.03	74.00	680338.67	135239.25	0.17
303.29	74.00	689952.67	135250.25	0.73
492.48	74.00	696212.67	135257.25	0.86
1001.53	74.00	713046.00	135275.25	0.64
3005.19	74.00	779388.33	135308.25	0.03
4994.65	74.10	845380.33	135306.25	0.25
5995.37	74.00	878599.00	135288.75	0.64
6996.44	74.00	911827.67	135262.50	0.86
9002.26	74.00	978373.33	135182.50	0.73
10004.67	74.20	1011573.67	135120.00	0.26
13.04	98.30	680447.67	129003.25	-0.77
303.31	98.30	689578.33	129014.00	-0.99
492.49	98.30	695543.67	129019.75	-0.73
1001.55	98.30	711576.00	129037.50	-0.90
3005.20	98.30	774797.33	129066.25	-0.12
4994.67	98.30	837614.67	129069.25	-0.65
5995.38	98.30	869227.00	129056.75	-0.79
6996.45	98.30	900849.67	129035.50	-0.90
9002.27	98.40	964183.67	128969.00	-0.92
10004.69	98.40	995802.33	128923.25	-0.93
13.05	122.60	680623.67	123046.00	1.17
303.32	122.70	689309.33	123054.00	0.80
492.50	122.60	694975.33	123060.50	0.63
1001.56	122.60	710227.67	123076.50	-0.01
3005.21	122.70	770470.33	123108.75	0.31
4994.68	122.60	830430.67	123115.50	1.15
5995.39	122.60	860569.67	123102.75	0.53
6996.47	122.60	890723.33	123084.75	0.17
9002.28	122.70	951127.00	123039.00	0.42
10004.70	122.70	981270.67	122997.75	1.55
13.06	146.80	680801.33	117455.75	1.33
303.34	146.90	689032.33	117466.50	-0.43
492.51	146.80	694413.33	117474.25	-1.17
1001.58	146.70	708942.33	117488.25	-1.99
3005.22	146.70	766486.00	117519.75	0.51
4994.69	146.80	823742.67	117526.75	0.12
5995.40	146.80	852585.67	117520.50	0.27
6996.46	146.80	881413.33	117509.50	-0.49
9002.28	146.90	939126.33	117469.75	-1.27
10004.68	146.80	967923.00	117434.25	-0.25
303.32	165.80	689042.00	113002.50	0.97
492.50	165.90	694186.67	113010.00	-0.72
3005.21	165.90	763520.67	113055.25	0.04
4994.67	165.90	818745.33	113066.25	0.21
5995.38	165.90	846580.33	113067.00	0.07
6996.44	165.90	874446.00	113064.75	0.06
9002.25	165.80	930216.00	113036.50	-0.36
10004.67	165.90	958059.00	113016.00	0.53



SPARTEK SYSTEMS

GEOPHYSICAL INSTRUMENTATION

"Providing our customers with Best in Class Technology"

Spartek Systems
#1 Thevenaz Ind. Tr.
Sylvan Lake, AB, Ca, T4S 1P5
Phone (403) 887-2443
Fax (403) 887-4050
URL www.sparteksystems.com

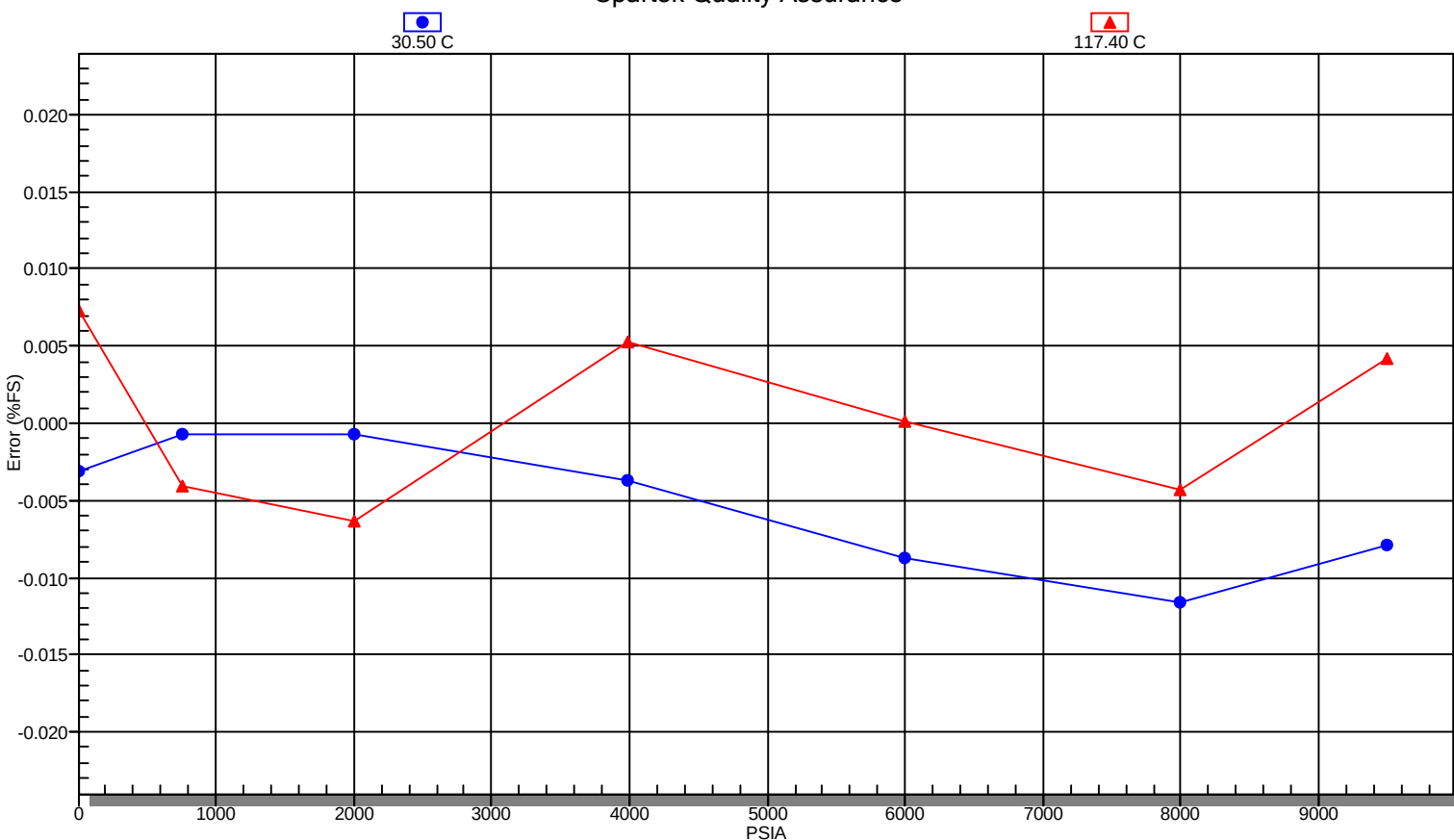
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76404	CALIBRATION DATE	JUN 11/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.02 - 10004.67 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.80 - 165.80 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.024\%$ F.S. of the pressure standard used in calibration, which is accurate to within $\pm 0.01\%$ of reading. This gives an overall accuracy of $\pm(0.024\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Accepted By: _____

Date: JUN 14/11

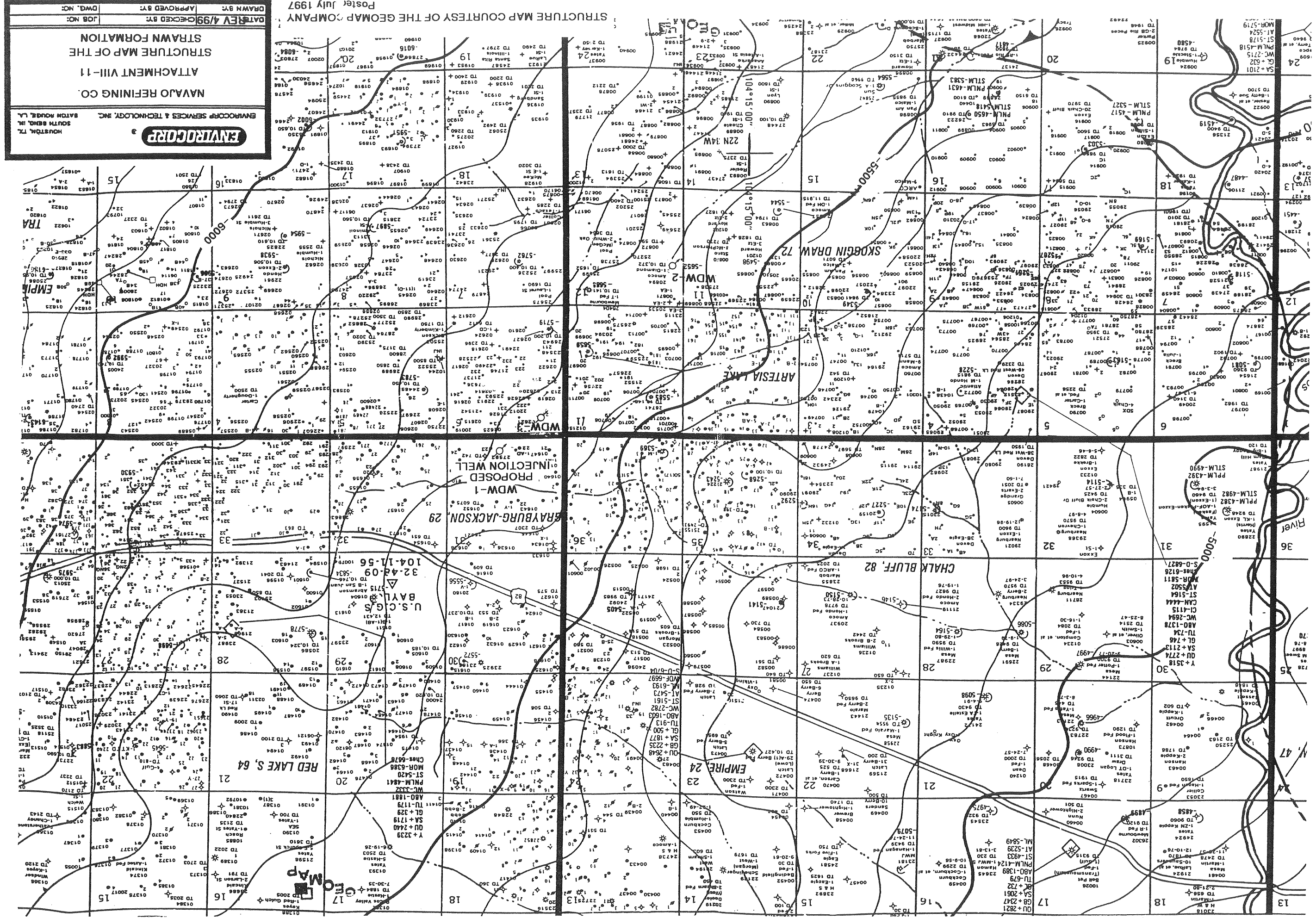
Ramp report: Serial # 76404

Gauge range = 10004.700 PSI. Max. DIFF. = 2.401

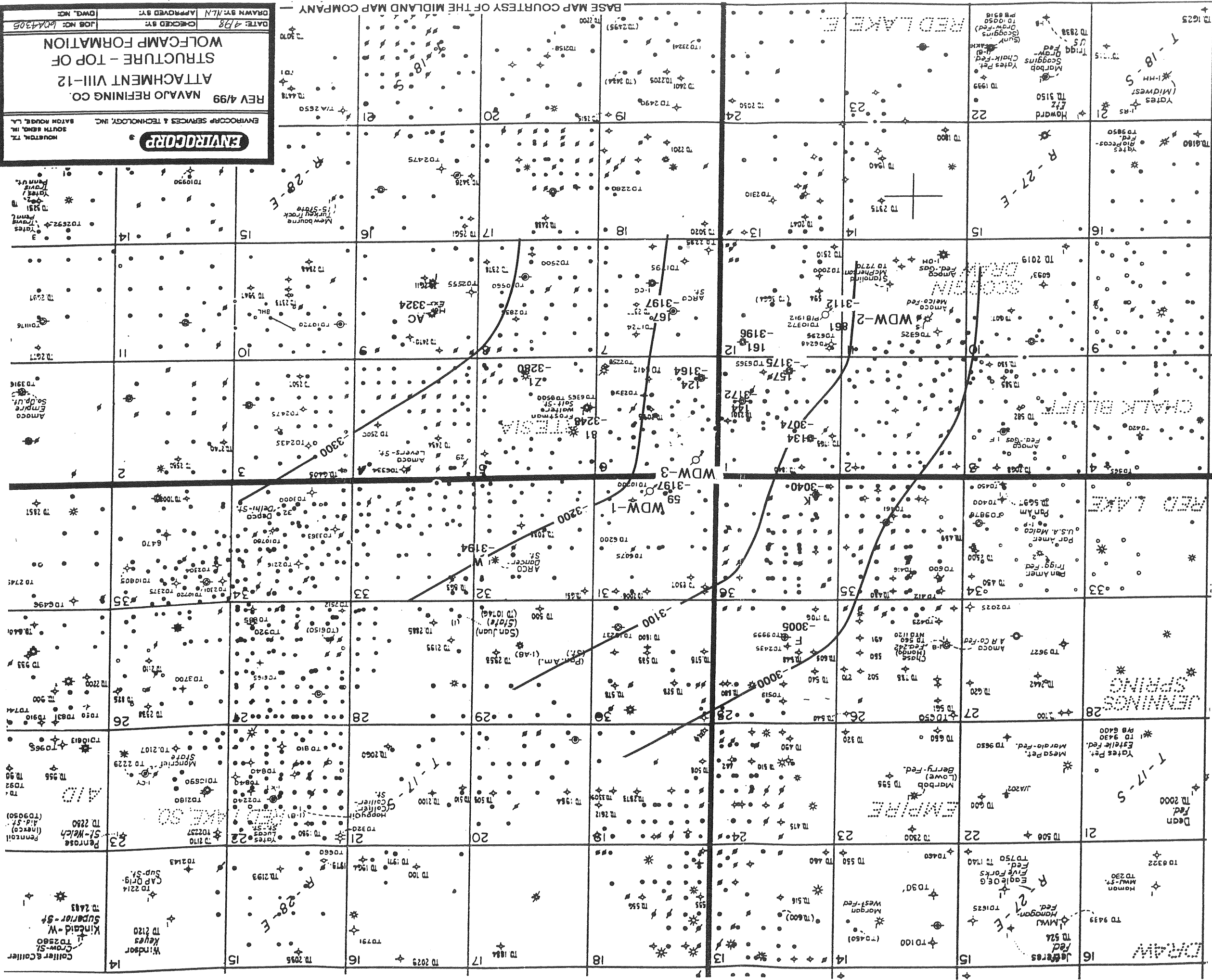
Ramp check result: PASS, Max Err = 0.012% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
9496.60	9495.81	9496.38	-0.79	0.0079	30.50	31.01
8000.40	7999.24	8000.21	-1.16	0.0116	30.60	30.69
5995.36	5994.48	5994.98	-0.88	0.0088	30.40	30.38
3992.86	3992.49	3992.50	-0.37	0.0037	30.30	30.22
2002.91	2002.85	2002.60	-0.07	0.0007	30.60	30.27
753.95	753.88	753.61	-0.07	0.0007	30.60	30.39
13.02	12.70	12.51	-0.32	0.0032	30.60	30.53
9496.60	9497.03	9496.30	0.42	0.0042	117.40	117.41
8000.41	7999.97	8000.16	-0.44	0.0044	117.50	117.35
5995.36	5995.38	5994.97	0.02	0.0002	117.50	117.29
3992.87	3993.39	3992.50	0.52	0.0052	117.60	117.39
2002.92	2002.29	2002.55	-0.63	0.0063	117.60	117.57
753.95	753.54	753.61	-0.41	0.0041	117.60	117.73
13.02	13.75	12.49	0.73	0.0073	117.80	117.87

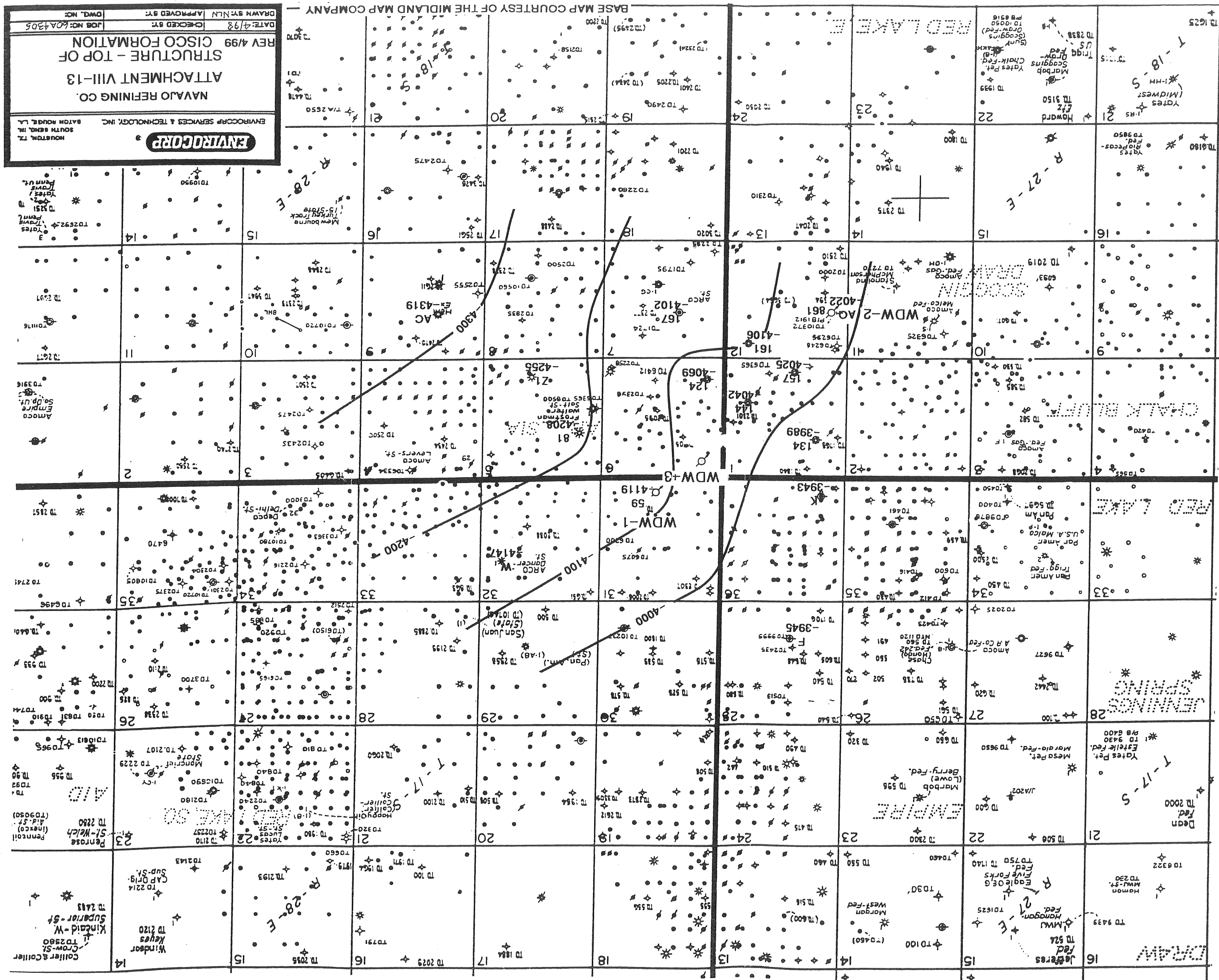
APPENDIX I



157 ID NO. -4025 SUBSEA DEPTH



APPENDIX K



157
-4025

APPENDIX L
CHRONOLOGY OF FIELD ACTIVITIES

Friday, May 9, 2014

Larry McDonald:

Confirm schedule and pick up rental vehicle.

Saturday, May 10, 2014

Larry McDonald:

Travel to Sweetwater, TX.

Sunday, May 11, 2014

Larry McDonald:

Travel to Roswell, NM. Confirm the chart recorder pressure range with calibration certificates.

Monday, May 12, 2014

Larry McDonald:

Travel to Artesia, NM. Attend Navajo site specific orientation. Pick up chart recorder and travel to Mewbourne location. At 1100 hours, arrive at Mewbourne location and rig up chart recorder; injection pressure = 1020 psig; annulus pressure = 225 psig; pressure up annulus to 340 psig. At 1200 hours, start annulus pressure test at 340 psig and run for 30 minutes. End annulus pressure test at 340 psig.

APPENDIX L

CHRONOLOGY OF FIELD ACTIVITIES (CONTINUED)

Moved to the Gaines location and rigged up a chart recorder. The injection pressure was 1280 psig; annulus pressure = 455 psig, bled down to 350 psig. At 1300 hours, started annulus pressure test at 350 psig. At 1330 hours, annulus pressure was 360 psig.

Moved to Chukka location and rigged up a chart recorder. The injection pressure was 1200 psig; annulus pressure = 305 psig, pressure up to 355 psig. At 1500 hours, started the annulus pressure test at 355 psig. At 1530 hours, the annulus pressure was 355 psig and the test was complete. Subsurface personnel returned to Roswell, NM and completed paperwork.

Tuesday, May 13, 2014

Larry McDonald:

Travel to Artesia, NM. Arrive at Chukka well; complete permit and JSA and rig up Pro-Well Testing. Run into the well with tandem memory gauges; injection pressure: 1200 psig. At 0845 hours, position the gauges at 7570 feet below ground level (BGL), secure location and move to the Gaines well. Arrive at the Gaines well and rig up. Run into the well with tandem memory gauges; injection pressure: 1280 psig. At 1030 hours, position gauges at 7660 feet BGL, secure location and move to Mewbourne well. Arrive at Mewbourne well and rig up. Run into the well with tandem memory gauges; injection pressure: 1020 psig. At 1145 hours, position the gauges at 7924 feet BGL and secure the location. Subsurface personnel traveled to San Angelo, TX.

Wednesday, May 14, 2014

Larry McDonald:

Subsurface personnel traveled to Houston, TX from San Angelo, TX.

APPENDIX L

CHRONOLOGY OF FIELD ACTIVITIES (CONTINUED)

Saturday, May 17, 2014

Tim Jones:

Subsurface personnel traveled from Houston, TX to Midland, TX. Drove to Roswell, NM from Midland, TX.

Sunday, May 18, 2014

Tim Jones:

Subsurface personnel traveled from Roswell, NM to Navajo Refinery in Artesia, NM and obtained work permit. Subsurface personnel traveled to the Mewbourne location and met with Pro-Well Testing and rigged up. At 0740 hours, tagged total depth in Mewbourne at 8990 feet BGL. From 0740 hours to 0900 hours, 5-minute static gradient stops were made at 7924 feet, 7000 feet, 6000 feet, 5000 feet, 4000 feet, 3000 feet, 2000 feet, 1000 feet, and at the surface. All depths are BGL. The BHP tool was retrieved from the well and moved to Gaines location. At 10:45 hours, removed BHP tool from Gaines well and moved to Chukka location. At 11:45, removed BHP tool from Chukka. Motor on trailer wouldn't start and had to use the wireline mast truck to pull the BHP tool out. ProWell Testing rigged down and moved off of the well location. Subsurface personnel confirmed operations with Byron Ironmonger of Navajo and left location to travel to Midland, TX.

Subsurface personnel travelled to Midland, TX. Subsurface personnel travelled to Houston, TX via Dallas, TX and arrived at home.

Production Optimization Systems

Report File:

2014 WDW-1 PFO.pan

PanSystem Version 3.5

Analysis Date:

6/04/2014

Well Test Analysis Report

Company: Navajo Refining Company
Location: Artesia, New Mexico
Well Name: Mewbourne Well No. 1
Testing Date: May 15 - 18, 2014

Gauge Depth: 7924 feet RGL

Injection Interval: 7924 feet - 8476 feet

Completion Type: Perforations

Top Of Fill: 8990 feet

Analyst: TLJ

Subsurface Project No.: 185818-7039

Remarks:

Well Test Analysis Report

Reservoir Description

Fluid type : Water

Well orientation : Vertical

Number of wells : 1

Number of layers : 1

Layer Parameters Data

	Layer 1
Formation thickness	175.0000 ft
Average formation porosity	0.1000
Water saturation	0.0000
Gas saturation	0.0000
Formation compressibility	0.000000 psi-1
Total system compressibility	8.4000e-6 psi-1
Layer pressure	0.000000 psia
Temperature	0.000000 deg F

Well Parameters Data

	Well 1
Well radius	0.3646 ft
Distance from observation to active well	0.000000 ft
Wellbore storage coefficient	0.482928 bbl/psi
Storage Amplitude	0.000000 psi
Storage Time Constant	0.000000 hr
Second Wellbore Storage	0.000000 bbl/psi
Time Change for Second Storage	0.000000 hr
Well offset - x direction	0.0000 ft
Well offset - y direction	0.0000 ft

Fluid Parameters Data

	Layer 1
Oil gravity	0.000000 API
Gas gravity	0.000000 sp grav
Gas-oil ratio (produced)	0.000000 scf/STB
Water cut	0.000000
Water salinity	0.000000 ppm
Check Pressure	0.000000 psia
Check Temperature	0.000000 deg F
Gas-oil ratio (solution)	0.000000 scf/STB
Bubble-point pressure	0.000000 psia
Oil density	0.000 lb/ft3
Oil viscosity	0.000 cp
Oil formation volume factor	0.000 RB/STB
Gas density	0.000 lb/ft3
Gas viscosity	0.0 cp
Gas formation volume factor	0.000 ft3/scf
Water density	0.000 lb/ft3
Water viscosity	0.570 cp
Water formation volume factor	1.000 RB/STB
Oil compressibility	0.000000 psi-1
Initial Gas compressibility	0.000000 psi-1
Water compressibility	0.000000 psi-1

Well Test Analysis Report

Layer 1 Correlations

Not Used

Layer 1 Model Data

Layer 1 Model Type : Radial homogeneous

	Layer 1
Permeability	545.303669 md
Skin factor (Well 1)	44.939048

Rate Change Data

Time Hours	Pressure psia	Rate STB/day
-14387.304720	0.000000	-4349.591270
-14363.304720	0.000000	-4626.722222
-14339.304720	0.000000	-2759.000000
-14315.304720	0.000000	-3576.631035
-14291.304720	0.000000	-4530.932457
-14267.304720	0.000000	-4468.333333
-14243.304720	0.000000	-4497.037616
-14219.304720	0.000000	-4385.934524
-14195.304720	0.000000	-4472.312864
-14171.304720	0.000000	-4512.843171
-14147.304720	0.000000	-4525.236028
-14123.304720	0.000000	-4454.204729
-14099.304720	0.000000	-4339.198330
-14075.304720	0.000000	-4470.244053
-14051.304720	0.000000	-4388.263889
-14027.304720	0.000000	-4438.904762
-14003.304720	0.000000	-4440.378968
-13979.304720	0.000000	-4437.466270
-13955.304720	0.000000	-3957.946429
-13931.304720	0.000000	-4381.051587
-13907.304720	0.000000	-4451.962384
-13883.304720	0.000000	-4420.085235
-13859.304720	0.000000	-4430.430556
-13835.304720	0.000000	-4395.583333
-13811.304720	0.000000	-4321.317543
-13787.304720	0.000000	-4353.505787
-13763.304720	0.000000	-4223.938575
-13739.304720	0.000000	-4310.706035
-13715.304720	0.000000	-4254.753886
-13691.304720	0.000000	-4110.285797
-13667.304720	0.000000	-3947.769759
-13643.304720	0.000000	-4113.333333
-13619.304720	0.000000	-3942.682540
-13595.304720	0.000000	-3718.716518
-13571.304720	0.000000	-4017.323082
-13547.304720	0.000000	-4012.307622
-13523.304720	0.000000	-3882.107226
-13499.304720	0.000000	-3880.595155
-13475.304720	0.000000	-4085.216270
-13451.304720	0.000000	-4049.305638
-13427.304720	0.000000	-4122.595155

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-13403.304720	0.000000	-3481.515873
-13379.304720	0.000000	-2640.738095
-13355.304720	0.000000	-2645.738095
-13331.304720	0.000000	-2817.099206
-13308.304720	0.000000	-4187.376984
-13284.304720	0.000000	-4305.069527
-13260.304720	0.000000	-4642.773727
-13236.304720	0.000000	-4568.654762
-13212.304720	0.000000	-4607.638806
-13188.304720	0.000000	-4429.385003
-13164.304720	0.000000	-4630.835317
-13140.304720	0.000000	-4491.422619
-13116.304720	0.000000	-4345.426587
-13092.304720	0.000000	-4483.224289
-13068.304720	0.000000	-4488.408647
-13044.304720	0.000000	-4562.132937
-13020.304720	0.000000	-4521.414683
-12996.304720	0.000000	-4521.694362
-12972.304720	0.000000	-4512.758019
-12948.304720	0.000000	-4475.357226
-12924.304720	0.000000	-4404.777695
-12900.304720	0.000000	-4202.926505
-12876.304720	0.000000	-3467.920718
-12852.304720	0.000000	-2605.561508
-12828.304720	0.000000	-2600.176587
-12804.304720	0.000000	-3867.160797
-12780.304720	0.000000	-4308.956184
-12756.304720	0.000000	-4360.220321
-12732.304720	0.000000	-4564.463128
-12708.304720	0.000000	-4410.958615
-12684.304720	0.000000	-4283.279845
-12660.304720	0.000000	-4047.557540
-12636.304720	0.000000	-4037.295635
-12612.304720	0.000000	-4167.595238
-12588.304720	0.000000	-4022.180473
-12564.304720	0.000000	-4016.198495
-12540.304720	0.000000	-4235.738178
-12516.304720	0.000000	-4092.861028
-12492.304720	0.000000	-3954.299521
-12468.304720	0.000000	-3855.202546
-12444.304720	0.000000	-3878.777778

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-12420.304720	0.000000	-4178.989997
-12396.304720	0.000000	-4086.922421
-12372.304720	0.000000	-4292.111111
-12348.304720	0.000000	-4258.609127
-12324.304720	0.000000	-4350.357143
-12300.304720	0.000000	-4387.166667
-12276.304720	0.000000	-4337.224289
-12252.304720	0.000000	-4342.357060
-12228.304720	0.000000	-4221.827381
-12204.304720	0.000000	-4259.176587
-12180.304720	0.000000	-4448.795635
-12156.304720	0.000000	-4705.815393
-12132.304720	0.000000	-4806.261987
-12108.304720	0.000000	-4803.462302
-12084.304720	0.000000	-4797.628968
-12060.304720	0.000000	-3542.458333
-12036.304720	0.000000	-5182.761987
-12012.304720	0.000000	-4849.279679
-11988.304720	0.000000	-4117.823330
-11964.304720	0.000000	-4869.924769
-11940.304720	0.000000	-4822.855076
-11916.304720	0.000000	-4939.448413
-11892.304720	0.000000	-4917.404762
-11868.304720	0.000000	-4846.861194
-11844.304720	0.000000	-5306.308449
-11820.304720	0.000000	-3209.279762
-11796.304720	0.000000	-4268.833333
-11772.304720	0.000000	-4751.609127
-11748.304720	0.000000	-4820.121032
-11724.304720	0.000000	-4716.031746
-11700.304720	0.000000	-4720.333333
-11676.304720	0.000000	-4891.857060
-11652.304720	0.000000	-4846.666749
-11628.304720	0.000000	-4479.869048
-11604.304720	0.000000	-4050.994048
-11580.304720	0.000000	-2417.904762
-11556.304720	0.000000	-3690.613095
-11532.304720	0.000000	-4881.541667
-11508.304720	0.000000	-4801.900794
-11484.304720	0.000000	-4830.309441
-11460.304720	0.000000	-4827.694527
-11436.304720	0.000000	-4786.438492
-11412.304720	0.000000	-4793.666667
-11388.304720	0.000000	-4807.686508
-11364.304720	0.000000	-4713.813492
-11340.304720	0.000000	-4770.894841
-11316.304720	0.000000	-4761.533730
-11292.304720	0.000000	-4791.095238
-11268.304720	0.000000	-4711.785714

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-11244.304720	0.000000	-4412.184524
-11220.304720	0.000000	-4584.642857
-11196.304720	0.000000	-4608.170647
-11172.304720	0.000000	-4327.319444
-11148.304720	0.000000	-4650.204365
-11124.304720	0.000000	-4644.162616
-11100.304720	0.000000	-4634.228257
-11076.304720	0.000000	-4664.656746
-11052.304720	0.000000	-4663.091270
-11028.304720	0.000000	-4619.513972
-11004.304720	0.000000	-4637.462219
-10980.304720	0.000000	-4689.976273
-10956.304720	0.000000	-4677.109044
-10932.304720	0.000000	-4650.871032
-10908.304720	0.000000	-4613.119130
-10884.304720	0.000000	-4360.632854
-10860.304720	0.000000	-4603.248099
-10836.304720	0.000000	-4584.408647
-10812.304720	0.000000	-4615.444444
-10788.304720	0.000000	-4718.329448
-10764.304720	0.000000	-4680.779679
-10740.304720	0.000000	-4640.571429
-10716.304720	0.000000	-4673.329365
-10692.304720	0.000000	-4654.375000
-10668.304720	0.000000	-4638.533730
-10644.304720	0.000000	-4592.404762
-10620.304720	0.000000	-4648.097139
-10596.304720	0.000000	-4617.238178
-10572.304720	0.000000	-4628.317378
-10548.304720	0.000000	-4584.744130
-10524.304720	0.000000	-4611.212302
-10500.304720	0.000000	-4630.285714
-10476.304720	0.000000	-4647.176587
-10452.304720	0.000000	-4691.184524
-10428.304720	0.000000	-4689.004051
-10404.304720	0.000000	-4593.160549
-10380.304720	0.000000	-4641.482226
-10356.304720	0.000000	-4670.976190
-10332.304720	0.000000	-4765.783730
-10308.304720	0.000000	-4547.503968
-10283.304720	0.000000	-4589.013889
-10259.304720	0.000000	-4674.115079
-10235.304720	0.000000	-4633.323413
-10211.304720	0.000000	-4647.932540
-10187.304720	0.000000	-4688.771743
-10163.304720	0.000000	-4634.652860
-10139.304720	0.000000	-4682.013889
-10115.304720	0.000000	-4622.248016
-10091.304720	0.000000	-4637.146825

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-10067.304720	0.000000	-4597.190476
-10043.304720	0.000000	-4581.414683
-10019.304720	0.000000	-4618.500000
-9995.304722	0.000000	-4590.142857
-9971.304722	0.000000	-4564.228092
-9947.304722	0.000000	-4125.666832
-9923.304722	0.000000	-4428.726108
-9899.304722	0.000000	-4403.115079
-9875.304722	0.000000	-4491.853175
-9851.304722	0.000000	-4552.861028
-9827.304722	0.000000	-4576.884921
-9803.304722	0.000000	-4628.742064
-9779.304722	0.000000	-4611.359210
-9755.304722	0.000000	-4666.551587
-9731.304722	0.000000	-4561.575314
-9707.304722	0.000000	-4600.182540
-9683.304722	0.000000	-4571.428737
-9659.304722	0.000000	-4577.013806
-9635.304722	0.000000	-4492.133267
-9611.304722	0.000000	-4551.291501
-9587.304722	0.000000	-4469.356564
-9563.304722	0.000000	-4319.567378
-9539.304722	0.000000	-4265.564484
-9515.304722	0.000000	-4422.950231
-9491.304722	0.000000	-4321.628720
-9467.304722	0.000000	-4356.787533
-9443.304722	0.000000	-4607.994461
-9419.304722	0.000000	-4255.046710
-9395.304722	0.000000	-3744.862103
-9371.304722	0.000000	-3884.540675
-9347.304722	0.000000	-3536.534392
-9323.304722	0.000000	-3529.992311
-9299.304722	0.000000	-3456.094825
-9275.304722	0.000000	-3590.767940
-9251.304722	0.000000	-3613.542989
-9227.304722	0.000000	-3312.197999
-9203.304722	0.000000	-3687.994808
-9179.304722	0.000000	-3525.321346
-9155.304722	0.000000	-3158.166667
-9131.304722	0.000000	-3613.095899
-9107.304722	0.000000	-3770.710648
-9083.304722	0.000000	-3847.750992
-9059.304722	0.000000	-4170.501736
-9035.304722	0.000000	-3004.759672
-9011.304722	0.000000	-2490.145337
-8987.304722	0.000000	-2736.991567
-8963.304722	0.000000	-3126.008432
-8939.304722	0.000000	-1914.809524
-8915.304722	0.000000	-2499.166667

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-8891.304722	0.000000	-3345.225198
-8867.304722	0.000000	-5257.375992
-8843.304722	0.000000	-3993.435102
-8819.304722	0.000000	-3645.947421
-8795.304722	0.000000	-3444.535036
-8771.304722	0.000000	-3056.440972
-8747.304722	0.000000	-3297.557622
-8723.304722	0.000000	-4036.118519
-8699.304722	0.000000	-4771.265212
-8675.304722	0.000000	-4415.677464
-8651.304722	0.000000	-4451.315307
-8627.304722	0.000000	-4462.200480
-8603.304722	0.000000	-4182.352892
-8579.304722	0.000000	-4458.347801
-8555.304722	0.000000	-4395.811012
-8531.304722	0.000000	-4394.656200
-8507.304722	0.000000	-4551.232061
-8483.304722	0.000000	-4958.221015
-8459.304722	0.000000	-5080.932622
-8435.304722	0.000000	-5103.983879
-8411.304722	0.000000	-4965.563822
-8387.304722	0.000000	-5018.378971
-8363.304722	0.000000	-4792.612698
-8339.304722	0.000000	-5060.678655
-8315.304722	0.000000	-5059.750909
-8291.304722	0.000000	-5023.751984
-8267.304722	0.000000	-5028.952381
-8243.304722	0.000000	-4959.335235
-8219.304722	0.000000	-5048.914764
-8195.304722	0.000000	-5254.436765
-8171.304722	0.000000	-5118.255744
-8147.304722	0.000000	-5108.087021
-8123.304722	0.000000	-5042.622934
-8099.304722	0.000000	-5033.500165
-8075.304722	0.000000	-4819.065311
-8051.304722	0.000000	-4918.984207
-8027.304722	0.000000	-4973.238177
-8003.304722	0.000000	-4932.276505
-7979.304722	0.000000	-4890.392857
-7955.304722	0.000000	-4659.297536
-7931.304722	0.000000	-4807.849683
-7907.304722	0.000000	-4912.976109
-7883.304722	0.000000	-5142.422619
-7859.304722	0.000000	-5273.668737
-7835.304722	0.000000	-5157.273313
-7811.304722	0.000000	-5618.053471
-7787.304722	0.000000	-5614.527779
-7763.304722	0.000000	-5699.350052
-7739.304722	0.000000	-5712.435728

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-7715.304722	0.000000	-5609.309954
-7691.304722	0.000000	-5587.356751
-7667.304722	0.000000	-5452.194355
-7643.304722	0.000000	-5011.115078
-7619.304722	0.000000	-5177.142857
-7595.304722	0.000000	-5177.142857
-7571.304722	0.000000	-5177.142857
-7547.304722	0.000000	-5177.142857
-7523.304722	0.000000	-5177.142857
-7499.304722	0.000000	-5177.142857
-7475.304722	0.000000	-4876.863261
-7451.304722	0.000000	-4972.319279
-7427.304722	0.000000	-5055.760003
-7403.304722	0.000000	-4995.045552
-7379.304722	0.000000	-4961.502222
-7355.304722	0.000000	-5106.023457
-7331.304722	0.000000	-5047.452464
-7307.304722	0.000000	-5085.208416
-7283.304722	0.000000	-5167.620949
-7259.304722	0.000000	-5116.073330
-7235.304722	0.000000	-5123.990079
-7211.304722	0.000000	-5583.852464
-7187.304722	0.000000	-5502.545122
-7163.304722	0.000000	-5063.341187
-7139.304722	0.000000	-5247.021825
-7115.304722	0.000000	-5246.894759
-7091.304722	0.000000	-5246.271908
-7067.304722	0.000000	-5271.500000
-7043.304722	0.000000	-5232.035714
-7019.304722	0.000000	-5269.374802
-6995.304722	0.000000	-5245.533730
-6971.304722	0.000000	-5228.561425
-6947.304722	0.000000	-5250.962384
-6923.304722	0.000000	-5225.799603
-6899.304722	0.000000	-5246.404762
-6875.304722	0.000000	-5257.462219
-6851.304722	0.000000	-5290.381035
-6827.304722	0.000000	-5288.595238
-6803.304722	0.000000	-5284.047619
-6779.304722	0.000000	-5297.047536
-6755.304722	0.000000	-5285.285797
-6731.304722	0.000000	-5253.942460
-6707.304722	0.000000	-5268.142857
-6683.304722	0.000000	-5247.714286
-6659.304722	0.000000	-5250.595238
-6635.304722	0.000000	-5240.761905
-6611.304722	0.000000	-5222.394759
-6587.304722	0.000000	-5234.319610
-6563.304722	0.000000	-4951.269759

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-6539.304722	0.000000	-5172.432540
-6515.304722	0.000000	-4999.575314
-6491.304722	0.000000	-5005.724289
-6467.304722	0.000000	-4836.097222
-6443.304722	0.000000	-4759.785714
-6419.304722	0.000000	-4778.619048
-6395.304722	0.000000	-4748.979960
-6371.304722	0.000000	-4701.690476
-6347.304722	0.000000	-4828.007937
-6323.304722	0.000000	-4976.048214
-6299.304722	0.000000	-4934.150794
-6275.304722	0.000000	-4845.700397
-6251.304722	0.000000	-4851.619048
-6227.304722	0.000000	-4847.466353
-6203.304722	0.000000	-4793.478092
-6179.304722	0.000000	-4870.804167
-6155.304722	0.000000	-4912.424603
-6131.304722	0.000000	-4913.041667
-6107.304722	0.000000	-4868.109127
-6083.304722	0.000000	-4866.366981
-6059.304722	0.000000	-4863.357226
-6035.304722	0.000000	-4871.630952
-6011.304722	0.000000	-4858.704282
-5987.304722	0.000000	-4821.283813
-5963.304722	0.000000	-4913.980241
-5939.304722	0.000000	-4897.783647
-5915.304722	0.000000	-4820.823330
-5891.304722	0.000000	-4793.422784
-5867.304722	0.000000	-4726.271743
-5843.304722	0.000000	-4701.486111
-5819.304722	0.000000	-4709.740108
-5795.304722	0.000000	-4725.271825
-5771.304722	0.000000	-4736.095238
-5747.304722	0.000000	-4737.823413
-5723.304722	0.000000	-4743.568056
-5699.304722	0.000000	-4730.452381
-5675.304722	0.000000	-4734.309524
-5651.304722	0.000000	-4718.166667
-5627.304722	0.000000	-4705.724206
-5603.304722	0.000000	-4741.918651
-5579.304722	0.000000	-4720.619048
-5555.304722	0.000000	-4739.047619
-5531.304722	0.000000	-4653.851190
-5507.304722	0.000000	-4763.730159
-5483.304722	0.000000	-5165.357143
-5459.304722	0.000000	-5153.476273
-5435.304722	0.000000	-5126.632854
-5411.304722	0.000000	-5126.166667
-5387.304722	0.000000	-5106.085317

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-5363.304722	0.000000	-4508.486111
-5339.304722	0.000000	-4996.841270
-5315.304722	0.000000	-5007.857060
-5291.304722	0.000000	-4996.309606
-5267.304722	0.000000	-4986.442460
-5243.304722	0.000000	-4986.438575
-5219.304722	0.000000	-4976.372454
-5195.304722	0.000000	-4978.176670
-5171.304722	0.000000	-4984.489997
-5147.304722	0.000000	-4953.200479
-5123.304722	0.000000	-4966.918651
-5099.304722	0.000000	-4958.904762
-5075.304722	0.000000	-4958.676587
-5051.304722	0.000000	-4977.310003
-5027.304722	0.000000	-4935.648132
-5003.304722	0.000000	-4903.452381
-4979.304722	0.000000	-4934.438575
-4955.304722	0.000000	-4931.718171
-4931.304722	0.000000	-4913.486111
-4907.304722	0.000000	-4572.208333
-4883.304722	0.000000	-3994.309524
-4859.304722	0.000000	-4061.601190
-4835.304722	0.000000	-4114.902860
-4811.304722	0.000000	-4733.605076
-4787.304722	0.000000	-4960.954365
-4763.304722	0.000000	-4976.271908
-4739.304722	0.000000	-4956.976191
-4715.304722	0.000000	-4982.452298
-4691.304722	0.000000	-4974.880754
-4667.304722	0.000000	-4501.174603
-4643.304722	0.000000	-4030.636572
-4619.304722	0.000000	-3988.309854
-4595.304722	0.000000	-3955.962302
-4572.304722	0.000000	-3966.190476
-4548.304722	0.000000	-4013.809524
-4524.304722	0.000000	-4037.805390
-4500.304722	0.000000	-4054.851157
-4476.304722	0.000000	-4040.690476
-4452.304722	0.000000	-4244.738095
-4428.304722	0.000000	-4118.837302
-4404.304722	0.000000	-3962.009921
-4380.304722	0.000000	-4013.180556
-4356.304722	0.000000	-3910.966270
-4332.304722	0.000000	-4663.015873
-4308.304722	0.000000	-5462.960235
-4284.304722	0.000000	-5687.751984
-4260.304722	0.000000	-6004.519924
-4236.304722	0.000000	-5596.109044
-4212.304722	0.000000	-5217.180721

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-4188.304722	0.000000	-5891.724206
-4164.304722	0.000000	-5989.478175
-4140.304722	0.000000	-5842.145354
-4116.304722	0.000000	-1490.035714
-4092.304722	0.000000	-5720.904762
-4068.304722	0.000000	-2791.488013
-4044.304722	0.000000	-3663.105241
-4020.304722	0.000000	-5084.833929
-3996.304722	0.000000	-5686.186789
-3972.304722	0.000000	-4888.931862
-3948.304722	0.000000	-5457.309607
-3924.304722	0.000000	-5564.446181
-3900.304722	0.000000	-5347.702546
-3876.304722	0.000000	-5114.529762
-3852.304722	0.000000	-5303.923214
-3828.304722	0.000000	-5062.442460
-3804.304722	0.000000	-1722.242063
-3780.304722	0.000000	-146.261905
-3756.304722	0.000000	0.000000
-3732.304722	0.000000	-2533.527778
-3708.304722	0.000000	-4572.543651
-3684.304722	0.000000	-5071.734210
-3660.304722	0.000000	-5067.494048
-3636.304722	0.000000	-5321.551505
-3612.304722	0.000000	-5458.934524
-3588.304722	0.000000	-5530.397073
-3564.304722	0.000000	-5599.188244
-3540.304722	0.000000	-5725.129051
-3516.304722	0.000000	-5067.589203
-3492.304722	0.000000	-4888.604762
-3468.304722	0.000000	-5058.900711
-3444.304722	0.000000	-5184.984210
-3420.304722	0.000000	-4917.674603
-3396.304722	0.000000	-4917.119048
-3372.304722	0.000000	-4936.488095
-3348.304722	0.000000	-4863.309524
-3324.304722	0.000000	-4855.085317
-3300.304722	0.000000	-4771.690559
-3276.304722	0.000000	-4888.577216
-3252.304722	0.000000	-4876.371197
-3228.304722	0.000000	-4840.676587
-3204.304722	0.000000	-4958.509441
-3180.304722	0.000000	-4901.017659
-3156.304722	0.000000	-4869.662781
-3132.304722	0.000000	-4709.679167
-3108.304722	0.000000	-4830.837219
-3084.304722	0.000000	-4666.136905
-3060.304722	0.000000	-4677.748016
-3036.304722	0.000000	-4486.063492

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-3012.304722	0.000000	-4070.908730
-2988.304722	0.000000	-4649.779762
-2964.304722	0.000000	-4705.968254
-2940.304722	0.000000	-4913.823413
-2916.304722	0.000000	-5182.414600
-2892.304722	0.000000	-5193.859127
-2868.304722	0.000000	-5232.190559
-2844.304722	0.000000	-5201.517857
-2820.304722	0.000000	-5116.946825
-2796.304722	0.000000	-5108.284921
-2772.304722	0.000000	-5043.613095
-2748.304722	0.000000	-5163.654762
-2724.304722	0.000000	-4477.769845
-2700.304722	0.000000	-5102.066215
-2676.304722	0.000000	-5183.085400
-2652.304722	0.000000	-5100.085235
-2628.304722	0.000000	-4990.784210
-2604.304722	0.000000	-4391.706267
-2580.304722	0.000000	-5061.452381
-2556.304722	0.000000	-5161.771825
-2532.304722	0.000000	-5039.496032
-2508.304722	0.000000	-4242.751984
-2484.304722	0.000000	-4761.463293
-2460.304722	0.000000	-5118.626868
-2436.304722	0.000000	-5101.589203
-2412.304722	0.000000	-5048.714286
-2388.304722	0.000000	-4976.982143
-2364.304722	0.000000	-5022.737764
-2340.304722	0.000000	-4957.401042
-2316.304722	0.000000	-5015.157424
-2292.304722	0.000000	-5149.150595
-2268.304722	0.000000	-5226.509838
-2244.304722	0.000000	-5256.067543
-2220.304722	0.000000	-5198.583333
-2196.304722	0.000000	-5097.303571
-2172.304722	0.000000	-5237.021032
-2148.304722	0.000000	-5122.496032
-2124.304722	0.000000	-5206.076587
-2100.304722	0.000000	-5288.956349
-2076.304722	0.000000	-5200.091353
-2052.304722	0.000000	-5062.400711
-2028.304722	0.000000	-5082.152778
-2004.304722	0.000000	-5033.644246
-1980.304722	0.000000	-5070.180556
-1956.304722	0.000000	-5051.424603
-1932.304722	0.000000	-5030.972222
-1908.304722	0.000000	-5025.817543
-1884.304722	0.000000	-4703.696346
-1860.304722	0.000000	-4768.833251

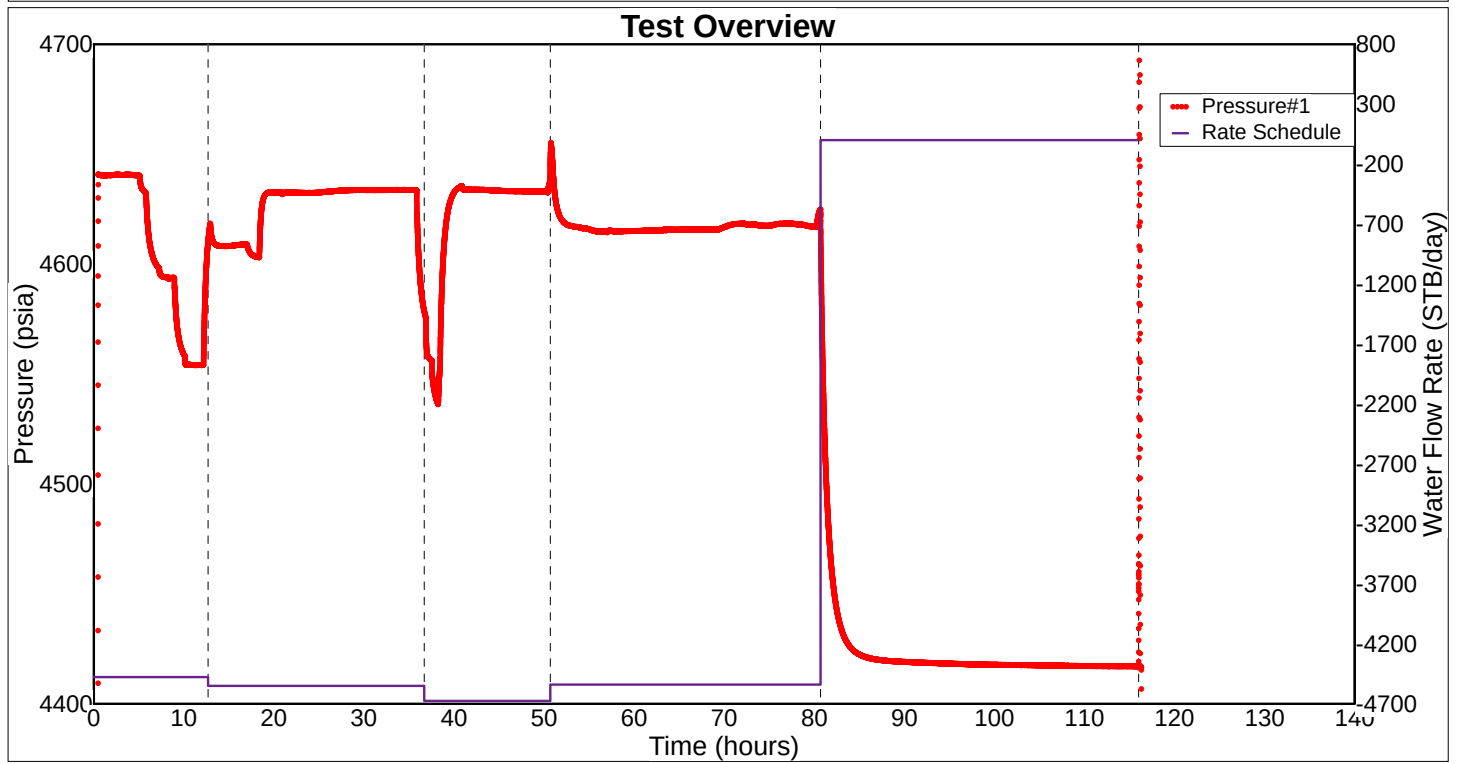
Rate Change Data (cont)

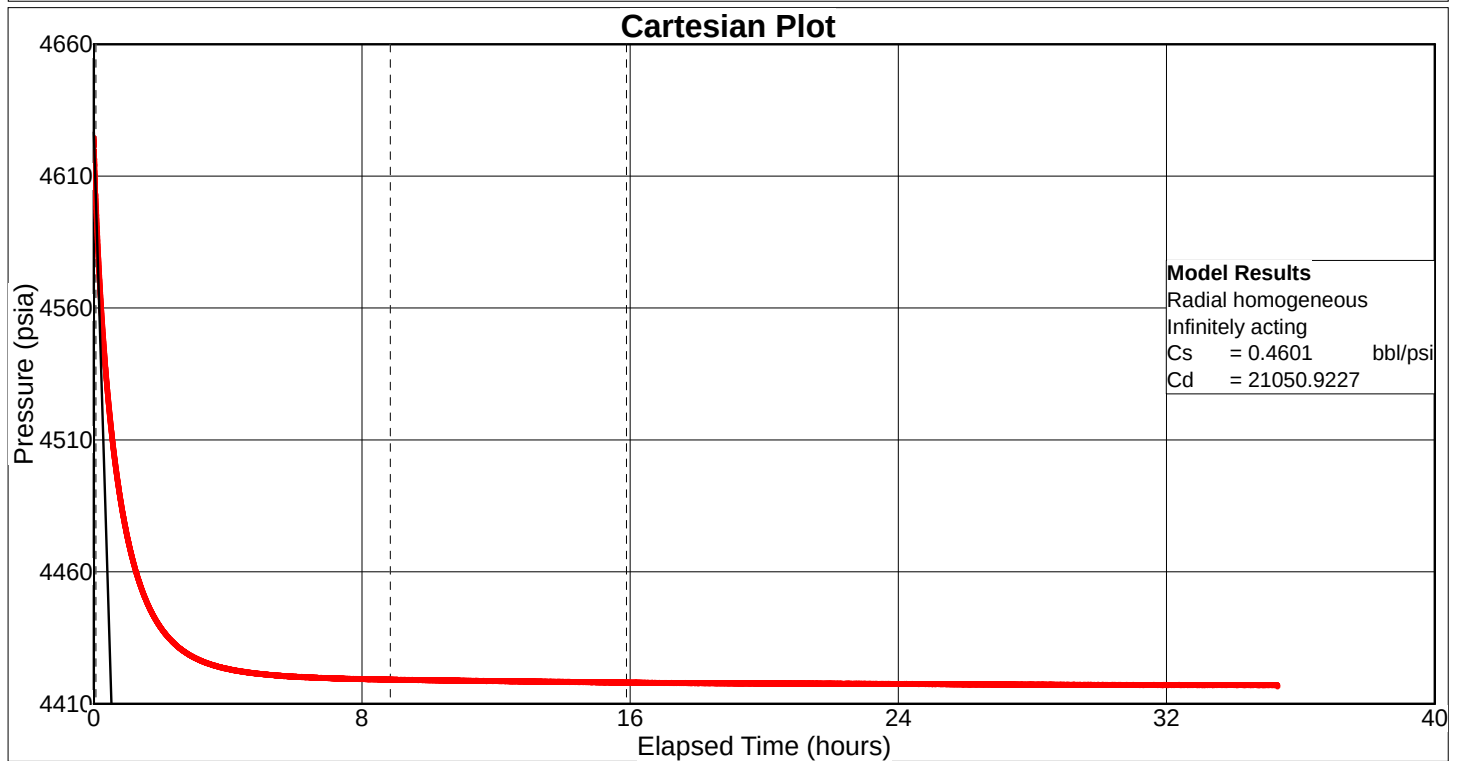
Time Hours	Pressure psia	Rate STB/day
-1836.304722	0.000000	-4923.554051
-1812.304722	0.000000	-4605.377265
-1788.304722	0.000000	-5052.603092
-1764.304722	0.000000	-5052.720238
-1740.304722	0.000000	-4835.513889
-1716.304722	0.000000	-4690.341270
-1692.304722	0.000000	-4674.906349
-1668.304722	0.000000	-4701.107143
-1644.304722	0.000000	-4867.004563
-1620.304722	0.000000	-4845.946429
-1596.304722	0.000000	-5002.277778
-1572.304722	0.000000	-4964.186508
-1547.304722	0.000000	-4924.613178
-1523.304722	0.000000	-4926.675711
-1499.304722	0.000000	-5003.861194
-1475.304722	0.000000	-4412.461624
-1451.304722	0.000000	-4936.942460
-1427.304722	0.000000	-4963.045437
-1403.304722	0.000000	-4973.636822
-1379.304722	0.000000	-4911.452464
-1355.304722	0.000000	-5003.555241
-1331.304722	0.000000	-5125.708251
-1307.304722	0.000000	-5070.021627
-1283.304722	0.000000	-5139.234127
-1259.304722	0.000000	-5165.976190
-1235.304722	0.000000	-4970.464286
-1211.304722	0.000000	-4875.938492
-1187.304722	0.000000	-4916.150711
-1163.304722	0.000000	-4937.277860
-1139.304722	0.000000	-4950.928571
-1115.304722	0.000000	-4810.441865
-1091.304722	0.000000	-4698.563575
-1067.304722	0.000000	-4568.089203
-1043.304722	0.000000	-4651.345238
-1019.304722	0.000000	-4699.420635
-995.304722	0.000000	-4631.486111
-971.304722	0.000000	-4449.426984
-947.304722	0.000000	-4442.587302
-923.304722	0.000000	-4573.071429
-899.304722	0.000000	-4633.103257
-875.304722	0.000000	-4690.275711
-851.304722	0.000000	-4683.894047
-827.304722	0.000000	-4709.593337
-803.304722	0.000000	-4676.809441
-779.304722	0.000000	-4662.864997
-755.304722	0.000000	-4544.623099
-731.304722	0.000000	-4573.309524
-707.304722	0.000000	-4712.349206
-683.304722	0.000000	-4578.559441

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-659.304722	0.000000	-4651.902860
-635.304722	0.000000	-4737.033730
-611.304722	0.000000	-4722.345238
-587.304722	0.000000	-4707.081349
-563.304722	0.000000	-4683.218254
-539.304722	0.000000	-4754.577381
-515.304722	0.000000	-4806.118254
-491.304722	0.000000	-4782.055076
-467.304722	0.000000	-4787.605324
-443.304722	0.000000	-4730.666584
-419.304722	0.000000	-4825.265790
-395.304722	0.000000	-4716.234210
-371.304722	0.000000	-4790.599206
-347.304722	0.000000	-4777.571429
-323.304722	0.000000	-4676.439881
-299.304722	0.000000	-4652.775876
-275.304722	0.000000	-4729.658052
-251.304722	0.000000	-4676.668651
-227.304722	0.000000	-4606.132937
-203.304722	0.000000	-4646.573330
-179.304722	0.000000	-4500.414765
-155.304722	0.000000	-4370.122933
-131.304722	0.000000	-4372.816154
-107.304722	0.000000	-4352.527778
-83.304722	0.000000	-4314.172619
-59.304722	0.000000	-4369.442460
-35.304722	0.000000	-4368.970238
-11.304722	0.000000	-4329.728257
12.695278	0.000000	-4477.938409
36.695278	0.000000	-4551.144841
50.695278	0.000000	-4676.716270
80.695278	4624.970913	-4541.152138
116.011944	4417.000674	0.000000



**Cartesian Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.460134 bbl/psi
Dimensionless wellbore storage	2.1051e4

Cartesian Plot Line Details

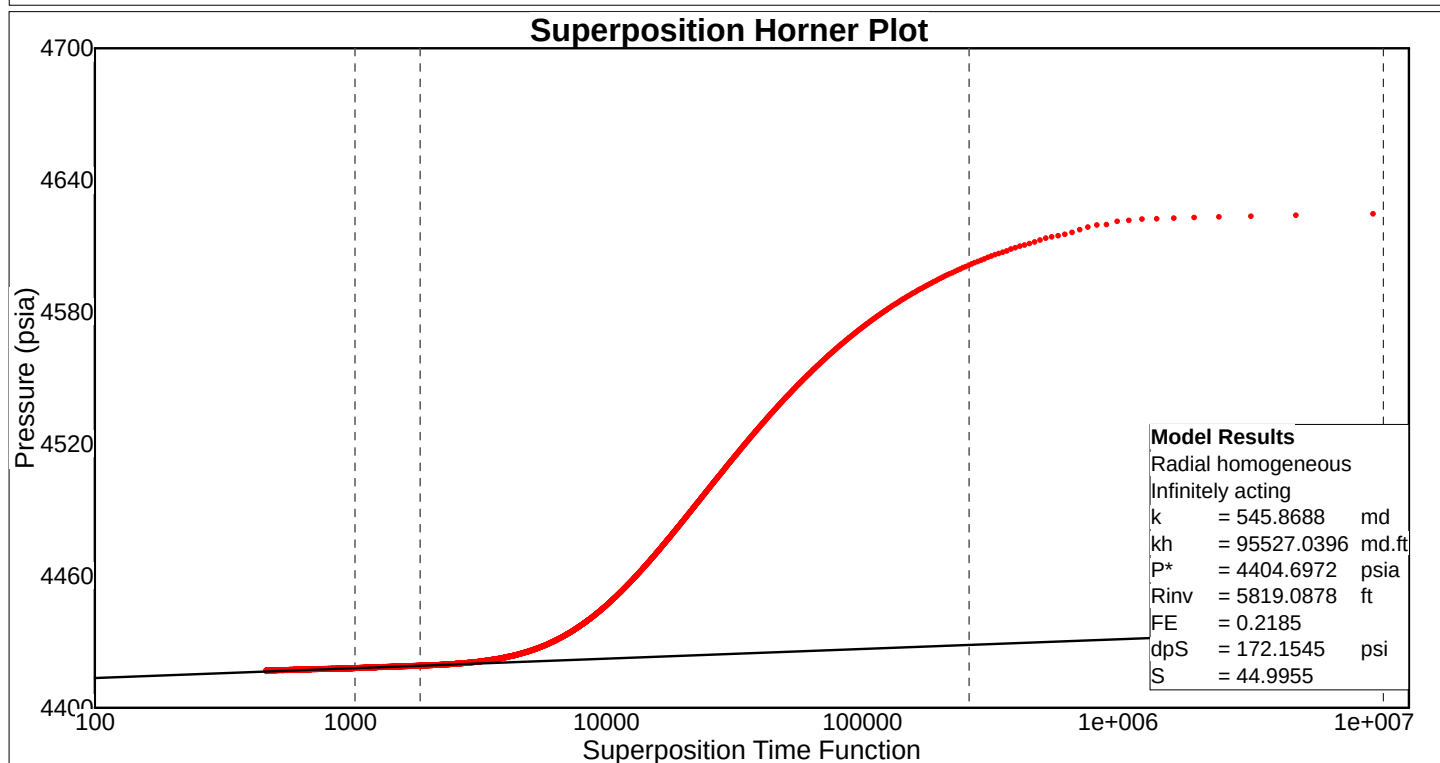
Line type : Wellbore storage

Slope : -411.216

Intercept : 4626.62

Coefficient of Determination : 0.990937

Number of Intersections = 0

**Superposition Horner Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Permeability	545.868798 md
Permeability-thickness	9.5527e4 md.ft
Extrapolated pressure	4404.697197 psia
Radius of investigation	5819.087817 ft
Flow efficiency	0.218452
dP skin (constant rate)	172.154479 psi
Skin factor	44.995496

Superposition Horner Plot Line Details

Line type : Radial flow

Slope : 4.40489

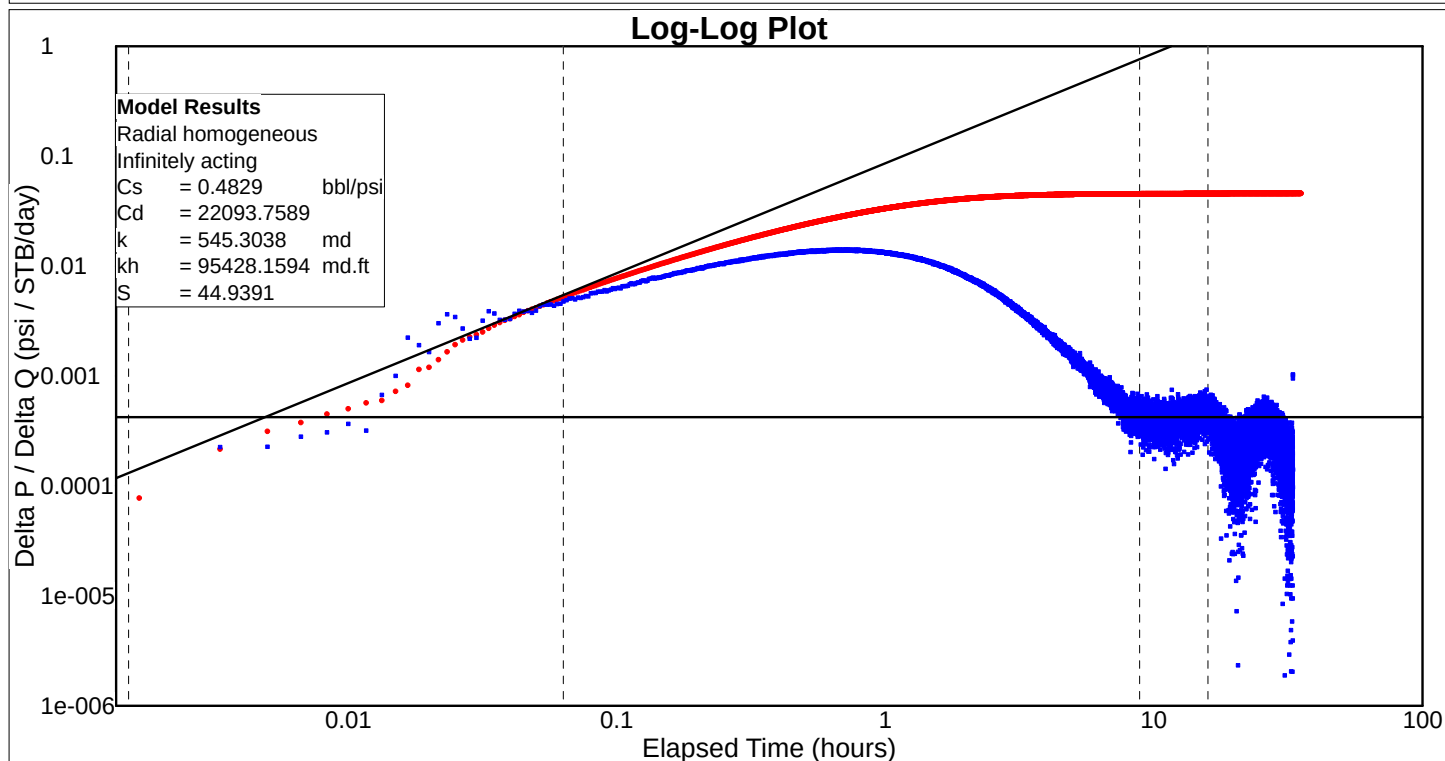
Intercept : 4404.7

Coefficient of Determination : 0.991535

	Radial flow
Extrapolated pressure	4404.697197 psia
Pressure at dt = 1 hour	4423.278507 psia

Number of Intersections = 0

Well Test Analysis Report

**Log-Log Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.482928 bbl/psi
Dimensionless wellbore storage	2.2094e4
Permeability	545.303768 md
Permeability-thickness	9.5428e4 md.ft
Skin factor	44.939057

Log-Log Plot Line Details

Line type : Wellbore storage

Slope : 1

Intercept : 0.0862792

Coefficient of Determination : Not Used

Line type : Radial flow

Slope : 0

Intercept : 0.000421699

Coefficient of Determination : Not Used

Number of Intersections = 0