

UICI-8 WDW-1

Navajo Refining CO.

**2012 Annual Bottom Hole
Pressure Survey & Pressure
Falloff Test for Mewbourne
Well No. 1**

**Subsurface Project
No. 70D6835**



**2012 ANNUAL BOTTOM-HOLE PRESSURE SURVEY AND
PRESSURE FALLOFF TEST FOR MEWBOURNE WELL NO. 1**

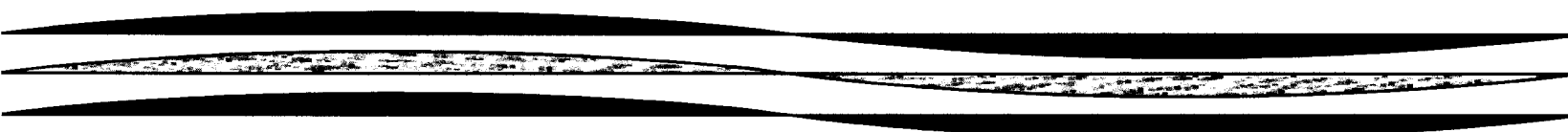
**NAVAJO REFINING COMPANY
ARTESIA, NEW MEXICO**

SUBSURFACE PROJECT NO. 70D6835

**REPORT SUBMITTED:
JANUARY 2013**

PREPARED BY:

**SUBSURFACE CONSTRUCTION CORP.
HOUSTON, TEXAS 77024**



I Thaine W Cook, Jr, PE certify that the following is accurate:

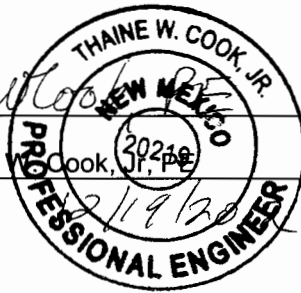
1. I or my agent have visited and examined the Navajo Refining Mewbourne #1 facility;
2. This report was prepared in accordance with good engineering practice and accepted and sound industry practices and standards;
3. I either have prepared engineering portions of this report or they were prepared under my supervision and I certify that they are correct.

Signature

Thaine W Cook, Jr

Name Thane W Cook, Jr, PE

New Mexico PE # 20219



Title: Principal Consultant

Date: 12/19/2012



**2012 ANNUAL BOTTOM-HOLE PRESSURE SURVEY AND
PRESSURE FALLOFF TEST FOR MEWBOURNE WELL NO. 1**

**NAVAJO REFINING COMPANY
ARTESIA, NEW MEXICO
PROJECT NO. 70D6835**

**REPORT SUBMITTED:
JANUARY 2013**

PREPARED BY:

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

TABLE OF CONTENTS

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 2011 Annual Update
TABLE V:	Wells That Have Been Temporarily Abandoned Since the 2011 Annual Update

TABLE OF CONTENTS (CONTINUED)

TABLE VI:	Wells That Have Been Put Back Into Production Since the 2011 Annual Update
TABLE VII:	Wells That Have Been Recompleted Since the 2011 Annual Update
TABLE VIII:	Newly Drilled Wells Since the 2011 Annual Update
TABLE IX:	Tabulation of the Figures Included in the Report
TABLE X:	Comparison of Permeability, Transmissibility, Skin, False Extrapolated Pressure, and Fill Depth
TABLE XI:	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:	Cartesian Plot of Surface Pressure and Injection Rates vs. Time

TABLE OF CONTENTS (CONTINUED)

FIGURE 13: Historical Surface Pressure and Injection Rates vs. Calendar Time

FIGURE 14: Derivative Log-Log Plot

FIGURE 15: Superposition Horner (Semi-Log) Plot

FIGURE 16: Expanded Superposition Horner (Semi-Log) Plot

FIGURE 17: Hall Plot

FIGURE 18: 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 Construction Corp (Subsurface) was contracted by Navajo Refining Company (Navajo) to perform a pressure falloff test, bottom-hole pressure survey, and temperature 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 test plan submitted and approved by the OCD. The test 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 30.77-hour injection period and a 36.03-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 2011 falloff testing) is discussed in Section 10 and geology is discussed 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: WDW-1 UIC I-8
- 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, 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 pound per foot, 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 pound per foot and 29 pound per foot, 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 September 23, 2012, fill was tagged at 9,018 feet.

- h. 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 November 14, 2011 following the 2011 falloff testing completed on November 13, 2011. 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 September 21, 2012, was 2,755,143,650 gallons. The volume of fluid injected into the Mewbourne Well No. 1 was 1,466,030,030 gallons. The volume of fluid injected into the Chukka Well No. 2 was 890,772,418 gallons. The volume of fluid injected into the Gaines Well No. 3 was 398,341,202 gallons. The area of review (AOR) indicates that there are no other 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 and one surface pressure gauge 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. 76120 and 76404) is Spartek Systems. The surface pressure gauge was a quartz crystal gauge (Serial No. 10469) manufactured by 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. 76171 and 75900. 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. 76222 and 76077. 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. 76120 and 76404 has a full range of 0 psi to 6,000 psi, an accuracy of 0.022% of full scale, and a resolution of 0.0003% of full scale. The surface pressure gauge (Serial No. 10469) has a full range of 0 psi to 6,000 psi, an accuracy of 0.03% of full scale, and a resolution of 0.0003% of full scale.

In Gaines Well No. 3, the MRO pressure gauge, Serial No. 76171, has a full range of 0 psi to 6,000 psi, an accuracy of 0.022% of full scale, and a resolution of 0.0003% of full scale. The MRO pressure gauge, Serial No. 75900, has a full range of 0 psi to 6,000 psi, and accuracy of 0.022% of full scale, and a resolution of 0.0003% of full scale.

In Chukka Well No. 2, the MRO pressure gauge, Serial No. 76222, has a full range of 0 psi to 6,000 psi, an accuracy of 0.022% of full scale, and a resolution of 0.0003% of full scale. The MRO pressure gauge, Serial No. 76077, has a full range of 0 psi to 6,000 psi, an accuracy of 0.022% of full scale, and a resolution of 0.0003% 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 2011 update.

No new fresh water wells were reported within the search area since the submittal of the 2011 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 VIII 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 2011 pressure falloff report.

Twenty-eight (28) wells were found in which the owner had changed. One (1) new plugged and abandoned oil and gas well was found. Two (2) wells were placed in temporarily abandoned status. Four (4) wells were found that were returned to production status. Six (6) wells were found that had been recompleted.

There were twenty-nine (29) 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. 157 in Table II. 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 two offset wells identified in the AOR that inject into the same interval: the Gaines Well No. 3 and the Chukka Well No. 2. Both wells 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 September 20, 2012, at 3:15 p.m. and continued until September 21, 2012, at 10:01 p.m., when the Mewbourne Well No. 1 was shut-in. The falloff test ended on September 23, 2012, at 10:02 a.m. The total depth of the well was tagged at 9,018 feet and five-minute gradient stops were made while pulling the pressure gauges out of the wellbore. After the pressure gauge was pulled out of the well on September 23, 2012, the well was turned over to Navajo plant operations personnel.

b. Time of the injection period:

The buildup portion of the testing began on September 20, 2012, when the injection rate was set at an average injection rate of 140 gallons per minute (gpm). The injection rate was held constant for 30.77 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 30.77-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 4,167.06 psia and 92.2°F, respectively.

e. Total shut-in time:

The Mewbourne Well No. 1 was shut-in with offset wells shut-in for 36.03 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 4,015.90 psia. The final temperature was 99.9°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

There are two, 4-inch motor controlled valves installed on the incoming pipeline to Mewbourne Well No. 1. The valves are located 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 wellhead. 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 IX. 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 36.03 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 36.03 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 surface pressures and injection rates versus time for the stabilized injection period of the testing. Figure 13 is a plot of the historical injection rates and surface pressures versus calendar time.

Figure 14 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 0.0024 hours and continues to an elapsed shut in time of 0.031 hours. Radial flow begins at an elapsed shut in time of 15.34 hours and continues until 33.05 hours (OCD Guideline Section IX.15.b).

The reservoir permeability was determined from the radial flow region of the superposition Horner plot, Figure 15. The radial flow regime begins at a Horner time of 297.84 and continues until a Horner time of 143.88, at which time the pressure data departs the semi-log straight-line. Figure 16 shows an expanded view of the radial flow regime. The slope of the radial flow period, as calculated by the analysis software, was 3.807719 psi/cycle (OCD Guideline Section IX.15.c). The injection rate just prior to shut in was 139.0 gpm which is equivalent to 4,752.14 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 202,929 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

$$\frac{k h}{\mu} = 162.6 \frac{(4,752.14)(1.0)}{3.807719}$$

$$= 202,929 \text{ md-ft/cp}$$

The permeability-thickness (flow capacity, OCD Guideline Section IX.15.i), kh , was determined to be 115,670 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:

$$kh = \left(\frac{kh}{\mu} \right) \mu_{\text{reservoir}}$$

$$= (202,929) * (0.57)$$

$$= 115,670 \text{ md-ft}$$

The reservoir permeability (OCD Guideline Section IX.15.e) using the total thickness (see Section 5 and Section 11) of 175 feet was 661 md:

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

$$= \frac{115,670}{175}$$

$$= 661 \text{ md}$$

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 1,466,030,030 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 1,888 feet:

$$r_{\text{waste}} = \left(\frac{(0.13368)(1,466,030,030)}{(\pi)(175)(0.10)} \right)^{\frac{1}{2}}$$

$$= 1,888 \text{ feet}$$

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 2.45 hours:

$$t_{\text{waste}} = 948 \frac{(0.10)(0.57)(8.4 \times 10^{-6})(1,888)^2}{661}$$

$$= 2.45 \text{ hours}$$

Since the time required to pass through the waste is less than the 15.34 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 4,167.06 psia. The pressure determined by extrapolating the radial flow semi-log line to a Δt of one hour, p_{1hr} , was 4,021.86 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 36.08:

$$s = 1.151 \left[\frac{4,167.06 - 4,021.86}{3.807719} - \log \left(\frac{661}{(0.10)(0.57)(8.4 \times 10^{-6})(0.3646)^2} \right) + 3.23 \right]$$

$$= 36.08$$

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 119.39 psi:

$$\begin{aligned} \Delta P_{\text{SKIN}} &= 0.869(m)(s) \\ &= 0.869(3.807719)(36.08) \\ &= 119.39 \text{ psi} \end{aligned}$$

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_{wf} = 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 0.21:

$$E = \frac{4,167.06 - 119.39 - 4,015.9}{4,167.06 - 4,015.9}$$
$$= 0.21$$

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 6,112 feet:

$$R_{inv} = 0.029 \sqrt{\frac{(685)(31.03)}{(0.10)(0.57)(8.4 \times 10^6)}}$$

$$R_{inv} = 6,468 \text{ ft}$$

As indicated on Figure 14, the pressure data departs the radial flow region at an elapsed time from shut in of 21.704 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 17. 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 X (OCD Guideline Section IX.19).

On September 23, 2012, a static pressure gradient survey was conducted while pulling the pressure gauges out of the well. Static gradient stops were conducted at 9,000 feet, 8,000 feet, 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 36.03 hours of shut-in at 7,924 feet, were 4,015.90 psia and 99.9°F, respectively. The gradient survey is summarized in Table XI. The data are graphically depicted in Figure 18.

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.

TABLES

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
NO3-N (mg/L)	<10	<10	--	<10
SO4 (mg/L)	2,200	2000	1,908	2,036
CaCO3 (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".

TAL
Tabulation of Wells Within One Mile Area of Review

ID NO	API	Unit No.	TOWNS		RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
			Sect	HIP									
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	MCQUADRANGLE, LC	O	8/13/2002	ZONE ABAN	2/27/1948
17		J	36	17S	27E			DOOLEY STATE #3	MARTIN YATES III	O			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							MISPLLOT 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

TAL .J
Tabulation of Wells Within One Mile Area of Review

ID	NO	API	Unit	No.	Sect	HIP	TOWNS	RNG	NS	FTG	EW	FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
50	30-015-01650	J	31	175	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	175	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	175	28E	2310S	330W	RAMPO #002	APACHE CORPORATION	O		ACTIVE	7/16/1955					
53	30-015-01648	3	31	175	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	175	28E	990S	330W	RAMPO #001	APACHE CORPORATION	O		ACTIVE	5/1/1948					
55	30-015-01647	4	31	175	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	175	28E	660S	2082W	EMPIRE ABO UNIT #022A	BP AMERICA PRODUCTION COMPANY	O		P&A	1/22/1960					
57	30-015-10118	N	31	175	28E	766S	2188W	STATE FV #001	APACHE CORPORATION	O		ACTIVE	3/1/1963					
58	30-015-01653	O	31	175	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	175	28E	660S	2310E	WDW #001	NAVAJO REFINING CO. PIPELINE DIVISION	I		ACTIVE	8/4/1998					
60	30-015-01649	O	31	175	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	175	28E	990S	660E	NORTHWEST ARTESIA UNIT #011	LIME ROCK RESOURCES A, LP	O		ACTIVE	5/8/1967					
62	30-015-01641	P	31	175	28E	660S	660E	EMPIRE ABO UNIT #024	APACHE CORPORATION	O		ACTIVE	3/12/1960					
63	30-015-01654	D	32	175	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	175	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	175	28E	2280N	1980W	AA STATE NO. 1	APACHE CORPORATION	O		ACTIVE	8/24/1960					
66	30-015-10818	K	32	175	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	175	28E	1650S	2310W	EMPIRE ABO UNIT #026B	APACHE CORPORATION	O		ACTIVE	3/27/1960					
68	30-015-10795	L	32	175	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	175	28E	1650S	990W	EMPIRE ABO UNIT #025A	APACHE CORPORATION	O		ACTIVE	4/13/1960					
70	30-015-20043	M	32	175	28E	990S	760W	NORTHWEST ARTESIA UNIT #012	APACHE CORPORATION	O		T/A	5/9/1967					
71	30-015-01660	M	32	175	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	175	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	175	28E	660S	1980W	EMPIRE ABO UNIT #026A	APACHE CORPORATION	O		ACTIVE	2/14/1960					
74	30-015-21539	N	32	175	28E	150S	1400W	EMPIRE ABO UNIT #261	APACHE CORPORATION	O		ACTIVE	7/25/1975					
75	30-015-22009	O	32	175	28E	330S	2481E	EMPIRE ABO UNIT #272	APACHE CORPORATION	O		ACTIVE	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		ACTIVE	3/27/1960					
79	30-015-22750	4	5	18S	28E	660N	150W	EMPIRE ABO UNIT #251	APACHE CORPORATION	O		SHUT IN	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	O		T/A	12/21/1959					
90	30-015-21542	2	6	18S	28E	1260N	1580E	EMPIRE ABO UNIT #231	APACHE CORPORATION	O		ACTIVE	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		SHUT IN	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					

TAL
Tabulation of Wells Within One Mile Area of Review

ID	NO	API	Unit	No.	Sect	HIP	TOWNS		RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
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	ACTIVE	7/8/1979					
105	30-015-22593	G	6	18S	28E	1900N	2441E	EMPIRE ABO UNIT #234	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	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	ACTIVE	5/7/2009 P&A					
108		H	6	18S	28E						MISPLUG OF 107	4/13/1976					
109	30-015-22490	G	6	18S	28E	2550N	2050E	EMPIRE ABO UNIT #233	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	6/5/1978					
110	30-015-02616	H	6	18S	28E	1650N	990E	EMPIRE ABO UNIT #024C	APACHE CORPORATION	O	ACTIVE	3/24/1960					
111	30-015-23547	H	6	18S	28E	1950N	660E	EMPIRE ABO UNIT #241	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	4/12/1981					
112	30-015-02617	I	6	18S	28E	2310S	990E	EMPIRE ABO UNIT #024K	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	12/12/2002 P&A					
113	30-015-22528	J	6	18S	28E	2300S	1570E	EMPIRE ABO UNIT #232A	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	2/5/1979					
114	30-015-02611	J	6	18S	28E	2310S	2310E	STATE NO. 1	BARNEY COCKBURN	O	ACTIVE	8/15/1949 P&A					
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	ACTIVE	8/13/1978					
117	30-015-02618	J	6	18S	28E	1647S	2076E	CAPITOL STATE NO. 1	MILLER BROS OIL CO	G	ACTIVE	3/21/1955 P&A					
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						MISPLUG						
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	ACTIVE	5/1/1961					
127	30-015-25503	P	6	18S	28E	660S	330E	KIMBERLY STATE NO. 1	DICKSON PETROLEUM CO	O	ACTIVE	12/30/1985 P&A					
128	30-015-02612	P	6	18S	28E	330S	330E	STATE NO. 1	D & H OIL CO	O	ACTIVE	5/13/1952 P&A					
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	LIME ROCK RESOURCES II-A, L.P.	O	ACTIVE	7/7/1959					
131		C	1	18S	27E			HILL #4	MALCO REFINERIES		ACTIVE	5/10/1948 P&A					
132		C	1	18S	27E						MISPLUG						
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						MISPLUG						
138	30-015-21552	G	1	18S	27E	2500N	2500E	EMPIRE ABO UNIT #191	CFM OIL, LLC	O	ACTIVE	9/7/1975					
139	30-015-00711	H	1	18S	27E	1980N	660E	EMPIRE ABO UNIT #020C	ALAMO PERMIAN RESOURCES, LLC	O	ACTIVE	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		ACTIVE	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	G	ACTIVE	1/16/1993					
145	30-015-00697	I	1	18S	27E	1980S	660E	EMPIRE ABO UNIT #020K	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	1/5/2003 P&A					
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	ALAMO PERMIAN RESOURCES, LLC	O	ACTIVE	8/20/1959					
148	30-015-22560	J	1	18S	27E	220S	1390E	EMPIRE ABO UNIT #192	BP AMERICA PRODUCTION COMPANY	O	ACTIVE	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					

TAL I
Tabulation of Wells Within One Mile Area of Review

ID	NO	API	Unit	TOWNS	Unit No.	Sect	HIP	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
150	30-015-22658	J	1	18S	27E	1500S	2130E	EMPIRE ABO UNIT #194	APACHE CORPORATION	O	ACTIVE	11/14/1978				
151	30-015-22659	K	1	18S	27E	2290S	2445W	EMPIRE ABO UNIT #184	APACHE CORPORATION	O	SHUT IN	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 #0188	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	WDW-3	EMPIRE ABO UNIT #018D	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 #0208	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				
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	30-015-00715	4	1	18S	27E	330N	330W	SOUTH RED LAKE GRAYBURG UNIT #037	LEGACY RESERVES OPERATING LP	I	ACTIVE					
748	30-015-00701	D	1	18S	27E	330N	330W	SOUTH RED LAKE GRAYBURG UNIT 37 WIW	FAIRWAY RESOURCES OPERATING LLC	O	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	30-015-00704	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	30-015-00714	N	1	18S	27E	990S	660W	EMPIRE ABO UNIT #017B	VALLEY REFINING CO	O	12/20/1943 P&A	12/20/1943				
756	30-015-00705	M	1	18S	27E	330N	610E	STATE 2	BRAINARD & GUY	O	7/21/2004 P&A	6/25/1959				
757	30-015-00721	1	2	18S	27E	330N	990E	SOUTH RED LAKE GRAYBURG UNIT #036	FAIRWAY RESOURCES OPERATING LLC	O	1/31/1942 NO COMPL	1/31/1942				
765	30-015-00724	1	2	18S	27E	990N	330E	EMPIRE ABO UNIT #016B	LIME ROCK RESOURCES A, L.P.	O	PROD	11/6/1947				
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	MAC 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	30-015-00741	G	2	18S	27E	2310N	1650E	HUDSON #2	RUTTER & WILBANKS	O	1/1/1957	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	30-015-00717	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	APACHE CORPORATION	O	ACTIVE	2/6/1995				
786	30-015-00716	J	2	18S	27E	1980S	1830E	EMPIRE ABO UNIT #015	APACHE CORPORATION	O	ACTIVE	3/23/1959				

TAL .JL
Tabulation of Wells Within One Mile Area of Review

ID	Unit			TOWNS			RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
	NO	API	No.	Sect	HIP										
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	ACTIVE	9/13/1979		
792		O	2	18S	27E				APACHE CORPORATION	O	MISPLUG OF 814	12/20/1978			
793	30-015-22609	N	2	18S	27E	1200S	1900W	EMPIRE ABO UNIT #143		MISPLUG OF 765	O	ACTIVE			
795		P	2	18S	27E				APACHE CORPORATION	O	T/A	11/4/1975			
796	30-015-21544	O	2	18S	27E	1110S	1322E	EMPIRE ABO UNIT #151		T/A	O	T/A	5/1/1979		
797	30-015-22885	O	2	18S	27E	1040S	2025E	EMPIRE ABO UNIT #155	APACHE CORPORATION	O	T/A	1/20/1959			
799	30-015-00722	P	2	18S	27E	660S	660E	EMPIRE ABO UNIT #016A		BP AMERICA PRODUCTION COMPANY	O	2/24/2009 P&A	2/5/2009 P&A		
800	30-015-22808	O	2	18S	27E	600S	1330E	EMPIRE ABO UNIT #156	BP AMERICA PRODUCTION COMPANY	O	2/11/2009 P&A	11/19/1958			
801	30-015-00731	O	2	18S	27E	660S	1980E	EMPIRE ABO UNIT #015A		BP AMERICA PRODUCTION COMPANY	O	1/27/2009 P&A	12/4/1978		
802	30-015-22669	O	2	18S	27E	800S	2500E	EMPIRE ABO UNIT #154	BP AMERICA PRODUCTION COMPANY	O	10/30/2008 P&A	4/20/1977			
805	30-015-22013	O	2	18S	27E	90S	1456E	EMPIRE ABO UNIT #153		APACHE CORPORATION	O	T/A	6/17/1976		
806	30-015-21825	O	2	18S	27E	320S	2602E	EMPIRE ABO UNIT #152	BP AMERICA PRODUCTION COMPANY	O	P&A				
807	30-015-22608	N	2	18S	27E	100S	1950W	EMPIRE ABO UNIT #142		(No info on dates)	O	ACTIVE	7/1/1976		
808	30-015-21807	M	2	18S	27E	275S	1243W	EMPIRE ABO UNIT #132	APACHE CORPORATION	O	ACTIVE	10/21/1958			
812	30-015-00730	N	2	18S	27E	660S	1980W	EMPIRE ABO UNIT #014		BP AMERICA PRODUCTION COMPANY	O	12/12/2008 P&A	10/21/1959		
813	30-015-00720	A	2	18S	27E	990N	1650E	RIVERWOLF UNIT #004	APACHE CORPORATION	O	ACTIVE	5/17/1977			
814	30-015-22051	K	2	18S	27E	1370S	2445W	EMPIRE ABO UNIT #141A		BP AMERICA PRODUCTION COMPANY	O	10/25/2004 P&A	10/25/2004		
836	30-015-00869	A	11	18S	27E	330N	653E	EMPIRE ABO UNIT #016C	BP AMERICA PRODUCTION COMPANY	O	8/16/2006 P&A	8/16/2006			
837	30-015-22568	B	11	18S	27E	400N	1450E	EMPIRE ABO UNIT #151B		BP AMERICA PRODUCTION COMPANY	O	1/4/2009 P&A	5/6/1979		
838	30-015-22838	B	11	18S	27E	200N	1925E	EMPIRE ABO UNIT #153B	BP AMERICA PRODUCTION COMPANY	O	7/16/2004 P&A	7/16/2004			
839	30-015-00868	B	11	18S	27E	660N	1980E	EMPIRE ABO UNIT #015C		BP AMERICA PRODUCTION COMPANY	O	9/24/2008 P&A	8/23/1978		
840	30-015-22569	B	11	18S	27E	560N	2588E	EMPIRE ABO UNIT #152B	APACHE CORPORATION	O	ACTIVE	5/21/1979			
841	30-015-22834	C	11	18S	27E	225N	2280W	EMPIRE ABO UNIT #141B		ARCO OIL & GAS	O	9/5/1957 P&A	9/5/1957		
842	30-015-00864	C	11	18S	27E	660N	1980W	EMPIRE ABO UNIT M NO. 14	APACHE CORPORATION	O	ACTIVE	5/23/1979			
843	30-015-22833	D	11	18S	27E	450N	1175W	EMPIRE ABO UNIT #133B		ARCO OIL & GAS	O	4/26/1958 P&A	4/26/1958		
844	30-015-00867	D	11	18S	27E	660N	660W	EMPIRE ABO UNIT M NO. 13	ARCO OIL & GAS	O	7/10/1978 P&A	7/10/1978			
846	30-015-22556	D	11	18S	27E	1100N	1200W	EMPIRE ABO UNIT M NO. 131		AMOCO PRODUCTION CO	O	10/16/1971 P&A	10/16/1971		
848	30-015-20510	F	11	18S	27E	1650N	1653W	MALCO S NO. 1	ARCO OIL & GAS	O	2/3/1961 P&A	2/3/1961			
849	30-015-00865	F	11	18S	27E	1650N	1980W	EMPIRE ABO UNIT N NO. 14		ARCO OIL & GAS	O	3/27/1958 P&A	3/27/1958		
850	30-015-00866	E	11	18S	27E	1980N	660W	EMPIRE ABO UNIT N NO. 131	AMOCO PRODUCTION CO	O	9/1/1956 P&A	9/1/1956			
851	30-015-00870	J	11	18S	27E	1980S	1980E	SMITH-MCPHERSON NO. 1		OSCAR HOWARD	O	4/15/2027 P&A			
852	30-015-01201	N	11	18S	27E			AN ETZ #3	OSCAR HOWARD		2/4/2027 P&A				
853	30-015-01202	O	11	18S	27E			AN ETZ #2		B.R. POLK, JR.		10/14/1949 P&A	10/14/1949		
854	30-015-00863	N	11	18S	27E			VICKERS #1	CHESAPEAKE OPERATING INC	G	ACTIVE	5/18/1984			
855	30-015-24857	M	11	18S	27E	700S	990W	FEDERAL DH GAS COM #001		ROBERT G COX	O	8/7/1973 P&A	8/7/1973		
856	30-015-20535	D	12	18S	27E	330N	455W	FEDERAL EA 2	RHONDA OPERATING CO	O	4/12/1994 P&A	4/12/1994			
857	30-015-00871	D	12	18S	27E	330N	330W	FEDERAL EA #001		RHONDA OPERATING CO	O	3/16/1980 D&A	3/16/1980		
858	30-015-23115	D	12	18S	27E	330N	380W	FEDERAL EA NO. 3	HARLOW ENTERPRISES LLC	O	ACTIVE	4/25/1987			
859	30-015-25738	G	12	18S	27E	2310N	2310E	COMSTOCK FEDERAL #009		BILL MILLER	O	ACTIVE	4/23/1985		
860	30-015-25270	F	12	18S	27E	2310N	2310W	CHUKKA FEDERAL #001	NAVAJO REFINING COMPANY	I	ACTIVE	7/18/1973			
861	30-015-20894	E	12	18S	27E	1980N	660W	WDW #002		HARLOW ENTERPRISES LLC	O	ACTIVE	6/29/1948		
862	30-015-00874	J	12	18S	27E	2310S	2355E	COMSTOCK FEDERAL #007	MCKEE-JONES	O	2/18/1943 D&A				
863	30-015-00872	L	12	18S	27E	310S	990W	MAGRUDER NO. 1			O	ACTIVE			
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	O	2/27/1945 P&A	2/27/1945		

TAE
Tabulation of Wells Within One Mile Area of Review

ID		Unit		TOWNS		WELL			DATE - Comp or Plug				
NO	API	No.	Sect	HIP	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
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	O	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	
879	30-015-25241	C	13	18S	27E	330N	1650W	ARTESIA STATE #001	BILL MILLER	O		ACTIVE	
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-GOV'T 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	
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	I	31	17S	28E	460N	990W	ENRON STATE #004	LIME ROCK RESOURCES A, LP	O		ACTIVE	
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	5/4/2004		5/4/2004
929	30-015-32309	2	1	18S	27E	330N	1690E	AAO FEDERAL #003	APACHE CORPORATION	O	4/10/2003		4/10/2003
930	30-015-32308	3	1	18S	27E	430N	2310W	AAO FEDERAL #002	APACHE CORPORATION	O	9/19/2002		9/19/2002
931	30-015-32307	4	1	18S	27E	330N	990W	AAO FEDERAL #001	APACHE CORPORATION	O		ACTIVE	
932	30-015-22816	O	1	18S	27E	1120S	1440E	EMPIRE ABO UNIT L #192	APACHE CORPORATION	O		ACTIVE	
933	30-015-20388	N	1	18S	27E	990S	2297E	EMPIRE ABO #5	ARCO OIL & GAS	O	6/23/1980	ABAN LOCATION	6/28/1980
934	30-015-27719	I	12	18S	27E	1650S	990E	CHALK BLUFF 12 FED #001	ARCO OIL & GAS	O	12/31/9999	SAME AS 158	
935	30-015-27437	B	14	18S	27E	660N	1980E	BEAUREGARD ANP STATE COM #001	MEWBOURNE OIL CO	G		ABAN LOCATION	
936	30-015-31086	E	5	18S	28E	1650N	990W	LP STATE #001	YATES PETROLEUM CORPORATION	G		ABAN LOCATION	
937	30-015-31109	E	5	18S	28E	2301N	230W	LP STATE #002	MARBOB ENERGY CORP	O	3/11/2008	P&A	3/11/2008
									APACHE CORPORATION	O		PROPOSED	

TAL
Tabulation of Wells Within One Mile Area of Review

ID	API	Unit	No.	Sect	HIP	TOWNS	RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
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	30-015-36281	1	18S	27E	2193S	1520W	SUN DEVILS FEDERAL NO. 001	MACK ENERGY CORPORATION	O	PERMIT TO DRILL					
968	30-015-38240	G	36	17S	27E	1425N	1520E	KIOWA STATE NO. 3	COG OPERATING, LLC	O	PERMIT TO DRILL				
969	30-015-39029	G	36	17S	27E	2210N	2310E	CONKLIN STATE NO. 1-Y	G AND C SERVICE	O	ACTIVE				
970	30-015-39321	M	36	17S	27E	990S	890W	BIG BOY STATE NO. 1	COG OPERATING, LLC	O	PERMIT TO DRILL				
971	30-015-39322	M	36	17S	27E	840S	425W	BIG BOY STATE NO. 3	COG OPERATING, LLC	O	PERMIT TO DRILL				
972	30-015-39323	O	36	17S	27E	870S	1560E	BIG BOY STATE NO. 5	COG OPERATING, LLC	O	PERMIT TO DRILL				
973	30-015-39324	O	36	17S	27E	480S	2210E	BIG BOY STATE NO. 6	COG OPERATING, LLC	O	PERMIT TO DRILL				
974	30-015-39325	O	36	17S	27E	990S	2210E	BIG BOY STATE NO. 7	COG OPERATING, LLC	O	PERMIT TO DRILL				
975	30-015-39326	O	36	17S	27E	275S	1560E	BIG BOY STATE NO. 8	COG OPERATING, LLC	O	PERMIT TO DRILL				
976	30-015-39401	P	36	17S	27E	1110S	630E	EMPIRE ABO UNIT NO. 417	APACHE CORPORATION	O	PERMIT TO DRILL				
977	30-015-39009	G	2	18S	27E	1650N	2430E	EMPIRE ABO UNIT NO. 415	APACHE CORPORATION	O	PERMIT TO DRILL				
978	30-015-39066	L	2	18S	27E	2551S	1170W	EMPIRE ABO UNIT NO. 416	APACHE CORPORATION	O	PERMIT TO DRILL				
979	30-015-38234	P	30	17S	28E	430S	800E	ANTHONY NO. 2	LIME ROCK RESOURCES	O	ACTIVE				
980	30-015-39299	M	30	17S	28E	990S	990W	MAPLE STATE NO. 5	COG OPERATING, LLC	O	PERMIT TO DRILL				
981	30-015-39300	M	30	17S	28E	330S	330W	MAPLE STATE NO. 6	COG OPERATING, LLC	O	PERMIT TO DRILL				
982	30-015-38512	D	30	17S	28E	990N	940W	ENRON STATE NO. 16	LIME ROCK RESOURCES	O	ACTIVE				
983	30-015-39004	P	31	17S	28E	150S	1300E	EMPIRE ABO UNIT NO. 401	APACHE CORPORATION	O	PERMIT TO DRILL				
984	30-015-39011	O	31	17S	28E	1190S	1320E	EMPIRE ABO UNIT NO. 419	APACHE CORPORATION	O	PERMIT TO DRILL				
985	30-015-39020	O	31	17S	28E	140S	2560E	EMPIRE ABO UNIT NO. 408	APACHE CORPORATION	O	PERMIT TO DRILL				

TAE
Tabulation of Wells Within One Mile Area of Review

ID	NO	API	Unit	TOWNS			RNG	NS FTG	EW FTG	WELL NAME	OPERATOR	WELL TYPE	PLUG DATE	STATUS	DATE - Comp or Plug
985	30-015-38513	J	32	17S	28E	2310S	2032E	JEFFER 32 STATE NO. 3	LIME ROCK RESOURCES	O	ACTIVE				4/30/2012
986	30-015-39006	J	32	17S	28E	2400S	2450E	EMPIRE ABO UNIT NO. 407	APACHE CORPORATION	O	PERMIT TO DRILL				
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	PERMIT TO DRILL				
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				
1005	30-015-40428	M	36	17S	27E	200S	485W	BIG BOY STATE NO. 2	COG OPERATING, LLC	O	PERMIT TO DRILL				
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	PERMIT TO DRILL			11/7/2011	
1016	30-015-39020	O	31	17S	28E	140S	2560E	EMPIRE ABO UNIT NO. 408	APACHE CORPORATION	O	ACTIVE			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	PERMIT TO DRILL				
1024	30-015-40339	D	32	17S	28E	990N	330W	ENRON STATE NO. 18	LRE OPERATING, LLC	O	PERMIT TO DRILL				

TABLE III

Well Changes in the Combined One Mile Area of Review Since the 2011 Annual Report for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sec	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
5	30 015 00690	G	36	17S	27E	1830 FNL & 2205 FEL	Conklin #2	G & C Service	Recompletion: Install 4-1/2" liner to 480 ft and cement in place with 100 sks. Well is back in production						1	
6	30 015 00667	G	36	17S	27E	2310FNL & 2310 FEL	South Red Lake Grayburg Unit #01	Legacy Reserves Operating LP	Changed owner from Fairway Resources Operating Inc to Legacy Reserves Operating LP	1						
47	30 015 10833	I	31	17S	28E	1980 FSL & 660 FEL	Northwest Artesia Unit No. 10	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
61	30 015 20042	O	31	17S	28E	990 FSL & 660 FEL	Northwest Artesia Unit No. 11	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
70	30 015 20043	M	32	17S	28E	990 FSL & 760 FWL	Northwest Artesia Unit No. 12	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
82	30 015 02602	F	05	18S	28E	1650 FNL & 1650 FWL	Empire Abo Unit No. 026D	Apache Corporation	Recompletion: Added perforations in Upper Abo formation at 5969'-5980'-6015-6030'; 6030'-6095' with 2 SPF and acidized. Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC and to production #2011. This is a STD well. Perfs from 7518' to 7812'					1		
83	30 015 25522	L	05	18S	28E	2240 FSL & 400 FWL	Walker Silt Unit No. 001	Walker Silt, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC							
87	30 015 20019	A	06	18S	29E	330 FNL & 330 FEL	Northwest Artesia Unit No. 16	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
355	30 015 00676	M	36	17S	27E	330 FNL & 990 FWL	Empire Abo unit # 17	Apache Corporation	Recompletion: Perforate Abo shale at 5330'-5332'; 5380'-5382'; 5430'-5432' with 4 SPF. frac the new perfs.							
765	30 015 00724	1	02	18S	27E	990 FNL & 330 FEL	Empire Abo Unit No. 16B	Apache Corporation	Recompletion: Perforate Abo shale at 5444'-5446'; 5480'-5482'; 5512'-5514'; 5290'-5292'; 5340'-5342'; 5392'-5394' with 4 SPF acidize and frac.							
797	30 015 22885	O	02	18S	27E	1040 FSL & 2025 FEL	Empire Abo Unit No. 15S	Apache Corporation	Recompletion: Perforate Abo shale at 5795'-5805'; 5811'-5816'; 5860'-5869'; 5890'-5900'; 5909'-5920'; 5950'-5955' with 2 SPF and 120 deg phasing and acidize perfs. Well placed back into T&A status.							
814	30 015 22051	K	02	18S	27E	1370 FSL & 2445 FWL	Empire Abo Unit No. 141A	Apache Corporation	P&A: set CIBP at 5625 ft and fill wellbore with cement							
911	30 015 31123	H	36	17S	27E	1980 FNL & 760 FEL	No Bluff 36 State Com #2	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
917	30 015 30784	A	31	17S	28E	330 FNL & 480 FEL	NW State No. 12	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
918	30 015 30893	A	31	17S	28E	973 FNL & 950 FEL	NW State No. 26	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
919	30 015 32162	D	31	17S	28E	460 FNL & 990 FWL	Emron State No. 4	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
920	30 015 30783	H	31	17S	28E	1650 FNL & 330 FEL	NW State No. 11	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
921	30 015 30849	I	31	17S	28E	2310 FSL & 270 FEL	NW State No. 9	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
922	30 015 30760	P	31	17S	28E	735 FSL & 330 FEL	NW State No. 10	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
923	30 015 31920	D	32	17S	28E	990 FNL & 990 FWL	Emron State No. 2	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
924	30 015 30781	K	32	17S	28E	1900 FSL & 2146 FWL	NW State No. 5	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
925	30 015 30777	L	32	17S	28E	2310 FSL & 990 FWL	NW State No. 6	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
926	30 015 30685	M	32	17S	28E	990 FSL & 990 FWL	NW State No. 7	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
927	30 015 30815	N	32	17S	28E	1000 FSL & 2126 FWL	NW State No. 8	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
938	30 015 30785	A	06	18S	28E	430 FNL & 330 FEL	NW State #015	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
954	30 015 35050	D	32	17S	28E	330 FNL & 500 FWL	Emron State No. 12	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
961	30 015 36978	D	31	17S	28E	990 FNL & 330 FWL	Emron State No. 15	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
962	30 015 36554	L	32	17S	28E	1770 FSL & 550 FWL	NW State No. 29	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
963	30 015 36689	K	32	17S	28E	1630 FSL & 1710 FWL	NW State No. 30	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
964	30 015 37057	N	32	17S	28E	330 FSL & 1750 FWL	NW State No. 31	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
965	30 015 37058	M	32	17S	28E	330 FSL & 330 FWL	NW State No. 32	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
967	30 015 38420	M	36	17S	27E	840 FSL & 425 FWL	Kiewit State No. 3	Cog Operating LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1						
969	30 015 39321	M	36	17S	27E	990 FSL & 890 FWL	Big Boy State No. 1	Cog Operating LLC	NEW: Drilled to TD of 5030'; perforations at 3755'-3980'; 4040'-4200'; 4350'-4600'; 1 SPF in Yesso formation. Completed on 12/19/11							1
970	30 015 39322	M	36	17S	27E	840 FSL & 425 FWL	Big Boy State No. 3	Cog Operating LLC	NEW: Drilled to TD of 5015'; perforations at 3740'-3990'; 4050'-4300'; 4360'-4610'; 1 SPF in Yesso formation. Completed on 1/10/12							1
971	30 015 39323	O	36	17S	27E	870 FSL & 1560 FEL	Big Boy State No. 5	Cog Operating LLC	NEW: Drilled to TD of 4953'; perforations at 4375'-4600'; 4090'-4315'; 3805'-4030'; 3410'-3660'; 1 SPF in Yesso formation. Completed on 5-21-12							1
972	30 015 39324	O	36	17S	27E	480 FSL & 2210 FEL	Big Boy State No. 6	Cog Operating LLC	NEW: Drilled to TD of 5072'; perforations at 3430'-3680'; 3780'-4030'; 4090'-4340'; 4400'-4650'; 1 SPF in Yesso formation. Completed on 1-19-12							1
973	30 015 39325	O	36	17S	27E	990 FSL & 2210 FEL	Big Boy State No. 7	Cog Operating LLC	NEW: Drilled to TD of 5120'; perforations at 3360'-3615'; 3795'-4020'; 4080'-4305'; 4385'-4690'; 1 SPF in Yesso formation. Completed on 1-30-12							1

TABLE III

Well Changes in the Combined One Mile Area of Review Since the 2011 Annual Report for Navajo's WDW-1, WDW-2, and WDW-3

ID	API No.	Unit	Sec	Town	Range	Footages	Well Name	Operator	Changes	Change of Owner	P&A	T&A	Prod	Recomp	New	Total
975	30 015 39001	P	36	17S	27E	1110 FSL & 630 FEL	Empire Abo Unit No. 417	Apache Corp	NEW: Drilled to TD of 6300'. perforations at 5734'-5831' 2 SPF in Abo formation. Completed on 3-21-12						1	1
976	30 015 39009	G	02	18S	27E	1650 FNL & 2430 FEL	Empire Abo Unit No. 415	Apache Corp	NEW: Drilled to TD of 6300'. perforations at 5386'-5700' 2 SPF in Abo formation. Completed on 1-17-12						1	1
977	30 015 39006	E	02	18S	27E	2420 FNL & 185 FWL	Empire Abo Unit No. 416	Apache Corp	NEW: Permit to Drill, changed surface hole location. Changed to production on 10/22/2011. Perforations at 3215'-3543'. Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1					1	1
981	30 015 38512	D	31	17S	28E	990 FNL & 940 FWL	Enron State No. 16	LRE Operating, LLC	Changed owner from Lime Rock Resources A, LP to LRE Operating, LLC	1			1			1
985	30 015 38513	J	32	17S	28E	2310 FSL & 2032 FEL	Jeffrey 32 State No. 3	LRE Operating, LLC	Changed to production on 12/17/2011. Perfs at 5836'-6030' in Abo formation.	1					1	1
988	30 015 39006	J	32	17S	28E	2400 FSL & 2450 FEL	Empire Abo Unit No. 407	Apache Corp	New drill. Changed to production. Perforations in th Abo at 5774'-5938' (2 SPF, 188 holes). Started production on 1/14/2012				1			1
990	30 015 39021	D	06	18S	28E	40 FNL & 145 FWL	Empire Abo Unit No. 411	Apache Corp	NEW: Drilled to TD of 4900'. perforations at 3260'-3510'. 3765'-3900'. 4050'-4300'. 4350'-4610' 1 SPF in Yaso formation. Completed on 4-30-12						1	1
1004	30 015 39056	G	36	17S	27E	2176 FNL & 1858 FEL	Kowa State No. 8	Cog Operating LLC	NEW: Permit To Drill						1	1
1005	30 015 40428	M	36	17S	27E	200 FSL & 485 FWL	Big Boy State No. 2	Cog Operating LLC	NEW: Permit To Drill						1	1
1006	30 015 40429	M	36	17S	27E	492 FSL & 806 FWL	Big Boy State No. 4	Cog Operating LLC	NEW: Permit To Drill						1	1
1007	30 015 39698	A	01	18S	27E	1258 FNL & 1005 FEL	Empire Abo Unit No. 412	Apache Corp	NEW: Permit To Drill						1	1
1008	30 015 39699	3	01	18S	27E	1305 FNL & 2535 FWL	Empire Abo Unit No. 413	Apache Corp	NEW: Permit To Drill						1	1
1009	30 015 39900	4	01	18S	27E	1120 FNL & 1205 FWL	Empire Abo Unit No. 414	Apache Corp	NEW: Permit To Drill						1	1
1011	30 015 38564	O	30	17S	28E	330 FSL & 2210 FEL	Staley State No. 9	LRE Operating, LLC	NEW to AOR Perforations: 3666'-3942'. Changed operator from Lime Rock Resources to LRE Operating, LLC	1					1	1
1012	30 015 37673	N	30	17S	28E	330 FSL & 1650 FWL	Staley State No. 12	LRE Operating, LLC	NEW to AOR. Perforations in Yaso: 3623'-3859', 3924'-4222', 4290'-4598'. Changed operator from Lime Rock Resources to LRE Operating, LLC	1					1	1
1013	30 015 38203	M	30	17S	28E	330 FSL & 990 FWL	Marie State No. 8	Cog Operating LLC	NEW: Drilled to TD of 5108'. Perforations in Yaso: 3318'-3574' (45 holes), 3634'-3928' (40 holes), 4013'-4280' (40 holes), 4345'-4680' (44 holes) at 2 SPF. Completed on 4-4-12.						1	1
1014	30 015 40026	N	30	17S	28E	330 FSL & 2410 FWL	Staley State No. 17	LRE Operating, LLC	NEW to AOR. Well drilled to TD of 6310' on 11-7-11. Perforated in Abo at 5810'-5920'. Well was temporarily abandoned on 7-5-12 due to lack of production.			1			1	1
1015	30 015 39011	O	31	17S	28E	1190 FSL & 1320 FEL	Empire Abo Unit No. 419	Apache Corp	NEW to AOR. Well drilled to TD of 6273' on 11-9-11. Perforated in Abo at 5770'-5780', 5786', 5790', 5798'-5803', 5820'-5838', 5840'-5880', 5866'-5876', 5904'-5924', 5940'-5962', 6022'-6032' with 2 SPF and acidized.						1	1
1016	30 015 39020	O	31	17S	28E	140 FSL & 2560 FEL	Empire Abo Unit No. 408	Apache Corp	NEW: Permit To Drill						1	1
1017	30 015 40257	D	31	17S	28E	184 FNL & 257 FWL	Big Girl 31 State No. 1	Cog Operating LLC	NEW: Permit To Drill						1	1
1018	30 015 40258	D	31	17S	28E	195 FNL & 990 FWL	Big Girl 31 State No. 2	Cog Operating LLC	NEW: Permit To Drill						1	1
1019	30 015 40259	G	31	17S	28E	2160 FNL & 2310 FEL	Big Girl 31 State No. 5	Cog Operating LLC	NEW: Permit To Drill						1	1
1020	30 015 40260	D	31	17S	28E	1155 FNL & 990 FWL	Big Girl 31 State No. 7	Cog Operating LLC	NEW: Permit To Drill						1	1
1021	30 015 40409	L	31	17S	28E	1920 FSL & 330 FWL	Big Girl 31 State No. 9H	Cog Operating LLC	NEW: Permit To Drill						1	1
1022	30 015 40410	M	31	17S	28E	615 FSL & 10 FWL	Big Girl 31 State No. 11H	Cog Operating LLC	NEW: Permit To Drill						1	1
1023	30 015 39927	K	32	17S	28E	1750 FSL & 1765 FWL	AA State No. 2	Apache Corp	NEW: Permit To Drill						1	1
1024	30 015 40339	D	32	17S	28E	990 FNL & 330 FWL	Enron State No. 18	LRE Operating, LLC	NEW: Permit To Drill						1	1

TABLE IV
Wells that have been Plugged and Abandoned since the 2011 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
814	30 015 22051	K	02	19S	27E	1370 FSL & 2445 FWL	Empire Ace Unit No. 141A	Apache Corporation	P&A sat CIGP at 5625 ft and fill wellbore with cement.		1					

TABLE V
Wells that have been Temporarily Abandoned since the 2011 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
30									Perforate Abo shale at 5795'-8505', 5811'-5816', 5860'-5869', 5890'-5900', 5909'-5920', 5950'-5955' with 2 SPF and 120 deg phasing and acidize perfs. Well placed back into T&A status			1		1		
797	015	22885	O	02	18S	27E	1040 FSL & 2025 FEL	Empire Abo Unit No. 155	Apache Corporation	NEW to AOR. Well drilled to TD of 6310' on 11-7-11. Perforated in Abo at 5810'-5920'. Well was temporarily abandoned on 7-5-12 due to lack of production.						
30												1				1
1015	015	39011	O	31	17S	28E	1190 FSL & 1320 FEL	Empire Abo Unit No. 419	Apache Corp							

TABLE VI
Wells that have been put back into Production Since the 2011 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
981	30 015 38512	D	31	17S	28E	990 FNL & 940 FWL	Erion State No. 16	LRE Operating, LLC	Changed to production on 10/2/2011. Perfs at 3215'-3543'				1			
986	30 015 39006	J	32	17S	28E	2400 FSL & 2450 FEL	Empire Abo Unit No. 407	Apache Corp	Changed to production on 12/17/2011. Perfs at 5636'-6030' in Abo Formation				1		1	
83	30 015 25522	L	05	18S	28E	2240 FSL & 400 FWL	Walter Soil State No. 001	Walter Soil, LLC	Changed to production 9/20/11. This is a SWD well. Perfs from 7518' to 7812'				1			
990	30 015 39021	D	06	18S	28E	40 FNL & 145 FWL	Empire Abo Unit No. 411	Apache Corp	New drill. Changed to production. Perforations in th Abo at 5774'-5938' (2 SPF, 188 holes). Started production on 1/14/2012.				1			

TABLE VII
Wells that have been Recompleted in Upper Zones since the 2011 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
355	30 015 00676	M	36	17S	27E	330 FNL & 990 FWL	Empire Abo Unit #17	Apache Corporation	Perforate Abo shale at 5330'-5332', 5980'-5382', 5430'-5432' with 4 SPF, frac the new perf.						1	1
5	30 015 00690	G	36	17S	27E	1630 FNL & 2205 FEL	Combin #2	G & C Service	Install 4-1/2" liner to 480 ft and cement in place with 100 sks. Well is back in production						1	1
765	30 015 00724	1	02	18S	27E	990 FNL & 330 FEL	Empire Abo Unit No. 16B	Apache Corporation	Perforate Abo shale at 5444'-5446', 5480'-5482', 5512'-5514', 5290'-5292', 5340'-5342', 5392'-5394' with 4 SPF acidize and frac						1	1
30	015 22885	O	02	18S	27E	1040 FSL & 2025 FEL	Empire Abo Unit No. 155	Apache Corporation	Perforate Abo shale at 5795'-6505', 5811'-5816', 5860'-5865', 5890'-5900', 5909'-5920', 5950'-5955 with 2 SPF and 120 deg phasing and acidize perf. Well is back in production			1			1	1
923	30 015 31920	D	32	17S	28E	990 FNL & 990 FWL	Enron State No. 2	LRE Operating, LLC	Chase and Enron placed back into T&A status. LRE Operating, LLC. Perforations in the Glorieta Yaso at 5350'-5765' with 47 holes	1					1	1
82	30 015 02602	F	05	18S	28E	1650 FNL & 1650 FWL	Empire Abo Unit No. 026D	Apache Corporation	Added perforations in Upper Abo formation at 5980'-5980', 6018'-6020', 6080'-6092' with 2 SPF and acidized						1	1

TABLE VIII
Newly Drilled Wells in the Area of Review since the 2011 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
967	30 015 38420	M	36	17S	27E	840 FSL & 425 FWL	Kowa State No. 3	Cog Operating LLC	NEW: Drilled to TD of 4873; perforated at 3770-4020', 4080-4330', 4390-4640' all at 1 SPF and in the Yesso formation. Completed on 11/11/11						1	1
969	30 015 39321	M	36	17S	27E	990 FSL & 690 FWL	Big Boy State No. 1	Cog Operating LLC	NEW: Drilled to TD of 5030'; perforations at 3755-3980', 4040-4290', 4350-4600' 1 SPF in Yesso formation. Completed on 12/19/11						1	1
970	30 015 39322	M	36	17S	27E	840 FSL & 425 FWL	Big Boy State No. 3	Cog Operating LLC	NEW: Drilled to TD of 5015'; perforations at 3740-3990', 4050-4300', 4360-4610' 1 SPF in Yesso formation. Completed on 1/10/12						1	1
971	30 015 39323	O	36	17S	27E	870 FSL & 1560 FEL	Big Boy State No. 5	Cog Operating LLC	NEW: Drilled to TD of 4953'; perforations at 4375-4600', 4080-4315', 4365-4630', 3410-3860' 1 SPF in Yesso formation. Completed on 5-21-12						1	1
972	30 015 39324	O	36	17S	27E	480 FSL & 2210 FEL	Big Boy State No. 6	Cog Operating LLC	NEW: Drilled to TD of 5072'; perforations at 3430-3680', 3760-4030', 4090-4340', 4400-4650' 1 SPF in Yesso formation. Completed on 1-19-12						1	1
973	30 015 39325	O	36	17S	27E	990 FSL & 2210 FEL	Big Boy State No. 7	Cog Operating LLC	NEW: Drilled to TD of 5120'; perforations at 3360-3615', 3795-4020', 4080-4305', 4365-4590' 1 SPF in Yesso formation. Completed on 1-30-12						1	1
975	30 015 39401	P	36	17S	27E	1110 FSL & 630 FEL	Empire Abo Unit No. 417	Apache Corp	NEW: Drilled to TD of 6300'; perforations at 5734-5831' 2 SPF in Abo formation. Completed on 3-21-12						1	1
1004	30 015 39556	G	36	17S	27E	2176 FNL & 1659 FEL	Kowa State No. 8	Cog Operating LLC	NEW: Permit To Drill						1	1
1005	30 015 40428	M	36	17S	27E	200 FSL & 465 FWL	Big Boy State No. 2	Cog Operating LLC	NEW: Permit To Drill						1	1
1006	30 015 39868	M	36	17S	27E	1258 FNL & 1005 FEL	Empire Abo Unit No. 412	Apache Corp	NEW: Permit To Drill						1	1
1007	30 015 39868	A	01	18S	27E	1258 FNL & 1005 FEL	Empire Abo Unit No. 412	Apache Corp	NEW: Permit To Drill						1	1
1008	30 015 39899	3	01	18S	27E	1305 FNL & 2535 FWL	Empire Abo Unit No. 413	Apache Corp	NEW: Permit To Drill						1	1
1009	30 015 39900	4	01	18S	27E	1120 FNL & 1205 FWL	Empire Abo Unit No. 414	Apache Corp	NEW: Permit To Drill						1	1
976	30 015 39009	G	02	18S	27E	1650 FNL & 2430 FEL	Empire Abo Unit No. 415	Apache Corp	NEW: Drilled to TD of 6300'; perforations at 5396-5700' 2 SPF in Abo formation. Completed on 1-17-12						1	1
977	30 015 39066	E	02	18S	27E	2420 FNL & 185 FWL	Empire Abo Unit No. 416	Apache Corp	NEW: Permit To Drill; changed surface hole location.						1	1
1011	30 015 36564	O	30	17S	28E	330 FSL & 2210 FEL	Staley State No. 9	LRE Operating, LLC	NEW to AOR: Perforations: 3656-3942'. Changed operator from Lime Rock Resources to LRE Operating, LLC	1					1	1
1012	30 015 37673	N	30	17S	28E	330 FSL & 1650 FWL	Staley State No. 12	LRE Operating, LLC	NEW to AOR: Perforations in Yesso: 3623-3859', 3924-4222', 4230'. 4598' Changed operator from Lime Rock Resources to LRE Operating, LLC		1				1	1
1013	30 015 38203	M	30	17S	28E	330 FSL & 990 FWL	Staley State No. 8	Cog Operating LLC	NEW: Drilled to TD of 5108'; Perforations in Yesso: 3318-3574' (45 holes), 3622-3922' (40 holes), 4014-4286' (40 holes), 4345-4680' (44 holes), 4680-4740' (25 holes) and 4740-4812' (25 holes) completed on 1-17-12						1	1
1014	30 015 40026	N	30	17S	28E	330 FSL & 2410 FWL	Staley State No. 17	LRE Operating, LLC	NEW to AOR: Well drilled 11-7-11, TD at 6310'. Perforated in Abo at 5810-5920'. Well was temporarily abandoned on 7-5-12 due to lack of production.			1			1	1
1015	30 015 39011	O	31	17S	29E	1190 FSL & 1320 FEL	Empire Abo Unit No. 419	Apache Corp	NEW to AOR: Well drilled to TD of 6273 on 11-9-11. Perforated in Abo at 5770-5780', 5790', 5798-5903', 5820-5838', 5846-5860', 5866-5876', 5904-5924', 5940-5962', 6022-6032' with 2 SPF and acidized.						1	1
1016	30 015 39020	O	31	17S	29E	140 FSL & 2560 FEL	Empire Abo Unit No. 408	Apache Corp	NEW: Permit To Drill						1	1
1017	30 015 40257	D	31	17S	28E	184 FNL & 257 FWL	Big Girl 31 State No. 1	Cog Operating LLC	NEW: Permit To Drill						1	1
1018	30 015 40258	D	31	17S	28E	195 FNL & 990 FWL	Big Girl 31 State No. 2	Cog Operating LLC	NEW: Permit To Drill						1	1
1019	30 015 40259	G	31	17S	28E	2160 FNL & 2310 FEL	Big Girl 31 State No. 5	Cog Operating LLC	NEW: Permit To Drill						1	1
1020	30 015 40260	D	31	17S	28E	1155 FNL & 990 FWL	Big Girl 31 State No. 7	Cog Operating LLC	NEW: Permit To Drill						1	1
1021	30 015 40409	L	31	17S	28E	1920 FSL & 330 FWL	Big Girl 31 State No. 9H	Cog Operating LLC	NEW: Permit To Drill						1	1
1022	30 015 40410	M	31	17S	28E	615 FSL & 101 FWL	Big Girl 31 State No. 11H	Cog Operating LLC	NEW: Permit To Drill						1	1
1023	30 015 39927	K	32	17S	28E	1750 FSL & 1765 FWL	AA State No. 2	Apache Corp	NEW: Permit To Drill						1	1
1024	30 015 40359	D	32	17S	28E	990 FNL & 330 FWL	Ermon State No. 18	LRE Operating, LLC	NEW: Permit To Drill						1	1

TABLE IX
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	Mewbourne Well #1 Cartesian Plot of Surface Pressure and Injection Rates vs. Time	Section IX.18.e
13	Historical Surface Pressure and Injection Rates vs. Calendar Time	Section IX.18.g

TABLE IX (cont.)

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

TABLE X**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
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 XI

**NAVAJO REFINING COMPANY
STATIC PRESSURE GRADIENT SURVEY – MEWBOURNE WELL #1
September 23, 2012**

Depth (ft)	Pressure (psia)	Pressure Gradient (psi/ft)	Temperature (°F)
7924	4015.89	0.436	99.90
7000	3613.47	0.435	102.74
6000	3178.89	0.434	99.89
5000	2744.96	0.435	95.94
4000	2310.37	0.434	92.13
3000	1875.89	0.434	88.88
2000	1441.75	0.434	85.57
1000	1008.08	0.441	82.08
0	567.52	0.00	95.29

FIGURES

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 Gilsomite 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 Gilsomite, 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, Gilsomite, 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.

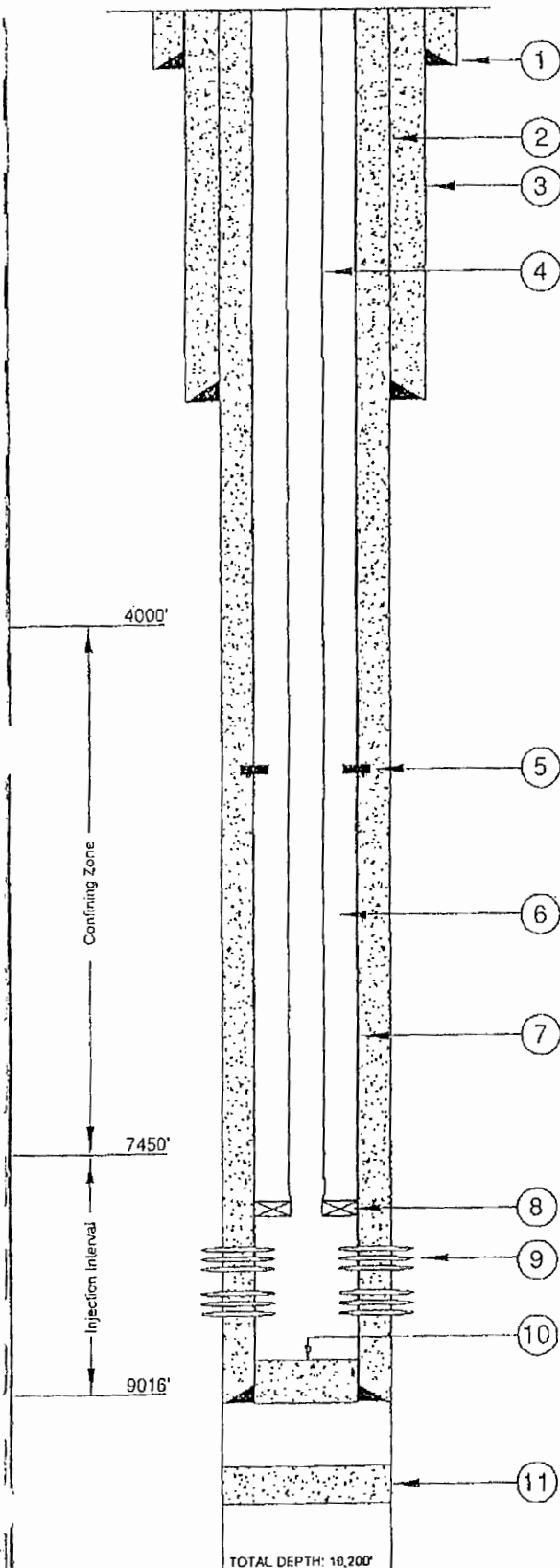
9. Perforations (2 SPF):

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: 7005255
DRAWN BY: WOL	APPROVED BY:	DWG. NO:

FIGURE 1

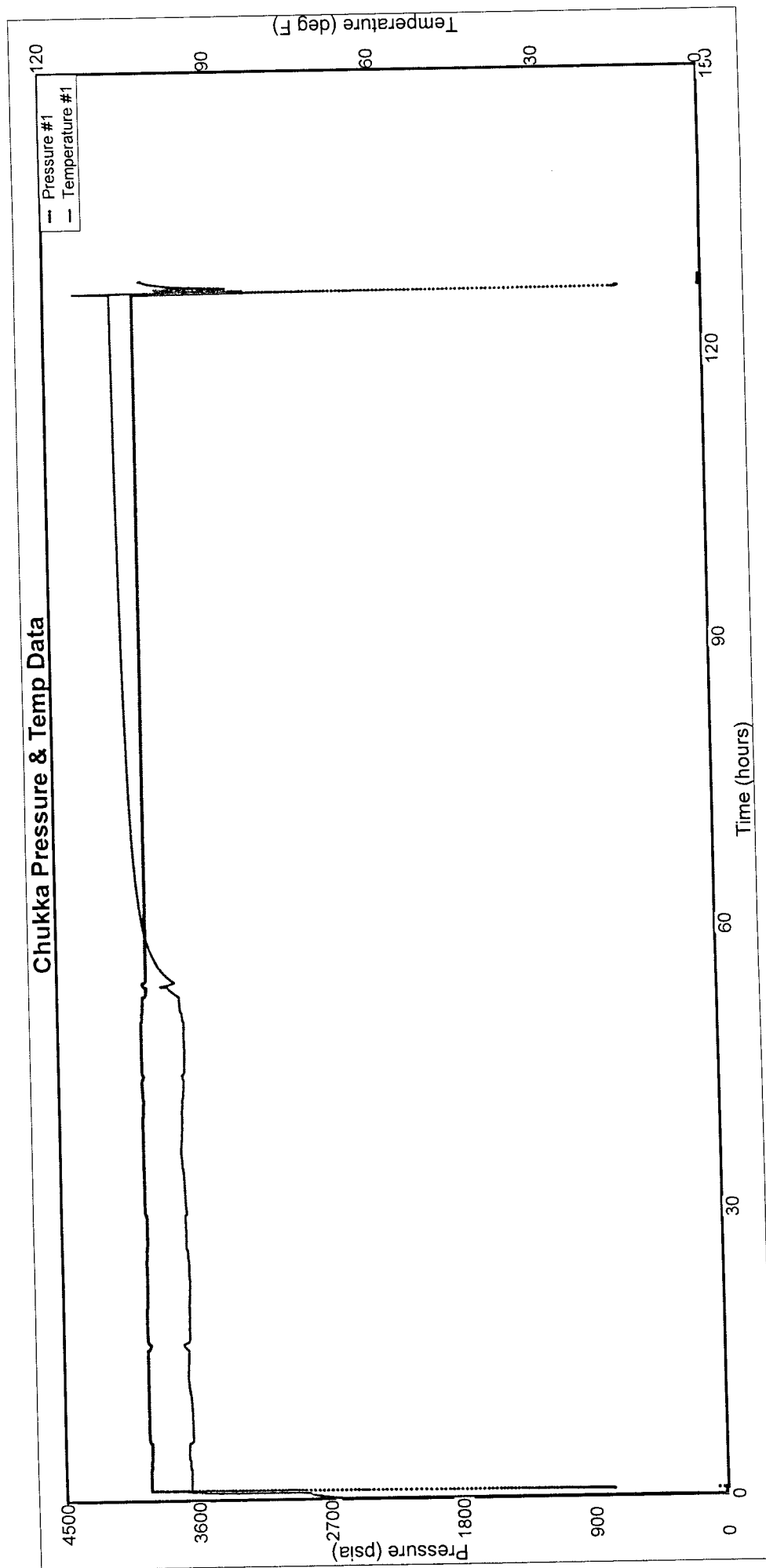


FIGURE 2

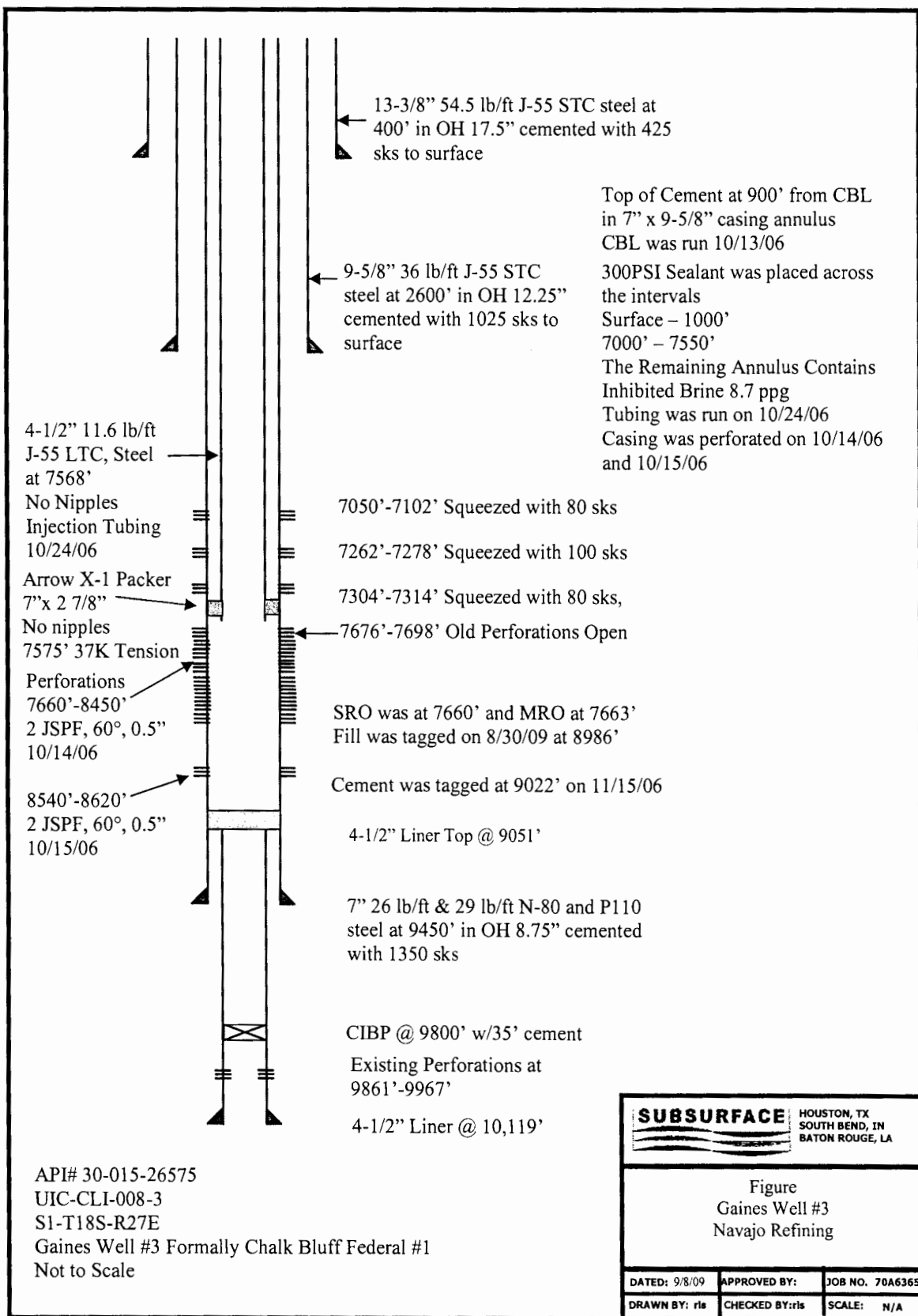
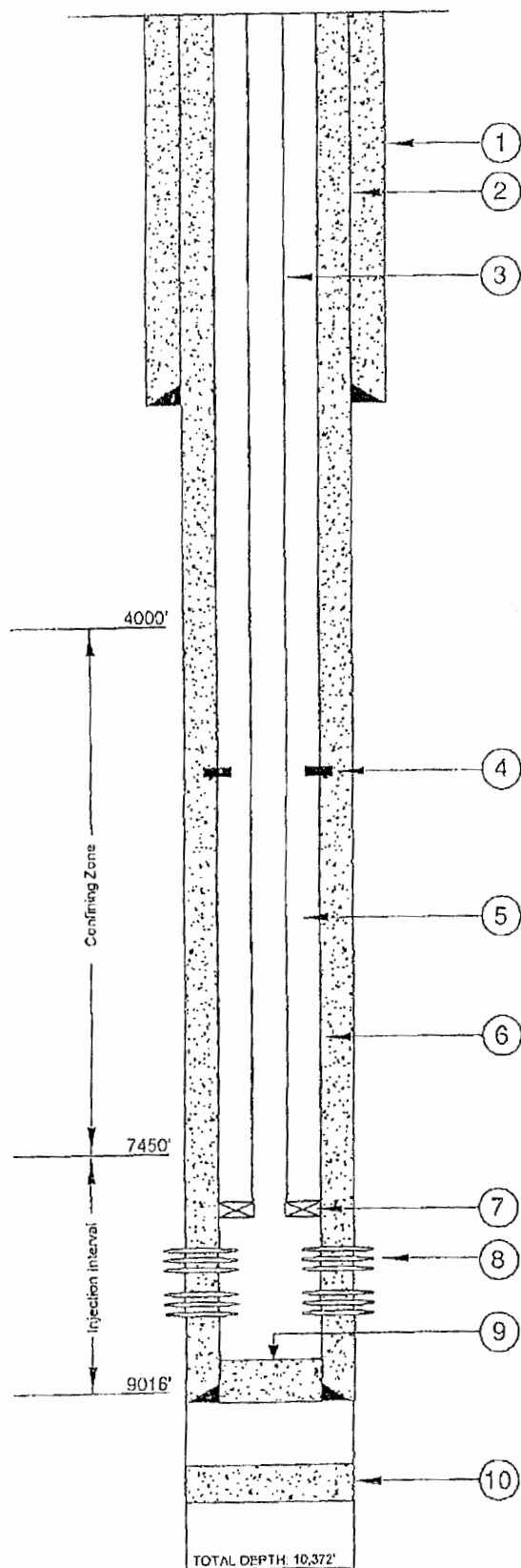


FIGURE 3



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 $\frac{1}{8}$ " Weatherford Completion Tools (Arrow) Model X-1 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: WOL	APPROVED BY:	DWG. NO:

FIGURE 4

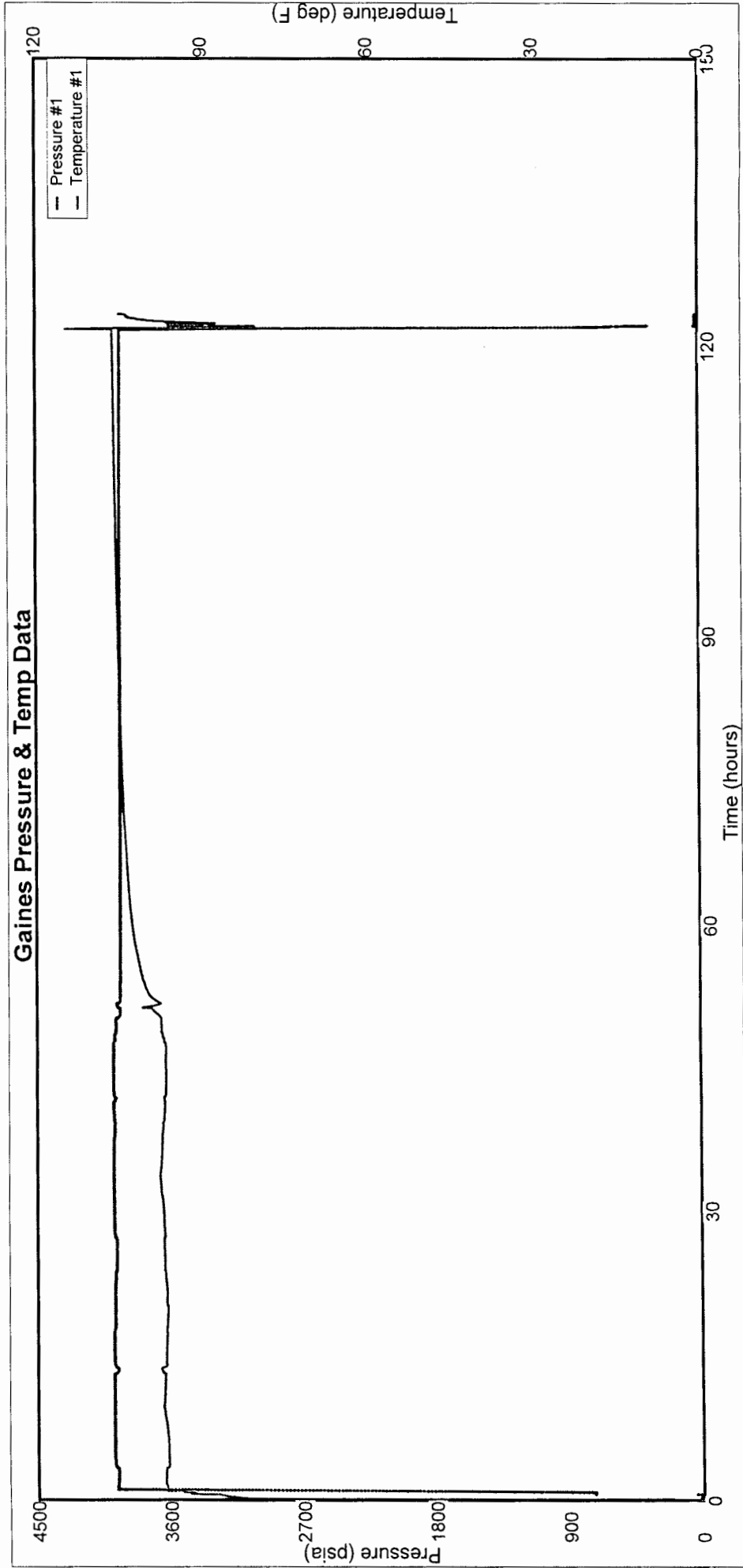
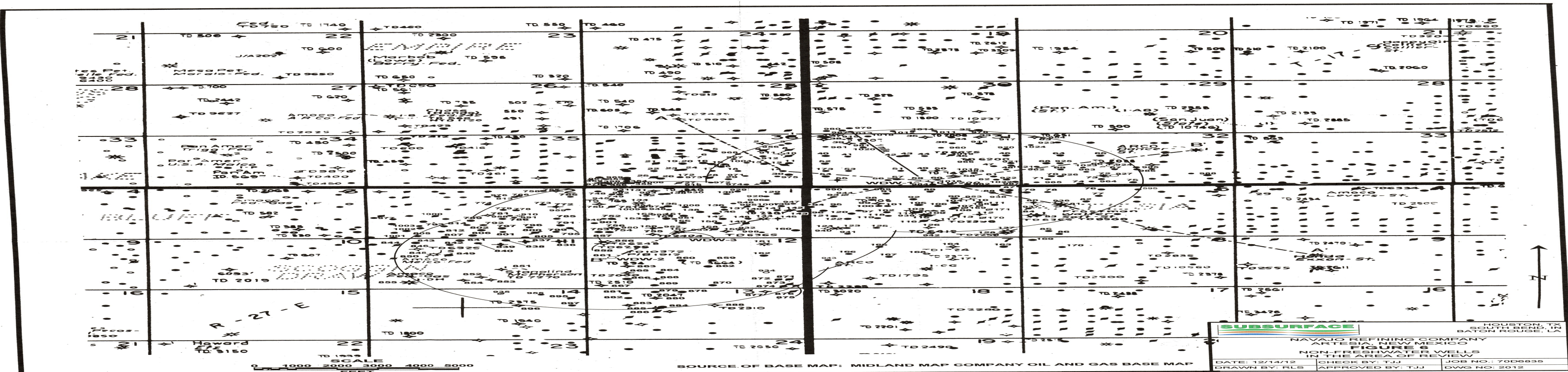


FIGURE 5



SUBSURFACE TECHNOLOGY

FIGURE 7

WELL: NAVAJO REFINING MEWBOURNE WELL NO. 1

UPPER TREE ASSEMBLY

A5PP, 4-1/2" 3K X 4-1/16" 3K

FLANGE

7-1/16", 3-1/2" 3K X 4-1/16" UPTBG 3K

TOP CONNECTION

2-3/8" 8rd x 4-1/16" 3K
2" x 2-3/8" Ball Valve
2-3/8" Bull Plug 1/2" NPT
5000 LB Pressure Gauge

TREE GATE VALVE

4-1/16" 3K

ANNULUS VALVE

2" 3K Ball Valve

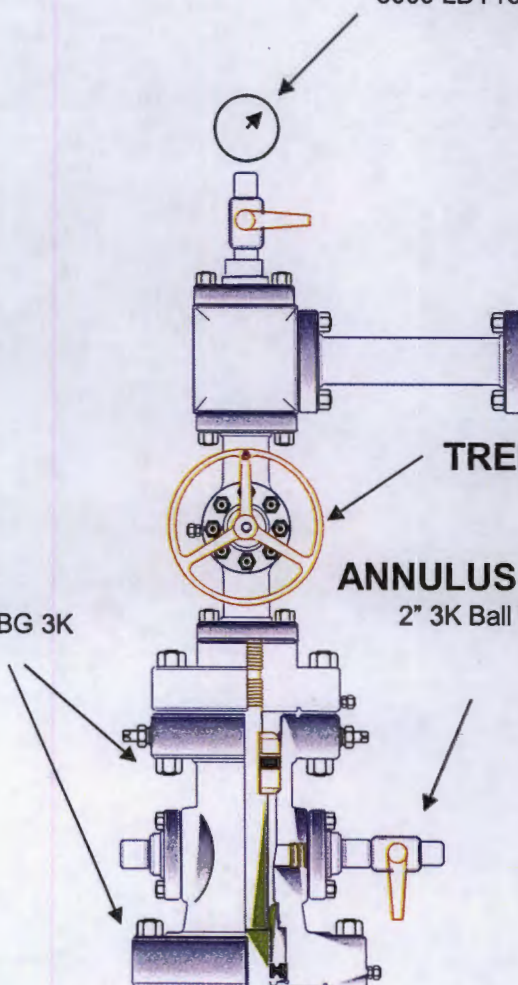
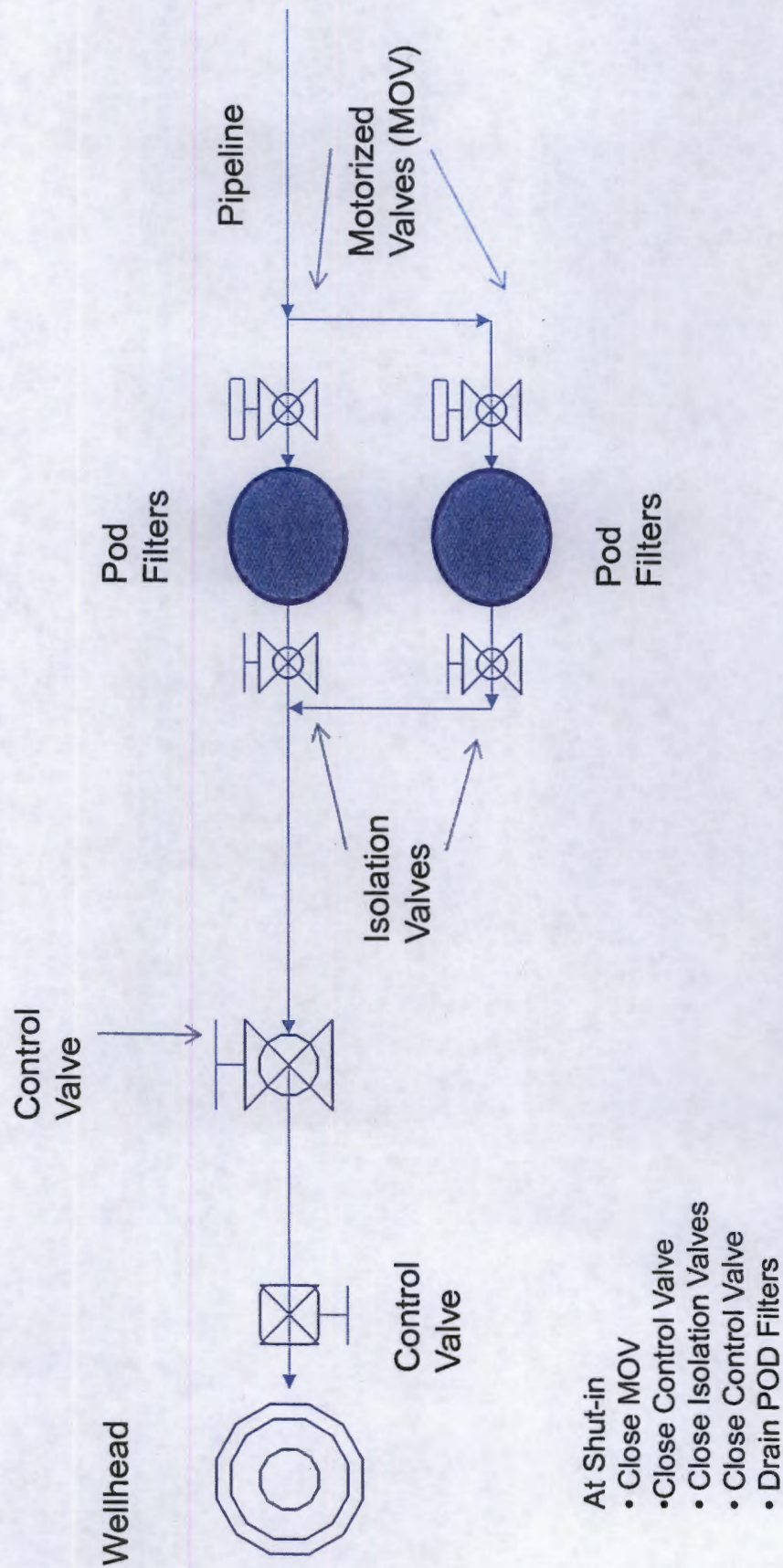


FIGURE 8
Mewbourne Well No. 1
Diagram of Shut-in Valve Control



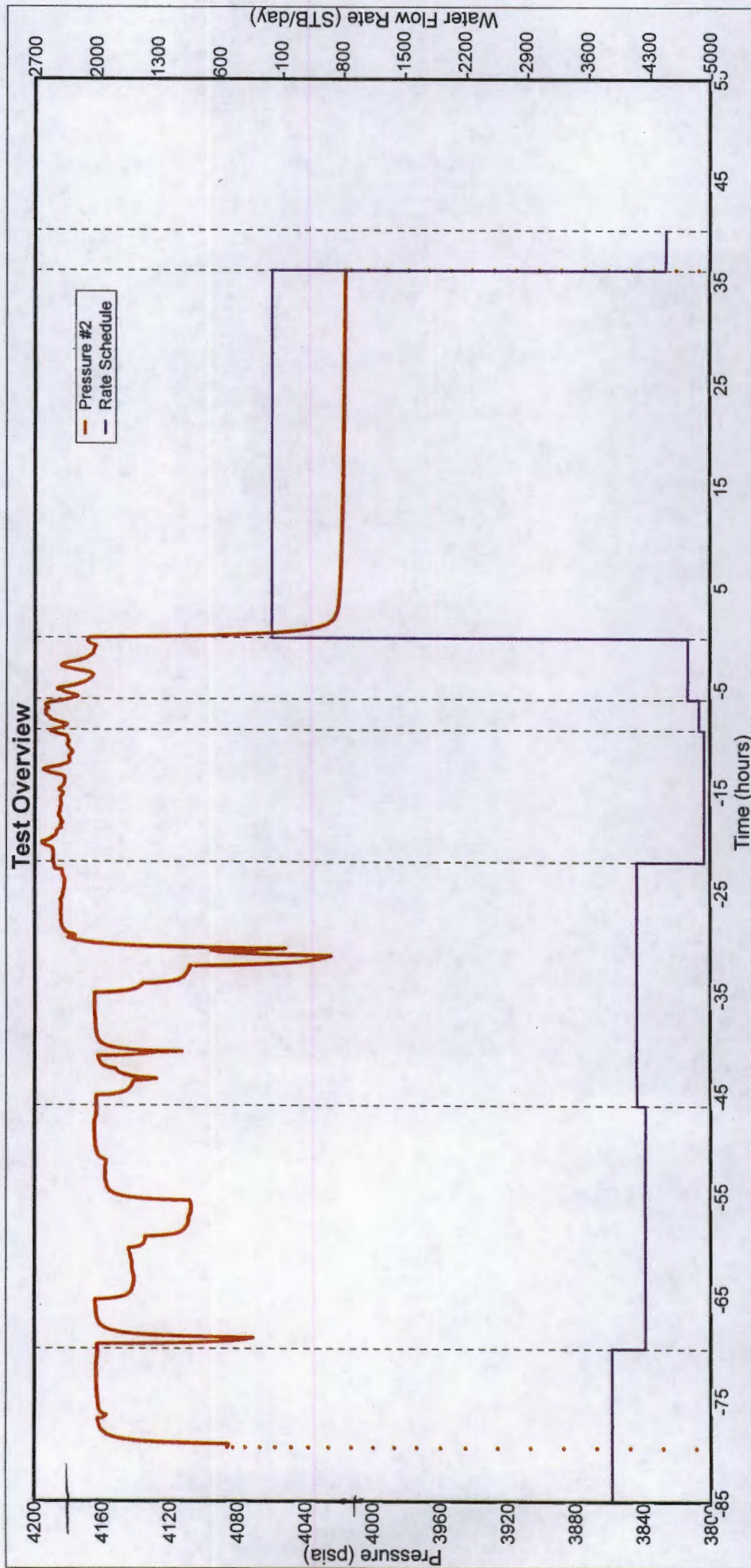


FIGURE 9

APR 1993
4180 - 4014

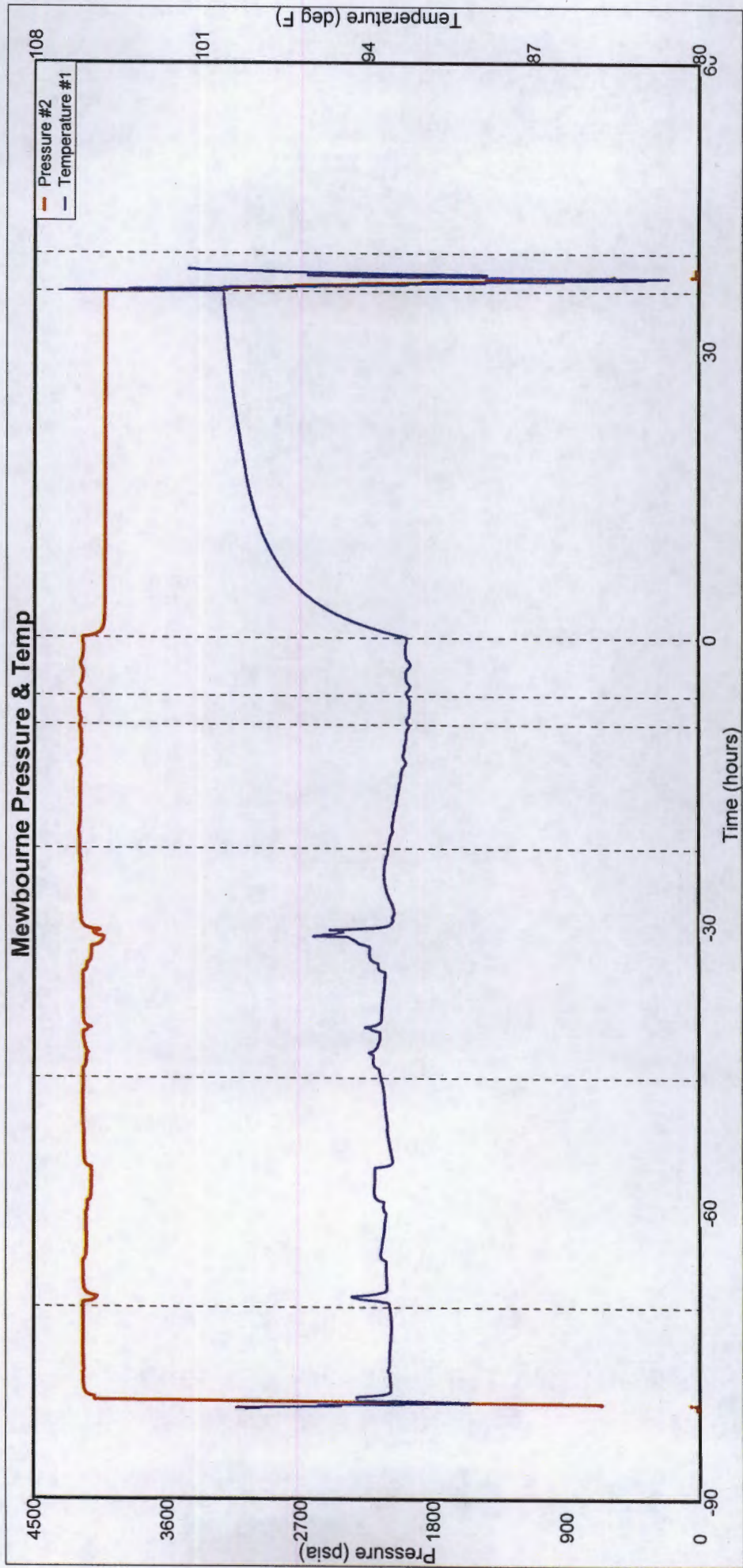


FIGURE 10

FIGURE 10

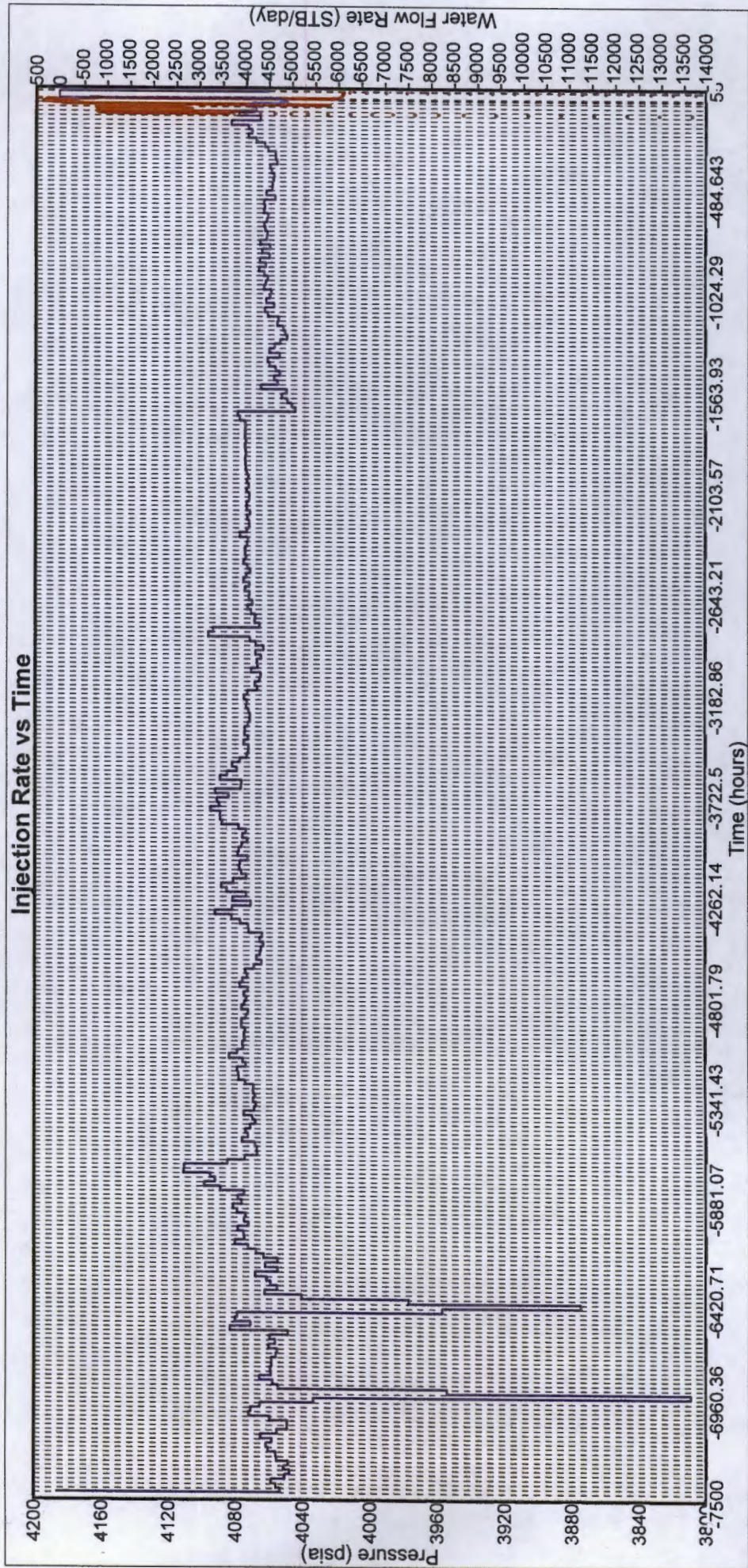


FIGURE 11

FIGURE 11

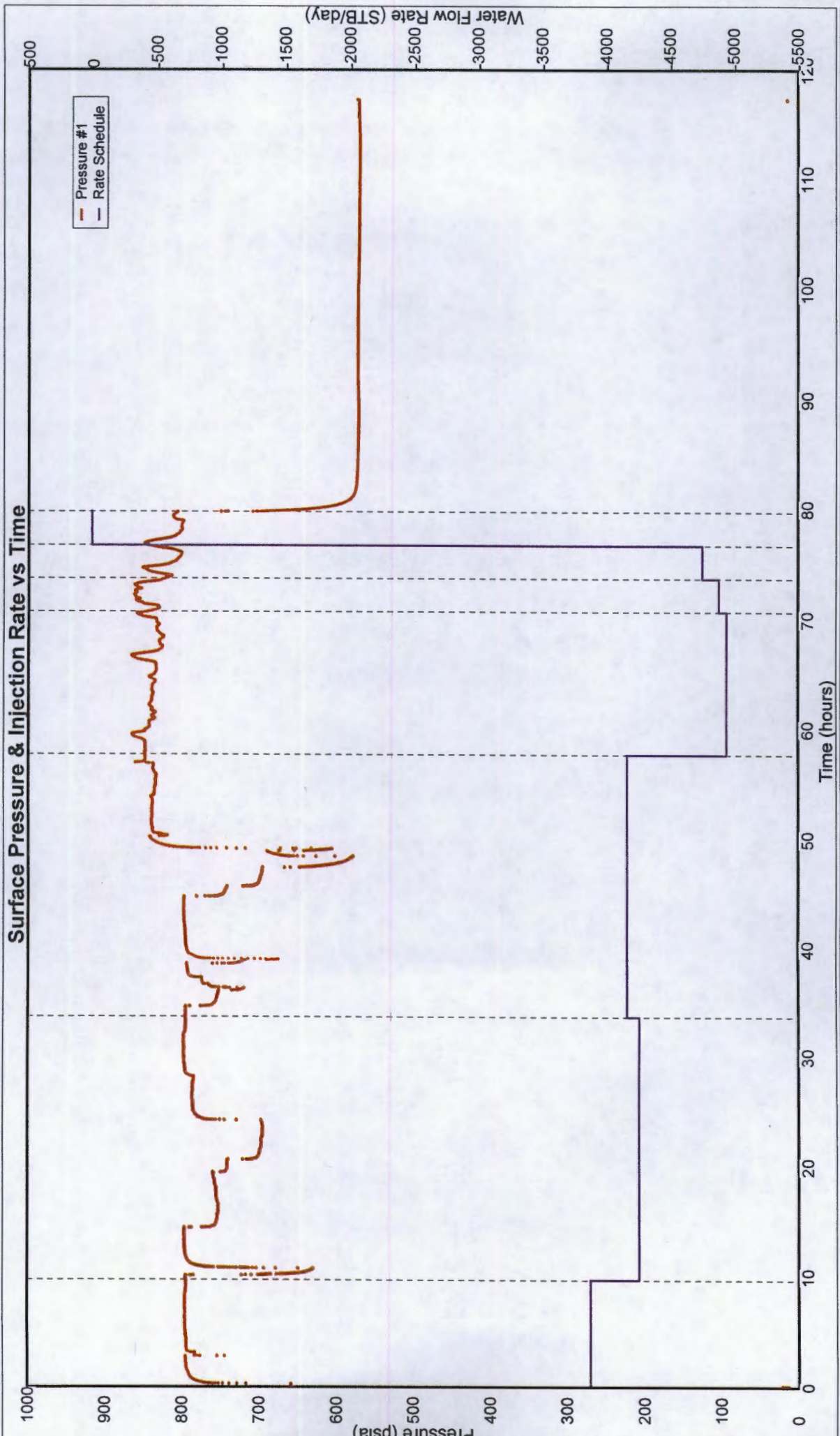


FIGURE 12

Mewbourne Well No. 1
Cartesian Plot of Surface Pressure and Injection Rates
December 24, 2000 to September 20, 2012

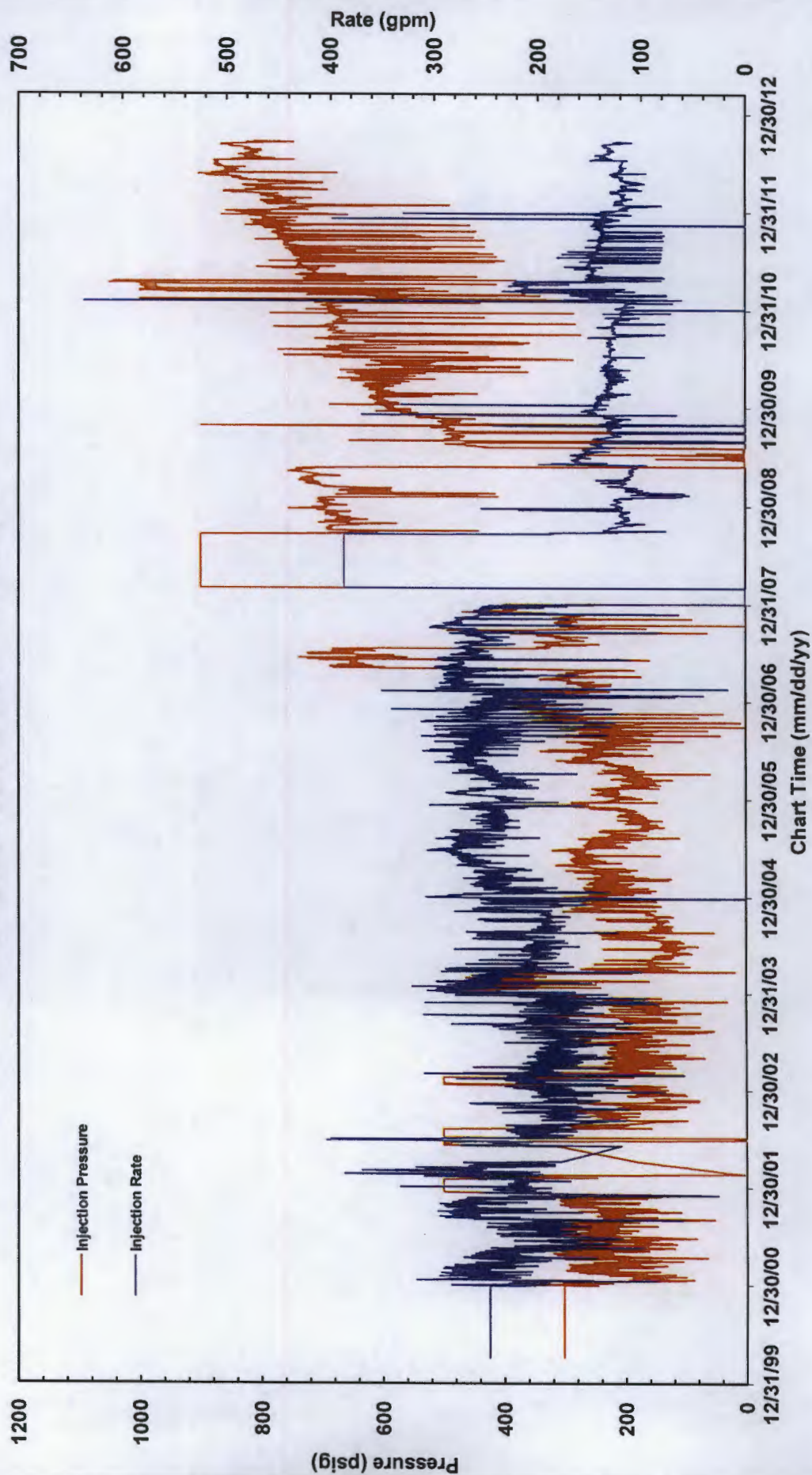


FIGURE 13

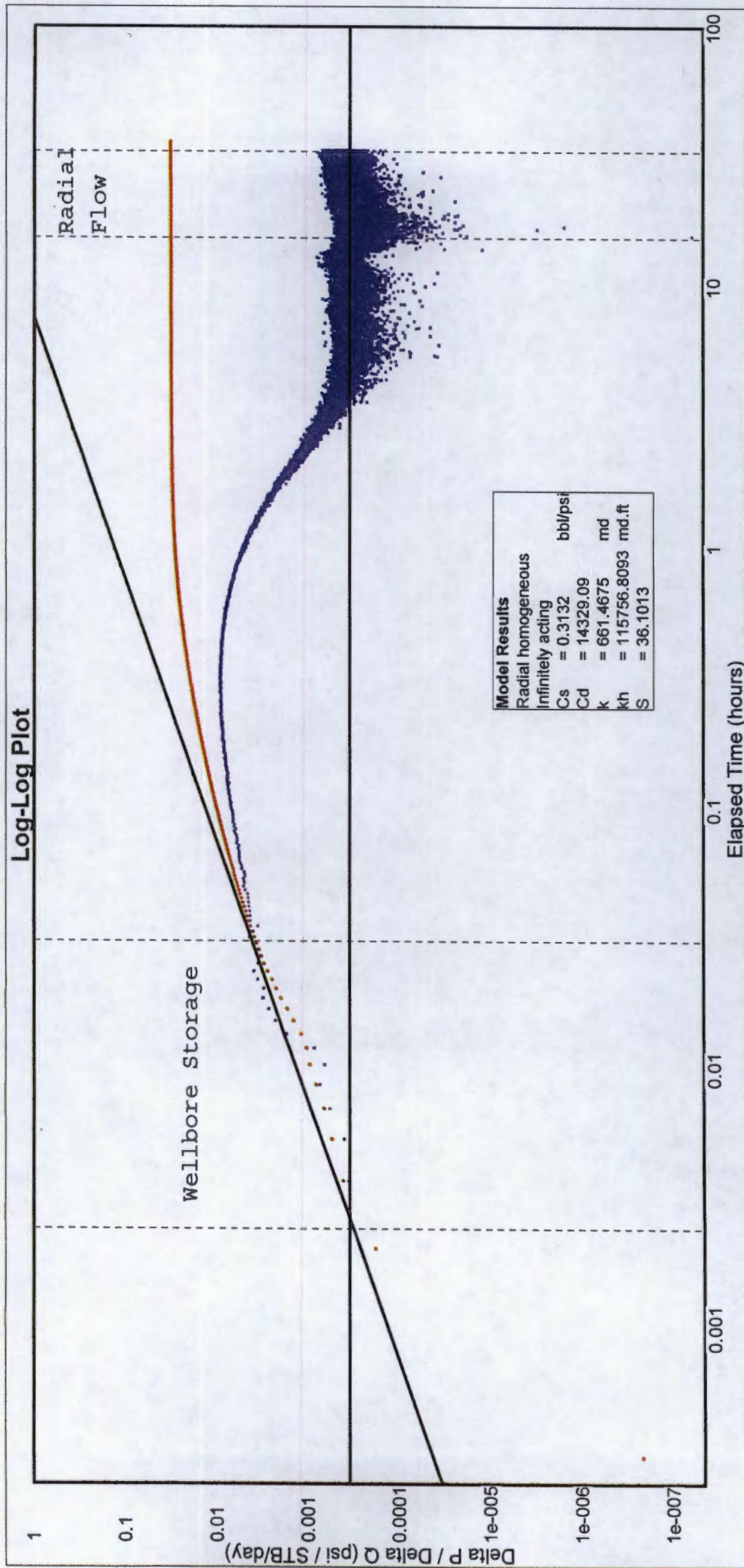


FIGURE 14

FIGURE 14

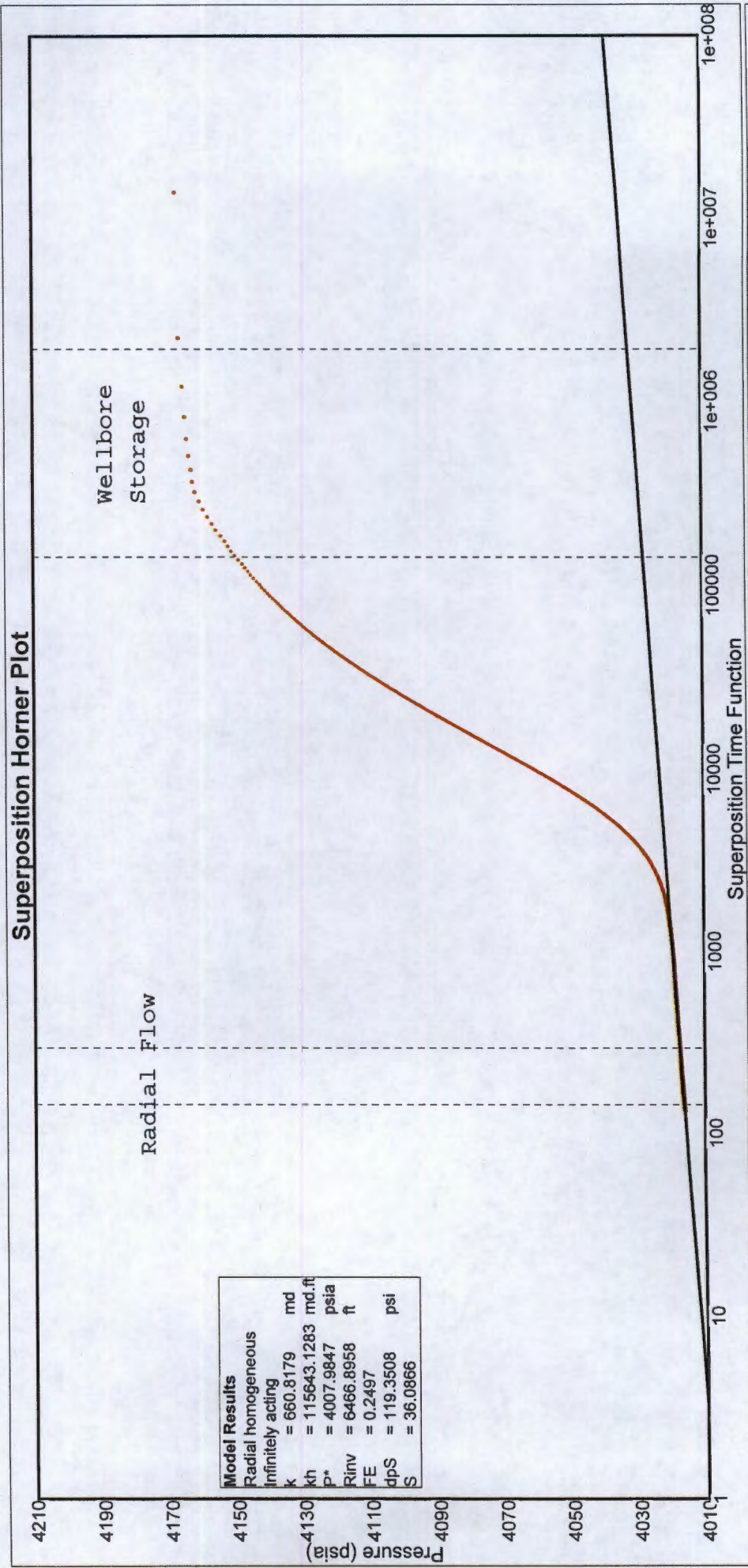


FIGURE 15

FIGURE 15

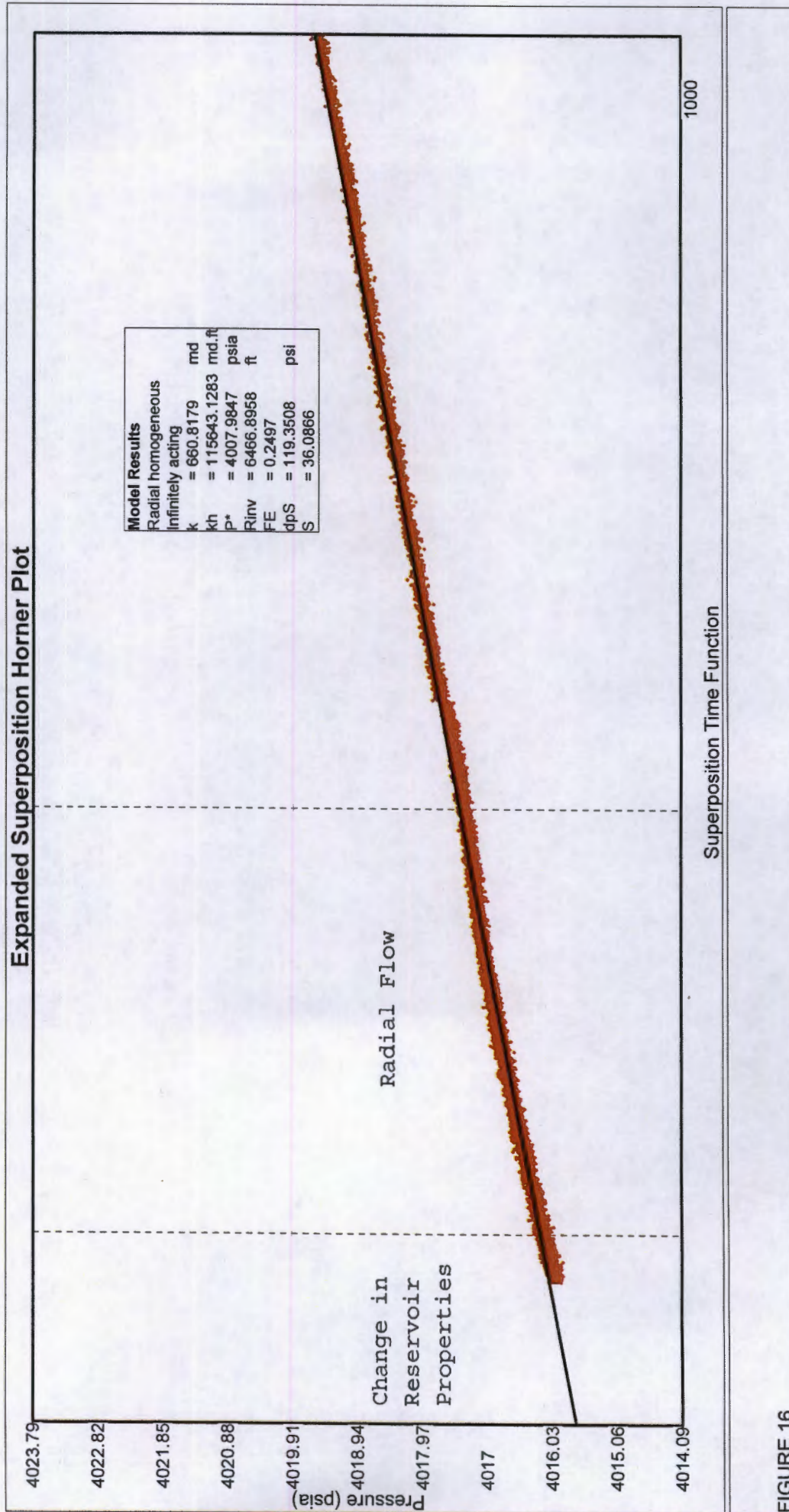


FIGURE 16

Navajo Refining Company
Mewbourne Well No. 1
August 1, 2012 to September 20, 2012
Hall Plot

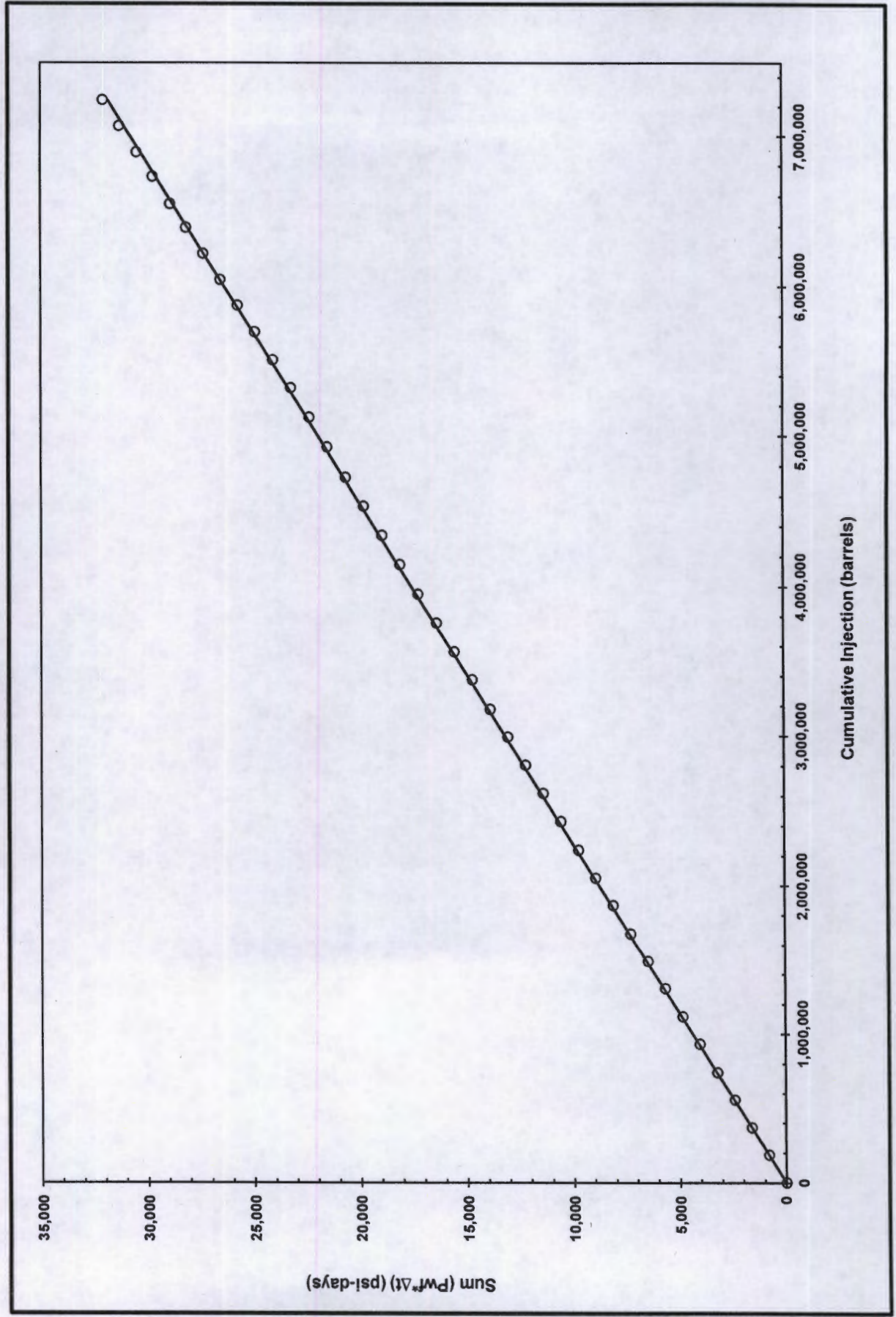
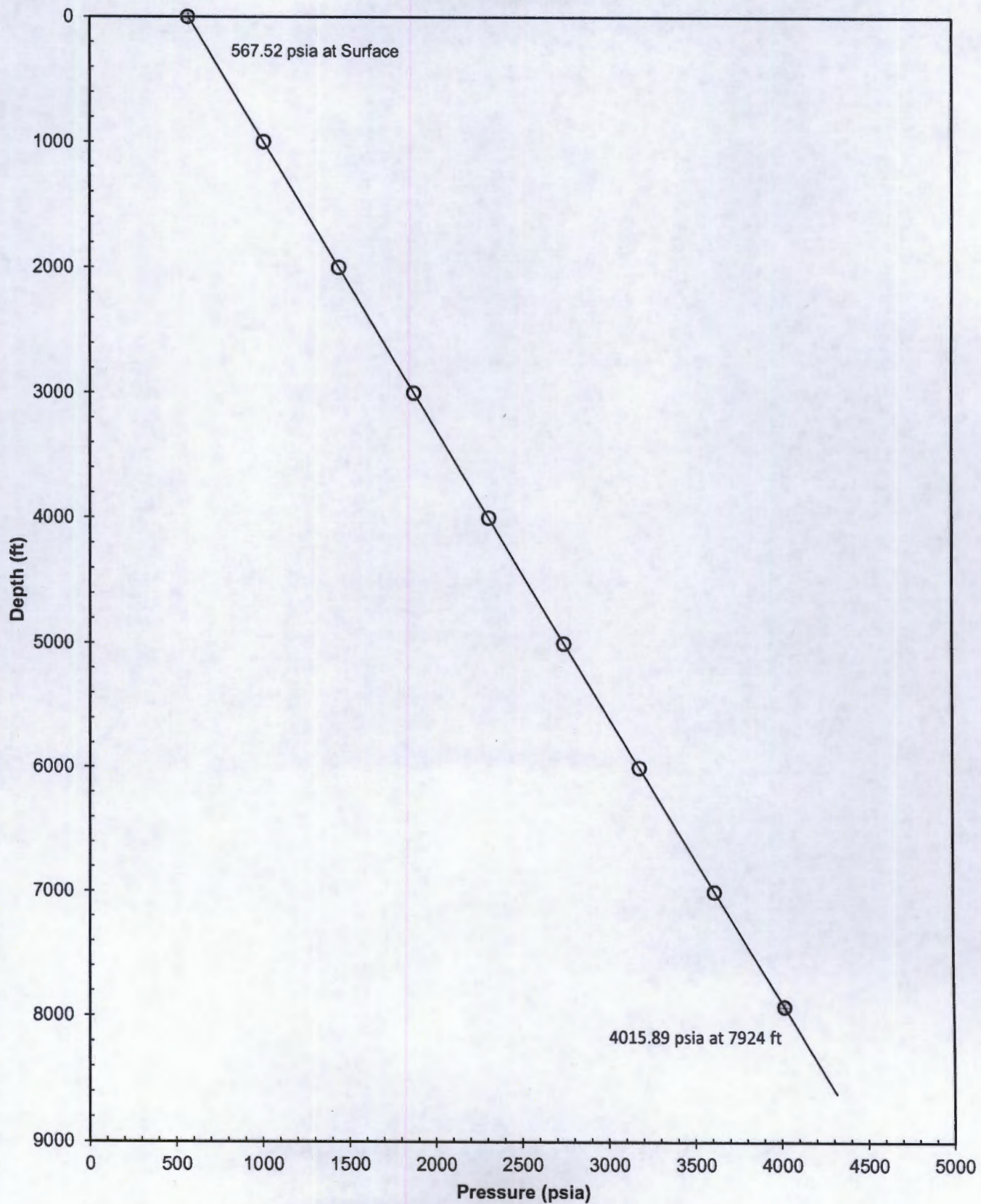


FIGURE 17

FIGURE 18

Navajo Refining Company
Static Pressure Gradient Survey
Mewbourne Well No. 1
September 23, 2012



Grand River Select®

25 COTTON

APPENDICES

APPENDIX C
COMPRESSIBILITY OF FLUID

APPENDIX C

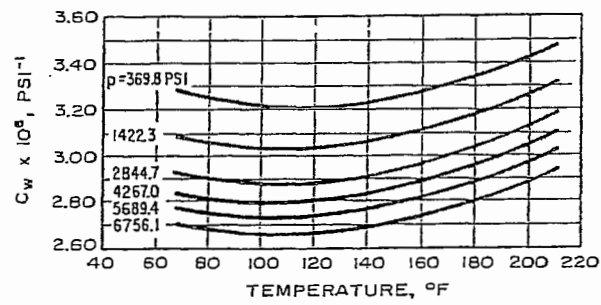


Fig. D.16 Average compressibility of distilled water. After Long and Chierici.¹³

Source: Earlougher, 1977, Advances in Well Test Analysis

COMPRESSIBILITY OF PORE VOLUME AND DISTILLED WATER

APPENDIX D

COMPRESSIBILITY OF PORE VOLUME

APPENDIX D

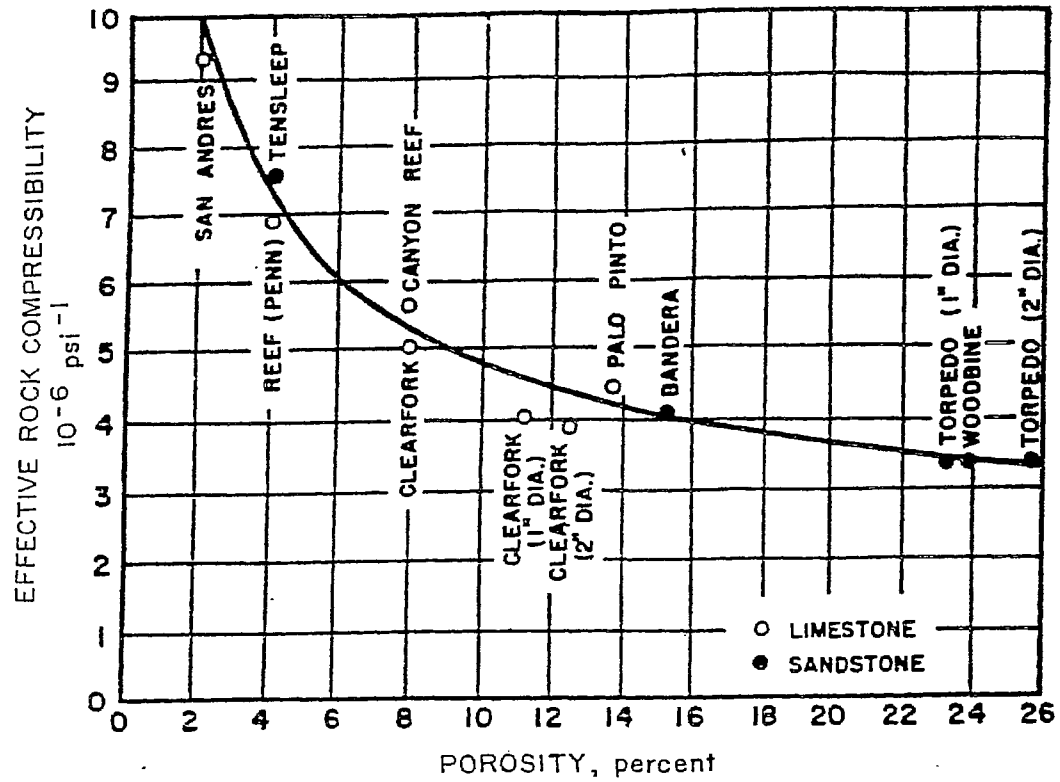


Fig. G.5 Effective formation (rock) compressibility. From Hall, *Trans., AIME* (1953) 198, 309.

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

APPENDIX F

**WATER VISCOSITIES AT VARIOUS SALINITIES
AND TEMPERATURES**

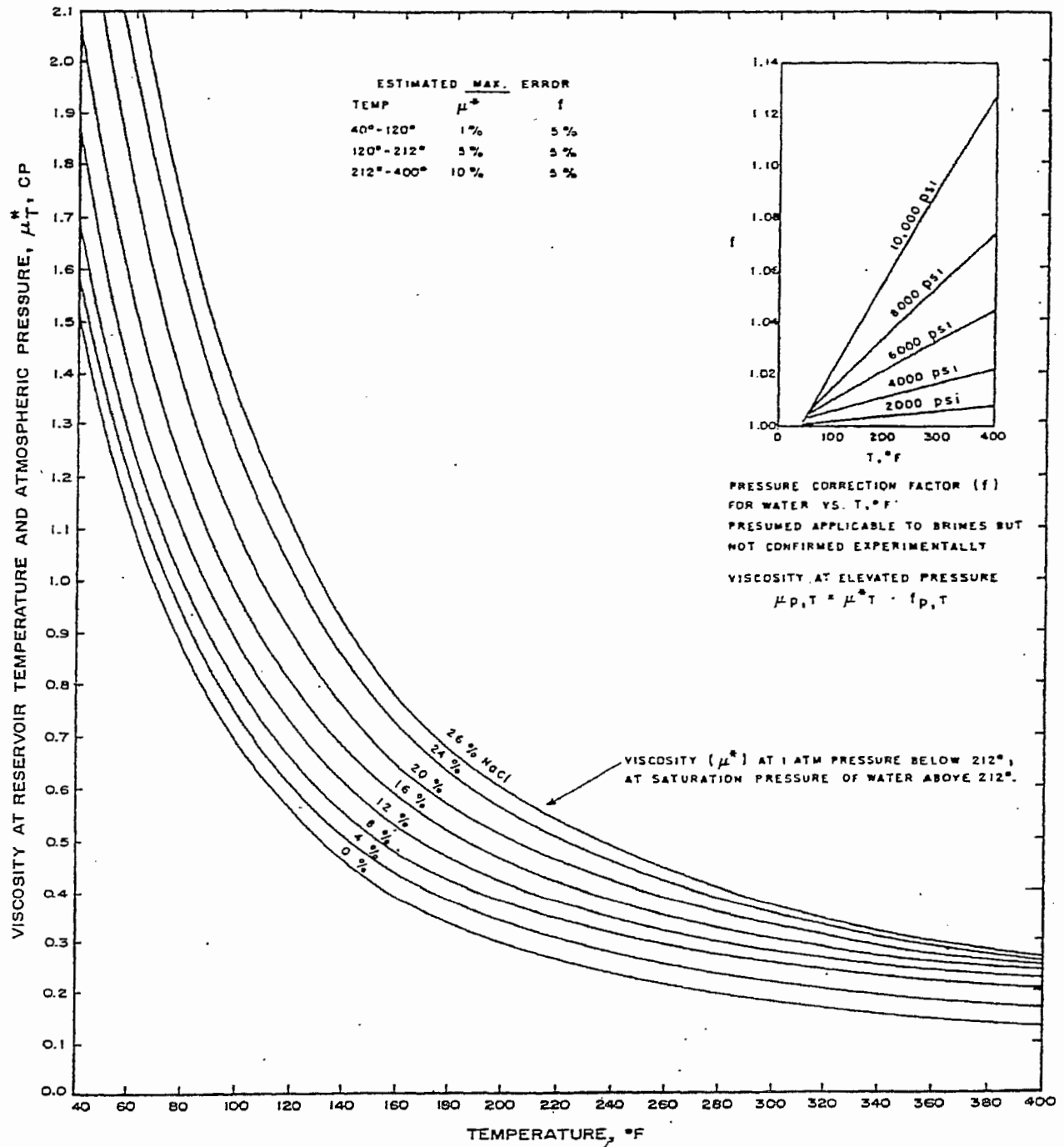


Fig. D.35 Water viscosity at various salinities and temperatures. After Matthews and Russell, data of Chesnut.¹⁸

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

APPENDIX G
DAILY RATE HISTORY DATA

Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
11/14/11	12:00:00 AM	141.689	-7462.0167	784.857	-4857.925
11/15/11	12:00:00 AM	140.485	-7438.0167	780.856	-4816.629
11/16/11	12:00:00 AM	137.682	-7414.0167	764.129	-4720.524
11/17/11	12:00:00 AM	134.929	-7390.0167	751.786	-4626.137
11/18/11	12:00:00 AM	143.386	-7366.0167	795.553	-4916.095
11/19/11	12:00:00 AM	146.464	-7342.0167	812.563	-5021.615
11/20/11	12:00:00 AM	142.950	-7318.0167	795.361	-4901.157
11/21/11	12:00:00 AM	145.855	-7294.0167	814.891	-5000.728
11/22/11	12:00:00 AM	138.365	-7270.0167	785.707	-4743.950
11/23/11	12:00:00 AM	137.929	-7246.0167	789.408	-4729.000
11/24/11	12:00:00 AM	133.067	-7222.0167	759.697	-4562.282
11/25/11	12:00:00 AM	131.918	-7198.0167	757.583	-4522.919
11/26/11	12:00:00 AM	135.330	-7174.0167	777.740	-4639.881
11/27/11	12:00:00 AM	128.345	-7150.0167	742.766	-4400.405
11/28/11	12:00:00 AM	138.483	-7126.0167	788.332	-4747.982
11/29/11	12:00:00 AM	144.955	-7102.0167	810.259	-4969.877
11/30/11	12:00:00 AM	144.967	-7078.0167	817.654	-4970.305
12/01/11	12:00:00 AM	134.041	-7054.0167	808.178	-4595.690
12/02/11	12:00:00 AM	120.829	-7030.0167	775.510	-4142.720
12/03/11	12:00:00 AM	122.220	-7006.0167	781.489	-4190.393
12/04/11	12:00:00 AM	127.869	-6982.0167	798.036	-4384.097
12/05/11	12:00:00 AM	161.377	-6958.0167	783.136	-5532.919
12/06/11	12:00:00 AM	398.580	-6934.0167	751.286	-13665.61
12/07/11	12:00:00 AM	245.552	-6910.0167	793.893	-8418.917
12/08/11	12:00:00 AM	139.264	-6886.0167	798.088	-4774.756
12/09/11	12:00:00 AM	135.787	-6862.0167	779.961	-4655.554
12/10/11	12:00:00 AM	127.616	-6838.0167	739.547	-4375.393
12/11/11	12:00:00 AM	134.825	-6814.0167	785.767	-4622.575
12/12/11	12:00:00 AM	134.557	-6790.0167	787.581	-4613.393
12/13/11	12:00:00 AM	135.157	-6766.0167	795.313	-4633.942
12/14/11	12:00:00 AM	135.204	-6742.0167	797.282	-4635.577
12/15/11	12:00:00 AM	137.920	-6718.0167	814.898	-4728.694
12/16/11	12:00:00 AM	138.699	-6694.0167	819.939	-4755.401
12/17/11	12:00:00 AM	133.395	-6670.0167	794.085	-4573.542
12/18/11	12:00:00 AM	137.362	-6646.0167	818.024	-4709.556
12/19/11	12:00:00 AM	134.031	-6622.0167	802.612	-4595.347
12/20/11	12:00:00 AM	145.441	-6598.0167	865.120	-4986.553
12/21/11	12:00:00 AM	109.024	-6574.0167	656.791	-3737.966
12/22/11	12:00:00 AM	121.941	-6550.0167	739.425	-4180.829
12/23/11	12:00:00 AM	112.353	-6526.0167	684.721	-3852.105
12/24/11	12:00:00 AM	113.517	-6502.0167	699.927	-3892.000
12/25/11	12:00:00 AM	242.438	-6478.0167	744.326	-8312.145
12/26/11	12:00:00 AM	329.506	-6454.0167	793.126	-11297.34
12/27/11	12:00:00 AM	221.778	-6430.0167	784.497	-7603.814
12/28/11	12:00:00 AM	154.038	-6406.0167	832.622	-5281.294
12/29/11	12:00:00 AM	130.866	-6382.0167	799.477	-4486.837
12/30/11	12:00:00 AM	138.609	-6358.0167	843.238	-4752.308
12/31/11	12:00:00 AM	134.474	-6334.0167	823.030	-4610.544
01/01/12	12:00:00 AM	132.039	-6310.0167	821.032	-4527.044
01/02/12	12:00:00 AM	125.026	-6286.0167	784.809	-4286.609
01/03/12	12:00:00 AM	139.001	-6262.0167	856.848	-4765.748
01/04/12	12:00:00 AM	131.215	-6238.0167	812.072	-4498.800
01/05/12	12:00:00 AM	139.008	-6214.0167	859.030	-4765.990
01/06/12	12:00:00 AM	130.192	-6190.0167	811.389	-4463.734
01/07/12	12:00:00 AM	125.247	-6166.0167	792.723	-4294.169
01/08/12	12:00:00 AM	120.471	-6142.0167	764.488	-4130.430
01/09/12	12:00:00 AM	112.119	-6118.0167	721.493	-3844.089
01/10/12	12:00:00 AM	117.982	-6094.0167	755.330	-4045.087
01/11/12	12:00:00 AM	117.504	-6070.0167	753.392	-4028.724
01/12/12	12:00:00 AM	113.823	-6046.0167	735.771	-3902.508
01/13/12	12:00:00 AM	120.521	-6022.0167	769.213	-4132.163
01/14/12	12:00:00 AM	117.784	-5998.0167	748.701	-4038.310
01/15/12	12:00:00 AM	118.741	-5974.0167	757.280	-4071.115
01/16/12	12:00:00 AM	113.582	-5950.0167	730.923	-3894.226
01/17/12	12:00:00 AM	110.906	-5926.0167	713.638	-3802.496
01/18/12	12:00:00 AM	116.168	-5902.0167	750.770	-3982.901
01/19/12	12:00:00 AM	114.048	-5878.0167	734.770	-3910.216
01/20/12	12:00:00 AM	117.831	-5854.0167	756.605	-4039.917
01/21/12	12:00:00 AM	102.862	-5830.0167	675.018	-3526.704
01/22/12	12:00:00 AM	92.619	-5806.0167	616.014	-3175.522
01/23/12	12:00:00 AM	99.520	-5782.0167	662.835	-3412.129
01/24/12	12:00:00 AM	96.493	-5758.0167	619.817	-3308.321
01/25/12	12:00:00 AM	79.655	-5734.0167	488.999	-2731.024
01/26/12	12:00:00 AM	80.022	-5710.0167	487.781	-2743.605
01/27/12	12:00:00 AM	107.343	-5686.0167	655.305	-3680.333
01/28/12	12:00:00 AM	118.051	-5662.0167	748.414	-4047.462
01/29/12	12:00:00 AM	126.057	-5638.0167	787.751	-4321.942
01/30/12	12:00:00 AM	125.677	-5614.0167	791.164	-4308.926
01/31/12	12:00:00 AM	124.647	-5590.0167	788.727	-4273.619
02/01/12	12:00:00 AM	116.649	-5566.0167	742.515	-3999.405
02/02/12	12:00:00 AM	120.253	-5542.0167	763.389	-4122.962
02/03/12	12:00:00 AM	118.538	-5518.0167	744.858	-4064.175
02/04/12	12:00:00 AM	121.564	-5494.0167	775.668	-4167.901
02/05/12	12:00:00 AM	124.903	-5470.0167	794.937	-4282.379
02/06/12	12:00:00 AM	122.978	-5446.0167	784.024	-4216.405
02/07/12	12:00:00 AM	117.468	-5422.0167	741.274	-4027.476
02/08/12	12:00:00 AM	124.127	-5398.0167	792.569	-4255.796
02/09/12	12:00:00 AM	125.365	-5374.0167	795.823	-4298.228
02/10/12	12:00:00 AM	123.377	-5350.0167	790.135	-4230.071
02/11/12	12:00:00 AM	124.517	-5326.0167	800.405	-4269.165
02/12/12	12:00:00 AM	123.368	-5302.0167	797.907	-4229.752
02/13/12	12:00:00 AM	123.588	-5278.0167	796.897	-4237.286
02/14/12	12:00:00 AM	118.288	-5254.0167	768.069	-4055.571
02/15/12	12:00:00 AM	114.426	-5230.0167	749.999	-3923.181
02/16/12	12:00:00 AM	113.991	-5206.0167	751.524	-3908.256
02/17/12	12:00:00 AM	113.323	-5182.0167	743.021	-3885.357
02/18/12	12:00:00 AM	118.654	-5158.0167	777.505	-4068.139
02/19/12	12:00:00 AM	116.779	-5134.0167	768.446	-4003.837
02/20/12	12:00:00 AM	108.190	-5110.0167	716.619	-3709.367
02/21/12	12:00:00 AM	113.342	-5086.0167	740.825	-3886.024
02/22/12	12:00:00 AM	116.962	-5062.0167	762.038	-4010.136
02/23/12	12:00:00 AM	116.550	-5038.0167	770.832	-3995.996
02/24/12	12:00:00 AM	117.847	-5014.0167	792.152	-4040.476
02/25/12	12:00:00 AM	117.571	-4990.0167	786.858	-4031.010
02/26/12	12:00:00 AM	118.240	-4966.0167	789.875	-4053.927
02/27/12	12:00:00 AM	115.967	-4942.0167	778.907	-3976.028
02/28/12	12:00:00 AM	115.923	-4918.0167	766.536	-3974.512
02/29/12	12:00:00 AM	118.588	-4894.0167	794.112	-4065.881
03/01/12	12:00:00 AM	119.979	-4870.0167	800.602	-4113.564
03/02/12	12:00:00 AM	115.962	-4846.0167	779.160	-3975.831
03/03/12	12:00:00 AM	117.685	-4822.0167	787.223	-4034.927
03/04/12	12:00:00 AM	118.790	-4798.0167	791.686	-4072.808
03/05/12	12:00:00 AM	117.387	-4774.0167	786.067	-4024.690
03/06/12	12:00:00 AM	119.775	-4750.0167	801.193	-4106.561
03/07/12	12:00:00 AM	114.768	-4726.0167	771.642	-3934.891
03/08/12	12:00:00 AM	116.661	-4702.0167	789.278	-3999.800
03/09/12	12:00:00 AM	119.384	-4678.0167	805.369	-4093.151
03/10/12	12:00:00 AM	118.321	-4654.0167	802.342	-4056.730
03/12/12	12:00:00 AM	123.723	-4630.0167	830.345	-4241.938
03/13/12	12:00:00 AM	128.467	-4606.0167	850.280	-4404.599
03/14/12	12:00:00 AM	125.275	-4582.0167	836.834	-4295.127
03/15/12	12:00:00 AM	127.473	-4558.0167	847.780	-4370.490
03/16/12	12:00:00 AM	128.227	-4534.0167	852.064	-4396.369
03/17/12	12:00:00 AM	129.582	-4510.0167	862.172	-4442.827
03/18/12	12:00:00 AM	127.382	-4486.0167	848.854	-4367.391
03/19/12	12:00:00 AM	128.948	-4462.0167	860.668	-4421.089
03/20/12	12:00:00 AM	120.479	-4438.0167	814.034	-4130.708
03/21/12	12:00:00 AM	119.897	-4414.0167	811.819	-4110.762
03/22/12	12:00:00 AM	115.040	-4390.0167	787.312	-3944.224
03/23/12	12:00:00 AM	109.601	-4366.0167	757.523	-3757.756
03/24/12	12:00:00 AM	99.039	-4342.0167	689.980	-3395.639
03/25/12	12:00:00 AM	109.846	-4318.0167	756.222	-3766.163
03/26/12	12:00:00 AM	121.639	-4294.0167	827.295	-4170.486
03/27/12	12:00:00 AM	110.116	-4270.0167	760.851	-3775.475
03/28/12	12:00:00 AM	118.574	-4246.0167	811.259	-4065.381
03/29/12	12:00:00 AM	106.547	-4222.0167	742.591	-3653.028
03/30/12	12:00:00 AM	103.184	-4198.0167	718.047	-3537.752
03/31/12	12:00:00 AM	110.590	-4174.0167	764.485	-3791.673
04/01/12	12:00:00 AM	118.578	-4150.0167	807.462	-4065.523
04/02/12	12:00:00 AM	115.565	-4126.0167	794.811	-3962.212
04/03/12	12:00:00 AM	114.293	-4102.0167	794.235	-3918.621
04/04/12	12:00:00 AM	114.774	-4078.0167	798.272	-3935.097
04/05/12	12:00:00 AM	119.559	-4054.0167	827.023	-4099.167
04/06/12	12:00:00 AM	113.602	-4030.0167	782.914	-3894.936
04/07/12	12:00:00 AM	114.094	-4006.0167	787.903	-3911.790
04/08/12	12:00:00 AM	115.964	-3982.0167	809.824	-3975.925
04/09/12	12:00:00 AM	119.364	-3958.0167	830.623	-4092.482
04/10/12					

Appendix G Daily Rate History Data

Date	Time	Rate	Hours	Pressure	Rate
mm/dd/yy	hh:mm:ss	gpm	Δt	psig	bpd
04/21/12	12:00:00 AM	115.312	-3670.0167	805.328	-3953.563
04/22/12	12:00:00 AM	115.580	-3646.0167	804.078	-3962.732
04/23/12	12:00:00 AM	102.156	-3622.0167	725.488	-3502.504
04/24/12	12:00:00 AM	106.438	-3598.0167	751.024	-3649.310
04/25/12	12:00:00 AM	112.716	-3574.0167	792.593	-3864.534
04/26/12	12:00:00 AM	109.738	-3550.0167	760.166	-3762.435
04/27/12	12:00:00 AM	114.751	-3526.0167	803.302	-3934.313
04/28/12	12:00:00 AM	118.987	-3502.0167	828.885	-4079.544
04/29/12	12:00:00 AM	119.940	-3478.0167	835.963	-4112.238
04/30/12	12:00:00 AM	119.806	-3454.0167	836.777	-4107.643
05/01/12	12:00:00 AM	117.023	-3430.0167	821.922	-4012.208
05/02/12	12:00:00 AM	119.659	-3406.0167	833.333	-4102.601
05/03/12	12:00:00 AM	117.429	-3382.0167	823.277	-4026.143
05/04/12	12:00:00 AM	117.696	-3358.0167	825.170	-4035.276
05/05/12	12:00:00 AM	119.639	-3334.0167	839.836	-4101.895
05/06/12	12:00:00 AM	120.911	-3310.0167	845.484	-4145.510
05/07/12	12:00:00 AM	120.972	-3286.0167	848.539	-4147.619
05/08/12	12:00:00 AM	120.008	-3262.0167	846.793	-4114.548
05/09/12	12:00:00 AM	118.532	-3238.0167	840.296	-4063.942
05/10/12	12:00:00 AM	118.902	-3214.0167	841.259	-4076.629
05/11/12	12:00:00 AM	117.140	-3190.0167	832.587	-4016.214
05/12/12	12:00:00 AM	119.183	-3166.0167	842.450	-4086.260
05/13/12	12:00:00 AM	125.584	-3142.0167	877.136	-4305.748
05/14/12	12:00:00 AM	124.075	-3118.0167	869.384	-4254.012
05/15/12	12:00:00 AM	126.984	-3094.0167	886.014	-4353.742
05/16/12	12:00:00 AM	127.718	-3070.0167	890.901	-4378.893
05/17/12	12:00:00 AM	121.600	-3046.0167	853.129	-4169.151
05/18/12	12:00:00 AM	125.534	-3022.0167	874.433	-4304.013
05/19/12	12:00:00 AM	125.222	-2998.0167	872.152	-4293.309
05/20/12	12:00:00 AM	127.850	-2974.0167	891.747	-4383.439
05/21/12	12:00:00 AM	124.594	-2950.0167	874.318	-4271.802
05/22/12	12:00:00 AM	129.399	-2926.0167	902.593	-4436.546
05/23/12	12:00:00 AM	124.594	-2902.0167	877.282	-4271.796
05/24/12	12:00:00 AM	120.926	-2878.0167	857.208	-4146.048
05/25/12	12:00:00 AM	94.627	-2854.0167	674.420	-3244.355
05/26/12	12:00:00 AM	97.593	-2830.0167	679.915	-3346.060
05/27/12	12:00:00 AM	126.823	-2806.0167	881.580	-4348.204
05/28/12	12:00:00 AM	123.690	-2782.0167	869.687	-4240.798
05/29/12	12:00:00 AM	124.149	-2758.0167	873.703	-4256.534
05/30/12	12:00:00 AM	121.413	-2734.0167	858.669	-4162.714
05/31/12	12:00:00 AM	119.189	-2710.0167	847.020	-4086.476
06/01/12	12:00:00 AM	122.313	-2686.0167	865.999	-4193.571
06/02/12	12:00:00 AM	120.109	-2662.0167	854.004	-4118.010
06/03/12	12:00:00 AM	120.467	-2638.0167	858.390	-4130.310
06/04/12	12:00:00 AM	117.652	-2614.0167	840.488	-4033.772
06/05/12	12:00:00 AM	120.331	-2590.0167	852.080	-4125.643
06/06/12	12:00:00 AM	116.662	-2566.0167	836.483	-3999.835
06/07/12	12:00:00 AM	118.563	-2542.0167	841.441	-4065.026
06/08/12	12:00:00 AM	121.029	-2518.0167	861.563	-4149.558
06/09/12	12:00:00 AM	118.990	-2494.0167	852.176	-4079.657
06/10/12	12:00:00 AM	116.754	-2470.0167	841.882	-4003.008
06/11/12	12:00:00 AM	118.332	-2446.0167	844.132	-4057.111
06/12/12	12:00:00 AM	117.657	-2422.0167	843.417	-4033.968
06/13/12	12:00:00 AM	117.585	-2398.0167	847.360	-4031.472
06/14/12	12:00:00 AM	118.920	-2374.0167	859.068	-4077.242
06/15/12	12:00:00 AM	119.382	-2350.0167	862.794	-4093.085
06/16/12	12:00:00 AM	114.320	-2326.0167	825.139	-3919.558
06/17/12	12:00:00 AM	118.710	-2302.0167	863.286	-4070.062
06/18/12	12:00:00 AM	120.326	-2278.0167	872.258	-4125.464
06/19/12	12:00:00 AM	119.967	-2254.0167	868.041	-4113.143
06/20/12	12:00:00 AM	118.951	-2230.0167	862.972	-4078.331
06/21/12	12:00:00 AM	120.687	-2206.0167	874.188	-4137.847
06/22/12	12:00:00 AM	118.662	-2182.0167	865.885	-4068.401
06/23/12	12:00:00 AM	118.610	-2158.0167	864.748	-4066.613
06/24/12	12:00:00 AM	120.174	-2134.0167	875.766	-4120.248
06/25/12	12:00:00 AM	120.312	-2110.0167	877.713	-4124.976
06/26/12	12:00:00 AM	118.435	-2086.0167	867.008	-4060.621
06/27/12	12:00:00 AM	119.899	-2062.0167	876.933	-4110.810
06/28/12	12:00:00 AM	118.861	-2038.0167	869.992	-4075.224
06/29/12	12:00:00 AM	119.678	-2014.0167	877.418	-4103.248
06/30/12	12:00:00 AM	118.590	-1990.0167	873.281	-4065.933
07/01/12	12:00:00 AM	117.968	-1966.0167	870.584	-4044.607
07/02/12	12:00:00 AM	117.814	-1942.0167	870.639	-4039.347
07/03/12	12:00:00 AM	117.644	-1918.0167	869.805	-4033.524
07/04/12	12:00:00 AM	118.143	-1894.0167	874.967	-4050.619
07/05/12	12:00:00 AM	117.778	-1870.0167	873.073	-4038.100
07/06/12	12:00:00 AM	117.478	-1846.0167	873.299	-4027.805
07/07/12	12:00:00 AM	118.051	-1822.0167	876.786	-4047.453
07/08/12	12:00:00 AM	117.517	-1798.0167	871.564	-4029.167
07/09/12	12:00:00 AM	117.627	-1774.0167	871.814	-4032.938
07/10/12	12:00:00 AM	117.670	-1750.0167	873.174	-4034.395
07/11/12	12:00:00 AM	117.505	-1726.0167	877.240	-4028.728
07/12/12	12:00:00 AM	114.340	-1702.0167	855.905	-3920.213
07/13/12	12:00:00 AM	112.884	-1678.0167	844.302	-3870.310
07/14/12	12:00:00 AM	149.247	-1654.0167	851.165	-5117.028
07/15/12	12:00:00 AM	146.984	-1630.0167	846.449	-5039.456
07/16/12	12:00:00 AM	144.238	-1606.0167	836.482	-4945.298
07/17/12	12:00:00 AM	140.654	-1582.0167	823.136	-4822.413
07/18/12	12:00:00 AM	143.712	-1558.0167	837.313	-4927.254
07/19/12	12:00:00 AM	127.583	-1534.0167	777.625	-4374.290
07/20/12	12:00:00 AM	138.053	-1510.0167	816.931	-4733.238
07/21/12	12:00:00 AM	135.890	-1486.0167	812.456	-4659.095
07/22/12	12:00:00 AM	139.357	-1462.0167	826.522	-4777.962
07/23/12	12:00:00 AM	136.734	-1438.0167	817.046	-4688.038
07/24/12	12:00:00 AM	132.941	-1414.0167	804.542	-4557.960
07/25/12	12:00:00 AM	131.697	-1390.0167	800.221	-4515.335
07/26/12	12:00:00 AM	139.210	-1366.0167	827.389	-4772.929
07/27/12	12:00:00 AM	132.871	-1342.0167	807.279	-4555.563
07/28/12	12:00:00 AM	135.993	-1318.0167	818.189	-4662.607
07/29/12	12:00:00 AM	139.504	-1294.0167	811.627	-4782.983
07/30/12	12:00:00 AM	144.158	-1270.0167	828.526	-4942.563
07/31/12	12:00:00 AM	142.715	-1246.0167	832.855	-4893.084
08/01/12	12:00:00 AM	141.272	-1222.0167	837.185	-4843.606
08/02/12	12:00:00 AM	137.795	-1198.0167	828.907	-4724.393
08/03/12	12:00:00 AM	138.564	-1174.0167	832.564	-4750.762
08/04/12	12:00:00 AM	131.720	-1150.0167	808.915	-4516.123
08/05/12	12:00:00 AM	129.821	-1126.0167	803.634	-4451.000
08/06/12	12:00:00 AM	135.629	-1102.0167	826.313	-4650.143
08/07/12	12:00:00 AM	130.647	-1078.0167	810.598	-4479.310
08/08/12	12:00:00 AM	133.113	-1054.0167	821.329	-4563.889
08/09/12	12:00:00 AM	133.917	-1030.0167	824.822	-4591.443
08/10/12	12:00:00 AM	129.241	-1006.0167	805.416	-4431.131
08/11/12	12:00:00 AM	130.445	-0982.0167	811.169	-4472.397
08/12/12	12:00:00 AM	131.682	-0958.0167	815.893	-4514.798
08/13/12	12:00:00 AM	129.460	-0934.0167	810.442	-4438.643
08/14/12	12:00:00 AM	126.077	-0910.0167	798.951	-4322.649
08/15/12	12:00:00 AM	130.465	-0886.0167	814.327	-4473.083
08/16/12	12:00:00 AM	126.572	-0862.0167	799.478	-4339.595
08/17/12	12:00:00 AM	132.725	-0838.0167	823.806	-4550.585
08/18/12	12:00:00 AM	128.031	-0814.0167	808.750	-4389.643
08/19/12	12:00:00 AM	133.049	-0790.0167	828.626	-4561.692
08/20/12	12:00:00 AM	126.955	-0766.0167	799.519	-4352.736
08/21/12	12:00:00 AM	131.075	-0742.0167	820.688	-4494.010
08/22/12	12:00:00 AM	131.437	-0718.0167	821.715	-4506.397
08/23/12	12:00:00 AM	130.064	-0694.0167	818.071	-4459.322
08/24/12	12:00:00 AM	129.458	-0670.0167	817.392	-4438.572
08/25/12	12:00:00 AM	131.206	-0646.0167	824.371	-4498.508
08/26/12	12:00:00 AM	131.994	-0622.0167	827.129	-4525.492
08/27/12	12:00:00 AM	129.328	-0598.0167	818.922	-4434.111
08/28/12	12:00:00 AM	129.812	-0574.0167	821.998	-4450.696
08/29/12	12:00:00 AM	129.264	-0550.0167	823.500	-4431.909
08/30/12	12:00:00 AM	136.276	-0526.0167	850.321	-4672.319
08/31/12	12:00:00 AM	130.740	-0502.0167	830.014	-4482.514
09/01/12	12:00:00 AM	134.376	-0478.0167	844.832	-4607.181
09/02/12	12:00:00 AM	134.681	-0454.0167	848.987	-4617.642
09/03/12	12:00:00 AM	135.219	-0430.0167	852.051	-4636.071
09/04/12	12:00:00 AM	135.676	-0406.0167	854.189	-4651.738
09/05/12	12:00:00 AM	134.052	-0382.0167	848.832	-4596.052
09/06/12	12:00:00 AM	133.258	-0358.0167	848.223	-4568.837
09/07/12	12:00:00 AM	137.498	-0334.0167	866.242	-4714.228
09/08/12	12:00:00 AM	136.634	-0310.0167	863.173	-4684.591
09/09/12	12:00:00 AM	136.473	-0286.0167	864.895	-4679.077
09/10/12	12:00:00 AM	131.803	-0262.0167	845.164	-4518.948
09/11/12	12:00:00 AM	129.734	-0238.0167	833.468	-4448.024
09/12/12	12:00:00 AM	124.303	-0214.0167	813.833	-4261.817
09/13/12	12:00:00 AM	119.329	-0190.0167	795.663	-4091.296
09/14/12	12:00:00 AM	121.591	-0166.0167	806.572	-4168.835
09/15/12</					

APPENDIX H
GAUGE CALIBRATION SHEETS



Spartek Systems

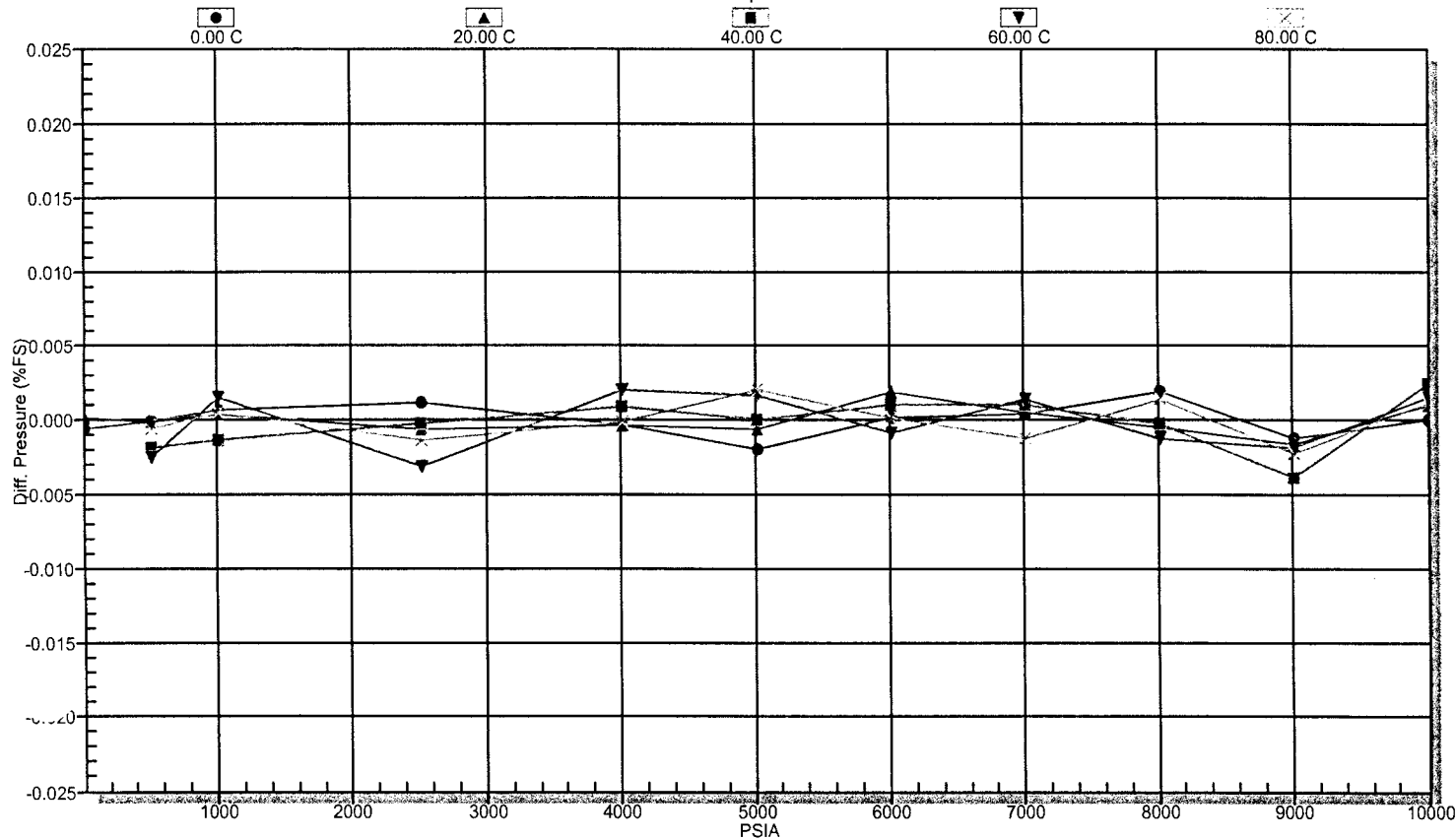
#1 Thevenaz Ind. Tr.
Sylvan Lake, AB, Ca, T4S 1P5
Phone (403) 887-2443
Fax (403) 887-4050

APPENDIX H

Pressure Gauge

Certificate of Calibration

Calibration Report - 10469.



GAUGE NUMBER: 10469

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

Prescale: $xp = m * (fp - fp0)$

m: 0.01

$fp0 = 681904$

Temp

4

$xt = m * (ft - ft0)$

0.01

$ft0 = 125193$

Pressure Equation:

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

Temperature Compensation:

$A = A0 + xt(A1 + xt(A2 + xt(A3 + xt(A4))))$

$B = B0 + xt(B1 + xt(B2 + xt(B3 + xt(B4))))$

$C = C0 + xt(C1 + xt(C2 + xt(C3 + xt(C4))))$

$D = D0 + xt(D1 + xt(D2 + xt(D3 + xt(D4))))$

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 12.825395	0.06135181202	0.000723885587	5.089702876E-06	1.279137902E-08
B 4.352505487	-0.003791521532	-1.282245198E-06	-1.198154782E-08	-2.382083001E-11
C -1.268952652E-05	1.105665746E-09	-7.976268291E-10	-1.571765592E-12	3.353848599E-15
D 7.059185814E-10	3.309431345E-12	2.435522112E-13	6.755648057E-16	-2.718418398E-19

Temperature (C) STANDARD FIT COEFFICIENTS

A 0.3779180527

B -0.3675073048

C -0.0001174302267

D -4.486565358E-07

0 points eliminated.

Error File: Gauge # 10469

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
12.90	0.00	681904.25	125193.63	-0.06
513.00	0.00	693401.00	125212.38	-0.01
1013.20	0.00	704911.50	125229.86	0.07
2513.60	0.00	739496.63	125275.94	0.11
4014.00	0.00	774157.56	125308.16	-0.03
5014.20	0.00	797300.75	125324.34	-0.20
6014.50	0.00	820480.25	125334.92	0.02
7014.80	0.00	843677.00	125340.63	0.04
8015.10	0.00	866906.38	125349.03	0.19
9015.40	0.00	890118.63	125339.88	-0.12
10015.70	0.00	913346.88	125325.22	0.00
12.90	20.00	681947.88	119680.09	0.01
513.00	20.00	692921.00	119692.95	-0.01
1013.20	20.00	703908.13	119707.59	0.04
2513.60	20.00	736920.00	119752.48	-0.06
4014.00	20.00	770024.38	119802.47	-0.04
5014.20	20.00	792120.38	119815.14	-0.06
6014.50	20.00	814255.38	119830.11	0.19
7014.80	20.00	836402.81	119839.64	0.05
8015.10	20.00	858556.06	119835.69	-0.05
9015.40	20.00	880728.06	119832.69	-0.17
10015.70	20.00	902915.13	119824.03	0.10
0.00	40.00	681701.25	114083.73	0.24
513.00	40.00	692451.31	114099.14	-0.19
1013.20	40.00	702954.31	114113.41	-0.14
2513.60	40.00	734521.81	114154.09	-0.03
4014.00	40.00	766172.50	114186.94	0.09
5014.20	40.00	787311.25	114209.83	-0.01
6014.50	40.00	808474.00	114219.17	0.10
7014.80	40.00	829665.81	114235.03	0.10
8015.10	40.00	850862.13	114238.73	-0.02
9015.40	40.00	872067.25	114240.69	-0.39
10015.70	40.00	893296.31	114236.67	0.23
0.00	60.00	681726.81	108548.77	0.18
513.00	60.00	692015.81	108573.03	-0.26
1013.20	60.00	702075.31	108576.72	0.15
2513.60	60.00	732284.06	108613.19	-0.31
4014.00	60.00	762604.13	108652.50	0.20
5014.20	60.00	782847.81	108671.53	0.16
6014.50	60.00	803111.31	108682.59	-0.09
7014.80	60.00	823414.25	108699.11	0.13
8015.10	60.00	843718.31	108707.09	-0.13
9015.40	60.00	864034.38	108709.61	-0.19
10015.70	60.00	884368.06	108711.72	0.15
0.00	80.00	681709.88	103183.42	0.05
513.00	80.00	691586.50	103212.05	-0.06
1013.20	80.00	701230.06	103211.28	0.06
2513.60	80.00	730209.25	103240.66	-0.14
4014.00	80.00	759279.50	103274.42	-0.02
5014.20	80.00	778703.13	103297.84	0.20
6014.50	80.00	798139.00	103308.17	0.02
7014.80	80.00	817602.50	103322.56	-0.12
8015.10	80.00	837091.06	103334.30	0.14
9015.40	80.00	856572.13	103337.64	-0.23
10015.70	80.00	876075.81	103339.88	0.11



Spartek Systems

#1 Thevenaz Ind. Tr.
Sylvan Lake, AB, Ca, T4S 1P5
Phone (403) 887-2443
Fax (403) 887-4050

Pressure Gauge

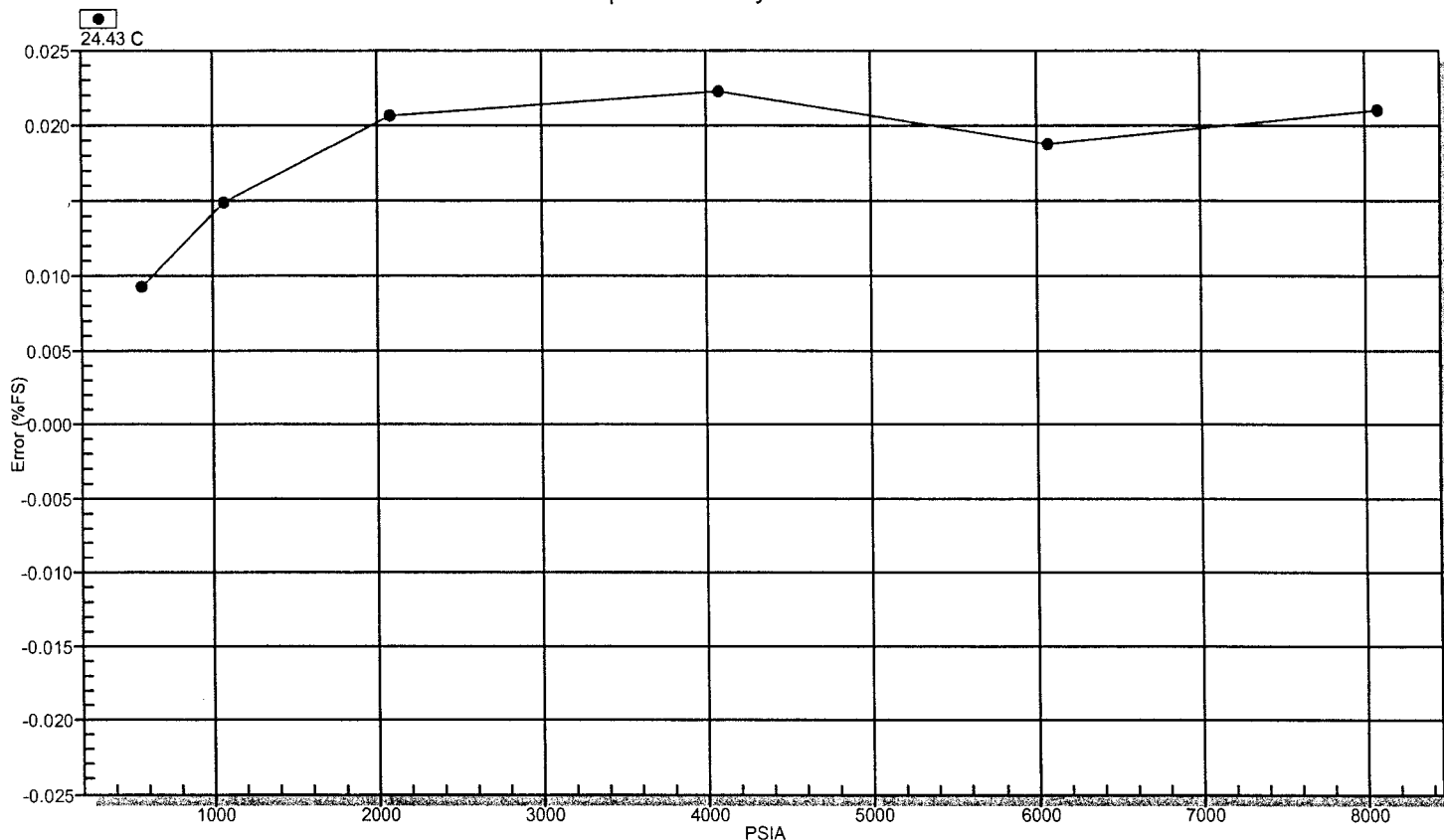
Certificate of Conformance

MODEL	0	REVISION	0
SERIAL NUMBER	10469	DEADWEIGHT USED	Piston Cylinder No. 528
CALIBRATED	Mar 07/01	E.U.B. CERT. DATE	May 09 2006
PRESSURE RANGE	10015.70 psi	TEMPERATURE RANGE	80.00 Deg. C

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.025\%$ 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 $\pm(0.025\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Accepted By:

Date: Thursday, May 29, 2008



SPARTEK SYSTEMS

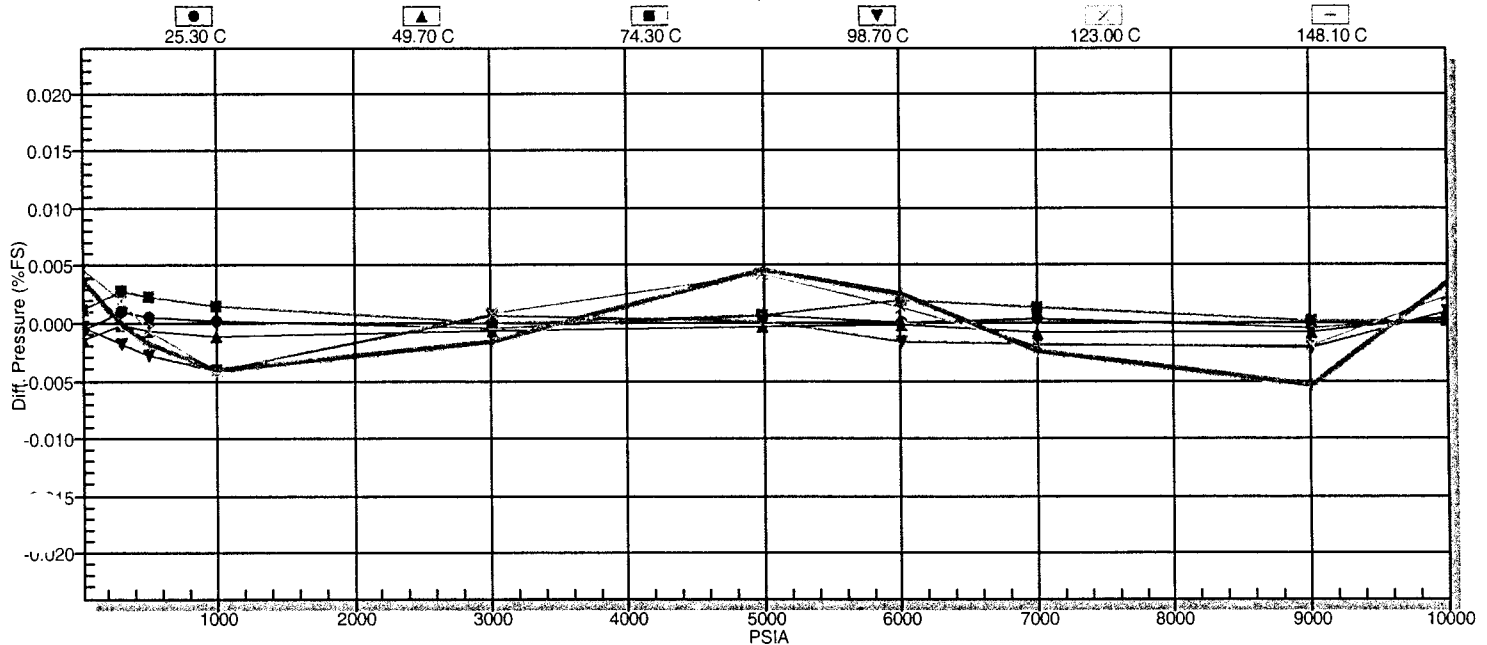
GEOPHYSICAL INSTRUMENTATION

"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 - 75900.



GAUGE NUMBER: 75900

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 699538$

Temp

4

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

0.01

$f_{t0} = 166637$

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 13.00853743	0.05801425486	0.0001652165752	4.967798855E-07	-5.351374463E-10
B 1.833025732	-0.001405181555	-4.682730297E-07	-2.635051392E-09	-7.63332118E-13
C 1.153936164E-06	1.162571183E-08	1.216794333E-10	4.965639847E-13	2.028300563E-16
D 1.285303115E-10	-3.056931778E-12	-2.013721113E-14	-7.533232117E-17	-4.131924069E-20
Temperature (C) STANDARD FIT COEFFICIENTS				
A 24.66625687				
B -0.3354976137				
C -3.002206867E-05				
D -2.119199127E-07				

0 points eliminated.

Error File: Gauge # 75900

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.08	25.30	699538.33	166637.00	-0.06
303.04	25.40	715365.33	166651.50	0.09
507.34	25.30	726507.33	166655.50	0.05
1002.92	25.50	753537.67	166674.25	0.01
3008.11	25.50	862746.33	166647.75	-0.06
4993.33	25.40	970370.33	166504.50	0.06
6008.92	25.50	1025095.00	166376.75	0.01
7006.13	25.30	1078602.00	166233.75	0.03
9008.61	25.50	1185100.67	165859.00	-0.06
10001.23	25.40	1237343.67	165629.50	0.03
13.13	49.70	699720.33	159370.50	-0.14
303.09	49.60	714722.67	159383.00	-0.02
507.39	49.70	725285.67	159392.00	-0.07
1002.98	49.70	750912.00	159405.00	-0.12
3008.17	49.70	854489.33	159390.75	-0.07
4993.39	49.70	956602.67	159271.50	-0.03
6008.97	49.70	1008573.00	159170.25	-0.01
7006.18	49.70	1059375.33	159046.75	-0.07
9008.66	49.80	1160602.00	158733.75	-0.09
10001.26	49.70	1210303.67	158540.25	0.05
13.18	74.30	699883.00	152029.75	0.11
303.14	74.30	714132.33	152043.00	0.28
507.44	74.20	724163.67	152052.25	0.22
1003.03	74.20	748500.00	152063.00	0.15
3008.21	74.20	846874.33	152055.00	-0.01
4993.41	74.20	943922.67	151962.25	0.07
6008.99	74.30	993349.33	151881.25	0.20
7006.20	74.30	1041684.00	151782.25	0.13
9008.67	74.30	1138039.00	151518.75	0.01
10001.27	74.30	1185398.33	151358.75	0.01
13.23	98.70	700064.00	144919.25	-0.04
303.19	98.60	713599.33	144932.25	-0.17
507.48	98.60	723136.33	144938.25	-0.28
1003.07	98.70	746280.67	144952.50	-0.41
3008.25	98.70	839916.67	144948.75	0.06
4993.45	98.70	932322.67	144874.50	0.02
6009.03	98.70	979399.67	144808.00	-0.16
7006.24	98.80	1025464.00	144723.50	-0.18
9008.72	98.70	1117367.00	144508.25	-0.21
10001.33	98.70	1162536.67	144363.75	0.09
13.26	123.00	700375.67	138147.75	0.48
303.22	123.10	713245.67	138160.25	0.20
507.51	123.00	722313.67	138165.75	-0.06
1003.10	123.10	744331.00	138175.00	-0.41
3008.29	123.00	833531.67	138180.00	0.09
4993.51	123.00	921675.67	138118.75	0.42
6009.09	123.10	966604.67	138066.75	0.13
7006.30	123.20	1010568.33	137995.00	-0.19
9008.78	123.00	1098342.67	137813.50	-0.19
10001.40	123.10	1141523.00	137697.75	0.23
13.28	148.10	700811.67	131565.00	0.37
303.24	148.10	713033.00	131573.00	-0.01
507.53	148.00	721653.33	131577.25	-0.17
1003.12	148.10	742588.33	131589.75	-0.41
3008.30	148.10	827483.33	131593.75	-0.17
4993.51	148.10	911543.33	131546.00	0.45
6009.09	148.10	954423.67	131501.00	0.24
7006.30	148.10	996402.67	131444.75	-0.25
9008.77	148.10	1080235.67	131292.25	-0.54
10001.37	148.30	1121505.00	131193.25	0.34



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

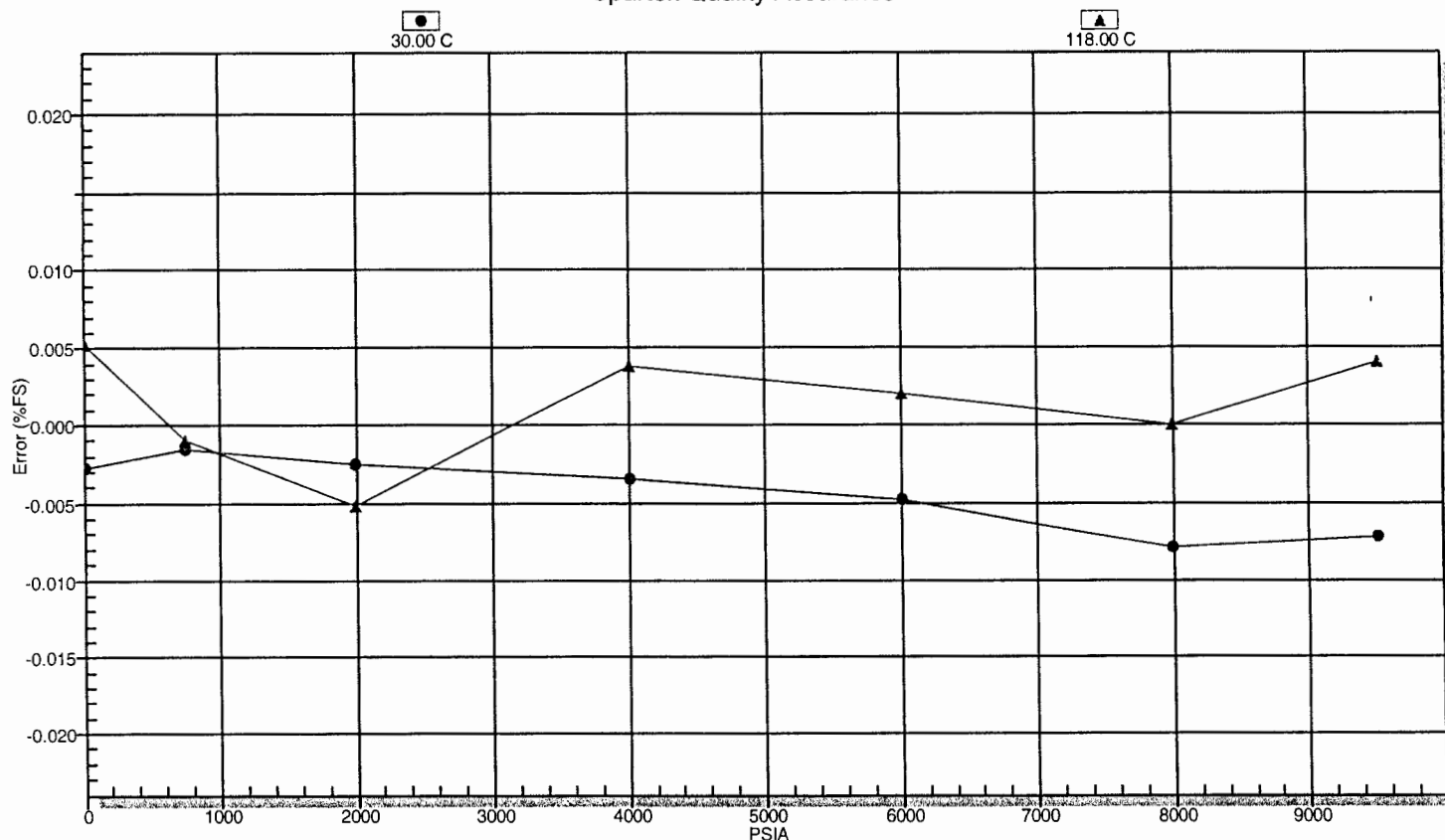
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	75900	CALIBRATION DATE	SEP 03/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.08 - 10001.23 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.30 - 148.10 °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: SEP 06/11

Ramp report: Serial # 75900

Gauge range = 10001.400 PSI. Max. DIFF. = 2.400

Ramp check result: PASS, Max Err = 0.008% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
9506.55	9505.82	9507.75	-0.72	0.0072	30.00	32.27
7995.15	7994.36	7996.38	-0.79	0.0079	30.20	31.30
6008.87	6008.40	6010.04	-0.48	0.0048	30.10	30.27
4003.76	4003.41	4004.82	-0.35	0.0035	30.20	29.64
1992.05	1991.80	1993.06	-0.25	0.0025	30.00	29.34
741.47	741.31	742.28	-0.16	0.0016	30.10	29.40
13.08	12.80	13.54	-0.27	0.0027	30.30	29.50
9506.54	9506.95	9507.79	0.41	0.0041	118.00	118.62
7995.15	7995.15	7996.40	0.00	0.0000	117.90	118.17
6008.88	6009.08	6010.09	0.21	0.0021	118.10	117.73
4003.77	4004.16	4004.95	0.39	0.0039	118.10	117.50
1992.06	1991.55	1993.04	-0.51	0.0051	118.10	117.43
741.48	741.39	742.32	-0.09	0.0009	118.10	117.55
13.09	13.62	13.55	0.53	0.0053	118.20	117.66



SPARTEK SYSTEMS

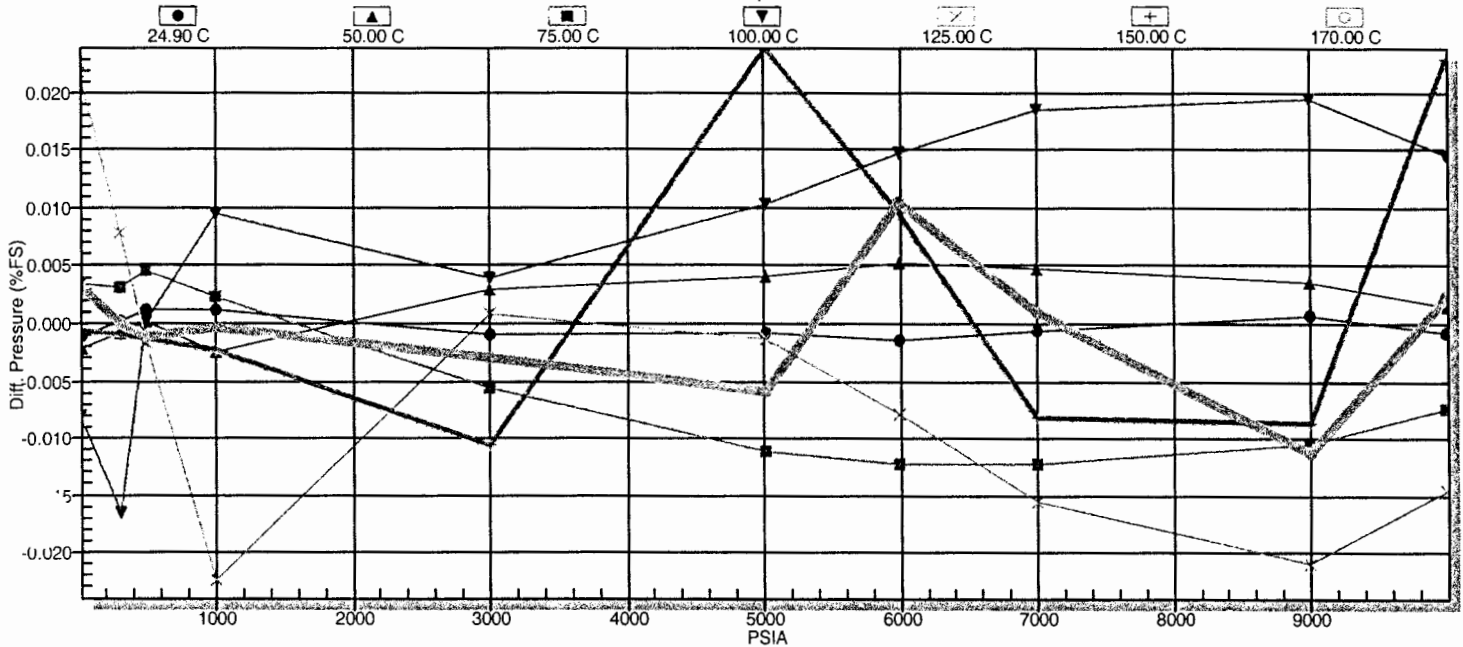
GEOPHYSICAL INSTRUMENTATION

"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 - 76077.



GAUGE NUMBER: 76077

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 696205$

Temp

5

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

0.01

$f_{t0} = 150709$

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 13.0136963	-0.01597146349	-0.003409903515	-3.126272132E-05	-1.079801947E-07
B -1.20366904E-10	2.566524369	-0.00181832986	6.893628782E-06	6.462276628E-08
C 2.439273265E-10	2.918895194E-13	2.465612196E-06	-2.155514842E-07	-6.037720502E-09
D -5.390582477E-11	-1.859576295E-13	-2.104819019E-16	3.934133943E-10	4.404493663E-11
Temperature (C) STANDARD FIT COEFFICIENTS				
A 25.09298827				
B -0.3345891166				
C 0.0002234251032				
D 3.202327425E-07				

0 points eliminated.

Error File: Gauge # 76077

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.14	24.90	696205.67	150709.75	-0.11
304.14	24.90	707549.00	150725.00	0.02
492.97	25.10	714910.33	150735.25	0.12
1002.43	25.00	734759.00	150758.25	0.11
2996.09	25.00	812351.33	150789.25	-0.10
5006.81	24.90	890382.33	150760.25	-0.08
5993.35	24.90	928536.00	150727.00	-0.14
6998.81	25.00	967319.00	150681.50	-0.07
8995.36	25.00	1043926.00	150543.75	0.07
9997.60	25.00	1082145.33	150451.25	-0.09
13.14	50.00	696469.67	143706.00	-0.22
304.14	50.00	707208.67	143719.50	-0.08
492.98	50.00	714178.00	143728.25	0.02
1002.44	50.00	732959.67	143746.50	-0.24
2996.11	50.00	806452.67	143774.75	0.29
5006.82	50.00	880374.67	143759.25	0.40
5993.37	50.00	916544.67	143735.25	0.53
6998.82	50.00	953316.00	143701.00	0.47
8995.37	50.00	1025999.00	143592.50	0.36
9997.62	50.00	1062286.33	143521.00	0.14
13.13	75.00	696703.67	136798.75	0.35
304.13	75.00	706894.67	136809.25	0.32
492.96	75.00	713514.00	136819.25	0.47
1002.42	75.00	731349.67	136839.00	0.23
2996.09	75.00	801097.67	136866.25	-0.56
5006.80	75.00	871290.00	136856.25	-1.11
5993.35	75.10	905646.00	136839.00	-1.22
6998.80	75.10	940581.67	136810.00	-1.23
8995.35	75.00	1009673.33	136724.25	-1.05
9997.60	75.00	1044186.67	136663.75	-0.74
13.09	100.00	696777.00	130141.75	-0.81
304.09	100.00	706451.00	130154.00	-1.65
492.93	100.00	712802.00	130163.25	0.01
1002.38	100.00	729812.67	130178.00	0.95
2996.04	100.10	796156.67	130204.00	0.40
5006.74	100.00	862936.00	130200.25	1.03
5993.28	100.00	895628.00	130188.25	1.47
6998.73	100.00	928874.67	130163.75	1.84
8995.27	100.00	994653.67	130090.75	1.94
9997.52	100.00	1027532.67	130041.50	1.46
13.05	125.00	697214.67	123832.75	2.18
304.05	125.10	706374.67	123836.75	0.78
492.88	125.00	712319.00	123847.00	-0.17
1002.33	125.00	728379.00	123862.25	-2.24
2996.00	125.10	791594.67	123885.25	0.09
5006.69	125.10	855234.67	123884.00	-0.14
5993.24	125.10	886388.00	123871.75	-0.79
6998.69	125.00	918084.00	123856.00	-1.55
8995.23	124.90	980807.67	123795.50	-2.09
9997.47	125.00	1012148.67	123744.50	-1.45
13.03	150.00	697797.67	117358.25	-0.07
304.02	150.10	706476.33	117368.25	-0.10
492.86	150.00	712115.67	117374.50	-0.13
1002.32	150.00	727356.33	117391.50	-0.23
2995.98	150.00	787272.67	117411.75	-1.07
5006.68	150.00	848086.67	117414.00	2.39
5993.23	149.90	877838.33	117409.25	0.94
6998.68	150.00	908103.67	117395.75	-0.82
8995.23	150.00	968022.33	117346.50	-0.87
9997.48	149.90	997991.00	117315.25	2.29
12.99	170.00	698213.00	111793.50	0.33
303.99	169.80	706531.33	111800.50	-0.01
492.82	170.10	711940.67	111810.00	-0.11
1002.28	170.00	726572.33	111814.00	-0.03
2995.95	169.90	784153.00	111836.25	-0.29
5006.65	170.10	842570.67	111840.25	-0.60
5993.20	169.90	871331.00	111837.50	1.04
6998.64	169.90	900556.33	111835.25	0.09
8995.20	169.90	958388.00	111791.00	-1.14

9997.44

170.10

987328.67

111770.50

0.23



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

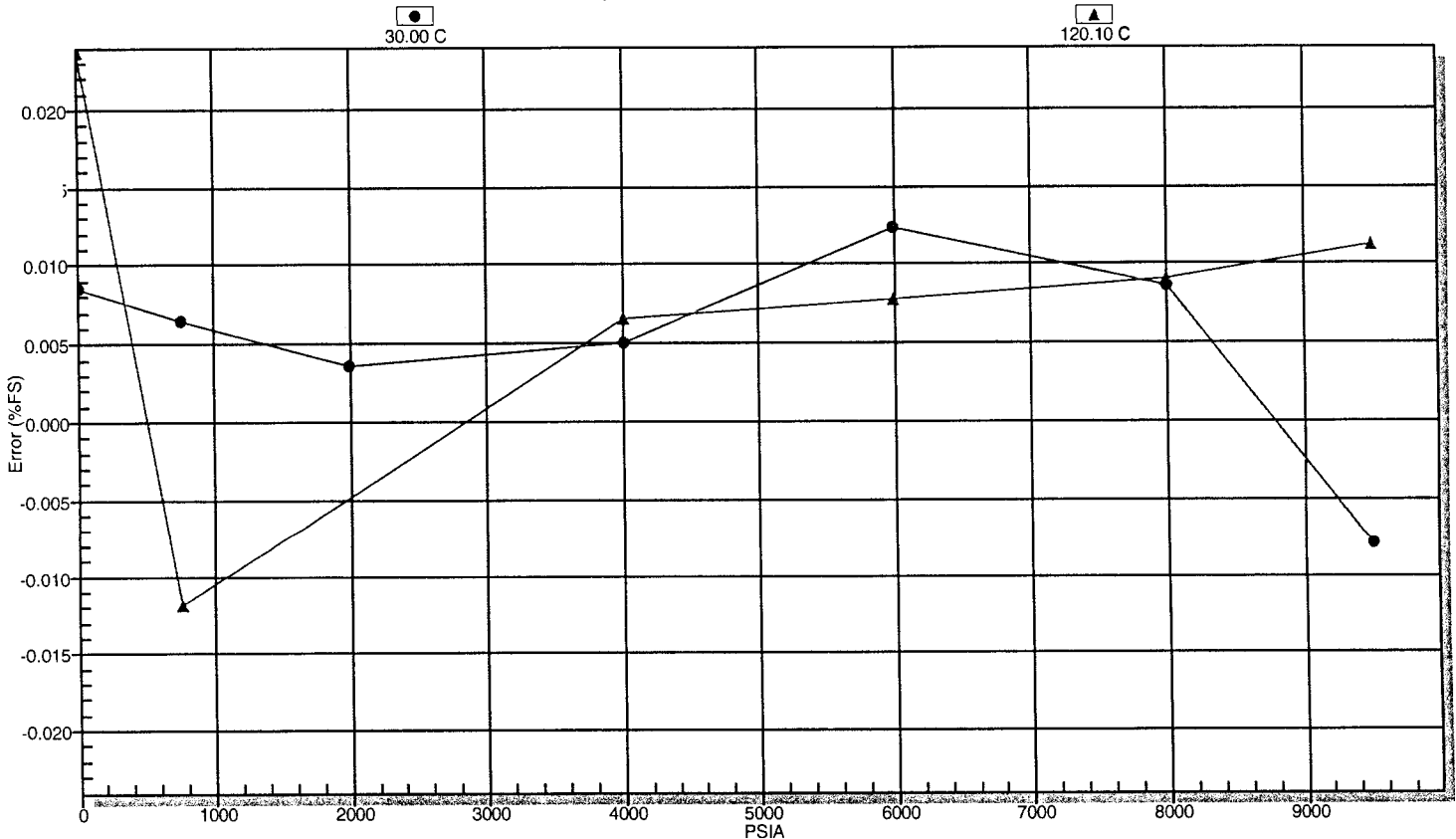
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76077	CALIBRATION DATE	JUN 30/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.14 - 9997.60 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	24.90 - 170.00 °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



Accepted By: _____

Date: JUL 07/11

Ramp report: Serial # 76077

Gauge range = 9997.621 PSI. Max. DIFF. = 2.399

Ramp check result: PASS, Max Err = 0.024% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
9504.50	9503.71	9504.65	-0.79	0.0079	30.00	30.46
8006.05	8006.91	8006.20	0.86	0.0086	30.10	30.10
5993.35	5994.57	5993.45	1.23	0.0123	29.90	29.74
4003.83	4004.33	4003.72	0.50	0.0050	30.00	29.58
1993.77	1994.14	1993.62	0.36	0.0036	29.90	29.60
755.13	755.78	754.91	0.65	0.0065	29.90	29.71
13.15	14.00	12.54	0.85	0.0085	29.90	29.79
9504.52	9505.64	9504.44	1.12	0.0112	120.10	119.78
8006.07	8006.98	8006.00	0.91	0.0091	119.90	119.74
5993.36	5994.14	5993.25	0.78	0.0078	120.10	119.68
4003.84	4004.51	4003.68	0.66	0.0066	120.00	119.72
755.13	753.95	754.68	-1.18	0.0118	120.00	119.95
13.15	15.52	12.27	2.37	0.0237	119.90	120.06



SPARTEK SYSTEMS

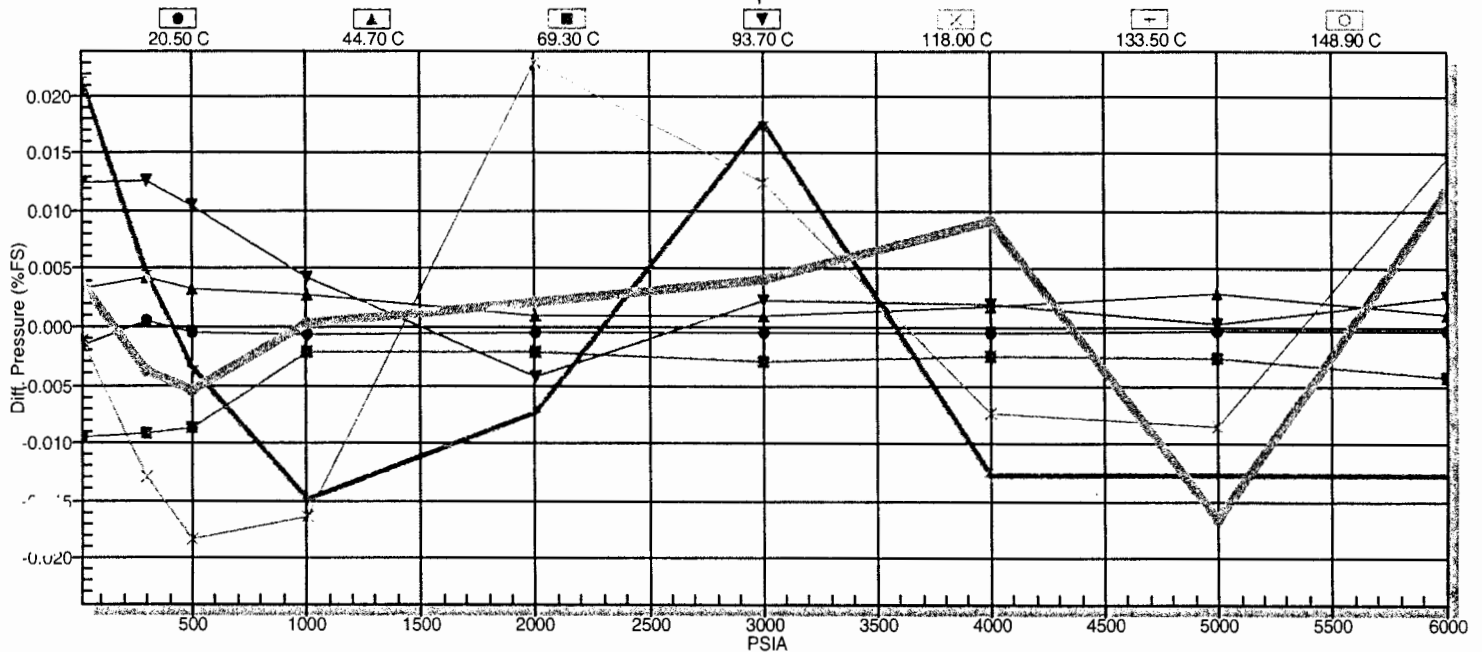
GEOPHYSICAL INSTRUMENTATION

"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

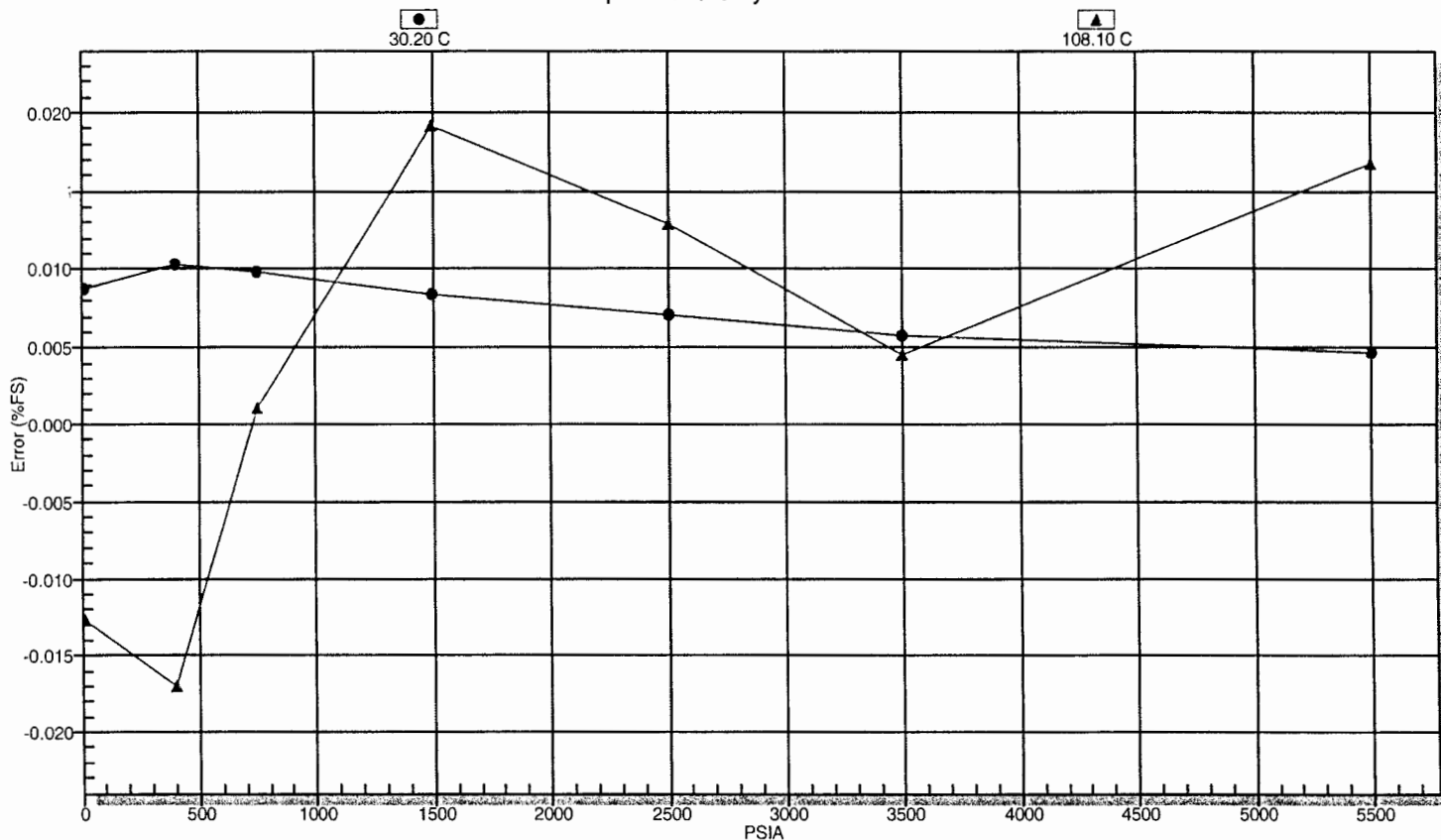
Pressure Gauge Certificate of Conformance

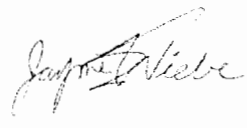
SERIAL NUMBER	76171	CALIBRATION DATE	AUG 23/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.06 - 6000.93 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	20.50 - 148.90 °C	TRACEABILITY DOC.	CAL-STANDARD-001

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

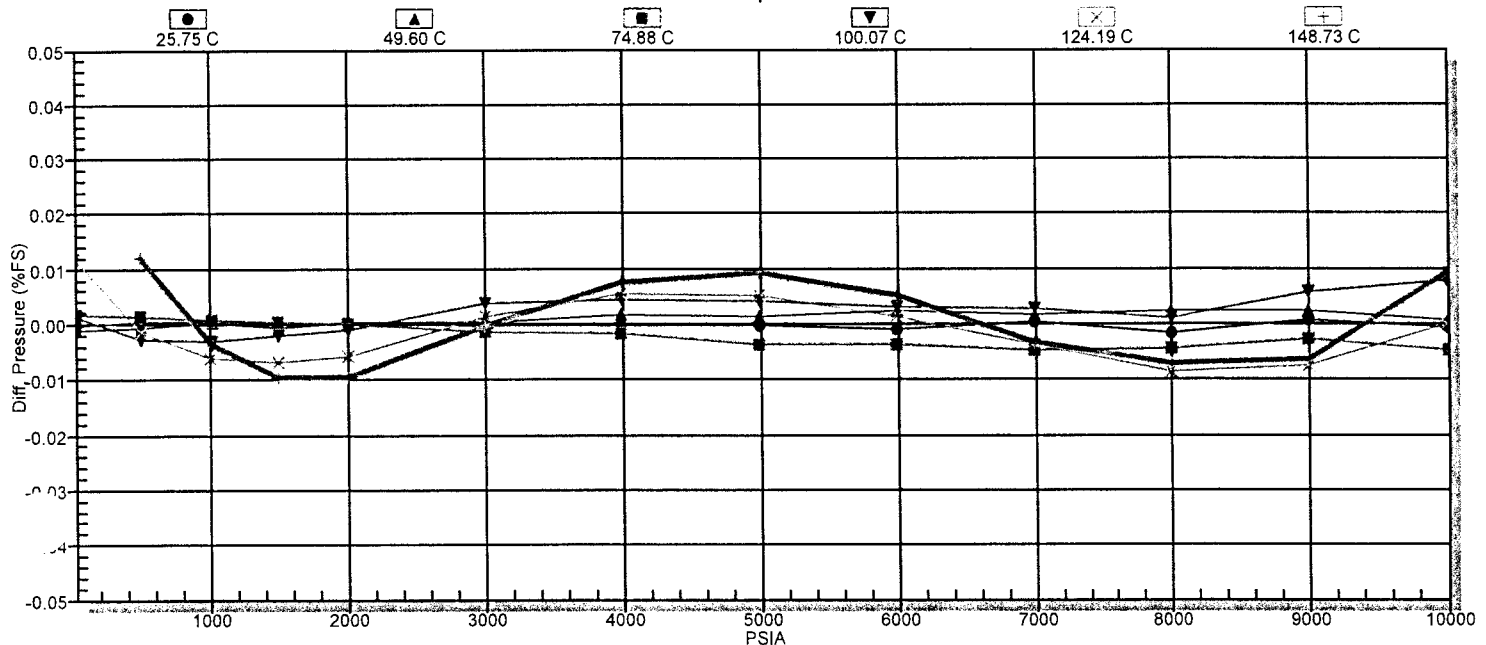
GEOPHYSICAL INSTRUMENTATION

"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 - 76222.



GAUGE NUMBER: 76222

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 698327$

Temp

4

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

0.01

$f_{t0} = 159453$

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 13.05800257	0.1550681824	0.0006833249363	2.19782565E-06	8.269551256E-10
B 2.854184739	-0.002379161074	-1.638722057E-06	-8.649890759E-09	-6.29832023E-12
C -1.178183015E-06	1.345414041E-08	2.427442915E-10	9.381777193E-13	-1.191484389E-15
D 1.263008801E-10	-3.100118503E-12	-2.427153497E-14	-6.139178868E-17	3.924538304E-19

Temperature (C) STANDARD FIT COEFFICIENTS

A 25.75469192

B -0.3633286108

C -6.566361962E-05

D -2.760684325E-07

1 points eliminated.

Error File: Gauge # 76222

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.09	25.75	698327.17	159453.75	-0.03
492.51	25.72	715129.67	159474.13	0.04
1001.56	25.72	732975.83	159494.13	0.03
1495.01	25.77	750275.83	159493.50	0.03
2002.94	25.72	768096.67	159516.50	-0.01
3005.19	25.79	803241.67	159505.50	-0.05
3992.87	25.73	837912.83	159525.88	-0.02
4994.64	25.81	873012.50	159487.75	-0.04
5995.35	25.74	908100.00	159475.75	-0.10
6996.40	25.82	943107.83	159416.13	0.03
8000.38	25.77	978228.50	159380.00	-0.16
9002.18	25.81	1013174.83	159307.63	0.08
10004.62	25.80	1048082.50	159233.38	-0.05
13.12	49.60	698587.67	152837.63	-0.11
492.55	49.57	714537.33	152858.75	-0.06
1001.60	49.58	731480.17	152876.13	0.03
1495.04	49.62	747897.83	152874.63	-0.05
2002.98	49.57	764819.50	152903.00	0.05
3005.21	49.64	798178.50	152893.00	0.03
3992.91	49.59	831087.83	152913.50	0.17
4994.64	49.66	864404.50	152879.88	0.13
5995.39	49.59	897727.50	152880.38	0.24
6996.39	49.66	930964.00	152830.25	0.18
8000.42	49.60	964332.83	152808.25	0.25
9002.17	49.67	997501.33	152739.63	0.24
10004.66	49.63	1030695.17	152690.38	0.05
13.10	74.88	698768.00	145756.00	0.16
492.52	74.89	713897.00	145774.13	0.14
1001.58	74.87	729964.50	145789.75	0.06
1495.02	74.90	745540.17	145787.50	0.03
2002.95	74.86	761587.00	145814.88	0.00
3005.20	74.95	793226.50	145805.38	-0.14
3992.88	74.84	824435.83	145829.38	-0.18
4994.63	74.95	856037.17	145802.25	-0.36
5995.36	74.88	887638.67	145806.75	-0.38
6996.39	74.99	919165.17	145762.88	-0.49
8000.39	74.92	950816.33	145748.50	-0.43
9002.17	74.94	982293.50	145691.00	-0.28
10004.63	74.96	1013784.00	145651.88	-0.46
13.10	100.07	698950.83	138858.50	0.12
492.52	100.06	713301.17	138874.13	-0.28
1001.57	100.05	728559.50	138890.50	-0.29
1495.02	100.09	743354.67	138885.88	-0.21
2002.95	100.02	758602.50	138917.63	-0.10
3005.20	100.13	788678.17	138905.50	0.36
3992.88	100.05	818340.33	138931.63	0.44
4994.63	100.10	848379.00	138905.75	0.42
5995.35	100.04	878422.50	138919.63	0.31
6996.39	100.15	908394.00	138879.13	0.29
8000.38	100.05	938484.17	138875.50	0.10
9002.17	100.14	968418.67	138825.50	0.59
10004.60	100.08	998375.67	138800.88	0.78
13.08	124.19	699238.00	132521.75	1.19
492.50	124.16	712859.58	132533.25	-0.12
1001.55	124.18	727362.92	132543.19	-0.63
1495.00	124.17	741447.25	132551.75	-0.68
2002.93	124.16	755961.92	132561.31	-0.58
3005.18	124.20	784642.50	132570.69	0.14
3992.85	124.19	812924.83	132578.19	0.56
4994.62	124.19	841609.17	132579.06	0.52
5995.32	124.21	870251.92	132574.75	0.12
6996.38	124.22	898891.42	132567.13	-0.36
8000.35	124.19	927574.42	132546.13	-0.84
9002.17	124.20	956168.17	132519.13	-0.74
10004.58	124.19	984745.00	132489.00	0.01
492.51	148.73	712581.17	126354.88	1.20
1001.56	148.74	726337.50	126362.75	-0.37
1495.01	148.73	739721.50	126369.13	-0.96
2002.94	148.72	753538.33	126379.00	-0.96

3005.19	148.73	780871.83	126372.38	-0.03
3992.86	148.70	807879.67	126394.50	0.75
4994.63	148.70	835288.83	126402.25	0.92
5995.34	148.70	862658.33	126394.38	0.52
6996.40	148.72	890034.50	126393.63	-0.33
8000.37	148.71	917466.00	126379.75	-0.71
9002.20	148.74	944809.33	126364.88	-0.66
10004.61	148.71	972130.00	126339.00	0.92



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

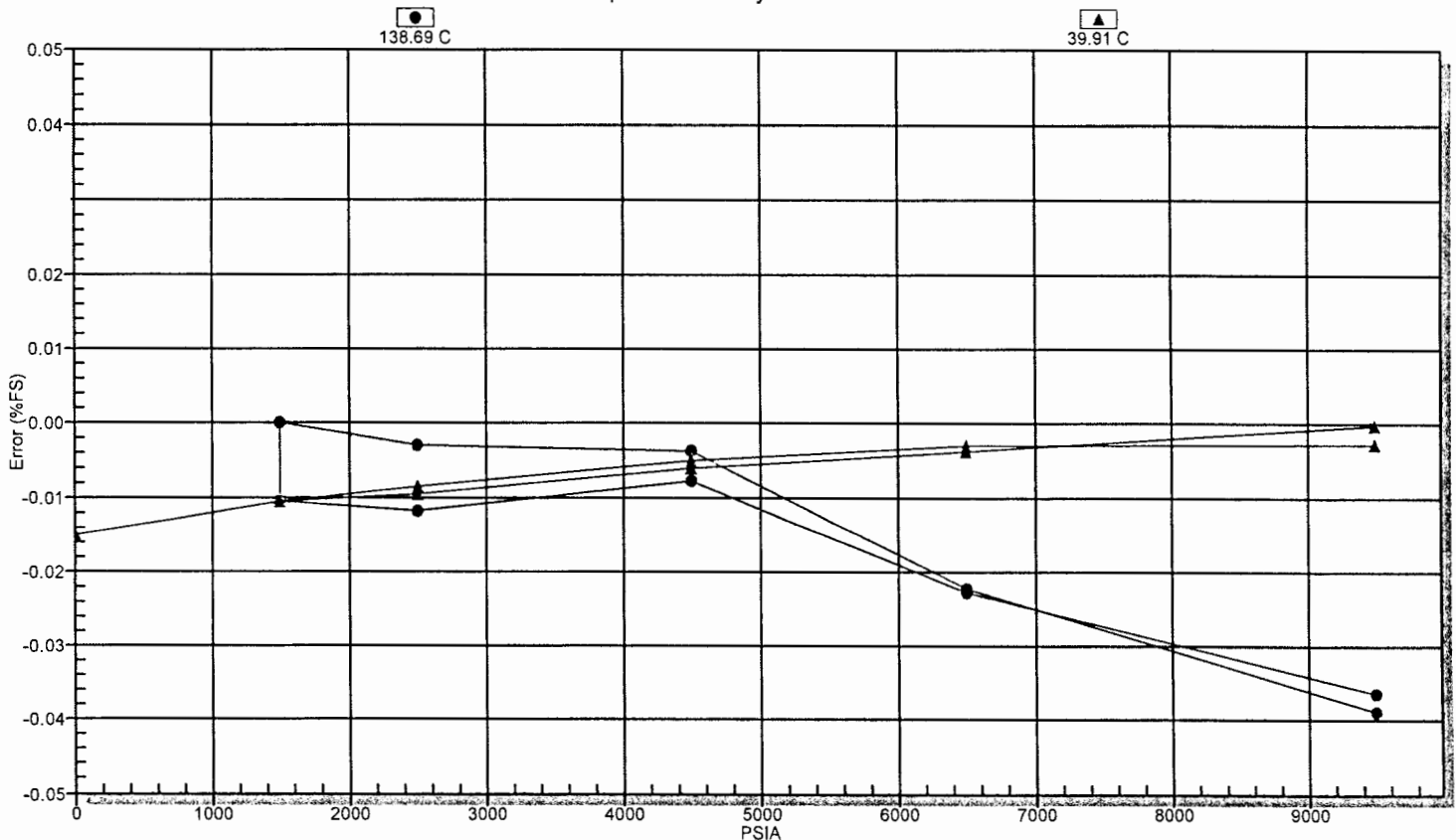
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76222	CALIBRATION DATE	MAY 28/12
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.09 - 10004.62 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.75 - 148.73 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.050\%$ 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 $\pm(0.050\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Accepted By: _____

Date: JUN 01/12 _____

Ramp report: Serial # 76222
 Gauge range = 10004.660 PSI. Max. DIFF. = 5.002
 Ramp check result: PASS, Max Err = 0.039% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
9496.45	9492.56	9496.11	-3.90	0.0389	138.69	138.49
6503.08	6500.87	6502.55	-2.22	0.0221	138.69	138.20
4499.30	4498.94	4498.84	-0.36	0.0036	138.83	138.18
2497.26	2496.96	2496.73	-0.30	0.0030	138.88	138.29
1494.95	1494.94	1494.41	-0.01	0.0001	138.94	138.39
1494.96	1493.91	1494.44	-1.05	0.0105	138.97	138.48
2497.28	2496.11	2496.73	-1.17	0.0117	139.08	138.47
4499.32	4498.54	4498.77	-0.78	0.0078	139.10	138.45
6503.09	6500.82	6502.51	-2.27	0.0227	139.14	138.53
9496.46	9492.81	9496.16	-3.64	0.0364	139.15	138.74
9496.48	9496.19	9495.91	-0.28	0.0028	39.91	40.38
6503.12	6502.82	6502.42	-0.30	0.0030	39.89	39.79
4499.34	4498.83	4498.69	-0.51	0.0051	39.82	39.61
2497.29	2496.44	2496.59	-0.85	0.0085	39.79	39.59
1494.98	1493.92	1494.37	-1.05	0.0105	39.79	39.65
13.06	11.56	12.17	-1.50	0.0150	39.81	39.81
1494.98	1493.92	1494.28	-1.05	0.0105	39.84	39.68
2497.30	2496.36	2496.68	-0.94	0.0094	39.85	39.62
4499.33	4498.74	4498.72	-0.59	0.0059	39.85	39.64
6503.10	6502.73	6502.48	-0.37	0.0037	39.85	39.80
9496.47	9496.46	9496.07	-0.02	0.0002	39.89	40.35



SPARTEK SYSTEMS

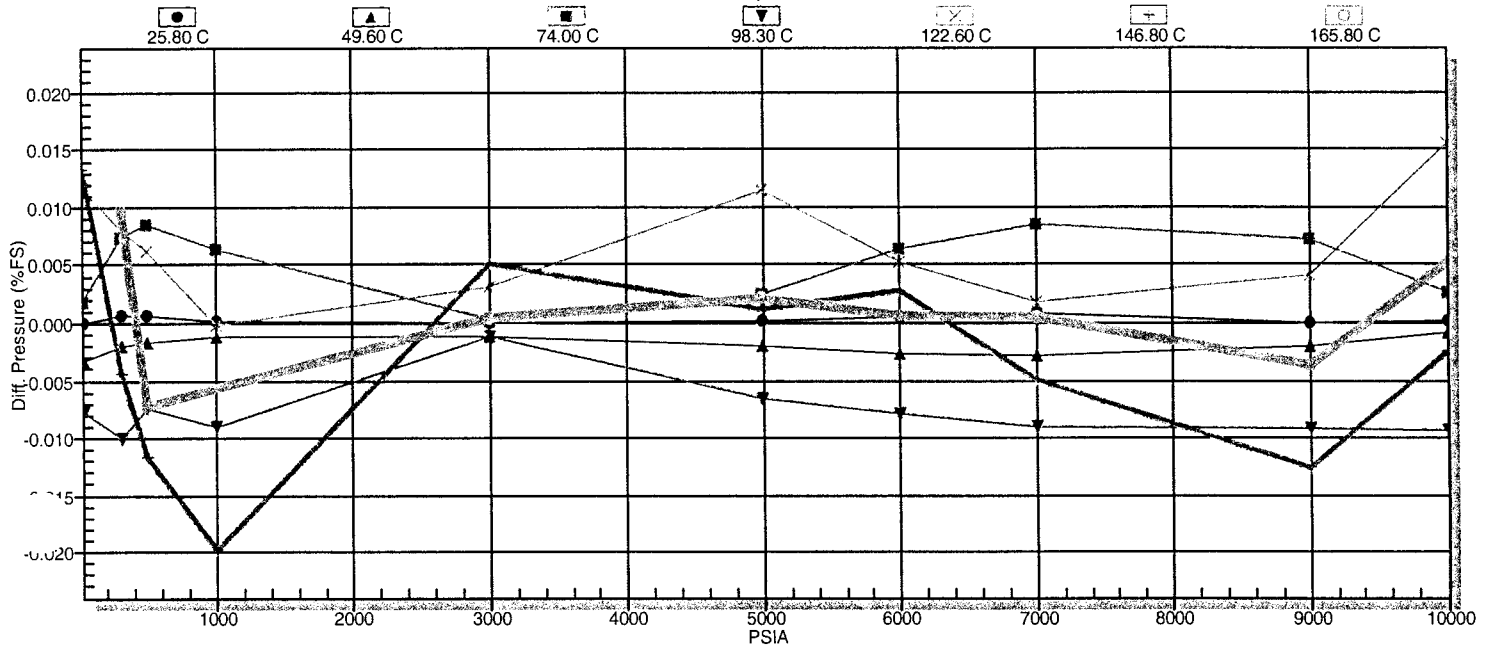
GEOPHYSICAL INSTRUMENTATION

"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:

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

Temperature Compenstation:

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

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

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

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

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

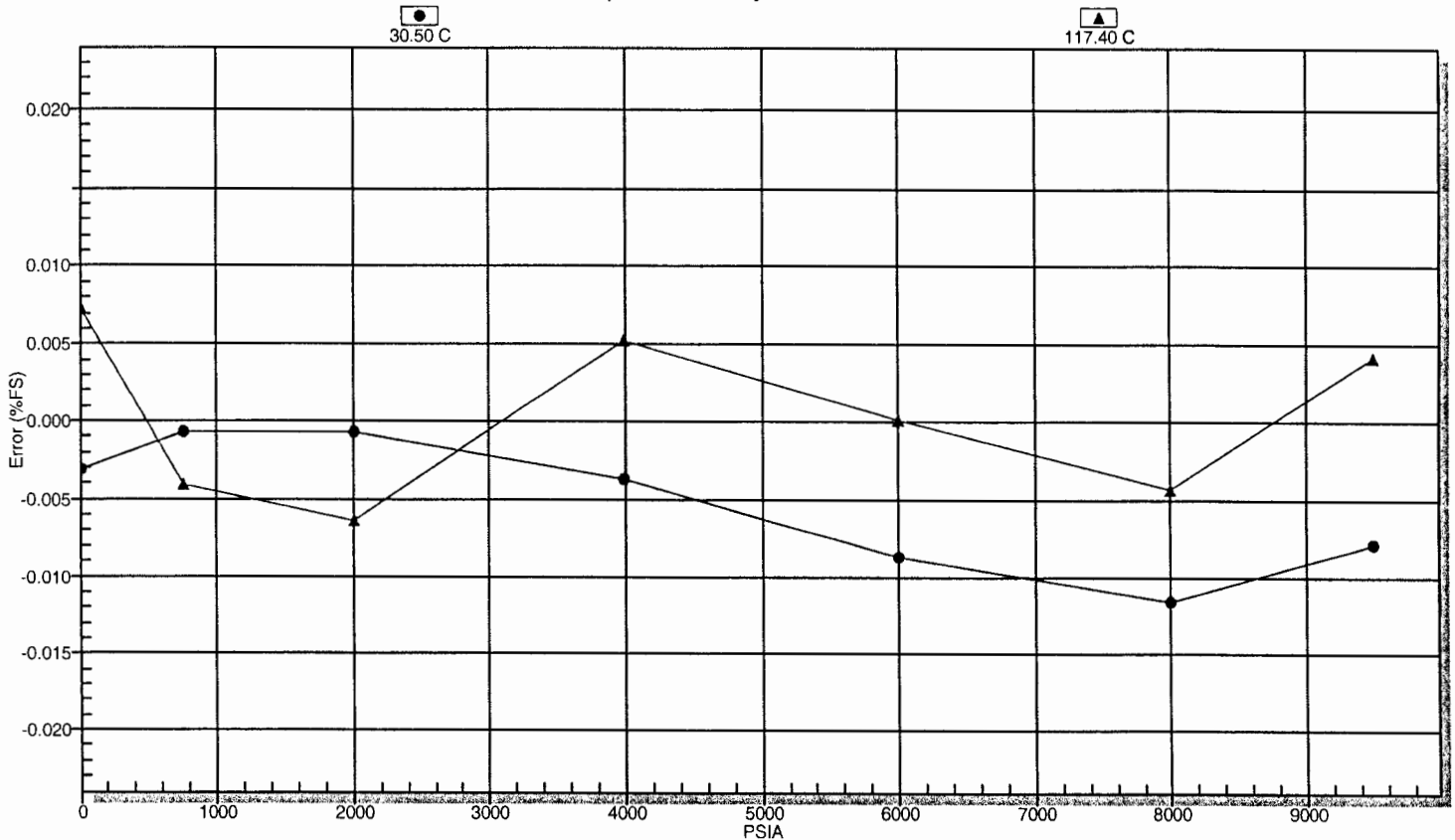
Pressure Gauge Certificate of Conformance

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



SPARTEK SYSTEMS

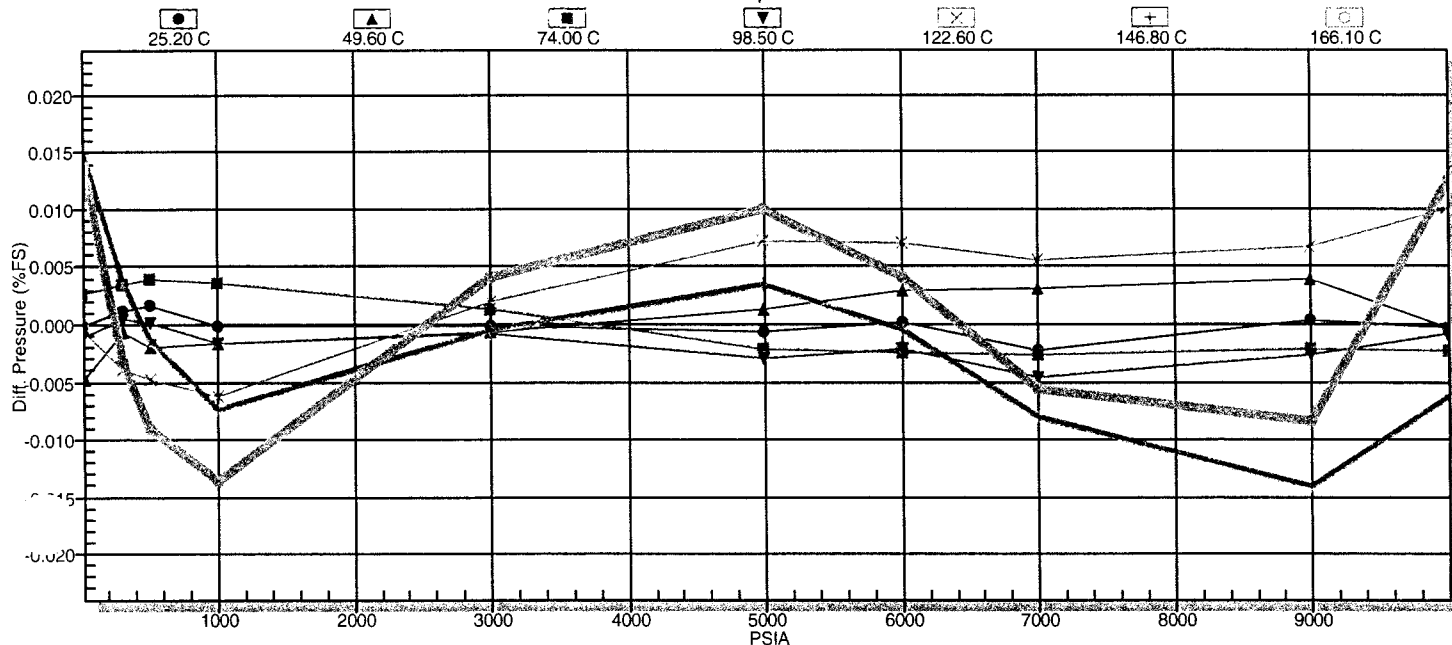
GEOPHYSICAL INSTRUMENTATION

"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 - 77120.



GAUGE NUMBER: 77120

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 699891$

Temp

4

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

0.01

$f_{t0} = 167028$

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 13.0432838	0.1499180608	-3.080875207E-05	-1.263127066E-06	-3.057087791E-09
B 4.000558812	-0.003070597307	-5.067364471E-07	-9.711693386E-10	7.200526642E-12
C 2.702005388E-07	-3.059959235E-08	-7.953499894E-10	-5.804401761E-12	-1.267193684E-14
D 4.206977423E-10	1.411644212E-11	3.018115908E-13	1.922674542E-15	3.882800519E-18
Temperature (C) STANDARD FIT COEFFICIENTS				
A 25.39179459				
B -0.3341482087				
C -1.996610629E-05				
D -1.908812792E-07				

0 points eliminated.

Error File: Gauge # 77120

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.08	25.20	699891.33	167028.75	-0.02
300.10	25.30	707069.33	167038.00	0.11
504.31	25.10	712175.67	167043.75	0.16
1000.87	25.20	724587.67	167063.75	-0.02
3003.67	25.20	774683.33	167113.00	-0.02
4989.63	25.20	824350.00	167129.75	-0.06
6003.59	25.20	849698.67	167131.00	0.01
6996.87	25.10	874506.33	167124.50	-0.22
8995.48	25.10	924358.67	167081.75	0.03
9994.76	25.20	949234.67	167050.25	-0.04
13.09	49.60	700133.67	159748.50	-0.48
300.12	49.60	706942.00	159756.00	-0.06
504.32	49.50	711776.33	159765.00	-0.19
1000.88	49.70	723542.33	159784.75	-0.16
3003.69	49.60	771010.67	159828.75	-0.06
4989.66	49.50	818087.00	159854.00	0.13
6003.62	49.60	842114.00	159855.50	0.29
6996.92	49.50	865638.67	159852.50	0.32
8995.53	49.50	912920.00	159823.25	0.40
9994.82	49.60	936516.00	159798.75	-0.03
13.07	74.00	700346.67	152463.25	0.26
300.09	74.00	706808.33	152470.75	0.34
504.30	74.00	711406.00	152482.00	0.39
1000.86	74.10	722584.00	152497.00	0.35
3003.66	74.10	767679.00	152540.25	0.13
4989.63	74.00	812391.33	152561.00	-0.21
6003.60	74.00	835215.67	152565.50	-0.24
6996.88	74.00	857566.00	152565.50	-0.26
8995.49	74.00	902490.67	152544.25	-0.21
9994.78	74.10	924917.00	152522.25	-0.24
13.05	98.50	700484.00	145396.75	-0.11
300.06	98.40	706638.00	145405.00	0.05
504.27	98.30	711013.67	145413.25	0.02
1000.83	98.30	721653.33	145430.00	-0.16
3003.64	98.40	764589.67	145466.25	-0.08
4989.60	98.40	807156.33	145488.00	-0.30
6003.54	98.50	828883.67	145490.25	-0.21
6996.81	98.40	850155.00	145491.25	-0.45
8995.43	98.40	892930.00	145475.75	-0.26
9994.72	98.40	914281.67	145452.25	-0.08
13.03	122.60	700623.33	138676.00	-0.05
300.08	122.60	706476.33	138682.75	-0.39
504.28	122.60	710644.00	138690.75	-0.48
1000.82	122.60	720781.67	138703.00	-0.63
3003.61	122.60	761726.67	138742.00	0.19
4989.58	122.70	802337.00	138761.50	0.72
6003.54	122.60	823062.67	138766.50	0.70
6996.82	122.60	843354.00	138765.25	0.56
8995.43	122.60	884160.00	138756.25	0.67
9994.72	122.70	904535.67	138740.75	1.00
13.09	146.80	700837.67	132357.75	1.48
300.12	146.80	706393.00	132365.50	0.38
504.33	146.70	710353.00	132372.50	-0.14
1000.88	146.80	720002.33	132386.50	-0.73
3003.68	146.70	759062.67	132420.00	-0.05
4989.66	146.80	797869.33	132439.25	0.35
6003.62	146.70	817682.33	132446.00	-0.05
6996.91	146.70	837080.33	132448.75	-0.80
8995.52	146.80	876083.67	132443.50	-1.41
9994.80	146.90	895561.67	132431.25	-0.63
13.09	166.10	701051.00	127439.00	1.38
300.11	166.10	706365.00	127449.50	-0.32
504.32	166.00	710162.00	127457.50	-0.91
1000.88	166.10	719427.00	127469.50	-1.36
3003.68	166.10	757029.33	127498.75	0.40
4989.65	166.10	794474.00	127521.00	1.00
6003.60	166.10	813606.33	127528.00	0.41
6996.88	166.10	832345.67	127536.00	-0.56
8995.49	166.00	870021.67	127536.50	-0.83

9994.77

166.00

888846.00

127534.25

1.25



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

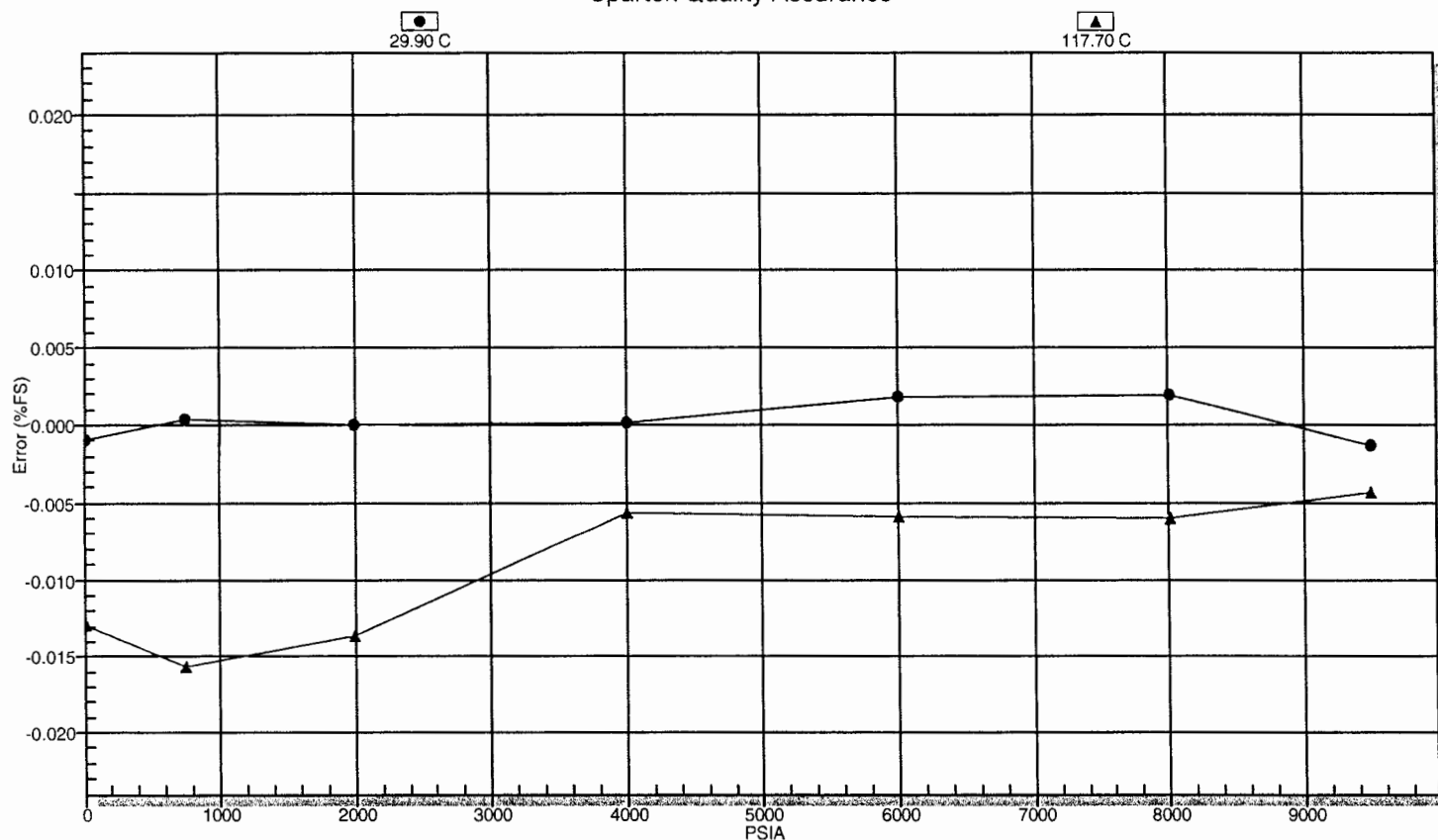
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	77120	CALIBRATION DATE	JUL 19/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.08 - 9994.76 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.20 - 166.10 °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: JUL 21/11

Ramp report: Serial # 77120

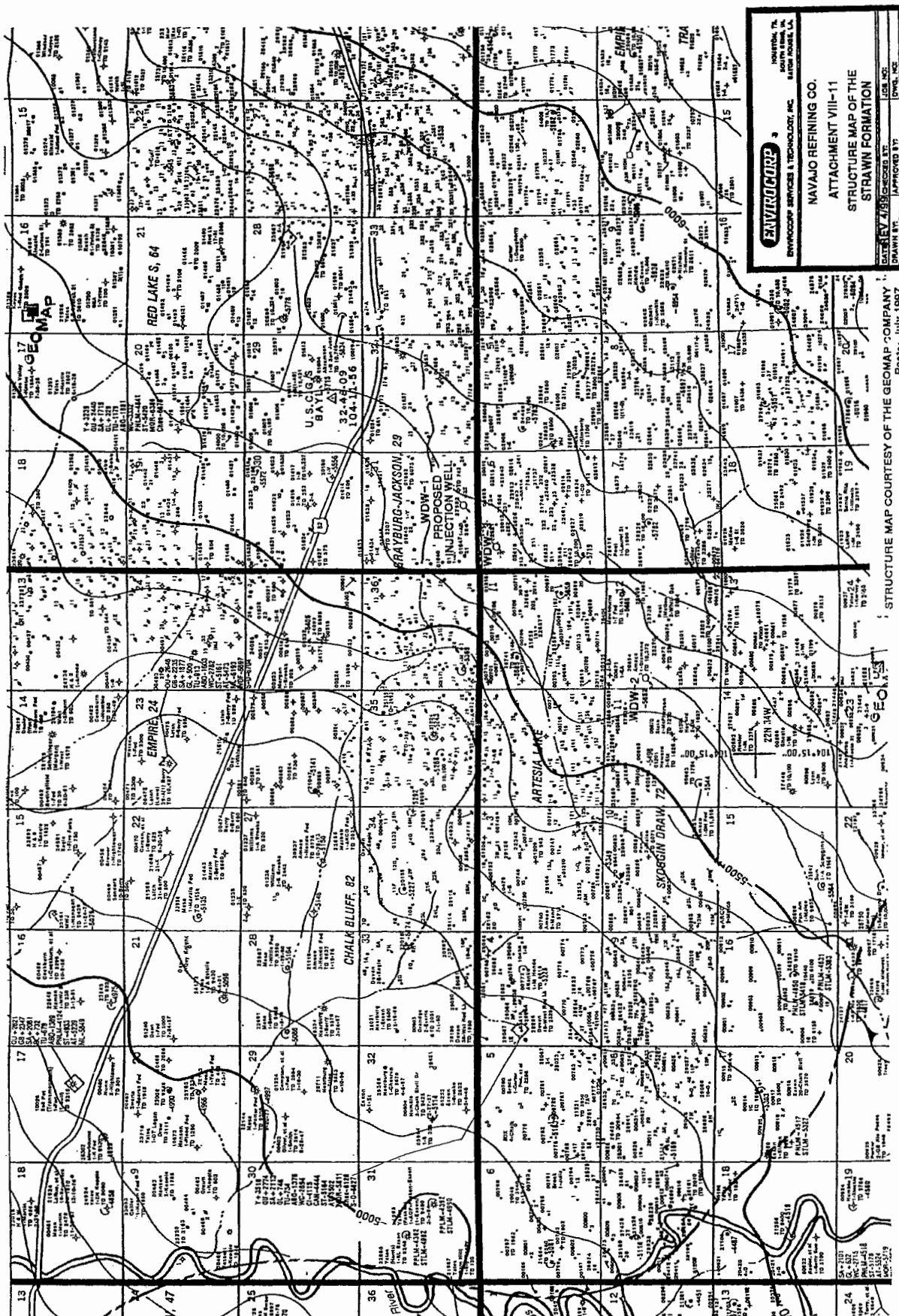
Gauge range = 9994.815 PSI. Max. DIFF. = 2.399

Ramp check result: PASS, Max Err = 0.016% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
9499.10	9498.97	9499.18	-0.13	0.0013	29.90	29.97
8014.48	8014.67	8014.66	0.19	0.0019	30.00	29.86
6003.61	6003.79	6003.85	0.18	0.0018	30.00	29.81
4000.87	4000.88	4000.93	0.01	0.0001	30.00	29.84
1989.27	1989.27	1989.30	0.00	0.0000	30.00	29.96
738.26	738.29	737.97	0.03	0.0003	30.10	30.10
13.08	12.99	12.45	-0.09	0.0009	30.00	30.20
9499.11	9498.67	9499.17	-0.43	0.0043	117.70	117.27
8014.49	8013.89	8014.59	-0.59	0.0059	117.70	117.33
6003.60	6003.01	6003.80	-0.59	0.0059	117.80	117.40
4000.86	4000.29	4000.94	-0.56	0.0056	117.70	117.53
1989.26	1987.89	1989.17	-1.37	0.0137	117.70	117.70
738.24	736.67	737.94	-1.57	0.0157	117.70	117.82
13.06	11.76	12.41	-1.29	0.0129	117.80	117.94

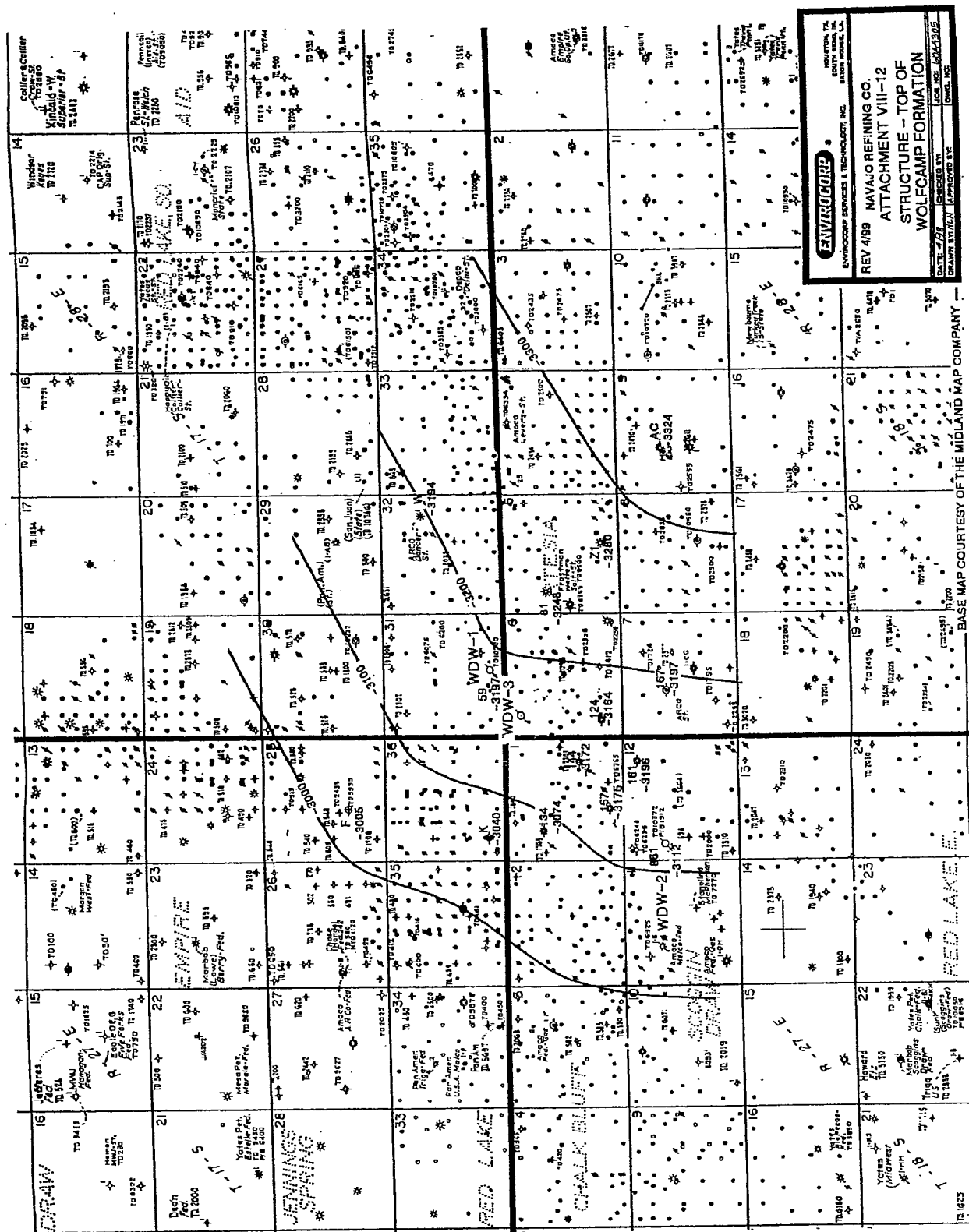
APPENDIX I

STRAWN STRUCTURE MAPS



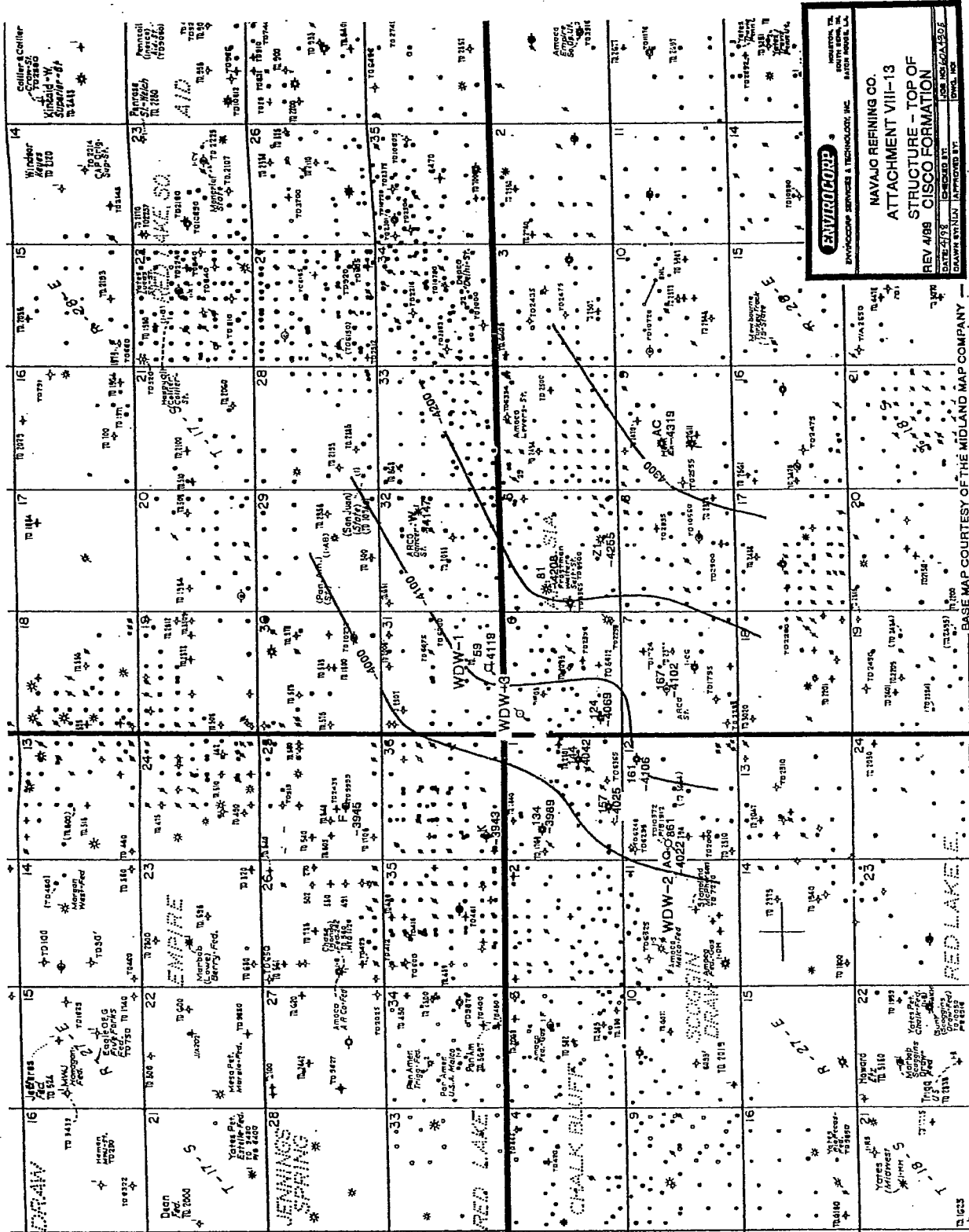
APPENDIX J

WOLFCAMP STRUCTURE MAPS



157-4025
 ID NO.
 SUBSEA DEPTH

APPENDIX K
CISCO STRUCTURE MAPS



APPENDIX L
CHRONOLOGY OF FIELD ACTIVITIES

APPENDIX L

CHRONOLOGY OF FIELD ACTIVITIES

Sunday September 16, 2012

Rusty Clark:

Traveled to Artesia, New Mexico and contacted contractors. Note all times are in Mountain Standard Time (MST).

Monday September 17, 2012

Subsurface personnel travelled to the refinery and met with Navajo personnel. Subsurface personnel arrived on location at WDW-1 which had an injection pressure of 700 psig and annulus pressure of 320 psig. A successful annulus pressure test was conducted using the chart recorder. The annulus pressure dropped from 320 psig to 305 psig in 30 minutes within the 10% allowed for the annulus pressure test. A successful annulus pressure test was conducted at WDW-2 of 340 psig at the start and 340 psig at the end of 30 minutes. A successful annulus pressure test was conducted at WDW-3 of 300 psig at the start of the test and 300 psig at the end of 30 minutes. Subsurface personnel left the location. Note: The chart recorder Serial No. 3908.

Tuesday September 18, 2012

Subsurface personnel and Pro-Well Testing arrived on location and held JSA safety meeting. Rigged up the slickline unit at WDW-2, which had an injection pressure (IP) of 890 psig and an annulus pressure (AP) of 340 psig. Ran in WDW-2 with bottomhole gauges, (top gauge Serial No: 76222, bottom gauge Serial No: 76077), and set at a depth of 7570 feet. Moved to WDW-3 and rigged up the slickline unit. WDW-3 -- IP = 790 psig and AP = 350 psig. Ran in WDW-3 with bottomhole gauges, (top gauge Serial No: 76171, bottom gauge Serial No: 75900), and set gauges at 7660 feet. Moved to WDW-1 and rigged up slickline unit. WDW-1 -- IP = 620 psig and AP = 300 psig. Ran in WDW-1 with bottomhole gauges (top gauge Serial No: 77120, bottom gauge Serial No: 76404) and set at 7924 feet at 2:15 p.m. Hooked up surface gauge (Serial No: 10469) to WDW-1. Secured the well. Continued injection into all three wells.

APPENDIX L
CHRONOLOGY OF FIELD ACTIVITIES (CONTINUED)

Wednesday September 19, 2012

Subsurface personnel returned to Baton Rouge, Louisiana from Artesia, New Mexico. Subsurface personnel will return September 22, 2012, and the bottomhole gauges will be removed from the wells on September 23, 2012.

Saturday September 22, 2012

Subsurface personnel travelled from Baton Rouge, Louisiana to Artesia, New Mexico.

Sunday September 23, 2012

Subsurface personnel met with Pro-Well Testing and held JSA safety meeting. All three wells were shut-in until 1000 hours on September 23, 2012. WDW-1 had surface pressure of 569 psig and annulus pressure (AP) of 390 psig. The memory gauges were pulled from WDW-1 (set at 7924 feet) while making gradient stops every 1000 feet moving up hole. Each gradient stop was for 7 minutes. The memory gauges were removed from WDW-1 at 1140 hours. A bailer was run into WDW-1 which tagged bottom at 9018 feet and obtained a bottomhole sample. The sample was turned over to the Navajo lab for analysis.

Subsurface and Pro-Well Testing personnel moved to WDW-3 and pulled out the bottomhole memory gauges. The total depth in WDW-3 was tagged at 9018 feet. The surface pressure was 650 psig, and annulus pressure was 410 psig at WDW-3. Subsurface personnel and Pro-Well Testing personnel moved to WDW-2. The surface pressure at WDW-2 was 700 psig, and the annulus pressure was 420 psig. The total depth was tagged at 8775 feet. The bottomhole memory gauges were pulled out of the well. All wells were returned to Navajo personnel for normal injection operations. Pro-Well Testing and Subsurface personnel left the location.

Monday, September 24, 2012

Subsurface personnel travelled back to Baton Rouge, Louisiana.

APPENDIX M

PANSYSTEM© ANALYSIS OUTPUT

Production Optimization Systems

Report File:

2012 WDW-1 PFO.pan

PanSystem Version 3.5

Analysis Date:

11/26/2012

Well Test Analysis Report

APPENDIX M

Company:	Navajo Refining Company
Location:	Artesia, New Mexico
Well Name:	Mewbourne Well No. 1
Testing Date:	September 21-23, 2012

Gauge Depth:	7924 feet RGL
--------------	---------------

Injection Interval:	7924 feet - 8476 feet
Completion Type:	Perforations
Top Of Fill:	9018 feet

Analyst:	TJJ
Subsurface Project No.:	70D6835

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	0.0000 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 Boundaries Data

Layer 1 Boundary Type : Infinitely acting

	Layer 1
L1	0.000000 ft
L2	0.000000 ft
L3	0.000000 ft
L4	0.000000 ft
Drainage area	0.000000 acres
Dietz shape factor	0.000000

Layer 1 Model Data

Layer 1 Model Type : Radial homogeneous

	Layer 1
Permeability	0.0000 md
Skin factor (Well 1)	0.0000

Rate Change Data

Time Hours	Pressure psia	Rate STB/day
-7462.016667	0.000000	-4857.924603
-7438.016667	0.000000	-4816.628968
-7414.016667	0.000000	-4720.523892
-7390.016667	0.000000	-4626.136822
-7366.016667	0.000000	-4916.095238
-7342.016667	0.000000	-5021.615079
-7318.016667	0.000000	-4901.156746
-7294.016667	0.000000	-5000.728175
-7270.016667	0.000000	-4743.950480
-7246.016667	0.000000	-4728.999835
-7222.016667	0.000000	-4562.281746
-7198.016667	0.000000	-4522.918651
-7174.016667	0.000000	-4639.880952
-7150.016667	0.000000	-4400.404762
-7126.016667	0.000000	-4747.982226
-7102.016667	0.000000	-4969.876984
-7078.016667	0.000000	-4970.305159
-7054.016667	0.000000	-4595.689683
-7030.016667	0.000000	-4142.720238
-7006.016667	0.000000	-4190.392940
-6982.016667	0.000000	-4384.097140
-6958.016667	0.000000	-5532.918651
-6934.016667	0.000000	-1.3666e4
-6910.016667	0.000000	-8418.916749
-6886.016667	0.000000	-4774.755870
-6862.016667	0.000000	-4655.553571
-6838.016667	0.000000	-4375.392857
-6814.016667	0.000000	-4622.575314
-6790.016667	0.000000	-4613.392940
-6766.016667	0.000000	-4633.942378
-6742.016667	0.000000	-4635.577464
-6718.016667	0.000000	-4728.694362

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-6694.016667	0.000000	-4755.400876
-6670.016667	0.000000	-4573.541667
-6646.016667	0.000000	-4709.555556
-6622.016667	0.000000	-4595.347305
-6598.016667	0.000000	-4986.553489
-6574.016667	0.000000	-3737.966270
-6550.016667	0.000000	-4180.829365
-6526.016667	0.000000	-3852.105159
-6502.016667	0.000000	-3892.000083
-6478.016667	0.000000	-8312.144759
-6454.016667	0.000000	-1.1297e4
-6430.016667	0.000000	-7603.813575
-6406.016667	0.000000	-5281.293734
-6382.016667	0.000000	-4486.837302
-6358.016667	0.000000	-4752.307540
-6334.016667	0.000000	-4610.543568
-6310.016667	0.000000	-4527.043734
-6286.016667	0.000000	-4286.608962
-6262.016667	0.000000	-4765.748181
-6238.016667	0.000000	-4498.799521
-6214.016667	0.000000	-4765.990079
-6190.016667	0.000000	-4463.734127
-6166.016667	0.000000	-4294.168651
-6142.016667	0.000000	-4130.430473
-6118.016667	0.000000	-3844.089368
-6094.016667	0.000000	-4045.087302
-6070.016667	0.000000	-4028.724206
-6046.016667	0.000000	-3902.507937
-6022.016667	0.000000	-4132.162698
-5998.016667	0.000000	-4038.309524
-5974.016667	0.000000	-4071.115079
-5950.016667	0.000000	-3894.226190

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-5926.016667	0.000000	-3802.496114
-5902.016667	0.000000	-3982.900711
-5878.016667	0.000000	-3910.216187
-5854.016667	0.000000	-4039.916749
-5830.016667	0.000000	-3526.704282
-5806.016667	0.000000	-3175.521908
-5782.016667	0.000000	-3412.128968
-5758.016667	0.000000	-3308.321429
-5734.016667	0.000000	-2731.023810
-5710.016667	0.000000	-2743.605159
-5686.016667	0.000000	-3680.333333
-5662.016667	0.000000	-4047.462302
-5638.016667	0.000000	-4321.942378
-5614.016667	0.000000	-4308.925678
-5590.016667	0.000000	-4273.619048
-5566.016667	0.000000	-3999.404679
-5542.016667	0.000000	-4122.962384
-5518.016667	0.000000	-4064.174603
-5494.016667	0.000000	-4167.900794
-5470.016667	0.000000	-4282.379167
-5446.016667	0.000000	-4216.404960
-5422.016667	0.000000	-4027.476389
-5398.016667	0.000000	-4255.795718
-5374.016667	0.000000	-4298.228092
-5350.016667	0.000000	-4230.071429
-5326.016667	0.000000	-4269.164881
-5302.016667	0.000000	-4229.751984
-5278.016667	0.000000	-4237.285714
-5254.016667	0.000000	-4055.571429
-5230.016667	0.000000	-3923.180556
-5206.016667	0.000000	-3908.255870
-5182.016667	0.000000	-3885.357226
-5158.016667	0.000000	-4068.138608
-5134.016667	0.000000	-4003.837467
-5110.016667	0.000000	-3709.366981
-5086.016667	0.000000	-3886.024223
-5062.016667	0.000000	-4010.135896
-5038.016667	0.000000	-3995.996114
-5014.016667	0.000000	-4040.476108
-4990.016667	0.000000	-4031.009921
-4966.016667	0.000000	-4053.926505
-4942.016667	0.000000	-3976.027860
-4918.016667	0.000000	-3974.511905
-4894.016667	0.000000	-4065.880952
-4870.016667	0.000000	-4113.563575
-4846.016667	0.000000	-3975.831266
-4822.016667	0.000000	-4034.926587
-4798.016667	0.000000	-4072.807540
-4774.016667	0.000000	-4024.690476

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-4750.016667	0.000000	-4106.561425
-4726.016667	0.000000	-3934.890956
-4702.016667	0.000000	-3999.799603
-4678.016667	0.000000	-4093.150794
-4654.016667	0.000000	-4056.730159
-4630.016667	0.000000	-4241.938409
-4606.016667	0.000000	-4404.599289
-4582.016667	0.000000	-4295.126901
-4558.016667	0.000000	-4370.490162
-4534.016667	0.000000	-4396.369048
-4510.016667	0.000000	-4442.827381
-4486.016667	0.000000	-4367.390873
-4462.016667	0.000000	-4421.089203
-4438.016667	0.000000	-4130.708416
-4414.016667	0.000000	-4110.761905
-4390.016667	0.000000	-3944.224124
-4366.016667	0.000000	-3757.756118
-4342.016667	0.000000	-3395.638806
-4318.016667	0.000000	-3766.162616
-4294.016667	0.000000	-4170.486276
-4270.016667	0.000000	-3775.418568
-4246.016667	0.000000	-4065.380870
-4222.016667	0.000000	-3653.027860
-4198.016667	0.000000	-3537.751984
-4174.016667	0.000000	-3791.673363
-4150.016667	0.000000	-4065.523065
-4126.016667	0.000000	-3962.212302
-4102.016667	0.000000	-3918.621032
-4078.016667	0.000000	-3935.097222
-4054.016667	0.000000	-4099.166749
-4030.016667	0.000000	-3894.936425
-4006.016667	0.000000	-3911.789683
-3982.016667	0.000000	-3975.924603
-3958.016667	0.000000	-4092.482143
-3934.016667	0.000000	-3992.418651
-3910.016667	0.000000	-4061.009921
-3886.016667	0.000000	-3906.656746
-3862.016667	0.000000	-3547.388889
-3838.016667	0.000000	-3509.178571
-3814.016667	0.000000	-3503.363095
-3790.016667	0.000000	-3298.164683
-3766.016667	0.000000	-3488.242063
-3742.016667	0.000000	-3436.248016
-3718.016667	0.000000	-3685.323330
-3694.016667	0.000000	-3395.652778
-3670.016667	0.000000	-3953.563492
-3646.016667	0.000000	-3962.732226
-3622.016667	0.000000	-3502.503886
-3598.016667	0.000000	-3649.309606

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-3574.016667	0.000000	-3864.533730
-3550.016667	0.000000	-3762.434524
-3526.016667	0.000000	-3934.313492
-3502.016667	0.000000	-4079.543733
-3478.016667	0.000000	-4112.238013
-3454.016667	0.000000	-4107.642857
-3430.016667	0.000000	-4012.208333
-3406.016667	0.000000	-4102.601190
-3382.016667	0.000000	-4026.142857
-3358.016667	0.000000	-4035.275711
-3334.016667	0.000000	-4101.894841
-3310.016667	0.000000	-4145.510003
-3286.016667	0.000000	-4147.619048
-3262.016667	0.000000	-4114.547619
-3238.016667	0.000000	-4063.942372
-3214.016667	0.000000	-4076.629051
-3190.016667	0.000000	-4016.214286
-3166.016667	0.000000	-4086.260119
-3142.016667	0.000000	-4305.748016
-3118.016667	0.000000	-4254.012302
-3094.016667	0.000000	-4353.741981
-3070.016667	0.000000	-4378.892692
-3046.016667	0.000000	-4169.151042
-3022.016667	0.000000	-4304.013294
-2998.016667	0.000000	-4293.309359
-2974.016667	0.000000	-4383.438657
-2950.016667	0.000000	-4271.801505
-2926.016667	0.000000	-4436.545800
-2902.016667	0.000000	-4271.795552
-2878.016667	0.000000	-4146.047619
-2854.016667	0.000000	-3244.355159
-2830.016667	0.000000	-3346.059524
-2806.016667	0.000000	-4348.204365
-2782.016667	0.000000	-4240.797619
-2758.016667	0.000000	-4256.533730
-2734.016667	0.000000	-4162.714368
-2710.016667	0.000000	-4086.476108
-2686.016667	0.000000	-4193.571429
-2662.016667	0.000000	-4118.009921
-2638.016667	0.000000	-4130.309524
-2614.016667	0.000000	-4033.771743
-2590.016667	0.000000	-4125.642940
-2566.016667	0.000000	-3999.835400
-2542.016667	0.000000	-4065.025628
-2518.016667	0.000000	-4149.557622
-2494.016667	0.000000	-4079.656746
-2470.016667	0.000000	-4003.007771
-2446.016667	0.000000	-4057.111359
-2422.016667	0.000000	-4033.968171

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-2398.016667	0.000000	-4031.472222
-2374.016667	0.000000	-4077.242146
-2350.016667	0.000000	-4093.085235
-2326.016667	0.000000	-3919.557540
-2302.016667	0.000000	-4070.061508
-2278.016667	0.000000	-4125.464286
-2254.016667	0.000000	-4113.142857
-2230.016667	0.000000	-4078.331349
-2206.016667	0.000000	-4137.847222
-2182.016667	0.000000	-4068.400711
-2158.016667	0.000000	-4066.613178
-2134.016667	0.000000	-4120.248016
-2110.016667	0.000000	-4124.976190
-2086.016667	0.000000	-4060.620949
-2062.016667	0.000000	-4110.809524
-2038.016667	0.000000	-4075.224289
-2014.016667	0.000000	-4103.248016
-1990.016667	0.000000	-4065.932540
-1966.016667	0.000000	-4044.607226
-1942.016667	0.000000	-4039.347140
-1918.016667	0.000000	-4033.523810
-1894.016667	0.000000	-4050.619048
-1870.016667	0.000000	-4038.100083
-1846.016667	0.000000	-4027.805390
-1822.016667	0.000000	-4047.452546
-1798.016667	0.000000	-4029.166584
-1774.016667	0.000000	-4032.938492
-1750.016667	0.000000	-4034.394841
-1726.016667	0.000000	-4028.728175
-1702.016667	0.000000	-3920.213294
-1678.016667	0.000000	-3870.309524
-1654.016667	0.000000	-5117.027778
-1630.016667	0.000000	-5039.456349
-1606.016667	0.000000	-4945.297702
-1582.016667	0.000000	-4822.412698
-1558.016667	0.000000	-4927.253968
-1534.016667	0.000000	-4374.289600
-1510.016667	0.000000	-4733.238095
-1486.016667	0.000000	-4659.095238
-1462.016667	0.000000	-4777.962301
-1438.016667	0.000000	-4688.037698
-1414.016667	0.000000	-4557.960317
-1390.016667	0.000000	-4515.335317
-1366.016667	0.000000	-4772.928571
-1342.016667	0.000000	-4555.563492
-1318.016667	0.000000	-4662.607143
-1294.016667	0.000000	-4782.982631
-1270.016667	0.000000	-4942.563041
-1246.016667	0.000000	-4893.084281

Well Test Analysis Report

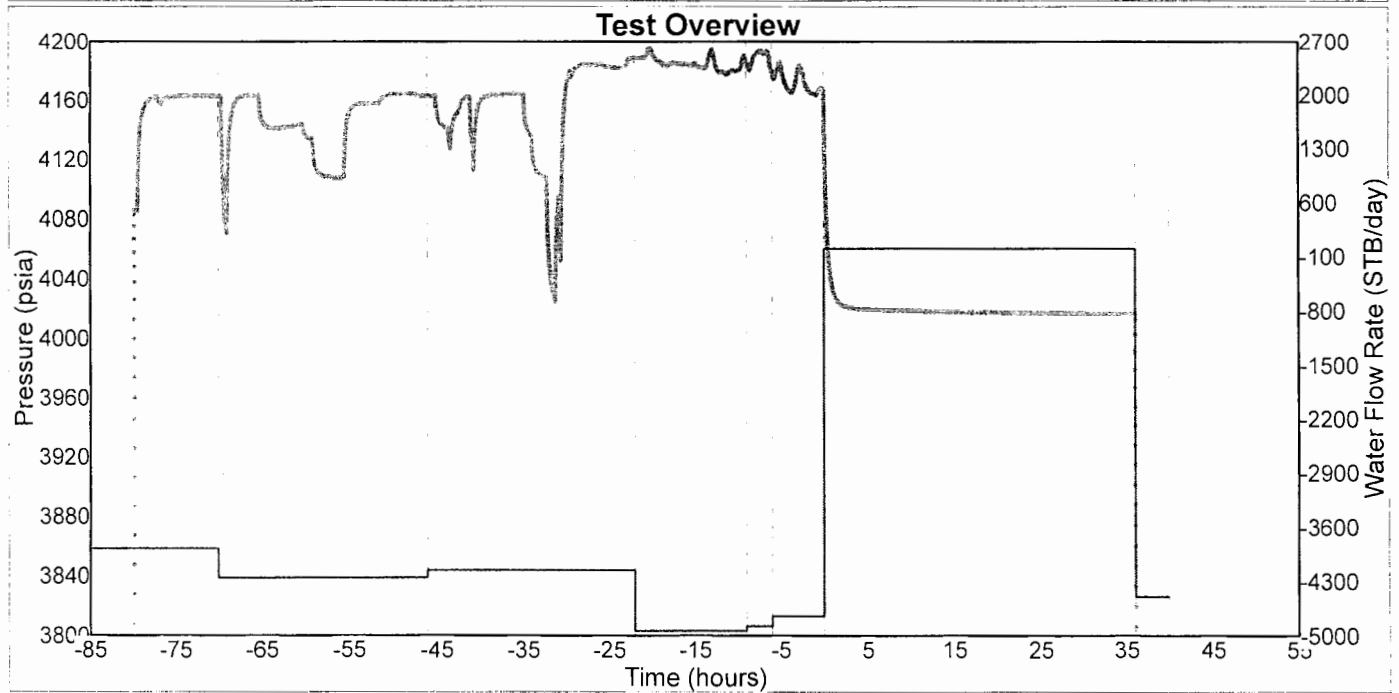
Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-1222.016667	0.000000	-4843.605783
-1198.016667	0.000000	-4724.392604
-1174.016667	0.000000	-4750.761905
-1150.016667	0.000000	-4516.122933
-1126.016667	0.000000	-4451.000083
-1102.016667	0.000000	-4650.142857
-1078.016667	0.000000	-4479.309524
-1054.016667	0.000000	-4563.888889
-1030.016667	0.000000	-4591.442543
-1006.016667	0.000000	-4431.130870
-982.016667	0.000000	-4472.396627
-958.016667	0.000000	-4514.797619
-934.016667	0.000000	-4438.642940
-910.016667	0.000000	-4322.648644
-886.016667	0.000000	-4473.083416
-862.016667	0.000000	-4339.595155
-838.016667	0.000000	-4550.585400
-814.016667	0.000000	-4389.642940
-790.016667	0.000000	-4561.692461
-766.016667	0.000000	-4352.736028
-742.016667	0.000000	-4494.009921
-718.016667	0.000000	-4506.397024
-694.016667	0.000000	-4459.321743
-670.016667	0.000000	-4438.571511
-646.016667	0.000000	-4498.507937
-622.016667	0.000000	-4525.492063
-598.016667	0.000000	-4434.110714
-574.016667	0.000000	-4450.696429
-550.016667	0.000000	-4431.908730
-526.016667	0.000000	-4672.319444
-502.016667	0.000000	-4482.513889
-478.016667	0.000000	-4607.180556
-454.016667	0.000000	-4617.642063
-430.016667	0.000000	-4636.071346
-406.016667	0.000000	-4651.738178
-382.016667	0.000000	-4596.051505
-358.016667	0.000000	-4568.837385
-334.016667	0.000000	-4714.228257
-310.016667	0.000000	-4684.591106
-286.016667	0.000000	-4679.077464
-262.016667	0.000000	-4518.948495
-238.016667	0.000000	-4448.023727
-214.016667	0.000000	-4261.817460
-190.016667	0.000000	-4091.295635
-166.016667	0.000000	-4168.835235
-142.016667	0.000000	-4090.966353
-118.016667	0.000000	-3725.589286
-94.016667	0.000000	-4351.418651
-70.016667	0.000000	-3880.916667

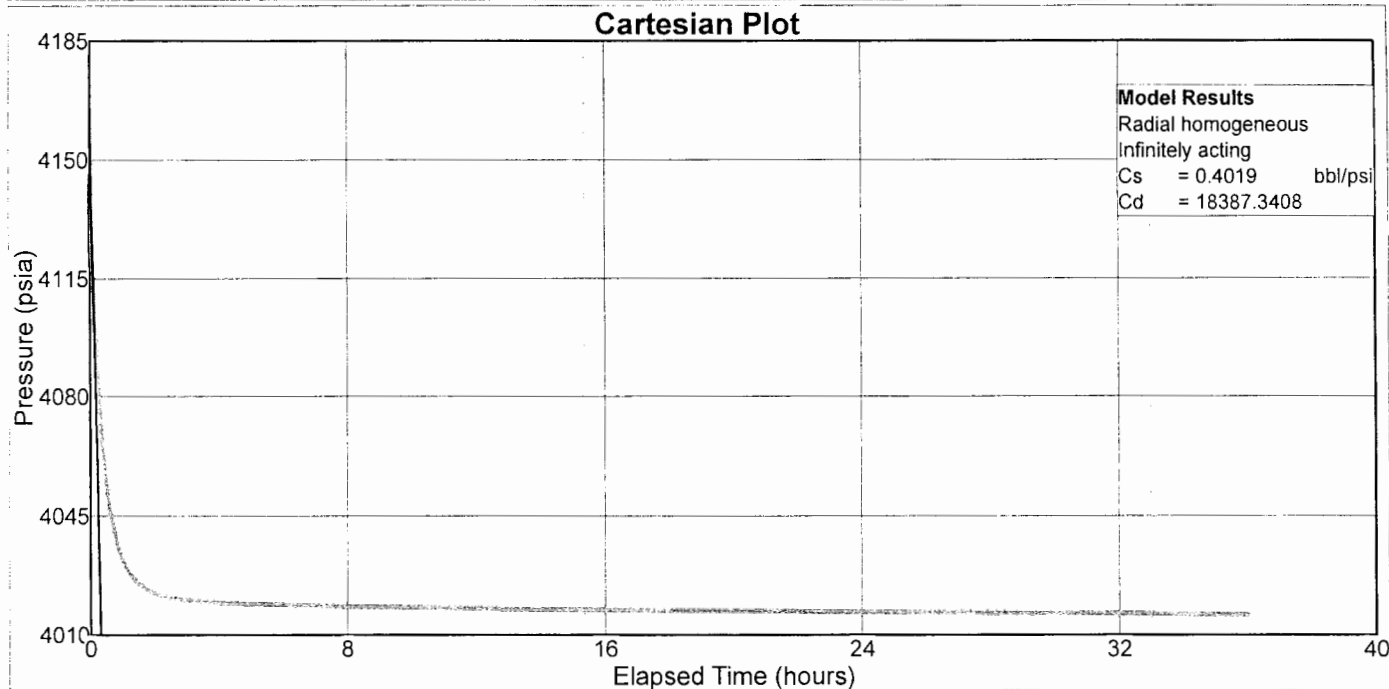
Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-46.016667	0.000000	-4258.894758
-22.016667	0.000000	-4163.095321
-9.016667	0.000000	-4941.476192
-6.016667	0.000000	-4881.378968
-0.000317	4167.062992	-4752.142844
36.031235	4015.899600	0.000000
39.983330	0.000000	-4501.605159

Well Test Analysis Report



Well Test Analysis Report

**Cartesian Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.401913 bbl/psi
Dimensionless wellbore storage	1.8387e4

Cartesian Plot Line Details

Line type : Wellbore storage

Slope : -492.659

Intercept : 4167.38

Coefficient of Determination : 0.972351

Number of Intersections = 0

Well Test Analysis Report

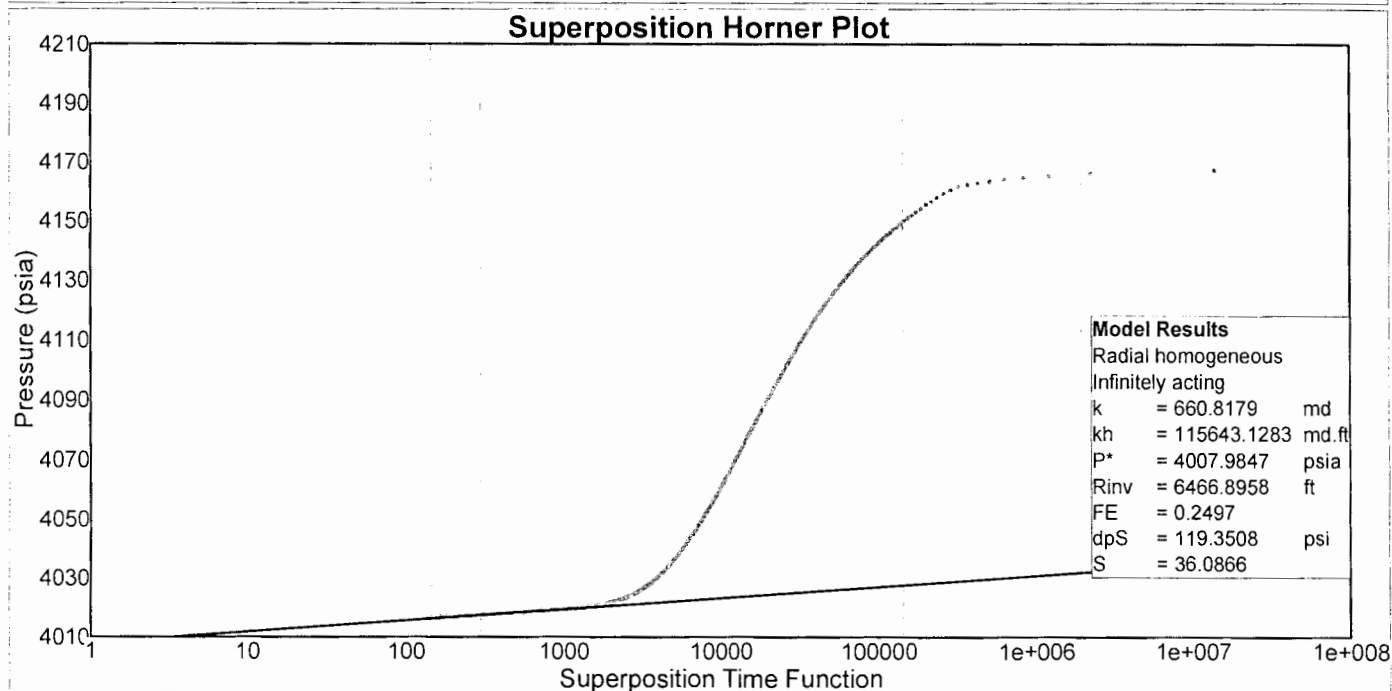


FIGURE 16

Superposition Horner Plot Model Results

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Permeability	660.817876 md
Permeability-thickness	1.1564e5 md.ft
Extrapolated pressure	4007.984739 psia
Radius of investigation	6466.895767 ft
Flow efficiency	0.249736
dP skin (constant rate)	119.350763 psi
Skin factor	36.086602

Superposition Horner Plot Line Details

Line type : Radial flow

Slope : 3.80772

Intercept : 4007.98

Coefficient of Determination : 0.972659

	Radial flow
Extrapolated pressure	4007.984739 psia
Pressure at dt = 1 hour	4021.863011 psia

Number of Intersections = 0

Well Test Analysis Report

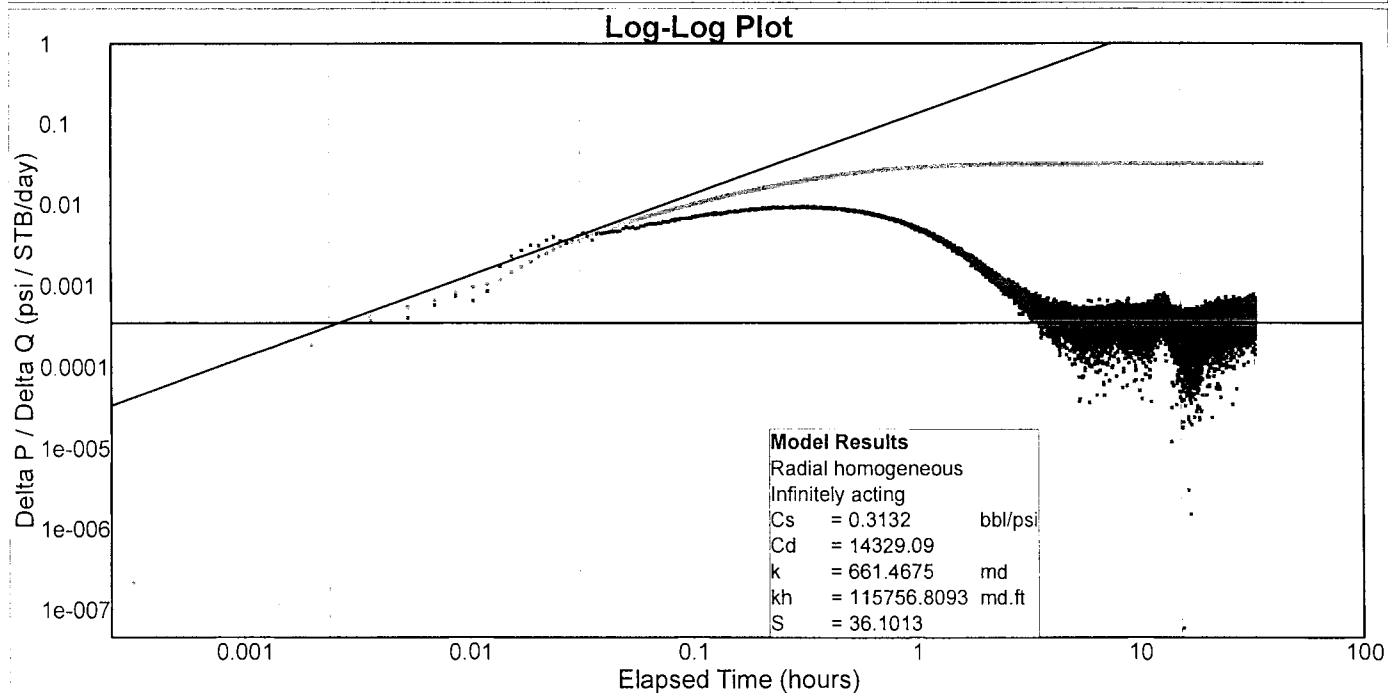


FIGURE 14

Log-Log Plot Model Results

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.313207 bbl/psi
Dimensionless wellbore storage	1.4329e4
Permeability	661.467482 md
Permeability-thickness	1.1576e5 md.ft
Skin factor	36.101314

Log-Log Plot Line Details

Line type : Radial flow

Slope : 0

Intercept : 0.000347643

Coefficient of Determination : Not Used

Line type : Wellbore storage

Slope : 1

Intercept : 0.133032

Coefficient of Determination : Not Used

Number of Intersections = 0