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EPA FALL-OFF
TEST
(WDW-2)

2014

**2014 ANNUAL BOTTOM-HOLE PRESSURE SURVEY AND
PRESSURE FALLOFF TEST FOR CHUKKA WELL NO. 2**

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

**REPORT SUBMITTED:
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EXECUTIVE SUMMARY

Subsurface Construction Corp (Subsurface) was contracted by Navajo Refining Company (Navajo) to perform a pressure falloff test and bottom-hole pressure survey on Navajo's Chukka Well No. 2. The test was performed in accordance with The 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 to 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 44-hour injection period and a 37.68-hour falloff period. Bottom-hole gauges were also placed in the offset wells: Mewbourne Well No. 1 and Gaines Well No. 3. These wells are owned by Navajo and are also used to inject plant waste into the same injection interval as Chukka Well No. 2.

As prescribed by the guidelines, this report discusses supporting and background information for Chukka Well No. 2, the one-mile area of review (updated since the 2012 falloff testing), and geology. In addition, information on the offset wells is provided. Daily testing activities and the point of shut-in are also provided. The pressure falloff testing and analysis results are discussed in Section 15.

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 OGRD Number: Section 1, Township 18 South, Range 27 East

2. WELL INFORMATION

- a. OCD UIC Permit Number: WDW-2 UIC I-8-1
- b. Well Classification: Class I Non-Hazardous
- c. Well Name and Number: Chukka Well No. 2
- d. API Number: 30-015-20894
- e. Well Legal Location: 1980 FNL, 660 FWL

3. CURRENT WELLBORE SCHEMATIC

The Chukka Well No. 2 wellbore schematic is presented in Figure 1. The schematic contains data, as requested by the guidelines and includes the following:

- a. Tubing: 3-1/2-inch, 9.2 pound per foot, steel construction, API grade J-55, smls, NUE 10 rd; (Item 3)
- b. Packer: Arrow X-1, 5-1/2-inch by 2-7/8-inch set in tension at 7,528 feet; (Item 7)
- c. Tubing Length: 7,528 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 two casing strings in the well and one below the injection interval. The information for these casing strings was obtained from OCD records on file with the state and geophysical logs. The casing strings are:

- i. 8-5/8-inch, 32.5 pound per foot, steel construction, API grade J-55, with short thread connections (STC), set at a depth of 1,995 feet. The casing was cemented to the surface with 800 sacks of cement. The casing was set in open hole with a diameter of 11 inches; (Item 2)
 - ii. 5-1/2-inch, 17 pound per foot, steel construction, API grade L-80, LT&C, set at a depth of 8,869 feet. The casing was cemented to the surface in two stages with 575 sacks of cement in the first stage and 995 sacks of cement in the second stage. The casing was set in open hole with a diameter of 7-7/8-inches. (Item 6)
- e. The top of cement: Determined from a CBL run in the 5-1/2-inch casing string on May 28, 1999. The top of cement in the 5-1/2-inch casing was found at the surface. From the CBL run in the 8-5/8-inch on May 9, 1999, the top of cement in the 9-5/8-inch was determined to be at 116 feet.
- f. The 5-1/2-inch casing: Perforated on June 1, 1999. The casing was perforated with a 0.5-inch diameter hole, at 2 shots per foot, on a 120° phasing. The perforations are located between 7,570 feet and 7,736 feet and from 7,826 feet to 8,399 feet.
- g. The total depth of the well: 10,372 feet, with the plug back depth at 8,770 feet. On November 3, 2012, fill was tagged at 8,773 feet (GL).
- h. The bottom-hole pressure gauges consisted of two memory readout (MRO) pressure gauges. The MRO pressure gauges were placed at 7,569 feet and 7,570 feet (top of the perforations).

4. ELECTRIC LOG ENCOMPASSING THE COMPLETED INTERVAL

The dual induction log is presented as Appendix A and encompasses the completed interval between 7,570 feet and 8,399 feet. The dual induction log was submitted to the OCD with the original permit. The original dual induction log was

completed August 27, 1973 by Amoco Production Company. The log was resubmitted to the OCD when the well was re-permitted as a Class I injection well.

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

The neutron density log is presented as Appendix B and encompasses the completed interval between 7,570 feet and 8,399 feet. The neutron density log was submitted to the OCD with the original permit after the well was drilled by Amoco Production Company. The compensated neutron formation density log was completed on August 27, 1973. The log was resubmitted to the OCD when the well was re-permitted as a Class I injection well. The average 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 Chukka Well No. 2 was recompleted in June 1999, prior to the issuance of the current well testing guidelines (December 3, 2007). At that time, no directives were in place to test formation fluids or derive formation characteristics from cores. However, reservoir fluid samples were obtained and the average specific gravity 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 Chukka Well No. 2 on May 28, 1999 and June 5, 1999, and included in this report as Appendix E.

b. Formation Fluid Viscosity with Reference Temperature:

The formation fluid had an average 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 specific gravity 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 of the refinery waste water was measured during the injection portion of the reservoir testing. The specific gravity was 1.0013 (8.34 pounds per gallon). Using the same methodology described above, the viscosity of the injected fluid was 0.50 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 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 June 30, 2014, was 3,122,722,546 gallons. The volume of fluid injected into the Mewbourne Well No. 1 was 1,591,693,116 gallons. The volume of fluid injected into the Chukka Well No. 2 was 1,025,940,346 gallons. The volume of fluid injected into the Gaines Well No. 3 was 505,089,084 gallons. The area of review (AOR) indicates that there are two 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) downhole memory readout pressure gauges were used for the Chukka Well No. 2 buildup and falloff testing. The downhole MRO gauges were set at 7,569 feet and 7,570 feet. Bottom-hole MRO pressure gauges were also placed in each of the offset wells (Mewbourne Well No. 1 and Gaines Well No. 3). The pressure gauges were set at 7,924 feet in the Mewbourne Well No. 1 and at 7,660 feet in the Gaines Well No. 3.

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

In the Chukka Well No. 2, 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 MRO pressure gauges (Serial Nos. 75871 and 76173) were used. Both gauges were sapphire crystal gauges and were manufactured by Spartek Systems.

In the Mewbourne Well No. 1, two MRO pressure gauges were used to monitor the bottom-hole pressure and temperature during the testing of the Chukka Well No. 2. Both gauges were sapphire crystal gauges with Serial Nos. 76169 and 76170. Both gauges were 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 Chukka Well No. 2. Both gauges were sapphire crystal gauges with Serial Nos. 76171 and 76404. Both gauges were manufactured by Spartek Systems.

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

In Chukka Well No. 2, the MRO pressure gauges, Serial Nos. 75871 and 76173, has a full range of 0 psi to 6,000 psi, an accuracy of 0.01% of full scale, and a resolution of 0.024% of full scale.

In Mewbourne Well No. 1, the MRO pressure gauges, Serial Nos. 76169 and 76170, have a full range of 0 psi to 6,000 psi, an accuracy of 0.01% of full scale, and a resolution of 0.024% of full scale.

In Gaines Well No. 3, the MRO pressure gauges, Serial Nos. 76171 and 76404, have a full range of 0 psi to 6,000 psi, an accuracy of 0.01% of full scale, and a resolution of 0.024% of full scale.

- c. Provide the manufacture'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 manufacturers 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 2012, an update of the original AOR, submitted with the Discharge Application Permit 2003, was completed within the one-mile AOR for all three wells. The current update includes all existing wells within the one-mile AOR and any changes that have occurred to these wells since the 2012 update.

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

a. Identify wells located within the one mile AOR:

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

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

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

Ninety-four (94) wells were found in which the owner had changed. Fourteen (14) new plugged and abandoned oil and gas well was found. Sixteen (16) wells were placed in temporarily abandoned status. No wells were found that were returned to production status. Eight (8) wells were found that had been recompleted.

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

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

Navajo has two other injection wells in the same interval. Mewbourne Well No. 1 is listed at ID No. 59 in Table II and no changes have occurred to this well. Gaines #3 is listed at ID No. 157 in Table II and no changes have occurred to this well. The wellbore schematics for Mewbourne Well No. 1 and Gaines Well No. 3 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 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, but 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 and the structure map for the Cisco Formation 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 Federal No. 1, the Chalk Bluff Federal Com No. 3, the Mewbourne Well No. 1 and the Gaines Well No. 3. The Mewbourne and Gaines 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 10,860 feet from Chukka Well No. 2, the test well. The Gaines Well No. 3 is approximately 3,130 feet from the Chukka Well No. 2.

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

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

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

The offset wells were shut in prior to beginning the 44-hour injection period and remained shut-in during the 37.68-hour falloff portion of the testing. No impact was observed.

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 bottom-hole gauges were placed into the wells on June 27, 2014 and the 48 hour injection monitoring period portion of the testing started on June 27, 2014, at 12:00 p.m., and continued until July 2, 2014, at 8:00 a.m. On June 29, 2014 at 12:00 p.m. the Mewbourne Well No. 1 and Gaines Well No. 3 were shut-in and the 44 hour buildup portion for Chukka Well No. 2 was

started. The buildup portion of the testing ended at 8:00 p.m. on June 30, 2014 and Chukka Well No. 2 was shut-in with both of the offset wells remaining shut in for the duration of the 37.68 hour falloff portion of the testing. The Chukka Well No. 2 falloff test ended on July 2, 2014, at 8:00 a.m. On July 2, 2014, at 8:00 a.m., seven-minute gradient stops were made while pulling out of the wellbore with the pressure gauges. After the bottom-hole gauges were removed from the well, the well was turned over to Navajo plant operations personnel.

b. Time of the injection period:

The buildup portion of the testing began on June 29, 2014, when the injection rate was set at an average injection rate of 113.93 gallons per minute (gpm). The injection rate was held constant for 44 hours. The injection period used in the pressure falloff analysis was 44 hours.

c. Type of injection fluid:

The injected fluid was non-hazardous waste water from the plant. The density averaged 8.3 pounds per gallon during the 44-hour injection period (OCD Guideline Section VII.6).

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

The final flowing pressure (P_{wf}) and temperature (T_{wf}) were 4,374.58 psia and 84.40°F, respectively.

e. Total shut-in time:

The Chukka Well No. 2 was shut-in for a total of 37.68 hours.

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

The final static pressure at 7,570 feet was 4,288.26 psia. The final temperature was 107.67 °F.

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

On the pipeline to the Chukka Well No. 2, there is one, 4-inch control valve (CV) installed on the incoming pipeline before the POD filter. Two 4-inch valves are installed between the POD filter and the wellhead. One motorized valve (MV) and injection pump is installed between the POD filter and the well. 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.

At shut-in, the procedure would be to close the motorized valves, isolation valves, control valve, filter bypass valve, and drain the POD filters in that order.

15. PRESSURE FALLOFF ANALYSIS

The following discussion of the analysis of the pressure data recorded during the falloff testing of the Chukka Well No. 2 satisfies Sections 15 through 19 of the OCD's falloff test guidelines. Where appropriate, the specific guideline addressed is annotated. Specific parameters used in the equations and discussed previously in this report are also annotated. The plots included with this report are summarized in Table VIII. The inclusion of these plots in this report satisfies OCD Guideline Section IX.18.

The pressure data obtained during the falloff test were analyzed using the commercially available pressure transient analysis software program PanSystem®. Appendix M contains the output from this software program. Figure 9 shows the pressure data recorded by the bottom-hole gauge from the time the tool was in place. Figure 10 shows the pressure and temperature data recorded by the bottom-hole gauge from the time the tool was in place until it was pulled. Figure 11 is a Cartesian

plot of the injection rates versus time for the injection period from the time the bottom-hole pressure gauges were placed into the wellbore. The superposition time function was used to account for all rate changes since the last stable shut in period. Figure 12 is a plot of the surface pressures and injection rates versus time for the stabilized injection period (44 hours) of the testing. Figure 13 is a plot of the historical injection rates and surface pressures versus calendar time since injection began in 1999.

Figure 14 is a log-log diagnostic plot of the falloff data, showing change in pressure and pressure derivative versus elapsed shut in time. The wellbore storage, radial flow and change in reservoir characteristics flow regimes 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 0.0016 hours and continues to an elapsed shut in time of 0.031 hours. Radial flow begins at an elapsed shut in time of 2.66 hours and continues until 11.39 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 logarithmic Horner time of 11180.42 and continues until a Horner time of 2594.76, 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 1.98326 psi/cycle (OCD Guideline Section IX.15.c). The measured injection rate prior to shut in was 3906 bbl/day (113.93 gpm).

An estimate of mobility-thickness (transmissibility, OCD Guideline Section IX.15.d), kh/μ , for the reservoir was determined to be 320,238 md-ft/cp from 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

$$\frac{kh}{\mu} = 162.6 \frac{(3906)(1.0)}{(1.98326)}$$
$$= 320,238 \text{ md} - \text{ft} / \text{cp}$$

The permeability-thickness (flow capacity, OCD Guideline Section IX.15.i), kh , was determined to be 188,940 md-ft by multiplying the mobility-thickness, kh/μ , by the viscosity of the formation fluid (see Section 6), μ , of 0.59 centipoise:

$$kh = \left(\frac{kh}{\mu} \right) \mu$$
$$= 320,238 \text{ md} - \text{ft} / \text{cp} \times 0.59$$
$$= 188,940 \text{ md-ft}$$

The reservoir permeability (OCD Guideline Section IX.15.e) using the total thickness (see Section 5 and Section 11) of 175 feet was 1,080 md:

$$k = \frac{(kh)}{h}$$
$$= \frac{188,940}{175}$$
$$= 1,080 \text{ md}$$

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 1,025,940,346 gallons of waste has been injected into Chukka Well No. 2 (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 1579 feet:

$$r_{\text{waste}} = \left(\frac{(0.13368)(1,025,940,346)}{(\pi)(175)(0.10)} \right)^{1/2}$$

$$= 1,579 \text{ feet}$$

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 1.08 hours:

$$t_{\text{waste}} = 948 \frac{(0.10)(0.59)(8.4 \times 10^{-6})(1579)^2}{1080}$$

$$= 1.08 \text{ hours}$$

Since the time required to pass through the waste is less than the 2.66 hours required to reach the beginning of the radial flow period, the assumption that the pressure transient was traveling through formation 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 4,374.58 psia. The pressure determined by extrapolating the radial flow semi-log line to a Δt of one hour, p_{1hr} , was 4,294.07 psia (calculated from the analysis software). The wellbore radius, r_w , is 0.3281 feet (completion records). Using these values in addition to the previously discussed parameters results in a skin of 36.28:

$$s = 1.151 \left[\left[\frac{4,374.58 - 4,294.07}{1.98326} \right] - \log \left(\frac{1080}{(0.10)(0.59)(8.4 \times 10^{-6})(0.3281)^2} \right) + 3.23 \right]$$

$$= 36.28$$

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 66.47 psi:

$$\begin{aligned}\Delta p_{\text{skin}} &= 0.869(m)(s) \\ &= 0.869(1.98326)(36.28) \\ &= 62.53 \text{ psi}\end{aligned}$$

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 0.28

$$E = \frac{4,374.58 - 62.53 - 4,288.26}{4,374.58 - 4,288.26} = 0.28$$

The radius of investigation (OCD Guideline Section IX.15.a) was calculated using the analysis software and was determined to be 8,310 feet at an elapsed shut in time of 37.68 hours.

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

where,

- k = formation permeability, millidarcies
- Δt_s = elapsed shut-in time, hours
- θ = 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

$$0.029 \sqrt{\frac{1080(37.68)}{0.10(0.59)(8.4 \times 10^{-6})}}$$

$$R_{inv} = 8,310 \text{ ft}$$

As indicated on Figure 14, the pressure data departs the radial flow region at an elapsed time from shut in of 11.39 hours. Another change in slope is seen at an elapsed time from shut in of 13.04 hours. No pressure or temperature anomalies were noted that would cause this type of pressure response observed on the derivative log-log plot (OCD Section VIII.9). A review of the geology of the injection zones (Section 11) indicates that all three of the formations in which the Chukka Well No. 2 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.

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 IX (OCD Guideline Section IX.19).

On July 2, 2014, a static pressure gradient survey was conducted while pulling the pressure gauges out of the well. Static gradient stops were conducted at 7,570 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, at 7,570 feet, was measured after the well had been shut-in for 2 days and was 4,288.26 psia and 107.67 °F, respectively. The gradient survey is summarized in Table X. The data are depicted graphically 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.

TABLE I
FORMATION WATER ANALYSIS SUMMARY

Chemical	Mewbourn 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”.

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

TABLE II
Tabulation of Wells Within One Mile Area of Review

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

TABLE III

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE VIII**FIGURES INCLUDED IN THE REPORT**

Figure	Description	OCD Reference
1	Chukka Well #2 Schematic	Section VI.1 and IX.3
2	Plot of Bottom Hole Pressure and Temperature Data Mewbourne Well #1	n/a
3	Mewbourne Well #1 Schematic	n/a
4	Gaines Well #3 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	Chukka Well #2 Wellhead Schematic	Section IX.14
8	Diagram of Valve Locations for Shut-in on Chukka Well #2	Section IX.14
9	Chukka Well #2 Test Overview	Section IX.18.f
10	Chukka Well #2 Cartesian Plot of Bottom-Hole Pressure and Temperature vs. Time	Section IX.18.a
11	Chukka Well #2 Cartesian Plot of Injection Rate vs. Time	Section IX.18.b
12	Chukka Well #2 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 VIII (cont.)

Figure	Description	OCD Reference
14	Chukka Well #2 Derivative Log-Log Plot	Section IX.18.c
15	Chukka Well #2 Superposition Horner (Semi-Log) Plot	Section IX.18.d
16	Chukka Well #2 Expanded Superposition Horner (Semi-Log) Plot	Section IX.18.d
17	Chukka Well #2 Hall Plot	Section IX.18.h
18	Chukka Well #2 Static Pressure Gradient Survey	n/a

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

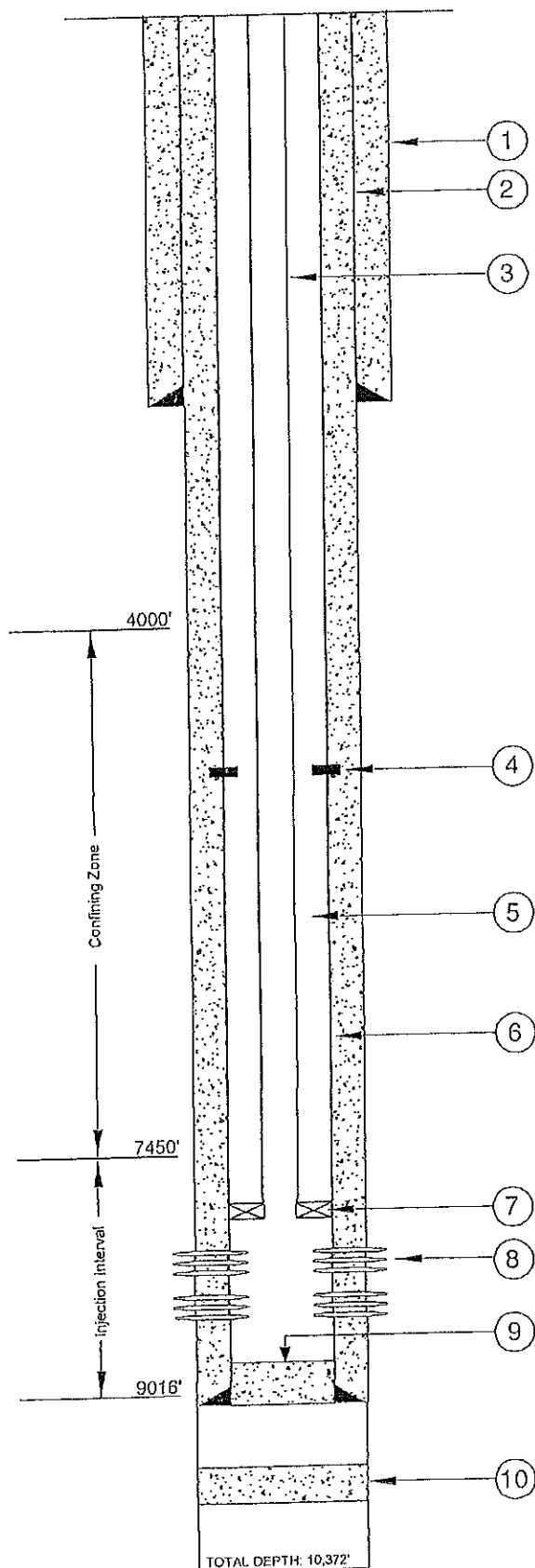
Date of Test	Permeability (k)	Transmissibility (kh/u)	Skin (s)	False Extrapolated Pressure (p*)	Fill Depth
June 30, 2014 to July 2, 2014	1,080 md	320,328 md-ft/cp	38.57	4,285.19 psia	8,773 feet
November 2-3, 2012	1,848 md	548,069 md-ft/cp	25.99	3898.55 psia	8,775 feet
October 17-22, 2011	1,451 md	430,405 md-ft/cp	29.41	3697.29 psia	8,335 feet
September 28- October1, 2010	820 md	243,351 md-ft/cp	86.50	3576.58 psia	8,775 feet
October 1-4, 2009	856 md	253,821 md-ft/cp	39.74	3445.89 psia	8,775 feet
April 1-4, 2008	1,091 md	265,300 md-ft/cp	155	3393.47 psia	N/A
April 3-6, 2006	2,183.54 md	707,629 md-ft/cp	81.55	3393.63 psia	N/A
April 2005	2,496.17 md	808,946 md-ft/cp	23.45	3347.95 psia	N/A
April 2001	2,211.07 md	716,551 md-ft/cp	54.07	3236.42 psia	N/A
April 1999	4,712.07 md	1,527,060 md-ft/cp	59.71	2844.45	N/A
Permit Parameters	250 md	40,094 md-ft-cp	N/A	N/A	N/A

TABLE X

**NAVAJO REFINING COMPANY
STATIC PRESSURE GRADIENT SURVEY – CHUKKA WELL #2
July 2, 2014**

Depth (ft)	Pressure (psia)	Pressure Gradient (psi/ft)	Temperature (°F)
7570	4288.26		107.67
7000	4039.71	0.436	111.87
6000	3604.37	0.435	106.47
5000	3168.84	0.436	100.24
4000	2733.46	0.435	95.73
3000	2297.83	0.436	91.88
2000	1863.00	0.435	88.88
1000	1427.13	0.436	83.89
0	1000.95	0.426	79.32

BELOW GROUND DETAILS



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

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

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

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

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

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

8. Perforations (2 SPF):

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

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

9. PBTD: 8770'

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

SUBSURFACE

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

NAVAJO REFINING COMPANY
ARTESIA, NEW MEXICO

BELOW GROUND DETAILS WASTE DISPOSAL WELL NO. 2

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

FIGURE 1

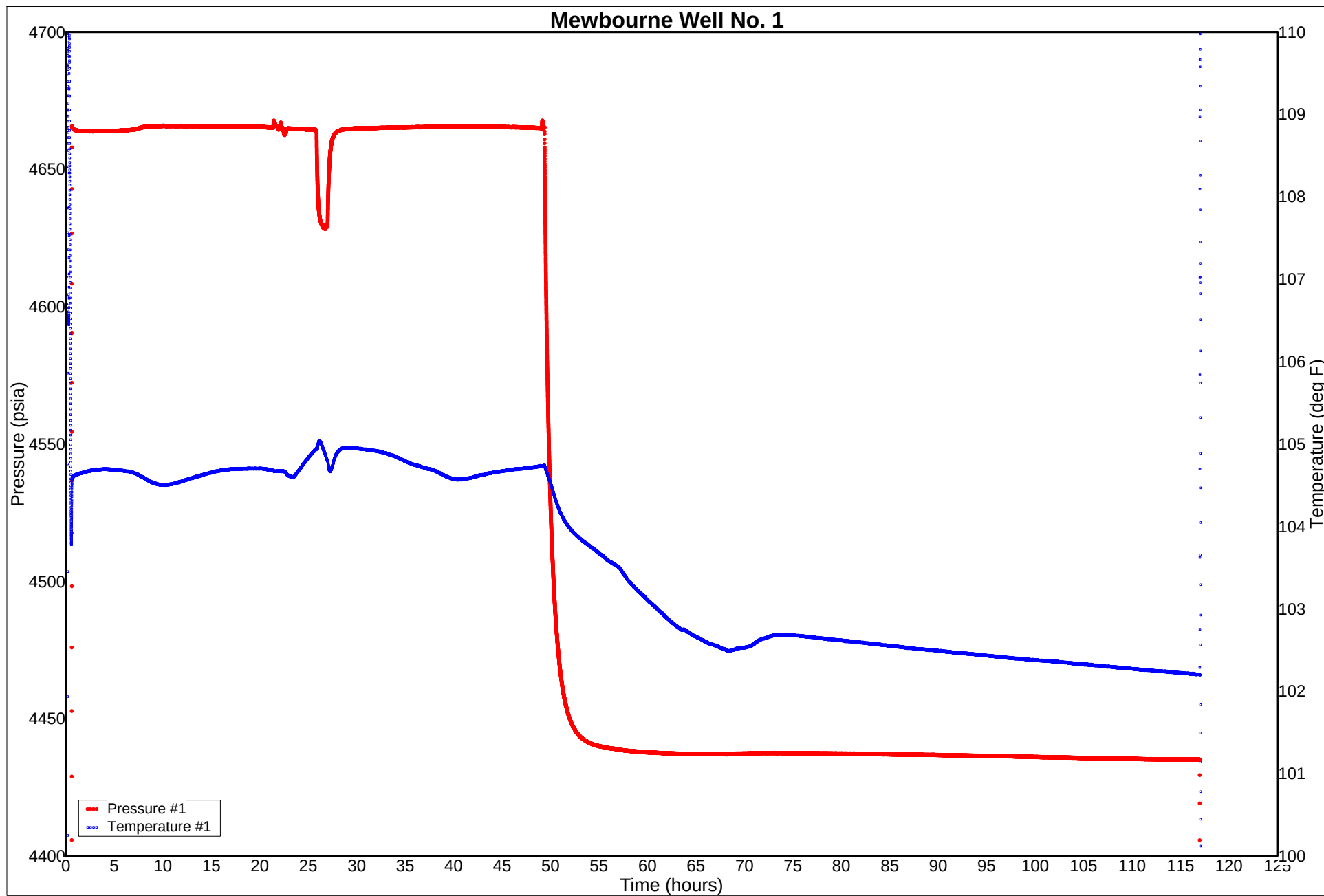


FIGURE 2

BELOW GROUND DETAILS

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

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

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

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

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

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

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

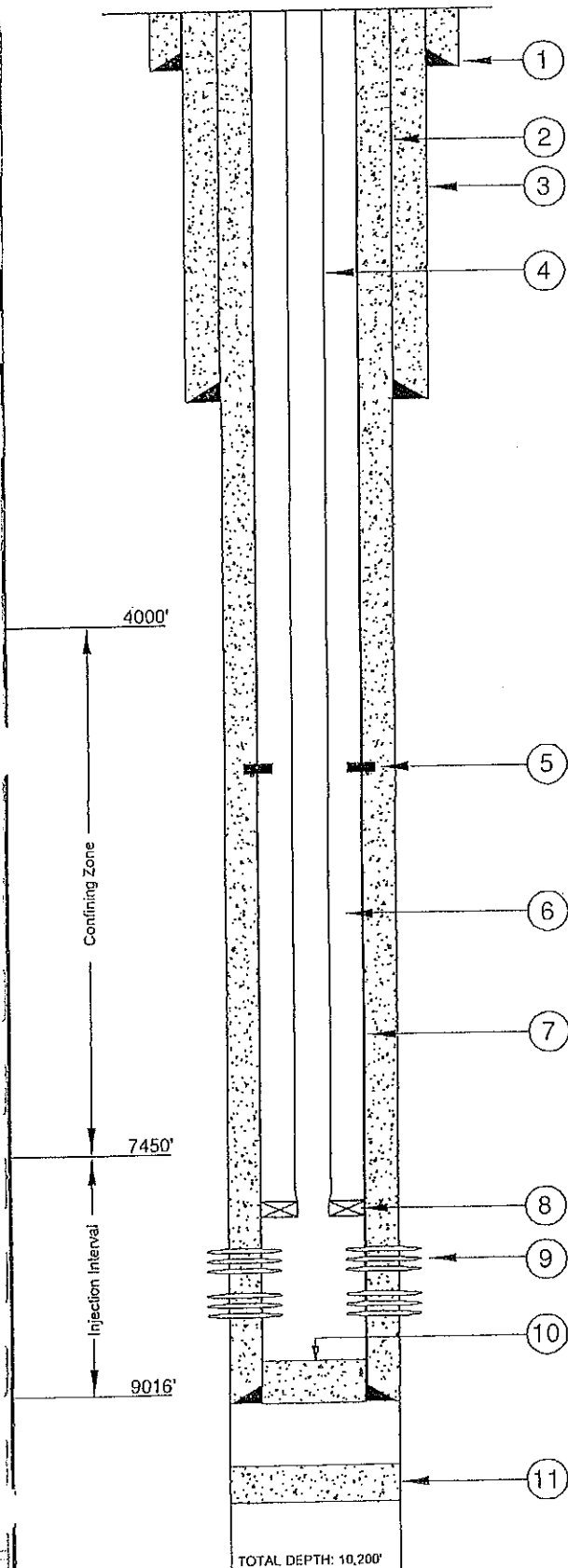
9. Perforations (2 SPF):

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

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

10. PBTD: 9004'.

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



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

FIGURE 3

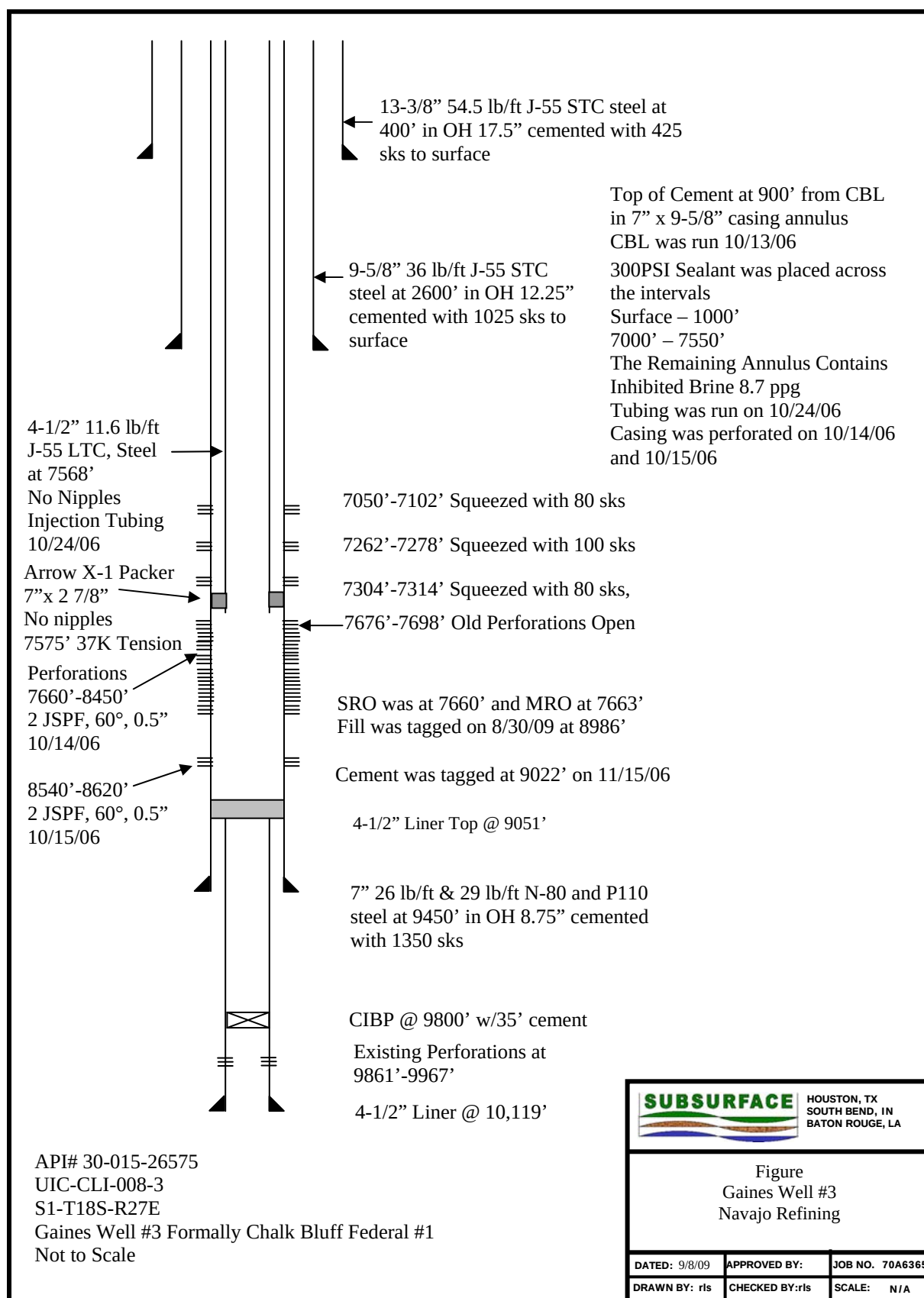


FIGURE 4

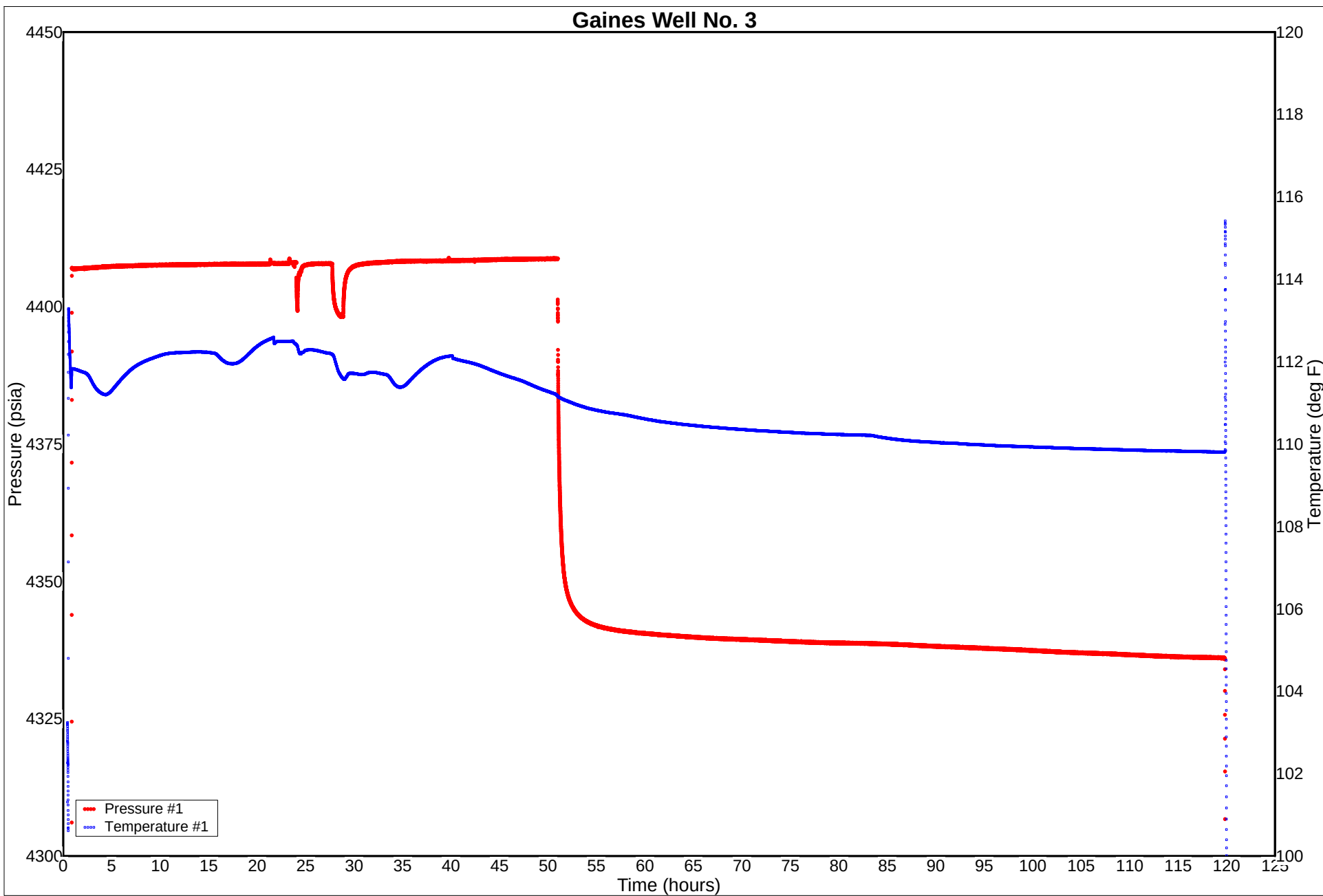
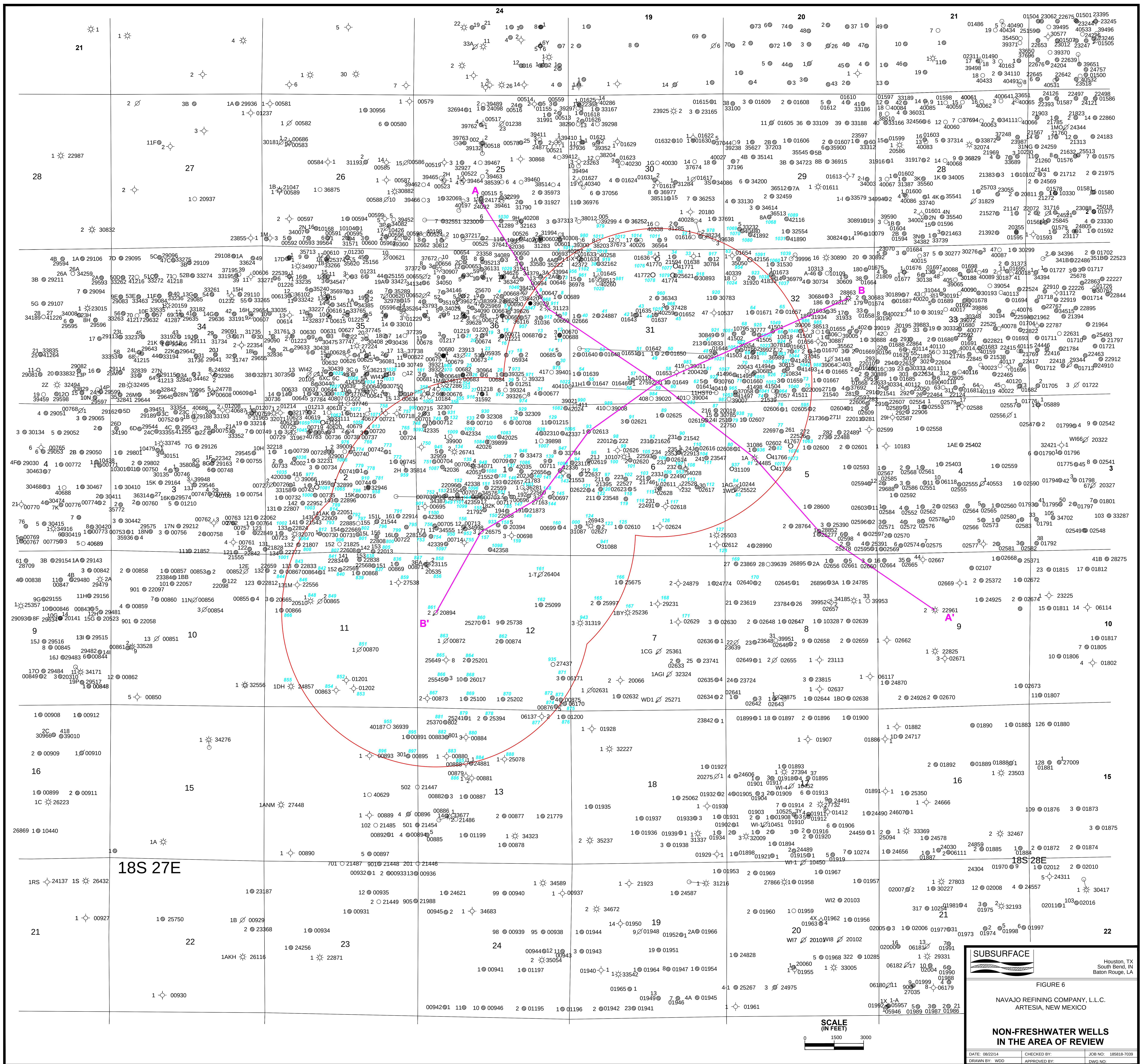


FIGURE 5



WELL: NAVAJO REFINING WDW #2

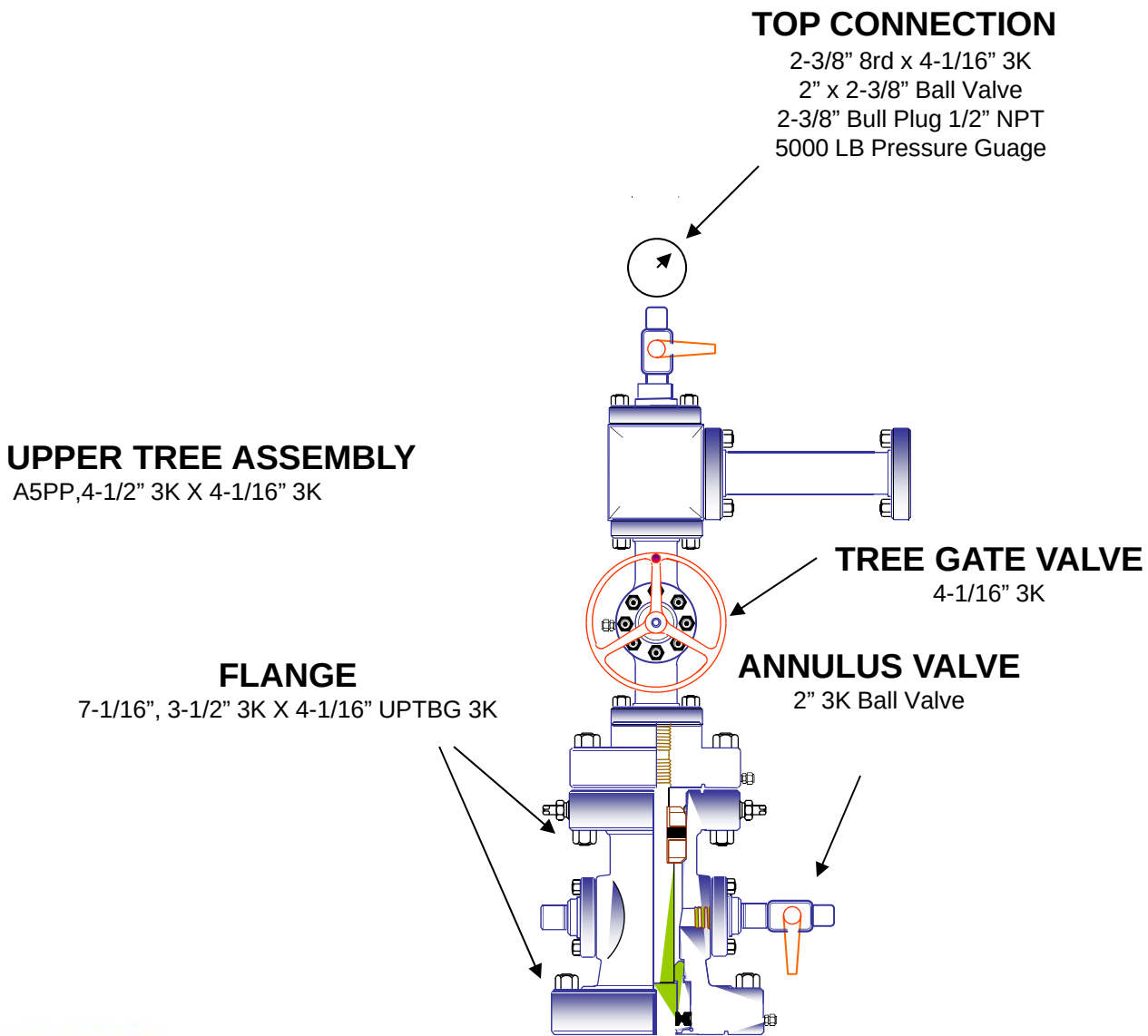
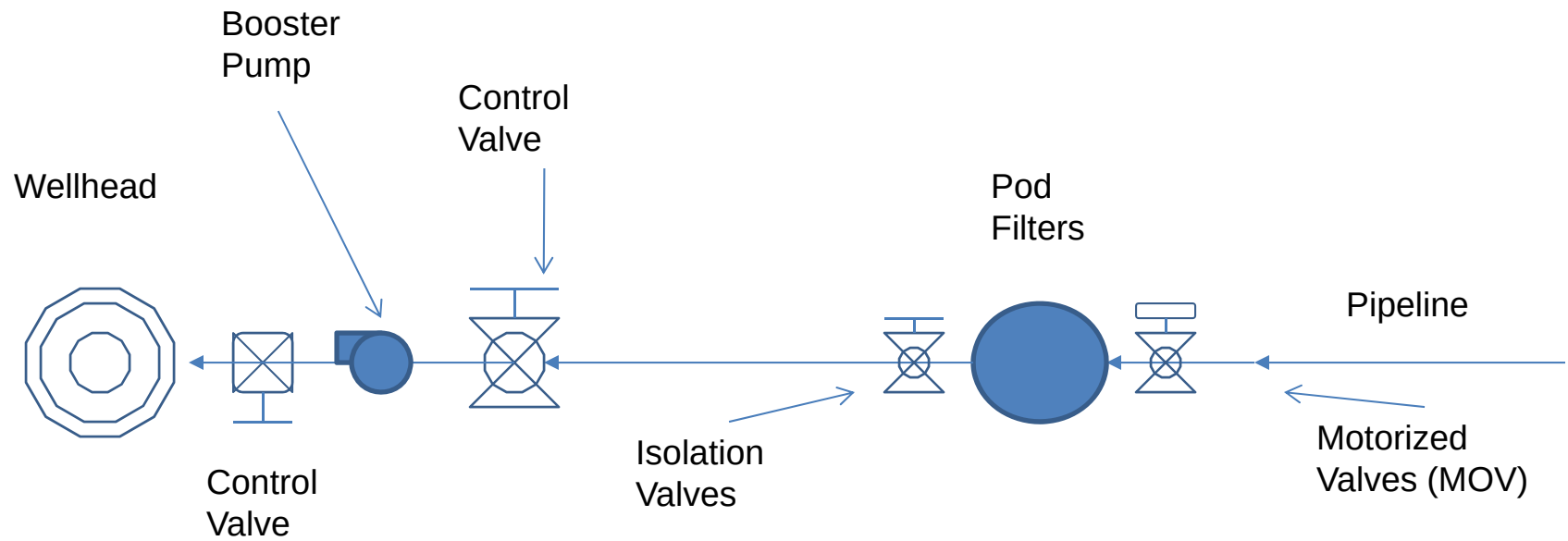


FIGURE 8
Chukka Well No. 2
Diagram of Shut-in Valve Control



At Shut-in

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

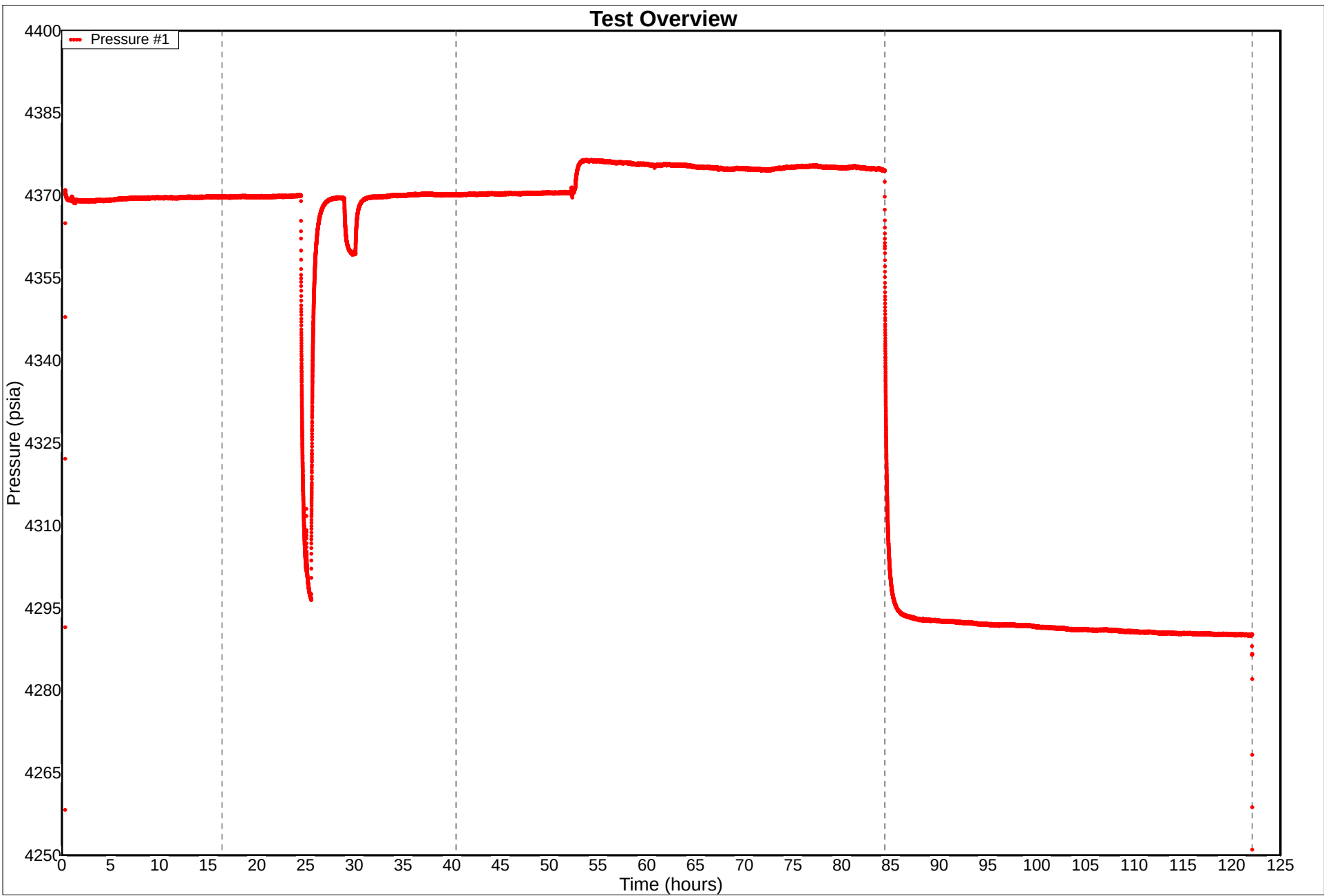


FIGURE 9

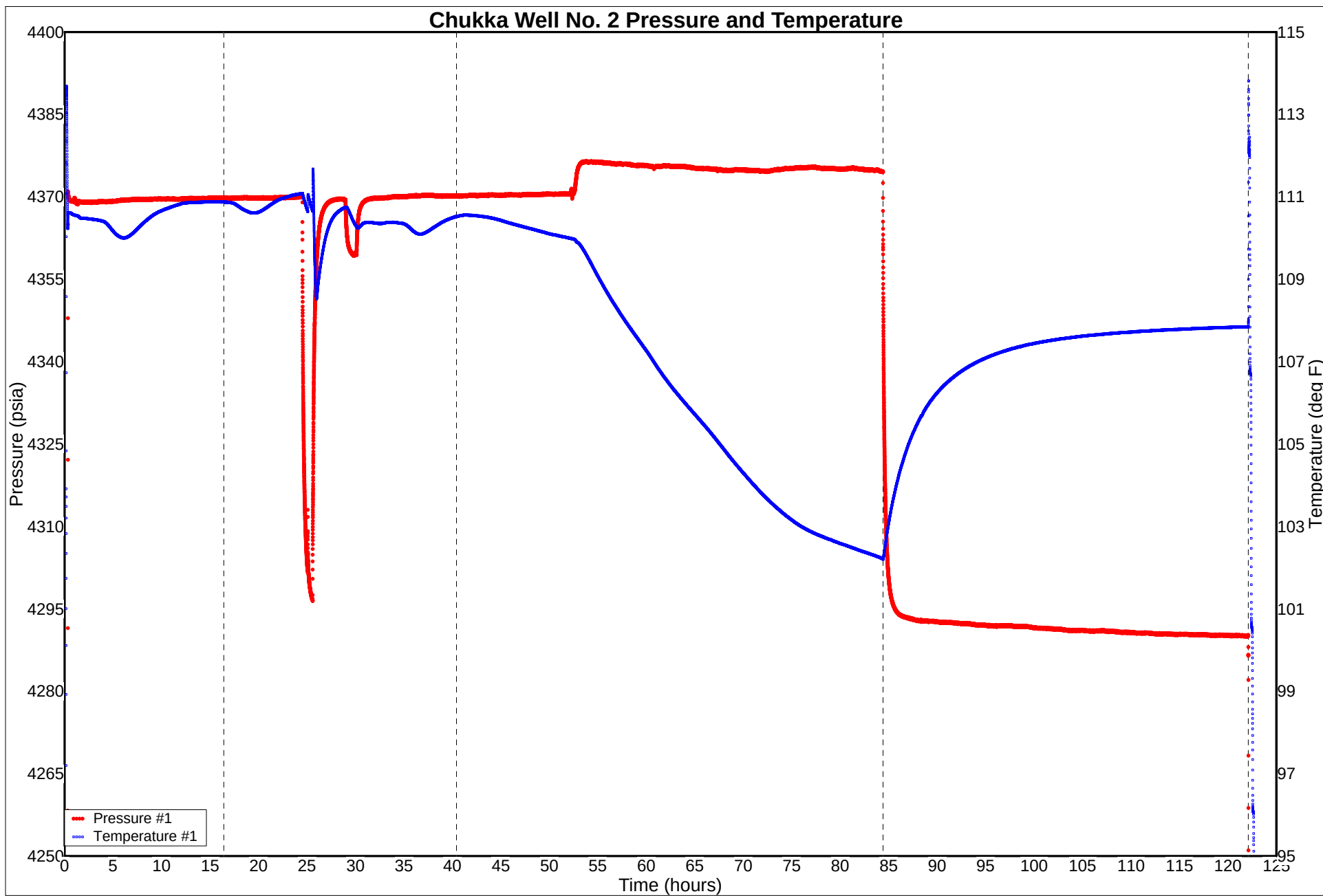


FIGURE 10

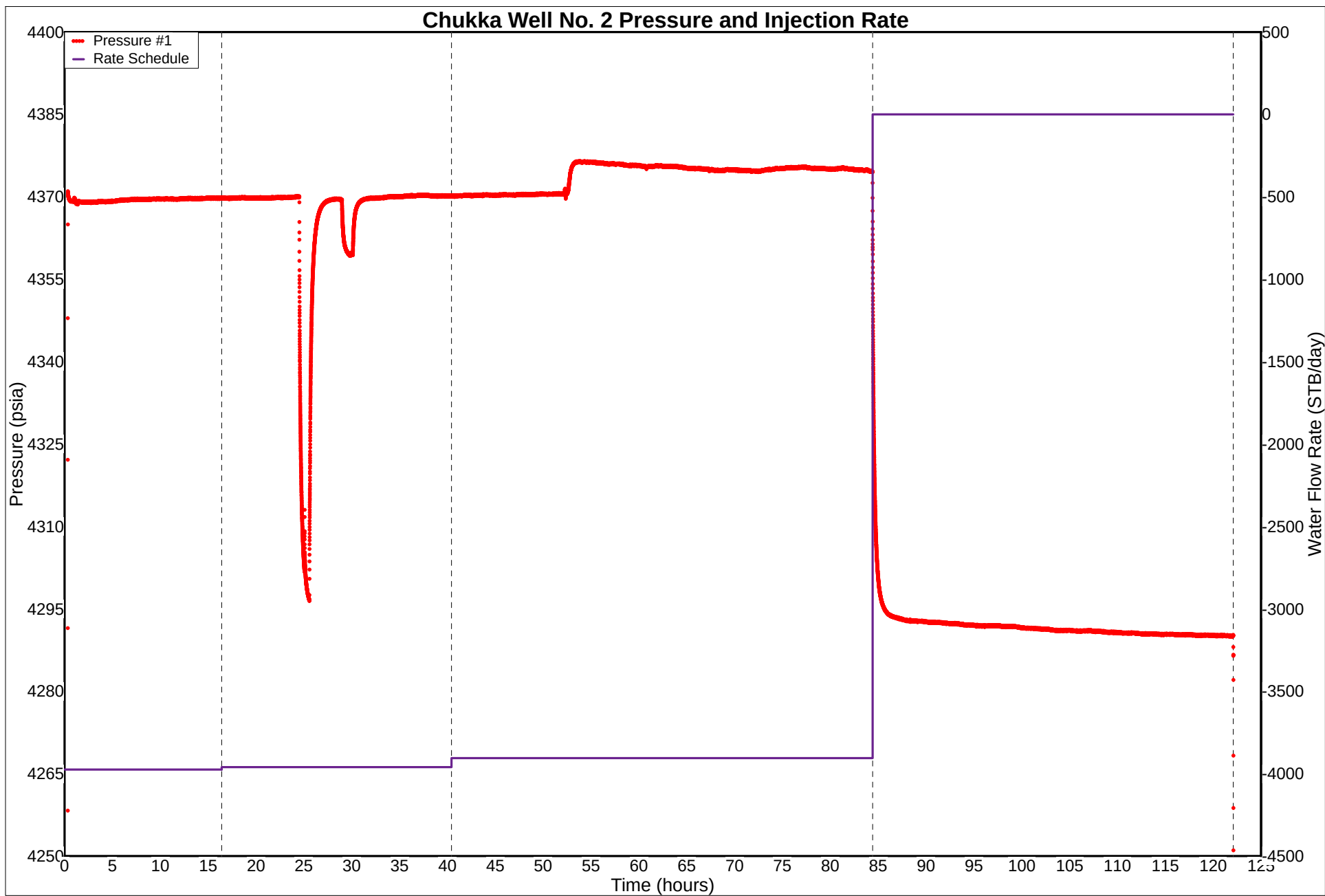


FIGURE 11

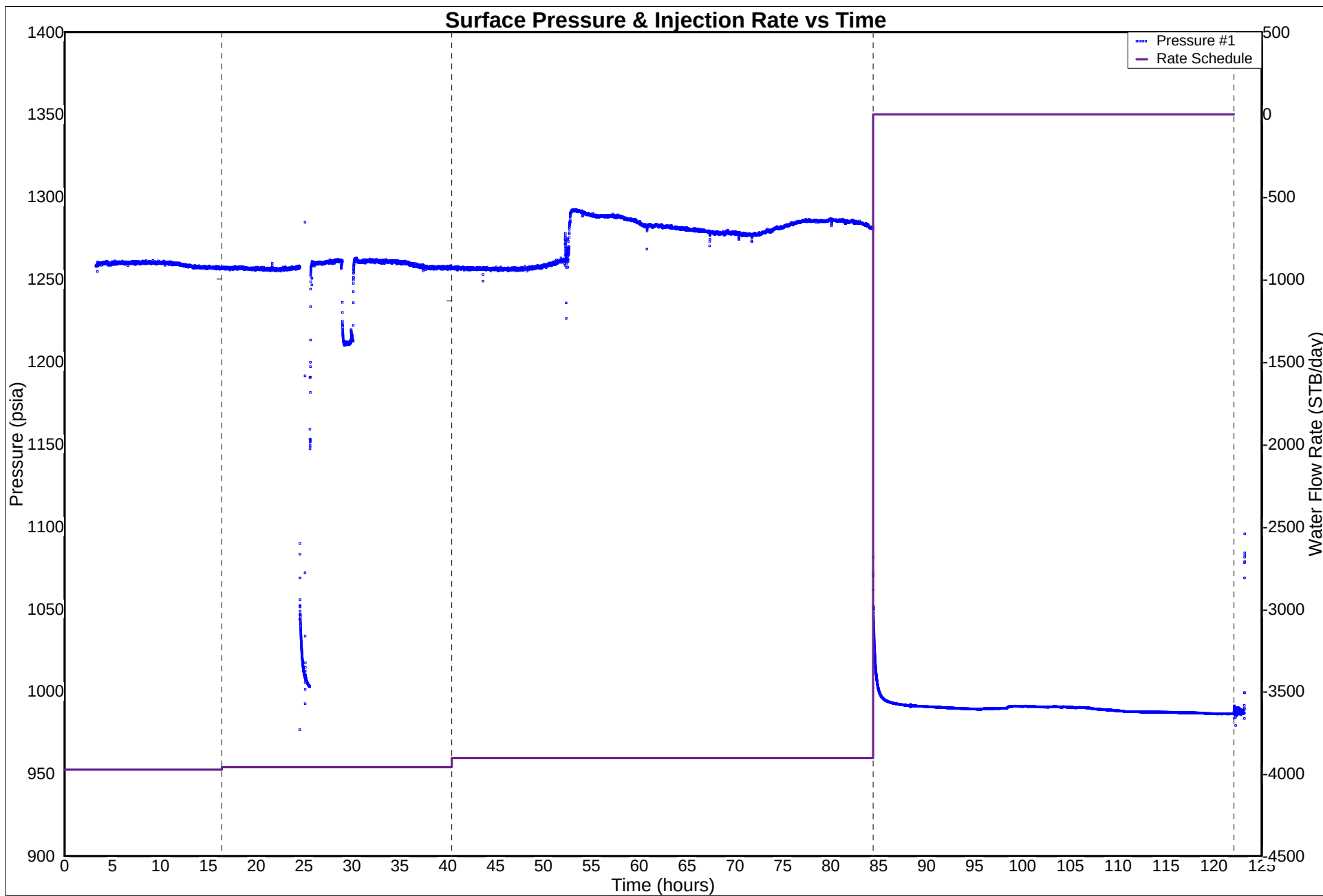


FIGURE 12

Chukka Well No. 2
Cartesian Plot of Surface Pressure and Injection Rates
December 24, 2000 to July 2, 2014

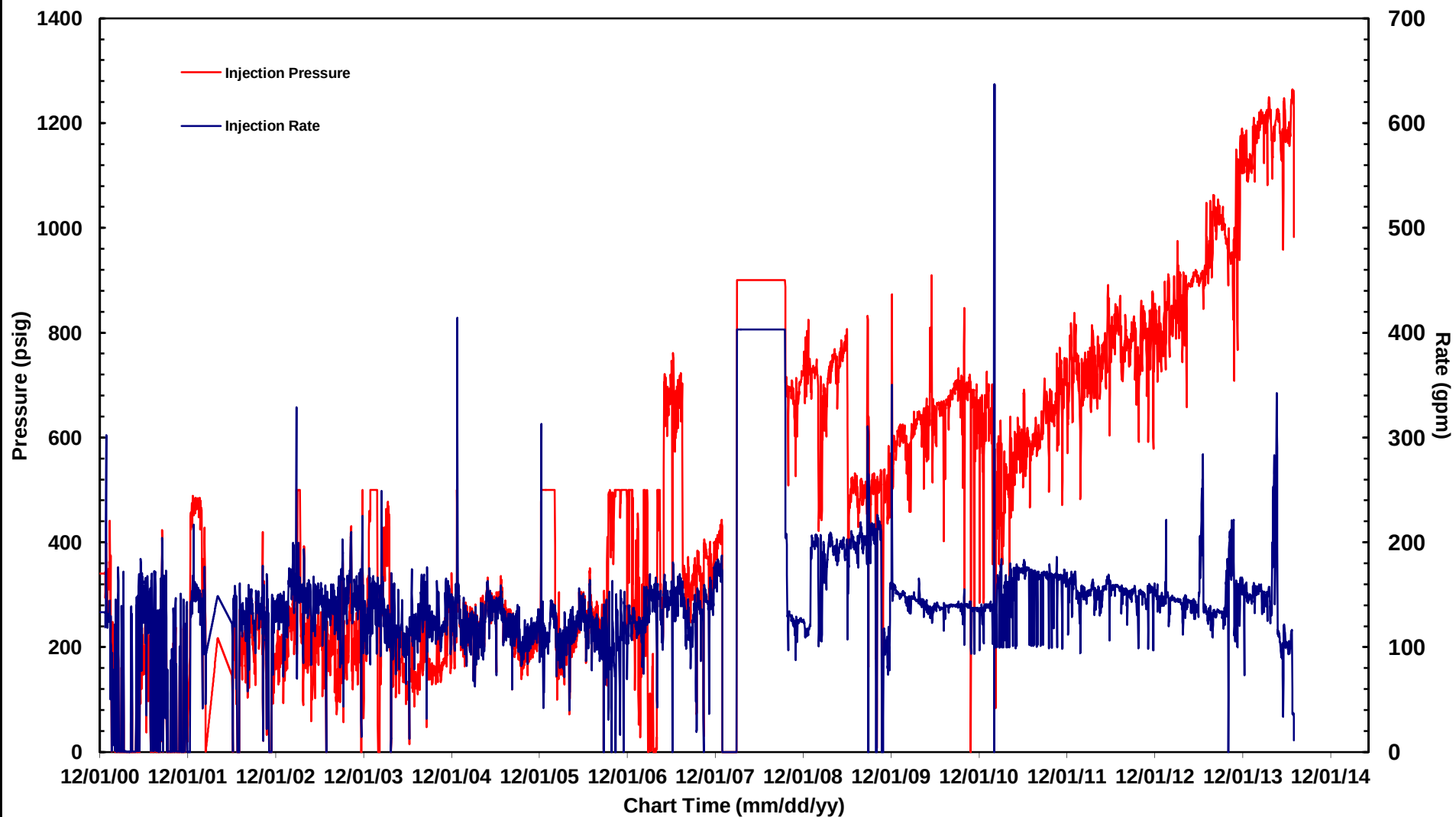


FIGURE 13

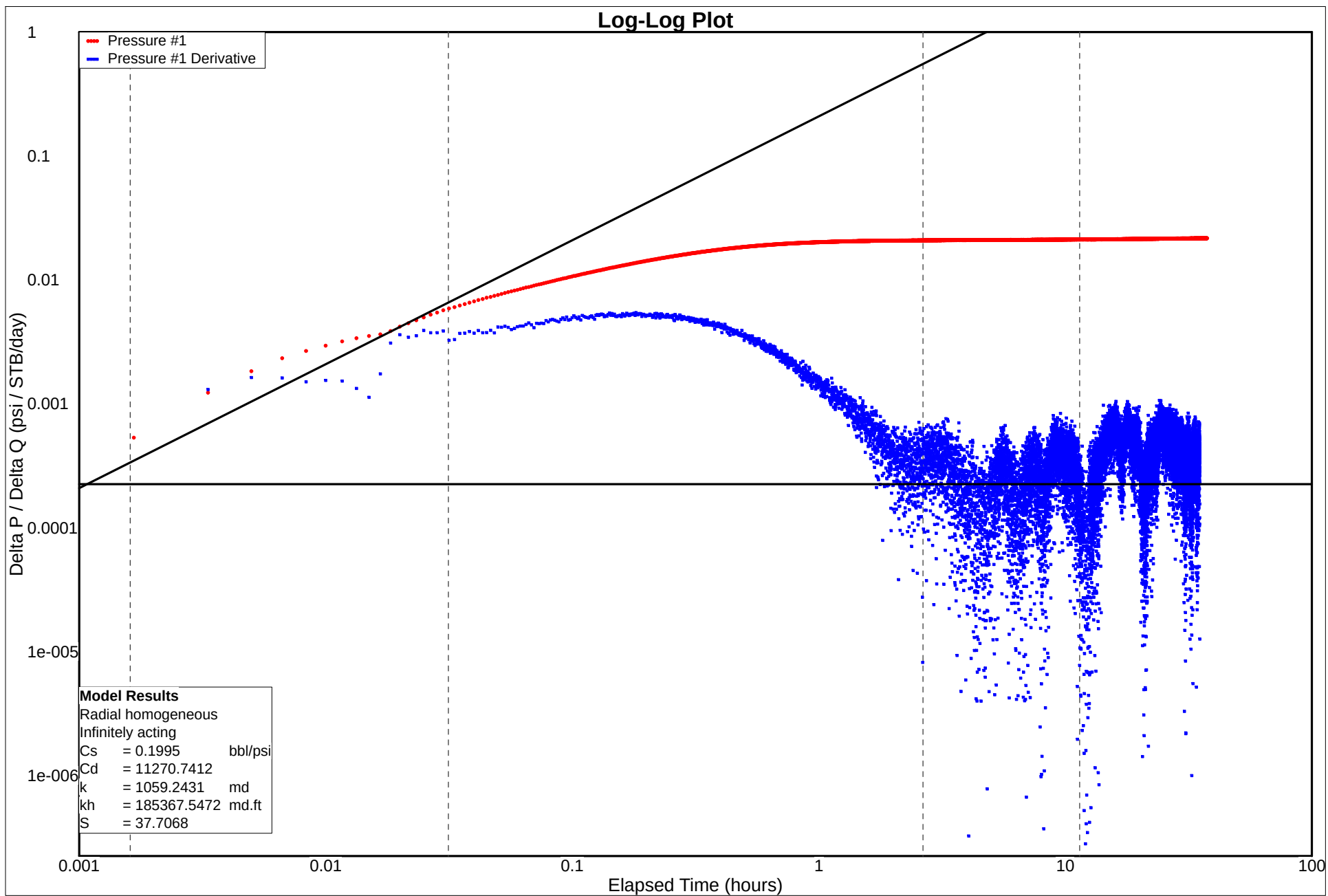


FIGURE 14

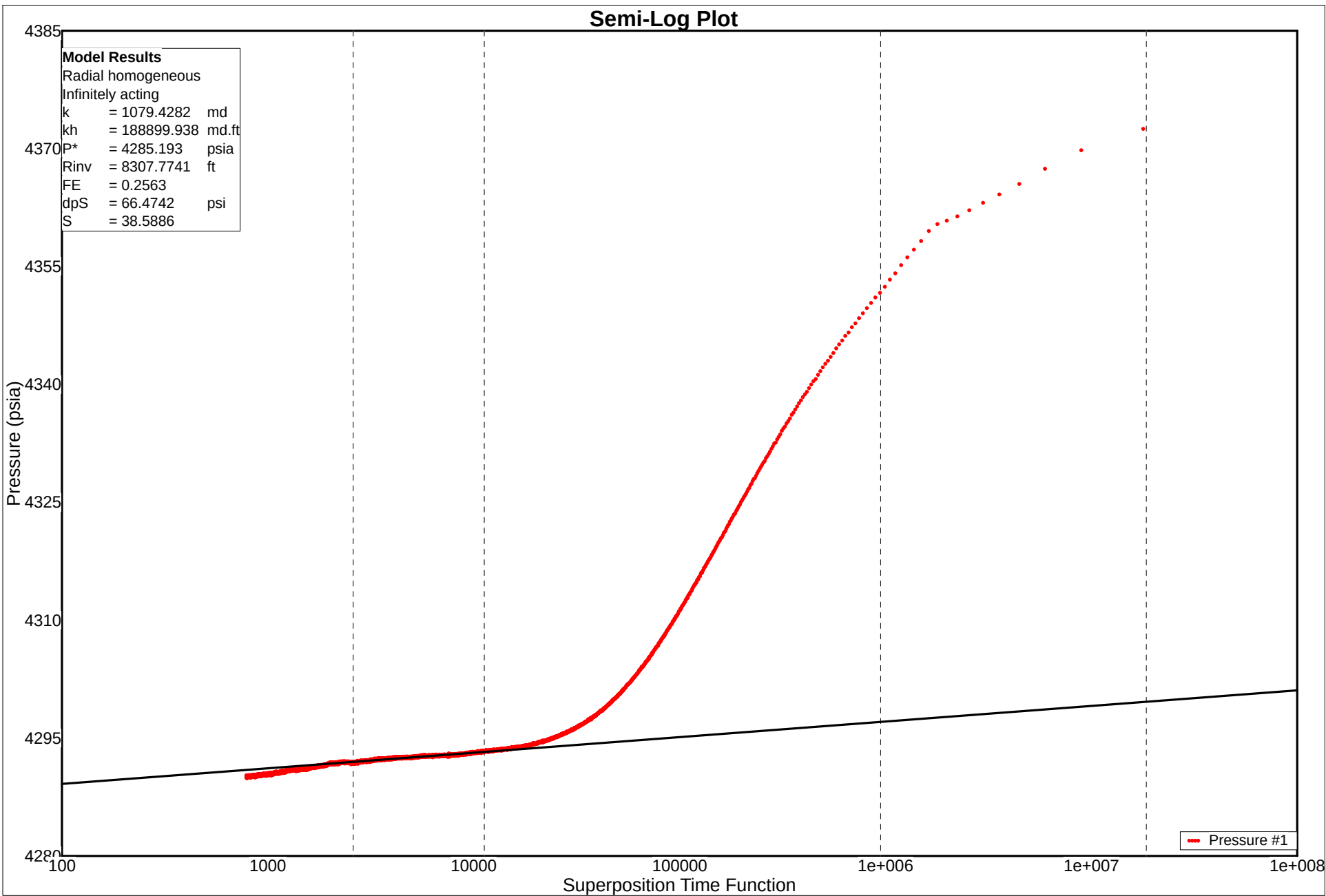


FIGURE 15

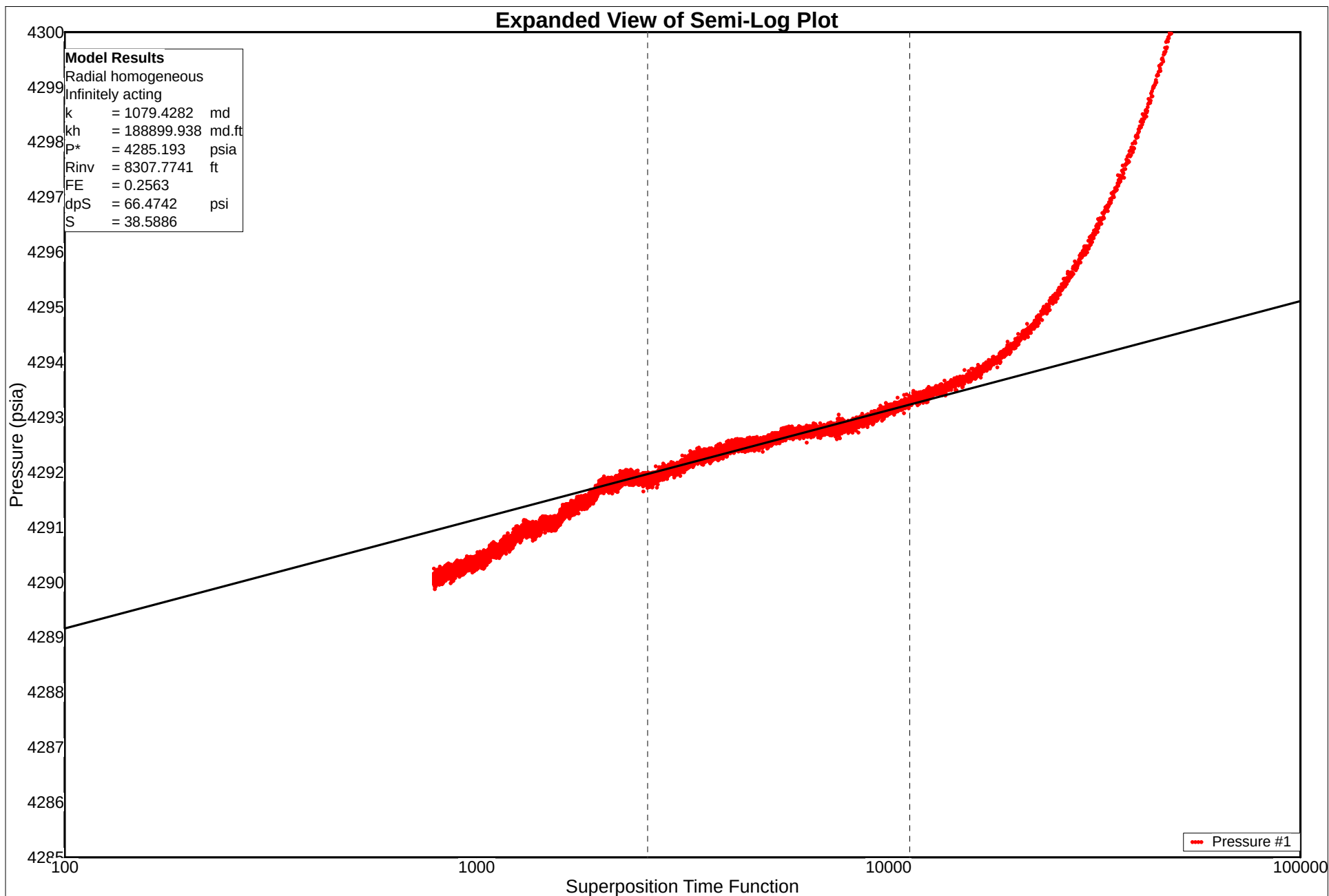


FIGURE 16

Chukka Well No. 2
Hall Plot
May 28, 2014 to June 30, 2014

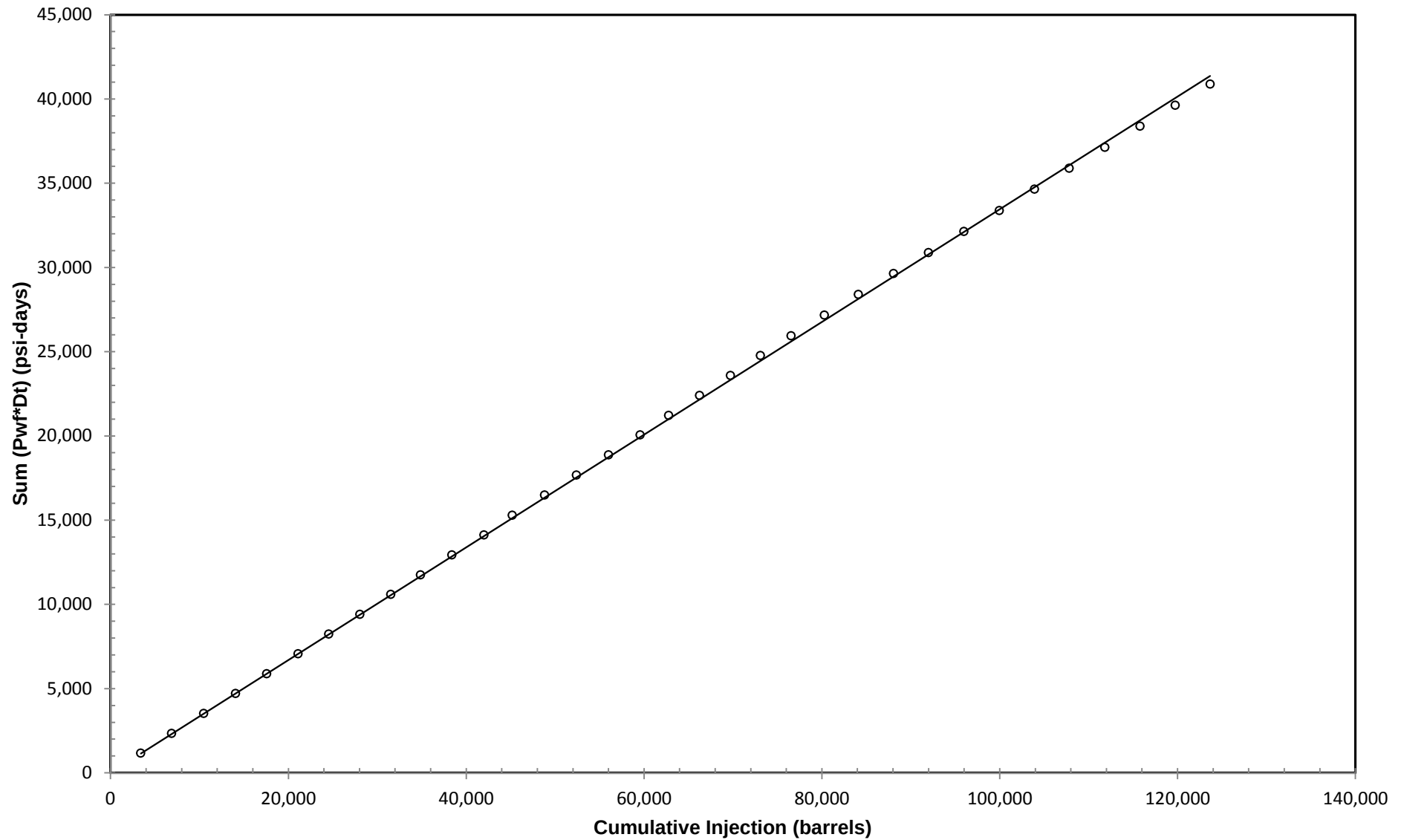


FIGURE 17

**Navajo Refining Company
Static Pressure Gradient Survey
Chukka Well No. 2
July 2, 2014**

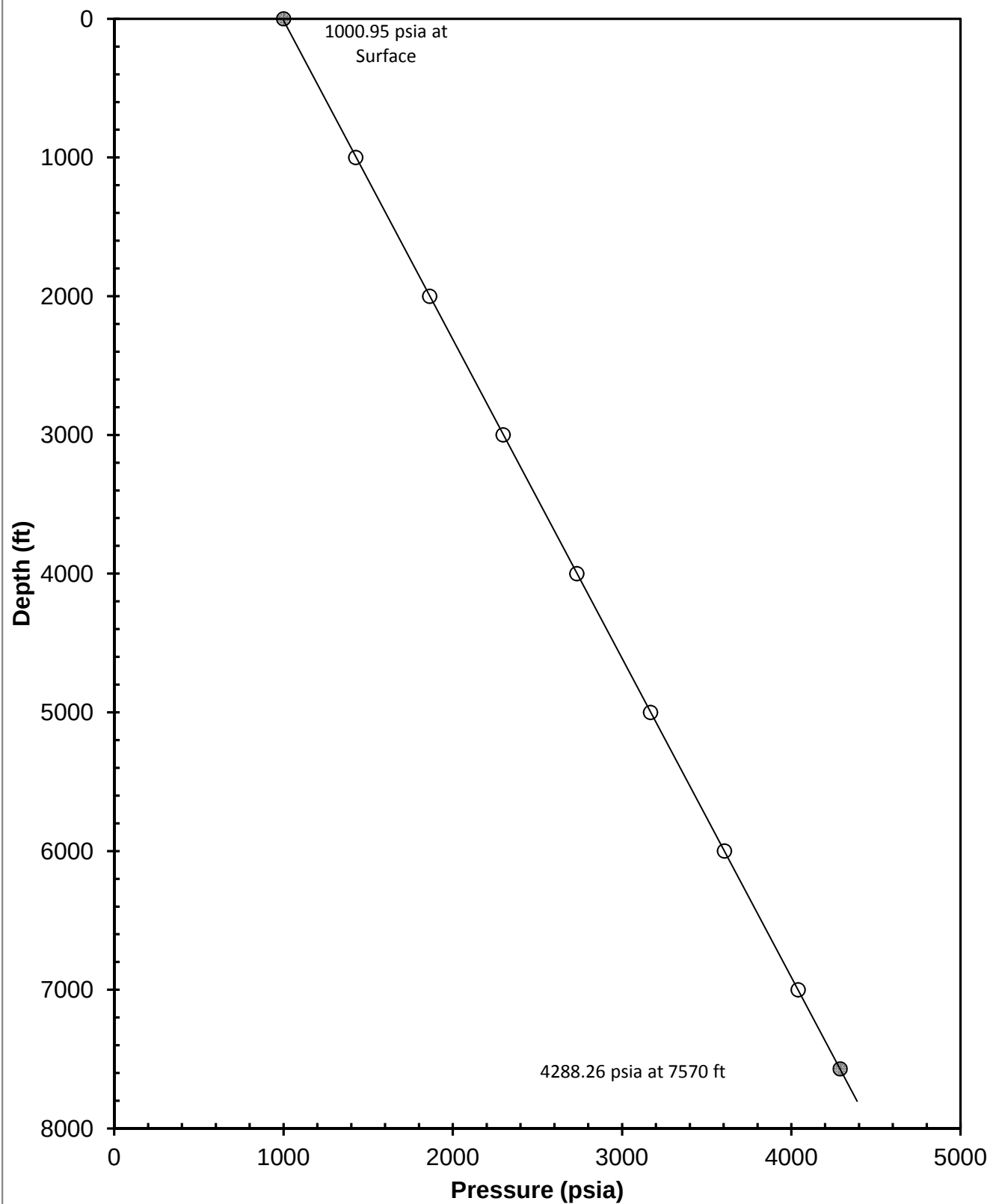


FIGURE 18

APPENDIX C

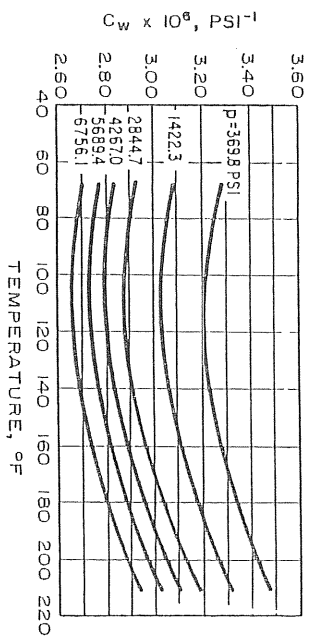


Fig. D.16 Average compressibility of distilled water. After Long and Chierici.¹³

Source: Earlougher, 1977, Advances in Well Test Analysis

COMPRESSIBILITY OF PORE VOLUME AND DISTILLED WATER

APPENDIX D

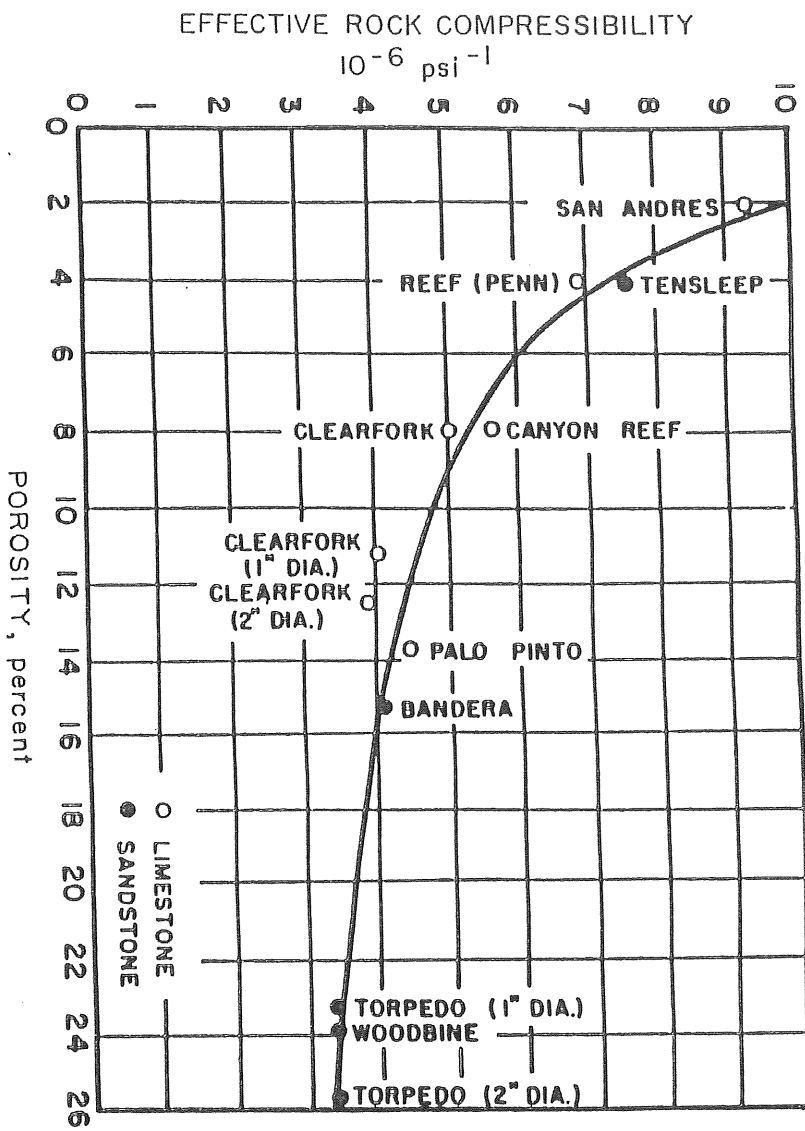


Fig. G.5 Effective formation (rock) compressibility. From Hall, *Trans.*, AIME (1953) 196, 309.

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

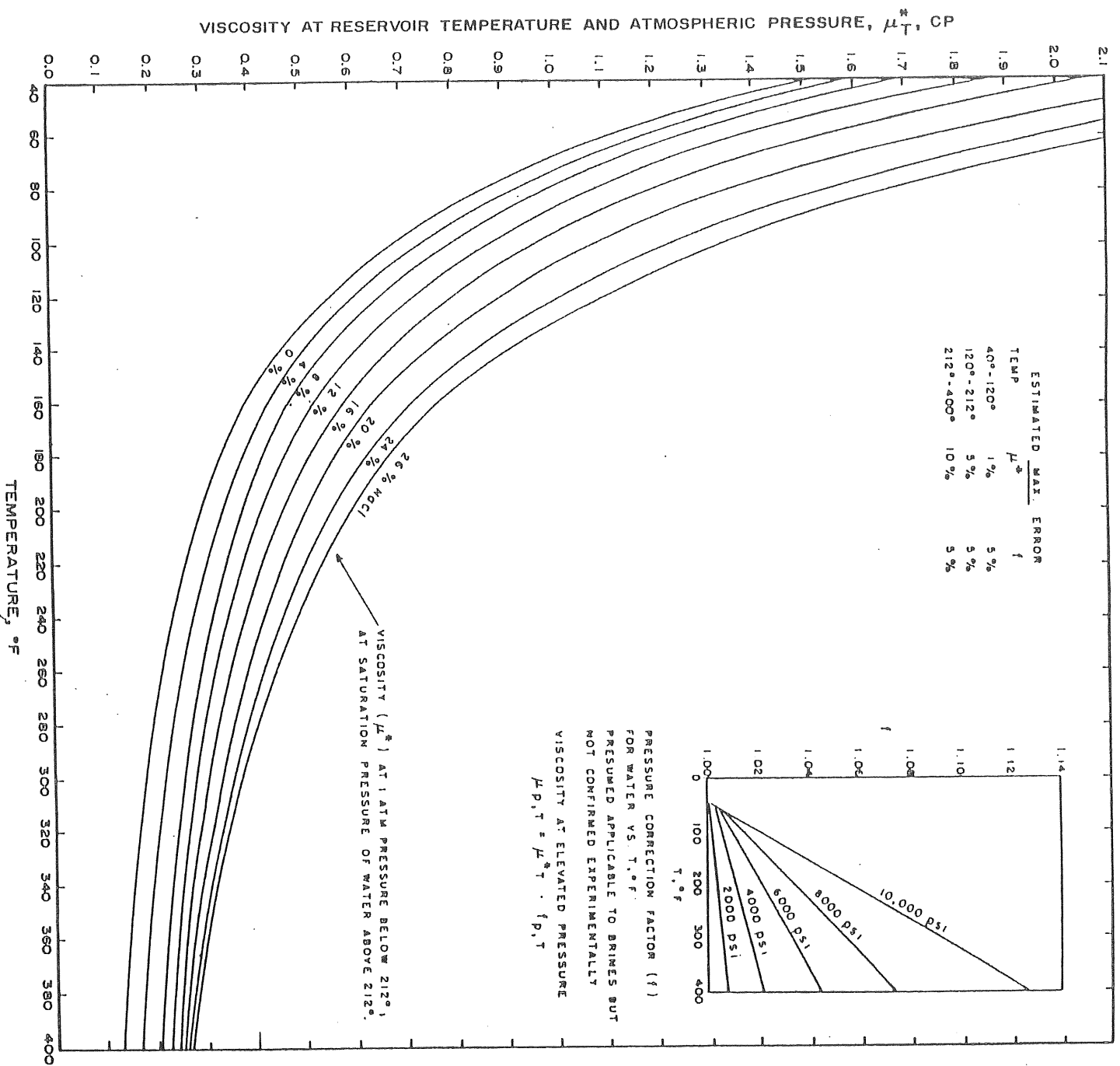


Fig. D.35 Water viscosity at various salinities and temperatures. After Matthews and Russell, data of Chesnut.¹⁸

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

APPENDIX G

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
11/02/2012	00:00:00	-14456	0808.4	-5430.7
11/03/2012	00:00:00	-14432	0779.0	-3933.6
11/04/2012	00:00:00	-14408	0591.9	-3369.4
11/04/2012	00:00:00	-14385	0707.9	-5140.5
11/05/2012	00:00:00	-14361	0725.2	-5227.6
11/06/2012	00:00:00	-14337	0782.0	-5501.5
11/07/2012	00:00:00	-14313	0802.1	-5415.4
11/08/2012	00:00:00	-14289	0828.4	-5445.1
11/09/2012	00:00:00	-14265	0842.7	-5212.4
11/10/2012	00:00:00	-14241	0820.0	-5453.3
11/11/2012	00:00:00	-14217	0730.0	-5339.7
11/12/2012	00:00:00	-14193	0732.7	-5215.5
11/13/2012	00:00:00	-14169	0763.7	-5327.1
11/14/2012	00:00:00	-14145	0784.9	-5349.1
11/15/2012	00:00:00	-14121	0815.0	-5409.6
11/16/2012	00:00:00	-14097	0831.7	-5388.9
11/17/2012	00:00:00	-14073	0845.8	-5399.7
11/18/2012	00:00:00	-14049	0846.2	-5399.7
11/19/2012	00:00:00	-14025	0877.4	-5378.4
11/20/2012	00:00:00	-14001	0853.4	-5332.4
11/21/2012	00:00:00	-13977	0879.1	-5173.3
11/22/2012	00:00:00	-13953	0873.8	-4341.8
11/23/2012	00:00:00	-13929	0602.7	-3322.7
11/24/2012	00:00:00	-13905	0578.8	-3322.3
11/25/2012	00:00:00	-13881	0723.2	-4779.2
11/26/2012	00:00:00	-13857	0776.2	-5307.5
11/27/2012	00:00:00	-13833	0726.2	-5327.7
11/28/2012	00:00:00	-13809	0808.0	-5516.3
11/29/2012	00:00:00	-13785	0831.3	-5397.5
11/30/2012	00:00:00	-13761	0848.7	-5306.9
12/01/2012	00:00:00	-13737	0855.7	-5135.1
12/02/2012	00:00:00	-13713	0821.2	-5139.0
12/03/2012	00:00:00	-13689	0844.4	-5237.2
12/04/2012	00:00:00	-13665	0779.5	-5082.5
12/05/2012	00:00:00	-13641	0789.4	-5098.7
12/06/2012	00:00:00	-13617	0842.5	-5285.8
12/07/2012	00:00:00	-13593	0814.6	-5175.9
12/08/2012	00:00:00	-13569	0816.4	-5069.1
12/09/2012	00:00:00	-13545	0775.2	-4994.2
12/10/2012	00:00:00	-13521	0721.9	-5488.4
12/11/2012	00:00:00	-13497	0705.8	-4587.8
12/12/2012	00:00:00	-13473	0757.8	-4700.1
12/13/2012	00:00:00	-13449	0799.5	-4950.2
12/14/2012	00:00:00	-13425	0788.5	-4943.8
12/15/2012	00:00:00	-13401	0792.1	-5070.9
12/16/2012	00:00:00	-13377	0807.8	-5098.8
12/17/2012	00:00:00	-13353	0822.2	-4994.1
12/18/2012	00:00:00	-13329	0849.6	-5016.8
12/19/2012	00:00:00	-13305	0813.8	-4908.8
12/20/2012	00:00:00	-13281	0750.2	-4907.7
12/21/2012	00:00:00	-13257	0745.0	-4557.2
12/22/2012	00:00:00	-13233	0752.4	-4779.7
12/23/2012	00:00:00	-13209	0818.3	-4980.6
12/24/2012	00:00:00	-13185	0806.6	-5018.1
12/25/2012	00:00:00	-13161	0739.2	-5122.6

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
12/26/2012	00:00:00	-13137	0725.4	-5085.3
12/27/2012	00:00:00	-13113	0775.4	-5079.0
12/28/2012	00:00:00	-13089	0773.4	-4777.7
12/29/2012	00:00:00	-13065	0768.0	-5208.7
12/30/2012	00:00:00	-13041	0774.5	-4888.4
12/31/2012	00:00:00	-13017	0799.0	-4779.1
01/01/2013	00:00:00	-12993	0802.8	-4913.4
01/02/2013	00:00:00	-12969	0801.9	-4938.5
01/03/2013	00:00:00	-12945	0759.5	-4963.3
01/04/2013	00:00:00	-12921	0754.4	-4961.7
01/05/2013	00:00:00	-12897	0786.3	-5037.3
01/06/2013	00:00:00	-12873	0792.2	-5084.6
01/07/2013	00:00:00	-12849	0826.3	-4778.7
01/08/2013	00:00:00	-12825	0838.3	-5036.9
01/09/2013	00:00:00	-12801	0806.9	-4841.9
01/10/2013	00:00:00	-12777	0845.3	-4841.7
01/11/2013	00:00:00	-12753	0897.8	-4999.4
01/12/2013	00:00:00	-12729	0809.1	-5134.7
01/13/2013	00:00:00	-12705	0764.5	-5570.5
01/14/2013	00:00:00	-12681	0729.5	-4837.4
01/15/2013	00:00:00	-12657	0773.9	-5804.3
01/16/2013	00:00:00	-12633	0781.6	-7599.8
01/17/2013	00:00:00	-12609	0814.5	-5055.3
01/18/2013	00:00:00	-12585	0858.9	-5151.0
01/19/2013	00:00:00	-12561	0854.5	-5186.2
01/20/2013	00:00:00	-12537	0858.0	-5198.5
01/21/2013	00:00:00	-12513	0843.8	-5101.7
01/22/2013	00:00:00	-12489	0870.9	-5225.9
01/23/2013	00:00:00	-12465	0897.1	-5168.0
01/24/2013	00:00:00	-12441	0900.1	-5093.8
01/25/2013	00:00:00	-12417	0912.0	-5077.9
01/26/2013	00:00:00	-12393	0886.3	-4988.2
01/27/2013	00:00:00	-12369	0905.9	-4103.7
01/28/2013	00:00:00	-12345	0889.1	-4630.1
01/29/2013	00:00:00	-12321	0782.1	-4265.4
01/30/2013	00:00:00	-12297	0754.2	-4822.2
01/31/2013	00:00:00	-12273	0793.2	-4952.6
02/01/2013	00:00:00	-12249	0815.3	-4504.1
02/02/2013	00:00:00	-12225	0813.8	-5011.6
02/03/2013	00:00:00	-12201	0797.2	-5028.3
02/04/2013	00:00:00	-12177	0820.4	-4996.8
02/05/2013	00:00:00	-12153	0841.3	-5072.7
02/06/2013	00:00:00	-12129	0841.9	-5071.2
02/07/2013	00:00:00	-12105	0851.9	-4951.5
02/08/2013	00:00:00	-12081	0817.6	-5019.3
02/09/2013	00:00:00	-12057	0834.8	-5092.2
02/10/2013	00:00:00	-12033	0813.5	-5114.4
02/11/2013	00:00:00	-12009	0829.7	-5060.4
02/12/2013	00:00:00	-11985	0793.5	-5020.1
02/13/2013	00:00:00	-11961	0825.8	-4975.4
02/14/2013	00:00:00	-11937	0850.5	-5000.9
02/15/2013	00:00:00	-11913	0827.0	-4999.9
02/16/2013	00:00:00	-11889	0848.9	-5041.1
02/17/2013	00:00:00	-11865	0904.7	-5053.2
02/18/2013	00:00:00	-11841	0907.8	-5050.9

APPENDIX G

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
02/19/2013	00:00:00	-11817	0851.5	-4982.7
02/20/2013	00:00:00	-11793	0863.2	-4922.7
02/21/2013	00:00:00	-11769	0830.6	-4939.9
02/22/2013	00:00:00	-11745	0828.9	-5003.2
02/23/2013	00:00:00	-11721	0853.5	-4909.9
02/24/2013	00:00:00	-11697	0861.6	-4984.4
02/25/2013	00:00:00	-11673	0788.8	-4978.2
02/26/2013	00:00:00	-11649	0860.2	-4977.6
02/27/2013	00:00:00	-11625	0817.7	-4949.4
02/28/2013	00:00:00	-11601	0835.7	-4977.4
03/01/2013	00:00:00	-11577	0858.4	-4988.9
03/02/2013	00:00:00	-11553	0901.6	-4996.6
03/03/2013	00:00:00	-11529	0951.1	-5012.6
03/04/2013	00:00:00	-11505	0974.6	-4930.0
03/05/2013	00:00:00	-11481	0827.3	-4938.2
03/06/2013	00:00:00	-11457	0841.1	-4991.8
03/07/2013	00:00:00	-11433	0896.4	-4950.5
03/08/2013	00:00:00	-11409	0928.3	-4913.1
03/09/2013	00:00:00	-11385	0839.7	-4980.6
03/11/2013	00:00:00	-11360	0789.4	-5008.4
03/12/2013	00:00:00	-11336	0847.6	-4996.2
03/13/2013	00:00:00	-11312	0844.9	-4924.0
03/14/2013	00:00:00	-11288	0854.8	-4901.4
03/15/2013	00:00:00	-11264	0914.9	-4989.5
03/16/2013	00:00:00	-11240	0902.0	-4908.6
03/17/2013	00:00:00	-11216	0911.7	-4982.1
03/18/2013	00:00:00	-11192	0836.3	-4913.5
03/19/2013	00:00:00	-11168	0852.3	-4888.0
03/20/2013	00:00:00	-11144	0833.4	-4827.9
03/21/2013	00:00:00	-11120	0803.3	-4872.9
03/22/2013	00:00:00	-11096	0871.7	-4827.6
03/23/2013	00:00:00	-11072	0856.7	-4878.7
03/24/2013	00:00:00	-11048	0833.9	-4689.0
03/25/2013	00:00:00	-11024	0743.9	-4643.3
03/26/2013	00:00:00	-11000	0762.1	-4245.6
03/27/2013	00:00:00	-10976	0782.2	-4121.1
03/28/2013	00:00:00	-10952	0863.0	-3832.4
03/29/2013	00:00:00	-10928	0904.9	-4231.5
03/30/2013	00:00:00	-10904	0915.1	-4778.7
03/31/2013	00:00:00	-10880	0909.0	-5031.5
04/01/2013	00:00:00	-10856	0901.3	-4664.7
04/02/2013	00:00:00	-10832	0896.3	-4915.1
04/03/2013	00:00:00	-10808	0780.9	-4662.2
04/04/2013	00:00:00	-10784	0775.0	-5099.2
04/05/2013	00:00:00	-10760	0819.6	-4948.9
04/06/2013	00:00:00	-10736	0862.4	-5131.5
04/07/2013	00:00:00	-10712	0876.8	-4373.6
04/08/2013	00:00:00	-10688	0908.7	-5110.9
04/09/2013	00:00:00	-10664	0897.4	-4946.7
04/10/2013	00:00:00	-10640	0829.9	-4939.9
04/11/2013	00:00:00	-10616	0746.3	-4969.1
04/12/2013	00:00:00	-10592	0657.6	-4761.3
04/13/2013	00:00:00	-10568	0866.7	-4665.8
04/14/2013	00:00:00	-10544	0888.9	-4873.7
04/15/2013	00:00:00	-10520	0883.0	-4707.9

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
04/16/2013	00:00:00	-10496	0891.0	-4983.5
04/17/2013	00:00:00	-10472	0889.8	-4960.7
04/18/2013	00:00:00	-10448	0890.6	-4964.1
04/19/2013	00:00:00	-10424	0891.6	-4936.5
04/20/2013	00:00:00	-10400	0893.6	-4944.9
04/21/2013	00:00:00	-10376	0895.1	-4960.0
04/22/2013	00:00:00	-10352	0889.5	-4935.7
04/23/2013	00:00:00	-10328	0892.6	-4952.4
04/24/2013	00:00:00	-10304	0891.7	-4949.6
04/25/2013	00:00:00	-10280	0888.7	-4879.2
04/26/2013	00:00:00	-10256	0887.2	-4912.8
04/27/2013	00:00:00	-10232	0888.2	-4871.5
04/28/2013	00:00:00	-10208	0887.9	-4839.6
04/29/2013	00:00:00	-10184	0889.4	-4557.4
04/30/2013	00:00:00	-10160	0894.9	-4536.8
05/01/2013	00:00:00	-10136	0899.0	-4934.8
05/02/2013	00:00:00	-10112	0897.8	-4919.0
05/03/2013	00:00:00	-10088	0901.2	-4927.7
05/04/2013	00:00:00	-10064	0902.7	-4956.3
05/05/2013	00:00:00	-10040	0888.6	-4551.7
05/06/2013	00:00:00	-10016	0897.2	-4892.5
05/07/2013	00:00:00	-09992	0899.3	-4901.5
05/08/2013	00:00:00	-09968	0908.6	-4945.9
05/09/2013	00:00:00	-09944	0896.4	-4850.5
05/10/2013	00:00:00	-09920	0912.4	-5009.6
05/11/2013	00:00:00	-09896	0915.4	-4875.4
05/12/2013	00:00:00	-09872	0907.5	-4422.9
05/13/2013	00:00:00	-09848	0909.2	-4720.6
05/14/2013	00:00:00	-09824	0908.8	-4354.7
05/15/2013	00:00:00	-09800	0914.8	-4956.8
05/16/2013	00:00:00	-09776	0910.0	-4770.9
05/17/2013	00:00:00	-09752	0908.9	-4355.4
05/18/2013	00:00:00	-09728	0912.7	-4901.9
05/19/2013	00:00:00	-09704	0917.6	-4900.8
05/20/2013	00:00:00	-09680	0920.0	-4899.0
05/21/2013	00:00:00	-09656	0915.3	-4548.6
05/22/2013	00:00:00	-09632	0913.0	-4740.9
05/23/2013	00:00:00	-09608	0917.0	-4802.8
05/24/2013	00:00:00	-09584	0906.2	-4792.5
05/25/2013	00:00:00	-09560	0907.5	-4815.8
05/26/2013	00:00:00	-09536	0896.3	-4711.5
05/27/2013	00:00:00	-09512	0902.4	-4639.0
05/28/2013	00:00:00	-09488	0897.9	-4677.7
05/29/2013	00:00:00	-09464	0899.2	-4684.1
05/30/2013	00:00:00	-09440	0909.7	-4724.3
05/31/2013	00:00:00	-09416	0895.9	-4411.3
06/01/2013	00:00:00	-09392	0902.9	-4895.6
06/02/2013	00:00:00	-09368	0900.4	-5221.9
06/03/2013	00:00:00	-09344	0889.4	-5104.8
06/04/2013	00:00:00	-09320	0903.4	-5231.2
06/05/2013	00:00:00	-09296	0903.6	-6137.3
06/06/2013	00:00:00	-09272	0895.1	-7069.3
06/07/2013	00:00:00	-09248	0901.8	-6880.0
06/08/2013	00:00:00	-09224	0898.3	-6276.4
06/09/2013	00:00:00	-09200	0904.1	-5698.3

APPENDIX G

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
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06/11/2013	00:00:00	-09152	0913.3	-7093.8
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06/13/2013	00:00:00	-09104	0908.2	-8106.8
06/14/2013	00:00:00	-09080	0903.0	-8626.5
06/15/2013	00:00:00	-09056	0908.5	-6430.0
06/16/2013	00:00:00	-09032	0917.8	-6837.5
06/17/2013	00:00:00	-09008	0907.6	-8913.5
06/18/2013	00:00:00	-08984	0904.8	-9058.4
06/19/2013	00:00:00	-08960	0894.9	-9736.7
06/20/2013	00:00:00	-08936	0845.7	-5266.3
06/21/2013	00:00:00	-08912	0902.9	-4682.4
06/22/2013	00:00:00	-08888	0884.7	-4553.7
06/23/2013	00:00:00	-08864	0891.2	-4604.9
06/24/2013	00:00:00	-08840	0890.0	-4591.2
06/25/2013	00:00:00	-08816	0918.8	-4775.7
06/26/2013	00:00:00	-08792	0928.0	-4834.3
06/27/2013	00:00:00	-08768	0890.5	-4579.0
06/28/2013	00:00:00	-08744	0891.8	-4575.1
06/29/2013	00:00:00	-08720	0915.5	-4732.9
06/30/2013	00:00:00	-08696	0912.0	-4716.7
07/01/2013	00:00:00	-08672	0922.9	-4763.4
07/02/2013	00:00:00	-08648	1047.9	-4646.9
07/03/2013	00:00:00	-08624	0984.7	-4504.5
07/04/2013	00:00:00	-08600	0968.2	-4546.9
07/05/2013	00:00:00	-08576	0982.5	-4602.9
07/06/2013	00:00:00	-08552	0956.0	-4566.5
07/07/2013	00:00:00	-08528	0916.4	-4287.4
07/08/2013	00:00:00	-08504	0908.1	-4263.8
07/09/2013	00:00:00	-08480	0904.3	-4235.6
07/10/2013	00:00:00	-08456	0894.3	-4182.1
07/11/2013	00:00:00	-08432	0895.8	-4231.2
07/12/2013	00:00:00	-08408	0932.0	-4417.9
07/13/2013	00:00:00	-08384	0966.2	-4682.2
07/14/2013	00:00:00	-08360	0964.2	-4673.0
07/15/2013	00:00:00	-08336	0975.5	-4713.7
07/16/2013	00:00:00	-08312	0970.5	-4718.7
07/17/2013	00:00:00	-08288	0962.1	-4605.8
07/18/2013	00:00:00	-08264	0924.0	-4340.4
07/19/2013	00:00:00	-08240	1021.2	-4774.3
07/20/2013	00:00:00	-08216	1051.8	-4731.0
07/21/2013	00:00:00	-08192	0957.8	-4163.6
07/22/2013	00:00:00	-08168	0927.9	-3985.7
07/23/2013	00:00:00	-08144	1031.2	-4508.8
07/24/2013	00:00:00	-08120	1020.5	-4561.5
07/25/2013	00:00:00	-08096	0957.6	-4461.5
07/26/2013	00:00:00	-08072	0905.5	-4013.5
07/27/2013	00:00:00	-08048	0976.6	-4124.8
07/28/2013	00:00:00	-08024	0936.6	-3753.6
07/29/2013	00:00:00	-08000	0951.5	-3735.7
07/30/2013	00:00:00	-07976	1010.9	-3965.3
07/31/2013	00:00:00	-07952	1045.9	-4159.0
08/01/2013	00:00:00	-07928	1062.9	-4630.8
08/02/2013	00:00:00	-07904	1061.2	-4636.7
08/03/2013	00:00:00	-07880	1062.0	-4550.9

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
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08/06/2013	00:00:00	-07808	1040.5	-4580.7
08/07/2013	00:00:00	-07784	1034.8	-4611.6
08/08/2013	00:00:00	-07760	1003.0	-4415.4
08/09/2013	00:00:00	-07736	1029.6	-4440.1
08/10/2013	00:00:00	-07712	1039.1	-4495.1
08/11/2013	00:00:00	-07688	0993.5	-4396.5
08/12/2013	00:00:00	-07664	1007.3	-4503.7
08/13/2013	00:00:00	-07640	0977.9	-4413.1
08/14/2013	00:00:00	-07616	1002.2	-4576.5
08/15/2013	00:00:00	-07592	1004.0	-4604.1
08/16/2013	00:00:00	-07568	1008.6	-4602.7
08/17/2013	00:00:00	-07544	1007.8	-4616.2
08/18/2013	00:00:00	-07520	1015.5	-4653.9
08/19/2013	00:00:00	-07496	1030.8	-4671.7
08/20/2013	00:00:00	-07472	1053.6	-4644.8
08/21/2013	00:00:00	-07448	1054.6	-4651.0
08/22/2013	00:00:00	-07424	1043.2	-4610.0
08/23/2013	00:00:00	-07400	1034.6	-4568.1
08/24/2013	00:00:00	-07376	1006.2	-4595.8
08/25/2013	00:00:00	-07352	1012.2	-4625.9
08/26/2013	00:00:00	-07328	1042.3	-4533.0
08/27/2013	00:00:00	-07304	1025.6	-4543.8
08/28/2013	00:00:00	-07280	1023.7	-4605.7
08/29/2013	00:00:00	-07256	1007.3	-4583.9
08/30/2013	00:00:00	-07232	1012.4	-4582.7
08/31/2013	00:00:00	-07208	1016.1	-4553.0
09/01/2013	00:00:00	-07184	1024.7	-4579.8
09/02/2013	00:00:00	-07160	1011.2	-4559.8
09/03/2013	00:00:00	-07136	1009.0	-4545.0
09/04/2013	00:00:00	-07112	1015.6	-4598.9
09/05/2013	00:00:00	-07088	1015.5	-4577.4
09/06/2013	00:00:00	-07064	0995.7	-4387.3
09/07/2013	00:00:00	-07040	1011.2	-4417.7
09/08/2013	00:00:00	-07016	1011.7	-4417.7
09/09/2013	00:00:00	-06992	1040.8	-4580.1
09/10/2013	00:00:00	-06968	0996.8	-4465.8
09/11/2013	00:00:00	-06944	1017.8	-4059.0
09/12/2013	00:00:00	-06920	1008.6	-4020.5
09/13/2013	00:00:00	-06896	1010.0	-4178.6
09/14/2013	00:00:00	-06872	1003.4	-4385.8
09/15/2013	00:00:00	-06848	1006.2	-4601.8
09/16/2013	00:00:00	-06824	1002.6	-4719.8
09/17/2013	00:00:00	-06800	1007.0	-4262.0
09/18/2013	00:00:00	-06776	0986.9	-4163.2
09/19/2013	00:00:00	-06752	0985.4	-4776.5
09/20/2013	00:00:00	-06728	0979.4	-4804.5
09/21/2013	00:00:00	-06704	0982.2	-4748.2
09/22/2013	00:00:00	-06680	0979.7	-5546.4
09/23/2013	00:00:00	-06656	0969.4	-5492.9
09/24/2013	00:00:00	-06632	0968.2	-5927.9
09/25/2013	00:00:00	-06608	0979.3	-4806.4
09/26/2013	00:00:00	-06584	0976.6	-4430.6
09/27/2013	00:00:00	-06560	0969.4	-5253.3

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Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
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09/29/2013	00:00:00	-06512	0961.2	-6319.6
09/30/2013	00:00:00	-06488	0957.6	-5814.4
10/01/2013	00:00:00	-06464	0969.5	-6273.2
10/02/2013	00:00:00	-06440	0890.5	-1785.9
10/03/2013	00:00:00	-06416	0949.5	0000.0
10/04/2013	00:00:00	-06392	0999.4	-4338.2
10/05/2013	00:00:00	-06368	0964.0	-6621.5
10/06/2013	00:00:00	-06344	0949.8	-6849.3
10/07/2013	00:00:00	-06320	0952.0	-6543.1
10/08/2013	00:00:00	-06296	0949.1	-7204.9
10/09/2013	00:00:00	-06272	0944.6	-7004.1
10/10/2013	00:00:00	-06248	0948.2	-7137.6
10/11/2013	00:00:00	-06224	0943.1	-6538.8
10/12/2013	00:00:00	-06200	0931.8	-7270.0
10/13/2013	00:00:00	-06176	0931.3	-5772.3
10/14/2013	00:00:00	-06152	0932.2	-5726.8
10/15/2013	00:00:00	-06128	0936.5	-5622.1
10/16/2013	00:00:00	-06104	0953.4	-7580.3
10/17/2013	00:00:00	-06080	0938.3	-5753.8
10/18/2013	00:00:00	-06056	0937.7	-6055.9
10/19/2013	00:00:00	-06032	0938.8	-6881.2
10/20/2013	00:00:00	-06008	0938.4	-6786.5
10/21/2013	00:00:00	-05984	0896.1	-7486.8
10/22/2013	00:00:00	-05960	0824.7	-6544.3
10/23/2013	00:00:00	-05936	0844.9	-7478.7
10/24/2013	00:00:00	-05912	0915.0	-7600.0
10/25/2013	00:00:00	-05888	0977.8	-6238.4
10/26/2013	00:00:00	-05864	0708.6	-5277.3
10/27/2013	00:00:00	-05840	1000.0	-3803.8
10/28/2013	00:00:00	-05816	1000.0	-4140.5
10/29/2013	00:00:00	-05792	1000.0	-4036.9
10/30/2013	00:00:00	-05768	1000.0	-3613.3
10/31/2013	00:00:00	-05744	0942.9	-3749.3
11/01/2013	00:00:00	-05720	0957.1	-4297.8
11/02/2013	00:00:00	-05696	1016.0	-4963.8
11/03/2013	00:00:00	-05672	1150.0	-5611.0
11/03/2013	00:00:00	-05649	1150.0	-5617.4
11/04/2013	00:00:00	-05625	1137.3	-5537.5
11/05/2013	00:00:00	-05601	1022.2	-4769.4
11/06/2013	00:00:00	-05577	0822.3	-3430.6
11/07/2013	00:00:00	-05553	0820.3	-3436.1
11/08/2013	00:00:00	-05529	0767.0	-3414.9
11/09/2013	00:00:00	-05505	0924.5	-4167.1
11/10/2013	00:00:00	-05481	1080.8	-5211.5
11/11/2013	00:00:00	-05457	1130.7	-5498.2
11/12/2013	00:00:00	-05433	1119.2	-5392.5
11/13/2013	00:00:00	-05409	1117.8	-5387.6
11/14/2013	00:00:00	-05385	1105.7	-5305.7
11/15/2013	00:00:00	-05361	1115.9	-5346.9
11/16/2013	00:00:00	-05337	0999.9	-4601.6
11/17/2013	00:00:00	-05313	0938.6	-4130.2
11/18/2013	00:00:00	-05289	1045.7	-4817.7
11/19/2013	00:00:00	-05265	1154.2	-5563.1
11/20/2013	00:00:00	-05241	1175.5	-5702.9

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
11/21/2013	00:00:00	-05217	1165.5	-5619.9
11/22/2013	00:00:00	-05193	1146.4	-5460.1
11/23/2013	00:00:00	-05169	1131.3	-5355.0
11/24/2013	00:00:00	-05145	1142.8	-5416.1
11/25/2013	00:00:00	-05121	1145.3	-5435.7
11/26/2013	00:00:00	-05097	1128.7	-5329.6
11/27/2013	00:00:00	-05073	1189.7	-5715.7
11/28/2013	00:00:00	-05049	1103.4	-5141.6
11/29/2013	00:00:00	-05025	1168.6	-5568.2
11/30/2013	00:00:00	-05001	1182.0	-5644.9
12/01/2013	00:00:00	-04977	1144.7	-5411.8
12/02/2013	00:00:00	-04953	1104.8	-5142.8
12/03/2013	00:00:00	-04929	1119.6	-5230.9
12/04/2013	00:00:00	-04905	1105.0	-5149.5
12/05/2013	00:00:00	-04881	1128.1	-5248.3
12/06/2013	00:00:00	-04857	1119.2	-5196.4
12/07/2013	00:00:00	-04833	1105.5	-2502.0
12/08/2013	00:00:00	-04809	1172.8	-4760.7
12/09/2013	00:00:00	-04785	1177.6	-5469.7
12/10/2013	00:00:00	-04761	1136.8	-5210.4
12/11/2013	00:00:00	-04737	1119.2	-5066.2
12/12/2013	00:00:00	-04713	1173.4	-5453.1
12/13/2013	00:00:00	-04689	1179.3	-5508.3
12/14/2013	00:00:00	-04665	1169.7	-5439.9
12/15/2013	00:00:00	-04641	1176.2	-5471.1
12/16/2013	00:00:00	-04617	1186.3	-5542.6
12/17/2013	00:00:00	-04593	1108.1	-5033.0
12/18/2013	00:00:00	-04569	1089.7	-4923.7
12/19/2013	00:00:00	-04545	1098.4	-4985.8
12/20/2013	00:00:00	-04521	1130.9	-5197.8
12/21/2013	00:00:00	-04497	1094.5	-4967.3
12/22/2013	00:00:00	-04473	1087.7	-4868.7
12/23/2013	00:00:00	-04449	1095.6	-4928.5
12/24/2013	00:00:00	-04425	1099.6	-4955.1
12/25/2013	00:00:00	-04401	1123.7	-5115.7
12/26/2013	00:00:00	-04377	1104.8	-4979.3
12/27/2013	00:00:00	-04353	1130.6	-5119.7
12/28/2013	00:00:00	-04329	1131.3	-5114.4
12/29/2013	00:00:00	-04305	1131.2	-5102.6
12/30/2013	00:00:00	-04281	1140.9	-5162.6
12/31/2013	00:00:00	-04257	1130.4	-5088.6
01/01/2014	00:00:00	-04233	1116.9	-4999.2
01/02/2014	00:00:00	-04209	1125.3	-5049.8
01/03/2014	00:00:00	-04185	1137.4	-5133.5
01/04/2014	00:00:00	-04161	1106.3	-4924.0
01/05/2014	00:00:00	-04137	1125.1	-4996.7
01/06/2014	00:00:00	-04113	1104.8	-4847.0
01/07/2014	00:00:00	-04089	1125.3	-4963.7
01/08/2014	00:00:00	-04065	1112.0	-4884.9
01/09/2014	00:00:00	-04041	1131.2	-4989.9
01/10/2014	00:00:00	-04017	1147.5	-5094.2
01/11/2014	00:00:00	-03993	1193.8	-5417.1
01/12/2014	00:00:00	-03969	1194.0	-5416.0
01/13/2014	00:00:00	-03945	1182.0	-5334.6
01/14/2014	00:00:00	-03921	1210.1	-5524.8

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Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
01/15/2014	00:00:00	-03897	1194.2	-5423.3
01/16/2014	00:00:00	-03873	1185.5	-5362.8
01/17/2014	00:00:00	-03849	1196.0	-5424.1
01/18/2014	00:00:00	-03825	1190.0	-5369.0
01/19/2014	00:00:00	-03801	1087.9	-4543.9
01/20/2014	00:00:00	-03777	1180.4	-5248.1
01/21/2014	00:00:00	-03753	1196.6	-5435.1
01/22/2014	00:00:00	-03729	1185.2	-5338.8
01/23/2014	00:00:00	-03705	1181.5	-5285.6
01/24/2014	00:00:00	-03681	1190.2	-5355.9
01/25/2014	00:00:00	-03657	1181.0	-5310.8
01/26/2014	00:00:00	-03633	1193.1	-5401.3
01/27/2014	00:00:00	-03609	1161.8	-5134.9
01/28/2014	00:00:00	-03585	1189.3	-5313.7
01/29/2014	00:00:00	-03561	1194.2	-5342.0
01/30/2014	00:00:00	-03537	1186.5	-5297.3
01/31/2014	00:00:00	-03513	1187.4	-5320.5
02/01/2014	00:00:00	-03489	1203.2	-5422.0
02/02/2014	00:00:00	-03465	1186.3	-5263.2
02/03/2014	00:00:00	-03441	1183.1	-5232.6
02/04/2014	00:00:00	-03417	1171.1	-5165.8
02/05/2014	00:00:00	-03393	1192.1	-5289.9
02/06/2014	00:00:00	-03369	1212.1	-5436.9
02/07/2014	00:00:00	-03345	1220.2	-5479.5
02/08/2014	00:00:00	-03321	1218.0	-5469.8
02/09/2014	00:00:00	-03297	1185.6	-5255.3
02/10/2014	00:00:00	-03273	1203.6	-5331.8
02/11/2014	00:00:00	-03249	1193.2	-5256.5
02/12/2014	00:00:00	-03225	1203.4	-5337.4
02/13/2014	00:00:00	-03201	1210.5	-5400.6
02/14/2014	00:00:00	-03177	1225.0	-5478.6
02/15/2014	00:00:00	-03153	1217.7	-5424.4
02/16/2014	00:00:00	-03129	1198.9	-5225.3
02/17/2014	00:00:00	-03105	1207.8	-5141.3
02/18/2014	00:00:00	-03081	1202.4	-4505.1
02/19/2014	00:00:00	-03057	1199.8	-4718.0
02/20/2014	00:00:00	-03033	1220.3	-5264.2
02/21/2014	00:00:00	-03009	1218.9	-5242.3
02/22/2014	00:00:00	-02985	1209.8	-5190.0
02/23/2014	00:00:00	-02961	1200.6	-5127.9
02/24/2014	00:00:00	-02937	1209.5	-5175.0
02/25/2014	00:00:00	-02913	1209.5	-5163.5
02/26/2014	00:00:00	-02889	1123.1	-4577.8
02/27/2014	00:00:00	-02865	1214.5	-5203.7
02/28/2014	00:00:00	-02841	1215.8	-5239.4
03/01/2014	00:00:00	-02817	1186.7	-5043.1
03/02/2014	00:00:00	-02793	1180.5	-4959.0
03/03/2014	00:00:00	-02769	1187.1	-4989.5
03/04/2014	00:00:00	-02745	1183.3	-5006.1
03/05/2014	00:00:00	-02721	1200.2	-5128.5
03/06/2014	00:00:00	-02697	1197.9	-5100.0
03/07/2014	00:00:00	-02673	1215.5	-4771.2
03/08/2014	00:00:00	-02649	1222.5	-4776.3
03/10/2014	00:00:00	-02624	1211.3	-5139.8
03/11/2014	00:00:00	-02600	1201.3	-5086.1

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
03/12/2014	00:00:00	-02576	1225.0	-5236.4
03/13/2014	00:00:00	-02552	1081.6	-4289.1
03/14/2014	00:00:00	-02528	1197.8	-5047.7
03/15/2014	00:00:00	-02504	1203.4	-5093.7
03/16/2014	00:00:00	-02480	1220.7	-5197.6
03/17/2014	00:00:00	-02456	1222.0	-5193.7
03/18/2014	00:00:00	-02432	1227.6	-5240.0
03/19/2014	00:00:00	-02408	1249.2	-5407.5
03/20/2014	00:00:00	-02384	1236.9	-5311.1
03/21/2014	00:00:00	-02360	1245.4	-5387.3
03/22/2014	00:00:00	-02336	1243.6	-5365.4
03/23/2014	00:00:00	-02312	1222.2	-5092.6
03/24/2014	00:00:00	-02288	1217.4	-4934.3
03/25/2014	00:00:00	-02264	1207.4	-4210.7
03/26/2014	00:00:00	-02240	1220.0	-4758.9
03/27/2014	00:00:00	-02216	1225.0	-4868.1
03/28/2014	00:00:00	-02192	1201.0	-4501.1
03/29/2014	00:00:00	-02168	1182.3	-4617.5
03/30/2014	00:00:00	-02144	1167.4	-4464.4
03/31/2014	00:00:00	-02120	1176.9	-4530.3
04/01/2014	00:00:00	-02096	1150.0	-5359.8
04/02/2014	00:00:00	-02072	1093.8	-6854.9
04/03/2014	00:00:00	-02048	1136.4	-6567.6
04/04/2014	00:00:00	-02024	1134.0	-6037.2
04/05/2014	00:00:00	-02000	1159.0	-7006.9
04/06/2014	00:00:00	-01976	1172.4	-8239.0
04/07/2014	00:00:00	-01952	1179.1	-8689.0
04/08/2014	00:00:00	-01928	1176.2	-8152.4
04/09/2014	00:00:00	-01904	1193.5	-7947.7
04/10/2014	00:00:00	-01880	1181.9	-8651.0
04/11/2014	00:00:00	-01856	1180.3	-9708.0
04/12/2014	00:00:00	-01832	1165.7	-9108.8
04/13/2014	00:00:00	-01808	1177.0	-8816.7
04/14/2014	00:00:00	-01784	1195.9	-4828.3
04/15/2014	00:00:00	-01760	1195.1	-5984.5
04/16/2014	00:00:00	-01736	1200.2	-7794.6
04/17/2014	00:00:00	-01712	1205.2	-8517.2
04/18/2014	00:00:00	-01688	1206.0	-9407.9
04/19/2014	00:00:00	-01664	1206.8	-8664.0
04/20/2014	00:00:00	-01640	1209.3	-9738.0
04/21/2014	00:00:00	-01616	1221.6	-11734.3
04/22/2014	00:00:00	-01592	1225.1	-10893.2
04/23/2014	00:00:00	-01568	1219.5	-9953.2
04/24/2014	00:00:00	-01544	1221.3	-6771.6
04/25/2014	00:00:00	-01520	1210.9	-3848.6
04/26/2014	00:00:00	-01496	1226.6	-3988.3
04/27/2014	00:00:00	-01472	1203.2	-3795.5
04/28/2014	00:00:00	-01448	1225.0	-3957.1
04/29/2014	00:00:00	-01424	1222.2	-3928.1
04/30/2014	00:00:00	-01400	1208.4	-3802.8
05/01/2014	00:00:00	-01376	1201.9	-3753.3
05/02/2014	00:00:00	-01352	1217.7	-3886.0
05/03/2014	00:00:00	-01328	1200.3	-3741.5
05/04/2014	00:00:00	-01304	1181.1	-3591.2
05/05/2014	00:00:00	-01280	1184.4	-3594.2

APPENDIX G

Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
05/06/2014	00:00:00	-01256	1180.0	-3568.5
05/07/2014	00:00:00	-01232	1160.4	-3394.1
05/08/2014	00:00:00	-01208	1150.0	-3307.8
05/09/2014	00:00:00	-01184	1137.3	-3180.9
05/10/2014	00:00:00	-01160	1129.6	-3105.9
05/11/2014	00:00:00	-01136	1130.6	-3112.5
05/12/2014	00:00:00	-01112	1132.1	-3138.1
05/13/2014	00:00:00	-01088	1126.8	-3057.3
05/14/2014	00:00:00	-01064	1176.4	-3444.7
05/15/2014	00:00:00	-01040	1188.8	-3562.8
05/16/2014	00:00:00	-01016	1090.4	-2514.6
05/17/2014	00:00:00	-00992	0959.5	-1152.4
05/18/2014	00:00:00	-00968	0957.8	-1154.1
05/19/2014	00:00:00	-00944	1073.8	-2381.0
05/20/2014	00:00:00	-00920	1241.0	-4119.4
05/21/2014	00:00:00	-00896	1211.2	-3791.8
05/22/2014	00:00:00	-00872	1247.9	-4165.4
05/23/2014	00:00:00	-00848	1229.8	-3987.3
05/24/2014	00:00:00	-00824	1230.6	-3985.9
05/25/2014	00:00:00	-00800	1223.8	-3903.9
05/26/2014	00:00:00	-00776	1223.3	-3901.9
05/27/2014	00:00:00	-00752	1183.6	-3582.2
05/28/2014	00:00:00	-00728	1163.5	-3405.1
05/29/2014	00:00:00	-00704	1171.3	-3470.1
05/30/2014	00:00:00	-00680	1187.3	-3604.5
05/31/2014	00:00:00	-00656	1185.3	-3580.8
06/01/2014	00:00:00	-00632	1176.1	-3502.2
06/02/2014	00:00:00	-00608	1177.1	-3520.3
06/03/2014	00:00:00	-00584	1170.1	-3449.9
06/04/2014	00:00:00	-00560	1179.6	-3518.4
06/05/2014	00:00:00	-00536	1174.1	-3477.2
06/06/2014	00:00:00	-00512	1161.3	-3340.4
06/07/2014	00:00:00	-00488	1182.8	-3530.9
06/08/2014	00:00:00	-00464	1192.3	-3593.5
06/09/2014	00:00:00	-00440	1164.3	-3191.0
06/10/2014	00:00:00	-00416	1202.0	-3628.0
06/11/2014	00:00:00	-00392	1191.0	-3578.9
06/12/2014	00:00:00	-00368	1194.8	-3607.3
06/13/2014	00:00:00	-00344	1191.3	-3559.7
06/14/2014	00:00:00	-00320	1156.6	-3216.8
06/15/2014	00:00:00	-00296	1182.9	-3469.1
06/16/2014	00:00:00	-00272	1184.5	-3470.7
06/17/2014	00:00:00	-00248	1175.1	-3382.9
06/18/2014	00:00:00	-00224	1183.1	-3440.7
06/19/2014	00:00:00	-00200	1216.9	-3737.0
06/20/2014	00:00:00	-00176	1232.2	-3840.4
06/21/2014	00:00:00	-00152	1244.9	-3960.9
06/22/2014	00:00:00	-00128	1241.3	-3906.1
06/23/2014	00:00:00	-00104	1248.6	-3997.1
06/24/2014	00:00:00	-00080	1250.5	-3975.4
06/25/2014	00:00:00	-00056	1264.4	-3960.9
06/26/2014	00:00:00	-00032	1245.8	-3906.1
06/27/2014	00:00:00	-00008	1242.9	-3997.1
06/28/2014	00:00:00	00016	1250.1	-3975.4
06/29/2014	00:00:00	00040	1236.8	-3960.9

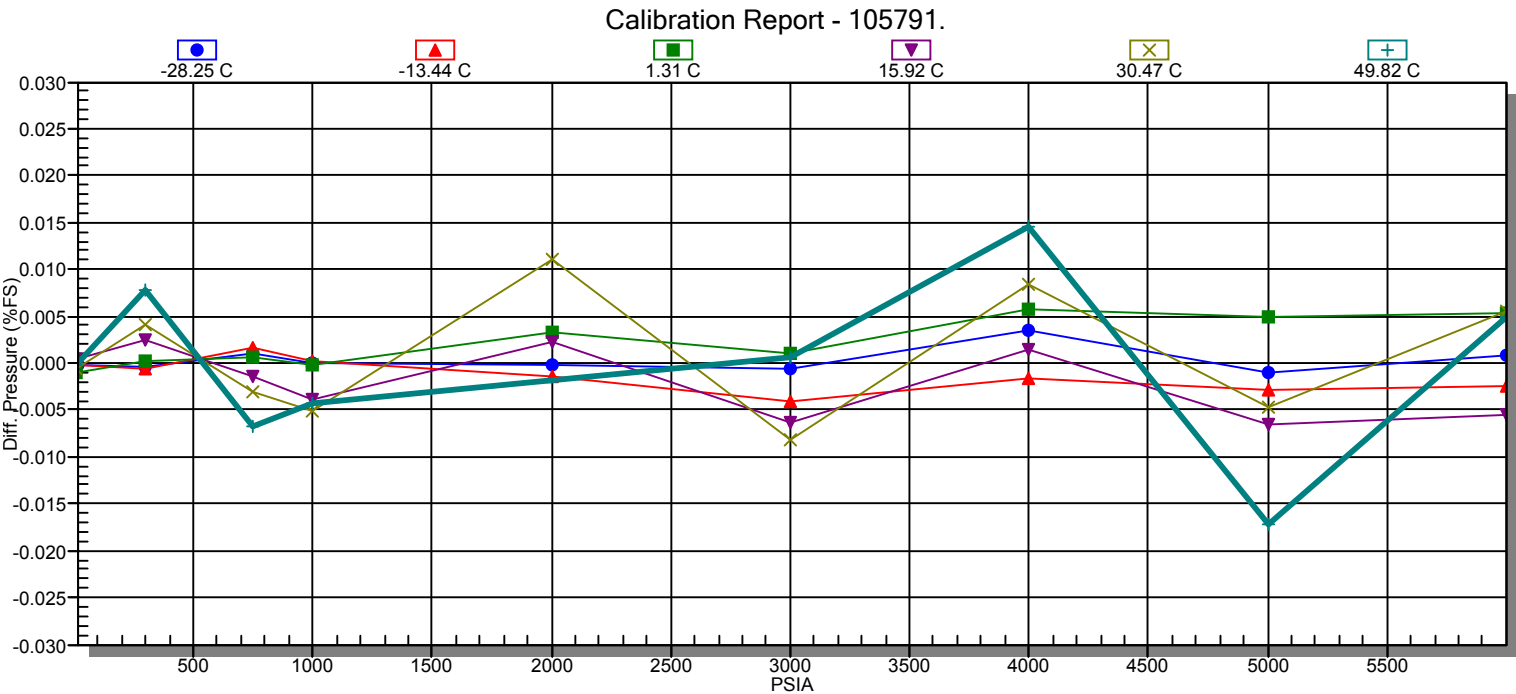
Date	Time	Hours	Pressure	Rate
mm/dd/yyyy	hh:mm:ss	ΔT	psig	bpd
06/30/2014	20:00:00	00084	1262.7	-3906.1
07/02/2014	09:40:00	00122	0982.8	0000.0



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Pressure Gauge Certificate of Calibration



GAUGE NUMBER: 105791

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 678074$

Temp

4

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

0.01

$f_{t0} = 129521$

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 13.01608356	0.2891667924	0.001295996866	5.951371965E-06	1.086111652E-08
B 1.352916959	-0.001797924778	-4.832011761E-06	-2.055203581E-08	-2.552253142E-11
C -1.612555807E-06	2.570590749E-08	1.269837568E-10	-7.506678123E-13	-8.337328246E-15
D -4.519174436E-10	-9.823658273E-12	-6.532926325E-14	-4.896044356E-17	1.091483229E-18
Temperature (C) STANDARD FIT COEFFICIENTS				
A -28.77846847				
B -0.4934266748				
C -0.0008227136643				
D -1.830985127E-06				

1 points eliminated.

Error File: Gauge # 105791

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.03	-28.25	678074.33	129521.75	-0.01
296.52	-28.25	699034.00	129543.25	-0.03
746.58	-28.27	732356.33	129553.75	0.06
1000.65	-28.23	751176.67	129555.50	0.00
2002.94	-28.22	825547.00	129534.50	-0.01
2996.96	-28.24	899355.67	129440.50	-0.03
3999.59	-28.23	973835.00	129298.75	0.20
5001.68	-28.24	1048033.67	129080.75	-0.06
5996.73	-28.22	1121594.33	128830.00	0.05
13.02	-13.44	678636.33	126412.00	-0.01
296.52	-13.42	698824.00	126425.00	-0.04
746.58	-13.42	730921.67	126435.00	0.10
1000.65	-13.39	749050.33	126442.00	0.01
2002.96	-13.47	820694.33	126434.50	-0.08
2996.98	-13.42	891787.67	126349.75	-0.25
3999.61	-13.46	963539.33	126228.50	-0.10
5001.71	-13.42	1035059.00	126035.50	-0.18
5996.77	-13.44	1105935.00	125812.50	-0.15
13.01	1.31	679101.67	122873.50	-0.06
296.51	1.34	698578.33	122896.00	0.01
746.57	1.35	729529.00	122902.25	0.04
1000.64	1.36	747016.00	122909.75	-0.02
2002.95	1.32	816124.67	122897.75	0.20
2996.97	1.35	884699.33	122825.50	0.06
3999.61	1.33	953922.00	122721.75	0.34
5001.71	1.37	1022944.00	122554.00	0.29
5996.77	1.36	1091345.33	122356.25	0.32
13.01	15.92	679499.00	119133.50	0.03
296.50	15.89	698320.00	119150.00	0.14
746.56	15.90	728207.33	119159.00	-0.08
1000.63	15.89	745097.00	119167.25	-0.23
2002.94	15.89	811873.33	119152.25	0.14
2996.96	15.92	878124.33	119099.00	-0.39
3999.59	15.92	945043.33	119012.50	0.09
5001.68	15.91	1011742.00	118864.75	-0.40
5996.75	15.90	1077899.67	118693.75	-0.34
13.00	30.47	679843.33	115258.25	-0.03
296.49	30.43	698043.67	115280.50	0.24
746.56	30.47	726923.00	115292.75	-0.19
1000.63	30.48	743249.33	115290.75	-0.31
2002.93	30.39	807890.33	115312.00	0.66
2996.95	30.41	871951.00	115269.50	-0.49
3999.58	30.33	936742.67	115196.50	0.50
5001.69	30.45	1001243.00	115053.00	-0.29
5996.74	30.33	1065380.33	114929.50	0.33
12.98	49.82	680241.67	110059.00	-0.01
296.48	49.82	697633.67	110075.00	0.47
746.55	49.85	725206.33	110083.25	-0.41
1000.63	49.83	740842.00	110087.25	-0.26
2996.96	49.83	864153.67	110048.00	0.03
3999.60	49.81	926294.67	109992.00	0.87
5001.70	49.86	988118.67	109882.25	-1.03
5996.77	49.78	1049545.00	109760.00	0.30



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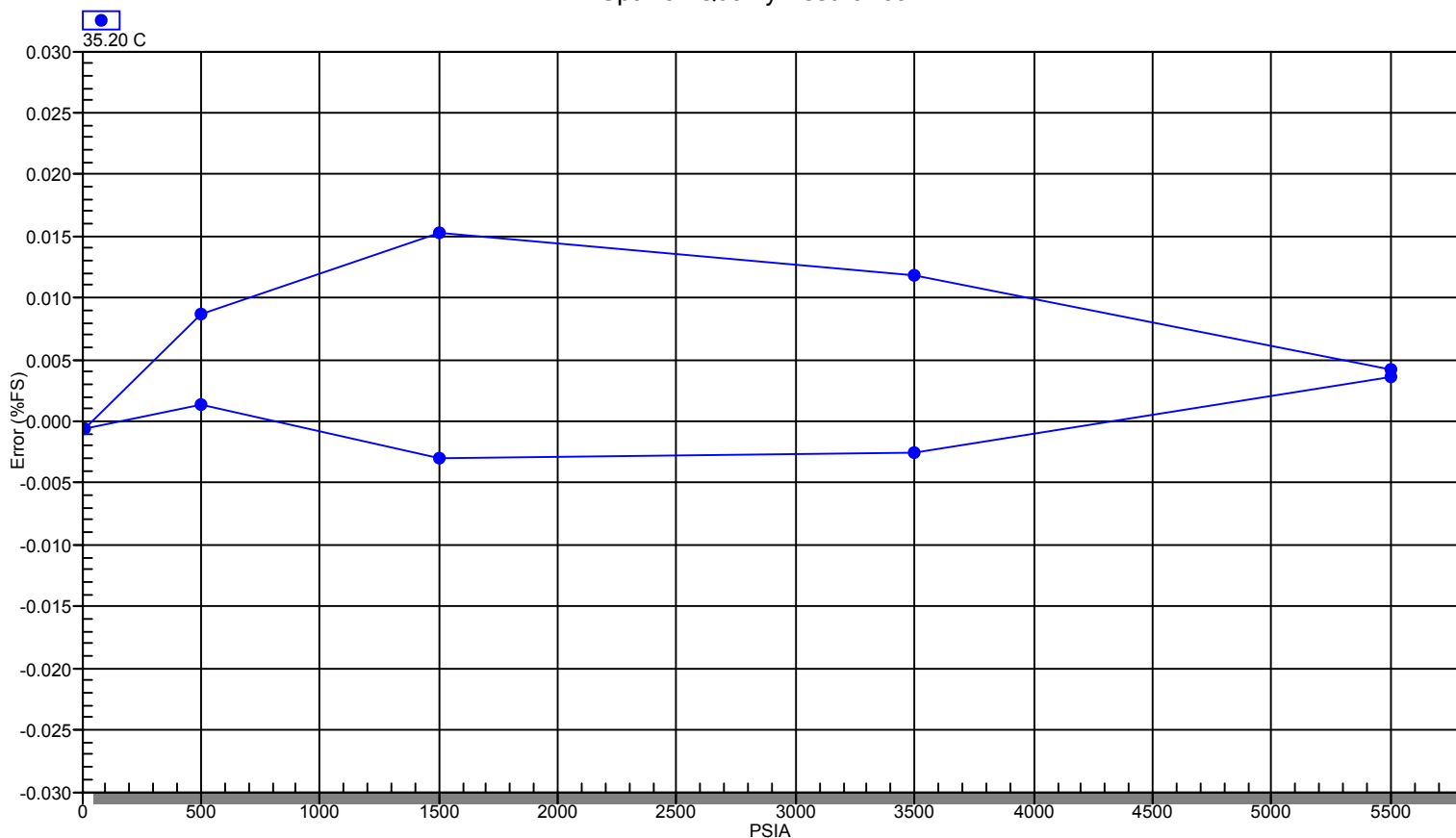
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	105791	CALIBRATION DATE	MAY 27/13
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.03 - 5996.73 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	-28.25 - 49.82 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

As shown in the graph below, this Spartek Gauge conformed to within $\pm 0.030\%$ 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 $\pm(0.030\% \text{ F.S.} + 0.01\% \text{ of reading})$

Spartek Quality Assurance



Accepted By: _____

Date: MAY 30/13 _____

Ramp report: Serial # 105791

Gauge range = 5996.770 PSI. Max. DIFF. = 1.799

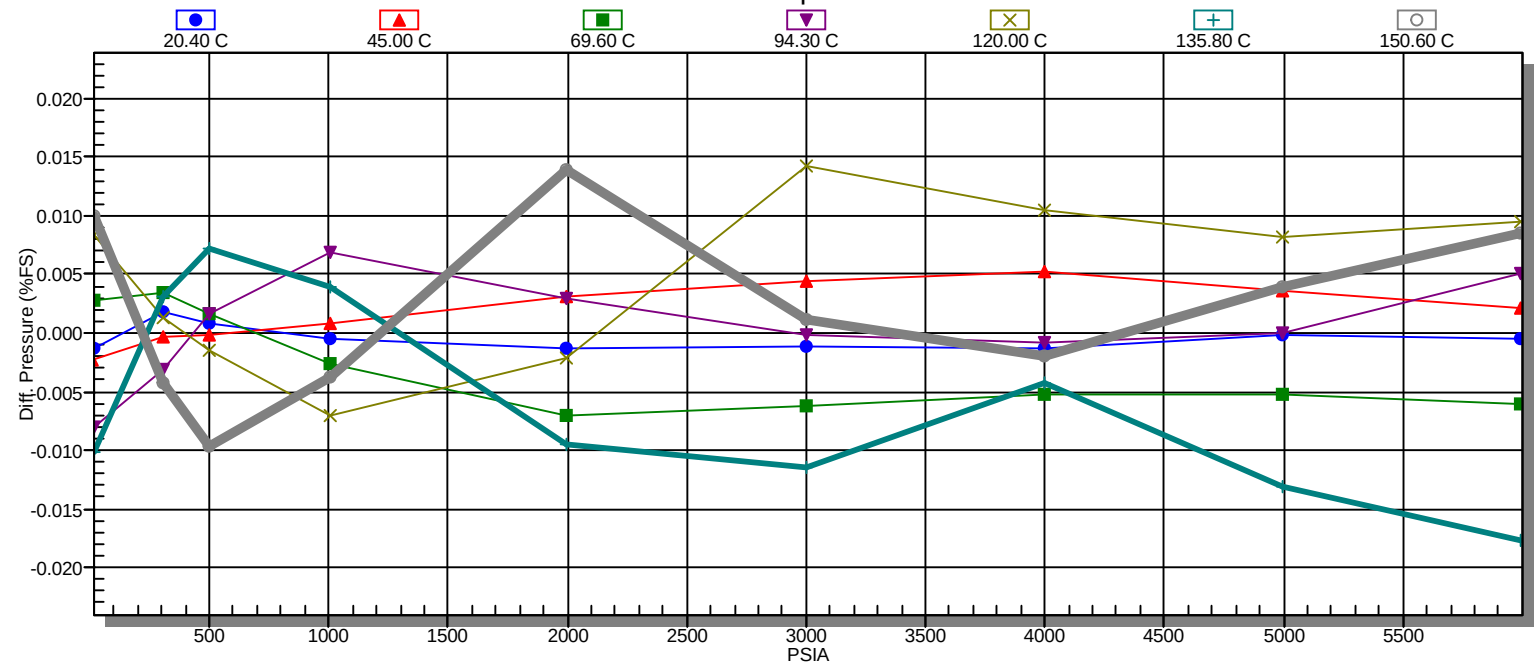
Ramp check result: PASS, Max Err = 0.015% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
5502.56	5502.81	5501.63	0.25	0.0042	35.20	35.87
3497.56	3498.26	3496.89	0.70	0.0117	35.19	35.00
1501.75	1502.67	1501.36	0.91	0.0152	35.22	34.77
499.90	500.42	499.53	0.52	0.0087	35.22	34.78
12.99	12.96	12.48	-0.03	0.0006	35.20	34.85
499.90	499.98	499.56	0.08	0.0014	35.19	34.76
1501.74	1501.56	1501.36	-0.18	0.0030	35.24	34.76
3497.55	3497.39	3496.95	-0.15	0.0025	35.24	35.07
5502.55	5502.76	5501.70	0.21	0.0036	35.23	35.90



Pressure Gauge Certificate of Calibration

Calibration Report - 75871.



GAUGE NUMBER: 75871

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 678735$

Temp

4

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

0.01

$f_{t0} = 158408$

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 12.97142642	0.11277823	-0.0001505740173	-1.823019195E-06	-3.301484115E-09
B 1.640874332	-0.001297519254	-3.71224205E-07	-1.385623931E-09	1.181939745E-12
C -4.03108653E-06	9.319688525E-09	1.006689622E-11	-5.12304544E-13	-1.763346489E-15
D 1.30010629E-10	-2.139856247E-12	-1.958534961E-15	7.951008165E-17	2.863833649E-19
Temperature (C) STANDARD FIT COEFFICIENTS				
A 20.19981389				
B -0.343470116				
C -2.629672432E-05				
D -2.249422711E-07				

0 points eliminated.

Error File: Gauge # 75871

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
13.06	20.40	678735.67	158408.25	-0.08
303.58	20.30	696461.00	158422.00	0.11
499.73	20.40	708428.33	158434.00	0.05
1002.67	20.20	739155.33	158454.50	-0.03
1998.86	20.30	800150.00	158459.50	-0.08
3000.93	20.20	861624.33	158426.25	-0.07
3999.15	20.30	922915.67	158357.25	-0.08
4998.32	20.20	984256.67	158250.25	-0.01
5997.31	20.30	1045483.00	158099.75	-0.03
13.05	45.00	679208.00	151257.00	-0.14
303.57	44.90	695994.67	151273.75	-0.02
499.73	44.90	707335.00	151286.25	-0.01
1002.66	44.80	736447.67	151306.50	0.05
1998.85	44.80	794234.00	151319.50	0.19
3000.92	44.80	852472.33	151300.50	0.26
3999.14	44.80	910532.33	151243.50	0.31
4998.32	44.90	968636.00	151156.25	0.21
5997.31	44.90	1026665.33	151037.50	0.12
13.06	69.60	679587.67	144051.25	0.17
303.59	69.60	695525.00	144068.50	0.20
499.74	69.70	706286.00	144076.75	0.09
1002.67	69.60	733908.00	144095.75	-0.16
1998.86	69.60	788734.67	144111.00	-0.42
3000.92	69.60	843999.00	144099.00	-0.37
3999.15	69.60	899095.00	144055.75	-0.31
4998.32	69.60	954243.33	143988.25	-0.31
5997.31	69.70	1009316.33	143888.00	-0.37
13.06	94.30	679761.00	137072.75	-0.48
303.59	94.30	694940.67	137085.00	-0.18
499.73	94.30	705200.33	137093.75	0.09
1002.67	94.40	731510.33	137111.00	0.41
1998.86	94.40	783663.33	137127.50	0.18
3000.92	94.40	836203.67	137118.50	-0.01
3999.14	94.30	888588.67	137086.50	-0.05
4998.32	94.30	941030.67	137034.25	0.00
5997.30	94.40	993420.33	136953.00	0.30
13.06	120.00	679944.00	130197.25	0.50
303.59	120.00	694342.00	130207.75	0.08
499.74	119.90	704076.33	130217.50	-0.08
1002.68	120.10	729063.67	130229.25	-0.42
1998.86	120.10	778693.67	130244.25	-0.13
3000.92	120.10	828736.00	130243.50	0.85
3999.14	120.00	878567.00	130223.00	0.62
4998.31	120.00	928441.67	130180.00	0.49
5997.30	120.00	978274.67	130120.75	0.57
13.07	135.80	679988.67	126175.50	-0.61
303.59	135.80	694006.33	126188.00	0.19
499.74	135.80	703465.33	126195.50	0.43
1002.68	135.80	727711.33	126212.75	0.24
1998.86	135.80	775823.33	126229.00	-0.57
3000.92	135.90	824357.00	126229.50	-0.68
3999.13	135.80	872779.67	126211.50	-0.26
4998.30	135.80	921194.33	126173.25	-0.79
5997.29	135.80	969554.33	126117.75	-1.06
13.09	150.60	680190.00	122440.50	0.60
303.62	150.60	693715.00	122453.25	-0.25
499.77	150.60	702870.00	122461.25	-0.58
1002.69	150.50	726441.33	122479.50	-0.22
1998.86	150.60	773291.00	122498.50	0.83
3000.91	150.60	820468.33	122500.75	0.06
3999.12	150.60	867567.00	122490.25	-0.12
4998.28	150.60	914740.00	122463.25	0.24
5997.25	150.60	961847.33	122425.25	0.51



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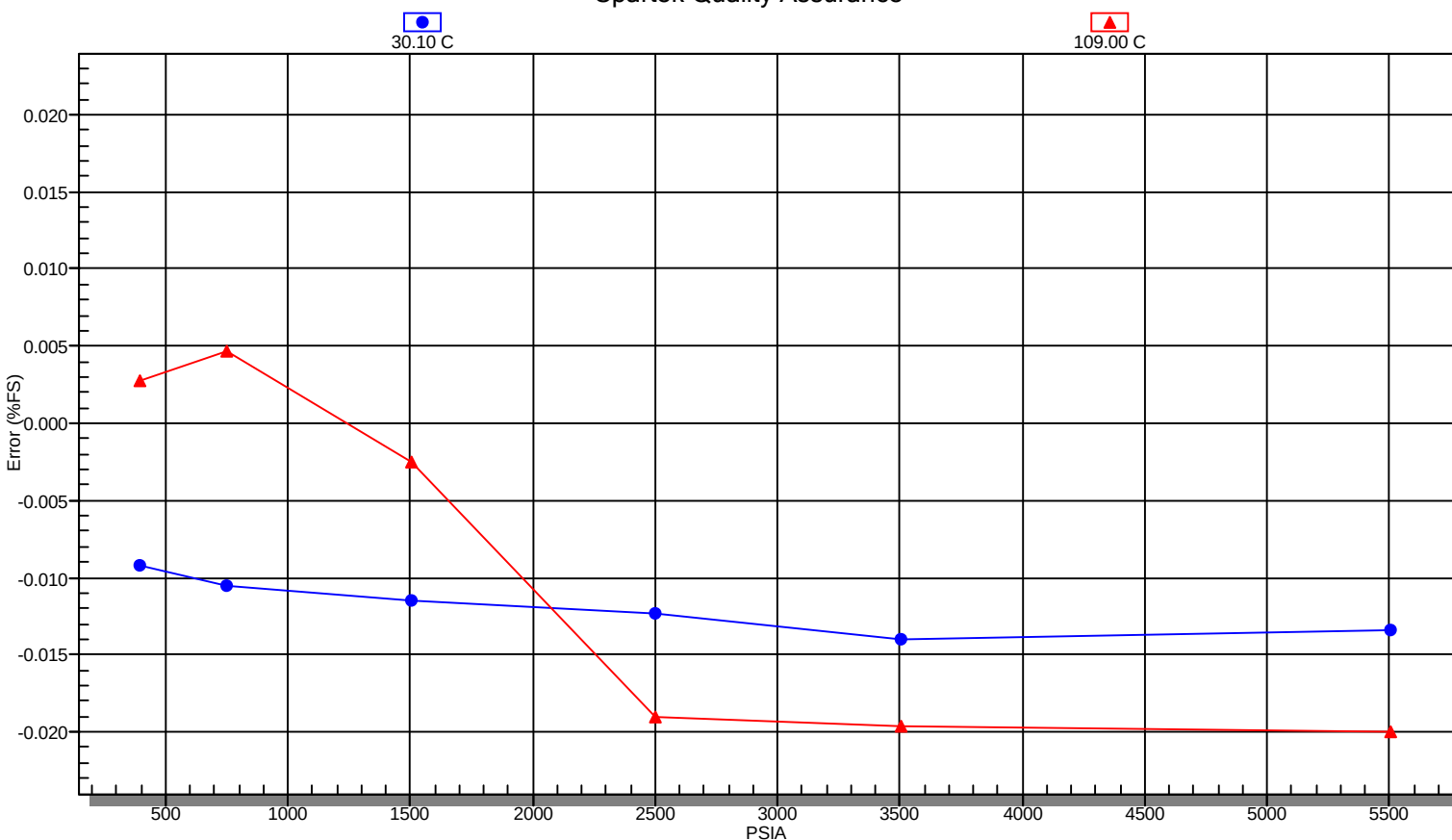
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	75871	CALIBRATION DATE	MAR 25/11
MODEL NUMBER	0 FF0	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	13.06 - 5997.31 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	20.40 - 150.60 °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: MAR 28/11

Ramp report: Serial # 75871

Gauge range = 5997.314 PSI. Max. DIFF. = 1.439

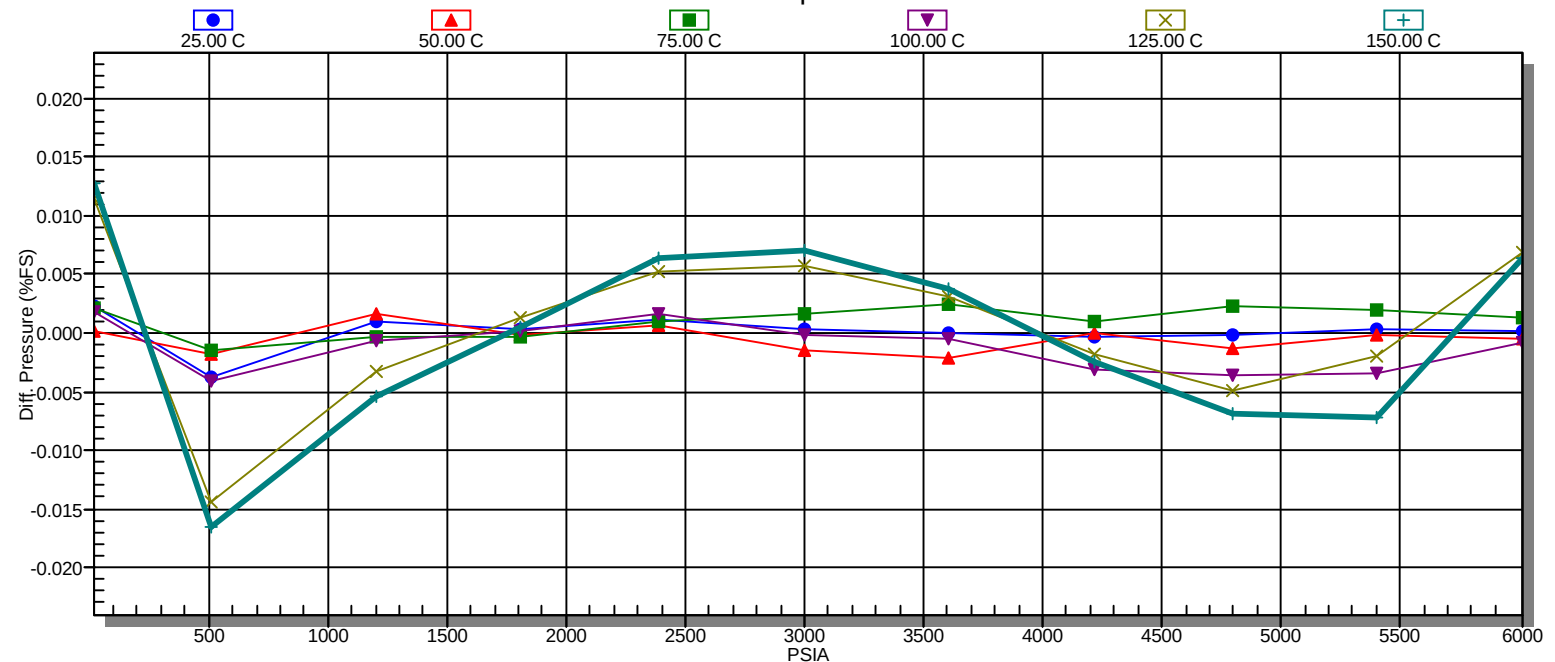
Ramp check result: PASS, Max Err = 0.020% F.S.

DW Pressure	Gauge Pressure	RPM4 Pressure	Differential	%F.S.	Oven Temp.	Gauge Temp.
5501.98	5502.78	5500.70	0.80	0.0134	30.10	30.57
3503.40	3504.24	3502.05	0.84	0.0141	30.20	29.92
2501.32	2502.06	2500.02	0.74	0.0124	30.10	29.77
1503.32	1504.01	1501.96	0.69	0.0115	30.20	29.76
753.27	753.90	751.71	0.63	0.0105	30.20	29.82
397.58	398.13	395.90	0.55	0.0092	30.20	29.89
5501.99	5503.19	5500.72	1.20	0.0200	109.00	109.09
3503.42	3504.60	3502.10	1.18	0.0196	109.20	108.84
2501.33	2502.48	2499.94	1.14	0.0191	109.10	108.85
1503.34	1503.49	1501.87	0.15	0.0026	109.20	108.93
753.29	753.01	751.73	-0.28	0.0046	109.10	109.02
397.59	397.43	395.90	-0.17	0.0028	109.20	109.09



Pressure Gauge Certificate of Calibration

Calibration Report - 76169.



GAUGE NUMBER: 76169

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 710742$

Temp

4

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

0.01

$f_{t0} = 156337$

Pressure Equation:

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

Temperature Compensation:

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

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

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

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

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

0 points eliminated.

Error File: Gauge # 76169

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



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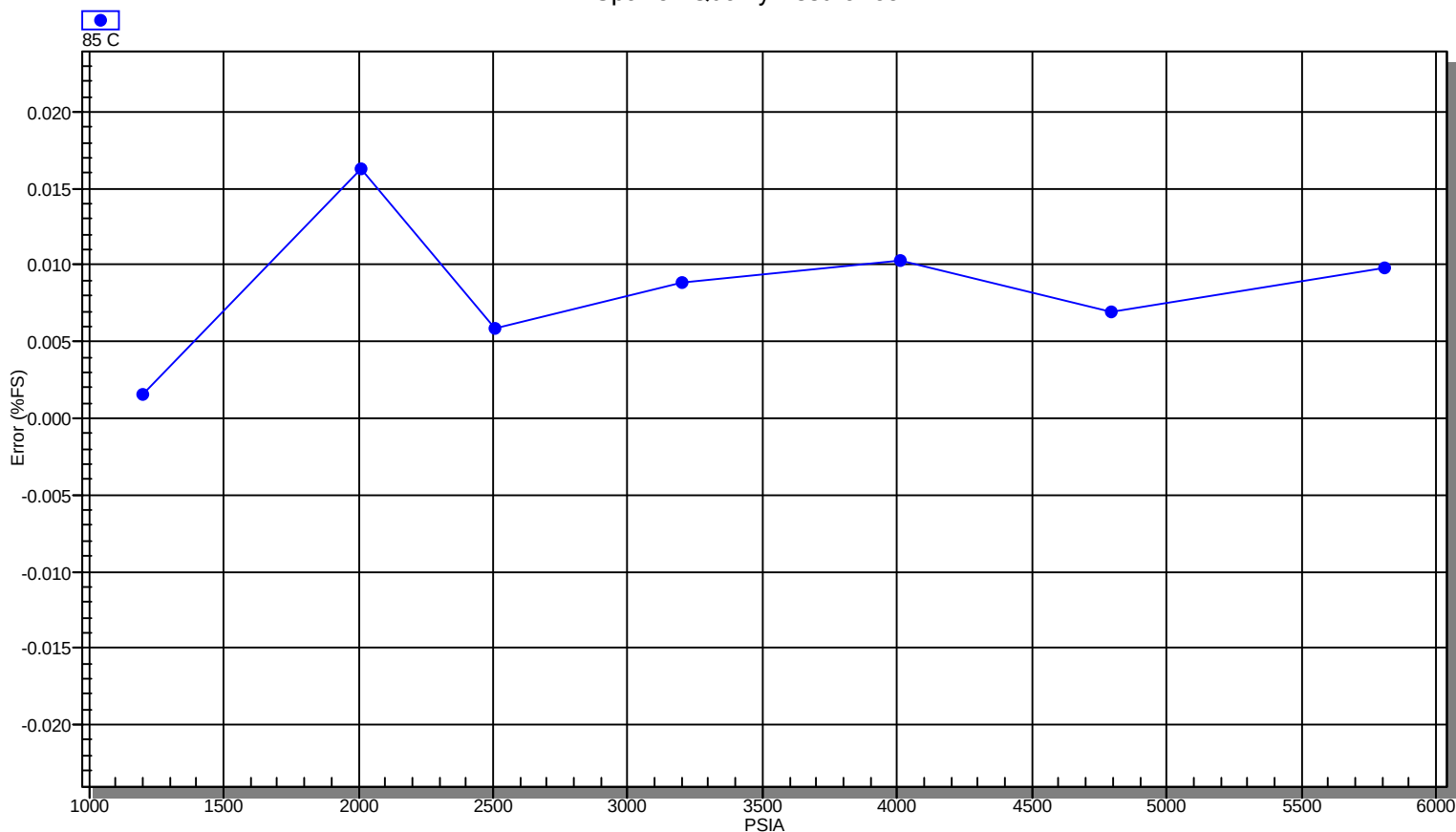
Pressure Gauge Certificate of Conformance

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

ACCURACY

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

Spartek Quality Assurance



Jeff Banno

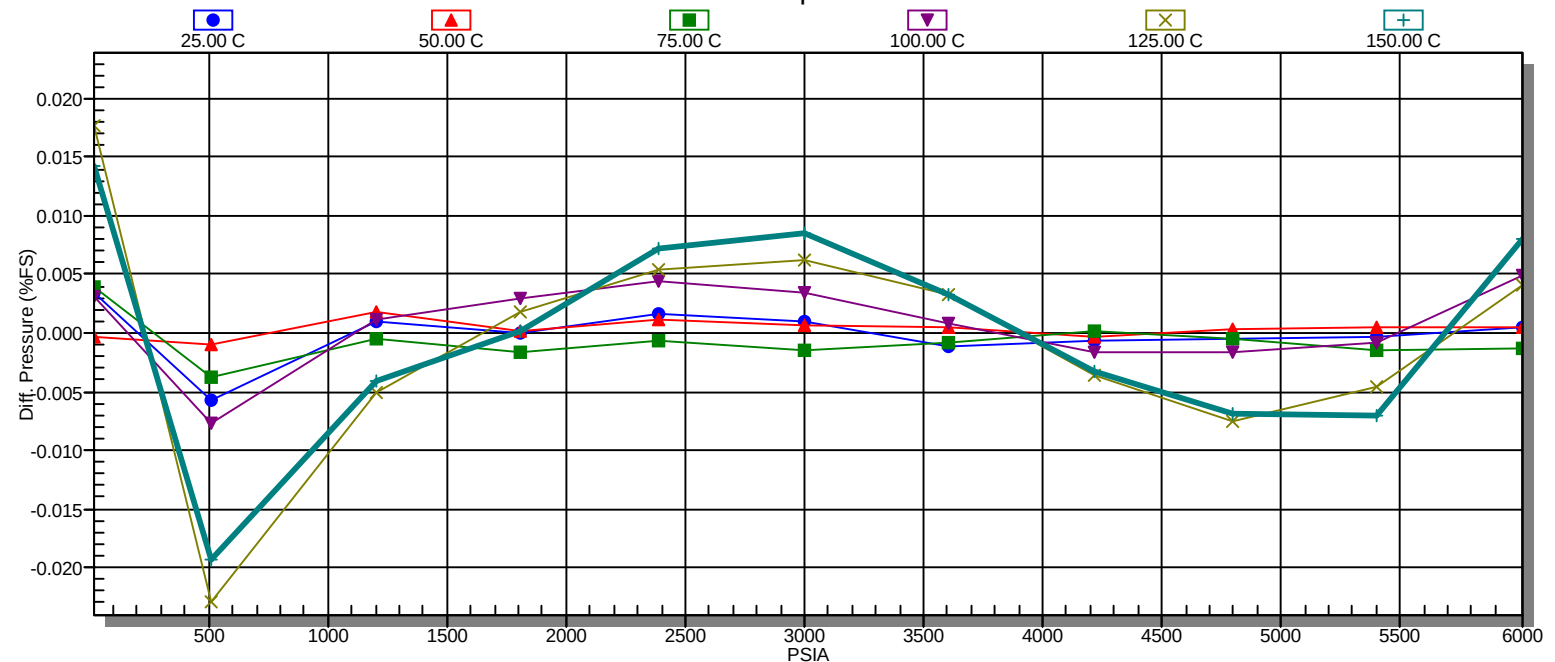
Accepted By: _____

Date: APR 08/13



Pressure Gauge Certificate of Calibration

Calibration Report - 76170.



GAUGE NUMBER: 76170

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 716096$

Temp

4

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

0.01

$f_{t0} = 154918$

Pressure Equation:

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

Temperature Compensation:

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

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

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

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

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

0 points eliminated.

Error File: Gauge # 76170

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



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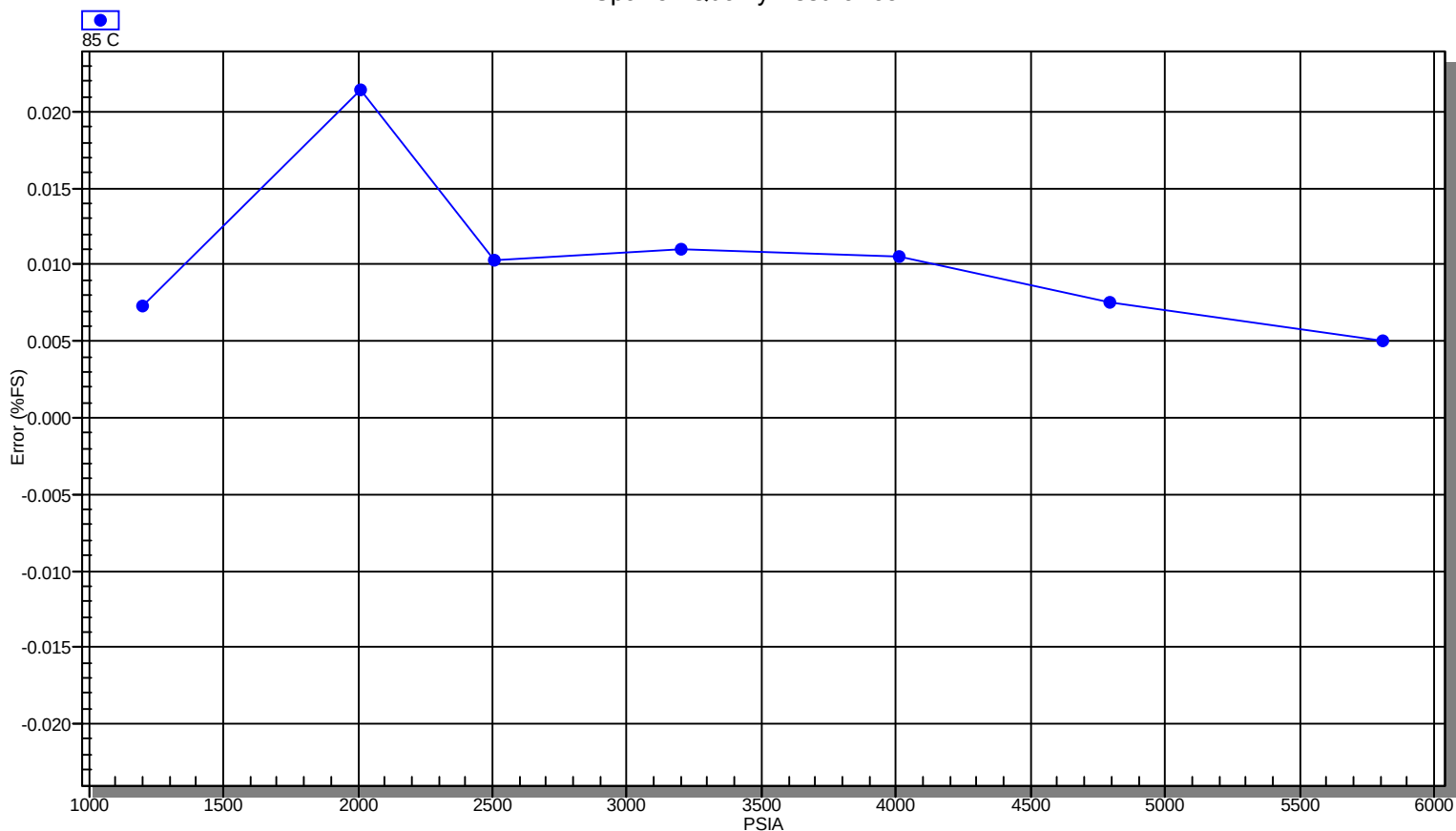
Pressure Gauge Certificate of Conformance

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

ACCURACY

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

Spartek Quality Assurance



Jeff Basso

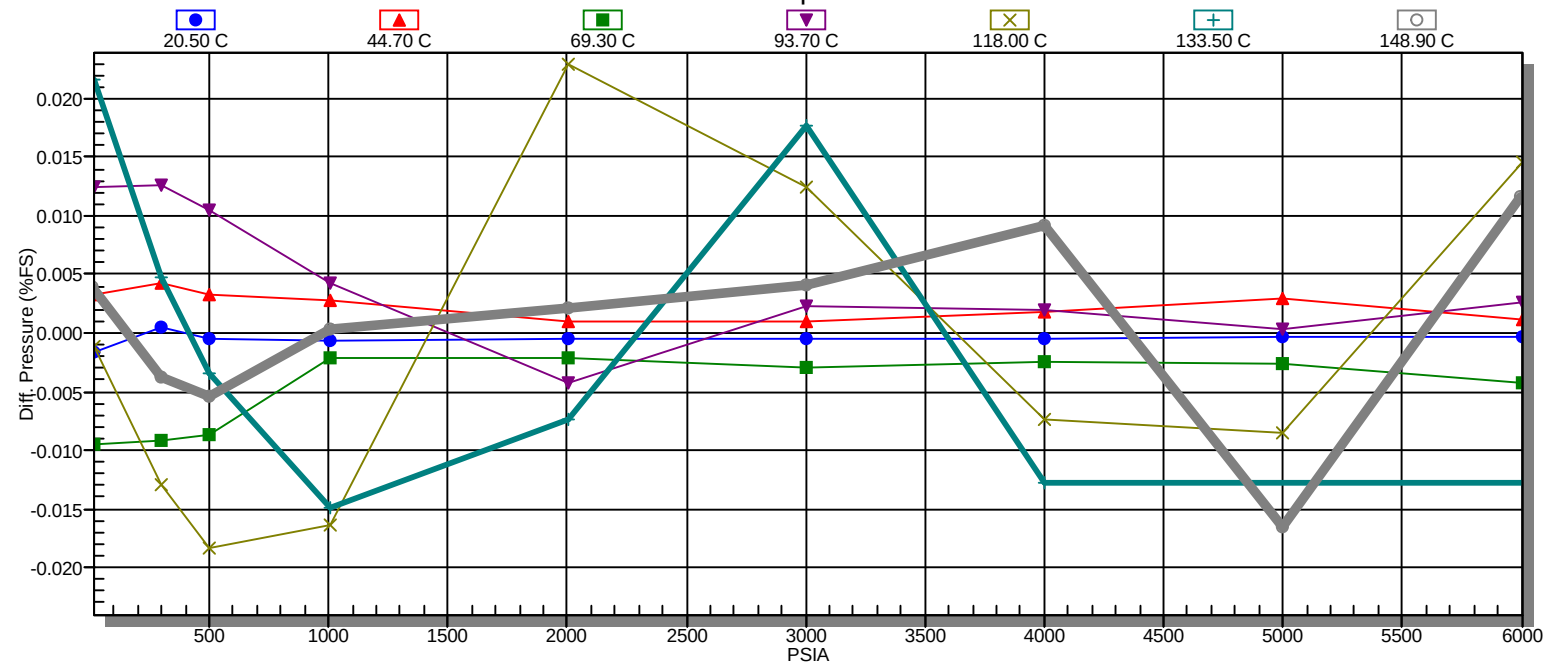
Accepted By: _____

Date: APR 08/13



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



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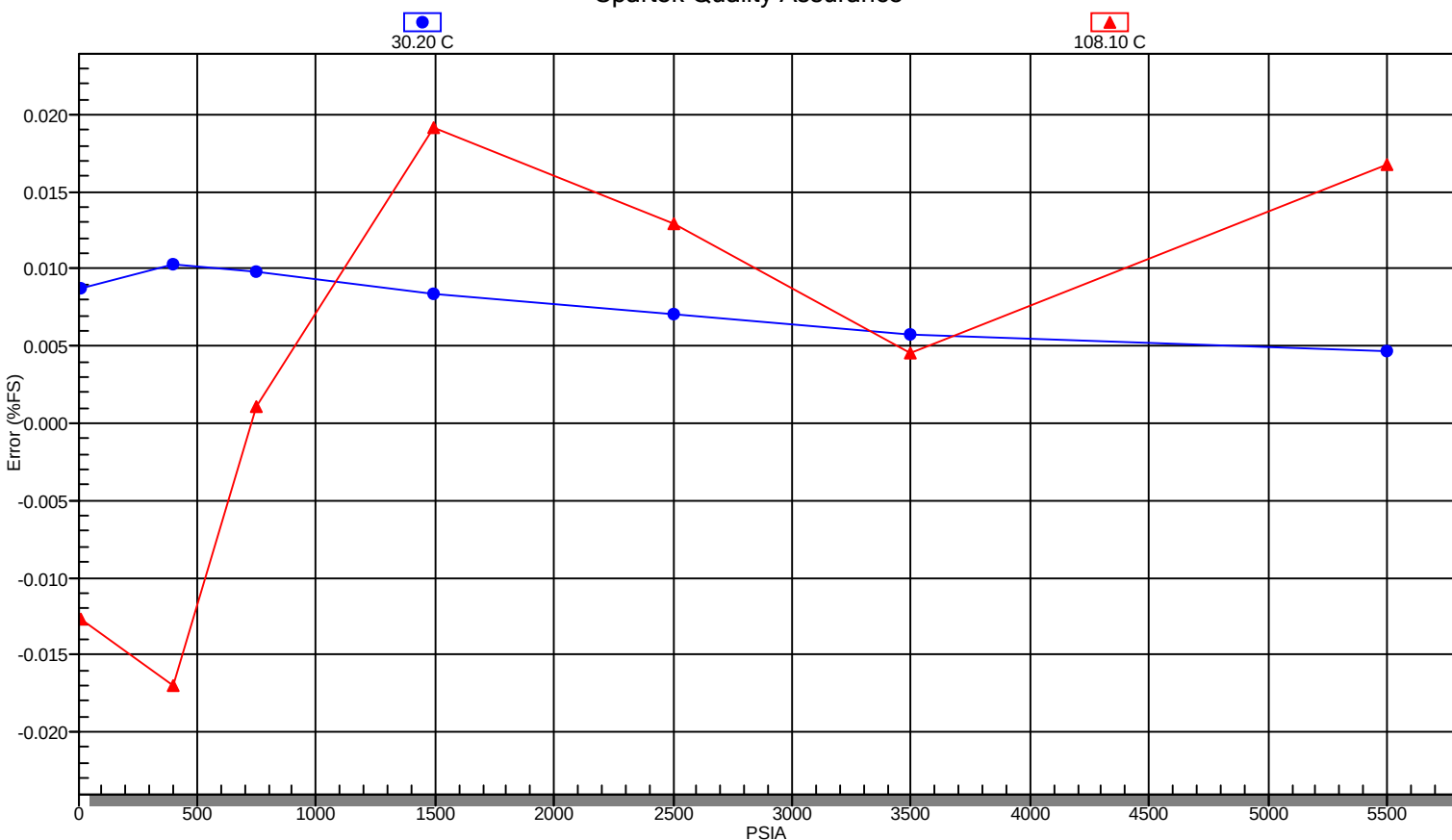
Pressure Gauge Certificate of Conformance

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

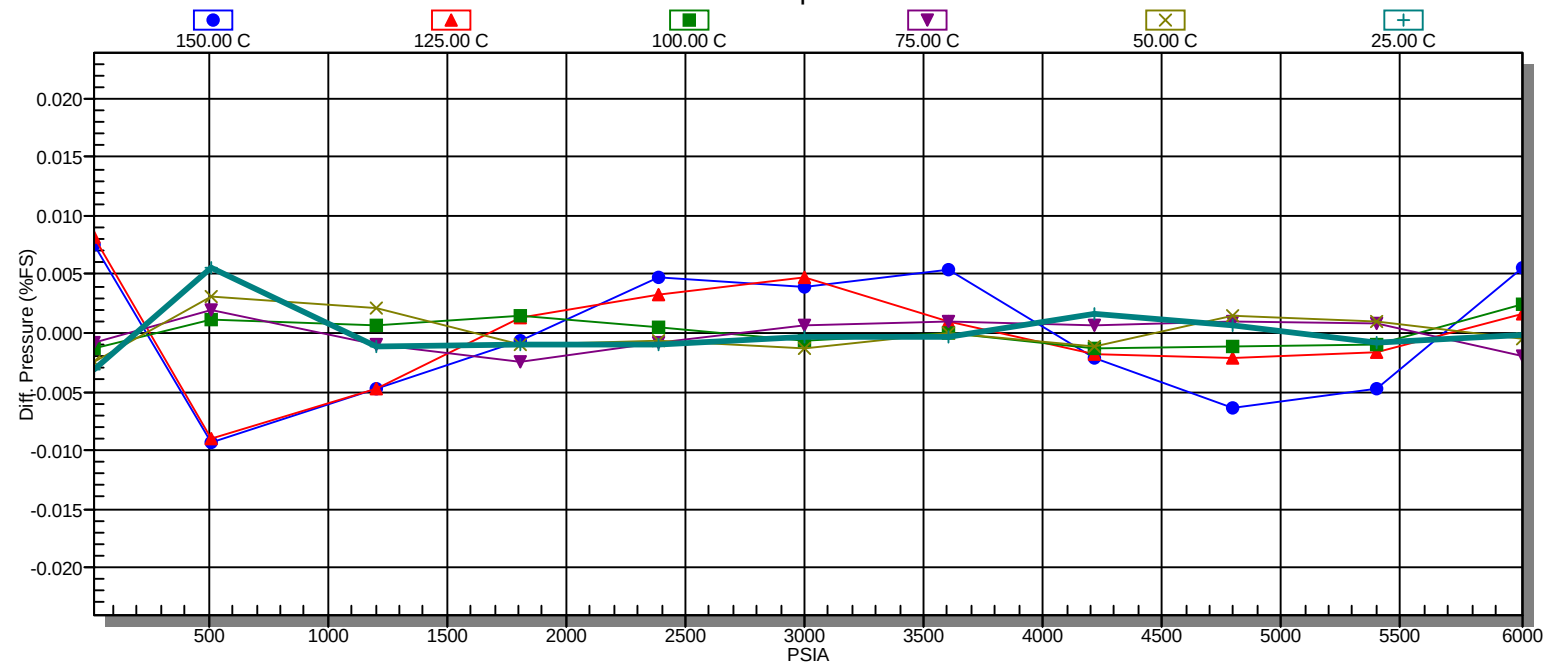
Ramp check result: PASS, Max Err = 0.019% F.S.

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



Pressure Gauge Certificate of Calibration

Calibration Report - 76173.



GAUGE NUMBER: 76173

2-D POLYNOMIAL LMS CURVEFIT

Source of f: Pres

Fit Order: 3

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

m: 0.01

$f_{p0} = 700229$

Temp

4

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

0.01

$f_{t0} = 127024$

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 15.14196823	0.289496676	-0.001775714932	5.341638695E-06	-5.666419815E-09
B 2.905735861	-0.002745795093	4.557738229E-06	-9.234916781E-09	6.858524361E-12
C -2.647349886E-05	3.639182637E-07	-1.8805042E-09	4.306707785E-12	-3.674019485E-15
D 6.227769712E-09	-7.620579987E-11	3.518572067E-13	-6.951310252E-16	4.774776321E-19
Temperature (C) STANDARD FIT COEFFICIENTS				
A 150.2278801				
B -0.4181662077				
C 0.0002482875714				
D -3.153549048E-07				

0 points eliminated.

Error File: Gauge # 76173

Pressure psi	Temperature Deg. C	Count (Pres)	Count (Temp)	DIFF (press) psi
14.70	150.00	700229.31	127024.75	0.45
506.98	150.00	717173.31	127230.75	-0.56
1202.05	150.00	741245.69	127176.25	-0.28
1810.22	150.00	762325.31	127070.00	-0.04
2389.41	150.00	782467.00	127059.50	0.28
2997.56	150.00	803637.31	127055.00	0.24
3605.68	150.00	824834.31	127053.00	0.32
4213.86	150.00	846022.31	127049.25	-0.12
4793.00	150.00	866198.31	127043.50	-0.38
5401.15	150.00	887377.00	127034.00	-0.29
6009.25	150.00	908541.00	127023.25	0.34
14.70	125.00	699781.69	133256.75	0.49
506.98	125.00	717668.31	133397.25	-0.54
1202.05	125.00	743002.31	133309.25	-0.29
1810.22	125.00	765196.00	133285.50	0.08
2389.41	125.00	786344.69	133282.00	0.19
2997.56	125.00	808563.69	133283.50	0.29
3605.68	125.00	830772.69	133282.25	0.06
4213.86	125.00	852979.00	133276.50	-0.11
4793.00	125.00	874118.69	133269.00	-0.13
5401.15	125.00	896295.00	133255.75	-0.10
6009.25	125.00	918446.31	133239.75	0.09
14.70	100.00	699533.00	139835.75	-0.08
506.98	100.00	718394.31	139831.75	0.07
1202.05	100.00	745028.00	139840.75	0.04
1810.22	100.00	768345.31	139850.25	0.09
2389.41	100.00	790552.00	139857.25	0.03
2997.56	100.00	813866.69	139858.25	-0.04
3605.68	100.00	837179.31	139855.50	0.00
4213.86	100.00	860479.69	139848.50	-0.08
4793.00	100.00	882658.31	139839.25	-0.06
5401.15	100.00	905923.69	139822.00	-0.06
6009.25	100.00	929172.69	139802.25	0.14
14.70	75.00	699386.31	146722.25	-0.05
506.98	75.00	719239.31	146782.00	0.12
1202.05	75.00	747247.31	146753.25	-0.06
1810.22	75.00	771761.00	146756.75	-0.15
2389.41	75.00	795113.00	146758.25	-0.05
2997.56	75.00	819626.00	146754.75	0.04
3605.68	75.00	844131.69	146751.75	0.06
4213.86	75.00	868623.00	146740.50	0.04
4793.00	75.00	891934.69	146727.25	0.06
5401.15	75.00	916391.69	146706.50	0.05
6009.25	75.00	940817.69	146681.00	-0.12
14.70	50.00	699200.31	153818.25	-0.15
506.98	50.00	720120.31	153830.75	0.18
1202.05	50.00	749637.69	153836.00	0.13
1810.22	50.00	775459.69	153840.00	-0.05
2389.41	50.00	800057.69	153841.75	-0.04
2997.56	50.00	825876.31	153837.75	-0.07
3605.68	50.00	851689.69	153830.25	0.00
4213.86	50.00	877487.00	153818.00	-0.07
4793.00	50.00	902036.31	153794.75	0.09
5401.15	50.00	927792.31	153770.25	0.05
6009.25	50.00	953512.31	153737.00	-0.03
14.70	25.00	698976.31	160862.75	-0.19
506.98	25.00	721067.31	160849.50	0.33
1202.05	25.00	752213.31	160867.75	-0.07
1810.22	25.00	779484.00	160877.25	-0.06
2389.41	25.00	805453.31	160880.75	-0.06
2997.56	25.00	832712.69	160874.50	-0.02
3605.68	25.00	859953.69	160860.00	-0.02
4213.86	25.00	887186.00	160839.50	0.10
4793.00	25.00	913091.31	160815.25	0.04
5401.15	25.00	940265.00	160782.00	-0.05
6009.25	25.00	967401.00	160737.75	-0.01



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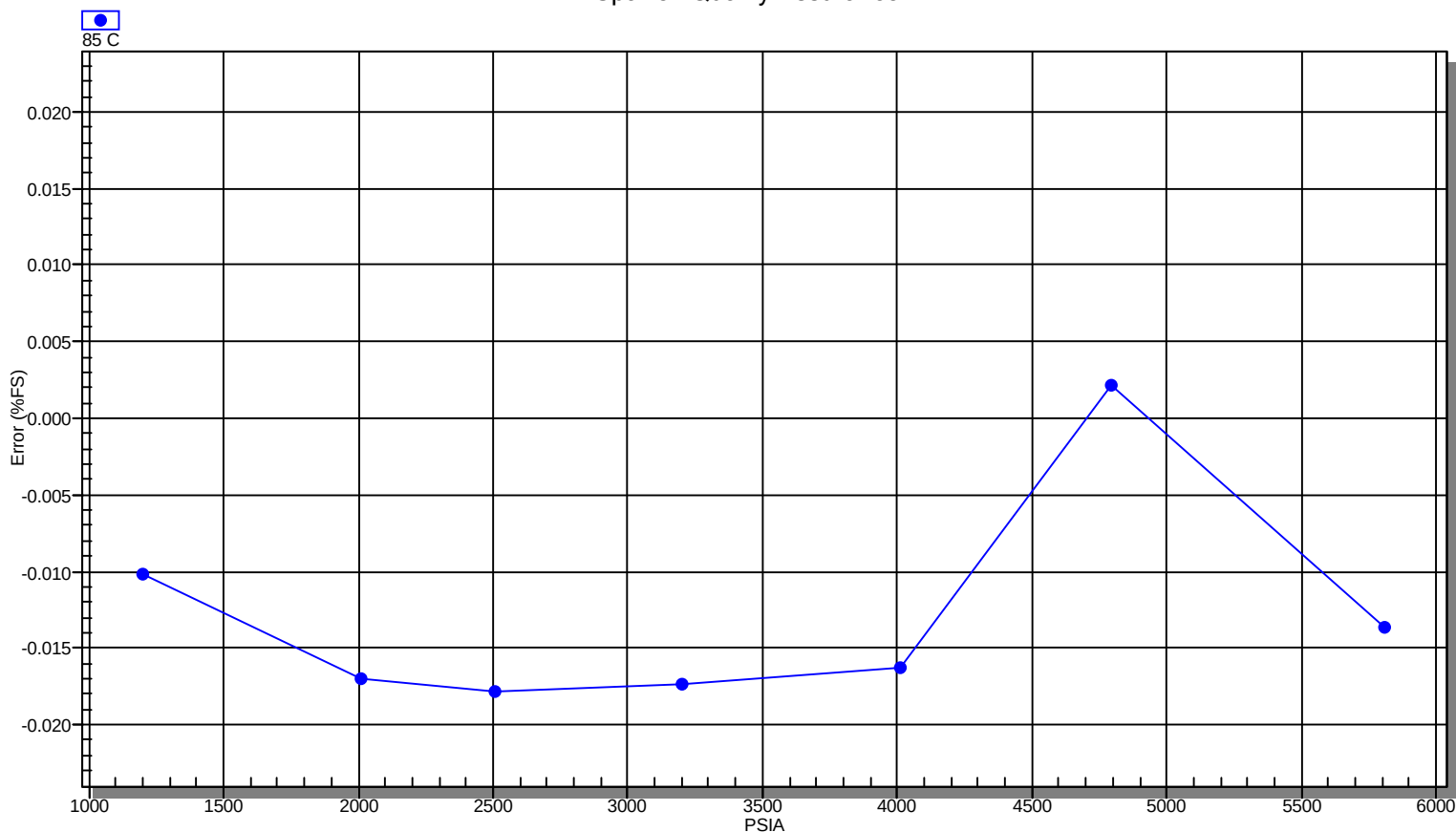
Pressure Gauge Certificate of Conformance

SERIAL NUMBER	76173	CALIBRATION DATE	OCT 29/12
MODEL NUMBER	1139 FF4	PRESSURE REFERENCE	NIST Traceable
PRESSURE RANGE	14.70 - 6009.25 psi	TEMP. REFERENCE	NIST Traceable
TEMP. RANGE	25.00 - 150.00 °C	TRACEABILITY DOC.	CAL-STANDARD-001

ACCURACY

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

Spartek Quality Assurance



Jeff Banas

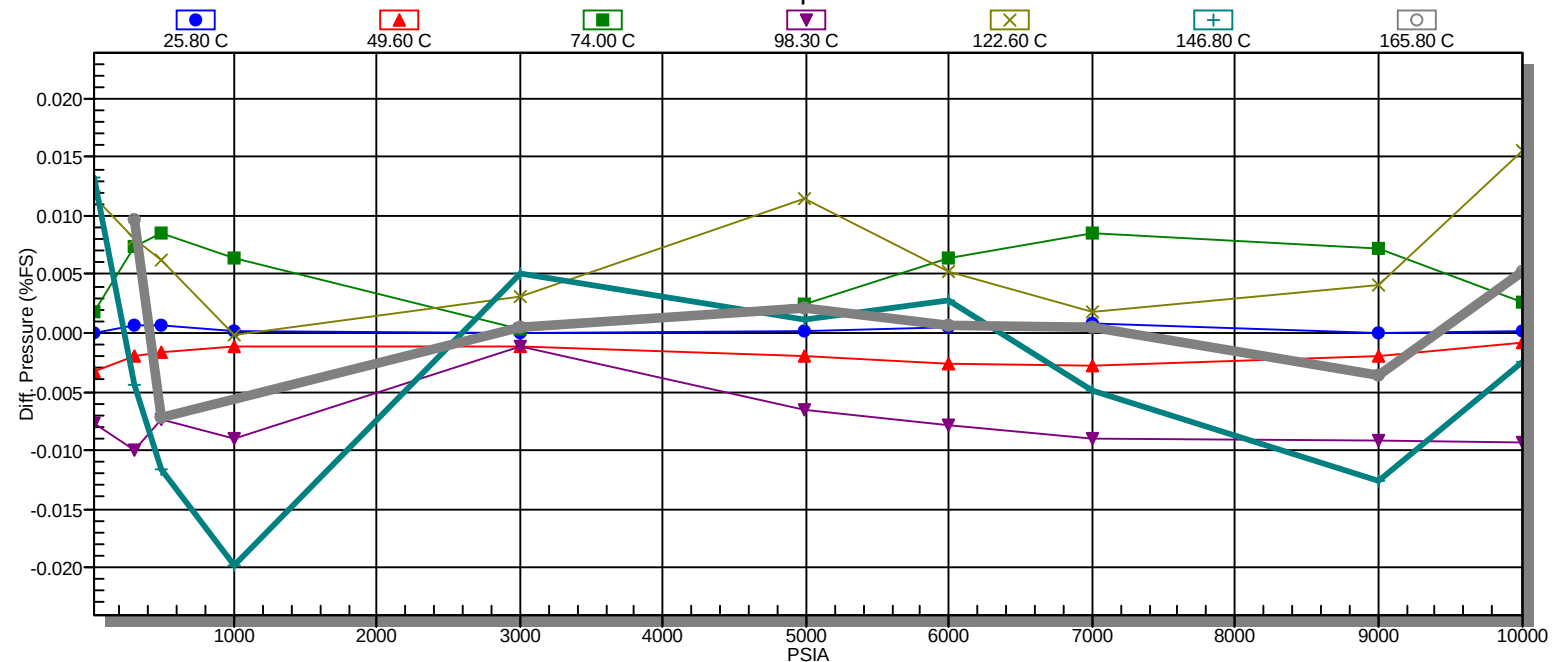
Accepted By: _____

Date: OCT 29/12



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 Compensation:

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

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

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

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

0	1	2	3	4
Pressure (psi) STANDARD FIT COEFFICIENTS:				
A 12.99794347	0.2330350417	0.001448503543	8.059807097E-06	2.546076087E-08
B 3.425793327E-11	2.732094734	-0.002470381242	-2.808599563E-06	-1.357774352E-08
C -9.364561627E-12	7.798827128E-15	-5.296904725E-06	1.130329865E-07	2.416253335E-09
D 1.471188786E-11	3.328730054E-14	2.832889781E-17	1.145768863E-10	-2.228504448E-11
Temperature (C) STANDARD FIT COEFFICIENTS				
A 25.84508201				
B -0.3744317269				
C 1.894632477E-05				
D -1.71314099E-07				

2 points eliminated.

Error File: Gauge # 76404

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



SPARTEK SYSTEMS

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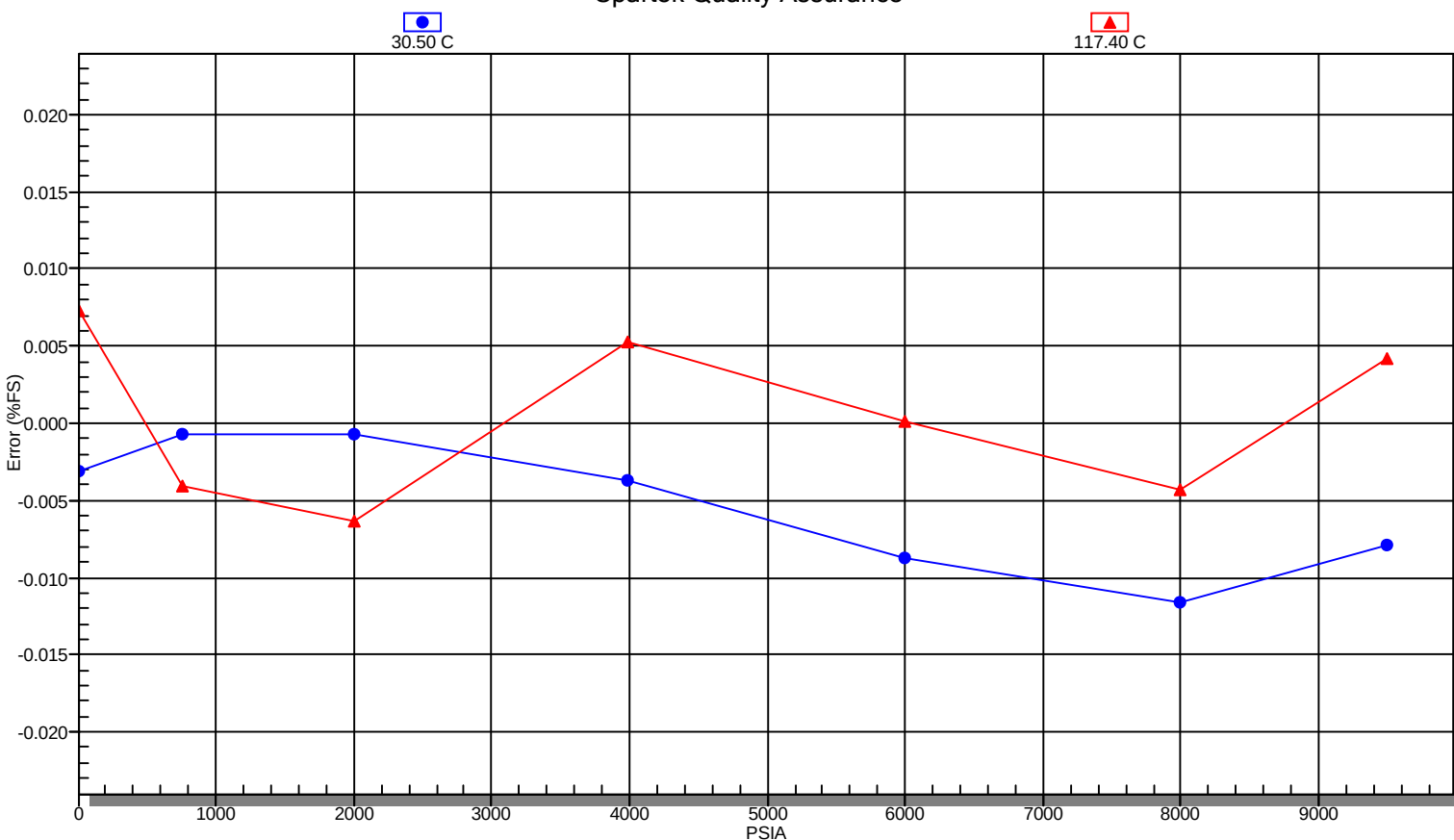
Pressure Gauge Certificate of Conformance

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

ACCURACY

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

Spartek Quality Assurance



Accepted By: _____

Date: JUN 14/11

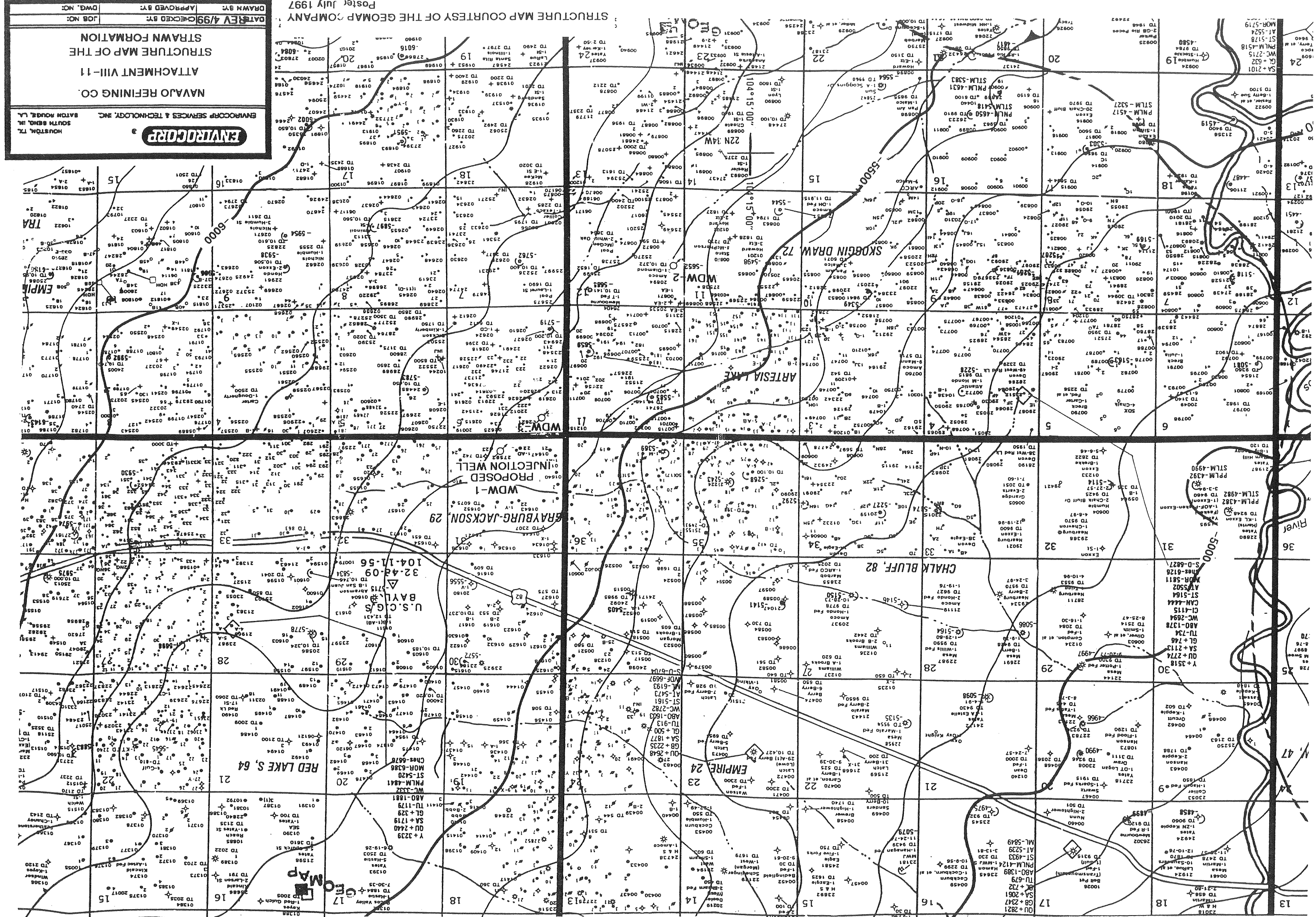
Ramp report: Serial # 76404

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

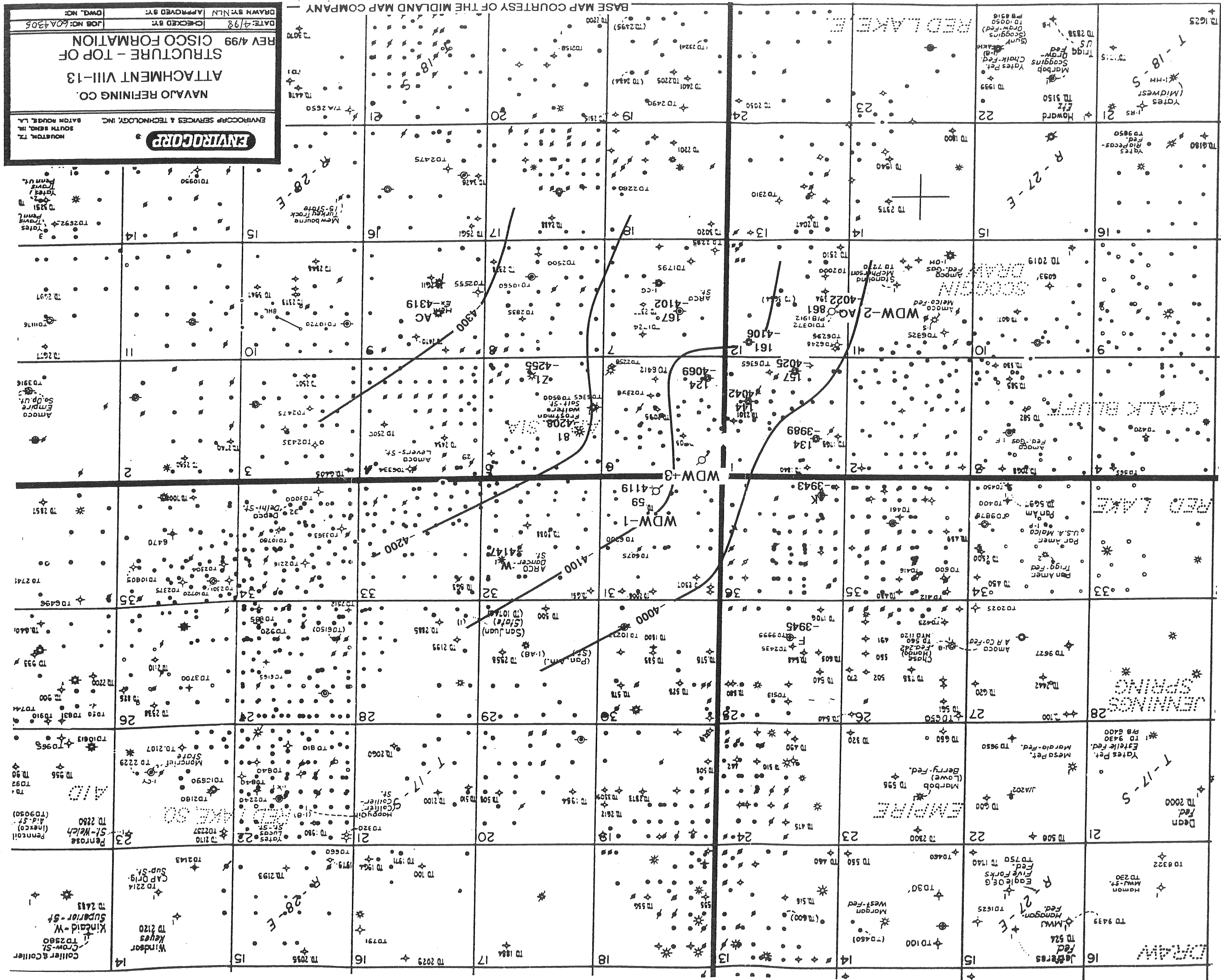
Ramp check result: PASS, Max Err = 0.012% F.S.

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

APPENDIX I



APPENDIX K



157--4025
ID NO. SUBSEA DEPTH

APPENDIX L
CHRONOLOGY OF FIELD ACTIVITIES

June 26, 2014

Traveled to Roswell, NM from Houston, TX.

June 27, 2014

Traveled from Roswell, NM to Navajo Refinery and obtained work permit. Traveled to Chukka WDW-2 location, met with Pro-Well Testing and rig up. Set Gauges at 7570 feet. Traveled to Gaines WDW-3 Location, and rig up. Set gauges at 7660 feet. Traveled to Mewbourne WDW-1 Location, and rig up. Set gauges at 7924 feet. Subsurface personnel confirmed status with Byron Ironmonger and left location. Traveled to Midland, TX. Subsurface personnel traveled from Midland, TX to Houston, TX. Subsurface personnel arrived in Houston and drove to house.

July 1, 2014

Traveled to Roswell, NM from Houston, TX.

July 2, 2014

Traveled from Roswell, NM to Navajo Refinery and obtained work permit. Traveled to Mewbourne WDW-1 location, met with Pro-Well Testing and rig up. Waited on lightening. Tripped out of the well with the bottom-hole pressure tool. Moved to Gaines WDW-3 location. Tripped out of the well with the bottom-hole pressure tool. Moved to Chukka WDW-2 location. Removed BHP tool from WDW-2. Made 5-minute static gradient stops at 7000 feet, 6000 feet, 5000 feet, 4000 feet, 3000 feet, 2000 feet, 1000 feet, and at the surface. Tagged Total Depth at 8773 feet. ProWell Testing rigged down and moved off location. Subsurface personnel confirmed status with Byron Ironmonger and left location. Traveled to Midland, TX. Subsurface personnel arrived in Houston and drove to house.

APPENDIX M

Production Optimization Systems

Report File:

2014 WDW-2.pan

PanSystem Version 3.5

Analysis Date:

8/18/2014

Well Test Analysis Report

Company	Navajo Refining (Holly Corporation)
Location	Artesia, NM
Well	Chukka Well No. 2
Test Date	June 27, 2014 to July 2, 2014
Test Type	Buildup/Falloff Test
Gauge Type/Serial Number	Spartek Systems/75871
Gauge Depth	7570 feet
Injection Interval	7570 feet to 8399 feet
Completion Type	Perforated 2 SPF on 120 deg Phasing
Top of Fill	8773 feet GL
Analyst	TLJ
Subsurface Project No.	185818-7039

Remarks:

Well Test Analysis Report

Reservoir Description

Fluid type : Water

Well orientation : Vertical

Number of wells : 1

Number of layers : 1

Layer Parameters Data

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

Well Parameters Data

	Well 1
Well radius	0.3281 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	0.590 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
-14455.576390	808.430382	-5430.676587
-14431.576390	778.979514	-3933.632937
-14407.576390	591.919794	-3369.416584
-14384.576390	707.891086	-5140.462467
-14360.576390	725.151157	-5227.589203
-14336.576390	781.974942	-5501.468254
-14312.576390	802.107060	-5415.442460
-14288.576390	828.442822	-5445.148810
-14264.576390	842.693576	-5212.400794
-14240.576390	820.037273	-5453.333333
-14216.576390	729.956187	-5339.704365
-14192.576390	732.725465	-5215.490079
-14168.576390	763.651910	-5327.057540
-14144.576390	784.865046	-5349.081349
-14120.576390	814.985417	-5409.585317
-14096.576390	831.701852	-5388.928571
-14072.576390	845.779919	-5399.666667
-14048.576390	846.224306	-5399.676587
-14024.576390	877.442532	-5378.380952
-14000.576390	853.364817	-5332.371032
-13976.576390	879.148090	-5173.309607
-13952.576390	873.823785	-4341.831267
-13928.576390	602.686343	-3322.680556
-13904.576390	578.847974	-3322.285714
-13880.576390	723.195313	-4779.202381
-13856.576390	776.199072	-5307.476190
-13832.576390	726.231889	-5327.704365
-13808.576390	808.044356	-5516.312592
-13784.576390	831.306591	-5397.535714
-13760.576390	848.718692	-5306.890873
-13736.576390	855.739988	-5135.083333
-13712.576390	821.239931	-5138.988013

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-13688.576390	844.449998	-5237.152943
-13664.576390	779.475060	-5082.513806
-13640.576390	789.408157	-5098.738178
-13616.576390	842.452838	-5285.809441
-13592.576390	814.583333	-5175.928571
-13568.576390	816.372222	-5069.142857
-13544.576390	775.156018	-4994.178571
-13520.576390	721.935938	-5488.402778
-13496.576390	705.836458	-4587.789683
-13472.576390	757.796528	-4700.061310
-13448.576390	799.459143	-4950.202381
-13424.576390	788.472625	-4943.823413
-13400.576390	792.055963	-5070.904679
-13376.576390	807.790715	-5098.809524
-13352.576390	822.166553	-4994.071511
-13328.576390	849.621762	-5016.833333
-13304.576390	813.790275	-4908.837219
-13280.576390	750.229167	-4907.666832
-13256.576390	744.990854	-4557.170552
-13232.576390	752.444502	-4779.740079
-13208.576390	818.270144	-4980.642774
-13184.576390	806.564347	-5018.119130
-13160.576390	739.169678	-5122.619048
-13136.576390	725.429514	-5085.285714
-13112.576390	775.415741	-5079.017857
-13088.576390	773.398435	-4777.710317
-13064.576390	767.953185	-5208.708333
-13040.576390	774.530671	-4888.422619
-13016.576390	799.021007	-4779.146825
-12992.576390	802.809259	-4913.414600
-12968.576390	801.915162	-4938.450479
-12944.576390	759.547164	-4963.341270

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-12920.576390	754.385243	-4961.748016
-12896.576390	786.284551	-5037.291667
-12872.576390	792.153065	-5084.619048
-12848.576390	826.305382	-4778.670635
-12824.576390	838.294907	-5036.928571
-12800.576390	806.886697	-4841.934152
-12776.576390	845.256647	-4841.732504
-12752.576390	897.773674	-4999.410714
-12728.576390	809.070773	-5134.727761
-12704.576390	764.474824	-5570.494378
-12680.576390	729.500347	-4837.438492
-12656.576390	773.947859	-5804.293816
-12632.576390	781.569618	-7599.803654
-12608.576390	814.536343	-5055.313327
-12584.576390	858.855556	-5151.029762
-12560.576390	854.529977	-5186.194444
-12536.576390	857.991090	-5198.500000
-12512.576390	843.806537	-5101.666667
-12488.576390	870.928643	-5225.928571
-12464.576390	897.125810	-5168.047536
-12440.576390	900.115859	-5093.756035
-12416.576390	911.963426	-5077.924603
-12392.576390	886.254340	-4988.185929
-12368.576390	905.923782	-4103.714534
-12344.576390	889.118000	-4630.143188
-12320.576390	782.050347	-4265.369130
-12296.576390	754.151736	-4822.158648
-12272.576390	793.192823	-4952.638889
-12248.576390	815.303125	-4504.081349
-12224.576390	813.764699	-5011.595238
-12200.576390	797.172975	-5028.329365
-12176.576390	820.388079	-4996.799603
-12152.576390	841.255382	-5072.666667
-12128.576390	841.887613	-5071.200480
-12104.576390	851.903938	-4951.503968
-12080.576390	817.602083	-5019.295470
-12056.576390	834.791840	-5092.210400
-12032.576390	813.531250	-5114.357060
-12008.576390	829.722627	-5060.365245
-11984.576390	793.478299	-5020.114914
-11960.576390	825.781018	-4975.432622
-11936.576390	850.494039	-5000.948330
-11912.576390	826.960417	-4999.928654
-11888.576390	848.930319	-5041.105241
-11864.576390	904.726859	-5053.198165
-11840.576390	907.843400	-5050.877067
-11816.576390	851.478588	-4982.664434
-11792.576390	863.160298	-4922.711971
-11768.576390	830.633162	-4939.897487

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-11744.576390	828.859549	-5003.238095
-11720.576390	853.478762	-4909.894841
-11696.576390	861.603822	-4984.357143
-11672.576390	788.754196	-4978.239087
-11648.576390	860.200805	-4977.579448
-11624.576390	817.657178	-4949.372933
-11600.576390	835.740509	-4977.394759
-11576.576390	858.449653	-4988.867146
-11552.576390	901.591896	-4996.595238
-11528.576390	951.052028	-5012.640873
-11504.576390	974.623206	-4929.964368
-11480.576390	827.286806	-4938.156663
-11456.576390	841.142650	-4991.775794
-11432.576390	896.419618	-4950.486111
-11408.576390	928.276273	-4913.071429
-11384.576390	839.719505	-4980.607143
-11359.576390	789.419092	-5008.404845
-11335.576390	847.631021	-4996.247933
-11311.576390	844.887671	-4923.952381
-11287.576390	854.778070	-4901.404762
-11263.576390	914.918866	-4989.537698
-11239.576390	902.019097	-4908.642857
-11215.576390	911.681132	-4982.129051
-11191.576390	836.339238	-4913.509921
-11167.576390	852.292361	-4887.989914
-11143.576390	833.429861	-4827.883184
-11119.576390	803.296123	-4872.876736
-11095.576390	871.748322	-4827.580440
-11071.576390	856.652662	-4878.651951
-11047.576390	833.891667	-4689.047536
-11023.576390	743.860532	-4643.303737
-10999.576390	762.094155	-4245.560185
-10975.576390	782.241435	-4121.112434
-10951.576390	862.956771	-3832.408565
-10927.576390	904.865104	-4231.450149
-10903.576390	915.054803	-4778.682044
-10879.576390	909.021991	-5031.499339
-10855.576390	901.292245	-4664.699983
-10831.576390	896.259317	-4915.145833
-10807.576390	780.942940	-4662.218502
-10783.576390	775.027544	-5099.156994
-10759.576390	819.562734	-4948.852596
-10735.576390	862.392014	-5131.516038
-10711.576390	876.811458	-4373.591849
-10687.576390	908.724016	-5110.946181
-10663.576390	897.416840	-4946.686673
-10639.576390	829.851854	-4939.937335
-10615.576390	746.310993	-4969.144593
-10591.576390	657.580150	-4761.303241

Well Test Analysis Report

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-10567.576390	866.701794	-4665.848049
-10543.576390	888.878241	-4873.667411
-10519.576390	883.009028	-4707.885251
-10495.576390	890.953935	-4983.476273
-10471.576390	889.826042	-4960.666584
-10447.576390	890.624711	-4964.071511
-10423.576390	891.582118	-4936.489997
-10399.576390	893.553759	-4944.914765
-10375.576390	895.070431	-4959.972140
-10351.576390	889.474826	-4935.738013
-10327.576390	892.606944	-4952.373347
-10303.576390	891.724421	-4949.576389
-10279.576390	888.651910	-4879.186905
-10255.576390	887.223206	-4912.798032
-10231.576390	888.198322	-4871.509838
-10207.576390	887.851389	-4839.635003
-10183.576390	889.377662	-4557.413277
-10159.576390	894.948785	-4536.769593
-10135.576390	898.991493	-4934.751984
-10111.576390	897.848611	-4918.990162
-10087.576390	901.221125	-4927.706349
-10063.576390	902.739755	-4956.317212
-10039.576390	888.641262	-4551.749752
-10015.576390	897.184954	-4892.522239
-9991.576389	899.265741	-4901.500000
-9967.576389	908.639757	-4945.894759
-9943.576389	896.389586	-4850.535962
-9919.576389	912.435877	-5009.630126
-9895.576389	915.389873	-4875.445437
-9871.576389	907.464942	-4422.937269
-9847.576389	909.211687	-4720.564897
-9823.576389	908.822688	-4354.680638
-9799.576389	914.766956	-4956.777480
-9775.576389	909.964988	-4770.896412
-9751.576389	908.908333	-4355.379481
-9727.576389	912.678356	-4901.908234
-9703.576389	917.568229	-4900.809111
-9679.576389	920.011401	-4899.042774
-9655.576389	915.291088	-4548.634838
-9631.576389	912.950579	-4740.933284
-9607.576389	917.023933	-4802.788955
-9583.576389	906.225986	-4792.549438
-9559.576389	907.497301	-4815.804150
-9535.576389	896.320720	-4711.459987
-9511.576389	902.434144	-4639.015377
-9487.576389	897.930266	-4677.722636
-9463.576389	899.241956	-4684.074074
-9439.576389	909.740104	-4724.307738
-9415.576389	895.905266	-4411.317874

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-9391.576389	902.892072	-4895.582755
-9367.576389	900.390550	-5221.894941
-9343.576389	889.444207	-5104.828174
-9319.576389	903.363021	-5231.156333
-9295.576389	903.644155	-6137.345321
-9271.576389	895.074580	-7069.309317
-9247.576389	901.792231	-6879.958542
-9223.576389	898.298264	-6276.403770
-9199.576389	904.128067	-5698.252563
-9175.576389	908.937498	-6301.309524
-9151.576389	913.262155	-7093.779348
-9127.576389	907.237566	-7565.241997
-9103.576389	908.154914	-8106.774058
-9079.576389	903.026432	-8626.487996
-9055.576389	908.451389	-6430.000166
-9031.576389	917.757870	-6837.513972
-9007.576389	907.583449	-8913.465856
-8983.576389	904.796528	-9058.406829
-8959.576389	894.916609	-9736.739170
-8935.576389	845.682984	-5266.314319
-8911.576389	902.918868	-4682.398810
-8887.576389	884.734190	-4553.720833
-8863.576389	891.172280	-4604.861028
-8839.576389	889.994849	-4591.208416
-8815.576389	918.763484	-4775.698413
-8791.576389	927.969558	-4834.337219
-8767.576389	890.525118	-4578.972305
-8743.576389	891.808912	-4575.105159
-8719.576389	915.538368	-4732.936508
-8695.576389	912.042535	-4716.718254
-8671.576389	922.863067	-4763.401984
-8647.576389	1047.924363	-4646.908730
-8623.576389	984.697914	-4504.527778
-8599.576389	968.219563	-4546.879051
-8575.576389	982.469676	-4602.859044
-8551.576389	955.991734	-4566.521825
-8527.576389	916.351900	-4287.418651
-8503.576389	908.128009	-4263.767857
-8479.576389	904.348493	-4235.557540
-8455.576389	894.315107	-4182.117063
-8431.576389	895.797340	-4231.194444
-8407.576389	931.972278	-4417.934524
-8383.576389	966.192766	-4682.180473
-8359.576389	964.234022	-4673.043831
-8335.576389	975.510003	-4713.681335
-8311.576389	970.470315	-4718.724124
-8287.576389	962.077079	-4605.809524
-8263.576389	924.035334	-4340.422619
-8239.576389	1021.179039	-4774.259921

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Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-8215.576389	1051.810947	-4730.970238
-8191.576389	957.766435	-4163.577381
-8167.576389	927.906076	-3985.682622
-8143.576389	1031.153547	-4508.823330
-8119.576389	1020.452934	-4561.547536
-8095.576389	957.585712	-4461.460119
-8071.576389	905.516843	-4013.543651
-8047.576389	976.595722	-4124.787781
-8023.576389	936.626100	-3753.565476
-7999.576389	951.547160	-3735.746032
-7975.576389	1010.947454	-3965.301505
-7951.576389	1045.881250	-4159.017940
-7927.576389	1062.902083	-4630.821429
-7903.576389	1061.165319	-4636.702298
-7879.576389	1062.031718	-4550.936591
-7855.576389	1061.830047	-4657.156746
-7831.576389	1040.593622	-4582.623016
-7807.576389	1040.491734	-4580.738013
-7783.576389	1034.753115	-4611.573495
-7759.576389	1002.952269	-4415.359127
-7735.576389	1029.594324	-4440.071429
-7711.576389	1039.067190	-4495.142857
-7687.576389	993.495375	-4396.523810
-7663.576389	1007.263710	-4503.690559
-7639.576389	977.944097	-4413.053489
-7615.576389	1002.204282	-4576.466270
-7591.576389	1004.000521	-4604.119048
-7567.576389	1008.585477	-4602.660549
-7543.576389	1007.809722	-4616.244213
-7519.576389	1015.545544	-4653.948413
-7495.576389	1030.833102	-4671.738095
-7471.576389	1053.608690	-4644.808218
-7447.576389	1054.555211	-4650.982854
-7423.576389	1043.234257	-4609.958416
-7399.576389	1034.554920	-4568.123727
-7375.576389	1006.181303	-4595.829365
-7351.576389	1012.243803	-4625.875496
-7327.576389	1042.255442	-4532.977844
-7303.576389	1025.642477	-4543.817295
-7279.576389	1023.652894	-4605.670635
-7255.576389	1007.301487	-4583.878373
-7231.576389	1012.404456	-4582.722139
-7207.576389	1016.098264	-4553.037781
-7183.576389	1024.700868	-4579.841187
-7159.576389	1011.162445	-4559.849206
-7135.576389	1008.951736	-4545.002067
-7111.576389	1015.592361	-4598.859375
-7087.576389	1015.502257	-4577.372685
-7063.576389	995.707639	-4387.262070

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-7039.576389	1011.219095	-4417.746693
-7015.576389	1011.684380	-4417.658069
-6991.576389	1040.758157	-4580.105407
-6967.576389	996.835790	-4465.787285
-6943.576389	1017.804111	-4059.031829
-6919.576389	1008.595756	-4020.490741
-6895.576389	1010.048399	-4178.564401
-6871.576389	1003.399766	-4385.760747
-6847.576389	1006.184727	-4601.820767
-6823.576389	1002.588655	-4719.784888
-6799.576389	1007.027198	-4261.982622
-6775.576389	986.865856	-4163.239997
-6751.576389	985.405558	-4776.540923
-6727.576389	979.376449	-4804.464120
-6703.576389	982.195310	-4748.182953
-6679.576389	979.698433	-5546.393849
-6655.576389	969.430963	-5492.920222
-6631.576389	968.170023	-5927.894593
-6607.576389	979.322509	-4806.416749
-6583.576389	976.597456	-4430.613343
-6559.576389	969.410419	-5253.345569
-6535.576389	968.592298	-5272.608052
-6511.576389	961.246704	-6319.632854
-6487.576389	957.622049	-5814.424024
-6463.576389	969.470949	-6273.225777
-6439.576389	890.534777	-1785.889633
-6415.576389	949.503937	0.000000
-6391.576389	999.444568	-4338.214286
-6367.576389	964.023900	-6621.501158
-6343.576389	949.840509	-6849.344494
-6319.576389	951.962847	-6543.069279
-6295.576389	949.086863	-7204.853472
-6271.576389	944.611053	-7004.082589
-6247.576389	948.199014	-7137.602431
-6223.576389	943.090049	-6538.766369
-6199.576389	931.832639	-7270.020751
-6175.576389	931.292824	-5772.339947
-6151.576389	932.151505	-5726.836971
-6127.576389	936.546991	-5622.124752
-6103.576389	953.353241	-7580.293320
-6079.576389	938.345775	-5753.767559
-6055.576389	937.729051	-6055.895784
-6031.576389	938.765683	-6881.154679
-6007.576389	938.387384	-6786.495370
-5983.576389	896.135069	-7486.774306
-5959.576389	824.680672	-6544.323918
-5935.576389	844.949421	-7478.741071
-5911.576389	915.046875	-7599.983218
-5887.576389	977.778701	-6238.350694

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Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-5863.576389	708.568866	-5277.343750
-5839.576389	1000.000000	-3803.789683
-5815.576389	1000.000000	-4140.535714
-5791.576389	1000.000000	-4036.873099
-5767.576389	1000.000000	-3613.275000
-5743.576389	942.913067	-3749.250513
-5719.576389	957.103108	-4297.826637
-5695.576389	1016.032019	-4963.784474
-5671.576389	1150.009722	-5610.964286
-5648.576389	1150.029861	-5617.357143
-5624.576389	1137.273611	-5537.498016
-5600.576389	1022.192824	-4769.402778
-5576.576389	822.290799	-3430.648413
-5552.576389	820.298322	-3436.113095
-5528.576389	766.969850	-3414.892857
-5504.576389	924.470660	-4167.101190
-5480.576389	1080.811632	-5211.496032
-5456.576389	1130.663669	-5498.186624
-5432.576389	1119.150058	-5392.545718
-5408.576389	1117.767014	-5387.621114
-5384.576389	1105.727546	-5305.676505
-5360.576389	1115.850637	-5346.918651
-5336.576389	999.883099	-4601.621032
-5312.576389	938.587444	-4130.158730
-5288.576389	1045.717135	-4817.677464
-5264.576389	1154.207002	-5563.067378
-5240.576389	1175.516901	-5702.877067
-5216.576389	1165.450518	-5619.929084
-5192.576389	1146.370313	-5460.051670
-5168.576389	1131.310648	-5355.021743
-5144.576389	1142.773785	-5416.081349
-5120.576389	1145.258333	-5435.724206
-5096.576389	1128.710706	-5329.587302
-5072.576389	1189.732178	-5715.659408
-5048.576389	1103.405285	-5141.591981
-5024.576389	1168.624308	-5568.214286
-5000.576389	1182.002201	-5644.876984
-4976.576389	1144.714002	-5411.767774
-4952.576389	1104.775463	-5142.819610
-4928.576389	1119.624844	-5230.911028
-4904.576389	1105.040162	-5149.517774
-4880.576389	1128.082870	-5248.349289
-4856.576389	1119.222222	-5196.357060
-4832.576389	1105.467535	-2502.014368
-4808.576389	1172.776039	-4760.722139
-4784.576389	1177.643810	-5469.660714
-4760.576389	1136.830926	-5210.367940
-4736.576389	1119.195949	-5066.186508
-4712.576389	1173.422222	-5453.119048

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-4688.576389	1179.258333	-5508.271825
-4664.576389	1169.656549	-5439.945354
-4640.576389	1176.228868	-5471.092345
-4616.576389	1186.268056	-5542.595238
-4592.576389	1108.106869	-5032.957655
-4568.576389	1089.696736	-4923.681035
-4544.576389	1098.383567	-4985.789683
-4520.576389	1130.940217	-5197.835317
-4496.576389	1094.486400	-4967.255952
-4472.576389	1087.683565	-4868.678571
-4448.576389	1095.559491	-4928.527778
-4424.576389	1099.624132	-4955.105076
-4400.576389	1123.740353	-5115.746429
-4376.576389	1104.823611	-4979.265559
-4352.576389	1130.567650	-5119.672536
-4328.576389	1131.256366	-5114.404845
-4304.576389	1131.176968	-5102.605076
-4280.576389	1140.870081	-5162.563294
-4256.576389	1130.449811	-5088.635995
-4232.576389	1116.918863	-4999.186425
-4208.576389	1125.295388	-5049.832903
-4184.576389	1137.381021	-5133.460235
-4160.576389	1106.333910	-4923.956266
-4136.576389	1125.112211	-4996.730324
-4112.576389	1104.777604	-4846.995949
-4088.576389	1125.317014	-4963.718254
-4064.576389	1112.028880	-4884.869048
-4040.576389	1131.207310	-4989.874008
-4016.576389	1147.495894	-5094.194362
-3992.576389	1193.847338	-5417.142857
-3968.576389	1193.953356	-5415.976273
-3944.576389	1182.015093	-5334.636905
-3920.576389	1210.125113	-5524.791584
-3896.576389	1194.210980	-5423.316154
-3872.576389	1185.545793	-5362.799917
-3848.576389	1196.013079	-5424.125000
-3824.576389	1189.974306	-5368.966270
-3800.576389	1087.858599	-4543.873102
-3776.576389	1180.367711	-5248.079848
-3752.576389	1196.565972	-5435.119048
-3728.576389	1185.217361	-5338.823413
-3704.576389	1181.456935	-5285.636905
-3680.576389	1190.182636	-5355.886905
-3656.576389	1181.041667	-5310.809441
-3632.576389	1193.084028	-5401.295718
-3608.576389	1161.779167	-5134.935036
-3584.576389	1189.328819	-5313.690642
-3560.576389	1194.160041	-5341.989997
-3536.576389	1186.515278	-5297.295833

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Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-3512.576389	1187.368750	-5320.462302
-3488.576389	1203.165972	-5421.966270
-3464.576389	1186.264178	-5263.166749
-3440.576389	1183.083131	-5232.583085
-3416.576389	1171.097425	-5165.811591
-3392.576389	1192.135851	-5289.866353
-3368.576389	1212.105758	-5436.886706
-3344.576389	1220.227778	-5479.476108
-3320.576389	1218.045833	-5469.785797
-3296.576389	1185.597627	-5255.307457
-3272.576389	1203.603762	-5331.801587
-3248.576389	1193.167359	-5256.512583
-3224.576389	1203.402088	-5337.390873
-3200.576389	1210.528036	-5400.636310
-3176.576389	1225.026389	-5478.609210
-3152.576389	1217.690972	-5424.404762
-3128.576389	1198.897338	-5225.309358
-3104.576389	1207.785706	-5141.254960
-3080.576389	1202.374601	-4505.108019
-3056.576389	1199.787500	-4717.990079
-3032.576389	1220.329630	-5264.216270
-3008.576389	1218.935764	-5242.309524
-2984.576389	1209.790856	-5189.988095
-2960.576389	1200.649306	-5127.857143
-2936.576389	1209.507815	-5175.035714
-2912.576389	1209.512295	-5163.534921
-2888.576389	1123.148266	-4577.814765
-2864.576389	1214.538771	-5203.666584
-2840.576389	1215.825345	-5239.420635
-2816.576389	1186.725986	-5043.142857
-2792.576389	1180.508507	-4958.952464
-2768.576389	1187.062506	-4989.478290
-2744.576389	1183.255035	-5006.074405
-2720.576389	1200.216366	-5128.466667
-2696.576389	1197.851794	-5100.007937
-2672.576389	1215.509317	-4771.226190
-2648.576389	1222.500752	-4776.295718
-2623.576389	1211.286053	-5139.769759
-2599.576389	1201.335394	-5086.098413
-2575.576389	1225.043750	-5236.438575
-2551.576389	1081.601973	-4289.115112
-2527.576389	1197.811111	-5047.666667
-2503.576389	1203.430556	-5093.749967
-2479.576389	1220.661111	-5197.585235
-2455.576389	1222.006944	-5193.738095
-2431.576389	1227.587025	-5239.964765
-2407.576389	1249.155843	-5407.456184
-2383.576389	1236.875408	-5311.079646
-2359.576389	1245.350000	-5387.261905

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-2335.576389	1243.649306	-5365.438575
-2311.576389	1222.165683	-5092.642278
-2287.576389	1217.365914	-4934.306465
-2263.576389	1207.403819	-4210.699322
-2239.576389	1219.997170	-4758.889831
-2215.576389	1225.014583	-4868.144841
-2191.576389	1200.994329	-4501.138806
-2167.576389	1182.307231	-4617.535466
-2143.576389	1167.356310	-4464.436425
-2119.576389	1176.909606	-4530.266204
-2095.576389	1150.040160	-5359.785714
-2071.576389	1093.835245	-6854.889881
-2047.576389	1136.377778	-6567.554745
-2023.576389	1134.032870	-6037.160218
-1999.576389	1159.049190	-7006.873925
-1975.576389	1172.420602	-8239.023810
-1951.576389	1179.103009	-8688.960235
-1927.576389	1176.233481	-8152.428042
-1903.576389	1193.482236	-7947.700727
-1879.576389	1181.884722	-8651.037781
-1855.576389	1180.308044	-9707.952381
-1831.576389	1165.741609	-9108.814319
-1807.576389	1176.987037	-8816.729415
-1783.576389	1195.904630	-4828.327960
-1759.576389	1195.091319	-5984.527282
-1735.576389	1200.238252	-7794.624835
-1711.576389	1205.192998	-8517.181052
-1687.576389	1205.975289	-9407.926091
-1663.576389	1206.766956	-8663.964286
-1639.576389	1209.291840	-9737.976190
-1615.576389	1221.589468	-1.1734e4
-1591.576389	1225.084028	-1.0893e4
-1567.576389	1219.450341	-9953.237302
-1543.576389	1221.283241	-6771.594444
-1519.576389	1210.948900	-3848.585235
-1495.576389	1226.625752	-3988.317460
-1471.576389	1203.236458	-3795.549686
-1447.576389	1225.011806	-3957.132937
-1423.576389	1222.173611	-3928.119048
-1399.576389	1208.411291	-3802.783929
-1375.576389	1201.922396	-3753.326587
-1351.576389	1217.675463	-3886.031746
-1327.576389	1200.272859	-3741.452464
-1303.576389	1181.067016	-3591.218171
-1279.576389	1184.383678	-3594.164765
-1255.576389	1180.039630	-3568.475116
-1231.576389	1160.365278	-3394.129051
-1207.576389	1149.996528	-3307.753886
-1183.576389	1137.330556	-3180.884838

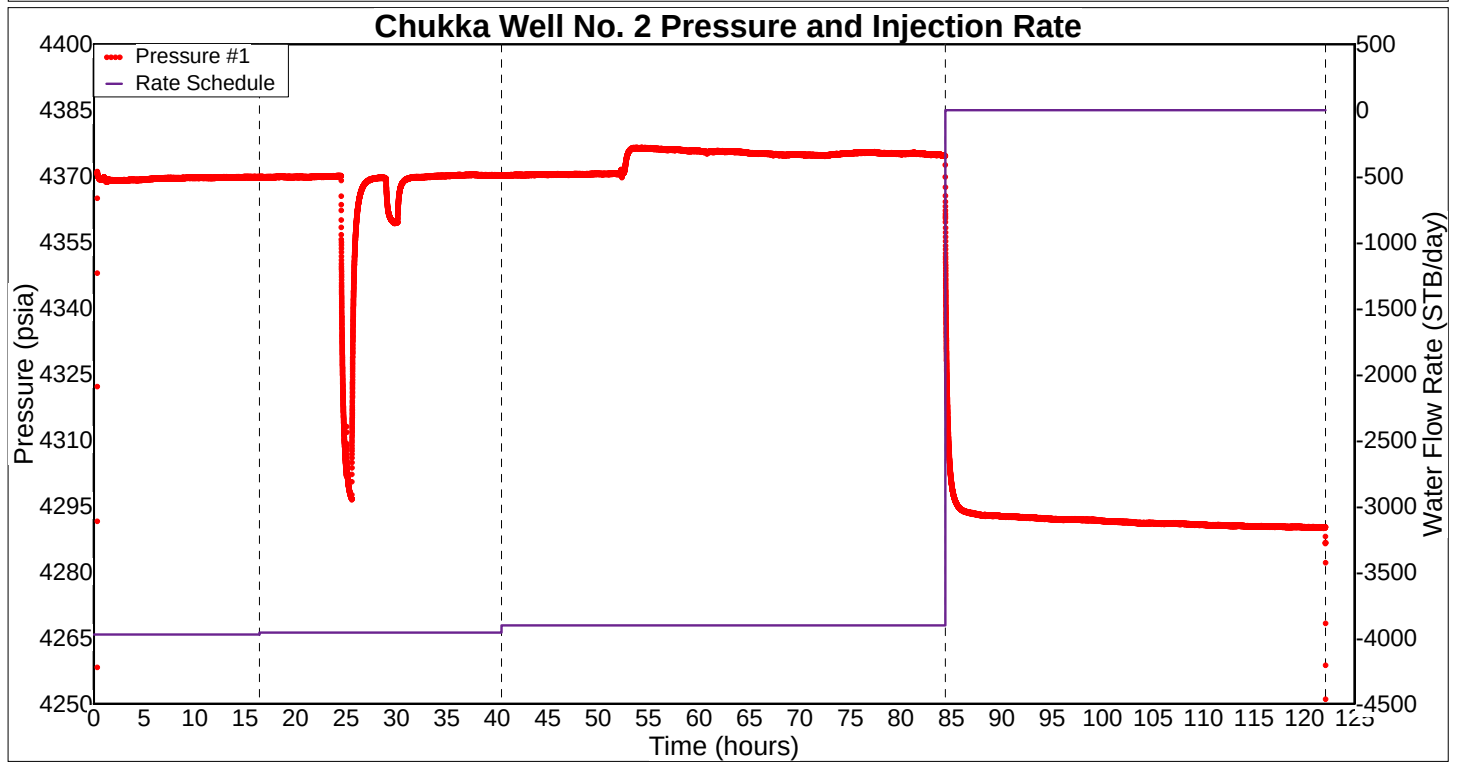
Well Test Analysis Report

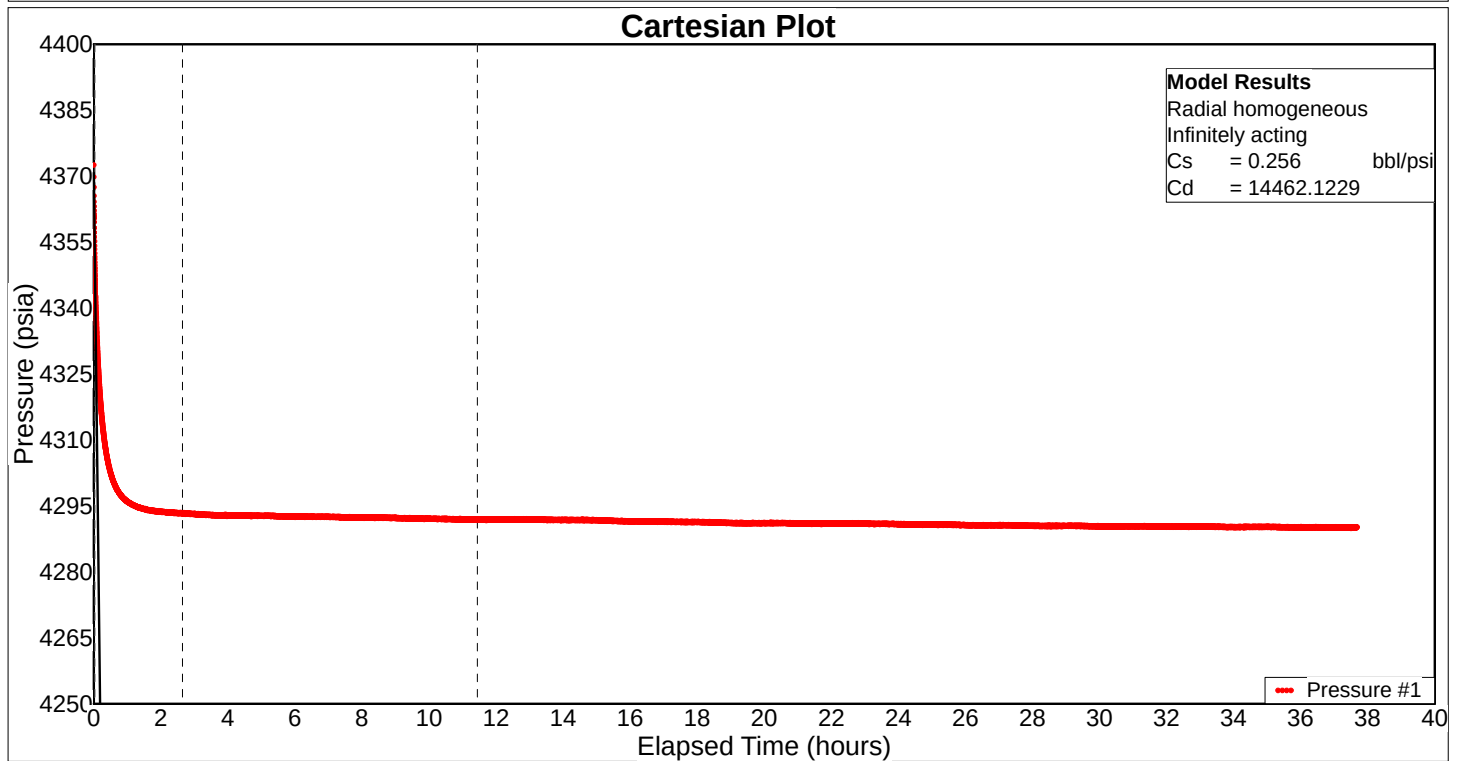
Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
-1159.576389	1129.621354	-3105.896908
-1135.576389	1130.576447	-3112.537698
-1111.576389	1132.127951	-3138.125083
-1087.576389	1126.829632	-3057.317295
-1063.576389	1176.435924	-3444.696908
-1039.576389	1188.841088	-3562.815559
-1015.576389	1090.410880	-2514.565394
-991.576389	959.526505	-1152.381035
-967.576389	957.839699	-1154.057457
-943.576389	1073.775169	-2380.952381
-919.576389	1240.991556	-4119.430556
-895.576389	1211.202780	-3791.809524
-871.576389	1247.874303	-4165.442460
-847.576389	1229.759433	-3987.345155
-823.576389	1230.629748	-3985.916832
-799.576389	1223.821352	-3903.903009
-775.576389	1223.254861	-3901.896908
-751.576389	1183.647338	-3582.218254
-727.576389	1163.487734	-3405.059524
-703.576389	1171.320715	-3470.111111
-679.576389	1187.306019	-3604.492063
-655.576389	1185.283449	-3580.787698
-631.576389	1176.056715	-3502.216187
-607.576389	1177.127370	-3520.279927
-583.576389	1170.101794	-3449.942378
-559.576389	1179.613151	-3518.448661
-535.576389	1174.127937	-3477.157771
-511.576389	1161.271973	-3340.382936
-487.576389	1182.791262	-3530.858962
-463.576389	1192.325289	-3593.521991
-439.576389	1164.251404	-3191.007854
-415.576389	1201.993446	-3628.004051
-391.576389	1191.019353	-3578.894163
-367.576389	1194.831081	-3607.343337
-343.576389	1191.287271	-3559.718089
-319.576389	1156.573727	-3216.821511
-295.576389	1182.906768	-3469.132937
-271.576389	1184.478993	-3470.704282
-247.576389	1175.098208	-3382.867064
-223.576389	1183.060067	-3440.726273
-199.576389	1216.915914	-3737.000000
-175.576389	1232.164053	-3840.430473
-151.576389	1244.925181	-3960.926670
-127.576389	1241.273590	-3906.059524
-103.576389	1248.570139	-3997.140873
-79.576389	1250.501586	-3975.417360
-55.576389	1264.369979	-3960.926670
-31.576389	1245.804861	-3906.059524
-7.576389	1242.949306	-3997.140873

Rate Change Data (cont)

Time Hours	Pressure psia	Rate STB/day
16.423611	1250.102083	-3975.417360
40.423611	1236.793053	-3960.926670
84.423611	4374.580000	-3906.059524
122.103611	4290.125000	0.000000



**Cartesian Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.255991 bbl/psi
Dimensionless wellbore storage	1.4462e4

Cartesian Plot Line Details

Line type : Wellbore storage

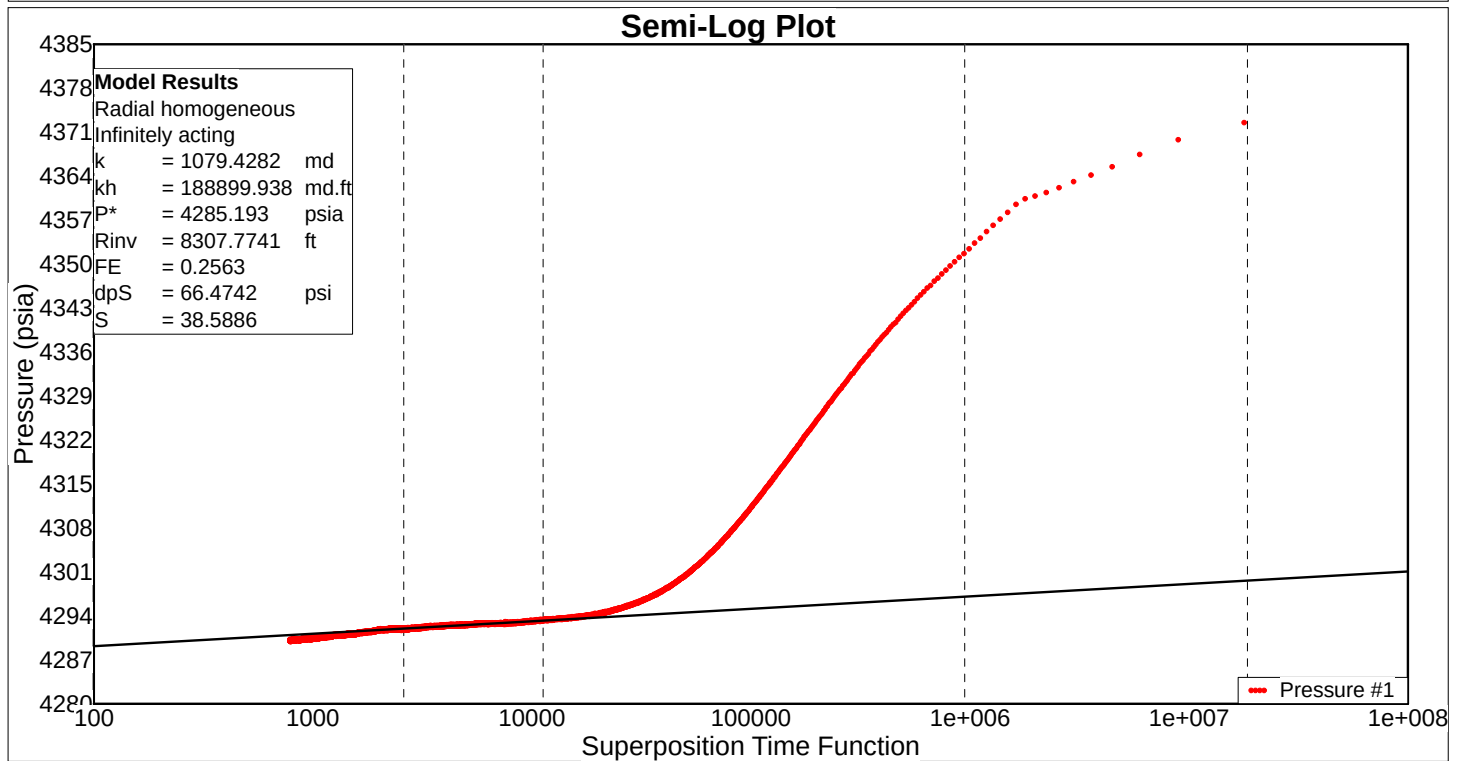
Slope : -635.775

Intercept : 4370.76

Coefficient of Determination : 0.964375

Number of Intersections = 0

Well Test Analysis Report

**Semi-Log Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Permeability	1079.428217 md
Permeability-thickness	1.8890e5 md.ft
Extrapolated pressure	4285.193038 psia
Radius of investigation	8307.774110 ft
Flow efficiency	0.256332
dP skin (constant rate)	66.474210 psi
Skin factor	38.588637

Semi-Log Plot Line Details

Line type : Radial flow

Slope : 1.98326

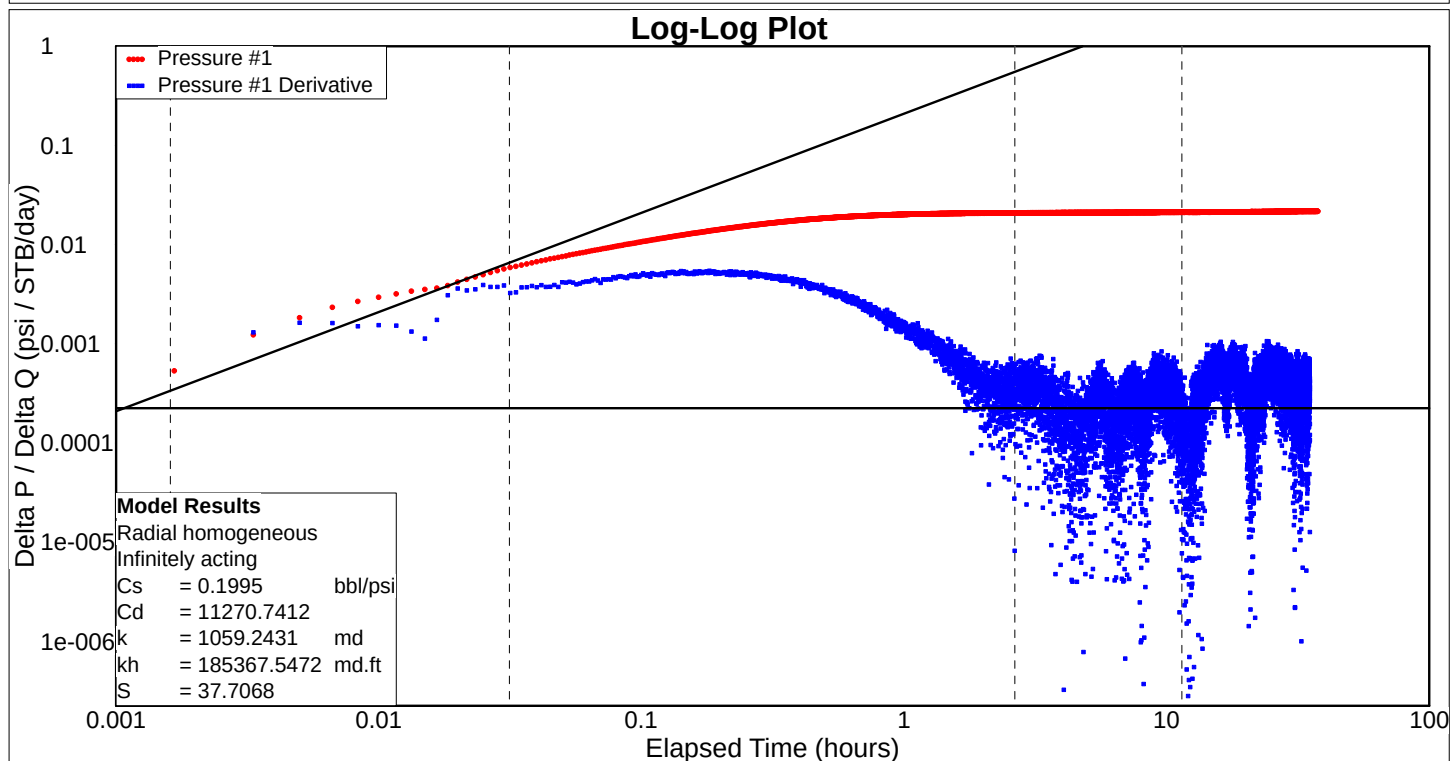
Intercept : 4285.19

Coefficient of Determination : 0.951438

	Radial flow
Extrapolated pressure	4285.193038 psia
Pressure at dt = 1 hour	4294.067340 psia

Number of Intersections = 0

Well Test Analysis Report

**Log-Log Plot Model Results**

Radial homogeneous - Infinitely acting

Classic Wellbore Storage

	Value
Wellbore storage coefficient	0.199501 bbl/psi
Dimensionless wellbore storage	1.1271e4
Permeability	1059.243127 md
Permeability-thickness	1.8537e5 md.ft
Skin factor	37.706831

Log-Log Plot Line Details

Line type : Wellbore storage

Slope : 1

Intercept : 0.208855

Coefficient of Determination : Not Used

Line type : Radial flow

Slope : 0

Intercept : 0.00022471

Coefficient of Determination : Not Used

Number of Intersections = 0