GROUNDWATER AVAILABILITY STUDY
REDTOWN RANCH PROPERTY
ANDERSON AND HOUSTON COUNTY, TX

Prepared for:

Redtown Ranch, LLC
PO Box 192689
Dallas, TX 75219

Prepared by:

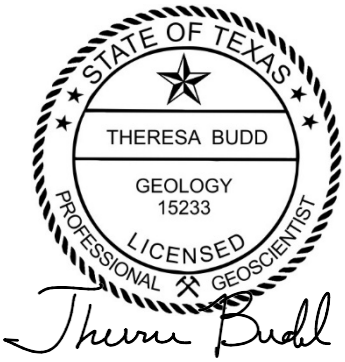
LRE Water, LLC
1101 Satellite View, Ste 301
Round Rock, Texas 78665

May 31, 2024

LRE Project Number 4314CEM01

CERTIFICATION

The technical material in this report was prepared by or under the supervision and direction of the undersigned, whose seal as a Professional Geoscientist is affixed below.



Theresa Budd, PG
Senior Project Hydrogeologist

5/31/24
TBPG Firm #50516

Vince Clause, PG, GISP
Texas Groundwater Lead

The following members of the LRE Water staff contributed to the preparation of this report.

Vince Clause, PG, GISP, Texas Groundwater Lead
Theresa Budd, PG, Senior Project Hydrogeologist
Jordan Furnans, PhD, PE, PG, Vice President TX Operations
Vicky Yeap, Staff Hydrogeologist – LRE Denver Office
Scott Stokes, GIT, Staff Hydrogeologist – LRE Denver Office
Clinton Meyer, PG, Project Hydrogeologist – LRE Denver Office

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

LRE Water, LLC ("LRE"), on behalf of Redtown Ranch, LLC, has prepared a groundwater availability study for an approximately 7,465-acre property in Anderson and Houston County, Texas. The property is herein referred to as the "Redtown Ranch Property." The primary objective of this study was to evaluate the availability and feasibility of developing up to 50,000 acre-feet per year (ac-ft/yr) of groundwater from the aquifers that underlie the property. The principal groundwater resource in Anderson and Houston County is the Carrizo-Wilcox Aquifer.

Based on this evaluation, the project's water demands of up to 50,000 ac-ft/yr could possibly be met with the installation of 32 production wells on the Redtown Ranch Property. This wellfield configuration comprises eight wells completed in the Carrizo Sand (at depths of approximately 420 to 510 feet), 12 wells completed in the Upper Wilcox (at depths of approximately 1,125 to 1,215 feet), and 12 wells completed in the Middle Wilcox (at depths of approximately 1,720 to 1,810 feet). Long-term pumping rates range from 350 to 1,150 gallons per minute (gpm) from the Carrizo Sand, 200 to 1,400 gpm from the Upper Wilcox, and 600 to 1,100 gpm from the Middle Wilcox. Water quality assessments for the target aquifers indicate that groundwater supplies beneath the Redtown Ranch Property are fresh to slightly saline and are generally suitable for public supply.

The Redtown Ranch Property is located within Groundwater Management Area 11 (GMA-11) and partially located within the jurisdiction of the Neches and Trinity Valley Groundwater Conservation District ("NTVGCD"). The NTVGCD regulates groundwater production in Anderson County, while GMA-11 establishes desired future conditions (DFCs) for the aquifers within the management area. The currently adopted DFCs are 155 feet of drawdown in the Carrizo-Wilcox Aquifer in Anderson County, and 86 feet of drawdown in the Carrizo-Wilcox Aquifer in Houston County, expressed in terms of average drawdown. These DFCs were established based on known and anticipated pumping during the last round of joint planning in 2021. Simulated numerical modeling conducted for the Northern Portion of the Carrizo-Wilcox Aquifer Groundwater Availability Model ("North QCSCW GAM") indicates that the proposed maximum production of up to 51,455 ac-ft/yr may not be feasible under the current model assumptions and constraints. Currently, this volume of groundwater exceeds the modeled available groundwater (MAG) established by the Texas Water Development Board (TWDB). Obtaining production permits from the NTVGCD for wells located in Anderson County will be essential for this project to be considered in the current round of GMA-11 joint planning, therefore increasing the available MAG issued by the TWDB.

While this evaluation indicates that groundwater resources in the Carrizo-Wilcox aquifers are available to meet the project demands, a cautious and conservative approach is recommended due to data limitations and current model assumptions regarding the aquifer properties beneath the Redtown Ranch Property. Initiating preliminary discussions with the local groundwater regulatory authorities will be crucial for navigating the permitting and joint planning process, which will ensure sustainable resource utilization and the project's long-term viability.

SECTION 1: INTRODUCTION

1.1 BACKGROUND

For this work, LRE compiled and reviewed publicly available information pertaining to the geologic structure, lithology, hydraulic properties, and water quality of the target aquifers beneath the Redtown Ranch Property in Anderson and Houston County, Texas. This included a review of geologic and hydrogeologic data from published groundwater studies, geologic maps, state well reports, well drilling reports, water quality analyses, and other applicable information from published literature. Data sources included the Texas Commission on Environmental Quality (TCEQ), the Texas Water Development Board (TWDB), the Submitted Drillers Report (SDR) Database, and LRE files. LRE's literature review included the TWDB Report No. 150 ("R-150") "Ground-Water Conditions in Anderson, Cherokee, Freestone, and Henderson Counties, Texas by Guyton & Associates (1972) and TWDB Report No. 18 ("R-18") "Ground Water Resources of Houston County, Texas" by G.E. Tarver (1966). Hydraulic properties for the target aquifers were extracted from the Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifer Groundwater Availability Model ("North QCSCW GAM") by Schorr and others (2020).

1.2 STUDY AREA

The Redtown Ranch Property encompasses approximately 7,465 acres of primarily undeveloped land in southwest Anderson County and northwest Houston County, Texas. The Trinity River borders the Redtown Ranch Property to the north and west. The Redtown Ranch Property is bound by Anderson, Houston, and Leon counties, where the northern portion of the property is located in Anderson County and the southern portion of the property is located in Houston County. Redtown Ranch can be accessed via CR-117, CR-119, CR-2260, and CR-2263. The property is also located approximately five miles southeast of Oakwood, Texas and approximately eight miles southwest of Elkhart, Texas. A site location map of the Redtown Ranch Property is provided in Figure 1.

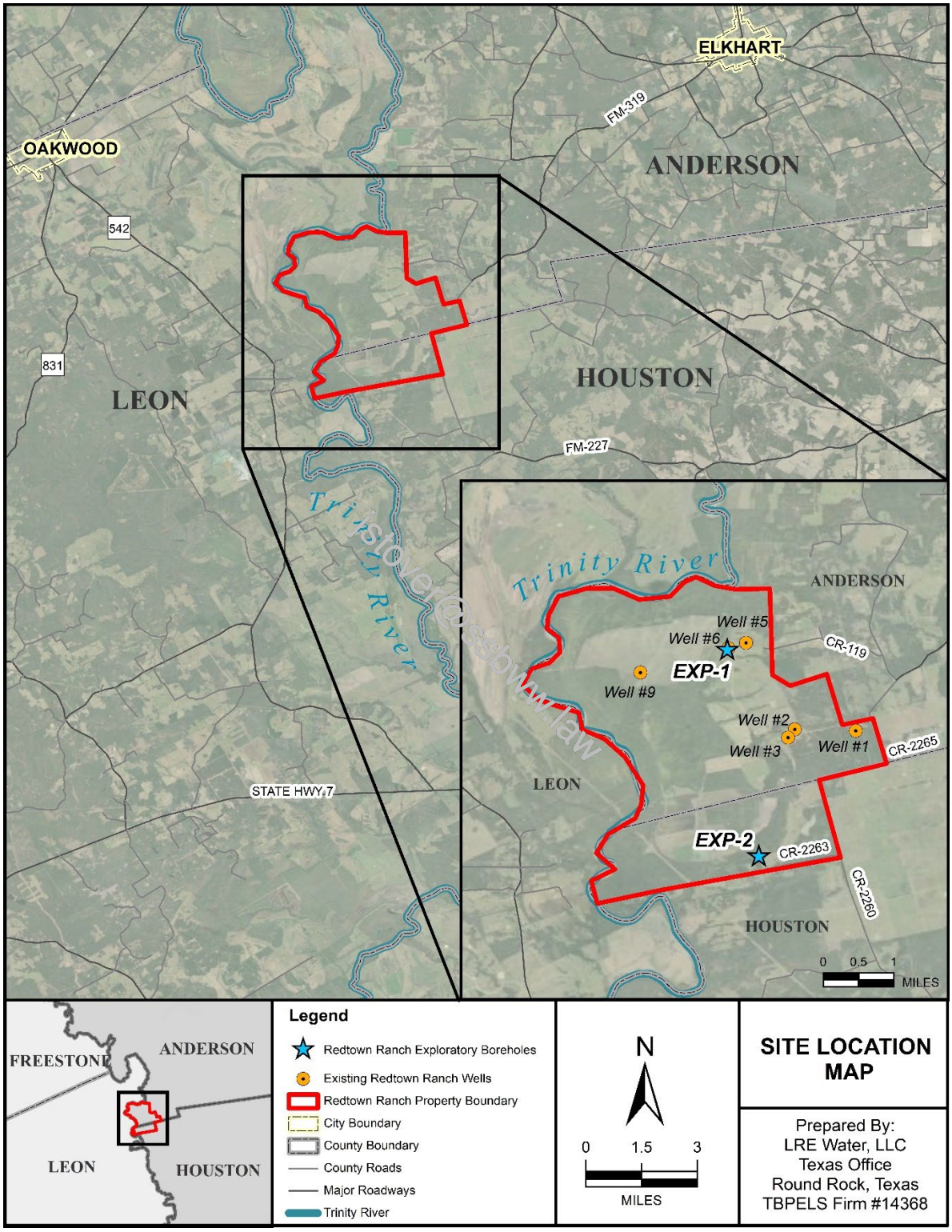


Figure 1. Site Location Map

SECTION 2: GEOLOGIC SETTING

The geology beneath the Redtown Ranch Property is comprised of a northeast to southwest trending sequence of Eocene-age sand, silt, and clays. Figure 2 illustrates the Geologic Atlas of Texas (GAT) surface geology and the aquifer outcrop extents in Anderson and Houston County at and around the Redtown Ranch Property. Alluvial and fluvatile terrace deposits consisting of gravel, sand, silt and clay, occur at surface along the Trinity River (Figure 2). The Queen City Sand outcrops (i.e., is exposed at the surface) across the Redtown Ranch Property and is comprised of cross-bedded, fine- to medium-grained sand interbedded with sandy and lignitic shales (Tarver, 1966).

The Queen City Sand overlies the Reklaw Formation, which is comprised of an upper shale section and a lower sand section (Tarver, 1966). The Carrizo Sand underlies the Reklaw Formation and is characterized as a massive sand unit with fine- to medium-grained sand with some thin shale beds (Tarver, 1966). The Wilcox Group underlies the Carrizo Sand and consists primarily of interbedded sand, silt, and clay with minor amounts of lignite (Guyton & Associates, 1972). In Anderson and Houston County, the units of the Wilcox Group are generally indistinguishable or "undivided." However, for the purpose of this study, the Wilcox Group was subdivided into three units, namely the "Upper Wilcox," the "Middle Wilcox," and the "Lower Wilcox," based on predominantly sandy and clayey zones within the Wilcox Group. The Midway Group underlies the Wilcox Group and consists almost entirely of impermeable clays and shale. Table 1 summarizes general stratigraphic units present beneath the Redtown Ranch Property.

Table 1. Summary of Generalized Stratigraphic Units Beneath the Redtown Ranch Property

Series	Group	Stratigraphic Unit	Principal Composition
Holocene	N/A	Alluvium	Gravel, sand, silt, and silty clay
Pleistocene		Fluviatile Terrace Deposits	Gravel, sand, and silt
Eocene	Claiborne	Queen City Sand	Interbedded sand and clay
		Reklaw Formation	Clay, silt, and sand
		Carrizo Sand	Massive sand
	Wilcox	Wilcox Group	Interbedded sand, silt, and clay
	Midway	Midway Group	Clay

"N/A" indicates not applicable.

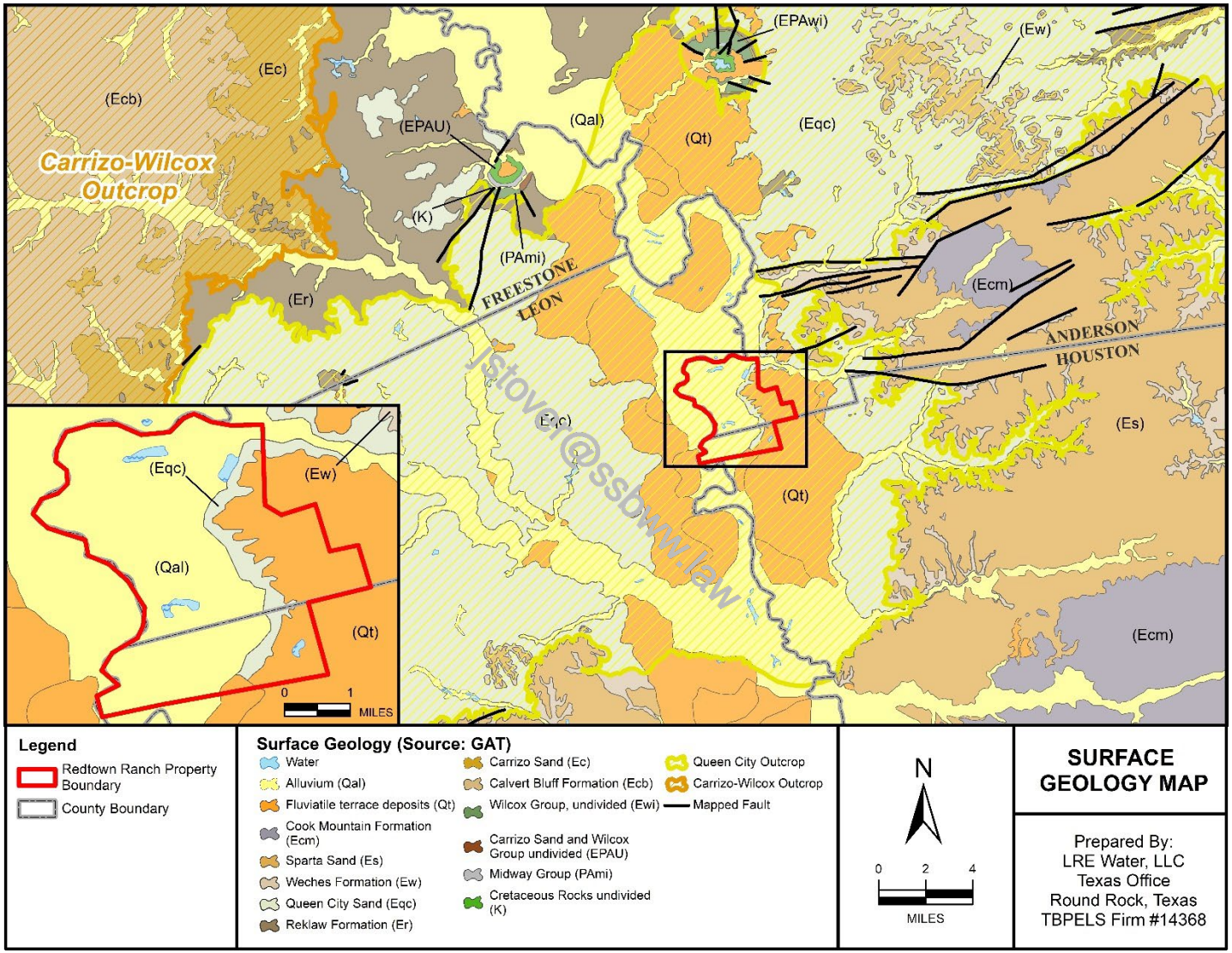


Figure 2. Surface Geology Map

2.1 TARGET AQUIFERS

The Queen City Sand is classified as a minor aquifer by the TWDB and provides water primarily for domestic and livestock purposes in Anderson and Houston County. The Carrizo-Wilcox Aquifer is classified as a major aquifer system by the TWDB and provides water for public supply, irrigation, and domestic use in Anderson and Houston County. The Carrizo-Wilcox Aquifer is comprised of thick, laterally extensive and permeable fluvio-deltaic sands separated by clayey, silty, discontinuous sand mixtures. The Carrizo-Wilcox Aquifer outcrops approximately 15 miles west of the Redtown Ranch Property along a broad northeast-southwest trending belt and locally dips to the southeast beneath the Redtown Ranch Property (Figure 2). Locally, shallow wells located along the Trinity River produce small to moderate quantities of water from the Alluvium for domestic use in Anderson and Houston County (Figure 2).

The Queen City Sand, Carrizo Sand, and Wilcox Group aquifers are the principal water-bearing formations in Anderson and Houston Counties (Guyton & Associates, 1972; Tarver, 1966). Due to its limited occurrence and shallow depths, the Alluvium and Queen City Sand do not likely contain significant quantities of groundwater beneath the Redtown Ranch Property. Therefore, the target aquifers beneath the Redtown Ranch Property are Carrizo-Wilcox aquifers.

2.2 GEOLOGIC MAPPING

LRE prepared geologic subsurface structure maps, net sand thickness (ispoach) maps, and geologic cross sections using ArcMap and IHS Petra® Geologic Mapping Software to visualize the geologic structure of the hydrogeologic units beneath the Redtown Ranch Property. LRE obtained geophysical logs from the Brackish Resources Aquifer Characterization System (BRACS) Database and interpreted formation depths and sand thickness of the Carrizo-Wilcox aquifers beneath the Redtown Ranch Property. LRE used "type" logs and characteristic electric log signatures described in TWDB R-150 (Guyton & Associates, 1972) and R-18 (Tarver, 1966) to correlate formations beneath the Redtown Ranch Property.

Andrews & Foster Drilling Company (A&F) drilled two 7.875-inch exploratory boreholes ("EXP-1" and "EXP-2") to determine formation depths of aquifers beneath the Redtown Ranch Property. The exploratory borehole EXP-1 was drilled in Anderson County at Latitude 31.540694, Longitude -95.716917 to approximately 1,197 feet below land surface (ft bls), and exploratory borehole EXP-2 was drilled in Houston County at Latitude 31.498361, Longitude -95.710417 to approximately 1,307 ft bls, as shown in Figure 1. GeoCAM conducted geophysical logging of the exploratory boreholes, which included gamma ray, resistivity, and spontaneous potential logs. The geophysical logs for EXP-1

and EXP-2 are provided in Appendix A. LRE used the geophysical logs from the BRACS Database and the exploratory boreholes to prepare geologic structure maps (Appendix B), net sand thickness maps (Appendix C), and geologic cross sections (Appendix D) for the Redtown Ranch Property. Table 2 summarizes the formation depths, and aquifer and net sand thicknesses beneath the Redtown Ranch Property based on LRE's interpretation and correlation of surrounding geophysical logs.

Table 2. Formation Depths for the Hydrogeologic Units Beneath the Redtown Ranch Property

Formation	Top Elevation (ft msl)	Base Elevation (ft msl)	Depth to Top (ft bls)	Depth to Base (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)
Carrizo Sand	(-15) – (-75)	(-175) – (-230)	175 – 340	335 – 505	130 – 185	125 – 175
Upper Wilcox	(-175) – (-230)	(-915) – (-950)	335 – 505	1,075 – 1,215	700 – 755	135 – 185
Middle Wilcox	(-915) – (-950)	(-1,515) – (-1,560)	1,075 – 1,215	1,680 – 1,820	555 – 645	210 – 260
Lower Wilcox	(-1,515) – (-1,560)	(-2,050) – (-2,240)	1,680 – 1,820	2,220 – 2,510	525 – 725	N/A

"ft" indicates feet, "ft msl" indicates feet above mean sea level, "ft bls" indicates feet below land surface, land surface measured from the NED (USGS, 2004), "N/A" indicates not applicable.

2.2.1 Formation Depths

LRE prepared geologic structure maps for the base of the Reklaw Formation, Carrizo Sand, and Wilcox Group beneath the Redtown Ranch Property, as provided in Appendix B. Most surrounding geophysical logs did not log the entire section of the Queen City Sand and therefore was not mapped across the Redtown Ranch Property. LRE employed the U.S. Geological Survey National Elevation Dataset (NED) 30-Meter Resolution Digital Elevation Model (2004) to establish a land surface elevation in feet above mean sea level (ft msl) across the Redtown Ranch Property to standardize formation depths in units of feet below land surface (ft bls), as presented in Appendix B.

The Wilcox Group is primarily undifferentiated in Anderson and Houston County and therefore individual sand units were not distinguished from well-to-well. However, surfaces were created for the Upper Wilcox, the "Middle Wilcox, and the Lower Wilcox based on significant changes in lithology (Appendix B). Beneath the Redtown Ranch Property, elevations to the base of the hydrogeologic formations range from approximately -15 to -75 ft msl for the Reklaw Formation, -175 to -230 ft msl for the Carrizo Sand, -915 to -950 ft msl for the Upper Wilcox, -1,515 to -1,560 ft msl for the Middle Wilcox, and -2,050 to -2,240 to the base of the Wilcox Group (Table 2)(Appendix B). These elevations correspond to depths of approximately 175 to 340 feet to the base of the Reklaw Formation, approximately 335 to 505 feet to the base of the Carrizo Sand,

approximately 1,075 to 1,215 feet to the base of the Upper Wilcox, approximately 1,680 to 1,820 feet to the base of the Middle Wilcox, and approximately 2,220 to 2,510 feet to the base of the Wilcox (Table 2). Based on the depths for the Wilcox Group beneath the Redtown Ranch Property, the exploratory boreholes EXP-1 and EXP-2 did not penetrate the entire thickness of the Wilcox Group.

2.2.2 Formation Thickness

Formation thicknesses were calculated as the difference between each formation top and bottom. The formation thickness of the Queen City Sand and Reklaw Formation beneath the Redtown Ranch Property could not be accurately determined, as not all the surrounding geophysical logs included the entire section of the Queen City Sand. Formation thicknesses of the hydrogeologic units beneath the Redtown Ranch Property range from approximately 130 to 185 feet for the Carrizo Sand, approximately 700 to 755 feet for the Upper Wilcox, approximately 555 to 645 feet for the Middle Wilcox, and approximately 525 to 725 feet for the Lower Wilcox (Table 2).

2.2.3 Net Sand Thickness

LRE prepared net sand thickness (isopach) maps for the Carrizo Sand and Wilcox Group beneath the Redtown Ranch Property, as provided in Appendix C. LRE did not analyze net sands in the Queen City Sand, as most of the surrounding geophysical logs did not include the entire section of the Queen City Sand, which would therefore underestimate the total net sands in the Queen City Sand. In addition, LRE did not calculate net sand thickness of the Reklaw Formation or Lower Wilcox Group, as these formations do not contain significant amounts of sand and are not considered to be target aquifers beneath the Redtown Ranch Property.

LRE's net sand analysis of the Carrizo and Wilcox Group aquifers only evaluated the likely screened sands (intervals greater than 10 feet) and therefore provides a conservative estimate for the total sands within each of these formations (Appendix C). Net sands within the Upper and Middle Wilcox were aggregated for each interval. Based on LRE's analysis of net sands beneath the Redtown Ranch Property, net sand thickness ranges from 125 to 175 feet for the Carrizo Sand, 135 to 185 feet for the Upper Wilcox, and 210 to 260 feet for the Middle Wilcox (Table 2)(Appendix C). As indicated in Table 2, the Carrizo Sand is comprised almost entirely of sand beneath the Redtown Ranch Property.

2.2.4 Structural Features

LRE prepared geologic cross sections using IHS Petra® Geologic Mapping Software to show the general depth, thickness, and dip of the formations beneath the Redtown Ranch

Property (Appendix D). Cross sections A-A' and B-B' represent the relative dip of the formations and cross sections C-C' and D-D' represent the relative strike of the formations beneath the Redtown Ranch Property (Appendix D). In general, the formations trend northeast-southwest and dip to the southeast beneath the Redtown Ranch Property (Appendix D).

Northeast-southwest trending normal faults are located approximately 2,000 northeast of the Redtown Ranch Property, as indicated in the structure maps presented in Appendix B and surface geology map presented in Figure 2. It is possible that these faults extend beneath the Redtown Ranch Property but could not be mapped at the surface due to the deposition of alluvium and floodplain deposits. Furthermore, smaller localized faults may be present beneath the Redtown Ranch Property where no data is available and structure depths were interpolated. Thus, it is possible that faults may be identified beneath the Redtown Ranch Property during the drilling and logging of exploratory boreholes.

SECTION 3: AQUIFER PROPERTIES

In general, the productivity of a well is influenced by its hydraulic properties, which include a well's specific capacity and aquifer properties such as hydraulic conductivity, transmissivity, specific yield and specific storage. Specific capacity is primarily a function of the well's performance, which relates to well efficiency and construction. Specific capacity can be derived by dividing a well's pumping rate (in gallons per minute [gpm]) by drawdown (in feet). Hydraulic conductivity is a measure of the aquifer's ability to transmit water and can be expressed in units of gallons per day per square foot (gpd/ft^2). Transmissivity, a function of hydraulic conductivity and the aquifer's saturated thickness, is a measure of the aquifer's ability to transmit groundwater and can be expressed in units of gallons per day per foot (gpd/ft). Storativity, also known as the storage coefficient, is dimensionless and is defined as the volume of water released from storage per unit surface area per unit change in hydraulic head for confined aquifers. These hydraulic properties can be calculated from a constant rate pumping test, where the pumping rate is held constant and drawdown in the well (i.e., water level decline from the static, pre-pumping water level, in feet) is measured over a specified timeframe.

3.1 SITE-SPECIFIC AQUIFER PROPERTIES FROM EXISTING REDTOWN RANCH WELLS

A&F conducted a pumping test on two existing Redtown Ranch wells ("Well #2" and "Well #3") located on the Redtown Ranch Property (Figure 1) to determine the site-specific hydraulic properties of the aquifers. Well #2 is located in Anderson County at Latitude 31.524167, Longitude -95.703056, and Well #3 is located in Anderson County

approximately 750 feet from Well #2 at Latitude 31.5225, Longitude -95.704444 (Figure 1). Based on reported well construction information, Well #2 is a 10-inch diameter well that was completed to a depth of 386 feet. The completion intervals for Well #2 are unknown, but the top of the liner in the well is reported to be at 282.4 feet. Therefore, Well #2 is assumed to be completed with approximately 100 feet of screen. Well #3 is reported to be a 6-inch diameter well with unknown depth and well completion intervals. Based on the reported and assumed well depths and completion intervals, both wells are likely completed in the Carrizo Sand.

A&F conducted a 27-hour pumping test at Well #2 on March 9, 2023, at an average pumping rate of 590 gpm. The static water level in Well #2 was at approximately 64.06 feet bls prior to starting the test. After pumping Well #2 for 27 hours at 590 gpm, the pumping water level was at 126.82 feet bls, which equates to approximately 62.76 feet of drawdown in the wellbore. Therefore, the specific capacity of Well #2 is 9.4 gpm/ft. Water levels were also measured in Well #3 during the pumping test to calculate a storage coefficient for the Carrizo Sand beneath the Redtown Ranch Property. Static water levels in observation Well #3 were at approximately 70 ft bls prior to starting the test. The total drawdown in observation Well #3 at the end of the pumping test was approximately 13.07 feet. LRE analyzed the pumping test data from Well #2 using the Cooper-Jacob (1946) solution for the pumping portion of the test and the Theis (1935) residual drawdown solution for the non-pumping (recovery) portion of the test. Based on the pumping test results and recovery data from Well #2, transmissivity was calculated to be approximately 22,250 gpd/ft for the Carrizo Sand. The time-drawdown graph and residual drawdown graph used to plot the pumping test data and calculate transmissivity are presented in Figure 3 for the pumping portion of the test and Figure 4 for the recovery portion of the test at Well #2, respectively.

Hydraulic conductivity can be calculated by dividing transmissivity (in gpd/ft) by the screen length or net sand thickness (in feet). Hydraulic conductivity was calculated to be 222.5 gpd/ft^2 for the Carrizo Sand beneath Well #2 based on the calculated transmissivity of 22,250 gpd/ft and an estimated screen length of 100 feet. It is important to note that if the screen interval is less than 100 feet in Well #2, the hydraulic conductivity of the Carrizo Sand would be higher.

The storage coefficient for the Carrizo Sand was calculated from the time-drawdown graph for Well #3 by using the zero-drawdown intercept of the straight line, as derived from the Cooper-Jacob (1946) equation (Figure 5). The storage coefficient (or storativity) was calculated to be 0.000009 or 9 x 10^{-5} for the Carrizo Sand (Figure 5).

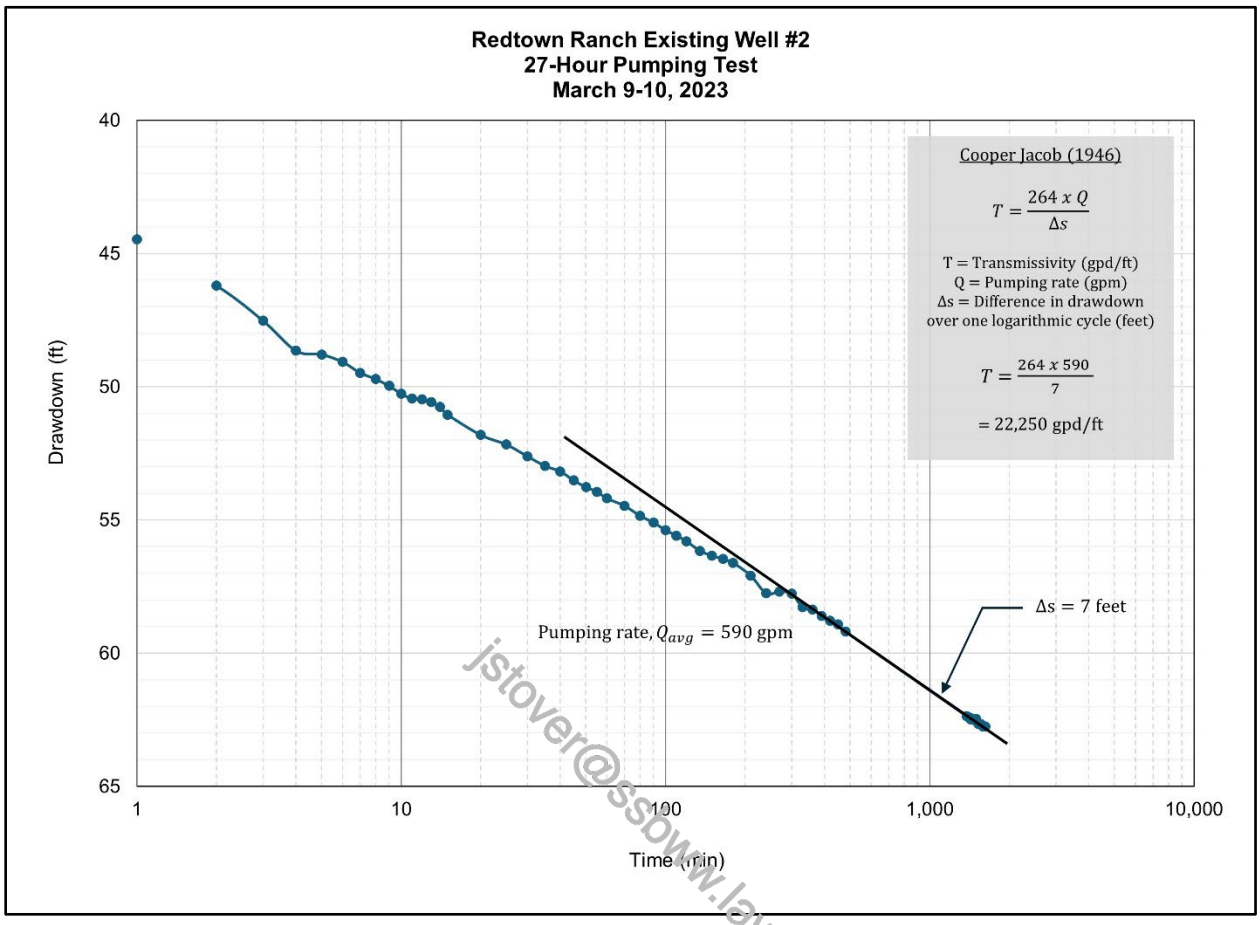


Figure 3. Time-Drawdown Graph for Well #2

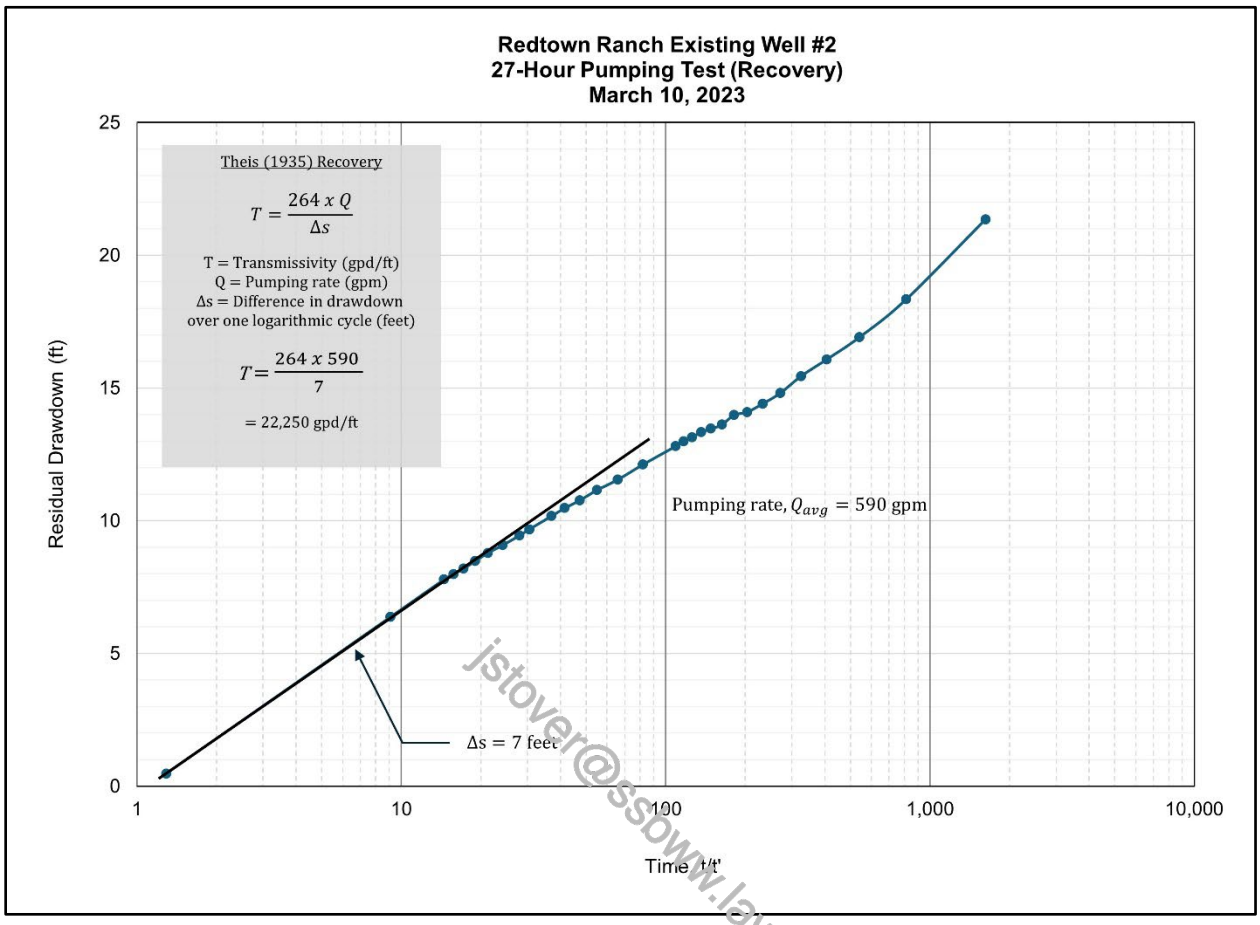


Figure 4. Residual Drawdown Recovery Graph for Well #2

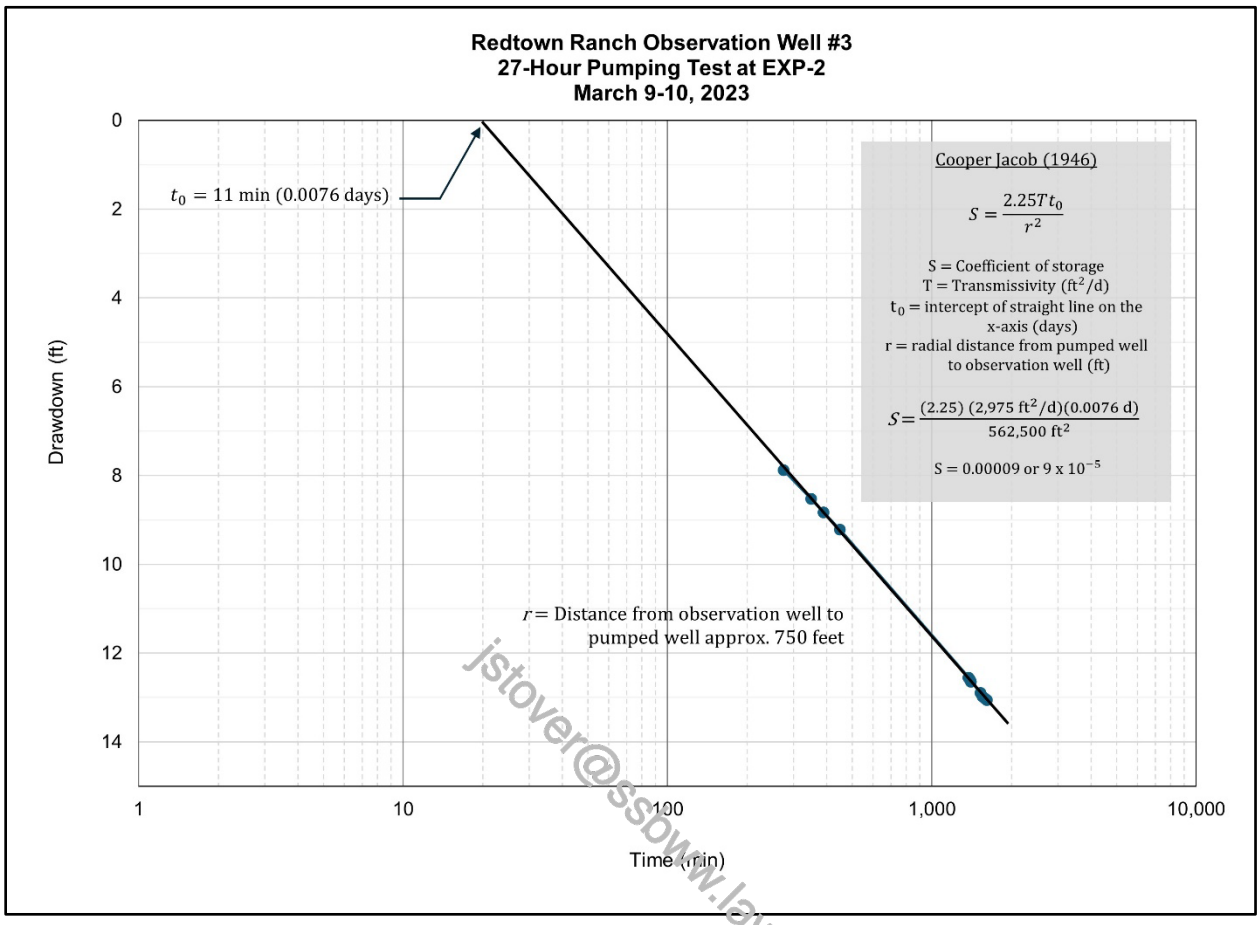


Figure 5. Time-Drawdown Graph for Observation Well #3

3.2 ESTIMATED AQUIFER PROPERTIES FROM SURROUNDING WELLS

Where site-specific hydraulic properties are not available from pumping tests, they can be estimated from surrounding wells with reported pumping test data. LRE reviewed TWDB R-150 (Guyton & Associates, 1972) and R-18 (Tarver, 1966) to assess the reported hydraulic properties for the target aquifers in Anderson and Houston County, Texas. In addition, LRE obtained reported pumping test data from surrounding wells in the SDR Database and the TWDB Database to estimate hydraulic properties of the target aquifers beneath the Redtown Ranch Property. Surrounding well data from the SDR and TWDB Database are presented in Figure 6 for the Carrizo Sand, Figure 7 for the Upper Wilcox, and Figure 8 for the Middle Wilcox, respectively.

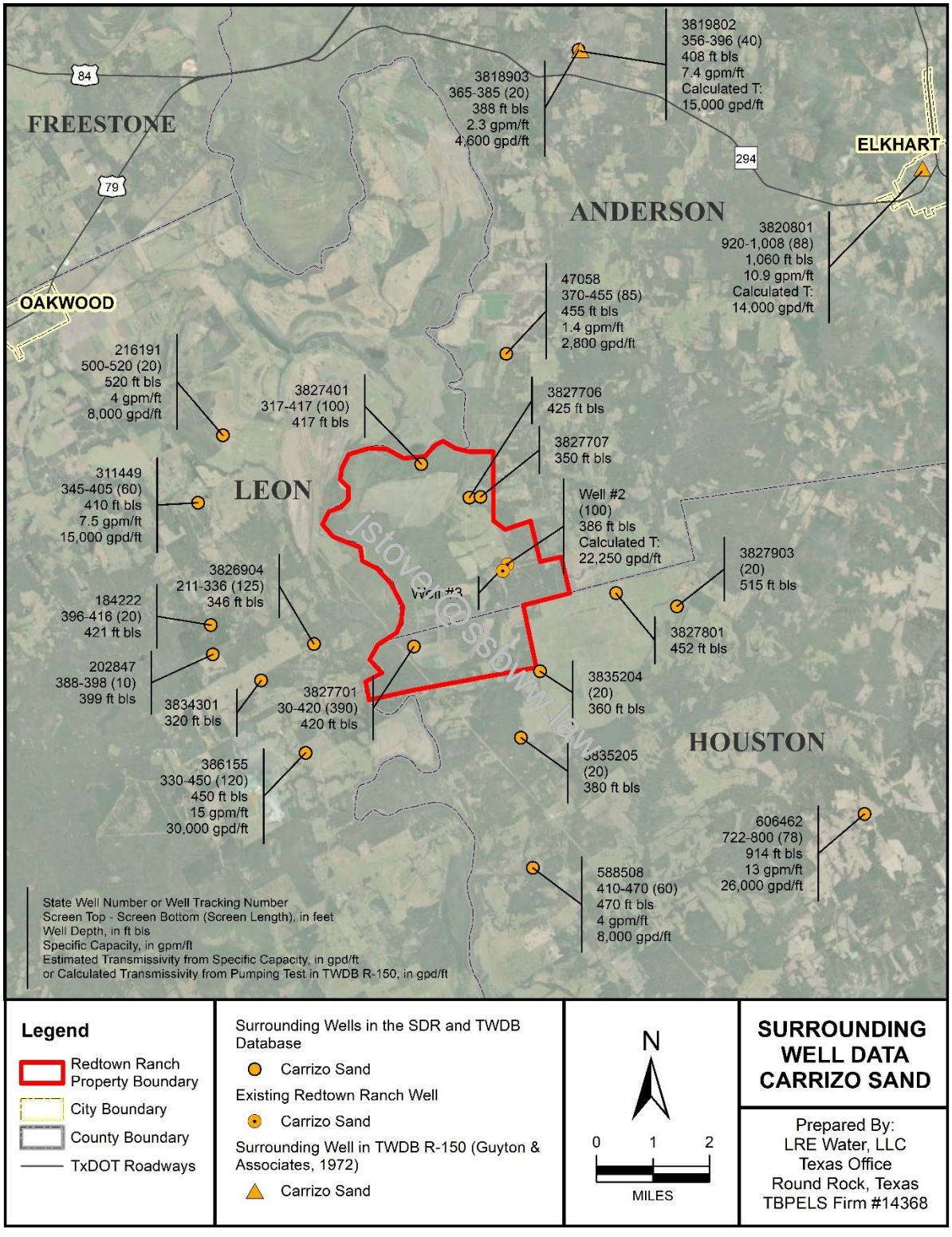


Figure 6. Surrounding Well Data for the Carrizo Sand

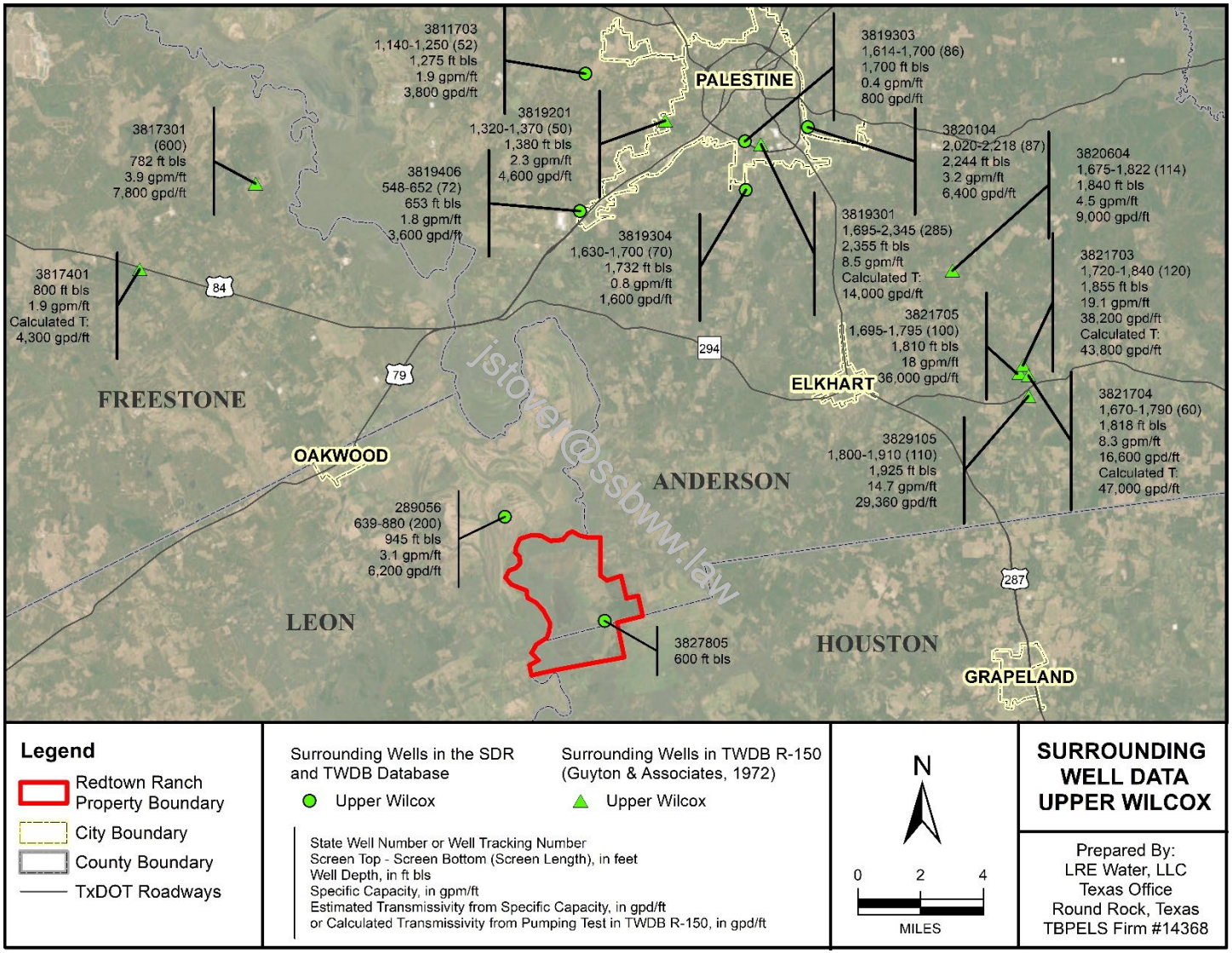


Figure 7. Surrounding Well Data for the Upper Wilcox Group

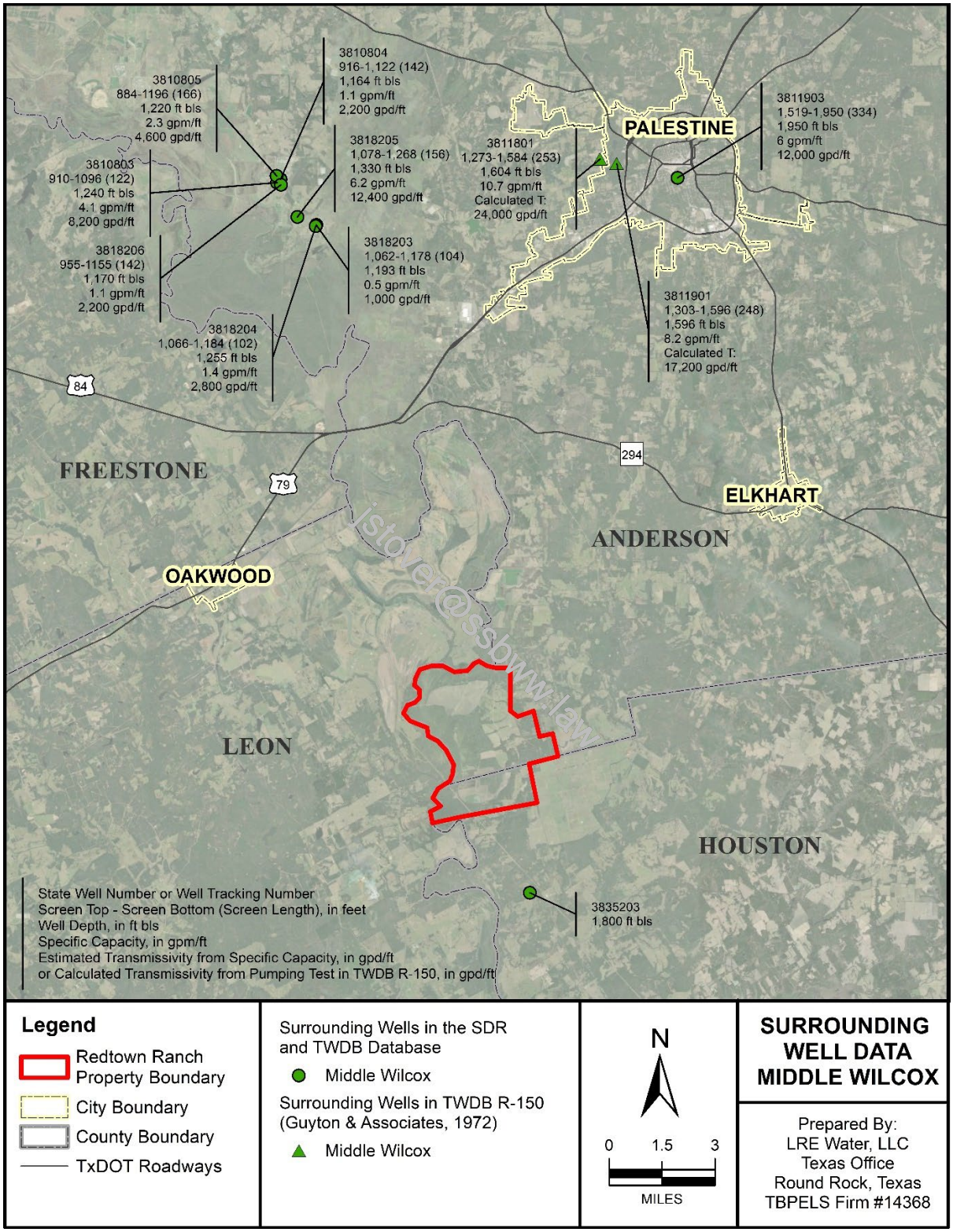


Figure 8. Surrounding Well Data for the Middle Wilcox Group

LRE used site-specific and surrounding well data to estimate hydraulic properties of the target aquifers beneath the Redtown Ranch Property. Table 3 summarizes the hydraulic properties of the target aquifers beneath the Redtown Ranch Property based on surrounding well data, analysis of pumping test results at Well #2 and Well #3, and information obtained from geophysical logs.

Table 3. Estimated Hydraulic Properties for the Carrizo-Wilcox Aquifers Beneath the Redtown Ranch Property from Surrounding Well Data

Formation	Depth to Base (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)	Static Water Level (ft bls)	Hydraulic Conductivity (gpd/ft^2)	Transmissivity (gpd/ft)
Carrizo Sand	335 – 505	130 – 185	175 – 125	0 – 80	222.5 – 333.3	27,240 – 58,095
Upper Wilcox	1,075 – 1,215	700 – 755	135 – 185	--	31 – 287.3	4,175 – 52,805
Middle Wilcox	1,680 – 1,820	555 – 645	210 – 260	--	10.6 – 84.7	2,215 – 22,055

"ft" indicates feet, "ft bls" indicates feet below land surface, land surface measured from the NED (USGS, 2004), "gpd/ft^2" indicates gallons per day per foot squared, "gpd/ft" indicates gallons per day per foot, "--" indicates value not available/calculated.

3.2.1 Specific Capacity

In the TWDB R-150, two wells (State Well Number 3819802 and 320801) located within 10 miles of the Redtown Ranch Property had reported specific capacity values of 7.4 gpm/ft and 10.9 gpm/ft for the Carrizo Sand (Figure 6), respectively (Guyton & Associates, 1972). Several wells within 15 miles of the Redtown Ranch Property had reported specific capacity values for the Upper Wilcox in the TWDB R-150 ranging from 1.9 gpm/ft to 21.9 gpm/ft (Figure 7), respectively (Guyton & Associates, 1972). Two wells (State Well Numbers 3811901 and 3811801) in the TWDB R-150 had reported specific capacity values for the Middle Wilcox of 8.2 gpm/ft and 10.7 gpm/ft (Figure 8), respectively (Guyton & Associates, 1972).

Surrounding wells in the SDR and TWDB Database within approximately five miles of the Redtown Ranch Property have reported specific capacity values ranging from 1.4 gpm/ft to 15 gpm/ft for the Carrizo Sand (Figure 6), and 3.1 gpm/ft for one well (Well Tracking Number 289056) completed in the Upper Wilcox Group (Figure 7). Within 15 miles, surrounding wells in the SDR and TWDB Database had reported specific capacity values ranging from 0.4 gpm/ft to 3.2 gpm/ft for the Upper Wilcox (Figure 7), and 0.5 gpm/ft to 6.2 gpm/ft for the Middle Wilcox (Figure 8). Reported pumping rates from surrounding wells range from approximately 10 to 1,205 gpm for the Carrizo Sand, approximately 90 gpm to 1,050 gpm for the Upper Wilcox, and approximately 175 gpm to 715 gpm for the Middle Wilcox.

It is important to note that specific capacity does not account for important variables such as well efficiency, well size, or partial penetration of the well into the aquifer. Therefore, specific capacity should only be used as a general indicator of aquifer productivity.

3.2.2 Transmissivity and Hydraulic Conductivity

LRE reviewed TWDB R-150 and R-18 to assess transmissivity values calculated from constant-rate pumping tests for the target aquifers in Anderson and Houston County, Texas. Within a 10-mile radius of the Redtown Ranch Property, two wells (State Well Numbers and 3820801 and 3819802) had calculated transmissivity values for the Carrizo Sand from constant-rate pumping tests, which were calculated to be 14,000 gpd/ft and 15,000 gpd/ft (Figure 6), respectively (Guyton & Associates, 1972). Within a 15-mile radius of the Redtown Ranch Property, several wells had calculated transmissivity values for the Upper Wilcox ranging from 4,300 gpd/ft to 47,000 gpd/ft (Figure 7), and two wells (State Well Numbers 3811901 and 3811801) had calculated transmissivity values of 17,200 gpd/ft and 24,000 gpd/ft for the Middle Wilcox (Figure 8) (Guyton & Associates, 1972). It is noted in TWDB R-150 that several wells with pumping test data and calculated transmissivity values may not fully penetrate the entire aquifer thickness, which results in lower estimates of transmissivity (Guyton & Associates, 1972). Therefore, these calculated values of transmissivity likely underestimate the actual transmissivity for wells that fully penetrate the entire aquifer thickness.

Where time-drawdown measurements are not available to calculate transmissivity from a constant-rate pumping test using the Theis (1935) or Cooper Jacob (1946) equation, it can be estimated from specific capacity values where reported yield (in gpm) and drawdown (in feet) are available. Transmissivity can be estimated using an empirical equation developed by Driscoll (1986), where a well's specific capacity (in gpm/ft) is multiplied by 2,000 for confined aquifers. Estimates of transmissivity were calculated from reported specific capacity values for surrounding wells in the TWDB and SDR Database using the Driscoll (1986) estimation method. This included transmissivity estimates from seven wells completed in the Carrizo Sand within 10-miles of the Redtown Ranch Property for the Carrizo Sand (Figure 6), 11 wells completed in the Upper Wilcox (Figure 7) and eight wells completed in the Middle Wilcox (Figure 8) within 15-miles of the Redtown Ranch Property. Transmissivity estimates from surrounding wells using the Driscoll (1986) estimation method ranged from approximately 2,800 gpd/ft to 30,000 gpd/ft for the Carrizo Sand (Figure 6), approximately 800 gpd/ft to 36,000 gpd/ft for the Upper Wilcox (Figure 7), and approximately 1,000 gpd/ft to 12,400 gpd/ft for the Middle Wilcox (Figure 8). Most surrounding wells completed in the Carrizo-Wilcox aquifers are "partially penetrating" and were constructed as low-yield wells for domestic or livestock

use. Therefore, these transmissivity estimates from reported pumping test data likely underestimate the actual aquifer transmissivity of the aquifer. In general, wells with higher transmissivity estimates are larger-diameter wells that penetrate the entire aquifer thickness and are used for irrigation, industrial, or public supply. Therefore, higher transmissivity values and well yields could likely be obtained from larger-diameter and properly constructed wells that penetrate the entire aquifer thickness.

Hydraulic conductivity is an estimate of aquifer productivity that is independent of aquifer thickness. To account for variations in transmissivity from partially penetrating wells, hydraulic conductivity values were calculated for surrounding wells by dividing the estimated transmissivity (in gpd/ft) by the screen length (in feet) or reported net sand thickness (in feet). Hydraulic conductivity values reported in the TWDB R-150 range from 175 gpd/ft^2 to 176 gpd/ft^2 for the Carrizo Sand, 49 gpd/ft^2 to 338 gpd/ft^2 for the Upper Wilcox, and 78 gpd/ft^2 to 81 gpd/ft^2 for the Middle Wilcox (Guyton & Associates, 1972). Hydraulic conductivity values calculated from surrounding wells with estimated transmissivity values using the Driscoll (1986) method range from approximately 32.9 gpd/ft^2 to 400 gpd/ft^2 for the Carrizo Sand, 8.8 gpd/ft^2 to 360 gpd/ft^2 for the Upper Wilcox, and 10.6 gpd/ft^2 to 84.7 gpd/ft^2 for the Middle Wilcox (Table 3). Surrounding estimates of hydraulic conductivity were used to estimate transmissivity of the target aquifers beneath the Redtown Ranch Property, assuming all proposed wells on the Redtown Ranch Property will penetrate the entire aquifer thickness of the target aquifers. This was calculated by multiplying hydraulic conductivity (in gpd/ft^2) from surrounding well data by the net sand thickness (ft) for each target aquifer. Due to the range in estimated hydraulic conductivity values from surrounding wells and site-specific data, LRE used a range of hydraulic conductivity values to estimate the range of transmissivity values for the target aquifers beneath the Redtown Ranch Property.

LRE calculated the transmissivity of the Carrizo Sand beneath the Redtown Ranch Property using the Carrizo net sand thickness (Appendix C) and a hydraulic conductivity value of 222.5 gpd/ft^2, as derived from the pumping test at the existing Redtown Ranch Well #2, which resulted in a transmissivity of approximately 27,240 gpd/ft to 38,785 gpd/ft for the Carrizo Sand beneath the Redtown Ranch Property (Table 3). The specific capacity for a nearby public supply well (Well Report Tracking Number 606462) completed in the Carrizo Sand was estimated to be 13 gpm/ft, which results in a transmissivity of 26,000 gpd/ft using the Driscoll (1986) estimation method (Figure 6). This well had a reported screen length of 78 feet, which results in a hydraulic conductivity value of 333.3 gpd/ft^2 (Table 3). LRE calculated a transmissivity value for the Carrizo Sand beneath the Redtown Ranch Property using the Carrizo net sand thickness

(Appendix C) and a hydraulic conductivity value of 333.3 gpd/ft^2, which results in transmissivity values ranging from 40,800 gpd/ft to 58,095 gpd/ft beneath the Redtown Ranch Property (Table 3).

Transmissivity estimates for the Upper Wilcox were calculated by multiplying the Upper Wilcox net sand thickness (Appendix C) by hydraulic conductivity from surrounding wells, as derived from the Driscoll (1986) estimation method. A hydraulic conductivity value of 31 gpd/ft^2 (from nearby Well Tracking Number 289056)(Figure 7) and net sand thickness of the Upper Wilcox (Appendix C) results in estimated transmissivity values ranging from 4,175 gpd/ft to 5,700 gpd/ft beneath the Redtown Ranch Property (Table 3). Three large-capacity industrial wells (State Well Numbers 3821703, 3821704, 3829105) located approximately 14 miles northeast of the Redtown Ranch Property have estimated hydraulic conductivity values of 318.3 gpd/ft^2, 276.7 gpd/ft^2, and 266.9 gpd/ft^2, which equates to an average hydraulic conductivity of 287.3 gpd/ft^2 for the Upper Wilcox. The hydraulic conductivity value of 287.3 gpd/ft^2 was multiplied by the Upper Wilcox net sand thickness (Appendix C), resulting in transmissivity estimates ranging from approximately 38,690 gpd/ft to 52,805 gpd/ft for the Upper Wilcox (Table 3). The hydraulic conductivity value of 287.3 gpd/ft^2 is assumed to represent “higher” hydraulic conductivity estimates that are possible from the Upper Wilcox from wells located along the same strike (northeast-southwest) as the Redtown Ranch Property. These wells are located within a series of northeast-southwest trending normal faults mapped to the northeast of the Redtown Ranch Property (Figure 2), which may be attributing to the higher aquifer productivity compared to wells located updip of the Redtown Ranch Property (Figure 7).

Transmissivity estimates for the Middle Wilcox were calculated by multiplying the Middle Wilcox net sand thickness (Appendix C) by hydraulic conductivity from surrounding wells, as derived from the Driscoll (1986) estimation method. A hydraulic conductivity value of 10.6 gpd/ft^2, as derived from State Well Number 3818203 (Figure 8), and net sand thickness of the Middle Wilcox (Appendix C), results in estimated transmissivity values ranging from 2,215 gpd/ft to 2,760 gpd/ft beneath the Redtown Ranch Property (Table 3). Net sand thickness of the Middle Wilcox (Appendix C) and a hydraulic conductivity value of 84.7 gpd/ft^2, as derived from State Well Number 3811801 using the Driscoll (1986) estimation method (Figure 8), were used to estimate transmissivity beneath the Redtown Ranch Property. This resulted in transmissivity estimates ranging from 17,690 gpd/ft to 22,055 gpd/ft beneath the Redtown Ranch Property (Table 3).

The range in transmissivity values across all formations can likely be attributed to variations in the aquifer permeability, net sand and aquifer thickness, proximity to aquifer boundary conditions (such as faults or recharge zones), partially penetrating wells (i.e.,

wells that do not fully penetrate the entire aquifer thickness or screen all the water-bearing sands), improperly conducted pumping tests or measurements during drawdown tests, and variations in estimating transmissivity from the Driscoll (1986) method. Therefore, hydraulic properties estimated from surrounding well data should only be used as general estimates, as site-specific hydraulic properties of the target aquifers beneath the Redtown Ranch Property can only be confirmed after test well drilling.

3.2.3 Storativity

LRE reviewed TWDB R-150 and R-18 to assess reported estimates of storativity calculated from constant-rate pumping tests in Anderson and Houston County, Texas. A storage coefficient of 0.00037 (or 3.7×10^{-4}) was calculated for the Middle Wilcox Group at the City of Palestine Well #1 (State Well Number 3811901) located in Anderson County approximately 15 miles northeast of the Redtown Ranch Property (Guyton & Associates, 1972). No other values of storage coefficient were reported from wells completed in the Carrizo-Wilcox aquifer in Anderson and Houston County.

3.2.4 Water Levels

Recent water level data for the target aquifers were obtained from surrounding wells in the TWDB and SDR Database. Water levels in the Carrizo Sand are anticipated to be at (or above) land surface to approximately 80 ft bls (195 to 225 ft msl) beneath the Redtown Ranch Property (Table 3)(Appendix E). Where water levels are anticipated to be above land surface, water levels are considered to be "artesian" and may be free flowing. Across the Redtown Ranch Property, this primarily occurs within the floodplain of the Trinity River. Several wells completed in the Carrizo Sand on the Redtown Ranch Property have reported "artesian" water levels, including State Well Numbers 3827401, 3827701, and the existing Redtown Ranch Well #9. Therefore, wells completed in the Carrizo Sand within the floodplain of the Trinity River may experience "free flowing" or artesian conditions. The water level elevation map for the Carrizo Sand beneath the Redtown Ranch Property from surrounding water level measurements is presented in Appendix E. In general, groundwater in the Carrizo Sand flows to the southeast beneath the Redtown Ranch Property (Appendix E).

Two surrounding wells (State Well Number 3827805 and Well Tracking Number 289056) completed in the Upper Wilcox and one surrounding well (State Well Number 3835203) completed in the Middle Wilcox reported "artesian" water levels in 1972 and 2012, respectively. Due to the lack of recent and available water level data for the Wilcox Group surrounding the Redtown Ranch Property, water level elevation maps using recent water level measurements were not prepared for the Wilcox Group aquifers.

3.3 EXTRACTED PROPERTIES FROM GROUNDWATER AVAILABILITY MODEL

The Texas Water Development Board has developed Groundwater Availability Models (GAMs) to simulate the impacts of groundwater pumping on aquifers and to provide estimates of groundwater availability for groundwater resource management and water planning purposes. In general, GAMs are not intended to be used for obtaining site-specific aquifer parameters but can be used to provide general estimates of hydraulic properties where site-specific and surrounding well data are limited. The Redtown Ranch Property lies within the extent of the Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifers GAM ("North QCSCW GAM") (Schorr and others, 2020). For modeling purposes, the North QCSCW GAM comprises the following aquifer units, from youngest to oldest, based on significant differences in geologic properties: Quaternary alluvium and younger units (Layer 1), Sparta Sand (Layer 2), Weches Formation (Layer 3), Queen City Sand (Layer 4), Reklaw Formation (Layer 5), Carrizo Sand (Layer 6), and the Wilcox Group, which is sub-divided into the Upper Wilcox (Layer 7), Middle Wilcox (Layer 8), and Lower Wilcox (Layer 9) (Schorr and others, 2020). Hydraulic properties from the North QCSCW GAM were extracted from the water-bearing units/layers from the cells beneath the Redtown Ranch Property and are summarized in Table 4.

Table 4. Hydraulic Properties for the Carrizo-Wilcox Aquifers Beneath the Redtown Ranch Property from the North QCSCW GAM

Model Layer	Top Elevation (ft msl)	Base Elevation (ft msl)	Depth to Base (ft bls)	Model Layer Thickness (ft)	Water Level Elevation (ft msl)	Storativity	Hydraulic Conductivity (gpd/ft^2)
6	10 – (-112)	(-198) – (-306)	360 – 585	155 – 222	208 – 190	0.0005 – 0.0007	52.7
7	(-198) – (-306)	(-890) – (-1,315)	1,080 – 1,510	585 – 1,090	247 – 227	0.0006 – 0.0008	29.5
8	(-890) – (-1,315)	(-1,475) – (-1,595)	1,675 – 1,830	228 – 685	192 – 172	0.001 – 0.0009	65.6

"North QCSCW GAM" indicates the Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifers Groundwater Availability Model (Schorr and others, 2020), "ft" indicates feet, "ft msl" indicates feet above mean sea level, "ft bls" indicates feet below land surface, land surface measured from NED (USGS, 2004), "gpd/ft^2" indicates gallons per day per foot squared, "--" indicates value not available/calculated.

3.3.1 Formation Depths

Structure data from the North QCSCW GAM indicate that the elevation for the top of the Carrizo Sand (Layer 6) is from 10 to -112 ft msl (155 to 390 ft bls) and the base of the Carrizo Sand is from -198 to -306 ft msl (360 to 585 ft bls), the base of the Upper Wilcox (Layer 7) is from -890 to -1,315 ft msl (1,080 to 1,510 ft bls), and the base of the Middle Wilcox (Layer 8) is from -1,475 to -1,595 ft msl (1,675 to 1,830 ft bls) from the cells beneath the Redtown Ranch Property (Table 4). As indicated, formation depths in the

North QCSCW GAM differ from formation depths obtained from surrounding geophysical logs.

3.3.2 Aquifer Thickness

Aquifer thickness for the model layers beneath the Redtown Ranch Property are approximately 155 to 222 feet thick for the Carrizo Sand (Layer 6), approximately 585 to 1,090 feet thick for the Upper Wilcox (Layer 7), and approximately 228 to 685 feet for the Middle Wilcox (Layer 8) beneath the Redtown Ranch Property (Table 4). Based on the North QCSCW GAM data, the Carrizo Sand thickens to the southeast, the Upper Wilcox thickens to the east, and the Middle Wilcox thickens to the east-northeast beneath the Redtown Ranch Property.

3.3.3 Hydraulic Conductivity

Beneath the Redtown Ranch Property, hydraulic conductivity values from the North QCSCW GAM are 52.7 gpd/ft^2 for the Carrizo Sand (Layer 6), 29.5 gpd/ft^2 for the Upper Wilcox (Layer 7), and 65.63 gpd/ft^2 for the Middle Wilcox (Layer 8)(Table 4). The hydraulic conductivity value of 29.5 gpd/ft^2 is consistent with the hydraulic conductivity value of 31 gpd/ft^2 calculated from a nearby well completed in the Upper Wilcox (Table 3)(Figure 7).

It should be noted that the vast majority of hydraulic conductivity values from the North QCSCW GAM are reported from wells located at or near the outcrop areas (Schorr and others, 2020). Therefore, the spatial distribution of hydraulic conductivity data in the deeper, downdip (confined) portions of the Carrizo-Wilcox aquifer is limited and does not likely represent aquifer conditions beneath the Redtown Ranch Property.

3.3.4 Storativity

Specific storage, expressed in per foot (ft^{-1}) units, were extracted from the North QCSCW GAM for cells beneath the Redtown Ranch Property. Storativity, a dimensionless property, was computed for each model layer by multiplying the aquifer net sand thickness (in feet)(Appendix C) by the specific storage coefficient (ft^{-1}) from the North QCSCW GAM (Schorr and others, 2020). Storage properties were specified in the North QCSCW GAM from Fryar and others (2003) and Kelley and others (2004) for the northern portions of the Queen City Sand and Carrizo-Wilcox aquifer system. Specific storage values from the North QCSCW GAM were assumed to be 4x10^{-6} ft^{-1} for the Carrizo and 4.5x10^{-6} ft^{-1} for all Wilcox model layers (Schorr and others, 2020). Storativity values range from approximately 0.0005 to 0.0007 for the Carrizo Sand (Layer 6), 0.0006 to 0.0008 for the Upper Wilcox (Layer 7), and 0.001 to 0.0009 for the Middle Wilcox (Layer 8) beneath the Redtown Ranch Property (Table 4).

3.3.5 Water Levels

Since water level data was not available from surrounding wells for the Wilcox aquifers, LRE extracted the 2015 water elevation contours from the North QCSCW GAM for the Upper Wilcox (Layer 7) and Middle Wilcox (Layer 8), as shown in Appendix E (Schorr and others, 2020). These water levels range from approximately 208 to 190 ft msl for the Carrizo (Layer 6), 247 to 227 ft msl for the Upper Wilcox (Layer 7), and approximately 192 to 172 ft msl for the Middle Wilcox (Layer 8) beneath the Redtown Ranch Property (Table 4)(Appendix E). Based on the 2015 water level elevations from the North QCSCW GAM, groundwater in the Upper Wilcox flows to the southeast and groundwater in the Middle Wilcox flows to the east beneath the Redtown Ranch Property (Appendix E).

SECTION 4: WATER QUALITY

The TCEQ regulates the quality of public water supplies using a defined set of primary and secondary drinking water standards for specific water quality constituents in accordance with 30 TAC §290.104 and §290.105. The TCEQ has established Maximum Contaminant Levels (MCLs) and Secondary Constituent Levels (SCLs) for several constituents of concern for organic, inorganic, microbial, and radionuclide contaminants. Water with constituent concentrations exceeding the MCLs pose a public health risk and must be treated and/or blended to bring the constituent levels below the MCL prior to distribution. Constituent concentrations exceeding the SCL are not considered a health risk but can cause aesthetic issues such as taste, color, or odor. Written approval from the TCEQ executive director is needed before water with constituent concentrations above the SCLs may be used for public supply. Water treatment or blending may also be required to lower the constituent concentrations below the SCLs. Per the TCEQ requirements, Anderson and Houston County are not considered “high-risk” counties for radionuclides, and therefore water quality analyses for radionuclides will not be required.

4.1.1 Site-Specific Water Quality Data

A&F collected a water sample from the existing Redtown Ranch Well #2 to assess the water quality beneath the Redtown Ranch Property. A&F collected a water sample on March 10, 2023 at the end of the 27-hour pumping test and submitted the sample to EastTX Environmental Laboratory for analysis of drinking water constituents. The water quality laboratory report for Well #2 is provided in Appendix F. The laboratory analysis results were compared to the TCEQ standards for drinking water and are summarized in Table 5. The laboratory results indicate that no constituents exceeded the TCEQ MCLs or SCLs for drinking water from the Redtown Ranch Well #2 (Table 5). Therefore, water quality of the Carrizo Sand meets all TCEQ standards for drinking water supplies.

Table 5. Reported Water Quality Results from the Existing Redtown Ranch Well #2

Water Quality Parameter	TCEQ Standard	Well #2 (Sampled 03/10/23)
Alkalinity, Total (mg/L as CaCO3)	NS	129
Aluminum, Total (µg/L as Al)	50 to 200**	4.65
Antimony, Total (µg/L as Sb)	6.00*	<1.00
Arsenic, Total (µg/L as As)	1.0*	<1.00
Barium, Total (µg/L as Ba)	2,000*	14.3
Beryllium, Total (µg/L as Be)	4.00*	<0.50
Bicarbonate (mg/L as HCO3)	NS	129
Bromide (mg/L as Br)	NS	<0.10
Cadmium, Total (µg/L as Cd)	5.00*	<1.00
Calcium, Total (mg/L)	NS	0.919
Chloride (mg/L as Cl)	300**	7
Chromium, Total (µg/L as Cr)	100*	<3.00
Copper, Total (mg/L as Cu)	1.00**	<0.05
Fluoride (mg/L as F)	2.0** or 4.0*	0.375
Total Hardness, Calc (mg/L as CaCO3)	NS	<5.00
Iron, Total (mg/L as Fe)	0.30**	<0.15
Lead, Total (mg/L as Pb)	0.015***	<0.005
Magnesium, Total (mg/L)	NS	<0.50
Manganese, Total (mg/L as Mn)	NS	3.73
Nickel, Total (µg/L as Ni)	NS	<2.00
Nitrate-Nitrite Nitrogen (mg/L as N)	10.00*	<0.02
Nitrate Nitrogen, Total (mg/L as N)	10.00*	<1.00
Nitrite Nitrogen, Total (mg/L as N)	1.00*	<0.05
pH, Lab (std units)	>7.0*	7.06
Selenium, Total (µg/L as Se)	50*	<5.00
Silver, Total (µg/L as Ag)	100**	<0.50
Sodium (mg/L as Na)	NS	69
Sulfate (mg/L as SO4)	300**	24.8
Thallium, Total (µg/L as Tl)	2.0*	<0.05
TDS, Sum of Constituents (mg/L)	1,000**	201
Zinc, Total (µg/L as Zn)	5,000**	9.84

"NS" indicates no TCEQ Standard, "<" indicates concentration is below the laboratory detection limit, "mg/L" indicates milligram per liter, "µ/L" indicates micrograms per liter.
**TCEQ MCL for Primary Drinking Water Standards*
***TCEQ Secondary Constituent Level for Secondary Drinking Water Standards*
****TCEQ Lead Action Level*

Total Dissolved Solids (TDS), expressed in milligrams per liter (mg/L), is a measure of all dissolved constituents in water and is commonly used as an indicator of water quality. The TWDB classifies groundwater quality into four broad categories; fresh (less than 1,000 mg/L), slightly-saline (1,000-3,000 mg/L), moderately-saline (3,000-10,000 mg/L),

and very-saline (10,000-35,000 mg/L)(LBG-Guyton Associates, 2003). The TCEQ SCL for TDS is 1,000 mg/L. Water quality results from the Redtown Ranch Well #2 indicate that water in the Carrizo Sand is fresh beneath the Redtown Ranch Property, with a TDS concentration of 201 mg/L (Table 5).

4.1.2 Surrounding Water Quality Data

LRE obtained reported water quality data from the TWDB Database from surrounding wells within approximately seven miles of the Redtown Ranch Property. This included data from 12 wells completed in the Carrizo Sand and three wells completed in the Wilcox Group aquifer. Figure 9 shows the locations of surrounding wells with reported water quality data for the Carrizo-Wilcox aquifer. Wells that were "dual completed" (i.e., screened in two aquifers) were not included in the dataset. Table 6 and Table 7 summarize the minimum, maximum, and median concentrations of constituents detected in surrounding wells and the number of wells with reported measurements for each water quality parameter for the Carrizo Sand and Wilcox Group aquifers, respectively. These water quality data were compared to the TCEQ MCLs and SCLs for public drinking water supplies. Only the most recent reported water quality data for each constituent in each well were analyzed.

Groundwater from the target aquifers within seven miles of the Redtown Ranch Property is generally fresh, with a median TDS concentration of 210 mg/L for the Carrizo Sand (Table 6), and 740 mg/L for the Wilcox Group aquifer (Table 7), as shown in Figure 9. Water quality results from surrounding wells completed in the Carrizo Sand are consistent with water quality results from the existing Redtown Ranch Well #2, which had a TDS concentration of 201 mg/L (Table 5). Therefore, the water quality of the Carrizo Sand beneath the Redtown Ranch Property is anticipated to be fresh (less than 1,000 mg/L TDS). The TCEQ SCL for TDS was exceeded in one well (State Well Number 3835203) completed in the Upper Wilcox Group at a concentration of 1,104 mg/L (Table 7). This well is located approximately 2.5 miles south of the Redtown Ranch Property and is the furthest well downdip with water quality results for the Wilcox Group (Figure 9). According to the TWDB R-18, this is the only well with water quality data for the Wilcox Group in Houston County, which is used for irrigation and livestock (Tarver, 1966). In general, mineralization of water increases with depth and distance from the outcrop (Tarver, 1966). Therefore, the water quality of the Wilcox Group beneath the Redtown Ranch Property is anticipated to be fresh to slightly-saline. Furthermore, it is anticipated that the Middle Wilcox may contain higher concentrations of TDS than the Upper Wilcox.

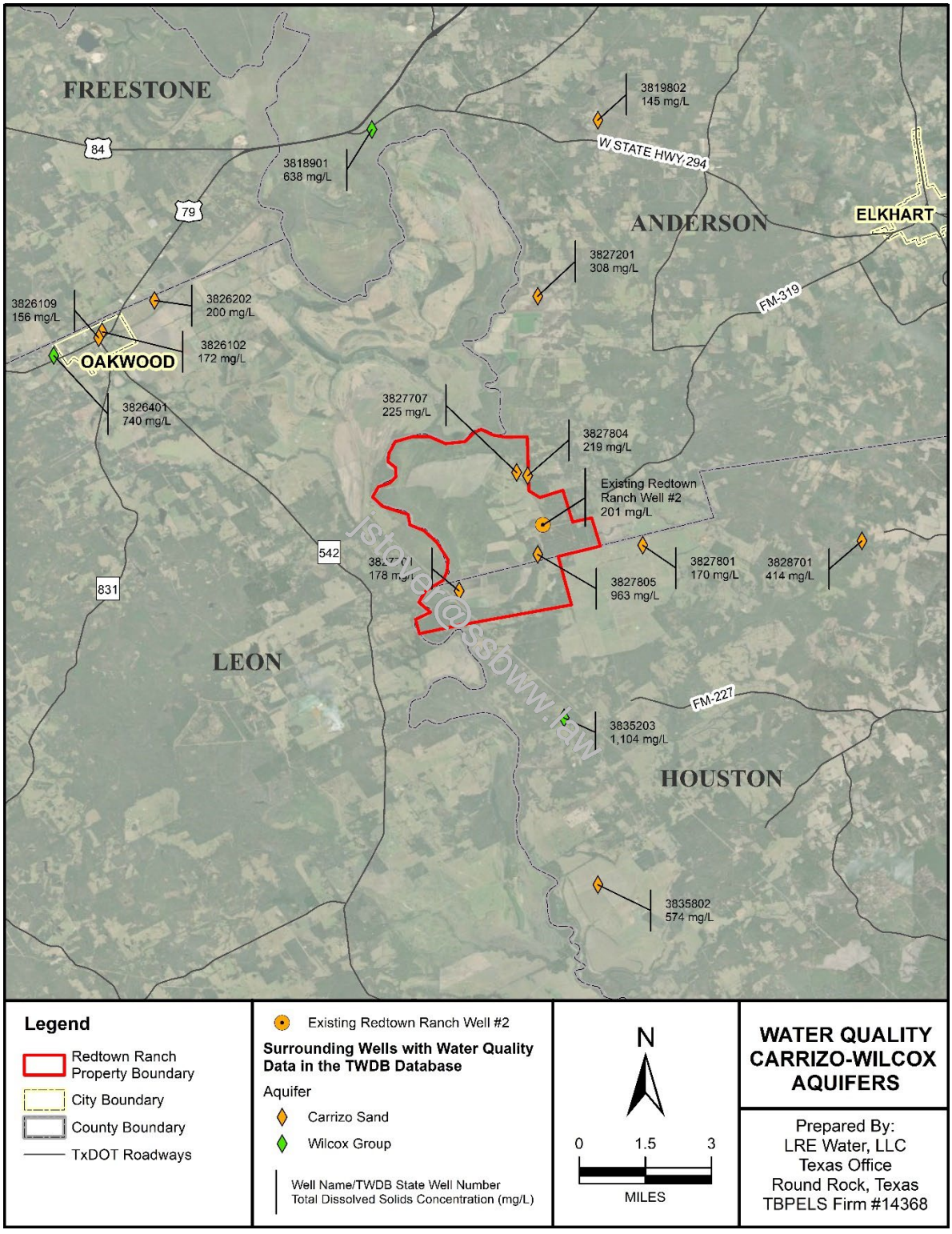


Figure 9. Surrounding Wells with Water Quality Data for the Carrizo-Wilcox Aquifers

Table 6. Reported Water Quality Results from the TWDB Database for the Carrizo Sand

Water Quality Parameter	TCEQ Standard	Carrizo Sand (12 Wells)			
		Min	Max	Median	Count
Alkalinity, Total (mg/L as CaCO3)	NS	65	800	152	12
Aluminum, Dissolved (mg/L as Al)	0.05 to 0.20**	<0.004	0.015	<0.004	3
Antimony, Dissolved (mg/L as Sb)	0.006*	<0.001	<0.001	<0.001	3
Arsenic, Dissolved (mg/L as As)	0.010*	<0.002	<0.002	<0.002	3
Barium, Dissolved (mg/L as Ba)	2.00*	0.02	0.10	0.03	3
Beryllium, Dissolved (mg/L as Be)	0.004*	<0.001	<0.001	<0.001	3
Bicarbonate, Calc (mg/L as HCO3)	NS	80	942	182	12
Bromide, Dissolved (mg/L as Br)	NS	<0.02	0.05	<0.04	3
Cadmium, Dissolved (mg/L as Cd)	0.005*	<0.001	<0.001	<0.001	3
Calcium (mg/L)	NS	1.2	18.0	4.0	11
Chloride, Total (mg/L as Cl)	300**	5	59	9	11
Chromium, Dissolved (mg/L as Cr)	0.100*	<0.001	0.005	<0.002	3
Copper, Dissolved (mg/L as Cu)	1.000**	<0.001	0.005	<0.001	3
Fluoride, Dissolved (mg/L as F)	2.0** or 4.0*	0.1	1.3	0.3	10
Total Hardness, Calc (mg/L as CaCO3)	NS	5	47	19	12
Iron, Total (mg/L as Fe)	0.30**	0.04	2.7	0.79	5
Lead, Dissolved (mg/L as Pb)	0.015***	<0.001	<0.001	<0.001	3
Magnesium (mg/L)	NS	<0.5	3	<2.0	11
Mercury, Dissolved (mg/L as Hg)	0.002*	<0.0002	<0.0002	<0.0002	2
Nitrate Nitrogen Dissolved Calc (mg/L as N)	10.00*	<0.02	2.00	<0.20	11
Nitrite Nitrogen, Dissolved (mg/L as N)	1.00*	<0.01	<0.01	<0.01	1
pH, Field (std units)	>7.0*	6.5	8.7	7.7	11
Potassium, Total (mg/L as K)	NS	2.0	3.9	3.0	2
Selenium, Dissolved (mg/L as Se)	0.050*	<0.004	<0.004	<0.004	3
Silica, Dissolved (mg/L as SiO2)	NS	11	15	12	11
Silver, Dissolved (mg/L as Ag)	0.100**	<0.001	<0.01	<0.006	2
Sodium, Total (mg/L as Na)	NS	50	401	81	11
Sulfate, Total (mg/L as SO4)	300**	4	35	22	11
Temperature (Celsius)	NS	20.0	24.4	22.3	5
Thallium, Dissolved (mg/L as Tl)	0.002*	<0.001	<0.001	<0.001	3
TDS, Sum of Constituents (mg/L)	1,000**	145	963	210	12
Zinc, Dissolved (mg/L as Zn)	5.000**	<0.004	0.021	<0.005	3

Cells highlighted in Red indicate TCEQ MCL exceedance, "NS" indicates no TCEQ Standard, "<" indicates concentration is below the laboratory detection limit or was flagged as a conversion error in TWDB Database, "mg/L" indicates milligram per liter, "Calc" indicates constituent was calculated.
**TCEQ MCL for Primary Drinking Water Standards*
***TCEQ Secondary Constituent Level for Secondary Drinking Water Standards*
**** TCEQ Lead Action Level*

Table 7. Reported Water Quality Results from the TWDB Database for the Wilcox Group

Water Quality Parameter	TCEQ Standard	Wilcox Group (3 Wells)			
		Min	Max	Median	Count
Alkalinity, Total (mg/L as CaCO3)	NS	559	884	652	3
Aluminum, Dissolved (mg/L as Al)	0.05 to 0.20**	NA	NA	NA	0
Antimony, Dissolved (mg/L as Sb)	0.006*	NA	NA	NA	0
Arsenic, Dissolved (mg/L as As)	0.010*	NA	NA	NA	0
Barium, Dissolved (mg/L as Ba)	2.00*	NA	NA	NA	0
Beryllium, Dissolved (mg/L as Be)	0.004*	NA	NA	NA	0
Bicarbonate, Calc (mg/L as HCO3)	NS	NA	NA	NA	0
Bromide, Dissolved (mg/L as Br)	NS	NA	NA	NA	0
Cadmium, Dissolved (mg/L as Cd)	0.005*	NA	NA	NA	0
Calcium (mg/L)	NS	1.8	6.8	4.8	3
Chloride, Total (mg/L as Cl)	300**	20	83	29	3
Chromium, Dissolved (mg/L as Cr)	0.100*	NA	NA	NA	0
Copper, Dissolved (mg/L as Cu)	1.000**	NA	NA	NA	0
Fluoride, Dissolved (mg/L as F)	2.0** or 4.0*	0.5	1.9	1.2	3
Total Hardness, Calc (mg/L as CaCO3)	NS	4	28	13	3
Iron, Total (mg/L as Fe)	0.30**	0.09	0.23	0.16	2
Lead, Dissolved (mg/L as Pb)	0.015***	NA	NA	NA	0
Magnesium (mg/L)	NS	0.1	2.7	0.4	3
Mercury, Dissolved (mg/L as Hg)	0.002*	NA	NA	NA	0
Nitrate Nitrogen Dissolved Calc (mg/L as N)	10.00*	0	<0.04	0	3
Nitrite Nitrogen, Dissolved (mg/L as N)	1.00*	NA	NA	NA	0
pH, Field (std units)	>7.0*	7.7	8.5	8.3	3
Potassium, Total (mg/L as K)	NS	2	2	2	1
Selenium, Dissolved (mg/L as Se)	0.050*	NA	NA	NA	1
Silica, Dissolved (mg/L as SiO2)	NS	13	17	15	2
Silver, Dissolved (mg/L as Ag)	0.100**	NA	NA	NA	0
Sodium, Total (mg/L as Na)	NS	259	463	313.3	3
Sulfate, Total (mg/L as SO4)	300**	0	4.8	1.9	3
Temperature (Celsius)	NS	24	24	24	1
Thallium, Dissolved (mg/L as Tl)	0.002*	NA	NA	NA	0
TDS, Sum of Constituents (mg/L)	1,000**	638	1,104	740	3
Zinc, Dissolved (mg/L as Zn)	5.00**	NA	NA	NA	0

Cells highlighted in Yellow indicate TCEQ Secondary Standard exceedance, "NS" indicates no TCEQ Standard, "<" indicates concentration is below the laboratory detection limit or was flagged as a conversion error in TWDB Database, "mg/L" indicates milligram per liter, "Calc" indicates constituent was calculated, "NA" indicates constituent not analyzed.
**TCEQ MCL for Primary Drinking Water Standards*
***TCEQ Secondary Constituent Level for Secondary Drinking Water Standards*
**** TCEQ Lead Action Level*

The TCEQ MCL for pH (>7.0 standard units) was not met in one well completed in the Carrizo Sand (State Well Number 3826109)(Table 6). The pH concentration of water produced from the existing Redtown Ranch Well #2 had a reported pH concentration of 7.06 standard units from the Carrizo Sand (Table 5). Therefore, the concentration of pH in the Carrizo Sand beneath the Redtown Ranch Property is anticipated to meet the TCEQ MCL for pH.

The TCEQ SCL for iron (0.3 mg/L) was exceeded in four wells completed in the Carrizo Sand (State Well Numbers 3819802, 3826102, 3827801, and 3835802), with a maximum concentration of 2.7 mg/L and a median concentration of 0.79 mg/L (Table 6). In the TWDB R-18, Tarver (1966) indicates that chemical analyses for several wells in the Carrizo Sand reported iron constituents exceeding the TCEQ SCL of 0.3 mg/L, which may cause some concern. However, water quality results from the existing Redtown Ranch Well #2 indicate iron concentrations of less than 0.15 mg/L (Table 5). Therefore, the concentration of iron in the Carrizo Sand is not anticipated to exceed the TCEQ SCL of 0.30 mg/L beneath the Redtown Ranch Property.

SECTION 5: WELL SPACING REQUIREMENTS

According to 16 TAC §76.100, public supply wells shall be located a minimum horizontal distance of 150-feet from any concentrated sources of potential contamination. LRE reviewed publicly available databases to identify potential sources of contamination (PSOCs) within and surrounding the Redtown Ranch Property. Data sources included the TCEQ Source Water Assessment and Protection Viewer, the TWDB and SDR Database, the RRC Public Data Viewer, and the FEMA National Flood Hazard Layer (NFHL) Viewer.

5.1 TCEQ WELL SETBACK DISTANCE REQUIREMENTS

According to 30 TAC §290.41(c)(A)-(E), public groundwater sources shall be located at distances from potential hazards so that there will be no danger of pollution from flooding or unsanitary surroundings, such as privies, sewage, sewage treatment plants, livestock, solid waste disposal sites, or underground petroleum and chemical storage tanks and liquid transmission pipelines or abandoned or improperly sealed wells. Specifically, no well site shall be located within 50 feet of a sanitary sewer, septic tank, storm sewer, livestock pasture, or cemetery; within 150 feet of a septic tank perforated drain field, areas irrigated by low dosage, low angle spray on-site sewage facilities, absorption beds, improperly constructed water wells, or underground petroleum and chemical storage tanks or liquid transmission pipelines; within 300 feet of a sewage wet well, sewage pumping station or a drainage ditch which contains industrial waste discharge; within 500 feet of a sewage treatment plants, animal feed lots, solid disposal sites, or lands on which

sewage plant or septic tank sludge is applied. In addition, all known abandoned or inoperative wells within a ¼-mile of the proposed well site shall be reported to the TCEQ, which include landfill and dump sites, animal feedlots, military or industrial facilities, wood-treatment facilities, and/or liquid petroleum storage and transmission facilities.

Figure 10 presents the potential sources of contamination within and surrounding the Redtown Ranch Property identified in the publicly available databases. As shown, there were no identified PSOCs from the TCEQ Source Water Assessment and Protection Viewer located on the Redtown Ranch Property (Figure 10). Per the RRC Viewer, there are several dry holes, cancelled/abandoned wells, shut-in gas wells, and pipelines located throughout the Redtown Ranch Property (Figure 10). In addition, there are several domestic and rig supply wells from the SDR and TWDB Database located throughout the Redtown Ranch Property that are considered to be "improperly constructed" water wells (i.e., not constructed to public-supply standards), as shown in Figure 10. New public supply wells shall be located at distances from PSOCs in accordance with 30 TAC §290.41(A)-(E) to satisfy the TCEQ well setback distance requirements. Prior to well construction and permitting with the TCEQ, a well pollution hazard survey will be conducted at each wellsite to verify that no other potential sources of contamination exist within the well setback distances.

5.1.1 FLOOD ZONES

In general, a public supply well shall be located at a site not generally subject to flooding, per the 16 TAC §76.100(a)(3). However, if a public supply well is to be placed in a flood-prone area, it shall be completed with a watertight sanitary well seal with a steel sleeve extending a minimum of 36 inches above ground level and 24 inches below the ground surface. The Trinity River borders the northern and western boundaries of the Redtown Ranch Property, Box Creeks borders part of the northern property boundary, and a tributary of the Trinity River crosses the southeast corner of the Redtown Ranch Property (Figure 10). Areas within and adjacent to these rivers and creeks are identified as Special Flood Hazard Areas (SFHAs) with having a 1-percent annual chance of flooding ("Zone A"). Ideally, proposed public supply wells shall be located in areas not identified as a SFHA ("Zone X"). However, most of the western portion of the Redtown Ranch Property is located within a SFHA ("Zone A") and therefore some of the proposed wells will be located in a SFHA. Proposed wells located in the SFHAs should be designed so that the wellhead is completed above the Base Flood Elevation (BFE) to minimize contamination from flooding.

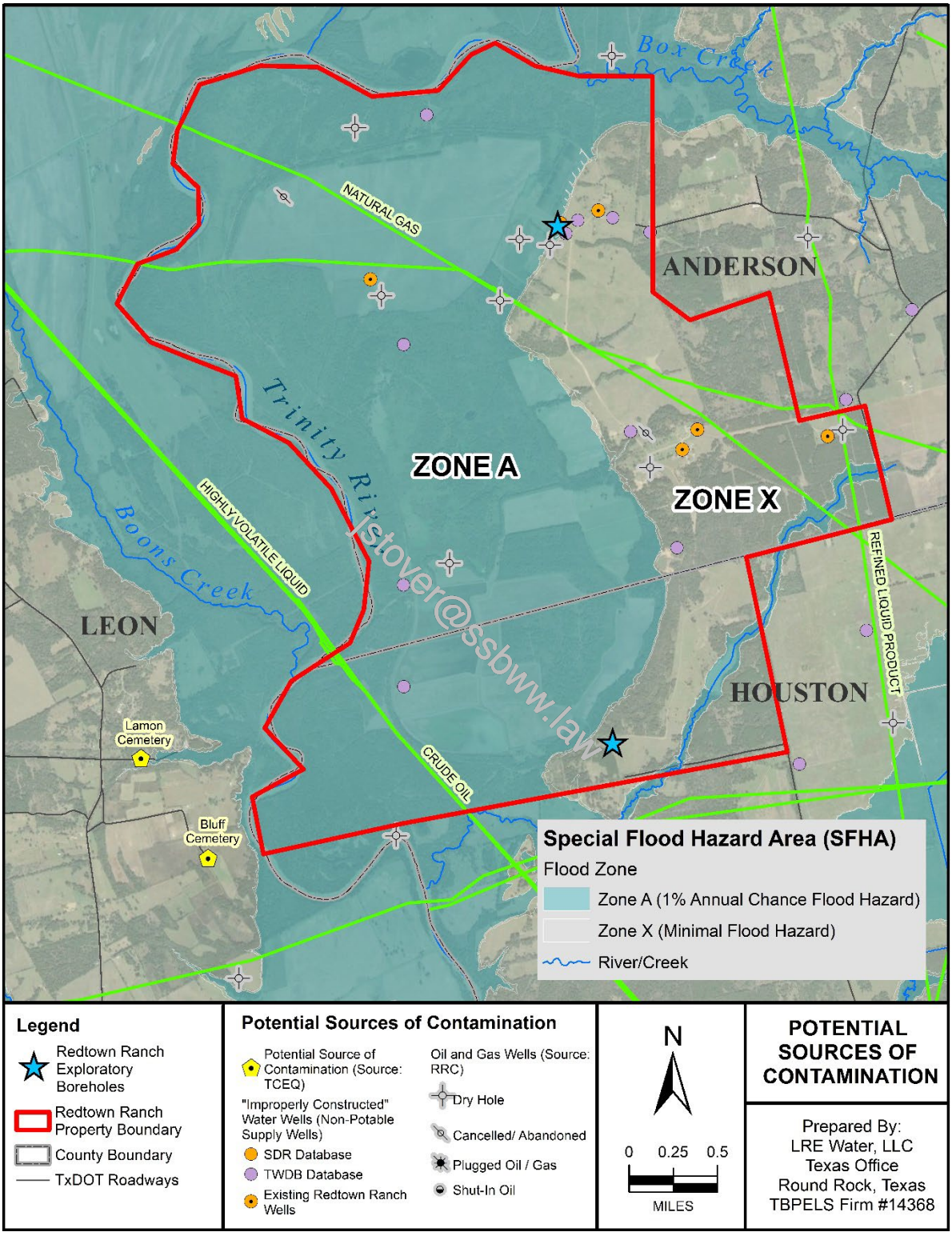


Figure 10. Potential Sources of Contamination

5.2 NTVGCD WELL SPACING REQUIREMENTS

The Redtown Ranch Property partially lies within the jurisdiction of the Neches and Trinity Valley Groundwater Conservation District ("NTVGCD" or "District"), which regulates the use of groundwater in Anderson County. The NTVGCD has adopted Rules (Effective June 11, 2003, Amended as of September 17, 2020) to regulate groundwater withdrawals by means of well spacing in order to minimize drawdown of the water table or the reduction of artesian pressure, prevent interference between wells, prevent degradation of water quality, prevent waste, and to facilitate DFC achievement. LRE reviewed the District's Rules to identify requirements pertaining to well spacing for non-exempt wells within the District boundaries.

New wells located in Anderson County must comply with the following minimum well spacing requirements:

1. Well(s) shall be located a minimum of 50 feet from any adjacent property line; and
2. Well(s) shall be located a minimum horizontal distance to prevent overlapping cones of depression resulting from production rates.

SECTION 6: ANALYTICAL GROUNDWATER MODELING

LRE conducted analytical groundwater modeling to estimate well yields and well-to-well interference between proposed wells on the Redtown Ranch Property. LRE used proprietary software that utilizes the Cooper-Jacob (1946) equation to simulate the proposed production and estimate well yields for wells on the Redtown Ranch Property that are completed in the Carrizo-Wilcox aquifer.

6.1 MODEL ASSUMPTIONS

When estimating well yields, LRE limits pumping water levels in the wellbore to ensure that at least 30-50% of the artesian (confined) pressure remains in the aquifer after a specified period. This provides a "safety factor" with respect to unforeseen interference effects from future groundwater users and unknown aquifer or operational conditions, such as areas of low transmissivity or lower well efficiency. Several factors can influence well yield, including aquifer hydraulic properties, aquifer boundary conditions, net sand thickness, well efficiency, well spacing (with respect to nearby pumping wells screened in the same aquifer), and pump characteristics. The modeling assumes that the proposed wells are 12-inch diameter wells operating at 70% efficiency. For public supply wells, LRE modeled the average continuous rates that can be sustained from the aquifer for over 50 years. Model scenarios assume that the proposed wells are pumping 24/7/365 to simulate the "maximum" drawdown impacts for each pumping scenario. If the proposed wells will

not be pumping 24/7/365, then the impacts will be less than those presented herein. For confined aquifers, available drawdown is measured from static water level to the top of the aquifer or screen. LRE modeled the well yields so that 30-50% of the aquifer's artesian pressure remains in the aquifer after pumping the proposed well(s) for 50 years. LRE used "50% remaining available drawdown" as a more "conservative" approach and "30% remaining available drawdown" as a more "aggressive" approach when estimating well yields. Therefore, this assumes that with 50% remaining available drawdown, the amount of water in the aquifer will be reduced by half after 50 years of continuous pumping. Alternatively, the more aggressive approach results in higher well yields that will leave 30% of the available drawdown remaining in the aquifer after 50 years of continuous pumping.

6.2 PROPOSED WELL LOCATIONS

LRE developed conceptual wellfields for the target aquifers beneath the Redtown Ranch Property, as presented in Figure 11. Proposed wells were located in areas of favorable hydraulic properties (i.e., higher transmissivity, hydraulic conductivity, and net sands) to maximize individual well yields. In addition, proposed wells were spaced throughout the Redtown Ranch Property to minimize well interference between wells completed in the same aquifer. Furthermore, proposed wells were located in accordance with the TCEQ well setback distance requirements and the NFV/GCD well spacing requirements for wells in Anderson County.

For the purpose of this study, each wellsite was issued a numerical number (numbers "1" through "12") and each proposed well was identified with the wellsite number that the well is located at and the designated aquifer that the proposed well will produce from (where "CZ" = Carrizo Sand, "UWLX" = Upper Wilcox, and "MWLX" = Middle Wilcox). Multiple wells may be located at the same wellsite where hydraulic properties were favorable for several target aquifers (Figure 11). This configuration assumes that multiple wells at the same wellsite produce from different target aquifers and the aquifers are not hydraulically connected. In some cases, there may only be two wells at a wellsite if the hydraulic properties for the other target aquifer(s) were not favorable.

6.3 MODEL INPUT PARAMETERS

Input parameters for the proposed wells used in the analytical groundwater modeling are provided in Table 8 for the Carrizo Sand, Table 9 for the Upper Wilcox Aquifer, and Table 10 for the Middle Wilcox Aquifer.

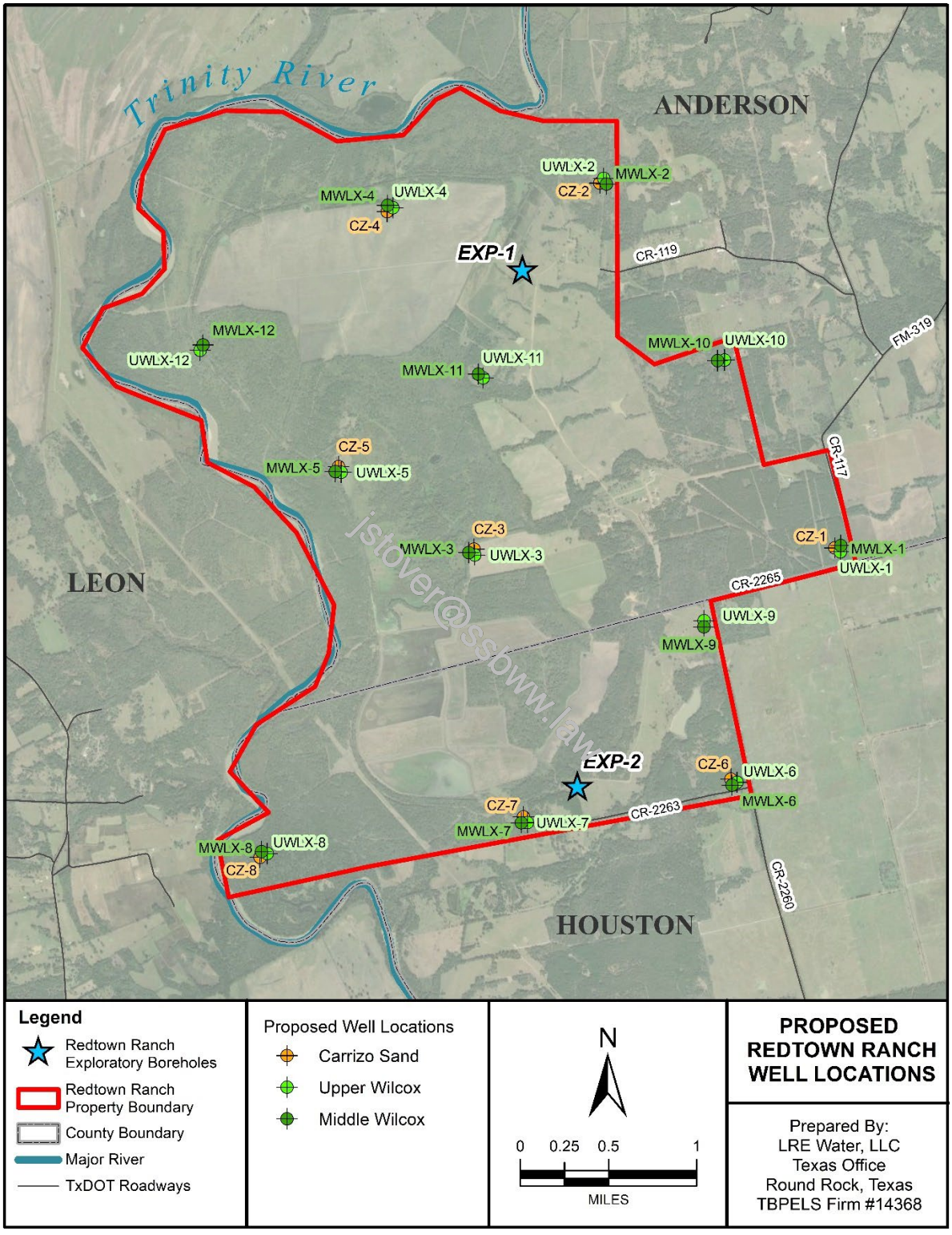


Figure 11. Proposed Well Locations

Table 8. Model Input Parameters for Proposed Wells Completed in the Carrizo Sand on the Redtown Ranch Property

Proposed Well	Latitude (NAD83)	Longitude (NAD83)	Aquifer	County	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)	Pump Setting (ft bls)	Static Water Level (ft bls)	Storativity	K Value from Well #2 Pumping Test (gpd/ft^2)	K Value from Surrounding Wells (gpd/ft^2)	Transmissivity Using K Value of 222.5 gpd/ft^2 (gpd/ft)	Transmissivity Using K Value of 333.3 gpd/ft^2 (gpd/ft)
CZ-1	31.518432	-95.686293	Carrizo Sand	Anderson	345	510	165	165	295	80	0.00009	222.5	333.3	36,715	54,995
CZ-2	31.547937	-95.709707	Carrizo Sand	Anderson	295	445	150	145	245	30	0.00009	222.5	333.3	32,265	48,330
CZ-3	31.517594	-95.720901	Carrizo Sand	Anderson	300	460	160	160	250	0	0.00009	222.5	333.3	35,600	53,330
CZ-4	31.545161	-95.730047	Carrizo Sand	Anderson	265	420	155	145	215	0	0.00009	222.5	333.3	32,265	48,330
CZ-5	31.524103	-95.734092	Carrizo Sand	Anderson	280	440	160	155	230	0	0.00009	222.5	333.3	34,490	51,660
CZ-6	31.499206	-95.695716	Carrizo Sand	Houston	330	500	170	170	278	65	0.00009	222.5	333.3	37,825	56,660
CZ-7	31.495684	-95.715513	Carrizo Sand	Houston	300	470	170	170	250	25	0.00009	222.5	333.3	37,825	56,660
CZ-8	31.491824	-95.740675	Carrizo Sand	Houston	300	470	170	170	250	0	0.00009	222.5	333.3	37,825	56,660

"NAD83" indicates North American Datum of 1983, "ft bls" indicates feet below land surface, land surface from NED (USGS, 2004), "ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpd/ft" indicates gallons per day per foot, K = Hydraulic Conductivity.

Table 9. Model Input Parameters for Proposed Wells Completed in the Upper Wilcox Aquifer on the Redtown Ranch Property

Proposed Well	Latitude (NAD83)	Longitude (NAD83)	Aquifer	County	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)	Pump Setting (ft bls)	Static Water Level (ft bls)*	Storativity*	K Value from GAM* and Surrounding Wells (gpd/ft^2)	K Value from Surrounding Wells (gpd/ft^2)	Transmissivity Using K Value of 31 gpd/ft^2 (gpd/ft)	Transmissivity Using K Value of 287.3 gpd/ft^2 (gpd/ft)
UWLX-1	31.518123	-95.685752	Upper Wilcox	Anderson	705	1,215	510	145	600	65	0.0007	31	287.3	4,495	41,660
UWLX-2	31.548341	-95.709335	Upper Wilcox	Anderson	655	1,180	525	145	550	20	0.0007	31	287.3	4,495	41,660
UWLX-3	31.517114	-95.720821	Upper Wilcox	Anderson	605	1,130	525	150	520	0	0.0007	31	287.3	4,650	43,095
UWLX-4	31.545485	-95.729504	Upper Wilcox	Anderson	600	1,130	530	155	500	0	0.0007	31	287.3	4,805	44,530
UWLX-5	31.523635	-95.733832	Upper Wilcox	Anderson	600	1,130	530	155	510	0	0.0007	31	287.3	4,805	44,530
UWLX-6	31.498966	-95.695118	Upper Wilcox	Houston	695	1,215	520	135	600	55	0.0006	31	287.3	4,185	38,785
UWLX-7	31.495227	-95.715124	Upper Wilcox	Houston	640	1,160	520	140	550	10	0.0006	31	287.3	4,340	40,220
UWLX-8	31.492151	-95.740006	Upper Wilcox	Houston	610	1,135	525	140	510	0	0.0006	31	287.3	4,340	40,220
UWLX-9	31.512172	-95.698673	Upper Wilcox	Houston	695	1,210	515	145	600	60	0.0007	31	287.3	4,495	41,660
UWLX-10	31.53364	-95.697315	Upper Wilcox	Anderson	700	1,210	510	155	600	65	0.0007	31	287.3	4,805	44,530
UWLX-11	31.531692	-95.720436	Upper Wilcox	Anderson	645	1,175	530	150	550	25	0.0007	31	287.3	4,650	43,095
UWLX-12	31.533374	-95.747637	Upper Wilcox	Anderson	585	1,125	540	165	500	0	0.0007	31	287.3	5,115	47,405

"NAD83" indicates North American Datum of 1983, "ft bls" indicates feet below land surface, land surface from NED (USGS, 2004), "ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpd/ft" indicates gallons per day per foot, K = Hydraulic Conductivity, "" indicates value from the North QCSCW GAM (Schorr and others, 2020).*

Table 10. Model Input Parameters for Proposed Wells Completed in the Middle Wilcox Aquifer on the Redtown Ranch Property

Proposed Well	Latitude (NAD83)	Longitude (NAD83)	Aquifer	County	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)	Pump Setting (ft bls)	Static Water Level (ft bls)*	Storativity*	K Value from GAM* (gpd/ft^2)	Transmissivity Using K Value of 65.63 gpd/ft^2 (gpd/ft)
MWLX-1	31.51863	-95.685727	Middle Wilcox	Anderson	1,215	1,800	585	220	990	145	0.001	65.63	14,440
MWLX-2	31.547869	-95.709071	Middle Wilcox	Anderson	1,180	1,790	610	235	925	95	0.001	65.63	15,425
MWLX-3	31.517293	-95.721394	Middle Wilcox	Anderson	1,130	1,720	590	235	900	55	0.001	65.63	15,425
MWLX-4	31.545674	-95.73002	Middle Wilcox	Anderson	1,135	1,735	600	230	885	55	0.001	65.63	15,095
MWLX-5	31.52368	-95.734393	Middle Wilcox	Anderson	1,130	1,725	595	235	910	55	0.001	65.63	15,425
MWLX-6	31.498713	-95.695601	Middle Wilcox	Houston	1,215	1,780	565	215	985	130	0.001	65.63	14,110
MWLX-7	31.495197	-95.715715	Middle Wilcox	Houston	1,160	1,740	580	230	910	80	0.001	65.63	15,095
MWLX-8	31.492297	-95.740562	Middle Wilcox	Houston	1,135	1,730	595	255	885	55	0.001	65.63	16,735
MWLX-9	31.511676	-95.698664	Middle Wilcox	Houston	1,210	1,790	580	220	980	135	0.001	65.63	14,440
MWLX-10	31.533583	-95.697982	Middle Wilcox	Anderson	1,210	1,810	600	230	990	140	0.001	65.63	15,095
MWLX-11	31.53199	-95.720896	Middle Wilcox	Anderson	1,175	1,770	595	230	950	100	0.001	65.63	15,095
MWLX-12	31.533823	-95.747392	Middle Wilcox	Anderson	1,125	1,720	595	230	890	50	0.001	65.63	15,095

"NAD83" indicates North American Datum of 1983, "ft bls" indicates feet below land surface, land surface from NED (USGS, 2004), "ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpd/ft" indicates gallons per day per foot, K = Hydraulic Conductivity, "" indicates value from the North QCSCW GAM (Schorr and others, 2020).*

The model input parameters used to estimate well yields include the well coordinates in latitude and longitude (decimal degrees, NAD 1983 coordinate system), top of the screen (ft bls), bottom of the screen (ft bls), aquifer thickness (ft), net sand thickness (ft), pump setting depth (ft bls), static water level (ft bls), storativity (dimensionless), hydraulic conductivity (gpd/ft^2), and transmissivity (gpd/ft). These parameters are based on the site-specific and estimated hydraulic properties from surrounding wells, including data obtained from the pumping test conducted at the existing Redtown Ranch Well #2, surrounding well data from the TWDB and SDR Database, geologic structure/net sand thickness maps and data extracted from the North QCSCW GAM (Schorr and others, 2020). Pump setting depths for the proposed wells assume that pumping water levels in the wellbore will be at least 30 feet above the pump setting depth.

LRE determined the target production zones for each proposed well location using the structure maps and net sand thickness maps provided in Appendix B and Appendix C, respectively. The target production zones (i.e., the "top of the screen" and the "bottom of the screen") are equivalent to the "top" and "bottom" of the aquifer. Aquifer thickness was calculated from the bottom of the aquifer to the top of the aquifer (in feet). Net sand thickness was extracted from the net sand maps at each proposed well location (Appendix C) and is equal to the anticipated screen length (in feet).

Static water levels for the Carrizo Sand were obtained from existing wells on the Redtown Ranch Property and surrounding wells in the SDR and TWDB Database with recent water level measurements (Appendix E). Where recent water level measurements were not available from surrounding wells (particularly for the Wilcox Group), LRE used the 2015 Water Level Elevations from the North QCSCW GAM (Schorr and others, 2020) and assumed current water levels to be 20 feet lower than the 2015 Water Level Elevations (Appendix E). At some of the proposed well locations (particularly in close proximity to the Trinity River), static water levels are anticipated to be at land surface (i.e., artesian) in the Carrizo Sand and Upper Wilcox (Appendix E).

Storativity for the Carrizo Sand was calculated from the pumping test at the existing Redtown Ranch Well #2 and #3 (observation well), which was 0.00009 (Table 8). Storativity values for the proposed wells completed in the Wilcox Group were calculated by multiplying net sand thickness of the aquifer at the proposed well location (in feet) by a specific storage value of 4.5×10^{-6} ft^{-1} from the North QCSCW GAM (Schorr and others, 2020), which range from 0.0006 to 0.0007 for the Upper Wilcox (Table 9) and 0.001 for the Middle Wilcox (Table 10) beneath the proposed well locations.

LRE calculated transmissivity values for the Carrizo Sand beneath the proposed well locations using the Carrizo net sand thickness (Appendix C) and hydraulic conductivity value of 222.5 gpd/ft^2 from the Well #2 pumping test (Table 3), which results in transmissivity values ranging from 32,265 gpd/ft to 37,825 gpd/ft (Table 8). In addition, LRE calculated transmissivity values for the Carrizo Sand beneath the proposed well locations using the Carrizo net sand thickness (Appendix C) and a hydraulic conductivity value of 333.3 gpd/ft^2 from surrounding wells (Table 3), which results in transmissivity values ranging 48,330 gpd/ft to 56,660 gpd/ft (Table 8).

LRE calculated transmissivity values for the Upper Wilcox by multiplying the estimated hydraulic conductivity from surrounding wells and the North QCSCW GAM by the Upper Wilcox net sand thickness (Appendix C). The hydraulic conductivity value of 31 gpd/ft^2 from surrounding wells (Table 3) is also consistent with the hydraulic conductivity value of 29.5 gpd/ft^2 for the Upper Wilcox (Layer 7) from the North QCSCW GAM (Table 4) for the cells beneath the Redtown Ranch Property (Table 9). Transmissivity values for the Upper Wilcox beneath the proposed well locations using a hydraulic conductivity value of 31 gpd/ft^2 results in transmissivity values ranging from 4,185 gpd/ft to 5,115 gpd/ft (Table 9). In addition, LRE calculated transmissivity values for the Upper Wilcox using an average hydraulic conductivity value of 287.3 gpd/ft^2 (Table 3), which results in transmissivity values ranging from 38,785 gpd/ft to 47,405 gpd/ft beneath the proposed well locations (Table 9).

Hydraulic conductivity values from the North QCSCW GAM for the Middle Wilcox (Layer 8) was 65.63 gpd/ft^2 (Table 4), which is within the range of hydraulic conductivity values obtained from surrounding well data (Table 3). Transmissivity for the Middle Wilcox beneath the proposed well locations was calculated by multiplying the hydraulic conductivity from the North QCSCW GAM (Table 4) by the Middle Wilcox net sand thickness (Appendix C), which resulted in estimates of transmissivity ranging from 14,110 gpd/ft to 16,735 gpd/ft (Table 10).

6.4 ESTIMATED WELL YIELDS

For this work, LRE modeled groundwater production at the proposed well locations using the model input parameters in Tables 8, 9 and 10. LRE modeled well yields for the target aquifers over 50 years and presented the results in Table 11 for wells completed in the Carrizo Sand, Table 12 for wells completed in the Upper Wilcox, and Table 13 for wells completed in the Middle Wilcox. Well yields are the pumping rates that the aquifer/well can sustain for long-term use (50 years). Cumulative drawdown (in feet) was calculated for each proposed well based on the well yield and pumping scenario.

Cumulative drawdown values include drawdown imposed from the pumping well and any well interference from nearby pumping wells completed in the same aquifer. The provided well yields assume that all proposed wells are pumping simultaneously.

Well yields from the Carrizo Sand with estimates of transmissivity using a hydraulic conductivity of 222.5 gpd/ft^2 range from 350 to 500 gpm (3,150 gpm or 5,081 ac-ft/yr) with 50% artesian pressure remaining, and 400 to 800 gpm (4,300 gpm or 6,936 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years from proposed wells on the Redtown Ranch Property (Table 11). Well yields from the Carrizo Sand with estimates of transmissivity using a hydraulic conductivity value of 333.3 gpd/ft^2 range from 450 to 800 gpm (4,600 gpm or 7,420 ac-ft/yr) with 50% artesian pressure remaining, and 600 to 1,150 gpm (6,350 gpm or 10,243 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years (Table 11).

Well yields from the Upper Wilcox with estimates of transmissivity using a hydraulic conductivity of 31 gpd/ft^2 are approximately 200 gpm (1,200 gpm or 1,936 ac-ft/yr) with 50% artesian pressure remaining, and 200 to 250 gpm (1,850 gpm or 2,984 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years (Table 12). Due to the lower estimates of transmissivity, some of the proposed well locations are not included in the pumping scenarios (where pumping rate = "0" gpm) to allow for higher individual well yields. Well yields from the Upper Wilcox with estimates of transmissivity using a hydraulic conductivity value of 287.3 gpd/ft^2 range from 800 to 1,100 gpm (10,900 gpm or 17,582 ac-ft/yr) with 50% artesian pressure remaining, and 1,000 to 1,400 gpm (14,800 gpm or 23,872 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years (Table 12). Due to the variability of these well yields, transmissivity for the Upper Wilcox should be confirmed with site-specific data.

Well yields for the Middle Wilcox with transmissivity estimates using a hydraulic conductivity of 65.63 gpd/ft^2 range from 600 to 800 gpm (7,900 gpm or 12,743 ac-ft/yr) with 50% artesian pressure remaining, and 800 to 1,100 gpm (10,750 gpm or 17,340 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years (Table 13). These estimates are based on hydraulic conductivity values from the North QCSCW GAM and should be confirmed with site-specific data.

Table 11. Estimated Well Yields for Proposed Wells Completed in the Carrizo Sand on the Redtown Ranch Property

Proposed Well	County	50% Remaining Available Drawdown		30% Remaining Available Drawdown		50% Remaining Available Drawdown		30% Remaining Available Drawdown	
		Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)
		Transmissivity Using K Value of 222.5 gpd/ft^2				Transmissivity Using K Value of 333.3 gpd/ft^2			
CZ-1	Anderson	400	137	500	182	550	136	750	186
CZ-2	Anderson	350	137	400	176	450	133	650	184
CZ-3	Anderson	400	145	600	202	650	151	950	210
CZ-4	Anderson	400	143	500	188	500	142	600	181
CZ-5	Anderson	400	145	500	192	550	143	750	195
CZ-6	Houston	350	132	500	182	550	137	750	186
CZ-7	Houston	350	134	500	185	550	139	750	189
CZ-8	Houston	500	144	800	208	800	151	1,150	210
Total Carrizo Sand (Anderson County)		1,950	gpm	2,500	gpm	2,700	gpm	3,700	gpm
		3,145	ac-ft/yr	4,033	ac-ft/yr	4,355	ac-ft/yr	5,968	ac-ft/yr
Total Carrizo Sand (Houston County)		1,200	gpm	1,800	gpm	1,900	gpm	2,650	gpm
		1,936	ac-ft/yr	2,903	ac-ft/yr	3,065	ac-ft/yr	4,274	ac-ft/yr
Total Carrizo Sand (Anderson and Houston)		3,150	gpm	4,300	gpm	4,600	gpm	6,350	gpm
		5,081	ac-ft/yr	6,936	ac-ft/yr	7,420	ac-ft/yr	10,243	ac-ft/yr

"ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpm" indicates gallons per minute, "ac-ft/yr" indicates acre-feet per year, K = Hydraulic Conductivity.

Table 12. Estimated Well Yields for Proposed Wells Completed in the Upper Wilcox on the Redtown Ranch Property

Proposed Well	County	50% Remaining Available Drawdown		30% Remaining Available Drawdown		50% Remaining Available Drawdown		30% Remaining Available Drawdown	
		Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)
		Transmissivity using K Value of 31 gpd/ft^2				Transmissivity Using K Value of 287.3 gpd/ft^2			
UWLX-1	Anderson	0	163	0	257	1,100	328	1,400	438
UWLX-2	Anderson	200	325	250	452	1,000	316	1,400	433
UWLX-3	Anderson	0	174	200	426	800	314	1,000	419
UWLX-4	Anderson	200	317	225	424	900	304	1,200	412
UWLX-5	Anderson	0	175	0	278	800	306	1,000	409
UWLX-6	Houston	200	321	250	462	900	315	1,300	436
UWLX-7	Houston	0	163	225	445	900	313	1,200	423
UWLX-8	Houston	200	312	225	426	900	299	1,300	413
UWLX-9	Houston	0	171	0	276	900	322	1,200	435
UWLX-10	Anderson	200	314	250	444	900	311	1,300	429
UWLX-11	Anderson	0	182	0	284	800	313	1,200	434
UWLX-12	Anderson	200	300	225	405	1,000	302	1,300	406
Total Upper Wilcox Group (Anderson County)		800	gpm	1,150	gpm	7,300	gpm	9,800	gpm
		1,290	ac-ft/yr	1,855	ac-ft/yr	11,775	ac-ft/yr	15,807	ac-ft/yr
Total Upper Wilcox Group (Houston County)		400	gpm	700	gpm	3,600	gpm	5,000	gpm
		645	ac-ft/yr	1,129	ac-ft/yr	5,807	ac-ft/yr	8,065	ac-ft/yr
Total Upper Wilcox Group (Anderson and Houston)		1,200	gpm	1,850	gpm	10,900	gpm	14,800	gpm
		1,936	ac-ft/yr	2,984	ac-ft/yr	17,582	ac-ft/yr	23,872	ac-ft/yr

"ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpm" indicates gallons per minute, "ac-ft/yr" indicates acre-feet per year, K = Hydraulic Conductivity.

Table 13. Estimated Well Yields and Drawdown for the Proposed Wells in the Middle Wilcox on the Redtown Ranch Property

Proposed Well	County	50% Remaining Available Drawdown		30% Remaining Available Drawdown	
		Well Yields (gpm)	Cumulative Drawdown (ft)	Well Yields (gpm)	Cumulative Drawdown (ft)
MWLX-1	Anderson	600	532	900	745
MWLX-2	Anderson	700	543	900	727
MWLX-3	Anderson	600	554	800	751
MWLX-4	Anderson	700	550	900	736
MWLX-5	Anderson	600	546	900	761
MWLX-6	Houston	700	558	900	747
MWLX-7	Houston	700	550	900	736
MWLX-8	Houston	800	529	1,100	722
MWLX-9	Houston	600	553	800	750
MWLX-10	Anderson	600	537	900	751
MWLX-11	Anderson	600	557	800	754
MWLX-12	Anderson	700	542	950	737
Total Middle Wilcox Group (Anderson County)		5,100 gpm 8,226 ac-ft/yr	gpm ac-ft/yr	7,050 gpm 11,372 ac-ft/yr	gpm ac-ft/yr
Total Middle Wilcox Group (Houston County)		2,800 gpm 4,516 ac-ft/yr	gpm ac-ft/yr	3,700 gpm 5,968 ac-ft/yr	gpm ac-ft/yr
Total Middle Wilcox Group (Anderson and Houston)		7,900 gpm 12,743 ac-ft/yr	gpm ac-ft/yr	10,750 gpm 17,340 ac-ft/yr	gpm ac-ft/yr

ft" indicates feet, "gpm" indicates gallons per minute, "ac-ft/yr" indicates acre-feet per year.

Based on these modeling results, estimated well yields in the target aquifers vary significantly based on the hydraulic properties. Well yields for the Carrizo Sand are based on site-specific data from pumping tests and surrounding well data, and well yields for the Wilcox Group are based on limited data obtained from surrounding wells or the North QCSCW GAM, which may not accurately reflect the site-specific aquifer properties beneath the Redtown Ranch Property. In addition, transmissivity values will vary based on the amount of net sands beneath each proposed well location. At some well locations, artesian (i.e., "free flowing") conditions may exist, which will increase well yields where the static water levels were assumed to be below land surface.

It is important to note that the vast majority of hydraulic conductivity values from the North QCSCW GAM are reported from wells located near the outcrop areas. Therefore, the spatial distribution of hydraulic conductivity data in the deeper, downdip (confined) portions of the Carrizo-Wilcox aquifer is limited and does not likely represent aquifer conditions beneath the Redtown Ranch Property. Similarly, most of the surrounding well

data for the Wilcox Group are from wells located 15 miles from the Redtown Ranch Property and may not reflect actual aquifer conditions beneath the property.

The provided well yields are based on the assumptions and hydraulic properties for the target aquifers beneath the proposed wellsites, as provided in Tables 8, 9 and 10. Site-specific hydraulic properties and well yields can only be confirmed after drilling and testing test wells. Furthermore, this modeling does not take into account additional water supply from recharge, which results from the infiltration of water from precipitation in the aquifer outcrop, seepage from lakes or other bodies of surface water, or vertical and lateral movement of water between formations.

SECTION 7: GROUNDWATER REGULATORY ENTITIES

The Redtown Ranch Property is located within the jurisdiction of the Neches & Trinity Valley Groundwater Conservation District ("NTVGCD"), which regulate the production of groundwater in Anderson County, and Groundwater Management Area 11 (GMA-11), which manages the groundwater resources in Anderson and Houston County. Figure 12 shows the boundaries of the entities that manage the groundwater resources in Anderson and Houston County.

7.1 NECHES & TRINITY VALLEY GCD

LRE reviewed the NTVGCD's Rules to identify requirements pertaining to permitting and production limits for non-exempt wells within the District boundaries.

7.1.1 Well Permitting Requirements

Per the District Rule 5.4, all applications for a water well drilling permit, operating permit, transfer permit, or permit amendment shall include the following information: general well owner information, documents establishing the applicable authority to construct and/or operate a well for the proposed use, statement of the nature and purpose of the water and intended amount of water for use, declaration of compliance with District Rules and Management Plan, well location, and estimated production rate. A hydrogeological report addressing the area of influence, drawdown, recovery time, and other pertinent information required by the District shall also be included with permit applications for: 1) requests to drill a well with a maximum capacity of more than 2 million gallons a day (mgd), or 2) requests to modify to increase production or production capacity of a Public Water Supply, Municipal, Commercial, Industrial, Agricultural, or Irrigation well with an outside casing diameter greater than 10 inches. LRE anticipates that the proposed wells on the Redtown Ranch Property will require production permits with hydrogeological reports.

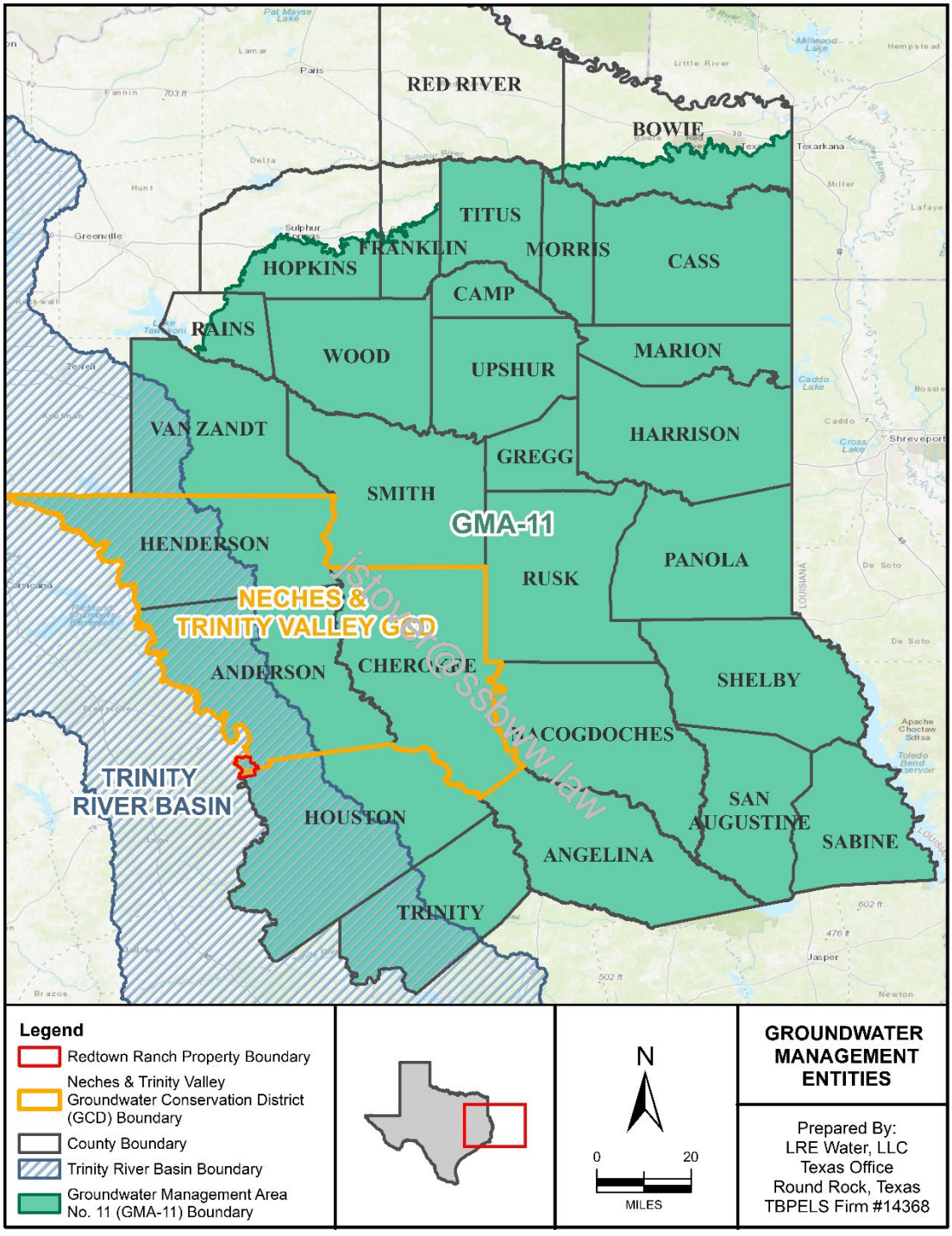


Figure 12. Groundwater Management Entities for Anderson and Houston County

7.1.2 Management Plan

The NTVGCD Management Plan (Amended August 15, 2019) was developed in accordance with Chapter 36 of the Texas Water Code and provisions of TAC Title 31, Groundwater Management Plan Certification. The primary purpose of the Management Plan is to identify the management goals of the District, estimate the availability of groundwater in the District, project water demands, and outline how the District will manage and conserve their groundwater resources. The District will implement the provisions of the management plan as a guide for District actions, operations, and decision-making. Such measures include regularly assessing the water supply of groundwater storage conditions, establishing an observation well network to monitor aquifer water levels, and conducting investigations of the available groundwater resources.

7.2 GROUNDWATER MANAGEMENT AREA 11 (GMA-11)

Groundwater Management Areas (GMAs) were created to conserve, preserve, protect, recharge, and prevent the waste of groundwater resources. GMAs are comprised of neighboring areas and GCD's that manage a shared aquifer and coordinate issues such as management goals and groundwater availability determinations. The Redtown Ranch Property is located within the jurisdiction of GMA-11, which encompasses the Neches & Trinity Valley Groundwater Conservation District, as well as the Panola County GCD, Pineywoods GCD, Rusk County GCD, and several other counties within GMA-11 that are not represented by a GCD, including Houston County (Figure 12).

7.2.1 GMA-11 2021 Joint Planning Desired Future Condition (DFC)

The primary purpose of the GMA is to establish a desired future condition (DFC), which is the desired, quantified condition of groundwater resources within a management area at one or more specified future times, as defined by participating GCDs within a groundwater management area as part of the joint planning process. The members of GMA-11 approved the DFCs on August 11, 2021, based on Scenario 33, documented in Technical Memorandum 21-01 (Hutchinson, 2021a), for the Carrizo-Wilcox and Queen City Sand aquifers. The adopted DFCs for Anderson and Houston County from the 2021 Joint Planning period are presented in Table 14.

Table 14. Adopted 2021 DFCs in Anderson and Houston County (GMA-11)

Average Drawdown from 2013 to 2080, in feet		
Aquifer	Anderson County	Houston County
Carrizo-Wilcox Aquifer	155	86

"DFC" indicates desired future condition, "GMA-11" is Groundwater Management Area 11

As described in the GMA-11 Desired Future Conditions Explanatory Report (Hutchinson, 2021b), average drawdown across the county represents the regional average drawdown occurring from pumping during the period of interest. In general, a regional average positive drawdown suggests that pumping has increased during the period of interest. The most recently adopted DFCs for Anderson County are an average drawdown of 155 feet from the Carrizo-Wilcox Aquifer, while the most recently adopted DFCs for Houston County are an average drawdown of 86 feet from the Carrizo-Wilcox Aquifer (Table 14).

7.2.2 Modeled Available Groundwater (MAG) 2021 Joint Planning

Modeled available groundwater (MAG), as defined in Chapter 36 of the Texas Water Code (2011), is the estimated average amount of water that may be produced annually to achieve a desired future condition. The TWDB issued the GAM Run-21-016 MAG Report for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in GMA-11 on February 17, 2022 (Wade, 2022), which used the North QCSCW GAM (Schorr and others, 2022) and documented development of the estimated modeled available groundwater associated with the DFCs adopted by GMA-11 on August 11, 2021.

The Redtown Ranch Property is located within the Trinity River Basin, as shown in Figure 12. Table 15 summarizes the MAG from the 2021 Joint Planning Cycle GAM Run 21-016 (Wade, 2022) from 2020 to 2080 by aquifer for the Trinity River Basin in Anderson and Houston County. The MAG for the Carrizo-Wilcox Aquifer in Anderson County from 2020 to 2080 is 5,066 ac-ft/yr, and the MAG for the Carrizo-Wilcox Aquifer in Houston County is 634 ac-ft/yr (Table 15).

Table 15. MAG for Anderson and Houston County – Trinity River Basin (2021 Joint Planning)

Aquifer	County	Modeled Available Groundwater (ac-ft/yr)						
		2020	2030	2040	2050	2060	2070	2080
Carrizo-Wilcox Aquifer	Anderson	5,066	5,066	5,066	5,066	5,066	5,066	5,066
Carrizo-Wilcox Aquifer	Houston	634	634	634	634	634	634	634

"MAG" indicates Modeled Available Groundwater, "ac-ft/yr" indicates acre-feet per year

SECTION 8: NUMERICAL GROUNDWATER MODELING

Groundwater Availability Models (GAMs) are regional-scale numerical models developed to simulate the impacts of groundwater pumping on aquifers and to provide estimates of groundwater availability for groundwater resource management and water planning purposes. The North QCSCW GAM is the currently adopted GAM for the Northern Portion of the Carrizo-Wilcox Aquifer System (Schorr and others, 2020). Due to the size of GAMs and complexity of the aquifer systems, GAMs are not exact representations of local hydrogeologic conditions and often lack detailed localized data such as pumping tests, current water level measurements and aquifer depths. GAMs are however useful tools in predicting regional water level trends and impacts from hydrologic stresses such as groundwater pumping. The North QCSCW GAM was recently updated in 2020 by Schorr and others (2020) and was used to create the DFCs for GMA-11 in 2021. During this process, some of the model files were altered to simulate future conditions, as outlined in technical memorandums from Hutchinson (2020, 2021a, 2021c, 2021d, 2021e, 2021f). The model files used to create the DFCs were also used in LRE's analysis.

To evaluate the impacts of the proposed production on the recently adopted DFCs, LRE added the proposed well locations in the associated North QCSCW GAM model cells in MODFLOW and simulated the proposed production outlined in Table 16. "Pumping Scenario #1" is the lowest pumping scenario (50% remaining artesian pressure and "low" transmissivity) that includes 5,081 ac-ft/yr from the Carrizo Sand, 1,936 ac-ft/yr from the Upper Wilcox, and 12,743 ac-ft/yr from the Middle Wilcox, for a total of 19,759 ac-ft/yr from the Carrizo-Wilcox Aquifer (Table 16). "Pumping Scenario #2" includes yields where there are lower estimates of transmissivity and 30% remaining artesian pressure, which includes 6,936 ac-ft/yr from the Carrizo Sand, 2,984 ac-ft/yr from the Upper Wilcox, and 17,340 ac-ft/yr from the Middle Wilcox, for a total of 27,260 ac-ft/yr from the Carrizo-Wilcox Aquifer (Table 16). "Pumping Scenario #3" includes yields where there are higher estimates of transmissivity and 50% remaining artesian pressure, which includes 7,420 ac-ft/yr from the Carrizo Sand, 17,904 ac-ft/yr from the Upper Wilcox, and 12,743 ac-ft/yr from the Middle Wilcox, for a total of 38,067 ac-ft/yr from the Carrizo-Wilcox Aquifer (Table 16). "Pumping Scenario #4" is the highest pumping scenario (30% remaining artesian pressure and "high" transmissivity) that includes 10,243 ac-ft/yr from the Carrizo Sand, 23,873 ac-ft/yr from the Upper Wilcox, and 17,340 ac-ft/yr from the Middle Wilcox, for a total of 51,455 ac-ft/yr from the Carrizo-Wilcox Aquifer (Table 16).

Table 16. Proposed Production from Redtown Ranch Property for the Numerical Modeling

Aquifer	Modeled Production, in ac-ft/yr			
	Pumping Scenario #1 ("50% Remaining Artesian Pressure" / "Low Transmissivity")	Pumping Scenario #2 ("30% Remaining Artesian Pressure" / "Low" Transmissivity)	Pumping Scenario #3 ("50% Remaining Artesian Pressure" / "High" Transmissivity)	Pumping Scenario #4 ("30% Remaining Artesian Pressure" / "High" Transmissivity)
Carrizo Sand	5,081	6,936	7,420	10,243
Upper Wilcox	1,936	2,984	17,904	23,873
Middle Wilcox	12,743	17,340	12,743	17,340
Total	19,759	27,260	38,067	51,455

"ac-ft/yr" indicates acre-feet per year.

Modeled drawdown from the proposed production for the Carrizo-Wilcox aquifers were computed and compared to the drawdown from the "Base Case" model run (Hutchison, W.R., 2021d) used to calculate the 2021 DFC's (which did not include the proposed wellfield). The amount of additional drawdown in Anderson and Houston County was calculated as a result of the proposed production at the Redtown Ranch Property. This aims to simulate the potential impacts in relation to the most recent DFC, which will allow 155 feet of drawdown from the Carrizo-Wilcox Aquifer in Anderson County and 86 feet of drawdown from the Carrizo-Wilcox Aquifer in Houston County (Table 14).

Table 17 presents the additional drawdown in the Carrizo-Wilcox aquifer in Anderson and Houston County caused only by the proposed production from the Redtown Ranch Property after 50 years of continuous pumping.

Table 17. Additional Drawdown in Anderson and Houston County After 50 Years

County	Additional Modeled Drawdown in the Carrizo-Wilcox Aquifer, in feet			
	Pumping Scenario #1 ("50% Remaining Artesian Pressure" / "Low Transmissivity")	Pumping Scenario #2 ("30% Remaining Artesian Pressure" / "Low" Transmissivity)	Pumping Scenario #3 ("50% Remaining Artesian Pressure" / "High" Transmissivity)	Pumping Scenario #4 ("30% Remaining Artesian Pressure" / "High" Transmissivity)
Anderson	207	197	--	--
Houston	185	168	--	--

"--" indicates drawdown was not computed.

The model results from Pumping Scenario #1 indicate that approximately 207 feet of additional drawdown will occur in Anderson County and 185 feet of additional drawdown will occur in Houston County in the Carrizo-Wilcox Aquifer after 50 years of continuous production from the Redtown Ranch Property (Table 17). The model results from

Pumping Scenario #2 indicate that approximately 197 feet of additional drawdown in Anderson County, and approximately 168 feet of additional drawdown in Houston County will occur in the Carrizo-Wilcox after 50 years of continuous production from the Redtown Ranch Property (Table 17).

The numerical modeling results underestimate the total impacts to the DFC, as the proposed pumping rates for Pumping Scenarios #1 and #2 provided in Table 16 could not be sustained in the GAM model run. Based on our evaluation, the site-specific local hydrogeologic characteristics are more favorable than the hydraulic properties for each model layer in the North QCSCW GAM, and thus the well yields modeled from the analytical modeling scenarios are not attainable in the numerical modeling scenarios. Therefore, pumping rates were automatically reduced in MODFLOW to prevent the modeled cells from being depleted. This process in MODFLOW is called “auto-flow” reduction. The pumping rates were automatically reduced in MODFLOW by approximately 27 ac/ft/yr in Pumping Scenario #1 and approximately 2,810 ac-ft/yr in Pumping Scenario #2, respectively. Since MODFLOW auto-reduced the pumpage inputs from the lower pumping rates, LRE did not conduct the numerical modeling for Pumping Scenarios #3 and #4 (Table 17). It is important to note that the impacts presented in Table 17 correspond to the MODFLOW-adjusted pumping rates and do not reflect drawdown from the total proposed production of 19,759 ac-ft/yr (Pumping Scenario #1) or 27,260 ac-ft/yr (Pumping Scenario #2) from the Carrizo-Wilcox aquifers. Since this is an automated process in MODFLOW, the rates could not be adjusted to reflect the total proposed production amounts, and therefore the total impacts from the proposed production could not be determined.

Some limitations of this analysis are as follows:

1. The DFC modeling uses hydraulic properties from the North QCSCW GAM, which are not an accurate representation of hydraulic properties for the target aquifers beneath the Redtown Ranch Property.

2. The MODFLOW modeling will simulate pumping until the cell (aquifer) is nearly depleted, which is not realistic when considering operational limitations, such as screen intervals and pump depths.

3. The proposed production of 19,759 ac-ft/yr from Pumping Scenario #1 and 27,260 ac-ft/yr from Pumping Scenario #2 exceeded the allowable production for the model cells in MODFLOW, which caused auto flow reduction. Therefore, the total impacts from the proposed production could not be determined.

To accurately model the total impacts from the proposed production, the hydraulic properties for the target aquifers in the North QCSCW GAM should be updated with the site-specific hydraulic properties to reflect actual aquifer conditions and enhance the accuracy of the model and simulate impacts to the target aquifers.

SECTION 9: CONCLUSIONS

The principal groundwater resources in Anderson and Houston County include the Carrizo-Wilcox aquifers. Based on this evaluation, the target production zones beneath the Redtown Ranch Property capable of producing significant volumes of water to support a large-scale wellfield infrastructure project include the Carrizo Sand, the Upper Wilcox, and the Middle Wilcox aquifers.

A 27-hour pumping test was conducted on the existing Redtown Ranch Well #2 (pumping well) and Well #3 (observation well) to determine the site-specific hydraulic properties of the Carrizo Sand beneath the Redtown Ranch Property. LRE analyzed the pumping test data from the existing Redtown Ranch Well #2 and calculated a transmissivity of 22,250 gpd/ft using the Cooper-Jacob (1946) and Theis (1935) recovery solution. Based on a transmissivity of 22,250 gpd/ft and assumed 100 feet of screen in the existing Redtown Ranch Well #2, the hydraulic conductivity of the Carrizo Sand beneath the Redtown Ranch Property was calculated to be approximately 222.5 gpd/ft^2. LRE analyzed the pumping test data from the existing Redtown Ranch Well #3 (observation well) and calculated a storativity of 0.00009 (dimensionless) for the Carrizo Sand. A water quality sample was collected from the existing Redtown Ranch Well #2 and was analyzed for common drinking water constituents.

The water quality laboratory results from the existing Redtown Ranch Well #2 well were compared to the TCEQ standards for drinking water supplies, which indicated that no constituents exceeded the TCEQ MCLs or SCLs for drinking water. Therefore, water quality in the Carrizo Sand beneath the Redtown Ranch Property is anticipated to meet the TCEQ standards for drinking water supplies. Surrounding water chemistry data for the Wilcox Group in the TWDB Database indicate that water in the Wilcox Group is generally fresh to slightly-saline, with total dissolved solids concentrations ranging from approximately 630 to 1,100 mg/L. Furthermore, water quality analyses from wells completed in the target aquifers surrounding the Redtown Ranch Property generally conform to the TCEQ MCLs and SCLs for drinking water supply. Therefore, water quality in the target aquifers beneath the Redtown Ranch Property is anticipated to generally meet the TCEQ standards for drinking water supplies. It should be noted that surrounding water quality data for the Wilcox Group is limited and water chemistry of the Wilcox Group

beneath the Redtown Ranch Property can only be confirmed with site-specific testing and sampling.

Where hydraulic properties could not be determined from site-specific data, properties were estimated from surrounding wells, including data obtained from the TWDB and SDR Database, geologic structure and net sand thickness maps, and data extracted from the North QCSCW GAM. LRE conducted analytical groundwater modeling using the estimated hydraulic properties to determine well yields that the target aquifers could sustain for 50 years. LRE modeled well yields so that 30-50% of the aquifer's saturated artesian pressure remains in the aquifer after pumping the proposed wells for 50 years. More specifically, LRE modeled "50% remaining available drawdown" as a more "conservative" approach, and the "30% remaining available drawdown" as a more "aggressive" approach. Due to the range in hydraulic properties surrounding the Redtown Ranch Property, LRE used "low" and "high" estimates of transmissivity to determine the range of well yields for the Carrizo Sand and Upper Wilcox aquifers.

The analytical model results indicate that proposed wells completed in the Carrizo Sand could produce yields ranging from 350 to 500 gpm (3,150 gpm or 5,081 ac-ft/yr) with 50% artesian pressure remaining and 400 to 600 gpm (4,300 gpm or 6,936 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years with a hydraulic conductivity value of 222.5 gpd/ft^2. Well yields from the Carrizo Sand with with a hydraulic conductivity value of 333.3 gpd/ft^2 range from 450 to 800 gpm (4,600 gpm or 7,420 ac-ft/yr) with 50% artesian pressure remaining, and 600 to 1,150 gpm (6,350 gpm or 10,243 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years.

Well yields from the Upper Wilcox with estimates of transmissivity using a hydraulic conductivity of 31 gpd/ft^2 are approximately 200 gpm (1,200 gpm or 1,936 ac-ft/yr) with 50% artesian pressure remaining, and 200 to 250 gpm (1,850 gpm or 2,984 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years. Well yields from the Upper Wilcox with estimates of transmissivity using a hydraulic conductivity value of 287.3 gpd/ft^2 range from 800 to 1,100 gpm (10,900 gpm or 17,582 ac-ft/yr) with 50% artesian pressure remaining, and 1,000 to 1,400 gpm (14,800 gpm or 23,872 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years.

Well yields for the Middle Wilcox with transmissivity estimates using a hydraulic conductivity of 65.63 gpd/ft^2 range from 600 to 800 gpm (7,900 gpm or 12,743 ac-ft/yr) with 50% artesian pressure remaining, and 800 to 1,100 gpm (10,750 gpm or 17,340 ac-ft/yr) with 30% artesian pressure remaining in the aquifer after 50 years.

For the Carrizo Sand and Upper Wilcox, well yields were modeled using a "low" transmissivity estimate and a "high" transmissivity estimate based on variable hydraulic conductivity values from surrounding wells. The proposed wellfield includes the installation of eight wells completed in the Carrizo Sand to depths of approximately 420 to 510 feet, 12 wells completed in the Upper Wilcox to depths of 1,125 to 1,215 feet, and 12 wells completed in the Middle Wilcox to depths of approximately 1,720 to 1,810 feet. This wellfield configuration meets regulatory spacing requirements and minimizes drawdown interference between wells completed in the same aquifer. At full wellfield build out, LRE estimates that up to approximately 51,589 ac-ft of groundwater is available annually from the Carrizo-Wilcox aquifers beneath the Redtown Ranch Property.

The Redtown Ranch Property is located within the jurisdiction of GMA-11, which manages groundwater resources in Anderson and Houston County. GMA-11 adopted desired future conditions (DFCs) for the Carrizo-Wilcox aquifers, which include 155 feet of drawdown in the Carrizo-Wilcox aquifer in Anderson County and 86 feet of drawdown in the Carrizo-Wilcox aquifer in Houston County. LRE conducted numerical modeling in MODFLOW to determine the impacts of the proposed production on the currently adopted DFCs. Due to the current model assumptions and limitations, impacts from the proposed production could not be accurately depicted. Updated hydraulic properties in the North QCSCW GAM would accurately reflect aquifer current conditions and impacts to the target aquifers.

SECTION 10: RECOMMENDATIONS

Based on this evaluation, LRE recommends drilling and constructing test wells in the target aquifers to further confirm the quality and quantity of groundwater supplies beneath the Redtown Ranch Property. Understanding the "site-specific" hydraulic properties of the target aquifers is crucial for refining estimates of water quality and well yields, which can substantially influence the required treatment and number of wells necessary to meet project demands, thereby providing a more accurate determination of feasibility projections for the entire project.

Test well(s) shall be drilled to the provided depths to ensure that all the target production zones have been fully penetrated to maximize overall well yields. Borehole geophysical logging would provide estimates of net sand thickness and formation depths, and advanced geophysical logging could provide estimates of hydraulic properties, including hydraulic conductivity, transmissivity, resistivity, temperature, formation permeability, porosity, and estimated TDS concentrations at specific depth intervals. Zonal testing

during drilling can provide water quality data and measurements of hydraulic conductivity for specific target production zones, which would be particularly useful for the Wilcox Group aquifer. Based on the results of zonal testing and selection of the target production zone(s), the borehole could be completed as either a temporary or permanent production well.

Careful planning and consideration shall go into the design, drilling, and construction of public supply wells located in the floodplain of the Trintiy River, where artesian conditions and flooding may occur. The drilling contractor should be aware that these conditions may be encountered during well drilling. Artesian wells should be constructed with properly designed annular seals, surface casing, and the appropriate number and use of control valves. Additionally, public supply wells located in a SFHA must be constructed so that the wellhead extends at least 36 inches above the Base Flood Elevation (BFE). This requirement may necessitate elevating the ground level above the BFE or extending the surface casing above the BFE. Therefore, thorough planning and design are essential before proceeding with the well drilling and construction process.

Until additional site-specific data and hydraulic properties can be confirmed, LRE suggests using the conservative production estimates and wellfield development approach presented within this report. These estimates should not be viewed as maximum production limits, but instead serve as a reference and initial framework for future conversations and project development. As additional data is obtained from test well drilling and aquifer testing, LRE recommends updating the analytical modeling with site-specific hydraulic properties and adjusting or confirming well yields.

Lastly, LRE recommends that Redtown Ranch, LLC initiate preliminary discussions with the NTVGCD and GMA-11 regarding any planned groundwater production within the ongoing round of Joint Planning, to be completed in 2026. This proactive engagement will facilitate alignment with regulatory requirements and enhance the project's long-term viability. Implementing these recommendations will not only provide crucial data to support informed decision-making, but may also promote collaboration with regulatory entities, which will ensure a sustainable and successful groundwater supply project.

SECTION 11: REFERENCES

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

Driscoll, F.G., 1986, Groundwater and Wells. 2nd Edition, Johnson Division, St. Paul.

Fryar, D.G., Senger, R., Deeds, N.E., Pickens, J., and Jones, T., 2003, Groundwater Availability Model for the Northern Carrizo-Wilcox Aquifer: Prepared for the Texas Water Development Board, January 31, 2003, 529 p.

Hutchison, W.R, 2020. Technical Memorandum Base Simulation for Joint Planning with Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers.

Hutchison, W.R., 2021a, GMA 11 Technical Memorandum 21-01, Adjusted Pumping Simulations for Joint Planning with Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers, 31 pp.

Hutchinson, W.R., 2021b, Desired Future Conditions Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 11.

Hutchison, W.R., 2021c, Technical Memorandum Comparison of 2017 Modeled Available Groundwater Values and 2020 Groundwater Availability Values from Regional Planning Groups.

Hutchison, W.R., 2021d, Base Scenario Pumping Factors using Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers.

Hutchison, W.R, 2021e. Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers: Grid File.

Hutchison, W.R., 2021f. Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers: Cell Counts and Areas for County-River Basin Splits.

Guyton, W.F., and Associates, 1972, Ground-Water Conditions in Anderson, Cherokee, Freestone and Henderson Counties, Texas: Texas Water Development Board Rept. 150, 250 pp.

Kelley, V.A., Deeds, N.E., Fryar, D.G., and Nicot, J.P., 2004, Groundwater Availability Models for the Queen City and Sparta Aquifers: Prepared for the Texas Water Development Board, October 2004, 867 p.

LBG-Guyton Associates in association with NRS Consulting Engineers, 2003, Brackish Groundwater Manual for Texas Regional Water Planning Groups: Prepared for the Texas Water Development Board, 188 pp.

Neches and Trinity Valleys Groundwater Conservation District Rules, Effective as of June 11, 2003. Amended September 17, 2020.

Schorr, S., Zivic, M., Hutchinson, W.R., Panday, S., Rumbaugh, J., 2020. Conceptual Model Report: Groundwater Availability Model for Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifers. Final Report prepared for Texas Water Development Board, Contract Number 1648302063.

Theis, C.V., 1935, The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage: Transactions of the American Geophysical Union, v. 16, p. 519-524.

U.S. Geological Survey, 2004, National Elevation Dataset 30-Meter Resolution Digital Elevation Model.

Wade, Shirley, 2022, GAM Run 21-016 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in Groundwater Management Area 11. Texas Water Development Board.

Appendix A – Geophysical Logs for Redtown Ranch Exploratory Boreholes EXP-1 and EXP-2

GEO CAM

Borehole: EXP-1

Logs: GAMMA, SP, RESISTIVITY

Water Well Logging & Video Recording Services

Geo Cam, Inc. 17118 Classen Rd, San Antonio, TX 78247 877-495-9121

Project: EXP-1
Client: **ANDREWS & FOSTER**
Location: N 31* 32' 26.5" W 95* 43' 00.9"

Date: 3/10/23
County: ANDERSON
State: TX

BOREHOLE DATA

Drilling Contractor: ANDREWS & FOSTER
Elevation: 232'
Depth Ref: G.L.

Driller T.D. (ft) : 1,200'
Logger T.D. (ft) : 1,197'
Date Drilled: 3/9/23

	BIT RECORD			CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	7 7/8"	0'	1,197'	10"	0'	20'
2						
3						

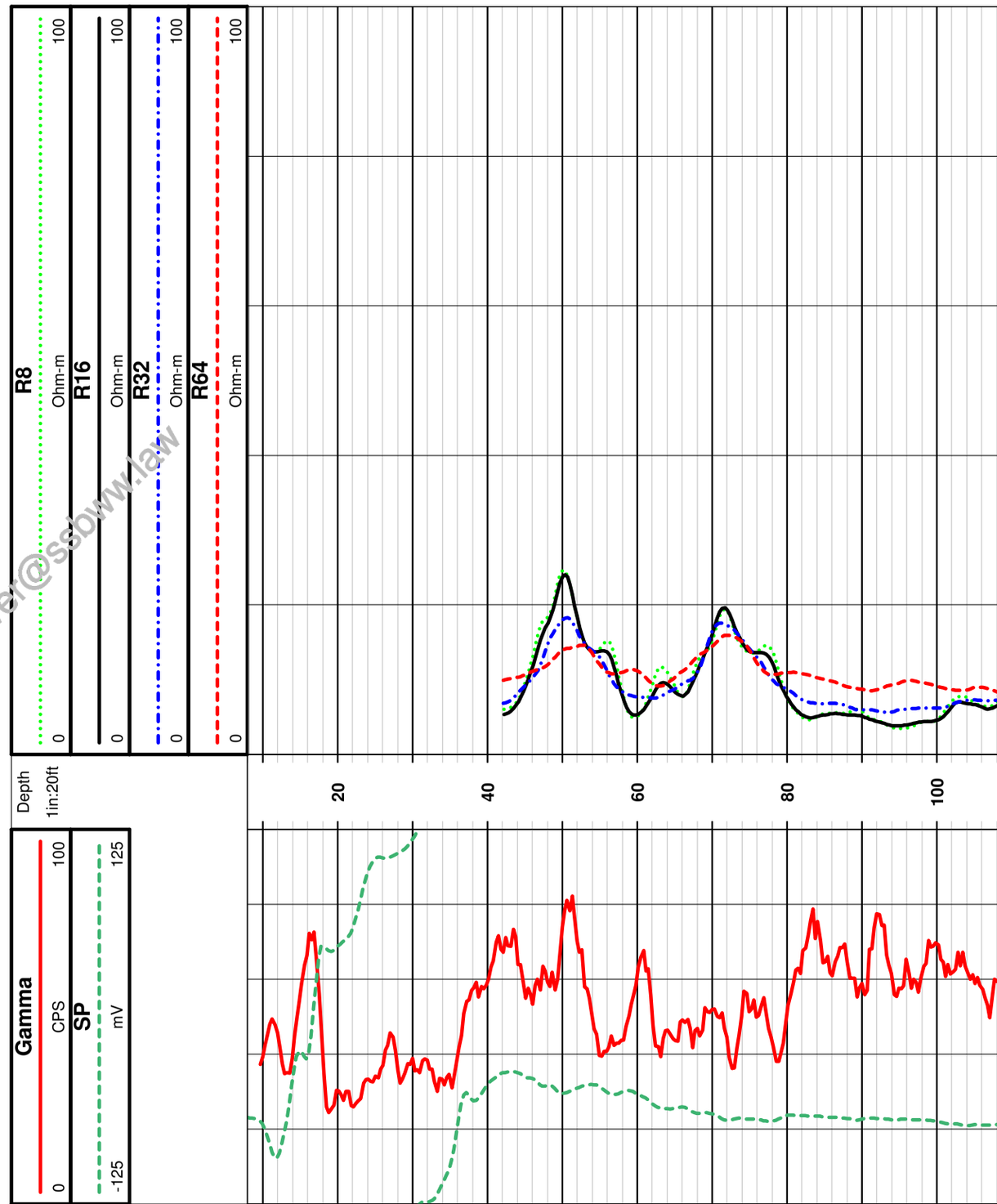
Drill Method: MUD ROTARY Weight: **Fluid Level (ft) :** FULL
Hole Medium: Mud Type: Time Since Circ:
Viscosity: Rm: at: Deg C

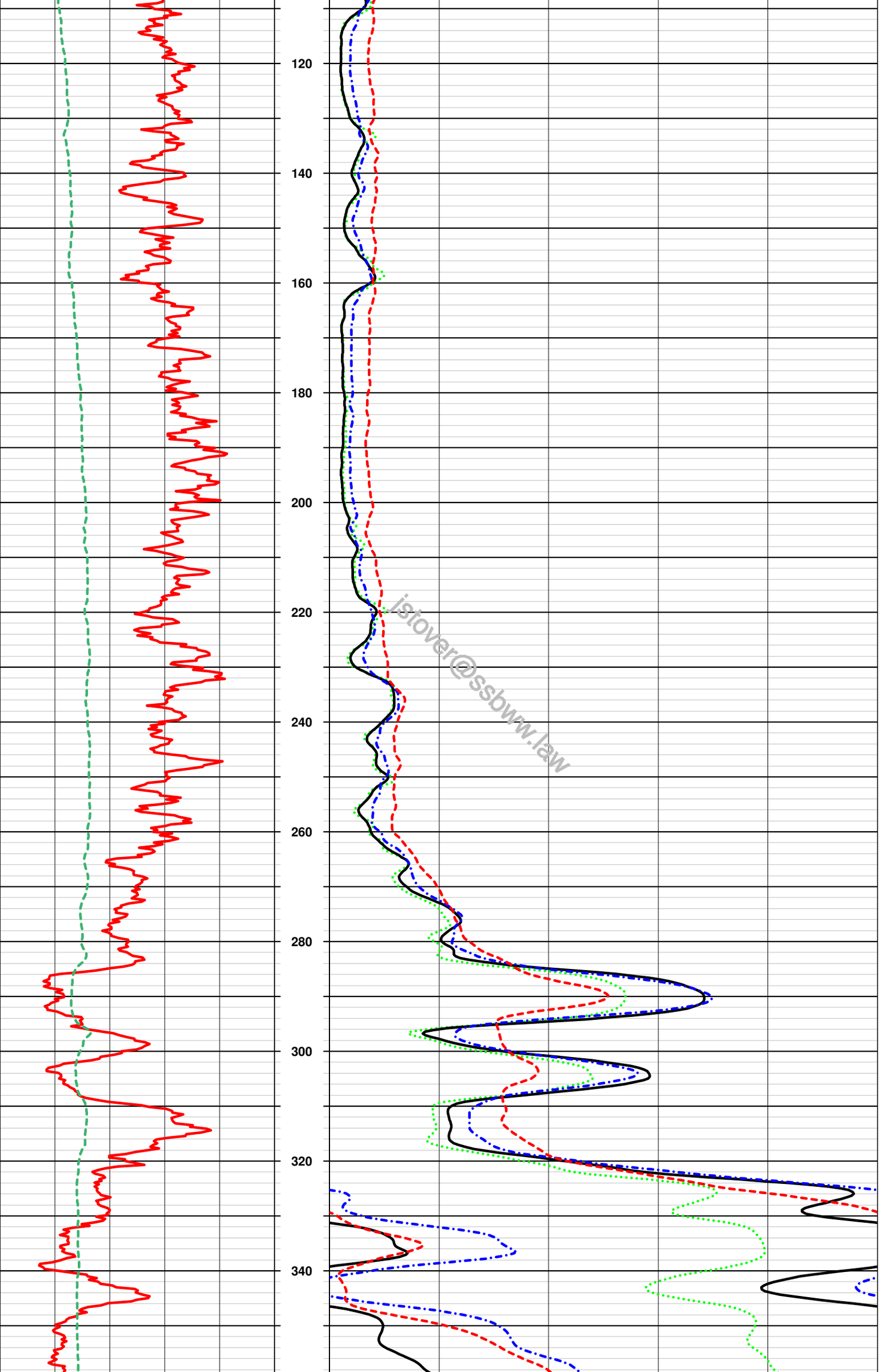
GENERAL DATA

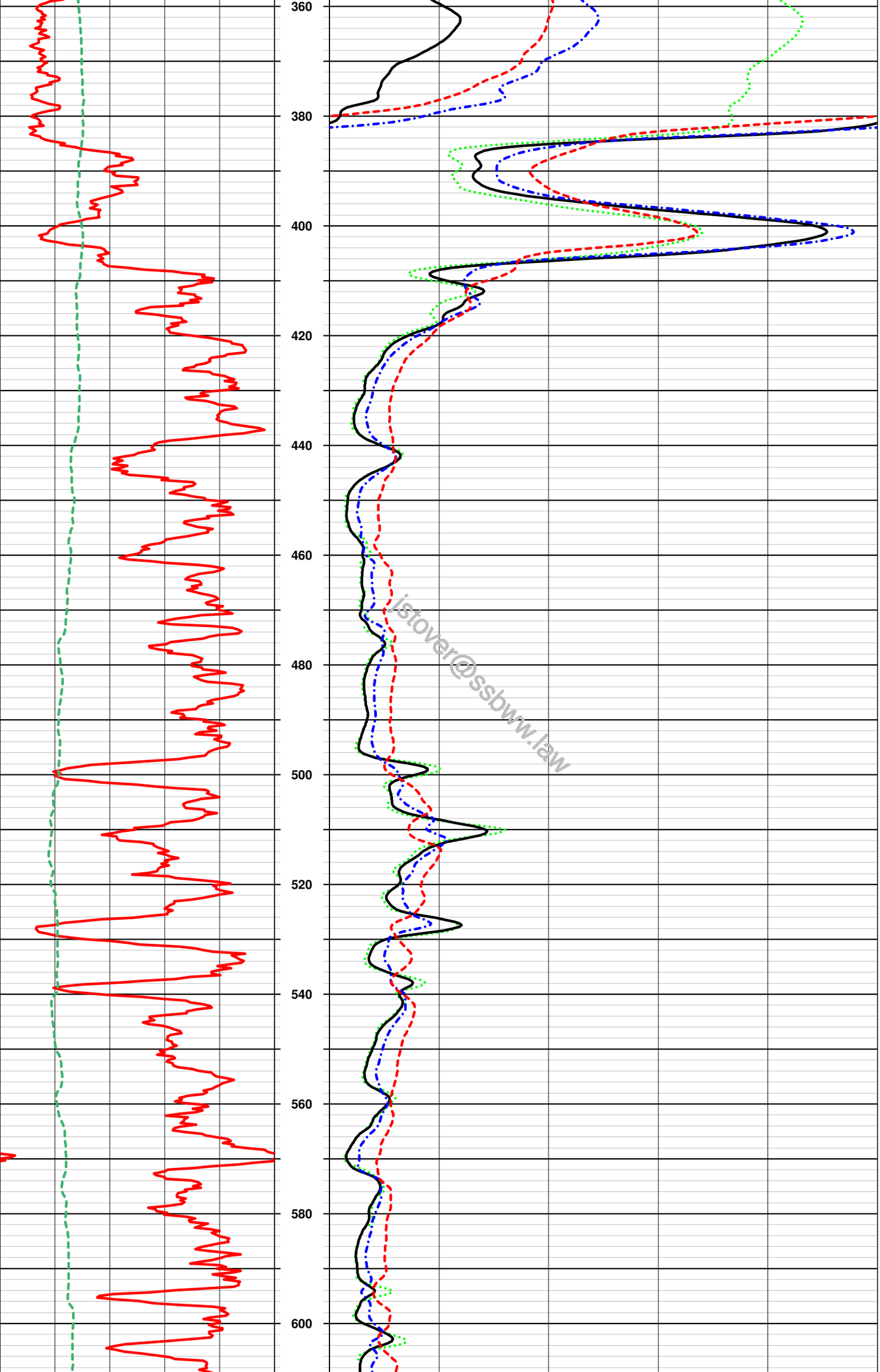
Logged By: DAVID S. Unit/Truck: 11
Witness:

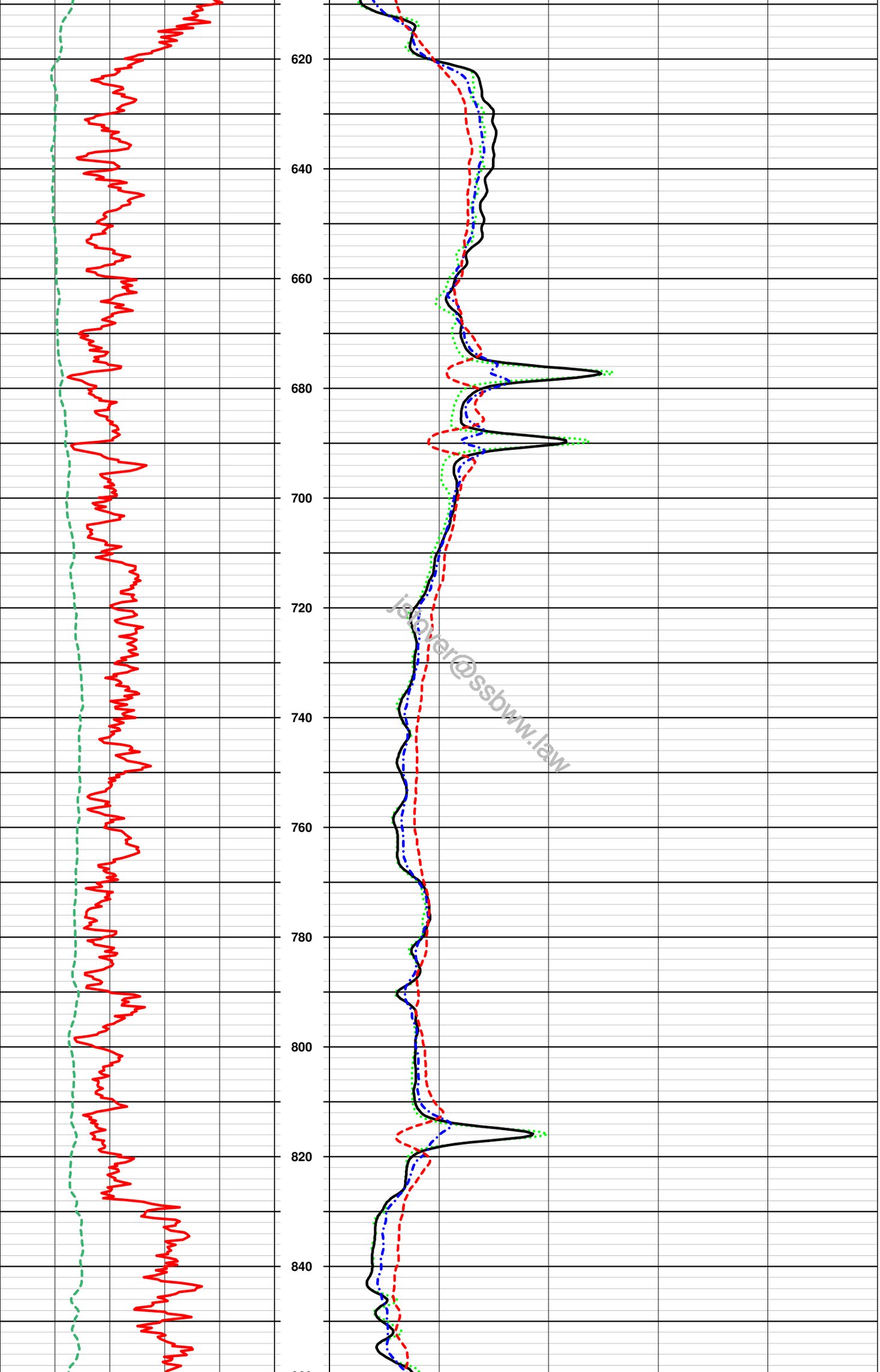
LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	2	35	1,192.7'	9.7'	20
SP	2	35	1,191.0'	8.0'	20
RESISTIVITY	2	35	1,196.0'	42.2'	20

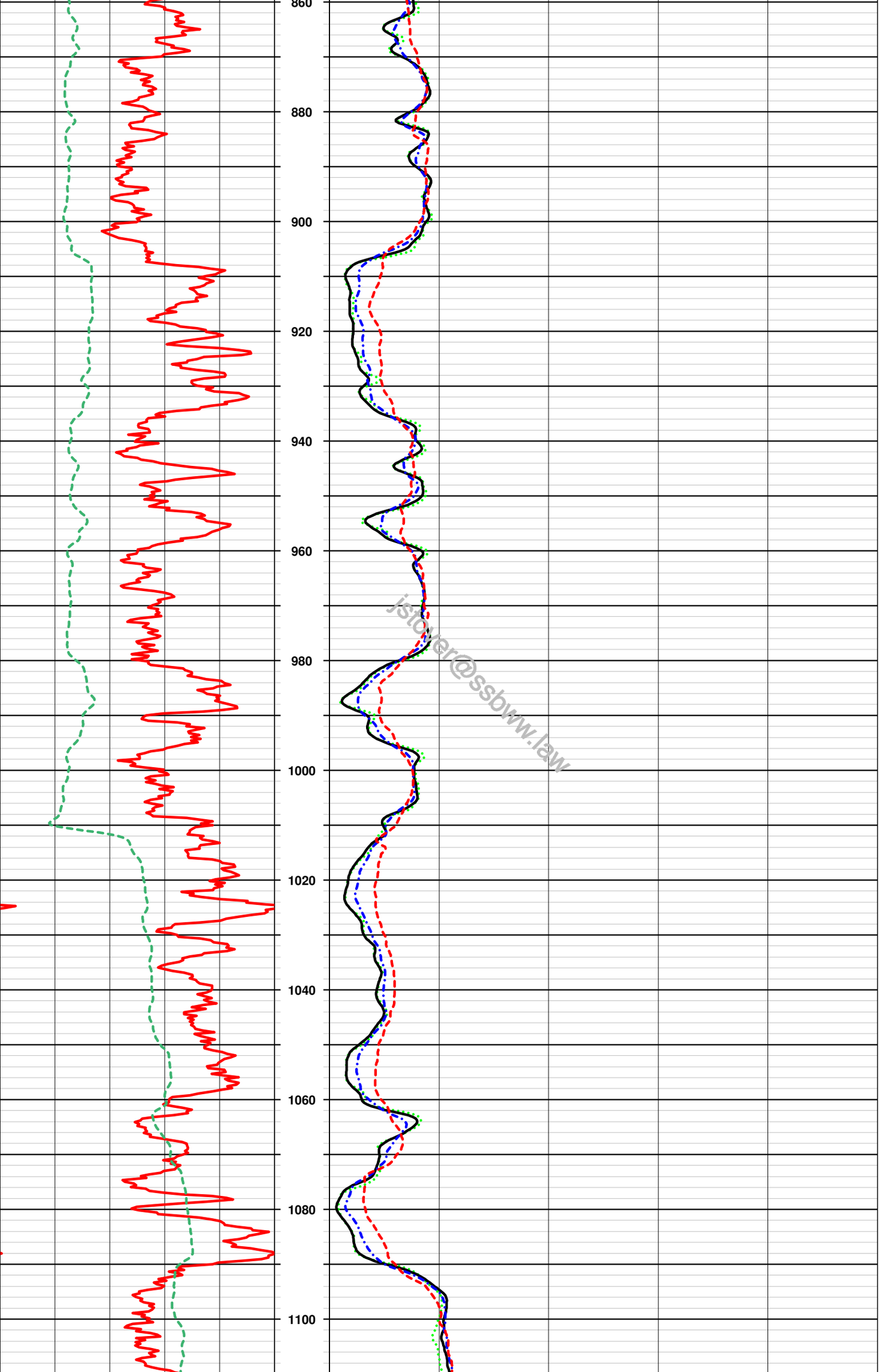
Comments: MEASUREMENTS WERE TAKEN FROM GROUND LEVEL.

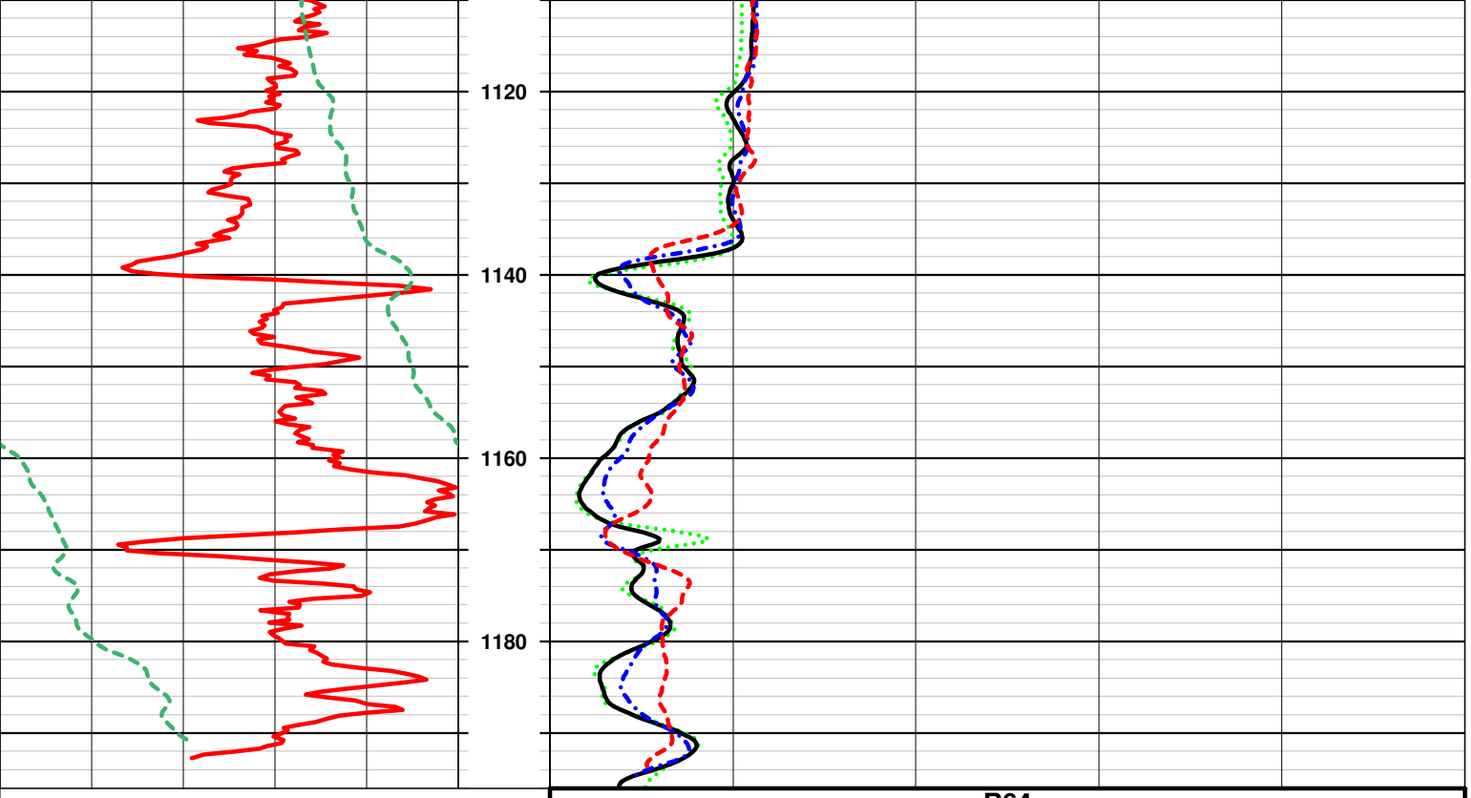



120
140
160
180
200
220
240
260
280
300
320
340
jstover@ssbww.law


360
380
400
420
440
460
480
500
520
540
560
580
600
jstover@ssbww.law


620
640
660
680
700
720
740
760
780
800
820
840
jeaver@ssbww.law


860
880
900
920
940
960
980
1000
1020
1040
1060
1080
1100
jstoner@ssbww.law



SP
-125 mV 125

Gamma
0 CPS 100

Depth
1in:20ft

R64
0 Ohm-m 100

R32
0 Ohm-m 100

R16
0 Ohm-m 100

R8
0 Ohm-m 100

GEO CAM

Borehole: RED TOWN EXP 2

Logs: GAMMA, SP, RESISTIVITY

Water Well Logging & Video Recording Services

Geo Cam, Inc. 17118 Classen rd. San Antonio, TX 78247 877-495-9121

Project: RED TOWN EXP 2 Date: 5/23/2023

Client: **ANDREWS AND FOSTER** County: HOUSTON

Location: **N 31° 29' 54.1 W 95° 42' 37.5"** State: TX

BOREHOLE DATA

Drilling Contractor: ANDREWS AND FOSTER **Driller T.D. (ft) : 1315'**

Elevation: 339' GPS Logger T.D. (ft) : 1307'

Depth Ref: GL Date Drilled: 5/23/2023

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	7 7/8	GL	TD	24" STEEL	GL	25
2						
3						

Drill Method: MUD ROTARY Weight: **Fluid Level (ft):** FULL

Hole Medium: Mud Type: Time Since Circ:

Viscosity: Rm: at: Deg F

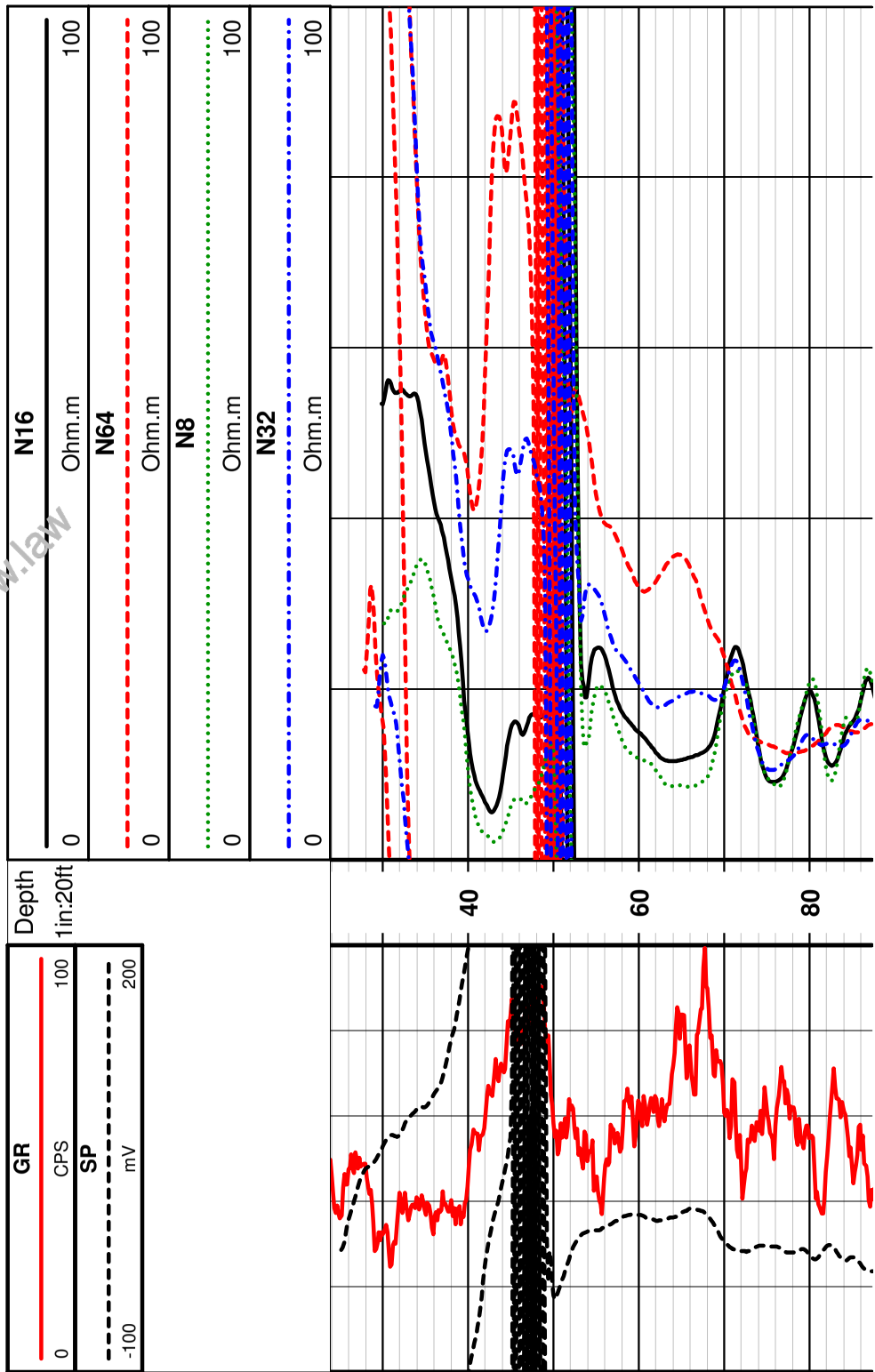
GENERAL DATA

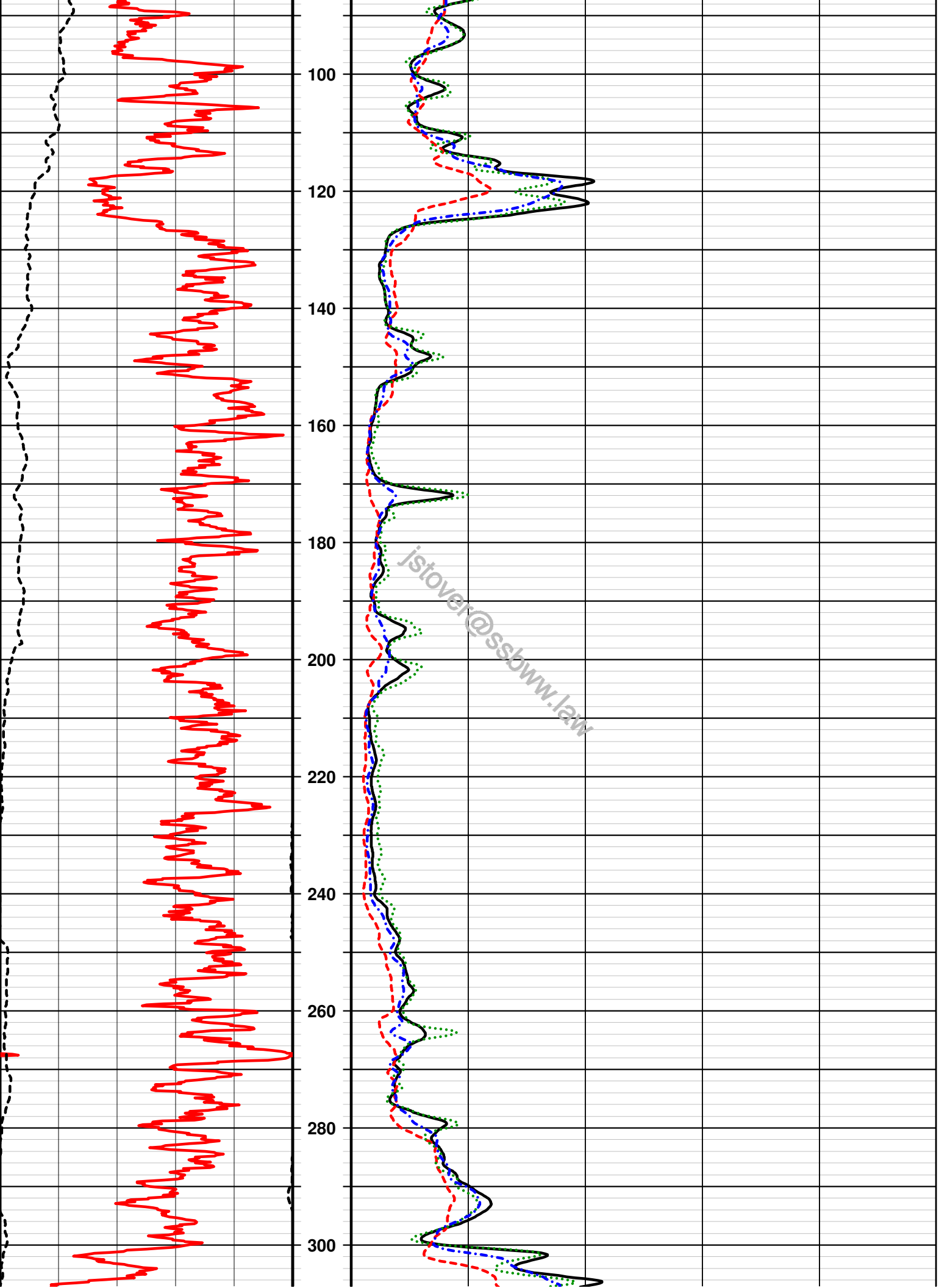
Logged by: JASON O Unit/Truck: 09

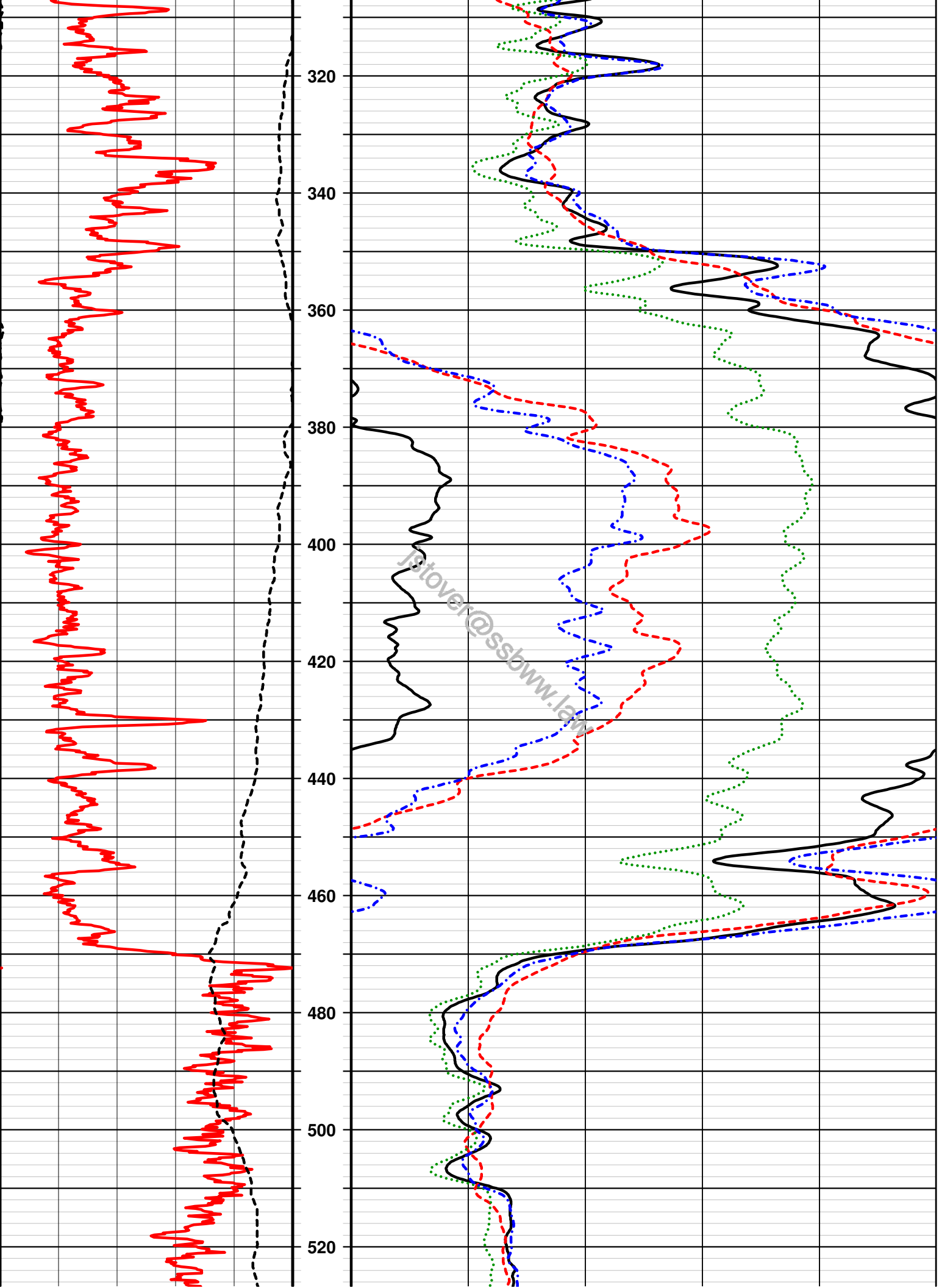
Witness:

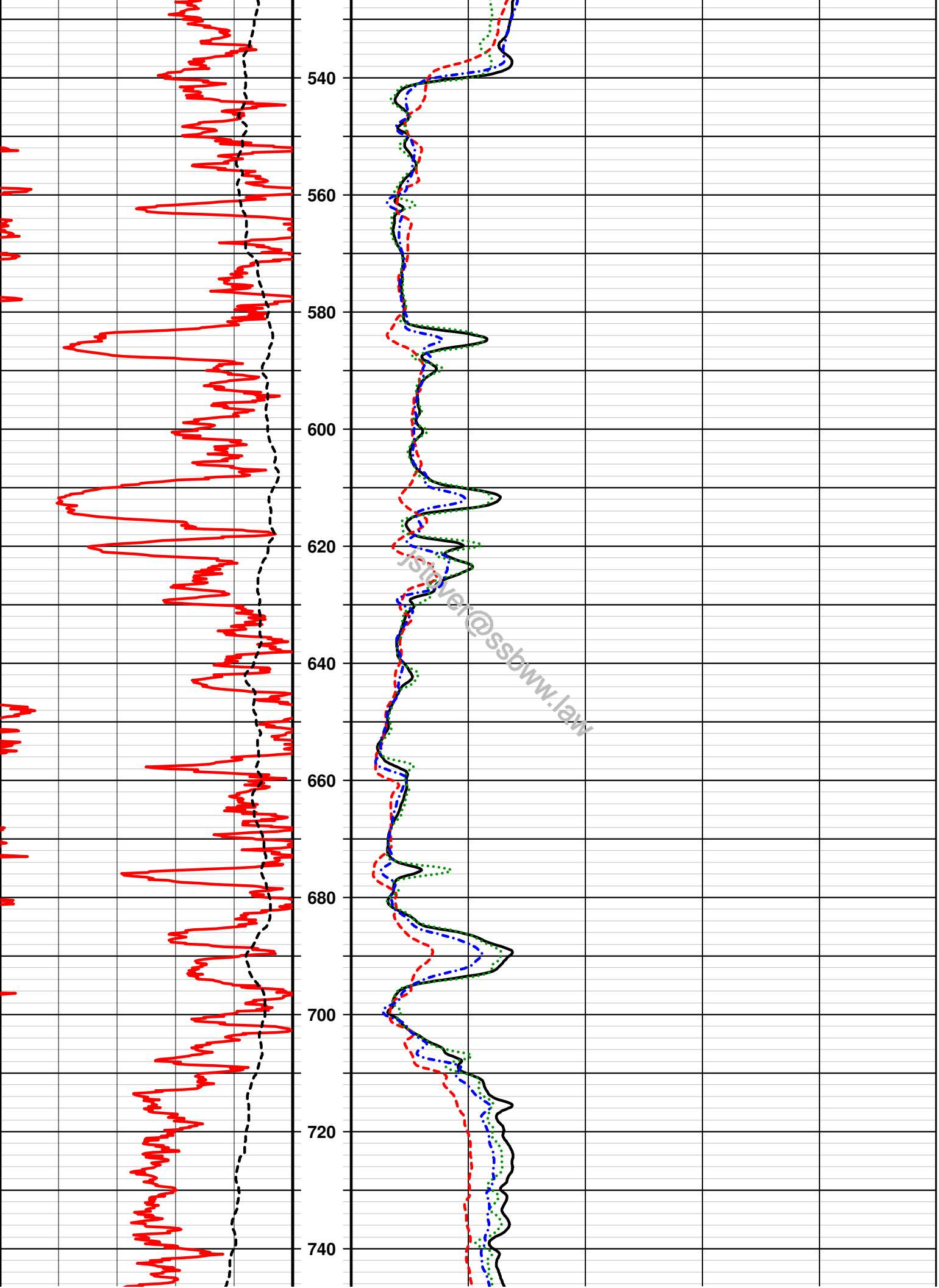
LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	40	1296.7	23.9	20
SP	1	40	1297.6	25.1	20
RESISTIVITY	1	40	1302.6	30.2	20
Tool Serial No.	GAM 4831 - RES 4943				

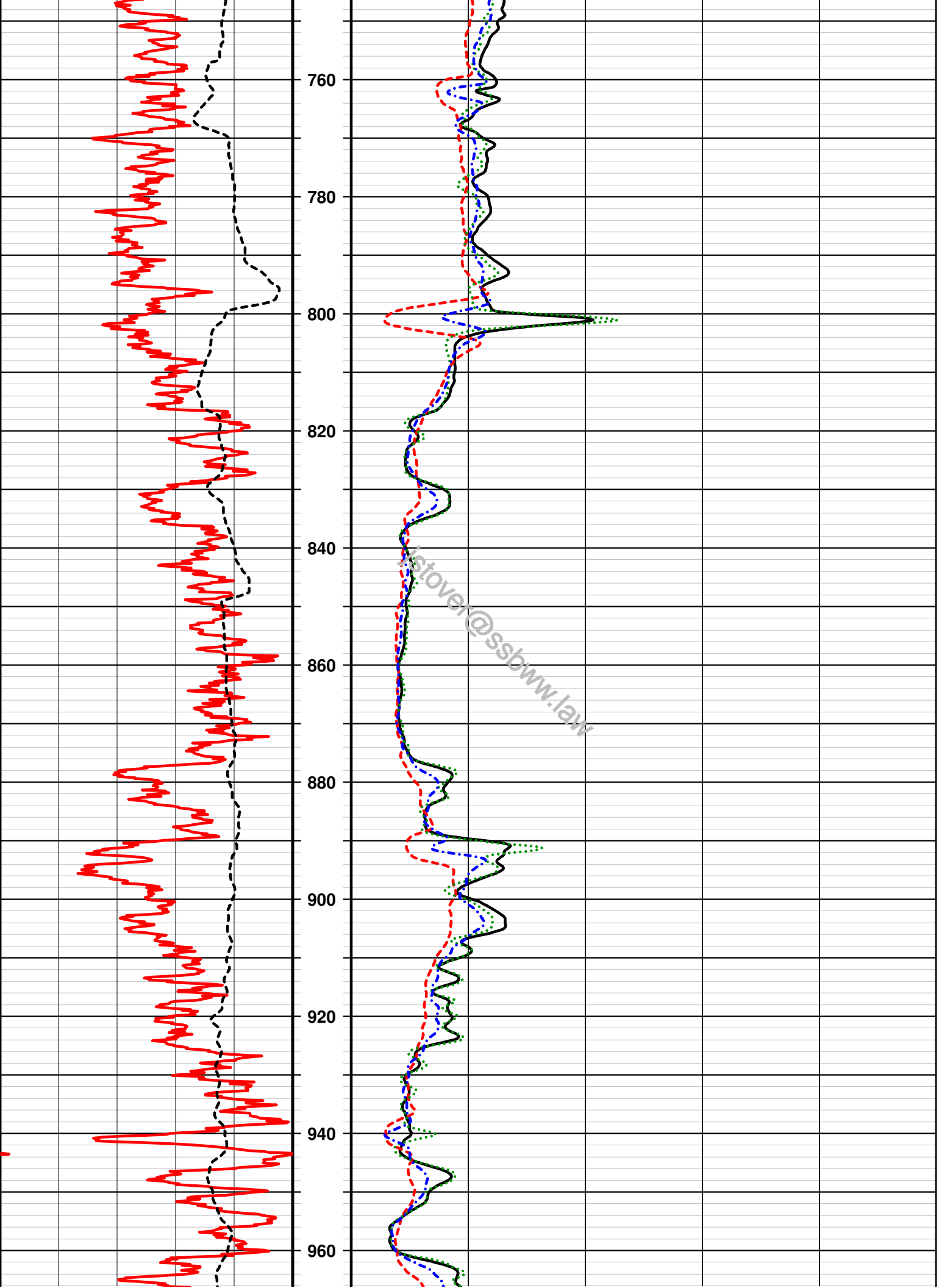
Comments: ALL MEASUREMENTS WERE TAKEN FROM GROUND LEVEL

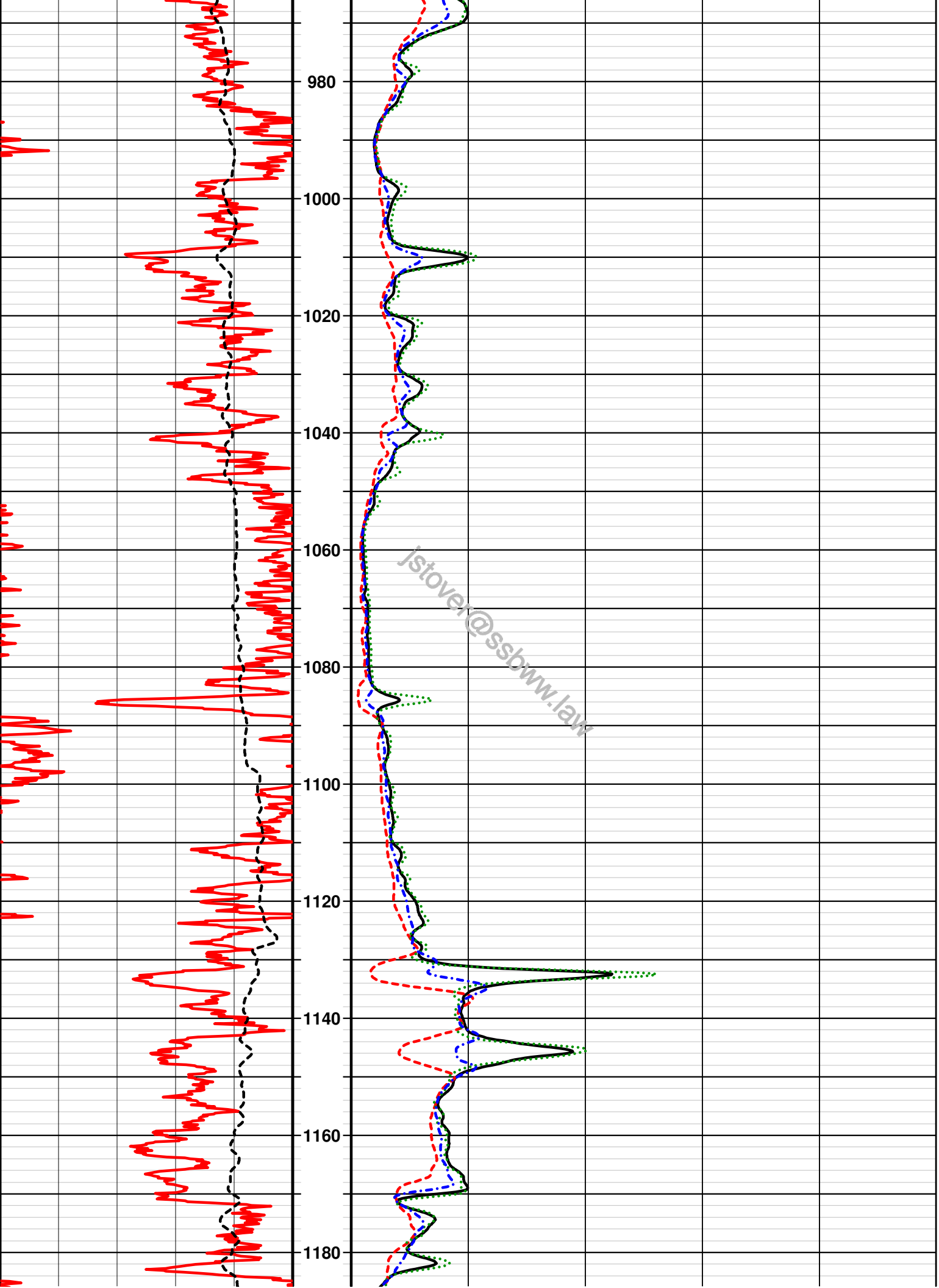


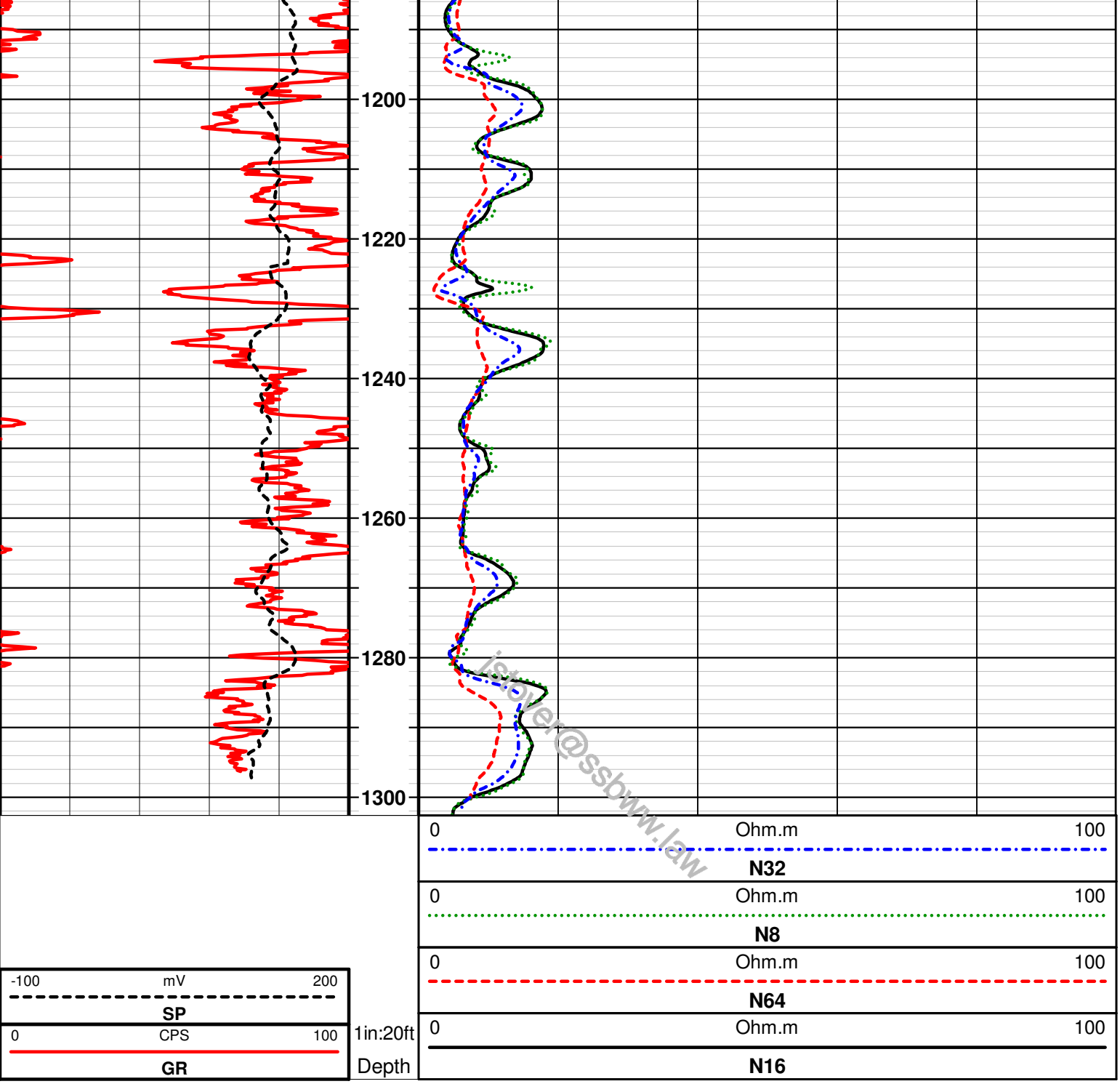

100
120
140
160
180
200
220
240
260
280
300
jstover@ssbww.law


320
340
360
380
400
420
440
460
480
500
520
fgtover@ssbwww.law


540
560
580
600
620
640
660
680
700
720
740
jstover@ssbww.law


760
780
800
820
840
860
880
900
920
940
960
jstover@ssbwww.law


980
1000
1020
1040
1060
1080
1100
1120
1140
1160
1180
jstover@ssbww.law

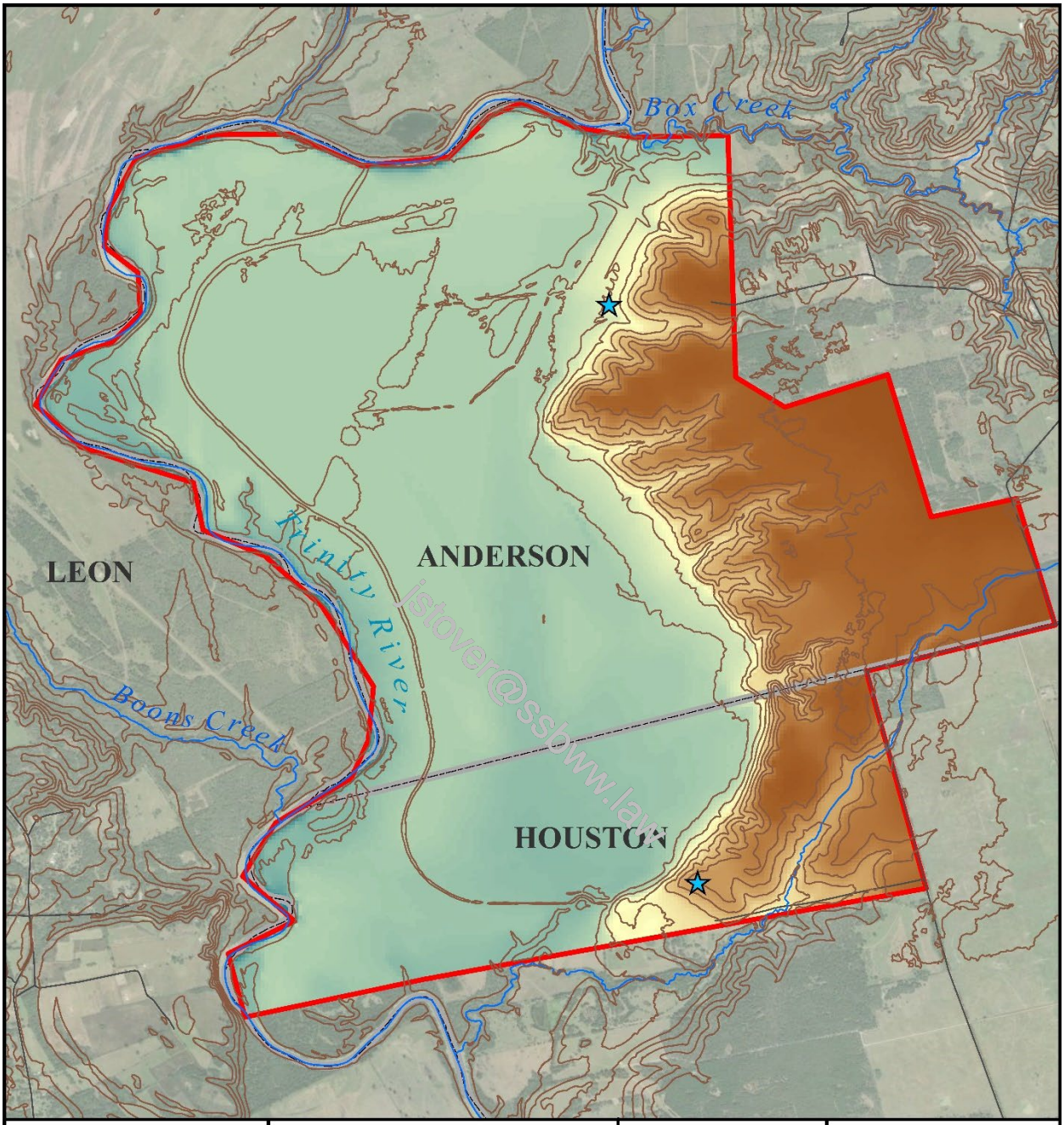


-100	mV	200
SP		
0	CPS	100
GR		

1in:20ft
Depth

0	Ohm.m	100
N32		
0	Ohm.m	100
N8		
0	Ohm.m	100
N64		
0	Ohm.m	100
N16		

Appendix B – Structure Maps



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways
- Rivers/Creeks

National Elevation Dataset (NED)
Digital Elevation Model (DEM)
Land Surface (USGS, 2004)

Elevation, in ft msl
280
160

Elevation Contour, in ft msl (Contour Interval = 10 feet)

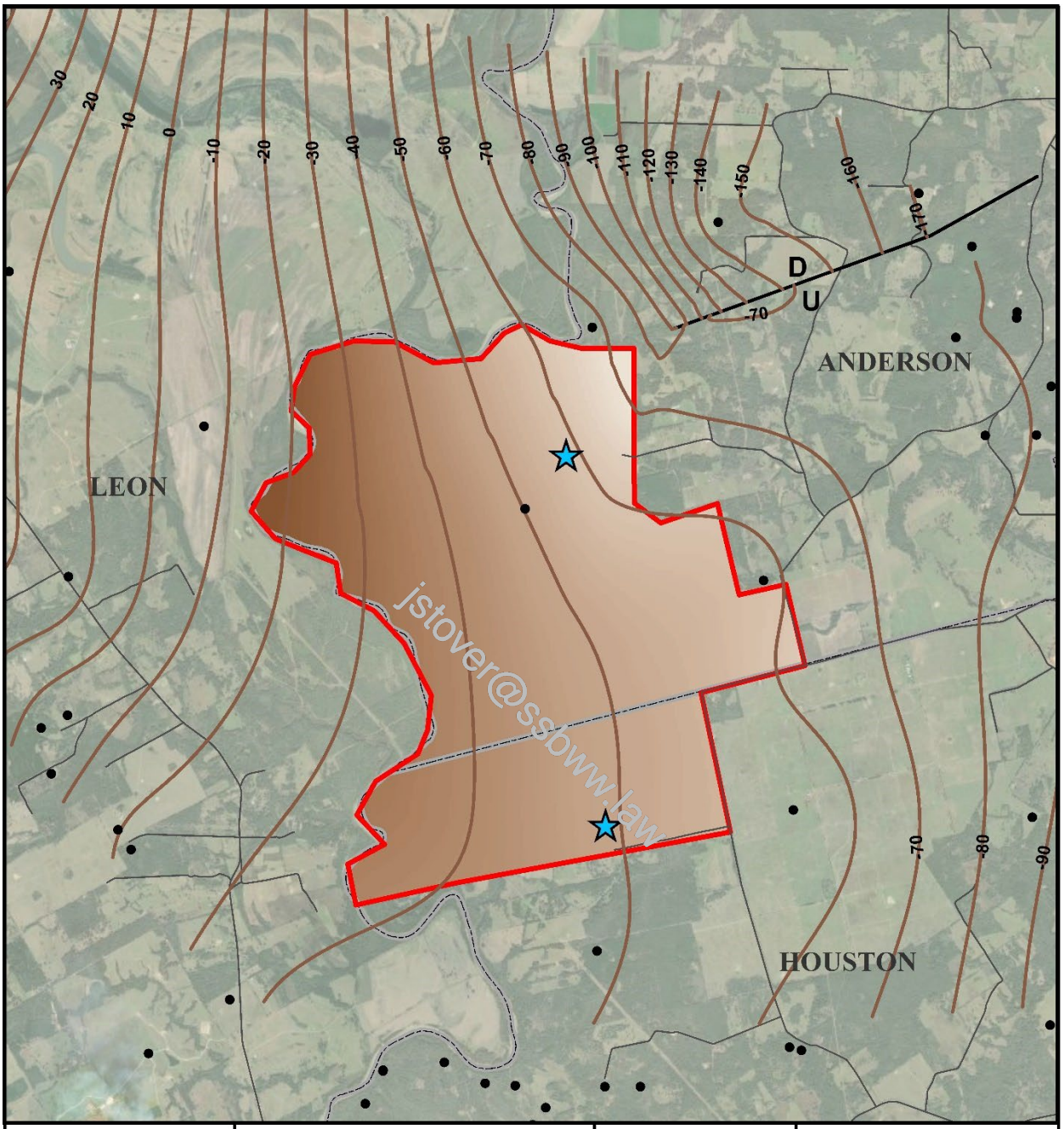
N

0 0.25 0.5
MILES

LAND SURFACE ELEVATION MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Base of the Reklaw Formation

Elevation, in ft msl

-15

-75

D / U Mapped Fault (U = Upthrown Block, D = Downthrown Block)

Elevation Contours, in ft msl (Contour Interval = 10 feet)

Well Control Points

N

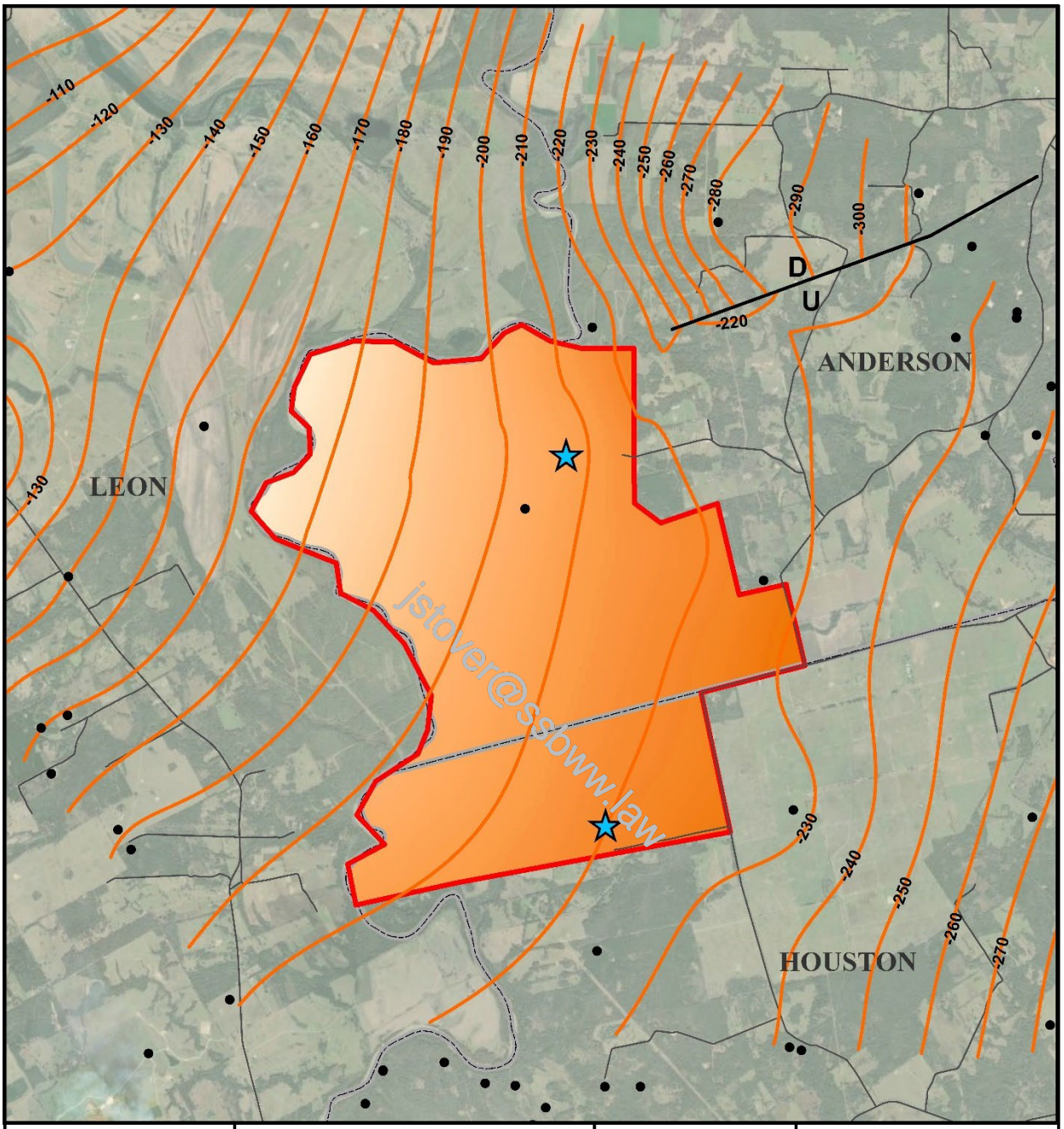
0 0.5 1

MILES

BASE OF THE REKLAW FORMATION STRUCTURE MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Base of the Carrizo Sand

Elevation, in ft msl

-175

-230

- D / U — Mapped Fault (U = Upthrown Block, D = Downthrown Block)
- Elevation Contours, in ft msl (Contour Interval = 10 feet)
- Well Control Points

N

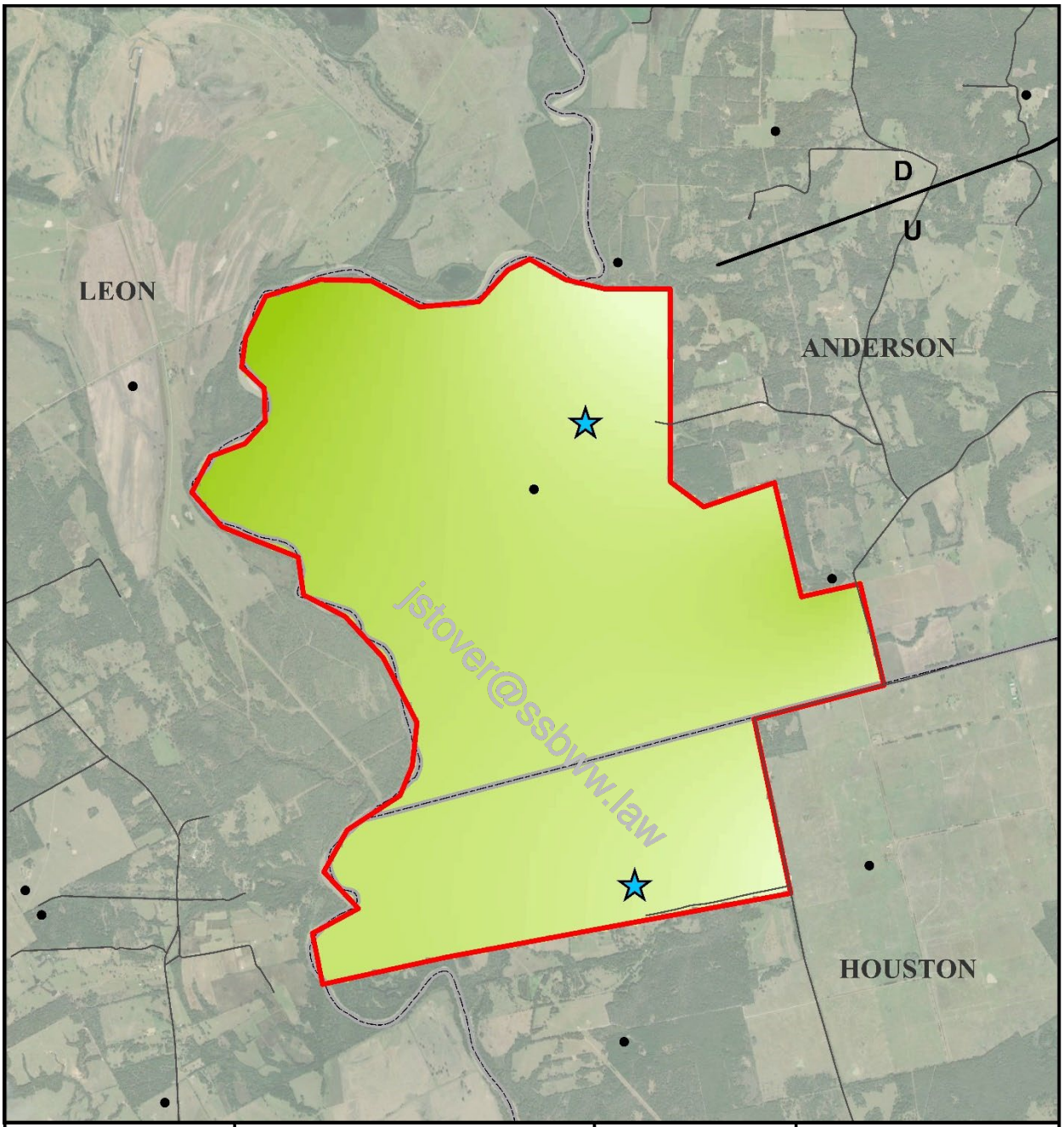
0 0.5 1

MILES

BASE OF THE CARRIZO SAND STRUCTURE MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Base of the Upper Wilcox

Elevation, in ft msl

-915

-950

D / U Mapped Fault (U = Upthrown Block, D = Downthrown Block)

Well Control Points

N

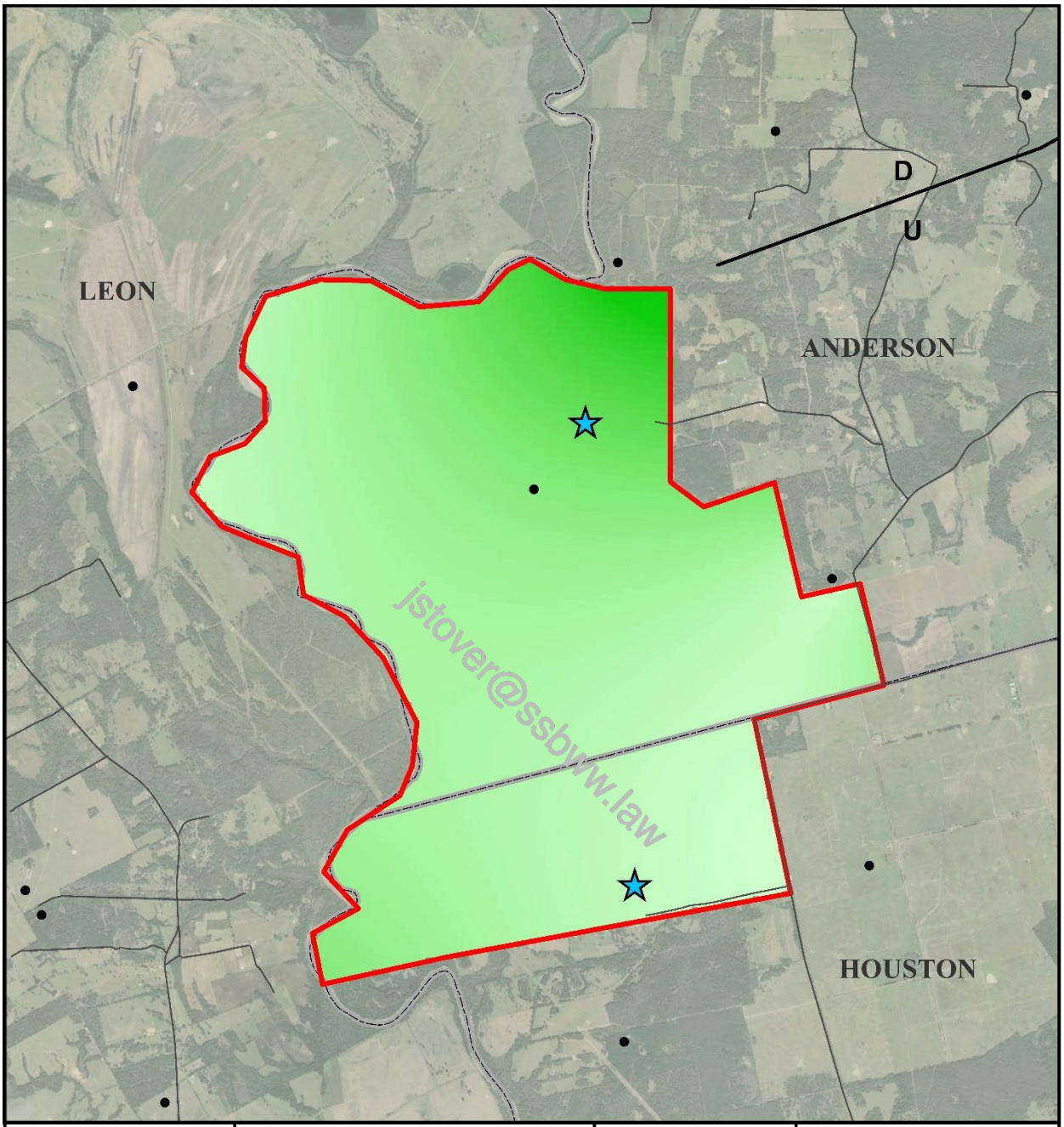
0 0.5 1

MILES

BASE OF THE UPPER WILCOX STRUCTURE MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Base of the Middle Wilcox

Elevation, in ft msl

-1,515

-1,560

D / U Mapped Fault (U = Upthrown Block, D = Downthrown Block)

Well Control Points

N

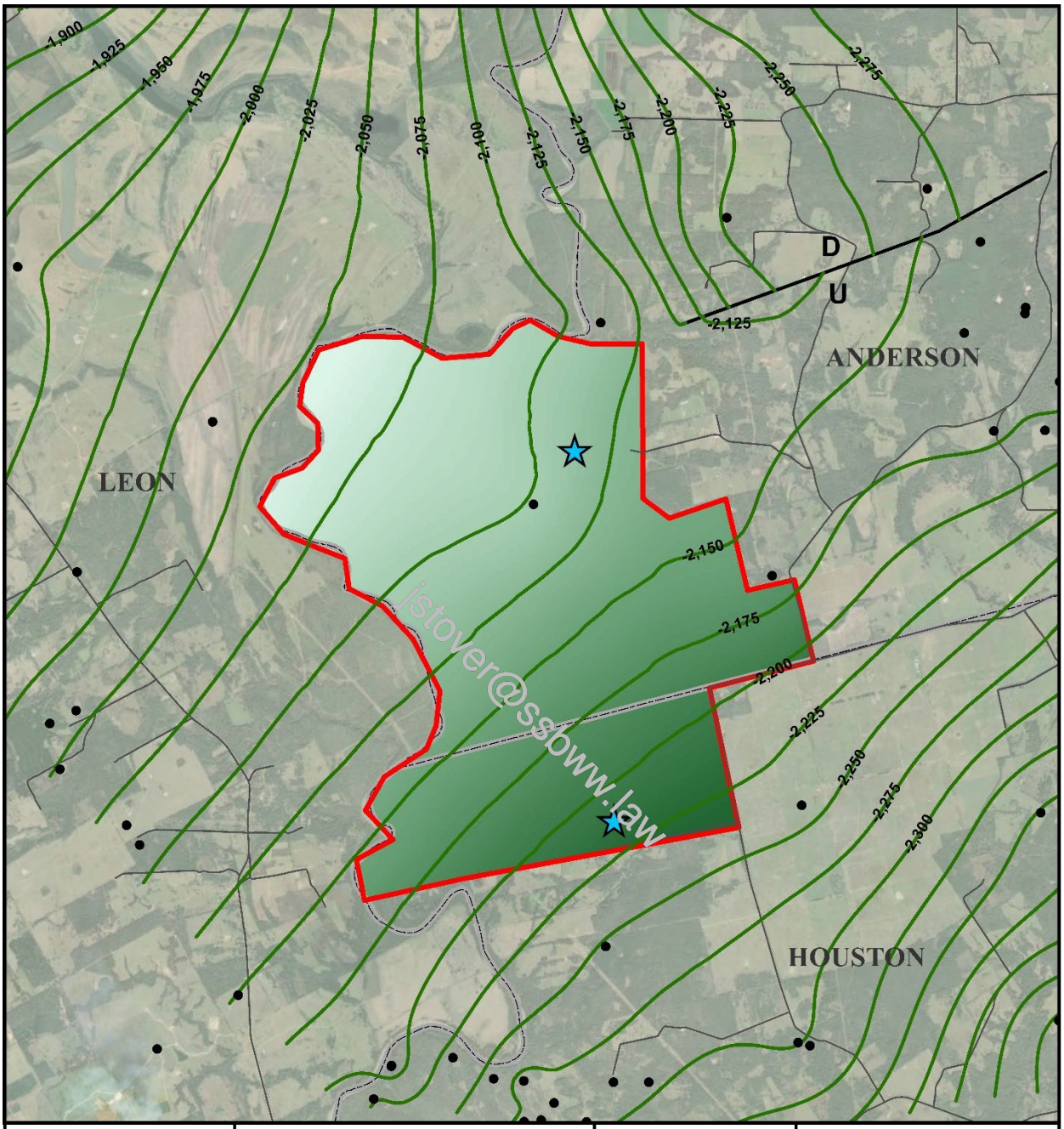
0 0.5 1

MILES

BASE OF THE MIDDLE WILCOX STRUCTURE MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Base of the Wilcox Group

Elevation, in ft msl

-2,050

-2,240

D / U — Mapped Fault (U = Upthrown Block, D = Downthrown Block)

Elevation Contours, in ft msl (Contour Interval = 25 feet)

Well Control Points

N

0 0.5 1

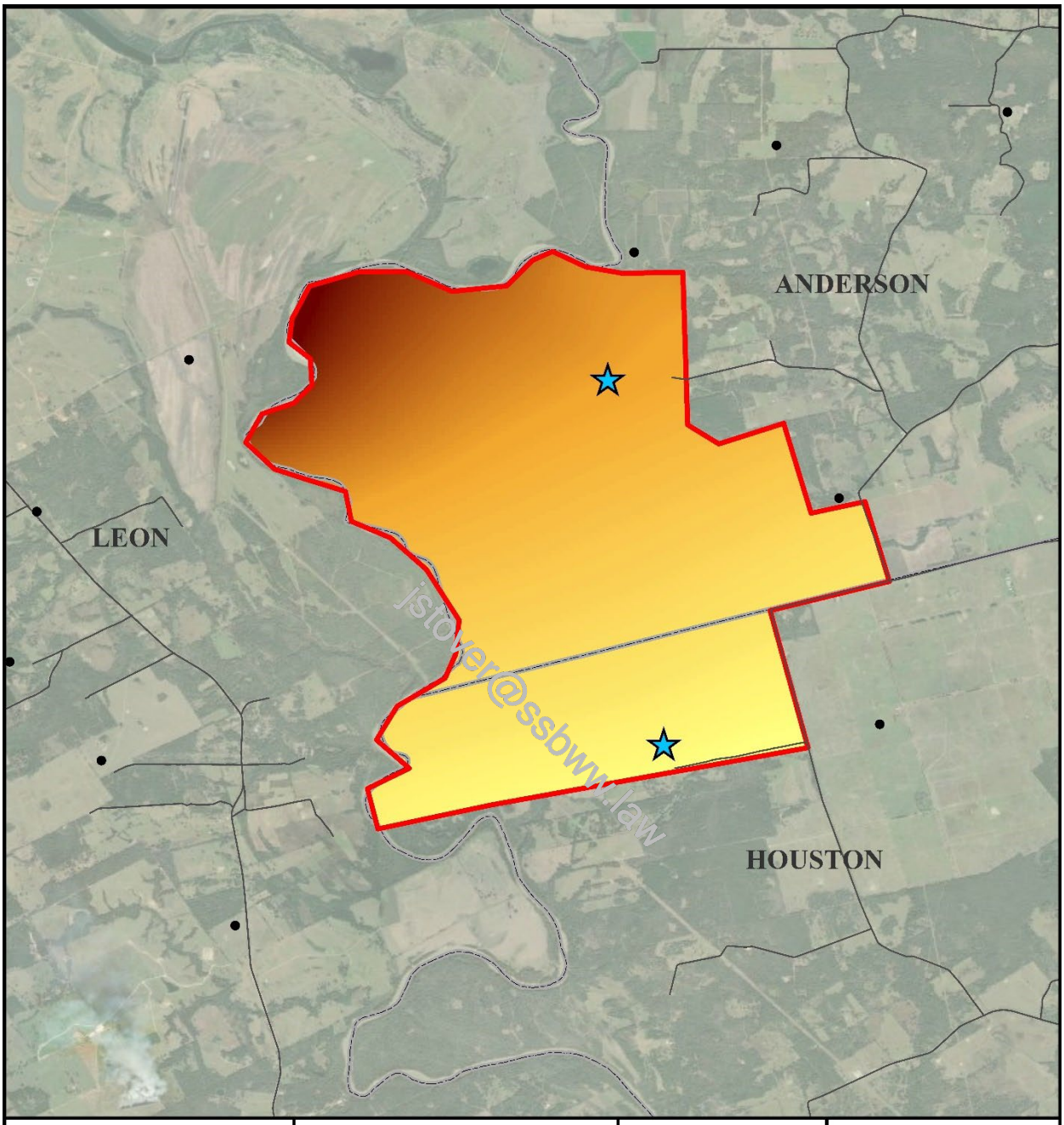
MILES

BASE OF THE WILCOX GROUP STRUCTURE MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER

Appendix C – Net Sand Thickness Maps



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Carrizo Sand

Net Sand Thickness, in feet

175

125

- Well Control Points

N

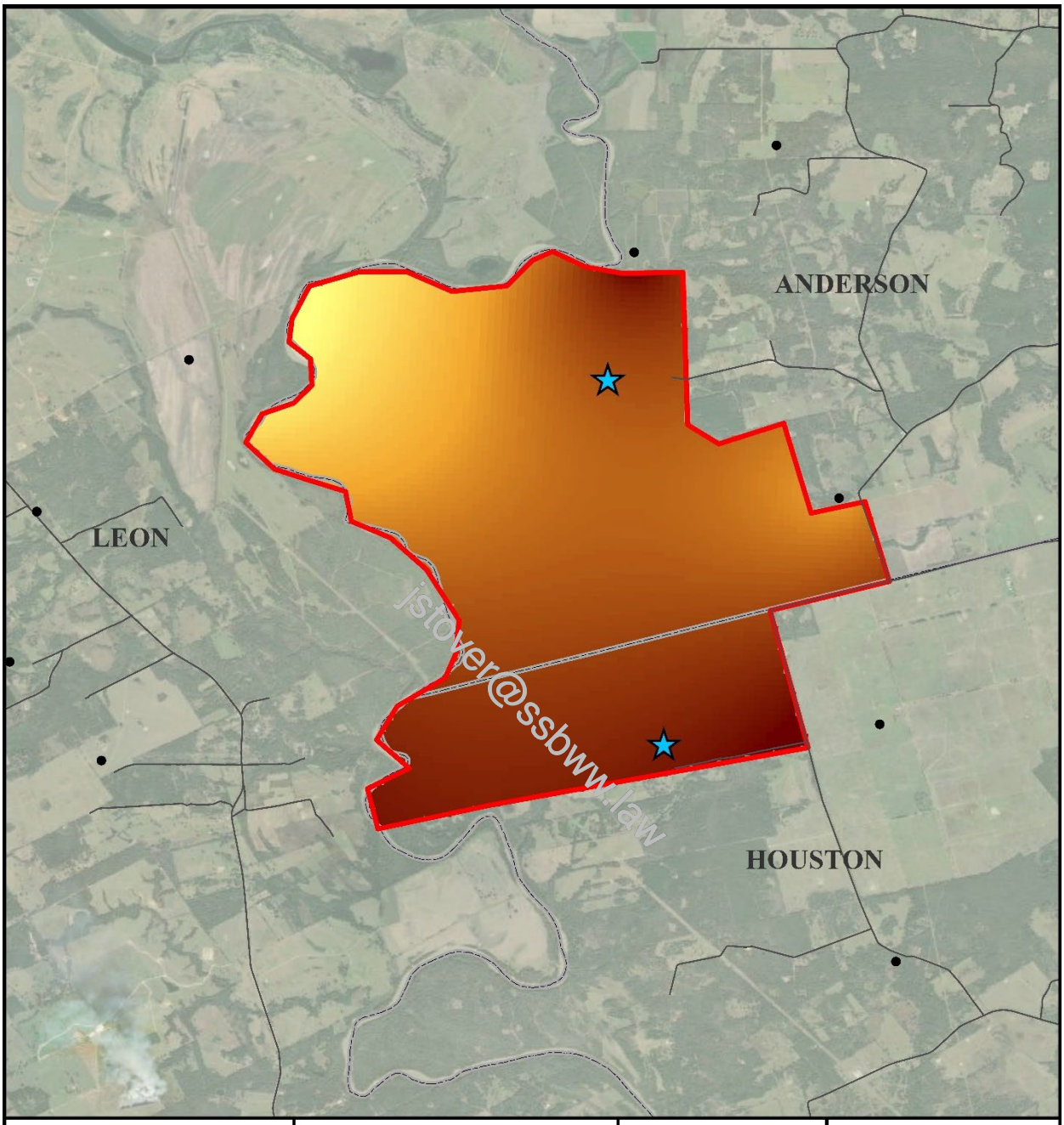
0 0.5 1

MILES

CARRIZO SAND NET SAND THICKNESS MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Upper Wilcox Group

Net Sand Thickness, in feet

185

135

- Well Control Points

N

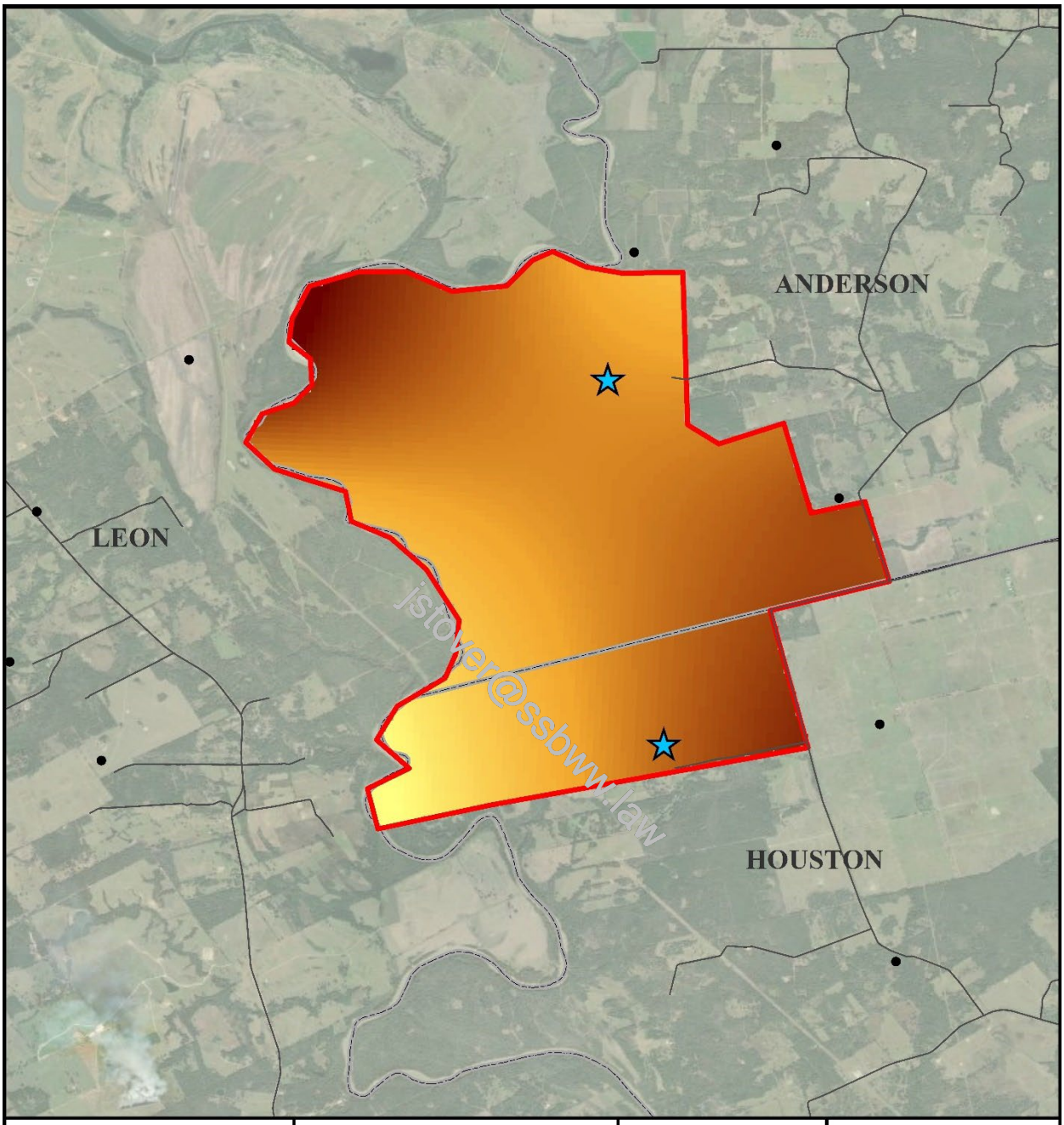
0 0.5 1

MILES

UPPER WILCOX NET SAND THICKNESS MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Middle Wilcox Group

Net Sand Thickness, in feet

260

210

- Well Control Points

N

0 0.5 1

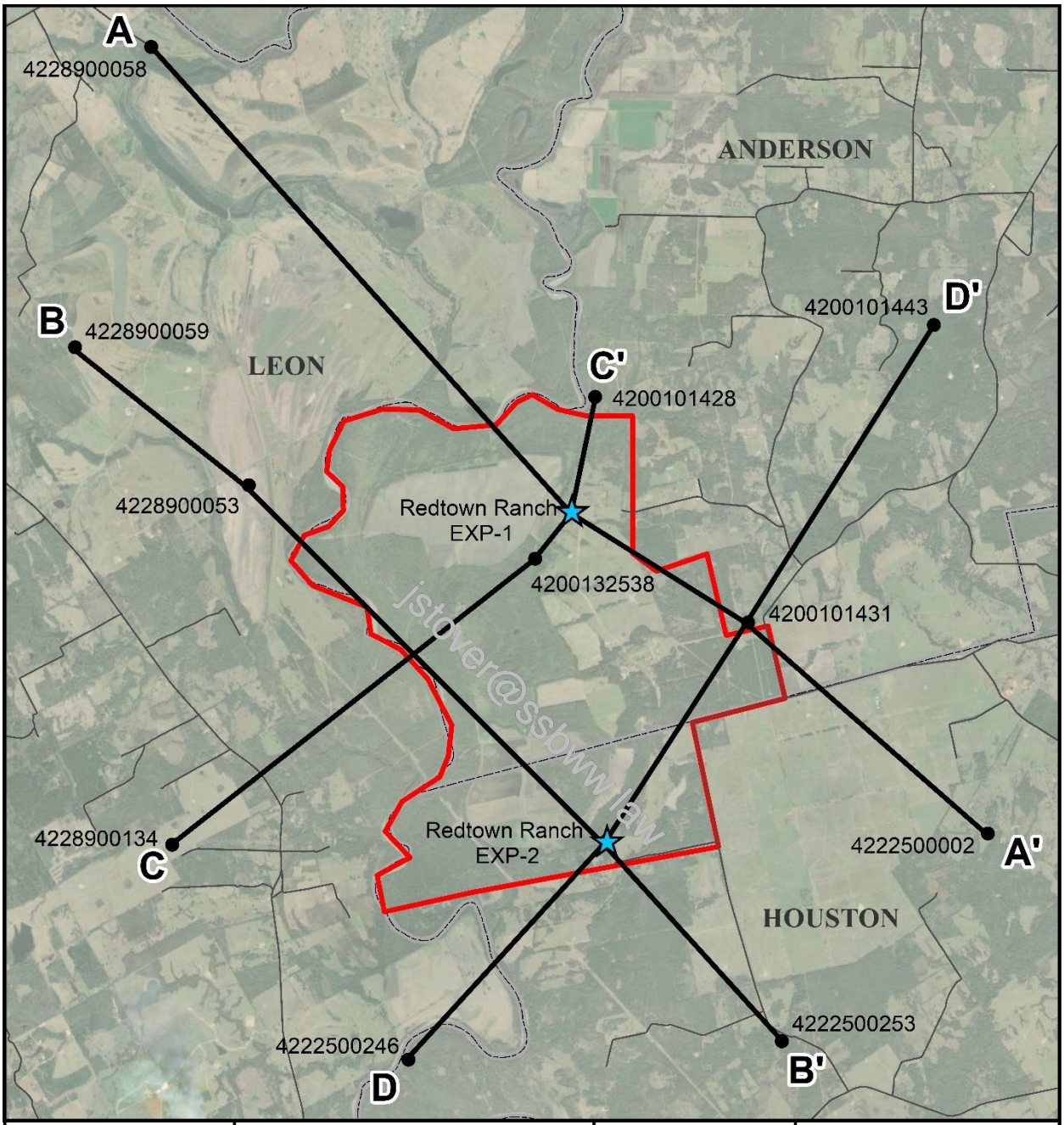
MILES

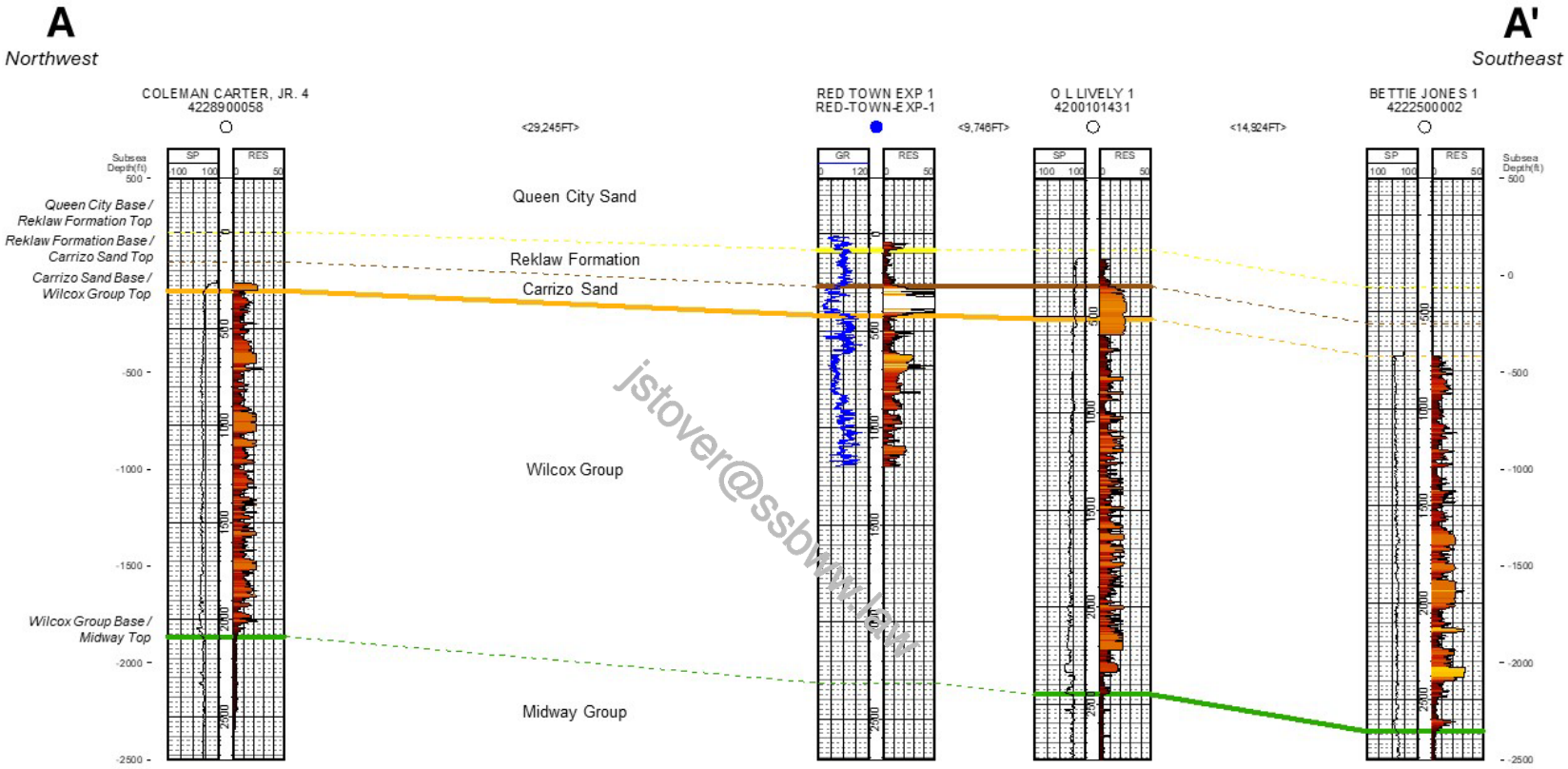
MIDDLE WILCOX NET SAND THICKNESS MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER

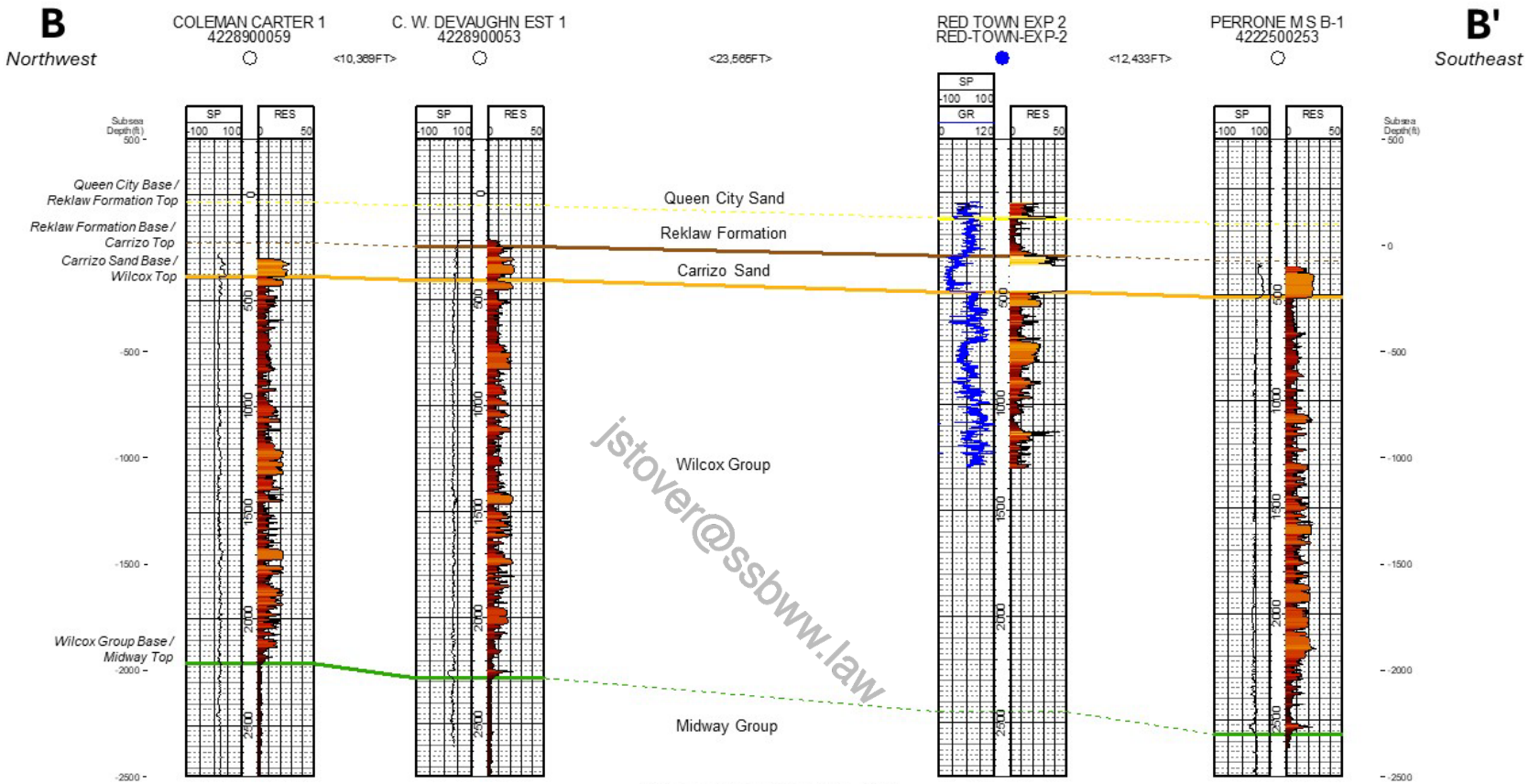
Appendix D – Geologic Cross Sections


A
4228900058
ANDERSON
B
4228900059
LEON
C'
4200101428
D'
4200101443
4228900053
Redtown Ranch
EXP-1
4200132538
4200101431
jstover@sbwwlaw
Redtown Ranch
EXP-2
4228900134
C
4222500002
A'
HOUSTON
4222500253
4222500246
D
B'
Legend
Redtown Ranch Exploratory Boreholes
Redtown Ranch Property Boundary
County Boundary
TxDOT Roadways
Well Control Points
API Number
Cross Section Lines
N
0
0.5
1
MILES
LOCATION OF GEOLOGIC CROSS SECTIONS
Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368



Cross Section A - A'

Structural Cross Section Along the Relative Dip Direction

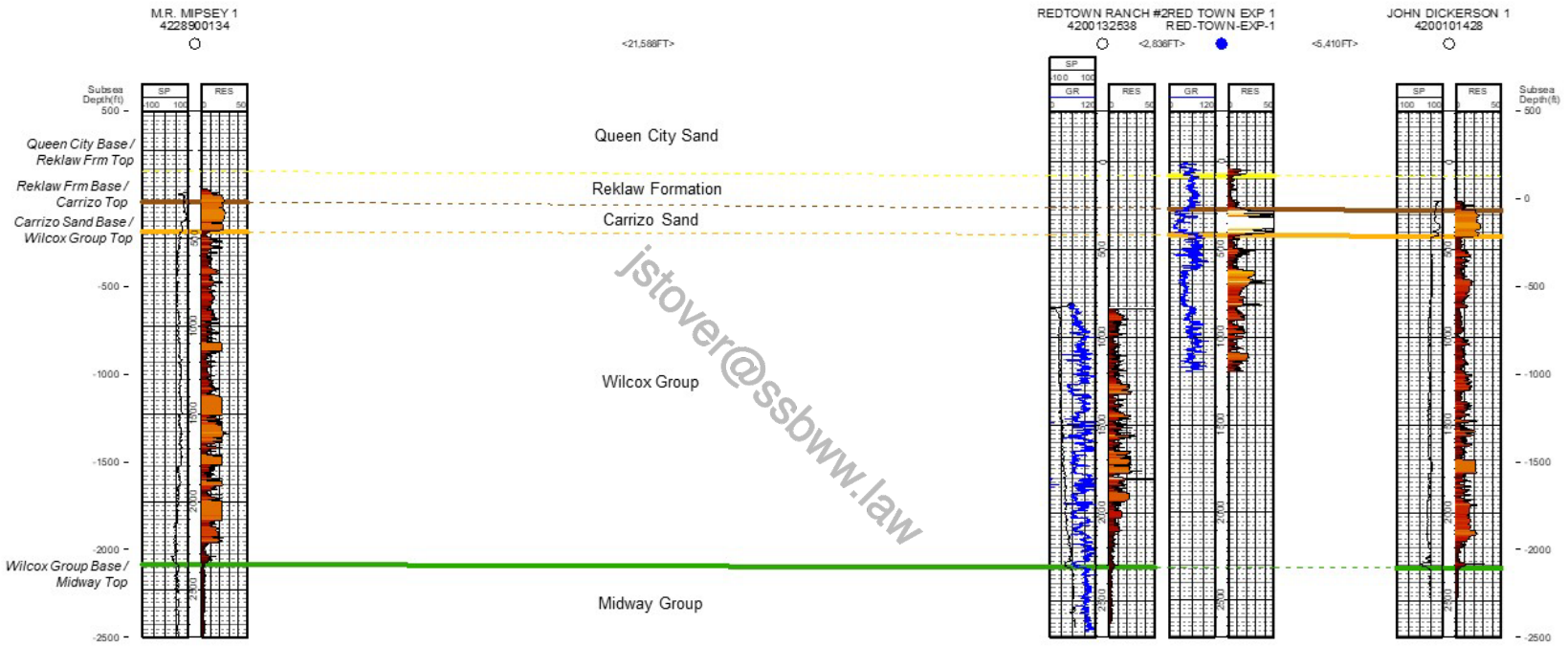


Cross Section B - B'

Structural Cross Section Along the Relative Dip Direction

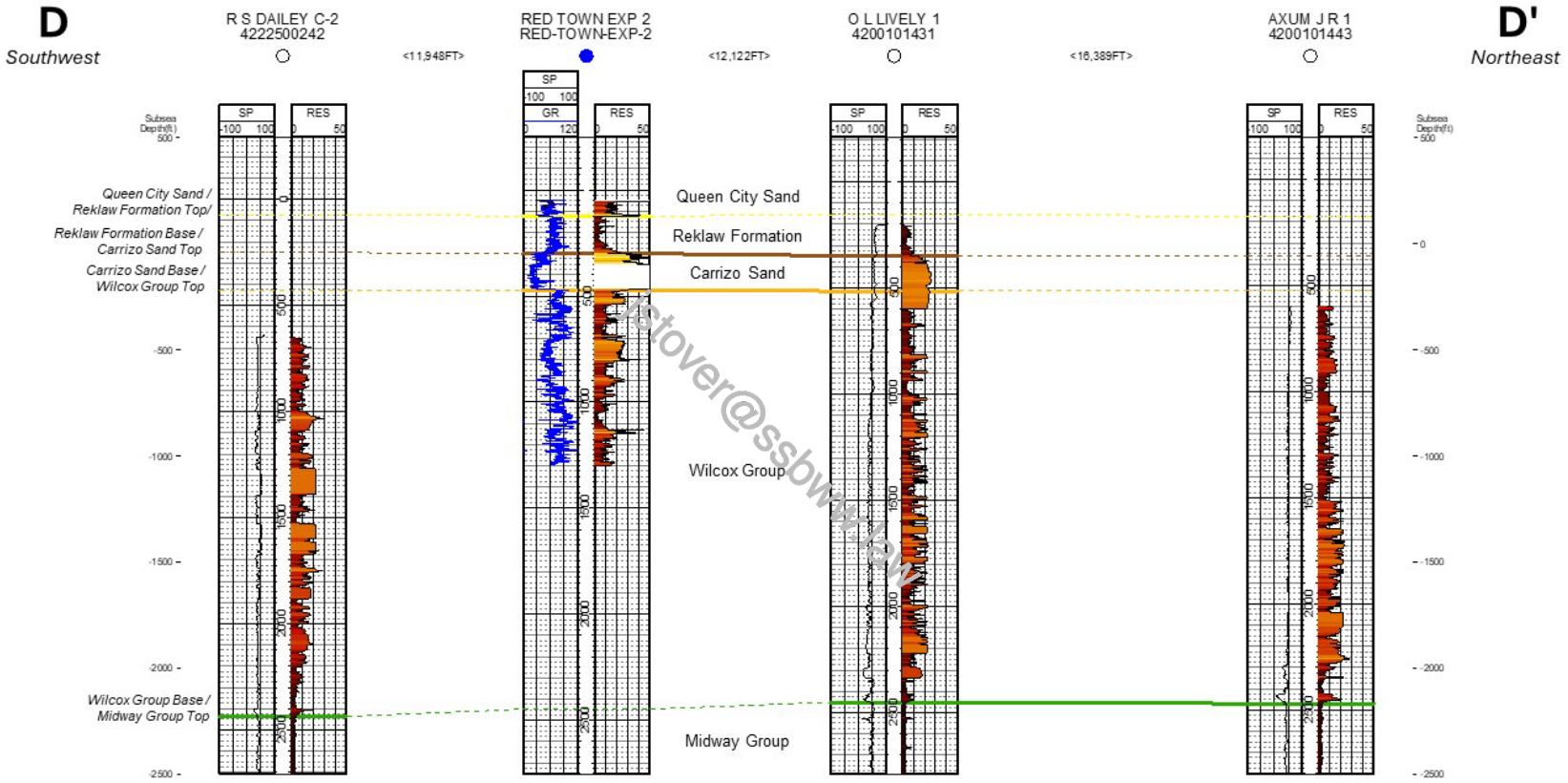
C
Southwest

C'
Northeast



Cross Section C - C'

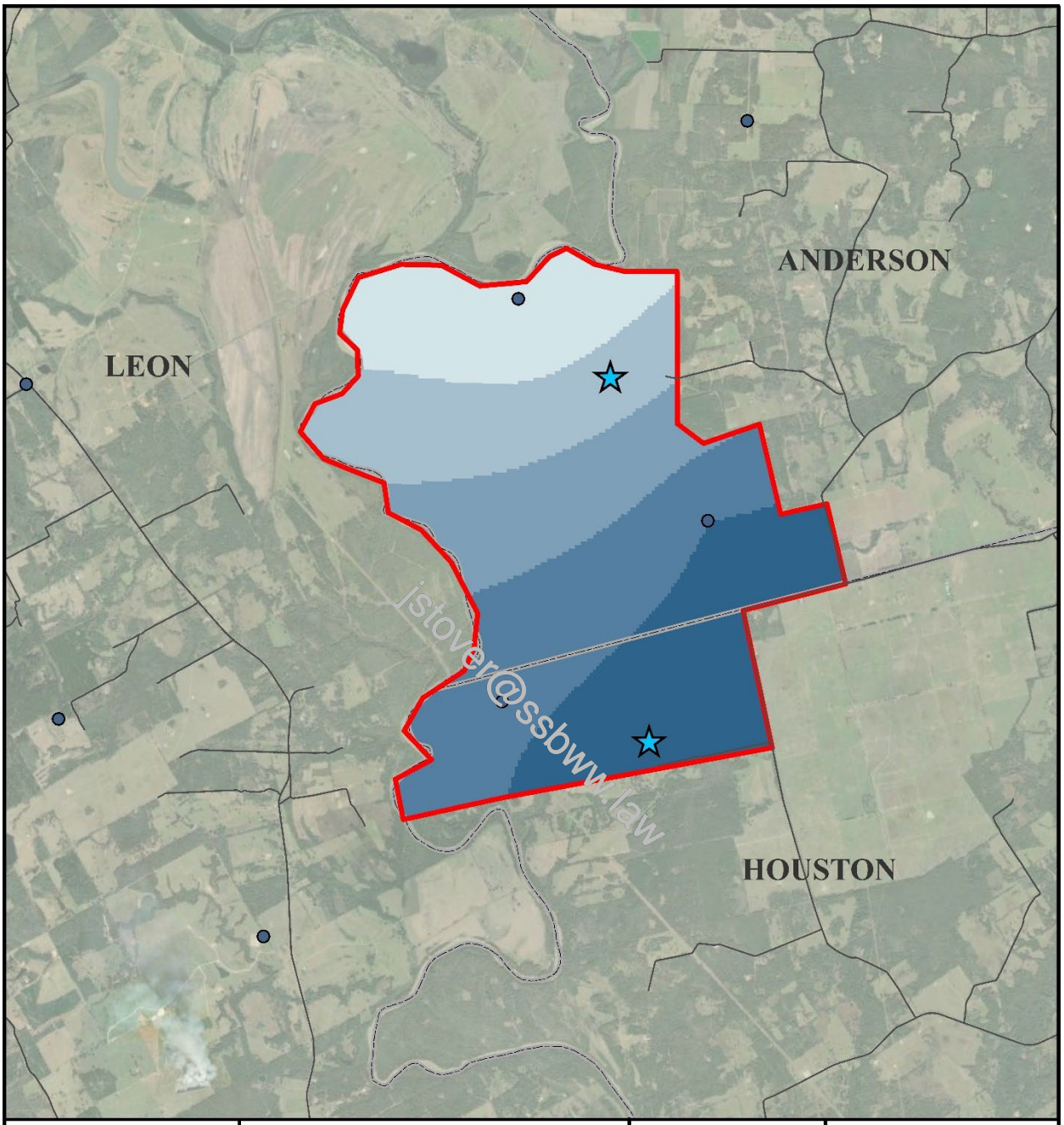
Structural Cross Section Along the Relative Strike Direction



Cross Section D - D'

Structural Cross Section Along the Relative Strike Direction

Appendix E – Water Level Elevation Maps



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

Water Level Elevation in the Carrizo Sand

Elevation, in ft msl

- 195 - 200
- 200 - 205
- 205 - 210
- 210 - 215
- 215 - 225
- Recent Water Level Measurements

N

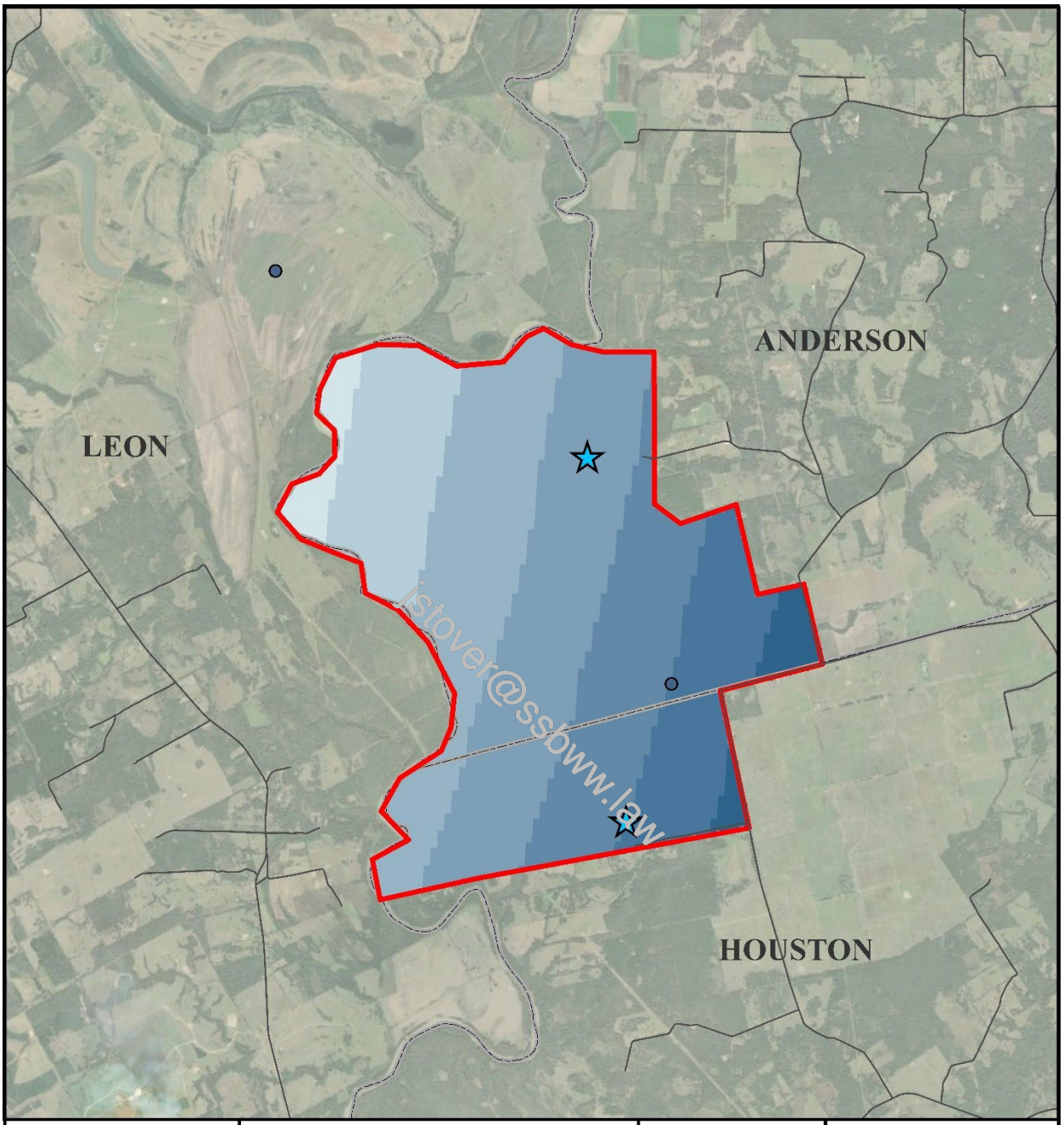
0 0.5 1

MILES

CARRIZO SAND WATER LEVEL ELEVATION MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER



Legend

- Redtown Ranch Exploratory Boreholes
- Redtown Ranch Property Boundary
- County Boundary
- TxDOT Roadways

2015 Water Level Elevation for the Upper Wilcox (Layer 7; Schorr and others, 2020)

Elevation, in ft msl

227 - 230	236 - 239
230 - 233	239 - 242
233 - 236	242 - 245
	245 - 247

Water Level Measurements for the Upper Wilcox ("Artesian Flow")

N

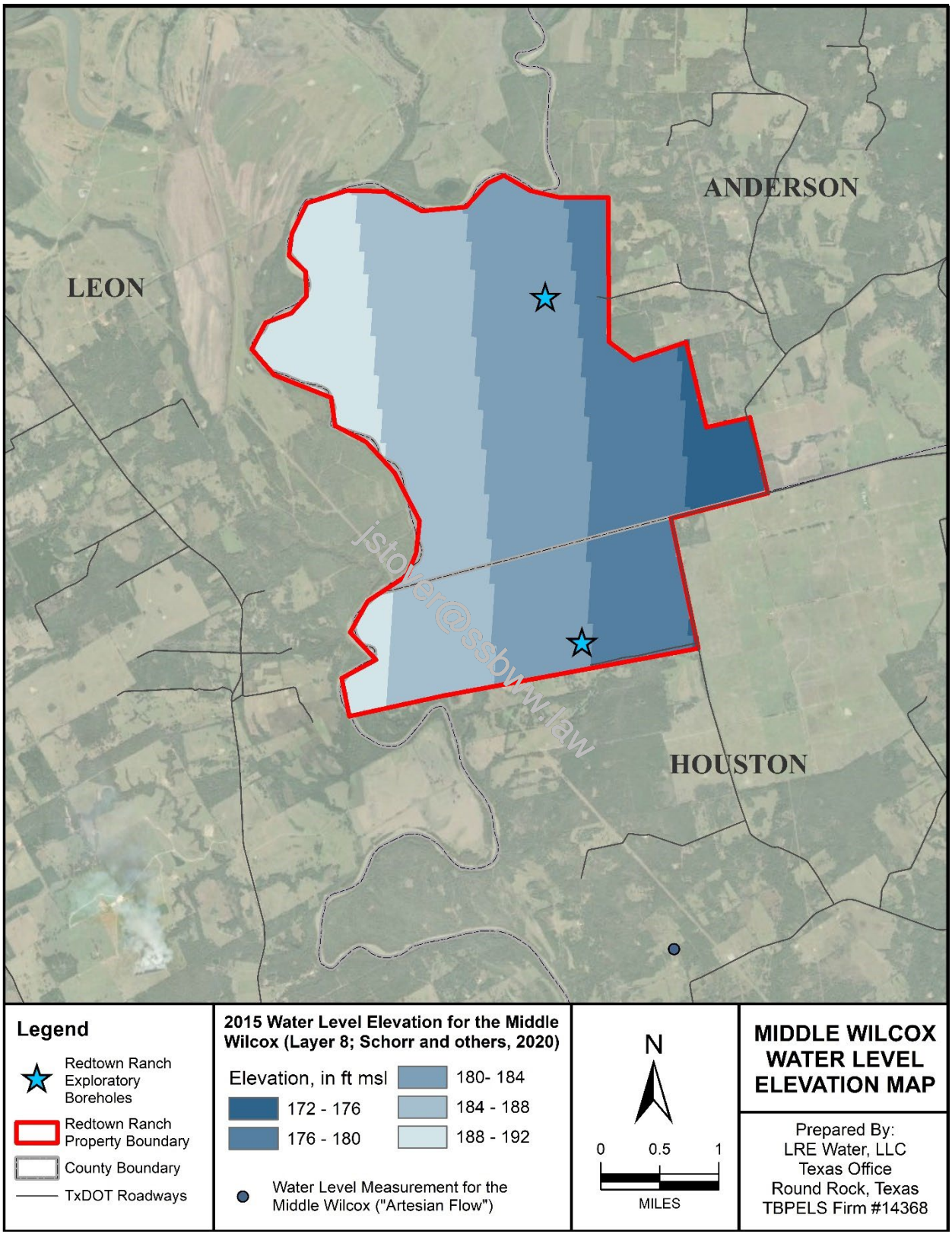
0 0.5 1

MILES

UPPER WILCOX WATER LEVEL ELEVATION MAP

Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

LRE WATER


ANDERSON
LEON
HOUSTON
jstoever@ssbww.law
Legend
Redtown Ranch Exploratory Boreholes
Redtown Ranch Property Boundary
County Boundary
TxDOT Roadways
2015 Water Level Elevation for the Middle Wilcox (Layer 8; Schorr and others, 2020)
Elevation, in ft msl
172 - 176
176 - 180
180- 184
184 - 188
188 - 192
Water Level Measurement for the Middle Wilcox ("Artesian Flow")
N
0
0.5
1
MILES
MIDDLE WILCOX WATER LEVEL ELEVATION MAP
Prepared By:
LRE Water, LLC
Texas Office
Round Rock, Texas
TBPELS Firm #14368

Appendix F – Water Quality Analytical Lab Results for Existing Redtown Ranch Well #2

REPORT

REPORT DATE	04/03/2023
RECEIVE DATE	03/10/2023
RECEIVE TIME	1120
WORK ORDER	N3C0824

REPORT TO
Andrews & Foster Drilling Terry Miller PO Box 348 Athens, TX 75751

REPORT FROM
Eastex Environmental Laboratory PO Box 631375 Nacogdoches, TX 75963 936-569-8879

PROJECT
Red Town Ranch

Enclosed are the results of analyses for samples received by the laboratory on 03/10/23 11:20, with Lab ID Number N3C0824. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Paul D. Hughes, Laboratory Director

LABORATORY ANALYTICAL REPORT

Project: Red Town Ranch

Sample Site: Well 2	Sample Number	Collector: Terry Miller
Sample Type: Grab	**N3C0824-01**	Sampled: 03/10/23 0915
Sample Matrix: Drinking		Received: 03/10/23 1120

Analyte	Result	Reporting Limit	Units	Nelac Status	Batch	Analyzed	Analyst	Method	Notes
Aluminum - Total	4.65	2.50	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Antimony - Total	<1.00	1.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Arsenic, Total	<1.00	1.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Barium, Total	14.3	3.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Beryllium, Total	<0.500	0.500	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Bromide	<0.100	0.100	mg/L	A	B3C3176	03/21/23 1500	TDS	EPA 300.0	Cs
Cadmium, Total	<1.00	1.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Calcium, Total	0.919	0.500	mg/L	P	B3C3606	03/23/23 1316	KJH	EPA 200.7	
Chloride	7.0	5.0	mg/L	A	B3C3176	03/21/23 1500	TDS	EPA 300.0	Cs
Chromium, Total	<3.00	3.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Copper, Total	<0.0500	0.0500	mg/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Fluoride	0.375	0.100	mg/L	A	B3C3176	03/21/23 1500	TDS	EPA 300.0	Cs
Iron, Total	<0.150	0.150	mg/L	A	B3C3606	03/23/23 1316	KJH	EPA 200.7	
Lead, Total	<0.00500	0.00500	mg/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Magnesium, Total	<0.500	0.500	mg/L	A	B3C3606	03/23/23 1316	KJH	EPA 200.7	
Manganese, Total	3.73	1.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Nickel, Total	<2.00	2.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Nitrate+Nitrite as N	<0.02	0.02	mg/L	N	B3C4612	03/30/23 1643	ECM	SM 4500 NO3 F	Cs
Selenium, Total	<5.00	5.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Silver, Total	<0.500	0.500	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	
Sodium, Total	69.0	0.500	mg/L	A	B3C3606	03/23/23 1316	KJH	EPA 200.7	
Sulfate	24.8	4.0	mg/L	A	B3C3176	03/21/23 1500	TDS	EPA 300.0	Cs
Thallium, Total	<0.500	0.500	ug/L	N	B3C2880	03/17/23 1318	LAN	EPA 200.8	
TOC	<1.0	1.0	mg/L	P	B3C3461	03/22/23 0926	WLS	SM 5310 C	Cs
Zinc, Total	9.84	5.00	ug/L	A	B3C2880	03/17/23 1318	LAN	EPA 200.8	

Sample Site: Well 2
Sample Type: Grab
Sample Matrix: Drinking

Sample Number
N3C0824-01

Collector: Terry Miller
Sampled: 03/10/23 0915
Received: 03/10/23 1120

Analyte	Result	Reporting Limit	Units	Nelac Status	Batch	Analyzed	Analyst	Method	Notes
Alkalinity	129	20	mg CaCO3/L	P	N301833	03/14/23 0655	SRD	SM 2320 B	
Bicarbonate	129	20	mg CaCO3/L		N302011	03/20/23 0800	SRD	SM 2320 B	
Carbonate	0		mg CaCO3/L		N302012	03/20/23 0800	SRD	SM 2320 B	
Color, True - Filtered	10	10	Color Units	N	N301830	03/10/23 1600	RJD	SM 2120 B	27
Conductivity	341	10	µmhos/cm @25C	A	N301834	03/13/23 1115	KP	SM 2510 B	
Hardness	<5.00	5.00	mg CaCO3/L	A	N302197	03/24/23 1200	CGK	SM 2340 C	
Hardness, Ca	<5.00	5.00	mg CaCO3/L	N	N302200	03/24/23 1140	CGK	EPA 215.2	
Langelier Stability Index	-2.09		std unit	N	N302018	03/28/23 1530	RJD	Calculation	ZZ
Nitrate - N	<1	1	mg/L	A	N301802	03/10/23 1330	KP	SM 4500 NO3 D	
Nitrite as N	<0.05	0.05	mg/L	A	N301800	03/10/23 1200	SRD	SM 4500 NO2 B	
pH Lab	7.06		std unit	P	N301803	03/10/23 1545	KP	SM 4500 H + B	3, 6
TDS	201	10.0	mg/L	A	N301842	03/13/23 1505	CGK	SM 2540 C	

SM 4500 NO2 B - Quality Control

Eastex Environmental Laboratory - Nacogdoches

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch N301800 - No Prep										
Blank (N301800-BLK1)										**Prepared & Analyzed: 03/10/23**
Nitrite as N	ND	0.05	mg/L							
LCS (N301800-BS1)										**Prepared & Analyzed: 03/10/23**
Nitrite as N	1.4		mg/L	1.39		101	90-110			
Matrix Spike (N301800-MS1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/10/23**
Nitrite as N	0.183	0.05	mg/L	0.200	0.01	86.5	80-120			
Matrix Spike Dup (N301800-MSD1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/10/23**
Nitrite as N	0.185	0.05	mg/L	0.200	0.01	87.5	80-120	1.09	20	
Batch N301802 - No Prep										
Blank (N301802-BLK1)										**Prepared & Analyzed: 03/10/23**
Nitrate - N	ND	1	mg/L							
LCS (N301802-BS1)										**Prepared & Analyzed: 03/10/23**
Nitrate - N	10.9		mg/L	10.0		109	90-110			
Matrix Spike (N301802-MS1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/10/23**
Nitrate - N	10.9	1	mg/L	10.0	0.35	106	80-120			
Matrix Spike Dup (N301802-MSD1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/10/23**
Nitrate - N	11.1	1	mg/L	10.0	0.35	108	80-120	1.82	20	
Batch N301803 - No Prep										
Duplicate (N301803-DUP1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/10/23**
pH Lab	7.11		std unit		7.06			0.706	20	3, 6

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch N301830 - No Prep										
Blank (N301830-BLK1)										**Prepared & Analyzed: 03/10/23**
Color, True - Filtered	ND	10	Color Units							27
Duplicate (N301830-DUP1)				**Source: N3C0824-01**						**Prepared & Analyzed: 03/10/23**
Color, True - Filtered	10	10	Color Units		10			0.00	20	27
Batch N301833 - No Prep										
Blank (N301833-BLK1)										**Prepared & Analyzed: 03/14/23**
Alkalinity	ND	20	mg CaCO3/L							
LCS (N301833-BS1)										**Prepared & Analyzed: 03/14/23**
Alkalinity	95		mg CaCO3/L	100		95.0	80-120			
Duplicate (N301833-DUP1)				**Source: N3C0245-01**						**Prepared & Analyzed: 03/14/23**
Alkalinity	19	20	mg CaCO3/L		18			5.41	20	
MRL Check (N301833-MRL1)										**Prepared & Analyzed: 03/14/23**
Alkalinity	20		mg CaCO3/L	20.0		100	70-130			
Batch N301834 - No Prep										
Blank (N301834-BLK1)										**Prepared & Analyzed: 03/13/23**
Conductivity	ND	10	µmhos/cm @25C							
LCS (N301834-BS1)										**Prepared & Analyzed: 03/13/23**
Conductivity	101		µmhos/cm @25C	100		101	80-120			

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch N301834 - No Prep										
Duplicate (N301834-DUP1)					**Source: N3C0569-01**					**Prepared & Analyzed: 03/13/23**
Conductivity	238	10	µmhos/cm @25C		238			0.00	20	
MRL Check (N301834-MRL1)										**Prepared & Analyzed: 03/13/23**
Conductivity	11		µmhos/cm @25C	10.0		110	0-200			
Batch N301842 - No Prep										
Blank (N301842-BLK1)										**Prepared & Analyzed: 03/13/23**
TDS	ND	10.0	mg/L							
LCS (N301842-BS1)										**Prepared & Analyzed: 03/13/23**
TDS	309		mg/L	300		103	80-120			
Duplicate (N301842-DUP1)					**Source: N3C0824-01**					**Prepared & Analyzed: 03/13/23**
TDS	204	10.0	mg/L		201			1.48	10	
Batch N302197 - No Prep										
Blank (N302197-BLK1)										**Prepared & Analyzed: 03/24/23**
Hardness	ND	5.00	mg CaCO3/L							
LCS (N302197-BS1)										**Prepared & Analyzed: 03/24/23**
Hardness	100		mg CaCO3/L	100		100	80-120			
MRL Check (N302197-MRL1)										**Prepared & Analyzed: 03/24/23**
Hardness	2.00		mg CaCO3/L	2.00		100	70-130			

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch N302197 - No Prep										
Matrix Spike (N302197-MS1)				**Source: N3C1051-02**					**Prepared & Analyzed: 03/24/23**	
Hardness	106	5.00	mg CaCO3/L	100	6.00	100	80-120			
Matrix Spike Dup (N302197-MSD1)				**Source: N3C1051-02**					**Prepared & Analyzed: 03/24/23**	
Hardness	108	5.00	mg CaCO3/L	100	6.00	102	80-120	1.87	20	
Batch N302200 - No Prep										
Blank (N302200-BLK1)									**Prepared & Analyzed: 03/24/23**	
Hardness, Ca	ND	5.00	mg CaCO3/L							
LCS (N302200-BS1)									**Prepared & Analyzed: 03/24/23**	
Hardness, Ca	96.0		mg CaCO3/L	100		96.0	80-120			
Matrix Spike (N302200-MS1)				**Source: N3C0824-01**					**Prepared & Analyzed: 03/24/23**	
Hardness, Ca	102	5.00	mg CaCO3/L	100	ND	102	80-120			
Matrix Spike Dup (N302200-MSD1)				**Source: N3C0824-01**					**Prepared & Analyzed: 03/24/23**	
Hardness, Ca	102	5.00	mg CaCO3/L	100	ND	102	80-120	0.00	20	

EPA 200.8 - Quality Control

Eastex Environmental Laboratory - Coldspring

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3C2880 - EPA 200.8 DW										
Blank (B3C2880-BLK1)										**Prepared & Analyzed: 03/17/23**
Aluminum - Total	ND	2.50	ug/L							
Antimony - Total	ND	1.00	ug/L							
Arsenic, Total	ND	1.00	ug/L							
Barium, Total	ND	3.00	ug/L							
Beryllium, Total	ND	0.500	ug/L							
Cadmium, Total	ND	1.00	ug/L							
Chromium, Total	ND	3.00	ug/L							
Copper, Total	ND	0.0500	mg/L							
Lead, Total	ND	0.00500	mg/L							
Manganese, Total	ND	1.00	ug/L							
Nickel, Total	ND	2.00	ug/L							
Selenium, Total	ND	5.00	ug/L							
Silver, Total	ND	0.500	ug/L							
Thallium, Total	ND	0.500	ug/L							
Zinc, Total	ND	5.00	ug/L							
LCS (B3C2880-BS1)										**Prepared & Analyzed: 03/17/23**
Aluminum - Total	87.4	2.50	ug/L	100		87.4	85-115			
Antimony - Total	91.1	1.00	ug/L	100		91.1	85-115			
Arsenic, Total	85.0	1.00	ug/L	100		85.0	85-115			
Barium, Total	86.0	3.00	ug/L	100		86.0	85-115			
Beryllium, Total	88.4	0.500	ug/L	100		88.4	85-115			
Cadmium, Total	92.9	1.00	ug/L	100		92.9	85-115			
Chromium, Total	86.3	3.00	ug/L	100		86.3	85-115			
Copper, Total	0.0882	0.0500	mg/L	0.100		88.2	85-115			
Lead, Total	0.0881	0.00500	mg/L	0.100		88.1	85-115			
Manganese, Total	85.5	1.00	ug/L	100		85.5	85-115			
Nickel, Total	86.1	2.00	ug/L	100		86.1	85-115			
Selenium, Total	88.3	5.00	ug/L	100		88.3	85-115			
Silver, Total	100	0.500	ug/L	100		100	85-115			
Thallium, Total	89.4	0.500	ug/L	100		89.4	85-115			
Zinc, Total	86.9	5.00	ug/L	100		86.9	85-115			

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3C2880 - EPA 200.8 DW										
Matrix Spike (B3C2880-MS1)				**Source: C3C3490-01**					**Prepared & Analyzed: 03/17/23**	
Aluminum - Total	106	2.50	ug/L	100	1.57	104	70-130			
Antimony - Total	105	1.00	ug/L	100	ND	105	70-130			
Arsenic, Total	109	1.00	ug/L	100	13.6	95.5	70-130			
Barium, Total	226	3.00	ug/L	100	124	102	70-130			
Beryllium, Total	91.6	0.500	ug/L	100	ND	91.6	70-130			
Cadmium, Total	94.9	1.00	ug/L	100	ND	94.9	70-130			
Chromium, Total	96.8	3.00	ug/L	100	ND	96.8	70-130			
Copper, Total	0.0999	0.0500	mg/L	0.100	0.00272	97.2	70-130			
Lead, Total	0.0987	0.00500	mg/L	0.100	ND	98.7	70-130			
Manganese, Total	161	1.00	ug/L	100	65.2	96.2	70-130			
Nickel, Total	94.9	2.00	ug/L	100	ND	94.9	70-130			
Selenium, Total	93.8	5.00	ug/L	100	ND	93.8	70-130			
Silver, Total	89.7	0.500	ug/L	100	ND	89.7	70-130			
Thallium, Total	99.9	0.500	ug/L	100	0.137	99.7	70-130			
Zinc, Total	116	5.00	ug/L	100	22.5	93.0	70-130			
Matrix Spike Dup (B3C2880-MSD1)				**Source: C3C3490-01**					**Prepared & Analyzed: 03/17/23**	
Aluminum - Total	97.8	2.50	ug/L	100	1.57	96.2	70-130	7.99	20	
Antimony - Total	95.5	1.00	ug/L	100	ND	95.5	70-130	9.53	20	
Arsenic, Total	103	1.00	ug/L	100	13.6	89.5	70-130	5.66	20	
Barium, Total	208	3.00	ug/L	100	124	84.3	70-130	8.39	20	
Beryllium, Total	87.0	0.500	ug/L	100	ND	87.0	70-130	5.08	20	
Cadmium, Total	86.7	1.00	ug/L	100	ND	86.7	70-130	9.07	20	
Chromium, Total	92.4	3.00	ug/L	100	ND	92.4	70-130	4.72	20	
Copper, Total	0.0964	0.0500	mg/L	0.100	0.00272	93.7	70-130	3.53	20	
Lead, Total	0.0901	0.00500	mg/L	0.100	ND	90.1	70-130	9.20	20	
Manganese, Total	154	1.00	ug/L	100	65.2	88.3	70-130	5.05	20	
Nickel, Total	91.0	2.00	ug/L	100	ND	91.0	70-130	4.25	20	
Selenium, Total	88.9	5.00	ug/L	100	ND	88.9	70-130	5.40	20	
Silver, Total	83.0	0.500	ug/L	100	ND	83.0	70-130	7.87	20	
Thallium, Total	93.2	0.500	ug/L	100	0.137	93.1	70-130	6.90	20	
Zinc, Total	110	5.00	ug/L	100	22.5	87.3	70-130	5.05	20	

EPA 300.0 - Quality Control

Eastex Environmental Laboratory - Coldspring

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3C3176 - No Prep										
Blank (B3C3176-BLK1)										**Prepared & Analyzed: 03/21/23**
Bromide	ND	0.100	mg/L							
Chloride	ND	5.0	mg/L							
Fluoride	ND	0.100	mg/L							
Sulfate	ND	4.0	mg/L							
LCS (B3C3176-BS1)										**Prepared & Analyzed: 03/21/23**
Bromide	0.474		mg/L	0.500		94.8	90-110			
Chloride	25.3		mg/L	25.0		101	90-110			
Fluoride	0.496		mg/L	0.500		99.3	90-110			
Sulfate	19.7		mg/L	20.0		98.6	90-110			
MRL Check (B3C3176-MRL1)										**Prepared & Analyzed: 03/21/23**
Bromide	0.0977	0.100	mg/L				0-200			
Chloride	5.09		mg/L	5.00		102	70-130			
Fluoride	0.107		mg/L	0.100		107	70-130			
Sulfate	3.47		mg/L	4.00		86.7	70-130			
Matrix Spike (B3C3176-MS1)				**Source: C3C3264-01**						**Prepared & Analyzed: 03/21/23**
Bromide	3.15	0.100	mg/L	2.50	0.444	108	80-120			
Chloride	716	5.0	mg/L	125	637	63.0	80-120			23
Fluoride	2.42	0.100	mg/L	2.50	0.261	86.2	80-120			
Sulfate	106	4.0	mg/L	100	ND	106	80-120			
Matrix Spike Dup (B3C3176-MSD1)				**Source: C3C3264-01**						**Prepared & Analyzed: 03/21/23**
Bromide	3.19	0.100	mg/L	2.50	0.444	110	80-120	1.46	20	
Chloride	716	5.0	mg/L	125	637	63.1	80-120	0.0173	20	
Fluoride	2.41	0.100	mg/L	2.50	0.261	85.8	80-120	0.357	20	
Sulfate	106	4.0	mg/L	100	ND	106	80-120	0.0463	20	

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3C3461 - No Prep										
Blank (B3C3461-BLK1)										**Prepared & Analyzed: 03/22/23**
TOC	ND	1.0	mg/L							
LCS (B3C3461-BS1)										**Prepared & Analyzed: 03/22/23**
TOC	10.5		mg/L	10.0		105	90-110			
LCS Dup (B3C3461-BSD1)										**Prepared & Analyzed: 03/22/23**
TOC	10.2		mg/L	10.0		102	90-110	2.81	20	
Matrix Spike (B3C3461-MS1)				**Source: N3C0824-01**						**Prepared & Analyzed: 03/22/23**
TOC	11.3	1.0	mg/L	10.0	ND	113	80-120			
Batch B3C3606 - EPA 200.7										
Blank (B3C3606-BLK1)										**Prepared: 03/22/23 Analyzed: 03/23/23**
Calcium, Total	ND	0.500	mg/L							
Iron, Total	ND	0.150	mg/L							
Magnesium, Total	ND	0.500	mg/L							
Sodium, Total	ND	0.500	mg/L							
LCS (B3C3606-BS1)										**Prepared: 03/22/23 Analyzed: 03/23/23**
Calcium, Total	24.1	0.500	mg/L	25.0		96.4	85-115			
Iron, Total	0.250	0.150	mg/L	0.250		100	85-115			
Magnesium, Total	24.0	0.500	mg/L	25.0		96.0	85-115			
Sodium, Total	23.8	0.500	mg/L	25.0		95.2	85-115			
Matrix Spike (B3C3606-MS1)				**Source: C3C3264-01**						**Prepared: 03/22/23 Analyzed: 03/23/23**
Calcium, Total	52.1	0.500	mg/L	25.0	25.8	101	70-130			
Iron, Total	7.69	0.150	mg/L	0.250	7.38	124	70-130			
Magnesium, Total	37.9	0.500	mg/L	25.0	12.9	100	70-130			
Sodium, Total	528	0.500	mg/L	25.0	498	120	70-130			

EPA 200.7 - Quality Control

Eastex Environmental Laboratory - Coldspring

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3C3606 - EPA 200.7										
Matrix Spike Dup (B3C3606-MSD1)				**Source: C3C3264-01**				**Prepared: 03/22/23**	**Analyzed: 03/23/23**	
Calcium, Total	52.1	0.500	mg/L	25.0	26.8	101	70-130	0.00	20	
Iron, Total	7.76	0.150	mg/L	0.250	7.38	152	70-130	0.906	20	
Magnesium, Total	38.0	0.500	mg/L	25.0	12.9	100	70-130	0.264	20	
Sodium, Total	525	0.500	mg/L	25.0	498	108	70-130	0.570	20	
Batch B3C4612 - No Prep										
Blank (B3C4612-BLK1)									**Prepared & Analyzed: 03/30/23**	
Nitrate+Nitrite as N	ND	0.02	mg/L							
LCS (B3C4612-BS1)									**Prepared & Analyzed: 03/30/23**	
Nitrate+Nitrite as N	1.063		mg/L	1.00		106	90-110			
Matrix Spike (B3C4612-MS1)				**Source: N3C0824-01**					**Prepared & Analyzed: 03/30/23**	
Nitrate+Nitrite as N	1.191	0.02	mg/L	1.00	ND	119	80-120			
Matrix Spike Dup (B3C4612-MSD1)				**Source: N3C0824-01**					**Prepared & Analyzed: 03/30/23**	
Nitrate+Nitrite as N	1.182	0.02	mg/L	1.00	ND	118	80-120	0.759	20	

Notes and Definitions

ZZ	Corrosive
Cs	Analyses performed at Coldspring Laboratory.
6	Sample not received within required holding time.
3	Sample analysis performed out of holding time.
27	Sample was pre-filtered as required by the method.
23	Spike recovery outside of acceptance limits due to matrix interference.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

**All Metals Analyses performed at Coldspring Laboratory, unless otherwise indicated.*

EASTEX ENVIRONMENTAL LAB, INC.

P.O. Box 1089 Coldspring, TX 77331 (936) 653-3249 * (800) 525-0508

P.O. Box 631375 Nacogdoches, TX 75963-1375 (936) 569-8879 * FAX (936) 569-8951

Report To:

Company:	Andrews & Foster
Address:	PO Box 348
	Athens Tx 75751
Attn:	Terry Miller
Phone#	903 675-2353
Fax#	email tmiller@andrews-foster.com
P.O. #	22-189
Sampler's Name (print)	Terry Miller
Project Number	
Project Name	

Remarks:

Sample and Bottle Identification

~~N3C0842~~ LET 3-10-23

N3C0824-01

ANALYSIS REQUESTED

Sample ID	Date	Time	C or G	DO	pH	Cl2	Flow	Temp	Matrix	Containers #	size	type	pres	TPH	New well	UST
Red Town Ranch well # 2	3/10	9:15	G							7	1	P	C	X	X	X

Relinquished By:	Date 3/10/23	Time 1120	Received By:	Date 3/10/23	Time 1120	Received Iced: YES / NO
Relinquished By:	Date	Time	Received By:	Date	Time	Received Iced: YES / NO
Relinquished By:	Date	Time	Received By and/or Checked in By:	Date	Time	Received Iced: YES / NO

LAB USE ONLY Sample Condition Acceptable:	Yes / No	Temp°C	Therm. ID	Logged In By:	Date	Time	
Alternate Check In: Date Time		11.8	022		3/10/23	1222	See back for instructions

* Thermometers have a +/- 0.0 factor and recorded temperature is the observed temperature.

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Justin Daniel
Eastex Environmental Laboratory Inc.
1119 South University Drive (75961)
PO BOX 631375
Nacogdoches, Texas 75963-1375

Generated 3/24/2023 3:48:38 PM

JOB DESCRIPTION

N3C0824

JOB NUMBER

860-45413-1

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477

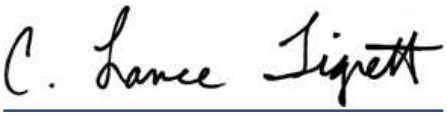
See page two for job notes and contact information.

Eurofins Houston

Job Notes

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization



Generated
3/24/2023 3:48:38 PM

Authorized for release by
Lance Tigrett, Project Manager II
Lance.Tigrett@et.eurofinsus.com
(979)484-9088

Table of Contents

Definitions/Glossary

Client: Eastex Environmental Laboratory Inc. Job ID: 860-45413-1
Project/Site: N3C0824

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Job ID: 860-45413-1

Laboratory: Eurofins Houston

Narrative

Job Narrative
860-45413-1

Receipt
The sample was received on 3/17/2023 1:50 PM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 1.6°C

GC Semi VOA
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Client Sample ID: N3C0824-01 **Lab Sample ID: 860-45413-1**

No Detections.

This Detection Summary does not include radiochemical test results.

Client: Eastex Environmental Laboratory Inc.
Job ID: 860-45413-1
Project/Site: N3C0824

Client Sample ID: N3C0824-01
Lab Sample ID: 860-45413-1
Date Collected: 03/10/23 09:15
Matrix: Water
Date Received: 03/17/23 13:50

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	ND		4.7		mg/L		03/22/23 19:42	03/24/23 09:11	1
>C12-C28 Range Hydrocarbons	ND		4.7		mg/L		03/22/23 19:42	03/24/23 09:11	1
>C28-C35 Range Hydrocarbons	ND		4.7		mg/L		03/22/23 19:42	03/24/23 09:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*102*		*70 - 130*	*03/22/23 19:42*	*03/24/23 09:11*	*1*
o-Terphenyl (Surr)	*107*		*70 - 130*	*03/22/23 19:42*	*03/24/23 09:11*	*1*

Method: EPA 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		03/23/23 08:40	03/23/23 17:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total (EPA 335.4)	ND		0.0050		mg/L		03/23/23 15:57	03/24/23 14:52	1

Surrogate Summary

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Method: TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)											
		1CO	OTPH										
Lab Sample ID	Client Sample ID	(70-130)	(70-130)										
860-45413-1	N3C0824-01	102	107										
LCS 860-95412/2-A	Lab Control Sample	103	113										
LCSD 860-95412/3-A	Lab Control Sample Dup	100	111										
MB 860-95412/1-A	Method Blank	95	104										

Surrogate Legend

1CO = 1-Chlorooctane (Surr)

OTPH = o-Terphenyl (Surr)

Method: TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Lab Sample ID: MB 860-95412/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95398 — **Prep Batch: 95412**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	ND		5.0		mg/L		03/22/23 19:42	03/22/23 22:02	1
>C12-C28 Range Hydrocarbons	ND		5.0		mg/L		03/22/23 19:42	03/22/23 22:02	1
>C28-C35 Range Hydrocarbons	ND		5.0		mg/L		03/22/23 19:42	03/22/23 22:02	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*95*		*70 - 130*	*03/22/23 19:42*	*03/22/23 22:02*	*1*
o-Terphenyl (Surr)	*104*		*70 - 130*	*03/22/23 19:42*	*03/22/23 22:02*	*1*

Lab Sample ID: LCS 860-95412/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95398 — **Prep Batch: 95412**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
C6-C12 Range Hydrocarbons	99.5	106		mg/L		106	75 - 125
>C12-C28 Range Hydrocarbons	99.6	113		mg/L		114	75 - 125

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1-Chlorooctane (Surr)	*103*		*70 - 130*
o-Terphenyl (Surr)	*113*		*70 - 130*

Lab Sample ID: LCSD 860-95412/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95398 — **Prep Batch: 95412**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
C6-C12 Range Hydrocarbons	99.5	106		mg/L		106	75 - 125	0	20
>C12-C28 Range Hydrocarbons	99.6	111		mg/L		111	75 - 125	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1-Chlorooctane (Surr)	*100*		*70 - 130*
o-Terphenyl (Surr)	*111*		*70 - 130*

Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 860-95462/10-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95615 — **Prep Batch: 95462**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		03/23/23 08:39	03/23/23 17:33	1

Lab Sample ID: LCS 860-95462/11-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95615 — **Prep Batch: 95462**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00200	0.00199		mg/L		99	85 - 115

Method: 245.1 - Mercury (CVAA) (Continued)

Lab Sample ID: LCSD 860-95462/12-A
Matrix: Water
Analysis Batch: 95615

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 95462

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury			0.00200	0.00205		mg/L		102	85 - 115	3	20

Lab Sample ID: LLCS 860-95462/13-A
Matrix: Water
Analysis Batch: 95615

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 95462

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury			0.000200	0.000221		mg/L		111	50 - 150		

Method: 335.4 - Cyanide, Total

Lab Sample ID: MB 860-95581/4-A
Matrix: Water
Analysis Batch: 95774

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 95581

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.0050		mg/L		03/23/23 15:57	03/24/23 14:32	1

Lab Sample ID: LCS 860-95581/5-A
Matrix: Water
Analysis Batch: 95774

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 95581

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Cyanide, Total			0.100	0.0973		mg/L		97	90 - 110		

Lab Sample ID: LLCS 860-95581/6-A
Matrix: Water
Analysis Batch: 95774

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 95581

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits		
Cyanide, Total			0.00500	0.00453	J	mg/L		91	50 - 150		

GC Semi VOA

Analysis Batch: 95398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 860-95412/1-A	Method Blank	Total/NA	Water	TX 1005	95412
LCS 860-95412/2-A	Lab Control Sample	Total/NA	Water	TX 1005	95412
LCSD 860-95412/3-A	Lab Control Sample Dup	Total/NA	Water	TX 1005	95412

Prep Batch: 95412

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	TX_1005_W_Prep	
MB 860-95412/1-A	Method Blank	Total/NA	Water	TX_1005_W_Prep	
LCS 860-95412/2-A	Lab Control Sample	Total/NA	Water	TX_1005_W_Prep	
LCSD 860-95412/3-A	Lab Control Sample Dup	Total/NA	Water	TX_1005_W_Prep	

Analysis Batch: 95531

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	TX 1005	95412

Metals

Prep Batch: 95462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	245.1	
MB 860-95462/10-A	Method Blank	Total/NA	Water	245.1	
LCS 860-95462/11-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 860-95462/12-A	Lab Control Sample Dup	Total/NA	Water	245.1	
LLCS 860-95462/13-A	Lab Control Sample	Total/NA	Water	245.1	

Analysis Batch: 95615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	245.1	95462
MB 860-95462/10-A	Method Blank	Total/NA	Water	245.1	95462
LCS 860-95462/11-A	Lab Control Sample	Total/NA	Water	245.1	95462
LCSD 860-95462/12-A	Lab Control Sample Dup	Total/NA	Water	245.1	95462
LLCS 860-95462/13-A	Lab Control Sample	Total/NA	Water	245.1	95462

General Chemistry

Prep Batch: 95581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	Distill/CN	
MB 860-95581/4-A	Method Blank	Total/NA	Water	Distill/CN	
LCS 860-95581/5-A	Lab Control Sample	Total/NA	Water	Distill/CN	
LLCS 860-95581/6-A	Lab Control Sample	Total/NA	Water	Distill/CN	

Analysis Batch: 95774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-45413-1	N3C0824-01	Total/NA	Water	335.4	95581
MB 860-95581/4-A	Method Blank	Total/NA	Water	335.4	95581
LCS 860-95581/5-A	Lab Control Sample	Total/NA	Water	335.4	95581
LLCS 860-95581/6-A	Lab Control Sample	Total/NA	Water	335.4	95581

Lab Chronicle

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Client Sample ID: N3C0824-01

Date Collected: 03/10/23 09:15
Date Received: 03/17/23 13:50

Lab Sample ID: 860-45413-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	TX_1005_W_Prep			32.1 mL	3 mL	95412	03/22/23 19:42	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			95531	03/24/23 09:11	T1S	EET HOU
Total/NA	Prep	245.1			50 mL	50 mL	95462	03/23/23 08:40	PB	EET HOU
Total/NA	Analysis	245.1		1			95615	03/23/23 17:49	SHZ	EET HOU
Total/NA	Prep	Distill/CN			6 mL	6 mL	95581	03/23/23 15:57	CL	EET HOU
Total/NA	Analysis	335.4		1			95774	03/24/23 14:52	YVD	EET HOU

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Accreditation/Certification Summary

Client: Eastex Environmental Laboratory Inc. Job ID: 860-45413-1
Project/Site: N3C0824

Laboratory: Eurofins Houston

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	88-00759	08-04-23
Florida	NELAP	E871002	06-30-23
Louisiana	NELAP	03054	06-30-23
Louisiana (All)	NELAP	03054	06-30-23
Oklahoma	State	1306	08-31-23
Texas	NELAP	T104704215-23-50	06-30-23
Texas	TCEQ Water Supply	T104704215	12-28-25
USDA	US Federal Programs	P330-22-00025	03-02-23 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Method	Method Description	Protocol	Laboratory
TX 1005	Texas - Total Petroleum Hydrocarbon (GC)	TCEQ	EET HOU
245.1	Mercury (CVAA)	EPA	EET HOU
335.4	Cyanide, Total	EPA	EET HOU
245.1	Preparation, Mercury	EPA	EET HOU
Distill/CN	Distillation, Cyanide	None	EET HOU
TX_1005_W_Prep	Extraction - Texas Total petroleum Hyrdocarbons	TCEQ	EET HOU

Protocol References:

EPA = US Environmental Protection Agency

None = None

TCEQ = Texas Commission of Environmental Quality

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: Eastex Environmental Laboratory Inc.
Project/Site: N3C0824

Job ID: 860-45413-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
860-45413-1	N3C0824-01	Water	03/10/23 09:15	03/17/23 13:50

EASTEX
ENVIRONMENTAL LABS INC.

P O. Box 631375 Nacogdoches Tx 75963
Website. eastexlabs.com
Email. eelnac@sbcglobal.net
Tel: 936 569 8879

SUBCONTRACT ORDER

Sending Laboratory:

Eastex Environmental Laboratory - Nacogdoches
1119 South University Drive
Nacogdoches, TX 75961
Phone 936-569-8879
Fax 936-569-8951

Project Manager: Paul Hughes

Subcontracted Laboratory:

Eurofins Xenco LLC
4147 Greenbriar Dr.
Stafford, TX 77477
Phone: 713-690-4444
Fax 713-690-5646

Work Order: N3C0824

PO: 031523 -B

Analysis to be Performed	Due	Sample ID	Matrix	Sample Date
		Sample ID: N3C0824-01[none]	Drinking	*Sampled. 03/10/2023 09:15*
		Sample Site Well 2		
Cyanide, Total	03/23/2023			
Mercury, Total	03/23/2023			
TPH TX 1005	03/23/2023			

Containers Supplied
AG 1000, Iced, NaOH (F) AG 250, Iced, HNO3 (O)

860-45413 Chain of Custody

Temp: 1.8 IR ID:HOU-344
C/F -0.2
Corrected Temp: 1.6

COMMENTS:

[signature]	3/15/23 1630	UPS	3/15/23 1630
Released By	Date & Time	Received By	Date & Time
UPS		[signature]	3/17/23 1350
Released By	Date & Time	Received By	Date & Time
Released By	Date & Time	Received By	Date & Time

Login Sample Receipt Checklist

Client: Eastex Environmental Laboratory Inc.

Job Number: 860-45413-1

Login Number: 45413

List Number: 1

Creator: Rubio, Yuri

List Source: Eurofins Houston

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	