

HollyFrontier Navajo Refining LLC
Class I Nonhazardous Permit Renewal
Application

Artesia, NM

WDW-1, WDW-2, AND WDW-3

August 2022

Prepared by:

Petrotek

Petrotek Corporation
5935 South Zang Street, Suite 200
Littleton, Colorado 80127
Phone: (303) 290-9414
Fax: (303) 290-9580

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I. Introduction and Facility Name

Through the submittal of this document, HollyFrontier Navajo Refining LLC (HFNR) requests continued authorization from the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) to operate three (3) non-hazardous Class I disposal wells located at the Artesia, New Mexico facility pursuant to the applicable Underground Injection Control (UIC) regulations. Waste Disposal Well No. 1 (WDW-1), Waste Disposal Well No. 2 (WDW-2) and Waste Disposal Well No. 3 (WDW-3) are located in Eddy County, New Mexico and are approximately 10 miles to the southeast of the refinery. A map identifying the facility location within the state is included as Figure I.1. Figure I.2 shows the locations of the three injection wells. Completed copies of EMNRD OCD form C-108 for each of the wells are included in this Response, and required attachments to this form are included in this document.

HFNR proposes to continue operating three non-hazardous, underground injection wells (WDW-1, WDW-2 and WDW-3) for the disposal of process wastewater generated at its refinery in Artesia, New Mexico. HFNR owns and operates both the facility and the injection wells. The wells are used to dispose of non-hazardous oil field waste fluids. The waste fluids are transported to each well via a waste water conveyance pipeline emanating from the Artesia refinery. All three wells are permitted to inject non-hazardous waste water into a subsurface Injection Zone consisting of the lower portion of the Wolfcamp Formation and the underlying Cisco and Canyon Formations.

Shallow aquifers in the vicinity of the wells are protected by multiple strings of casing and cement. Injected fluids are delivered to the injection interval under positive pressure flow through tubing and a packer. The wells each have at least one cemented long string protective casing extending into the injection interval. The wellbores are perforated casing completions within the injection interval. The annulus area between the protective casing and injection tubing string is filled with inhibited water. Annulus pressure will be continuously monitored to detect any leaks in the tubing or casing and annulus pressure will continue to be maintained at levels required by the OCD.

This renewal application is intended to satisfy all requirements set forth in the Discharge Permit Application for Class I Waste Injection Well Facility Form.



II. Operator, Address, Contact

Operator: HollyFrontier Navajo Refining LLC

Address: 501 East Main, Artesia, NM 88210

Contact Person: Travis Gibb

Phone: (575) 746-5281

III. Location

A map identifying the facility location within the state is included as Figure I.1. Figure I.2 shows the locations of the three injection wells. The location for each well is provided below.

WDW-1 (API No. 30-015-27592) is located 660 feet from the south line and 2,310 feet from the east line of SW/4, SE/4, Section 31, Township 17 South, Range 28 East, Latitude 32°47'6.77"N, Longitude 104°12'50.22"W, in Eddy County, New Mexico.

WDW-2 (API No. 30-015-20894) is located 1,980 feet from the north line and 660 feet from the west line of SW/4, NW/4, Section 12, Township 18 South, Range 27 East, Latitude 32°45'49.32"N, Longitude 104°14'18.59"W, in Eddy County, New Mexico.

WDW-3 (API No. 30-015-26575) is located 790 feet from the south line and 2,250 feet from the west line of SE/4, SW/4, Section 1, Township 18 South, Range 27 East, Latitude 32°46'16.51"N, Longitude 104°13'59.80"W, in Eddy County, New Mexico.



IV. Attach the name and address of the landowner of the facility site.

The parcel of land where WDW-1 is located is owned by the following:

HollyFrontier Navajo Refining LLC
501 E. Main Street
Artesia, New Mexico 88210
(575) 748-3311

The parcels of land where WDW-2 and WDW-3 are located are owned by the following:

U.S. Department of the Interior
Bureau of Land Management
620 Greene Street
Carlsbad, New Mexico 88220
(575) 887-6544

V. Attach a description of the types and quantities of fluids at the facility.

The fluid injected into the HFNR injection wells is comprised of exempt and nonexempt non-hazardous oilfield waste that is generated in the refining process. Waste waters from process units, cooling towers, boilers, streams from water purification units, desalting units, recovered and treated ground water, renewable diesel units, and general waste waters will be blended to form the fluid to be injected into the injection wells. In addition, stimulation and workover fluids may be injected periodically. Appendix V.1 presents data characterizing the injection fluid. More information regarding the requested information is included in Section X of this document.

VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.

The requested information regarding surface facilities is provided in Section X.M of this document.

VII. Attach a description of underground facilities (well diagrams etc. including a C-101 or C-103, and C-108).

The requested information regarding underground facilities is provided in Section XI of this document.



VIII. Attach a contingency plan for reporting and clean-up of spills or releases.

The requested information regarding contingency plans is provided in Section X.O of this document.

IX. Attach geological/hydrological evidence demonstrating that operations will not adversely impact fresh water.

The requested information regarding geology and hydrogeology is provided in Sections X.E, X.F, and X.G of this document.

X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

The following subsections present the information requested under Subsection B and C of Section 20.6.2.5210 NMAC.

A. Information required in Subsection C of 20.6.2.3106 NMAC.

The portions of Subsection C of 20.6.2.3106 NMAC that are relevant to Class I non-hazardous UIC are addressed in subsections B through W.

B. A map showing the Class I well, or Class III well or well fields, for which approval is sought and the applicable area of review; within the area of review, the map must show, in so far as is known or is reasonably available from the public records, the number, name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features, including residences and roads.

A map showing the WDW-1, WDW-2, and WDW-3 injection wells and all other wells including oil and gas and water wells within two miles is provided as Figure X.1. A composite, one-mile regulatory area of review (AOR) is identified on this map. Per OCD guidance, a map showing all drilled and plugged and abandoned wells since the most recent permit application (2017) within the one-mile AOR is provided as Figure X.2.

C. A tabulation of data on all wells within the area of review which may penetrate into the proposed injection zone; such data shall include, as available, a description of each well's type, the distance and direction to the injection well or well field, construction, date drilled, location, depth, record of plugging or completion, and any additional information the secretary may require.

A tabulation of all artificial penetrations in the AOR and wells which penetrate the injection zone were provided most recently in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3. These referenced tables from the 2017 document are Tables 1A and 1B, respectively. All publicly available well records including completion records, plugging records, and schematics for wells penetrating the injection zone were submitted as Appendix B in the above referenced document.

Per OCD guidance, Table X.1 provides a tabulation of all wells drilled and plugged and abandoned since the most recent permit application in 2017. The publicly available operator or owner, well number, lease name, date drilled, depth, and status of these wells are provided in this table.

A total of 32 artificial penetrations within the one-mile composite AOR were identified as drilled or plugged since 2017. Of these wells, all are oil and gas related wells. There are no water wells identified within the AOR based on publicly available information from the NM Office of the State Engineer data site. One of the 32 artificial penetrations was determined to penetrate the injection zone as is further discussed in Section X.D.

D. For wells within the area of review which penetrate the injection zone, but are not properly completed or plugged, the corrective action proposed to be taken under 20.6.2.5203 NMAC.

Each well identified within the regulatory AOR has been examined to determine status and construction and has been shown to be properly completed and/or plugged. Therefore, no corrective action is necessary to be proposed.

Available well records for wells drilled or plugged prior to 2017 that penetrate the injection interval were submitted as Appendix B of that application. The Contango Resources NO Bluff 36 State Com #002 was identified as plugged and abandoned in November 2020. This well was properly plugged and abandoned per applicable OCD requirements. The well records for this well are provided as Appendix X.1 of this document.

E. Maps and cross-sections indicating the general vertical and lateral limits of all ground water having 10,000 mg/l or less TDS within the area of review, the position of such ground water within the area of review relative to the injection formation, and the direction of water movement, where known, in each zone of ground water which may be affected by the proposed injection operation.

Per Form C-108 Application for Authorization to Inject and guidance from OCD staff, information required in this section need not be resubmitted as it has been previously submitted and accepted. The following provides a list of references to the previously approved permit application submittal and brief summary for the purpose of regulatory review.

Maps and cross-sections were most recently provided in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3. The following figures and drawings from the referenced document provide the requirement information for this section:

- Figure 3: Generalized Hydrogeologic Cross-Section
- Figure 4: Generalized Direction of Movement of Groundwater in Eddy County, New Mexico
- Drawing 4: Geologic Cross-Section Index Map

- Drawing 5: NW-SE Dip Geologic Cross-Section A-A'
- Drawing 6: SW-NE Strike Geologic Cross-Section B-B'
- Drawing 7: NW-SE Dip Geologic Cross-Section C-C'

The lowermost USDW for WDW-1, WDW-2 and WDW-3 is identified as the Tansill Formation. The base of the lowermost USDW observed at each of the wells is shown in the table below.

Table X.2: Base of USDW

	WDW-1 (KB = 3,693 ft MSL)		WDW-2 (KB = 3,623 ft MSL)		WDW-3 (KB = 3,625 ft MSL)	
	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>
Base of USDW	493	3,200	473	3,151	475	3,150

Details regarding the position of the USDW, direction of water movement, and other required information are provided in the above referenced permit application and original permit applications.

F. Maps and cross-sections detailing the geology and geologic structure of the local area, including faults, if known or suspected.

Maps and cross-sections were most recently provided in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3. The following figures and drawings from the referenced document provide the requirement information for this section:

- Figure 6: Stratigraphic Column
- Drawing 8: Structure Contour Map, Top of Injection Zone
- Drawing 9: Isopach Map of Injection Zone
- Drawing 10: Structure Contour Map of Injection Zone
- Drawing 11: Isopach Map of Upper Confining Zone

The permitted injection zone for WDW-1, WDW-2 and WDW-3 consists of portions of the Lower Wolfcamp, Cisco, and Canyon Formations. The permitted injection depths relevant to each well are presented in Table X.3.

Table X.3: Permitted Injection Zones

Injection Zone Formations	WDW-1 (KB = 3,693 ft MSL)		WDW-2 (KB = 3,623 ft MSL)		WDW-3 (KB = 3,625 ft MSL)	
	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>	<i>Depth KB (ft)</i>	<i>Depth (ft MSL)</i>
Lower Wolfcamp	7,450	3,757	7,270	3,647	7,303	3,678
Cisco	7,816	4,123	7,645	4,022	7,650	4,025
Canyon	8,475	4,782	8,390	4,767	8,390	4,765
Base of Injection Zone (base of Canyon)	9,016	5,323	8,894	5,271	8,894	5,269

Details regarding the geology and geologic structure of the local area and other required information are provided in the above referenced permit application and original permit applications.

G. Generalized maps and cross-sections illustrating the regional geologic setting.

Maps and cross-sections were most recently provided in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3. The following figures and drawings from the referenced document provide the requirement information for this section:

- Figure 5: Permian Basin Map
- Figure 6: Stratigraphic Column
- Figure 7: Regional Geologic Features
- Figure 8: Published Structure Map (Top of San Andres Formation)
- Figure 10: Surface Geologic Map

Details regarding the regional geologic setting and other required information are provided in the above referenced permit application and original permit applications.

Seismicity

The HFNR Artesia Refinery area in southeastern New Mexico has been designated as a low seismic risk area by the USGS. Figure X.3 presents earthquakes at or greater than M2.5 magnitude in the last 50 years within approximately 150 miles of the refinery based on the USGS database of earthquakes. The peak ground acceleration that has a 2% probability of exceedance in 50 years is less than 4%g near the project (Figure X.3) and no active faults have been mapped in the vicinity. No data are available to suggest that deep well injection presents a risk of induced seismicity in the project area.

H. Proposed operating data, including:

H.1 Average and maximum daily flow rate and volume of the fluid to be injected;

The average injection rate for WDW-1, WDW-2 and WDW-3, combined, will not exceed 800 gallons per minute (gpm). The total monthly injected volume will not exceed 34,560,000 gallons per month, based on a 30-day month (34,560,000 gallons = 800 gpm x 60 min/hr x 24 hr/day x 30 days). The total annual injected volume will not exceed 420,480,000 gallons per year based on a 365-day year (420,480,000 gallons = 800 gpm x 60 min/hr x 24 hr/day x 365 days). Historical volumes for each well are provided in Table X.4.

H.2 Average and maximum injection pressure;

Average injection pressures per well over the previous 5-year period are provided as Table X.4. HFNR does not propose any changes to the current permitted maximum injection pressures. Maximum allowable surface injection pressures (MASIP) are calculated according to OCD Proposed Rule 21.B(7), dated October 6, 1997, and are as follows:

WDW-1: 1,585 psig (7,924 feet x 0.2 psi/ft = 1,585 psi)

WDW-2: 1,514 psig (7,570 feet x 0.2 psi/ft = 1,514 psi)

WDW-3: 1,460 psig (7,303 feet x 0.2 psi/ft = 1,460 psi)

H.3 Source of injection fluids and an analysis or description, whichever the secretary requires, of their chemical, physical, radiological and biological characteristics;

The fluid injected into the HFNR injection wells is comprised of exempt and nonexempt non-hazardous oilfield waste that is generated in the refining process. Waste waters from process units, cooling towers, boilers, streams from water

purification units, desalting units, recovered and treated ground water, renewable diesel units, and general waste waters will be blended to form the fluid to be injected into the injection wells. In addition, stimulation and workover fluids may be injected periodically. Appendix V.1 presents data characterizing the injection fluid.

I. Results of the formation testing program to obtain an analysis or description, whichever the secretary requires, of the chemical, physical, and radiological characteristics of, and other information on, the receiving formation, provided that the secretary may issue a conditional approval of a discharge permit if he finds that further formation testing is necessary for final approval.

As detailed in previously submitted drilling, completion, and re-entry reports, formation testing was conducted to determine site-specific chemical, physical, and radiological characteristics of the receiving interval. Historical formation testing included logging, reservoir falloff and gradient surveys, drill stem tests, and fluid sampling. No coring activities were performed on WDW-1, WDW-2, or WDW-3 as approved by the OCD.

Formation fluid analysis is presented in Table X.7 of this document. Formation fluid compatibility analysis was most recently provided as Appendix F-2 in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3.

J. Expected pressure changes, native fluid displacement, and direction of movement of the injected fluid.

Pressure Buildup Predictions Within the AOR

The predictions of reservoir pressure have been conducted based on the following assumptions:

- The injection interval consists of horizontal, homogenous, porous, and permeable formation with low-permeability confining layers stratigraphically above and below. The geological data previously presented support this assumption. Although the porosity and permeability of rocks are rarely homogenous on all scales, injection interval parameters have been conservatively estimated so that this assumption of homogenous conditions is acceptable.
- The physical properties of the injected fluids do not differ significantly from those of the formation fluids at reservoir temperatures and pressures; namely, the viscosity and density of the injected liquid do not change under reservoir conditions. No changes are expected to occur since the temperature and pressure characteristics of the injection interval are essentially uniform within the area of review.

- The third assumption is that the injected liquids move uniformly and radially away from the wellbore and that the relative thickness of the injection interval remains fairly constant within the area of review.

In the subsurface, fluid storage is achieved by the compression of the reservoir rock along with the injected and native fluid. With the onset of injection, a pressure transient develops with a maximum at the wellbore and generally moves outward radially. The amount of pressure build-up is determined by injection flow rates and fluid and reservoir properties. The pressure effects are spread over a larger area than is actually invaded by the injected fluid.

The pressure build-up was calculated based on superposition of the analytical solution of the radial diffusivity equation (oilfield units) (Lee 1982):

$$dP = -70.6 Bq\mu /kh * \ln ([1,688 \Phi \mu c_{tr}^2 /kt] - 2s)$$

Conservative geologic and injectate input values, as summarized in Table X.5, were used to estimate pressure rise. Pressure rise due to injection according to the above equation by Lee (1982) was evaluated at a single location, based on the maximum injection rate of 800 gpm, and this one-dimensional solution was applied radially with respect to each well to characterize a two-dimensional evaluation of pressure rise. Pressure rise was modeled for an injection duration of five years, equal to the permit duration for each well.

The net thickness of the injection interval is conservatively assigned a value of 85 feet, less than 6% of the permitted injection interval thickness of each well. This value is consistent with historical permitting values. The permeability is assigned a value of 251 millidarcies (md), based on the results of recent falloff testing and historical permitting values. This results in a permeability-thickness of 21,335 millidarcy-ft (md-ft). Historical falloff testing data for each well are summarized in Table X.6.

Fluid samples of connate brine from the injection interval were collected from WDW-1 (33,000 mg/L) and WDW-2 (20,000 mg/L) during recompletion as Class I UIC wells. Both of these wells are completed in the same injection formation. The average density and total dissolved solids (TDS) of the fluids recovered from the two wells were 1.03 g/cc and 26,500 mg/l, respectively. The results of formation fluid analysis were provided in documents previously submitted to and approved by OCD. Available analyte values for WDWs 1, 2 and 3 are provided in Table X.7.

The formation viscosity, fluid compressibility, and total compressibility were estimated using the average brine salinity along with the bottom hole temperature and pressure recorded in the well at the depth of the injection zone in conjunction with industry standard correlations. The correlations used are presented in the SPE textbook on Pressure Transient Testing which was published as part of the

SPE Textbook Series as Volume 9. For the sake of brevity, only page, equation, and figure numbers from this volume are listed subsequently in this document as a reference for all correlations presented for the PVT data.

The percent solids for the fluid was approximated as 2.65%, based on the average 26,500 mg/l TDS brine concentration for the formation samples presented in Table 1. A bottom hole temperature of 126.4 °F has been used as representative of the formation for these correlations. This value was derived from the original temperature log, run in 1998 when WDW-1 was recompleted. This log is can be found online on the OCD site as part of the WDW-1 well files.

Fluid viscosity was estimated using multiple equations developed by McCain that first are used to estimate fluid viscosity at atmospheric conditions (equations B-72, 73 and 74), which is then converted to viscosity at bottom hole conditions (equation B-75) by using a correction factor. These equations can be found on page 527. As a primary input for the correlation, pressure is required. The pre-injection formation pressure has been estimated at a depth of 7,924 feet BGL using the pressure measurement from completion in 1998. Pressure was measured to be 2,928 psi at a depth of 7,911 feet BGL. Using this value and a SG of 1.03, a value of 2,934 psi has been estimated as the initial pressure at the top of the injection interval (7,924 feet BGL). At this pressure and a temperature of 126.4 °F, the following equations have been used to derive viscosity:

$$\mu_{w1} = AT^B \quad (B-72)$$

$$A = 109.574 - 8.40564 * S + 0.313314 * S^2 + 8.72213 * 10^{-3} * S^3 \quad (B-73)$$

$$B = -1.12166 + 2.63951 * 10^{-2} * S - 6.79461 * 10^{-4} * S^2 - 5.47119 * 10^{-5} * S^3 + 1.55586 * 10^{-6} * S^4 \quad (B-74)$$

$$\frac{\mu_w}{\mu_{w1}} = 0.9994 + 4.0295 * 10^{-5} * P + 3.1062 * 10^{-9} * P^2 \quad (B-75)$$

Where,

μ_{w1} is the viscosity of the formation fluid at atmospheric conditions

T_F is the bottom hole temperature in °F

S is the percent of solids

P is the bottom hole pressure in psi

μ_w is the viscosity of the brine at bottom hole conditions

Using these equations, a value of 0.61 centipoise is calculated for the formation fluid viscosity.

Formation Compressibility was estimated using equation L-89 provided on page 337. This equation was developed for limestone formations, consistent with the primary composition of the effective injection interval (see discussion in Section 11).

$$c_f = \frac{a}{(1+bc\Phi)^{\frac{1}{b}}} \quad (\text{L-89})$$

Where,

$$\begin{aligned} a &= 0.8535 \\ b &= 1.075 \\ c &= 2.303 \times 10^6 \\ \Phi &= 0.10 \end{aligned}$$

Based on this equation, a value of $8.20\text{E-}6 \text{ psi}^{-1}$ is derived for formation compressibility.

Fluid compressibility was estimated using figures L-30 and L-31 on page 338 with a bottom hole temperature of 126.4°F , a bottom hole pressure of 2,934 psi, and a dissolved solids weight of 2.65%. Using Figure L-31 to first estimate freshwater compressibility, a value of $2.90\text{E-}06 \text{ psi}^{-1}$ is derived. Using Figure L-30, the coefficient of isothermal compressibility (ratio of brine compressibility over freshwater compressibility) was determined to be approximately 0.95. This results in a value of $2.76\text{E-}06 \text{ psi}^{-1}$ for the formation fluid compressibility (c_w).

By combining the formation and formation fluid compressibility, the total system compressibility is determined. The total system compressibility (c_t) is approximately $1.10 \text{E-}05 \text{ psi}^{-1}$.

Table X.5. Reservoir Parameters for Modeling

Parameter	Source/Calculation	Value
Flow rate, q	800 gpm *1440 min/day* bbl/42 gal	27,429 bbl/day
Net Thickness, h	Portion of the >1,500-foot injection interval gross thickness	85 feet
Formation Volume Factor, B	Correlation	1.00
Porosity, ϕ	Logs	0.10
Permeability, k	Well tests, Historical value	251 millidarcies
Viscosity, μ	Correlation	0.61 centipoise
Total Compressibility, C_t	$3.1 \times 10^{-6} \text{ psi}^{-1} + 4.5 \times 10^{-6} \text{ psi}^{-1}$	$7.6 \times 10^{-6} \text{ psi}^{-1}$
Radius, r	Illustrative assumption	10,560 feet
Time, t	5 years * 365.25 days/yr * 24hr/day	43,830 hours

Table X.6. Historical Falloff Testing Data

Date	Depth (ft BGL)	kh (md-ft)	k (md)	Skin (units)
WDW-1				
2021	7,887	262,675	1,501	264
2020	7,887	202,125	1,155	118
2019	7,887	197,575	1,129	129
2018	7,887	179,375	1,025	87
2017	7,887	72,100	412	57
WDW-2				
2021	7,557	86,275	493	337
2020	7,557	144,375	825	149
2019	7,557	81,550	466	78
2018	7,557	137,375	785	117
2017	7,557	145,075	829	84
WDW-3				
2021	7,572	110,250	630	37
2020	7,572	30,450	174	12
2019	7,572	59,500	340	12
2018	7,572	64,050	366	9
2017	7,572	93,275	533	12

The calculated pressure build-up values for selected radial distances from the well for the modeled injection duration are provided in Table X.8. Note that this calculation was conducted assuming a single well scenario at a single point. Figure X.4 presents a pressure plot of the 5-year injection duration scenario. As depicted on this plot, the cone of influence (COI) pressure occurs at a radial distance of approximately 112 feet from each well (further discussed in this section).

Cone of Influence (COI) Determination and Calculations

The Cone of Influence is the area around the injection well(s) within which increased injection zone pressures caused by injection activities could be sufficient to drive fluids into an underground source of drinking water (USDW).

The determination of the COI requires the calculation of the maximum allowable pressure increase in the injection interval without causing fluid movement into an USDW. To conservatively estimate this pressure, HFNR proposes that the following worst-case scenario be utilized:

It is assumed that a hypothetical bore hole is located within the area of review. This borehole is constructed to represent a mud-filled conduit open to the injection interval and the lowermost USDW.

It is assumed that the borehole is filled with drilling mud with a density of 9.0 pounds per gallon. Drilling mud in an abandoned wellbore is a barrier to upward movement because the hydrostatic pressure of the mud column in the wellbore exceeds the reservoir pressure. To calculate the hydrostatic pressure of a mud

column, the weight of the drilling mud is required. Typical mud weights in the region range from 9.0 pounds per gallon (ppg) to over 12.0 ppg. A mud weight of 9.0 ppg (Specific Gravity of 1.08) will result in a pressure gradient of 0.468 psi/ft. Historically, gelled muds with a specific gravity greater than 1.08 (> 9.0 ppg) have been used to drill wells within the area of review. An assumed minimum mud weight of 9.0 in an abandoned wellbore is conservative.

It is assumed that the 9.0 ppg mud column does not extend to the surface. A 50-foot fallback is incorporated into the calculated hydrostatic pressure of the mud column.

The following calculations determine the minimum pressure required to balance the minimum hydrostatic overbalance created by the mud based on data from WDW-1 which is considered representative of the three wells.

Top of Injection Interval = 7,924 feet BGL

Minimum Density of Mud = 9.0 pounds per gallon (0.468 psi/ft.)

Initial Reservoir Pressure = 2,934 psi

Calculation of COI Pressure:

COI pressure = (hydrostatic pressure of 9.0 ppg mud from 50' to the top of the injection interval) - (static reservoir pressure at top of injection interval)

COI pressure = $[(0.468 \text{ psi/ft})(7,924 \text{ feet} - 50 \text{ feet})] - 2,934 \text{ psi}$

COI pressure = 751 psi (with 9.0 ppg mud)

This calculated value of critical pressure rise, which represents the pressure required to cause vertical migration through a hypothetical open borehole to the lowermost USDW, must be evaluated versus the calculated reservoir pressure rise from injection. Table X.8 presents the results of the calculated pressure rise due to injection, based on parameters presented in Table X.5.

As shown in Table X.8, the calculated pressure rise due to injection at a distance of one mile (5,280 feet) is approximately 324 psi, which is less than the calculated critical pressure rise of 751 psi. Based on these calculations, the distance to the calculated critical pressure rise is approximately 112 feet. Note that the calculated COI is determined as a conservative measure, and is substantially less than the one-mile regulatory AOR that is utilized for this permit application.

Extent of Waste Plume

The predicted positions of the current and 5-year waste fronts for each well were calculated, assuming a future injection rate of 400 gpm for each well for 5 years.

Injection into each well at a continuous rate of 400 gpm for 5 years will generate a volume of 1,051,200,000 gallons per well. The modeled thickness of the formation is 85 feet and the porosity is 10%. The radial distance of displacement was calculated using the following equation:

$$r = \sqrt{\frac{Q}{\pi h \phi}} \quad (\text{Green, 1983})$$

where:

r = radial distance of fluid front from well, feet;
Q = cumulative volume of fluid injected, ft³
φ = porosity of receiving formation (in order to be conservative, the effective porosity was assumed to be 80% of the assigned porosity)
h = thickness of formation, feet.

An estimate of the influence of dispersion was made with the following equation (Warner and Lehr, 1977):

$$r' = r + 2.3\sqrt{Dr}$$

where:

r' = radial distance of travel with dispersion
D = dispersion coefficient; 65 feet for carbonate aquifer.

Table X.9 presents the results of the above calculations for WDW-1, WDW-2, and WDW-3.

Table X.9: Extent of Waste Plume

	Parameter	WDW-1	WDW-2	WDW-3
Current Plume	Total Injected Volume (gal)	2,015,374,452	1,224,435,156	973,290,234
	Radial Distance of Fluid Front (feet)	3,552	2,768	2,468
	Radial Distance of Fluid Front with Dispersion (feet)	4,657	3,744	3,389
Projected 5-year Plume	Total Injected Volume (gal)	3,066,574,452	2,275,635,156	2,024,490,234
	Radial Distance of Fluid Front (feet)	4,381	3,774	3,560
	Radial Distance of Fluid Front with Dispersion (feet)	5,608	4,913	4,666

K. Proposed stimulation program.

Over the history of operation for each well, multiple stimulation activities have been conducted. The majority of stimulations where chemical stimulations performed via coiled tubing and HCl acid. The most recent stimulations performed at WDW-1, WDW-2, and WDW-3 were in 2013. These stimulations consisted of displacing approximately 20,000 gallons of 15% HCl into the injection zone via coiled tubing.

HFNR does not propose any changes to the current stimulation program. Future stimulations will likely consist of stimulation via coiled tubing and/or bullhead chemical treatment. Procedures and schedules on any future stimulations will be sent the OCD in advance for approval.

L. Proposed or actual injection procedure.

HFNR will continue to maintain a system for monitoring and control of injection operations, complete with digital data recording equipment, alarms, and automatic shutdown equipment. HFNR will operate the wells to ensure that the permitted operating parameters are not exceeded.

The facilities associated with the injection wells will have the same preventive maintenance schedules as other plant process equipment. This includes routine, regular servicing of instrumentation, lubricators, and like equipment. Pressure equipment tests, over-speed checks, relief valve tests, and tank internal inspections will be made at regular intervals.

The well annulus between the long-string protection casing and the injection tubing will be kept full of a fluid approved and at an annulus pressure both approved by the OCD (except during workovers or other maintenance activities as allowed by OCD regulation).

Digital devices will be used to measure and record the injection tubing pressure, injection flow rates and temperatures, and totalized injection volume. Annulus pressures will also be monitored and recorded continuously. Instrumentation will be enclosed in weatherproof housings.

Allowable operating set-points for the maximum and minimum values of injection pressure, injection rate, and annulus pressure will be programmed into the monitoring system. Operator notifications and/or alarms will be triggered when any of the limiting set-point values are detected. In the event of an alarm or shutdown, the trained deep well operator will immediately respond to the notification and take appropriate action as required. In the event of a loss of mechanical integrity, HFNR will comply with the regulatory provisions.

Prior to commencing any workover operation, HFNR will notify the OCD in advance in writing of the plans for the proposed work and receive approval to conduct the work. Pressure control equipment will be installed and maintained during workovers that involve removal of the tubing.

Plant personnel responsible for operation of the wells and associated facilities will be trained. Training will include details regarding permit conditions, fluid quality, alarms, shutdowns, and notification procedures. Practical classroom instruction will be followed by on-the-job training alongside experienced personnel. This training will continue until the trainee exhibits the knowledge of an experienced operator. Oversight of operations and compliance will be performed by specialists with appropriate operating experience, with assistance from supervisors, managers, and technical specialists. For more significant, specialized or long-range issues, additional technical staff will be utilized as needed.

M. Schematic or other appropriate drawings of the surface and subsurface construction details of the well.

Schematics of the WDW-1, WDW-2 and WDW-3 surface facilities are presented as Figures X.5, X.6, and X.7, respectively. Schematics of the WDW-1, WDW-2, and WDW-3 subsurface details are presented as Figures X.8, X.9, and X.10, respectively. Schematics of the WDW-1, WDW-2, and WDW-3 wellheads are presented as Figures X.11, X.12, and X.13, respectively. These schematics depict details regarding well construction materials and methods.

N. Construction procedures, including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program.

The following presents a summary of the well construction for WDW-1, WDW-2, and WDW-3. Information regarding construction history, well details, cementing, wellheads, and annulus systems are presented herein. Information regarding logging procedures, deviation checks, drilling, testing, and coring was submitted to OCD previously and is not included in this document.

Well Construction History

WDW-1 was drilled by Mewbourne Oil Company in 1993. The well was originally drilled as an oil and gas production well to a depth of 10,200 feet. The well was plugged and abandoned following drilling operations. In July 1998, WDW-1 was re-completed as a Class I non-hazardous injection well. During the re-completion operations, 7-inch protection casing was installed at a depth of 9,094 feet KB and cemented to surface. The protection casing was then perforated in the injection interval and injection tubing and a packer were installed.

The most recent workover of WDW-1 was performed in March 2018. The injection string and packer were pulled in order to re-establish mechanical integrity. Prior to performing a casing inspection log, the well was killed with brine and the injection tubing and packer were removed. A casing scraper was run to clean the wellbore. A Micro Vertilog was used to log the casing. An anomaly in the 7-inch casing was discovered just below ground level. As a result, the top 6 feet of the 7-inch casing was replaced with a new collar of 7-inch casing and welded in place.

A casing pressure was successfully performed following the casing repair. A new injection packer and 4 ½-inch injecting tubing were installed to a depth of 7,869 feet KB. A final MIT annulus pressure test was conducted per OCD approval.

WDW-2 was drilled by the Amoco Production Company in 1973. The well was originally drilled as an oil and gas production well to a depth of 10,372 feet KB. The well was plugged and abandoned following drilling operations. In 1985, the wellbore was re-entered by Fred Pool Drilling, Inc. and completed as an oil and gas production well. In May 1999, WDW-2 was re-completed as a Class I non-hazardous injection well. During the re-completion operations, the existing perforations from 1,446 to 1,462 feet KB were squeezed with cement and the cement plugs were drilled out. 5 1/2-inch protection casing was installed at a depth of 8,869 feet KB and cemented to surface. The protection casing was then perforated in the injection interval and injection tubing and a packer were installed.

WDW-3 was drilled by the Mewbourne Oil Company in 1991. The well was originally drilled as an oil and gas production well to a depth of 10,119 feet KB. The well was plugged and abandoned in 1995. In September 2006, WDW-3 was re-completed as a Class I non-hazardous injection well. During the re-completion operations, the existing perforations from 7,050 to 7,102 feet, 7,190 to 7,279 feet, and 7,262 to 7,314 feet KB were squeezed with cement and the cement and cast iron plugs were drilled out. The protection casing was then perforated in the injection interval and injection tubing and a packer were installed.

Historical drilling, completion, and well workover reports have been submitted to OCD following the completion of each activity.

Well Construction Details

The surface casing depth and specifications for each well were selected and designed to protect the lowermost USDW. The casing and injection tubing are designed to satisfy installation requirements and to suit the existing subsurface geologic, formation fluid, and injected fluid environment. Details regarding the tubing, casing, and packer along with their mechanical properties for WDW-1, WDW-2, and WDW-3 are included in Tables X.10, X.11, and X.12, respectively.

Table X.10: WDW-1 Construction Details

Equipment	Depth (KB)	Description	Collapse (psi)	Yield (psi)	Tensile (lbs)
Surface Casing	0 to 390 feet	13 3/8-inch, 48 lb/ft, J-55, STC	1,130	2,730	514,000
Intermediate Casing	0 to 2,555 feet	9 5/8-inch, 36 lb/ft, J-55, STC	2,020	3,520	394,000
Protection Casing	0 to 9,094 feet	7-inch, 26/29 lb/ft, P-110/N-80, LTC	5,410	7,240	519,000
Injection Tubing	0 to 7,869 feet	4 1/2-inch, 11.6 lb/ft, N-80, LTC	6,350	7,780	223,000
Packer	7,869 feet	7-inch x 2-7/8-inch Arrow X-1	N/A	N/A	N/A

Table X.11: WDW-2 Construction Details

Equipment	Depth (KB)	Description	Collapse (psi)	Yield (psi)	Tensile (lbs)
Surface Casing	0 to 1,955 feet	8 5/8-inch, 32 lb/ft, J-55, STC	2,530	3,930	372,000
Protection Casing	0 to 8,869 feet	5 1/2-inch, 17 lb/ft, L-80, LTC	6,390	7,740	356,000
Injection Tubing	0 to 7,528 feet	3 1/2-inch, 9.2 lb/ft, J-55, LTC	7,400	6,980	109,370
Packer	7,528 feet	5 1/2-inch x 2-7/8-inch Arrow X-1	N/A	N/A	N/A

Table X.12: WDW-3 Construction Details

Equipment	Depth (KB)	Description	Collapse (psi)	Yield (psi)	Tensile (lbs)
Conductor Casing	0 to 400 feet	13 3/8-inch, 54.5 lb/ft, J-55, STC	1,130	2,730	514,000
Surface Casing	0 to 2,604 feet	9 5/8-inch, 36 lb/ft, J-55, STC	2,020	3,520	394,000
Protection Casing	0 to 9,450 feet	7-inch, 26/29 lb/ft, P-110/N-80, LTC	5,410	7,240	519,000
Injection Tubing	0 to 7,568 feet	4 1/2-inch, 11.6 lb/ft, J-55, LTC	4,960	5,350	162,000
Packer	7,575 feet	7-inch x 2-7/8-inch Arrow X-1	N/A	N/A	N/A
Liner	9,051 to 10,119 feet	4 1/2-inch, 11.6 lb/ft, N-80	6,350	7,780	223,000

Cement Details

Figures X.8, X.9, and X.10 present the wellbore diagrams for each well. Wells are completed and cemented. Cementing details are presented on these figures.

Wellhead

Schematics of the WDW-1, WDW-2, and WDW-3 wellheads are presented as Figures X.11, X.12, and X.13, respectively. Each wellhead is pressure rated to withstand maximum injection pressures for the life of the project. The outer surface of each wellhead is protected at all times with protective paint as a corrosion preventative.

Annulus System

Each well has a positive annulus pressure operating and monitoring system and a system to cut power to the injection pump if permit conditions are exceeded or if unsafe conditions exist. Operating systems have preset limits, which can be adjusted depending upon specific operating conditions and reporting requirements.

The annulus pressure system for each well consists of an annulus fluid tank connected to a pressure source. The annulus tank will have sufficient reservoir capacity to accommodate the anticipated volume fluctuations due to temperature and pressure limitations.

A digital recorder is used to record the annulus pressure and injection pressure. Pressure transducers are located in appropriate taps in the flow line and annulus line near the wellhead to measure pressures.

O. Contingency plans to cope with all shut-ins or well failures so as to prevent movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to 20.6.2.5103 NMAC.

HFNR has an Integrated Contingency Plan detailing responses to spills of all types, reporting spills/releases, mitigation and corrective actions, clean up and disposal as applicable. WDW-1, WDW-2 and WDW-3 are equipped with a high-pressure shutoff switch to prevent operation of the injection pump at pressures greater than the designated MASIP. The wells are equipped with a low-pressure shutoff switch that will deactivate the injection pump in the event of a surface leak. In addition, the wells are equipped with a high/low pressure shutdown switch with a pressure sensor on the tubing/casing annulus. This pressure switch is intended to stop the injection pump in the event of 1) a tubing leak, or 2) a casing, packer, or wellhead leak.

If an alarm or shutdown is triggered at the wellhead, electronic signals are sent to the control room at the refinery notifying of the shutdown and the cause of the alarm or shutdown will be immediately investigated.

Operators will immediately cease injection operations at the wellhead and divert flow to another well, and notify maintenance and environmental to take all necessary steps to determine the presence or absence of a leak, and environmental will provide verbal notification to OCD within 24 hours.

If the alarm or shutdown is not related to mechanical integrity and the cause of the alarm or shutdown is corrected, injection operations will be resumed. If the mechanical integrity of the well is in question, the well will remain out of service until the mechanical integrity of the well is restored to the satisfaction of OCD and the agency approves resumption of injection operations.

P. Plans, including maps, for meeting the monitoring requirements of 20.6.2.5207 NMAC.

Mechanical Integrity

Periodic monitoring is performed to conform to both Part I and Part II mechanical integrity requirements. Annual testing including reservoir (ambient) monitoring and annulus pressure testing is conducted once each calendar year. Bradenhead testing will be conducted annually on wells where bradenhead valves are accessible. In addition, required Part II testing will be performed according to applicable regulatory standards once every five years. Casing inspection logs may be conducted to investigate casing condition if it is determined to be necessary due to operational or regulatory concerns when tubing is already removed from the borehole during a workover or stimulation.

Injected Fluid Analysis

Injectate characteristics are monitored by collecting a representative sample of plant produced injectate during each quarter during which operations take place. HFNR is currently in the process of commencing operations on a Renewable Diesel Unit (RDU) at the refinery. The implementation of the RDU is not expected to affect the currently permitted limits regarding effluent discharge quantity and quality. Appendix X.2 presents the current injected fluids monitoring plan as well as the proposed monitoring plan amendments pertaining to the addition of the RDU. Appendix X.2 also contains information regarding the proposed pilot sampling plan to be implemented to ensure waste stream compliance once the RDU is operational.

Continuous Monitoring

Both the injection pressure and the annulus pressure are continuously monitored and recorded. Electronic pressure transducers are maintained in pressure taps on the annulus system and injection flow lines. Flow rate and volume are also continuously monitored and recorded. The flow rate to the wells is determined using a liquid flow meter designed for continuous monitoring.

Monitoring Wells

Appendix X.3 presents information regarding monitoring wells.

- Q. The ability of the discharger to undertake measures necessary to prevent contamination of ground water having 10,000 mg/l or less TDS after the cessation of operation, including the proper closing, plugging and abandonment of a well, ground water restoration if applicable, and any post-operational monitoring as may be needed; methods by which the discharger shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the secretary, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the state of New Mexico, with the state as beneficiary; (3) a non-renewable letter of credit made out to the state of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance; such bond or materials shall be approved and executed prior to discharge permit issuance and shall become effective upon commencement of construction; if an adequate bond is posted by the discharger to a federal or another state agency, and this bond covers all of the measures referred to above, the secretary shall consider this bond as satisfying the bonding requirements of 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the discharger will fully perform the measures required hereinabove.**

Plugging of WDW-1, WDW-2 and WDW-3 will entail the protection casing string be filled with a series of cement plugs from just above the injection packer depth to the surface, as detailed in Appendix X.4.

Closure costs for plugging the wells in accordance to applicable OCD regulations were estimated using current costs for services and equipment. The estimated costs for plugging WDW-1, WDW-2 and WDW-3 are \$215,276, \$192,748 and \$216,268, respectively. Appendix X.5 details the estimated cost of plugging each well with cement.

HFNR currently has a financial surety instrument in place that has been provided to the OCD demonstrating sufficient financial assurance is available to manage well abandonment and estimated costs for the existing wells WDW-1, WDW-2, and

WDW-3. This financial surety instrument will be updated during the permit renewal process and will be provided to the OCD under separate cover demonstrating sufficient financial assurance is available pertaining to abandonment of WDW-1, WDW-2 and WDW-3.

R. All available logging and testing program data on the well;

Logging and testing program data were most recently provided in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and WDW-3. The following appendices from the referenced document provide the requirement information for this section:

- Appendix M: Open-hole logs (WDW-1, WDW-2, and WDW-3)
- Appendix N: Cased-hole logs (WDW-1, WDW-2, and WDW-3)

Additional logging and testing program data have been previously submitted to the OCD in the drilling, completion, and re-entry reports for each well.

S. The demonstration of mechanical integrity pursuant to 20.6.2.5204 NMAC;

Annual testing including reservoir (ambient) monitoring and annulus pressure testing is conducted once each calendar year on each injection well. Bradenhead testing will be conducted annually on wells where bradenhead valves are accessible. In addition, required Part II testing will be performed according to applicable regulatory standards once every five years. The most recent reservoir monitoring and annulus pressure testing reports (2022) have been submitted and are on file with the OCD. The most recent Part II mechanical integrity testing occurred during the week of 8/15/2022. Copies of historical MIT reports have been submitted and are on file with OCD.

T. The anticipated maximum pressure and flow rate at which the permittee will operate.

The requested information is provided in Section X.H of this document.

U. The results of the formation testing program.

The requested information is provided in Section X.I of this document.

V. The physical, chemical, and biological interactions between the injected fluids and fluids in the injection zone, and minerals in both the injection zone and the confining zone.

A detailed compatibility report was most recently provided in the 2017 Permit Application for Class I Non-Hazardous Waste Injection Wells WDW-1, WDW-2 and

WDW-3. Appendix F-2 from the referenced document provide the requirement information for this section.

Additional details regarding fluid interaction and other required information are provided in the above referenced permit application and original permit applications.

W. The status of corrective action on defective wells in the area of review.

As detailed in Section X.D, there are no wells within the AOR that require a corrective action plan.

REFERENCES

Green, C.J., 1983, Underground Injection Control Technical Assistance Manual, Subsurface Disposal and Solution Mining: Texas Water Development Board, Report 274

Lee, J., 1982. Well Testing. Society of Petroleum Engineers of AIME, SPE Textbook Series. Volume 1

Lee, John, et al. Pressure Transient Testing. Vol. 9, Henry L. Doherty Memorial Fund of AIME, Society of Petroleum Engineers, 2003

Warner, D.L., and Lehr, Jay H., 1977, An Introduction to the Technology of Subsurface Wastewater Injection: Environmental Protection Agency rept. 600/ 2-77-240, 345

XI. Attach completed Form C-108 with geologic/hydrogeologic/well design and construction evidence demonstrating that well operations will not adversely impact fresh water.

A completed copy of the OCD Form C-108, "Application for Authorization to Inject", is provided as Appendix XI.1 for the existing wells WDW-1, WDW-2 and WDW-3 and the required attachments to these forms are included in this appendix.

- XII. Attach copies of Waste Analysis Plan (40 C.F.R. 146.68), AoR Corrective Action Plan (20.6.2.5354 NMAC), Closure Plan (40 C.F.R. 146.71), Post-Closure Plan (20.6.2.5362 NMAC, 40 § C.F.R. 146.72 and 40 § C.F.R. 261), Completion Report (20.6.2.5360B NMAC), Public Notice (20.6.2.3108 NMAC) and Waste Minimization & Practicability Certification (20.6.2.5360D NMAC).**

Not applicable to Class I non-hazardous wells.

- XIII. Attach copy of EPA Region 6 (Dallas, TX) "No Migration Petition" submittal (20.6.2.5360B(9) NMAC) if application is for a hazardous injection well. Final permit approval is contingent on EPA approval of the petition. All variances to regulations must be approved by the EPA. All hazardous well permits shall comply with 20.6.2.5360 NMAC.**

Not applicable to Class I non-hazardous wells.



XIV. Certification

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

NAME: Travis Gibb

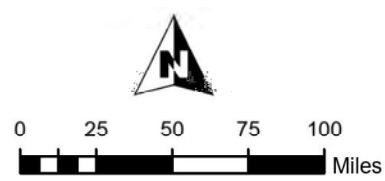
TITLE: Vice President and Refinery Manager

SIGNATURE:  DATE: 8/12/2022

Figures



★ Navajo Refinery Location



XY Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere



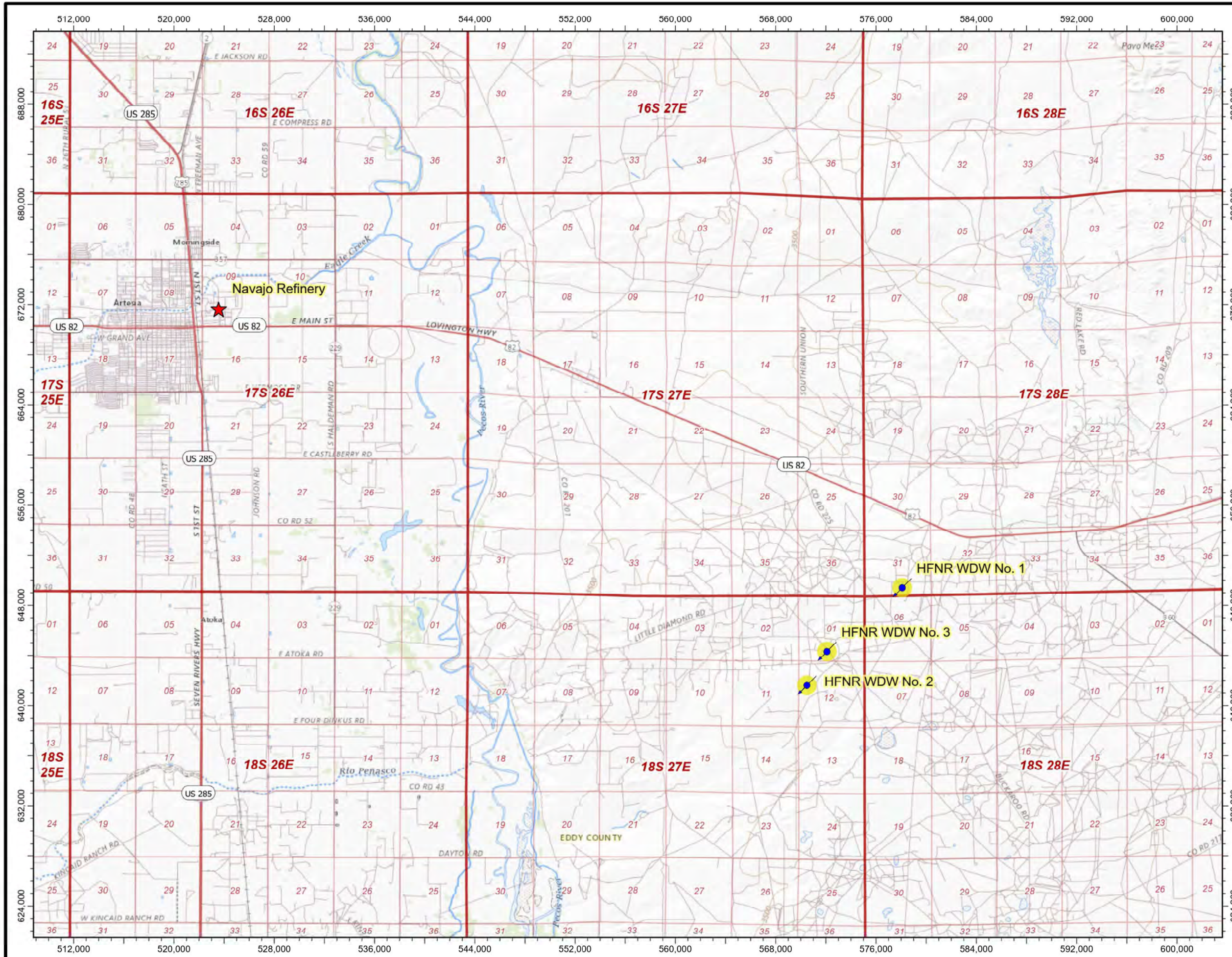
Figure I.1
Site Location Map

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: 1:4,000,000	Date: July 2022	
Fig_I.01_HF_NM_2022_WDW123	By: WEK	Checked: NB



5525 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com



- ★ Navajo Refinery Location
- HFNR WDW Location

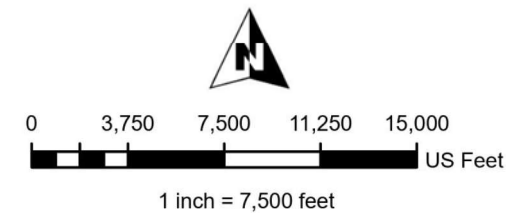


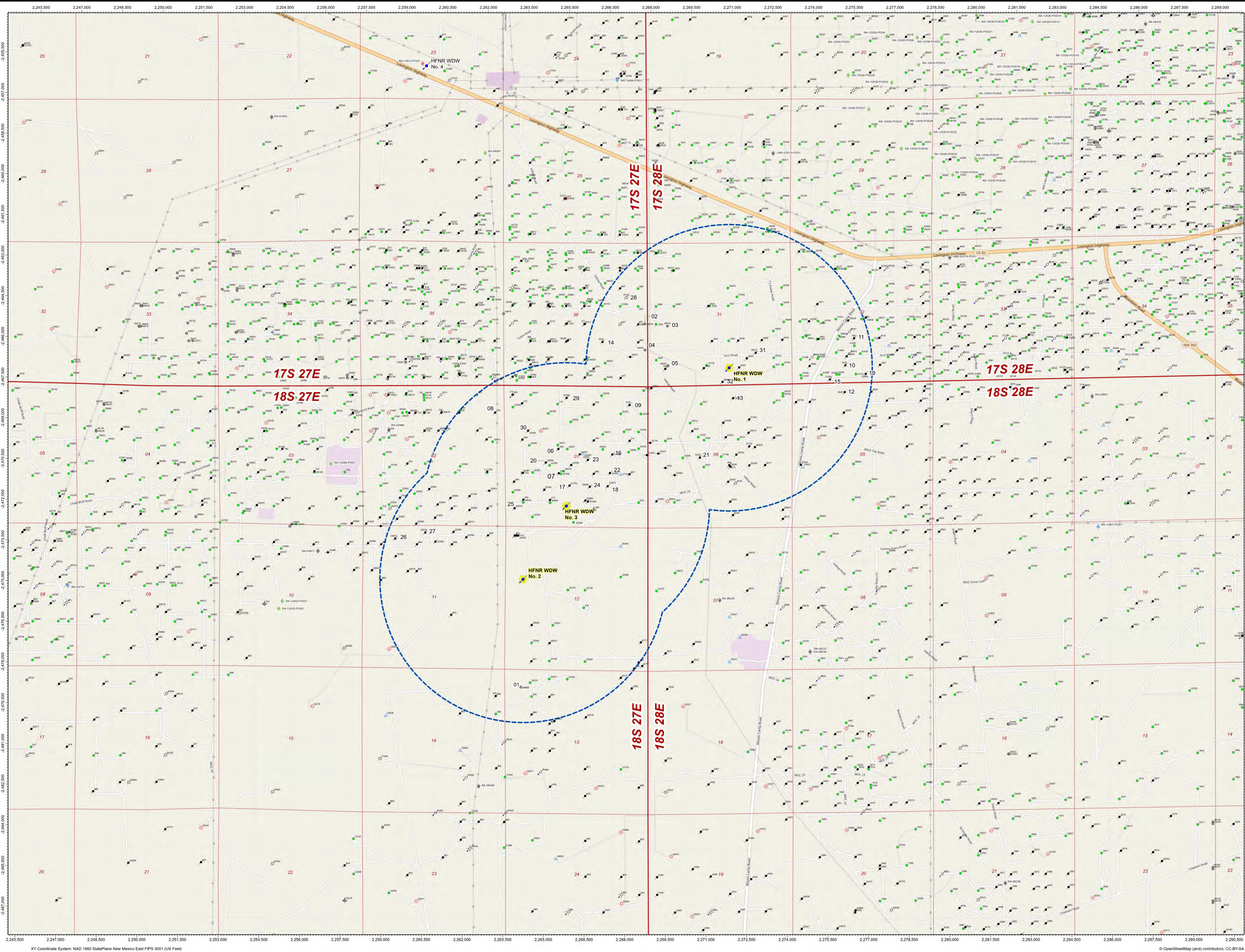
Figure I.2
WDW-1, WDW-2,
and WDW-3 Locations
2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: 1:90,000	Date: July 2022
Fig_I02_HF_NM_2022_WDW123	By: WEK Checked: NB



XY Coordinate System: NAD 1983 StatePlane New Mexico East FIPS 3001 (US Feet)

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed June, 2022.



HollyFrontier Navajo Refining Wells

HFNR WDW Location

HFNR WDW No. 4

Area of Review

One-Mile Composite Radius

Well Locations

- New / Permitted Well
- Active Injection Well
- Plugged Injection Well
- Active Salt Water Disposal
- Plugged Salt Water Disposal
- Active Oil Well
- Temporarily Abandoned Oil Well
- Plugged Oil Well
- Active Gas Well
- Temporarily Abandoned Gas Well
- Plugged Gas Well
- Plugged Water Well

Water Well Locations

- Active
- Pending
- Plugged
- Unknown

Note:
Map extent is within Eddy County, New Mexico.

One-Mile composite radius extends from HFNR WDW No. 1, No. 2, and No. 3.

Oil & Gas wells are labeled with the last five digits of their associated API number. Wells drilled or plugged since 2017 have been labeled with a unique map identifier. These labels correspond with the numbers found in Table X.1.

Oil & Gas well data from the EMNRD, OCD GIS Public FTP Site, accessed and downloaded 05/10/2022.

Water wells are labeled with their associated Point of Diversion file number.

Water well data from the NM Office of the State Engineer Water Rights Database, accessed and downloaded 07/20/2022.

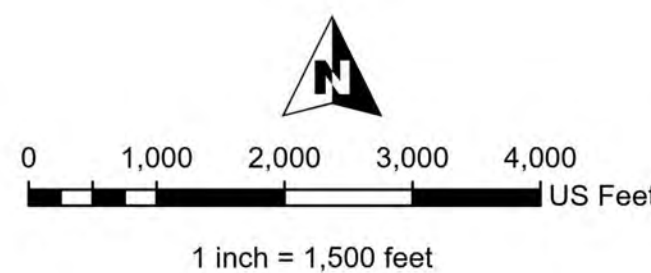


Figure X.1
Area of Review Map, All Wells

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: 1:18,000

Date: July 2022

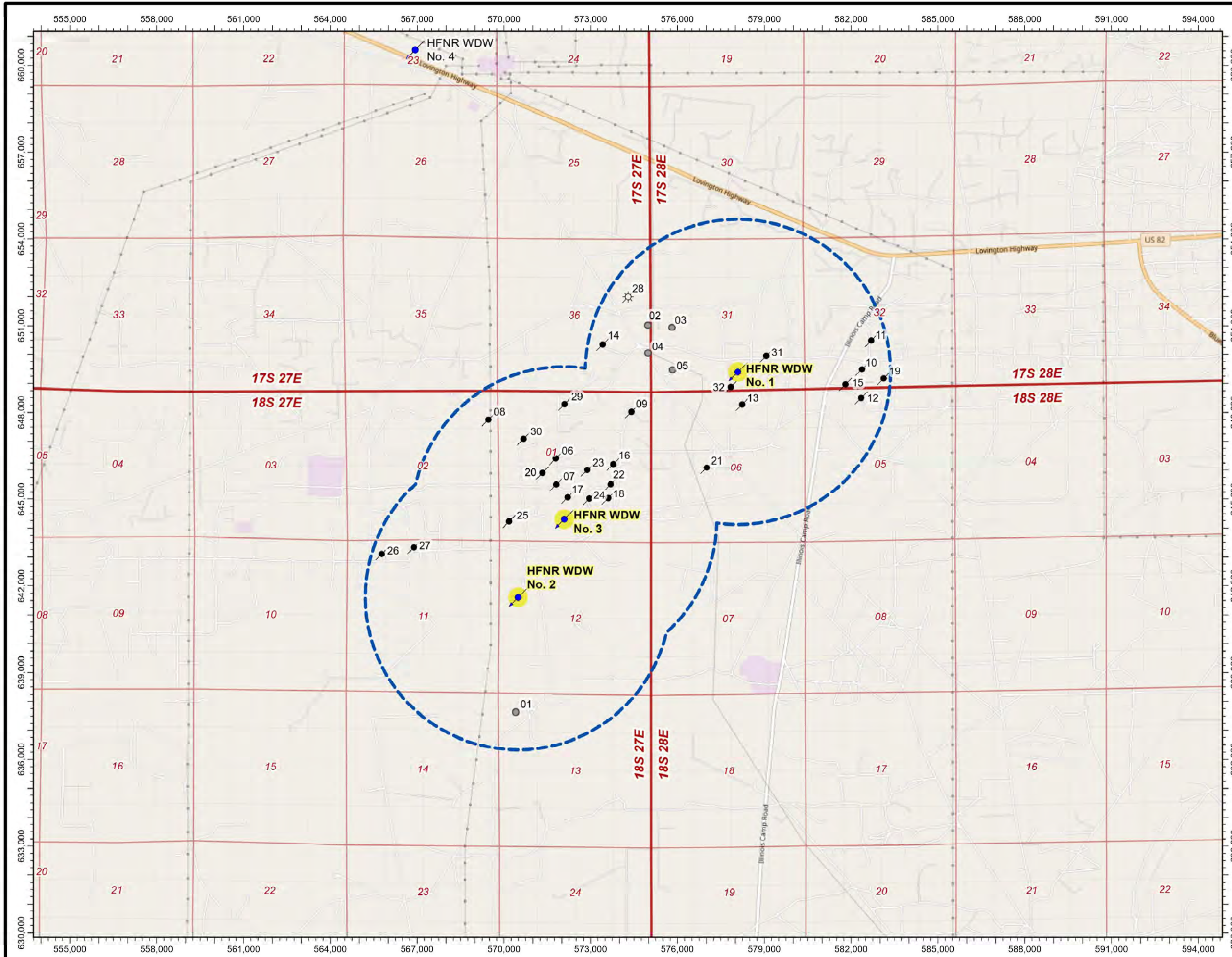
Fig_X.01_HF_NM_2022_WDW123

By: WEK

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HollyFrontier Navajo Refining Wells

- HFNR WDW Location
- HFNR WDW No. 4
- Area of Review**
- One-Mile Composite Radius
- Well Locations**
- New / Permitted Well
- Plugged Oil Well
- Plugged Gas Well

Note:
Map extent is within Eddy County, New Mexico.

One-Mile composite radius extends from HFNR WDW No. 1, No. 2, and No. 3.

Wells drilled or plugged since 2017 have been labeled with a unique map identifier. These labels correspond with the numbers found in Table X.1.

Oil & Gas well data from the EMNRD, OCD GIS Public FTP Site, accessed and downloaded 05/10/2022.

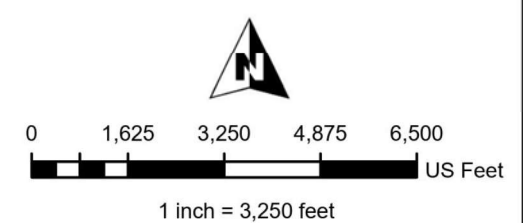
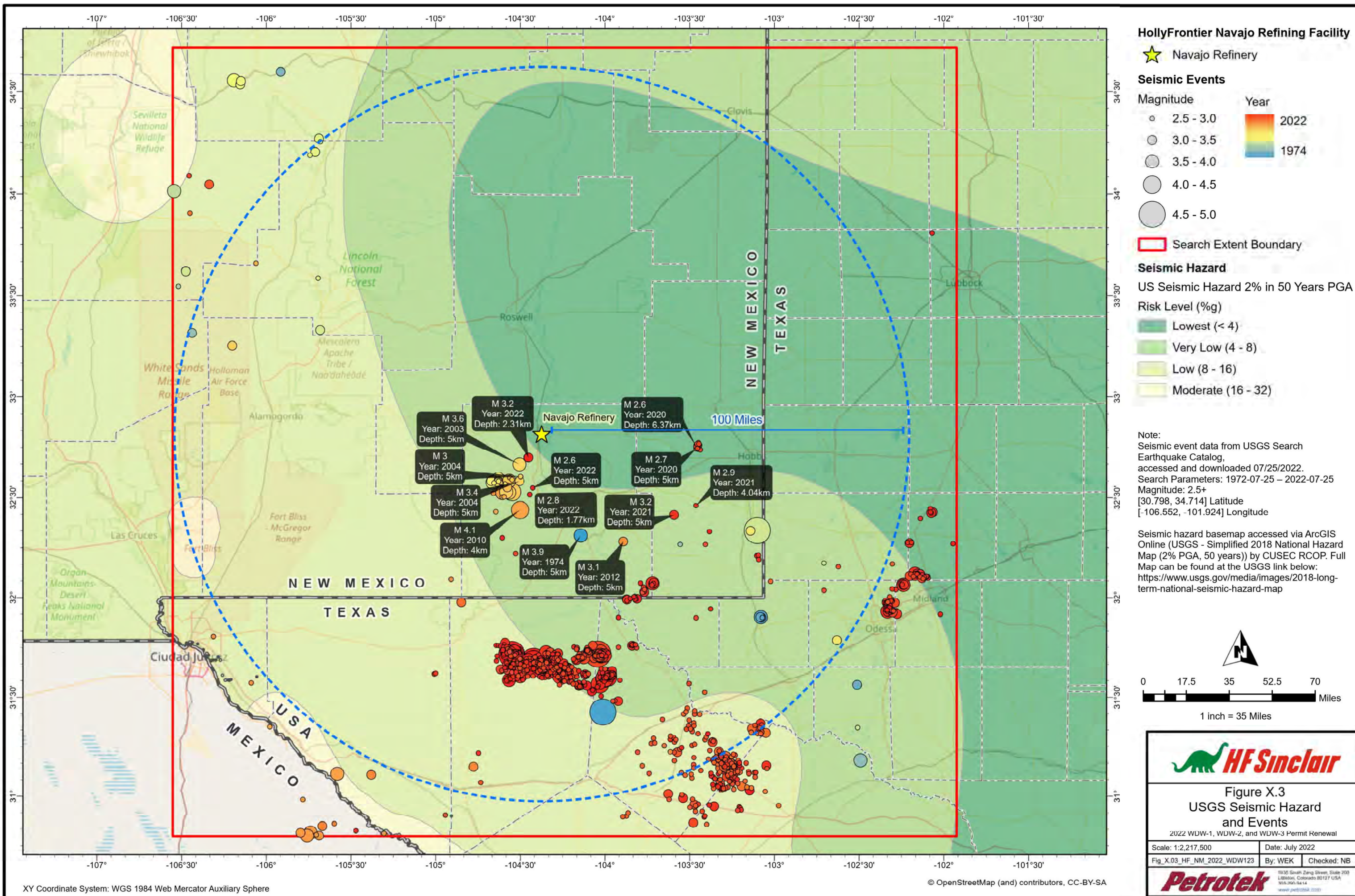


Figure X.2
Area of Review Map,
5-Year Update

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: 1:39,000	Date: July 2022
Fig_X.02_HF_NM_2022_WDW123	By: WEK Checked: NB

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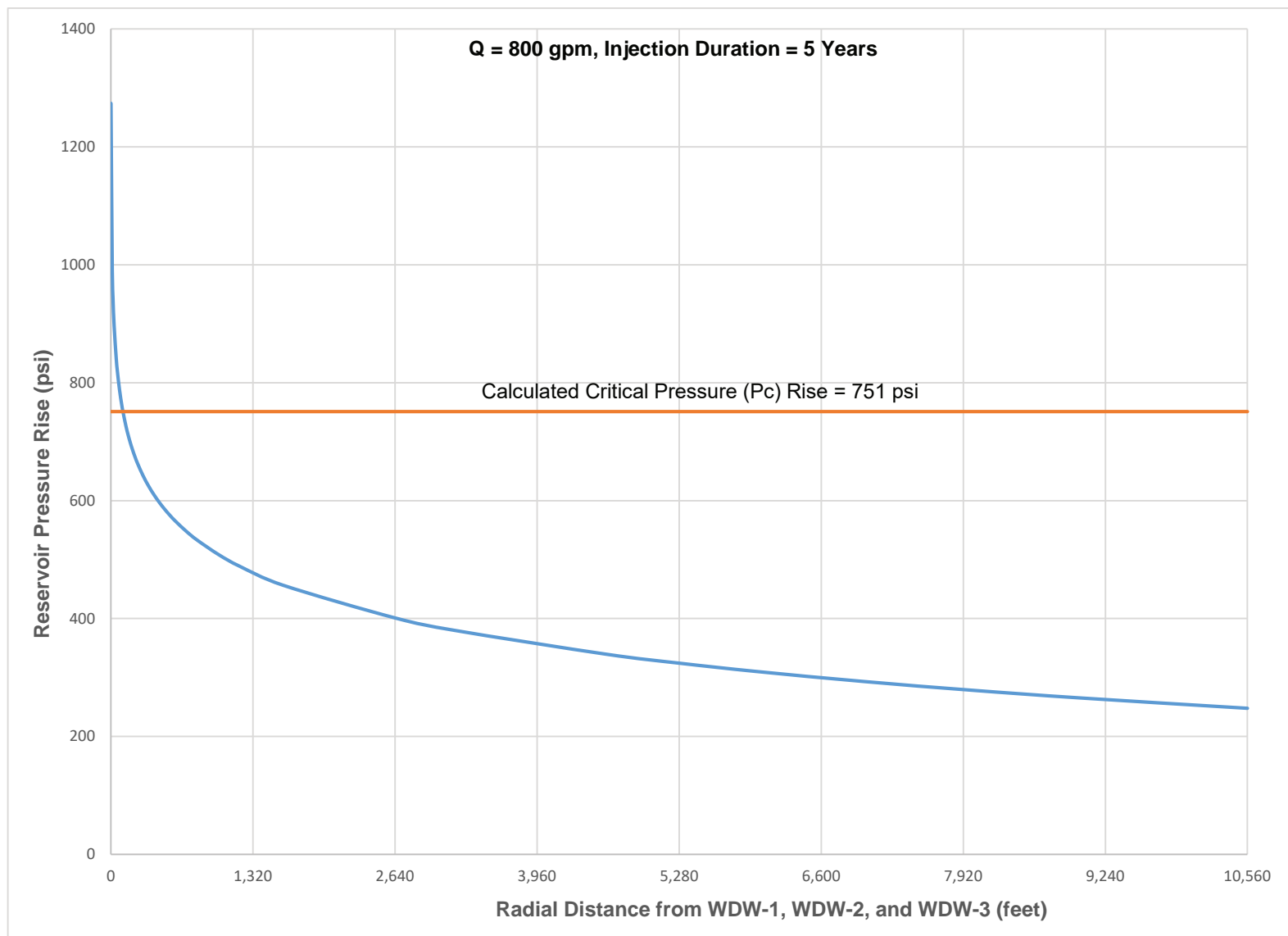


Figure X.4
Modeled Pressure vs. Distance

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.04_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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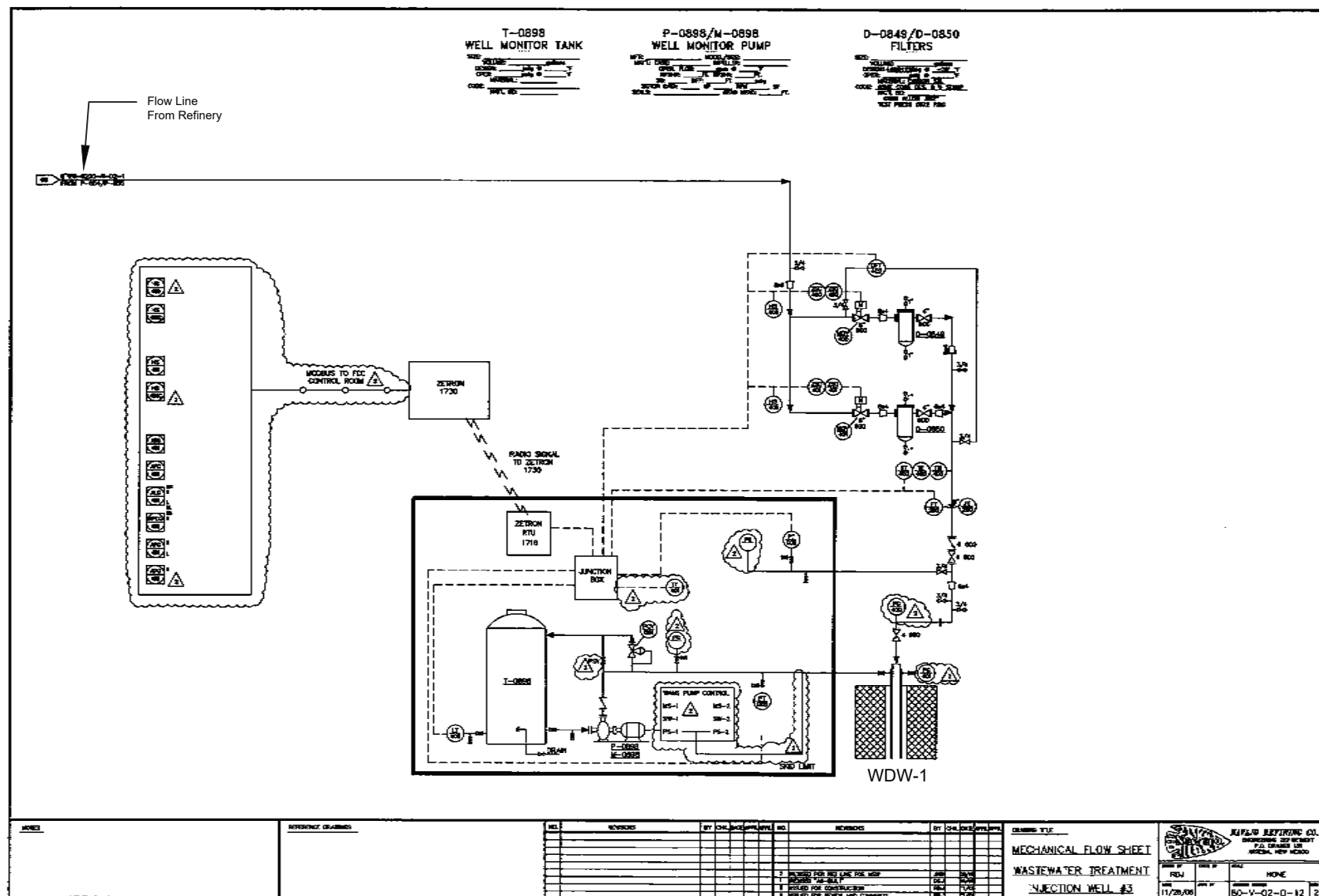


Figure X.5
Surface Facilities Schematic, WDW-1

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS Date: August 2022
Fig_X.05_HF_NM_2022_WDW123.pdf By: WEK Checked: NB

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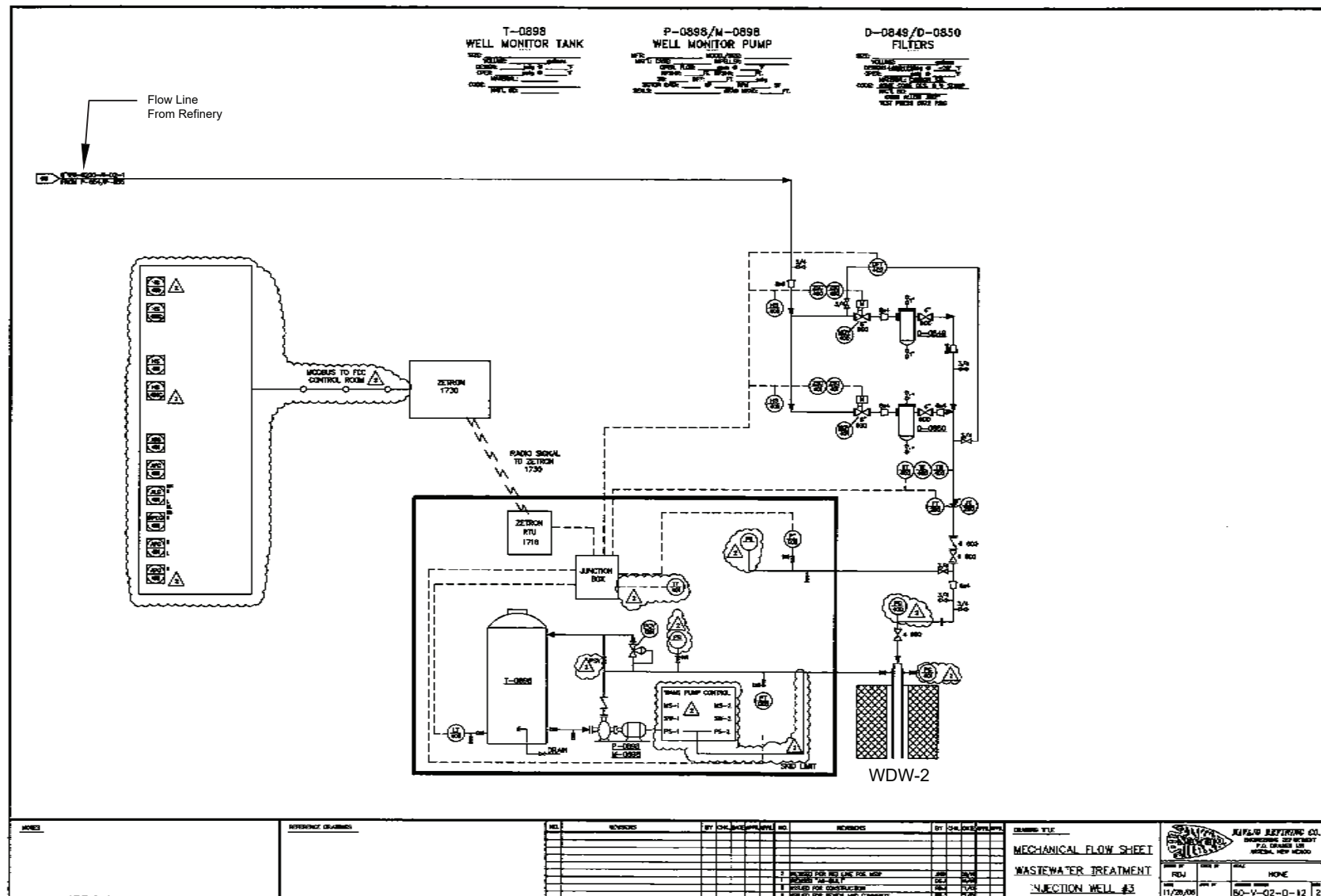


Figure X.6
Surface Facilities Schematic, WDW-2

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS Date: August 2022
Fig_X.06_HF_NM_2022_WDW123.pdf By: WEK Checked: NB

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OCD UIC Permit: UICI-008-1
 Well API Number: 30-015-27592
 Eddy County, New Mexico
 Sec. 31, T17S-R28E
 Lat. 32.78517° / Long. -104.21376° (NAD 83)

All depths referenced to Kelly Bushing (KB)
 elevation 2.5' above ground level.
 Ground Level Elevation: +3,678' MSL

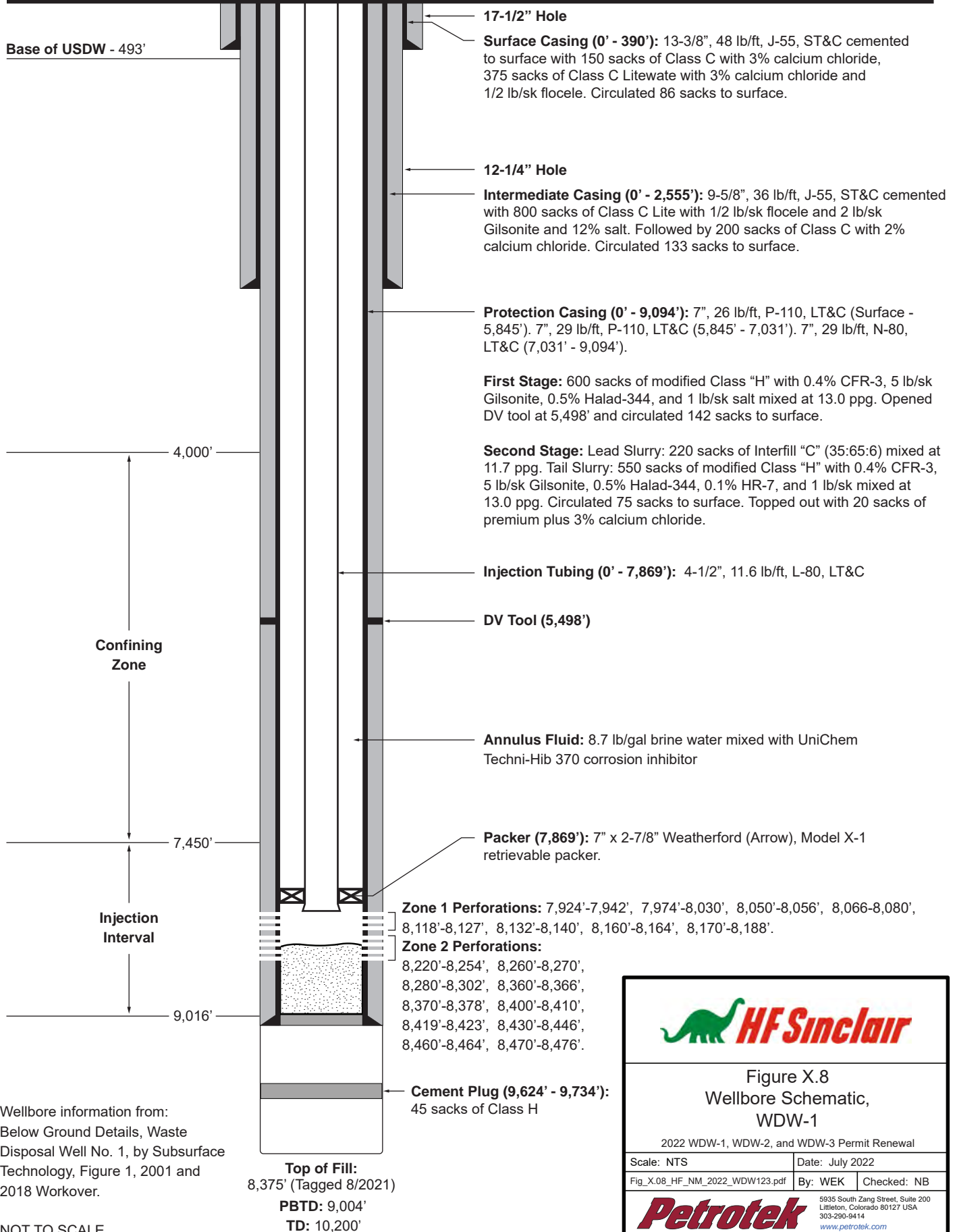


Figure X.8
 Wellbore Schematic,
 WDW-1

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.08_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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OCD UIC Permit: UICI-008-2
Well API Number: 30-015-20894
Eddy County, New Mexico
Sec. 31, T17S-R27E
Lat. 32.763772° / Long. -104.238508° (NAD 83)

All depths referenced to Kelly Bushing (KB)
elevation 13' above ground level.
Ground Level Elevation: +3,610' MSL

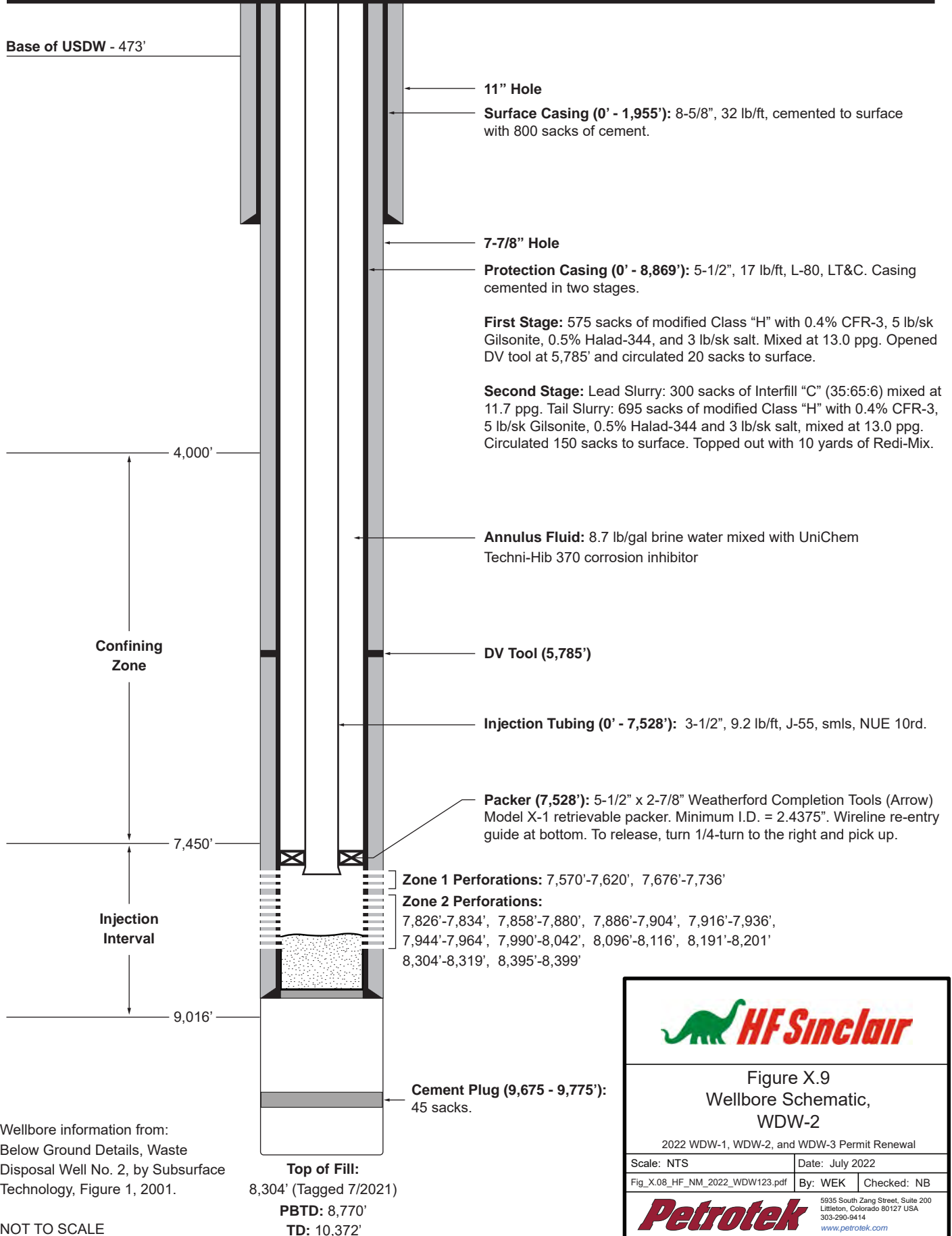


Figure X.9
Wellbore Schematic,
WDW-2

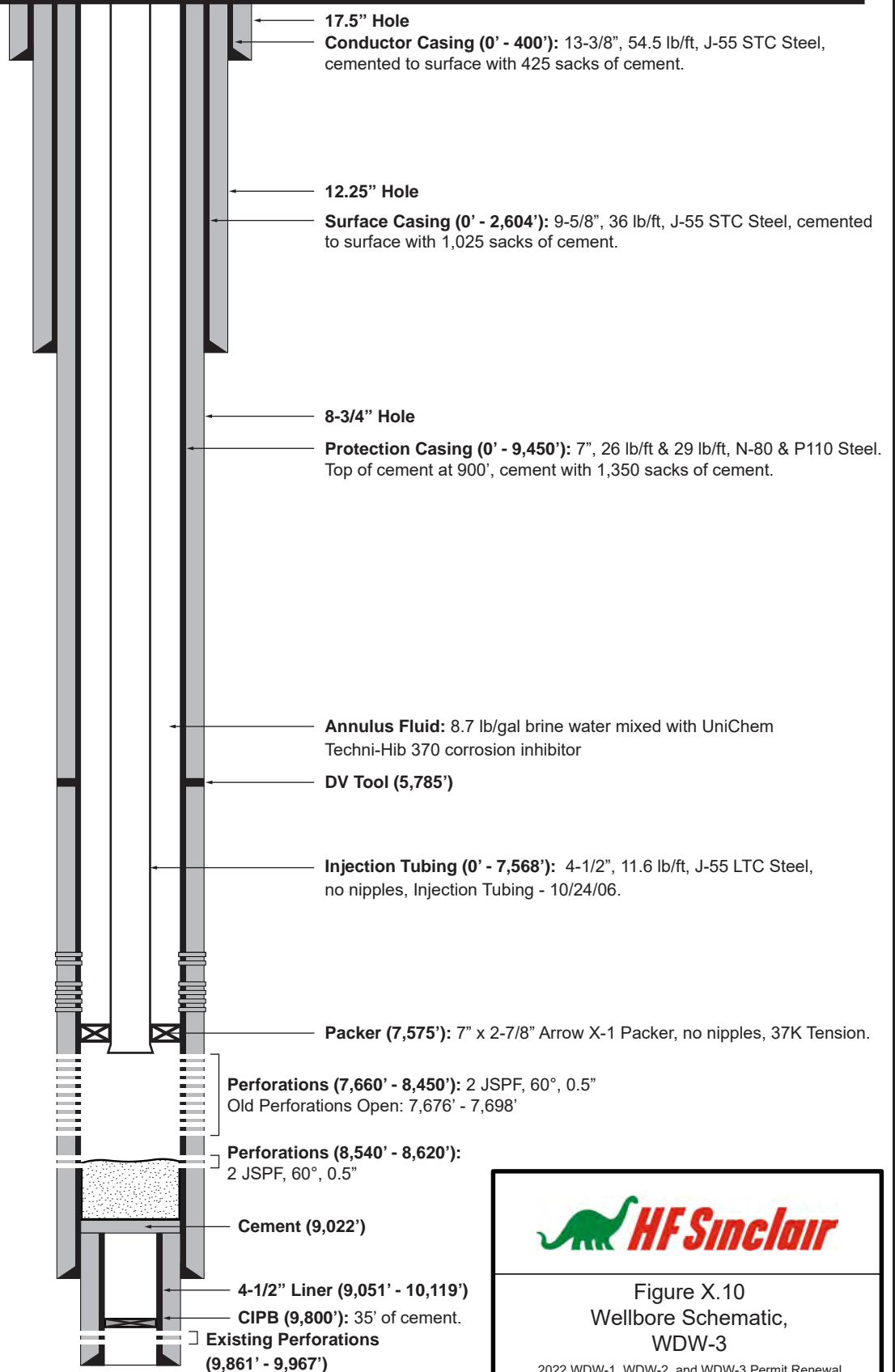
2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.08_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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OCD UIC Permit: UICI-008-3
 Well API Number: 30-015-26575
 Eddy County, New Mexico
 Sec. 31, T18S-R27E
 Lat. 32.771186° / Long. -104.233306° (NAD 83)



Top of Fill:
 8,604' (Tagged 8/2021)
PBTD: 9,022'
TD: 10,119'

Wellbore information from:
 Gaines Well #3 Navajo
 Refining schematic by
 Subsurface Technology, 2009.

NOT TO SCALE





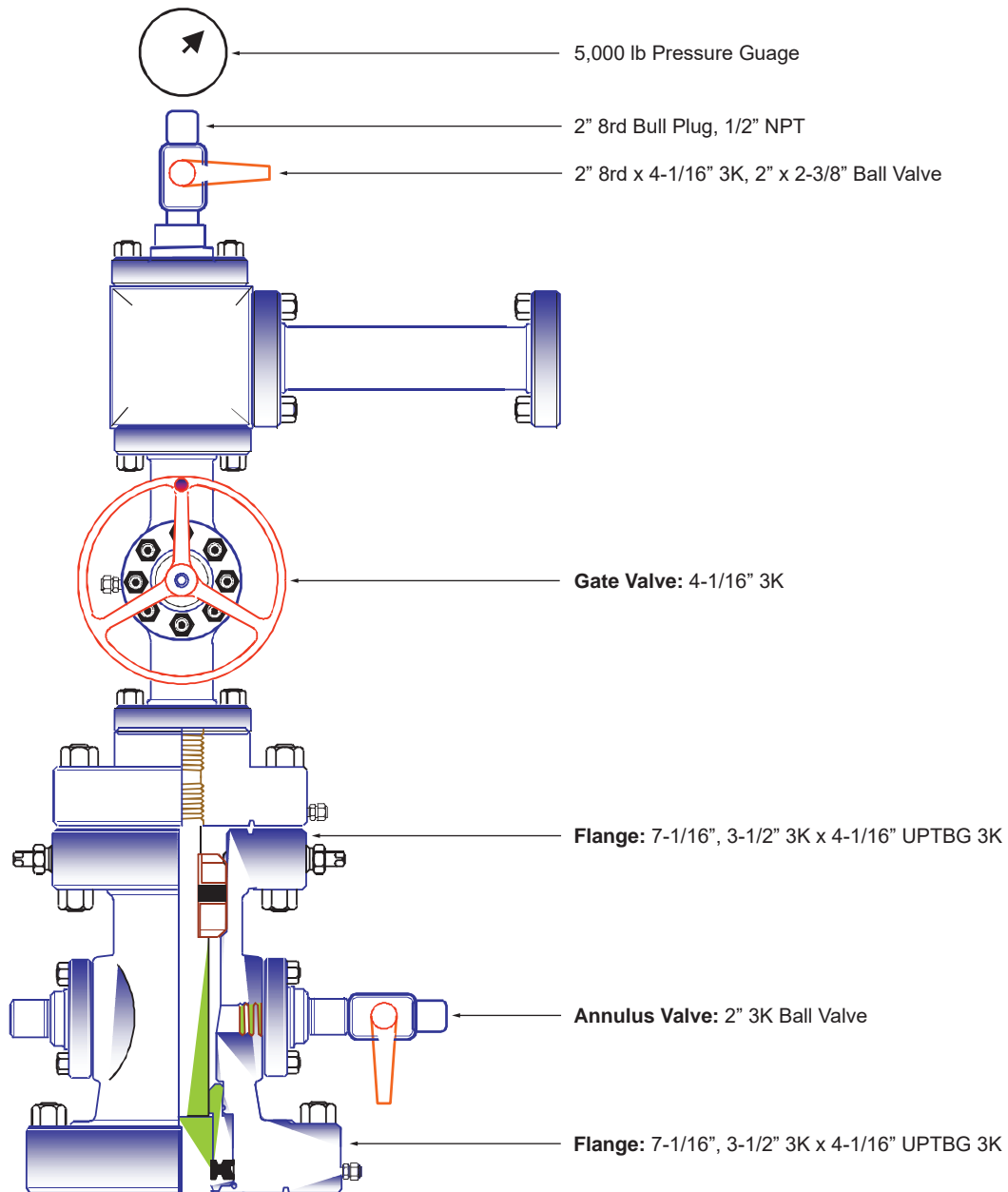
Figure X.10
Wellbore Schematic,
WDW-3

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.10_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB



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Well Head information partially
 from: Figure 5, Mewbourne Well
 No. 1 Wellhead Schematic by
 Superior Wellhead.

NOT TO SCALE



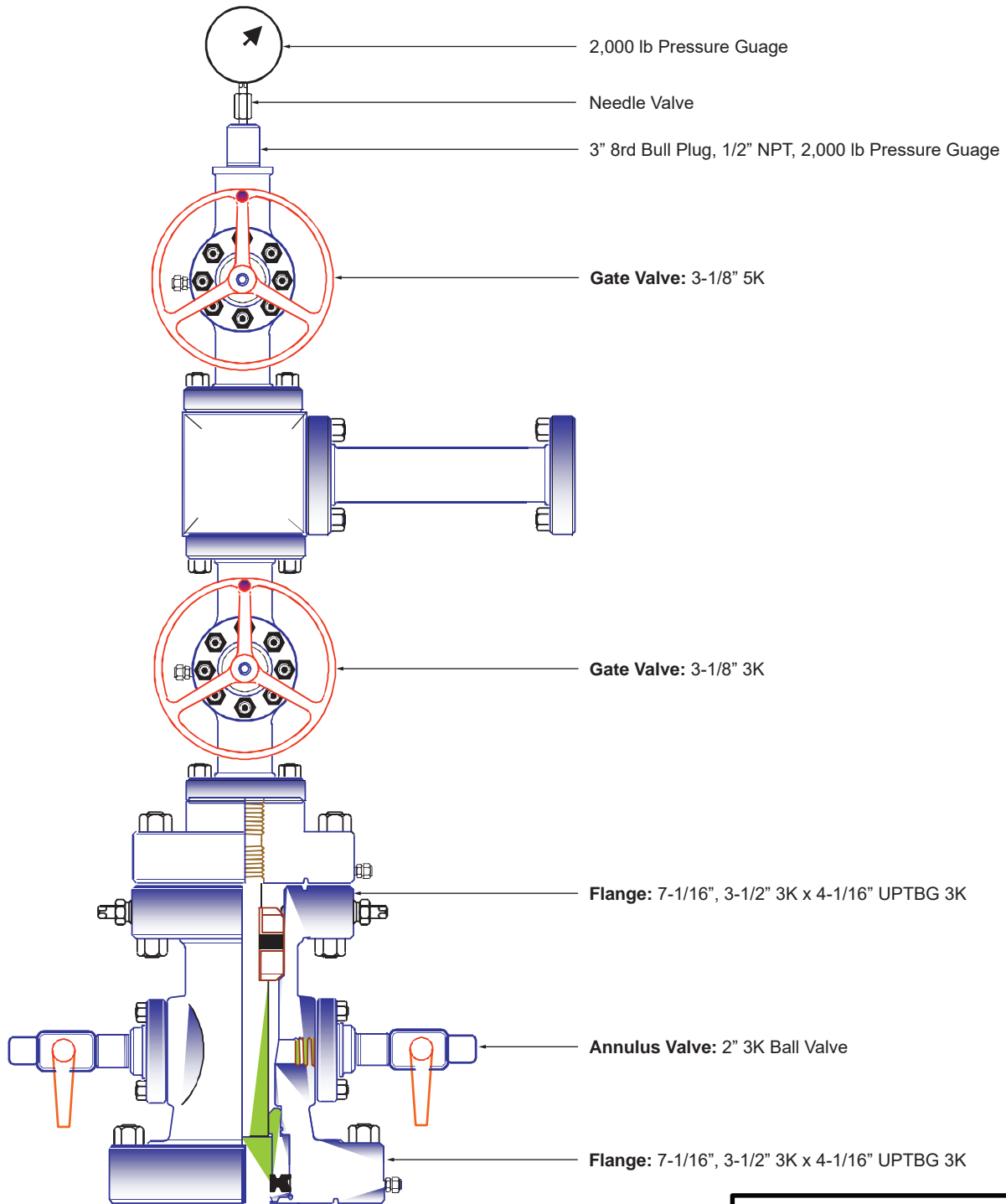
Figure X.11
 Wellhead Schematic,
 WDW-1

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.11_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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OCD UIC Permit: UICI-008-2
Well API Number: 30-015-20894
Eddy County, New Mexico
Sec. 31, T17S-R27E
Lat. 32.763772° / Long. -104.238508° (NAD 83)



Well Head information partially
from: Well: Navajo Refining
WDW #2, by Subsurface Technology

NOT TO SCALE



Figure X.12
Wellhead Schematic,
WDW-2

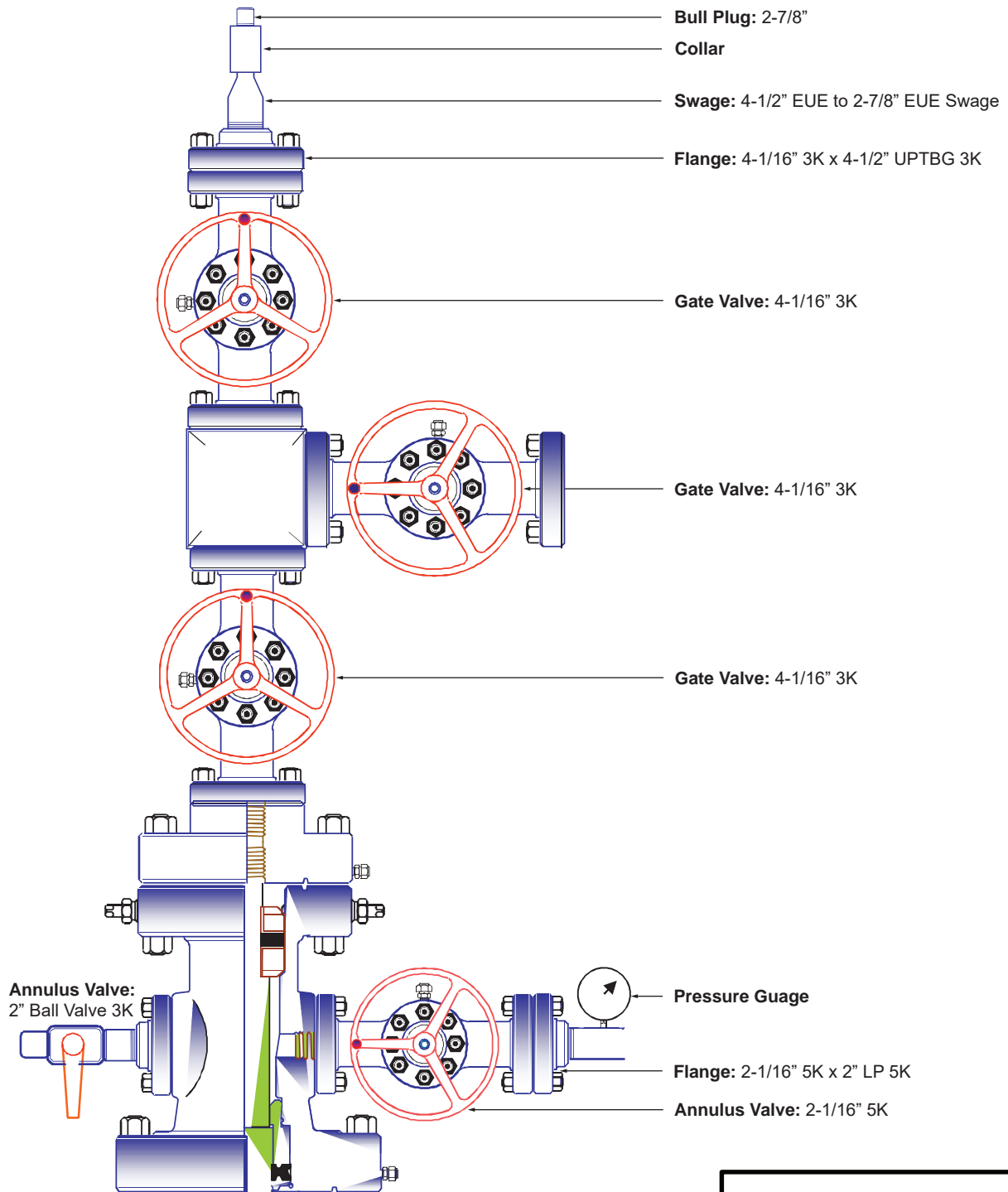
2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.12_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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OCD UIC Permit: UICI-008-3
Well API Number: 30-015-26575
Eddy County, New Mexico
Sec. 31, T17S-R27E
Lat. 32.771186° / Long. -104.233306° (NAD 83)



Well Head information partially
from: Well: Navajo Refining
WDW #3, by Subsurface Technology.

NOT TO SCALE



Figure X.13
Wellhead Schematic,
WDW-3

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.13_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

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Tables

TABLE X.1
Wells within the AOR, Drilled or P&A Since 2017

Map ID	API	Operator Name	Well Name	Type Code	Type	Status	Surface Location	Latitude	Longitude	Directional	Spud Date	MD	TVD	Pool ID	Plug Date
1	30-015-48888	Redwood Operating LLC	CHOATE DAVIS 13 STATE SWD #003	I	Injection	New	D-13-18S-27E	32.752855	-104.2387836	V	2/24/2022	0	0	[96186] SWD, CISCO-CANYON	12/31/9999
2	30-015-49018	Spur Energy Partners LLC	WAUKEE 36 STATE COM #011H	O	Oil	New	L-31-17S-28E	32.789612	-104.2238682	H	11/22/2021	0	0	[96836] RED LAKE, GLORIETA-YESO, NORTHEAST	12/31/9999
3	30-015-49019	Spur Energy Partners LLC	WAUKEE 36 STATE COM #051H	O	Oil	New	L-31-17S-28E	32.789399	-104.2211508	H	11/19/2021	0	0	[96836] RED LAKE, GLORIETA-YESO, NORTHEAST	12/31/9999
4	30-015-49020	Spur Energy Partners LLC	WAUKEE 36 STATE COM #002H	O	Oil	New	M-31-17S-28E	32.786974	-104.2238533	H	11/15/2021	0	0	[96836] RED LAKE, GLORIETA-YESO, NORTHEAST	12/31/9999
5	30-015-49026	Spur Energy Partners LLC	WAUKEE 36 STATE COM #010H	O	Oil	New	M-31-17S-28E	32.785374	-104.2210957	H	11/11/2021	0	0	[96836] RED LAKE, GLORIETA-YESO, NORTHEAST	12/31/9999
6	30-015-00706	APACHE CORPORATION	EMPIRE ABO UNIT #018A	O	Oil	Plugged (site release d)	F-01-18S-27E	32.776966	-104.2342606	V	4/24/1959	6087	6087	[22040] EMPIRE, ABO	9/20/2019
7	30-015-00707	APACHE CORPORATION	EMPIRE ABO UNIT #018B	O	Oil	Plugged (site release d)	K-01-18S-27E	32.774498	-104.2342148	V	4/23/1959	6163	6163	[22040] EMPIRE, ABO	6/7/2017
8	30-015-00724	APACHE CORPORATION	EMPIRE ABO UNIT #016B	O	Oil	Plugged (not release d)	A-02-18S-27E	32.780659	-104.2418365	V	8/1/1959	5920	5920	[22040] EMPIRE, ABO	2/3/2021
9	30-015-01215	APACHE CORPORATION	EMPIRE ABO UNIT #020D	O	Oil	Plugged (site release d)	A-01-18S-27E	32.781395	-104.2257233	V	11/7/1959	6118	6118	[22040] EMPIRE, ABO	5/19/2017
10	30-015-01659	APACHE CORPORATION	EMPIRE ABO UNIT #026A	O	Oil	Plugged (not release d)	N-32-17S-28E	32.7854	-104.1998062	V	1/26/1960	6172	6172	[22040] EMPIRE, ABO	3/8/2021
11	30-015-01661	APACHE CORPORATION	EMPIRE ABO UNIT #026B	O	Oil	Plugged (site release d)	K-32-17S-28E	32.788139	-104.1987686	V	3/13/1960	6083	6083	[22040] EMPIRE, ABO	3/12/2021
12	30-015-02606	APACHE CORPORATION	EMPIRE ABO UNIT #026E	O	Oil	Plugged (not release d)	C-05-18S-28E	32.782677	-104.1999054	V	7/6/1960	6254	6254	[22040] EMPIRE, ABO	1/15/2021

TABLE X.1
Wells within the AOR, Drilled or P&A Since 2017

Map ID	API	Operator Name	Well Name	Type Code	Type	Status	Surface Location	Latitude	Longitude	Directional	Spud Date	MD	TVD	Pool ID	Plug Date
13	30-015-02625	APACHE CORPORATION	EMPIRE ABO UNIT #023C	O	Oil	Plugged (not release d)	B-06-18S-28E	32.782078	-104.2132797	V	10/12/1959	6194	6194	[22040] EMPIRE, ABO	3/26/2021
14	30-015-05934	APACHE CORPORATION	EMPIRE ABO UNIT #019A	O	Oil	Plugged (not release d)	J-36-17S-27E	32.7878	-104.2289505	V	2/11/1964	5970	5970	[22040] EMPIRE, ABO	6/8/2021
15	30-015-21539	APACHE CORPORATION	EMPIRE ABO UNIT #261	O	Oil	Plugged (not release d)	N-32-17S-28E	32.783966	-104.2016678	V	6/24/1975	6220	6220	[22040] EMPIRE, ABO	5/31/2017
16	30-015-21783	APACHE CORPORATION	EMPIRE ABO UNIT #202	O	Oil	Plugged (site release d)	H-01-18S-27E	32.776405	-104.2277832	V	4/17/1976	6296	6296	[22040] EMPIRE, ABO	6/9/2017
17	30-015-21792	APACHE CORPORATION	EMPIRE ABO UNIT #182	O	Oil	Plugged (site release d)	K-01-18S-27E	32.773254	-104.2329254	V	5/6/1976	6369	6369	[22040] EMPIRE, ABO	4/14/2021
18	30-015-21873	APACHE CORPORATION	EMPIRE ABO UNIT #191A	O	Oil	Plugged (site release d)	J-01-18S-27E	32.773178	-104.2283478	V	8/27/1976	6350	6350	[22040] EMPIRE, ABO	5/19/2017
19	30-015-22009	APACHE CORPORATION	EMPIRE ABO UNIT #272	O	Oil	Plugged (site release d)	O-32-17S-28E	32.784531	-104.1973724	V	2/8/1977	6370	6370	[22040] EMPIRE, ABO	5/4/2021
20	30-015-22096	APACHE CORPORATION	EMPIRE ABO UNIT #183	O	Oil	Plugged (not release d)	K-01-18S-27E	32.775589	-104.2357635	V	6/23/1977	6210	6210	[22040] EMPIRE, ABO	4/27/2021
21	30-015-22527	APACHE CORPORATION	EMPIRE ABO UNIT #223	O	Oil	Plugged (not release d)	F-06-18S-28E	32.776077	-104.2172775	V	4/22/1978	6250	6250	[22040] EMPIRE, ABO	7/23/2021
22	30-015-22560	APACHE CORPORATION	EMPIRE ABO UNIT #192	O	Oil	Plugged (not release d)	J-01-18S-27E	32.77451	-104.22807	V	5/30/1978	6250	6250	[22040] EMPIRE, ABO	4/22/2021
23	30-015-22657	APACHE CORPORATION	EMPIRE ABO UNIT #193	O	Oil	Plugged (not release d)	J-01-18S-27E	32.775856	-104.2307205	V	9/29/1978	6225	6225	[22040] EMPIRE, ABO	4/29/2021
24	30-015-22658	APACHE CORPORATION	EMPIRE ABO UNIT #194	O	Oil	Plugged (not release d)	J-01-18S-27E	32.773132	-104.2304916	V	10/18/1978	6325	6325	[22040] EMPIRE, ABO	4/19/2021
25	30-015-22815	APACHE CORPORATION	EMPIRE ABO UNIT #171	O	Oil	Plugged (site release d)	M-01-18S-27E	32.770962	-104.2395248	V	5/22/1979	6300	6300	[22040] EMPIRE, ABO	10/24/2019
26	30-015-22833	APACHE CORPORATION	EMPIRE ABO UNIT #133B	O	Oil	Plugged (site release d)	D-11-18S-27E	32.767914	-104.2538376	V	5/23/1979	6225	6225	[22040] EMPIRE, ABO	6/22/2017

TABLE X.1
Wells within the AOR, Drilled or P&A Since 2017

Map ID	API	Operator Name	Well Name	Type Code	Type	Status	Surface Location	Latitude	Longitude	Directional	Spud Date	MD	TVD	Pool ID	Plug Date
27	30-015-22834	APACHE CORPORATION	EMPIRE ABO UNIT #141B	O	Oil	Plugged (site release d)	C-11-18S-27E	32.768524	-104.2502289	V	5/21/1979	6225	6225	[22040] EMPIRE, ABO	6/22/2017
28	30-015-31123	Contango Resources, Inc.	NO BLUFF 36 STATE COM #002	G	Gas	Plugged (site release d)	H-36-17S-27E	32.792305	-104.2260742	V	3/19/2001	10050	10050	[78890] ILLINOIS CAMP, MORROW, NORTH (GAS)	11/19/2020
29	30-015-32308	APACHE CORPORATION	AAO FEDERAL #002	O	Oil	Plugged (site release d)	C-01-18S-27E	32.782124	-104.2332687	V	8/20/2002	4150	4150	[51300] RED LAKE, QUEEN-GRAYBURG-SA; [96836] RED LAKE, GLORIETA-YESO, NORTHEAST	2/8/2018
30	30-015-32959	APACHE CORPORATION	AAO FEDERAL #005	O	Oil	Plugged (site release d)	E-01-18S-27E	32.778816	-104.2378845	V	11/4/2003	3900	3900	[51300] RED LAKE, QUEEN-GRAYBURG-SA; [96836] RED LAKE, GLORIETA-YESO, NORTHEAST	6/14/2017
31	30-015-39011	APACHE CORPORATION	EMPIRE ABO UNIT #419	O	Oil	Plugged (not release d)	O-31-17S-28E	32.786686	-104.2105637	V	10/11/2011	6310	6310	[22040] EMPIRE, ABO	2/13/2018
32	30-015-39020	APACHE CORPORATION	EMPIRE ABO UNIT #408	O	Oil	Plugged (site release d)	O-31-17S-28E	32.783733	-104.2145538	V	10/18/2011	6318	6318	[22040] EMPIRE, ABO	1/18/2017

TABLE X.4
Historical Injection Data (2017-2022)

Year	Month	WDW-1		WDW-2		WDW-3	
		Volume (bbls)	Pressure (psig)	Volume (bbls)	Pressure (psig)	Volume (bbls)	Pressure (psig)
2017	Jan	138,103	1,390	140,606	1,383	160,594	1,344
2017	Feb	115,543	1,318	96,034	1,313	136,114	1,301
2017	Mar	144,377	1,272	95,486	1,267	135,669	1,246
2017	Apr	128,571	1,045	103,886	1,383	150,180	1,344
2017	May	142,980	1,046	120,094	1,313	168,981	1,301
2017	Jun	138,857	983	106,980	1,267	137,820	1,246
2017	Jul	157,175	1,391	131,486	1,375	164,711	1,316
2017	Aug	181,429	1,360	129,371	1,318	182,527	1,281
2017	Sep	150,926	1,394	117,977	1,359	161,554	1,323
2017	Oct	151,032	1,269	110,670	1,255	158,844	1,236
2017	Nov	148,680	1,299	126,000	1,294	168,840	1,259
2017	Dec	163,968	1,302	135,744	1,304	174,300	1,258
2018	Jan	174,384	1,361	149,016	1,389	198,282	1,340
2018	Feb	184,320	1,305	108,000	1,312	191,520	1,282
2018	Mar	181,440	1,183	69,120	1,263	191,771	2,001
2018	Apr	273,463	1,215	62,880	1,221	105,086	1,210
2018	May	273,888	1,224	110,880	1,260	155,520	1,255
2018	Jun	443,520	1,342	146,880	1,359	180,000	1,302
2018	Jul	263,593	1,378	107,349	1,349	143,486	1,338
2018	Aug	234,887	1,304	138,222	1,305	167,040	1,258
2018	Sep	195,420	1,224	112,308	1,211	148,320	1,195
2018	Oct	223,200	1,291	94,594	1,276	132,857	1,251
2018	Nov	258,171	1,237	78,171	1,240	118,286	1,230
2018	Dec	256,149	1,240	75,463	1,225	111,600	1,217
2019	Jan	188,160	1,270	61,440	1,252	66,240	1,116
2019	Feb	188,160	1,270	61,440	1,252	66,240	1,116
2019	Mar	132,857	1,184	53,143	1,157	59,520	1,064
2019	Apr	138,857	1,240	48,343	1,140	52,457	1,047
2019	May	148,800	1,283	62,709	1,215	64,834	1,064
2019	Jun	134,743	1,223	62,743	1,247	55,543	1,031
2019	Jul	139,234	1,219	60,583	1,224	73,337	1,045
2019	Aug	129,669	1,098	54,206	1,160	81,840	1,062
2019	Sep	126,514	1,133	48,343	1,137	51,429	993
2019	Oct	125,417	1,117	46,766	1,142	69,086	1,033
2019	Nov	134,743	1,246	45,257	1,227	49,371	1,062
2019	Dec	123,291	1,117	38,263	1,207	53,143	1,097
2020	Jan	136,046	1,182	35,074	1,189	45,703	1,107
2020	Feb	126,274	1,164	52,697	1,185	39,771	1,075
2020	Mar	125,417	1,082	51,017	1,119	71,211	1,051
2020	Apr	137,829	1,205	53,486	1,109	67,886	1,014
2020	May	179,623	1,094	49,954	1,049	61,646	982
2020	Jun	161,486	1,099	56,571	1,064	59,657	979
2020	Jul	130,731	1,025	62,709	1,069	80,777	971
2020	Aug	139,234	1,031	66,960	1,056	90,343	940
2020	Sep	142,971	1,092	65,829	1,037	100,800	987
2020	Oct	151,989	1,008	71,211	1,040	89,280	983
2020	Nov	227,314	917	72,000	1,063	83,314	983
2020	Dec	235,954	1,096	70,149	1,037	62,709	929
2021	Jan	252,960	1,045	74,400	1,052	65,897	928
2021	Feb	217,920	1,049	69,120	1,093	92,160	934
2021	Mar	193,440	1,065	83,966	1,022	94,594	916
2021	Apr	273,600	936	98,743	1,077	121,371	929
2021	May	323,108	958	94,594	1,017	137,109	954
2021	Jun	292,114	1,031	92,571	1,034	135,771	924
2021	Jul	278,469	1,120	89,280	974	147,737	942
2021	Aug	292,286	1,129	90,343	1,010	148,800	960
2021	Sep	280,800	980	89,486	1,037	135,771	948
2021	Oct	242,331	993	81,840	987	120,103	894
2021	Nov	213,943	1,111	84,343	1,034	120,105	943
2021	Dec	230,640	1,126	95,657	993	99,909	868
2022	Jan	205,131	917	129,699	907	73,337	786

		WDW-1		WDW-2		WDW-3	
Year	Month	Volume (bbls)	Pressure (psig)	Volume (bbls)	Pressure (psig)	Volume (bbls)	Pressure (psig)
2022	Feb	192,000	858	77,760	814	67,200	760
2022	Mar	251,897	1,159	108,411	1,010	103,097	881
2022	Apr	256,114	1,114	229,371	1,000	97,714	881

TABLE X.7
Formation Fluid Sample Analysis Results

Chemical	WDW-1	WDW-2	WDW-3	Average
Date	7/31/1998	6/14/1999	9/8/2006	
Fluoride (mg/L)	2.6	9.7	ND	6.15
Chloride (mg/L)	19,000	15,000	10,447	14,816
NO3-N (mg/L)	<10	<10	--	<10
SO4 (mg/L)	2.20E+03	2,000	1,908	2,036
CaCO3 (mg/L)	1,000	1,210	--	1,105
Specific Gravity (unitless)	1.03	1.0249	--	1.0295
TDS (mg/L)	33,000	20,000	--	26,500
Specific Conductance (uMHOs/cm)	52000	43,000	--	47,500
Potassium (mg/L)	213	235	85.5	177.8
Magnesium (mg/L)	143.00	128	155	142
Calcium (mg/L)	390	609	393	464
Sodium (mg/L)	12770	8074	6080	8975
pH	8	7	--	8

Note: ND: Non-detect; -- indicates no analysis.

TABLE X.8
Calculated Pressure Rise vs. Distance

		WDW-1, WDW-2, WDW-3	
Based on Equations 1.7 and 1.9 (Lee, 1982; p. 3-5)		Injection Rate (bpd)=	27,429
$dp = -70.6(qBu/kh) * [Ei(-948*por*u*ct*rw^2/kt)]$		Injection Days=	1,826
Where Ei = Exponential Integral			
Solution Ignores Skin Factor			
Where:			
Term	Description	Value	Units
dp =	pressure differential	Solve	psi
q =	flowrate (STB/d)	27,429	bbl/d
B =	formation volume factor (RB/STB)	1.00	RB/STB
u =	viscosity (cp)	0.610	cp
k =	permeability (md)	251.0	md
h =	reservoir thickness (feet)	85	feet
por =	formation effective porosity (percent)	0.1	--
ct =	total matrix and fluid compressibility (1/psi)	1.10E-05	1/psi
rw =	wellbore radius (feet)	Variable	feet
t =	injection time (hours)	43,830	hours
s =	skin factor (units)	0	
	Term 1	70.6(qBu/kh)	
	Term 2	(-948*por*u*ct*rw^2/kt)	

$$dp = \text{Term 1} * \text{Term 2}$$

Radius (ft)	Term 1	Term 2	Ei(Term 2)	dp (psi)
1	55.366	-5.76E-11	23.000	1,273
13	55.366	-9.74E-09	17.870	989
20	55.366	-2.30E-08	17.009	942
30	55.366	-5.18E-08	16.198	897
50	55.366	-1.44E-07	15.176	840
60	55.366	-2.07E-07	14.811	820
80	55.366	-3.69E-07	14.236	788
100	55.366	-5.76E-07	13.790	763
112	55.366	-7.23E-07	13.563	751
140	55.366	-1.13E-06	13.117	726
160	55.366	-1.47E-06	12.850	711
180	55.366	-1.87E-06	12.614	698
200	55.366	-2.30E-06	12.403	687
225	55.366	-2.92E-06	12.168	674
250	55.366	-3.60E-06	11.957	662
300	55.366	-5.18E-06	11.593	642
350	55.366	-7.06E-06	11.284	625
400	55.366	-9.22E-06	11.017	610
450	55.366	-1.17E-05	10.782	597
500	55.366	-1.44E-05	10.571	585
550	55.366	-1.74E-05	10.380	575
600	55.366	-2.07E-05	10.206	565
700	55.366	-2.82E-05	9.898	548
800	55.366	-3.69E-05	9.631	533
1000	55.366	-5.76E-05	9.185	509
1200	55.366	-8.30E-05	8.820	488
1600	55.366	-1.47E-04	8.245	456
2640	55.366	-4.02E-04	7.243	401
3200	55.366	-5.90E-04	6.859	380
4600	55.366	-1.22E-03	6.134	340
5280	55.366	-1.61E-03	5.858	324
6000	55.366	-2.07E-03	5.603	310
7000	55.366	-2.82E-03	5.296	293
8000	55.366	-3.69E-03	5.029	278
9000	55.366	-4.67E-03	4.795	265
10560	55.366	-6.42E-03	4.477	248

Appendix V.1 - Injection Fluid Analysis



*Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com*

January 20, 2022

Randy Dade

Navajo Refining Company

P.O. Box 159

Artesia, NM 88211-0159

TEL: (575) 748-3311

FAX

RE: Quarterly WDW 1 2 3 4 Inj Well

OrderNo.: 2112C79

Dear Randy Dade:

Hall Environmental Analysis Laboratory received 2 sample(s) on 12/22/2021 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

Case Narrative

WO#: 2112C79
Date: 1/20/2022

CLIENT: Navajo Refining Company

Project: Quarterly WDW 1 2 3 4 Inj Well

Analytical Notes Regarding EPA Method 8270:

Pyridine is reported with an "E" flag. The "E" flag is used to represent an estimated value. Pyridine was not detected in the sample, but the calibration curve for this compound did not meet the method requirements.

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 2112C79

Date Reported: 1/20/2022

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,3 & 4 Effluent

Project: Quarterly WDW 1 2 3 4 Inj Well

Collection Date: 12/21/2021 10:15:00 AM

Lab ID: 2112C79-001

Matrix: AQUEOUS

Received Date: 12/22/2021 7:25:00 AM

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8081: PESTICIDES TCLP								
							Analyst: LSB	
Chlordane	ND	0.0012	0.075		mg/L	1	1/11/2022 7:03:42 PM	64757
Surr: Decachlorobiphenyl	73.2	0	73-119		%Rec	1	1/11/2022 7:03:42 PM	64757
Surr: Tetrachloro-m-xylene	60.2	0	36.6-84.1		%Rec	1	1/11/2022 7:03:42 PM	64757
EPA METHOD 300.0: ANIONS								
							Analyst: MRA	
Fluoride	57	0.80	2.0	*	mg/L	20	12/22/2021 3:16:42 PM	R84756
Chloride	800	25	50	*	mg/L	100	1/8/2022 2:29:50 PM	R85040
Nitrogen, Nitrite (As N)	ND	0.027	0.50		mg/L	5	12/22/2021 3:04:18 PM	R84756
Bromide	0.80	0.25	0.50		mg/L	5	12/22/2021 3:04:18 PM	R84756
Nitrogen, Nitrate (As N)	0.45	0.050	0.50	J	mg/L	5	12/22/2021 3:04:18 PM	R84756
Phosphorus, Orthophosphate (As P)	ND	1.2	2.5		mg/L	5	12/22/2021 3:04:18 PM	R84756
Sulfate	1800	25	50	*	mg/L	100	1/8/2022 2:29:50 PM	R85040
EPA METHOD 7470A: MERCURY								
							Analyst: VP	
Mercury	ND	0.20	0.0010		mg/L	5	12/27/2021 5:00:11 PM	64706
EPA METHOD 6010B: DISSOLVED METALS								
							Analyst: JLF	
Calcium	340	0.29	5.0		mg/L	5	12/22/2021 8:17:59 PM	A84757
Magnesium	110	0.17	5.0		mg/L	5	12/22/2021 8:17:59 PM	A84757
Potassium	140	1.0	5.0		mg/L	5	12/22/2021 8:17:59 PM	A84757
Sodium	850	21	50		mg/L	50	12/22/2021 8:20:16 PM	A84757
EPA 6010B: TOTAL RECOVERABLE METALS								
							Analyst: JLF	
Arsenic	ND	0.22	5.0		mg/L	10	1/4/2022 5:19:46 PM	64703
Barium	0.041	0.011	100	J	mg/L	10	1/4/2022 4:12:19 PM	64703
Cadmium	ND	0.012	1.0		mg/L	10	1/4/2022 7:10:30 PM	64703
Chromium	ND	0.017	5.0		mg/L	10	1/4/2022 4:12:19 PM	64703
Lead	0.19	0.13	5.0	J	mg/L	10	1/18/2022 7:46:25 AM	64703
Selenium	ND	0.25	1.0		mg/L	10	1/4/2022 7:10:30 PM	64703
Silver	0.015	0.013	5.0	J	mg/L	10	1/4/2022 4:12:19 PM	64703
EPA METHOD 8270C TCLP								
							Analyst: JME	
2-Methylphenol	0.016	0.0010	200	JD	mg/L	2	1/5/2022 4:05:58 AM	64755
3+4-Methylphenol	0.026	0.00090	200	JD	mg/L	2	1/5/2022 4:05:58 AM	64755
2,4-Dinitrotoluene	ND	0.0012	0.13	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Hexachlorobenzene	ND	0.0013	0.13	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Hexachlorobutadiene	ND	0.0016	0.50	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Hexachloroethane	ND	0.00090	3.0	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Nitrobenzene	ND	0.0010	2.0	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Pentachlorophenol	ND	0.0012	100	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Pyridine	ND	0.0019	40	ED	mg/L	2	1/5/2022 4:05:58 AM	64755
2,4,5-Trichlorophenol	ND	0.0012	400	D	mg/L	2	1/5/2022 4:05:58 AM	64755

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix interference

B	Analyte detected in the associated Method Blank
E	Estimated value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 2112C79

Date Reported: 1/20/2022

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,3 & 4 Effluent

Project: Quarterly WDW 1 2 3 4 Inj Well

Collection Date: 12/21/2021 10:15:00 AM

Lab ID: 2112C79-001

Matrix: AQUEOUS

Received Date: 12/22/2021 7:25:00 AM

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8270C TCLP								
							Analyst: JME	
2,4,6-Trichlorophenol	ND	0.00087	2.0	D	mg/L	2	1/5/2022 4:05:58 AM	64755
Cresols, Total	0.042	0.0010	200	JD	mg/L	2	1/5/2022 4:05:58 AM	64755
Surr: 2-Fluorophenol	0.497	0	15-118	SD	%Rec	2	1/5/2022 4:05:58 AM	64755
Surr: Phenol-d5	11.8	0	15-92.9	SD	%Rec	2	1/5/2022 4:05:58 AM	64755
Surr: 2,4,6-Tribromophenol	1.36	0	15-150	SD	%Rec	2	1/5/2022 4:05:58 AM	64755
Surr: Nitrobenzene-d5	71.4	0	15-136	D	%Rec	2	1/5/2022 4:05:58 AM	64755
Surr: 2-Fluorobiphenyl	69.9	0	15-134	D	%Rec	2	1/5/2022 4:05:58 AM	64755
Surr: 4-Terphenyl-d14	110	0	15-168	D	%Rec	2	1/5/2022 4:05:58 AM	64755
TCLP VOLATILES BY 8260B								
							Analyst: RAA	
Benzene	0.27	0.00023	0.50	J	mg/L	200	12/27/2021 9:36:53 PM	T84811
1,2-Dichloroethane (EDC)	ND	0.00025	0.50		mg/L	200	12/27/2021 9:36:53 PM	T84811
2-Butanone	ND	0.0020	200		mg/L	200	12/27/2021 9:36:53 PM	T84811
Carbon Tetrachloride	ND	0.00018	0.50		mg/L	200	12/27/2021 9:36:53 PM	T84811
Chloroform	ND	0.00013	6.0		mg/L	200	12/27/2021 9:36:53 PM	T84811
1,4-Dichlorobenzene	ND	0.00021	7.5		mg/L	200	12/27/2021 9:36:53 PM	T84811
1,1-Dichloroethene	ND	0.00020	0.70		mg/L	200	12/27/2021 9:36:53 PM	T84811
Tetrachloroethene (PCE)	ND	0.00036	0.70		mg/L	200	12/27/2021 9:36:53 PM	T84811
Trichloroethene (TCE)	ND	0.00020	0.50		mg/L	200	12/27/2021 9:36:53 PM	T84811
Vinyl chloride	ND	0.00032	0.20		mg/L	200	12/27/2021 9:36:53 PM	T84811
Chlorobenzene	0.069	0.00016	100	J	mg/L	200	12/27/2021 9:36:53 PM	T84811
Surr: 1,2-Dichloroethane-d4	107	0	70-130		%Rec	200	12/27/2021 9:36:53 PM	T84811
Surr: 4-Bromofluorobenzene	98.7	0	70-130		%Rec	200	12/27/2021 9:36:53 PM	T84811
Surr: Dibromofluoromethane	110	0	70-130		%Rec	200	12/27/2021 9:36:53 PM	T84811
Surr: Toluene-d8	91.3	0	70-130		%Rec	200	12/27/2021 9:36:53 PM	T84811
SM2510B: SPECIFIC CONDUCTANCE								
							Analyst: JRR	
Conductivity	7400	10	10		µmhos/c	1	12/27/2021 1:08:18 PM	R84794
SM2320B: ALKALINITY								
							Analyst: JRR	
Bicarbonate (As CaCO3)	826.6	20.00	20.00		mg/L Ca	1	12/27/2021 1:08:18 PM	R84794
Carbonate (As CaCO3)	ND	2.000	2.000		mg/L Ca	1	12/27/2021 1:08:18 PM	R84794
Total Alkalinity (as CaCO3)	826.6	20.00	20.00		mg/L Ca	1	12/27/2021 1:08:18 PM	R84794
SPECIFIC GRAVITY								
							Analyst: JRR	
Specific Gravity	1.002	0	0			1	1/7/2022 12:54:00 PM	R85017
SM2540C MOD: TOTAL DISSOLVED SOLIDS								
							Analyst: CJS	
Total Dissolved Solids	5340	100	100	*D	mg/L	1	12/30/2021 10:03:00 A	64762

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 2112C79

Date Reported: 1/20/2022

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW 1 2 3 4 Inj Well

Collection Date:

Lab ID: 2112C79-002

Matrix: TRIP BLANK

Received Date: 12/22/2021 7:25:00 AM

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed	Batch ID
TCLP VOLATILES BY 8260B							Analyst: RAA	
Benzene	ND	0.00023	0.50		mg/L	1	12/27/2021 10:03:52 P	T84811
1,2-Dichloroethane (EDC)	ND	0.00025	0.50		mg/L	1	12/27/2021 10:03:52 P	T84811
2-Butanone	ND	0.0020	200		mg/L	1	12/27/2021 10:03:52 P	T84811
Carbon Tetrachloride	ND	0.00018	0.50		mg/L	1	12/27/2021 10:03:52 P	T84811
Chloroform	ND	0.00013	6.0		mg/L	1	12/27/2021 10:03:52 P	T84811
1,4-Dichlorobenzene	ND	0.00021	7.5		mg/L	1	12/27/2021 10:03:52 P	T84811
1,1-Dichloroethene	ND	0.00020	0.70		mg/L	1	12/27/2021 10:03:52 P	T84811
Tetrachloroethene (PCE)	ND	0.00036	0.70		mg/L	1	12/27/2021 10:03:52 P	T84811
Trichloroethene (TCE)	ND	0.00020	0.50		mg/L	1	12/27/2021 10:03:52 P	T84811
Vinyl chloride	ND	0.00032	0.20		mg/L	1	12/27/2021 10:03:52 P	T84811
Chlorobenzene	ND	0.00016	100		mg/L	1	12/27/2021 10:03:52 P	T84811
Surr: 1,2-Dichloroethane-d4	105	0	70-130		%Rec	1	12/27/2021 10:03:52 P	T84811
Surr: 4-Bromofluorobenzene	93.3	0	70-130		%Rec	1	12/27/2021 10:03:52 P	T84811
Surr: Dibromofluoromethane	105	0	70-130		%Rec	1	12/27/2021 10:03:52 P	T84811
Surr: Toluene-d8	102	0	70-130		%Rec	1	12/27/2021 10:03:52 P	T84811

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Hall Environmental Analysis Laboratory

Sample Delivery Group: L1445523

Samples Received: 12/23/2021

Project Number:

Description:

Report To: Andy Freeman
4901 Hawkins NE
Albuquerque, NM 87109

Entire Report Reviewed By:



John Hawkins
Project Manager

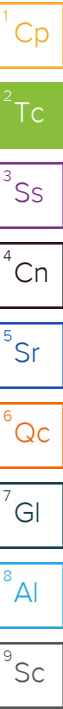
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Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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SAMPLE SUMMARY

2112C79-001F WDW-1,2,3 & 4 EFFLUENT L1445523-01 GW

Collected by

Collected date/time

Received date/time

12/21/21 10:15

12/23/21 09:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 2580	WG1794960	1	01/02/22 08:47	01/02/22 08:47	ARD	Mt. Juliet, TN
Wet Chemistry by Method 4500 CN E-2016	WG1794923	10	12/26/21 22:40	12/28/21 14:51	KEG	Mt. Juliet, TN
Wet Chemistry by Method 4500 S2 D-2011	WG1797616	1	01/03/22 21:51	01/03/22 21:51	BMD	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1795243	1	12/27/21 16:31	12/27/21 16:31	SCM	Mt. Juliet, TN
Wet Chemistry by Method D93/1010A	WG1794911	1	12/27/21 00:35	12/27/21 00:35	WOS	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

ACCOUNT:

Hall Environmental Analysis Laboratory

PROJECT:

SDG:

L1445523

DATE/TIME:

01/04/22 12:21

PAGE:

3 of 13

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

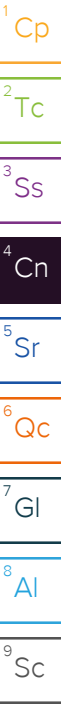


John Hawkins
Project Manager

Project Narrative

All Reactive Cyanide results reported in the attached report were determined as totals using method 4500 CN E-2016.

All Reactive Sulfide results reported in the attached report were determined as totals using method 4500 S2 D-2011.



Wet Chemistry by Method 2580

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
ORP	-10.4	T8	1	01/02/2022 08:47	WG1794960

¹ Cp² Tc

Wet Chemistry by Method 4500 CN E-2016

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Reactive Cyanide	ND		0.0500	10	12/28/2021 14:51	WG1794923

³ Ss⁴ Cn

Wet Chemistry by Method 4500 S2 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Reactive Sulfide	0.334	T8	0.0500	1	01/03/2022 21:51	WG1797616

⁵ Sr⁶ Qc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Corrosivity by pH	7.39	T8	1	12/27/2021 16:31	WG1795243

⁷ Gl⁸ Al

Sample Narrative:

L1445523-01 WG1795243: 7.39 at 20.1C

⁹ Sc

Wet Chemistry by Method D93/1010A

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Flashpoint	DNF at 170		1	12/27/2021 00:35	WG1794911

L1445523-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1445523-01 01/02/22 08:47 • (DUP) R3746662-3 01/02/22 08:47

Analyte	Original Result mV	DUP Result mV	Dilution	DUP Diff mV	<u>DUP Qualifier</u>	DUP Diff Limits mV
ORP	-10.4	-11.2	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3746662-1 01/02/22 08:47 • (LCSD) R3746662-2 01/02/22 08:47

Analyte	Spike Amount mV	LCS Result mV	LCSD Result mV	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	Diff mV	Diff Limits mV
ORP	108	108	110	99.9	102	86.0-105			2.40	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3745581-1 12/28/21 14:30

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Cyanide	U		0.00180	0.00500

L1445069-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1445069-02 12/28/21 14:42 • (DUP) R3745581-5 12/28/21 14:43

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Reactive Cyanide	ND	ND	1	0.000		20

L1445536-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1445536-01 12/28/21 14:55 • (DUP) R3745581-6 12/28/21 14:56

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Reactive Cyanide	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3745581-2 12/28/21 14:31

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Reactive Cyanide	0.100	0.0965	96.5	87.1-120	

L1445053-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1445053-03 12/28/21 14:36 • (MS) R3745581-3 12/28/21 14:37 • (MSD) R3745581-4 12/28/21 14:38

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Reactive Cyanide	0.100	0.00500	ND	0.103	0.000	98.0	1	90.0-110	J6	J3	200	20

L1445536-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1445536-02 12/28/21 14:57 • (MS) R3745581-7 12/28/21 14:58 • (MSD) R3745581-8 12/28/21 14:59

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Reactive Cyanide	0.100	ND	0.100	0.105	100	105	1	90.0-110			4.88	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3747054-1 01/03/22 21:06

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Reactive Sulfide	U		0.0250	0.0500

Laboratory Control Sample (LCS)

(LCS) R3747054-2 01/03/22 21:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Reactive Sulfide	0.500	0.545	109	85.0-115	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1445523-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1445523-01 12/27/21 16:31 • (DUP) R3745144-3 12/27/21 16:31

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	su	su		%		%
Corrosivity by pH	7.39	7.38	1	0.135		1

Sample Narrative:

OS: 7.39 at 20.1C

DUP: 7.38 at 19.9C

Laboratory Control Sample (LCS)

(LCS) R3745144-1 12/27/21 16:31

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	su	su	%	%	
Corrosivity by pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10.01 at 20C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1444846-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1444846-01 12/27/21 00:35 • (DUP) R3744823-3 12/27/21 00:35

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	deg F	deg F		%		%
Flashpoint	DNF at 170	DNF at 170	1	0.000		10

L1445523-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1445523-01 12/27/21 00:35 • (DUP) R3744823-4 12/27/21 00:35

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	deg F	deg F		%		%
Flashpoint	DNF at 170	DNF at 170	1	0.000		10

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3744823-1 12/27/21 00:35 • (LCSD) R3744823-2 12/27/21 00:35

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Analyte	deg F	deg F	deg F	%	%	%			%	%
Flashpoint	126	124	130	98.3	103	96.0-104			4.73	10

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

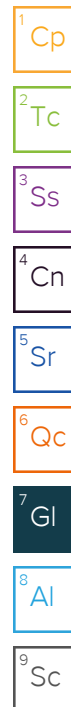
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



B208

SUB CONTRACTOR: Pace TN		COMPANY: PACE TN		PHONE: (800) 767-5859		FAX: (615) 758-5859	
ADDRESS: 12065 Lebanon Rd				ACCOUNT #:		EMAIL:	
CITY, STATE, ZIP: Mt. Juliet, TN 37122							

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2112C79-001F	WDW-1,2,3 & 4 Effluent	500HDPE	Aqueous	12/21/2021 10:15:00 AM	1	RCI, ORP -01
2	2112C79-001G	WDW-1,2,3 & 4 Effluent	500PLNAOH ZnAC	Aqueous	12/21/2021 10:15:00 AM	1	RCI, ORP -01
3	2112C79-001H	WDW-1,2,3 & 4 Effluent	500PL-NaOH	Aqueous	12/21/2021 10:15:00 AM	1	RCI, ORP -02

DKA7
5.3+0=5.3
55285948 0150

Sample Receipt Checklist
 COC Seal Present/Intact: ☒ Y ☐ N If Applicable
 COC Signed/Accurate: ☒ Y ☐ N VOA Zero Headspace: ☒ Y ☐ N
 Bottles arrive intact: ☒ Y ☐ N Pres. Correct/Check: ☒ Y ☐ N
 Correct bottles used: ☒ Y ☐ N
 Sufficient volume sent: ☒ Y ☐ N
 RAD Screen <0.5 mR/hr: ☒ Y ☐ N

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By: <u>SA</u>	Date: 12/22/2021	Time: 9:04 AM	Received By: <u>[Signature]</u>	Date: 12/23/21	Time: 9:50	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY Temp of samples _____ °C Attempt to Cool ? _____ Comments: _____	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:		
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>							

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB	SampType: mblk	TestCode: EPA Method 300.0: Anions								
Client ID: PBW	Batch ID: R84756	RunNo: 84756								
Prep Date:	Analysis Date: 12/22/2021	SeqNo: 2980681 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrogen, Nitrite (As N)	ND	0.10								
Bromide	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P)	ND	0.50								
Sulfate	ND	0.50								

Sample ID: LCS	SampType: lcs	TestCode: EPA Method 300.0: Anions								
Client ID: LCSW	Batch ID: R84756	RunNo: 84756								
Prep Date:	Analysis Date: 12/22/2021	SeqNo: 2980682 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.49	0.10	0.5000	0	97.8	90	110			
Chloride	4.9	0.50	5.000	0	98.2	90	110			
Nitrogen, Nitrite (As N)	0.99	0.10	1.000	0	99.5	90	110			
Bromide	2.5	0.10	2.500	0	101	90	110			
Nitrogen, Nitrate (As N)	2.6	0.10	2.500	0	104	90	110			
Phosphorus, Orthophosphate (As P)	4.9	0.50	5.000	0	97.0	90	110			
Sulfate	9.7	0.50	10.00	0	96.8	90	110			

Sample ID: MB	SampType: mblk	TestCode: EPA Method 300.0: Anions								
Client ID: PBW	Batch ID: R85040	RunNo: 85040								
Prep Date:	Analysis Date: 1/8/2022	SeqNo: 2991990 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								

Sample ID: LCS	SampType: lcs	TestCode: EPA Method 300.0: Anions								
Client ID: LCSW	Batch ID: R85040	RunNo: 85040								
Prep Date:	Analysis Date: 1/8/2022	SeqNo: 2991991 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	91.4	90	110			
Sulfate	9.1	0.50	10.00	0	90.6	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB-64757	SampType: MBLK		TestCode: EPA Method 8081: Pesticides TCLP							
Client ID: PBW	Batch ID: 64757		RunNo: 85069							
Prep Date: 12/28/2021	Analysis Date: 1/11/2022		SeqNo: 2993207		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chlordane	ND	0.030								
Surr: Decachlorobiphenyl	0.0022		0.002500		87.1	73	119			
Surr: Tetrachloro-m-xylene	0.0014		0.002500		56.3	36.6	84.1			

Sample ID: MB-64757	SampType: MBLK		TestCode: EPA Method 8081: Pesticides TCLP							
Client ID: PBW	Batch ID: 64757		RunNo: 85069							
Prep Date: 12/28/2021	Analysis Date: 1/11/2022		SeqNo: 2993208		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chlordane	ND	0.030								
Surr: Decachlorobiphenyl	0.0022		0.002500		88.2	73	119			
Surr: Tetrachloro-m-xylene	0.0014		0.002500		55.4	36.6	84.1			

Sample ID: LCS-64757	SampType: LCS		TestCode: EPA Method 8081: Pesticides TCLP							
Client ID: LCSW	Batch ID: 64757		RunNo: 85069							
Prep Date: 12/28/2021	Analysis Date: 1/11/2022		SeqNo: 2993315		Units: %Rec					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Decachlorobiphenyl	0.0022		0.002500		90.0	73	119			
Surr: Tetrachloro-m-xylene	0.0015		0.002500		62.0	36.6	84.1			

Sample ID: LCS-64757	SampType: LCS		TestCode: EPA Method 8081: Pesticides TCLP							
Client ID: LCSW	Batch ID: 64757		RunNo: 85069							
Prep Date: 12/28/2021	Analysis Date: 1/11/2022		SeqNo: 2993316		Units: %Rec					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Decachlorobiphenyl	0.0023		0.002500		91.7	73	119			
Surr: Tetrachloro-m-xylene	0.0016		0.002500		62.3	36.6	84.1			

Sample ID: LCSD-64757	SampType: LCSD		TestCode: EPA Method 8081: Pesticides TCLP							
Client ID: LCSS02	Batch ID: 64757		RunNo: 85069							
Prep Date: 12/28/2021	Analysis Date: 1/11/2022		SeqNo: 2993320		Units: %Rec					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Decachlorobiphenyl	0.0023		0.002500		93.3	73	119	0	0	
Surr: Tetrachloro-m-xylene	0.0014		0.002500		56.2	36.6	84.1	0	0	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: LCSD-64757	SampType: LCSD	TestCode: EPA Method 8081: Pesticides TCLP								
Client ID: LCSS02	Batch ID: 64757	RunNo: 85069								
Prep Date: 12/28/2021	Analysis Date: 1/11/2022	SeqNo: 2993321	Units: %Rec							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Decachlorobiphenyl	0.0024		0.002500		94.7	73	119	0	0	
Surr: Tetrachloro-m-xylene	0.0014		0.002500		56.7	36.6	84.1	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: 100ng lcs	SampType: LCS			TestCode: TCLP Volatiles by 8260B						
Client ID: LCSW	Batch ID: T84811			RunNo: 84811						
Prep Date:	Analysis Date: 12/27/2021			SeqNo: 2983267			Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.017	0.00023	0.02000	0	86.5	70	130			
1,1-Dichloroethene	0.017	0.00020	0.02000	0	85.8	70	130			
Trichloroethene (TCE)	0.017	0.00020	0.02000	0	82.9	70	130			
Chlorobenzene	0.018	0.00016	0.02000	0	88.3	70	130			
Surr: 1,2-Dichloroethane-d4	0.0094		0.01000		94.4	70	130			
Surr: 4-Bromofluorobenzene	0.010		0.01000		100	70	130			
Surr: Dibromofluoromethane	0.0095		0.01000		95.0	70	130			
Surr: Toluene-d8	0.0093		0.01000		92.7	70	130			

Sample ID: mb	SampType: MBLK			TestCode: TCLP Volatiles by 8260B						
Client ID: PBW	Batch ID: T84811			RunNo: 84811						
Prep Date:	Analysis Date: 12/27/2021			SeqNo: 2983270			Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
2-Butanone	ND	200								
Carbon Tetrachloride	ND	0.50								
Chloroform	ND	6.0								
1,4-Dichlorobenzene	ND	7.5								
1,1-Dichloroethene	ND	0.70								
Tetrachloroethene (PCE)	ND	0.70								
Trichloroethene (TCE)	ND	0.50								
Vinyl chloride	ND	0.20								
Chlorobenzene	ND	100								
Surr: 1,2-Dichloroethane-d4	0.0090		0.01000		90.0	70	130			
Surr: 4-Bromofluorobenzene	0.010		0.01000		101	70	130			
Surr: Dibromofluoromethane	0.0094		0.01000		94.3	70	130			
Surr: Toluene-d8	0.0094		0.01000		93.6	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB-64755	SampType: MBLK	TestCode: EPA Method 8270C TCLP								
Client ID: PBW	Batch ID: 64755	RunNo: 84935								
Prep Date: 12/28/2021	Analysis Date: 1/5/2022	SeqNo: 2989261 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	ND	200								
3+4-Methylphenol	ND	200								
2,4-Dinitrotoluene	ND	0.13								
Hexachlorobenzene	ND	0.13								
Hexachlorobutadiene	ND	0.50								
Hexachloroethane	ND	3.0								
Nitrobenzene	ND	2.0								
Pentachlorophenol	ND	100								
Pyridine	ND	40								E
2,4,5-Trichlorophenol	ND	400								
2,4,6-Trichlorophenol	ND	2.0								
Cresols, Total	ND	200								
Surr: 2-Fluorophenol	0.12		0.2000		60.0	15	118			
Surr: Phenol-d5	0.091		0.2000		45.7	15	92.9			
Surr: 2,4,6-Tribromophenol	0.15		0.2000		76.6	15	150			
Surr: Nitrobenzene-d5	0.063		0.1000		63.4	15	136			
Surr: 2-Fluorobiphenyl	0.060		0.1000		60.3	15	134			
Surr: 4-Terphenyl-d14	0.11		0.1000		110	15	168			

Sample ID: LCS-64755	SampType: LCS	TestCode: EPA Method 8270C TCLP								
Client ID: LCSW	Batch ID: 64755	RunNo: 84935								
Prep Date: 12/28/2021	Analysis Date: 1/5/2022	SeqNo: 2989262 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.075	0.00010	0.1000	0	75.5	19	106			
3+4-Methylphenol	0.16	0.00010	0.2000	0	80.5	16.3	112			
2,4-Dinitrotoluene	0.068	0.00010	0.1000	0	67.8	15	99.6			
Hexachlorobenzene	0.088	0.00010	0.1000	0	88.4	41.8	111			
Hexachlorobutadiene	0.057	0.00010	0.1000	0	57.1	15	91.5			
Hexachloroethane	0.066	0.00010	0.1000	0	65.5	15	87.5			
Nitrobenzene	0.072	0.00010	0.1000	0	71.8	19.3	114			
Pentachlorophenol	0.083	0.00010	0.1000	0	82.5	29	103			
Pyridine	0.023	0.00010	0.1000	0	23.0	15	92.6			E
2,4,5-Trichlorophenol	0.087	0.00010	0.1000	0	87.0	25.2	114			
2,4,6-Trichlorophenol	0.078	0.00010	0.1000	0	78.1	25.7	112			
Cresols, Total	0.24	0.00010	0.3000	0	78.9	15	145			
Surr: 2-Fluorophenol	0.13		0.2000		63.0	15	118			
Surr: Phenol-d5	0.10		0.2000		49.9	15	92.9			
Surr: 2,4,6-Tribromophenol	0.18		0.2000		91.2	15	150			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: LCS-64755		SampType: LCS		TestCode: EPA Method 8270C TCLP						
Client ID: LCSW		Batch ID: 64755		RunNo: 84935						
Prep Date: 12/28/2021		Analysis Date: 1/5/2022		SeqNo: 2989262			Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	0.076		0.1000		75.7	15	136			
Surr: 2-Fluorobiphenyl	0.078		0.1000		78.0	15	134			
Surr: 4-Terphenyl-d14	0.12		0.1000		122	15	168			

Sample ID: 2112C79-001BMS		SampType: MS		TestCode: EPA Method 8270C TCLP						
Client ID: WDW-1,2,3 & 4 Efflu		Batch ID: 64755		RunNo: 84935						
Prep Date: 12/28/2021		Analysis Date: 1/5/2022		SeqNo: 2989264		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.10	0.00020	0.1000	0.01601	85.0	15.8	101			D
3+4-Methylphenol	0.18	0.00020	0.2000	0.02632	79.2	16.9	97.9			D
2,4-Dinitrotoluene	0.059	0.00020	0.1000	0	59.5	20.1	90.5			D
Hexachlorobenzene	0.085	0.00020	0.1000	0	84.9	34	108			D
Hexachlorobutadiene	0.061	0.00020	0.1000	0	61.4	15	99.7			D
Hexachloroethane	0.071	0.00020	0.1000	0	70.7	15	86.4			D
Nitrobenzene	0.071	0.00020	0.1000	0	70.9	15	109			D
Pentachlorophenol	ND	0.00020	0.1000	0	0	15	130			SD
Pyridine	0.051	0.00020	0.1000	0	50.7	15	82			ED
2,4,5-Trichlorophenol	0.0052	0.00020	0.1000	0	5.25	28.1	105			SD
2,4,6-Trichlorophenol	0.0048	0.00020	0.1000	0	4.76	21.5	110			SD
Cresols, Total	0.35	0.00020	0.3000	0.04232	102	15	127			D
Surr: 2-Fluorophenol	0.0083		0.2000		4.13	15	118			SD
Surr: Phenol-d5	0.049		0.2000		24.5	15	92.9			D
Surr: 2,4,6-Tribromophenol	0.010		0.2000		5.07	15	150			SD
Surr: Nitrobenzene-d5	0.076		0.1000		76.0	15	136			D
Surr: 2-Fluorobiphenyl	0.079		0.1000		78.8	15	134			D
Surr: 4-Terphenyl-d14	0.11		0.1000		107	15	168			D

Sample ID: 2112C79-001BMSD		SampType: MSD		TestCode: EPA Method 8270C TCLP						
Client ID: WDW-1,2,3 & 4 Efflu		Batch ID: 64755		RunNo: 84935						
Prep Date: 12/28/2021		Analysis Date: 1/5/2022		SeqNo: 2989265		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.086	0.00020	0.1000	0.01601	69.9	15.8	101	16.2	20	D
3+4-Methylphenol	0.14	0.00020	0.2000	0.02632	55.7	16.9	97.9	29.1	20	RD
2,4-Dinitrotoluene	0.063	0.00020	0.1000	0	62.8	20.1	90.5	5.42	20	D
Hexachlorobenzene	0.092	0.00020	0.1000	0	92.3	34	108	8.35	20	D
Hexachlorobutadiene	0.059	0.00020	0.1000	0	59.0	15	99.7	3.86	20	D
Hexachloroethane	0.067	0.00020	0.1000	0	67.2	15	86.4	5.18	20	D
Nitrobenzene	0.072	0.00020	0.1000	0	71.7	15	109	1.12	20	D

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: 2112C79-001BMSD		SampType: MSD		TestCode: EPA Method 8270C TCLP						
Client ID: WDW-1,2,3 & 4 Efflu		Batch ID: 64755		RunNo: 84935						
Prep Date: 12/28/2021		Analysis Date: 1/5/2022		SeqNo: 2989265		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Pentachlorophenol	ND	0.00020	0.1000	0	0	15	130	0	20	SD
Pyridine	0.049	0.00020	0.1000	0	48.6	15	82	4.15	20	ED
2,4,5-Trichlorophenol	0.0021	0.00020	0.1000	0	2.09	28.1	105	86.2	20	RSD
2,4,6-Trichlorophenol	0.0035	0.00020	0.1000	0	3.52	21.5	110	30.0	20	RSD
Cresols, Total	0.26	0.00020	0.3000	0.04232	74.0	15	127	27.0	20	RD
Surr: 2-Fluorophenol	0.0028		0.2000		1.41	15	118	0	0	SD
Surr: Phenol-d5	0.030		0.2000		15.1	15	92.9	0	0	D
Surr: 2,4,6-Tribromophenol	0.0062		0.2000		3.08	15	150	0	0	SD
Surr: Nitrobenzene-d5	0.073		0.1000		72.8	15	136	0	0	D
Surr: 2-Fluorobiphenyl	0.078		0.1000		77.8	15	134	0	0	D
Surr: 4-Terphenyl-d14	0.11		0.1000		109	15	168	0	0	D

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: lcs-1 99.3uS eC	SampType: lcs		TestCode: SM2510B: Specific Conductance							
Client ID: LCSW	Batch ID: R84794		RunNo: 84794							
Prep Date:	Analysis Date: 12/27/2021		SeqNo: 2982430		Units: µmhos/cm					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	100	10	99.30	0	101	85	115			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB-64706	SampType: MBLK	TestCode: EPA Method 7470A: Mercury
Client ID: PBW	Batch ID: 64706	RunNo: 84787
Prep Date: 12/23/2021	Analysis Date: 12/27/2021	SeqNo: 2982004 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Mercury	ND	0.00020

Sample ID: LCSLL-64706	SampType: LCSLL	TestCode: EPA Method 7470A: Mercury
Client ID: BatchQC	Batch ID: 64706	RunNo: 84787
Prep Date: 12/23/2021	Analysis Date: 12/27/2021	SeqNo: 2982005 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Mercury	0.00017	0.00020 0.0001501 0 115 50 150 J

Sample ID: LCS-64706	SampType: LCS	TestCode: EPA Method 7470A: Mercury
Client ID: LCSW	Batch ID: 64706	RunNo: 84787
Prep Date: 12/23/2021	Analysis Date: 12/27/2021	SeqNo: 2982006 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Mercury	0.0049	0.00020 0.005000 0 98.3 85 115

Sample ID: 2112C79-001EMS	SampType: MS	TestCode: EPA Method 7470A: Mercury
Client ID: WDW-1,2,3 & 4 Efflu	Batch ID: 64706	RunNo: 84787
Prep Date: 12/23/2021	Analysis Date: 12/27/2021	SeqNo: 2982150 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Mercury	ND	0.0010 0.005000 0 0 75 125 S

Sample ID: 2112C79-001EMSD	SampType: MSD	TestCode: EPA Method 7470A: Mercury
Client ID: WDW-1,2,3 & 4 Efflu	Batch ID: 64706	RunNo: 84787
Prep Date: 12/23/2021	Analysis Date: 12/27/2021	SeqNo: 2982151 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Mercury	ND	0.0010 0.005000 0 0 75 125 0 20 S

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB	SampType: MBLK	TestCode: EPA Method 6010B: Dissolved Metals								
Client ID: PBW	Batch ID: A84757	RunNo: 84757								
Prep Date:	Analysis Date: 12/22/2021	SeqNo: 2980772 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID: LCS	SampType: LCS	TestCode: EPA Method 6010B: Dissolved Metals								
Client ID: LCSW	Batch ID: A84757	RunNo: 84757								
Prep Date:	Analysis Date: 12/22/2021	SeqNo: 2980774 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	47	1.0	50.00	0	94.0	80	120			
Magnesium	47	1.0	50.00	0	93.4	80	120			
Potassium	46	1.0	50.00	0	92.8	80	120			
Sodium	46	1.0	50.00	0	92.1	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB-64703	SampType: MBLK	TestCode: EPA 6010B: Total Recoverable Metals								
Client ID: PBW	Batch ID: 64703	RunNo: 84926								
Prep Date: 12/22/2021	Analysis Date: 1/4/2022	SeqNo: 2989056 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.030								
Barium	ND	0.0020								
Chromium	ND	0.0060								
Silver	ND	0.0050								

Sample ID: LCS-64703	SampType: LCS	TestCode: EPA 6010B: Total Recoverable Metals								
Client ID: LCSW	Batch ID: 64703	RunNo: 84926								
Prep Date: 12/22/2021	Analysis Date: 1/4/2022	SeqNo: 2989063 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.45	0.030	0.5000	0	89.3	80	120			
Barium	0.44	0.0020	0.5000	0	87.2	80	120			
Chromium	0.40	0.0060	0.5000	0	80.0	80	120			
Silver	0.091	0.0050	0.1000	0	90.6	80	120			

Sample ID: LCSD-64703	SampType: LCSD	TestCode: EPA 6010B: Total Recoverable Metals								
Client ID: LCSS02	Batch ID: 64703	RunNo: 84926								
Prep Date: 12/22/2021	Analysis Date: 1/4/2022	SeqNo: 2989064 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.44	0.030	0.5000	0	88.4	80	120	0.960	20	
Barium	0.44	0.0020	0.5000	0	87.1	80	120	0.0742	20	
Chromium	0.41	0.0060	0.5000	0	81.1	80	120	1.36	20	
Silver	0.090	0.0050	0.1000	0	90.3	80	120	0.388	20	

Sample ID: MB-64703	SampType: MBLK	TestCode: EPA 6010B: Total Recoverable Metals								
Client ID: PBW	Batch ID: 64703	RunNo: 84926								
Prep Date: 12/22/2021	Analysis Date: 1/4/2022	SeqNo: 2989221 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	ND	0.0020								
Selenium	ND	0.050								

Sample ID: LCS-64703	SampType: LCS	TestCode: EPA 6010B: Total Recoverable Metals								
Client ID: LCSW	Batch ID: 64703	RunNo: 84926								
Prep Date: 12/22/2021	Analysis Date: 1/4/2022	SeqNo: 2989223 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.48	0.0020	0.5000	0	96.6	80	120			
Selenium	0.49	0.050	0.5000	0	97.9	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: LCSD-64703	SampType: LCSD			TestCode: EPA 6010B: Total Recoverable Metals						
Client ID: LCSS02	Batch ID: 64703			RunNo: 84926						
Prep Date: 12/22/2021	Analysis Date: 1/4/2022			SeqNo: 2989224		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.48	0.0020	0.5000	0	95.9	80	120	0.745	20	
Selenium	0.49	0.050	0.5000	0	97.7	80	120	0.211	20	

Sample ID: MB-64703	SampType: MBLK			TestCode: EPA 6010B: Total Recoverable Metals						
Client ID: PBW	Batch ID: 64703			RunNo: 85207						
Prep Date: 12/22/2021	Analysis Date: 1/12/2022			SeqNo: 2997505		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.020								

Sample ID: LCS-64703	SampType: LCS			TestCode: EPA 6010B: Total Recoverable Metals						
Client ID: LCSW	Batch ID: 64703			RunNo: 85207						
Prep Date: 12/22/2021	Analysis Date: 1/12/2022			SeqNo: 2997517		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.41	0.020	0.5000	0	82.0	80	120			

Sample ID: LCSD-64703	SampType: LCSD			TestCode: EPA 6010B: Total Recoverable Metals						
Client ID: LCSS02	Batch ID: 64703			RunNo: 85207						
Prep Date: 12/22/2021	Analysis Date: 1/12/2022			SeqNo: 2997518		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.42	0.020	0.5000	0	83.9	80	120	2.38	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: mb-1 alk	SampType: mblk	TestCode: SM2320B: Alkalinity								
Client ID: PBW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982456 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: lcs-1 alk	SampType: lcs	TestCode: SM2320B: Alkalinity								
Client ID: LCSW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982457 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	74.80	20.00	80.00	0	93.5	90	110			

Sample ID: mb-2 alk	SampType: mblk	TestCode: SM2320B: Alkalinity								
Client ID: PBW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982479 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: lcs-2 alk	SampType: lcs	TestCode: SM2320B: Alkalinity								
Client ID: LCSW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982480 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	75.32	20.00	80.00	0	94.2	90	110			

Sample ID: mb-3 alk	SampType: mblk	TestCode: SM2320B: Alkalinity								
Client ID: PBW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982502 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: lcs-3 alk	SampType: lcs	TestCode: SM2320B: Alkalinity								
Client ID: LCSW	Batch ID: R84794	RunNo: 84794								
Prep Date:	Analysis Date: 12/27/2021	SeqNo: 2982503 Units: mg/L CaCO3								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	74.96	20.00	80.00	0	93.7	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: 2112C79-001CDUP		SampType: DUP		TestCode: Specific Gravity						
Client ID: WDW-1,2,3 & 4 Efflu		Batch ID: R85017		RunNo: 85017						
Prep Date:		Analysis Date: 1/7/2022		SeqNo: 2991233		Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	1.001	0						0.0999	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2112C79

21-Jan-22

Client: Navajo Refining Company
Project: Quarterly WDW 1 2 3 4 Inj Well

Sample ID: MB-64762	SampType: MBLK	TestCode: SM2540C MOD: Total Dissolved Solids								
Client ID: PBW	Batch ID: 64762	RunNo: 84892								
Prep Date: 12/28/2021	Analysis Date: 12/30/2021	SeqNo: 2986299	Units: mg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: LCS-64762	SampType: LCS	TestCode: SM2540C MOD: Total Dissolved Solids								
Client ID: LCSW	Batch ID: 64762	RunNo: 84892								
Prep Date: 12/28/2021	Analysis Date: 12/30/2021	SeqNo: 2986300	Units: mg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1000	20.0	1000	0	100	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

Sample Log-In Check List

Client Name: Navajo Refining

Work Order Number: 2112C79

RcptNo: 1

Received By: Isaiah Ortiz 12/22/2021 7:25:00 AM

Completed By: Sean Livingston 12/22/2021 8:57:18 AM

Reviewed By: *WPA* 12/22/21

I-Ox
San Lopez

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Courier

Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0° C? Yes ☒ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☒ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
8. Was preservative added to bottles? Yes ☒ No ☒ NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA? Yes ☒ No ☐ NA ☐
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels? Yes ☒ No ☐
(Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
13. Is it clear what analyses were requested? Yes ☒ No ☐
14. Were all holding times able to be met? Yes ☒ No ☐
(If no, notify customer for authorization.)

of preserved
bottles checked,
for pH: 32
(≤2 or ≥12 unless noted)

Adjusted? yes

Checked by: jn 12/22/21

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: _____ Date: _____
By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: _____
Client Instructions: _____

16. Additional remarks: 0.5ml of HNO₃ was added to sample 001E for pH2. jn 12/22/21

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	0.5	Good				

Appendix X.1 – AOR Well Records

30-15-31123

Land - 148111
Prop - 25858
Pool - 78890

Geol. Tops per 1301

Bowers 845
Queen 1040
Grayburg 1372
San Andres 1733
Glorieta 3197
Tubb 4057

Alco 5018
Wolfcamp 6735
Cisco 8237
Canyon 8360
Strawn 8881
Atoka 9464
Morrow 9650

Comp Conf -

Confidential
8-23-01

5-23-01

DLL/GR

4995 - 10003

Comp Z-DL/Comp NEET/GR

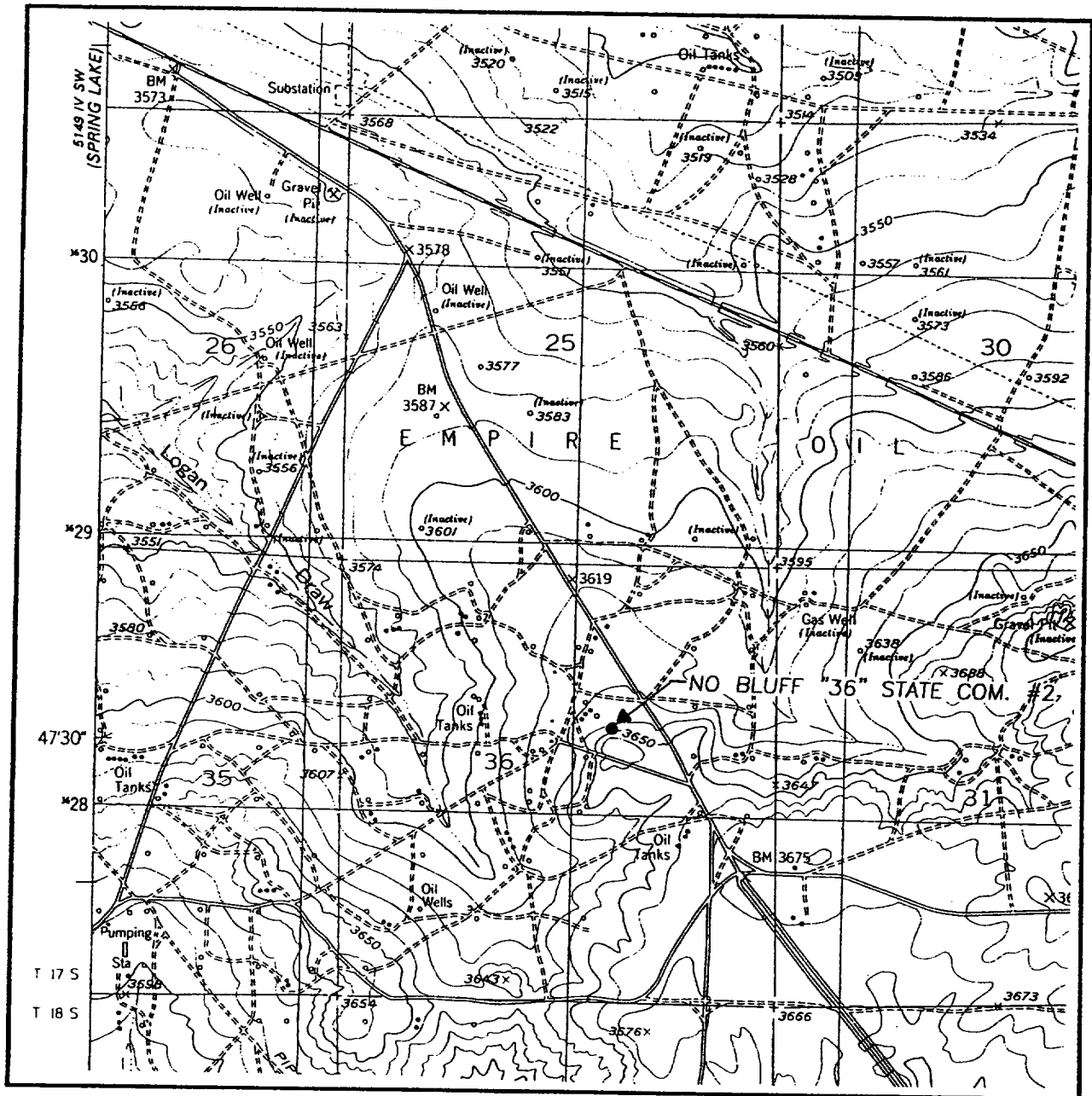
Surf - 9984

Multipole AA/Recomputed Comp & Sh

GR

1990 - 10013

LOCATION VERIFICATION MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL:
RED LAKE, N.M. - 10'

SEC. 36 TWP. 17-S RGE. 27-E

SURVEY N.M.P.M.

COUNTY EDDY

DESCRIPTION 1980' FNL & 1980' FEL

ELEVATION 3639

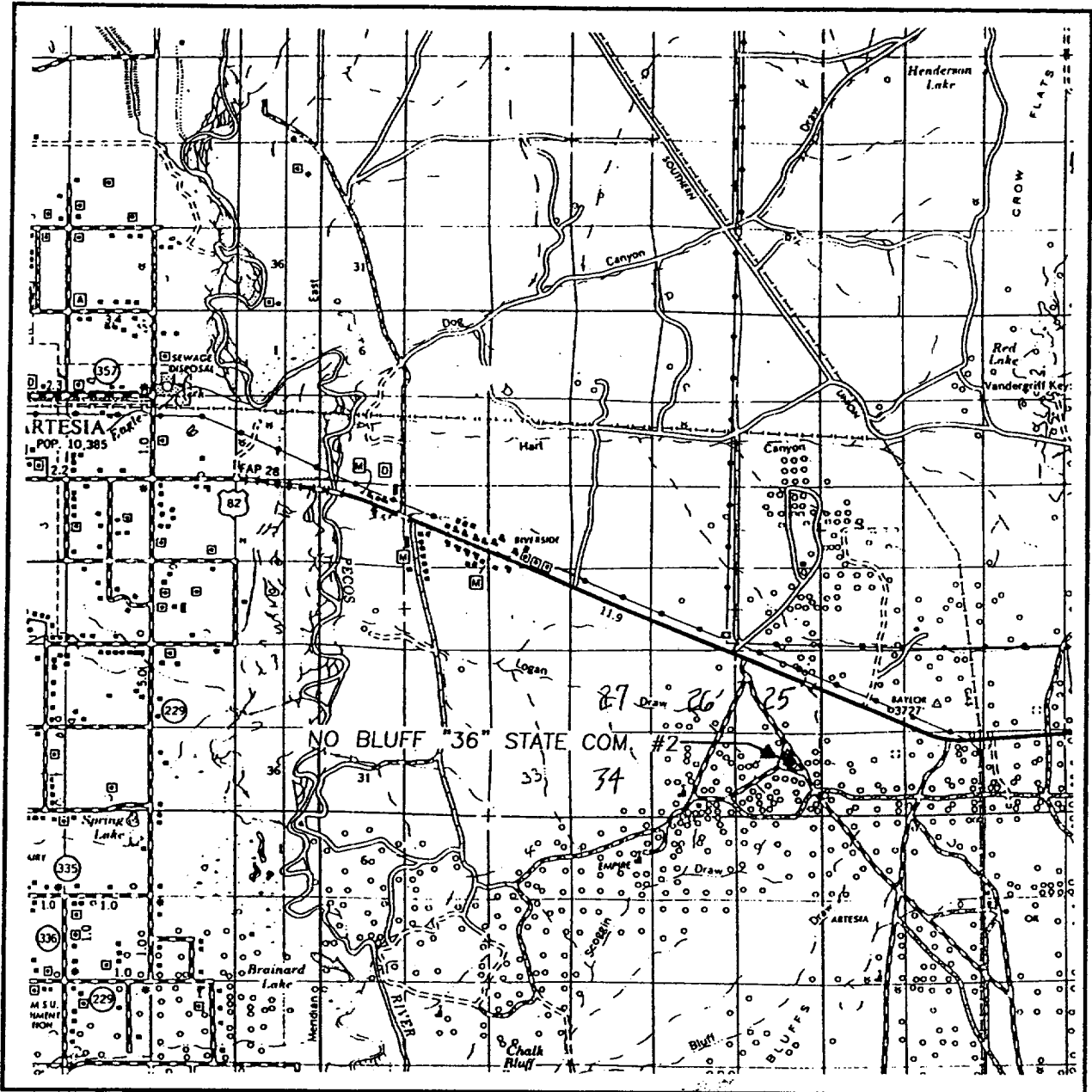
OPERATOR SOUTHWESTERN ENERGY
PRODUCTION CO.

LEASE NO BLUFF "36" STATE COM.

U.S.G.S. TOPOGRAPHIC MAP
RED LAKE, N.M.

JOHN WEST SURVEYING
HOBBS, NEW MEXICO
(505) 393-3117

VICINITY MAP



SCALE: 1" = 2 MILES

SEC. 36 TWP. 17-S RGE. 27-E

SURVEY N.M.P.M.

COUNTY EDDY

DESCRIPTION 1980' FNL & 1980' FEL

ELEVATION 3639

OPERATOR SOUTHWESTERN ENERGY PRODUCTION CO.

LEASE NO BLUFF "36" STATE COM.

JOHN WEST SURVEYING
HOBBS, NEW MEXICO
(505) 393-3117

2000'-10,100' 13-5/8" 5000# double ram type preventers, 5000# annular preventer and rotating head body. Test all rams choke manifold, kill line upper and lower kelly valves to 3000 psi. A choke manifold and 120 gallon accumulator with floor and remote operating stations and auxiliary power system.

Any equipment failing to test satisfactorily, will be repaired or replaced. Results of the BOP test will be recorded in the Driller's Log.

The BOP's will be maintained ready for use until drilling operations are completed. BOP drills will be conducted as necessary to assure that equipment is operational and each crew is properly trained to carry out emergency duties.

Accumulator shall maintain a pressure capacity reserve at all times to provide for the close-open-close sequence of the blind and pipe rams of the hydraulic preventers.

GENERAL DRILLING PROGRAM- Attachment to Form C-101

Southwestern Energy Production Company- No Bluff "36" State Com. #2
1980' FNL 1980' FEL Section 36-T17S-R27E
Eddy County, New Mexico

Elevation: 3639' GR

Proposed Total Depth: 10,100'

Estimated Formation Tops

San Andres	1851'
Glorietta	3355'
Wolfcamp	6670'
Strawn	9030'
Morrow Clastics	9770'
Missippian	10,000'

Casing/Cement Program

<u>Hole Size</u>	<u>Casing Size/Weight/Grade</u>	<u>Setting Depth</u>	<u>Cement</u>	<u>Est. TOC</u>
	20" Conductor pipe	40'	ready mix	surface
17-1/2"	13-3/8" 61# J-55 ST&C	425'	1500 sx 15:85 Poz: Class C + 0.25 pps D29+2% S1+2% D20	surface
12-1/4"	8-5/8" 32# J-55 ST&C	2000'	Lead: 1260 sx 35:65 Poz: Class C + 6% D20+ 0.25 pps D29 Tail: 235 sx Class C+ 2% S1 +0.25 pps D29	surface
7-7/8"	5-1/2" 17# N-80 LT&C	10,100'	860 sx 50:50 Poz: Class H + 6% D44 +2% D20+0.4% D59	8000'

Drilling Fluids Program

<u>Depth</u>	<u>Mud Weight</u>	<u>Viscosity</u>	<u>Fluid Loss</u>	<u>Comments</u>
0-425'	8.4-8.6	32-34	NC	spud mud
425'-2000'	9.0-9.2	28-29	NC	cut brine water,paper,caustic
2000'-9300'	8.4-9.3	28-29	NC	cut brine,caustic,paper
9300'-10,100'	9.3-9.6	34-38	<15 cc	xantham gum, starch

Blowout Prevention Program- Attachment to Form C-101

0'-425'	None
425'-2000'	20" 2000# annular preventer system.

DISTRICT I
P.O. Box 1960, Hobbs, NM 88241-1960

DISTRICT II
P.O. Drawer DD, Artesia, NM 86211-0719

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

DISTRICT IV
P.O. BOX 2088, SANTA FE, N.M. 87504-2088

State of New Mexico

Energy, Minerals and Natural Resources Department

Form C-102

Revised February 10, 1994

Submit to Appropriate District Office

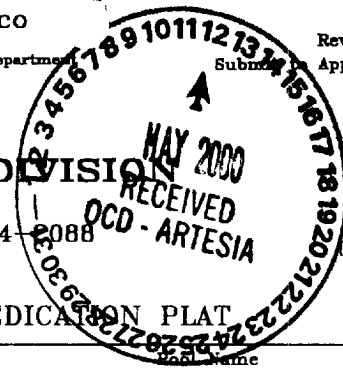
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OIL CONSERVATION DIVISION

P.O. Box 2088

Santa Fe, New Mexico 87504-2088



AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Well Name
Property Code	Property Name NO BLUFF "36" STATE COM.	Well Number 2
OGRID No.	Operator Name SOUTHWESTERN ENERGY PRODUCTION CO.	Elevation 3639

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
G	36	17 S	27 E		1980	NORTH	1980	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Dedicated Acres 320	Joint or Infill	Consolidation Code	Order No.						

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

	<p>OPERATOR CERTIFICATION</p> <p>I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.</p> <p>Signature Cathy Rowan Printed Name Drilling Technician Title May 4, 2000 Date</p>
	<p>SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</p> <p>APRIL 19, 2000</p> <p>Date Surveyed LMP</p> <p>Signature & Seal of Professional Surveyor Ronald J. Eidson 4/24/2000 00-11-0509</p> <p>Certificate No. RONALD J. EIDSON 3239 GARY EIDSON 12641 MACON McDONALD 12185</p>

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

RECEIVED
OCD - ARTESIA

Submit to appropriate District Office
State Lease - 6 Copies
Fee Lease - 5 Copies

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUG BACK, OR ADD A ZONE

¹ Operator Name and Address Southwestern Energy Production Company 2350 North Sam Houston Parkway East, Suite 300 Houston, TX 77032		² OGRID Number 148111
		³ API Number 30 - 015 - 31123
³ Property Code 25858	⁵ Property Name No Bluff "36" State Com.	⁶ Well No. 2

⁷ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
G	36	17S	27E		1980	North	1980	East	Eddy

⁸ Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

⁹ Proposed Pool 1

Wildcat (Mississippian)

¹⁰ Proposed Pool 2

¹¹ Work Type Code N	¹² Well Type Code G	¹³ Cable/Rotary R	¹⁴ Lease Type Code S	¹⁵ Ground Level Elevation 3639
¹⁶ Multiple N	¹⁷ Proposed Depth 10,100'	¹⁸ Formation Mississippian	¹⁹ Contractor Patterson	²⁰ Spud Date 5/25/00 (est.)

²¹ Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	Minimum WOC time	8 hrs 40'	Ready Mix	Surface
17 - 1/2"	13 - 3/8"	61#	425'	1500	Surface
12 - 1/4"	8 5/8"	32#	2,000'	1,495	Surface
7 7/8"	5 1/2"	17#	10,100'	860	8,000 *

* Oper to cover all oil, gas & water bearing zones

22 Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone. Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE ATTACHMENT

Notify OCD at SPUD & TIME
to witness cementing the
13 3/8" casing.

²³ I hereby certify that the information given above is true and complete to the best of my knowledge and belief.

Signature: *Cathy Rowan*

Printed name: Cathy Rowan

Title: Drilling Technician

Date: May 2, 2000

Phone: 281-618-4733

OIL CONSERVATION DIVISION

Approved by:

ORIGINAL SIGNED BY TIM W. GUN
DISTRICT II SUPERVISOR

Approval Date:

MAY 03 2000

Expiration Date:

MAY 03 2001

Conditions of Approval:

Attached ☐

DISTRICT I
1685 N. French Dr., Hobbs, NM 88240

State of New Mexico
Energy, Minerals & Natural Resources Department

Form C-102
Revised August 15, 2000
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

DISTRICT II
P.O. Drawer 80, Artesia, NM 88211-0719

DISTRICT III
1000 Rio Brueco Rd., Aztec, NM 87410

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

DISTRICT IV
2040 South Pacheco, Santa Fe, NM 87505

XX AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-31123	Pool Code	Pool Name Wildcat (Mississippian)
Property Code 25858	Property Name NO BLUFF "36" STATE COM	Well Number 2
OGRID No. 148111	Operator Name SOUTHWESTERN ENERGY PRODUCTION CO. ✓	Elevation 3634

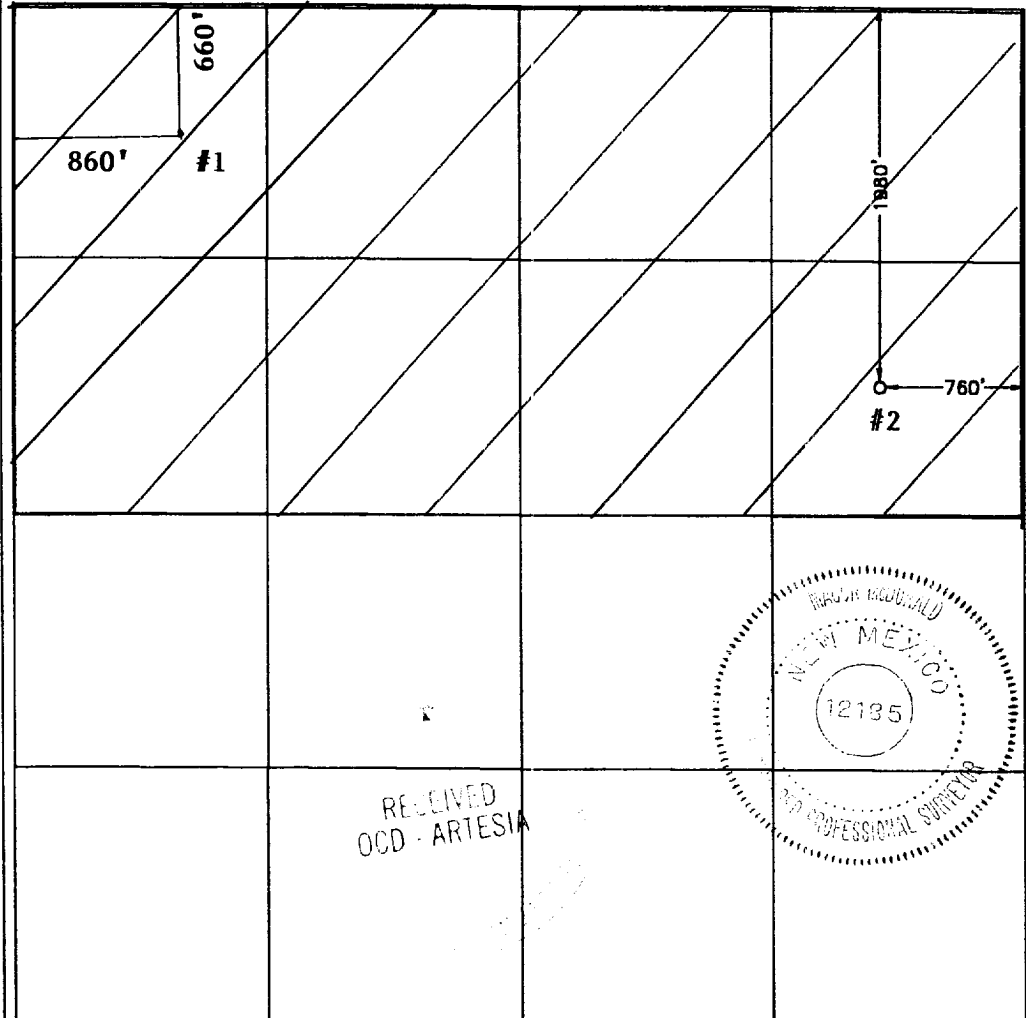
Surface Location

UL or lot No. H	Section 36	Township 17 S	Range 27 E	Lot Idn	Feet from the 1980	North/South line NORTH	Feet from the 760	East/West line EAST	County EDDY
--------------------	---------------	------------------	---------------	---------	-----------------------	---------------------------	----------------------	------------------------	----------------

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Dedicated Acres 320	Joint or Infill	Consolidation Code	Order No.						

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

	<p>OPERATOR CERTIFICATION</p> <p>I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.</p> <p><i>Cathy Rowan</i> Signature Cathy Rowan Printed Name Sr. Engineering Tech. Title March 1, 2001 Date</p> <p>SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision and that the same is true and correct to the best of my belief.</p> <p>February 28, 2001 Date Surveyed Signature & Seal of Professional Surveyor W.O. Num. 2001-0151-S Certificate No. WACON McDONALD 12185</p>
---	---

District I

1625 N. French Dr., Hobbs, NM 88240

District II

811 South First, Artesia, NM 88210

District III

1000 Rio Brazos Road, Aztec, NM 87416

District IV

2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division

2040 South Pacheco

Santa Fe, NM 87505

Form C-101

Revised March 17, 1999

Submit to appropriate District Office

State Lease - 6 Copies

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☒ AMENDED REPORT**APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE**

¹ Operator Name and Address Southwestern Energy Production Company 2350 North Sam Houston Parkway East, Suite 300 Houston, TX 77032		² OGRID Number 148111
		³ API Number 30 - 015 - 31123
³ Property Code 25858	⁵ Property Name No Bluff "36" State Com.	⁶ Well No. 2

⁷ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
64	36	17S	27E		1980	North	760	East	Eddy

⁸ Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
⁹ Proposed Pool 1 Wildcat (Mississippian)					¹⁰ Proposed Pool 2				

¹¹ Work Type Code N	¹² Well Type Code G	¹³ Cable/Rotary R	¹⁴ Lease Type Code S	¹⁵ Ground Level Elevation 3634
¹⁶ Multiple N	¹⁷ Proposed Depth 10,050'	¹⁸ Formation Mississippian	¹⁹ Contractor UTI	²⁰ Spud Date 04/01/01 (est.)

²¹ Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"		40'	Ready Mix	Surface
17 - 1/2"	13 - 3/8"	61#	425'	1500	Surface
12 - 1/4"	8 5/8"	32#	2,000'	1,495	Surface
7 7/8"	5 1/2"	17#	10,100'	860	8,000'

²² Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone. Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE ATTACHMENT

NOTE: SL changed from 1980' FNL, 660' FEL to 1980' FNL, 760' FEL

²³ I hereby certify that the information given above is true and complete to the best of my knowledge and belief.		OIL CONSERVATION DIVISION	
Signature: <i>Cathy Rowan</i>		1300	
Printed name: Cathy Rowan		Approved by: ORIGINAL SIGNED BY TIM W. GUM DISTRICT II SUPERVISOR	
Title: Sr. Engineering Technician		Approval Date: MAR - 8 2001	Expiration Date: MAR - 8 2002
Date: March 1, 2001	Phone: 281-618-4733	Conditions of Approval: Attached <input type="checkbox"/>	

GENERAL DRILLING PROGRAM- Attachment to Form C-101

Southwestern Energy Production Company- No Bluff "36" State Com. #2
1980' FNL 760' FEL Section 36-T17S-R27E
Eddy County, New Mexico

Elevation: 3630' GR

Proposed Total Depth: 10,100'

Estimated Formation Tops

Yates	320'
7 Rivers	460'
Queen	1000'
Grayburg	1300'
San Andres 'D'	1784'
Glorieta	3160'
Wolfcamp	6470'
Strawn	8870'
Atoka	9430'
Morrow Lime	9544'
Morrow Clastics	9724'
Missippian	10,040'

Casing/Cement Program

<u>Hole Size</u>	<u>Casing Size/Weight/Grade</u>	<u>Setting Depth</u>	<u>Cement</u>	<u>Est. TOC</u>
	20" Conductor pipe	40'	ready mix	surface
17-1/2"	13-3/8" 61# J-55 ST&C	425'	550 sx 15:85 Poz: Class C + 0.25 pps D29+2% S1+2% D20	surface
12-1/4"	8-5/8" 32# J-55 ST&C	1900'	Lead:700 sx 35:65 Poz: Class C + 6% D20+ 0.25 pps D29 Tail: 235 sx Class C+ 2% S1 +0.25 pps D29	surface
7-7/8"	5-1/2" 17# N-80 LT&C	10,050'	860 sx 50:50 Poz: Class H + 6% D44 +2% D20+0.4% D59	8000'

Drilling Fluids Program

<u>Depth</u>	<u>Mud Weight</u>	<u>Viscosity</u>	<u>Fluid Loss</u>	<u>Comments</u>
0-425'	8.4-8.6	32-34	NC	spud mud
425'-1900'	9.0-9.2	28-29	NC	cut brine water,paper,caustic
1900'-9300'	8.4-9.3	28-29	NC	cut brine,caustic,paper
9300'-10,050'	9.3-9.6	34-38	<15 cc	xantham gum, starch

Blowout Prevention Program- Attachment to Form C-101

Submit 3 Copies To Appropriate District
Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-103
Revised March 25, 1999

WELL API NO. 30-015-31123
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name: No Bluff "36" State Com
8. Well No. 2
8. Pool name or Wildcat Wildcat (Mississippian)
10. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR

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

1. Type of Well:
Oil Well ☒ Gas Well ☐ Other ☐
2. Name of Operator
Southwestern Energy Production Company
3. Address of Operator
2350 N. Sam Houston Parkway East, Suite 300 - Houston, TX 77032
4. Well Location

Unit Letter H : 1980 feet from the N line and 760 feet from the E line
Section 36 Township 17S Range 27E NMPM Eddy County

11. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data	
NOTICE OF INTENTION TO:	SUBSEQUENT REPORT OF:
PERFORM REMEDIAL WORK <input type="checkbox"/> PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/> ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/> CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input checked="" type="checkbox"/> PLUG AND ABANDONMENT <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/> MULTIPLE COMPLETION <input type="checkbox"/>	CASING TEST AND CEMENT JOB <input checked="" type="checkbox"/>
OTHER: <input type="checkbox"/>	OTHER: <input type="checkbox"/>

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

03/19/01 thru 03/20/01

Set 20" conductor to 40'. Cmt to surf w/ready mix. Spud @ 9:00 CST on 03/19/01. Drl to 425'. Run 10 jts -13-3/8" 48#, H-40 csg to 425'. Cmt w/465 sx Class C + 2% S1 + 0.25 pps D29. Circ to surf. WOC 18 hrs. Tst csg. OK.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Vonnie J. Cermin TITLE Drilling Technician DATE 03/21/01
Type or print name Vonnie J. Cermin Telephone No. 281-618-4739

(This space for State use)
ORIGINAL SIGNED BY TIM W. GUM
DISTRICT IV SUPERVISOR

APPROVED BY Tim W. Gum TITLE DISTRICT IV SUPERVISOR DATE APR 25 2001
Conditions of approval, if any:

Submit 3 Copies To Appropriate District
Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-103
Revised March 25, 1999

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 30-015-31123
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Southwestern Energy Production Company		6. State Oil & Gas Lease No.
3. Address of Operator 2350 N. Sam Houston Parkway East, Suite 300 - Houston, TX 77032		7. Lease Name or Unit Agreement Name: No Bluff "36" State Com
4. Well Location Unit Letter <u>H</u> : <u>1980</u> feet from the <u>N</u> line and <u>760</u> feet from the <u>E</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM <u>Eddy</u> County		8. Well No. <u>2</u>
10. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR		8. Pool name or Wildcat Wildcat (Mississippian)

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

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐
PULL OR ALTER CASING ☐ MULTIPLE COMPLETION ☐
OTHER: ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐
COMMENCE DRILLING OPNS. ☐ PLUG AND ABANDONMENT ☐
CASING TEST AND CEMENT JOB ☐
OTHER: Completion ☒

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

04/19/01 thru 04/28/01.

MI RU CU. Drl cmt. Tag TD. Corrected TD - 10,015'. Perf. L. Morrow from 9,927' - 9,964'. Swab. RD MO CU. WOPL.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

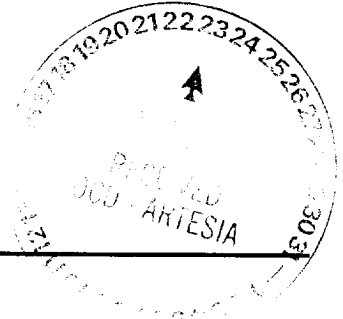
SIGNATURE Cathy Rowan TITLE Sr. Engineering Technician DATE 05/21/01
Type or print name Cathy Rowan Telephone No. 281-618-4733

(This space for State use)

ORIGINAL SIGNED BY TIM W. GUM
DISTRICT II SUPERVISOR

APPROVED BY _____ TITLE _____ DATE _____

Conditions of approval, if any:



Submit 3 Copies To Appropriate District
Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-103
Revised March 25, 1999

WELL API NO.
30-015-31123

5. Indicate Type of Lease
STATE ☒ FEE ☐

6. State Oil & Gas Lease No.

7. Lease Name or Unit Agreement
Name:
No Bluff "36" State Com

8. Well No. 2

8. Pool name or Wildcat
Wildcat (Mississippian)

10. Elevation (Show whether DR, RKB, RT, GR, etc.)
3634' GR

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

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

2. Name of Operator
Southwestern Energy Production Company

3. Address of Operator
2350 N. Sam Houston Parkway East, Suite 300 - Houston, TX 77032

4. Well Location
Unit Letter H, 1980 feet from the N line and 760 feet from the E line
Section 36 Township 17S Range 27E NMPM Eddy County

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG AND ABANDONMENT <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPLETION <input type="checkbox"/>	CASING TEST AND CEMENT JOB <input checked="" type="checkbox"/>	OTHER: <input type="checkbox"/>
OTHER: <input type="checkbox"/>			

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

03/21/01 thru 03/23/01

Drl to 2002'. Run 45 jts -8-5/8" 32#, J-55 csg to 2002'. Cmt lead w/500 sx 35/65 Poz "C" + 5% D44 BWOW + 6% D20 + 0.25 PPS D29. Cmt tail w/150 sx Class "C" + 2% S1 + 0.25 pps D29. Circ to surf. WOC 18 hrs. Tst csg. OK.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Vonnie J. Cermin TITLE Drilling Technician DATE 03/27/01
Type or print name Vonnie J. Cermin Telephone No. 281-618-4739

(This space for State use)

APPROVED BY ORIGINAL SIGNED BY TIM W. [Signature] TITLE DISTRICT II SUPERVISOR DATE APR 25 2001
Conditions of approval, if any:

Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

458
Form C-103
Revised March 25, 1999

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 30-015-31123
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Southwestern Energy Production Company		6. State Oil & Gas Lease No.
3. Address of Operator 2350 N. Sam Houston Parkway East, Suite 300 -- Houston, TX 77032		7. Lease Name or Unit Agreement Name: No Bluff "36" State Com
4. Well Location Unit Letter <u>H</u> : <u>1980</u> feet from the <u>N</u> line and <u>760</u> feet from the <u>E</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM <u>Eddy</u> County		8. Well No. <u>2</u>
10. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR		8. Pool name or Wildcat Wildcat (Mississippian)

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

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐
PULL OR ALTER CASING ☐ MULTIPLE COMPLETION ☐
OTHER: ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐
COMMENCE DRILLING OPNS. ☐ PLUG AND ABANDONMENT ☐
CASING TEST AND CEMENT JOB ☒
OTHER: ☐

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

03/23/01 thru 04/16/01

Drl to 10,050'. Log. Run SW Cores. Run 232 jts -5 1/2" 17#, N-80 csg to 10,050'. Cmt w/553 sx 35/65 Poz "C" + 5% D44 BWOW + 6% D20 + .1 PPS D130. Calc. TOC @ 7,350'. Release rig @ 2100 CST on 4/16/01. WOCU.



I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Cathy Rowan TITLE Sr. Engineering Technician DATE 05/21/01
Type or print name Cathy Rowan Telephone No. 281-618-4733

(This space for State use)

ORIGINAL SIGNED BY TIM W. GUM
DISTRICT II SUPERVISOR

APPROVED BY 360 TITLE _____ DATE JUL 05 2001
Conditions of approval, if any:

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe. NM 87505

Form C-104
Revised March 25, 1999

Submit to Appropriate District Office
5 Copies

☐ AMENDED REPORT

I. REQUEST FOR ALLOWABLE AND AUTHORIZATION TO TRANSPORT

¹ Operator name and Address Southwestern Energy Production Company 2350 N. Sam Houston Parkway East, Suite 300 – Houston, TX 77032		² OGRID Number 14811
		³ Reason for Filing Code NW
⁴ API Number 30 – 015-31123	⁵ Pool Name Illinois Camp	⁶ Pool Code 78890
⁷ Property Code 25858	⁸ Property Name No Bluff State Com.	⁹ Well Number 2

II. ¹⁰ Surface Location

UI or lot no. H	Section 36	Township 17S	Range 27E	Lot Idn	Feet from the 1980	North/South Line North	Feet from the 760	East/West line East	County Eddy
---------------------------	----------------------	------------------------	---------------------	---------	------------------------------	----------------------------------	-----------------------------	-------------------------------	-----------------------

¹¹ Bottom Hole Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
¹² Lse Code S	¹³ Producing Method Code Flowing		¹⁴ Gas Connection Date 5/17/01		¹⁵ C-129 Permit Number		¹⁶ C-129 Effective Date		¹⁷ C-129 Expiration Date

III. Oil and Gas Transporters

¹⁸ Transporter OGRID 36785	¹⁹ Transporter Name and Address Duke Energy Field Services	²⁰ POD 2829076	²¹ O/G G	²² POD ULSTR Location and Description

IV. Produced Water

²³ POD	²⁴ POD ULSTR Location and Description
-------------------	--

V. Well Completion Data

²⁵ Spud Date 3/19/01	²⁶ Ready Date 4/28/01	²⁷ TD 10,050'	²⁸ PBTD 10,015'	²⁹ Perforations 9,927' – 9,964'	³⁰ DHC, MC
³¹ Hole Size 17 1/2"		³² Casing & Tubing Size 13 3/8", 61#		³³ Depth Set 425'	
12 1/4"		8 5/8", 32#		2,002'	
7 7/8"		5 1/2", 17#		10,050'	
		2 7/8" TBG		9,925'	

VI. Well Test Data

³⁵ Date New Oil n/a	³⁶ Gas Delivery Date 5/17/01	³⁷ Test Date 5/19/01	³⁸ Test Length 24 HRS	³⁹ Tbg. Pressure 4	⁴⁰ Csg. Pressure 0
⁴¹ Choke Size open	⁴² Oil 0	⁴³ Water 0	⁴⁴ Gas 250 MCF	⁴⁵ AOF	⁴⁶ Test Method F

⁴⁷ I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information given above is true and complete to the best of my knowledge and belief.

Signature: *Cathy Rowan*
Printed name: **Cathy Rowan**
Title: **Sr. Engineering Technician**
Date: **05/21/01** Phone: **(281) 618-4733**

OIL CONSERVATION DIVISION

Approved by:

ORIGINAL SIGNED BY TIM W. GUM
DISTRICT II SUPERVISOR

Title:

Approval Date:

JUL 05 2001

⁴⁸ If this is a change of operator fill in the OGRID number and name of the previous operator

Previous Operator Signature	Printed Name	Title	Date
-----------------------------	--------------	-------	------

Arrant, Bryan

From: Arrant, Bryan
Sent: Monday, July 15, 2002 1:37 PM
To: Jones, William V
Cc: Gum, Tim
Subject: RE: No Bluff "36" State Com Well No. 2 API: 30-015-31123

Will,
I briefly looked into the area surrounding the Bluff 36 State Com. #2 well and I see that there is Abo production immediately to the south of this well.
The operator should had brought cement to cover the Abo. As you indicated with operators permitting Glorieta-Yeso wells in this area, possibly cement up though these formations also. Once you issue an order, we will take steps and have SW Energy perf and squeeze their production casing to meet OCD requirements. If you have other plans or concerns, please advice.
Bryan

-----Original Message-----

From: Jones, William V
Sent: Thursday, July 11, 2002 8:50 AM
To: Gum, Tim
Cc: Arrant, Bryan; Catanach, David
Subject: No Bluff "36" State Com Well No. 2 API: 30-015-31123

Hello Tim:
I thought I would send an email with all the facts as I have found them:

This well was drilled and 5.5 inch set to 10050' (to the Mississippian) on 4/16/01. They only used 553 sx of cement and calc cement top at 7,350'. Many operators in this area to this depth have used 2 stage tools and cemented 2000 sacks total in 3 stages. I see OCD instructions in the file 5/3/2000 for the operator (Southwestern Energy Production Company) to "cover all oil, gas, and water bearing zones".

I think there are other productive zones. For instance, the Jeffers 36 St #003 (api: 30-015-31541) and other wells have been permitted to 4000' in this area with the Glorieta or SA as the objective. There is also some 500' shallow Yates production that is played out already.

The reason I found this:
I am looking at an SWD application from Mack Energy. They have drilled a new well and want to complete the Beech Federal #003 for SWD in the Abo at 5000'. The No Bluff 36 State Com #2 is in the Area of Review with cement top below the Abo.

Please let me know what action you will take on this - so I can determine how to proceed with Mack's application.

Regards,

Will Jones

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-105

Revised March 25, 1999

WELL API NO. 30-015-31123

5. Indicate Type of Lease

STATE ☒ FEE ☐

State Oil & Gas Lease No.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

1a. Type of Well:

OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER _____

b. Type of Completion:

NEW ☒ WORK ☐ DEEPEN ☐ PLUG ☐ DIFF. ☐
WELL OVER BACK RESVR. OTHER

2. Name of Operator

Southwestern Energy Production Company

3. Address of Operator

2350 N. Sam Houston Parkway East, Suite 300 - Houston, TX 77032

4. Well Location

Unit Letter H : 1980 Feet From The N Line and 760 Feet From The E LineSection 36 Township 17S Range 27E NMPM Eddy County

10. Date Spudded

03/19/01

11. Date T.D. Reached

04/14/01

12. Date Compl. (Ready to Prod.)

04/28/01

13. Elevations (DF& RKB, RT, GR, etc.)

3,634' GR

14. Elev. Casinghead

15. Total Depth

10,050'

16. Plug Back T.D.

10,015'

17. If Multiple Compl. How Many Zones?

18. Intervals Drilled By

Rotary Tools

Cable Tools

0 - 10,050'

19. Producing Interval(s), of this completion - Top, Bottom, Name

9,927' - 9,964' L Morrow

20. Was Directional Survey Made

Yes

21. Type Electric and Other Logs Run
Combo

21. Was Well Cored

Yes

23. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8"	61#	425'	17 1/2"	465 sx	
8 5/8"	32#	2,002'	12 1/4"	650 sx	
5 1/2"	17#	10,050'	7 7/8"	553 sx	

24. LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN

25. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2 7/8"	9,925'	9,869'

26. Perforation record (interval, size, and number)

9,927' - 9,964' 6 SPF, 37', 222 shots

27. ACID, SHOT, FRACTURE, CEMENT, SQUEEZE, ETC.

DEPTH INTERVAL AMOUNT AND KIND MATERIAL USED

28. PRODUCTIONDate First Production
05/17/01Production Method (Flowing, gas lift, pumping - Size and type pump)
FlowingWell Status (Prod. or Shut in)
Prod.

Date of Test	Hours Tested	Choke Size	Prod'n For Test Period	Oil - Bbl	Gas - MCF	Water - Bbl.	Gas/Oil Ratio
05/19/01	24	open		0	250	0	
Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate	Oil - Bbl.	Gas - MCF	Water - Bbl.	Oil Gravity - API - (Corr.)	
4	0		0	250	0		

29. Disposition of Gas (Sold, used for fuel, vented, etc.)

Sold

Test Witnessed By

30. List Attachments
logs, inclinational survey

31. I hereby certify that the information shown on both sides of this form as true and complete to the best of my knowledge and belief

Signature Cathy Rowan Printed Name Cathy Rowan Title Sr. Engineering Technician Date 05/21/01

INSTRUCTIONS

This form is to be filed with the appropriate District Office of the Division not later than 20 days after the completion of any newly-drilled or deepened well. It shall be accompanied by one copy of all electrical and radio-activity logs run on the well and a summary of all special tests conducted, including drill stem tests. All depths reported shall be measured depths. In the case of directionally drilled wells, true vertical depths shall also be reported. For multiple completions, items 25 through 29 shall be reported for each zone. The form is to be filed in quintuplicate except on state land, where six copies are required. See Rule 1105.

INDICATE FORMATION TOPS IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE

Southeastern New Mexico

T. Anhy	T. Canyon	8350
T. Salt	T. Strawn	8881
B. Salt	T. Atoka	9464
T. Yates	T. Miss	
T. 7 Rivers	T. Devonian	
T. Queen	T. Silurian	
T. Grayburg	T. Montoya	
T. San Andres	T. Simpson	
T. Glorieta	T. McKee	3199
T. Paddock	T. Ellenburger	
T. Blinebry	T. Gr. Wash	
T. Tubb	T. Delaware Sand	4059
T. Drinkard	T. Bone Springs	
T. Abo	T.	5018
T. Wolfcamp	T.	6740
T. Penn	T.	
T. Cisco (Bough C)	T.	8242

Northwestern New Mexico

T. Ojo Alamo	T. Penn. "B"
T. Kirtland-Fruitland	T. Penn. "C"
T. Pictured Cliffs	T. Penn. "D"
T. Cliff House	T. Leadville
T. Menefee	T. Madison
T. Point Lookout	T. Elbert
T. Mancos	T. McCracken
T. Gallup	T. Ignacio Otzite
Base Greenhorn	T. Granite
T. Dakota	T.
T. Morrison	T.
T. Todilto	T.
T. Entrada	T.
T. Wingate	T.
T. Chinle	T.
T. Permian	T.
T. Penn. "A"	T.

OIL OR GAS SANDS OR ZONES

No. 1, from.....to.....

No. 3, from.....to.....

No. 2, from.....to.....

No. 4, from.....to.....

IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from.....to.....feet.....

No. 2, from.....to.....feet.....

No. 3, from.....to.....feet.....

LITHOLOGY RECORD (Attach additional sheet if necessary)

From	To	Thickness In Feet	Lithology
5000	5290	290	Dolomite
5290	5310	20	No sample
5310	5500	190	Dolomite w/tr of shale
5500	5520	20	No sample
5520	6730	1210	Dolomite w/tr of shale
6730	7480	750	Dolomite w/tr of ls & shale
7480	9140	1660	Dolomite w/ls, chert, & shale
9140	10040	910	Dolomite w/tr of ss, sh ls

From	To	Thickness In Feet	Lithology

Deviation surveys taken on Southwestern Energy Production Company's No Bluff "36" State Com #2 well in Eddy County, New Mexico:

<u>Depth</u>	<u>Degree</u>
190	1.00
302	.75
395	1.00
492	.75
765	.50
1042	.75
1319	.75
1645	.75
1845	.75
1950	1.00
2166	2.00
2256	1.50
2412	1.75
2597	1.75
2784	2.00
3084	2.00
3372	2.00
3591	2.00
3839	2.00
4119	2.00
4210	2.25
4303	2.75
4365	2.50
4521	3.00
4614	2.75
4707	2.50
4798	2.75
4891	3.00
4983	3.00
5133	2.75
5227	3.00
5414	3.00
5662	2.75
5822	3.00
6063	3.00
6249	3.00
6374	2.50
6469	2.75
6807	1.50
7240	2.00
7450	2.25
7741	2.25
7986	2.75
8140	2.00
8450	1.00
8849	1.50

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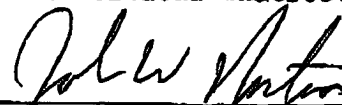
1.00
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I hereby certify that I have personal knowledge of the facts placed on this sheet and that such information given above is true and complete.



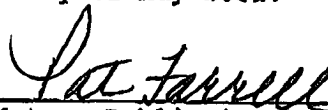
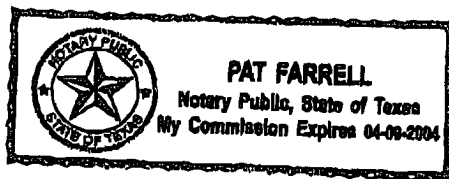
Patterson-UTI Drilling Co., LP, LLLP

Before me, the undersigned authority, on this day personally appeared John W. Norton, known to me to be the person whose name is subscribed hereto, who, after being duly sworn, on oath states that he is the drilling contractor of the well identified in this instrument and that such well was not intentionally deviated from the vertical whatsoever.



John W. Norton

SWORN AND SUBSCRIBED TO before me this 21st day of May 2001.



Notary Public in and for
Lubbock County, Texas.

C104AReport

Page 1 of 1

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(505) 393-6161 Fax:(505) 393-0720
District II
1301 W. Grand Ave., Artesia, NM 88210
Phone:(505) 748-1283 Fax:(505) 748-9720

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Form C-145
Permit 76583

Change of Operator

Previous Operator Information

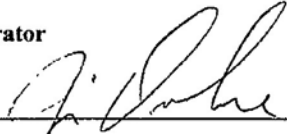
OGRID: 148111
Name: SOUTHWESTERN ENERGY
PRODUCTION COMPANY
Address: 2350 N. SAM HOUSTON PKWY E
Address: SUITE 300
City, State, Zip: HOUSTON, TX 77032

New Operator Information

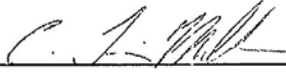
Effective Date: 8/15/2008
OGRID: 255333
Name: LIME ROCK RESOURCES A, L.P.
Address: 1111 BAGBY STREET
Address: SUITE 4600
City, State, Zip: HOUSTON, TX 77002

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Previous Operator

Signature: 
Printed Name: Jim Dewbre
Title: VP. LAND
Date: 10/29/08 Phone: 281-618-4711

New Operator

Signature: 
Printed Name: C. Tim Miller
Title: Vice President - Operations
Date: 10/29/08 Phone: 713-292-9514

NMOCD Approval

Electronic Signature: Paul Kautz, District 1

Electronic Signature: Jane Prouty, District 2

Date: October 29, 2008

ChangeOp Comments

OGRID: [148111] SOUTHWESTERN ENERGY PRODUCTION COMPANY
Permit Number: 76583
Permit Type: ChangeOp

Created By	Comment	Comment Date
DPHILLIPS	I show a bond in your Financial Assurance report that requires bonding - 30-015-31552. I cannot approve the change of operator until bonding for this well is received. Questions? Call me 476-3461.	10/9/2008
DMULL	The form C-145 that is attached is the wrong one. The Permit number that is required to be signed and attached should be 76583, and not 80162. Please send the correct, signed permit number 76583 and then resubmit. If you have questions on this matter, please call Donna Mull (575) 393-6161 ext 115.	10/23/2008

District I

1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720

District II

811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720

District III

1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural
Resources

Oil Conservation Division**1220 S. St Francis Dr.****Santa Fe, NM 87505**

Form C-145
August 1, 2011

Permit 140504

Change of Operator

Previous Operator Information

OGRID: 255333
Name: LIME ROCK RESOURCES A, L.P.
Address: 1111 Bagby Street
Suite 4600
City, State, Zip: Houston, TX 77002

New Operator Information

Effective Date: Effective on the date of approval by the OCD
OGRID: 281994
Name: LRE OPERATING, LLC
Address: 1111 Bagby
Suite 4600
City, State, Zip: Houston, TX 77002

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, LRE OPERATING, LLC certifies that it has read and understands the following synopsis of applicable rules.

PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17.13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17.11(I) NMAC.

LRE OPERATING, LLC understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.

As the operator of record of wells in New Mexico, LRE OPERATING, LLC agrees to the following statements:

1. I am responsible for ensuring that the wells and related facilities comply with applicable statutes and rules, and am responsible for all regulatory filings with the OCD. I am responsible for knowing all applicable statutes and rules, not just the rules referenced in this list. I understand that the OCD's rules are available on the OCD website under "Rules," and that the Water Quality Control Commission rules are available on the OCD website on the "Publications" page.
2. I understand that if I acquire wells from another operator, the OCD must approve the operator change before I begin operating those wells. See 19.15.9.9.B NMAC. I understand that if I acquire wells or facilities subject to a compliance order addressing inactive wells or environmental cleanup, before the OCD will approve the operator change it may require me to enter into an enforceable agreement to return those wells to compliance. See 19.15.9.9.C(2) NMAC.
3. I must file a monthly C-115 report showing production for each non-plugged well completion for which the OCD has approved an allowable and authorization to transport, and injection for each injection well. See 19.15.7.24 NMAC. I understand that the OCD may cancel my authority to transport from or inject into all the wells I operate if I fail to file C-115 reports. See 19.15.7.24.C NMAC.
4. I understand that New Mexico requires wells that have been inactive for certain time periods to be plugged or placed on approved temporary abandonment. See 19.15.25.8 NMAC. I understand the requirements for plugging and approved temporary abandonment in 19.15.25 NMAC. I understand that I can check my compliance with the basic requirements of 19.15.25.8 NMAC by using the "Inactive Well List" on OCD's website.
5. I must keep current with financial assurances for well plugging. I understand that New Mexico requires each state or fee well that has been inactive for more than two years and has not been plugged and released to be covered by a single-well financial assurance, even if the well is also covered by a blanket financial assurance and even if the well is on approved temporary abandonment status. See 19.15.8.9.C NMAC. I understand that I can check my compliance with the single-well financial assurance requirement by using the "Inactive Well Additional Financial Assurance Report" on the OCD's website.
6. I am responsible for reporting releases as defined by 19.15.29 NMAC. I understand the OCD will look to me as the operator of record to take corrective action for releases at my wells and related facilities, including releases that occurred before I became operator of record.
7. I have read 19.15.5.9 NMAC, commonly known as "Part 5.9," and understand that to be in compliance with its requirements I must have the appropriate financial assurances in place, comply with orders requiring corrective action, pay penalties assessed by the courts or agreed to by me in a settlement agreement, and not have too many wells out of compliance with the inactive well rule (19.15.25.8 NMAC). If I am in violation of Part 5.9, I may not be allowed to drill, acquire or produce any additional wells, and will not be able to obtain any new injection permits. See 19.15.16.19 NMAC, 19.15.26.8 NMAC, 19.15.9.9 NMAC and 19.15.14.10 NMAC. If I am in violation of Part 5.9 the OCD may, after notice and hearing, revoke my existing injection permits. See 19.15.26.8 NMAC.
8. For injection wells, I understand that I must report injection on my monthly C-115 report and must operate my wells in compliance with 19.15.26 NMAC and the terms of my injection permit. I understand that I must conduct mechanical integrity tests on my injection wells at least once every five years. See 19.15.26.11 NMAC. I understand that when there is a continuous one-year period of non-injection into all wells in an injection or storage project or into a saltwater disposal well or special purpose injection well, authority for that injection automatically terminates. See 19.15.26.12 NMAC. I understand that if I transfer operation of an injection well to another operator, the OCD must approve the transfer of authority to inject, and the OCD may require me to demonstrate the well's mechanical integrity prior to approving that transfer. See 19.15.26.15 NMAC.

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District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 86210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural
Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505
Change of Operator

Form C-145
August 1, 2011
Permit 210311

Previous Operator Information

OGRID: 281994
Name: LRE OPERATING, LLC
Address: 1111 Bagby
Suite 4600
City, State, Zip: Houston, TX 77002

New Operator Information

Effective Date: Effective on the date of approval by the OCD
OGRID: 258350
Name: VANGUARD OPERATING, LLC
Address: 5847 San Felipe, Suite 3000
City, State, Zip: Houston, TX 77057

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, VANGUARD OPERATING, LLC certifies that it has read and understands the following synopsis of applicable rules.


PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17.13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17.11(l) NMAC.

VANGUARD OPERATING, LLC understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.

As the operator of record of wells in New Mexico, VANGUARD OPERATING, LLC agrees to the following statements:

1. I am responsible for ensuring that the wells and related facilities comply with applicable statutes and rules, and am responsible for all regulatory filings with the OCD. I am responsible for knowing all applicable statutes and rules, not just the rules referenced in this list. I understand that the OCD's rules are available on the OCD website under "Rules," and that the Water Quality Control Commission rules are available on the OCD website on the "Publications" page.
2. I understand that if I acquire wells from another operator, the OCD must approve the operator change before I begin operating those wells. See 19.15.9.9.B NMAC. I understand that if I acquire wells or facilities subject to a compliance order addressing inactive wells or environmental cleanup, before the OCD will approve the operator change it may require me to enter into an enforceable agreement to return those wells to compliance. See 19.15.9.9.C(2) NMAC.
3. I must file a monthly C-115 report showing production for each non-plugged well completion for which the OCD has approved an allowable and authorization to transport, and injection for each injection well. See 19.15.7.24 NMAC. I understand that the OCD may cancel my authority to transport from or inject into all the wells I operate if I fail to file C-115 reports. See 19.15.7.24 C NMAC.
4. I understand that New Mexico requires wells that have been inactive for certain time periods to be plugged or placed on approved temporary abandonment. See 19.15.25.8 NMAC. I understand the requirements for plugging and approved temporary abandonment in 19.15.25 NMAC. I understand that I can check my compliance with the basic requirements of 19.15.25.8 NMAC by using the "Inactive Well List" on OCD's website.
5. I must keep current with financial assurances for well plugging. I understand that New Mexico requires each state or fee well that has been inactive for more than two years and has not been plugged and released to be covered by a single-well financial assurance, even if the well is also covered by a blanket financial assurance and even if the well is on approved temporary abandonment status. See 19.15.8.9.C NMAC. I understand that I can check my compliance with the single-well financial assurance requirement by using the "Inactive Well Additional Financial Assurance Report" on the OCD's website.
6. I am responsible for reporting releases as defined by 19.15.29 NMAC. I understand the OCD will look to me as the operator of record to take corrective action for releases at my wells and related facilities, including releases that occurred before I became operator of record.
7. I have read 19.15.5.9 NMAC, commonly known as "Part 5.9," and understand that to be in compliance with its requirements I must have the appropriate financial assurances in place, comply with orders requiring corrective action, pay penalties assessed by the courts or agreed to by me in a settlement agreement, and not have too many wells out of compliance with the inactive well rule (19.15.25.8 NMAC). If I am in violation of Part 5.9, I may not be allowed to drill, acquire or produce any additional wells, and will not be able to obtain any new injection permits. See 19.15.16.19 NMAC, 19.15.26.8 NMAC, 19.15.9.9 NMAC and 19.15.14.10 NMAC. If I am in violation of Part 5.9 the OCD may, after notice and hearing, revoke my existing injection permits. See 19.15.26.8 NMAC.
8. For injection wells, I understand that I must report injection on my monthly C-115 report and must operate my wells in compliance with 19.15.26 NMAC and the terms of my injection permit. I understand that I must conduct mechanical integrity tests on my injection wells at least once every five years. See 19.15.26.11 NMAC. I understand that when there is a continuous one-year period of non-injection into all wells in an injection or storage project or into a saltwater disposal well or special purpose injection well, authority for that injection automatically terminates. See 19.15.26.12 NMAC. I understand that if I transfer operation of an injection well to another operator, the OCD must approve the transfer of authority to inject, and the OCD may require me to demonstrate the well's mechanical integrity prior to approving that transfer. See 19.15.26.15 NMAC.
9. I am responsible for providing the OCD with my current address of record and emergency contact information, and I am responsible for updating that information when it changes. See 19.15.9.8.C NMAC. I understand that I can update that information on the OCD's website under "Electronic Permitting."
10. If I transfer well operations to another operator, the OCD must approve the change before the new operator can begin operations. See 19.15.9.9.B NMAC. I remain responsible for the wells and related facilities and all related regulatory filings until the OCD approves the operator change. I understand that the transfer will not relieve me of responsibility or liability for any act or omission which occurred while I operated the wells and related facilities.

Previous OperatorSignature: Printed Name: Charles AdcockTitle: Co-Chief Executive OfficerDate: 10/5/2015 Phone: 713-292-9510**New Operator**Signature: Printed Name: Britt PenceTitle: EVP OperationsDate: 10/5/15 Phone: 832-327-2252

Permit 210311

NMOCD ApprovalElectronic Signature: Paul Kautz, District 1Date: October 26, 2015

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
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District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Comments
Permit 210311

CHANGEOP COMMENTS

Operator: LRE OPERATING, LLC 1111 Bagby Houston, TX 77002	OGRID: 281994
	Permit Number: 210311
	Permit Type: ChangeOp

Comments

Created By	Comment	Comment Date
There are no Comments for this Permit		

NM OIL CONSERVATION

FEB 17 2016

OIL CONSERVATION DIVISION

1220 South St. Francis Dr.

RECEIVED Santa Fe, NM 87505

WELL API NO.

30-015-31123

5. Indicate Type of Lease

STATE ☒ FEE ☐

6. State Oil & Gas Lease No.

7. Lease Name or Unit Agreement Name

NO BLUFF 36 STATE COM

8. Well Number #2

9. OGRID Number 258350

10. Pool name or Wildcat

Illinois Camp, Morrow, North, gas (78890)

SUNDRY NOTICES AND REPORTS ON WELLS

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

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

2. Name of Operator

VANGUARD OPERATING, LLC

3. Address of Operator

c/o Mike Pippin LLC, 3104 N. Sullivan, Farmington, NM 87401

4. Well Location

Unit Letter H : 1980 feet from the North line and 760 feet from the East lineSection 36 Township 17-S Range 27-E NMPM Eddy County

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

3639' GL

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

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐TEMPORARILY ABANDON ☒ CHANGE PLANS ☐PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐DOWNHOLE COMMINGLE ☐CLOSED-LOOP SYSTEM ☒OTHER: Reperf Morrow & test & TA (If Necessary) ☒

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐COMMENCE DRILLING OPNS. ☐ P AND A ☐CASING/CEMENT JOB ☐OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

VANGUARD OPERATING, LLC would like to reperf the Morrow (9927-9964), swab test, & if necessary, temporarily abandon (TA) this well as follows: MIRUSU. TOH with all production equipment. Reperf the Morrow @ ~9927'-9964' & swab test. If necessary, TA as follows: Set a 5-1/2" CIBP @ ~9877' & top w/25 sx cmt. Complete as a TA gas well. Schedule & perform MIT test. This will give new operator, Vanguard, time to evaluate the Yeso.

Spud Date: 3/19/01

Drilling Rig Release Date: 4/16/01

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Mike Pippin TITLE Petroleum Engineer - Agent DATE 2/11/16Type or print name Mike Pippin E-mail address: mike@pippinllc.com PHONE: 505-327-4573

For State Use Only

APPROVED BY: [Signature] TITLE Dr. J. Spier DATE 2/18/16

Conditions of Approval (if any):

Submit 1 Copy To Appropriate District Office
District I - (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II - (575) 748-1283
811 S. First St., Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV - (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

Form C-103
Revised July 18, 2013

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

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 30-015-31123
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input checked="" type="checkbox"/> Other		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator VANGUARD OPERATING, LLC		6. State Oil & Gas Lease No.
3. Address of Operator 5847 SAN FELIPE, STE. 3000, HOUSTON, TEXAS, 77057		7. Lease Name or Unit Agreement Name NO BLUFF 36 STATE COM
4. Well Location Unit Letter <u>H</u> : <u>1,980</u> feet from the <u>NORTH</u> line and <u>760</u> feet from the <u>EAST</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM County <u>EDDY</u>		8. Well Number <u>2</u>
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 3639' GL		9. OGRID Number 258350
		10. Pool name or Wildcat ILLINOIS CAMP; MORROW, NORTH

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

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐
TEMPORARILY ABANDON ☒ CHANGE PLANS ☐
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐
DOWNHOLE COMMINGLE ☐
CLOSED-LOOP SYSTEM ☐
OTHER: ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐
COMMENCE DRILLING OPNS. ☐ P AND A ☐
CASING/CEMENT JOB ☐
OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Vanguard Operating, LLC is requesting to temporarily abandon (TA) this well to evaluate any future uphole recompletion opportunities in the Yeso. TA procedure is as follows:

1. Notify NMOCD 24 hours prior to MIRU.
2. MIRU WS. LD production equipment.
3. RU WL. Set CIBP @ 9,877' (top perf @ 9,927'). Cap w/ 35' of cement.
4. Contact NMOCD Artesia office to schedule MIT test (24 hour notice). Fill casing with treated water and pressure test casing to 500 psig for at least 30 minutes. Record pressure chart. Open all casing valves during the pressure test and report a flow or pressure change occurring immediately before, during, or immediately after the 30 minute pressure test.
5. RD WS & WL.
6. File subsequent C-103 and MIT chart.

LAST Prod 5/2014
TA status may be granted after a successful MIT test is performed.
Contact the OCD to schedule the test so it may be witnessed.

NM OIL CONSERVATION

ARTESIA DISTRICT

NOV 13 2018

Spud Date:

Ri

RECEIVED

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kyle Zimmermann TITLE Operations Engineer DATE 11/09/2018

Type or print name Kyle Zimmermann E-mail address: kzimmerman@vnrenergy.com PHONE: 432-202-0145

For State Use Only

APPROVED BY: [Signature] TITLE Staff Mgr DATE 11-14-18
Conditions of Approval (if any):

LEASE/WELL: NO BLUFF "36" STATE COM #002

LOCATION 1,980' FNL & 460' FEL
H-36-17S-27E

CO/ST: EDDY COUNTY, NEW MEXICO

FIELD: ILLINOIS CAMP; MORROW, NORTH

API NO. 30-015-31123

GR 3634

SPUDDED 3/19/2001

COMPLETED 4/28/2001

LAT 32.7923050

LONG -104.2260742

FORMATION TOPS PER C-105

GLORIETA	3199
TUBB	4059
ABO	5018
WOLFCAMP	6740
CISCO	8242
CANYON	8350
STRAWN	8881
ATOKA	9464

17-1/2" HOLE

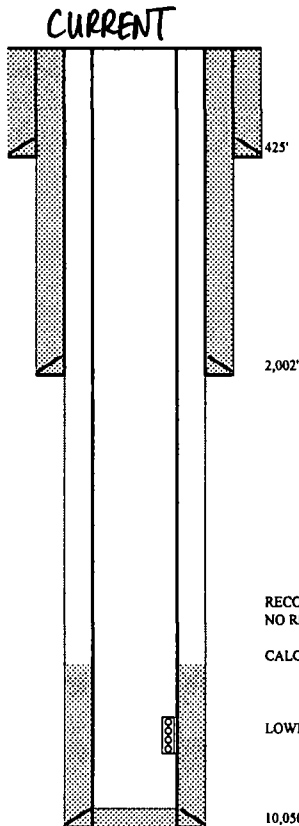
13-3/8" 61# H-40
CMT W/ 465 SX. CIRC.

12-1/4" HOLE

8-5/8" 32# J-55
CMT W/ 650 SX. CIRC.

7-7/8" HOLE

5-1/2" 17# N-80
CMT W/ 553 SX.



PBTD: 10,015'
TD: 10,050'

RECOMMENDATION TO PERF & SQZ. CMT DATED 7/15/2002
NO RECORD IF CARRIED OUT

CALC TOC @ 7,350'

LOWER MORROW PERFS: 9,927-9,964' (222 HOLES)

10,050'

KDZ 11-09-2018

LEASE/WELL: NO BLUFF "36" STATE COM #002

LOCATION 1,980' FNL & 460' FEL
H-36-17S-27E

CO/ST: EDDY COUNTY, NEW MEXICO

FIELD: ILLINOIS CAMP; MORROW, NORTH

API NO. 30-015-31123

GR 3634

SPUDDED 3/19/2001

COMPLETED 4/28/2001

LAT 32.7923050

LONG -104.2260742

FORMATION TOPS PER C-105

GLORIETA	3199
TUBB	4059
ABO	5018
WOLFCAMP	6740
CISCO	8242
CANYON	8350
STRAWN	8881
ATOKA	9464

17-1/2" HOLE

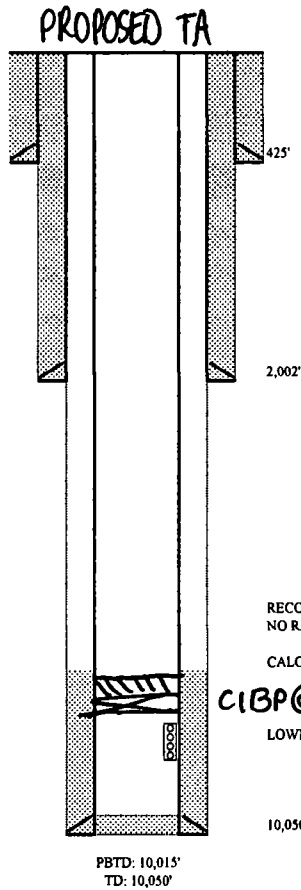
13-3/8" 61# H-40
CMT W/ 465 SX. CIRC.

12-1/4" HOLE

8-5/8" 32# J-55
CMT W/ 650 SX. CIRC.

7-7/8" HOLE

5-1/2" 17# N-80
CMT W/ 553 SX.



RECOMMENDATION TO PERF & SQZ. CMT DATED 7/15/2002
NO RECORD IF CARRIED OUT

CALC TOC @ 7,350'

CIBP@9,877'. CAP W/ 35' CMT.

LOWER MORROW PERFS: 9,927-9,964' (222 HOLES)

10,050'

KDZ 11-09-2018

District I

1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720

District II

811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720

District III

1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

**State of New Mexico
Energy, Minerals and Natural
Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505**

Form C-146
August 1, 2011
Permit 275994

Change of Operator Name

OGRID: 258350

Effective Date: 7/10/2019

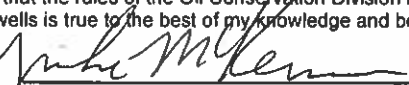
Previous Operator Name and Information

Name: VANGUARD OPERATING, LLC
Address: 5847 San Felipe, Suite 3000
Address: _____
City, State, Zip: Houston, TX 77057

New Operator Name and Information

Name: Grizzly Operating, LLC
Address: 5847 San Felipe, Suite 3000
Address: _____
City, State, Zip: Houston, TX 77057

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information given on this form and the certified list of wells is true to the best of my knowledge and belief.

Signature: 

Printed Name: Mike McKenna

Title: EH&S Manager

Date: 12/18/19 Phone: 832-399-3762

NMOCD Approval

Electronic Signature(s): Daniel J Sanchez District 5

Date: February 28, 2020

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Comments

Permit 275994

NAMECHANGE COMMENTS

Operator: Grizzly Operating, LLC 5847 San Felipe, Suite 3000 Houston, TX 77057	OGRID: 258350
	Permit Number: 275994
	Permit Type: NameChange

Comments

Created By	Comment	Comment Date
emathes	Grizzly Operating needs to have bonding in place before the Name Change can be approved.	1/9/2020
emathes	Bonding received	1/23/2020

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

NMOCD Rec'd: 10/011/2020 Form C-103
Revised July 18, 2013

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

WELL API NO. 30-015-31123
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name NO BLUFF 36 STATE COM
8. Well Number 2
9. OGRID Number 258350
10. Pool name or Wildcat CLAYTON BASIN; YATES-SEVEN RIVERS

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>	
2. Name of Operator GRIZZLY OPERATING, LLC	
3. Address of Operator 5847 SAN FELIPE, STE. 3000, HOUSTON, TEXAS, 77057	
4. Well Location Unit Letter <u>H</u> : <u>1,980</u> feet from the <u>NORTH</u> line and <u>460</u> feet from the <u>EAST</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM County <u>Eddy</u>	
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR	

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: <input type="checkbox"/>		OTHER: Attempt to TA <input checked="" type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Grizzly Operating, LLC attempted to TA the well as follows: MIRU WS. LD production equipment. Set CIBP @ 9,827' (top perf @ 9,927'). Cap w/ 35' of cmt via bailer. Load casing w/ 20 bbls. Pressure up to 500# but could not hold pressure. Well unable to pass MIT. Well will be P&A'd. Details of P&A operations to be submitted on separate sundry notice. Cmt top to be tagged as part of P&A operations.

Well to be plugged by 4-2021
Accepted for record NMOCD DS 10-21-2020

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kyle D Zimmerman TITLE Operations Engineer DATE 10/11/2020

Type or print name Kyle Zimmermann E-mail address: kzimmerman@grizzlyenergylc.com PHONE: 432-202-0145

For State Use Only

APPROVED BY: _____ TITLE _____ DATE _____

Conditions of Approval (if any): _____

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

Form C-103
Revised July 18, 2013

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

WELL API NO. 30-015-31123
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name NO BLUFF 36 STATE COM
8. Well Number 2
9. OGRID Number 258350
10. Pool name or Wildcat CLAYTON BASIN; YATES-SEVEN RIVERS

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>	
2. Name of Operator GRIZZLY OPERATING, LLC	
3. Address of Operator 5847 SAN FELIPE, STE. 3000, HOUSTON, TEXAS, 77057	
4. Well Location Unit Letter <u>H</u> : <u>1,980</u> feet from the <u>NORTH</u> line and <u>460</u> feet from the <u>EAST</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM County <u>Eddy</u>	
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR	

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input checked="" type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Please read COA's for max. squeeze pressure

1. Notify OCD 24 hrs prior to MIRU to P&A.
2. Tag top of cmt over CIBP @ 9,827'. Cmt top should be @ 9,792'. Circ MLF.
3. Perf @ 9,514 & sqz 50 sx "H" 9,414-9,514' (Atoka). WOC & tag.
4. Perf @ 8,931' & sqz 50 sx "H" 8,831-8,931' (Strawn). WOC & tag.
5. Perf @ 8,400' & sqz 100 sx "H" 8,200-8,400' (Cisco, Canyon). WOC & tag.
6. Perf @ 6,790' & sqz 50 sx "C" 6,690-6,790' (Wolfcamp). WOC & tag. Perf @ 6740'
7. Perf @ 5,068' & sqz 50 sx "C" 4,968-5,068' (Abo). WOC & tag. Perf @ 5018'
8. Perf @ 4,109' & sqz 50 sx "C" 4,009-4,109' (Tubb). WOC & tag.
9. Perf @ 3,249' & sqz 50 sx "C" 3,149-3,249' (Glorieta). WOC & tag. Perf @ 3199'
10. Perf @ 2,052' & sqz 50 sx "C" 1,952-2,052' (8-5/8" shoe). WOC & tag.
11. Perf @ 475' & sqz 50 sx "C" 375-475' (13-3/8" shoe). WOC & tag.
12. Perf @ 100' & circ cmt to surface via 5-1/2" x 8-5/8" x 13-3/8" csg ann. Verify cmt to surf behind all strings.
13. RD P&A equipment. Cut off wellhead. Install dry hole marker. Clean location and move off.

Spud Date:

Rig Release Date:

****SEE ATTACHED COA's****

MUST BE PLUGGED BY 10/27/2021

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kyle D Zimmermann TITLE Operations Engineer DATE 10/11/2020

Type or print name Kyle Zimmermann E-mail address: kzimmerman@grizzlyenergyllc.com PHONE: 432-202-0145

For State Use Only

APPROVED BY: [Signature] TITLE Staff Manager DATE 10/27/2020

Conditions of Approval (if any):

LEASE/WELL: NO BLUFF "36" STATE COM #002

LOCATION1,980' FNL & 460' FEL
H-36-17S-27E

CO/ST:EDDY COUNTY, NEW MEXICO

FIELD:ILLINOIS CAMP, MORROW, NORTH

API NO.30-015-31123

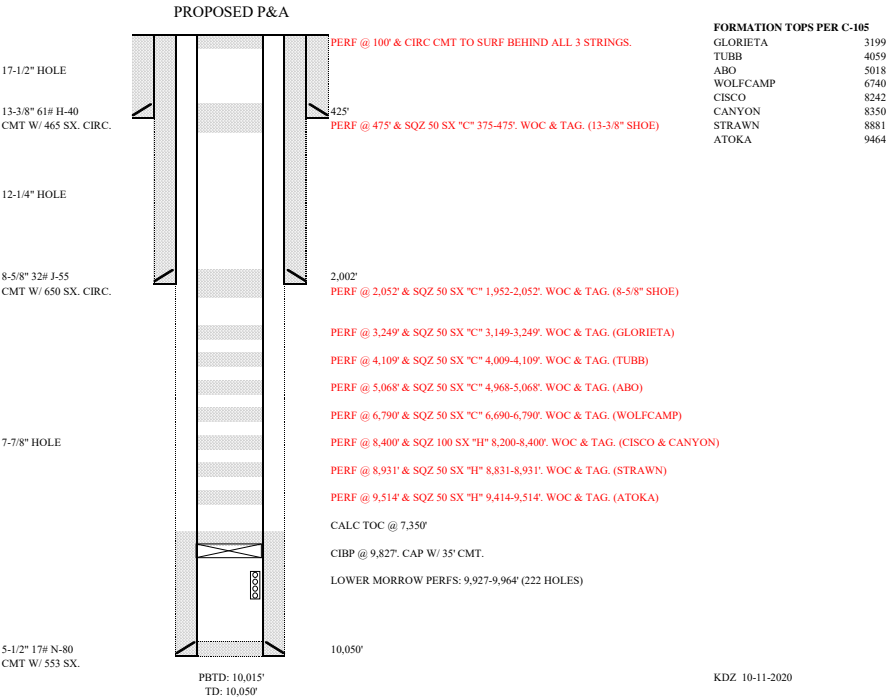
GR3634

SPUDDED3/19/2001

COMPLETED4/28/2001

LAT32.7923050

LONG-104.2260742



LEASE/WELL:

NO BLUFF "36" STATE COM #002

LOCATION

1.980' FNL & 460' FEL
H-36-17S-27E

CO/ST:

EDDY COUNTY, NEW MEXICO

FIELD:

ILLINOIS CAMP; MORROW, NORTH

API NO.

30-015-31123

GR

3634

SPUDDED

3/19/2001

COMPLETED

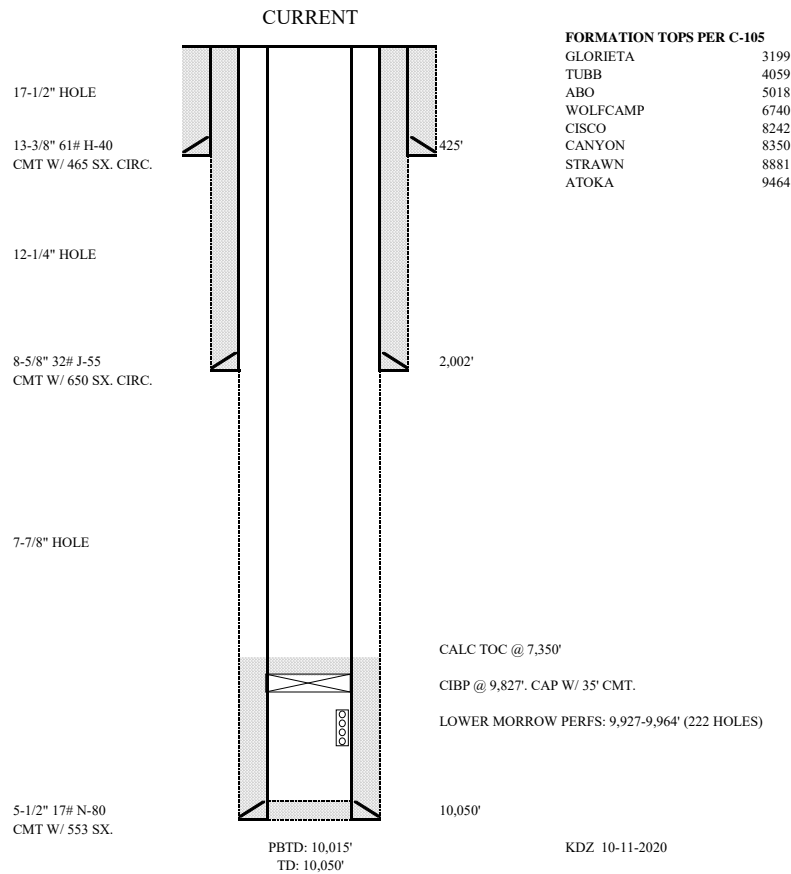
4/28/2001

LAT

32.7923050

LONG

-104.2260742



CONDITIONS FOR PLUGGING AND ABANDONMENT

OCD - Southern District

The following is a guide or checklist in preparation of a plugging program, this is not all inclusive and care must be exercised in establishing special plugging programs in unique and unusual cases, **Notify NMOCD District Office II at (575)-748-1283 at least 24 hours before beginning work. After MIRU rig will remain on well until it is plugged to surface. OCD is to be notified before rig down. Company representative will be on location during plugging procedures.**

1. A notice of intent to plug and abandon a wellbore is required to be approved before plugging operations are conducted. A cement evaluation tool is required in order to ensure isolation of producing formations, protection of water and correlative rights. A cement bond log or other accepted cement evaluation tool is to be provided to the division for evaluation if one has not been previously run or if the well did not have cement circulated to surface during the original casing cementing job or subsequent cementing jobs. Insure all bradenheads have been exposed, identified and valves are operational prior to rig up.
2. Closed loop system is to be used for entire plugging operation. Upon completion, contents of steel pits are to be hauled to a permitted disposal location.
3. Trucking companies being used to haul oilfield waste fluids to a disposal – commercial or private – shall have an approved NMOCD C-133 permit. A copy of this permit shall be available in each truck used to haul waste products. It is the responsibility of the operator as well as the contractor, to verify that this permit is in place prior to performing work. Drivers shall be able to produce a copy upon request of an NMOCD Field inspector.
4. Filing a subsequent C-103 will serve as notification that the well has been plugged.
5. A final C-103 shall be filed (and a site inspection by NMOCD Inspector to determine if the location is satisfactorily cleaned, all equipment, electric poles and trash has been removed to Meet NMOCD standards) before bonding can be released.
6. If work has not begun within 1 Year of the approval of this procedure, an extension request must be file stating the reason the well has not been plugged.
7. Squeeze pressures are not to exceed 500 psi, unless approval is given by NMOCD.
8. Produced water **will not** be used during any part of the plugging operation.
9. Mud laden fluids must be placed between all cement plugs mixed at 25 sacks per 100 bbls of water.
10. All cement plugs will be a minimum of 100' in length or a minimum of 25 sacks of cement, whichever is greater. 50' of calculated cement excess required for inside casing plugs and 100% calculated cement excess required on outside casing plugs.
11. Class 'C' cement will be used above 7500 feet.
12. Class 'H' cement will be used below 7500 feet.
13. A cement plug is required to be set 50' above and 50' below, casing stubs, DV tools, attempted casing cut offs, cement tops outside casing, salt sections and anywhere the casing is perforated, these plugs require a 4 hour WOC and then will be tagged
14. All Casing Shoes Will Be Perforated 50' below shoe depth and Attempted to be Squeezed, cement needs to be 50' above and 50' Below Casing Shoe inside the Production Casing.

16. When setting the top out cement plug in production, intermediate and surface casing, wellbores should remain full at least 30 minutes after plugs are set
17. A CIBP is to be set within 100' of production perforations, capped with 100' of cement, WOC 4 hours and tag.
18. A CIBP with 35' of cement may be used in lieu of the 100' plug if set with a bailer. This plug will be placed within 100' of the top perforation, (WOC 4 hrs and tag).
19. No more than 3000' is allowed between cement plugs in cased hole and 2000' in open hole.
20. Some of the Formations to be isolated with cement plugs are: These plugs to be set to isolate formation tops
 - A) Fusselman
 - B) Devonian
 - C) Morrow
 - D) Wolfcamp
 - E) Bone Springs
 - F) Delaware
 - G) Any salt sections
 - H) Abo
 - I) Glorieta
 - J) Yates.
 - K) **Potash---** (In the R-111-P Area (Potash Mine Area), a solid cement plug must be set across the salt section. Fluid used to mix the cement shall be saturated with the salts that are common to the section penetrated and in suitable proportions, not more than 3% calcium chloride (by weight of cement) will be considered the desired mixture whenever possible, WOC 4 hours and tag, this plug will be 50' below the bottom and 50' above the top of the Formation.
21. If cement does not exist behind casing strings at recommended formation depths, the casing can be cut and pulled with plugs set at recommended depths. If casing is not pulled, perforations will be shot and cement squeezed behind casing, WOC and tagged. These plugs will be set 50' below formation bottom to 50' above formation top inside the casing

DRY HOLE MARKER REQUIREMENTS

The operator shall mark the exact location of the plugged and abandoned well with a steel marker not less than four inches in diameter, 3' below ground level with a plate of at least ¼" welded to the top of the casing and the dry hole marker welded on the plate with the following information welded on the dry hole marker:

1. Operator name 2. Lease and Well Number 3. API Number 4. Unit Letter 5. Quarter Section (feet from the North, South, East or West) 6. Section, Township and Range 7. Plugging Date 8. County (SPECIAL CASES)-----AGRICULTURE OR PRARIE CHICKEN BREEDING AREAS

In these areas, a below ground marker is required with all pertinent information mentioned above on a plate, set 3' below ground level, a picture of the plate will be supplied to NMOCD for record, the exact location of the marker (longitude and latitude by GPS) will be provided to NMOCD (We typically require a current survey to verify the GPS)

SITE REMEDIATION DUE WITHIN ONE YEAR OF WELL PLUGGING COMPLETION

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

Form C-103
Revised July 18, 2013

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

WELL API NO. 30-015-31123
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name NO BLUFF 36 STATE COM
8. Well Number 2
9. OGRID Number 258350
10. Pool name or Wildcat CLAYTON BASIN; YATES-SEVEN RIVERS

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>	
2. Name of Operator GRIZZLY OPERATING, LLC	
3. Address of Operator 5847 SAN FELIPE, STE. 3000, HOUSTON, TEXAS, 77057	
4. Well Location Unit Letter <u>H</u> : <u>1,980</u> feet from the <u>NORTH</u> line and <u>460</u> feet from the <u>EAST</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM County <u>Eddy</u>	
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR	

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: <input type="checkbox"/>		OTHER: Attempt to TA <input checked="" type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Grizzly Operating, LLC attempted to TA the well as follows: MIRU WS. LD production equipment. Set CIBP @ 9,827' (top perf @ 9,927'). Cap w/ 35' of cmt via bailer. Load casing w/ 20 bbls. Pressure up to 500# but could not hold pressure. Well unable to pass MIT. Well will be P&A'd. Details of P&A operations to be submitted on separate sundry notice. Cmt top to be tagged as part of P&A operations.

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kyle D Zimmerman TITLE Operations Engineer DATE 10/11/2020

Type or print name Kyle Zimmermann E-mail address: kzimmerman@grizzlyenergylc.com PHONE: 432-202-0145

For State Use Only

APPROVED BY: Accepted for record – NMOCD gc 10/27/2020 DATE

Conditions of Approval (if any):

Submit 1 Copy To Appropriate District Office
 District I - (575) 393-6161
 1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
 Energy, Minerals and Natural Resources
OIL CONSERVATION DIVISION
 1220 South St. Francis Dr.
 Santa Fe, NM 87505

Form C-103
 Revised July 18, 2013

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 30-015-31123
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Grizzly Operating, LLC		6. State Oil & Gas Lease No.
3. Address of Operator 5847 San Felipe St., Suite 3000, Houston, TX 77057		7. Lease Name or Unit Agreement Name NO BLUFF 36 STATE COM
4. Well Location Unit Letter <u>H</u> : <u>1980</u> feet from the <u>North</u> line and <u>460</u> feet from the <u>East</u> line Section <u>36</u> Township <u>17S</u> Range <u>27E</u> NMPM County <u>Eddy</u>		8. Well Number <u>2</u>
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 3634' GR		9. OGRID Number 258350
		10. Pool name or Wildcat CLAYTON BASIN; YATES-SEVEN RIVERS

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input checked="" type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

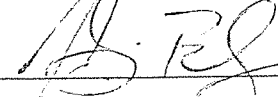
13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

- 11/12/20 Set CIBP at 9827'. Spot 25 sx class H cmt on top of CIBP at 9827'. Tag TOC at 9548' inside 5 1/2 csg.
- 11/13/20 Perf at 9514'. Could not get inject rate. Notify Gilbert w/OCD. Drop down to 9548'. Spot 25 sx class H cmt. Tag TOC at 9339' inside 5 1/2 csg. Perf at 8931'. Could not get inject rate. Drop down to 8981'. Spot 25 sx class H cmt. Tag TOC at 8768' inside 5 1/2 csg.
- 11/16/20 Perf at 8400'. Could not get inject rate. Notify Gilbert w/OCD. Drop down to 8450'. Spot 35 sx class H cmt. Tag TOC at 8144' inside 5 1/2 csg.
- 11/17/20 Perf at 6740'. Sqz'd 50 sx class C cmt. Tag TOC at 6619' inside 5 1/2 csg. Perf at 5018'. Sqz'd 50 sx class C cmt. Tag TOC at 4894' inside 5 1/2 csg.
- 11/18/20 Perf at 4109'. Sqz'd 50 sx class C cmt. Tag TOC at 3958' inside 5 1/2 csg. Perf at 3199'. Sqz'd 50 sx class C cmt. Tag TOC at 3050' inside 5 1/2 csg.
- 11/19/20 Perf at 2052'. Sqz'd 50 sx class C cmt. Tag TOC at 1882' inside 5 1/2 csg. Perf at 475'. Circulate 320 sx class C cmt to surface inside and behind 5 1/2 - 8 5/8 csg. Cut off wellhead, back free location. RD P&A equipment. Job completed.


Spud Date: Rig Release Date:

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

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE  TITLE Agent DATE 10/29/20

Type or print name Jimmy Bagley E-mail address: sunsetwellservice@yahoo.com PHONE: 432-561-8600
For State Use Only

APPROVED BY:  TITLE Staff Manager DATE 12/29/2020
 Conditions of Approval (if any):

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
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Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 11742

CONDITIONS OF APPROVAL

Operator:	SUNSET WELL SERVICE HOLDINGS I	P.O. Box 7139	Midland, TX79708	OGRID:	235634	Action Number:	11742	Action Type:	C-103F
OCD Reviewer	Condition								
gcordero	None								

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State of New Mexico
Energy, Minerals and Natural
Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505
Change of Operator

Form C-145
Revised May 19, 2017

Permit 291904

Previous Operator Information

OGRID: 258350
Name: Grizzly Operating, LLC
Address: 5847 San Felipe, Suite 3000
City, State, Zip: Houston, TX 77057

New Operator Information

Effective Date: Effective on the date of approval by the OCD
OGRID: 330447
Name: Contango Resources, Inc.
Address: 717 Texas Ave.
Suite 2900
City, State, Zip: Houston, TX 77002

I hereby certify that the rules of the Oil Conservation Division ("OCD") have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, Contango Resources, Inc. certifies that it has read and understands the following synopsis of applicable rules.

PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17.13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17.11(l) NMAC.

Contango Resources, Inc. understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.

As the operator of record of wells in New Mexico, Contango Resources, Inc. agrees to the following statements:

1. Initials I am responsible for ensuring that the wells and related facilities comply with applicable statutes and rules, and am responsible for all regulatory filings with the OCD. I am responsible for knowing all applicable statutes and rules, not just the rules referenced in this list. I understand that the OCD's rules are available on the OCD website under "Rules," and that the Water Quality Control Commission rules are available on the OCD website on the "Publications" page.
2. Initials I understand that if I acquire wells from another operator, the OCD must approve the operator change before I begin operating those wells. See Subsection B of 19.15.9.9 NMAC. I understand that if I acquire wells or facilities subject to a compliance order addressing inactive wells or environmental cleanup, before the OCD will approve the operator change it may require me to enter into an enforceable agreement to return those wells to compliance. See Paragraph (2) of Subsection C of 19.15.9.9 NMAC.
3. Initials I must file a monthly C-115 report showing production for each non-plugged well completion for which the OCD has approved an allowable and authorization to transport, and injection for each injection well. See 19.15.7.24 NMAC. I understand that the OCD may cancel my authority to transport from or inject into all the wells I operate if I fail to file C-115 reports. See Subsection C of 19.15.7.24 NMAC.
4. Initials I understand that New Mexico requires wells that have been inactive for certain time periods to be plugged or placed in approved temporary abandonment. See 19.15.25.8 NMAC. I understand the requirements for plugging and approved temporary abandonment in 19.15.25 NMAC. I understand that I can check my compliance with the basic requirements of 19.15.25.8 NMAC by using the "Inactive Well List" on OCD's website.
5. Initials I must keep current with financial assurances for well plugging. I understand that New Mexico requires each state or fee well that has been inactive for more than two years and has not been plugged and released to be covered by a single-well financial assurance or a "blanket plugging financial assurance for wells in temporarily abandoned statuses", even if the well is also covered by a blanket financial assurance and even if the well is on approved temporary abandonment status. See Subsection C of 19.15.8.9 NMAC. I understand that I can check my compliance with the financial assurance requirement by using the "Inactive Well Additional Financial Assurance Report" on the OCD's website.
6. Initials I am responsible for reporting and remediating releases pursuant to 19.15.29 NMAC. I understand the OCD will look to me as the operator of record to take corrective action for releases at my wells and related facilities, including releases that occurred before I became operator of record. I am responsible for conducting my own due diligence for any releases that have occurred prior to becoming operator of my wells and related facilities and am responsible for any open releases or unreported releases.
7. Initials I have read 19.15.5.9 NMAC, commonly known as "Part 5.9," and understand that to be in compliance with its requirements I must have the appropriate financial assurances in place, comply with orders requiring corrective action, pay penalties assessed by the courts or agreed to by me in a settlement agreement, and not have too many wells out of compliance with the inactive well rule (19.15.25.8 NMAC). If I am in violation of Part 5.9, I may not be allowed to drill, acquire or produce any additional wells, and will not be able to obtain any new injection permits. See 19.15.16.19 NMAC, 19.15.26.8 NMAC, 19.15.9.9 NMAC and 19.15.14.10 NMAC. If I am in violation of Part 5.9 the OCD may, after notice and hearing, revoke my existing injection permits and seek other relief. See 19.15.26.8 NMAC and 19.15.5.10 NMAC.
8. Initials For injection wells, I understand that I must report injection on my monthly C-115 report and must operate my wells in compliance with 19.15.26 NMAC and the terms of my injection permit. I understand that I must conduct mechanical integrity tests on my injection wells at least once every five years. See 19.15.26.11 NMAC. I understand that when there is a continuous one-year period of non-injection into all wells in an injection or storage project or into a saltwater disposal well or special purpose injection well, authority for that injection automatically terminates. See 19.15.26.12 NMAC. I understand that if I transfer operation of an injection well to another operator, the OCD must approve the transfer of authority to inject, and the OCD may require me to demonstrate the well's mechanical integrity prior to approving that transfer. See 19.15.26.15 NMAC.
9. Initials I am responsible for providing the OCD with my current address of record and emergency contact information, and I am responsible for updating that information when it changes. See Subsection C of 19.15.9.8 NMAC. I understand that I can update that information on the OCD's website under "Electronic Permitting."
10. Initials If I transfer well operations to another operator, the OCD must approve the change before the new operator can begin operations. See Subsection B of 19.15.9.9 NMAC. I remain responsible for the wells and related facilities and all related regulatory filings until the OCD approves the operator change. I understand that the transfer will not relieve me of responsibility or liability for any act or omission which occurred while I operated the wells and related facilities.
11. Initials No person with an interest exceeding 25% in the undersigned company is, or was within the last 5 years, an officer, director, partner or person with a 25% or greater interest in another entity that is not currently in compliance with Subsection A of 19.15.5.9 NMAC.
12. Initials MOC Rule Subsection E and F of 19.15.16.8 NMAC: An operator shall have 90 days from the effective date of an operator name change to change the operator name on the well sign unless the division grants an extension time, for good cause shown, along with a schedule for making the changes. Each sign shall show the (1) well number, (2) property name, (3) operator's name, (4) location by footage, quarter-quarter section, township and range (or unit letter can be substituted for the quarter-quarter section), and (5) API number.

C-145

Page 3 of 3

I hereby certify I understand the above. The statements I have made are true and correct and a condition precedent to the Oil Conservation Division accepting this Change of Operator.

Previous Operator

Signature:

Printed Name:

Title:

Date:

[Signature]
STEVE W. ALLEN
CEO
2/1/21 Phone: 832-399-3777

New Operator

Signature:

Printed Name:

Title:

Date:

[Signature]
E. Joseph Grady
Senior Vice President & CFO
1/31/21 Phone: 713-236-7400

Permit 2 1904

NMOCD Approval

Electronic Signature(s): Daniel J Sanchez, District 2

Date: March 26, 2021

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720

District II
811 S. First St., Artesia, NM 88210
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District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
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State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Wells Selected for Transfer

Permit 291904

1 Well Selected for Transfer

From:	Grizzly Operating, LLC	OGRID:	258350
To:	Contango Resources, Inc.	OGRID:	330447

OCD District: Artesia (1 Well selected.)

Property	Well	Lease Type	ULSTR	OCD Unit	API	Pool ID	Pool Name	Well Type
330112	NO BLUFF 36 STATE COM #002	S	H-36-17S-27E	H	30-015-31123			G

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Energy, Minerals and Natural Resources
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Santa Fe, NM 87505

Comments

Permit 291904

CHANGEOP COMMENTS

Operator: Grizzly Operating, LLC 5847 San Felipe, Suite 3000 Houston, TX 77057	OGRID: 258350
	Permit Number: 291904
	Permit Type: ChangeOp

Comments

Created By	Comment	Comment Date
------------	---------	--------------

There are no Comments for this Permit

No Bluff 36 State Com 002, 015-31123







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State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

DEFINITIONS

Action 67323

DEFINITIONS

Operator: Contango Resources, Inc. 717 Texas Ave. Houston, TX 77002	OGRID: 330447
	Action Number: 67323
	Action Type: [C-103] Sub. Release After P&A (C-103Q)

DEFINITIONS

For the sake of brevity and completeness, please allow for the following in all groups of questions and for the rest of this application:

- lease and well location, hereinafter "location";
- flowlines or pipelines, hereinafter "pipelines";
- and non-retrieved or abandoned, hereinafter "abandoned".

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QUESTIONS

Action 67323

QUESTIONS

Operator: Contango Resources, Inc. 717 Texas Ave. Houston, TX 77002	OGRID: 330447
	Action Number: 67323
	Action Type: [C-103] Sub. Release After P&A (C-103Q)

QUESTIONS

Subsequent Report of: Location Ready For OCD Inspection After P&A	
Was this the last remaining or only well on the location	No
Are there any abandoned pipelines that are going to remain on the location	No
Is there any production equipment or structure (not including steel marker, poured onsite concrete bases, or pipelines) that is going to remain on the location	No
If any production equipment or structure is to remain on the location, please specify	Not answered.

Site Evaluation

Please answer all questions in this group.

Have all the required pits been remediated in compliance with OCD rules and the terms of the Operator's pit permit and closure plan	Yes
Have the rat hole and cellar been filled and leveled	Yes
Have the cathodic protection holes been properly abandoned	Yes
Has a steel marker, at least 4 inches in diameter and at least 4 feet above ground level, been set in concrete	Yes
The (concrete-set) steel marker shows: Must attach marker photograph(s). *	THE OPERATOR NAME, LEASE NAME AND WELL NUMBER AND LOCATION, INCLUDING UNIT LETTER, SECTION, TOWNSHIP AND RANGE, SHALL BE WELDED, STAMPED OR OTHERWISE PERMANENTLY ENGRAVED INTO THE MARKER'S METAL.
Has the location been leveled as nearly as possible to original ground contour	Yes
Have all the required pipelines and other production equipment been cleared	Yes
Has all the required junk and trash been cleared from the location	Yes
Have all the required anchors, dead men, tie downs and risers have been cut off at least two feet below ground level	Yes
Have all the required metal bolts and other materials have been removed	Yes

Poured onsite concrete bases do not have to be removed.

Have all the the required portable bases been removed	Yes
Have all other environmental concerns have been addressed as per OCD rules	Yes
If any environmental concerns remain on the location, please specify	none

* Proof of the site marker (photograph) is required.

Please submit any other site photographs that would assist in documenting the above answers, site features, additional concerns, or other nearby / remaing structures and equipment.

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QUESTIONS, Page 2

Action 67323

QUESTIONS (continued)

Operator: Contango Resources, Inc. 717 Texas Ave. Houston, TX 77002	OGRID: 330447
	Action Number: 67323
	Action Type: [C-103] Sub. Release After P&A (C-103Q)

QUESTIONS

Abandoned Pipelines	
<i>Only need to provide answers in this group, if any pipelines have been abandoned (in accordance with 19.15.35.10 NMAC).</i>	
Have all fluids have been removed from any abandoned pipelines	<i>Not answered.</i>
Have all abandoned pipelines been confirmed to NOT contain additional regulated NORM, other than that which accumulated under normal operation	<i>Not answered.</i>
Have all accessible points of abandoned pipelines been permanently capped	<i>Not answered.</i>

Last Remaining or Only Well on the Location	
<i>Please answer all questions that apply in this group, specifically if there is no longer going to be any well or facility remaining at this location.</i>	
Have all electrical service poles and lines been removed from the location	Yes
Is there any electrical utility distribution infrastructure that is remaining on the location	No
Have all the battery and pit location(s) have been remediated in compliance with OCD rules and the terms of the Operator's pit permit and closure plan	Yes
Have all the retrievable pipelines, production equipment been removed from the location	Yes
Has all the junk and trash been removed from the location	Yes

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District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

ACKNOWLEDGMENTS

Action 67323

ACKNOWLEDGMENTS

Operator: Contango Resources, Inc. 717 Texas Ave. Houston, TX 77002	OGRID: 330447
	Action Number: 67323
	Action Type: [C-103] Sub. Release After P&A (C-103Q)

ACKNOWLEDGMENTS

<input checked="" type="checkbox"/>	I hereby certify that all the work has been completed for this location and the site is ready for an OCD scheduled inspection.
-------------------------------------	--

District I

1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720

District II

811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720

District III

1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
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CONDITIONS

Action 67323

CONDITIONS

Operator: Contango Resources, Inc. 717 Texas Ave. Houston, TX 77002	OGRID: 330447
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	Action Type: [C-103] Sub. Release After P&A (C-103Q)

CONDITIONS

Created By	Condition	Condition Date
gcordero	None	12/20/2021

Appendix X.2 – Injected Fluids Monitoring Plan

January 28, 2022 (**REVISED MARCH 11, 2022**)

Via Electronic Mail

Phillip Goetze
Supervisor – UIC Permitting
New Mexico Oil Conservation Division (Albuquerque Office)
Energy Minerals and Natural Resources Department
5200 Oakland Avenue, NE
Albuquerque, New Mexico 87113

RE: HollyFrontier Navajo Refining LLC / Artesia Refinery / Renewable Diesel Unit /
Verification of Non-Hazardous Injection Fluids from RDU Process – Pilot
Sampling Plan

Dear Mr. Goetze:

Per our December 8, 2021 conference call, enclosed herein is the requested “Verification of Non-hazardous Injection Fluids from RDU Process - Pilot Sampling Plan” (presented as Appendix A). This Pilot Sampling Plan (“PSP”) is intended to characterize the HollyFrontier Navajo Refining LLC (“Navajo”) effluent discharge from the on-site wastewater treatment plant (“WWTP”) and the blowdown from certain cooling towers at Navajo’s Artesia Refinery once operations from the new Renewable Diesel Unit (“RDU”) have commenced. The WWTP effluent is currently discharged to both the City of Artesia POTW as well as four underground injection control (“UIC”) wells regulated collectively under the December 2017 Class I Non-Hazardous Waste Injection Well Discharge Permit UICI-8 as follows:

- Well WDW-1
 - API #30-015-27592 under Permit UICI-8-1 (Facility ID = fCJC2117350329)
- Well WDW-2
 - API #30-015-20894 under Permit UICI-8-2 (Facility ID = fCJC2117351808)
- Well WDW-3
 - API #30-015-26575 under Permit UICI-8-3 (Facility ID = fCJC2117354810)
- Well WDW-4
 - API #30-015-44677 under Permit UICI-8-4 (Facility ID = fCJC2117357871)

The New Mexico Oil Conservation Division, Engineering Bureau (“OCD”) has requested the PSP and subsequent sampling program to confirm that RDU operations will not result in the WWTP effluent to the UIC wells becoming characteristically hazardous under RCRA. The results of the sampling will be compared to the characteristic levels contained in 40 Code of Federal Regulations (CFR) Section 261.21 through 261.24 for ignitability, corrosivity, reactivity, and toxicity. Specific parameters of concern given in the PSP are not only those in 40 CFR 261.24(b), but also include those listed in Section 2.A of the December 2017 UICI-8 Discharge Permit. The December 2017 Permit parameters are currently monitored (and will continue to be once the RDU is in operation)

on a quarterly basis. To determine if the new RDU operations have any additional potential effect on the quality (concentration) of the discharge to the UIC wells, the results from the PSP program will also be compared to historical monitoring data (pre-RDU).

Appendix B is the November 6, 2021 letter from Navajo to OCD. As explained in this letter, and pending confirmation by the PSP program:

- Current Refinery WWTP capacity will be sufficient to treat the additional RDU wastewater stream, and any corresponding increase in constituent concentrations will be reduced via treatment such that Navajo will be able to maintain compliance with current limitations set forth in Discharge Permit UICI-8.
- The RDU wastewater stream will not change the current flow and concentration characteristics of the Refinery WWTP discharge to the UIC well network; therefore, the RDU project will not affect the current terms of the UICI-8 Discharge Permit. In other words, effluent discharge quantity (flow), quality (concentrations), and injection pressure will meet current permitted limits/levels.

Navajo has reviewed all provisions of the December 2017 Class I Non-Hazardous Waste Injection Well Discharge Permit UICI-8 and cannot identify any amendments/changes that need to be made to accommodate the RDU discharge. The addition of RDU activities will not alter the operation, maintenance, or monitoring of the four underground injection wells. Specifically, under Section 1.G (Modification and Termination), and subject to confirmation by the PSP program, Navajo believes that permit modification for the existing UICI Discharge Permit should not be necessary. Based on results from the PSP program, OCD and Navajo can together make a determination as to whether further sampling may be warranted and/or if any other changes/revisions to the current Discharge Permit UICI-8 are necessary during permit renewal in 2022.

If you have any questions, please contact me by e-mail at kawika.tupou@hollyfrontier.com or by phone at 575-748-3311.

Sincerely,

Signed Jan 28, 2022

Kawika Tupou
Environmental Manager

Cc: Becca Crumpler, HollyFrontier Renewables
Mike Holder, HollyFrontier Corporation

APPENDIX A - HollyFrontier Navajo Refining LLC		
Section:		Page: 1 of 3
Title: Verification of Non-hazardous Injection Fluids from RDU Process- Pilot Sampling Plan		
Status: Active	Revision Number: 0	Revision Date: 11 Mar 2022

Purpose

This Pilot Sampling Plan (“PSP”) is intended to characterize the HollyFrontier Navajo Refining LLC (“Navajo”) effluent discharge from the on-site wastewater treatment plant (“WWTP”) at Navajo’s Artesia Refinery once operations from the new Renewable Diesel Unit (“RDU”) have commenced. The WWTP effluent is currently discharged to both the City of Artesia POTW as well as four underground injection control (“UIC”) wells regulated collectively under Class I Non-Hazardous Waste Injection Well Discharge Permit UICI-8 as follows:

1. Well WDW-1 (API #30-015-27592) under Permit UICI-8-1
2. Well WDW-2 (API #30-015-20894) under Permit UICI-8-2
3. Well WDW-3 (API #30-015-26575) under Permit UICI-8-3
4. Well WDW-4 (API #30-015-44677 under Permit UICI-8-4

In addition to the WWTP effluent, this PSP also covers sampling of the cooling tower blowdown (“CTB”) from units Y-1, Y-2, Y-11, and Y-12 (which currently exist for refinery operations) as well as Y-26 (new cooling tower for RDU operations). The CTB sampling is included due to the potential discharge of these sources to the UIC wells as shown in Attachment 1. During normal conditions, all CTB discharges directly to the City POTW; however, CTB can be rerouted to the Refinery’s onsite WWTP during emergency conditions for ultimate discharge to the City POTW and/or to the Refinery’s UIC well network.

Sample Locations for WWTP Effluent and Cooling Tower Blowdown

Under Discharge Permit UICI-8, Section 2.A, Navajo collects quarterly samples of injected waste fluids (i.e., WWTP effluent) at the injection well pumps. This routine quarterly sampling is performed by AquaMicrobics according to the Procedure document provided in Attachment 2, which includes a map of the sampling location. This same sampling location will be utilized for the PSP to allow comparison of the historical quarterly data with data representative of RDU operations. The injection well pumps sampling site is representative of the WWTP effluent and is shown schematically on Attachment 1.

The PSP sample location for the CTB will be the current sample location for the combined CTB (from Y-1, Y-2, Y-11, and Y-12) and WWTP effluent that discharges to the POTW (schematically shown on Attachment 1). However, prior to the PSP sampling events, all WWTP effluent will be physically blocked from the City POTW (i.e., using the control valve as well as a manual block valve) and diverted to the injection wells so that the resulting discharge to the POTW only consists of CTB and can be sampled without the contribution of the WWTP effluent. A separate sampling point for just CTB does not currently exist; hence the procedure above. The CTB sampling Procedure document is provided in Attachment 3.

APPENDIX A - HollyFrontier Navajo Refining LLC		
Section:		Page: 2 of 3
Title: Verification of Non-hazardous Injection Fluids from RDU Process- Pilot Sampling Plan		
Status: Active	Revision Number: 0	Revision Date: 11 Mar 2022

Sample Type and Parameters

In accordance with Attachments 2 and 3, both samples (WWTP effluent to injection wells and CTB to City POTW) will be collected as grab samples representative of normal discharge flow conditions. The list of parameters for both the WWTP effluent and the CTB discharge will include those given in 40 CFR 261.24(b) as well as those required under Discharge Permit UICI-8, Section 2.A (quarterly monitoring); a summary of these parameters along with corresponding analytical methods and laboratory reporting levels (RLs) is given in Attachment 4. These parameters and methods have been identified in conjunction with the New Mexico Oil Conservation Division (OCD) as the most appropriate for the UIC well program at Navajo over the life of the program and serve to characterize the Refinery effluent. Hall Environmental Laboratory (NELAP Certified) will perform all analyses under the chain-of-custody shown in Attachment 2, along with Level I standard QA/QC procedures.

Sample Frequency and Duration

Prior to RDU startup, sampling of cooling tower blowdown to the City POTW will occur once per week for three weeks since no historical data for CTB exist for all the parameters of concern given in Attachment 4. No weekly pre-RDU sampling for the WWTP effluent to the wells is planned or necessary due to the existence of the historical quarterly database required under the December 2017 Permit.

Once the RDU is online and corresponding operations are normal and representative, samples for the WWTP effluent and CTB will be collected concurrently once per week for four weeks (i.e., a total of four sampling events post-RDU startup). Individual sample events will be collected on the same day of the week and at the same time of the day. However, if the day/time must be slightly altered due to weather, safety, or operational issues (e.g., upset conditions that prevent discharge), Navajo will notify OCD at the time of sampling.

Data Compilation and Comparison

Per OCD request, Navajo will expedite lab results. According to Hall Environmental Analysis Laboratory (contractor), the standard turnaround time for the December 2017 Permit quarterly UIC sampling is 10 days, but this will be expedited to about 5 days for this PSP.

Analytical results from the three pre-RDU and four post-RDU sampling events will be compiled into Excel spreadsheets to allow statistical processing (i.e., averages, maximums, variability, UCL 95%, etc.). Results will be documented along with the corresponding laboratory reporting levels.

The primary purpose of this sampling program is to confirm that RDU operations will not result in the WWTP effluent to the UIC wells becoming characteristically hazardous under RCRA. The results of the sampling will be compared to the characteristic levels contained in 40 Code of Federal Regulations (CFR) Section 261.21-261.24 for ignitability, corrosivity, reactivity, and toxicity. To

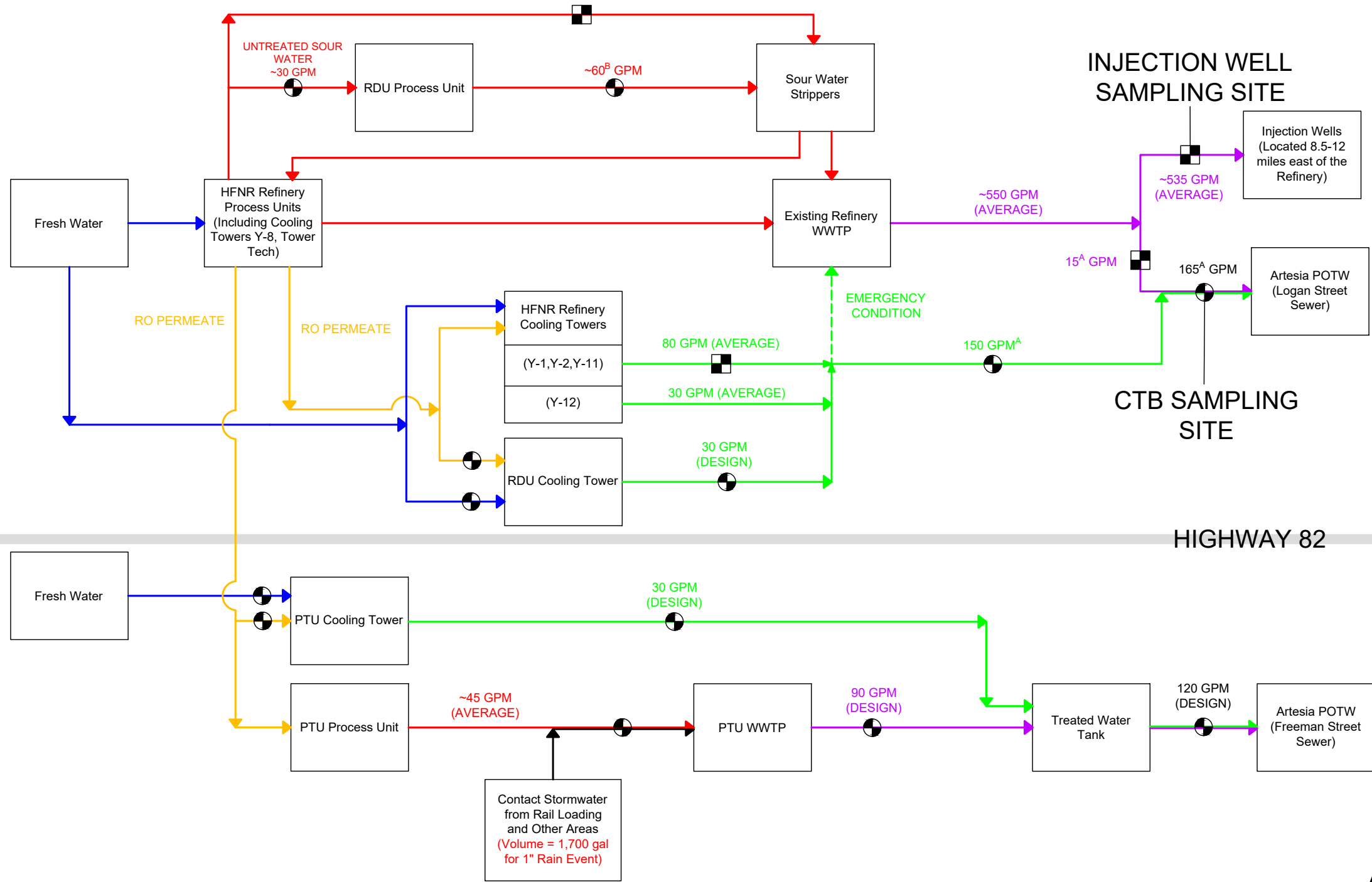
APPENDIX A - HollyFrontier Navajo Refining LLC		
Section:		Page: 3 of 3
Title: Verification of Non-hazardous Injection Fluids from RDU Process- Pilot Sampling Plan		
Status: Active	Revision Number: 0	Revision Date: 11 Mar 2022

determine if the new RDU operations have any additional potential effect on the quality (concentration) of the discharge to the UIC wells, the results from the four sampling events (post-RDU) will be compared to WWTP effluent historical quarterly monitoring data (pre-RDU) as well as the three CTB samples collected prior to RDU start-up (i.e., without Y-26). Differences in average and maximum concentrations will be noted as well as variations from UCL 95% baseline concentrations. Again, comparisons will be made for both the WWTP effluent to the injection wells and the CTB to the City POTW.

PSP Reporting

Each of the four weekly post-RDU sample results will be submitted individually to OCD upon Navajo receipt/review from the lab to facilitate dialog for any potential actions/corrections during the program. After the last sample event, a summary report will be prepared and include full pre- and post-RDU comparisons (including the use of UCL 95% baseline calculations and other statistical methods, as appropriate based on the data set) as well as evaluation against TCLP and ICR regulatory criteria. The summary report of the PSP program will be submitted to the Oil Conservation Division (OCD) within four weeks of receipt of the lab report for the final (fourth) sampling event. Based on this report, it is anticipated that OCD and Navajo will together make a determination as to whether further sampling may be warranted and/or if any other changes/revisions to the current Discharge Permit UICI-8 are necessary during permit renewal in 2022. If during the PSP program no impacts from RDU operations are observed on the discharge to the UIC wells , quarterly monitoring will continue in accordance with the current UICI-8 Discharge Permit, including assessment for one year of any changes over PSP baseline levels.

Drawing path: N:\Portland\Figures\123 01368 - HollyFrontier Navajo Refining Artesia\HF Artesia RDU WW - Alternate.dwg



ATTACHMENT 1

NOTES

^A DENOTES CURRENT LIMIT

^B INCLUDES 30 GPM CREATED FROM RDU PROCESS

LEGEND

- FRESH WATER SUPPLY
- RO PERMEATE
- COOLING TOWER BLOWDOWN
- PROCESS UNIT DISCHARGE
- WWTP EFFLUENT
- STORMWATER

CURRENT FLOW MONITORING LOCATION

PLANNED FLOW MONITORING LOCATION

HollyFrontier - Artesia, New Mexico

Drawing

Refinery/RDU & PTU Updated Water Flow Diagram

Date	June 6, 2021	Scale	AS SHOWN	Drawing No.	2
File Name	HF Artesia RDU WW - Alternate	Project No.	122.01368.00026		



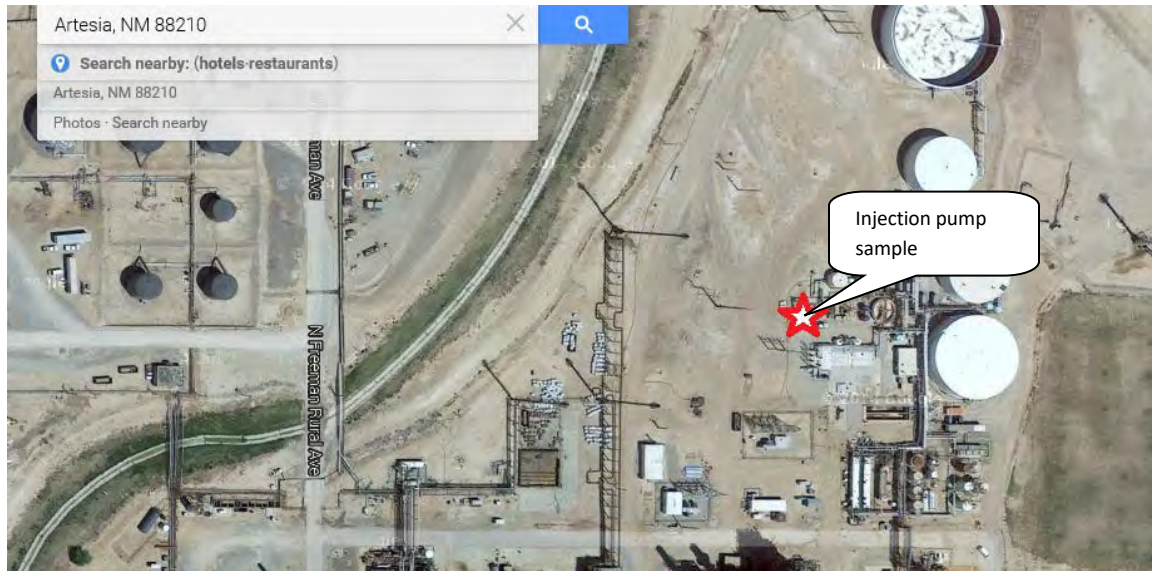
Quarterly WDW 1, 2, 3, & 4 Injection Well

Materials

- Pre-packaged ice chest that contains all sample bottles
- Quarterly WDW 1, 2, 3, & 4 Injection Well chain of custody
- Detailed Attachment of WDW 1, 2, 3, & 4 Injection Well
- Job Safety Analysis
- Portable pH meter
- Portable thermometer
- Clock
- Latex gloves
- Safety glasses
- Ice
- Ziploc bags
- Black tape
- Clear tape
- Keynote slip
- Sharpie or Good Quality Pen

Procedures

- Acquire the pre-prepared WDW 1, 2, 3, & 4 ice chest from the environmental storage unit (the white shed between Carbon filters and Pipeline sample point)
- Confirm all bottles are labeled (you will need to add the time, date, and person who collected sample)
- Go to injection well pumps (red star on map below)



- Take note of the time you begin sampling
- Using the portable pH probe obtain the pH of the water and write it down (make sure pH probe is calibrated)
- Using a portable thermometer obtain the temperature of the water sample and write it down
- Fill all the empty containers with water from the sample point.

ATTACHMENT 2 - Quarterly WDW 1, 2, 3, & 4 Injection Well Sample Collection Procedure

- One sample bottle is labeled to be filtered (use the filter provided in the ice chest). This sample bottle is for calcium, potassium, magnesium, and sodium.
- Take note of the time you cease sampling
- Wrap black tape tightly around the lids of the bottles taking care that all the lid is covered so that none of the sample can leak
- Place the sample bottles in Ziploc bags (you will need multiple bags in order to hold all sample bottles)
- Fill out the chain of custody shown in Attachment 5 (make sure the time on the sheet is the same time listed on the bottles)
- Place chain of custody in a Ziploc bag and place inside ice chest
- Confirm all bottles are sealed in Ziploc bags
- Collect ice in ice chest making sure to cover all sides of sample
- Tape the outside of the ice chest with the clear tape
- When courier arrives, go to main gate and relinquish the samples

If you need to ship the samples

- Take ice chest and extra Ziploc bags to Navajo lab
- Before entering Navajo Labs put on clear safety glasses
- Place ice inside of a Ziploc bag and seal completely so no water leaks
- Do this with multiple Ziploc bags until the entire sample is covered in ice
- Take ice chest to the welcome desk which is located in Navajo Main office
- Weigh ice chest on the scale provided to the right of computer
- Fill out a shipping label using the computer; type in the shipping location, the weight, of your package, mark that it is your shipping material, charge to sender, and charge environmental department (if you have any questions ask the person working at the front desk)
- At 3:00 pm go to Navajo lab and replace the ice that is in the Ziploc bags (making sure that nothing leaks)
- Add the shipping label to the outside of ice chest
- Hold on to copy of tracking number
- Make sure to completely seal the ice chest by wrapping all corners with clear tape
- Place the sealed ice chest in the FedEx shed located at the warehouse by 3:30 p.m.

Chain of Custody Sample Information

Please be sure to include accurate **Field Temperature** and **pH** of any sample collected. Upon being collected, samples are to be immediately taken to the AquaMicrobics lab so that a pH test can be performed. It is also acceptable to use the Temperature reading from the pH probe for the field temperature reading of the sample.

ATTACHMENT 3 – Cooling Tower Blowdown (CTB) Sample Collection Procedure

Purpose

This procedure is for sampling events for wastewater discharged from the Artesia facility to the City of Artesia POTW, which can include discharges from the onsite wastewater treatment plant (WWTP) and cooling tower blowdown (CTB) streams from Y-1, Y-2, Y-11, Y-12, and Y-26 (post-RDU).

Scope and Application

This guideline applies to all HollyFrontier Navajo Refining LLC (Navajo or HFNR) employees, contractors and visitors.

The sampling is located at the sample station near the Artesia WWTP Effluent Outfall to the POTW, downstream of the confluence of the cooling tower blowdown (CTB from Y-1, Y-2, Y-11, Y-12, and Y-26) and Walnut Shell Filter (WWTP) effluent (see map below). Prior to the PSP sampling events, all WWTP effluent will be physically blocked from the City POTW (i.e., using the control valve as well as a manual block valve) and diverted to the injection wells so that the resulting discharge to the POTW only consists of CTB and can be sampled without the contribution of the WWTP effluent. A separate sampling point for just CTB does not currently exist; hence the procedure above.



Reference Document

This procedure has been prepared in accordance with the US EPA guidance document on wastewater sampling: https://www.epa.gov/sites/production/files/2017-07/documents/wastewater_sampling306_af.r4.pdf

Needed Materials

ATTACHMENT 3 – Cooling Tower Blowdown (CTB) Sample Collection Procedure

- Job Safety Analysis
- Appropriate Personal Protective Equipment (PPE) as dictated by HFNR requirements. These include, but are not limited to: FRC clothing, safety glasses, hardhat, steel-toe boots, nitrile gloves, and hearing protection;
- Sample Chain of Custody (COC) form (provided by contract laboratory – see Attachment 5);
- Labeled Sample Bottles: Date, time, sample location, preservation method, and analyses (provided by contract laboratory);
- Five-gallon bucket;
- Glass beaker for sample pouring (if needed) and pH measurement;
- Calibrated pH probe / meter (refer to pH Meter Calibration SOP);
- Ice chest filled with ice;
- Appropriate material to wipe sample bottles clean; and
- Electrical tape.

Please Note- All safety and PPE precautions should be taken in accordance with Navajo SDS and safety procedures applicable for the material being sampled. Navajo personnel will comply with all safety, handling and disposal information and precautions set forth in those documents.

Special Sampling Considerations

- A clean pair of new, non-powdered disposable nitrile gloves will be worn each time the CTB location is sampled, and the gloves should be donned immediately prior to sampling;
- CTB samples will typically be collected either by directly filling the sample container or by using an interim container that fills the sample container;
- During sample collection, if transferring the sample from a collection device or container, make sure the device or interim container does not come in contact with the sample containers;
- Place the samples into the appropriate, labeled containers as provided by the contract laboratory;
- All samples requiring preservation must be preserved as soon as practically possible, ideally immediately at the time of sample collection. Note: The contract laboratory will add the appropriate preservatives to the corresponding sample bottles; and
- Do not overfill sample bottles containing preservative to prevent any loss.

Manual Sampling

Manual sampling is normally used for collecting grab samples and/or for immediate in-situ field analyses. The best method to manually collect a sample is to use the actual sample container which will be used to transport the sample to the laboratory. This eliminates the possibility of contaminating the sample with intermediate collection containers.

If the CTB stream cannot be physically reached by the sampling personnel or it is not safe to reach for the sample, an intermediate collection container may be used, from which the sample can be redistributed to other containers.

If the CTB sample can be collected from a sample port, valve, or spigot, place a five-gallon bucket

ATTACHMENT 3 – Cooling Tower Blowdown (CTB) Sample Collection Procedure

under the sample location and allow the sample to run for at least one minute before collection to clear the lines.

Quality Control and Documentation

Equipment blanks should be collected if equipment is field cleaned and re-used on-site or if necessary, to document that low-level contaminants were not introduced by the sampling equipment.

Chain of Custody forms (Attachment 5) must stay with the samples at all times and must be filled out each time sample control is transferred to another individual or entity.

Sample Bottles and Collection

Trace metals and organics detection limits are typically in the parts per billion (ppb or µg/L), so extreme care must be exercised to ensure sample integrity. When possible, the sample should be collected directly into the appropriate sample container. If the material to be sampled cannot be physically reached, an intermediate collection device may be used.

The sample container to be analyzed may contain a preservative. Care should be taken not to flush any preservative out of the container during fill.

Sampling Procedure

1. Don PPE.
2. Inspect all sample bottles to ensure that they are clean and in good condition.
3. Verify all sample bottles are labeled with the appropriate preservative. Labels shall include:
 - a. Sample location;
 - b. Date;
 - c. Time;
 - d. Sampler's initials;
 - e. Requested analyses; and
 - f. Preservative type.
4. After confirming that the WWTP effluent is being diverted to the injection wells, proceed to the sample station near the Artesia WWTP Effluent Outfall to the POTW. This location is downstream of the confluence of the cooling tower blowdown (CTB) and WWTP Effluent (see map above).
5. Collect samples:
 - a. Don new, clean gloves;
 - b. Place a five-gallon bucket under the sample point to collect the flush water and any spillage;
 - c. Open the sample tap and allow the sample to run for at least one minute to flush the lines;
 - d. **NEVER** leave an open sample point unattended for any reason;

ATTACHMENT 3 – Cooling Tower Blowdown (CTB) Sample Collection Procedure

- e. Place each bottle under the open, running sample port. A clean, glass beaker may be used as an interim container for ease of pouring, if needed. Fill each bottle to near the top, ensuring not to overfill to retain all the sample preservative (if present);
 - f. Close the sample tap;
 - g. Tape down all sample bottle lids with electrical tape;
 - h. Place sample bottles in cooler filled with ice;
 - i. Fill glass beaker with sample for pH and temperature measurement;
 - j. Using a calibrated pH meter and probe, measure the pH and temperature of the CTB sample and record results on the Chain of Custody form;
 - k. Fully complete the sample Chain of Custody, ensuring the COC contains:
 - i. Date;
 - ii. Time;
 - iii. Sampler's name, initials, and signature;
 - iv. Line item for each sample bottle; and
 - v. Requested analyses;
 - l. Place completed COC into plastic bag and place on top of sample inside the cooler;
 - m. Close and secure cooler lid; and
 - n. Relinquish sample to contract laboratory courier.
6. If any quantity of material has spilled onto the ground, it must be cleaned up immediately as per HFNR's spill response procedures.
 7. Dispose of any material from the five-gallon bucket and excess sample in the glass beaker used in temperature and pH measurement by emptying into an approved drain. This is either the sewer box near the Talon tanks or the laboratory sink.
 8. Decontaminate and triple rinse all interim sample containers and PPE used, except for nitrile gloves, which should be disposed of in an appropriate trash receptacle.
 9. **If any conditions arise which would alter or prevent sampling as described in this document or if there are any questions or concerns regarding the sampling of a particular source or location, contact the HFNR Supervisor immediately for further guidance prior to performing sampling.**

END OF PROCEDURE

ATTACHMENT 4 - LIST OF PSP PARAMETERS

SOURCE: DISCHARGE PERMIT UICI-8 SECTION 2.A AND 40 CFR 261.24(b)

EPA Haz Waste #	Parameter	Laboratory Method (a)	Laboratory Reporting Level (mg/L) (b)
D004	Arsenic	6010B	5
D005	Barium	6010B	100
D018	Benzene	8260B	0.5
D006	Cadmium	6010B	1
D019	Carbon tetrachloride	8260B	0.5
D020	Chlordane	8081A	0.03
D021	Chlorobenzene	8260B	100
D022	Chloroform	8260B	6
D007	Chromium	6010B	5
D023	o-Cresol	8270C	200
D024	m-Cresol	8270C	200
D025	p-Cresol	8270C	200
D026	Cresol	8270C	200
D016	2,4-D	8151	10
D027	1,4-Dichlorobenzene	8260B	7.5
D028	1,2-Dichloroethane	8260B	0.5
D029	1,1-Dichloroethylene	8260B	0.7
D030	2,4-Dinitrotoluene	8270C	0.13
D012	Endrin	8081A	0.02
D031	Heptachlor (and its epoxide)	8081A	0.008
D032	Hexachlorobenzene	8270C	0.13
D033	Hexachlorobutadiene	8270C	0.5
D034	Hexachloroethane	8270C	3
D008	Lead	6010B	5
D013	Lindane	8081A	0.4
D009	Mercury	7470B	0.2
D014	Methoxychlor	8081A	10
D035	Methyl ethyl ketone	8260B	200
D036	Nitrobenzene	8270C	2
D037	Pentachlorophenol	8270C	100
D038	Pyridine	8270C	5
D010	Selenium	6010B	1
D011	Silver	6010B	5
D039	Tetrachloroethylene	8260B	0.7
D015	Toxaphene	8081A	0.5
D040	Trichloroethylene	8260B	0.5
D041	2,4,5-Trichlorophenol	8270C	400
D042	2,4,6-Trichlorophenol	8270C	2
D017	2,4,5-TP (Silvex)	8151	1
D043	Vinyl chloride	8260B	0.2
--	pH	9040C	--
--	Eh (ORP)	2580	--
--	Specific Conductance	2510B	10 umho/cm
--	Specific Gravity	not given	1
--	Temperature	provided with pH	--
--	Fluoride	300.0	0.1
--	Calcium	200.7	1
--	Potassium	200.7	1
--	Magnesium	200.7	1
--	Sodium	200.7	1
--	Bicarbonate	2320B	20
--	Carbonate	2320B	2
--	Chloride	300.0	0.5
--	Sulfate	300.0	0.5
--	Bromide	300.0	0.1
--	Total Dissolved Solids	2540C	40
--	Total Suspended Solids	2540D	4
--	Cation/anion balance	Calculation	--
D001	Ignitability	Flashpoint (D93/1010A)	--
D002	Corrosivity	Corrosivity by pH (9040C)	--
D003	Reactivity	Reactive Cyanide, Sulfide (4500 CN/S2)	--

For metals and organics with an EPA Hazardous Waste Number:

(a) = Laboratory method performed on total sample per July 1992 EPA SW-846 Test Method 1311 Section 1.2 (TCLP)

(b) = Laboratory Reporting Level equivalent to TCLP Regulatory Level given in 40 CFR 261.24(b)

Chain-of-Custody Record

Client: Navajo Refining Co.

Mailing Address: P.O. Box 159

Artesia, NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

☐ Standard ☐ Rush _____

Project Name:

PSP WDW-1, 2, 3 & 4 Inj Well

Project #:

Project Manager:

Randy Dade

Sampler:

On Ice: ☐ Yes ☐ No

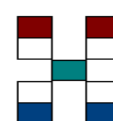
of Coolers:

Cooler Temp (including CF):

Container
Type and #

Preservative
Type

HEAL No.



**HALL ENVIRONMENTAL
ANALYSIS LABORATORY**

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.	Specific Gravity, C/A Balance, ORP, pH, TSS	8260 TCLP Compounds	8270 TCLP Compounds	RCI	RCRA 8 Metals	8081 TCLP Compounds	8151 TCLP Compounds								
		Liquid	WDW-1, 2, 3 & 4 Effluent	**	**		x														
		Liquid	WDW-1, 2, 3 & 4 Effluent	3-40ml VOA	HCL			x													
		Liquid	WDW-1, 2, 3 & 4 Effluent	1-1L Amber	none				x												
		Liquid	WDW-1, 2, 3 & 4 Effluent	***	***					x											
		Liquid	WDW-1, 2, 3 & 4 Effluent	1-250ml P	HNO3						x										
		Liquid	WDW-1, 2, 3 & 4 Effluent	1-1L Amber	none							x									
		Liquid	WDW-1, 2, 3 & 4 Effluent	1-1L Amber	none								x								
		Liquid	CTB to City POTW	**	**		x														
		Liquid	CTB to City POTW	3-40ml VOA	HCL			x													
		Liquid	CTB to City POTW	1-1L Amber	none				x												
		Liquid	CTB to City POTW	***	***					x											
		Liquid	CTB to City POTW	1-250ml P	HNO3						x										
		Liquid	CTB to City POTW	1-1L Amber	none							x									
		Liquid	CTB to City POTW	1-1L Amber	none								x								
Date:	Time:	Relinquished by:		Received by:		Via:	Date	Time	Remarks: Dissolved Cations by EPA Method 200.7. 1-500ml unpreserved plastic, 1-125ml H2SO4 plastic, 1-125ml HNO3 plastic. *** 1-500ml unpreserved plastic, 1-500ml NaOH plastic, 1-500ml NaOH/ZnAcetate plastic												
Date:	Time:	Relinquished by:		Received by:		Via:	Date	Time													

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly noted on the analytical report.

Appendix X.3 – Monitoring Wells Information



Petrotek Corporation 5935 S. Zang St., Suite 200 Littleton, Colorado 80127 (303) 290-9414 FAX (303) 290-9580

DATE: August 2, 2022

TO: Phillip Goetze (Oil Conservation Division)
Carl Chavez (Oil Conservation Division)

FROM: Wes Janes, Nolan Beasley, & David Huffington (Petrotek Corporation)

CC: Mike Holder (HF Sinclair)
Randy Dade (HollyFrontier Navajo Refining)
Alberto Gutierrez (Geolex)

**SUBJECT: Discharge Permits (UICI-008-1, UICI-008-2, UICI-008-3, and UICI-008-4)
Groundwater Monitoring Wells**

Based on the conference call with New Mexico Energy, Minerals, and Natural Resources Department Oil Conservation Division (OCD) on June 2, 2022, it was requested that HollyFrontier Navajo Refining (HFNR) install groundwater monitoring wells into the uppermost water bearing unit downgradient from the injection wells WDW-1, 2, 3, and 4 (Permits: UICI-008-1, UICI-008-2, UICI-008-3, and UICI-008-4). Alternatively, it was also discussed that HFNR demonstrate groundwater quality via a search for existing data. The existing groundwater quality data is presented in this document. The findings outlined in this document show that there is no regulatory or technical basis requiring a shallow groundwater monitoring well near each of the above-referenced wells. Furthermore, installing shallow monitor wells provides no environmental benefit and creates a potential pathway for surface contamination to enter shallow groundwater. As such, HFNR is requesting the requirements of Section 2.B be removed from the upcoming permits during the renewal process.

As discussed on the call, HollyFrontier Navajo Refining (HFNR) has significant concerns with the installation of groundwater monitoring wells in the vicinity of the four UIC wells. These concerns are discussed further below and include the fact that the uppermost water bearing unit sits less than 400 feet below ground level (BGL), which is more than 7,000 feet above the injection zone. Furthermore, in addition to being isolated by surface casing that extends well below the depth of groundwater in the area, the injection zone is separated from the shallow groundwater zone by several hydrocarbon producing zones, saline aquifers, and layers of impermeable shale. The four Class I non-hazardous injection wells also sit in an area of historical oil & gas activity, may have historical spills, Class II salt water disposal (SWD) well activity, and active production, none of which are associated with HFNR activities. In addition, questions concerning the regulatory requirement(s) for the installation of the groundwater monitoring wells and related thoughts are presented below.

As a possible alternative to the installation of monitoring wells, it was discussed that a demonstration of groundwater quality might be possible through the location of existing groundwater data. As part of this effort, a comprehensive search for available data was performed. The results are summarized in this document.

Based on the information presented in this document, HFNR is requesting that the requirements of Section 2.B of the current permits be removed and not included in the renewal applications currently under preparation, nor in the renewal permits.

An excerpt of the New Mexico UIC regulations referring to monitoring wells is included below.

**20.6.2.5207 MONITORING REQUIREMENTS FOR CLASS I NON-
HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:**

A. The discharger shall demonstrate mechanical integrity for each Class I non-hazardous waste injection well or Class III well at least once every five years during the life of the well pursuant to Section 20.6.2.5204 NMAC.

B. Additional monitoring requirements for Class I non-hazardous waste injection wells.

(1) The discharger shall provide analysis of the injected fluids at least quarterly or, if necessary, more frequently to yield data representative of their characteristics.

(2) Continuous monitoring devices shall be used to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

(3) The discharger shall provide wells within the area of review as required by the discharge permit to be used by the discharger to monitor pressure in, and possible fluid movement into, ground water having 10,000 mg/l or less TDS except for such ground waters designated pursuant to Section 20.6.2.5103 NMAC. **This Section does not require monitoring wells for Class I non-hazardous waste injection wells unless monitoring wells are necessary due to possible flow paths within the area of review.**

NMAC 20.6.2.5207 (B)(3) directly applies to HFNR's four Class I non-hazardous disposal wells in Artesia, stating, "This Section does not require monitoring wells for Class I non-hazardous waste injection wells unless monitoring wells are necessary due to possible flow paths within the area of review." As the previous and upcoming permit renewal applications demonstrate, there are no potential flow paths through the confining zone to the shallowest water bearing unit. No flow paths were identified in the form of artificial penetrations as no corrective action plans were needed based on the records of the wells within the AOR indicating that they are sufficiently cemented and plugged. In addition, no faults near the area of review (AOR) have been identified which also have the potential to allow fluid to migrate out of the permitted injection zones. There is sufficient evidence of no fluid migration from the respective injection zones in WDW-1, 2, 3, and 4 based on the annual MIT requirements and continuous pressure monitoring. As there are no

possible flow paths identified, groundwater monitoring wells should not be required in the permits for WDW-1, 2, 3, and 4 Class I non-hazardous wells in these instances. Monitoring wells are not mandated by rule but may be required only if there are possible flow paths in the area of review. NMAC 20.6.2.5358 (E)(1) further provides that monitoring requirements are to be based on a “site-specific assessment of the potential for fluid movement from the injection zone, and on the potential value of monitoring wells to detect such movement.” No such “site-specific assessment” has been conducted, nor has there been a determination of the potential value of the proposed monitoring wells to detect fluid movement. Note that HFNR, Petrotek, and Geolex are unaware of any example at any facility in the country where shallow groundwater monitoring wells are required for Class I non-hazardous injection. If such a case exists, it is certainly the exception rather than the rule and would most likely be responsive to unusually shallow injection zones that have potential flow paths to affect groundwater in the event of injectate migration out of the injection zone.

The HFNR injection wells (WDW-1, 2, 3, and 4) are constructed to Class I standards with multiple intervals of casing and cement separating the wellbore from the surrounding formations. In addition, the cement quality of the annuli are suitable to prevent vertical fluid migration. Injection was approved by the OCD based on the as-built construction of these wells. This is further confirmed by the continuous monitoring of the annular space between the tubing and production casing and the annual MIT testing required for these wells.

Geolex, Inc. (Geolex) was contracted to identify local groundwater and well data in the vicinity of the four injection wells, as well as provide additional information and support of this document. Geolex was able to identify 63 groundwater wells in the greater vicinity of the four injection wells. The map (Figure 1 of Attachment 1), list of the wells identified (Table 1 of Attachment 1), and water quality data (Tables 2, 3, and 4 of Attachment 1) are all included within Attachment 1. Geolex identified historical data from 1952 (Table 2 of Attachment 1) that had water quality data to assess potential baseline shallow water quality. From the wells identified in Table 1, recent water quality data from the Riverside water system facilities is shown on Tables 3 and 4. The Riverside wells are located approximately 2.3 miles west-northwest from WDW-4. The historical and current datasets are believed to be representative of the groundwater quality in the vicinity of the HFNR UIC wells, thus additional monitoring is not required

An estimate of the water quality can also be calculated from logs using the Schlumberger Generation-9 chart, which substitutes NaCl content as TDS in parts-per-million (ppm). WDW-4 openhole log data were used for this calculation because of data availability; specifically, the porosity and the deep resistivity logs were used for this estimate. Note that the resistivity and porosity log data have wide variations throughout most of the surface section, most likely due to hole conditions at the time of logging. It is most likely a combination of washout (some identified in the surface section), drilling fluid used, and highly permeable formations in the shallow section, leading to deeper invasion of the drilling fluids. Most of the calculations were off the Gen-9 chart, but the two that were present indicated NaCl content of approximately 2,500 ppm. This range is on the same order as the published data from Table 2 of Attachment 1. The two points used to

calculate reasonable values were from depths of 258 and 260 feet measured depth. The Gen-9 chart of the two points is included as Attachment 2. While confidence in this estimate is low based on the data quality, this method is usually effective as a substitute for sampling.

The shallow monitoring wells required by the permits would have to be installed in the midst of an active and long-operating oil field. Hence, any water sampled from a new monitoring well could be subject to contamination from historical practices in that field (e.g., surface spills or mechanical integrity issues with producing wells) that in no way relate to the operation of the subject HFNR Class I UIC wells. Further, there are Class II injection wells in the area which are not operated nor constructed under Class I standards. The result is that any theoretical potential shallow groundwater contamination more than 7,000 feet above HFNR injection activities would most likely be linked to other sources separate from HFNR well operations. HFNR has not had any significant releases of injectate to the surface at any of the injection well locations.

Considering the findings within the regulations, the specific construction of the wells, the lack of potential conduits out of the injection zone including no identified potential flow pathways that may affect shallow groundwater, the lack of water production wells within the AOR, the availability of nearby groundwater quality data, and the successful history of MITs on WDW-1, 2, 3, and 4, there seems to be no reasonable regulatory basis for, or technical merit, to require monitoring wells for these Class I non-hazardous waste injection wells. Based on the information presented in this document, HFNR is requesting that the requirements of Section 2.B of the current permits be removed and not included in the renewal applications currently under preparation, nor in the renewal permits. If the Division is aware of a regulatory requirement or factual circumstance relating to the HFNR injection wells that justifies requiring installation of groundwater monitoring wells, please bring that information to our attention at your earliest convenience so we can evaluate it.

Please contact Mike Holder (Michael.Holder@HFSinclair.com), Randy Dade (Lewis.Dade@HFSinclair.com), or Wes Janes (wjanes@petrotek.com) if you have any comments or questions.

Attachment 1 – Geolex Water Well Info in WDW Vicinity

Attachment 2 – Shallow Groundwater Gen-9 Input Chart

Attachment 1
Geolex Water Well Info in WDW Vicinity

Water Wells Near WDW Injection Wells

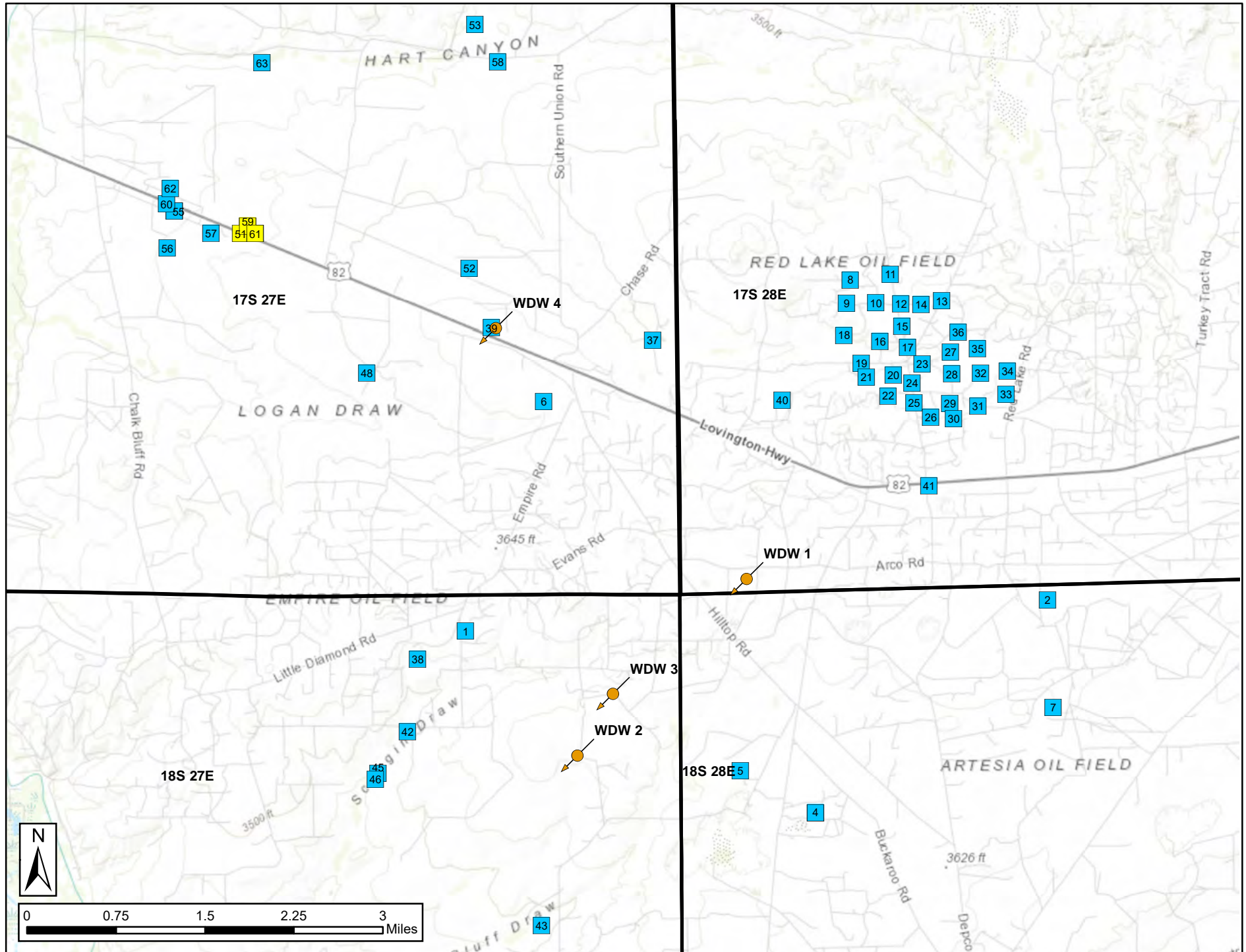


Figure 1. Water wells in the vicinity of WDW injection wells #1 - #4. Water wells are labeled with their corresponding numbers found in Table 1.

Table 1. All nearby water wells within a 3-mile vicinity of WDW #1 - #4 injection wells.

Well No.	Name	Use of Well	Pod Status	Owner Name	Total Depth (ft)	Depth Water (ft)	Dist. From WDW 1 (mi)	LAT 83	LONG 83	Completion Date	GS Elevation
1	RA 02996	DOMESTIC	PMT	PATON BROTHERS	-	-	2.306	32.77892643	-104.2545799	N/A	
2	RA 09001	OIL FIELD MAINT	DCL	ATLANTIC RICHFIELD COMPANY	-	-	2.638	32.78222054	-104.170205	N/A	
3	RA 08237	LIVESTOCK	DCL	BOGLE FARMS	-	-	2.037	32.75640759	-104.2040712	N/A	
4	RA 08236	LIVESTOCK	DCL	BOGLE FARMS	-	-	2.037	32.75640759	-104.2040712	N/A	
5	RA 08235	LIVESTOCK	DCL	BOGLE FARMS	-	-	1.567	32.76162662	-104.214914	N/A	
6	RA 04561	PROSP/DEV	PEN	LOWE DRILLING CO	250	-	2.234	32.80697337	-104.2429917	N/A	
7	RA 11857 POD1	DOM/LIVESTOCK	PMT	VERDUGO, JESSIE	235	95	2.876	32.76904171	-104.1694999	Sep 30 2012	
8	RA 12030 POD2	MONITOR	PEN	OXY USA WTP LP	-	-	2.749	32.82158301	-104.1984171	N/A	
9	RA 12030 POD3	MONITOR	PEN	OXY USA WTP LP	-	-	2.552	32.81869484	-104.1989996	N/A	
10	RA 12030 POD4	MONITOR	PEN	OXY USA WTP LP	-	-	2.657	32.81874984	-104.1947773	N/A	
11	RA 12030 POD5	MONITOR	PEN	OXY USA WTP LP	-	-	2.929	32.82225019	-104.1926113	N/A	
12	RA 12030 POD9	MONITOR	PEN	OXY USA WTP LP	-	-	2.751	32.81861093	-104.191139	N/A	
13	RA 12030 POD21	MONITOR	PEN	OXY USA WTP LP	-	-	2.961	32.81891695	-104.1851946	N/A	
14	RA 12030 POD22	MONITOR	PEN	OXY USA WTP LP	-	-	2.838	32.818528	-104.1882224	N/A	
15	RA 12030 POD23	MONITOR	PEN	OXY USA WTP LP	-	-	2.596	32.81586137	-104.1909717	N/A	
16	RA 12030 POD24	MONITOR	PEN	OXY USA WTP LP	-	-	2.391	32.81405555	-104.1941948	N/A	
17	RA 12030 POD25	MONITOR	PEN	OXY USA WTP LP	-	-	2.476	32.81327745	-104.1901939	N/A	
18	RA 12030 POD26	MONITOR	PEN	OXY USA WTP LP	-	-	2.296	32.81480526	-104.1994169	N/A	
19	RA 12030 POD27	MONITOR	PEN	OXY USA WTP LP	-	-	2.149	32.811361	-104.1969718	N/A	
20	RA 12030 POD28	MONITOR	PEN	OXY USA WTP LP	-	-	2.218	32.80991642	-104.1922774	N/A	
21	RA 12030 POD29	MONITOR	PEN	OXY USA WTP LP	-	-	2.073	32.80966651	-104.1961945	N/A	
22	RA 12030 POD30	MONITOR	PEN	OXY USA WTP LP	-	-	2.052	32.80736148	-104.1930557	N/A	
23	RA 12030 POD31	MONITOR	PEN	OXY USA WTP LP	-	-	2.442	32.81122249	-104.1880837	N/A	
24	RA 12030 POD32	MONITOR	PEN	OXY USA WTP LP	-	-	2.263	32.80888874	-104.1895833	N/A	
25	RA 12030 POD33	MONITOR	PEN	OXY USA WTP LP	-	-	2.151	32.80644443	-104.1893331	N/A	
26	RA 12030 POD34	MONITOR	PEN	OXY USA WTP LP	-	-	2.174	32.80469488	-104.1868891	N/A	
27	RA 12030 POD35	MONITOR	PEN	OXY USA WTP LP	-	-	2.676	32.81266697	-104.183972	N/A	
28	RA 12030 POD36	MONITOR	PEN	OXY USA WTP LP	-	-	2.551	32.80997243	-104.1838054	N/A	
29	RA 12030 POD37	MONITOR	PEN	OXY USA WTP LP	-	-	2.369	32.80633312	-104.1841388	N/A	
30	RA 12030 POD38	MONITOR	PEN	OXY USA WTP LP	-	-	2.315	32.80450036	-104.1836108	N/A	
31	RA 12030 POD39	MONITOR	PEN	OXY USA WTP LP	-	-	2.544	32.80602771	-104.180055	N/A	
32	RA 12030 POD40	MONITOR	PEN	OXY USA WTP LP	-	-	2.734	32.81002819	-104.1796391	N/A	
33	RA 12030 POD41	MONITOR	PEN	OXY USA WTP LP	-	-	2.792	32.80741637	-104.1759994	N/A	
34	RA 12030 POD42	MONITOR	PEN	OXY USA WTP LP	-	-	2.92	32.81027776	-104.1757498	N/A	

35	RA 12030 POD43	MONITOR	PEN	OXY USA WTP LP	-	-	2.855	32.81302817	-104.1800281	N/A	
36	RA 12030 POD46	MONITOR	PEN	OXY USA WTP LP	-	-	2.843	32.81508329	-104.1828336	N/A	
37	RA 12456 POD1	LIVESTOCK	ACT	KEY LIVESTOCK LLC	220	92	2.174	32.81433912	-104.227155	Sep 08 2016	
38	RA 12568 POD1	MONITOR	PEN	AKA ENERGY GROUP	-	-	2.749	32.77550023	-104.2615414	N/A	
39	RA 12612 POD1	PROSP/DEV	PLG	HOLLYFRONTIER NAVAJO REFINING	300	-	2.985	32.81602804	-104.2505005	May 06 2018	
40	LWD 03213 POD1	NONLVSTK WATER	DCL	BOGLE FARMS	-	-	1.605	32.806895	-104.2084387	N/A	
41	LWD 03214 POD1	NONLVSTK WATER	DCL	BOGLE FARMS	-	-	1.836	32.79630487	-104.1872688	N/A	
Well No.	Name	Use of Well	Pod Status	Owner Name	Total Depth (ft)	Depth Water (ft)	Dist. from WDW 2 (mi)	LAT 83	LONG 83	Completion Date	GS Elevation
42	RA 03917	PROSP/DEV	PMT	PAN AMERICAN PETROLEUM CORP.	130	50	1.439	32.76666404	-104.2631058	Jul 30 1958	
43	RA 04048	OBSERVATION	PMT	WESTERN OIL FIELDS INC.	2096	-	1.463	32.74282567	-104.2438549	Jan 02 1948	3514
44	RA 08239	LIVESTOCK	DCL	KEY LIVESTOCK LLC	-	-	2.935	32.72358272	-104.2213622	N/A	
45	RA 12433 POD1	MONITOR	PEN	CENTURION PIPELINE LP	-	-	1.678	32.7615836	-104.2673892	N/A	
46	RA 12433 POD2	MONITOR	PEN	CENTURION PIPELINE LP	-	-	1.707	32.76083373	-104.2678053	N/A	
Well No.	Name	Use of Well	Pod Status	Owner Name	Total Depth (ft)	Depth Water (ft)	Dist. from WDW 4 (mi)	LAT 83	LONG 83	Completion Date	GS Elevation
47	RA 04153	DOMESTIC	ACT	MOORE, J. HIRAM	1220	175	2.193	32.82776679	-104.2846743	Mar 14 1960	
48	RA 01493	IRRIGATION	DCL	MONTOYA, JULIAN	876	-	1.165	32.81061661	-104.2686289	Dec 31 1907	
49	RA 01716	COMMERCIAL	PMT	RIVERSIDE MUTUAL DOMESTIC ASSO	-	-	2.273	32.82868384	-104.2857246	N/A	
50	RA 03816	DOMESTIC	ACT	COLLIER, R.D.	945	931	2.898	32.83054834	-104.2963938	Jan 21 1958	
51	RA 07844	EXPLORATION	PMT	RIVERSIDE WATER USERS ASSOC.	1300	180	2.309	32.82777898	-104.2868109	Sep 06 1990	
52	RA 04554	PROSP/DEV	PMT	LOWE DRILLING COMPANY	220	40	0.556	32.82331913	-104.2536645	Feb 19 1962	
53	RA 07774	LIVESTOCK	ACT	BOGLE FARMS	100	50	2.563	32.85311597	-104.2526243	Dec 19 1989	
54	RA 04114	DOMESTIC	ACT	MOORE, J. HIRAM	1042	260	2.193	32.82776679	-104.2846743	Jan 14 1960	
55	RA 03694	DOMESTIC	ACT	BERRY, C.M.	300	90	2.898	32.83054834	-104.2963938	Feb 01 1957	
56	RA 06560	DOMESTIC	ACT	HALL, TONY	133	80	2.866	32.82600811	-104.2974659	Aug 23 1979	
57	RA 07231	MULTI DOM HOUSE	EXP	WILSON, FERN	-	-	2.544	32.8278213	-104.2910841	N/A	
58	RA 07936	LIVESTOCK	DCL	BOGLE FARMS	-	-	2.244	32.84857702	-104.2493176	N/A	
59	RA 07844 EXPL	EXPLORATION	PMT	RIVERSIDE WATER USERS ASSOC.	1300	180	2.273	32.82868384	-104.2857246	Sep 06 1990	
60	RA 06531	DOMESTIC	PEN	POWELL, CHARLES C.	200	-	2.982	32.83145675	-104.2975299	N/A	
61	RA 01716 S	COMMERCIAL	ACT	RIVERSIDE MUTUAL DOMESTIC ASSO	1200	-	2.193	32.82776679	-104.2846743	Aug 02 2004	
62	RA 11691 POD1	MONITOR	ACT	INTEGRATED WATER SERVIES	150	0	2.999	32.8333333	-104.2969445	Mar 03 2011	
63	LWD 02481 POD1	NONLVSTK WATER	DCL	BOGLE FARMS	-	-	2.988	32.84861519	-104.2835239	N/A	

*Highlighted PODs indicate the water wells associated with Riverside water system facilities

POD STATUS Key:

PMT = Permitted
DCL = Declared
PEN = Pending
ACT = Active
EXP = Expired

Table 2. Historical water quality data from *Geology and Ground-Water Resources of Eddy County, New Mexico* by Hendrickson & Jones (1952).

Well Location	TDS (ppm)	Cl (ppm)	SO4 (ppm)	Depth H2O (ft)
17.27.11 (1948)	2690	33	1780	18
18.29.24 (1950)	1730	110	911	158

Table 3. Water quality data of various chemical constituents from recent available Riverside water system facilities. The TDS in these water wells are consistent with TDS values for USDW (static water level at 180' below ground surface).

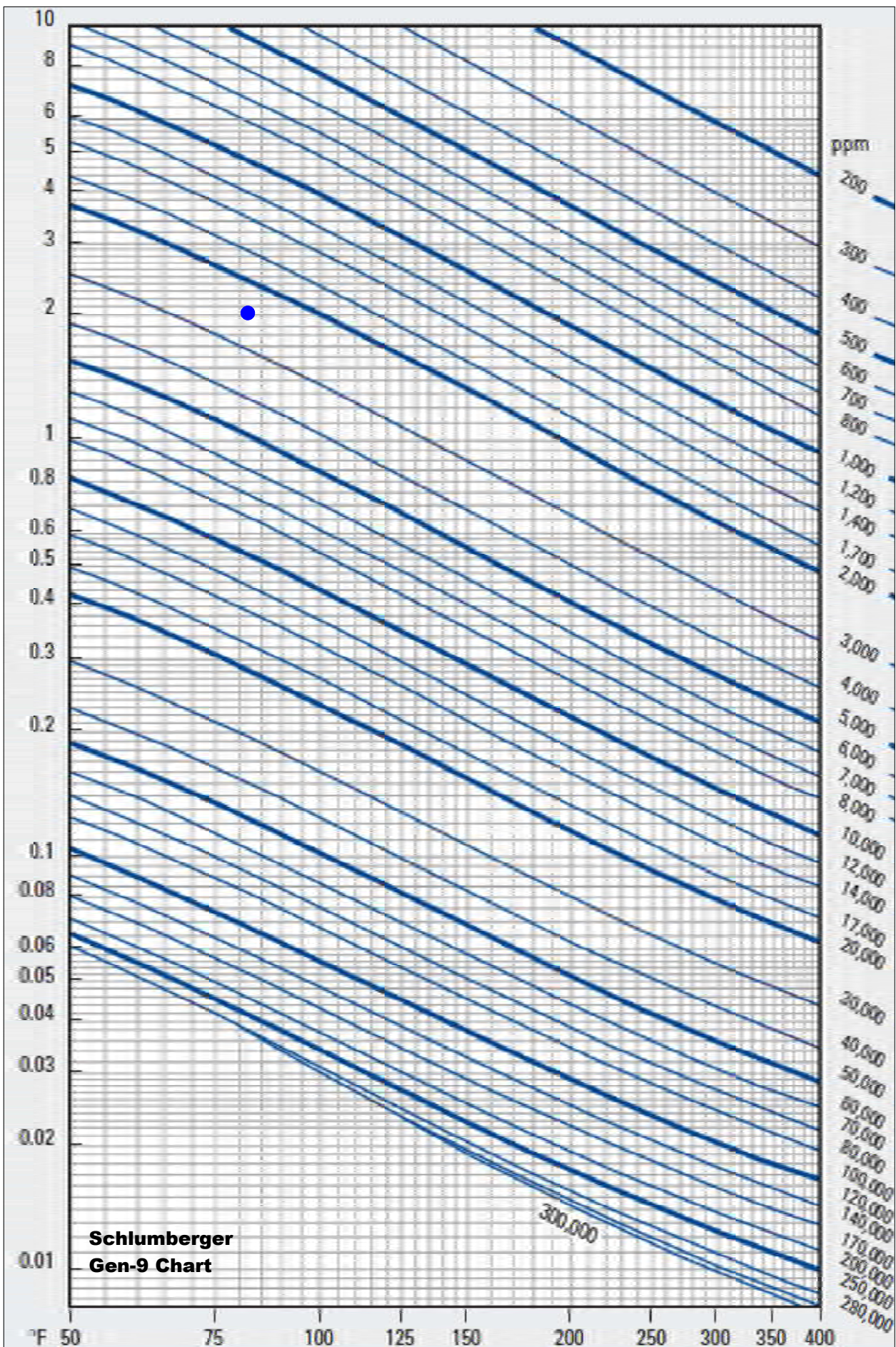
Date of Sample	Analyte	TDS (mg/L)
2/21/2022	ANTIMONY, TOTAL	ND
2/21/2022	ARSENIC	0.001
2/21/2022	BARIUM	0.017
2/21/2022	BERYLLIUM, TOTAL	ND
2/21/2022	CADMIUM	ND
2/21/2022	CHROMIUM	ND
2/21/2022	CYANIDE	ND
2/21/2022	FLUORIDE	0.95
2/21/2022	MERCURY	ND
2/21/2022	NICKEL	ND
2/21/2022	SELENIUM	ND
2/21/2022	THALLIUM, TOTAL	ND

Table 4. Recent chlorine concentration data from water wells in Riverside facilities measured on a monthly basis, showing very little concentration of contaminants in the USDW (Static water level at 180' below ground surface).

Date of Sample (2022)	Analyte	TDS (mg/l)
January	Chlorine	0.5
February	Chlorine	0.4
March	Chlorine	0.4
April	Chlorine	0.4
May	Chlorine	0.4
June	Chlorine	0.5

Attachment 2
Shallow Groundwater Gen-9 Input Chart

Calculated Water Quality as NaCl; WDW-4 258 and 260' MD



Appendix X.4 – Closure Plan

WDW-1, WDW-2, and WDW-3 CLOSURE PLAN

WDW-1, WDW-2, and WDW-3 will be plugged and abandoned following applicable OCD requirements. Prior to closing each well, HFNR will observe and record the pressure decay for the period specified by the Executive Director. In addition, appropriate mechanical integrity testing shall be conducted to provide reasonable assurance of the integrity of that portion of the long-string casing and cement that will be left in the ground after closure. In reality, it would be extremely difficult to remove the cemented casing strings from the subsurface. Also, removing the casing strings would provide much greater potential of a conduit for movement of fluids vertically than cementing the casing and leaving it in place. A casing inspection and cement bond/variable density log will also be conducted prior to closure.

HFNR intends to accomplish plugging of the injection well by cementing the well from the base of casing to surface using premium cement. This method of closure will not allow the movement of fluids out of the injection zone either into or between USDWs or freshwater aquifers. The procedure utilized for the closure of each well is as follows:

1. At least 60 days before commencing plugging and abandonment, notify the OCD of estimated start time for plugging operations.
2. Prepare the location to receive the rig and associated equipment.
3. Move in and rig up the workover rig. Spot additional support equipment.
4. Perform an annulus pressure test by pressurizing the tubing-casing annulus to the required pressure with an OCD inspector present, if required, for a one-hour period. Record the results of the test.
5. Perform and record a reservoir pressure falloff test for a length of time specified by the Executive Director.

6. Run a radioactive tracer survey to verify the external mechanical integrity of the well.
 7. Pump fresh water (nonhazardous buffer fluid) down the tubing for decontamination and flushing the well. If surface pressure has been indicated on the well, pump sufficient brine down the tubing to bring the well into static equilibrium.
 8. Remove the tree and install blowout preventers. Rig up the pump to the well annulus. Use brine as necessary to maintain control of the well.
 9. Pull the tubing and packer from the well and dispose of properly or decontaminate for salvage value.
 10. Run a cement bond log and casing inspection log on the long-string casing.
 11. Run in the hole with a squeeze retainer on the tubing. Set the retainer in the protection casing above the injection packer historical depth. Unstring from the retainer and pressure test the retainer and casing string.
 12. Sting back into the retainer and establish an injection rate. Pump premium cement plus additives below the cement retainer in the well. Cement volume is to be approximately 1.5 times the calculated casing volume below the retainer and above the fill.
 13. Unstring from the retainer and pump 200 feet cement plug on top of the retainer. Pull up hole and reverse circulate the tubing to clear it of cement.
 14. Wait approximately 12 hours for the cement to cure.
 15. Tag and test the plug for seal and stability and record the depth. Pressure test the plug to 1000 psi, or as required. Circulate the well with freshwater, bentonite-laden drilling fluid (~9 ppg).
 16. From this point, spot successive balanced, premium cement plugs in 1,000 feet interval from the top of the retainer cement plug to surface.
-

17. After bringing the tubing out of the hole with the cement at the surface, remove the blowout preventer and tubing head. Cut off the protection casing casinghead.
18. Allow the cement to cure for 24 hours, then test for seal and stability.
19. Cut off casings three feet below ground level and weld 1/2 inch thick steel plate caps into the remaining casings.
20. Install a permanent marker on the wellsite with the permit number, date of abandonment, and company name.
21. Release the workover rig and support equipment.

A closure report certifying that the well was closed in accordance with applicable requirements will be submitted to the proper agencies within 30 days of plugging the well. This report, stating that the abandonment is complete and was in accordance with OCD regulations, will be certified by HFNR and by an independent registered professional engineer.

Appendix X.5 – Closure Cost Estimate

WDW-1			
Well Closure Cost Estimate			
PBTD 9,004 feet			
Intangible Cost	Units Req'd.	Unit Rate	Total Cost
Mob/Demob	1	\$ 10,000	\$ 10,000
Cement (Yield = 1.18 ft ³ /sack)	1,743	\$ 32	\$ 55,776
Workover Rig	5	\$ 6,500	\$ 32,500
Fuel (diesel/LNG & propane)	5	\$ 1,000	\$ 5,000
Water	5	\$ 500	\$ 2,500
Mud, Chemicals, Engineering	5	\$ 500	\$ 2,500
Logging - Cased Hole	1	\$ 25,000	\$ 25,000
Communication	5	\$ 500	\$ 2,500
Transportation	5	\$ 1,000	\$ 5,000
Project Management/Office Support	5	\$ 2,000	\$ 10,000
Equipment Rental: BOPs, forklift, tubing, subs	5	\$ 4,000	\$ 20,000
Trailer, drinking water, toilets, septic, trash baskets	5	\$ 500	\$ 2,500
Location Trucking & Setup (trailers, sewer, water)	1	\$ 5,000	\$ 5,000
Contract Labor	1	\$ 2,000	\$ 2,000
Welder	1	\$ 5,000	\$ 5,000
Travel & Expenses	5	\$ 500	\$ 2,500
Pump Truck & BOP Testing	2	\$ 5,000	\$ 10,000
Reservoir Testing	1	\$ 2,500	\$ 2,500
Test Analysis & Reporting	1	\$ 15,000	\$ 15,000
Total Estimated Well Closure Cost:			\$ 215,276

WDW-2			
Well Closure Cost Estimate			
PBTD 8,770 feet			
Intangible Cost	Units Req'd.	Unit Rate	Total Cost
Mob/Demob	1	\$ 10,000	\$ 10,000
Cement (Yield = 1.18 ft ³ /sack)	1,039	\$ 32	\$ 33,248
Workover Rig	5	\$ 6,500	\$ 32,500
Fuel (diesel/LNG & propane)	5	\$ 1,000	\$ 5,000
Water	5	\$ 500	\$ 2,500
Mud, Chemicals, Engineering	5	\$ 500	\$ 2,500
Logging - Cased Hole	1	\$ 25,000	\$ 25,000
Communication	5	\$ 500	\$ 2,500
Transportation	5	\$ 1,000	\$ 5,000
Project Management/Office Support	5	\$ 2,000	\$ 10,000
Equipment Rental: BOPs, forklift, tubing, subs	5	\$ 4,000	\$ 20,000
Trailer, drinking water, toilets, septic, trash baskets	5	\$ 500	\$ 2,500
Location Trucking & Setup (trailers, sewer, water)	1	\$ 5,000	\$ 5,000
Contract Labor	1	\$ 2,000	\$ 2,000
Welder	1	\$ 5,000	\$ 5,000
Travel & Expenses	5	\$ 500	\$ 2,500
Pump Truck & BOP Testing	2	\$ 5,000	\$ 10,000
Reservoir Testing	1	\$ 2,500	\$ 2,500
Test Analysis & Reporting	1	\$ 15,000	\$ 15,000
Total Estimated Well Closure Cost:			\$ 192,748

WDW-3			
Well Closure Cost Estimate			
PBTD 9,022 feet			
Intangible Cost	Units Req'd.	Unit Rate	Total Cost
Mob/Demob	1	\$ 10,000	\$ 10,000
Cement (Yield = 1.18 ft ³ /sack)	1,774	\$ 32	\$ 56,768
Workover Rig	5	\$ 6,500	\$ 32,500
Fuel (diesel/LNG & propane)	5	\$ 1,000	\$ 5,000
Water	5	\$ 500	\$ 2,500
Mud, Chemicals, Engineering	5	\$ 500	\$ 2,500
Logging - Cased Hole	1	\$ 25,000	\$ 25,000
Communication	5	\$ 500	\$ 2,500
Transportation	5	\$ 1,000	\$ 5,000
Project Management/Office Support	5	\$ 2,000	\$ 10,000
Equipment Rental: BOPs, forklift, tubing, subs	5	\$ 4,000	\$ 20,000
Trailer, drinking water, toilets, septic, trash baskets	5	\$ 500	\$ 2,500
Location Trucking & Setup (trailers, sewer, water)	1	\$ 5,000	\$ 5,000
Contract Labor	1	\$ 2,000	\$ 2,000
Welder	1	\$ 5,000	\$ 5,000
Travel & Expenses	5	\$ 500	\$ 2,500
Pump Truck & BOP Testing	2	\$ 5,000	\$ 10,000
Reservoir Testing	1	\$ 2,500	\$ 2,500
Test Analysis & Reporting	1	\$ 15,000	\$ 15,000
Total Estimated Well Closure Cost:			\$ 216,268

Appendix XI.1 – Form C-108's

APPLICATION FOR AUTHORIZATION TO INJECT

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

II. OPERATOR: HollyFrontier Navajo Refining LLC _____

ADDRESS: 501 East Main, Artesia, New Mexico, 88210 _____

CONTACT PARTY: Travis Gibb _____PHONE: (575) 748-3311 _____

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

IV. Is this an expansion of an existing project? _____Yes X _____No
If yes, give the Division order number authorizing the project: _____

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

The requested AOR map is included in Section X.B of the Class I Nonhazardous Permit Application, 2022.

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

The requested AOR data tabulation is included in Section X.C of the Class I Nonhazardous Permit Application, 2022.

- VII. Attach data on the proposed operation, including:
- Proposed average and maximum daily rate and volume of fluids to be injected;
The requested rate and volume information are included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Whether the system is open or closed;
Surface facilities and wellbores for WDW-1, WDW-2, and WDW-3 are designed as a closed system.
 - Proposed average and maximum injection pressure;
The requested injection pressure information is included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
The requested injection fluid information is included in Sections X.H and X.V of the Class I Nonhazardous Permit Application, 2022.
 - If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
The requested injection fluid information is included in Sections X.I of the Class I Nonhazardous Permit Application, 2022.

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

The requested geologic information is included in Sections X.E, X.H, and X.G of the Class I Nonhazardous Permit Application, 2022.

VIII. Describe the proposed stimulation program, if any.

The requested stimulation information is included in Section X.K of the Class I Nonhazardous Permit Application, 2022.

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

The requested information is included in Sections X.I and X.R of the Class I Nonhazardous Permit Application, 2022.

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

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

The requested information is included in Section X.P of the Class I Nonhazardous Permit Application, 2022.

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

The proof of notice is attached to this form.

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

NAME: Travis Gibb TITLE: Vice President and Refinery Manager

SIGNATURE:  DATE: 8/12/2022

E-MAIL ADDRESS: _____

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

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

III. WELL DATA

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

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

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

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

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

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

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

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

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

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

WELL NAME & NUMBER: WDW-1

WELL LOCATION:	600 feet from the south line and 2,310 feet from the east line of SW/4, SE/4	31	17 South	28 East
	FOOTAGE LOCATION	UNIT LETTER	SECTION	TOWNSHIP
				RANGE

WELL CONSTRUCTION DATA

(Perforated)

OCD UIC Permit: UICI-008-1
 Well API Number: 30-015-27592
 Eddy County, New Mexico
 Sec. 31, T17S-R28E
 Lat. 32.78517° / Long. -104.21376° (NAD 83)

All depths referenced to Kelly Bushing (KB)
 elevation 2.5' above ground level.
 Ground Level Elevation: +3,678' MSL

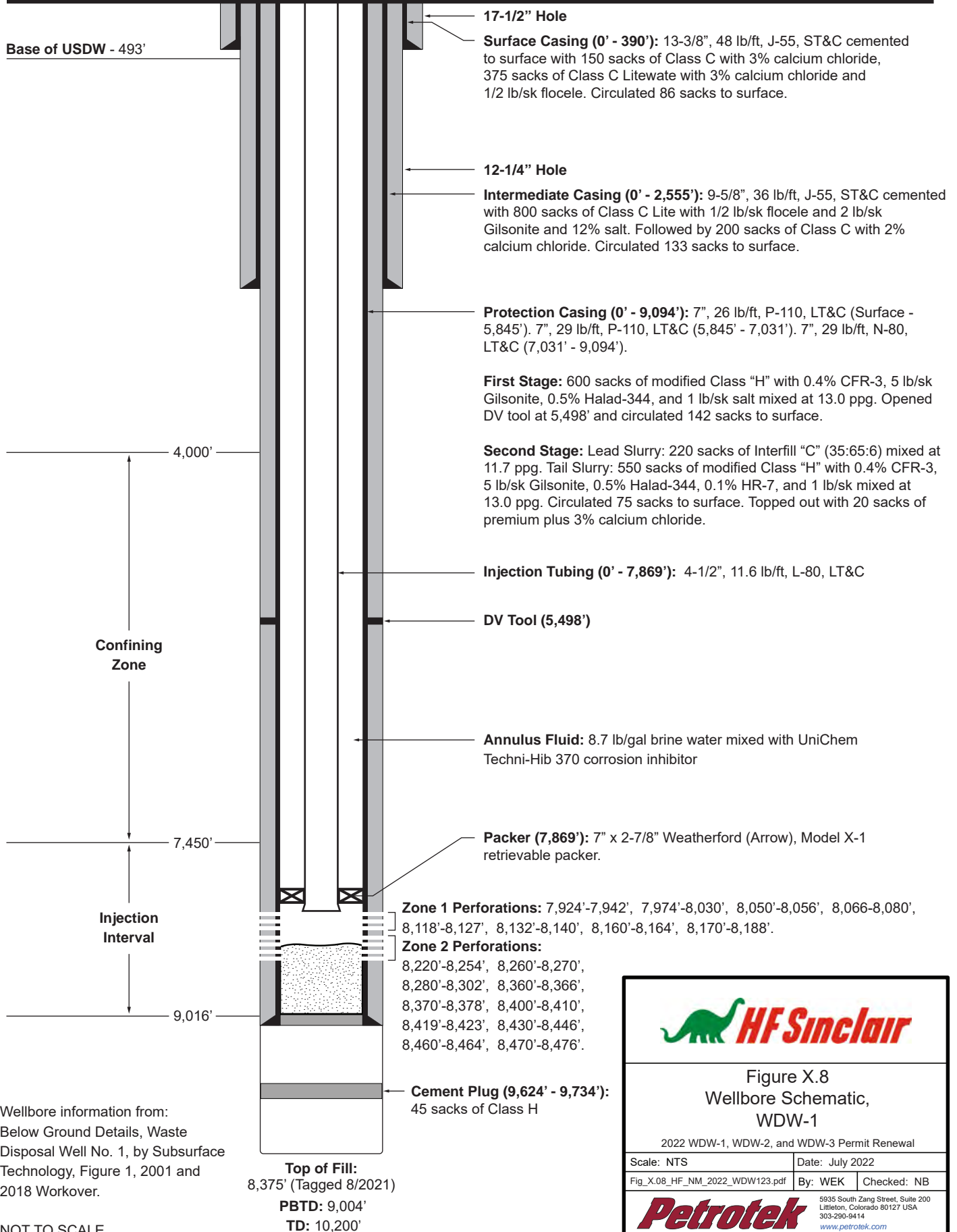


Figure X.8
 Wellbore Schematic,
 WDW-1

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.08_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

Petrotek
 5935 South Zang Street, Suite 200
 Littleton, Colorado 80127 USA
 303-290-9414
www.petrotek.com

INJECTION WELL DATA SHEET

Tubing Size: 4 ½" Lining Material: Steel tubing

Type of Packer: Arrow X-1

Packer Setting Depth: 7,869'

Other Type of Tubing/Casing Seal (if applicable): N/A

Additional Data

1. Is this a new well drilled for injection? _____ Yes X _____ No

If no, for what purpose was the well originally drilled? Oil and gas, later converted to Class I injection well

2. Name of the Injection Formation: Lower Wolfcamp, Cisco, and Canyon Formations

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

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used.
The well was originally drilled to a depth of 10,200 feet. The well was converted in 1999, and a cement plug was set from 9,624 to 9,734 feet and 7" protection casing was set at 9,094 feet. A bottom plug was installed at the base of the protection casing with the top of the plug at 9,004 feet. The 7" casing was perforated with a 0.5" diameter hole at 2 shots per foot with 60 deg phasing. The perforations are between 7,924 – 8,188 feet and 8,220 – 8,476 feet.

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:
The Abo Formation overlies the Wolfcamp and extends from 5,400 feet to 6,890 feet in WDW-1, from 5,506 feet to 6,728 feet in WDW-2, and from 5,380 feet to 6,745 feet in WDW-3. Although the Abo is a major oil producer in the AOR, the producing intervals lie in the upper Abo, whose equivalents are above 6,100 feet in WDW-1 and above 6,200 feet in WDW-2. The deepest Abo test well in the area is located 6,000 feet east (downdip) of WDW-3 and was drilled to 6,412 feet.

APPLICATION FOR AUTHORIZATION TO INJECT

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

II. OPERATOR: HollyFrontier Navajo Refining LLC _____

ADDRESS: 501 East Main, Artesia, New Mexico, 88210 _____

CONTACT PARTY: Travis Gibb _____PHONE: (575) 748-3311 _____

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

IV. Is this an expansion of an existing project? _____Yes X _____No
If yes, give the Division order number authorizing the project: _____

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

The requested AOR map is included in Section X.B of the Class I Nonhazardous Permit Application, 2022.

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

The requested AOR data tabulation is included in Section X.C of the Class I Nonhazardous Permit Application, 2022.

- VII. Attach data on the proposed operation, including:
- Proposed average and maximum daily rate and volume of fluids to be injected;
The requested rate and volume information are included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Whether the system is open or closed;
Surface facilities and wellbores for WDW-1, WDW-2, and WDW-3 are designed as a closed system.
 - Proposed average and maximum injection pressure;
The requested injection pressure information is included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
The requested injection fluid information is included in Sections X.H and X.V of the Class I Nonhazardous Permit Application, 2022.
 - If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
The requested injection fluid information is included in Sections X.I of the Class I Nonhazardous Permit Application, 2022.

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

The requested geologic information is included in Sections X.E, X.H, and X.G of the Class I Nonhazardous Permit Application, 2022.

VIII. Describe the proposed stimulation program, if any.

The requested stimulation information is included in Section X.K of the Class I Nonhazardous Permit Application, 2022.

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

The requested information is included in Sections X.I and X.R of the Class I Nonhazardous Permit Application, 2022.

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

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

The requested information is included in Section X.P of the Class I Nonhazardous Permit Application, 2022.

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

The proof of notice is attached to this form.

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

NAME: Travis Gibb TITLE: Vice President and Refinery Manager

SIGNATURE:  DATE: 8/12/2022

E-MAIL ADDRESS: _____

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

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

III. WELL DATA

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

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

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

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

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

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

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

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

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

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

WELL NAME & NUMBER: WDW-2

WELL LOCATION:	1,980 feet from the north line and 660 feet from the west line of SW/4, NW/4	12	18 South	27 East
	FOOTAGE LOCATION	UNIT LETTER	SECTION	TOWNSHIP
				RANGE

WELL CONSTRUCTION DATA

Hole Size: 11" _____ Casing Size: 8 5/8" _____

Cemented with: 800 sx. *or* ft³

Top of Cement: Surface Method Determined: NM OCD_____

Hole Size: N/A _____ Casing Size: N/A _____

Cemented with: N/A sx. *or* ft³

Top of Cement: N/A Method Determined: N/A

Hole Size: 7 7/8" Casing Size: 5 1/2"

Cemented with: 1,570 sx. *or* ft³

Top of Cement: Surface Method Determined: NM OCD

Total Depth: 8,770

7,570 feet to 8,399

(Perforated)

OCD UIC Permit: UICI-008-2
Well API Number: 30-015-20894
Eddy County, New Mexico
Sec. 31, T17S-R27E
Lat. 32.763772° / Long. -104.238508° (NAD 83)

All depths referenced to Kelly Bushing (KB)
elevation 13' above ground level.
Ground Level Elevation: +3,610' MSL

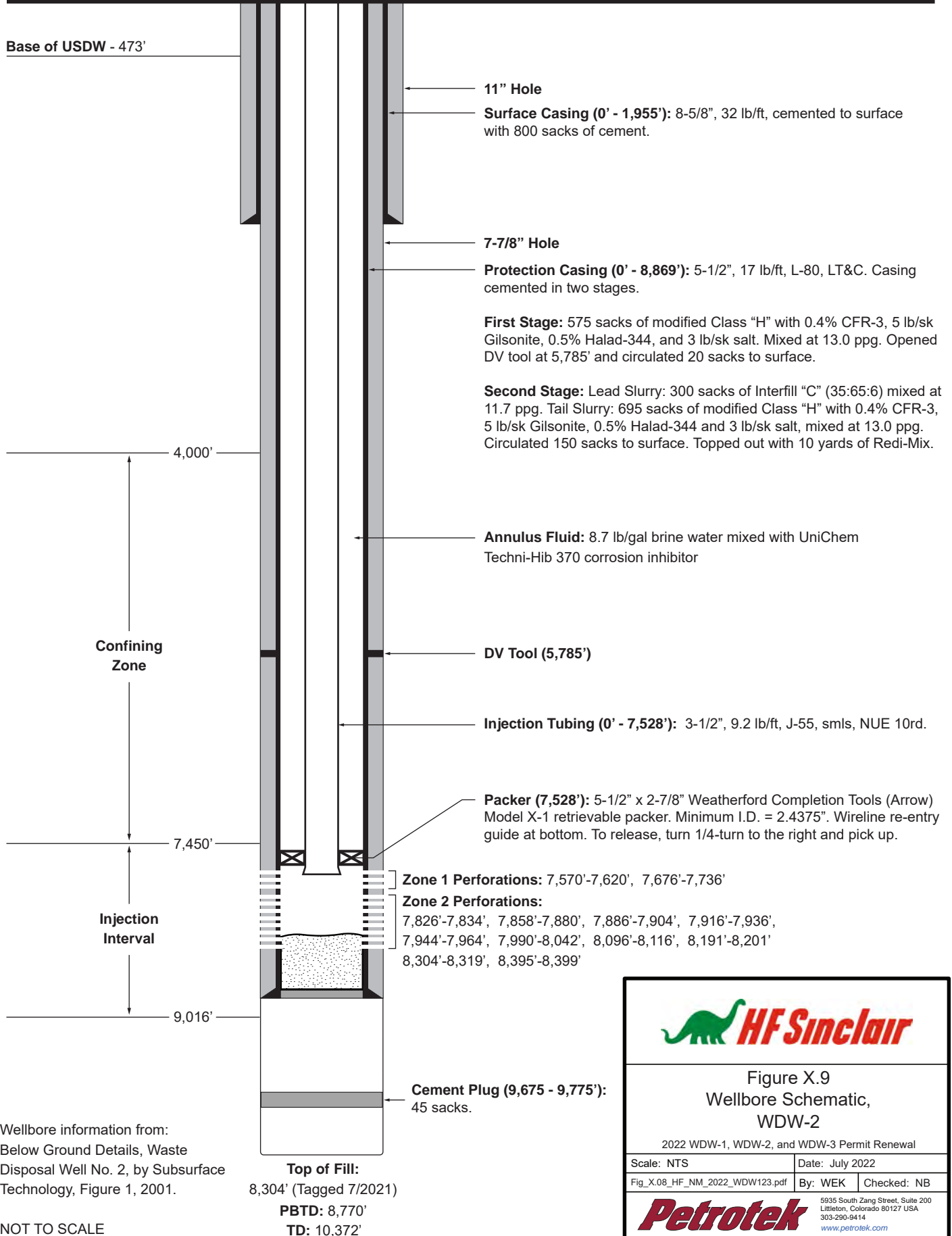


Figure X.9
Wellbore Schematic,
WDW-2

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.08_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB

Petrotek

5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

INJECTION WELL DATA SHEET

Tubing Size: 3 1/2" Lining Material: Steel tubing

Type of Packer: Arrow X-1

Packer Setting Depth: 7,528'

Other Type of Tubing/Casing Seal (if applicable): N/A

Additional Data

1. Is this a new well drilled for injection? _____ Yes X _____ No

If no, for what purpose was the well originally drilled? Oil and gas, later converted to Class I injection well

2. Name of the Injection Formation: Lower Wolfcamp, Cisco, and Canyon Formations

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

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used.
The well was originally drilled to a depth of 10,372 feet. The well was converted in 1999, and a cement plug was set from 9,675 to 9,775 feet and 5 1/2" protection casing was set at 8,869 feet. A bottom plug was installed at the base of the protection casing with the top of the plug at 8,770 feet. The 5 1/2" casing was perforated with a 0.5" diameter hole at 2 shots per foot with 60 deg phasing. The perforations are between 7,570 – 7,736 feet and 7,826 – 8,399 feet.

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:
The Abo Formation overlies the Wolfcamp and extends from 5,400 feet to 6,890 feet in WDW-1, from 5,506 feet to 6,728 feet in WDW-2, and from 5,380 feet to 6,745 feet in WDW-3. Although the Abo is a major oil producer in the AOR, the producing intervals lie in the upper Abo, whose equivalents are above 6,100 feet in WDW-1 and above 6,200 feet in WDW-2. The deepest Abo test well in the area is located 6,000 feet east (downdip) of WDW-3 and was drilled to 6,412 feet.

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance X _____ Disposal _____ Storage
Application qualifies for administrative approval? _____ Yes _____ No

II. OPERATOR: HollyFrontier Navajo Refining LLC _____

ADDRESS: 501 East Main, Artesia, New Mexico, 88210 _____

CONTACT PARTY: Travis Gibb _____ PHONE: (575) 748-3311 _____

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

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

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

The requested AOR map is included in Section X.B of the Class I Nonhazardous Permit Application, 2022.

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

The requested AOR data tabulation is included in Section X.C of the Class I Nonhazardous Permit Application, 2022.

- VII. Attach data on the proposed operation, including:
- Proposed average and maximum daily rate and volume of fluids to be injected;
The requested rate and volume information are included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Whether the system is open or closed;
Surface facilities and wellbores for WDW-1, WDW-2, and WDW-3 are designed as a closed system.
 - Proposed average and maximum injection pressure;
The requested injection pressure information is included in Section X.H of the Class I Nonhazardous Permit Application, 2022.
 - Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
The requested injection fluid information is included in Sections X.H and X.V of the Class I Nonhazardous Permit Application, 2022.
 - If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
The requested injection fluid information is included in Sections X.I of the Class I Nonhazardous Permit Application, 2022.

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

The requested geologic information is included in Sections X.E, X.H, and X.G of the Class I Nonhazardous Permit Application, 2022.

VIII. Describe the proposed stimulation program, if any.

The requested stimulation information is included in Section X.K of the Class I Nonhazardous Permit Application, 2022.

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

The requested information is included in Sections X.I and X.R of the Class I Nonhazardous Permit Application, 2022.

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

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

The requested information is included in Section X.P of the Class I Nonhazardous Permit Application, 2022.

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

The proof of notice is attached to this form.

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

NAME: Travis Gibb TITLE: Vice President and Refinery Manager

SIGNATURE:  DATE: 8/12/2022

E-MAIL ADDRESS: _____

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

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

III. WELL DATA

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

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

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

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

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

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

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

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

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

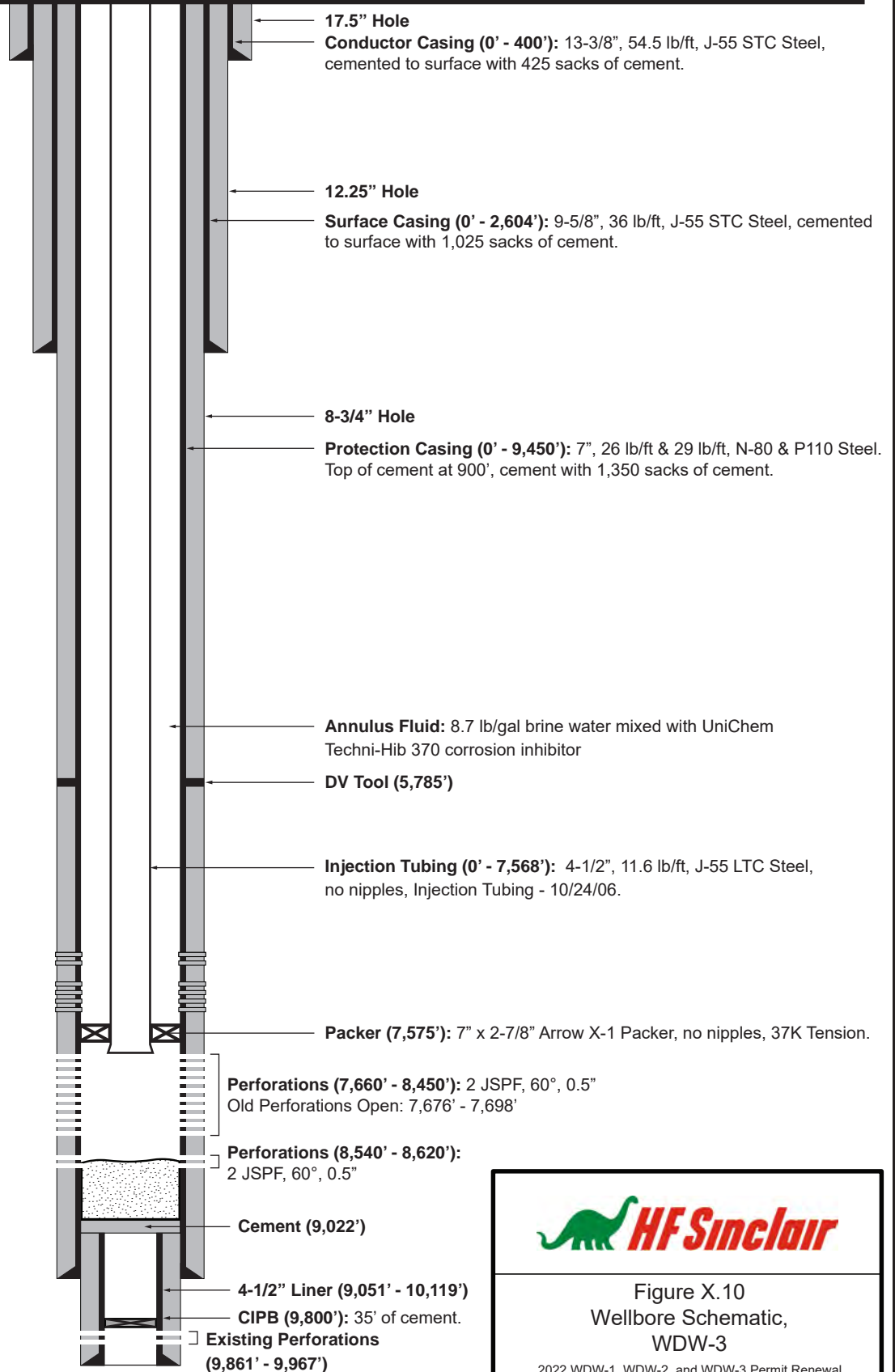
NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

WELL LOCATION:	790 feet from the south line and 2,250 feet from the west line of SE/4, SW/4	1	18 South	27 East
	FOOTAGE LOCATION	UNIT LETTER	SECTION	TOWNSHIP
				RANGE

WELL CONSTRUCTION DATA

(Perforated)

OCD UIC Permit: UICI-008-3
 Well API Number: 30-015-26575
 Eddy County, New Mexico
 Sec. 31, T18S-R27E
 Lat. 32.771186° / Long. -104.233306° (NAD 83)



Top of Fill:
 8,604' (Tagged 8/2021)
PBTD: 9,022'
TD: 10,119'

Wellbore information from:
 Gaines Well #3 Navajo
 Refining schematic by
 Subsurface Technology, 2009.

NOT TO SCALE





Figure X.10
Wellbore Schematic,
WDW-3

2022 WDW-1, WDW-2, and WDW-3 Permit Renewal

Scale: NTS	Date: July 2022
Fig_X.10_HF_NM_2022_WDW123.pdf	By: WEK Checked: NB



5935 South Zang Street, Suite 200
 Littleton, Colorado 80127 USA
 303-290-9414
www.petrotek.com

INJECTION WELL DATA SHEET

Tubing Size: 4 ½" Lining Material: Steel tubing

Type of Packer: Arrow X-1

Packer Setting Depth: 7,575'

Other Type of Tubing/Casing Seal (if applicable): N/A

Additional Data

1. Is this a new well drilled for injection? _____ Yes X _____ No

If no, for what purpose was the well originally drilled? Oil and gas, later converted to Class I injection well

2. Name of the Injection Formation: Lower Wolfcamp, Cisco, and Canyon Formations

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

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used.
The well was originally drilled to a depth of 10,119 feet. The well was converted in 2006, and a cement plug was set at 9,022 feet and a cast iron bridge plug at 9,800 feet in the 4 ½" liner. The 7" protection casing was perforated with a 0.5" diameter hole at 2 shots per foot with 60 deg phasing. The perforations are between 7,660 – 8,450 feet and 8,540 – 8,620 feet.

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:
The Abo Formation overlies the Wolfcamp and extends from 5,400 feet to 6,890 feet in WDW-1, from 5,506 feet to 6,728 feet in WDW-2, and from 5,380 feet to 6,745 feet in WDW-3. Although the Abo is a major oil producer in the AOR, the producing intervals lie in the upper Abo, whose equivalents are above 6,100 feet in WDW-1 and above 6,200 feet in WDW-2. The deepest Abo test well in the area is located 6,000 feet east (downdip) of WDW-3 and was drilled to 6,412 feet.

Draft Public Notice

WDW-1, WDW-2, and WDW-3

(UICI-8-1, UICI-8-2, UUCI-8-3) HollyFrontier Navajo Refining LLC, Travis Gibb, Vice President and Refinery Manager, 501 E. Main Street, Artesia, New Mexico, at (575) 748-3311 has submitted a renewal application for three Underground Injection Control (UIC) Class I (Non-Hazardous) Injection Well Discharge Permits for the wells below.

- WDW -1 (API# 30-015-27592). The WDW-1 is located in the SW/4, SE/4 of Section 31, Township 17 South, Range 28 East, NMPM, Eddy County, New Mexico. WDW-1 is located approximately 11 miles SE of the intersection of I-285 and Hwy 82 or approximately 1 mile SW of the intersection of Hwy 82 and CR-206.
- WDW-2 (API# 30-015-20894). The WDW-2 is located in the SW/4, NW/4 of Section 12, Township 18 South, Range 27 East, NMPM, Eddy County, New Mexico. WDW-2 is located approximately 10 miles SE of the intersection of US-285 and Hwy 82 or approximately 3 miles South of the intersection of Hwy 82 and CR-204 (Hilltop Road).
- WDW-3 (API# 30-015-26575). The WDW-3 is located in the SE/4, SW/4 of Section 1, Township 18 South, Range 27 East, NMPM, Eddy County, New Mexico. WDW-3 is located approximately 14 miles E-SE of the intersection of I-285 and Hwy 82 (Navajo Refinery) or approximately 2.75 miles S of Hwy 82 and CR-225.

Non-hazardous oilfield waste fluids are injected within the Lower Wolfcamp, Cisco, and Canyon Formations.

- Underground injection at WDW-1 occurs within the injection interval from 7,924 to 8,476 feet KB. The injection rate into WDW-1 will not exceed 500 gpm and the maximum allowable surface injection pressure is 1,585 psig.
- Underground injection at WDW-2 occurs within the injection interval from 7,570 to 8,399 feet KB. The injection rate into WDW-2 will not exceed 500 gpm and the maximum allowable surface injection pressure is 1,514 psig.

- Underground injection at WDW-3 occurs within the injection interval from 7,660 to 8,620 feet (log depth). The injection rate into WDW-3 will not exceed 500 gpm and the maximum allowable surface injection pressure of 1530 psig.

The injected refinery waste water quality is approximately 3,400 mg/L TDS. Formation fluids within the permitted injection interval exceeds 10,000 mg/L TDS. Groundwater is first encountered in the area of the wells is at a depth range of approximately 50 to 150 feet below ground level. The groundwater quality ranges from approximately 1,500 to 2,200 mg/L TDS.

Interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.