

08/02/13 DATE IN	SUSPENSE	ENGINEER PG	08/05/13 LOGGED IN	TYPE IPI	PPRG 1321743247 PNO
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ABOVE THIS LINE FOR DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION

- Engineering Bureau -

1220 South St. Francis Drive, Santa Fe, NM 87505



ADMINISTRATIVE APPLICATION CHECKLIST

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

Application Acronyms:

[NSL-Non-Standard Location] [NSP-Non-Standard Proration Unit] [SD-Simultaneous Dedication]
 [DHC-Downhole Commingling] [CTB-Lease Commingling] [PLC-Pool/Lease Commingling]
 [PC-Pool Commingling] [OLS - Off-Lease Storage] [OLM-Off-Lease Measurement]
 [WFX-Waterflood Expansion] [PMX-Pressure Maintenance Expansion]
 [SWD-Salt Water Disposal] [IPI-Injection Pressure Increase]
 [EOR-Qualified Enhanced Oil Recovery Certification] [PPR-Positive Production Response]

[1] TYPE OF APPLICATION - Check Those Which Apply for [A]

[A] Location - Spacing Unit - Simultaneous Dedication
☐ NSL ☐ NSP ☐ SD

Check One Only for [B] or [C]

[B] Commingling - Storage - Measurement
☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[C] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery
☐ WFX ☐ PMX ☐ SWD ☒ IPI ☐ EOR ☐ PPR

[D] Other: Specify SWD-1245-A

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[2] NOTIFICATION REQUIRED TO: - Check Those Which Apply, or Does Not Apply

[A] ☐ Working, Royalty or Overriding Royalty Interest Owners

[B] ☐ Offset Operators, Leaseholders or Surface Owner

[C] ☐ Application is One Which Requires Published Legal Notice

[D] ☐ Notification and/or Concurrent Approval by BLM or SLO
 U.S. Bureau of Land Management - Commissioner of Public Lands, State Land Office

[E] ☐ For all of the above, Proof of Notification or Publication is Attached, and/or,

[F] ☐ Waivers are Attached

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[3] SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED ABOVE.

[4] **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

David Stewart
 Print or Type Name

Signature

SR. Regulatory Advisor
 Title

7/30/13
 Date

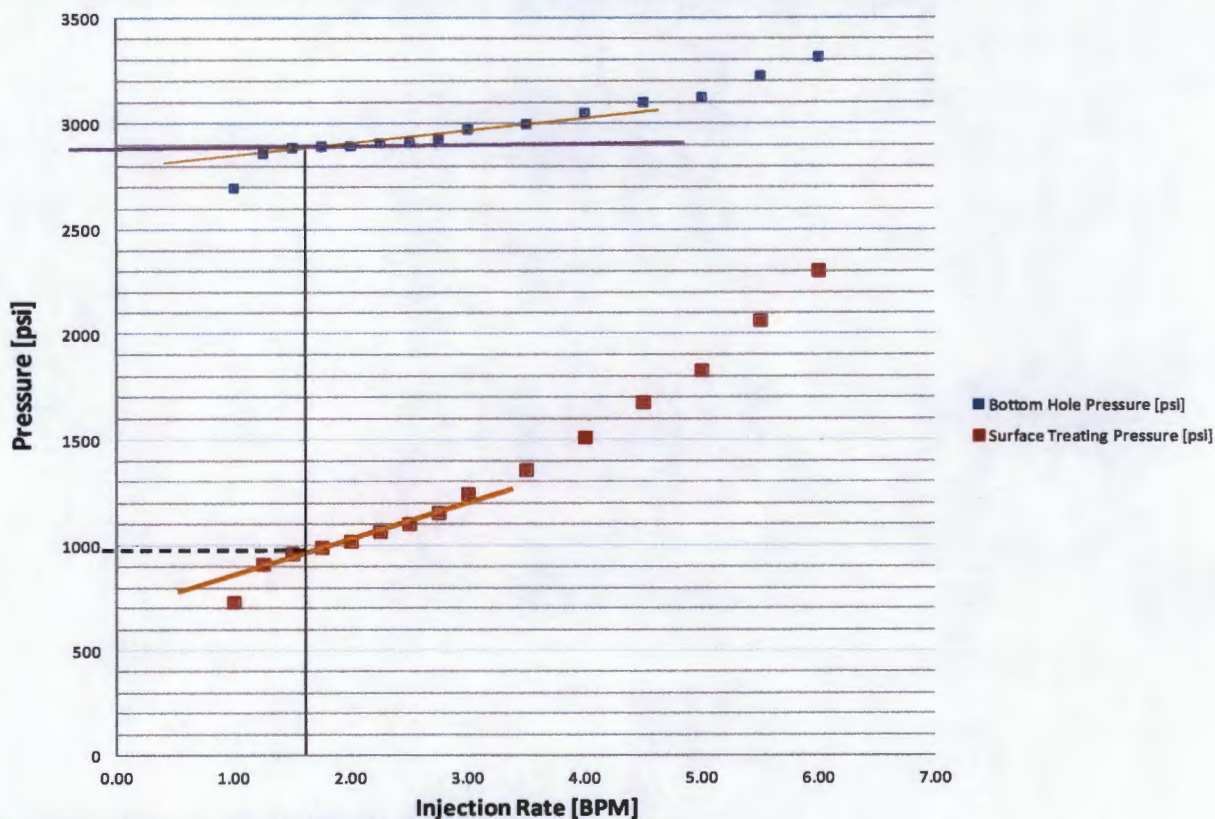
OX4 USA Inc. - 16696
 Sundance 4 Federal #324
 30-015-38527

SWD-1245-A

david_stewart@ox4.com
 e-mail Address 432-685-5717

SUNDANCE 4 FEDERAL #32Y (SWD-1245A)

The STP didn't clearly show an FPP thus an interpretation was done using the bottom hole pressure curve. The BHP curve appears to show an FPP between point 3 and point 4. The rates corresponding to these points are 1.5 & 1.75 bpm. Using linear interpretation, the resulting surface treating pressure is 980 psi. Based on an FPP of 980 psi, Oxy would like to request an increase to 930 psi.



Rate [bbls/min]	Tubing Head Pressure [psi]
1.00	735
1.25	915
1.50	965
1.75	995
2.00	1025
2.25	1070
2.50	1106
2.75	1158
3.00	1247
3.50	1360
4.00	1515
4.50	1680
5.00	1830
5.50	2068
6.00	2307

To: New Mexico Oil Conservation Division
Attn: Phillip R. Goetze, P.G.

OXY USA Inc. (16696) formally requests an increase in maximum injection pressure to 2500 psi for the following approved SWD permit. The justification will be presented herein.

Well Name: Sundance 4 Federal 32Y
API#: 30-015-38527
660 FNL 458 FWL NWNW(4) Sec 4 T24S R31E
Administrative Order SWD-1245-A 8/11/11

The SWD well is completed in the Bell Canyon & Upper Cherry Canyon (4602-5830') with 2.875" composite lined tubing (2.25" ID) set at a depth of 4857'. See Figure 1 below:

Well Name	Sundance 4 Federal 32Y
API	30-015-38527
Location	Sec 4 T24S R31E



Hole size	14-3/4"
Surface casing	11-3/4" 42#, H-40
Set @	509'
Cement	410 SX circulated to surface

Hole size	10-5/8"
Intermediate Casing	8-5/8", 32#, J-55 LTC
Set @	4295'
Cement	1200 sx TOC-- 450'

Hole size	7-7/8"
Intermediate Casing	5-1/2", 17#, J-55 LTC
Set @	6316'
Cement	1466 SX circulated to surface

<u>Tubing String</u>	
Tubing, 2-7/8" & Packer	set @ 4564'

*Delaware
Bell & upper
cherry*

$$\frac{2500 \text{ psi}}{4602 \text{ ft}} = 0.54 \text{ psi/ft}$$

*Approved
for
4249 to
5882*

4602' - 4690'
4712' - 4774'
4912' - 4970'
4980' - 5020'
5052' - 5070'
5525' - 5567'
5740' - 5757'
5800' - 5830'

$$\frac{930}{4602} = 0.202$$

CIBP set @ 6243'

1 SPFw/ total of
444 holes

PBTD: 6243' (CIBP)

TD: 6316'

Figure 1: Sundance 4 Federal 32Y Well Schematic.

On 6/20/2013 a planned step rate test was performed on the Sundance 4 Federal 32Y to identify the formation parting pressure, thus determining a maximum allowable injection pressure. The well was back flowed for 4hrs, then shut-in for an additional 12 hrs to ensure accurate testing results. The step-rate test was then conducted at the below rates utilizing treated water and a mobile pump truck. Pump rates were maintained for 15 minutes or until we achieved a stable injection pressure.

Rate [bbls/day]	Rate [bbls/min]	Cumulative Volume Pumped [bbls]	Tubing Head Pressure [psi]
1440	1.00	14	735
1800	1.25	32	915
2160	1.50	55	965
2520	1.75	74	995
2880	2.00	96	1025
3240	2.25	117	1070
3600	2.50	147	1106
3960	2.75	170	1158
4320	3.00	186	1247
5040	3.50	221	1360
5760	4.00	243	1515
6480	4.50	271	1680
7200	5.00	304	1830
7920	5.50	354	2068
8640	6.00	390	2307
9360	6.50	429	2496
10080	7.00	478	2711

Table 1: Sundance 4 Federal 32Y SWD Step Rate test data.

The formation parting pressure was not observed during the step-rate test. A conservative approach was taken in regards to injection rates in order to eliminate the possibility of fracture propagation into a non-disposal zone. Figure 3 displays the results from modeling conducted after the step rate test was completed. The modeling results identified that the pressure drop due to friction in the small diameter tubing was preventing the bottom-hole pressure from reaching the formation parting pressure. It is important to note that the previous step rate test (dated June 7, 2000) did not achieve the formation parting pressure with a maximum injection rate of 3600 bpd and surface tubing pressure of 1350 psi.

The calculated flowing bottom-hole pressure during the test was found to have never exceeded 3388 psi with a corresponding surface treating pressure of 2711 psi. Figure 2 displays the surface treating pressure obtained during the test along with the corresponding bottom-hole pressure (calculated). The various injection rates for each interval are plotted on the horizontal axis in figure 2. The requested 2500 psi surface injection pressure represents an equivalent bottom-hole pressure well below the maximum pressure obtained during the test, thus remaining below the formation parting pressure.

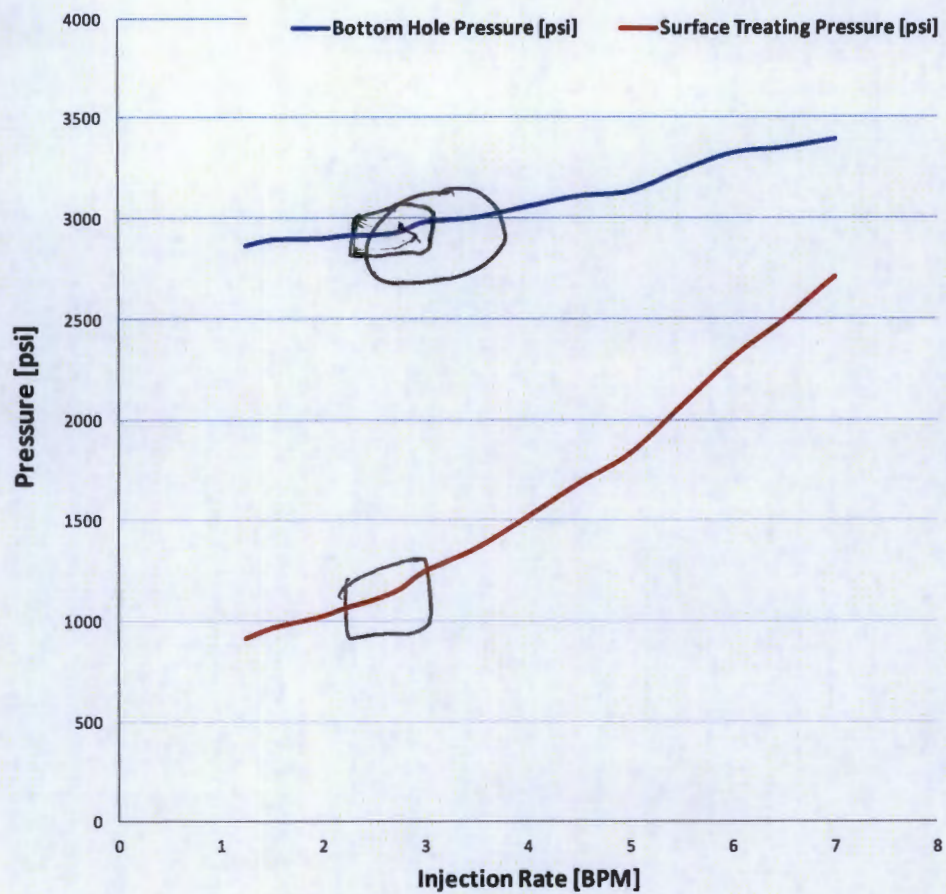


Figure 2: Surface Treating Pressure & Calculated Bottom Hole Pressure versus injection rate.

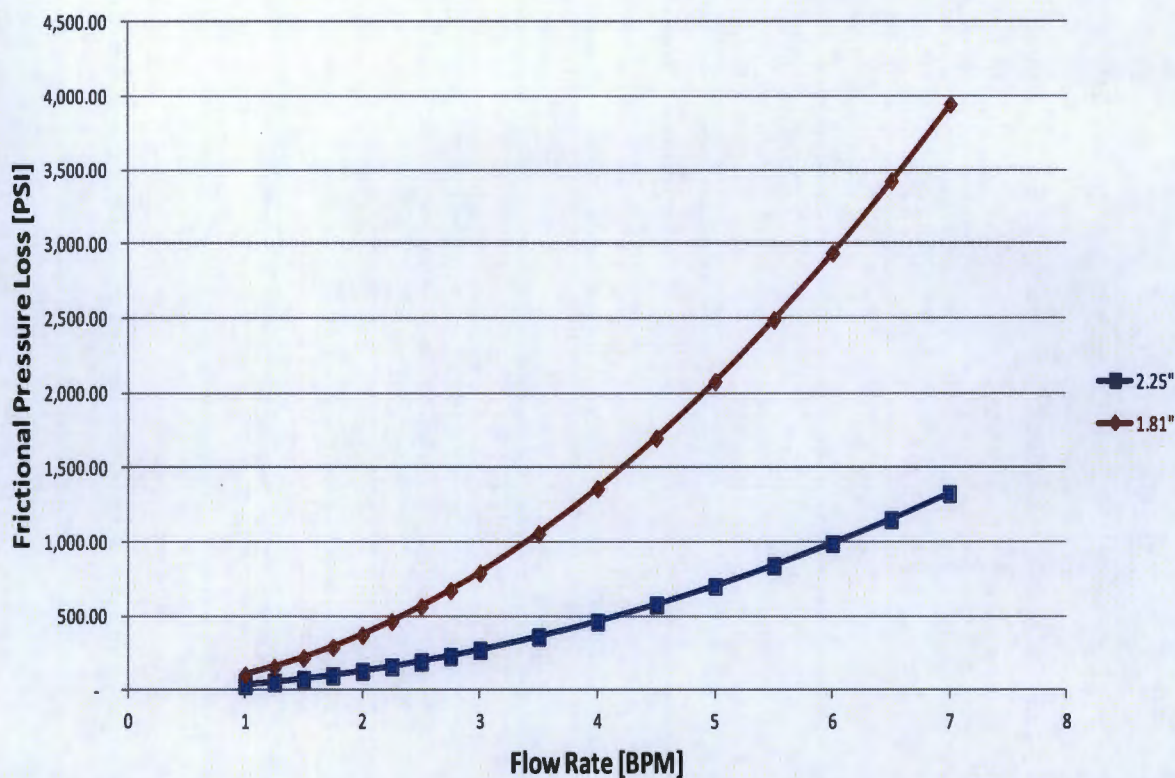


Figure 3: Frictional Pressure Loss comparison in a tubing ID of 2.25" versus 1.81" set at a depth of 4564 feet.

Please advise if any additional data is required in order to make a ruling of the proposed increase in permitted injection pressure.

Best regards

Joseph M. Evans
 Production Engineer
 SE New Mexico Reservoir Management Team
 OXY Permian Primary Development.
 Office - 713-350-4640
 Cell - 713-855-0624
joseph_evans@oxy.com

cc: NMOCD-Artesia, BLM-Carlsbad



New Mexico Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

John H. Bemis
Cabinet Secretary-Designate

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

Jami Bailey
Division Director
Oil Conservation Division



Administrative Order SWD-1245-A
August 11, 2011

ADMINISTRATIVE ORDER OF THE OIL CONSERVATION DIVISION

Under the provisions of 19.15.26.8B NMAC, OXY USA, INC. seeks an administrative order to utilize its Sundance 4 Federal Well No. 32Y (API 30-015-38527) located 680 feet from the North line and 458 feet from the West line, Unit Letter D of Section 4, Township 24 South, Range 31 East, NMPM, Eddy County, New Mexico, for produced water disposal purposes.

THE DIVISION DIRECTOR FINDS THAT:

The application has been duly filed under the provisions of 19.15.26.8B NMAC and satisfactory information has been provided that affected parties as defined in said rule have been notified and no objections have been received within the prescribed waiting period. The applicant has presented satisfactory evidence that all requirements prescribed in 19.15.26.8 NMAC have been met and the operator is in compliance with 19.15.5.9 NMAC.

IT IS THEREFORE ORDERED THAT:

The applicant, OXY USA, INC., is hereby authorized to utilize its Sundance 4 Federal Well No. 32Y (API 30-015-38527) located 680 feet from the North line and 458 feet from the West line, Unit Letter D of Section 4, Township 24 South, Range 31 East, NMPM, Eddy County, New Mexico, for disposal of oil field produced water (UIC Class II only) into the Bell Canyon and Cherry Canyon members of the Delaware Mountain Group through perforations from approximately 4249 to 5882 feet through lined tubing and a packer set within 100 feet of the permitted disposal interval.

IT IS FURTHER ORDERED THAT:

The operator shall take all steps necessary to ensure that the disposed water enters only the proposed disposal interval and is not permitted to escape to other formations or onto the surface.



After installing tubing, the casing-tubing annulus shall be loaded with an inert fluid and equipped with a pressure gauge or an approved leak detection device in order to determine leakage in the casing, tubing, or packer. The casing shall be pressure tested from the surface to the packer setting depth to assure casing integrity.

The well shall pass an initial mechanical integrity test ("MIT") prior to initially commencing disposal and prior to resuming disposal each time the disposal packer is unseated. All MIT testing procedures and schedules shall follow the requirements in Division Rule 19.15.26.11A. NMAC.

The wellhead injection pressure on the well shall be limited to **no more than 850 psi**. In addition, the disposal well or system shall be equipped with a pressure limiting device in workable condition which shall, at all times, limit surface tubing pressure to the maximum allowable pressure for this well.

The Director of the Division may authorize an increase in tubing pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the disposed fluid from the target formation. Such proper showing shall be demonstrated by sufficient evidence including but not limited to an acceptable Step-Rate-Test.

The operator shall notify the supervisor of the Division's district office of the date and time of the installation of disposal equipment and of any MIT test so that the same may be inspected and witnessed. The operator shall provide written notice of the date of commencement of disposal to the Division's district office. The operator shall submit monthly reports of the disposal operations on Division Form C-115, in accordance with Division Rules 19.15.26.13 and 19.15.7.24 NMAC.

Without limitation on the duties of the operator as provided in Division Rules 19.15.29 and 19.15.30 NMAC, or otherwise, the operator shall immediately notify the Division's district office of any failure of the tubing, casing or packer in the well, or of any leakage or release of water, oil or gas from around any produced or plugged and abandoned well in the area, and shall take such measures as may be timely and necessary to correct such failure or leakage.

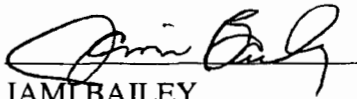
The injection authority granted under this order is not transferable except upon division approval. The division may require the operator to demonstrate mechanical integrity of any injection well that will be transferred prior to approving transfer of authority to inject.

The division may revoke this injection permit after notice and hearing if the operator is in violation of 19.15.5.9 NMAC.

The disposal authority granted herein shall terminate two years after the effective date of this order if the operator has not commenced injection operations into the subject well. One year after the last date of reported disposal into this well, the Division shall consider the well abandoned, and the authority to dispose will terminate *ipso facto*. The Division, upon written request mailed by the operator prior to the termination date, may grant an extension thereof for good cause.

Compliance with this order does not relieve the operator of the obligation to comply with other applicable federal, state or local laws or rules, or to exercise due care for the protection of fresh water, public health and safety and the environment.

Jurisdiction is retained by the Division for the entry of such further orders as may be necessary for the prevention of waste and/or protection of correlative rights or upon failure of the operator to conduct operations (1) to protect fresh or protectable waters or (2) consistent with the requirements in this order, whereupon the Division may, after notice and hearing, terminate the disposal authority granted herein.



JAMI BAILEY
Director

JB/wvjj

cc: Oil Conservation Division – Artesia
Bureau of Land Management – Carlsbad