STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION COMMISSION

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO. **COMM. CASE NO. 24123**

APPLICATIONS OF GOODNIGHT MIDSTREAM PERMIAN LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS, LEA COUNTY, NEW MEXICO. **DIV. CASE NOS. 23614-23617**

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC TO AMEND ORDER NO. R-22026/SWD-2403 TO INCREASE THE APPROVED INJECTION RATE IN ITS ANDRE DAWSON SWD #1, LEA COUNTY, NEW MEXICO. **DIV. CASE NO. 23775**

APPLICATIONS OF EMPIRE NEW MEXICO, LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO. **DIV. CASE NOS. 24018-24020, 24025**

FINDINGS OF FACT AND CONCLUSIONS OF LAW OF EMPIRE NEW MEXICO, LLC

COMES NOW Empire New Mexico, LLC ("Empire"), by and through its undersigned counsel of record, and pursuant to the Commission's Order issued on March 4, 2025, hereby tenders its *Findings of Fact and Conclusions of Law*.

This matter came before the Commission upon the *Application of Goodnight Midstream Permian, LLC, for Approval of a Saltwater Disposal Well, Lea County, New Mexico*, Comm. Case No. 24123; *Application of Goodnight Midstream Permian, LLC, for Approval of Saltwater Disposal Wells, Lea County, New Mexico*, Div. Case Nos. 23614-23617; *Application of Goodnight Midstream Permian, LLC, to Amend Order No. R-22026/SWD-2403 to Increase the Approved Injection Rate in its Andre Dawson SWD #1, Lea County, New Mexico,* Div. Case No. 23775; and the *Applications of Empire New Mexico, LLC, to Revoke Injection Authority, Lea County, New Mexico*, Div. Case Nos. 24018-24020 and 24025.

A hearing was held on these matters before the Commission beginning on February 20, 2025, and continuing intermittently through May 21, 2025.

Goodnight Midstream Permian, LLC ("Goodnight") appeared through its attorneys Adam Rankin, Esq., Julia Broggi, Esq., and Nathan Jurgensen, Esq.

The Oil Conservation Division appeared through its attorney, Chris Moander, Esq.

Empire New Mexico, LLC, appeared through its attorneys, Dana Hardy, Esq., Ernest L. Padilla, Esq., Sharon Shaheen, Esq., and Corey Wehmeyer, Esq.

Pilot Water Solutions SWD, LLC appeared through its attorneys, Miguel Suazo, Esq., and James Parrot, Esq.

Rice Operating Company and Permian Line Service, LLC, appeared through their attorney, Matthew Beck, Esq.

The Commission, having considered the evidence and the testimony of the witnesses; and having heard the arguments of Counsel, and having conducted a hearing, and being otherwise fully advised in the premises, makes the following Findings of Fact and Conclusions of Law.

GENERAL FINDINGS

1. The Eunice Monument South Unit ("EMSU") was formed on December 27, 1984, and is comprised of 14,189.94 acres, 58% of which are owned by the New Mexico State Land Office (SLO) and 20% by the U.S. Bureau of Land Management (BLM). TR 04/08/25 at 142:21-25; Empire Ex. A ¶10.

2. In 1984 the Oil Conservation Commission ("OCC") heard consolidated Cases No. 8397, No. 8398 and No. 8399 which established the EMSU and the parameters under which the Unit was to operate. (Empire Exs. A6, A7, A8)

   a. Case No. 8397 was an application for statutory unitization of the EMSU, which was approved in Commission Order No. R-7765.

   b. Case No. 8398 was an application for the waterflood project and operation, which was approved in Commission Order No. R-7766.

   c. Case No. 8399 was an application for pool extension and contraction for the EMSU, which was approved in Commission Order No. R-7767.

3. The EMSU is now operated by Empire after Empire Petroleum Corporation purchased the EMSU from ExxonMobil/XTO on March 12, 2021. TR 04/08/2025 at 144:13-16.

4. In Case Nos. 23614-23617 Goodnight seeks orders authorizing injection of produced water for disposal into the San Andres formation within the EMSU between approximately 4,100 and 5,300 feet. *See* GN Exs. A-4 through A-7.

5. In Case No. 23775, Goodnight seeks authorization to increase the rate of injection into the Andre Dawson SWD #1 within the EMSU. TR 04/08/25 at 90:24-91:18.

6. In Case Nos. 24018-24027, Empire seeks orders revoking Goodnight's existing permits to inject produced water into the San Andres formation. Case Nos. 24018, 24019,24020 and 24025 involve Goodnight's four active wells that are located within the EMSU – the Andre

Dawson SWD #1 (30-025-50634), the Ernie Banks SWD #1 (30-025-50633), the Sosa SWD #1 (30-025-47947), and the Ryno SWD #1 (30-025-43901), respectively.

7. In Case No. 24123, Goodnight seeks a de novo hearing on Division Order No. R-22869-A.

8. Before filing its applications for the existing salt water disposal wells, Goodnight knew that the disposal intervals in the four disposal wells were within the unitized interval of the EMSU. However, Goodnight failed to disclose that the disposal wells were located within the boundaries of the EMSU and the unitized interval thereof. TR 04/24/25 at 70:1-7, 71:1-19.

9. On December 27, 1984, Commission Order No. R-7765 established the EMSU with the vertical limits including the San Andres formation (Ordering Paragraph (3)). Concurrently, Commission Order No. R-7766 also included the San Andres formation as part of the Unitized Interval (or "Unitized Formation"). Finally, Ordering Paragraphs (1) and (2) of Commission Order No. R-7767 realigned the vertical limits for the shallower Eumont Gas Pool and the deeper Eunice Monument Oil pool [Eunice Monument Grayburg-San Andres pool; pool code 23000]. This separate order on nomenclature changes also reaffirmed that the limit of the Eunice Monument Oil pool as the base of the San Andres Formation. Order No. R-22869-A at 6-7, Conclusion of Law ("COL") 5.

10. The Commission approved the inclusion of the San Andres formation in the Unitized Interval based on the Technical Committee findings presented in the hearing for the consolidated cases. The Technical Committee Report (*Proposed Eunice Monument South Unit, Lea County, New Mexico* dated April 1983; "Report") concluded that the southern portion of the Eunice Monument Oil pool should be unitized and a waterflood initiated. The Report further recommended "'*The unitized interval shall include the formation from a lower limit defined by the base of the San Andres formation, to an upper limit defined by the top of the Grayburg formation or a -100 foot subsea datum, whichever is higher.*' [Recommendations and page 43]" *Id.* at 7 (emphasis in original), COL 6.

11. The approval of the Unitized Interval, including the San Andres formation, indicates the OCC recognized this formation as a "critical element for a successful waterflood operation and for the potential of undeveloped hydrocarbon resources. This approval is concordant with the authority provided to the OCC under the provisions of NMSA1978, § 70-7-7(J) which states that the Division order providing for unitization and unit operation of a pool or part of a pool shall include "*such additional provisions as are found to be appropriate for carrying on the unit operation and for the protection of correlative rights and the prevention of waste." Id.* at 8 (emphasis in original), COL 9.

12. On November 29, 2023, the New Mexico Oil Conservation Division ("NMOCD") issued Order No. R-22869 *rejecting* Goodnight's authority to inject produced water into the San Andres using the Piazza SWD Well No.1 for the following rationale:

> Empire has provided sufficient evidence for continued assessment of the Unitized Interval for potential recovery of any additional hydrocarbon resources remaining in place. Approval of the Proposed Well would contradict the

responsibility of the OCD ***"to prevent the drowning by water of any stratum or part thereof capable of producing oil or gas or both oil and gas in paying quantities and to prevent the premature and irregular encroachment of water or any other kind of water encroachment that reduces or tends to reduce the total ultimate recovery of crude petroleum oil or gas or both oil and gas from any pool."*** *Id.* at 8 (emphasis added); COL 11.

13. Goodnight failed to inform the NMOCD in their Applications for Authority to inject for the Ryno No. 1 SWD well, the Ernie Banks No. 1 SWD Well, the Sosa SA 17 No. 2 Well and the Andre Dawson No. 1 Well that the proposed injection zone was a "Unitized Formation." TR 04/24/25 at 70:1-7, 71:1-19.

14. Class 2 injection permits issued by the NMOCD can be revoked if they: (1) contain a material mistake, (2) the permittee made an incorrect statement on which the NMOCD relied, (3) the injected fluid is escaping from the approved injection interval, or (4) the injection could lead to waste. 40 CFR 144.36(a); *see, e.g.*, UIC Class II Permit SWD-2261, submitted in Goodnight ("GN") Ex. A-9 at 303-315.

15. Goodnight violated and continues violating each and all four of these requisites as follows:

Basis (1) and (2)—Goodnight made false and misleading statements in its Applications for Authorization to Inject that the NMOCD relied on when:

a. Goodnight stated that "The proposed SWD will be injecting water into the San Andres Formation which is a non-productive zone known to be compatible with formation water from the Wolfcamp and Bone Springs." GN Exs. A-4, A-5, A-6, A-7 (VII (5)).

b. The true statement is that the water is not compatible, *see, e.g.*, Empire Ex. N at 10-12, ¶ 9; and the San Andres is a known and unitized oil and gas producing zone (1) in the EMSU and (2) known production within 2 miles of the EMSU. *Id.* at 12, ¶ 10 ; *see id.* at 9; TR 02/25/25 at 452:2-7 (production in EMSU 658 and EMSU 660); *see* TR 05/21/25 at 17:14-19; Empire Ex. N at 12, ¶ 10; Empire Ex. N-15 (Wortham wells).

Basis (3)—Goodnight's injection fluid is escaping the approved injection interval in the San Andres because:

a. No impermeable barrier exists between the Grayburg and the underlying San Andres, *see, e.g.*, Empire Ex. B at 10-12; Empire Ex. J at 2-4, 10; Empire Ex. K at 4-5, 14-15; Empire Ex. M at 13—Goodnight's wastewater is communicating out of the permitted formation and up into the Grayburg; *see, e.g.*, Empire Ex. M at 2-3; and

b. Goodnight has made no effort whatsoever to identify where radially its wastewater is presently going, or will go. *See, e.g.*, TR 05/20/25 at 192:23-193:10, 194:18-20.

Basis (4)—Goodnight's wastewater injection in the EMSU is causing waste by.

a. Washing out and reducing secondary recovery of oil in the Grayburg Formation. Empire Ex. B at 8-9, 13; Empire Ex. C at 6; *id.* at 8, ¶ 15; Empire Ex. G at 5, ¶ 15; Empire Ex. I at 15.

b. All witnesses agree secondary recovery of oil is presently occurring in the Grayburg.

c. Washing out and reducing future tertiary development of oil in the Grayburg Formation. Empire Ex. B at 8-9, 13; Empire Ex. I at 12-13.

d. All witnesses agree a ROZ exists in the Grayburg Formation. TR 04/21/25 at 65:15-22.

e. Washing out and reducing future tertiary recovery of oil in the San Andres Formation. Empire Ex. B at 12; Empire Ex. C at 6; *id.* at 8, ¶ 15; Empire Ex. I at 12-13, 15; Empire Ex. I-2.

f. Both Empire and Goodnight witnesses agree there is a ROZ in the Upper San Andres. TR 04/21/25 at 65:15-22, 232:8-18; TR 04/22/25 at 28:3-5; TR 04/24/25 at 223:4-21; TR 04/25/25 at 104:19-21.

16. Goodnight omitted material information relating to the EMSU and its unitized interval in its Applications, TR 04/24/25 at 58:7-14, 61:1-6, 61:20-63:7, 68:19-69:12, 71:3-19, 72:4-73:5, 80:9-82:13; *see, e.g.*, GN Ex. A-4 at 43-48, 55, 71-74; and made false statements regarding water compatibility in its Applications. TR 04/24/25 at 63:8-64:6, 69:13-24; 70:1-7, 71:1-19; *see, e.g.*, GN Ex. A-4 at 75-78.

17. Goodnight knew that it would be injecting into the EMSU's unitized interval and into hydrocarbon bearing zones and failed to disclose this information in its Applications. TR 04/24/25 at 58:7-14, 120:21-122:5; (identifying the EMSU #660 as penetrating the injection zone).

18. Goodnight failed to inform the Division in their Applications for Authority to Inject for the Ryno No. 1 SWD Well, the Ernie Banks No. 1 SWD Well, the Sosa SA 17 No. 2 SWD Well and the Andre Dawson No. 1 SWD Well that the proposed injection into the San Andres Formation was into a Unitized Interval and the Eunice Monument Oil Pool, not only into the San Andres SWD Pool No. 96121 as stated in their Application. TR. 4/24/25 at 80:9-82:13; *see, e.g.*, GN Ex. A-4 at 43-48, 55, 71-74.

19. Goodnight made material omissions or misrepresentations through All Consulting, as Agent for Goodnight, when they filed the various Applications for Authority to Inject. An example that the Commission can use as a reference is the Application for the Ryno SWD No. 1, ("Ryno Admin. App."). Examples of these intentional false and misleading statements are in III. (Well Data) B. (1) The name of the injection formation and, if applicable, the field or pool name. *See id.* at pdf 4. On the Slide 2 Information Page the Injection Formation Pool Name is reflected as SWD; San Andres Pool Code: 96121. *Id.* at pdf 5. Goodnight's failure to include this material information prevented the Division from knowing that the Ryno well would be injecting into the San Andres Unitized Interval. Goodnight failed to include as the Pool Name, the Eunice Monument Oil Pool as defined by Order No. R-7767. TR 04/24/25 at 70:1-7, 71:3-19.

20. Goodnight also published deceptive information regarding the Ryno well. In the Legal Notice published on June 12, 2019 in the Hobbs News-Sun Newspaper, the Injection Interval is listed as 4,500' – 5,350'. Ryno Admin. App. at pdf 27. However, the administrative application identified the injection interval as 4,320' – 5,625'. *Id.* at pdf 5. Subsequently, Admin. Order SWD 2307 authorized Goodnight to inject "within the San Andres formation from 4320 feet to 5625 feet." SWD 2307 at 1.

21. Goodnight also failed to list the San Andres Formation in Article III.B.(5) Overlying Oil and Gas Zones: which states "Below are the approximate formation tops for **known oil and gas producing zones in the area.** Ryno Admin. App. at pdf 4. The San Andres Formation is a known oil and gas producing zone around the Eunice Monument South Unit as close as two miles. *See supra* ¶ 15(b); TR 05/21/25 17:14-19.

22. Goodnight made additional false and misleading statements in its Application for Authorization to Inject for the Ryno SWD Well No. 1 in Article VII (4) Injection Formation Water Analysis: which states "The proposed SWD will be injecting water into the San Andres formation which is a non-productive zone known to be compatible with formation water from the Wolfcamp and Bone Springs formations." Ryno Admin. App. at pdf 6, VII(4). The San Andres formation is a production zone in and near the EMSU, and the source water is not compatible with the formation water. *See supra*, ¶ 15(b).

23. On Attachment 2 Area of Review Information, the Area of Review Maps prepared by Goodnight fail to include the Boundaries of the Eunice Monument South Unit reflecting that the proposed Ryno SWD No. 1 Well is within the Unitized San Andres Formation Interval. Ryno Admin. App. at pdf 13-15. Once again by not reflecting that the proposed SWD Well will be injected into a Unitized Interval, Goodnight knowingly omitted disclosure of boundaries of the EMSU in its applications to the Division resulting in granting of the SWD Permits. Goodnight made the same misrepresentations on the other three (3) Applications for Authority to Inject which were approved.

24. An example of the applicable law and OCD authority relating to saltwater disposal ("SWD") wells is found in UIC Class II Permit SWD-2404 for the Ernie Banks SWD No. 1, attached to Order No. R-22027, which provides as follows:

a. Paragraph I.B.1. Duty to Comply with Permit: "Any noncompliance with the terms and conditions of this Permit, or of any provision of the Act, Rules or an Order issued by OCD or the Oil Conservation Commission, shall constitute a violation of law and is grounds for an enforcement action, **including revocation of this Permit** and civil and criminal penalties." (Emphasis added).

b. Paragraph I.B.2. Duty to Halt or Reduce Activity to Avoid Permit Violations: "Permittee shall halt or reduce injection to avoid a violation of this Permit or other applicable law".

c. Paragraph I.B.3. Duty to Mitigate Adverse Effects: "Permittee shall take all reasonable steps to minimize, mitigate and correct any waste or effect on correlative rights".

d. Paragraph I.B.6. Private Property: "This Permit does not convey a property right or authorize an injury to any person or property, an invasion of private rights, or an infringement of state or local law or regulations".

e. Paragraph I.C.2.d. Tests and Reports: "If Permittee detects a hydrocarbon show during the drilling of the Well, it shall notify OCD Engineering Bureau by email and obtain written approval prior to commencing injection into the Well".

f. Paragraph I.H.3.a. "The OCD may amend, suspend, or revoke this Permit after notice and an opportunity for hearing if it determines that:

. . .

ii. Permittee made an incorrect statement on which OCD relied to establish a term or condition of the Permit or grant this Permit;

. . .

v. Injected fluid is escaping from the approved injection interval; Injection may cause or contribute to the waste of oil, gas or potash resources or affect correlative rights, public health, or the environment:

. . .

vii. Injection may cause or contribute to the waste of oil, gas or potash resources or affect correlative rights, public health, or the environment

g. Paragraph 1.H.3.b. "OCD retains jurisdiction to enter such orders as it deems necessary to prevent waste and to protect correlative rights, protect public health, and the environment."

h. Paragraph 1.H.3.c. "OCD retains jurisdiction to review this Permit as necessary and no less than once every five (5) years, and may determine whether this Permit should be modified, revoked and reissued or terminated. [40 CFR 144.36(a).]"

25. The same provisions recited in Paragraph 24 above are included in Order No. R-22026 for the Andre Dawson SWD No. 1 Well as provided in UIC Class II Permit SWD-2261, in the Administrative Order for the Ryno SWD Well No. 1 (formerly the Snyder SWD No. 1), and in Order No. R-21190 for the Sosa SA 17 SWD Well No. 2.

26. Goodnight testified that XTO received notice of applications when it did not provide return receipts and failed to notify XTO of the hearing applications. GN Exs. A4, A5, A6 and A7; TR 04/24/25 at 65:3-66:20, 70:8-72:3, 73:6-74:9; *see* Hearing Exhibits in Case Nos. 21569, 21570, 20721, and Goodnight's administrative application for the Ryno SWD; *see also* TR 04/24/25 at 75:12-77:6 (approving Empire's requests that the Commission take administrative notice of the foregoing hearing exhibits).

27. Goodnight was legally obligated to notify XTO since XTO is an "affected party" as defined by 19.15.2.7(A)(8) NMAC.

28. Goodnight witness Preston McGuire's cross-sections show no barriers between the Lower San Andres and Upper San Andres. *See* GN Exs. B-9, B-10.1 through B-10.5.

29. Empire should not be forced into hasty decisions because of a trespassing saltwater disposal company. The economic analysis performed by Empire's witness William West is the first part in a scoping process normally performed when evaluating a field for a potential CO_2 EOR project. Empire should be given the opportunity, without any restriction, to fully complete the necessary detailed engineering and economic analysis. TR 04/24/25 at 221:15-222:5.

FINDINGS OF FACT
Testimony Findings

Dr. Robert Lindsay, Ph.D. was accepted as an expert in the field of Petroleum Geology and testified as follows:

30. A meteoric recharge in late Eocene to early Miocene pushed oil out of the structural closure and created a "residual oil interval," now called "residual oil zone" or "ROZ." This is the mechanism that created residual oil zones in the Permian Basin, including in the Eunice Monument South Unit ("EMSU"). TR 02/24/25 at 16:7-23.

31. Slides provided by Dr. Lindsay of the coring of the EMSU 679 and RR Bell 4 wells show there is oil saturation that is visible to the naked eye. The coring started above the Grayburg in the base of the Queen Formation and went through the entire Grayburg formation and then extended down into the San Andres. The slides show a residual oil zone in the San Andres. The slide of a closeup of RR Bell Number 4 shows oil-stained intervals in that core description, from just below the top of San Andres to the base of the cored interval. In the slides, in both the EMSU 679 and in the RR Bell No. 4, show oil stain right at the base of both of these cores. The range of oil saturation is 38 percent (highest) to 1 percent (lowest). The saturations reported here show a residual oil zone. *Id.* at 18:17-24, 37:4-7.

32. In a conventional core analysis, anything with 20 percent or greater percent oil would be considered a residual oil zone. *Id.* at 25:15-19.

33. In the fracture study of the upper 36 feet of the San Andres in EMSU 679 done by Dr. Lindsay, there were 129 vertical fractures. These fractures ranged in size from small fractures just a couple of inches in length to one to three feet in length. These fractures allow for the communication of fluids between the San Andres and the Grayburg. These fractures are oil stained. The fact that the oil has gotten into all these fractures shows that they are interconnected. High-salinity water that is being injected into the San Andres is going to pressure up the reservoir and is coming up through these fractures into the Grayburg Reservoir. *Id.* at 28:10-30:21, 37:8-20.

34. Although the fractures look like they are not communicating, the oil stain shows that the oil has communicated through all the fractures, so three-dimensionally all the fractures are connected. *Id.* at 34:2-35:25; 38:13-39:15; Empire Ex. B at 9-10; Empire Exs. B-27 through B-30.

35. The high-salinity water that Goodnight injects into the San Andres mixes with the sulfate and creates an enormous amount of scale and cements up the reservoir; thus, destroying the ROZ. TR 2/24/25 at 38:13-39:15.

36. There is a ROZ in the Upper and Lower San Andres, and there is a ROZ in the Grayburg within the EMSU. There is one ROZ associated with the Grayburg and there is another one associated with the San Andres. *Id.* at 68:12-23.

Ryan Bailey was accepted as an expert in the field of Geoscience and testified as follows:

37. There is no barrier to fluid flow between Goodnight's injection zone and the ROZ because there are too many fractures. There is well over 20 to 40 percent oil saturation within the Grayburg, and in the San Andres 20 to 40 percent as well. TR 02/25/25 at 262:14-20.

38. The studies define a marker called the "Lovington Sand." The Lovington Sand sits in the middle of the Upper San Andres. It's been seen in outcrop; it's tied from outcrop to the subsurface. It basically subdivides the Upper San Andres. Below that there is the PI marker, which is the top of the Lower San Andres. *Id.* at 263:6-25.

39. The core of the RR Bell and the EMSU 679 show oil saturation throughout the San Andres. The logs show oil saturations above 20 percent throughout the San Andres on both the low case and the high case. *Id.* at 265:12-16.

40. Down dip to up dip, there are oil saturations all the way through the San Andres. And there are oil saturations below what Goodnight considers their barrier. Baffles would constitute a barrier to vertical liquid flow as well, but are not extensive in the horizontal direction. There are no consistent baffles across any of these wells; they are not consistent or contiguous. *Id.* at 267:23-268:3, 268:20-270:3.

41. ExxonMobil/XTO sold the field to Empire based on a ROZ interval below this top down to approximately -700 feet subsea. Empire bought this field under the premise that they had a ROZ interval within the San Andres and that they would be able to exploit the oil. *Id.* at 274:3-13.

42. The oil saturation averages for the Lower San Andres would be somewhere between 30 to 40 percent in the Lower San Andres across the EMSU generally, or right around 30 percent, on the low case. *Id.* at 277:11-15. In the Lower San Andres, there is somewhere between 15 to 40 million barrels per section in the low case, and in the high case could be anywhere from 25 to 60 million barrels per section. *Id.* at 277:20-25. In the Upper San Andres, there are oil saturations on average within the net pay that are somewhere in the 28 to 30 percent range for the low case, and on the high case, generally between 30 to 40 percent. *Id.* at 278:3-9. There are somewhere between 10 to 20 million barrels per section within the Upper San Andres on the low case, and on the high

case between 20 to 30 million barrels per section. *Id.* at 278:10-18. *See generally id.* at 277-280, Empire Exs. K-26, K-27, K-32, K-33, K-38, K-40, K-45, K-46.

43. In the San Andres as a whole, on the low case there is between 25 to 60 million barrels and on the high case, between 30 to 85 million barrels per section. TR 02/25/25 at 278:20-25. For the EMSU alone, on a low case original oil in place ("OOIP") is about 191 million barrels, and in a high case, about 331 million barrels. TR 02/25/25 at 279:23-280:6; Empire Ex. K-53.

44. The Goodnight picks for the top of the San Andres Formation, with a 200-foot interval between the two picks, are unsupported and improperly exclude part of the ROZ located in the San Andres formation. TR 02/25/25 at 265:17-268:3, 270:4-273:19; Empire Ex. K at 4 and Table 1; Empire Exs. K-9, K-10, K-13.

45. Ryan Bailey's pick of the San Andres top of structure is of critical importance because it shows ROZ in the Upper San Andres as opposed to Goodnight's approach, which shows ROZ in the Grayburg. TR 02/25/25 at 308:17-23. There are consistent oil saturations through the waterflooded Grayburg, all the way down through the San Andres and through to the end of the lower San Andres. *Id.* at 315:17-316:3.

46. Based on fluid communication between the San Andres and Grayburg in wells within the EMSU, these reservoirs are in communication with one another. *See* Empire Ex. K at 5; *see also* Empire Exs. J at 9; N-23. Any disposal into the San Andres in commercial quantities is inadvisable. TR 02/25/25 at 422:16-423:9; Empire's Notice of Supp. Exs. at pdf 4.

Stanley Scott Birkhead was accepted as an expert in the field of Petrophysics and testified as follows:

47. Looking at the EMSU 746 mud log, there is oil smell at the pits, small amounts of oil floating in a box, trace microfracs, yellow fluorescence, and fresh cut, which are definite first-order indications of hydrocarbons. TR 02/25/25 at 452:16-20.

48. When you have 30 percent oil saturation in a depleted oil reservoir and you take a core and bring it to the surface, you can go from 30 percent oil saturation all the way down to 12 percent, due to shrinkage and expulsion of the oil. *Id.* at 454:4-21.

49. Goodnight recognizes a ROZ in the San Andres. With the information that the San Andres top was picked incorrectly, then they are putting a ROZ into the Grayburg. *See id.* at 453:21-454:4. In this case, "net pay" means that with the CO_2 flood, we would be able to move some of this ROZ. It would not be conventionally producible, but it would be something that CO_2 would be able to flood into and help to move. *Id.* at 459:4-12.

50. Porosity throughout the Lovington Sand does not reflect a seal or other type of barrier that would impede fluid flow up through the San Andres the San Andres and into the Grayburg. *Id.* at 457:2-17.

51. At the depth of 4,050', this is one of the places where, up and within the Upper San Andres, we're seeing consistent descriptions of yellow fluorescence and streaming cut. Some

lower gas along with the streaming cut and some higher gas along with the streaming cut and fluorescence. So, we have direct indications of hydrocarbons showing up throughout the San Andres. TR 02/26/25 at 684:19-685:8.

Dr. Jim Buchwalter, Ph.D. was accepted as an expert in the field of Reservoir Engineering and Simulation and testified as follows:

52. Dr. Buchwalter modeled permeability leaks to match the water production at almost 100 different wells with reasonable certainty ("Model"). TR 02/27/25 at 730:5-9. There are 638 wells in the model with 10 layers and 345,000 cells. There are two Penrose layers, five Grayburg layers, and three San Andres layers. *Id.* at 731:3-7.

53. The Model results predicted a pressure increase at about 4 psi on average per million barrels of water currently injected. The Model is conservative in light of Goodnight witness Dr. Larry Lake's testimony that the San Andres is currently building up between 4 and 10 psi per million barrels of water injected. *Id.* at 739:14-740:3.

54. The Model indicates that within the next three years pressure in the San Andres will reach about 2,700 psi at 4100 feet deep At that point, injection of additional water would frac the rock if the injected water does not move. It takes longer for the injected water to move further out into the San Andres formation. Consequently, without the continued production of water from the water supply wells, migration of water from the San Andres to the Grayburg formation will increase by about 50,000 barrels a day very quickly within the next few years. *Id.* at 754:20-757:13.

55. Based on his modeling, Dr. Buchwalter opined, to a reasonable degree of scientific probability, that water is migrating from the San Andres into the Grayburg. *Id.* at 766:6-11.

Dr. Robert Craig Trentham, Ph.D. was accepted as an expert witness in the field of Residual Oil Zones, and testified as follows:

56. Mother Nature's waterflood resulted in the type of ROZ that is found underlying the EMSU, the nearby Arrowhead Grayburg Unit ("AGU"), and the nearby EMSU-B unit. *Id.* at 799:2-5; *see id.* at 798:16-17. The area to the west has been tilted up and as a result we see Mother Nature's meteoric-derived flushing fluids coming down from the area, from as far west as the Rio Grande, across the San Andres Mountains and across the Sacramento and Guadalupe mountains, into the basin flushing out the lower portion of the original oil column and creating a ROZ in the San Andres formation. *Id.* at 798:16-799:8.

57. A ROZ may be reflected in oil shows. However, oil in a ROZ is not movable except through the use of CO_2. *Id.* at 800:2-22.

Frank Marek was accepted as an expert witness in the field of Petroleum Engineering, and testified as follows:

58. Oil saturation calculated from logs and measured by core indicates there is a ROZ in the San Andres. TR 04/07/25 at 37:17-19, 38:12-17.

59. The Ryno SWD #1 is disposing of water into the ROZ interval defined by the EMSU-679 core and log oil saturations. *Id.* at 38:18-23.

60. The high-water disposal rates can cause higher pressures in the ROZ and higher potential for hydraulic fracturing and vertical communication, all of which will be detrimental to future ROZ operations. The same factors will also have a negative impact on current field operations in the traditional Grayburg producing zone. Higher pressures will also reduce the efficiency of any future CO_2 tertiary oil project because more CO_2 will be required than at lower pressures. *Id.* at 39:1-13.

61. In Mr. Marek's 48 years of experience, he has never seen an instance where an outside party was allowed to inject waste water into a unitized interval. *Id.* at 35:18-21.

Joe McShane was accepted as an expert witness in the field of Petroleum Geology and testified as follows:

62. ExxonMobil's sales package for the EMSU, EMSU-B, and AGU refers to the ROZin 5 of 7 pages. This oil resource is critical to the future of EMSU, EMSU-B and AGU. TR 04/07/25 at 242:19-243:17; Empire Ex. G-8.

Jack Wheeler was recognized as an expert witness in petroleum land matters, and testified as follows:

63. The Eunice Monument South Unit ("EMSU") was approved on December 27, 1984 and is comprised of 14,189.94 Acres, the majority of which are the New Mexico State Land Office Minerals (58.32% - 8,274.8 Acres) and the United States Bureau of Land Management Minerals (19.27% - 2,734.76 Acres). TR 04/08/25 at 143:3-8; Empire Ex. A at 10-11, ¶11; Empire Ex. A-4 at 45-49.

64. By Commission Order No. R-7765, the vertical limits of the EMSU Unit extend from an upper limit described at 100 feet below mean sea level or at the top of the Grayburg Formation, whichever is higher, to a lower limit at the base of the San Andres Formation. Order No. R-7765 at 9, ¶ 3.

65. By Commission Order No. R-7767, the vertical limits of the Eunice Monument Oil Pool within the EMSU Unit was amended to be from an upper limit described at 100 feet below mean sea level or at the top of the Grayburg Formation, whichever is higher, to a lower limit at the base of the San Andres Formation. Order No. R-7767 at 2, ¶ 2.

66. Empire Petroleum acquired the EMSU from ExxonMobil/XTO on March 12, 2021 following Empire's reliance on an ExxonMobil Sales Brochure for the ***EMSU, EMSU B and AGU Upside Potential – Infill Drilling and ROZ*** in which it was represented that there was a ROZ interval approximately 350' thick with average oil saturation of ~25% and 912 million barrels OOIP. TR 04/08/25 at 145:5-16; Empire Ex. A at 9, ¶7; Empire Ex. A-5.

67. ExxonMobil is the largest United States based Oil and Gas Company and is subject to the Texas Securities Act of 1933 and the United States Securities Exchange Act of 1934,

both of which contain anti-fraud provisions. The Acts have provisions that apply to a Party that "offers or sells" a Security and they prohibit the offer or sale of a Security using a devise of an untrue statement, or omission to state a material fact. When ExxonMobil advertised 912 MMB OIP of ROZ to Empire in this transaction, because of the existence of the Texas Security Act and the Federal Securities Act, Empire could rely on the statements made by ExxonMobil because there was no incentive for ExxonMobil to furnish an untrue statement and risk possible significant SEC punitive penalties. TR 04/08/25 at 145:13-23; 172:2-173:11.

68. Empire acquired the EMSU for its significant CO_2-EOR potential in the San Andres ROZ and Grayburg Main Pay Zone Intervals. Empire Ex. A, at 15-16, ¶ 22.

69. Goodnight has secured Surface Lease and Saltwater Disposal Agreements from various surface owners that purport to grant Goodnight the right to inject contaminated waste water into the San Andres Formation which is within the Unitized Interval of the EMSU. TR 04/08/25 at 51:6-15.

70. That the Surface Owners did not have the right to lease the San Andres Unitized Interval reference is made to that certain Dasco Cattle Amendment No. 1 To Surface Lease And Salt Water Disposal Agreement which amendment provides that the second paragraph of the 2018 SUA that commences with "Lessor is the record owner in fee simple" is hereby deleted in its entirety and replaced with the following: "Lessor is the record owner in fee simple, subject to oil and gas leases and mineral interests of record…" The same language was provided in the Surface Use And Salt Water Disposal Agreement with the Millard Deck Estate. Apparently this was an effort by Dasco Cattle and the Millard Deck Estate to protect them against any claims for damages by Empire for their execution of these Agreements since it provides that the rights granted under the Agreements are first subject to "oil and gas leases and mineral interests of record". *Id.* 197:6-14.

71. On November 29, 2023, the New Mexico Oil Conservation Division issued Order No. R-22869-A whereby the application of Goodnight for authority to inject produced water into the San Andres Formation using the proposed Piazza SWD Well No. 1 as a UIC Class II disposal well was **denied**. Order No. R-22869-A at 8, ¶ 1. The NMOCD stated that approval of the Piazza Well would contradict the responsibility of the OCD "*to prevent the drowning by water of any stratum or part thereof capable of producing oil or gas or both oil and gas in paying quantities and to prevent the premature and irregular encroachment of water or any other kind of water encroachment that reduces or tends to reduce the total ultimate recovery of crude petroleum oil or gas or both oil and gas from any pool.*" *Id.* at ¶ 11.

William West was recognized as an expert witness in the field of Petroleum Engineering, and testified as follows:

72. Goodnight has chosen to pick the top of the San Andres low to artificially reduce the oil saturation in the San Andres and to represent that there is a greater separation than exists between the Grayburg and San Andres water disposal intervals. This inaccurate geologic pick for the top of San Andres reduces the oil-in-place calculated in the San Andres and classifies the oil seen in the EMSU-679 core as a Grayburg ROZ interval. Empire has presented substantial evidence to demonstrate that the San Andres geologic top is 150'-200' higher than where Goodnight picks the top of the San Andres in the crestal area of EMSU. Empire Ex. L at 4, ¶¶ 12-

13 and Table 1; Empire Ex. N at 2-4; *see* Empire Exs. N-1 through N-4; TR 04/22/25 159:19-25; TR 04/25/25 138:11-18.

73. This is confirmed by the EMSU Unitization Type Log on Meyer B-4 #23 well, Exxon's structural cross-section in their sales package brochure, and the EMSU-679 core that clearly identifies the Premier and Lovington Sand markers which can be used to pick the San Andres top. All of Goodnight's experts including Preston McGuire admit they did not pick any geologic top and depended upon the work done by Mr. McGuire's predecessor, a Petroleum Engineer – not a Geologist. Empire Exs. B at 7-8, B-23, B-25; Empire Ex. N at 3; *see* Empire Ex. G at 5, ¶ 14, Ex. G-7(a, b); TR 05/20/25 at 174:1-5.

74. Goodnight uses an oil-wet system, and deep water environment rock type, which does not allow for high oil saturations to be calculated. *See, e.g.*, GN Reb. Ex. D at 11, ¶ 22; *id.* at 14, ¶ 29; *id.* at 20-21, ¶¶ 45-46; *see also* Empire Ex. L at 11, ¶ 28. It is well documented that the San Andres was deposited in a shallow water environment and that there is a higher concentration of grain-dominated packstone than the mud-dominated packstone used by Goodnight. By using the proper rock facies, the critical water saturation will be lower and there will be more room in the pore space for oil to occupy. By Goodnight's use of mud-dominated pack stone rock facies, the oil saturation calculated is extremely low and gets excluded from the oil-in-place calculation if it falls below the 20% oil saturation cutoff. *See* Empire Ex. L at 8, 10 ¶¶ 20-21, 25; Empire Ex. L-9.

75. Goodnight hired petrophysicist Dr. James Davidson who admits that there is likely a ROZ in the Upper San Andres and that oil saturations are calculated throughout the Lower San Andres. The cores on EMSU-679 and R.R. Bell #4 show conclusive evidence that there is a ROZ in the Upper San Andres. Empire Exs. L-11, L-12; *see* Empire Ex. L at 8, ¶¶ 20-21. Since there are no continuous barriers between the Lower San Andres and Upper San Andres, Empire's correlative rights are being impacted by Goodnight's disposal of saltwater into the Upper and Lower San Andres. Empire Ex. J at 2-4, ¶ ¶ 5, 7; *id.* at 7-10, ¶ 10; Empire Ex. N at 13.

76. Goodnight uses a 7% porosity and 20% oil saturation cutoff to determine oil-in-place. GN Reb. Ex. D at 9, ¶ 17; TR 04/21/25 176:5-22. Based on core data, 7% porosity has an average permeability of 1 md and it could be as high as 2,000 millidarcy (md). TR 04/21/25 at 137:13-20. For a CO_2 project, a permeability cutoff of 0.1 md is more realistic, *see* TR 04/21/25 at 250:5-14, and this would correspond to a 4% porosity cutoff. By applying a high porosity cutoff, Goodnight excludes oil-in-place volumes which should not be ignored. *See* Empire Ex. N at 7, ¶ 19.

77. The removal of oil volumes which have oil saturation below 20% is not realistic for a CO_2 flood. Empire will perforate the entire oil column and sweep intervals which have less than 20% oil saturation. For the intervals which have oil saturation greater than 20%, the entire oil volume is used by Goodnight for their oil-in-place calculation. In these higher oil saturation intervals, oil is recovered by CO_2 down to 20% oil saturation and continues to recover oil below that point. It is not reasonable to exclude intervals which have oil saturations below 20% if they are perforated and CO_2 injected into them. The porosity and oil saturation cutoffs used by Goodnight are not realistic. *Id.* at 2-4, ¶ 6; TR 04/21/25 248:17-20.

78. Goodnight estimates the pressure in the San Andres to be approximately 0.383 psi/ft. TR 05/19/25 at 74:6-7. Empire acquired a bottomhole pressure in the EMSU-380 during October 2024 and static fluid levels on other wells and estimates the Grayburg reservoir pressure to be 0.235 psi/ft. Empire Ex. M at 4. The San Andres has pressured back up to its original pressure and will continue to increase as water volumes are injected. *See, e.g.*, *id.* at 19-20, ¶¶ 17-18; TR 05/20/25 94:2-22. If the five SWD applications are approved, this pressurization will accelerate dramatically. Empire Ex. M-15.

79. The San Andres and Grayburg have baffles to fluid flow similar to baffles in Grayburg zones 1, 2, 3, 4, 5, and 6 as demonstrated by the EMSU-211 RFT taken in 1986. *See* Empire Ex. L at 12-13, ¶ 32; *see also* Empire Exs. K-10, K-11. Natural fractures exist in this thin Grayburg / San Andres baffle that allow fluids from the San Andres to flow into the Grayburg. Empire Ex. N at 13-14, ¶ 11. This is documented in the 1996 paper entitled "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in EMSU" where it states that San Andres water entered the Grayburg prior to the waterflood and caused barium sulfate scale. *See* Empire Ex. E at 6, ¶ 1. It is also documented in Dr. Robert Lindsay's 2014 PhD dissertation, stating, "There have been places found in EMSU, EMSUB, and AGU where faults/fractures have allowed Upper San Andres Formation fluids to move up section into Grayburg Formation strata, which form vertically-oriented plumes of Upper San Andres Formation water within the Grayburg Formation ." *Id*. at 3, ¶ 6 (explaining the differences in water analysis and stating that "[p]lumes of water were mapped in AGU prior to unitization."); Empire Ex. N-24.

80. The September 1989 Technical Committee Report for Arrowhead Grayburg Unit stated "A portion of the water production is probably attributable to communication of Zones 4 and 5 with the Lower Grayburg and San Andres aquifers. Although siliciclastics between each zone generally prevent vertical communication, in some localized areas of the field they do not act as permeability barriers. When the barriers break down in the lower Grayburg members, the prolific San Andres aquifer can influx into the oil productive horizons resulting in large volumes of water production." Empire Ex. J at 4; *see* Empire Ex. J-1.

81. Structural cross-sections provided by Goodnight do not show any continuous barriers within the San Andres, therefore fluid communication between the Upper and Lower San Andres exists. GN Ex. B-9, B-10.1 through B-10.5. Goodnight's downdip injection of saltwater moves through the residual oil zone in the Lower San Andres as defined by log analysis and upward into the residual oil zone defined by the EMSU-679 and R.R. Bell #4 cores. Empire Exs. N-5 & N-6; *see also* Empire Ex. N at 4-7.

ULTIMATE FACTS

82. **Based on the following testimony, there is a residual oil zone (ROZ in the San Andres formation in the Eunice Monument South Unit (EMSU):**

a. Cores of the EMSU 679 and the RR Bell Number 4 wells show oil stain in the San Andres, including right at the base of both cores, which indicates that oil saturations exist deeper into the San Andres. TR 02/24/25 at 20:11-21:2, 22:25-23:4; *see* Empire

Exs. B at 3-4, B-7 through B-9, B-24 through B-27, Plates B-1 and B-2. You can smell the oil in the cores. TR 02/24/25 at 23:5-6.

b. In the EMSU 679, core from 4280.85' (-685') indicated porosity of 14.9 percent, with 19 millidarcies of permeability, 38.4 precent oil saturation, and 28.4 percent of water saturation. *Id.* at 22:5-8; Empire Ex. B-8.

c. The range of oil saturation in the EMSU 679 core is about 38 percent (highest) to 1 percent (lowest). TR 2/24/25 at 23:16-24:6; *see* Empire Ex. B, Tables B-1 through B-8. These saturations are necessarily on the low end because the cores have been super flushed. TR 02/24/25 at 24:7-21. A published study by Hess indicates there is a 14 percent rise in oil saturation when comparing a conventional core analysis to a pressure core analysis. *Id.* at 24:22-25:9.

d. Oil saturations calculated from logs and core data indicate a ROZ exists in the San Andres reservoir. TR 04/07/25 at 37:17-19.

e. The Ryno SWD Number 1 well data shows oil saturation throughout the entire San Andres interval, top to base. *Id.* at 77:6-10

f. There is a potential for ROZ development in the San Andres formation underlying the EMSU. *Id.* at 122:6-10, 21-23

g. Logs for the EMSU 679 and RR Bell #4 show oil saturations throughout the San Andres. TR 02/25/25 at 264:1-265:1.

h. There is 20 to 40 percent oil saturation within the Grayburg and in the San Andres. *Id.* at 262:18-20. The logs show oil saturations above 20 percent throughout the San Andres on both the low case and the high case. *Id.* at 265:12-16.

i. Downdip to updip, there are oil saturations all the way through the San Andres, including below what Goodnight considers its barrier. *Id.* at 267:23-268:3.

j. Direct indications of hydrocarbons, such as consistent descriptions of yellow fluorescence and streaming cut, are found throughout the San Andres in the mud log for the EMSU #746. TR 02/26/25 at 683:13-685:8; *see* Empire Exhibit L-54.

k. The cores taken of wells EMSU 679 and R.R. Bell #4 show oil in the San Andres. TR 04/09/25 at 152:8-153:10.

l. There are many instances of ROZs in the San Andres formation in the Permian Basin, including the Platang, Seminole, Vacuum, Wasson, GLSAU, Goldsmith-Landreth San Andres Unit, Seminole East, and McCamey. TR 02/27/25 at 806:9-16.

m. Empire's witness Stephen Melzer identified 24 Permian Basin examples with CO_2 flooding below the producing oil-water contact. *Id.* at 846:3-15.

n. Residual oil zones are found in many existing fields -- Grayburg, San Andres, Clear Fork, Tubb or Drinkard fields on the Northwest Shelf on the Central Basin Platform, and also in a couple places on the Eastern Shelf. *Id.* at 795:25-796:7.

o. Goodnight only used a small fraction of the available core data to build their model for the San Andres. TR 02/25/25 at 445:12-14.

p. Goodnight neglected obvious first-order data such as visible and quantifiable oil volumes, fluorescence, oil odor in pits, streaming out, floating oil in the cuttings box, and gas increases across the San Andres interval. *Id.* at 445:14-18.

q. Goodnight's petrophysical model was calibrated on an incomplete section of the San Andres, only the bottom part of the 679. *Id.* at 445:23-446:1.

r. When the correct San Andres tops are used, Goodnight's interpretation would also include a San Andres in the ROZ. *Id.* at 446:2-4.

s. The following experts offered by Empire have testified that a ROZ exists in the San Andres in the EMSU: Dr. Robert Lindsay (TR 02/24/25 at 37:4-5); Ryan Bailey (TR 02/25/25 at 277:20-278:18); Dr. Robert Trentham (TR 02/27/25 at 829:18-22); L. Steven Melzer (*Id.* at 845:23-846:3, 858:18-20, 863:18-20); Frank Marek (TR 4/7/25 at 122:6-10, 21-23).

t. Goodnight's Expert Witnesses Dr. Davidson, Mr. Knights, Dr. Lake and Mr. Tomastik agreed that a ROZ exists in the San Andres. TR 04/21/25 at 232:8-18;TR 04/25/25 at 104:19-21; TR 04/22/25 at 28:3-5; Lake TR 04/24/25 at 223:4-21.

83. **Based on the following testimony, there is oil saturation in the San Andres sufficient to be commercially developed.**

a. In the Lower San Andres, there is somewhere between 15 to 40 million barrels per section in the low case, and in the high case could be anywhere from 45 to 90 million barrels per section. TR 02/25/25 at 277:20-278:1; *see* Empire Exs. K-32 & K-33.

b. In the Upper San Andres, there are oil saturations on average within the net pay that are somewhere in the 28 to 30 percent range for the low case, and on the high case, between 30 to 40 percent. TR 02/25/25 at 278:5-9; *see* Empire Exs. K-39 &K-40.

c. There are somewhere between 10 to 20 million barrels per section within the Upper San Andres on the low case and on the high case between 20 to 30 million barrels per section. TR 02/25/25 at 278:12-18; *see* Empire Exs. K-45 & K-46.

d. In the San Andres as a whole, on the low case there is between 25 to 60 million barrels per section and on the high case, between 30 to 85 million barrels per section. TR 02/25/25 at 278:22-25; *see* Empire Ex. K-53.

e. For the EMSU unit alone, on a low case OOIP is about 191 million barrels, and on an OOIP high case, about 331 million barrels. TR 02/25/25 at 279:23-280:1.

f. When you look at the total as a whole there are 630 million barrels on a low case and over a billion barrels on a high case. *Id.* at 280:7-11

g. The oil saturation averages for the Lower San Andres would be somewhere between 30 to 40 percent in the Lower San Andres across the EMSU generally, or right around 30 percent on the low case. *Id.* at 277:11-15, 278:3-9; *see* Empire Exs. K-26 & K-27.

h. An additional recovery of 10 to 20 percent of original oil in place in a field is possible using CO_2 is based on the types of recoveries you get in a main pay ROZ relative to the waterflood and the primary production in the main pays. TR 02/27/25 at 824:22-825:13.

84. **Based on the following testimony, the ROZ in the San Andres in the EMSU is capable of being commercially productive.**

a. Revenue of $5.5 billion dollars can be expected from the San Andres ROZ, less $1.2 billion expenditures, leaving a net recovery of $4.3 billion dollars. TR 04/09/25 at 154:23-155:3; *see* Empire Ex. I-29.

b. Based on these figures, the State would receive $1.1 billion in royalties plus another half a billion dollars in tax, and the federal government would receive about 0.37 billion dollars. TR 04/09/25 at 155:3-7.

c. Goodnight's expert John McBeath agrees that using Goodnight's volumes and Empire's cost of CO_2 and WTI deck, the ROZ project is profitable. TR 04/23/25 at 168:24-169:3.

85. **Based on the following testimony, there is communication (and not an impermeable barrier) between the Grayburg and San Andres in the EMSU.**

a. There were historical leaks in the reservoir from the San Andres into the Grayburg. TR 04/09/25 at 157:16-18. These are shown in the Technical Committee Report from April 1983, which shows the plumes or cracks in the reservoir where the water was coming up from the San Andres into the Grayburg. This documents that there is communication between the San Andres and the Grayburg. *Id.* at 159:5-17.

b. Post-starting the waterflood, they started seeing scaling tendencies; with the sulfate-rich waters from the San Andres mixing with the Grayburg, they started finding problems with barium scale and bearing scale deposits. *Id.* at 161:10-22.

c. In Dr. Lindsay's fracture study of just the upper 36 feet of the San Andres in EMSU 679 there were 129 vertical fractures. These fractures ranged in size from small fractures just a couple of inches in length to one to three feet in length. TR 02/24/25 at 28:16-29:6.

d. These fractures allow for the communication of fluids between the San Andres and the Grayburg. *Id.* at 29:22-30:4.

e. These fractures are oil-stained. The fact that the oil has gotten into all of these fractures shows that they are interconnected. *Id.* at 30:14-16.

f. There is no barrier to fluid flow between Goodnight's injection zone and the ROZ because there are too many fractures. TR 02/25/25 at 268:23-269:6.

g. Goodnight's position is that there is a 200 foot impermeable barrier between the injection interval and the Upper San Andres; in general, they place it at the Lovington Sand Marker. *Id.* at 265:20-266:5.

h. The core permeability in that zone is 0.1 millidarcies. 0.1 millidarcies is not an effective seal. *Id.* at 266:6-8.

i. There is a ROZ below the Lovington Sand. *Id.* at 271:18-20.

j. There are oil saturations below what Goodnight considers their barrier. *Id.* at 305:9-10.

k. Baffles would constitute a barrier to vertical liquid flow, as well as horizontally. There are no consistent baffles across any of these wells; they are not consistent or contiguous. There is no regional baffle in the EMSU, so the baffles would not prevent fluid migration. *Id.* at 268:20-269:4.

l. Based on fluid communication between the San Andres and Grayburg in wells within the EMSU, these reservoirs communicate with one another. Empire Ex. K at 4.

m. Chevron made it very clear that there was San Andres fluid migrating into the Grayburg pre-flood. TR 02/25/25 at 317:25-318:4.

n. If you have two formations in communication and you're moving up-dip through structure and you have secondary permeability and porosity through fracturing, it is clear that you will move fluids between those. TR 04/08/25 100:14-18

o. There are fractures in the San Andres that allow for communication into the Grayburg. *Id.* at 101:17-21

p. There is no barrier between the Grayburg and the San Andres. *Id.* at 111:3-9.

q. Goodnight's claim that there is an "impermeable barrier" between the Upper and Lower San Andres is meritless because it relies on mud losses and pressure differentials. *See* GN Ex. B at 41-43. Goodnight fails to cite any authority or literature showing that mud losses mean there is an impermeable barrier. *See* TR 05/20/25 at 38:25-42:8. Goodnight concedes no evidence or literature exists showing this "barrier" extends continuously across the entire EMSU. Goodnight was unable to map a barrier. Goodnight fails to understand that pressure is higher in the San Andres than in the Grayburg (as measured by pressure bomb); and is not supported by core permeability. TR 04/10/25 14:4-8; TR 05/20/25 32:1-33:22.

r. Goodnight's exhibit does not show any continuous barriers between the Lower San Andres and Upper San Andres. The barriers which are shown include porous intervals which would not act as barriers. Fractures do not have to be very long in order to result in communication across these thin baffles to fluid flow.

86. Goodnight's existing wells are currently injecting over 60,000 barrels of water per day into the San Andres. TR 05/20/25 175:5-11.

87. **Goodnight's existing permits are causing damage to the reservoir at the San Andres and up into the Grayburg.** TR 04/09/25 at 149:11-17.

a. There can be no disposal of water in the San Andres in the EMSU because it will affect the Grayburg. *Id.* at 159:18-21.
.

b. In his 48 years of experience, Empire witness Mr. Marek has never seen an instance where an outside party was allowed to inject water into a unitized interval. TR 04/07/25 at 35:18-21.

88. **Based on the following testimony, contaminated water is presently coming into the Grayburg from the San Andres.**

a. The water chemistry shows that water was moving from the San Andres into the Grayburg. TR 02/24/25 at 34:18-35:10. Bottom water is being pulled up through little water plumes vertically into the Grayburg. *Id.*; *See* Empire Ex. B-21.

b. Based on his modeling, it is Dr. Buchwalter's opinion, to a reasonable degree of scientific probability, that water is migrating from the San Andres into the Grayburg. TR 02/27/25 at 766:6-11.

c. Goodnight has not prepared any model to support their argument that this water influx is not occurring. *Id.* at 767:3-8.

d. High-salinity water that is being injected into the San Andres is going to pressure up the San Andres, forcing the injected wastewater up through these fractures and into the Grayburg Reservoir. TR 02/24/25 at 38:13-39:22.

89. **Based on the following testimony, injection of high volumes of water will inhibit the development of the ROZ in both the Grayburg and the San Andres.**

a. The high volume of the water injection impacts the development of the ROZ from a geological standpoint because if you're injecting commercial volumes, tens of thousands of barrels per well a day being injected into the system, eventually you're going to basically prohibit the ability of CO_2 to move the hydrocarbons in a ROZ. And you would potentially affect the Grayburg because of the lack of barrier, our current waterflood in Grayburg production as well. TR 04/08/25 at 113:23-114:13.

b. Continuous injection of the water can inhibit the development of the ROZ. *Id.* at 114:14-16.

c. Goodnight's permits are damaging to the potential recovery of the ROZ. TR 04/09/25 at 149:12-14.

d. Excessive water drives up the cost to operate a field. It causes wear and tear on the equipment. It would drive up the cost of a CO_2 project because it increases the pressure of the reservoir, which increases the amount of CO_2 needed. *Id.* at 158:2-13.

90. **Based on the following testimony, injecting water in the San Andres will detrimentally affect the Grayburg.**

a. The high-salinity water that Goodnight wants to inject into the San Andres could mix with the sulfate in the San Andres formation water, create an enormous amount of scale, and start to cement up the reservoir. That would destroy the ROZ. TR 2/24/25 at 39:5-15, 198:24-199:7.

b. Without the water supply well production to offset injection, the pressure difference between the San Andres and the Grayburg will build up. TR 02/27/25 at 757:1-10.

c. The net result will be a rapid increase in water moving into the Grayburg from the San Andres. *Id.* at 757:11-13.

d. As far as future forecasts, regardless of whether Goodnight drills the additional saltwater disposal wells , a leak of about 50,000 barrels a day will occur very quickly in the next few years. Unfortunately for Goodnight, their saltwater disposal rate will tank. *Id.* at 763:8-13.

e. The high water disposal rates that are occurring at EMSU can cause higher pressure in the ROZ and a higher potential for hydraulic fracturing and vertical communication, which would be detrimental to future ROZ operations. The same factors will have a negative impact on current field operations in the traditional Grayburg producing zone. TR 04/07/25 at 39:1-8.

f. In addition, the higher pressures will reduce the efficiency of any future CO_2 tertiary oil recovery project because it would require more CO_2 to produce the oil than it would at lower pressures. *Id.* at 39:9-13.

g. If commercial injection causes high enough pressures, that can cause vertical fractures and cause the disposed water to be diverted into the producing Grayburg zone, which would be very detrimental to future production operations in the Grayburg and cause the wells to produce at higher water volumes. *Id.* at 39:18-25.

h. The huge volumes of water that the commercial disposal operations inject are concerning. Although Empire has injected some water into the San Andres, it has been

only a few hundred barrels per day, versus the commercial operations, which are 15,000 barrels of water per day and, in some cases, much higher. Small volumes are inconsequential. The large volumes from the commercial operations, however, can be very detrimental. *Id.* at 110:15-111:1.

i. 15,000 barrels of water a day per well would have a detrimental impact on the ROZ. *Id.* at 111:1-11.

j. If high volumes of water were injected into the San Andres and, due to hydraulic fracturing, find their way into the Grayburg, then that would have a negative impact on the continued operations of the waterfloods in the Grayburg zone. *Id.* at 112:13-18

k. As the pressure increases due to water disposal, eventually "formation parting pressure" is reached, which will cause the reservoir rock to fracture. When that occurs, you lose control of where the water is going. There's a good chance that some of that water will migrate into the Grayburg, which would have a negative impact on the current waterflood operations in the Grayburg, including cycling of water in producing wells, higher operating costs, and reduction of sweep efficiencies. *Id.* at 126:9-22.

l. The injection rates from eight or nine prolific injection commercial wells can create waste by hydraulic fracturing causing some of the ROZ oil-saturated interval to be bypassed and requiring more CO_2 because of the higher pressure, which is costly and wasteful. Those two factors together would result in less ultimate oil recovery, which is a waste of resources. You would be leaving oil in the hole. *Id.* at 128:25-129:16.

m. Goodnight's proposed injection wells lie in the crestal area and therefore are more likely to damage the reservoir because, in the dynamic of drilling geology, the highest point on the structural closure should be your best production wells. Further, the water pushed down-dip will move up-dip as well, toward the crestable regions. *Id.* at 230:9-15.

n. Empire's oil in place volume calculation, based on NuTech's analysis calculated on a per 640 section basis, ranges from 15.6 million barrels per section to 62.2 million barrels per section. This calculation excluded the EMSU 713 well because it only has 125 foot of log in the San Andres. *Id.* at 234:18-24; *see* Empire Exs. G-3(a), G-3(b), G-3(c).

o. For the Ryno SWD, OPS Geologic had 19.86 million barrels per 640 to 33.02. And for the range across these seven wells, OPS Geologic calculated out 12.76 to 69.47 million barrels of oil per section, which consists of 640 acres. TR 04/07/25 at 235:8-15; Empire Ex. G-3(b).

p. Based on Nutech's revised analysis of the EMSU 658, which is located on top of the structural trap, Empire calculated 30.29 million barrels per section. TR 04/07/25 at 237:8-238:16; Empire Ex. G-3(d).

q. Based on Nutech's analysis of the EMSU 673 located on top of the structural trap, Empire calculated 31.68 million barrels per section, again, a very similar number still on top of the structure itself. Like the EMSU 658, the EMSU 673 is located on top of the structural trap, which is significant because Empire would expect to find some of the better reservoir rock here. TR 04/07/25 at 238:6-239:25; Empire Ex. G-3(e).

r. Notices of Goodnight's salt water disposal applications for Cases 23614, 23615, 23616 and 23617 were defective, and therefore, the resulting orders in those cases are null and void.

91. If Goodnight's injection is not stopped, Goodnight will commit $5.5 billion dollars of waste against Empire and the State of New Mexico, among other interest owners, excluding the value of the harm already caused. TR 04/09/25 at 154:23-155:3; *see* Empire Ex. I-29.

92. **Goodnight's applications in the following cases should be denied:**

Case 23614—Doc Gooden SWD # 1 Well;
Case 23615—Hernandez SWD # 1 Well;
Case 23616—Hodges SWD # 1 Well;
Case 23617—Seaver SWD # 1 Well;
Case 24123 (de novo)—Piazza SWD # 1 Well;

93. **The following orders authorizing injection of produced water by Goodnight within the EMSU should be revoked:**

a. Order No. R-22026/SWD -2403 (Andre Dawson SWD #1, Case No. 21569);
b. Order No. R-22027 (Ernie Banks SWD # 1 Well, Case No. 21570);
c. Administrative Order SWD-2307 (Ryno SWD # 1 Well, Case No. 16205);
d. Order No. 21190 (Sosa SWD, Case No. 20721).

CONCLUSIONS OF LAW

A. Approval of Goodnight's salt water disposal applications and issuance of Goodnight's four existing salt water disposal wells will violate Article XX, §21 of the New Mexico Constitution which states:

> The protection of the State's beautiful and healthful environment is hereby declared to be of fundamental importance to the public interest, health, safety and the general welfare. The Legislature shall provide for control of pollution and control of despoilment of the air, water and other natural resources of this State, consistent with the use and development of these resources for the maximum benefit of the people. (As added November 2, 1971.)

B. Article XX, § 21 of the Constitution dictates that natural resources of the State, which include oil and gas, be protected for the benefit of the State and its citizens, particularly where the minerals are owned by the State of New Mexico and the United States of America, as administered by the Bureau of Land Management.

C. Under NMSA § 70-2-11, the Division and Commission are obligated to prevent waste and protect correlative rights, defined by statute as follows:

> •NMSA § 70-2-3(A): "underground waste" as those words are generally understood in the oil and gas business, and in any event to embrace the inefficient, excessive or improper, use or dissipation of the reservoir energy, including gas energy and water drive, of any pool, and the locating, spacing, drilling, equipping, operating or producing, of any well or wells in a manner to reduce or tend to reduce the total quantity of crude petroleum oil or natural gas ultimately recovered from any pool, and the use of inefficient underground storage of natural gas.
>
> •NMSA § 70-2-33(H): Correlative rights means "the opportunity afforded, so far as it is practicable to do so, to the owner of each property in a pool to produce without waste the owner's just and equitable share of the oil or gas or both in the pool, being an amount, so far as can be practicably determined and so far as can be practicably obtained without waste, substantially in the proportion that the quantity of recoverable oil or gas or both under the property bears to the total recoverable oil or gas or both in the pool and, for such purpose, to use the owner's just and equitable share of the reservoir energy."

D. The issuance of a disposal license for injection of salt water into a disposal well by the Oil Conservation Commission or the Oil Conservation Division "does not authorize trespass or other tortious conduct by the licensee." *Snyder Ranches, Inc. v Oil Conservation Comm'n*, 1990-NMSC-090 ¶ 8, 110 N.M. 637, 640, 798 P.2d 590 (N.M. 1990).

E. The Commission is authorized to "prevent the drowning by water of any stratum or part thereof capable of producing oil or gas or both oil and gas in paying quantities and to prevent the premature and irregular encroachment of water or any other kind of water encroachment that reduces or tends to reduce the total ultimate recovery of crude petroleum oil or gas or both oil and gas from any pool" NMSA 70-2-12(B)(4).

F. The prevention of waste and protection of correlative rights empowers the Division and Commission to "make and enforce rules, regulations and orders, and do whatever may be reasonably necessary to carry out the purposes of this act, whether or not indicated or specified in any section of this act." NMSA 1978, § 70-2-11 (A).

G. By issuing Orders R-7765, R-7766, and R-7767 in 1984, the Commission found and ordered that approval of the Eunice Monument South Unit, having a unitized interval that included the Grayburg and San Andres formations, was in the best interests of conservation of oil and gas and protection of correlative rights.

H. Elimination of the San Andres formation from the unitized interval of the EMSU would violate Orders R-7765, R-7766, and R-7767.

I. Goodnight's existing permits must be revoked, and its new permits must be denied, "to prevent waste prohibited by this act and to protect correlative rights, as in this act provided."

NMSA 1978, § 70-2-11 (A). *See Continental v. Oil Conservation Comm'n,* 70 N.M. 310, 323 P.2d 809 (N.M. 1962).

J. When Goodnight submitted its applications resulting in the issuance of Orders R-22026, R-22027, Administrative Order SWD-2307, and R-21190, Goodnight knew that its proposed disposal would be within the Unitized Interval of EMSU which, in and of itself, warrants revocation of the orders.

K. In obtaining Order No. R-22026/SWD -2403 (Andre Dawson SWD #1; Order No. R-22027 (Ernie Banks SWD # 1 Well, Case No. 21570); Administrative Order SWD-2307 (Ryno SWD # 1 Well); Order No. 21190 (Sosa SWD, Case No. 20721) intentionally and knowingly concealed, omitted or otherwise misrepresented material facts, including the fact that all four commercial disposal wells would inject produced water into the Unitized Interval of the EMSU and the fact that the wells would inject into the Eunice Monument Oil Pool, which constitute grounds for revocation of these orders.

L. Revocation of the Division's UIC issued to Goodnight is authorized by the terms of the permits because:

(1) the Permits contain multiple material mistakes and representations;

(2) Goodnight, the Permittee, made an incorrect statement on which OCD relied to grant the Permits;

(3) Injected fluid is escaping from the approved injection interval into the Grayburg formation, the current producing interval of the EMSU;

(4) Further injection of produced water by Goodnight will cause or contribute to the waste of oil and gas and impair and/or affect correlative rights of the working interest and royalty owners of EMSU.[1]

[1] The Commission is authorized to revoke UIC permits In Case No. 115192, Order No. R-13955, APPLICATION OF MEWBOURNE OIL COMPANY TO REVOKE THE INJECTION AUTHORITY GRANTED UNDER SWD-744 FOR THE WILLOW LAKE WELL NO. 1 OPERATED BY PYOTE WELL SERVICE, LLC. EDDY COUNTY, NEW MEXICO, by ORDER OF THE DIVISION, the Division concluded in Article (19) that the disposal interval into the Bone Spring Formation as approved in Administrative Order SWD-744 is into a producing or productive interval. Any disposal into the Bone Spring Formation through the perforations in the subject SWD well is causing waste of oil and associated gas in the surrounding wells and surrounding, undrilled sands. In Article (20) the Division ruled that the **application of Mewbourne Oil Company to revoke administrative permit SWD-744 should be approved to prevent waste and protect correlative rights.**

In Case No. 15519, Order No. R-14300, APPLICATION OF BOPCO, L. P. FOR THE REVOCATION OF THE INJECTION AUTHORITY GRANTED UNDER SWD-1269 AND

M. Applicants to an adjudicatory proceeding before the division are required to provide notices as set out in 19.15.4.12 NMAC. Among other requirements for notice, an applicant must provide the same notice to "affected persons" as required by 19.15.26.8(B)(2) NMAC. In accordance with 19.15.2.7 NMAC, "affected persons" include "the designated unit operator" of a division-approved or federal unit. Order No. R-22026/SWD -2403 (Andre Dawson SWD #1; Order No. R-22027 (Ernie Banks SWD # 1 Well, Case No. 21570); and Order No. 21190 (Sosa SWD, Case No. 20721) should be revoked because Goodnight did not provide sufficient notice to all affected parties.

N. Regarding administrative SWD applications, the Division's Injection Rule (NMAC 19.15.26.8(C)(1)(c)) requires a published notice to include the injection interval. Goodnight's administrative application for the Ryno SWD identified the injection interval as 4,320' to 5,625', but the Legal Notice published on June 12, 2019 in the Hobbs News-Sun identified the injection

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SWD 649-B, EDDY COUNTY, NEW MEXICO, by ORDER OF THE DIVISION, In Case No. 15519 the Division Ordered That:

(1) Administrative Order No. SWD-1269 issued March 29, 2011, by the Oil Conservation Division ("Division") authorizing Mesquite SWD, Incorporated ("Operator" of Mesquite) to utilize its Heavy Metal 12 Federal Well No. 1 (API No. 30-015-29602) located 1900 feet from the South Line and 1900 feet from the West Line (Unit Letter K) of Section 2, Township 24 South, Range 31 East, Eddy County, New Mexico, **as a commercial well for disposal of oil-field produced water, is hereby revoked.**

(2) Administrative Order No. SWD-649-B issued February 15, 2012, by the Oil Conservation Division authorizing Mesquite to utilize the Bran SWD Well No. 1 (API No. 30-015-25697) located 660 feet from the South Line and 660 feet from the East Line (Unit Letter P) of Section 11, Township 24 South, Range 31 East, Eddy County, New Mexico, **as a commercial well for disposal of oil-field produced water, is hereby revoked.**

In Case No. 15723, Order No. R-14738, THE APPLICATION OF OWL SWD OPERATING, LLC FOR AUTHORIZATION TO INJECT, LEA COUNTY, NEW MEXICO, by ORDER OF THE DIVISION, the Division stated in (15) d. that "It is likely that the planned large disposal volumes into this depleted reservoir will eventually fill up the reservoir. At the estimated disposal rate in the C-108 application of 30,000 barrels of water per day, the well will fill up the 90 million barrels of depleted pore space in this project area **within less than nine years**. These numbers can be considered as estimates, since OWL did not clearly define the project area or estimated area of invasion and as shown above, the vertical injection interval is not precisely known." The Order further provided **IT IS THEREFORE ORDERED THAT** (1) The application of OWL SWD Operating, LLC for permit to inject into the proposed Bobcat SWD Well No. 1 to be located 740 feet from the South Line and 705 feet from the Esat Line, Unit P of Section 25, Township 25 South, Range 36 Est, NMPM, Lea County, New Mexico, **is denied without prejudice.**

interval as 4,500' to 5,350'. Because the published notice did not correctly identify the injection interval, the notice was defective and requires revocation of the injection permit.

O. Empire's proposed method of enhanced recovery operations within the EMSU is prudent, feasible, will prevent waste, and will result, with reasonable probability, in the recovery of substantially more hydrocarbons from the Unitized Area than would otherwise be recovered.

P. Empire has provided substantial evidence of recoverable oil and gas reserves in paying quantities from the San Andres formation of the Unitized Interval of the EMSU for recovery of any additional hydrocarbon resources remaining in place. Approval of Goodnight's disposal applications and failure to revoke Goodnight's existing disposal orders and UIC permits would violate the Oil and Gas Act by allowing ***"the drowning by water of any stratum or part thereof capable of producing oil or gas or both oil and gas in paying quantities and to prevent the premature and irregular encroachment of water or any other kind of water encroachment that reduces or tends to reduce the total ultimate recovery of crude petroleum oil or gas or both oil and gas from any pool."*** *See* NMSA 1978, § 70-2-12 (B)(4).

Q. The estimated additional cost of Empire's proposed operations will not exceed the estimated value of the additional hydrocarbons recovered plus a substantial profit.

R. Implementation of enhanced tertiary recovery operations in the EMSU, including the development of the ROZ oil reserves will benefit the working interest and royalty interest owners within the EMSU and will protect the rights of all parties, and is necessary to protect and safeguard the rights and obligations of such parties.

S. Section 10 of the Eunice Monument South Unit Agreement provides: RIGHTS AND OBLIGATIONS OF UNIT OPERATOR. Except as otherwise specifically provided herein, the exclusive right, privilege and duty of exercising any and all rights of the parties hereto including surface rights which are necessary or convenient for prospecting for, producing, storing, allocating and distributing the Unitized Substances are hereby delegated to and shall be exercised by the Unit Operator as herein provided. Upon request, acceptable evidence of title to said rights shall be deposited with said Unit Operator, and together with this Agreement, shall constitute and define the rights, privileges and obligations of the Unit Operator. Nothing herein, however, shall be construed to transfer title to any land or any lease or operating agreement, it being understood that under this Agreement the Unit Operator, in its capacity as Unit Operator, shall exercise the rights of possession and use vested in the parties hereto only for the purposes herein specified.

T. Goodnight is not empowered in any manner whatsoever to dispose of produced water in the Unitized Interval of the EMSU.

Respectfully submitted,

By: /s/ Dana S. Hardy

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served upon the following counsel of record by electronic mail on July 3, 2025.

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CONDITIONS

Operator: Empire New Mexico LLC 2200 S. Utica Place Tulsa, OK 74114	OGRID: 330679
	Action Number: 481708
	Action Type: [HEAR] Post Hearing Statement (POST HEARING STATEMENT)

CONDITIONS

Created By	Condition	Condition Date
sheila.apodaca	None	7/7/2025