

**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**

CASE NO. 24123

**APPLICATIONS OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
OF SALTWATER DISPOSAL WELLS,
LEA COUNTY, NEW MEXICO**

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**

CASE NO. 23775

**APPLICATIONS OF EMPIRE NEW MEXICO LLC
TO REVOKE INJECTION AUTHORITY,
LEA COUNTY, NEW MEXICO**

CASE NOS. 24018-24020, 24025

**EMPIRE NEW MEXICO LLC'S RESPONSE TO
RICE OPERATING COMPANY AND PERMIAN LINE SERVICE, LLC'S LEGAL BRIEF**

I. RICE’S MANUFACTURED “REQUIRED FINDINGS” ARE UNSUPPORTED BY STATUTE AND CASE LAW.

Rice relies heavily on *Continental Oil Co. v. Oil Conservation Comm’n*, 1962-NMSC-062, 70 N.M. 310, for the proposition that a party seeking relief from waste or impairment of correlative rights must prove (1) that “a certain amount of oil exists in the pool, and (2) that “a determined amount of [oil] could be produced and obtained without waste.” Rice Br. at 16-17. Rice’s artificial standard is contrary to the Oil and Gas Act and pertinent case law.

To manufacture its standard, Rice cherry picks language from the definitions of “waste” and “correlative rights” to suggest certain findings must be made to prove Goodnight’s operations are causing waste and impairing the correlative rights of the State of New Mexico, the Bureau of Land Management, and Empire, among others. Rice then applies isolated language from *Continental Oil* to manufacture requirements that impose limitations on the Commission’s ability to fulfill its obligations to prevent waste and protect correlative rights. Rice Br. at 16.

Rice’s reliance on *Continental Oil* is unavailing for several reasons. First, the issue before the court in *Continental Oil* was not whether waste had occurred and correlative rights went unprotected as a result of salt water disposal. Rather, the issue concerned proration of natural gas allowables from certain individual wells. *Continental Oil*, 1962-NMSC-062, ¶¶ 3-4, 12. Thus, *Continental Oil* is not applicable. See *El Paso Nat. Gas Co. v. Oil Conservation Comm’n*, 1966-NMSC-092, ¶ 6, 76 N.M. 268

Second, contrary to Rice’s implication, *Continental Oil* did not address the language “ultimately recovered” from the definition of “waste” in Section 70-2-3(A)¹. See Rice Br. at 16.

¹ *Continental Oil* is a 1962 case, and the waste statute at that time was compiled as NMSA 1953, Section 65-3-3. The language in NMSA 1953, Section 65-3-3(e) and NMSA 1978, Section 70-2-3(E) is identical.

Rather, *Continental Oil* addressed the definition of “waste” in Section 70-2-3(E), which relates to allowable production, defining “waste” to include production in excess of reasonable market demand or capacity of transportation facilities. See Section 70-2-3(E); 1962-NMSC-062, ¶¶ 7, 19.

Third, in *Grace v. Oil Conservation Commission of New Mexico*, 1975-NMSC-001, 87 N.M. 205, the Court made clear that “practical” or “practicable” language used in *Continental Oil* related to whether it was practicable to make certain findings, and not whether “it is ‘practicable’ to obtain a determined amount of oil,” as represented by Rice. *Grace*, 1975-NMSC-001 ¶¶ 26-27; Rice Br. at 20-21. *Grace*, like *Continental Oil* and *El Paso Natural Gas Co.*, related to proration and computing allowables. *Id.* ¶ 26. The facts necessary to prorate allowables are not necessary to the matter before the Commission here, that is, whether Goodnight’s injection of wastewater impairs correlative rights or causes waste in the EMSU. See Empire Closing Br. at 3-4. Stated in the language of Section 70-2-3(A), the question becomes whether Goodnight’s operation of its wells are conducted “in a manner to reduce or tend to reduce the total quantity of crude petroleum oil or natural gas ultimate recovered from any pool.”

Finally, contrary to Rice’s representation, the Court in *Continental Oil* did **not** hold “that the party seeking to prevent waste or protect correlative rights must prove . . . (1) that there exists ‘**a certain amount** of’ oil in the pool; and (2) that ‘**a determined amount** of [oil] **could be produced and obtained** without waste.” Rice Br. at 16. Rather, the Court posed the relevant issue, allocation of allowable production, as a hypothetical in light of the circumstances, which led the Court to conclude that the commission is a necessary party in the trial court. *Continental Oil*, 1962-NMSC-062, ¶ 28. Thus, *Continental Oil* provides no guidance here. The Commission should disregard Rice’s effort to impose its artificial constraints in this proceeding.

II. EMPIRE DEMONSTRATED THAT A ROZ EXTENDS INTO THE LOWER SAN ANDRES AND THAT GOODNIGHT'S EXISTING AND PROPOSED OPERATIONS INTERFERE WITH EMPIRE'S RIGHT TO RECOVER HYDROCARBONS, CAUSING WASTE.

As explained in Empire's Closing Brief, Empire proved by a preponderance of the evidence that a ROZ extends into the Lower San Andres and that Goodnight's existing and proposed operations interfere with the State, federal government, and Empire's right to recover hydrocarbons in both the Grayburg and San Andres formations, thereby causing waste.

A. Empire Demonstrated that a ROZ Extends into the Lower San Andres.

Empire demonstrated that a recoverable ROZ exists throughout the San Andres in the EMSU. Empire Closing Br. at 14-15. Indeed, Goodnight's petrophysicist Dr. James Davidson confirmed that oil saturation exists throughout the San Andres, stating "there's some up to 30 to 40 percent in there. They show up periodically up and down the system." 04/21 TR 242:17-243:14. As Empire's expert Stanley Birkhead opined, "regardless of the tops used, there is still an ROZ in the Upper and Lower San Andres." Empire Ex. L at 4, ¶ 13.

Moreover, contrary evidence offered by Goodnight is unsupported by sound science. Goodnight's expert Dr. Davidson selected rock types based on his incorrect belief that the EMSU was a deep-water environment. See Empire Cross Ex. 7. However, Goodnight's expert geologist William Knights testified that the San Andres was a predominantly shallow water environment. See Goodnight Exhibit E at 5; see also Empire Ex. L-1 at 8-10, ¶¶ 21-22.

Without citation to the record, Rice argues that Empire's experts "do not opine on a ROZ in the Lower San Andres" and "don't distinguish between the Lower San Andres and the Upper San Andres." Rice Br. at 17. This is simply false. Empire witness Ryan Bailey clearly distinguished the Lower and Upper San Andres with respect to numerous factors, including net pay, average porosity above 4% cutoff, average water saturation below 80% cutoff, oil saturation,

pore volume, hydrocarbon pore volume, and original oil in place. Empire Ex. K at 8-9; Empire Exs. K-21 through K-46. Similarly, Rice mischaracterizes the testimony of Empire's witnesses Dr. Robert Lindsay and Stephen Melzer to support Rice's argument that oil saturations below 700' subsea are unknown. Rice Br. at 18. Dr. Lindsay testified, however, that his work ends when there is no more core . . . [a]nd then other folks look at well logs and try to calculate oil and water saturations to see how much deeper that might extend down into the San Andres." 2/24 TR 184:21-185:5. Ops Geologic then looked at well logs and calculated saturations into the Lower San Andres. See Empire Exs. K at 8-9, K-21 to K-46, L-1 at 2-3, 7.

Rice's critique of Mr. Birkhead's Table 1 is puzzling at best. See Rice Br. at 18. Table 1 is a comparison of oil-in-place volumes using Ops Geologic and Goodnight San Andres tops. See Empire Ex. L at 5, Table 1. Rice appears to be relying on the Goodnight calculations therein to support its conclusion, rather than Ops Geologies calculations. See Rice Br. at 18. Table 1 indicates the logs for Goodnight's Ryno SWD #1 and the EMSU 746 reveal oil-in-place volumes in the lower San Andres ranging from 15.81 to 25.09 MMBO and from 25.55 to 43.88 MMBO, respectively. Empire Ex. L at 5, Table 1. Rice's reference to 0%, Rice Br. at 18; concerns a Goodnight calculation based on Goodnight's tops of the San Andres, Empire Ex. L at 5, Table 1; which were picked in a manner that is unsupported by any studies or literature. See Empire Closing Br. at 2. Goodnight's reservoir engineer and tertiary recovery expert, Dr. Larry Lake, testified that he had never seen formation tops picked in this manner. 4/24 TR 208:25-209:5. Moreover, Goodnight excluded all volumes below a 7 percent porosity. 4/22 TR 182:19-23. Thus, Rice's argument necessarily fails.

B. Empire Demonstrated that Goodnight's Operations Impair Empire's Operations in the Grayburg and Proposed Operations in the San Andres.

As explained in Empire's Closing Brief, Empire demonstrated by a preponderance of evidence that Goodnight's current and proposed injection results in waste and impairs the correlative rights of all interest owners in both the Grayburg and San Andres. *Id.* at 15-20. Rice relies on the testimony of Empire's witness William West to argue Empire offered no evidence showing that Goodnight's injections affect Empire's current operations in the Grayburg. Rice Br. at 17. Rice's citations to the record here are faulty, if not deceptive. Rice selects isolated testimony that it believes supports the proposition stated, yet review of the testimony as a whole reveals just the opposite. *See, e.g.*, 4/11 TR 48:14-50:15 (discussing the fact that even if communication with the Grayburg cannot be quantified by looking at the production profile, the Grayburg is impacted by corrosion resulting from incompatible water injected by Goodnight pumped by Empire's water supply wells and reinjected into the Grayburg for the waterflood operations). Contrary to Rice's misrepresentation, a number of Empire's witnesses testified about the impact on operations in the Grayburg. *See, e.g.*, 4/7 TR 39:1-8 (Mr. Marek, testifying that high water disposal rates can cause higher pressure in the ROZ and a higher potential for hydraulic fracturing and vertical communication" that "will have a negative impact on the current field operations in the traditional Grayburg producing zone," such as higher water production).

Similarly, Rice relies on Empire witness Joseph McShane to argue that Empire cannot present evidence that commercial water injection in the EMSU has affected Empire's production from the Grayburg." Rice Br. at 20. Notably, however, Mr. McShane expressly declines to speak to production. 4/8 TR 117:1-3. The language quoted by Rice pertains to Mr. McShane's opinion as to whether any changes have occurred to the geological formation, such as a change in saturations reflected in core. *Id.* 117:4-22. Mr. McShane goes on to state that Dr. Buchwalter's

model “seemed to be in line with what [the Empire] team was seeing, as far as the behavior of the . . . Grayburg wells.” *Id.* Notably, Empire has permitted new wells in the EMSU to quantify oil saturation changes resulting from water disposal into the San Andres ROZ interval and to monitor movement of fluids into the Grayburg. 4/9 TR 53:15-54.14.

Rice argues that the evidence at the hearing does not support Empire’s position “that Goodnight’s injection is migrating up into the Grayburg reservoir. Rice Br. at 20. Rice defines the “Lower San Andres” as “the separate zone in the San Andres aquifer into which Goodnight injects wastewater.” Rice Br. at 3 n.1. Rice provides no depths to identify its distinction between the Grayburg, the Upper San Andres, or the Lower San Andres. *See generally* Rice Br. Apparently in reliance on its definition of the Lower San Andres, Rice represents that “Goodnight’s injections in the EMSU are limited to the Lower San Andres.” *Id.* at 19. Rice’s definition and related assertion are circular. The Upper and Lower San Andres are defined by geological markers that exist in all wells. If you perforate at the top of the San Andres, as defined by the geology, then by definition the well is injecting into the upper San Andres.

Notably, the top perforation in the Ryno wells is at -748’ subsea depth. Empire Revised Ex. H at 2 (Apr. 4, 2025). Thus, as explained by Empire’s witness Frank Marek, “based on the perforations in the Ryno saltwater disposal well, that well is disposing of water into the ROZ that we see in Well 679 core and in the Ryno well log itself.” 4/7 TR 38:20-23. Review of the Goodnight SWD permits reveals that seven of the 10 active Goodnight SWD wells have perforations in the Upper San Andres. Moreover, the current approved injection intervals will allow for additional perforations in the upper San Andres interval without further notice or approval.

Rice also contends that Empire has not addressed the question regarding containment of the CO₂ upon injection, representing that Empire witness Joe McShane “acknowledged that Empire put forth no evidence on how the CO₂” would be contained. Rice Br. at 21. Again, Rice plays fast and loose with the record. Mr. McShane simply stated that as the geologist, he could not speak to the subject and agreed that the engineering team would address the question. 4/8 TR 124:24-125:8. As recognized by Rice, since CO₂ injected into the San Andres will migrate vertically through the natural fractures into the Grayburg, Rice Br. at 21; the Grayburg and San Andres will be developed simultaneously with one set of patterns for the Grayburg and one set of patterns for the San Andres during initial development. These separate patterns are necessary due to the large oil zone thickness within each zone. This will also allow for the CO₂ performance of the Grayburg and San Andres to be evaluated separately. *See* Goodnight Cross Ex. 16 at 30-39.

As explained in Empire’s Closing Brief, fractures and karsting exist in the San Andres formation, allowing communication, and Goodnight’s purported impermeable barrier simply does not exist. *Id.* at 16-18, 20-21. Goodnight’s purported barrier is based on mud losses. 4/22 TR 131:7-24. However, mud losses do not support Goodnight’s position. As shown during the hearing in cross examination of Mr. Knights, mud loss occurred not only in the Lower San Andres, but also in the Grayburg and in the Upper San Andres. *See* 4/22 TR 130:5-132:22; *see also* Empire Ex. N at 13 (“The point at which a well experiences mud losses is inconsistent between wells.”). Rice makes an arduous effort to discount the significant evidence of communication offered by Empire, by relying on testimony taken out of context. *See* Rice Br. at 21-23. For example, Rice relies on a 1939 paper to argue that the Goat Seep aquifer is the source of the high plumes of water in the EMSU wells. Rice Br. at 22. Rice ignores the subsequent Chevron papers that attribute excessive water production to upward migration of San Andres water. *See, e.g.,* Chevron,

Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the EMSU Water flood, Lea County, New Mexico; Chevron, September 1989 Technical Committee Report on the Proposed Arrowhead Grayburg Unit, Empire Ex. N-25; *see* Empire Exs. J at 3; J-1; J-2; K at 5, 11; M at 3; M-2; N at 6; N-26; *see also* Empire Ex. E at 4, 6. Instead, they rely on the 1939 paper, Goodnight Cross Ex. 18; and testimony from Mr. Knights and Dr. Lake. Rice Br. at 22-23. Mr. Knights admits that he has no “physical evidence to show the Commission that this is the barrier [Goodnight] believe[s] prevents communication between the Upper and the Lower San Andres.” 4/21 TR 248:25-250:11, 252:18-253:5. Instead, he conjectures, without support, that the migration paths are lateral. *Id.* 253:6-254:2. When asked to reconcile his position with Empire’s “bubble map” and material balance work, Mr. Knights simply stated, “I do not know.” *Id.* 252:10-17.

In support of its position, Rice takes the testimony of Dr. Jim Buchwalter out of context to argue that the model was “unreliable and unreasonable” for four different reasons. Rice Br. at 22. Simple cite-checking of Rice’s sources reveals the omission of pertinent testimony with respect to each cite. Dr. Buchwalter actually testified that the goal of his model was to match “field production, injection and pressures and then the influx.” 2/28 TR 1089:21-24. He further testified that prior to 1987, there were no water-supply wells in the modeled area, and the only way he could match historical production of the Grayburg and San Andres reservoir pressure was to include communication between the San Andres and the Grayburg. Dr. Buchwalter also explained that the Grayburg was not extended because it would add too much oil in the Grayburg. Sensitivity runs were made with Grayburg aquifer size for the rebuttal document. What it showed is if the Grayburg aquifer was too large, it would water out the wells on the western edge of the model and this did not match the historical water production seen in those wells. *See id.* 1120:15-1122:15. As Dr. Buchwalter also points out, Goodnight did not construct a model that can rebut Dr.

Buchwalter's model. *Id.* 1123:19-22. Importantly, Dr. Buchwalter's model fits the historical data, indicating excessive water production is a result of communication with the San Andres formation. *See, e.g.*, Empire Exs. E at 2-4; E-12(a)-E-17(a); E-12(b)-E-17(b); M at 2-5; M-3 to M-5.

Rice also relies on historical vacuum injection that occurred because the San Andres was "underpressurized." Rice Br. at 23. Rice ignores the fact that injection for disposal has effectively been on-lease disposal and not commercial disposal. *See, e.g.*, 4/9 TR 14:16-15:18. Indeed, Rice misrepresents the testimony of Goodnight expert Jack Wheeler. Rice Br. at 23. Mr. Wheeler's testimony was limited to the Eunice Monument Eunice system, which was created for disposal of water produced from certain wells in the field by a limited number of operators. 4/9 TR 12:21-15:18; *see also id.* at 49:23-50:14 (testifying that formation of the EME system occurred decades prior to formation of the unit and many years prior to the advent of CO₂ use to recover hydrocarbons from a ROZ). Commercial disposal did not begin in the EMSU until 2020 into Goodnight's Ryno SWD well. It is the exponential increase in commercial disposal, largely due to injection by Goodnight's four SWD wells and Permian Line Services' two SWD wells inside EMSU, that is causing waste and adversely impacting correlative rights. 4/9 TR 24:11-20, 169:19-20. The initial underpressured state of the San Andres, and the additional estimated 83 psi pressure drop from 1883 psi at 5000' (0.3766 psi/ft) in 1929 to 1800 psi (0.36 psi/ft) in July 1959 (as measured at Rice's EME H-20 well) allowed Rice and other SWD operators to inject small volumes of water into the San Andres on a vacuum. *See e.g.*, Empire Ex. M-5; Empire Cross Exs. 3, 4, & 6 (filed May 8, 2025).

Rice does not address the fact that the reservoir pressure in the Grayburg dropped to 364 psi prior to the waterflood. Empire Cross Ex. 6. A consequence of this low pressure is that the Goat Seep aquifer is limited in size and thus could not provide sufficient water volumes to produce

the high water production in the crestal area. *See* 2/27 TR 733:24-734:12, 736:25-737:7, 751:9-25; 2/28 TR 949:24-953:12; Empire Ex. N-18. On the other hand, the San Andres is sufficient in size to provide those large water volumes through natural fractures in the crestal area necessary to match the water production. *See* 2/27 TR 751:9-25. The production from San Andres water supply wells beginning in 1986 dropped the reservoir pressure in the San Andres to its lowest point and allowed saltwater disposal to continue at zero or low wellhead pressures. *See, e.g.*, Empire Exs. M-5; N at 6. As shown by Mr. West's Cumulative San Andres Water Balance, the large water volumes produced by the water supply wells near EMSU is estimated to be replaced by the large water disposal volumes this year and will continue to increase reservoir pressure above original reservoir pressure. *See* Empire Ex. N-7; 4/9 TR 166:10-174:7. Empire Exs. N-27, N-28 (filed 5/14/2025). Since water supply well volumes are currently low, the reservoir pressure will increase at a faster rate than historically during the 1960 to 2025 period. *See, e.g.*, Empire Cross Ex. 10.

In conclusion, Empire notes that as an intervenor, Rice had the opportunity to offer evidence in support of its position. Rice failed to do so. Its efforts to cherry pick testimony to support an artificial standard manufactured from inapposite case law is unavailing. As explained by Empire in its Closing Brief, Empire offered a preponderance of evidence demonstrating that a ROZ exists in the Grayburg and San Andres formations and that Goodnight's existing and proposed operations adversely impact tertiary recovery of the hydrocarbons therein. The Commission has an obligation to prevent the waste caused by Goodnight's operations and to protect the correlative rights of the State of New Mexico, the Bureau of Land Management, and Empire, among others. Goodnight's applications in Case Nos. 24123, 23614-23617, 23775 should be denied, and Empire's applications in Case No. 24018-24020, 24025 should be approved.

Respectfully submitted,

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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 18, 2025.

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