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

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS LEA COUNTY, NEW MEXICO **CASE NOS. 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. 24018-24027**

REPLY IN SUPPORT OF MOTION TO STRIKE EMPIRE'S REBUTTAL WITNESS DISCLOSURE

Goodnight Midstream Permian, LLC ("Goodnight Midstream"), through undersigned counsel, respectfully submits this reply in support of its motion to strike Empire New Mexico LLC's Rebuttal Witness Disclosure filed on January 6, 2025. Based on the motion and the arguments below, the Motion should be granted.

INTRODUCTION

Empire has not showed that the testimony identified for its additional rebuttal witnesses is proper rebuttal testimony, nor has it refuted that it was not required to be presented as part of

Empire's case in chief. The Commission should grant this motion and strike Empire's Rebuttal Witness Disclosure or, in the alternative, require Empire to file an amended Rebuttal Witness Disclosure that is limited to testimony that is properly rebuttal and not evidence that Empire has the burden of proving in its case in chief.

ARGUMENT

I. Empire has already Acknowledged it has the Initial Burden under its Applications to Demonstrate Injection Causes Waste or Impairs Correlative Rights.

Empire has already admitted to the Commission in a previous briefing and oral argument that it has the burden of proof under its applications to demonstrate Goodnight's injection is causing waste or violating correlative rights. *See* Reply in Support of Motion for Clarification on Scope of Hearing and Burden of Proof, filed Sept. 19, 2024, relevant portions attached as **Exhibit D** (stating "Goodnight and Empire each bear the burden of proof in their respective applications"[1] and Goodnight's injection "must cease if Empire demonstrates the injection is causing waste or violating correlative rights" (emphasis added)); *see also* Commission Hearing, Sept. 23, 2024, Tr. 25; 2-5, 19-22; 26:2-5, attached as **Exhibit E** (". . . Empire bears the burden of proof on its applications to revoke[.]").

Thus, Empire is estopped from taking a contrary position now, as it now appears to be doing, that "Goodnight has the initial burden of proof[.]" *See* Resp. at 1; *see Gallegos v. Pueblo of Tesuque*, 2002-NMSC-012, ¶ 23, 46 P.3d 668 (stating that judicial estoppel prevents a party from playing "'fast and loose' with the court by changing legal positions in the midst of a suit").

[1] Goodnight does not dispute that it has an initial burden of proof under its applications. *See* Goodnight Resp. in Opposition to Motion to Clarify, at 2, filed Sept. 12, 2024 ("Goodnight and Empire each are the movant for a series of applications seeking affirmative relief" and "applicants have the initial burden of going forward with production of evidence sufficient in law to establish facts necessary for approval.").

Because Empire has the burden of proof under its respective applications to demonstrate that Goodnight's injection "is causing waste or violating correlative rights," it must meet that burden in its case in chief. *See, e.g.*, *Transgard v. Atchison, Topeka & Santa Fe Ry. Co.*, 1918-NMSC-113, ¶ 3, 175 P. 280 ("The burden of showing the matter [claimed] rested upon [Plaintiff/Appellee], and in his case in chief it was his duty to have presented the facts[.]" (emphasis added)).

The fact that Empire has this burden in its case in chief is inescapable black-letter law.

II. Empire's Proposed Rebuttal Testimony Presenting a New Petrophysics Model and Oil in Place Analysis Goes to its Case in Chief and is not Proper Rebuttal Testimony.

Recognizing it has the burden of proof in its case in chief, Empire presented in its direct case testimony and evidence from Mr. McShane (a petroleum geologist with Empire) and Mr. Dillewyn (a petrophysicist with Nutech). This testimony and evidence are necessary to make out Empire's case that economically recoverable hydrocarbons exist in the San Andres formation. That showing is a necessary predicate to Empire's claim that Goodnight's injection is purportedly causing waste or impairing correlative rights. In other words, they must show there is economically recoverable hydrocarbons to prove that waste is occurring or that correlative rights are being impaired from injection. *See, e.g.*, NMSA 1978, § 70-2-12(B)(4).

"'Rebuttal testimony offered by the plaintiff should rebut the testimony brought out by the defendant and should consist of nothing which could have been offered in chief.'" *Ochsner*, 392 S.W.2d at 448 (*quoting* 53 Am.Jur. 107 (Trial, § 121)) (emphasis added). *Fraser v. Miller*, 427 S.W.3d 182, 184-85 (Ky. 2014) *comports with State v. Manus*, 1979-NMSC-035, ¶ 38 (holding a party is "not allowed to withhold substantial evidence supporting any of the issues which it has the burden of proving in its case in chief merely in order to present this evidence

cumulatively at the end of [the other party's] case."); *see also Sanchez v. Safeway Stores, Inc.*, 451 F.2d 998, 999 (10th Cir. 1971) (affirming exclusion of evidence offered as rebuttal when "plaintiffs failed to exercise the opportunity to call their expert during their case in chief, apparently for tactical reasons"). Stated simply: "A party may not use rebuttal as an attempt to introduce evidence that he should have introduced in his case-in-chief." *See United States v. Stitt*, 250 F.3d 878, 897 (4th Cir. 2001). That is because "[t]he purpose of rebuttal, of course, is not to provide a second opportunity to introduce evidence that could have been introduced in [the] case-in-chief." *See Naleway v. Agnich*, 897 N.E.2d 902, 916 (2008).

The problem with Empire's Disclosure—and its Revised Disclosure—is that it reflects on its face an intent to present testimony and exhibits on rebuttal that were required to be presented in support of Empire's burden of proof in its case in chief. Empire's Disclosure states as to its two additional witnesses that:

> Mr. Bailey is expected to testify regarding, *inter alia*, the structure of the San Andres formation and San Andres oil-in place volumes for the Eunice Monument South Unit ("EMSU") in light of petrophysical modeling developed by OPS Geologic and Scott Birkhead.[2]
>
> …
>
> Mr. Birkhead is expected to testify regarding, *inter alia*, log calculated oil saturation values in light of petrophysical modeling developed by Mr. Birkhead together with OPS Geologic.[3]

Goodnight contends in its Motion that the petrophysical model and oil-in-place analysis Empire proposes for rebuttal will be all new work that is different from the petrophysical model and oil-in-place analysis that Empire submitted in August 2024 and revised in December 2024 as part of

[2] *See* Empire's Revised Rebuttal Witness Disclosure at 2, attached as **Exhibit F**.

[3] *See id.* at 3.

its case in chief. Rather than simply refute the contention by affirming Empire intends no such thing—that the petrophysical model and oil-in-place analysis will not be new work—Empire hollowly contends the proposed testimony is designed to rebut Goodnight's case in chief. Resp. at 3. But evidence is not "rebuttal" if it was required to support the case in chief under the party's burden of proof. Empire also weakly argues Goodnight's motion is "speculative and incomplete" because the rebuttal testimony has not yet been filed. Resp. at 4. By failing to deny that Empire's "rebuttal" petrophysical model and oil-in-place analysis will not be new, Empire concedes this dispositive issue. It is not necessary to wait for the rebuttal testimony to confirm this.

Empire goes on to contend variously that its disclosure is no different than Goodnight's, that it complies with the Prehearing Order, and that Empire will provide its full rebuttal testimony two weeks in advance of the evidentiary hearing along with all documents the rebuttal witnesses referenced and relied on. Resp. at 4. Empire's contentions are meritless.

The parties' disclosures are worlds apart. Unlike Empire, Goodnight is sticking with the petrophysical model and oil-in-place analysis it presented in its case in chief to support its burden of proof. In contrast, Empire is proposing a new petrophysical model and oil-in-place analysis that it could have, and should have, presented in its case in chief.

Having Empire's new petrophysical model and oil-in-place analysis two weeks before the hearing is no cure to Goodnight's prejudice. Goodnight will not have the data and documents Empire's additional witnesses reference or rely on until a week before the hearing under the Prehearing Order. That is hardly enough time to evaluate and assess an entirely new petrophysical model and oil-in-place analysis when it took Goodnight and its experts from Netherland, Sewell & Associates more than six months to properly evaluate Empire's original analysis and develop its own model. Goodnight also will have no opportunity to conduct

additional discovery that may be required on the data and documents Empire's new rebuttal witnesses rely on, no opportunity to depose these additional experts in advance of the hearing on their new analyses and, therefore, no "full opportunity" to refute, contradict, criticize, or explain evidence Empire proposes to present as "rebuttal." *See* 19.15.4.17.A NMAC; *see also State v. Manus*, 1979-NMSC-035, ¶ 38.

III. Empire Should Not Be Given an Opportunity for a "Do-Over" on its Key Evidence.

When pushed to state whether Empire was adopting Nutech's petrophysical analysis—whether Empire trusts it and stands by it—Empire's Rule 30(b)(6) company representative, whose testimony is legally binding on the company, refused to affirm that Empire stood by the analysis in his deposition on December 3, 2024. *See* Depo. 30(b)(6), 12/3/24, Tr. 94-95, 97-98, 205, attached as **Exhibit G**. The following day—after Goodnight counsel deposed Empire's petroleum engineering witness, William West, in his individual capacity earlier that same day thereby preventing Goodnight counsel from asking him any questions about it—Empire filed revised testimony for its petrophysicist from Nutech, Galen Dillewyn. The revised testimony presented a substantial modification to Empire's petrophysical model "in light of direct testimony filed by Goodnight[.]" *See* Empire's Revised Notice of Revised Testimony, 1/30/25, attached as **Exhibit H**. The day after that, on December 5, 2024, Empire filed revised testimony for its petroleum geologist, Joseph McShane, that substantially modified its oil-in-place analysis based on Empire's revised petrophysical model. *See id.* It reduced Empire's oil-in-place estimates by an average of approximately 60%. Empire filed this revised testimony without notifying or conferring with Goodnight counsel and without seeking leave more than three months after the deadline to file direct testimony on August 26, 2024.[4]

[4] The parties reached agreement to file notices of revised testimony identifying what changed, why it was changed, and an explanation for the timing of the revision for its witnesses.

Now, apparently dissatisfied with its original petrophysical model presented in its case in chief and perhaps its revised one, Empire is improperly seeking a "re-do" through rebuttal. It is trying to submit on "rebuttal" a new petrophysical model and oil-in-place analysis that it failed to prepare as part of its case in chief. Empire is free to call additional witnesses on rebuttal to refute, contradict, criticize, or explain evidence Goodnight has submitted in its case in chief, but it is not permitted to present an entirely new petrophysical model and oil-in-place analysis. That testimony and evidence goes to support Empire's case in chief and should have been presented in its direct testimony. *See United Stitt*, 250 F.3d at 897; *see also Naleway*, 897 N.E.2d at 916.

Goodnight has already had to undergo additional substantial cost, expense, and effort to re-evaluate Empire's significantly revised direct testimony, which it received only in early December 2024. Now Empire is attempting a further "re-do" in a manner that will prevent Goodnight from fairly and timely evaluating—and responding to—evidence and testimony that should have been submitted at the end of August 2024.

Empire complains that Goodnight had months to review and analyze Empire's original testimony submitted to the Division in October 2023, so has effectively had "two bites at the apple, while precluding Empire from its first bite." Resp. at 6. Not only is this position inaccurate—Goodnight also filed its testimony and exhibits in October 2023 allowing Empire the same amount of time to study and review Goodnight's testimony and evidence—but Empire fails to disclose the problem was of Empire's own making. Empire failed to comply with its discovery obligations in the Division proceeding. On the eve of the Division hearing this failure became readily apparent after the parties' exhibits and testimony were filed. The Division vacated the

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Goodnight filed a notice of revised testimony for one witness, William Knights, due to a calculation error and to align his oil saturation cutoff with Empire's expert witnesses. *See* **Exhibit I**.

merits hearing on Goodnight's request, pending a hearing on Goodnight's motion to compel production of documents. The hearing was eventually referred to the Commission, along with additional cases.

Not only does Empire make this argument with "unclean hands," but it ignores the fact that Empire also had from October 2023 until August 2024 to evaluate Nutech's petrophysical model and its own oil-in-place analysis and determine whether it should stick with them or prepare something new. Empire chose the former and re-filed its testimony in August 2024—making some adjustments but largely keeping its petrophysical model and oil-in-place analysis intact—at least until it reviewed Goodnight's direct testimony and petrophysical model. Then it scrambled to make revisions and is now looking for a complete "re-do." That should not be allowed. The Commission should strike Empire's Rebuttal Witness Disclosure as to its two additional witnesses and require Empire to file an amended Rebuttal Witness Disclosure that is limited to testimony that is properly rebuttal in nature.

CONCLUSION

For the reasons stated above and in the Motion, the Commission should grant this motion.

DATED: February 2, 2025.

Respectfully submitted,

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/s/ Adam G. Rankin
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CERTIFICATE OF SERVICE

I hereby certify that on February 3, 2025, I served a copy of the foregoing document to the following counsel of record via Electronic Mail to:

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EXHIBIT D

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

APPLICATIONS OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS LEA COUNTY, NEW MEXICO.	**CASE NOS. 23614-23617**
APPLICATIONS OF EMPIRE NEW MEXICO LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO	**CASE NOS. 24018-24020, 24025**
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**
APPLICATION OF GOODNIGHT PERMIAN MIDSTREAM, LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO.	**CASE NO. 24123** **ORDER NO. 22869-A**

EMPIRE'S REPLY IN SUPPORT OF MOTION FOR CLARIFICATION ON SCOPE OF HEARING AND BURDEN OF PROOF

Empire New Mexico, LLC ("Empire") brought its Motion for Clarification on Scope of Hearing and Burden of Proof ("Empire's Motion") to request that the New Mexico Oil Conservation Commission ("Commission") clarify and confirm two issues: (1) Goodnight Permian Midstream, LLC's ("Goodnight") injection of produced water into Empire's unitized interval must cease if Empire demonstrates the injection is causing waste or violating correlative rights; and (2) Goodnight and Empire each bear the burden of proof on their respective applications. Although neither issue should be controversial because these matters are clearly established by New Mexico law, Goodnight's Response to Empire's Motion asks the Commission to ignore the Oil and Gas Act ("Act") and upend fundamental legal principles by holding that: (1)

of crude petroleum oil or gas or both oil and gas from any pool." Order No. R-22869-A at 8, ¶ 11 (quoting Section 70-2-12(B)(4)) (emphasis in the original). Empire was not required to show that the Grayburg was capable of producing in paying quantities, only that it should be continued to be assessed for the potential recovery of additional hydrocarbon resources.

Goodnight's insistence on siloing Empire into its manufactured burden of proof, derived from a misreading of one phrase in a subpart of a larger jurisdictional statutory framework, is precisely why Empire filed its Motion. Empire is requesting relief from the Commission because Goodnight's injection into the San Andres is causing water to migrate into the producing Grayburg formation and pressuring up the formation, as well as interfering with the San Andres ROZ. There is ***no dispute*** that the Grayburg is a producing formation, or that the Grayburg is part of the EMSU. This fact alone requires the Commission's intervention, as it is charged with doing "whatever may be reasonably necessary" "to prevent waste…and protect correlative rights." Section 70-2-11(A).

II. Goodnight and Empire each bear the burden of proof on their respective applications.

It is well established in New Mexico that administrative proceedings are subject to the common-law rule that the moving party bears the burden of proof. *Int'l Minerals & Chem. Corp. v. N.M. Pub. Serv. Comm'n*, 1970-NMSC-032, ¶ 10, 81 N.M. 280. In a shocking turn, Goodnight presents the novel theory that Empire alone "ultimately bears the burden of proof and persuasion in all applications pending before the Commission." Goodnight Response at 17. In seeking to overturn the common law as we have known it, Goodnight cobbles together its own burden of proof, claiming that "the party seeking to change the status quo" has the burden of proof. *Id*. at 18. Goodnight relies on *Atlantic & Pacific Insurance Co. v. Barnes*, 666 P.2d 163 (Colo. Ct. App. 1983), for this novel proposition. Close review reveals that Goodnight distorts the Colorado court's holding. The court stated, "as a general rule, the burden of proof rests upon the party who asserts

the affirmative of an issue." *Id*. at 165. In further explaining this general rule, the Colorado Court of Appeals goes on to state, "[t]he test is to determine which party would be successful if no evidence were given and then place the burden of proof on the adverse party. *In other words*, the party seeking to change the status quo has the burden on proof." *Id*. (emphasis added). This in no way creates some sort of new burden of proof that places the entirety of the burden – no matter who brings an application – on the party "seeking to change the status quo" on anything.

In applying the test set out by the Colorado Court of Appeals, if Goodnight were to fail to present sufficient evidence in support of its injection applications in Case Nos. 23614-23617, Goodnight would not be able to prevail. Thus, Goodnight is seeking to change the status quo by obtaining injection permits that do not currently exist. Looking at it the other way posed by the Court of Appeals, Goodnight's application in Case No. 23775, for example, seeks to change the status quo as Goodnight requests approval "to increase the approved maximum rate of injection in its Andre Dawson SWD #1." *See* 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 filed 8/31/2023). Therefore, the burden must lie with Goodnight on its own applications.

Goodnight also attempts to argue that Empire bears the burden of proof going forward because Goodnight has already met its *prima facie* case through its direct testimony and exhibits. *See* Goodnight Response at 2. It is well established that a party can only make a *prima facie* showing by demonstrating to the fact finder – in this case the Commission – "such evidence as is sufficient in law to raise a presumption of fact or establish the fact in question unless rebutted." *Romero v. Philip Morris Inc.*, 2010-NMSC-035, ¶ 10 (quoting *Goodman v. Brock*, 83 N.M. 789, 792-93 (1972)). To determine what facts must be established, the fact finder "must 'look to the

III. Reply to the Division's Response

The Division's Response to Empire's Motion argues that the Commission must consider the potential impact of injection on the Capitan Reef at the hearing on Goodnight's and Empire's applications. As an initial matter, Empire disagrees with the Division that Empire failed to seek information regarding the Division's position in these cases.[1] The Division did not raise water quality concerns in its Motion Concerning the Scope of the Evidentiary Hearing Set for September 23-27, 2024 (filed May 23, 2024) or in its witness disclosure filed on July 8, 2024. Empire relied on the Division's filings and was unaware of the Division's water quality concerns until the Division filed its Prehearing Statement on August 26, 2024. Regardless, Empire does not dispute that the Commission has jurisdiction over the Division's water quality concerns or that the concerns may be addressed at the February 2025 hearing if the Commission determines it is appropriate to do so.

IV. Conclusion

Goodnight continues to attempt to make these cases about something they are not. Goodnight has sought to apply for new SWDs and to increase the approved injection rate into existing SWDs. Empire is seeking to revoke Goodnight's existing injection permits and protest Goodnight's applications for additional wells. Goodnight and Empire each bear the burden of proof for their own applications. Empire has not filed an application to permit tertiary recovery of the unitized interval at this point in time and need not meet the burden set out in Section 70-7-6 of the Statutory Unitization Act. All Empire must show in these proceedings is that Goodnight's proposed and continuing actions will create waste and impair correlative rights. It will do so through evidence presented at hearing.

[1] *See* Oil Conservation Division's Response to Empire New Mexico's Motion for Clarification on the Scope of Hearing and Burden of Proof at 3.

EXHIBIT E

September Meeting of the State of New Mexico Oil Conservation Commission

Docket Nos. 24683, 24123, 23614-23617, 23775, 24018-24027

Moderated by Gerasimos Razatos

Monday, September 23, 2024

9:06 a.m.

Pecos Hall, Wendell Chino Building

1220 S. Saint Francis Drive

Santa Fe, NM 87505

Reported by: James Cogswell

JOB NO: 6866872

to address that, as well.

The other matter addressed by our motion is just, really, a clarification of very clear law, which is that each party bears the burden of proof on its own applications. That should not be controversial. In fact, it's not controversial under the law. It's very clear.

For some reason, Goodnight is trying to convolute that and argue that Empire somehow bears the burden of proof on all of the applications, including Goodnight's applications. That's not the law in New Mexico.

The case they cite is a Colorado case from the Court of Appeals, which states that the party seeking to change the status quo bears the burden of proof. That is not a novel concept.

And when you read the case, it's not saying anything different from the fact that the moving party bears the burden of proof. Here, Empire bears the burden of proof on its applications to revoke, and Goodnight bears the burden of proof on its applications to inject.

Goodnight is seeking to change the status quo by obtaining injection permits that it does not currently have, and also to increase its injection

rate in an existing well. So it clearly bears a burden of proof on those applications. Empire bears the burden of proof on its applications. I think that's a pretty clear principle of law that really should not be up for debate.

Goodnight argues that Empire somehow now bears the burden on Goodnight's applications because Goodnight has established a prima facie case based on its testimony that's been submitted.

Well, that's not correct. Empire has opposed Goodnight's applications, and also submitted testimony and exhibits in opposition to those. So no factfinder has held, at this point, that either party has met the burden of proof.

So if Goodnight's argument were correct on the burden of proof, then Empire has already met its burden on its own applications. So it's an inconsistent argument on the part of Goodnight. I don't think it really makes any sense, and it's inconsistent with well-established law.

So I think, really, to sum up here, Empire's motion should be granted. The Commission should clarify that the issue in these cases is whether Goodnight's injection is resulting in waste or violating correlative rights, and clarify that each

EXHIBIT F

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

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO	**CASE NO. 24123** **ORDER NO. R-22869-A**
APPLICATIONS OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS LEA COUNTY, NEW MEXICO	**CASE NOS. 23614-23617**
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APPLICATIONS OF EMPIRE NEW MEXICO LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO	**CASE NOS. 24018-24020, 24025**

EMPIRE NEW MEXICO LLC'S SUPPLEMENTAL REBUTTAL WITNESS DISCLOSURE

Empire New Mexico LLC ("Empire") hereby supplements its rebuttal witness disclosure, which was previously filed on January 6, 2024 ("January 6 Rebuttal Disclosure"). Therein, Empire identified Empire's two additional witnesses for rebuttal, their particular areas of expertise, and the subject matter for their anticipated testimony, in accordance with paragraph 2[1] of the New Mexico Oil Conservation Commission's ("Commission") Pre-Hearing Order issued on December 5, 2024 ("Pre-Hearing Order"). Nonetheless, in response to Goodnight's assertions that the Pre-Hearing Order requires more than expressly stated, Empire identifies all of its witnesses who may be called to provide rebuttal testimony at the evidentiary hearing beginning February 24, 2025.

[1] Paragraph 2 of the December 5, 2024 Pre-Hearing Order states that the parties "shall disclose their *additional* witnesses for rebuttal, each rebuttal witness's particular area of expertise, and identify the subject matter of each rebuttal witness's anticipated testimony, by Monday, January 6, 2025." (emphasis added)

1. Ryan Bailey

Mr. Bailey is a geologist employed with OPS Geo1ogic, LLC ("OPS Geologic"), where he serves as Vice-President of Geoscience. Mr. Bailey has 17 years of experience in the upstream oil and gas industry, including time managing operations in the most successful US onshore plays in the last two decades. He began his career at Anadarko Petroleum where he worked as an Asset Manager and Geoscience Manager. More recently, Mr. Bailey was the Vice President of Geoscience at JBL Energy Partners. Mr. Bailey received his Bachelor of Science and Master's of Science in geology from the University of Alabama. For further details regarding Mr. Bailey's professional experience and qualifications, a copy of Mr. Bailey's curriculum vitae is attached as Exhibit A.

Mr. Bailey is expected to testify regarding, *inter alia*, the structure of the San Andres formation and San Andres oil-in place volumes for the Eunice Monument South Unit ("EMSU") in light of petrophysical modeling developed by OPS Geologic and Scott Birkhead. Mr. Bailey's testimony will rebut the following testimony presented by Goodnight's witnesses:

- Testimony of Goodnight witnesses regarding the existence and extent of a residual oil zone in the Upper and Lower San Andres
- Preston McGuire opinions, including but not limited to the following:
    - That formation tops should be picked using engineering data rather than geologic data
    - That there is a regional laterally continuous seal

2. Scott Birkhead

Mr. Birkhead is a petrophysicist who works as an independent consultant with OPS Geo1ogic LLC, among others. Mr. Birkhead received his Bachelor of Arts in Geology and his Master's of Science degree in Geology from Texas A&M University. For almost 20 years, Mr. Birkhead has assisted oil and gas companies in developing petrophysical models to characterize reservoir properties throughout the world. Among other things, Mr. Birkhead utilizes data-specific

petrophysical techniques to provide quality control of well logging data. For further details regarding Mr. Birkhead's professional experience and qualifications, a copy of Mr. Birkhead's curriculum vitae is attached as Exhibit B.

Mr. Birkhead is expected to testify regarding, *inter alia*, log calculated oil saturation values in light of petrophysical modeling developed by Mr. Birkhead together with OPS Geologic. Mr. Birkhead's testimony will rebut the following testimony presented by Goodnight's witnesses:

- James A. Davidson opinions, including but not limited to the following:
    - That intervals with less than 20% oil saturation should be excluded from the analysis of whether a residual oil zone ("ROZ") is economically recoverable
    - Relating to his log analyses
- William J. Knights opinions, including but not limited to his opinions regarding the depths of residual oil zones
- Preston McGuire opinions, including but not limited to his opinion that the San Andres does not meet the criteria for a residual oil zone
- Goodnight witness opinions regarding the amount of oil loss while recovering the core in the EMSU-679

3. Robert Lindsay

Dr. Lindsay was previously identified as a witness on behalf of Empire. His education, experience, and expertise are detailed in his self-affirmed statement filed on August 26, 2024 and his curriculum vitae attached thereto.

In addition to the subject matter of his direct testimony, Dr. Lindsay is expected to rebut to the following testimony presented by Goodnight's witnesses:

- Preston McGuire, including but not limited to Mr. McGuire's opinions regarding the following:
    - Picks for the top of the San Andres
    - That there is no communication between the formations
    - That there is an impermeable barrier or "seal" between the San Andres and the Grayburg formations

- That fracture studies do not reflect the San Andres formation

- Thomas Tomastik, including but not limited to Mr. Tomastik's opinions regarding the following:
  - That vertical fluid flow is limited notwithstanding existing fractures
  - That vertical fractures in Goodnight's injection zones could not extend into the Lower Grayburg Formation
  - That the top of the San Andres Formation would act as a barrier against upward fluid migration and is confirmed by Lindsay's Ph. D. dissertation as a geologic seal
  - That there would be no vertical fractures extending from the "injection zones" of Goodnight's wells in the San Andres Formation into the Lower Grayburg Formation

4. William West

Mr. West was previously identified as a witness on behalf of Empire. His education, experience, and expertise are detailed in his self-affirmed statement filed on August 26, 2024 and his curriculum vitae attached thereto.

In addition to the subject matter of his direct testimony, Mr. West is expected to rebu the following testimony by Goodnight's witnesses:

- Preston McGuire, including but not limited to Mr. McGuire's opinions regarding the following:
  - That Goodnight's disposal operations will not cause waste or impair correlative rights in the "San Andres disposal zone"
  - That Goodnight's "San Andres disposal zone" is confined to intervals below any potential ROZ that is isolated by a "sustained and geographically extensive geologic seal"
  - That pressure within the San Andres formation is much lower than pressure within the Grayburg formation
  - That the San Andres does not meet the criteria for a ROZ because oil saturations are below 20%
  - Representations regarding the Piazza hearing

- Dr. Larry Lake, including but not limited to Dr. Lake's opinions regarding the following:

- That there is a 200' barrier across the field because no wells have perforated that interval
- That there is no oil production from the San Andres aquifer in the EMSU

- John McBeath, including but not limited to Mr. McBeath's opinion that there is no movable oil in the San Andres
- Thomas Tomastik, including but not limited to Mr. Tomastik's opinions regarding the following:
  - That there have been "longstanding known corrosion issues"
  - That "Empire's proposed CO2 EOR for the EMSU is seriously lacking in detailed technical considerations"
- Testimony of Goodnight's witnesses that oil in the San Andres is not economically recoverable
- Testimony of Goodnight's witnesses relating to exceedance of maximum surface injection pressures in Empire's injection wells

4. James L. Buchwalter

Mr. Buchwalter was previously identified as a witness on behalf of Empire. His education, experience, and expertise are detailed in his self-affirmed statement filed on August 26, 2024 and his curriculum vitae attached thereto.

In addition to the subject matter of his direct testimony, Mr. Buchwalter is expected to rebut the following testimony by Goodnight's witnesses:

- That water production occurred in some crestal wells because they were completed below the oil-water contact
- That there is no communication between the Grayburg and San Andres
- That the Goat Seep and Grayburg aquifers were the source of excessive water production by Grayburg wells

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 January 22, 2024.

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/s/ Sharon T. Shaheen
Sharon T. Shaheen

EXHIBIT G

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

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

APPLICATION OF GOODNIGHT PERMIAN MIDSTREAM LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO.

DIVISION CASE NO. 24123
ORDER NO. R-22869-A

VIDEO DEPOSITION OF RULE 30(b)6 WITNESS

December 3, 2024
9:04 a.m.
VIA ZOOM
Albuquerque, New Mexico

PURSUANT TO THE NEW MEXICO RULES OF CIVIL PROCEDURE, this DEPOSITION was:

TAKEN BY: ADAM G. RANKIN
ATTORNEY FOR GOODNIGHT MIDSTREAM PERMIAN LLC

REPORTED BY: RUTH A. ELWELL
CCR 166
Kendra Tellez Reporting, A Veritext Company
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I N D E X

WILLIAM WEST

E X H I B I T S

VIDEOGRAPHER: Good morning. We are going on the record at 9:04 a.m. on the 3rd of December 2024. Please note that this deposition is being conducted virtually. Quality of recording depends on the quality of camera and internet connection of the participants. What is seen from the witness and heard on the screen is what will be recorded. Audio and video recording will continue to take place unless all parties agree to go on or off the record. This is Media Unit No. 1 in the video recorded deposition of William West in the matter of the Applications of Goodnight Midstream Permian LLC, et al. filed in the State of New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Commission, Case Nos. 24018 through 24020 and 24025.

My name is Steven Milner representing Moir Litigation Video and I am the videographer. The court reporter is Ruth Elwell from the firm Veritext Legal Solutions. I am not authorized to administer an oath, and I am not related to any party in this action, nor am I financially interested in the outcome.

If there are any objections to the proceeding, please state them at the time of your appearance.

Counsel and all present, including remotely, will now state their appearances and affirmations for the record beginning with the noticing attorney.

MR. RANKIN: Morning. Adam Rankin with the law firm of Holland Hart in Santa Fe appearing in this deposition on behalf of Goodnight Midstream LLC.

MS. HARDY: Dana Hardy with the Santa Fe office of Hinkle Shanor appearing on behalf of Empire New Mexico LLC.

MR. MOANDER: Chris Moander, Assistant General Counsel New Mexico Oil Conservation Division.

MR. PADILLA: Ernest Padilla, counsel for Empire New Mexico LLC.

MS. SHAHEEN: Sharon Shaheen, Santa Fe office of Spencer Fane, appearing on behalf of Empire New Mexico. I'll just note on the record that Ms. Hardy will be defending the witness on behalf of Empire. I'll just be listening in.

MR. BECK: Matt Beck on behalf of Rice Operating Company and Permian Line Service LLC.

VIDEOGRAPHER: Is that all counsel? Would the court reporter now please swear in the witness.

WILLIAM WEST

was called as a witness and, having been first duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. RANKIN:

Q. Good morning, Mr. West.

here, this summary table, whatever you want to call it, is a statement that says, "Indicates EMSU 746 and Ryon SWD are anomalies, but also that oil can extend much deeper than minus 750 subsea." You see that?
A. Yes.
Q. Did I read that correctly?
A. Yeah, I see it on the document.
Q. Did Empire prepare this statement?
A. One of the -- I don't know who put this together exactly, but, you know, that piece of it would have been the interpretation at that point in time of that individual.
Q. Do you know why -- what that statement means or why it's stated that the EMSU 746 is an anomaly?
A. I don't know why that statement's in there that way, but I would rely on NuTech's interpretation now and the experts.
Q. Okay.
A. Rather than --
Q. So --
A. -- a, you know, preliminary presentation.
Q. And is Empire relying on -- is Empire adopting NuTech's log analyses that were presented to the Commission?
A. We would rely on, you know, that as a piece of data that you would put in there; right? They, you know,

refine it. I mean, during an evaluation process, you will always refine and go through; so at any point in time it will change if people are interpreting and it's an evaluation.
Q. Okay. So at this point in time is Empire -- has Empire adopted NuTech's log analysis?
MS. HARDY: Object to the form.
Q. (By Mr. Rankin) You can answer.
A. It's used as part of the evaluation process.
Q. Okay. I'll come back that to that question because I think it will relay -- relay -- relate to some other issues I want to talk through with you about.
And this log, this is for the 628, Mr. West, as part of Empire's evaluation of a potential ROZ development, as I understand this Huff-n-Puff document is, it's part of that ongoing evaluation, ongoing process, I note here that as to the EMSU 628, which is one of the three wells you identified as having tested oil in the San Andres.
Now, in this section of interval of the well, Empire puts a note here that it made only a hundred percent water. Agree?
A. That's what the note says. And an ROZ would not produce oil.
Q. Even at these oil saturations -- for example, on this lower most perf on this screen, even at these high oil

saturations, you're telling me that it would only -- it would not produce oil?
A. It depends on exactly where your perfs are and it depends on how bound that is or not; right? And that's where they see it would be in there for the tertiary recovery to recover that oil.
Q. So at this lower most perf, okay. You and I spoke earlier about how this curve, this third track on the log analysis, reflects oil saturation and water saturation. And on this particular curve where the dark blue intersects with the light blue, that's going to be an indication that that water saturation is immovable. Agree?
A. At that point, which it's completed in multiple intervals.
Q. Okay. And at this perf, with those oil saturations, only water was produced. Agree?
A. I would assume that the red blocks would be more of the intervals that's perforated, but I don't know from this document -- or from this piece which actual perfs are on this.
Q. Okay. This is Empire's document. Do these red blocks indicate perf sections?
A. I don't see the legend on here. I'd have to --
Q. And every other log analysis in this document the red intervals are identified as the perf zones. Do you

agree?
A. It looks like on there that it is. So it would be entire -- so it would be all three of those intervals, not that one little tiny perf.
Q. Okay. So this is the 577. Okay. If I go to the 628, the interval that was presented this document has three perf zones. Agree?
A. It looks like three perf intervals.
Q. And Empire's document says that these perf'd intervals made a hundred percent water. Agree?
A. Agree.
Q. And if this lower most perf had unmoveable water, wouldn't you have expected that those high oil saturations for some oil to have been produced?
A. Not necessarily. It's probably to confirm; right? So the first thing that flows out of the rock first would be water. Oil and gas would be able to go through. But water would go before oil would go. So it depends on how much it was drawn down, what the bottom hole pressure was to what would produce.
Q. Okay. Based on this analysis that Empire conducted evaluating the -- each of these wells and the zones that were tested for perfs, is Empire relying on NuTech's log analyses for identifying potential ROZ targets zones?

A. It's a piece of the evaluation. It's a tool; right? I mean, it's an interpretive tool.
Q. Is Em- -- does Empire trust NuTech's log analysis based on this comparison between these -- the well tests and the NuTech log analysis that were presented to Empire?
A. It is used as an evaluation tool. It's never an exact yes or no, and so it's part of the process. You trust it to be part of the process. And it's not a, you know...
Q. So based on -- on these log analyses, what -- you mentioned that the log analyses would give you some additional data and information that you might want or need. Based on these log analyses, what additional information has Empire determined that it wants or needs in order to further evaluate or assess a potential ROZ project within the San Andres in the EMSU?
A. As you can -- as you work to the development of the EOR, you will gather information. As you go, you'll drill wells, you'll take cores, you'll do some analysis.
Q. Okay. So Empire acquired this property in -- well, I guess it closed in May of 2021. Agree?
A. Yes.
Q. And has Empire drilled any wells -- let me back up. And at the time Empire acquired this property, part of the motivation -- or part of the intent was to evaluate a

potential ROZ development in the EMSU. Agree?
A. Agree.
Q. Okay. And since acquisition of the property in 2021, has Empire drilled any wells to take additional cores of the --
A. We have an approved drilling permit out there.
Q. I'm going to get to that. But up to that date, when you filed that application for an APD, has Empire undertaken any steps to drill any wells in the San Andres?
A. Any wells out here would be drilled in the San Andres as it's part of the injection interval. Now, we've had to stop and pause things to work to fight all this testimony and things. I mean, it delays and you can't really, you know... It's taken a lot of resources to fight the pollution.
Q. Okay. Wouldn't part of the effort to fight the pollution that you're alleging be to acquire data to show the viability of a ROZ in the San Andres?
A. There's cores there already that show that there's oil in the San Andres, so viability is there and it would be part of the development.
Q. Okay. So up to this point Empire has been relying on the existing cores to demonstrate ROZ via- -- that the San Andres has a viable ROZ for commercial production in the EMSU?

A. That's where you -- it would be part of the evaluation process; right? If you go and do the development, you gain more information and more data and you tweak and refine.
Q. Okay. And the more information and the more data that you would obtain, would be what? You mentioned cores. Additional cores; right?
A. You would do cores. You'd run more logs.
Q. Would you run more logs on existing wells?
A. It's hard. I mean, you -- you're a geologist. You open all logs much better than a case to a log. You get a lot more interpretation on a case to log. So you would have to drill, you know, a new well to get an open well in a field that's got case wells.
Q. Okay. So when you talk about Empire planning to do more -- take more logs or get more logs, acquire more logs, that would only be in new drills?
A. During the process you would probably run some stuff in the old wells, right, to have an analogy to refine your models of your case to a log and things that you would take open hole data from cores or whatever. You know, all this is a mile underneath the ground almost; right? I mean, you take your tools and you refine through the process and get better and better. You don't know all the answers before you start.

Q. Has Empire done any of that work on any existing wells since it acquired the property?
A. You just reviewed it or whatever, you know. You know, had logs for NuTech to do evaluations on, went out there. They, you know, ran logs, right, case to logs and did an evaluation. NuTech's, since then, done evaluations of more wells.
MS. HARDY: When you're at a -- sorry. When you're at a stopping point, can we break for lunch?
MR. RANKIN: Yeah. Yeah. Let me evaluate where I am. I apologize. Thank you. Okay. I think we're at a good stopping point, Dana, and we can go off the record and we'll pick up -- what do you guys -- is 45 minutes okay? Is that reasonable for you-all?
MS. HARDY: It will work for me.
William, is that enough time for you or do you need an hour?
THE WITNESS: It's fine.
MR. RANKIN: I'll make it work out. Let's do 45 minutes. We'll come back at 12:45 Mountain time.
THE WITNESS: Sounds good.
VIDEOGRAPHER: I'll read us off the record. Going off the record. The time is 12:01 p.m.
(Recess was held from 12:01 p.m. to 12:49 p.m.)
VIDEOGRAPHER: Going back on the record. The

to get it out and you will alternate it, you know, with water as needed. And we can change your 5-spot, as needed, of where you produce and where you inject into. But, you know, just starting at the bottom and working your way up.

Q. You say start at the bottom. What do you mean about that?

A. If you've got leakage going through, right, the reservoir, so then it would be caught into a zone. Start in probably the zone 5 for the fun of it. You know, it could migrate up into zone 4 and then you catch the oil in zone 4. You know, you just got to play the conformance. What goes in comes out somewhere and you've got to figure out where it comes out.

Q. Okay. So are -- when you say start at the bottom what do you -- again, what do you mean by start at the bottom?

A. Down in the San Andres. So, you know, you do different sections of it, you know, different pieces of conformance.

Q. So in the San Andres when you start your project as a -- initially, is it Empire's position that it would be best -- best results would be to start at the base of the San Andres? You would get the best results by starting at the base of San Andres?

A. You could start at the base and work your way up.

A. Evaluate in different ones. The Phase 1 that we, you know, referred to earlier is a potential one where you do Grayburg here and you do San Andres here 'cause that's your infrastructure that we know; right? And so you have your gas and things and it migrates up. You capture it in the same part. And then you would continue to expand as you get enough CO2 volume, phase back, you turn around and put that back in the ground in a CO2 project. Managing your volume of CO2, that dictates your speed.

Q. Okay. So what I understand you to say is that Empire is looking at initially starting on a phased approach. Agree?

A. Everything is kind of phases; right?

Q. Okay. As you described it, it's a phased approach. You start with a cent- -- near your centralized facilities and then build out over time as you start recovering your CO2. Does that help?

A. It's kind of like an economic model. You start with so many patterns, and then those -- as you get the breakthrough of the CO2 and then you get more patterns, and then you -- you know, as you get more breakthrough, then you get more, then it kind of self-generates.

Q. Okay. I'm going to get -- I hope to get to the economics today. If I don't, we'll just talk about it tomorrow. We may touch on it today.

I mean, you're going to have -- you're going to start in different portions of the reservoir, San Andres and Grayburg and all over the place and see how the conformance works.

Q. So when you do your full-field development plan, you're going to start your CO2 flood in different zones within the Grayburg and San Andres?

A. Yeah, you'll migrate on; right? I mean, you won't be able to hit every -- I mean, it's a -- it's a container that's tall and wide, so, you know, at the speed of which, you know, how fast you go, how fast you can go wide.

Q. So let me ask. I'm going to start over again. Okay. Because I'm not sure I'm getting the answers I'm asking for here. When -- when Empire goes forward with the development plan for CO2 recovery in the EMSU, how's it going to start from day one? What's it going to do from day one? Is it going to start with a small Phase 1 pilot program of a certain acreage and start at the base of the San Andres with injection? Or is it going to develop injection across different zones all at one time? Is it going to phase the injection into different in depths or is it going to start with injection at different intervals all at one time? What -- tell me how Empire is going to proceed with its CO2 recov- -- CO2 hydrocarbon recovery project.

Now, as far as the reservoir characterization goes, though, where Empire is in terms of conducting its reservoir characterization, we are privy to all that at this point. Is that fair?

A. Yes, you have the data.

Q. Okay. Does Empire consider NuTech's petrophysical analyses that were submitted to the Commission through Mr. -- I'm going to pronounce -- do my best to pronounce his name, Mr. Dillon's [phonetic] testimony on August 26, 2024, to be part of its San Andres reservoir characterization for a potential San Andres ROZ project?

A. We've got NuTech's analysis and then we've got also the geologist's analysis, the petrophysical analysis that they're doing also. So, you know, we get different -- it's opinions or evaluations; right?

Q. But you agree it's part -- it's part of Empire's reservoir characterization?

A. It's a piece of data that you use in the evaluation.

Q. Okay. And I kind of -- we talked around this a little bit, but I'm trying -- I need to try to make sure I understand. Is Empire adopting NuTech's petrophysical analysis that was submitted to the Commission? Is it adopting it as repre- -- as the correct representation of what the oil saturations are in the San Andres?

A. It's a piece of evaluation but, you know, we've got the geologist -- geologic guys that have that petrophysical model, so we're -- you know, you use and evaluate both of them. I mean, it's -- petrophysics is -- as to petrophysics of what, you know, number you want, you get to two different answers.
Q. My question is because you presented NuTech's analysis as part of your -- as part of the company's testimony, do you stand by it?
A. It's part of the analysis.
Q. Okay. That doesn't answer my question.
A. It's part of the evaluation. I mean, you wouldn't use one piece of data for the complete evaluation.
Q. What other data do you have besides the EMSU core 679 that gives you any data on oil saturations in the San Andres?
A. You got the core that's existing, all the data that you have. We'll have to gather more data.
Q. Okay. So other than the NuTech analysis that was presented, I'm asking you what other data do you have to support an oil saturation in the San Andres?
A. You've got the geological data that they used, their petrophysical model and data that they've used.
Q. Okay.
A. That supports it.

Q. But that's what I'm talking about. So the NuTech petrophysical data, other than that, what else does Empire point to for confirming the presence of oil? And I'll be more specific. The presence of oil, let me just say, below the EMSU 679 cored interval.
A. The hardest data that you have is going to be the core and then any petrophysical data is going to be an interpretation on electronic data.
Q. Okay. So but you're -- I've asked the question three or four different ways, but you haven't told me any other data that gives you an oil saturation other than the NuTech analysis that was presented by Empire below the cored interval for the EMSU 679.
MS. HARDY: I object to the form. I think he's answered the question.
MR. RANKIN: Okay. I don't -- I don't think he has.
Q. (By Mr. Rankin) I'm asking, Mr. West, does Empire have any other data that it can point to, other than the NuTech log analysis, for oil saturations below the cored interval of the EMSU 679?
A. The geological "petrophysic" data.
Q. Okay. That's all -- that's all you -- that's what Empire is relying on, then; right, is the petrophysical geological data that it's presented. Agree?

A. Correct. You've got the data.
Q. Okay. Now, the question I have, Mr. West, is are you aware that NuTech prepared a revised analysis provided to use at the end of October?
A. Yes.
Q. Does Empire understand that the revised study is applicable to all the wells that NuTech analyzed?
A. It's applicable to the -- I mean, it's -- to all the wells?
Q. Yeah.
A. I mean -- yeah, I mean, you've got the study of the results of it.
Q. I mean, what is Empire's understanding of what the effect of that revised analysis is?
A. You know, a revised analysis of, you know, oil saturations we originally had.
Q. And is it your understanding that those lower oil saturations are applicable across the entire EMSU in the San Andres?
A. I don't know if it's applicable all the way across it; right? I mean, you don't have data points all the way across, so you don't know fully; right? That would be on individual well logs.
Q. Okay. And with that revised analysis that NuTech provided, I don't have individual well logs. I don't have

that -- I don't have individualized well logs for how that analysis may have changed; right? They just gave us a segment of one well log, that was the EMSU 679, the core log. I mean, is it your understanding that NuTech has revised its analysis as to the other well logs that it's looked at?
A. I'll have to get back with you on that one.
Q. Okay.
A. So that revised, I don't know.
Q. Does this revise -- revision from NuTech affect any of your -- any of Empire's witnesses' testimony?
MS. HARDY: Object to foundation.
Q. (By Mr. Rankin) You can answer the question.
A. Revise -- you know, they were a little bit -- originally, the NuTech was a little bitter higher than what we have in our models and, you know, so it reduces it down and puts it -- you know, it can change the number some.
Q. Okay.
A. But, you know, biggest analy- -- you know -- go on.
Q. No, I was waiting for you to finish.
A. Yeah, no, I had it lost in my notes. I don't remember. We've covered a lot of material since then.
Q. Yeah. I'm going to go ahead and put this last sentence up that is what I'm kind of getting at here from

EXHIBIT H

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

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO	**CASE NO. 24123** **ORDER NO. R-22869-A**
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**

AMENDED NOTICE OF REVISED TESTIMONY OF EMPIRE WITNESSES
GALEN DILLEWYN AND JOE MCSHANE

Empire New Mexico LLC ("Empire") hereby provides notice that the revised direct written testimony of Galen Dillewyn was filed on December 4, 2024 (Revised Self-Affirmed Statement of Galen Dillewyn (Revised Exhibit F)), and the revised direct written testimony of Joe McShane was filed on December 5, 2024 (Revised Self-Affirmed Statement of Joseph A. McShane (Revised Exhibit G)). Empire provides this notice to identify the specific changes included in the revised testimony and to state the timing with respect to the same.

In light of direct testimony filed by Goodnight Midstream Permian LLC ("Goodnight") in this matter, Empire requested NUTECH to rerun its analysis with different m and n values and to review the EMSU-679 core report on September 13, 2024. NUTECH analyzed the EMSU-679 core report and provided a report to Empire with results on October 14, 2024, which was provided

to Goodnight that same month. On November 20, 2024, Empire asked NUTECH to apply the analysis used for the EMSU-679 to the EMSU-628, -658, -660, -673, -713, -745, and the Ryno (Snyder) SWD #1. Empire received those results on November 21, 2024 and filed Mr. Dillewyn's revised testimony on December 4, 2024. The following day, Empire filed the revised testimony of Joe McShane as it relates to the revised testimony of Mr. Dillewyn. No party has been prejudiced by the revisions because the net effect reduced Empire's estimated oil saturations in the San Andres.

Revisions to Mr. Dillewyn's Testimony (Exhibit F)

The revisions in Mr. Dillewyn's testimony reflect the analysis in the supplemental report included with Revised Exhibit F as Attachment 1 ("Supplemental Report"). Corresponding revisions were made to a related exhibit, Exhibit F-7. The Supplemental Report and revisions to Mr. Dillewyn's direct written testimony arose from Empire's request that NUTECH analyze core data and log data on the EMSU-679 well and consider variations in m and n values to match the water saturation values in the EMSU-679 core.

Revisions were made to page 5 of Exhibit F, as shown in the redlined text below:

> The two formations analyzed at Eunice Monument were the Grayburg and the San Andres. An example of the work is in **Exhibit F-6**. For EMSU-673. The Resistivity of the Water (RW) used was 0.4 ohm @ 75 degF. This was balanced in the reservoir above the Grayburg and in the evaporite sequence above that. The San Andres and Grayburg are primarily a dolomitic rock with some interspersed limestones. Both formations show evidence of hydrocarbon saturation. The work done on the 2 wells with pulsed neutron data shows that hydrocarbon sweep has occurred in areas where the waterflood is active but that the sweep has not been 100% effective with intervals of no sweep having occurred. The curves presented on each track are labeled on **Exhibit F-5** and described on pages 3 and 4. Of the 10 wells, 7 covered substantial portions of the San Andres interval and in each of the seven wells there is evidence of hydrocarbon saturation in the San Andres as shown in **Exhibit F-7**. In the Exhibit the water saturation reaches as low as ~~20~~35% indicating a hydrocarbon saturation of ~~80~~65%. The oil saturation varies from ~~80~~65% down to ~~40~~1% wherever porosity develops in the reservoir.

The San Andres formation generally is made up of three characteristics that are commonly broken into three parts. The upper portion of the reservoir is generally where the porosity develops and has been the conventional target of large fields such as Slaughter field in Cochran County, Texas and Wasson Field in Yoakum County, Texas. Below the porosity section is generally a zone of increasing water saturation that shows both moveable hydrocarbon and moveable water. Below this zone is the third zone known as the residual oil zone, or ROZ. This is an area with extremely high water saturation that some operators such as Steward Energy have been successful in producing hydrocarbon from.

The m and n values were adjusted for this updated analysis with additional discussion in Attachment 1 at the end of this document.

Revisions to Mr. McShane's Testimony (Exhibit G)

The revisions in Mr. McShane's testimony arose from the revisions to Mr. Dillewyn's testimony. Revisions were made to Paragraph 10 of Mr. McShane's testimony as reflected in the redlined text below. In addition, the exhibits identified in the revised Paragraph 10, including Exhibits G-3d through G-3j, were revised.

10. ~~The~~ EMSU 658 (Exhibit G-3d) ~~well covers approximately 400' logged 371'~~ of the San Andres formation with 182' net oil interval (>0.1 md permeability which contains oil) and has multiple packages of pay identified and estimated OIP of ~~60.9~~30.29 MMBO/640-acre section. ~~The~~ EMSU 673 (Exhibit G-3e) ~~well~~ had a Triple Combo (TCOM) OH log run in 2005 covering 362'~~approximately 400~~' of the San Andres reservoir with ~~75-100~~153' of hydrocarbons present and an estimated OIP of ~~61.1~~31.68 MMBO/sec. ~~The next well in the exhibit is~~ EMSU 713 (Exhibit G-3f) ~~which~~ had a~~n~~ TCOM OH log run in 2005 covering approximately~~200~~ 125'of the San Andres reservoir with 40' net oil pay. Estimated OIP of 8.02 MMBO/sec is calculated but it is low due to the limited section of San Andres drilled and logged. ~~From the log analysis we can see approximately 40' of hydrocarbons present and an estimated OIP of 13.6MMBO/sec. The next well,~~ EMSU 660 (Exhibit G-3g) had a TCOM OH log from 2005 that was analyzed over ~~approximately 400~~431' of the San Andres reservoir and shows ~~~170~~313' of hydrocarbons present with an estimated OIP of ~~98.1~~48.62 MMBO/sec. ~~The next well,~~ EMSU 746 (Exhibit G-3h) had a TCOM OH log run in 2005 that covers the entire unitized interval and ~~all approximately 1000~~1223' of the San Andres. The analysis shows ~~over 200~~508' of hydrocarbons in the San Andres with an OIP of ~~174.5~~62.18 MMBO/sec. ~~Moving to the next well, the~~Goodnight's Ryno SWD #1 (formerly Snyder SWD #1 shown in Exhibit G-3i), ~~one of Goodnight's SWD wells that~~ is currently disposing water into the San Andres~~,~~ which is part of Empire's unitized formation ~~that again shows presence of hydrocarbons in the log analysis~~. This well is near the down-dip ~~most~~ portion of EMSU and has approximately ~~150~~220' of net oil zone ~~pay~~ identified with an

estimated OIP of ~~91.5~~515.62 MMBO/sec. ~~The final well in the exhibit is the~~ EMSU 628 (Exhibit G-3j) which again had a modern TCOM OH log from 2005 that was analyzed over ~~greater than~~ ~~500~~590' of the San Andres reservoir and has 266' net oil interval. ~~The Simandoux calculation indicates greater than 250' of hydrocarbons present within the San Andres with a~~An ~~estimated~~ OIP of ~~89.4~~40.79 MMBO/sec is calculated. These log results show there is significant ROZ in the San Andres.

A minor correction was also made in the first line of Paragraph 15, as reflected in the redlined text below:

15. Based on the above analysis and data, it~~i~~'s indisputable that the San Andres formation within the EMSU contains a Residual Oil Zone that can be developed with enhanced oil recovery methodologies such as CO2 injection. As a result, Goodnight's proposal to inject produced water into the San Andres formation would result in the waste of hydrocarbons and thereby violate Empire's correlative rights.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served on the following by electronic mail on January 30, 2025.

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EXHIBIT I

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

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS LEA COUNTY, NEW MEXICO — **CASE NOS. 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. 24018-24027**

GOODNIGHT MIDSTREAM'S NOTICE OF REVISED TESTIMONY: WILLIAM KNIGHTS

Goodnight Midstream Permian, LLC ("Goodnight Midstream"), through undersigned counsel, respectfully provides notice pursuant to the agreement of the parties, that it is filing a revised self-affirmed statement for William J. Knights.

While preparing his rebuttal testimony, Mr. Knights determined that his initial self-affirmed statement filed in these matters on August 26, 2024, included an inadvertent calculation omission rendering his original oil in place ("OOIP") estimates incorrect. Specifically, Mr. Knights determined that his OOIP calculations were based on the incorrect assumption that the

petrophysical data prepared by Dr. James Davidson were on one-foot increments when, in fact, the data were in half-foot increments. The estimates in Mr. Knights' self-affirmed statement should have been half the values of what he originally provided. This calculation error has been corrected in the revised self-affirmed statement.

In addition, Mr. Knights' used a "practical threshold" of 30% oil saturation ("S_o") in preparing his initial analysis in his original self-affirmed statement based on his determination that that cutoff "more closely represents an average to better-than-average reservoir quality of existing CO_2 projects." *See* Goodnight Exhibit E, Testimony of William J. Knights, filed August 26, 2024. However, Mr. Knights has determined that a cutoff of S_o of greater than 20% "more closely aligns with a minimal saturation . . . to define an ROZ [residual oil zone]," according to Empire's expert witnesses Dr. Melzer and Dr. Trentham. Mr. Knights decided his analysis should use a 20% cutoff following his deposition on December 12, 2024, when Empire counsel queried him on the basis for his 30% cutoff and after some consideration. Accordingly, Mr. Knights' revised testimony includes a revised calculation for OOIP using the correct petrophysical data increments and summing hydrocarbon pore volumes values using a 20% S_o cutoff rather than a 30% S_o cutoff.

No other changes or updates were made to Mr. Knights' original analysis or testimony. A redline version of Mr. Knights' revised self-affirmed statement showing all the revisions is attached as **Exhibit A**. A clean version of his revised testimony has been filed with the Commission and served on all parties as Goodnight *Revised* Exhibit E.

DATED: January 21, 2025

Respectfully submitted,

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I hereby certify that on January 21, 2025, I served a copy of the foregoing document to the following counsel of record via Electronic Mail to:

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EXHIBIT A

NETHERLAND, SEWELL & ASSOCIATES, INC.

INTRODUCTION

Netherland, Sewell & Associates, Inc. (NSAI) has been retained by Goodnight Midstream Permian, LLC (Goodnight) to (1) conduct a geologic study of the lands in and around the Eunice Monument South Unit (EMSU) and in particular the San Andres Formation; (2) evaluate and confirm the presence of geologic barriers isolating the San Andres Formation from the overlying Grayburg Formation; and (3) prepare an oil-in-place (OIP) assessment for the San Andres Aquifer within the EMSU.

SUMMARY OF QUALIFICATIONS

My name is William J. Knights. I work for NSAI as a Vice President and Senior Technical Advisor. I have been with NSAI since 1991. I earned my Bachelor and Master of Science degrees from Texas Christian University in 1981 and 1984, respectively. I am a licensed Professional Geoscientist in the State of Texas since 2003, license number 1532. I am also an AAPG Certified Petroleum Geologist since 1994, license number 5188, and have over 40 years of experience in the oil and gas industry. My Curriculum Vitae is attached herein as Appendix A.

Before joining NSAI, I worked as an independent petroleum geologist, evaluating domestic and international exploration and development projects. Since 2002, I have had extensive experience in all of the productive and emerging unconventional shale plays in the United States and Canada, as well as in many prospective unconventional plays internationally. I have been involved in the estimation and classification of hydrocarbon volumes from prospective and contingent resources through proved, probable, and possible reserves in both unconventional and conventional reservoirs. I have extensive experience preparing and reviewing oil and gas reserves reports and performing due diligence reviews for financial transactions in the oil and gas industry. My responsibilities include structural/stratigraphic analysis using geophysical, geological, and petrophysical data interfaced with reservoir modeling to determine reservoir quality and in-place hydrocarbon volumes. With respect to tertiary recovery projects, I have worked the Altura property divestiture (Occidental Petroleum Corporation acquisition of BP and Shell Permian Basin assets), Yates Field (specifically, the Grayburg and San Andres Formations oil field), and Cantarell Field in southern offshore Mexico (the largest nitrogen injection project in the world). I have not previously testified before the New Mexico Oil Conservation Commission as an expert witness in petroleum geology.

SUMMARY

The San Andres Formation is a laterally extensive, high-permeability aquifer. Any injected water can be displaced over large lateral areas, and, since the San Andres Formation is in a migration pathway, oil saturations (S_o), while not unexpected, are not concentrated enough to be considered a target for recovery. Four separate depth intervals have been evaluated based on their evidence of movable fluids, yet no evidence of significant movable hydrocarbons is demonstrated below -500 feet (ft) true vertical depth subsea (TVDSS). Water being injected into the deeper San Andres Aquifer is vertically separated from the producing Grayburg Reservoir and from any potential residual oil zones (ROZs) by numerous vertical permeability barriers that extend across the EMSU. When evaluating potential OIP targets for tertiary recovery, the producing Grayburg Reservoir is the only interval above -500 ft TVDSS that has sufficient OIP concentration to warrant an economic evaluation to determine viability. Reservoirs below -500 ft TVDSS in the EMSU have insufficient OIP concentration to warrant economic evaluation.

NETHERLAND, SEWELL & ASSOCIATES, INC.

FIELD OVERVIEW

The EMSU is a secondary recovery project in the Permian Grayburg Formation reservoir. The Grayburg Formation is part of the large Permian Grayburg and San Andres Formation petroleum system that extends across the Delaware Basin and the Central Basin Platform (CBP) as shown in Figure 1. The Grayburg and San Andres Formations on the CBP are created by the migration of oil from the deeper Delaware Basin source rocks and into updip stratigraphic and structural traps as shown in Figure 2. Because of its thickness and lateral extent, the San Andres Formation is the more prolific of the two. The San Andres fields are located on the eastern edge of the CBP, while the Grayburg fields are more prevalent on the flanks of both the eastern and western edges of the CBP. These are depletion drive reservoirs with weak water drive, requiring additional pressure support from water injection to increase recovery. In some fields, additional recovery can be achieved by injecting carbon dioxide (CO_2) as an additional drive mechanism to improve residual oil mobility. Economic recovery from secondary and tertiary methods typically occurs in rocks with very little variation in permeability and porosity. This allows a large portion of the oil to be contacted by the injectant. Poor secondary and tertiary recoveries would occur in formations with significant variations in permeability and porosity. Oil concentration in the interval targeted for secondary and tertiary recovery methods is a key component for economic viability. In other words, the higher the oil concentration, the more likely it is to achieve economic recovery. The concentration of oil in a formation is calculated using hydrocarbon pore volume (HCPV) estimates from a combination of both S_o and porosity. Enhanced secondary and tertiary recovery methods require sources of water or gas for injection and a formation suitable for the disposal of any excess nonhydrocarbons produced. EMSU is a complete secondary recovery, economic hydrocarbon system in a concentrated oil reservoir with significant volume of primary oil recovery. The high-permeability and nonhydrocarbon aquifer in the San Andres Formation provides a source for injection water and can be used to dispose of excess fluids.

EMSU FIELD HISTORY

Eunice Field was discovered in March 1929. The field was initially slow to develop because of a lack of infrastructure, but by January 1, 1939, 474 wells had been completed across the field's 18,960 acres at approximately 40-acre spacing. Recovery in the field continued until a waterflood program was initiated in 1986 by Chevron Corporation (Chevron). Much of the early reservoir data reviewed in this report came from the 1983 Technical Committee Report on the proposed EMSU secondary recovery project.

The EMSU in Eunice Field is currently developed across 14,190 acres. The drive mechanism is characterized by a rapid decline in reservoir pressure without a rise in water production, leading to the conclusion that it is a solution gas drive reservoir. Early water encroachment from the south and east areas of the field supplied only a minor amount of aquifer pressure support. In the 1983 study, it was found that the primary oil production through October of 1982 amounted to 120 millions of barrels of oil (MMBO), the estimated ultimate recovery was 134 MMBO, the water-to-oil production ratio was four-to-one, the oil cut was 20 percent, and an original oil-in-place (OOIP) was estimated at 671 MMBO, based on an assumed 20 percent recovery factor. Chevron became the primary operator in February 1985. Initial water injection began in 1986 at a rate of about 85,000 barrels (BBL) of water per day and is still continuing as a waterflood project as of July 2024.

Opinions discussed herein are based on my review of electric logs, sample logs, core descriptions, core analysis, completion reports, and production data associated with the EMSU and in the surrounding area, as shown in Figure 3. NSAI collected data from public sources for 461 wells in the immediate EMSU area along with additional nearby wells, to create TVDSS cross sections of the well bore paths and perforated intervals. Core data for the EMSU 679 well were only available below the current producing interval. Additional representative core samples describing the lithology, porosity, and permeability in the EMSU area were presented in the Reservoir Characteristics of the Eunice Oil Field report by Anderson, Hinson, and Schroeder, which was prepared for the U.S Bureau of Mines. There are seven wells with mudlog data that we also reviewed that relate to lithology and fluid

saturation depths in the EMSU area. These are the EMSU 577, 628, 658, 660, 673, 713, and 746 wells. NSAI performed petrophysical analysis for eight wells: EMSU 628, 658, 660, 673, 679, 713, 746, and Ryno (previously Snyder). We also reviewed two area wells with spectral gamma ray logs: SEMU BTD 123 and Central Drinkard Unit 441. The EMSU 679 is the only one of these wells to have both core and log data below the producing oil-water contact (OWC) of -350 ft TVDSS, so it was used to calibrate the NSAI petrophysical model. We used these data for an analysis of porosity, permeability, fluid saturations, and OIP estimates in the EMSU.

We examined ten historical water supply wells that have produced water from reservoirs below the producing Grayburg Reservoir in the San Andres Formation, with six of these wells within the EMSU. These are the EMSU 457, 458, 459, 460, 461, and 462 wells, operated by Chevron. The other four water supply wells are located to the south of the EMSU in the Arrowhead Grayburg Units: the AGU 600 and 601, the Janda 060, and the State 060. The performance of the San Andres Formation water supply wells indicates both the size and permeability of the formation.

There are 18 water disposal wells in the area injecting into the San Andres Aquifer below the producing Grayburg Formation, of which 8 are on EMSU acreage. The Dawson, Sosa, Snyder, and Banks wells are operated by Goodnight; the Rice N11 and EME 21 (also known as the Rice 21) wells are operated by Permian Line Service, LLC; the Owl P15 well is operated by Pilot Water Solutions; and the Empire 1 well is operated by Empire Petroleum Corporation (Empire). Outside the EMSU, Goodnight operates the Piper, Ted Williams, Nolan Ryan, Yaz, Scully, and Pedro wells; Rice Operating Company operates the Rice N7, EME 33 (also known as the Rice 33), and the State E Tract 27 (also known as Rice E27) wells; and Parker Energy Support operates the Parker well.

A list of materials relied upon for this analysis is included in Appendix B. Other resources used in the analysis for this report are listed in Appendix C, and a list of abbreviations is included in Appendix D.

GEOLOGIC CONCLUSIONS

I. San Andres Regional Geologic Setting - Regional Aquifer

The San Andres Formation is a laterally extensive, high-permeability aquifer. Any injected water can be displaced over large lateral areas, and, since the Sand Andres Formation is in a migration pathway, S_o, while not unexpected, are not concentrated enough to be considered a target for recovery.

The San Andres Formation can be up to 1,600 ft thick and has depositional trends based on historical bathymetry. These trends include a deepwater depositional environment generating low-permeability carbonates, a nearshore ramp environment creating high-porosity carbonates, and a shallow tidal depositional environment producing low-porosity carbonates. Depositional environments have changed over time creating distinct stratigraphic pay intervals that can be correlated from the Guadalupe Mountains in the west to the CBP in the east. There are five regional pay units that are productive along the oil migration pathways: Holt, McKnight, Intermediate, Judkins, and Lovington (Trentham, 2012). Most of the oil that migrated through the San Andres Formation in the New Mexico portion of the CBP continued to move updip and into the eastern flank of the CBP in Texas. The five regional pay units were sourced by oil generated in the deeper Delaware Basin to the west.

Oil entered the San Andres Aquifer and migrated through a complicated porosity system to create several isolated reservoirs with varying compositions of salinity and hydrocarbon saturation. These reservoirs include both mobile oil in productive fields across the CBP and residual oil scattered along the migration pathways. A map of the migration in the EMSU is shown in Figure 4. Subsequent structural movement has caused some secondary flushing of previously trapped oil. This leaves behind more continuous ROZs associated with conventional traps that are predominantly on the east side of the CBP. There are 15 major updip San Andres fields that have produced over 1.9 billion BBL of oil, as of March 2024, from the San Andres Formation reservoirs, as shown in Figure 5. The

EMSU is along the downdip migration pathways and is not a part of a major structural or stratigraphic trap in the San Andres Formation. The major San Andres Formation reservoirs are distributed across the updip portions of the CBP. These reservoirs are the result of the regional extent of the aquifer and migration pathways and indicate that any withdrawal or injection volumes into these reservoirs could be displaced across large areas.

The San Andres Formation in the EMSU has been used as a source for water injection operations and is currently being used as a water disposal interval by numerous companies including Empire. Chevron developed one of these isolated and permeable San Andres Formation reservoirs beneath the EMSU as a source for injection water. The six Chevron-operated water supply wells have produced over 340 millions of barrels (MMBBL) of water from 1987 to the present.

The significant withdrawal of water volumes from the EMSU water supply wells over the 30 years of production history has not diminished their ability to produce at high rates. Although 340 MMBBL of water was extracted from this aquifer, no oil was reported to have been produced from these wells. These large volumes of water are an indication of both the extent of the connected reservoir and the good permeability throughout the reservoir, establishing this as a large aquifer rather than an oil reservoir. Our well log analysis and review of mud log data do indicate some scattered areas of elevated S_o in these water production intervals, but not at S_o levels high enough or laterally continuous enough to be a target for oil production.

More recently, seven water disposal wells that Goodnight drilled to the south of the Chevron water supply wells found a consistent zone of lost circulation below the producing Grayburg Reservoir. The lost circulation zones encountered by Goodnight while drilling its water disposal wells are in the same stratigraphic interval as the Chevron water supply wells that extracted over 340 MMBBL of water. These lost circulation zones are typically caused by extremely high permeability and/or lower pressure relative to the surrounding strata. This evidence suggests that the current Goodnight water injection intervals in the aquifer are most likely injecting into the same extensive reservoir from which the water supply wells produced. The similar stratigraphic interval of the lost circulation zones across all seven Goodnight water injection wells also indicates that this is a laterally extensive, high-permeability zone. The large volumes of water extracted from the EMSU, and the indications of laterally extensive, high-permeability zones from the recent San Andres injection wells, suggest that any injected water will be displaced over a large lateral area.

II. Evidence of Movable Hydrocarbons

Four separate depth intervals have been evaluated based on their evidence of movable fluids, yet no evidence of movable hydrocarbons is demonstrated below -500 ft TVDSS.

NSAI's independent petrophysical analysis does not indicate any significant S_o below -661 ft TVDSS, which corroborates the low S_o observations in core data and lack of any oil recovery from the water supply wells. In the EMSU, the original gas-oil contact (GOC) in the Grayburg Formation reservoir is defined at -100 ft TVDSS, and the OWC is estimated between -325 to -350 ft TVDSS, as defined in the unitization document. We have defined -350 ft TVDSS as the producing oil-water contact (POWC). We reviewed the three deepest wells with perforations in the EMSU below -500 ft TVDSS: the EMSU 577, 658, and 660. The EMSU 577 well tested the interval from -457 to -588 ft TVDSS, in which 220 BBL of water and 1 BBL of oil were swabbed on February 22, 2006, with an oil cut of 0.5 percent. Later, it tested with an oil cut of 6.6 percent with 45 BBL of oil, 636 BBL of water, and 63 thousands of cubic feet of gas produced with an electrical submersible pump (ESP) on February 26, 2006. Eighteen days later, on March 14, 2006, a cast iron bridge plug was set above these perforations at -422 ft TVDSS. The EMSU 577 well is the deepest indication of any movable oil in the EMSU. The next two intervals perforated in the EMSU 577 well were above the POWC, and these intervals produced both oil and water. The EMSU 658 well tested the interval from -395 to -576 ft TVDSS and recovered 667 BBL of salt water with no indications of oil on February 9, 2006. This interval was then tested using an ESP and produced 1,856 BBL of water and 2 BBL of oil on March 10, 2006, resulting in an oil cut of 0.1 percent. The EMSU 658 well was then perforated above the POWC and tested

oil and water on June 4, 2006. From December 2005 to January 2006, the EMSU 660 well tested the interval from -548 to -661 ft TVDSS. The well was acidized, then pump tested 4,056 BBL of water and 7 BBL of oil with an oil cut of 0.2 percent. A cast iron bridge plug was set at -422 ft TVDSS on March 3, 2006, then the well was perforated above the POWC from -206 to -334 ft TVDSS and tested oil and water on March 10, 2006. The average oil cut for these three deep tests was 0.8 percent, which is significantly lower than the 20 percent oil cut obtained in the period from 1980 to 1981, after 40 years of primary production and prior to waterflood. Oil cut and water cut for the deep well tests and the pre-waterflood EMSU are summarized in Figure 6. Data for key wells and their completion intervals are shown in Figure 7.

The six water supply wells within the EMSU have produced over 340 MMBBL of water from below the producing Grayburg Formation reservoir with no reported oil production. The upper perforations in these wells are at -500 ft TVDSS in the EMSU 458 well and they have no indications of produced oil. This establishes an upper limit of the aquifer at -500 ft TVDSS at this location.

Our analysis of core data suggests that the deepest continuous S_o above 20 percent is in the EMSU 679 well at -650 ft TVDSS. The NSAI log analysis in the EMSU 679 well has consistent S_o greater than 20 percent down to -660 ft TVDSS and scattered S_o as deep as -704 ft TVDSS. These data could indicate a possible base of a ROZ at this well location. The EMSU 679 well was completed from -256 to -500 ft TVDSS and produced oil and water. Additional log analysis in the EMSU 713 and EMSU 746 wells indicated continuous S_o greater than 20 percent down to -450 and -524 ft TVDSS, respectively. Additionally, the EMSU 713 and EMSU 746 wells indicated scattered S_o greater than 20 percent at -486 ft TVDSS and -672 ft TVDSS, respectively. An S_o comparison for the EMSU 679 core analysis to log analysis for the EMSU 679, EMSU 713, and EMSU 746 wells are shown in Figure 8. These S_o intervals indicate an uneven base of possible ROZ with a variability in depth for a minimal ROZ depth target between -450 and -704 ft TVDSS. Figure 9 shows the interpreted depth of deepest potential ROZ, based on a continuous S_o greater than 20 percent in the EMSU. Therefore, based on our analysis, any targeted oil recovery above -450 ft TVDSS would have the best chance to extend across a larger area, but S_o below -450 ft TVDSS would be restricted to the local area around the EMSU 679 and 746 wells to a maximum depth of -660 ft TVDSS.

Our review of available mud log data had indicated S_o and/or oil staining in intervals below -661 ft TVDSS down to as deep as -1,036 ft TVDSS. The seven wells with mud logs we reviewed had various oil staining and fluorescence. These shows of oil are not indications of any likely economic oil recovery targets based on the POWC at -350 ft TVDSS, a highest test of water without any oil at -500 ft TVDSS, and the lowest indication of scattered S_o above 20 percent at -704 ft TVDSS based on log and core data. The lack of data supporting significant movable oil below the POWC makes these depth intervals questionable for any significant oil recoveries. The highest upper perforations in the Goodnight injection wells are at -720 ft TVDSS, which is below both the estimated POWC, the highest water only test, and the lowest indication of oil. We have found no data to support that the current disposal intervals in the EMSU, or any interval below the highest water only test at -500 ft TVDSS, as being a reasonable target for economic oil recovery.

III. Separation of Reservoir from Aquifer - Permeability Barriers

Water being injected in the deeper San Andres Formation is vertically separated from the producing Grayburg Reservoir and any potential ROZ by numerous vertical permeability barriers.

The EMSU is located along the northwestern edge of the CBP, as shown in Figure 1. The unit is composed of the producing Grayburg Reservoir and the underlying San Andres Aquifer. These formations were deposited in typical marine and restricted-marine environments, with most of the EMSU deposition occurring in a predominantly shallow-water, carbonate ramp environment. These carbonate deposits are controlled by water depths that change over time with short-term tidal action and longer-term eustatic sea level changes. These changes cause the various carbonate rock types to change positions both vertically and laterally. In general, the shallower the water, the more the carbonate rock types will change over shorter distances. The best reservoirs are deposited in shallow, higher-

energy environments (e.g., grainstones), which transition to lower-energy environments. Lower-quality carbonate reservoirs deposited in slightly deeper water (e.g., packstones and wackestones) are generally thicker and more laterally extensive. Porosity is highest in the grainstones and packstones, with mud-rich wackestones forming low-permeability barriers. The higher gamma ray response in the underlying San Andres Formation, caused by the retention of uranium, indicates that these carbonates were deposited in slightly deeper waters relative to the producing Grayburg Reservoir and are more likely to be low-permeability barriers. Early diagenesis, caused by periodic variation in sea level, has further complicated reservoir distribution by allowing for dissolution, dolomitization, and the deposition of pore-filling secondary calcite, dolomite, and anhydrite in the producing Grayburg Reservoir.

The initial deposition and subsequent diagenetic activity created the stratigraphic variability and compartmentalization that define the eastern trapping mechanism in the EMSU producing Grayburg Reservoir. A northwest-to-southeast-trending anticline creates an oil trap on the southern and western portions of the field. A representative set of 12 core plugs in the EMSU Grayburg Formation was described and included a variety of lithologies, including porous oolitic dolomite, fine-grained dolomitic sandstone, dolomites with local dark streaks, and oolitic dolomites embedded in sandy dolomite (Anderson, 1939). The significant amount of fine-grained sand, oolites, and dolomite all indicate a very shallow-water, nearshore environment in the Grayburg Formation reservoir. It was noted by Anderson that these lithologies cut across structures, making correlations using lithology or log character difficult. Oil production in the EMSU is restricted to higher-permeability carbonates above the POWC. These complex carbonate environments make it difficult to estimate fluid saturations and permeabilities using a simple petrophysical model with standard values and to explain why actual oil production is a key component in any analysis of future potential.

In addition to petrophysical models, various publications have presented evidence of permeability barriers throughout the Grayburg Formation as an indication of the type of barriers that exist within and below the producing Grayburg Reservoir. Early initial potential (IP) tests showed variable gas-oil ratios at similar subsea depths, which indicates vertically isolated completions within the producing Grayburg Reservoir. Based on lithology and performance, three potential isolated reservoirs, called Zone A, Zone B, and Zone C, were interpreted. Cross sections showing lithologies, perforations, shows, IP test results, and casing seat points across the EMSU are shown in Figures 10 and 11. The highlighted permeability barriers (Anderson, 1939) were interpreted early in the analysis of the field and range from 20 to 40 ft thick and extend laterally across the field.

A 1998 Society of Petroleum Engineers (SPE) paper (Love, McCarty, Miller, and Semmelbeck, 1998) was published and attempted to diagnose the poor performance in the EMSU. This paper identified the main issue as poor vertical conformance primarily due to extensive horizontal permeability streaks, indicating that low-permeability streaks confined movement of fluids along horizontal layers. This confined movement caused a good portion of the oil in lower-permeability rock to be bypassed with water cycling mainly through the high-permeability layers. As shown in Figure 12, the complex stratigraphy and horizontal layering are exemplified by a stratigraphic cross section showing up to 82 separate depositional cycles, simplified into seven practical zones for the EMSU Grayburg Formation (Lindsay, 2014). The 1998 SPE paper described the EMSU as having six zones, similar to Lindsay's description, and described Zone 4 as a clastic-rich (sandy/silty) rock that forms a pressure barrier. "It is vertically impermeable, can have good porosity zones, and the upper surface of this zone is described as a karsted surface" (Love, et al., 1998).

Based on our review of spectral gamma ray logs, there is an interval of increasing gamma ray at the base of the Grayburg Formation correlated across the EMSU, as shown in Figure 13. This interval correlates across the EMSU and could act as a permeability barrier between the overlying reservoir and the underlying aquifer. NSAI petrophysical analysis of permeability in three Goodnight injection wells on the south end of the EMSU shows a significant number of vertical permeability barriers in the same correlative interval at the base of the Grayburg section. Additional permeability barriers are present throughout the interval as shown on Figure 14. The dark blue line on the logs identifies the depth of lost circulation while drilling. These indicate a significant change in the

reservoir characteristics from the overlying strata with both higher permeability and lower pressure at that depth. The red bar in the center of the wells in Figure 14 represents the perforated interval where the current water injection occurs. The key, continuous, thick permeability barrier above the Goodnight San Andres water injection intervals and above the lost circulation zones is also shown. Multiple vertical permeability barriers can be seen throughout the Grayburg Formation that clearly show separation between the water-injection and oil-producing intervals.

The permeability barriers in the 1939 Anderson analysis, the spectral gamma ray cross section, and the loss circulation intervals in the NSAI petrophysical analysis all indicate that the interval between the producing Grayburg Reservoir and the San Andres Aquifer is a consistent permeability barrier across the EMSU area.

IV. Concentration of Hydrocarbons - Quality of Potential

When evaluating potential OIP targets for tertiary recovery, the producing Grayburg Reservoir is the only interval above -500 ft TVDSS that has sufficient OIP concentration to warrant an economic evaluation to determine viability. Reservoirs below -500 ft TVDSS in the EMSU have insufficient OIP concentration to warrant economic evaluation.

After reviewing data across the area, NSAI evaluated four potential future oil recovery targets using an HCPV model. The four intervals evaluated include the currently developed EMSU producing Grayburg Reservoir extending from the GOC down to POWC, the potential ROZ extending below the POWC to the highest water only tested based on the water supply wells, the transition zone spanning from the base of potential ROZ to -700 ft TVDSS used to approximate the lowest indication of S_o from log analysis, and below the transition zone is designated as an aquifer. The saturation profiles reviewed in the EMSU did not conform to the continuous gradational ROZ models proposed in various articles by Trentham and Meltzer. Instead, I have defined four intervals to evaluate hydrocarbon potential with slightly different nomenclature. These intervals were evaluated based on indicators of reservoir quality such as gross OIP, the size of the target, and oil concentration. The EMSU producing Grayburg Reservoir is a reasonable target for tertiary recovery. The potential ROZ in the Grayburg Formation has no indications of significant movable hydrocarbons but does have a reasonable OIP concentration that could possibly be targeted for tertiary recovery. The transition interval below that zone has significantly less OIP distributed across a much larger rock volume and would not make a reasonable target for oil recovery. The deeper aquifer that serves as Goodnight's disposal interval has no potential as an oil recovery target since there is no significant indication of OIP.

A. Summary of OOIP Distribution Above ~~30~~20 Percent Oil Saturation

Economic viability is dependent on a number of factors, especially the defining of a continuous concentration of S_o. The higher the concentration of S_o, the more likely a development is to be economic. Since any secondary or tertiary recovery project has to develop the entire available gross rock volume, a large OIP spread across a thick interval is significantly less attractive from an economic perspective. The ability to identify areas of potentially recoverable oil is determined by calculating porosity and S_o, with higher porosity and S_o indicating that the hydrocarbons are more concentrated and movable. We used HCPV estimates to determine OIP per unit volume, which is an indicator of reservoir quality that is directly related to potential recovery factors.

To estimate the HCPV within the EMSU, we used the NSAI petrophysical model results to analyze the potential quantity of the OIP in each of the four potential future oil recovery intervals. While Meltzer has defined ROZ S_o to be as low as 20 percent, typically, mean S_o ranges from 27 to 39 percent in carbonate reservoirs at the start of CO_2 projects (Olea, 2017; Verma, 2017). For the purposes of our initial analysis, we used the more practical threshold of 30 percent S_o, which more closely represents an average to better-than-average reservoir quality of existing CO_2 projects. The 30 percent OOIP was created by summing the hydrocarbon pore volume values, but the calculations did not adjust for petrophysical data presented in ½-foot increments. Therefore, the correct estimates should have been half of the values in the previous report. For our updated analysis, we used a cutoff of S_o greater than 20

percent, which aligns more closely with a minimal saturation used by Meltzer to define an ROZ. The NSAI model calculated HCPV across the entire stratigraphic section and subdivided it into three reservoir quality groups. Tier 1 was based on standard industry water saturation cut-offs of 60 percent or greater than 40 percent S_o. Tier 1 reservoirs represent the highest concentration of oil that can be targeted for conventional primary recovery and an optimum target for secondary or tertiary recovery. Tier 2 reservoirs have between 40 and 30 percent S_o. These are generally not targets for primary recovery and in certain circumstances have been targeted for tertiary recovery by use of CO_2, steam, or nitrogen injection. Tier 3 reservoirs are between 30 and 20 percent S_o. Intervals with scattered S_o above 20 percent are defined as aquifers. Intervals with less than 20 percent S_o and are best described as "oil-stained." These reservoirs are not a reasonable target for oil recovery by primary or tertiary means and are well below the threshold for consideration as an ROZ.

B. Summary of the OIP and OIP Concentration Analysis

On average, the producing Grayburg Reservoir has a significant amount of OIP, with ~~31.7~~22.3 MMBO per section across a 250-ft gross interval or a concentration of ~~198~~139 BBL of oil per acre-foot (BO/ac-ft). Extrapolating this OIP across the 14,190 developed acres in the EMSU yields ~~702~~494 MMBBL of OIP. Figure 15 shows the distribution of S_o and OIP across the various depth intervals in the EMSU. In the 1983 Technical Committee Report, pre-waterflood primary recovery was estimated to be 134 MMBO, or about ~~19~~27 percent of OIP, and secondary recovery was estimated between 24 and 66 MMBO over the next 30 years. The current secondary oil recovery is based on EMSU cumulative oil. As of March 2024, the EMSU has produced 147 MMBO, or about ~~21~~30 percent of OIP. This is approximately 13 MMBO, or ~~2~~about 3 percent of OIP, more than the initial estimates of primary recovery. This low recovery factor for the waterflood can be explained by the highly variable depositional environment that can produce relatively thin beds with highly variable permeability and very limited areal extent. These reservoir characteristics would also indicate that the current EMSU Grayburg Formation reservoir would be a poor tertiary recovery candidate.

The potential Grayburg ROZ between -350 and -500 ft TVDSS has a reasonable amount of OIP. On average, this zone has ~~11.3~~9.7 MMBO per section across a 150-ft gross interval or a concentration of ~~118~~101 BO/ac-ft. Extrapolating this OIP across the 14,190 developed acres in the EMSU yields ~~252~~215 MMBBL of OIP, which is less than 50 percent of the estimated OIP in the EMSU producing Grayburg Reservoir. This potential Grayburg ROZ has lower OIP, which would make this a less desirable target for any recovery relative to the developed EMSU Grayburg Reservoir. We have found no indications of oil recovery or movable hydrocarbons across this interval that could indicate that this may be a ROZ target for tertiary recovery.

The transition zone between -500 and -700 ft TVDSS has a small amount of OIP. On average, this zone has ~~5.~~6.4 MMBO per section across a 200-ft gross interval with a concentration of ~~44~~49 BO/ac-ft. Extrapolating this OIP across the 14,190 developed acres in the EMSU yields ~~125~~141 MMBBL of OIP, which is less than ~~25~~30 percent of the developed OIP in the EMSU. The low concentration of OIP in this interval would not be a reasonable target for any type of recovery.

The aquifer below -700 ft TVDSS has a small amount of OIP. On average, the aquifer has ~~1~~3.2 MMBO per section across a 1,000-ft gross interval with a concentration of ~~2~~5 BO/ac-ft. Extrapolating this OOIP across the 14,190 developed acres in the EMSU yields ~~26~~71 MMBBL of OIP, which is less than ~~5~~15 percent of the developed OIP in the EMSU. The low concentration of OIP in the San Andres Aquifer interval would not be a reasonable target for any type of recovery.

CONCLUSION

There is a lack of significant oil concentration below -500 ft TVDSS, making it an unreasonable target for enhanced oil recovery within either the Grayburg or San Andres Formations below that depth. The producing Grayburg

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Reservoir is isolated and separated from the underlying San Andres Aquifer by multiple, laterally extensive permeability barriers. The San Andres Aquifer is a regionally extensive reservoir that has data supporting pressure separation from the overlying producing Grayburg Reservoir in the EMSU. The San Andres Aquifer has a significant areal extent, with sufficient high-permeability intervals to handle a large volume of disposed water without impacting the overlying EMSU. The poor performance of the secondary recovery project within the producing Grayburg Reservoir is a strong indication of the magnitude of recovery that may occur from any tertiary project in that interval. Significant additional evaluation would be required to determine if a tertiary recovery project could be economically viable in the oil-producing EMSU.

DISCLAIMER

This report summarizes my analysis and opinions to date. I reserve the right to amend or supplement this report, if necessary, should additional information become available to me, and to rebut any related opinions reached by experts related to these cases. All the opinions and conclusions herein are rendered to a reasonable degree of professional certainty.

I affirm under penalty of perjury under the laws of the State of New Mexico that the foregoing statements are true and correct. I understand that this self-affirmed statement will be used as written testimony in this case. This statement is made on the date next to my signature below.

Sincerely,

William J. Knights, P.G. 1532
Vice President

Date Signed: ~~August 26, 2024~~January 16, 2025

WJK:LMS