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

APPLICATION OF EMPIRE NEW MEXICO, LLC TO REVOKE THE INJECTION AUTHORITY GRANTED UNDER ORDER NO. R-22026 FOR THE ANDRE DAWSON SWD #001 WELL OPERATED BY GOODNIGHT MIDSTREAM PERMIAN, LLC, LEA COUNTY, NEW MEXICO	**CASE NO. 24018**
APPLICATION OF EMPIRE NEW MEXICO, LLC TO REVOKE THE INJECTION AUTHORITY GRANTED UNDER ORDER NO. R-22027 FOR THE ERNIE BANKS SWD NO. 1 WELL OPERATED BY GOODNIGHT MIDSTREAM PERMIAN, LLC, LEA COUNTY, NEW MEXICO	**CASE NO. 24019**
APPLICATION OF EMPIRE NEW MEXICO, LLC TO REVOKE THE INJECTION AUTHORITY GRANTED BY ADMINISTRATIVE ORDER SWD-2307 FOR THE RYNO SWD #001 F/K/A SNYDER SWD WELL NO. 1 OPERATED BY GOODNIGHT MIDSTREAM PERMIAN, LLC, LEA COUNTY, NEW MEXICO	**CASE NO. 24020**
APPLICATION OF EMPIRE NEW MEXICO, LLC TO REVOKE THE INJECTION AUTHORITY GRANTED UNDER ORDER NO. R-21190 FOR THE SOSA SA 12 NO. 2 WELL OPERATED BY GOODNIGHT MIDSTREAM PERMIAN, LLC, LEA COUNTY, NEW MEXICO	**CASE NO. 24025**

EMPIRE NEW MEXICO, LLC'S RESPONSE IN OPPOSITION TO GOODNIGHT MIDSTREAM PERMIAN'S CONSOLIDATED MOTION FOR PARTIAL SUMMARY JUDGMENT

In accordance with the Prehearing Order, Empire New Mexico, LLC ("Empire") submits the following response in opposition to *Goodnight Midstream Permian's Consolidated Motion for Partial Summary Judgment* ("Motion"). For the reasons discussed below, the Motion should be denied.

I. INTRODUCTION

Goodnight Midstream Permian, LLC ("Goodnight") seeks to preclude the Commission from evaluating the evidence and ruling on Empire's applications to revoke Goodnight's permits to inject massive volumes of water into Empire's unitized interval within the Eunice Monument South Unit ("EMSU") based on an incomplete view of the facts and a disregard for the applicable law. Not only does Goodnight ignore the Commission's paramount obligation to prevent waste and protect correlative rights under the Oil and Gas Act, Goodnight attempts to make an end run around the Commission's March 9, 2024 Order Denying Empire New Mexico LLC's Motion to Dismiss Applications to Amend Orders R-7765 and R-7767, which stayed Goodnight's applications to exclude the San Andres formation from the EMSU's unitized interval and the EMSU Oil Pool. Dissatisfied with the stay, Goodnight asks the Commission to summarily deny Empire's applications based on the argument that the San Andres formation was erroneously included within the unitized interval because the formation was not proven to contain producible oil *at the time of the 1984 unitization hearing* and is disconnected from the producing Grayburg formation by impermeable barriers and pressure differentials.

Goodnight's argument has no merit. It is based on a false premise – *i.e.,* that Empire can only prevail on its applications if evidence presented forty years ago demonstrated the existence of hydrocarbons within the San Andres formation. Contrary to Goodnight's claims, Empire's applications are predicated on the fact that Goodnight's injection is impairing correlative rights and resulting in waste *now* rather than the simple fact that Goodnight is injecting into Empire's unitized interval. And, Goodnight's "undisputed facts" are fundamentally flawed because they consist of cherry-picked evidence from the 1984 unitization hearing and completely ignore the voluminous evidence that exists today. Further, Goodnight should not be permitted to engage in

an improper collateral attack on the Commission's 1984 orders. Goodnight's request that the Commission allow it to continue to ruin Empire's unitized interval today because there was allegedly insufficient evidence of hydrocarbons in the San Andres in 1984 must be denied. Disputed issues of material fact exist that require a hearing on the merits.

II. SUMMARY JUDGMENT STANDARD

Summary judgment is disfavored and may be granted only when there are no genuine issues of disputed material fact.

> Summary judgment was appropriate in this case if there were no genuine issues of material fact, and Moongate was entitled to judgment as a matter of law. *See Self v. United Parcel Serv., Inc.*, 1998–NMSC–046, ¶ 6, 126 N.M. 396, 970 P.2d 582. In a motion for summary judgment, the movant has the initial burden of establishing a prima facie case for summary judgment. *Romero v. Philip Morris, Inc.*, 2010–NMSC–035, ¶ 10, 148 N.M. 713, 242 P.3d 280. "Once this prima facie showing has been made, the burden shifts to the non-movant to demonstrate the existence of specific evidentiary facts which would require trial on the merits." *Id.* (internal quotation marks and citation omitted). "Because resolution on the merits is favored, a reviewing court view[s] the facts in a light most favorable to the party opposing the motion and draw[s] all reasonable inferences in support of a trial on the merits." *Edward C. v. City of Albuquerque*, 2010–NMSC–043, ¶ 43, 148 N.M. 646, 241 P.3d 1086 (alterations in original) (internal quotation marks and citation omitted).

Moongate Water Co., Inc. v. City of Las Cruces, 2012-NMCA-003, ¶ 26, 269 P.3d 1, 7, *aff'd, Moongate Water Co., Inc. v. City of Las Cruces*, 2013-NMSC-018, ¶ 26, 302 P.3d 405. This standard has not been satisfied here.

III. RESPONSE TO GOODNIGHT'S STATEMENT OF UNDISPUTED FACTS

As demonstrated below, genuine issues of disputed material fact preclude the entry of summary judgment.

1. Empire admits statements of undisputed material facts ("SUMF") Nos.1, 2, 3, 4, and 5.

2. Empire disputes SUMF No. 6 because the San Andres and Grayburg intervals have been known to communicate since field discovery on March 21, 1929.

a. The San Andres reservoir pressure dropped from 1747 psi at -430' subsea to 1245 psi (28.7% depletion) by April 1986, with limited production from the San Andres, as measured in the EMSU-211 well. This pressure decline was also confirmed by the openhole RFT run in EMSU-458 which showed a 28.5% drop. Fluid levels in EMSU-457 and EMSU-460 San Andres water supply wells also showed a similar pressure drop. William West Self-Affirmed Statement at 5 (filed as Empire Ex. I on Aug. 26, 2024, attached hereto as Exhibit A ("West Statement"); Exhibits I-3 and I-4, attached thereto; *see also id.* at 10, Section B (discussing communication between the San Andres formation and the Grayburg formation).

b. Chevron documented sulfate water from the San Andres entering the Grayburg formation and causing barium sulfate scale prior to the waterflood. *Id.* at 6 and Exhibit I-7.

c. Chevron's September Technical Committee Report on Proposed Arrowhead Grayburg Unit (AGU) states that a portion of the water production is probably attributable to communication of Zones 4 and 5 with the Lower Grayburg and San Andres aquifers. Technical Committee Report on Proposed Arrowhead Grayburg Unit (AGU) at 8, attached hereto as Exhibit B.

d. Wells in the crestal area of the reservoir experienced high water production prior to the waterflood and this high water production is attributed to San Andres water entering the Grayburg through natural fractures. West Statement at 5-6, and Exhibit I-5 attached thereto.

e. Natural fractures exist in both the Grayburg and San Andres formations and these promote communication between the two intervals. *See* Self-Affirmed Statement of Dr. Robert F. Lindsay at 2, 5-6, 11 (filed as Exhibit B on Aug. 26, 2024), attached hereto as Exhibit C ("Lindsay Statement").

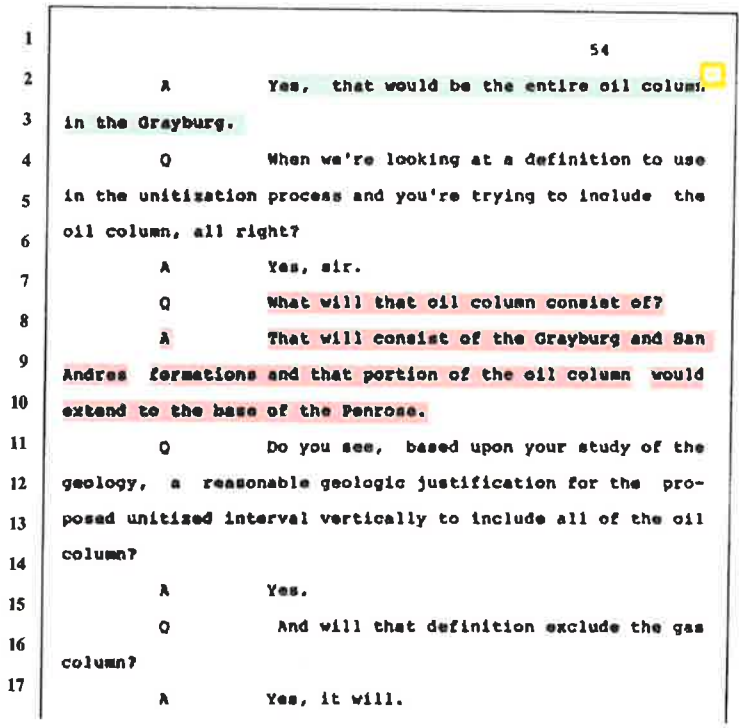
f. Empire witness Dr. James L. Buchwalter states:

> The San Andres is in hydraulic communication with the Grayburg through natural fractures which are most prevalent at the crestal portions of the field. Cumulative water production volumes as of 1/1/1986 prior to the waterflood were used to determine the vertical permeability necessary to match historical well performance and reservoir pressure. Self-Affirmed Statement of Dr. James L. Buchwalter at 3, ¶ K(1) (filed as Exhibit E on Aug. 26, 2024), attached hereto as Exhibit D.

g. There is not an effective seal between the Grayburg and the San Andres formation. Among the factors showing a lack of a seal are:
   - Fractures breached non-porous strata associated with the unconformity that separates San Andres reservoir strata from Grayburg reservoir strata.

- Fractures allowed San Andres water to communicate vertically up section to form what is termed a plume of water.
- Plumes of water were easily identified by water chemistry, which identified low salinity water (<10,000 ppm) that contain sulfate. Lindsay Statement at 11-12.

3. Empire disputes SUMF No. 7 because the oil column included the San Andres formation. At page 54 of the hearing transcript in the 1984 Case 8397, the Commission found that the oil column for unitization included the San Andres formation. That portion of the transcript states:



54

A Yes, that would be the entire oil column in the Grayburg.

Q When we're looking at a definition to use in the unitization process and you're trying to include the oil column, all right?

A Yes, sir.

Q What will that oil column consist of?

A That will consist of the Grayburg and San Andres formations and that portion of the oil column would extend to the base of the Penrose.

Q Do you see, based upon your study of the geology, a reasonable geologic justification for the proposed unitized interval vertically to include all of the oil column?

A Yes.

Q And will that definition exclude the gas column?

A Yes, it will.

See Goodnight Exhibit 9 at 54, attached to Motion (emphasis added).

4. Empire admits SUMF No. 8 to the extent that the statement applies only to the Grayburg producing interval of the unit. The focus of the 1984 hearing was to institute a waterflood operation within the Grayburg formation. At that time, there was no consideration for development of the lower Grayburg and upper San Andres for development of a residual oil zone ("ROZ"), i.e., brownfield and greenfield ROZ

targets, respectively. *See* Self-Affirmed Statement of Dr. Robert Trentham at 12- 13 (filed as Exhibit D on Aug. 26, 2024), attached hereto as Exhibit E ("Trentham Statement").

5. Empire disputes SUMF No. 9 because whether hydrocarbons have been reported in the public records does not in any respect demonstrate that hydrocarbons do not exist in the San Andres formation. By virtue of unitization of the EMSU, the San Andres, through inclusion in the oil column and the vertical limits of the unit, was allocated production from the Grayburg. *See* Order No. R-7765 at 5, ¶ 27, attached to Motion as Ex. 4. Stated another way, the allocation formula includes the San Andres.

6. Empire disputes SUMF No. 10. Of course, in 1984 the waterflood would target the oil column of the Grayburg formation. This statement incorrectly implies that a ROZ does not exist in the lower Grayburg or the San Andres. See Self-Affirmed statement of Laurence S. Melzer at 9, ¶ 18 ("The evidence from the cores taken at depth in the San Andres *clearly demonstrates a residual oil zone of at least 250' beneath the two EMSU units*." (emphasis added)) (filed as Empire Exhibit C on Aug. 26, 2024), attached hereto as Exhibit F ("Melzer Statement"). Goodnight does not disagree. Expert Report of William J. Knights, P.G. at 8 (conceding that a ROZ with a reasonable amount of oil in place exists between -350 and-500 ft subsea), filed as Goodnight Exhibit E on Aug. 26, 2024, attached hereto as Exhibit G.

As explained by Empire witness Dr. Lindsay,

> Upper San Andres reservoir at EMSU contains oil saturated porosity down section to depths of -719 ft (subsea) to -750 ft (subsea) and potentially deeper and is a residual oil zone (ROZ). Lower San Andres may also be a residual oil zone (ROZ).

Lindsay Statement at 2, ¶ 6. Empire witness William West opines on the estimated oil reserves contained in the San Andres:

> The San Andres contains a residual oil zone (ROZ) volume of approximately 900 million barrels oil over Empire's portion of the reservoir (EMSU, EMSU-B, and AGU). Water disposal is negatively impacting Empire's ability to perform a successful CO2 flood to recover as much as 270 million barrels of residual oil.

West Statement at 15(H). Further, Dr. Trentham concludes:

> Core and log information confirms the presence of a ROZ at EMSU, EMSU-B, and AGU. Goodnight's continued injection of off lease produced water into the San Andres reservoir within and near EMSU will greatly diminish or destroy Empire's ability to employ any potential EOR methodology in their properties. Disposal of off lease saltwater by a 3rd party Company should be terminated inside the waterflood units where a Main Pay Zone or ROZ interval exist so that EOR processes can be properly implemented.

Trentham Statement at 23-24.

7. Empire disputes SUMF No. 11. Empire admits that the San Andres was not producing oil and gas from the San Andres in 1984. However, that does not mean that the San Andres did not contain any oil and gas. Between Empire and Goodnight, the major material issue of fact is whether there is a ROZ in the San Andres. Core analysis from the Empire 679 well and the RR Bell # 4 indicates sufficient oil saturation to reach a conclusion that the San Andres has a ROZ irrespective of whether the San Andres was termed as "non-productive" in 1984. *See* Lindsay Statement at 3 and Exhibits B-7 and B-8. Similarly, Empire witness Galen Dillewyn opines that there is oil saturation in the San Andres:

> 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.

Revised Self-Affirmed Statement of Galen Dillewyn at 4-5, Track 18 (filed as Revised Exhibit F on Dec. 4, 2024) ("Dillewyn Statement"), attached hereto as Exhibit H. Indeed, Exhibit B-32 (slides 2 & 3) prepared by Goodnight witness Preston McGuire illustrates that core from the EMSU-679 well shows oil going as deep as -762' subsea and oil saturations are above 20% down to -652' subsea. *See* Exhibit I, attached hereto.

8. Empire admits SUMF Nos. 12 and 13 but disputes that the orders issued by the Oil Conservation Division listed in Paragraph 12 were lawfully issued.

Goodnight's *Motion for Partial Summary Judgment* must be denied due to the existence of genuine issues of disputed material fact. This case cannot be determined by the narrow and unsubstantiated argument that the Commission made a mistake 40 years ago.

IV. ARGUMENT

A. Goodnight's Motion ignores that the Commission's paramount statutory obligation is to prevent waste and protect correlative rights.

Goodnight focuses entirely on the Commission's 1984 unitization orders and ignores the Commission's ongoing statutory obligation to prevent waste of hydrocarbons and protect correlative rights. NMSA 1978, §§ 70-2-6 and 70-2-11; *see also Continental Oil Co. v. Oil Conservation Comm'n,* 1962-NMSC-062, ¶ 27, 373 P.2d 809 ("Our legislature has explicitly defined both 'waste' and 'correlative rights' and placed upon the commission the duty of preventing one and protecting the other."). NMSA 1978, Section 70-2-3(A) of the Act defines "underground waste" to include:

> the inefficient, excessive or improper, use or dissipation of the reservoir energy, including gas energy and water drive, of any pool, and the locating, spacing, drilling, equipping, operating or producing, of any well or wells in a manner to

> reduce or tend to reduce the total quantity of crude petroleum oil or natural gas ultimately recovered from any pool.

"Correlative rights" means:

> the opportunity afforded, so far as it is practicable to do so, to the owner of each property in a pool to produce without waste his just and equitable share of the oil or gas, or both, in the pool, being an amount, so far as can be practically determined, and so far as can be practicably obtained without waste, substantially in the proportion that the quantity of recoverable oil or gas, or both, under such property bears to the total recoverable oil or gas, or both, in the pool, and for such purpose to use his just and equitable share of the reservoir energy.

NMSA 1978, § 70-2-33(H).

Thus, it is abundantly clear that the Commission must preclude injection operations that "tend to reduce the total quantity of oil ultimately recovered from any pool" or prevent an interest owner from producing without waste his just and equitable share of oil in the pool.

Consistent with these provisions, the Commission entered its Joint Order on Goodnight's Motion to Limit Scope of Hearing on Cases Within the EMSU and the Oil Conservation Division Motion Concerning the Scope of the Evidentiary Hearing Set for September 23-27, 2024 ("Joint Order") on July 7, 2024, and limited the scope of the hearing to "the issue of the existence, extent of and possible interference with a residual oil zone the [EMSU] by produced water injection activities undertaken by Goodnight." *See* Joint Order at 2, ¶ 2. This is the critical issue for the Commission to evaluate in determining whether Goodnight's injection is interfering with correlative rights and producing waste. It is not – as Goodnight claims – whether the San Andres should have been excluded from the EMSU's unitized interval forty years ago.

Goodnight continues to ignore Commission orders in attempting to narrow and misstate the scope of the proceedings with each motion it files. It should not be permitted to do so.

B. Goodnight's Motion improperly seeks an end-run around the Commission's order staying Goodnight's applications to amend the EMSU's unitized interval in Case Nos. 24278 and 24277.

In Case No. 24278, Goodnight asks the Commission to exclude the San Andres formation from the EMSU's unitized interval, and in Case No. 24277, Goodnight asks the Commission to exclude the San Andres formation from the Eunice Monument Oil Pool within the EMSU. Empire filed a motion to dismiss those applications, which was fully briefed and argued. On March 9, 2024, the Commission issued an order denying Empire's motion and staying the applications pending a final resolution by the Commission of Case No. 24123. Despite that order, Goodnight now raises the exact same issue here, arguing that the San Andres formation was improperly included within the EMSU's unitized interval. Goodnight's motion is a blatant attempt to subvert the stay order and should be denied. The Commission has already determined that the issue here is whether a ROZ exists within the San Andres formation – not whether the San Andres formation should be excluded from the EMSU's unitized interval. *See* Joint Order at 2, ¶ 2. Goodnight's motion should be rejected on this basis alone.

C. Goodnight's Motion must be denied because it seeks to improperly attack the Commission's 1984 orders approving the EMSU.

As discussed above, Goodnight's applications in Case Nos. 24278 and 24277, which seek to improperly and unilaterally amend the EMSU's unitized interval, have been stayed. Dissatisfied with that outcome, Goodnight now seeks to engage in an impermissible collateral attack on the Commission's unitization orders. A collateral attack is "either an attempt to impeach the judgment by matters outside of the record, in an action other than that in which it was rendered or an attempt to avoid, defeat, or evade it, or deny its force and effect, in some incidental proceeding not provided by law for the express purpose of attacking it." *See Phoenix Funding, LLC v. Aurora Loan Servs., LLC*, 2017-NMSC-010, ¶ 32, 300 P.3d 174 (*citing Barela v. Lopez*, 1966-NMSC-163, ¶ 5, 76 N.M.

632). By arguing that the 1984 unitization orders improperly included the San Andres formation within the EMSU's unitized interval in these proceedings to revoke Goodnight's injection permits, that is exactly what Goodnight seeks to accomplish here. Goodnight's improper collateral attack on the prior orders should not be permitted.

D. The Commission's 1984 orders approving the EMSU correctly included the San Andres within the unitized interval.

Order R-7765 approving the statutory unit and including the San Andres formation in the vertical limits of the unit and the pool was based on substantial evidence. Goodnight, in pursuit of its salt water disposal business, now comes before the Commission approximately forty years later alleging that the Commission erred in including the San Andres in the EMSU. Since the 1984 approval of the unit, no one has come forward to challenge the vertical limits of the unit until now.

Goodnight does not and never did have a working interest in the Eunice Monument South Unit (EMSU)[1], but has contended in these proceedings that, by virtue of a surface lease, Goodnight has the right to inject produced water brought through its pipeline system and dispose of unprecedented and extraordinarily large amounts of produced water into the San Andres formation.

Goodnight's efforts fail to legitimately challenge Orders R-7765 and R-7765-A. Effectively, in its motion Goodnight says that Order R-7765 has no precedential value as to the San Andres formation. Goodnight argues that inclusion of the San Andres formation in the EMSU was solely as a water supply source for the Grayburg waterflood. The major endeavor of Case 8397 was the waterflood of the Grayburg formation. It is evident from Order R-7765 that further investigations were to be made, not necessarily limited to the Grayburg formation. Findings 34 and 35 of the Order state:

[1] *See, e.g.*, Deposition of Preston McGuire, at 42:9-11, excerpt(s) attached as Exhibit J.

> (34) During said period, it is expected that the unit operator will develop reservoir data from cores, well logs, tests and production which might be used to better allocate production to the unit during any period of recovery of secondary and tertiary oil in excess of 64.2 million barrels.
>
> (35) The proposed formula should not apply to the allocation of secondary or tertiary oil production in excess of a total of 64.2 million barrels.

See Exhibit 4 at 6, attached to Motion.

The foregoing findings indicate that future development of the unitized interval was contemplated, just as development of oil and gas fields generally progress. The principal issue before the Commission is whether a ROZ exists within the San Andres formation, as advanced by Empire.

As noted, in its Order limiting the scope of the current hearing the Commission said: "At said hearing, the parties shall submit all evidence, testimony, and legal argument on the issue of the existence, extent of and possible interference with a residual oil zone [underlying] the Eunice Monument South Unit ("EMSU") by produced water injection activities undertaken by Goodnight." Joint Order at 2, ¶ 2.

The major and crucial consideration for the acquisition by Empire of the EMSU, EMSU B, and the AGU units was the "significant CO2-EOR oil resources in the San Andres ROZ and Grayburg Main Pay Zone intervals underlying the units. *See* West Statement at 2, ¶ 3. The sales brochure of XTO estimated that the ROZ potential of the San Andres was 912 million barrels of oil. *See* Self-Affirmed Statement of Jack Wheeler, ¶ 13 and Exhibit A-5 (filed as Empire's Exhibit A on Aug. 26, 2024), attached hereto as Exhibit K.

Goodnight would have the Commission believe that when EMSU was formed there was no oil and gas productive value in the San Andres formation, and therefore, it should not have been

included within the vertical limits of the pool. Further, Goodnight would have the Commission believe that in 1984 when the EMSU was approved as a statutory unit, the San Andres formation could not and cannot be developed for oil and gas production. Since that time, ROZ development of the San Andres formation has occurred in the Central Platform Basin in nearby fields in Texas and the North Monument field in New Mexico, all in close proximity to the EMSU. *See, e.g.*, Melzer Statement at 3-4; *see also* Exs. C-4, C-5 to C-10, attached thereto.

There are now competing issues of material fact between Empire and Goodnight, including but not limited to whether there is communication between the Grayburg and San Andres formations; whether there is a barrier between the Grayburg and San Andres and, if so, the existence of fracturing between the two formations; whether there is a barrier between the upper San Andres and the lower San Andres; oil saturation and extent of oil saturation analysis taken from existing cores and other analysis in the San Andres; and whether there is moveable oil in the San Andres based on porosity and permeability characteristics within the San Andres.

Incredibly, Goodnight argues that the Commission did not have authority to include the San Andres formation in the vertical limits of the EMSU. Section 70-2-6(A) gives the Commission considerable latitude under the Oil and Gas Act (NMSA 1978, §§ 70-2-1 et seq.) in regulating oil and gas operations:

> The division shall have, and is hereby given, jurisdiction and authority over all matters relating to the conservation of oil and gas and the prevention of waste of potash as a result of oil or gas operations in this state. It shall have jurisdiction, authority and control of and over all persons, matters or things necessary or proper to enforce effectively the provisions of this act or any other law of this state relating to the conservation of oil or gas and the prevention of waste of potash as a result of oil or gas operations.

NMSA 1978, § 70-2-13 gives the Commission broad authority, and the conservation of oil and gas and prevention of waste has been the subject of considerable litigation in New Mexico, but there

never was an appellate challenge to Orders R-7765 and R-7767, the latter which created the Eunice Monument Oil Pool with vertical limits corresponding to the vertical limits of the EMSU.

The unchallenged Orders R-7765 and R-7767 found that approval of the EMSU was in the best interest of conservation of oil and gas and protection of corelative rights. Goodnight's farfetched arguments that the Orders should now be disregarded should be rejected.

E. Goodnight's argument that an aquifer cannot be unitized is irrelevant and wrong because the San Andres formation is oil bearing.

Goodnight's argument on this issue is specious. The direct testimony already submitted to the Commission demonstrates there is a ROZ in the San Andres formation underlying the EMSU. The San Andres is an oil-bearing reservoir. The ROZ in the San Andres is classified as a Greenfield ROZ, which will require CO2/EOR application because of the trapping of oil. In other words, oil in a Greenfield ROZ has limited movement and requires stimulation through CO2 flooding. *See* Trentham Statement at 12-13.

F. Goodnight's proposal to eliminate the San Andres formation from the unitized interval of the EMSU would lead to absurd and untenable results.

Finally, construing the Statutory Unitization Act in the manner suggested by Goodnight would create an absurd result. *See, e.g.*, *Old Abe Co. v. N.M. Mining Comm'n*, 1995-NMCA-134, ¶¶ 19-20, 121 N.M. 83 (recognizing that the mining commission properly construed the statutory language to avoid an absurd result). Exclusion of the San Andres from the unitized interval would have far reaching and detrimental implications to the interest owners in the unit. For example, would the ruling take effect *ab initio*, from the entry of Order R-7765? Would interest owners in the San Andres formation who received production distributions have to pay back funds they have received since 1984? Would the allocation formula have to be changed? In short, elimination of

the San Andres would cause a great deal of chaos. Goodnight's effort to unilaterally amend the unitized interval should be rejected.

G. A motion for summary judgment is not an appropriate vehicle for relief in an administrative proceeding.

Goodnight does not cite any rule, statute or case law authorizing or permitting it to file a motion for summary judgment in an administrative proceeding before the Oil Conservation Commission. "We assume where arguments in briefs are unsupported by cited authority, counsel after diligent search, was unable to find any supporting authority." *Doe v. Lee,* 1984-NMSC-024, ¶ 2, 100 N.M. 764, 676 P.2d 1329. "Where a party cites no authority to support an argument, we may assume no such authority exists." *Curry v. Great Nw. Ins. Co.,* 2014-NMCA-031, ¶ 28, 320 P.3d 482, 489.

Despite diligent search, Empire has not found any authority for motions for summary judgment in cases before the Oil Conservation Commission or the Energy, Minerals and Natural Resources Department. Nowhere in the Oil and Gas Act or the rules and regulations of the Oil Conservation Division and the Commission is there authority delegated for the Division or Commission to render summary judgment. *See* generally Oil and Gas Act. Summary judgment is generally a judicial function, not the function of an administrative agency. Although the enabling statutes of some agencies specifically permit motions for summary judgment,[2] neither the enabling statutes of the Oil Conservation Commission nor the pertinent parts of the New Mexico Administrative Code give such jurisdiction to issue summary judgment.

[2] *See, e.g.,* NMSA 1978 § 7-1B-8(G) (allowing motions for summary judgment in tax protest cases before the Administrative Hearing Office).

V. CONCLUSION

For the foregoing reasons, Goodnight's Motion should be denied. To the extent summary judgment is even available as a remedy in this proceeding, disputed issues of material fact preclude its entry here. These matters should proceed to a hearing on the merits so the Commission can evaluate the evidence and determine, in accordance with its statutory obligations, whether Goodnight's injection into the San Andres formation is resulting in waste or violating 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 to all counsel of record by electronic mail this 6th day of February, 2025, as follows:

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

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

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

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

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

SELF-AFFIRMED STATEMENT OF WILLIAM WEST

1. I am over the age of 18. I am a Petroleum Engineer working as Senior Vice President of Operations for Empire Petroleum Corporation ("Empire") and have personal knowledge of the matters stated herein. I have not previously testified before the New Mexico Oil Conservation Commission ("Commission"). My credentials as an expert Petroleum Engineer are provided in the attached resume. In short, I graduated from Marietta College with a Bachelor of Science Degree in Petroleum Engineering in May 1999. I began my career with Marathon Oil Company and have been employed in the oil and gas industry since graduation. I have been the Senior Vice President of Operations for Empire Petroleum Corporation since May 2023. I am a Certified Professional Engineer in the State of Wyoming - WY ID # 12599. I have over 25 years of oil and gas experience and have worked in most of the major oil and gas producing basins and States, including New Mexico, during my career.

2. My area of responsibility for Empire includes Lea County, New Mexico. I am responsible for the secondary waterflood operations in the Eunice Monument South Unit ("EMSU") and am working on developing the tertiary recovery CO_2 Project there. I submit the following information in support of Empire's opposition to the above-referenced Goodnight

recompleted to a disposal well in the San Andres within the EMSU unitized interval. Failure to furnish notification of the recompletion of a disposal well into a new zone violated NMOCD rules and therefore should never have been approved. As a result, the well has disposed of 16.61 million barrels saltwater into Empire's unitized interval and has impacted roughly 181 acres as of June 1, 2024.

A. Discussion of Exhibits

4. **Exhibit I-1** shows the location of the five proposed SWD wells inside the EMSU. These wells are located in areas of EMSU where water production prior to the waterflood in 1986 was abnormally high, indicating communication between the San Andres and Grayburg through natural fractures.

5. **Exhibit I-2** shows the above five wells and the four active SWD wells Goodnight already operates within the EMSU that are disposing of water into the unitized interval. No disposal volumes are available on the Division's website for the Andre Dawson SWD #1, but Goodnight's document production demonstrates it has been disposing of water since January, 2023. The Ernie Banks SWD #1 has also been utilized for disposal since May, 2023 but disposal volumes are not available on the Division's website. It is estimated that these 2 wells have disposed of 12.8 million barrels as of June 1, 2024.

6. **Exhibit I-3** shows the results from an open-hole Repeat Formation Test (RFT) taken on April 8, 1986 in the EMSU-211 well prior to the start of water injection. The results show the depths where pressure measurements were made and the subsea depth associated with these measured depths based on a well elevation of 3576 feet. The original reservoir pressure in 1929 was measured to be 1450 psi at subsea depth of -250 feet. We assume a 0.43 psi per foot pressure gradient to determine the original reservoir pressure at the various depths where the RFT pressure measurements were taken. The top of San Andres has been picked at 3975' measured depth in the EMSU-211 well and this depth equates to -399' subsea. We then compare the original reservoir pressure at each depth with the measured pressure in 1986 and see that the pressure at the one depth tested in the San Andres has declined by 282 psi or 18.5%. The pressure in the Grayburg has declined by over 1000 psi at the top of the interval due to oil, water, and gas production from wells completed in the Grayburg since 1929. No wells have produced from the San Andres at EMSU, so the only way this San Andres pressure could have dropped is through communication with the Grayburg.

7. **Exhibit I-4** is a graphical representation of **Exhibit I-3** showing the measured pressures plotted on the X axis and the measured depth plotted on the Y axis. The graph shows the 282 psi (18.5%) pressure depletion in the San Andres in the area shaded in red at the bottom of the graph. The only physical explanation is that fluids from the San Andres interval migrated into the Grayburg interval. This confirms the two formations are hydraulically connected.

8. **Exhibit I-5** shows the 1/1/1986 cumulative water production for wells which produced over 500,000 barrels water before the waterflood and their location in respect to the 5 application and 4 existing active SWD wells. The high water production from these wells can be attributed to San Andres water migrating into the crestal areas of the Grayburg though natural

fractures. One can see the areas where the EMSU-144, 239, 262-H, 362, and 368 will be impacted by raising the San Andres reservoir pressure and forcing more water through the natural fractures. These high water producers in the central portion of the field produced high water volumes even though wells around them produced low water volumes. This difference in water production is an indication that there is communication between the Grayburg and San Andres intervals, which is letting water migrate into the Grayburg from below. This concept was confirmed by the sulfur content of the produced water increasing as San Andres water entered the Grayburg interval as discussed in Chevron paper "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the EMSU Waterflood".[1] The five proposed and 4 existing active SWD wells are located in the area where the largest influx of San Andres water occurred prior to the waterflood, demonstrating the wells are in an area which will do the most harm to Empire's unit if allowed to continue disposal. EMSU-262H produced this water before it was horizontally sidetracked in 2012, so the high water production cannot be explained by greater fluid withdrawals.

9. **Exhibit I-6** is taken from the Technical Committee Report – April 1983 – "Proposed Eunice Monument South Unit, Lea County, New Mexico" [2] which was written prior to unitization. It is a 3-D visualization prepared by Chevron to show the plumes of water production from the Grayburg wells. These locations are where the greatest influx of San Andres water will occur if saltwater disposal is allowed.

10. **Exhibit I-7** cites a paragraph from Chevron's 1996 NACE paper number 181 "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the EMSU Waterflood".[1] In this paper, Chevron concludes that San Andres water is migrating into the Grayburg wellbores even though the wells penetrated only the Penrose and Grayburg, and resulted in a barium sulfate scale, barite, and deposition problem. This problem occurred prior to the injection of San Andres water into the Grayburg interval during the waterflood, therefore indicating communication between the San Andres and Grayburg.

11. **Exhibit I-8** shows Goodnight's proposed five SWD wells in relation to Empire's active San Andres water supply well EMSU-459. Empire produces San Andres water to assist with the waterflood of the Grayburg interval. The EMSU-459 is approximately 3822 feet from the Hodges SWD #1 proposed well and produced an average of 3518 BWPD during 2023. The disposal of high salinity corrosive fluids into the SWD wells proposed by Goodnight will result in damage to this water supply well and the high salinity water will then be re-injected into the EMSU injection wells causing further damage to Grayburg oil producers. These SWD wells should not be drilled and the existing SWD wells within the boundaries of the unitized interval must be shut-in to prevent further damage.

12. **Exhibit I-9** shows the relative magnitude of the saltwater chlorides that Goodnight is disposing into the EMSU versus the chlorides of the EMSU water. The disposal water chlorides average 86,147 mg/L based on water analysis provided from Goodnight's Wrigley facility over the period of November, 2022 to August, 2023. As shown by **Exhibit I-10**, Goodnight is gathering water with chlorides as high as 224,384 mg/L. **Exhibits I-11 and I-12** show historical water analyses for produced water from EMSU, with average chlorides content of 7,814 mg/L.

Permian Midstream, LLC's ("Goodnight") saltwater disposal applications and Empire's applications to revoke the four (4) permitted saltwater disposal wells within the EMSU boundaries.

3. In regard to Goodnight's applications to drill five new SWD wells[1] and four active SWD wells inside EMSU, I considered the following facts.

- **The Eunice Monument South Unit (EMSU) waterflood currently produces approximately 720 BOPD; 70,000 BWPD; 500 MCFPD and injects approximately 70,000 BWPD into the unitized Grayburg / San Andres Reservoir. The EMSU 14,189.84-acre Unit was formed December 27, 1984 and water injection began November, 1986.**

- **Empire acquired the EMSU in March 2021 from XTO due to its significant CO_2-EOR potential in the San Andres ROZ and Grayburg Main Pay Zone intervals.**

- **After discovering that Goodnight is disposing of enormous volumes of water into the San Andres and has plans to expand disposal operations into the unitized interval, Empire's focus during 2023 and 2024 has been to seek support from the Commission to revoke Goodnight's existing SWD permits and to deny Goodnight's new applications.**

- **Disposal of water into the San Andres is violating the correlative rights of State, Federal, and Private mineral owners at EMSU and EMSU-B (also referred to as Eunice Monument South A & B Unit), and AGU (Arrowhead Grayburg Unit), all of which are operated by Empire. The disposal water is pressuring up the reservoir to levels above original reservoir pressure (1527 psi @ 4000 feet) and based upon maximum allowed surface injection pressures, will likely reach 3000 psi before disposal rates decline significantly. This will require that Empire operate the CO_2 at a higher pressure than necessary (MMP < 2000 psi), and will require Empire to inject produced water into another zone to make room for the CO_2 to avoid fracturing the formation. This will add significant capital to the cost of the project.**

- **Of major concern is that the re-pressurization of the San Andres is increasing water influx into the Grayburg through natural fractures and this is pre-maturely watering out Grayburg producers. Reservoir modeling shows that water influx into the Grayburg could reach 50,000 BWPD over the next two years due to the increased pressure, even without the use of the five new proposed wells. Water disposal inside EMSU must be terminated so that correlative rights are protected.**

- **The Grayburg / San Andres unitized interval has produced as a single reservoir since discovery in March, 1929. Grayburg oil, gas, and water production caused an influx of San Andres water through natural fractures as Grayburg reservoir pressure dropped, with a**

[1] Goodnight also has sought a de novo hearing on the Division's denial of its application for authorization to inject produced water into the Piazza SWD #1 (not drilled) and is seeking to increase the rate of water disposal into the Andre Dawson SWD #1 (API 30-025-50634) from 25,000 barrels water per day (BWPD) to 40,000 BWPD. As I will explain below, Goodnight proposes to inject all of this water into the same formation within Empire's unitized interval, and the impact of the injection is cumulative.

Pressure Depletion Prior To Water Injection (Original Pressure in 1929 compared to 1986 pressure)

Exhibit I-3

KEY POINTS

- The 1986 reservoir pressure of the San Andres interval measured by an openhole pressure probe indicates a decline of 18.5% prior to any production from the interval.
- This confirms that the Grayburg and San Andres intervals are in pressure communication, therefore any water injection into San Andres will impact Grayburg oil recovery.

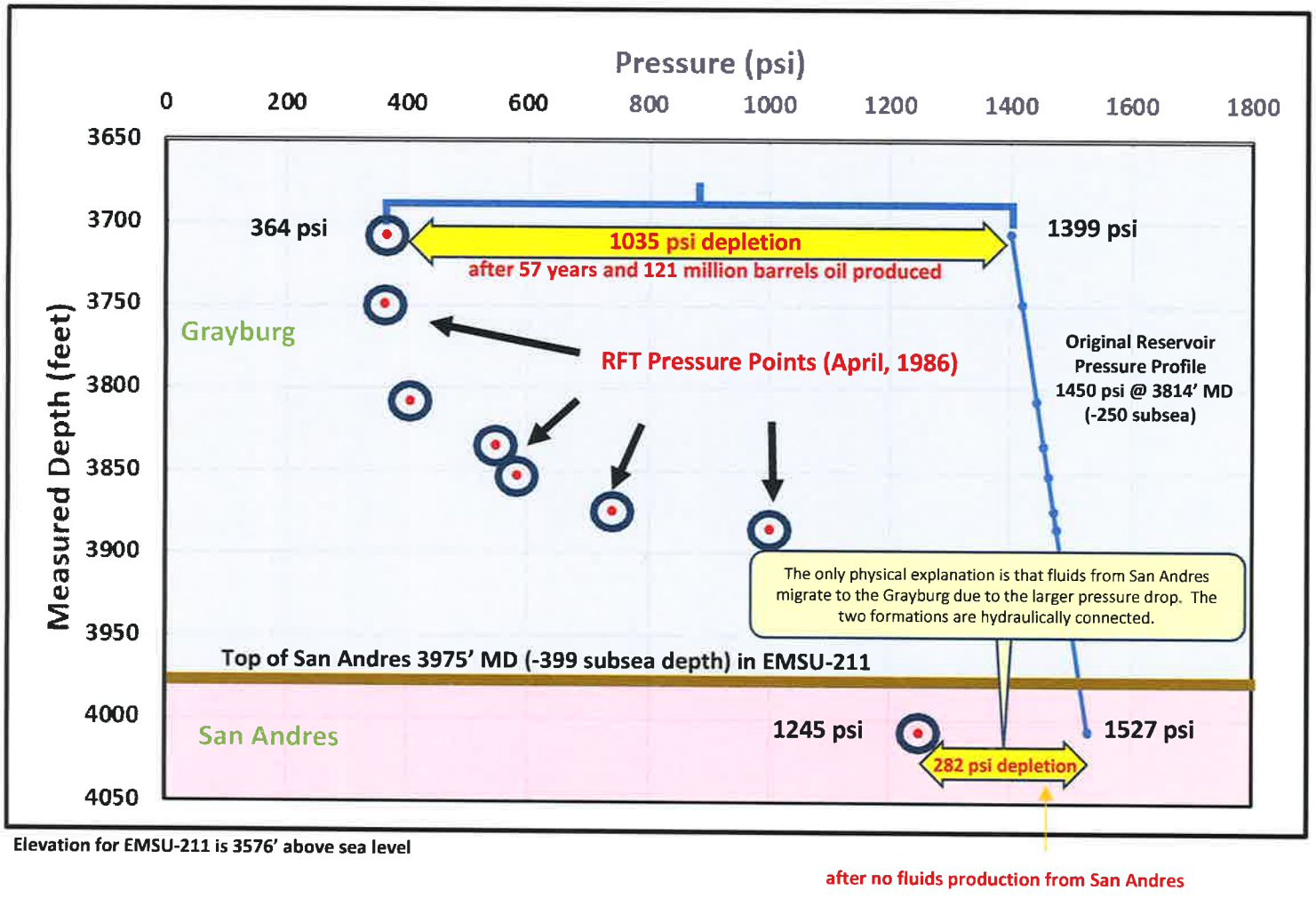
REPEAT FORMATION TEST (RFT) PRESSURE DATA

DEPTH: (FEET)	ELEV = 3576' SUBSEA ELEVATION (FEET)	API: 30-025-29615 ORIGINAL RESERVOIR PRESSURE (PSI)	WELL NAME: EMSU #211 RFT APRIL 8, 1986 SHUT IN PRESSURE (PSI)	DATE TAKEN: 4/8/1986 PRESSURE DEPLETION (PSI)	PRESSURE DEPLETION (PERCENT)
3707	-131	1399	364	1035	74.0%
3749	-173	1417	360	1057	74.6%
3807	-231	1442	402	1040	72.1%
3834	-258	1453	544	909	62.6%
3852	-276	1461	579	882	60.4%
3873	-297	1470	735	735	50.0%
3884	-308	1475	997	478	32.4%
4006	-430	1527	1245	282	18.5%

Original reservoir pressure was 1450 psi @-250' subsea. Assumes 0.43 psi/foot gradient during original conditions
Top of San Andres at 3975' MD (-399' subsea)

Pressure Depletion Prior To Water Injection (Pressure Measured in EMSU-211 April, 1986)

Exhibit I-4



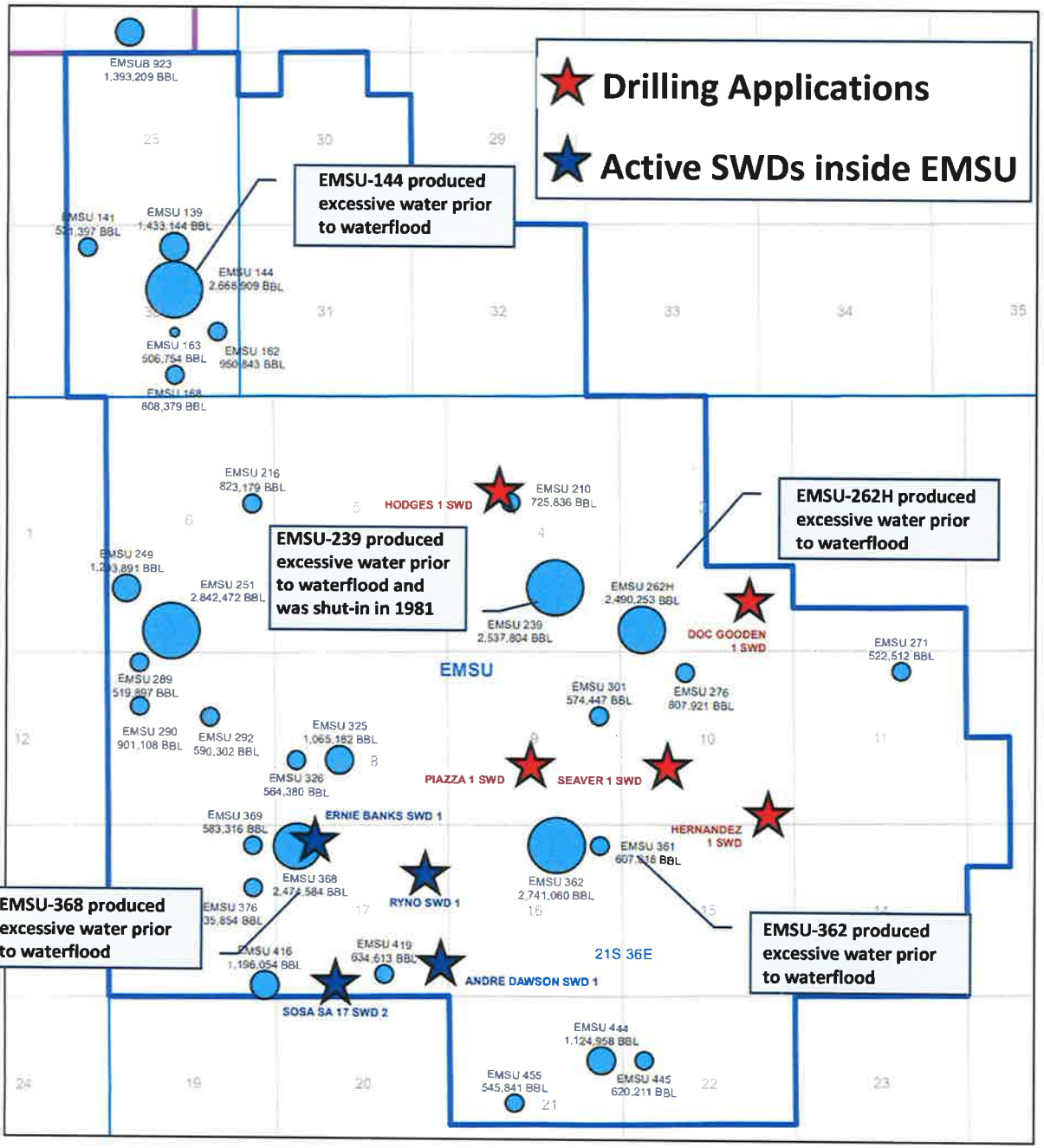
Elevation for EMSU-211 is 3576' above sea level

KEY POINTS

- This is a graphical presentation of Exhibit I-3 showing pressures measured with depth in the EMSU-211 well during April, 1986.
- Seven pressure points in the Grayburg interval indicated 400 psi to 1035 psi depletion due to production of 121 million barrels oil.
- Although no production was made from the San Andres interval, pressure measurement indicated 282 psi depletion.
- This indicates that the Grayburg and San Andres are in pressure communication.

Goodnight SWD Applications & Active Wells in relation to high water production areas of field (Cumulative water volumes as of 1/1/1986)

Exhibit I-5



KEY POINTS

- Some wells produced excessive amounts of water prior to the waterflood. Due to their structural position, the water production must have occurred by influx of San Andres water into the Grayburg.
- The five (5) SWD wells planned to be drilled by Goodnight and the 4 existing active SWD wells are located close to these high water producers, indicating that high water influx will migrate into the natural fractures if water disposal is allowed in these areas.
- Disposing of saltwater into the San Andres damages oil and gas production and is a direct conflict of NMOCD directives.
- The future value of EMSU to the State and Federal Government will be reduced by continued disposal of saltwater.
- Excess water production due to SWD disposal increases lease operating costs and results in early plug & abandonment of wells and loss reserves.

Exhibit I-7

Indication of Communication Between San Andres & Grayburg

- **1996 Chevron paper "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico"**

During the time of primary production prior to unitization and initiating the waterflood in the Eunice Monument field, barium sulfate scale deposition was experienced in a number of producing wells. Although the drilling was confined to the Penrose and Grayburg formations, apparently some **San Andres water was finding its way into the wellbore of these wells** and resulted in a barium sulfate scale, barite, deposition problem.

KEY POINTS

- This paper presented in 1996 indicates that the San Andres and Grayburg intervals were in communication prior to the waterflood.
- The San Andres water contains sulfate ions which are not present in the Grayburg water. Mixing of this water with the Grayburg water which contains barium ions caused barium sulfate prior to the waterflood.
- Further proves that Chevron as the operator of the Unit recognized the communication between the Grayburg & San Andres.
- NMOCD and the royalty owners have recognized the Grayburg & San Andres intervals as one oil producing zone for over 3 decades.
- With 900 million barrels of residual oil in the San Andres and documented communication between zones, the vertical limits of the UNIT should not be changed.

H. Conclusions

50. Based on the above analysis, my conclusions are as follows:

- **The EMSU is a valuable source of hydrocarbons and must be protected to prevent waste and protect correlative rights.**

- **The San Andres contains a residual oil zone (ROZ) volume of approximately 900 million barrels oil over Empire's portion of the reservoir (EMSU, EMSU-B, and AGU). Water disposal is negatively impacting Empire's ability to perform a successful CO_2 flood to recover as much as 270 million barrels of residual oil.**

- **Due to communication between the Grayburg and San Andres intervals, Goodnight's saltwater disposal will cause waste, water out Grayburg oil producers, increase the failure rate of Empire's wells and facilities due to high corrosion, and will result in loss of ultimate oil recovery.**

- **The area impacted by each SWD well is significant and increases the likelihood that corrosive, high salinity water will enter the Grayburg interval due to increased pressure in the San Andres and fluid contact with natural fractures or breaches in the barrier between the two intervals.**

- **The five new SWD wells proposed (Hernandez SWD #1, Doc Gooden SWD #1, Hodges SWD #1, Piazza SWD #1, and Seaver SWD #1 shown in Exhibit I-2, will exacerbate the damage that has already been caused by the active Goodnight disposal inside and near EMSU. These applications for additional SWD wells within the unitized interval should be denied as they will result in well and facilities damage and loss of oil and gas reserves.**

- **The Ernie Banks SWD #1 (30-025-50633), Andre Dawson SWD #1 (30-025-50634), Ryno SWD #1 (30-025-43901), and Sosa SA 17 SWD #2 (30-025-47947) shown in Exhibit I-3, dispose into the EMSU unitized interval. These wells should be shut in to prevent damage and protect the correlative rights to Empire's wells and facilities, including loss of oil and gas reserves.**

51. The attached exhibits were either prepared by me or were compiled from company business records.

Morrow

AGU

10259

Technical Committee Report
Proposed Arrowhead Grayburg Unit
Lea County, New Mexico

Chevron

September 1989

EXHIBIT B

Technical Committee Report
Proposed Arrowhead Grayburg Unit
Lea County, New Mexico

September 1989

end of 1964 was 24.1 MMSTBO, or 67% of the expected ultimate primary production. The corresponding loss from original reservoir pressure at that time was 69%. If a water-drive mechanism exists, it is not of sufficient strength to maintain reservoir pressure and is probably not significantly affecting primary oil recovery.

Cumulative water production has been 54.8 MMBW (excluding production in 1958 when water records were not kept). Water producing rates and cumulatives vary significantly with location, and no single source of the water production is apparent. Figures 12 and 13 indicate cumulative water and cumulative water-oil ratio, respectively, for wells in the proposed Unit.

A portion of the water production is probably attributable to communication of Zones 4 and 5 with the Lower Grayburg and San Andres aquifers. Although siliciclastics between each zone generally prevent vertical communication, in some localized areas of the field they do not act as permeability barriers. When the barriers break down in the lower Grayburg members, the prolific San Andres aquifer can influx into the oil productive horizons resulting in large volumes of water production.

Other water production may be attributable to completions in the Penrose (Lower Queen) which has been found to be influenced by a water drive in the EMSU. Additional portions of the water production can be attributed to casing leaks, which have been identified in 36 wells.

Localized areas of high water production consist of less than five proration units. In most cases, wells adjacent to high water production areas have produced significantly less water. The change in water production appears to be independent of completion depth, both subsea and stratigraphically, and no clear water production trend is identifiable.

Based on the lack of uniform water production and the relationship of pressure depletion to recovery, solution gas drive is thought to be the predominant primary recovery mechanism with water influx having only a minor effect on recovery. The Arrowhead Grayburg Pool is therefore a good candidate for waterflooding with respect to primary recovery mechanism.

CURRENT STATUS

The proposed Unit includes all currently active Arrowhead Grayburg wells and several wells classified as Eumont, Langlie Mattix, Penrose Skelly, and Eunice San Andres Southwest.

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

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO.	**COMM. CASE NO. 24123**
APPLICATIONS OF GOODNIGHT MIDSTREAM PERMIAN LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS, LEA COUNTY, NEW MEXICO.	**DIV. CASE NOS. 23614-23617**
APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC TO AMEND ORDER NO. R-22026/SWD-2403 TO INCREASE THE APPROVED INJECTION RATE IN ITS ANDRE DAWSON SWD #1, LEA COUNTY, NEW MEXICO.	**DIV. CASE NO. 23775**
APPLICATIONS OF EMPIRE NEW MEXICO LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO.	**DIV. CASE NOS. 24018-24020**

SELF-AFFIRMED STATEMENT OF ROBERT F. LINDSAY

1. My name is Robert Forrest Lindsay. I am over eighteen years of age and have personal knowledge of the facts herein. I am a geologist with 47 years of experience in the petroleum industry, having worked for Gulf (1976-1985), Chevron (1985-2001), ChevronTexaco (2001-2002), Saudi Aramco (2002-2015), and Lindsay Consulting (2016-Present). My expertise is in reservoir characterization.

2. I hold a Bachelor of Science degree in Geology from Weber State College (June, 1974), a Master of Science degree in Geology from Brigham Young University (December, 1976), and Doctor of Philosophy degree in Geology from the University of Aberdeen, Scotland (July, 2014).

3. I worked on Eunice Monument complex of unitized oil fields for Chevron from 1988 to 2002. I retired from Chevron in 2002. While working for Saudi Aramco (2002-2015), I used the 14-man year data base that I built on Eunice Monument unitized oil fields, other oil fields, and mountain range outcrops to complete a PhD degree (2014) on the Grayburg Formation.

4. I am a member of the following: 1) American Association of Petroleum Geologists (AAPG); 2) Society for Sedimentary Geology (SEPM); 3) Secretary (2023-Present) Midland chapter Society of Independent Professional Earth Scientists (SIPES, #3605); 4) Past-president and honorary life member of the West Texas Geological Society (WTGS); 5) Past-president and honorary life member of the

EXHIBIT C

Permian Basin Section–SEPM (PBS-SEPM); 5) President-Elect American Association of Petroleum Geologists Southwest Section (2026), and 7) Texas Board of Professional Geoscientists #1386.

5. I served my country in U.S. Army Special Forces as a medical specialist.

A. THE PROPOSED SWD WELLS WOULD INJECT INTO SAN ANDRES FORMATION WHICH CONTAINS A RESIDUAL OIL ZONE

6. While describing cores and characterizing Grayburg and San Andres reservoirs at Eunice Monument South Unit (EMSU), Eunice Monument South Unit Expansion Area B (EMSUB), and Arrowhead Grayburg Unit (AGU), located on the northwest corner of the Central Basin Platform (CBP), **it was discovered that the San Andres contains a residual oil zone (ROZ):**

- Upper San Andres reservoir at EMSU contains oil saturated porosity down section to depths of -719 ft (subsea) to -750 ft (subsea) and potentially deeper and is a residual oil zone (ROZ). Lower San Andres may also be a residual oil zone (ROZ).
- Grayburg reservoir at EMSU had initial water-free oil production to a depth of -350 ft (subsea), mixed oil and water production from -350 ft to -540 ft (subsea). Beneath -540 ft only water is produced.
- The unitized interval for EMSU is from -100 ft in the Grayburg Formation to the base of the San Andres Formation.

The attached exhibits illustrate and confirm the points made above. A description of the exhibits is as follows:

Exhibit B-1 shows that in the Late Eocene to Early Miocene the Southern Rocky Mountain Epeirogen uplifted western North America. Uplift was via a series of igneous intrusive bodies that formed the Trans-Pecos Magmatic Province. West of the Permian Basin this huge land mass recharged hot, high pressure, high volume meteoric water into the subsurface. Recharging meteoric water had an enormous head of energy and swept mobile oil out of structural closures to create residual oil zones (ROZ's). Middle Miocene to Late Miocene Rio Grande rifting down faulted and destroyed the large recharge area leaving small, isolated mountain ranges to recharge cool, low pressure, low volume meteoric water into the subsurface. This allowed some ROZ's to completely or partially re-saturate with mobile oil.

Exhibit B-2. Left figure is a map of the regional San Andres porosity fairways. These are porous pathways recharging meteoric water took when entering the Permian Basin as it recharged off the Southern Rocky Mountain Epeirogen. Right figure is a fracture halo, where a series of fractures surround a fault. Deep-seated differential block faulting folded overlying Permian dolostone strata and created a fracture halo without having a fault present. Meteoric water and later undersaturated fluid flow solution-widened fractures.

Exhibit B-3. Index map of New Mexico part of the Delaware Basin, Northwest Shelf, and Central Basin Platform (CBP). Positions of EMSUB, EMSU, and AGU are shown along the northwest corner of the

Mountain Epeirogen west of the Sacramento Mountains by meteoric recharge of fresh water down-dip into the Permian Basin. Recharging meteoric water dissolved San Andres evaporite strata ($CaSO_4$), which accounts for the source of sulfate (SO_4) in San Andres bottom water at EMSU, EMSUB, and AGU. **If produced water is injected into the San Andres ROZ and that water contains ions such as Ca, Na, K, Ba these ions will mix with SO_4 to precipitate cement (scale) within the ROZ, which will reduce reservoir quality and damage future ROZ productivity.**

It should be noted that water analysis of Goodnight's Wrigley SWD had the following comparison with Empire's produced water samples. The high levels of sodium and calcium cause major concern for scale precipitation in the San Andres ROZ interval.

	Average Chloride (mg/L)	Average Sodium (mg/L)	Average Calcium (mg/L)	Average Potassium (mg/L)
Goodnight	86,147	45,602	4,016	924
Empire	10,542	6,426	652	202

The following figures and previous illustrations confirm the points made above.

Exhibit B-10. Structural cross section of Grayburg reservoir in EMSU. The double humped asymmetric anticline gently dips to the east (right) into the lateral stratigraphic trap and dips 5° to the west (left) into the Delaware basin and is in pressure and fluid communication with the Goat Seep Aquifer. Folding of brittle dolostone reservoir strata created fractures. The Eunice-Monument complex of unitized oil fields is positioned atop the Eunice High structural block. The Eunice High is broken into smaller structural blocks.

Exhibit B-11. The Eunice High is broken into a series of smaller basement-cored structural blocks. This interpretation overlays Exhibit B6 as a comparison. These smaller structural blocks re-adjusted during the Laramide orogeny to uplift and fold Grayburg reservoir strata in EMSU into a double-humped asymmetric anticline and created a series of fractures. Top of San Andres was used as the datum to illustrate vertical offset of individual deep-seated basement structural blocks within the Eunice High.

Exhibit B-12. A Chevron in-house fracture study was performed on EMSU-679 oriented core (120 ft). Fractures were measured in Lower Grayburg reservoir and upper San Andres residual oil zone (ROZ).

Exhibit B-13. EMSU-679 total fractures and their orientation in lower Grayburg reservoir and San Andres residual oil zone (ROZ). Two fracture trends stand out. One is northwest to southeast and another is northeast to southwest. A total of 313 vertical fractures were measured.

Exhibit B-14. EMSU-679 large vertical fractures 1-3 ft in height. A major trend is northwest to southeast, with a minor trend northeast to southwest. A total of 24 fractures measured.

Exhibit B-15. EMSU-679 pyritized vertical fractures. A major trend is northwest to southeast, with minor trends to the northeast to southwest and east to west. 12 pyritized fractures were identified and measured.

Exhibit B-16. EMSU-679 fractures bounding collapse breccias and solution pipes. Two subtle trends are northeast to southwest and east to west. A total of 3 were measured.

Exhibit B-17. EMSU-679 San Andres core containing less porous, solution-widened, oil-stained, en echelon fractures from 4233-34 ft (-637 to -638 ft). Core is 89 ft below top of the San Andres. San Andres strata is less porous, brittle, and was easily fractured and solution-widened during structural movement that formed the Eunice Monument asymmetric anticline. Core width is 3 inches (7.62 cm). Left: Core photograph is dry. Right: Core photograph wet. Porosity = 4.8%. Permeability = 102 mD to 1292 mD. Oil saturation = 33.8%. Water saturation = 46.4%.

Exhibit B-18. EMSU-679 San Andres porous, oil-stained core containing solution-widened stylolitic tension gashes from 4175 ft (-579 ft). These small fractures are the most common fractures identified in Eunice Monument unitized oil fields (Lindsay, 2014). There are several in this field of view. Note the large tension gash that has undergone coring induced fracturing (**red arrow**). Several small fractures are throughout the field of view, most are solution-widened. Note pinpoint moldic porosity is throughout the field of view. Width of core is 3 inches (7.62 cm). Core photograph is dry. Porosity = 12.5%. Permeability = 5.2 mD. Permeability is low due to non-touching pinpoint moldic pores that lack connectivity. Oil saturation = 24.2%. Water saturation = 36.3%. Core is 31 ft beneath top of the San Andres.

Exhibit B-19. EMSU-679 San Andres residual oil zone (ROZ) vertical, solution-widened, en echelon fractures (**red arrows**) in porous, oil-stained strata from 4261-62 ft (-665 to -666 ft). Core is 117 ft beneath top of the San Andres. Core width is 3 inches (7.62 cm). Core photograph is dry. Porosity = 12.3%. Permeability = 1.4 mD. Oil saturation = 19.4%. Water saturation = 41.2%.

Exhibit B-20. EMSU-679 San Andres cores containing vertical stylolites (**red arrows**). Vertical stylolites were created by compression associated with the Laramide orogeny. Compression reactivated deep-seated fault blocks to fold Permian strata and form the Eunice Monument double-humped asymmetric anticline. Left: EMSU-679 4184 ft (-588 ft) (dry), 40 ft beneath top of San Andres. Right: EMSU-679 4188 ft (-592 ft) (wet), 44 ft beneath top of San Andres. Left: Core porosity = 6.3%, permeability = 5.7 mD, oil saturation = 26.5%, and water saturation = 60.7%. Right: Core porosity = 3.2%, permeability = 0.9 mD, oil saturation = 2.7%, and water saturation = 81.3%. Core widths are 3 inches (7.62 cm).

Exhibit B-21. A water chemistry study in EMSU revealed three water chemistries. First, connate water (120,000 ppm) in the Grayburg reservoir contains barium (Ba). Second, low salinity (<10,000 ppm) edge water entered the west side of the Grayburg reservoir. Edge water contains no sulfate. Edge water is sourced from the Goat Seep Aquifer, which is 1.5 to 2 miles down-dip of the west unit boundary of EMSU. Edge water entry into the Grayburg reservoir was by a drop in reservoir pressure due to production through time. Edge water is sourced from the present-day Guadalupe and Glass mountains. **Third, low salinity (<10,000 ppm) bottom water, in the San Andres reservoir residual oil zone (ROZ) is sulfate rich.** San Andres water was sourced from the Southern Rocky Mountain Epeirogen west of the Sacramento Mountains by meteoric recharge, which dissolved evaporite beds ($CaSO_4$) as it recharged into the subsurface and added sulfate (SO_4) to the low salinity water.

- Fractures breached non-porous strata associated with the unconformity that separates San Andres reservoir strata from Grayburg reservoir strata.
- Fractures allowed San Andres water to communicate vertically up section to form what is termed a plume of water.
- Plumes of water were easily identified by water chemistry, which identified low salinity water (<10,000 ppm) that contain sulfate.
- San Andres water in the residual oil zone (ROZ) at the Eunice Monument complex of unitized oil fields was sourced from the Southern Rocky Mountain Epeirogen west of the Sacramento Mountains.
- Field work along U.S. Highway 82 west of Artesia, New Mexico and east of the foothills of the Sacramento Mountains identified San Andres collapse breccia horizons where evaporite strata ($CaSO_4$) were dissolved by recharging meteoric water to form cave horizons that filled with collapse breccia of overlying carbonate strata.
- Dissolution of evaporite strata ($CaSO_4$) added sulfate (SO_4) to low salinity San Andres water as it recharged into the subsurface.
- Through time recharging meteoric water delivered low salinity water (<10,000 ppm) containing sulfate (SO_4) into the San Andres residual oil zone (ROZ) at EMSUB, EMSU, and AGU.

The following figures and preceding illustrations confirm the points made above.

Exhibit B-31. San Andres collapse breccia along U.S. Highway 82 near the foothills of the Sacramento Mountains, New Mexico. Meteoric recharge of low salinity (<10,000 ppm) water dissolved San Andres evaporite strata ($CaSO_4$) and formed a cavernous porosity, which caused carbonate strata forming the cave roof to collapse. Dissolved evaporite strata ($CaSO_4$) added sulfate (SO_4) to low salinity (<10,000 ppm) meteoric water as it recharged farther into the subsurface.

Exhibit B-32. EMSU R.R. Bell #4 3958 ft (-407 ft) nonporous to porous, partially oil-stained strata containing solution-widened fractures. Core is 75 ft beneath top of the San Andres. Porosity = 8.2%. Permeability = 50.4 mD. Oil saturation = 15.4%. Water saturation = 41.0%. Core width is 3 inches (7.62 cm). Left: Core is dry. Right: Core is wet. Well location is near southeast unit boundary of EMSU. Within EMSU near the up-dip pinch out of the reservoir porosity, permeability, and oil saturation decrease and eventually terminate.

Exhibit B-33. EMSU-679 San Andres swarm of vertical fractures. Some fractures are solution-widened and oil-stained, and some are simple hairline fractures. Fractures are in nonporous (tight) to porous strata along the edge of a solution pipe or sink hole. Core is 11 ft beneath top of the San Andres. Porosity = 11.4%. Permeability = 560 mD to 1,044 mD. Oil saturation = 14.5%. Water saturation = 35.4%. Note intense fracturing in less porous strata adjacent to porous, oil-stained, grain-rich strata that filled the solution pipe or sink hole. Left: core is dry. Right: core is wet. Laramide (Late Cretaceous-Early Cenozoic) reactivation of basement-cored fault blocks folded Permian strata and preferentially fractured less porous San Andres dolostone strata. Core width is 3 inches (7.62 cm).

Exhibit B-34. EMSU-679 San Andres 4335 ft (-739 ft) with less porous (gray) to more porous (beige) strata, adjacent to solution-widened fractures that are partially calcite cemented. Core is 191 ft beneath

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SELF-AFFIRMED STATEMENT OF JAMES L. BUCHWALTER

A) My name is James Buchwalter. I am over eighteen years of age, have personal knowledge of the matters addressed herein, and am competent to provide this Self-Affirmed Statement. I have not previously testified before the New Mexico Oil Conservation Division ("Division").

B) I am a reservoir engineer with 43 years of experience in the petroleum industry. I was employed at Texaco from 1981-1997. In 1998, I formed Gemini Solutions Inc. (GSI) where I have served as President from 1998 to the present.

C) I hold BS and MS degrees from Ohio State University and a PhD degree from Rice University. My degrees are in Chemical Engineering with an emphasis on reservoir engineering applications. I developed an improved compositional simulation formulation for my PhD thesis. I am a member of the Society of Petroleum Engineers (SPE), and a registered Professional Engineer in Texas. I have authored a variety of reservoir engineering papers published in SPE over the past 40+ years and co-authored the reservoir engineer book "Practical Enhanced Reservoir Engineering" published by PennWell and taught at universities.

D) At Texaco I co-developed the in-house simulator, completed simulation studies worldwide for Texaco US and international assets, and taught simulation schools.

E) In 1998, I co-founded GSI and reached an agreement with Texaco to outsource Texaco's in-house simulator and, in return, supported more than 300 Texaco users worldwide.

EXHIBIT D

migrate from the San Andres to Grayburg by adjusting the vertical permeability between zones. Without adjusting the vertical permeability of layer 8 (top of San Andres) and allowing water to move into the Grayburg, there were over 100 wells in the central portions of EMSU and AGU which produced very limited amounts of water when there was no communication between zones. By adjusting the vertical permeability based on historical production performance, a fieldwide match was obtained both on production and pressures. The San Andres pressure dropped from 1527 psi initial to 1245 psi in April 1986 as seen by pressure measurements taken when the EMSU-211 well was drilled. This indicates there is communication between the San Andres and Grayburg intervals.

2. The model produces 185 million barrels of oil and 1,842 million barrels of water as of 1/1/2024 versus 183 million barrels oil and 1,841 million barrels water historical from the EMSU, EMSU-B, and AGU, for a variance of 1% on oil and 0% on water. A key element of the study was including 435 million barrels water produced from the San Andres by the water supply wells primarily during the 1986 to 2005 period to inject into the Grayburg. As a result of communication between the San Andres and Grayburg, approximately 161 million barrels of water also entered the Grayburg through natural fractures prior to the waterflood (1/1/1986) and an additional 111 million barrels has entered since that time. Prior to 1986, the model predicts that water was entering the Grayburg at a rate of more than 16,000 BWPD due to the 676 psi pressure difference between the San Andres (1245 psi) and Grayburg (569 psi). This water supply well production from the San Andres, and migration of water from the San Andres into the Grayburg, dropped San Andres reservoir pressure. With the disposal of 570 million barrels of water by Goodnight and Rice, the San Andres reservoir pressure has now increased above original reservoir pressure in some areas. The model predicts that the rate of water influx into the Grayburg will increase from 24,000 BWPD to 46,000 BWPD by Jan-2028 and 52,000 BWPD by Jan-2033, assuming that the seven application SWD wells are not drilled. Not all of this water influx into the Grayburg will be produced unless downhole pumps are modified to handle more water. The water influx which is not produced will slowly pressure up the Grayburg. This water influx assumes in the Base Case that 220,000 BWPD is being withdrawn from the San Andres by other oil fields or migrates to pressure depleted portions of the reservoir. Migration into the Grayburg in other areas outside EMSU and AGU is likely, and losses into shallow zones near the outcrop of the San Andres could also be occurring as reservoir pressure increases. Simulation results indicate that once San Andres pressure increases above 2500 psi near EMSU, that approximately 50,000 BWPD will migrate into the Grayburg with or without the 220,000 BWPD spillover to other remote areas of the San Andres. The spillover rate only impacts the disposal rates of the wells over time as the reservoir pressures up.

K) SUMMARY OF STUDY RESULTS

1. **The San Andres is in hydraulic communication with the Grayburg through natural fractures which are most prevalent at the crestal portions of the field. Cumulative water production volumes as of 1/1/1986 prior to the waterflood were used to determine the vertical permeability necessary to match historical well performance and reservoir pressure.** To determine the degree of communication between the San Andres and Grayburg, a simulation run was made with no vertical communication between the two intervals. The 1/1/1986 modeled

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SELF-AFFIRMED STATEMENT OF ROBERT C. TRENTHAM

1. My name is Robert Craig Trentham. I am over eighteen years of age and have personal knowledge of the facts herein. I am a geologist with 44 years' experience in, or with the petroleum industry, having worked for Gulf (1980-1985), Chevron (1985-1992), Muskoka Consultants (1992-2001), and University of Texas Permian Basin, Director Center for Energy and Economic Diversification, Senior Lecturer and Research associate and Professor of Practice (2001- Present). My expertise is in reservoir characterization and Residual Oil Zones.

2. I hold a Bachelor of Science (January, 1970) and Masters of Arts (June 1976) degrees in Geology from City College of New York, and a Doctor of Geological Sciences degree from the University of Texas El Paso (August, 1981).

3. I worked in both exploration and production geology in the Permian and surrounding basins from February 1980 to April 2001. I had new field and new pool discoveries and worked on a number of well-established fields (Sand Hills, North Ward Estes, Wagon

EXHIBIT E

COMMERCIAL DEMONSTRATIONS OF OIL RECOVERY FROM RESIDUAL OIL ZONES.

Seminole Field

Since, by definition, residual oil zones are at waterflood residual oil saturation (Sorw), it is not possible to produce commercial quantities of oil from the intervals in either primary or secondary phases of production. Thus, the commercial importance has to be due solely to enhanced oil extraction. If the intervals were insignificant in thickness and/or extent, their potential contributions to oil resources would be negligible. What has become very obvious during the course of this subject study is, however, that the ROZ resources are very, very large in an aerial sense and of sufficient vertical thickness to potentially contribute billions of barrels of oil reserves to the Permian Basin. Considerable future work will be necessary to spatially map and quantify these resources.

It was not until 1999 that Hess began CO_2 Pilot tests in the ROZ, ***Exhibit D-9***. The first test flooded the Main pay and ROZ together. Although successful, the decision was made to complete a ROZ only CO_2 Pilot flood to better evaluate the ROZ potential alone. The success of the 2004 "ROZ only" flood led to the initiation of a series of "Phases" with Main Pay and ROZ floods using comingled injectors and individual producers beginning in 2007. CO_2 flood of the ROZ allowed for total field production to be maintained close to 20,000 barrels oil per day from 2008 to 2020, with current production 15,349 barrels oil per day. Over this past 16 years since Jan-2008, a total of 114,815,141 barrels oil has been produced. (***Exhibit D-10***) This project stands as proof of concept that CO_2 EOR floodable pay exists below main pays in San Andres reservoirs.

GOLDSMITH LANDRETH SAN ANDRES UNIT (GLSAU) – DETAILED STUDY OF Oil Saturation in a "Brownfield" ROZ

Legado Petroleum and later Kinder Morgan studied ROZ CO_2 EOR potential in the Goldsmith Landreth San Andres Unit (GLSAU). After recovering a number of cores as part of their CO2 EOR project in the San Andres Main Pay and ROZ in the Goldsmith Landreth Unit of the Goldsmith Field the oil saturations Legado plotted the oil saturation vs depth, ***Exhibit D-11***. The plot of the oil saturation in the re-saturated Gas Cap, waterflooded Main Pay and ROZ, confirms the conclusion that, based on the core analyses, similar oil saturations exist in an older waterflooded SADR pay, re-saturated gas cap and the Brownfield ROZ. The variation in saturations from 20 to almost 50% verifies the conclusion seen at Seminole and elsewhere that saturations in the ROZ as similar to those found in waterflooded main pays and as such are CO_2 EOR targets.

Tall Cotton Field – The First Greenfield Only ROZ Field.

Tall Cotton Field, ***Exhibit D-6***, west-central Gaines County, TX, is an example of production from a Greenfield ROZ ONLY with no associated main pay production. The nearest "Main Pay" SADR Field is the Seminole West Field ~3 miles to the east. The Seminole Field is ~9 miles to the east on the northeast corner of the Central Basin Platform. Kinder Morgan became interested in the area due to the results of the Anschutz #1 Keating (previously discussed) well, and the Read & Stevens #1-427 Charlene "Bittner Field" which IP'd for 15 BO, 5 MCF, and 55BW but produced only 138 BO before being plugged, is within a location of the CO_2 EOR project at Tall Cotton. These two wells encouraged Kinder Morgan to initiate a project of the area and develop a "classic" 5 spot vertical flood in the ROZ. Currently there are 39 producing wells and 27 injectors in the field. KM initiated CO_2 injection in Nov 2014. Production peaked at 3038 BOPD in October 2018 with 40 oil producers. The field is in the process of being sold to Atlas Energy. To date the Tall Cotton Field has produced 5,153,787 BO, 7,493,051 MCF gas. The nearest "Main Pay" SADR Field is the Seminole West Field is ~2 miles to the east.

Mother Nature's Waterflood

The RPSEA sponsored research expanded on the initial DOE/NETL work by Melzer (2006) and Advanced Resources International (2006). It has documented the evidence for, and characteristics of, ROZs below major San Andres reservoirs in the Permian Basin. There is significant anecdotal evidence for the presence of ROZs from exploration wells in "goat pasture" areas adjacent to and at distance from existing fields, in what has become known as "Greenfields." After discussions with a number of exploration and production geologists, and having viewed cores, logs and mud logs from a number of documented ROZs, some characteristics are beginning to stand out as the properties of, and evidence for, the presence of a ROZ. The rock and fluid properties are the same whether looking at Brownfield or Greenfield ROZ's. These ROZ's are now being very privately documented over wide areas of the northern Central Basin Platform (CBP) and Northwest Shelf and, with this study, on the west side of the CBP. In addition to their extensive presence in the San Andres, our study has identified the presence of ROZ's in the Abo (Wichita Albany), Lower and Upper Clearfork, Glorieta/San Angelo and Grayburg. Additionally, ROZ's are believed to be present in the basinal sand reservoirs in the Delaware Basin.

ROZ fluid properties include: overwhelmingly high water cuts (typically 'skims' of oil) during drill stem testing (DST) or attempted completions; log calculations that suggest producible hydrocarbons; mixed or changed wettabilities; hydrogen sulfide–rich waters produced in DSTs or attempted production tests; spotty oil stain/saturations near the base

produced with vertical wells. Initially, the operator will use submersible pumps to produce 500 – 2,000 barrels of fluid a day. Often the well is pumped for 30 to 60 days before the first oil is produced. The drop in pressure associated with the high volumes of water produced would result in swelling the oil and the development of a solution gas drive. Since the only way to produce economic volumes of oil is by reducing the pressure. Platang Field total Production >72,000,000 BO since 2006. *Continued injection of produced water by Goodnight into the San Andres in Empire's San Andres would render DUROZ impossible.*

Platang Field – Brushy Bill CO_2 Flood

Riley Permian, in southcentral Yoakum in the eastern portion of **Platang Field** has initiated the Brushy Bill pilot with vertical CO_2 injectors and horizontal producers in the San Andres. This is a modification of the DUROZ production method by adding vertical CO_2 injectors. As in any of the CO_2 EOR methods in the San Andres ROZ, the injection of any additional produced water into the ROZ flood interval, or beneath it would destroy the effectiveness of this classic WAG pattern of alternating CO_2 and water injection being initiated in the field, rendering the project uneconomic.

EMSU Huff-n-Puff

Empire proposed a "CO_2 Huff-n-Puff" in EMSU with vertical wells to test the concept of developing EMSU SA ROZ CO_2 Flood. Testing the San Andres ROZ with vertical Huff-n-Puff well(s) is a method used elsewhere to test the viability of a CO2 Flood in the ROZ. The success of this type of test requires Static Conditions. *Goodnight's injection of produced water would render this test invalid.* A Huff-n-Puff CO_2 test has been used to evaluate the CO_2 potential by Texaco in **Vacuum & in Slaughter Levelland Fields.**

"Bubble Up"

In the Sable Field (San Andres) in central Yoakum County, ER Operating is initiating a project with horizontal CO_2 injection wells landed deep, and producing wells shallow in the San Andres Greenfield ROZ in the ROZ and utilizing the presence of good Kv/Kh to drive the oil upward to the 9 producing wells in the upper ROZ. *Continued injection of produced water by Goodnight into the San Andres in Empire's San Andres would render a "Bubble Up" CO_2 flood impossible.*

In summary, ROZ intervals are very prevalent in the Permian Basin. *Core and log information confirms the presence of a ROZ at EMSU, EMSU-B, and AGU. Goodnight's continued injection of off lease produced water into the San Andres reservoir within and near EMSU will greatly diminish or destroy Empire's ability to employ any potential EOR*

methodology in their properties. Disposal of off lease saltwater by a 3rd party Company should be terminated inside the waterflood units where a Main Pay Zone or ROZ interval exist so that EOR processes can be properly implemented.

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SELF-AFFIRMED STATEMENT OF LAURENCE STEPHEN MELZER

1. My name is Laurence Stephen Melzer. I am working as a consulting engineer (Texas Professional Engineer #46859) with Melzer CO_2 Consulting. I have been recognized as an expert geological engineer. I was awarded a Bachelor of Science degree in Geological Engineering from Texas A&M University in May of 1968, a Masters of Engineering Degree from Purdue University in 1969 and served as a research engineer in the US Air Force for 4 years. I have conducted research in nuclear weapons effects both in the Air Force and as a civilian GS-12 for nine total years at Kirtland AFB in Albuquerque. Since June 1978 I have operated wells and conducted research into tertiary oil recovery and have had have a private consulting practice in Midland, Texas for 28 years.

2. I have not testified before as an expert witness for the Energy, Minerals and Natural Resources Department, Oil Conservation Division.

3. During the last 22 years I have directed much of my research into zones below the producing oil/water contacts (OWCs), now commonly understood to be residual oil zones or ROZs[1,2].

[1] L.S. Melzer, G.J. Koperna and V.A. Kuuskraa (2006), "The Origin and Resource Potential of Residual Oil Zones,"

EXHIBIT F

16. The public data and referenced EXHIBITS illustrate that the concept of producing ROZs beneath existing oil fields is a demonstrated, proven process and proven in over 20 different San Andres oilfields in the Permian Basin. This testimony and others amply demonstrate the existence of a thick oil-bearing zone below the MPZ identified as the EMSU San Andres ROZ.

17. I understand that this Self-Affirmed Statement will be used as written testimony in this case. I affirm that my testimony above is true and correct and is made under penalty of perjury under the laws of the State of New Mexico. My testimony is made as of the date identified next to my signature below.

18. **The evidence from the cores taken at depth in the San Andres clearly demonstrates a residual oil zone of at least 250' beneath the two EMSU units.** I believe the continued large volume water disposal within the unitized San Andres formation at the EMSU has seriously damaged the ROZ and MPZ oil recovery there. The vertical permeability profile due to the Grayburg and San Andres Kv/Kh ratios, presence of collapse breccias and vertical conductive fractures causes vertical migration. The CO_2 storage potential is being eliminated for a huge portion of the Unit. Any further injection will extend the affected area to the entire Unit and even into the Grayburg MPZ and possibly the adjoining ROZ greenfields. The broader issue of allowing water disposal into San Andres greenfield ROZ regions should be re-considered as well.

Laurence Stephen Melzer, July 31, 2024

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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. 22626 Order No. R-22869-A Commission Case No. 24123

Expert Report of: William J. Knights, P.G.

August 26, 2024

EXHIBIT G

BEFORE THE OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. E
Submitted by: Goodnight Midstream Permian, LLC
Hearing Date: September 23, 2024
Case Nos. 23614-23617, 23775,
24018 – 24020, 24025, 24123

NETHERLAND, SEWELL & ASSOCIATES, INC.

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 MMBO per section across a 250-ft gross interval or a concentration of 198 BBL of oil per acre-foot (BO/ac-ft). Extrapolating this OIP across the 14,190 developed acres in the EMSU yields 702 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 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 percent of OIP. This is approximately 13 MMBO, or 2 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 MMBO per section across a 150-ft gross interval or a concentration of 118 BO/ac-ft. Extrapolating this OIP across the 14,190 developed acres in the EMSU yields 252 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 MMBO per section across a 200-ft gross interval with a concentration of 44 BO/ac-ft. Extrapolating this OIP across the 14,190 developed acres in the EMSU yields 125 MMBBL of OIP, which is less than 25 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 1.2 MMBO per section across a 1,000-ft gross interval with a concentration of 2 BO/ac-ft. Extrapolating this OOIP across the 14,190 developed acres in the EMSU yields 26 MMBBL of OIP, which is less than 5 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 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

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REVISED SELF-AFFIRMED STATEMENT OF GALEN DILLEWYN

My name is Galen Dillewyn. I have been recognized as an expert in subsurface characterization with over 20 years of detailed petrophysical (log) analysis and saturation profile modeling work. I was awarded a Bachelor of Science degree in Chemical Engineering from Texas Tech University in May 2000. Since July 2009, I have worked as an engineer for NUTECH Energy Alliance in Houston, Texas, supporting geological, petrophysical, completion engineering and optimization, and reservoir engineering services. This includes but is not limited to exploration of new fields and plays and development of existing fields.

In the present case, NUTECH analyzed the wireline logs on 10 wells. NUTECH was selected for this work from our technical approach to characterization and that we had previously done 8 wells in the field for XTO, the previous operator of the field. The only information provided by Empire Petroleum was the raw raster images of the data. NUTECH digitized the data for analysis.

The scope of analysis was to determine reservoir quality, porosity, permeability, and saturations. **Table F-1** shows the depths analyzed and the input curves used for each analysis. For the current wells analyzed, only open hole data, data which is obtained at the time of drilling, was used. No

REVISED EXHIBIT H

Track 9 – NUSPEC™: This is a variable density display of the textural pore size distribution. The textural geometric mean (dashed curve) overlaid on the VDL is used in permeability calculation. This representation is similar to the bins produced in NMR log analysis.

Track 10 – Pore Size Distribution: The percentages of the various pores in the matrix are displayed. Clay content is brown, silt/small pores are tan, medium pores are yellow, and large pores are red. This representation is similar to the bins produced in NMR log analysis.

Track 11 – Volumetric Analysis: This track contains several curves:

- Water Saturation (Sw) is presented with a scale of 1 to -1, from left to right. With this representation for Sw, the left edge of the track corresponds to 100% water saturation and the center of the track corresponds to 0% water saturation.
- Effective porosity (PHIE) is presented as a red curve in decimal equivalent porosity units. It is scaled from 0.3 to 0 (or 0.6 to 0), and is presented across the full width of the track. Bulk Volume Water (BVW) is presented as a dark-cyan curve.
- Bulk Volume Irreducible (BVI) is the light-gray curve which is enhanced with dark-cyan shading. Free water is indicated with a light-cyan shading between BVW and BVI.
- The Free Fluid Volume is the difference between BVI and PHIE.
- The volume of hydrocarbons is indicated with black shading between PHIE and BVW.

Track 12 – Permeability: Permeability is presented in mili-Darcys with a color spectrum trending from blue to red as permeability increases. The scaling is determined from the values selected for risk ratings and depends on the basin/formation. For intervals where Shale Vision processing is utilized, the color spectrum is set to purple, indicating that SHALEPERM is being calculated in micro-Darcys.

Track 13 – "W" & In-Place: "W" is a varying textural parameter derived from irreducible water (BVI) and effective porosity (PHIE) that takes into account the "m" and "n" values in the saturation equation. ADSGAS (Adsorbed Gas), TOTGAS(Total gas) are presented in this track or Oil-In-Place based on hydrocarbon type or preference

Track 14 – Comments: Petrophysical Analyst comments on an identified zone.

Track 15 – Code: This coding provides a quick reference for the zone ratings. (See description for Track 2.) Intervals with Five flags have a code coloring of red intervals with Four flags have a code coloring of green, which intervals with Three flags have a code coloring of blue.

Track 16 – Fracture Track: Fracture Density Flags.

Track 17– Fracture Track: Gray flag to identify FIV zone and comments.

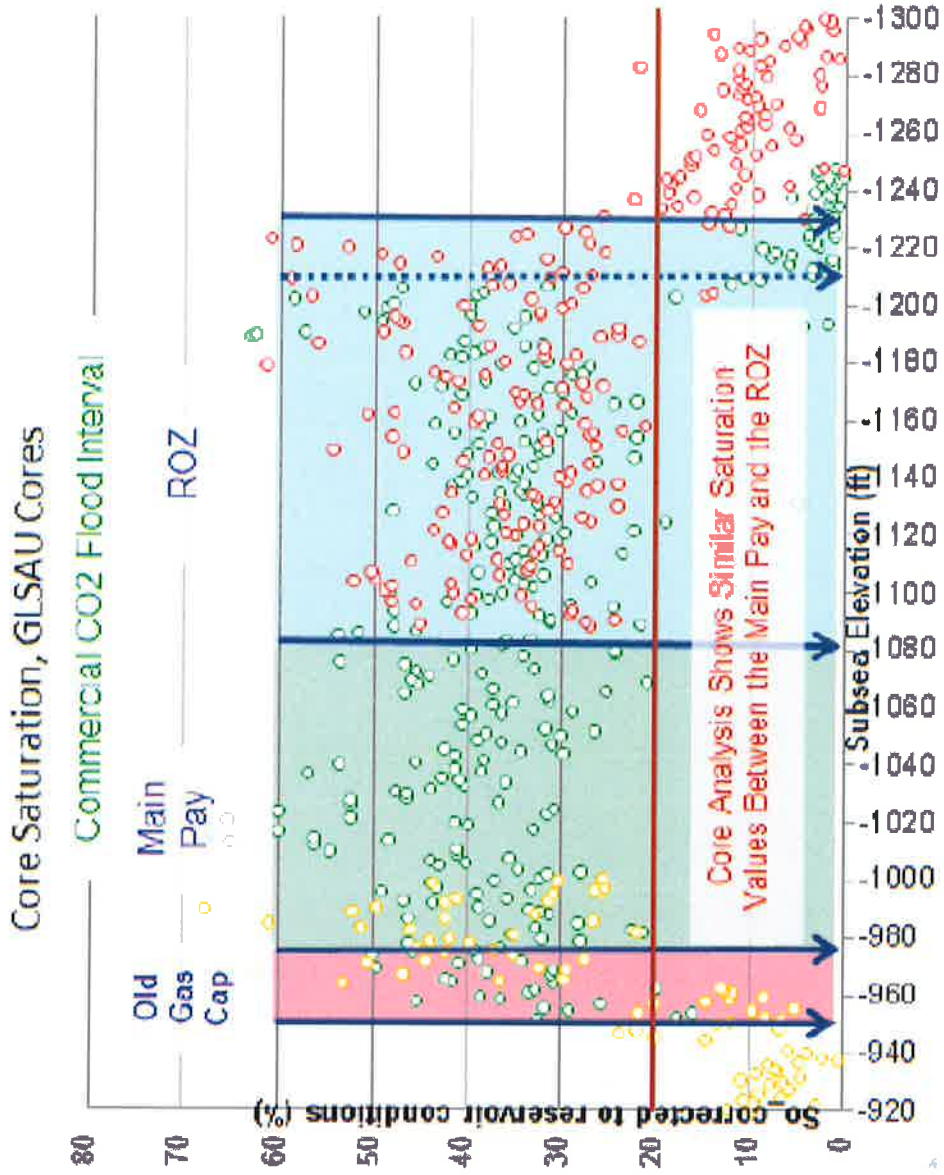
Track 18 – Fracture Track: Cumulative Fracture Height.

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 35% indicating a hydrocarbon saturation of 65%. The oil saturation varies from 65% down to 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.

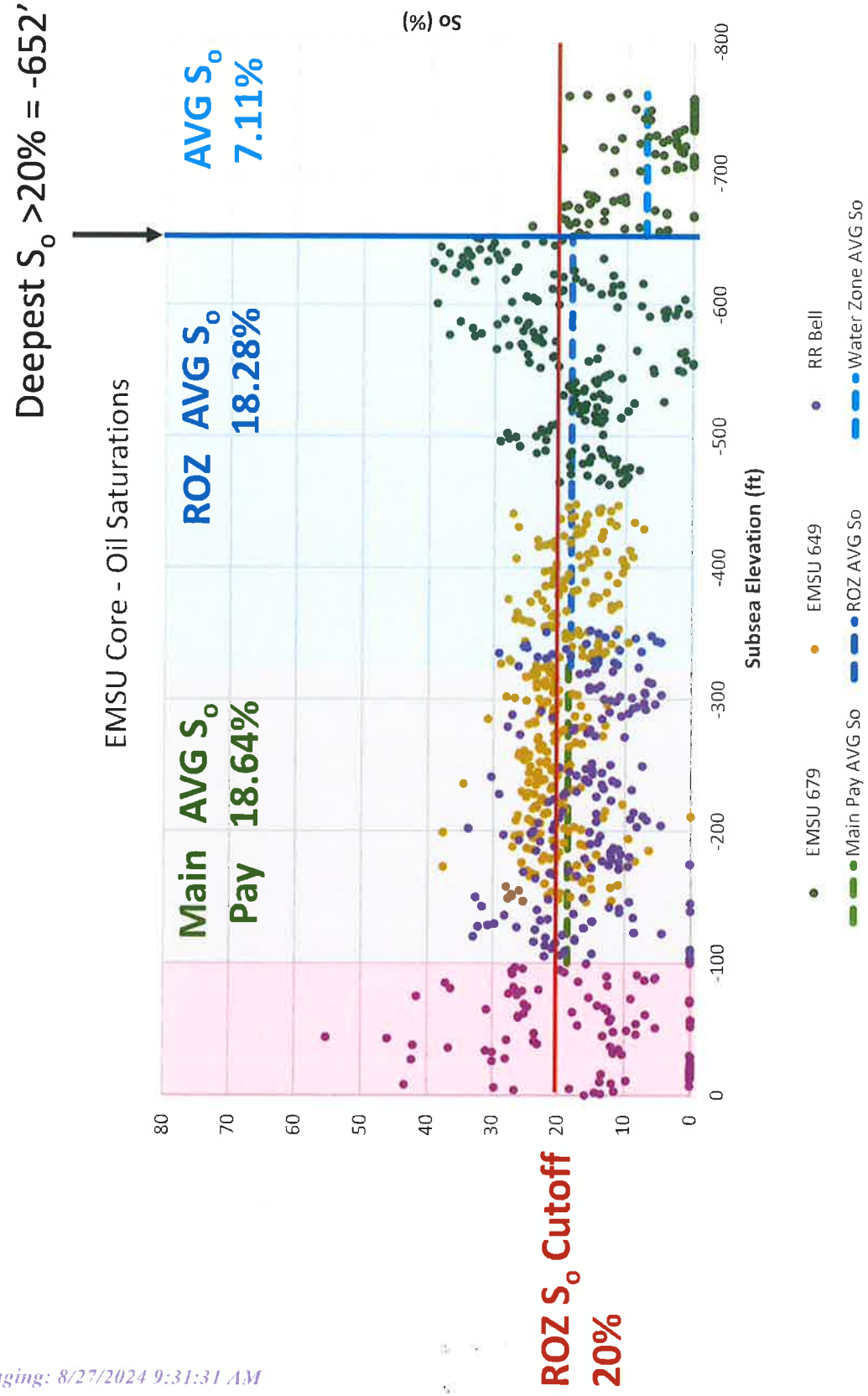
The m and n values were adjusted for this updated analysis with additional discussion in Attachment 1 at the end of this document.

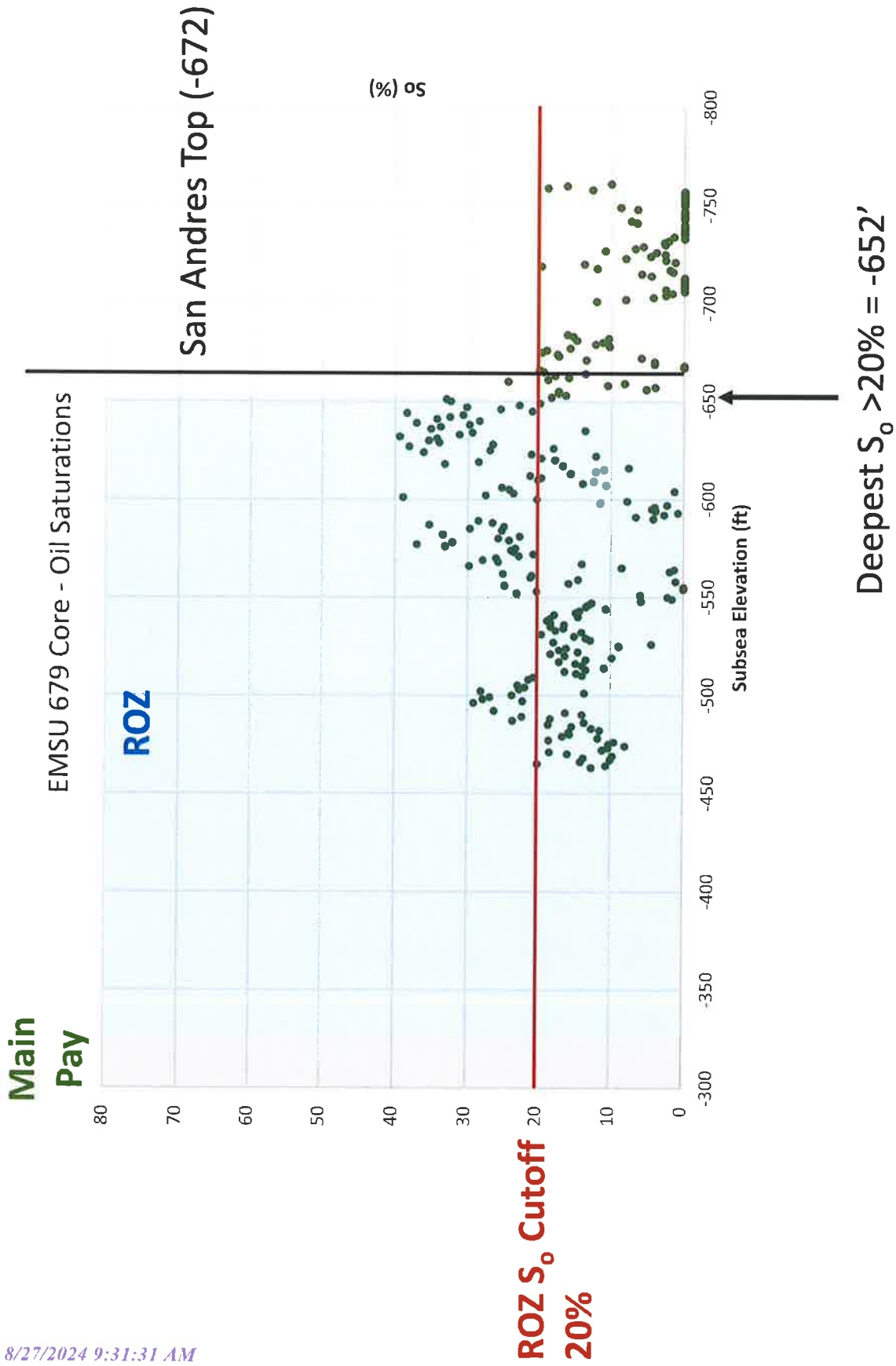
BEFORE THE OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. B-32
Submitted by: Goodnight Midstream Permian, LLC
Hearing Date: September 23, 2024
Case Nos. 23614-23617, 23775,
24018 – 24020, 24025, 24123



ROZ S_o Cutoff
20%

EXHIBIT
1


Deepest S_o >20% = -652'
EMSU Core - Oil Saturations
AVG S_o 7.11%
ROZ AVG S_o 18.28%
Main Pay AVG S_o 18.64%
ROZ S_o Cutoff 20%
So (%)
Subsea Elevation (ft)
EMSU 679
EMSU 649
RR Bell
Main Pay AVG So
ROZ AVG So
Water Zone AVG So


San Andres Top (-672)
EMSU 679 Core - Oil Saturations
So (%)
ROZ
Main Pay
Subsea Elevation (ft)
-300
-350
-400
-450
-500
-550
-600
-650
-700
-750
-800
0
10
20
30
40
50
60
70
80
ROZ So Cutoff 20%
Deepest So >20% = -652'

2

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

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

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

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

APPLICATIONS OF EMPIRE NEW MEXICO LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO. DIV. CASE NOS.

PRESTON McGUIRE
January 21, 2025
9:05 a.m. MST
VideotapedZoom Deposition
Albuquerque, New Mexico

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

TAKEN BY: ERNEST L. PADILLA
Attorney for Empire New Mexico
REPORTED BY: Shawnie Archuleta, CRR, NM CCR #298
Veritext Legal Solutions

VIDEOGRAPHER: Albert Torres
Veritext Legal Solutions

EXHIBIT J

A. And you have to do that before you can unitize the interval, is my understanding of the -- how that works.
Q. Are you a unit expert?
A. I'm not a lawyer, no.
Q. Well, as a geologist, have you ever done any unit work?
A. No.
Q. Goodnight is not a working interest in the unit, correct?
A. We are not.
Q. Can you tell me why Goodnight has asserted that Empire is injecting water for its waterflood in excess of acceptable limits?
A. Can you repeat that? Sorry.
Q. Why did Goodnight assert in this case that its wells that -- that Empire is exceeding injection pressures?
A. Well, I think it was confirmed. You're asking why did we look at that?
Q. Yes.
A. Well, it -- we were looking at the field -- at the injection wells in the field to learn about pressures in the Grayburg. And we noticed the pressures that they were injecting at were above the

permitted pressures.
Q. Was that to embarrass Empire?
A. No.
Q. Well, what business did Goodnight have in bringing that assertion?
A. Well, there was -- we wanted to understand if there was the potential that they could frac down into the San Andres compromising the barrier.
Q. Do you know what the fracture rate into the Grayburg is?
A. Yes, I do, but I don't have it off the -- at -- at hand right now.
Q. Who came up with the idea that -- to bring this before the Commission, that Empire was exceeding pressure limits?
A. I can't -- I can't recall who came up with the idea to bring it to the Commission's attention.
Q. Does Goodnight have -- if Goodnight doesn't have an interest -- a working interest in the unit and has no interest in oil and gas production in the unit, what -- why would it matter whether or not Empire is exceeding its injection limits?
A. Because it could pose the risk to the formation.
Q. Well, you're telling me that you -- you can

inject easily within the San Andres. What does it -- what does it matter?
A. Well, if the confining zone that separates the two zones was compromised by Empire, that would be important.
Q. How?
A. Because they compromised the confining zone.
Q. What confining zone -- yours or Empire's -- in the Grayburg?
A. The confining zone that separates the water management zone that's been used for disposal and water supply versus the production zone that's above it.
Q. How did Goodnight go about investigating this issue?
A. What do you mean?
Q. Well, how did it go about investigating whether or not Empire was exceeding injection rates -- injection pressures? Sorry.
A. We were reviewing the publicly filed documents of the OCD and noticed that the pressures were high and said, That seems odd. What is the permit for these wells, and noticed it was over.
Q. How much over?
A. Well, we can look at the testimony and look at

individual wells.
Q. Did you see the response that Empire filed?
A. I did.
Q. And do you agree with me that some of those pressure limits were erroneous, because they were taken at locations where the well was shut in?
A. So, I guess the question is, are the pressure measurements at the wellhead or not?
Q. No. Did you investigate whether they were all at the wellhead?
A. Well, I don't know where Empire measures the pressure. But the ethos of OCD regulation is that you're measuring tubing pressure all the time.
Q. Well, suppose it's not tubing pressure all the time. Suppose there's a valve located before -- before the wellhead. That would be an erroneous measurement, right?
A. Are you saying that Empire is not accurately measuring the tubing of their wellhead?
Q. No. I'm just asking whether or not that would be an erroneous reading if you have a reading, which is really a pipeline pressure, if the well is shut in.
A. So that was reported -- it was reported as tubing pressure.

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

SELF-AFFIRMED STATEMENT OF JACK E. WHEELER

I, Jack E. Wheeler state as follows:

1. I am over eighteen years of age and have personal knowledge of the matters stated herein. I am an Attorney working as Senior Vice President - Land and Legal for Empire Petroleum Corporation ("Empire"). I have previously testified before the New Mexico Oil Conservation Division ("Division") on matters of unitization, pooling and various other matters, and my credentials as a land and legal expert have been accepted by the Division and made a matter of record; however, I have never testified before the New Mexico Oil Conservation Commission ("Commission"). My credentials as an attorney and landman may be found in the

EXHIBIT K

EXHIBIT A-5

ExxonMobil

EMSU, EMSU B and AGU Upside Potential – Infill Drilling and ROZ

Energy lives here

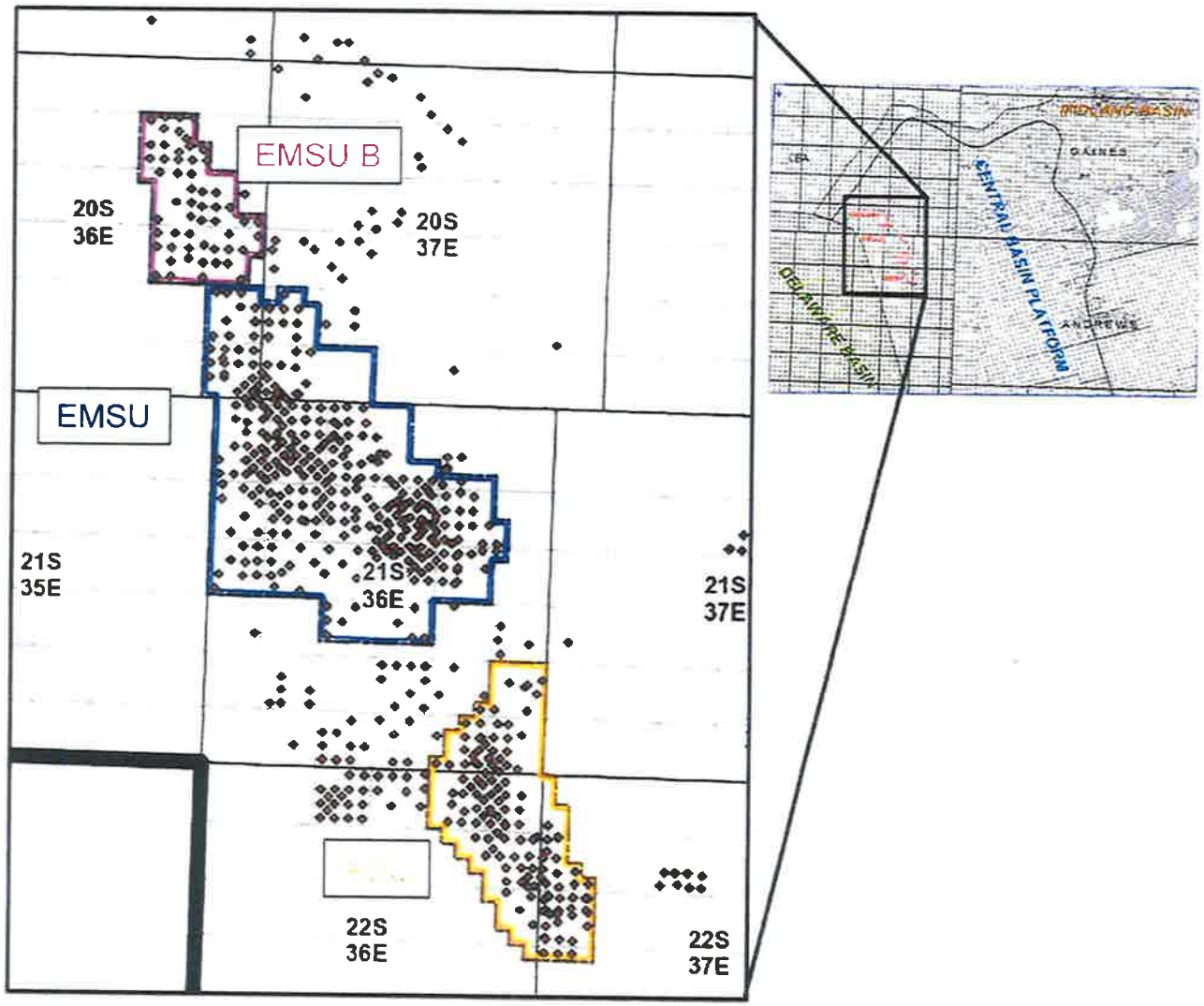
Location Map

Description

- Three existing units; EMSU, EMSU B, AGU all have infill drill well and ROZ potential
- Significant "outside leases" are also part of Eunice asset but do not contain significant contiguous ROZ acreage

Incentive

- EMSU, EMSU B and AGU have approximately 50 infill drill well locations
- EMSU, EMSU B and AGU hold a combined 23,400 ac of ROZ potential
- ROZ interval approximately 350' thick with average oil saturation of ~25%



- XTO Operated Wells

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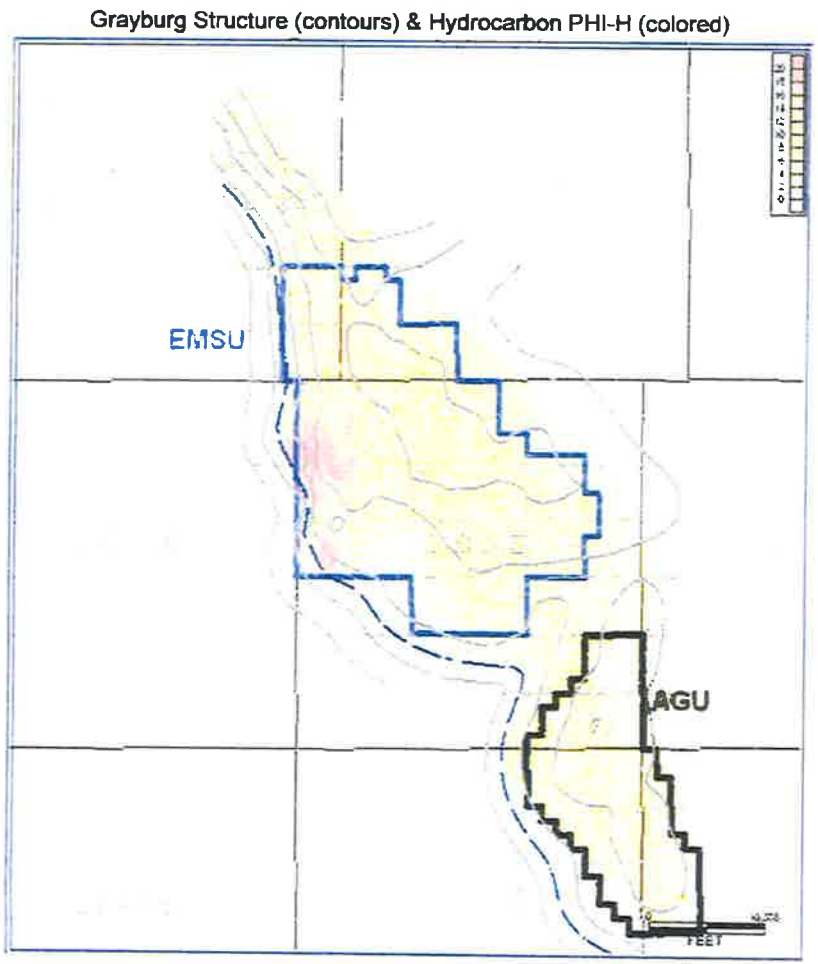
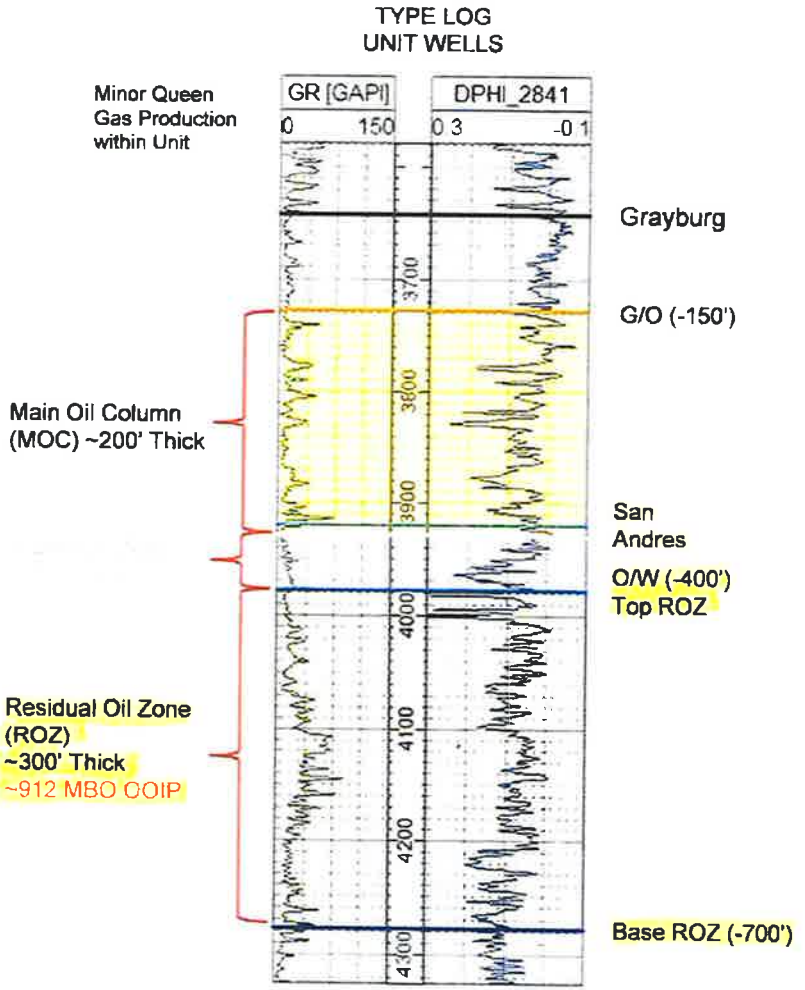
EMSU, EMSU B and AGU Grayburg Structure, PhiH (MOC) and Type Log



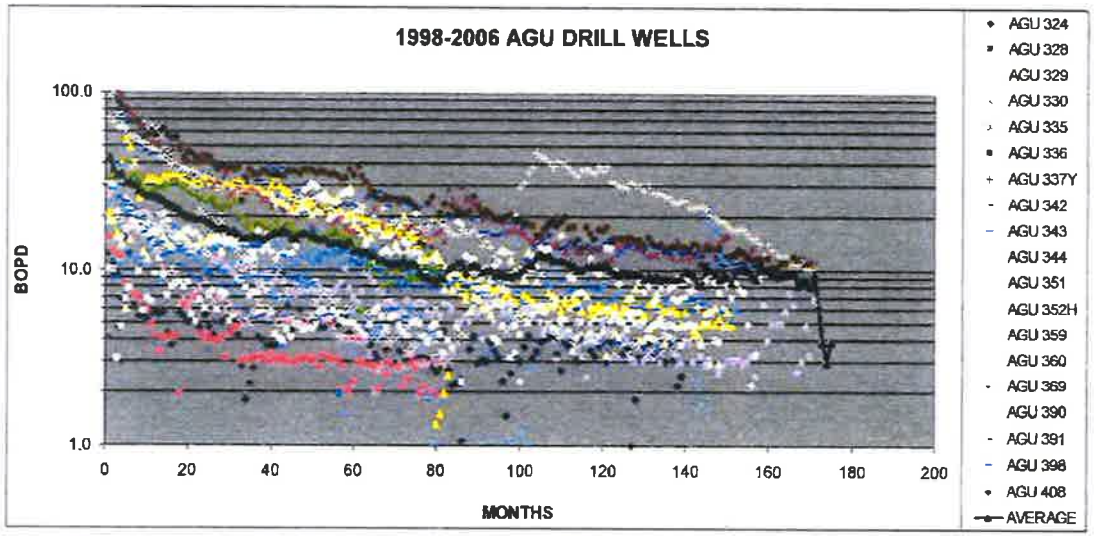


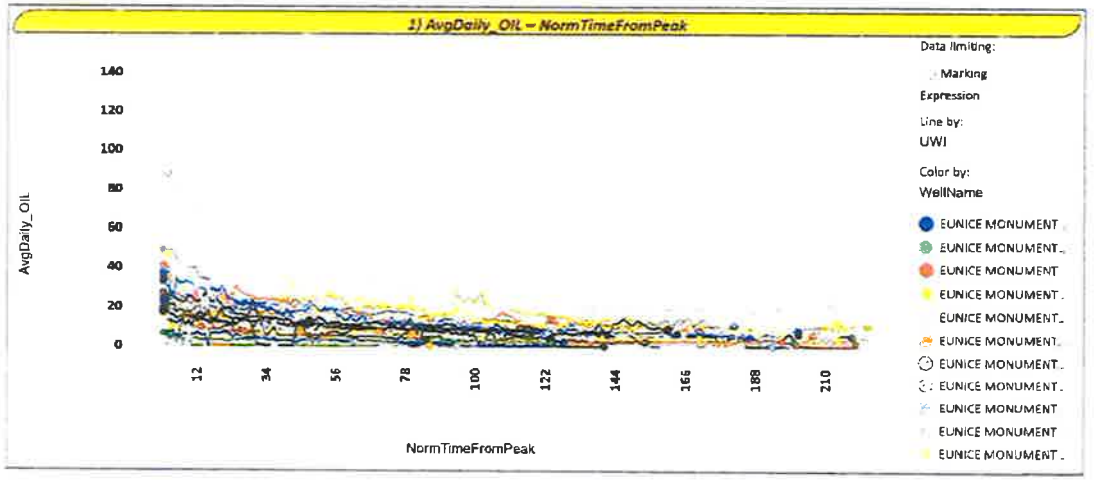
ExxonMobil

3

EMSU, EMSU B and AGU Infill Type Curve

- A series of infill wells were drilled between 1998-2006 at EMSU and AGU
- 61 in total (42 EMSU and 19 AGU)
  - 13 XTO wells drilled between 2005-2006
  - 48 Chevron wells drilled between 1998-2002
- EMSU AVG IP = 49 BOPD
- AGU AVG IP = 43 BOPD





ExxonMobil

EMSU, EMSU B, AGU and Surrounding Area Potential

Infill Potential

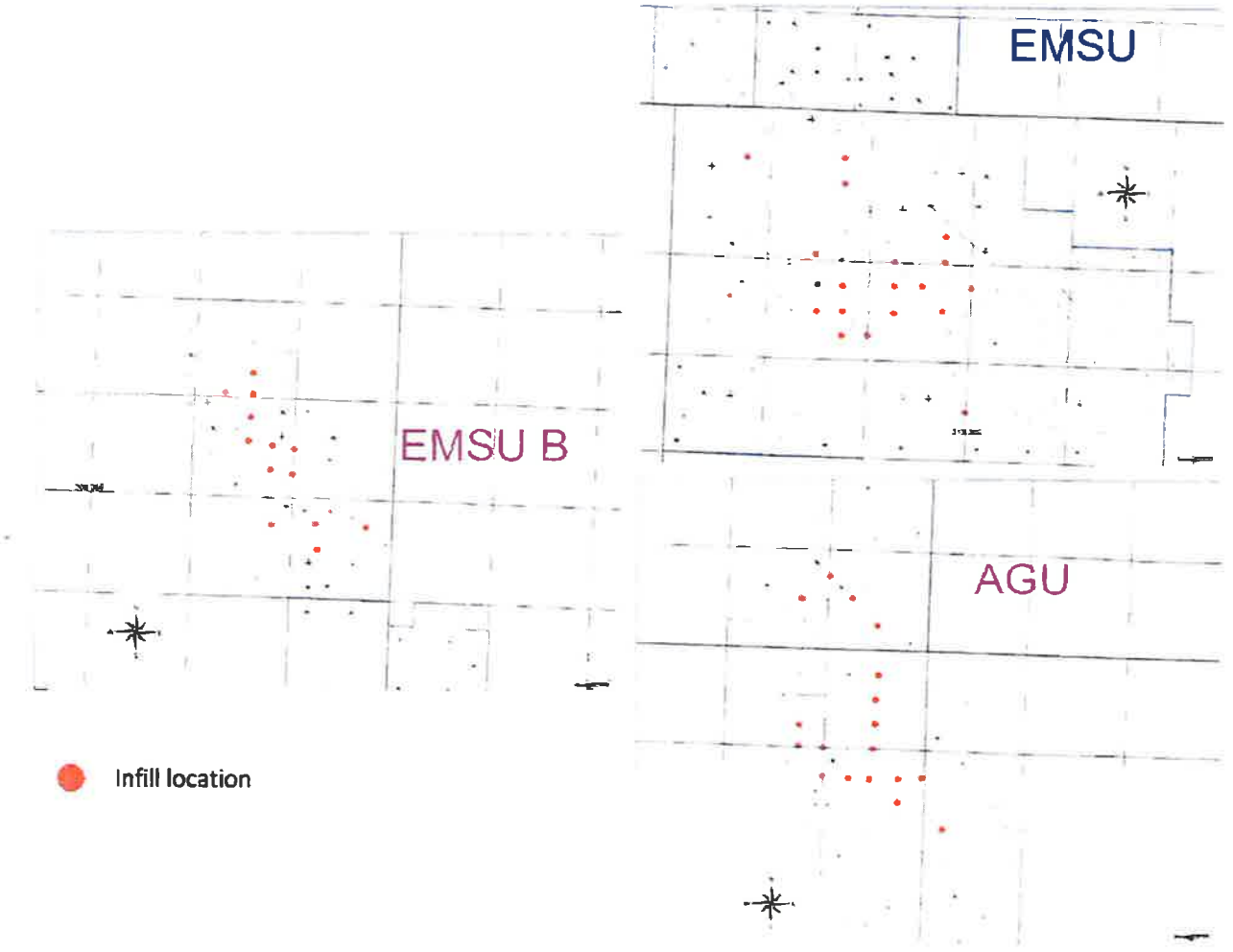
- Approximately 50 infill locations (20 acre spacing) have been identified within the three units

Returning ~40 shut-in wells to production

- An additional ~250 BOPD if wells could be repaired more cost effectively
- Evaluate shut-in wells for OAP

Optimization of water floods

- Injector conformance work: Attempt squeezing zones in the upper Grayburg previously identified with injection profile logs as being "thief" zones



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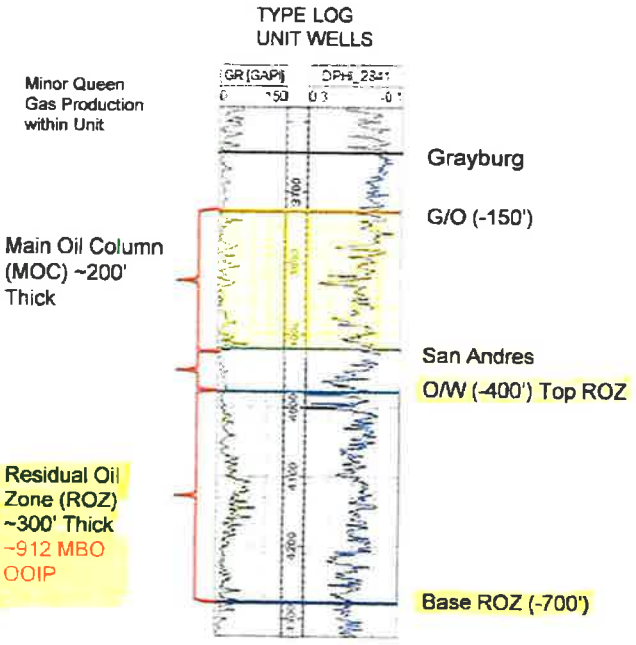
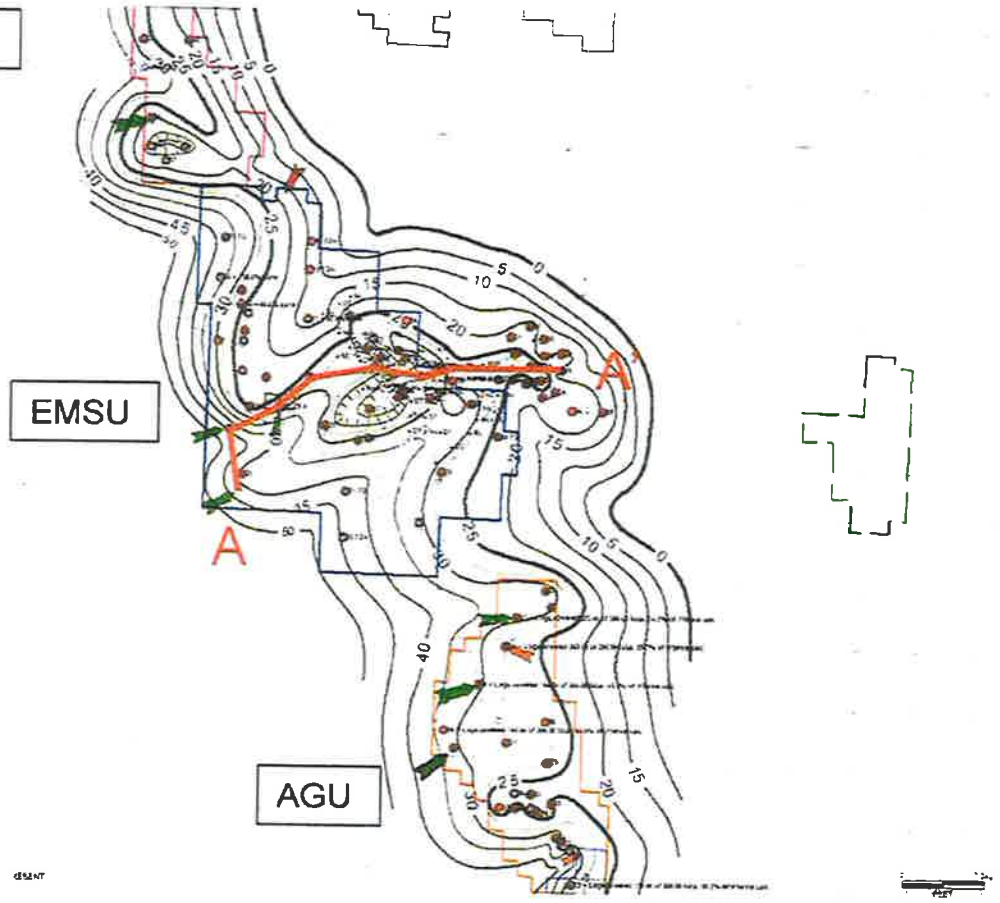
Eunice Area ROZ PhiH Map

Map Description

- Porosity Cutoff >6%
- Porosity curve calculated from RhoB using 2.84 g/cc matrix based on core matrix density
- Green arrows indicate core location
- Please note location of cross-section A – A' (see next slide)





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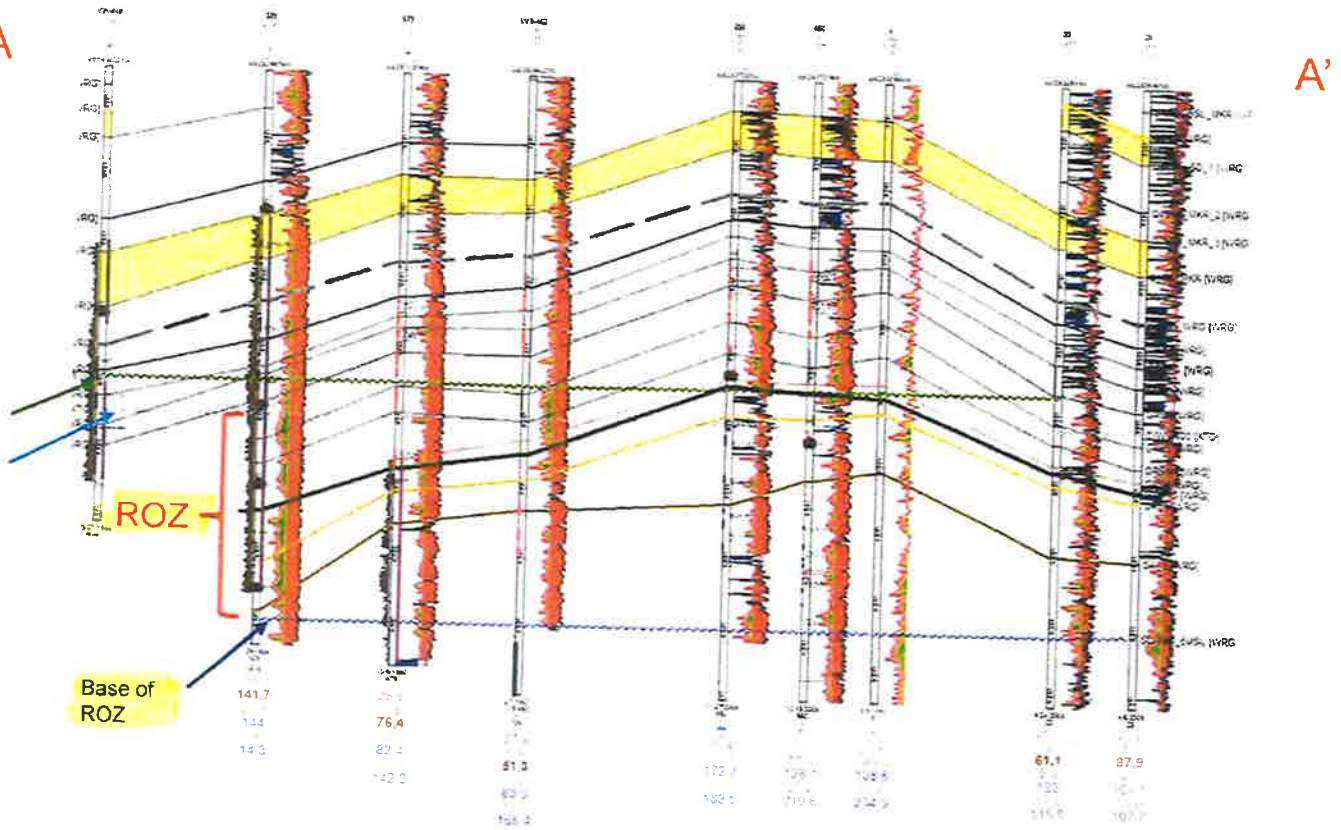
Eunice Area ROZ Cross-section

Cross-section Description

- Porosity Cutoff 6% Green Shading
- Sw < 50% Red Shading
- Core So > 5% Brown Shading
- Top of Grayburg Gray Dash
- Top of San Andres Dark Green



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